Phase 1 Palaeontological & Archaeological Impact Assessment of portion of remainder of the farm Bloemfontein 654, Bloemfontein, FS Province.

Report prepared for
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Executive Summary

- A Phase 1 Palaeontological and Archaeological Impact Assessment was carried out at a 17 ha site demarcated for commercial development on portion of remainder of the farm Bloemfontein 654 outside Bloemfontein
- The site is situated on a 17 ha dolerite outcrop next to the N1 national road going north to Winburg
- The study area is underlain by resistant Jurassic dolerites, which also determine the relief at the site. As a result of the topography, overlying Quaternary sediments (superficial, residual deposits) largely represent an erosional surface made up of well-developed, residual soils of varying depth.
- There is no evidence of intact or capped Stone Age archaeological material or Quaternary fossil remains within the confines of the affected area.
- There are no indications of prehistoric structures or rock engravings within the affected areas.
- There is also no evidence of graves, graveyards or historical structures within the confines of the affected areas.
- It is also unlikely that the proposed development will significantly impact on potentially fossil-bearing bedrock, because the site is largely underlain by igneous Jurassic dolerites.
- There are **no major archaeological or palaeontological grounds** to suspend the proposed development.
- Recommended Heritage Grading of the site: **General Protection C (Field Rating IV C).**
- **The site** has been sufficiently recorded, mapped and documented in terms of conditions necessary for a Phase 1 Palaeontological and Archaeological impact assessment and **can be accessed for development**.

Introduction

At the request of MDA Environmental Consultants in Bloemfontein, a Phase 1 Palaeontological and Archaeological Impact Assessment was carried out at a 17 ha site demarcated for commercial development on portion of remainder of the farm Bloemfontein 654 outside Bloemfontein in the Free State Province (**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 during 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.

Description of the Affected Area

Details of development and the area surveyed

Maps: 1:50 000 topographical map 2926 AA Bloemfontein

1:250 000 geological map 2926 Bloemfontein

General coordinates (**Fig. 3**): A) 29° 5'13.55"S 26°10'7.43"E

B) 29° 5'2.85"S 26°10'28.88"E

C) 29° 5'3.36"S 26°10'30.42"E

D) 29° 5'18.01"S 26°10'13.57"E

The proposed project calls for the establishment of a new commercial development situated on a 17 ha dolerite outcrop next to the N1 national road going north to Winburg (**Fig. 3 & 4**).

Geology

The geology of the Bloemfontein area has been described by Theron (1963) and Johnson (2006). It is situated within the Beaufort Group, Adelaide Subgroup (Karoo Supergroup), and is primarily represented by late Permian, Balfour Formation sedimentary rocks, which are made up of alternating and potentially fossil-bearing

sandstone and mudstone layers. The study area is underlain by resistant Jurassic dolerites, which also determine the relief at the site (**Fig. 5**). As a result of the topography, overlying Quaternary sediments (superficial, residual deposits) largely represent an erosional surface made up of well-developed, residual soils of varying depth (**Fig. 6**).

Methodology

The baseline study involved a pedestrian survey of the area. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera, were used to record pertinent data. Relevant archaeological and palaeontological information in the form of published articles, maps, field data and databases were assimilated for the report and integrated with data acquired during the on-site inspection.

Background

The local palaeontological footprint is primarily represented by Late Permian Karoo vertebrate fauna and Late Cenozoic (Quaternary) macrofossils (Broom 1909 a, b; Kitching 1977, 1995; Churchill *et al* 2000; Rossouw 1999, 2006).

The sedimentary bedrock in the region are assigned to the *Dicynodon* Assemblage Zone (AZ) (Kitching 1995; **Fig. 8**). This biozone is characterized by the presence of a distinctive and fairly common dicynodont genus. Therapsids and other vertebrate fossils from this biozone are usually found as dispersed and isolated specimens in mudrock horizons, associated with an abundance of calcareous nodules. 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.

Dolerite, in the form of dykes and sills are not palaeontologically significant and can be excluded from further consideration in the present palaeontological evaluation. It is however moderately significant form an archaeological point of view as many Stone Age quarry sites (knapping sites) are found at the foot of dolerite hills where hornfels outcrop occur as a result of contact metamorphism following the intrusion of dykes and sills.

Quaternary-age surface deposits in the region can be highly fossiliferous in places, especially those that are directly related to fluvial environments along major river courses, or near spring areas and pans. Fossil assemblages, individual specimens and fossilized hyena burrows have been found preserved in Late Pleistocene alluvial sediments of the nearby Modder River and its tributaries.

