

# **Phase 1 Heritage Impact Assessment of a proposed new sandstone quarry in Zastron, Free State Province.**

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## Summary

A phase 1 Heritage Impact Assessment was carried out for the development of a proposed new sandstone quarry in Zastron, Free State Province. The site is underlain by Molteno Formation sandstones that are horizontally exposed along a north-facing pavement where no potentially fossil-bearing, argillaceous or conglomeritic structures were observed. The site is also regarded as of low palaeontological significance with regards to the superficial residual soils capping the sandstone in places (Quaternary overburden). This is mainly due to a lack of suitable alluvial/fluvial deposits at the site. As far as the palaeontological heritage is concerned, the development can proceed, provided that the development allows for monitoring on a regular basis by a professional palaeontologist. A professional palaeontologist should be appointed to check for potential fossil exposure in unweathered/fresh sedimentary bedrock. The palaeontologist must apply for a valid collection / removal permit from SAHRA if fossil material is found during the operational phase of the development. The terrain has severely disturbed by informal residential development and associated human activities. There is no evidence of intact Stone Age archaeological material, distributed as surface scatters on the landscape. There are also no indications of rock art, prehistoric structures or related Iron Age remains, above-ground signs of graves or historical buildings older than 60 years within the boundaries of the study area. As far as the archaeological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint. The terrain in general is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (GP.C).

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## Introduction

A phase 1 Heritage Impact Assessment was carried out for the development of a proposed new sandstone quarry in Zastron, 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 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 in the area to be developed, and that make recommendations for protection or mitigation of the impact of such 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 relevant to the proposed development are listed in Section 34 (1), Section 35 (4), Section 36 (3) and Section 38 (1) of the NHR Act and are as follows:

34. (1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

35 (4) No person may, without a permit issued by the responsible heritage resources authority—

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- *b*) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

36 (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- 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).

### Terms of Reference

The task involved the following:

- 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 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. Maps and aerial photographs (incl. Google Earth) were consulted and integrated with data acquired during the on-site inspection.

### Field Rating

Site significance classification standards prescribed by SAHRA (2005) were used to indicate overall significance and mitigation procedures where relevant (**Table 1**).

## **Locality Data**

The affected area covers 5 ha of undulated rocky grassland on the eastern outskirts of the Matlakeng township in Zastron (**Fig. 2 & 3**).

Maps: 1:50 000 topographical map 3027AC Zastron

1:250 000 geological map 3028 Harrismith

Site Coordinates:

A) 30°17'46.41"S 27° 7'1.38"E

B) 30°17'52.10"S 27° 7'6.36"E

C) 30°17'54.92"S 27° 7'2.92"E

D) 30°17'54.65"S 27° 6'56.92"E

E) 30°17'50.07"S 27° 6'57.14"E

## **Background**

The geology of the area around Zastron has been described by Bruce and Kruger (1983) and is made up of Mesozoic Molteno Formation sandstones and mudstones (Beaufort Group, Karoo Supergroup) and intrusive dolerites (Karoo Dolerite Suite). Superficial deposits consist of Quaternary aged valley fill, alluvial sediments and residual soils.

### **Karoo Fossils**

The sedimentary bedrock in the region is assigned to the *Cynognathus* Assemblage Zone (AZ) where it occupies the upper two-thirds of the Burgersdorp Formation of the Tarkastad Subgroup of the Beaufort Group. (Kitching 1995; **Fig. 4**). This biozone is characterized by the presence of the marker taxa *Cynognathus*, *Diademodon* and *Kannemeyeria* and the absence of *Lystrosaurus* (**Fig. 5**). The overlying Molteno Formation has not as yet yielded any tetrapods (Kitching 1995). Plant fossils include *Dadoxylon* and *Dicroidium*. Several fossil localities have been recorded around Aliwal North (where fossil remains of *Howesia* and *Euperkeria* were discovered) and

between Aliwal North and Rouxville, as well as at Beestekraal (**Fig. 6 & 7**). Plant fossils are particularly abundant in the Molteno Formation with various species of the seed fern *Dicroidium* making up the bulk of the plant fossils (Anderson & Anderson 1985; Johnson *et al.* 2006).

