

Phase 1 Palaeontological Impact Assessment of Plot 146 Bloemspruit, Bloemfontein, FS Province.

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Summary

A Phase 1 Palaeontological Impact Assessment was carried out on a 3.5 ha plot of land in Bloemspruit, Bloemfontein as a prerequisite for proposed residential development. The site is underlain by palaeontologically significant rocks that are for the most part buffered by a well-developed superficial overburden. It is therefore considered unlikely that intact fossil material from potentially fossil-bearing bedrock sediments will be impacted by the proposed development. However, it is advised that any excavations into fresh bedrock exceeding >1m depths x 1000 m² surface areas will require palaeontological monitoring for the duration of the activity. It is also considered unlikely that the proposed development will affect potential fossil remains within the overlying Quaternary soils due to the disturbed condition of the substrate and the absence of alluvial deposits at the site. The probability of palaeontological impact on superficial sediments at Plot 146 is regarded as improbable.

Introduction

The report is a final assessment of potential palaeontological impact with regard to proposed residential development on Plot 146, Bloemspruit in Bloemfontein, Free State Province (**Fig. 1**). A palaeontological impact assessment is required as a prerequisite for new development where *any development or other activity which will change the character of the site exceeding 5000 m² in extent*, is involved (National Heritage Resources Act 25 of 1999, Section 38). A site visit and subsequent assessment took place in October 2016. 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. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant paleontological information, aerial photographs (incl. Google Earth) and site records were consulted and integrated with data acquired during the on-site inspection.

Locality data

1:50 000 scale topographic map 2926AB Maselspoort

1:250 000 scale geological map 2826 Bloemfontein

Site coordinates:

A) 29° 7'58.78"S 26°16'45.92"E

B) 29° 8'0.49"S 26°16'52.65"E

C) 29° 8'7.03"S 26°16'50.04"E

D) 29° 8'5.63"S 26°16'43.69"E

Plot 146 covers 3.5 ha and is situated on flat and degraded terrain (**Fig. 2 & 3**) on the corner of Kendall and Voorspoed Street in Bloemspruit (Farm Bloemspruit B 2232). The site is located about 2.3 km south of the N8 national road and 2km east of the M10 bypass.

Palaeontological Background

The geology of the region has been described by Theron (1963) and Johnson (2006). It is situated within the Adelaide Subgroup (Beaufort Group, Karoo Supergroup), which is represented by late Permian sedimentary rocks, including alternating sandstone and mudstone layers (*Pa*) (**Fig. 4**). Superficial deposits consist of alluvium and shallow to well-developed, agricultural soils of varying depth. The palaeontological footprint around Bloemfontein is primarily represented by Late Permian Karoo vertebrate fauna from the Adelaide subgroup and late Quaternary mammalian fossils from floodplain deposits that are often associated with intact Middle Stone Age artefact assemblages. According to the SAHRIS Palaeo-sensitivity map the site is located within an area considered to be of high palaeontological sensitivity, because of the potentially fossil-bearing rocks underlying the area (**Fig. 5**). The origin of these rocks is associated with stream deposits consisting of floodplain mudstones and subordinate, lenticular channel sandstones. They are assigned to the *Dicynodon* Assemblage Zone, a biozone which is characterized by the presence of a distinctive and fairly common dicynodont genus (**Fig. 6 & 7**). Several sites have been recorded to the east of Bloemfontein (**Fig. 8**). Alluvial deposits of the nearby Modder River and its tributaries north and east of Bloemspruit, are associated with abundant Quaternary mammalian fossils representing several extinct ungulates including *Equus capensis*, *E lylei*, *Megalotragus priscus*, *Pelorovis antiquus* and *Antidorcas bondi* (Broom 1909a, 1909b, Churchill *et al* 2000; Rossouw 2000; 2006).

Field Assessment

The site is completely capped by younger, superficial deposits of Quaternary age. Outcrop visibility is hampered by the well-developed Quaternary overburden and a general lack of topographical relief in the area (**Fig. 9**).

Impact Statement & Recommendation

The bedrock sediments at Plot 146 are for the most part buffered by a well-developed superficial overburden. It is therefore considered unlikely that intact fossil material from potentially fossil-bearing bedrock sediments will be impacted by the proposed development. However, it is advised that any excavations into fresh bedrock exceeding >1m depths x 1000 m² surface areas will require palaeontological monitoring for the duration of the activity. It is considered unlikely that the proposed development will affect potential fossil remains within the overlying Quaternary soils due to the disturbed condition of the substrate and the absence of alluvial deposits at the site. The probability of palaeontological impact on superficial sediments at Plot 146 is regarded as improbable.