The Stone Age archaeological record of Modder River catchment west of Bloemfontein spans back to the early Middle Stone Age. Along much of the course of Modder River and its tributaries, alluvial deposits contain numerous occurrences of *in situ* Middle and Later Stone Age material eroding out of the overbank sediments. The incidence of surface scatters usually decreases away from localized areas such as alluvial contexts and dolerite-shale contact zones when stone tools largely occur as contextually derived individual finds in the open veld. Stone tools are mostly made of hornfels, a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area.

The open veld situated immediately east of the affected area forms part of the a large concentration camp established by the British Military in October 1900 during the Anglo-Boer War (Van der Bank 2001) (Dam van Trane, **Fig. 8**). People were housed in bell tents during the existence of the camp. It grew from 4704 Boer women and children in July 1901 to 6322 individuals at the end of November 1901.

Results of Survey

The foot survey indicated surprisingly little evidence of cultural material, modern or otherwise. This may be as a result of topography because the surface appears to susceptible to water erosion which most likely increases during the rainy season. In addition, the western boundary of the terrain has been severely disturbed by previous road building activities with the construction of Van Blerck Street (**Fig. 3 & 9**).

There is no evidence of intact or capped Stone Age or Quaternary fossils within the confines of the footprint. There are no indications of prehistoric structures or rock engravings within the footprint area. There is also no evidence of graves, graveyards historical structures or material older than 60 years within the confines of the footprint.

Impact Statement

Potential impacts are summarized in **Table 1**. Impact on potentially intact Stone Age archaeological remains or historical structures is considered unlikely.

The proposed development will not affect palaeontological heritage resources within the overlying Quaternary soils, due to the disturbed condition of the substrate and the absence of suitable Quaternary-aged alluvial deposits at the site. It is also unlikely that the proposed development will significantly impact on potentially fossil-bearing bedrock, because the site is underlain by igneous Jurassic dolerites.

Recommendation

Recommended Grading: General Protection C (Field Rating IV C)

There are no major archaeological or palaeontological grounds to suspend the proposed development. The site has been sufficiently recorded, mapped and documented in terms of conditions necessary for a Phase 1 heritage impact assessment and can be accessed for development.

References

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Table 1. Summary of potential impacts at the site.

Rock type / Age	Duration of Development	Overall Palaeontological significance	Overall Archaeological significance	Palaeontological Impact at site	Archaeological Impact at site
Aeolian sands, Residual soils (Quaternary)	Permanent	Low	Low	Low	Low
Dolerite Suite, *Jd* (Jurassic)	Permanent	None	Low	None	None