### **Karoo Dolerites**

Dolerite (Jd), 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 from an archaeological point of view as many Stone Age quarry sites (“factory” sites) are found at the foot of dolerite hills where hornfels or other metasediment outcrop occur as a result of contact metamorphism following the intrusion of dykes and sills.

### **Late Cenozoic Deposits**

The archaeological footprint in the region is primarily represented by Stone Age localities and rock art sites, early indigenous farming communities as well as historical structures related to early trek-farmers (Goodwin & Van Riet Low 1929; Lye 1967; Sampson 1968, 1972; Maggs 1976). Extensive surveying during the late 1960’s revealed that the Gariep Dam flood basin, including the Orange-Caledon interfluvium has a very rich Stone Age archaeological footprint with multiple open and buried sites (Sampson 1968, 1972). Stone tool open-sites have been recorded at Goedemoed, Weenkop and Wesselsdal near Rouxville and at Middelpaats, Melkspruit, Grassridge Farm in the Aliwal North district. Rock art localities recorded in the region include sites on more than 31 farms in the Rouxville district and on 21 farms in the Aliwal North district, including Beestekraal 64/0. European trek-farmers crossed the Orange River from the Cape as early as 1819 and settled throughout the region during the 1820’s and 1830’s. One of the earliest farms in the region was established in 1835 at Klipplaatsdrif, about 24 km from Rouxville on the way to Smithfield (**Fig. 8**).

## **Field Assessment**

Weathered yellowish brown, fine- to medium-grained, feldspathic sandstones, attributed to the Molteno Formation, are horizontally exposed along a north-facing pavement where no potentially fossil-bearing, argillaceous or conglomeritic structures were observed (**Fig. 9 & 10**). The site is also regarded as of low palaeontological significance with regards to the superficial residual soils capping the sandstone in

places (Quaternary overburden). This is mainly due to a lack of suitable alluvial/fluvial deposits at the site. The terrain has severely disturbed by informal residential development and associated human activities (**Fig. 11**). There is no evidence of intact Stone Age archaeological material, distributed as surface scatters on the landscape. There are also no indications of rock art, prehistoric structures or related Iron Age remains, above-ground signs of graves or historical buildings older than 60 years within the boundaries of the study area.

## **Impact Statement & Recommendation**

The Molteno Formation has not as yet yielded any tetrapods, but plant fossils may be particularly abundant. As far as the palaeontological heritage is concerned, the development can proceed, provided that the project allows for monitoring on a regular basis by a professional palaeontologist.

- A professional palaeontologist should be appointed to check for potential fossil exposure in unweathered/fresh sedimentary bedrock;
- The palaeontologist must apply for a valid collection / removal permit from SAHRA if fossil material is found during the operational phase of the development.

As far as the archaeological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint. The terrain in general is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (GP.C).

## **References**

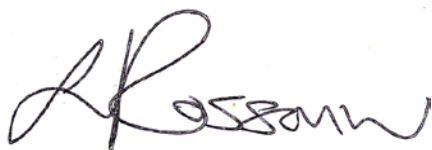
- Anderson J.M. and Anderson H. M. 1985. Palaeoflora of Southern Africa. A.A. Balkema, Rotterdam. 423 pp.
- Bruce, R.W. and Kruger, G.P. 1983. Die geologie van die gebied Aliwal-Noord. Geologiese Opname, 9 pp.
- Lye, W.F. 1967. The Difaqane – the Mfecane in the Southern Sotho area, 1822 – 1824. Journal of African History 8 (1): 107-131.
- Goodwin H.J. & Van Riet Lowe, C. 1929. The Stone Age cultures of South Africa. Annals of the South African Museum 27: 1 – 289.