References

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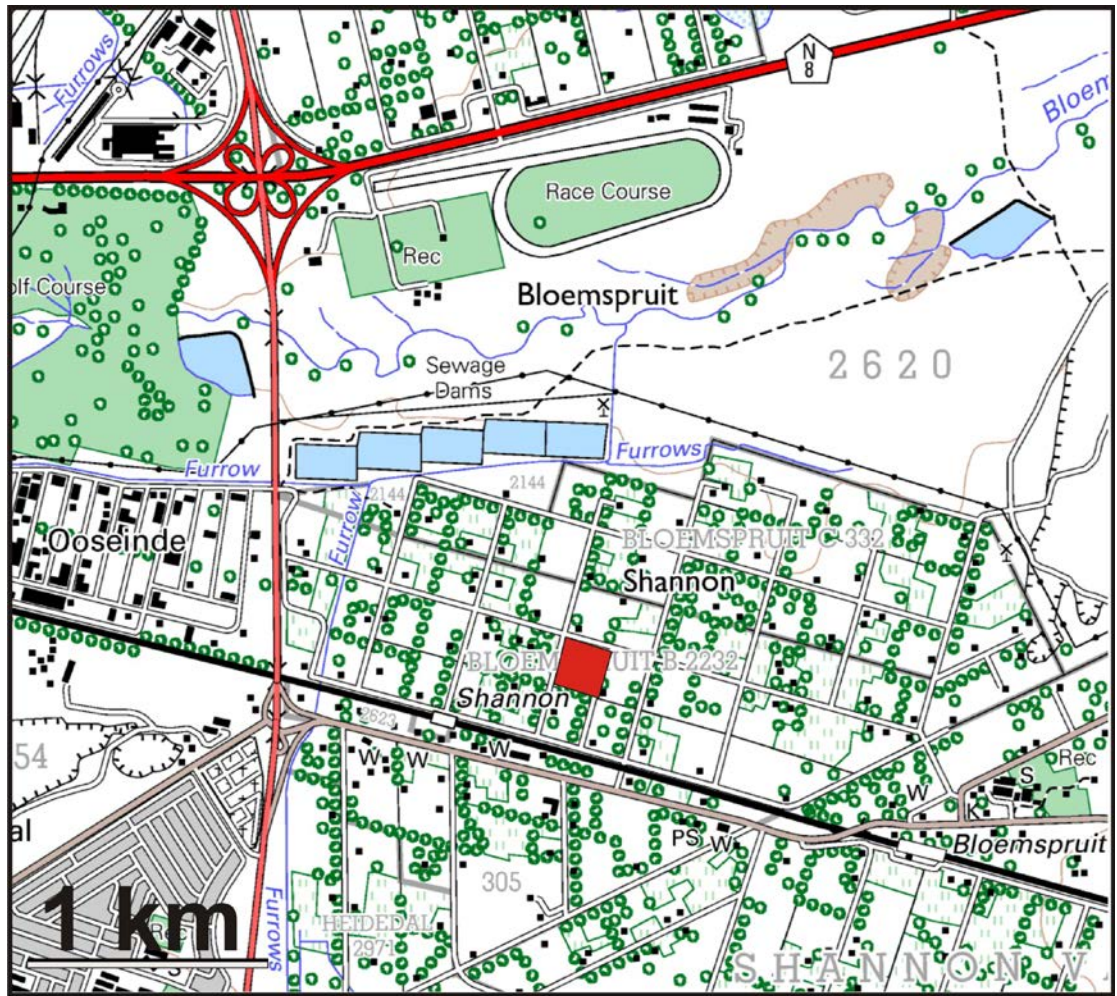


Figure 1. Location of Plot 146, Bloemspruit, marked on portion of 1:50 000 scale topographic map 2926 AB Maselspoort.



Figure 2. Aerial view of Plot 146.



Figure 3. General view of Plot 146, looking east.