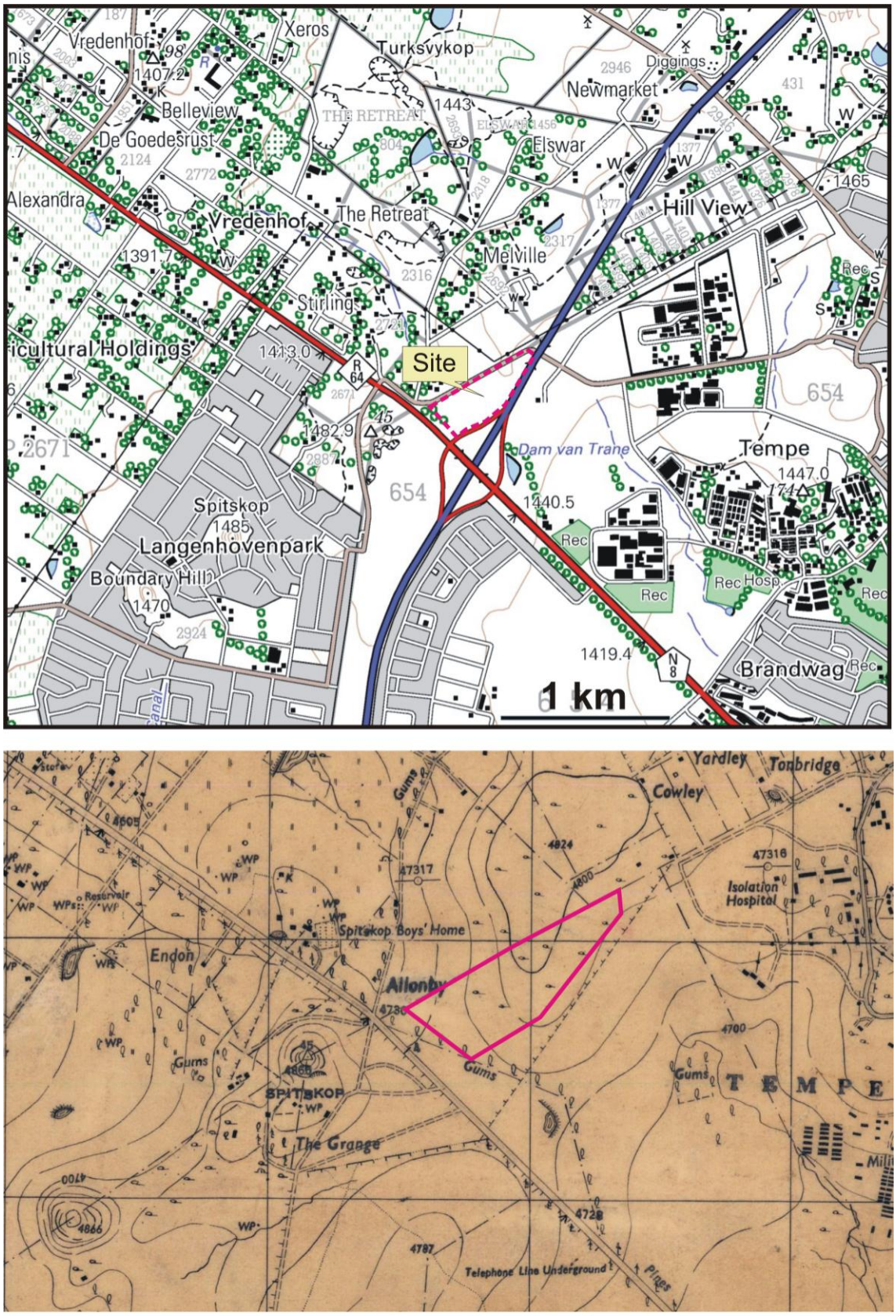

Figure 1. Portion of 1:50 000 scale topographic map 2926 AA Bloemfontein of the study area, farm Bloemfontein 654 ca. 1993 (above). Portion of 1:18 000 scale topographic map of the same area ca. 1948 (below).

