Phase 1 Heritage Impact Assessment of a part of the Farm Bosduifkloof 522, Behulie District, FS.

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Executive Summary

- A Phase 1 Heritage Impact Assessment was carried on the farm Bosduifkloof 522 near Bethulie in the southern Free State, for a newly planned low-density leisure residential development.
- The site is underlain by dolerite bedrock. Igneous Jurassic dolerites are not fossiliferous and can be excluded from further consideration.
- There is no evidence for the accumulation and preservation of intact fossil vertebrate material within the Quaternary sediments (topsoils) covering the underlying bedrock.
- No rock engravings, graves or graveyards and historical buildings older than 60 years, were recorded.
- An approximately 4 metre long structure, resembling a ≤ 1m high rampart constructed from dolerite cobbles, is located near the south-western margin of the site.
- A spent cartridge, identified as a .303 Ball Cordite Mark II, produced by the Royal Laboratory (Woolwich Arsenal) in Kent, England was found aboveground next to the rampart.
- A small number of stone artefacts were recorded as individual, uncapped surface occurrences within the affected area (approximately 1 artefact for every 100 m walked).
- A LSA surface locality is located to the south of and adjacent to the southern boundary of the affected area, but will not be impacted by the proposed development.
- The findings of this assessment strongly advise against development within the confines or in the immediate vicinity of the rampart.
- In order for the development to proceed, it is advised that an integrated heritage management plan is implemented as part of the proposed development to preserve and maintain the rampart locality as well as the LSA surface locality that is located to the south of and adjacent to the affected area.

- Both localities must be protected within a 30 m, no-activity buffer zone, particularly with regard to building activities during the construction phase, as well human activities during the operational phase of the development.
- Access to the localities is controlled to ensure that, except for educational purposes, the sites are not used for inappropriate activities.

Introduction

At the request of MDA Environmental Consultants, a Phase 1 Heritage Impact Assessment was carried on the farm Bosduifkloof 522 near Bethulie in the southern Free State, (1:50 000 topographical map 3025 DA Gariepdam) for a newly planned low-density leisure residential development (**Fig. 1**). The survey 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 25 of 1999. The site visit and subsequent assessment took place in March 2013. The task involved identification of possible archaeological and palaeontological sites or occurrences in the proposed zone, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Site information

Locality data

1:50 000 scale topographic map: 3025 DA Gariepdam

1:250 000 scale geological map 3024 Colesberg

Site Coordinates (**Fig 2**): A) 30°32'53.00"S 25°38'6.18"E

B) 30°32'59.46"S 25°38'4.99"E

C) 30°32'53.44"S 25°38'34.77"E

D) 30°32'44.16"S 25°38'27.36"E

The site is located north of the R701 and next to the Gariep Dam, about thirty-four kilometres west of Bethulie (**Fig. 2**). The study area is situated on sloping, mountainous terrain covered by grass and open shrubveld (**Fig. 3 & 4**).

Geology

The geology of the region has been described by Le Roux (1993) and Johnson (2006) and is shown on the 1: 250 000 geological map 3024 Colesberg (Council for Geoscience, Pretoria 1997). The affected area is underlain by Late Permian Beaufort Group sediments of the Adelaide Subgroup (*Pa*). These sedimentary rocks are primarily made up of bluish-grey to grey-green mudrocks and lenticular sandstones (**Fig. 5**), which form the base on which younger, superficial deposits of Late Cenozoic age have been

deposited (Partridge *et al*. 2006). These include colluvial slope deposits, sheet wash and alluvium (**Fig. 6**). Dykes and sills of resistant Jurassic dolerites (*Jd***)** determine the relief of the study and surrounding area (**Fig. 7)**. Bedrock in the affected area is primarily represented by intrusive dolerites.

Methodology

The site was surveyed on foot, using a Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera for recording purposes (**Fig. 8**). Relative surface distribution density of uncapped lithic material was calculated by conducting a 500 m arbitrary transect across the study area. Relevant archaeological and paleontological information were assimilated for the report and integrated with data acquired during the on-site inspection.