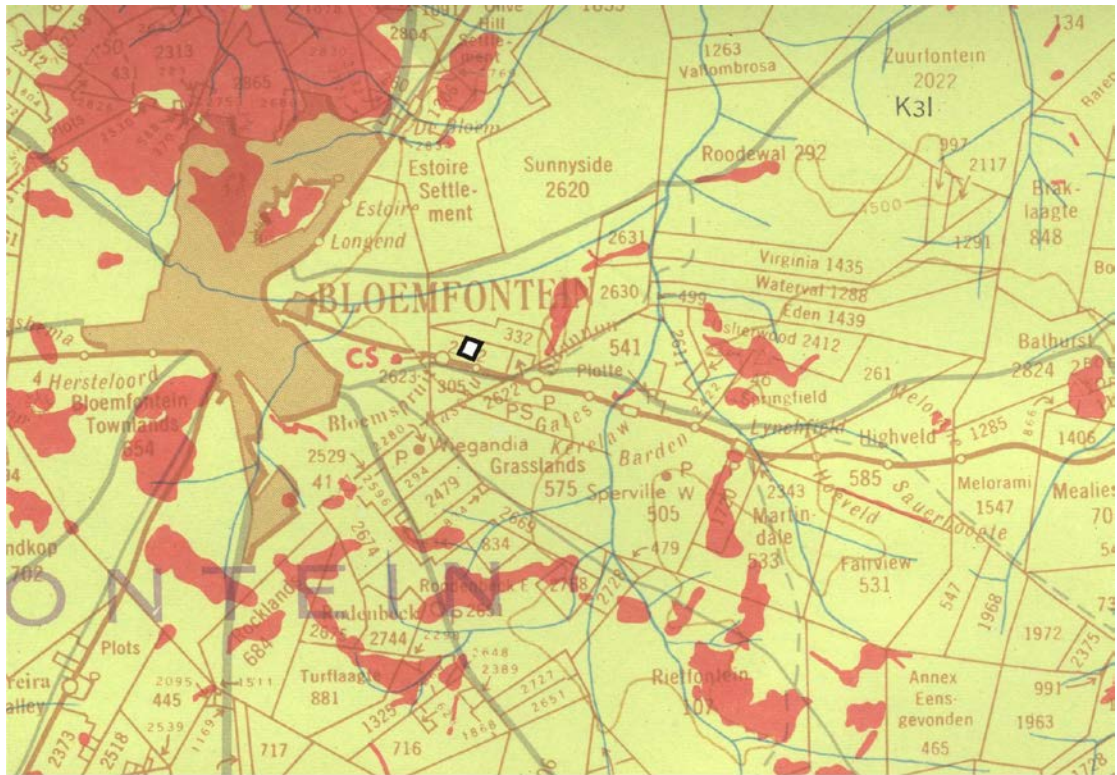


Figure 4. Portion of the 1:250 000 scale geological map Bloemfontein 2926. The site (white square) is situated within the Beaufort Group, Adelaide Subgroup, which is represented by late Permian sedimentary rocks, made up of alternating sandstone and mudstone layers (green area). Intrusive Jurassic dolerites are (Karoo Dolerite Suite) shown in red. Surface (superficial) sediments are primarily made up of alluvium, aeolian sands and residual soils(not shown on map).