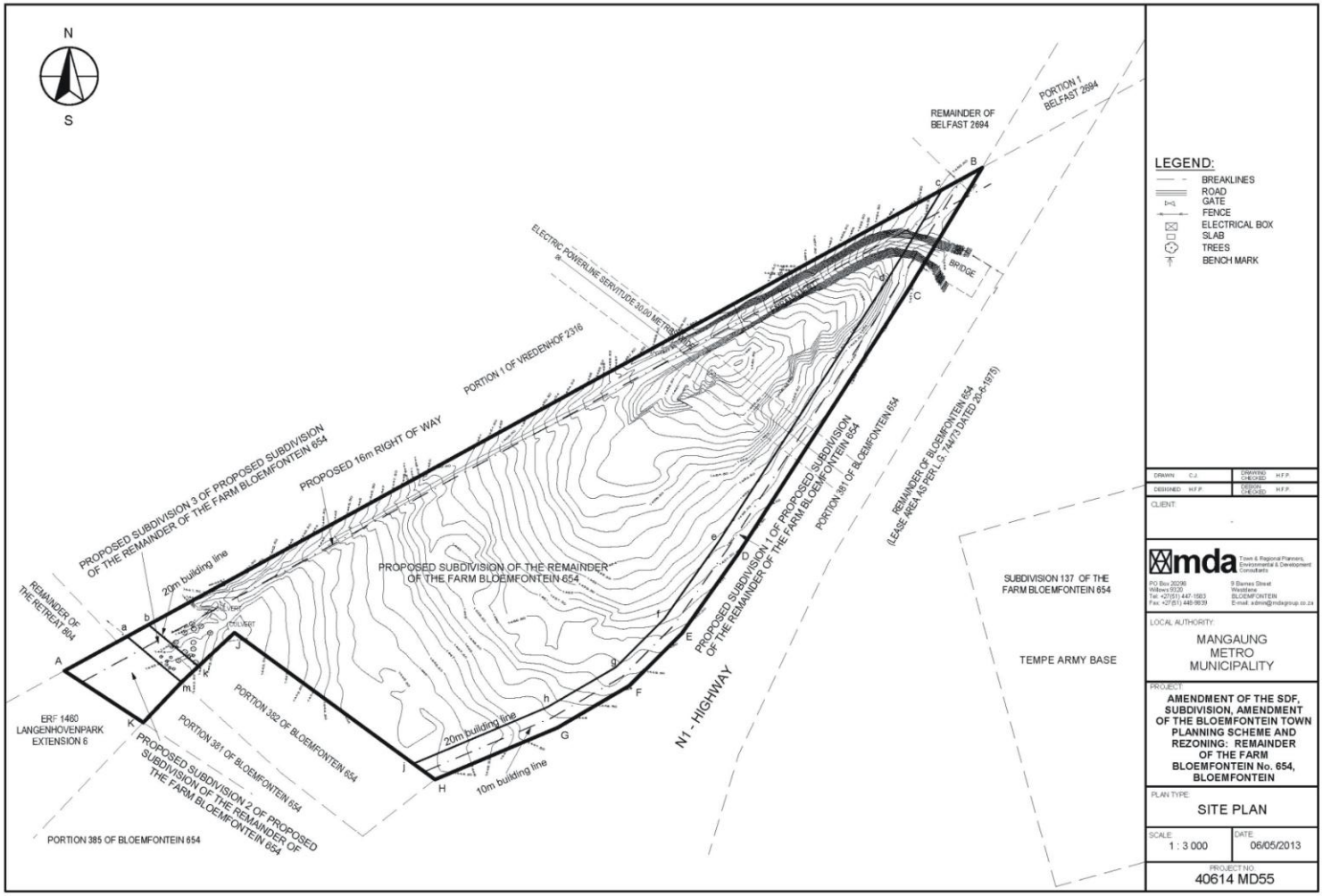

Figure 2. Layout of the proposed development.