Terms of reference for assessment

- Identify and map possible heritage 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.

Background

Major palaeontological and archaeological localities in the region are illustrated relative to the position of the study area in **Figure 9.**

Palaeontology

The affected area is situated within the *Dicynodon* Assemblage Zone (AZ) near the latter's eastern boundary with the Early Triassic sediments of the younger *Lystrosaurus* AZ (Rubidge 1995) (**Fig. 10**).

The *Dicynodon* Assemblage represents the terminal phase of the Palaeozoic continental biota, that was dominated by therapsid "mammal-like reptiles" and *Glossopteris* Flora before it was largely wiped out by the end-Permian Mass Extinction Event (Ward *et al*. 2005). This Late Palaeozoic extinction event, which severely reduced the diversity of life represented in the terrestrial fossil record (a disappearance of over 70% in the number of tetrapod families), is used as a marker to define the boundary between the

Permian and Triassic periods. The area around Bethulie in particular, produces a wealth of Karoo vertebrate localities related to the Permian-Triassic transition and extinction event. For example, the principal casualties of the end-Permian extinction include all Gorgonopsian predators, and most Dicynodontian herbivores, with the exception of *Lystrosaurus*. A shift to *Lystrosaurus*-dominated vertebrate faunas is seen in early Triassic sections of the Katberg Formation (Kitching 1977, 1995). Overlying Late Cenozoic valley fill deposits may occasionally contain much younger fossil biotas, including the skeletal remains of Quaternary mammals, non-marine molluscs and a variety of other microfossils (Klein 1984; Berger & Brink 1996; Rossouw 1999; Rossouw 2006). Unlike the wealth of Karoo vertebrate fossil localities found in the region, the distribution of Late Cenozoic (primarily Quaternary) palaeontological deposits is localized and infrequent.

Archaeology

The upper Orange River valley represents a long and rich archaeological record that spans back to the Early Stone Age. Prehistoric archaeological remains previously recorded in the region include Stone Age artefacts and mammal fossil remains from sealed and or exposed contexts as well as rock engravings. Well-known sites near the study area include Riversmead Shelter, Glen Elliot and Holmsgrove Shelter. Along much of the course of the upper Orange River and its tributaries alluvial deposits in the form of river terraces occur that contain occurrences of Middle and Later Stone Age material eroding out of the overbank sediments. Surface sites are common along valley floors, dolerite hills and ridges (Samson 1984). Stone tools found in the region are mostly made of hornfels, a dark, fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area.

The establishment of the town of Bethulie dates back to the founding of a mission station there during the 1830's while remnants of early 19th century *veeboer* farmsteads or kraals as well as Anglo-Boer War graveyards and concentration camps are well-recorded in the region.

Results of Survey

The results are summarized in **Table 1** and **Figure 11**. The area demarcated for development is underlain by dolerite bedrock. The igneous Jurassic dolerites are not fossiliferous and can be excluded from further consideration in the present assessment.

There is no evidence for the accumulation and preservation of intact fossil material within the Quaternary sediments (topsoils) **(Fig. 12**).

No rock engravings, graves or graveyards and historical buildings older than 60 years, were recorded, but an approximately 4 metre long structure, resembling a ≤ 1m high rampart constructed from dolerite cobbles, is located near the south-western margin of the site (**Fig. 13**). A spent cartridge, identified as a .303 Ball Cordite Mark II, produced by the Royal Laboratory (Woolwich Arsenal) in Kent, England was found aboveground next to the structure (**Fig. 14**). The Mark II was in use from 1893 until it was replaced by Mark VI in 1904, suggesting that the rampart might date back to the early part of the Anglo-Boer War (South African War) when British forces crossed the Orange River at nearby Norvals Pont during their advance on Bloemfontein in 1900 (**Fig. 15**).