- Johnson, M.R., et al. 2006. Sedimentary rocks of the Karoo Supergroup:461-499. In Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. eds (2006) The geology of South Africa. Geological Society of South African and Council for Geoscience, Pretoria.
- Kitching, J.W. 1977. Distribution of Karoo vertebrate fauna with special reference to certain genera and the bearing of this distribution on the zoning of the Beaufort Beds. Memoirs of the BPI 1: 131pp.
- Kitching, J.W. 1995. Biostratigraphy of the Cynognathus Assemblage Zone IN B.S. Rubidge (ed.) Biostratigraphy of the Beaufort Group. Biostrat. Ser. S.Afr. Comm. Strat. 1, 40 - 45.
- Maggs T. M. O'C 1976. Iron Age Communities of the Southern Highveld. Occasional Publications of the Natal Museum No. 2. Natal Museum, Pietermaritzburg.
- Rubidge, B. S. 1995. (ed.) Biostratigraphy of the Beaufort Group. Biostrat. Ser. S.Afr. Comm. Strat. 1: 1 – 45.
- Sampson, C.G. 1968. The Middle Stone Age of the Orange River Scheme Area. National Museum, Bloemfontein. Memoir, no. 4.
- Sampson 1972. The Stone Age Industries of the Orange River Scheme and South Africa. National Museum, Bloemfontein. Memoir, no. 6.

#### 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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## Tables & Figures

**Table 1.** Field rating categories as prescribed by SAHRA.

<b>Field Rating</b>	<b>Grade</b>	<b>Significance</b>	<b>Mitigation</b>
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