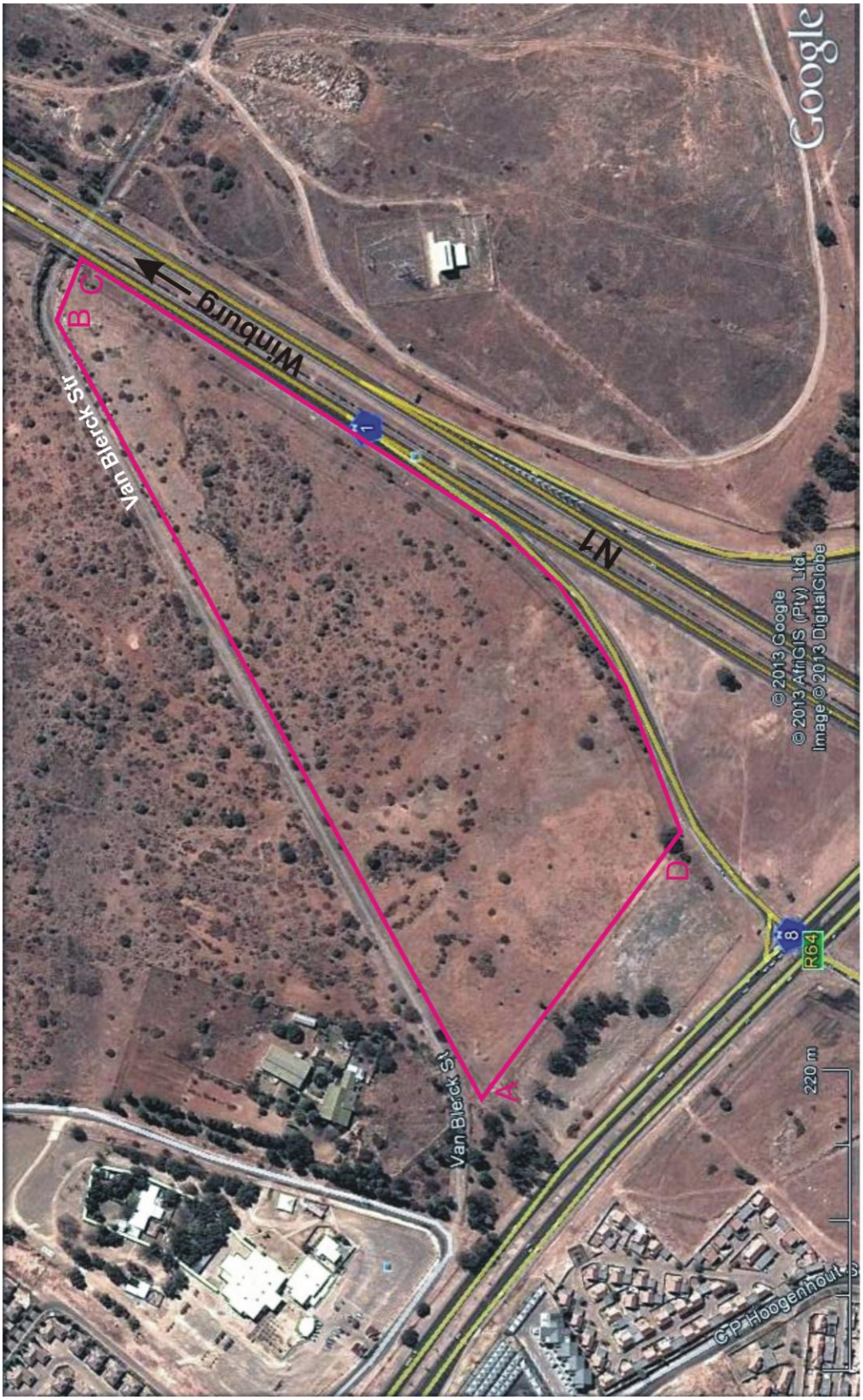

Figure 3. Aerial view of the study area.

Figure 4. Panoramic view of the terrain, looking south.

Figure 5. The study area is entirley underlain by resistant Jurassic dolerites.