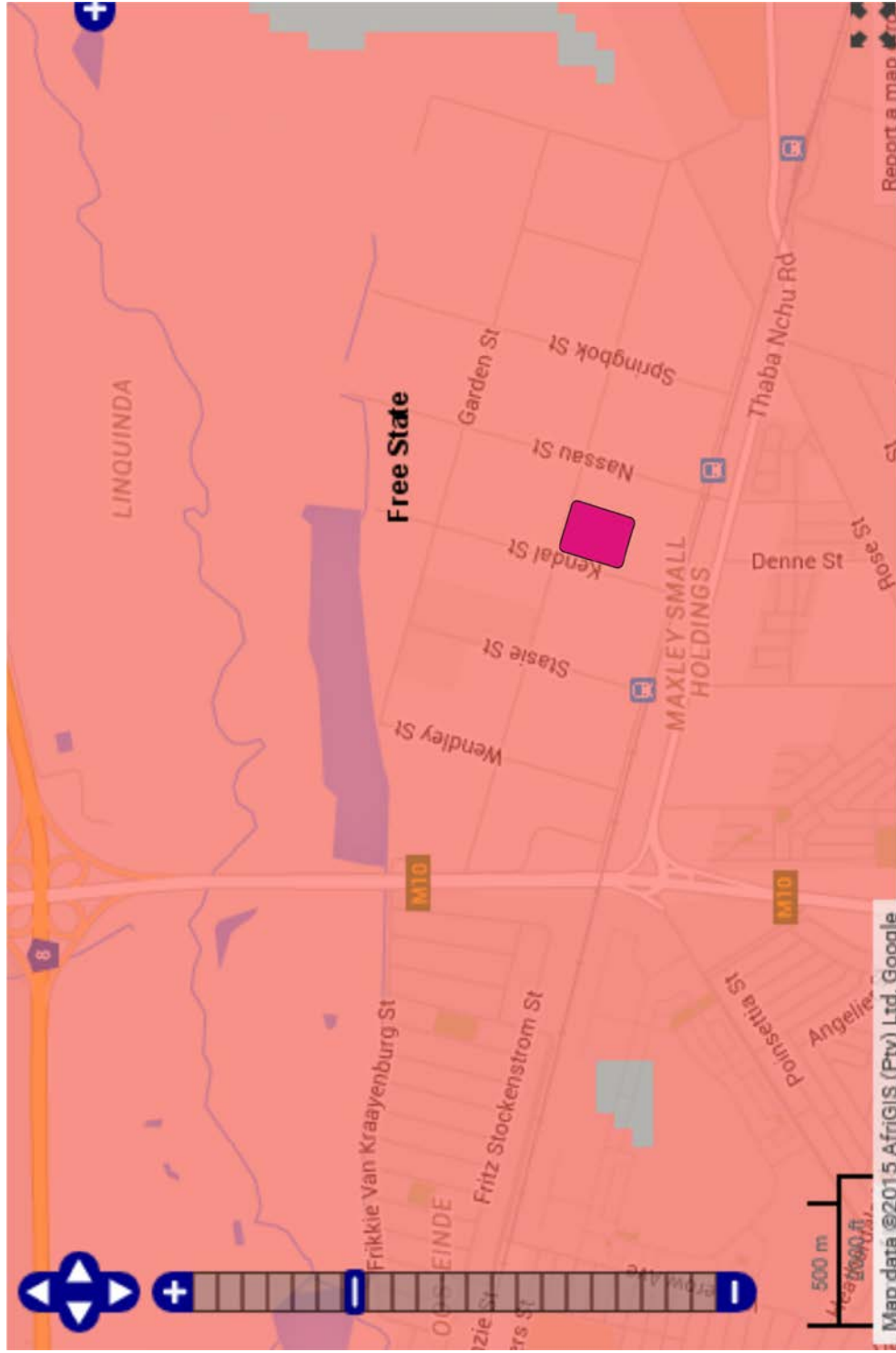


Figure 5. Distribution of palaeontologically sensitive sediments in the vicinity of

Plot 146 (square) according to the SAHRIS Palaeontological Sensitivity

Map. Red area = high sensitivity. Grey area = low sensitivity.