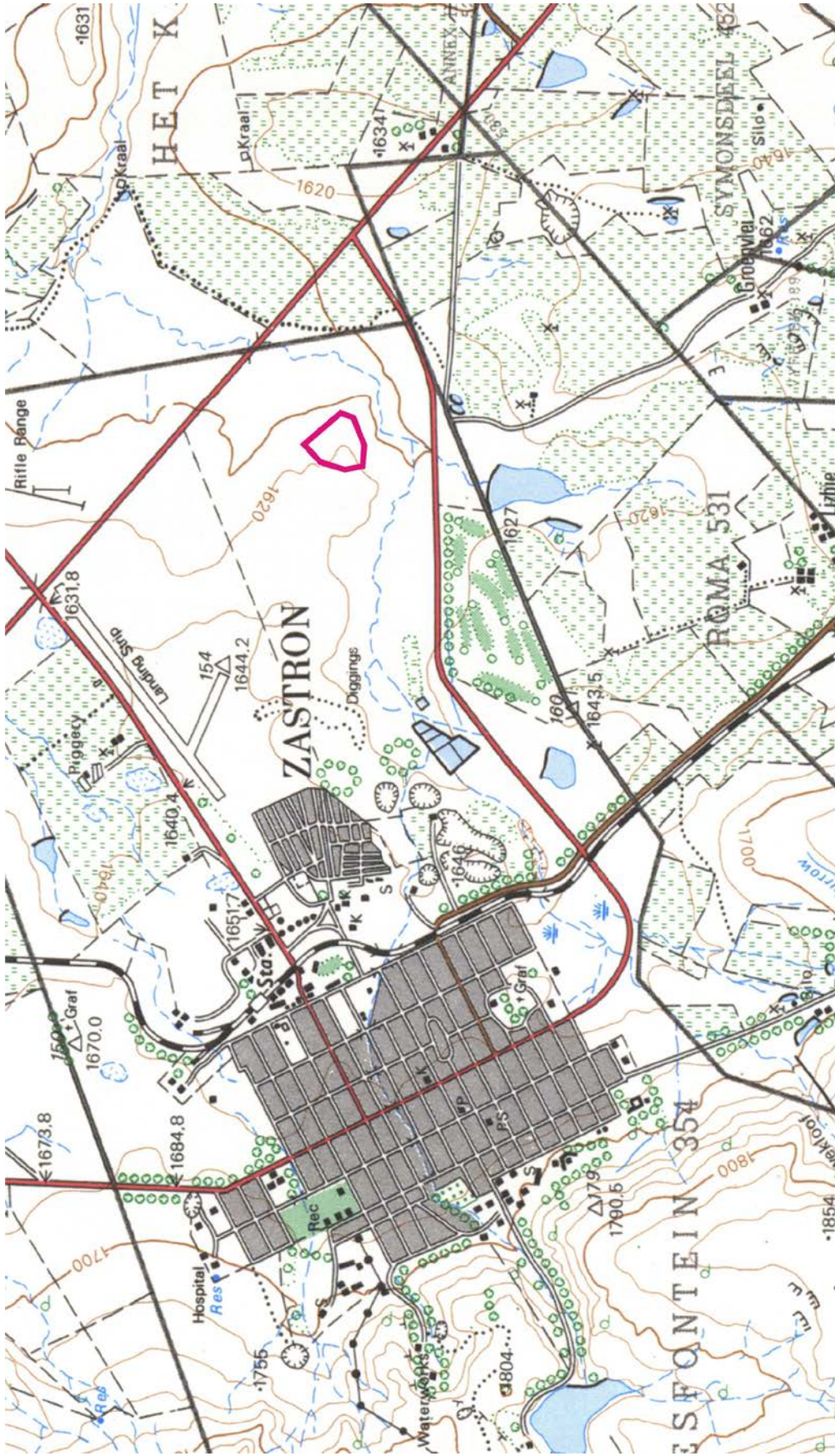


Figure 1. Locality map of the proposed new quarry (portion of 1:50 000 scale topographic 3027 AC Zastron).





Figure 2. Aerial view of the site.



Figure 3. General view of the site, looking east.