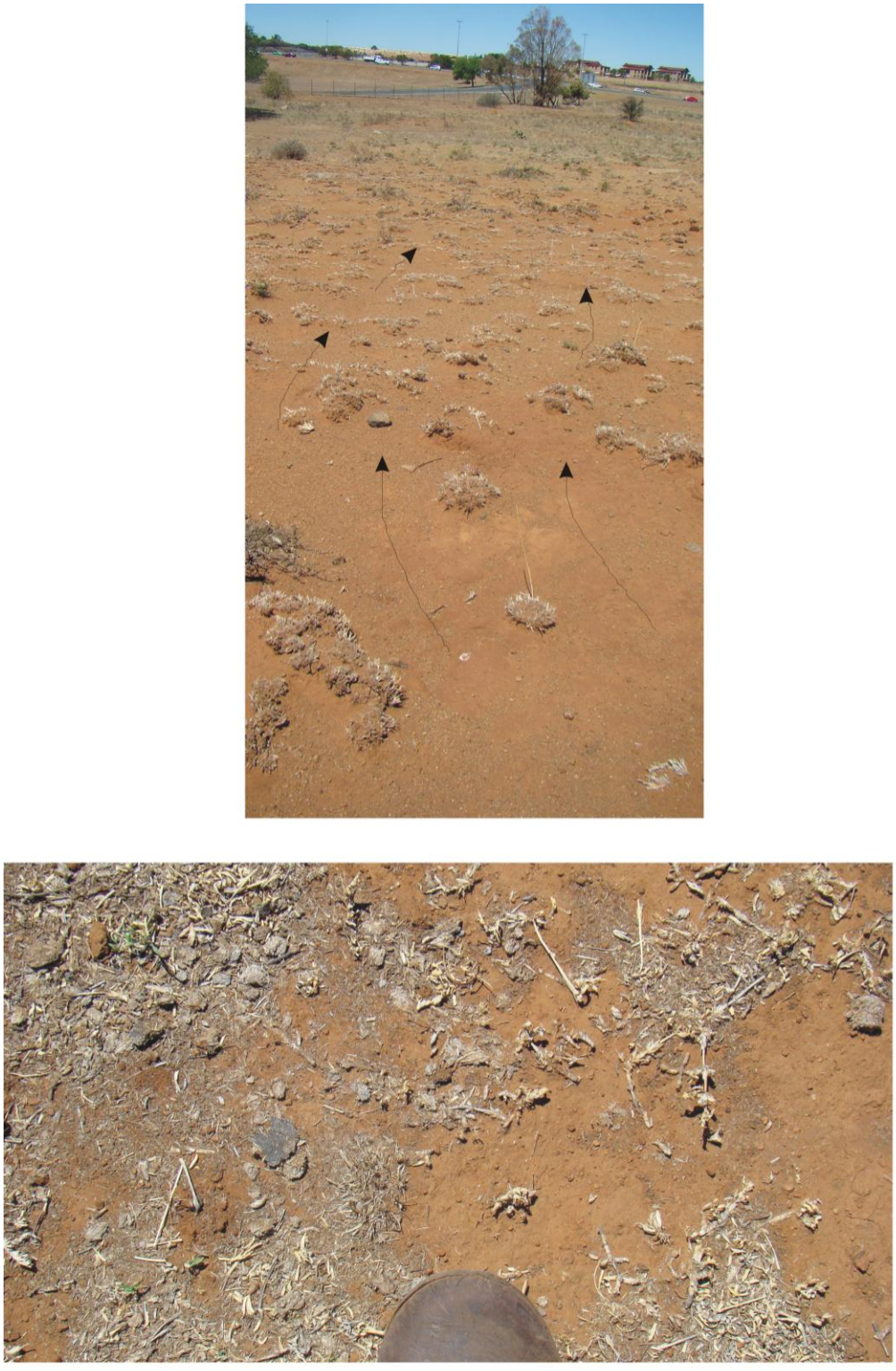

Figure 6. Superficial Quaternary deposits represent an erosional surface made up of well-developed, residual soils of varying depth.

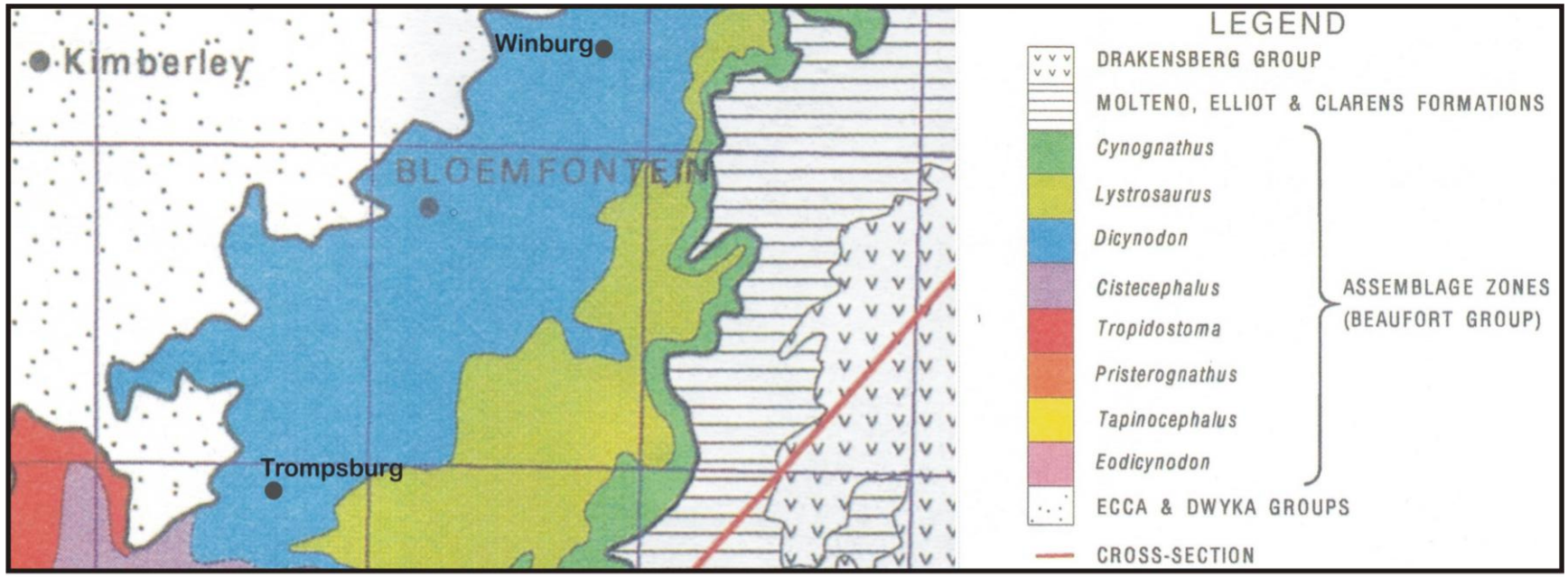

Figure 7. Geographical distribution of vertebrate biozones of the Beaufort Group around Bloemfontein (Rubidge 1995).

Figure 8. The Bloemfontein concentration camp established by the British Military in October 1900 during the Anglo-Boer War (Dam van Trane).

Figure 9. The western boundary of the terrain has been severely disturbed by previous road building activities with construction of Van Blerck Street.