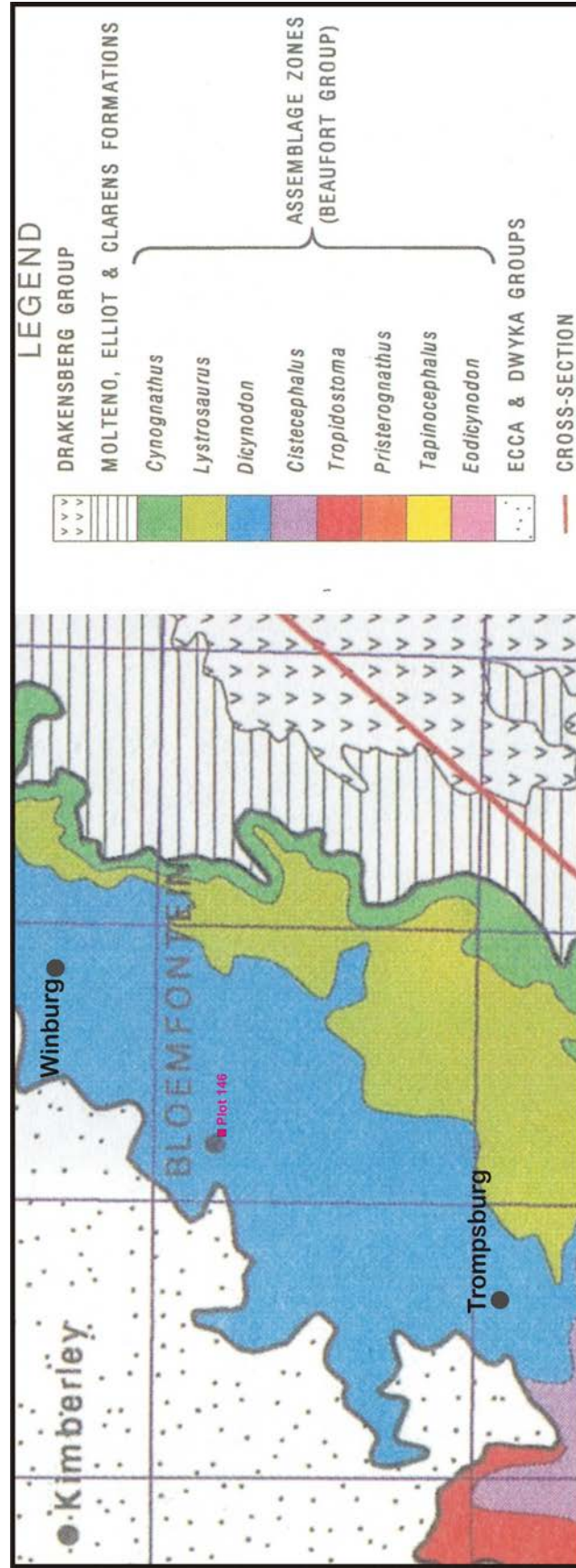


Figure 6. Geographical distribution of vertebrate biozones of the Beaufort Group around Bloemfontein (map after Rubidge 1995).