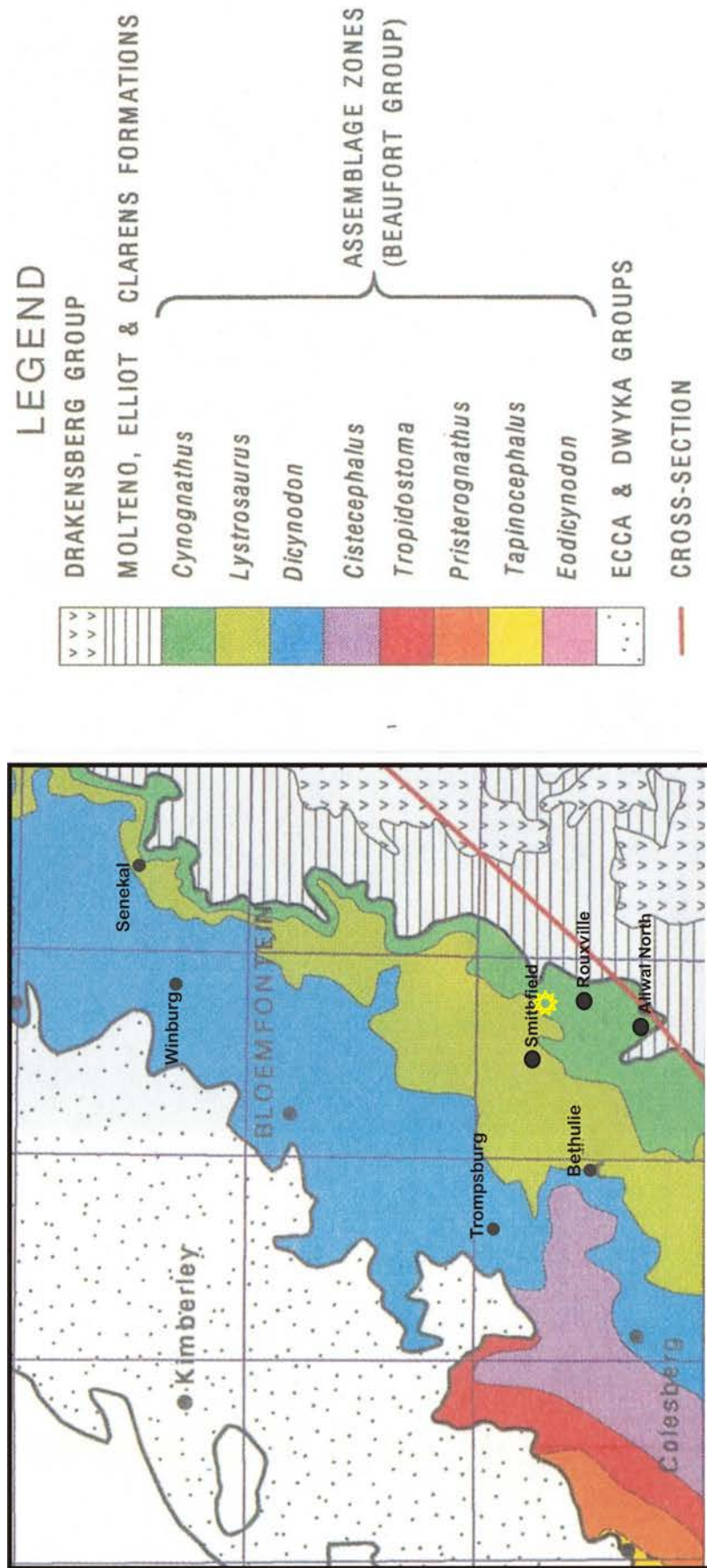


Figure 4. Geographical distribution of vertebrate biozones of the Beaufort Group (after Rubidge 1995). Zastron indicated by yellow star.

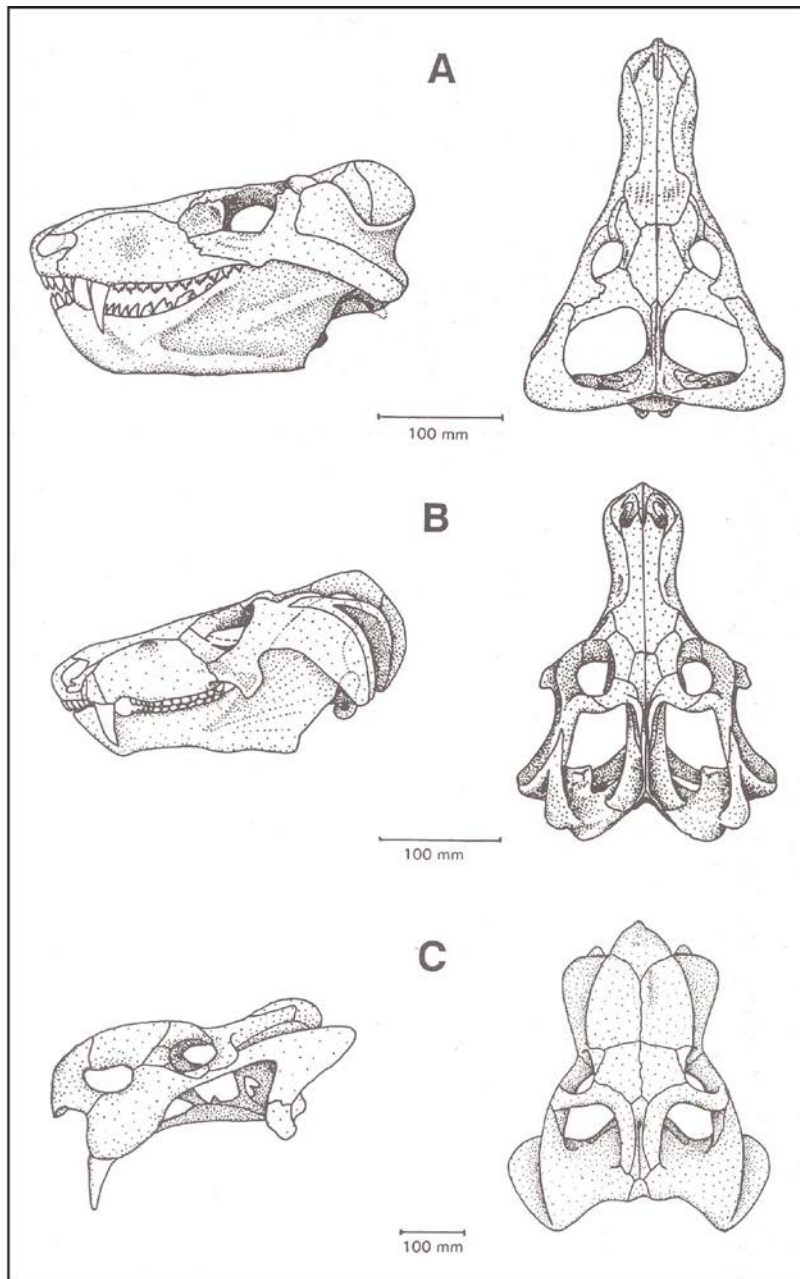


Figure 5. Lateral and dorsal views of biozone-defining fossils of the Cynognathus Assemblage Zone. A) Cynognathus; B) Diademodon; C) Kannemeyeria (after Kitching 1995).

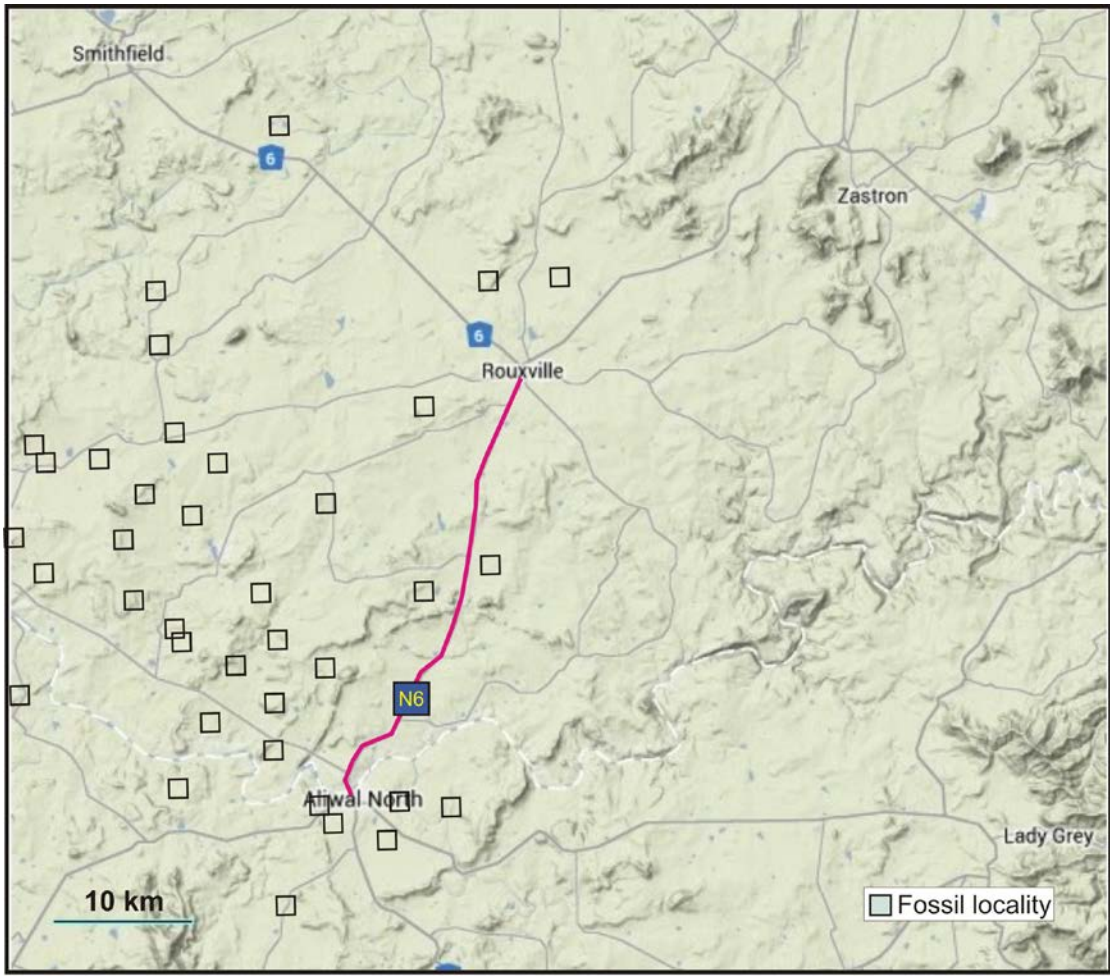


Figure 6. Karoo fossil vertebrate localities recorded between Rouxville and Aliwal North (after Kitching 1977).