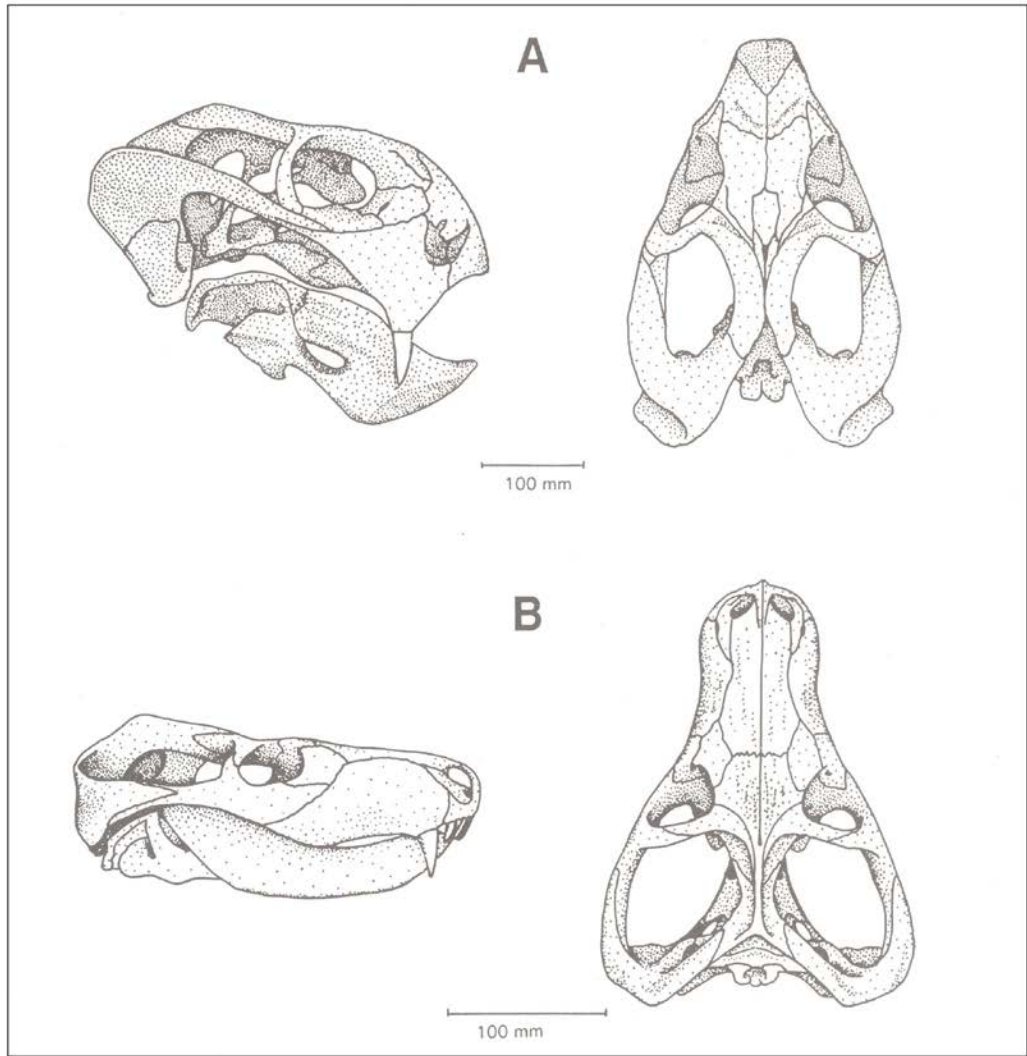
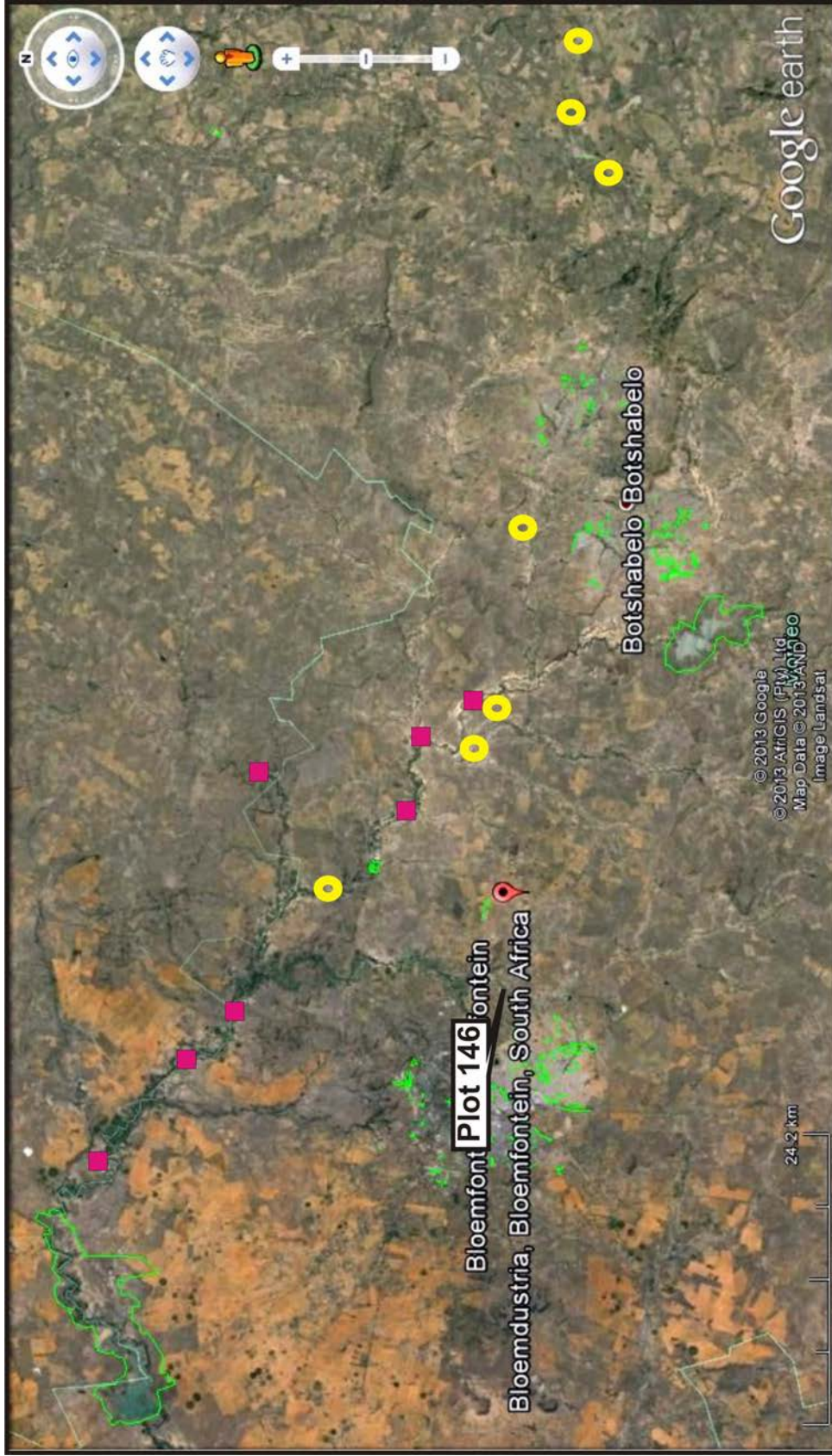


Figure 7 Lateral and dorsal views of biozone-defining fossils of the Dicynodon AZ (from Kitching 1995).



○ Karoo vertebrate fossil locality

■ Quaternary fossil/Stone Age locality

Figure 8. Locality map of fossil and Stone Age archaeological sites in the vicinity of the affected area.



Figure 9. Excavation showing part of a section through the superficial overburden at Plot 146.