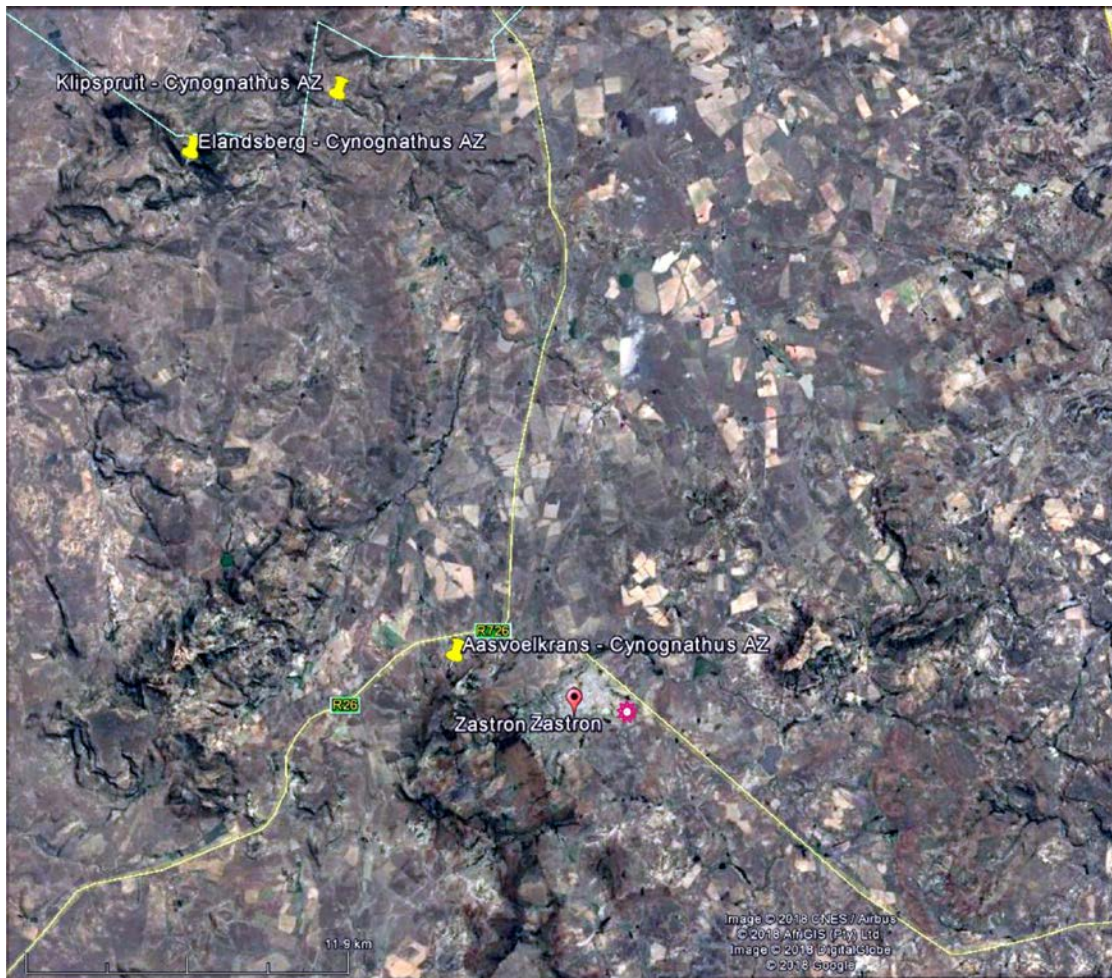


Figure 7. Vertebrate fossil sites previously recorded in the Burgersdorp Formation (Tarkastad Subgroup) in the vicinity of Zastron.



Figure 8. The “kleihuis” ruins at Klipplaatsdrif built ca the 1830’s, one of the earliest Trekboer dwellings north of the Orange River.



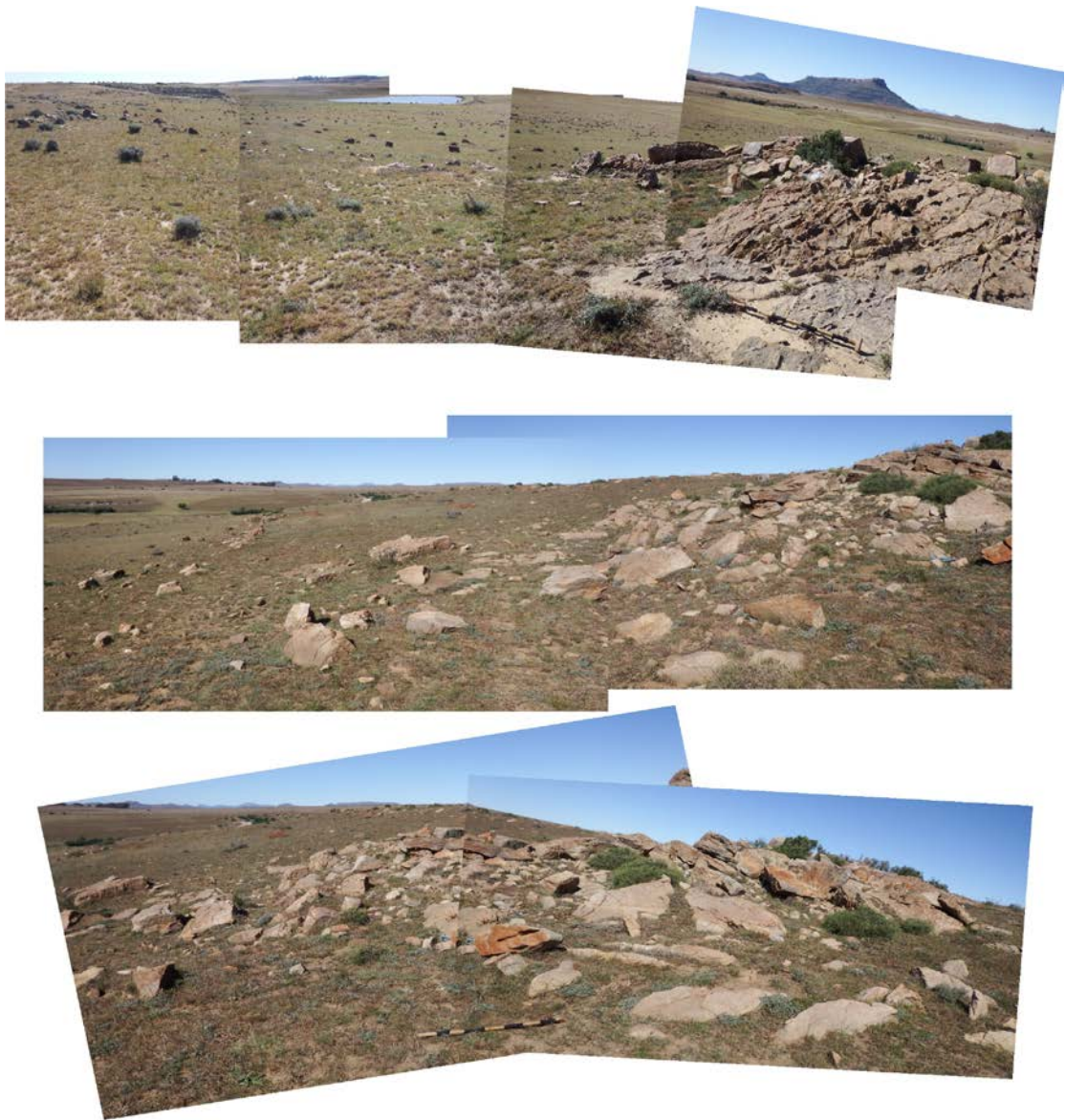


Figure 9. General view of the site showing yellow-weathered, horizontal sandstone pavements exposed along the southern margin of a broad interfluvium, looking north, east and southeast.



Figure 10. Fine- to medium-grained, sandstones with fragmented, pitted and sharp-crested surfaces. Scale 1 = 10 cm.





Figure 11. General view from the site, looking northwest towards Matlakeng and Zastron .