A small number of stone artefacts were recorded as individual, uncapped surface occurrences within the affected area (approximately 1 artefact for every 100 m walked) and are represented by formal and informal tools made from hornfels (**Fig. 16**). A potential LSA surface site, made up of two lithic clusters covering about 50 m^2, were recorded to the south of and adjacent to the study area (**Fig. 17**) The artefact occurrences concur with previous findings that Smithfield surface sites in the Karoo are commonly concentrated on low dolerite hills and ridges (Sampson 1984). The locality resembles a deflation area, which appears to be the result of seasonal runoff from the north. It will not be impacted by the proposed development.

Impact Statement and Recommendation

The site has been sufficiently recorded, mapped and documented in terms of conditions necessary for a Phase 1 heritage impact assessment. Overall, the potential impact of the proposed development is regarded as minimal given that the underlying bedrock at the site is not palaeontologically significant and that the density of stone tools recorded as surface occurrences is low and not part of a capped assemblage. However, what appear to be the remains of a rampart, is located within the confines of the proposed development. The rampart possibly dates back to the Anglo-Boer War. The original locus of the rampart is still intact with relatively little displacement. As such, it constitutes a non-renewable heritage resource that is of conservation and research interest, and every effort should be made to conserve the terrain *in situ.*

The findings of this assessment strongly advise against development within the confines or in the immediate vicinity of the rampart. As stipulated by regulations under subsection 4, 5 and 6 of Section 35 of the National Heritage Resources Act of 1999, the following recommendations are proposed. The affected area can be accessed for development provided that:

- an integrated heritage management plan is implemented as part of the proposed development to preserve and maintain the rampart locality as well as the LSA surface locality that is located to the south of and adjacent to the affected area.
- both localities is protected within a 30 m, no-activity buffer zone, particularly with regard to building activities during the construction phase, as well human activities during the operational phase of the development.
- access to the localities is controlled to ensure that, except for educational purposes, the sites are not used for inappropriate activities.

References

Berger, L.R. & Brink, J.S. 1996. Late Middle Pleistocene fossils, including a human patella, from the Riet River gravels, Free State, South Africa. *South African Journal of Science* 92(6): 277-278.

Le Roux, F.G. 1993. Die geologie van die gebied Colesberg. Explanation to 1: 250 000scale geological sheet 3024 Colesberg, 12 pp. Council for Geoscience, Pretoria.

Johnson, M.R. *et. al*. 2006. Sedimentary Rocks of the Karoo Supergroup. **In**: M.R. Johnson, *et. al*. (eds). *The Geology of South Africa*. Geological Society of South Africa.

Keyser, A.W. & Smith, R.M.H. 1978-79. Vertebrate biozonation of the Beaufort Group with special reference to the western Karoo Basin. *Annals of the Geological Survey of South Africa* 12: 1-35.

Kitching, J.W. 1977. The distribution of Karoo Vertebate Fauna. Bernard Price Institute for Palaeontological Research. Memoir 1, 1 – 131.

Kitching, J.W. 1995. Biostratigraphy of the Dicynodon AZ. In: B.S. Rubidge (ed) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 29 – 34.

Klein, R.G. 1984. The large mammals of southern Africa: Late Pliocene to Recent. In: Klein, R.G. (Ed.) *Southern African prehistory and paleoenvironments*, pp 107-146.

Balkema, Rotterdam.

Partridge, T.C. *et al*. 2006. Cenozoic deposits of the interior. **In**: M.R. Johnson, *et. al*. (eds). *The Geology of South Africa*. Geological Society of South Africa.

Rossouw, L. 1999. Palaeontological and archaeological survey of the Riet River, Modder River and certain sections of the Gariep River. *Unpublished Report, Palaeo-Anthropological Research Group,* University of the Witwaterswatersrand.

Rossouw, L. 2006 . Florisian mammal fossils from reosional gullies along the Modder River at Mitasrust Farm, central Free State South Africa. *Navorsinge van die Nasionale Museum* 22(6): 145 – 161.

Rubidge, B. S. 1995. (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 46.

Sampson, G. 1984. Site clusters in the Smithfield Settlement Pattern. *South African Archaeological Bulletin* 39:5 – 23.

Ward, P.D. *et al*. 2005. Abrupt and gradual extinction among Late Permian land vertebrates in the Karoo Basin, South Africa. Science 307: 709 – 714.

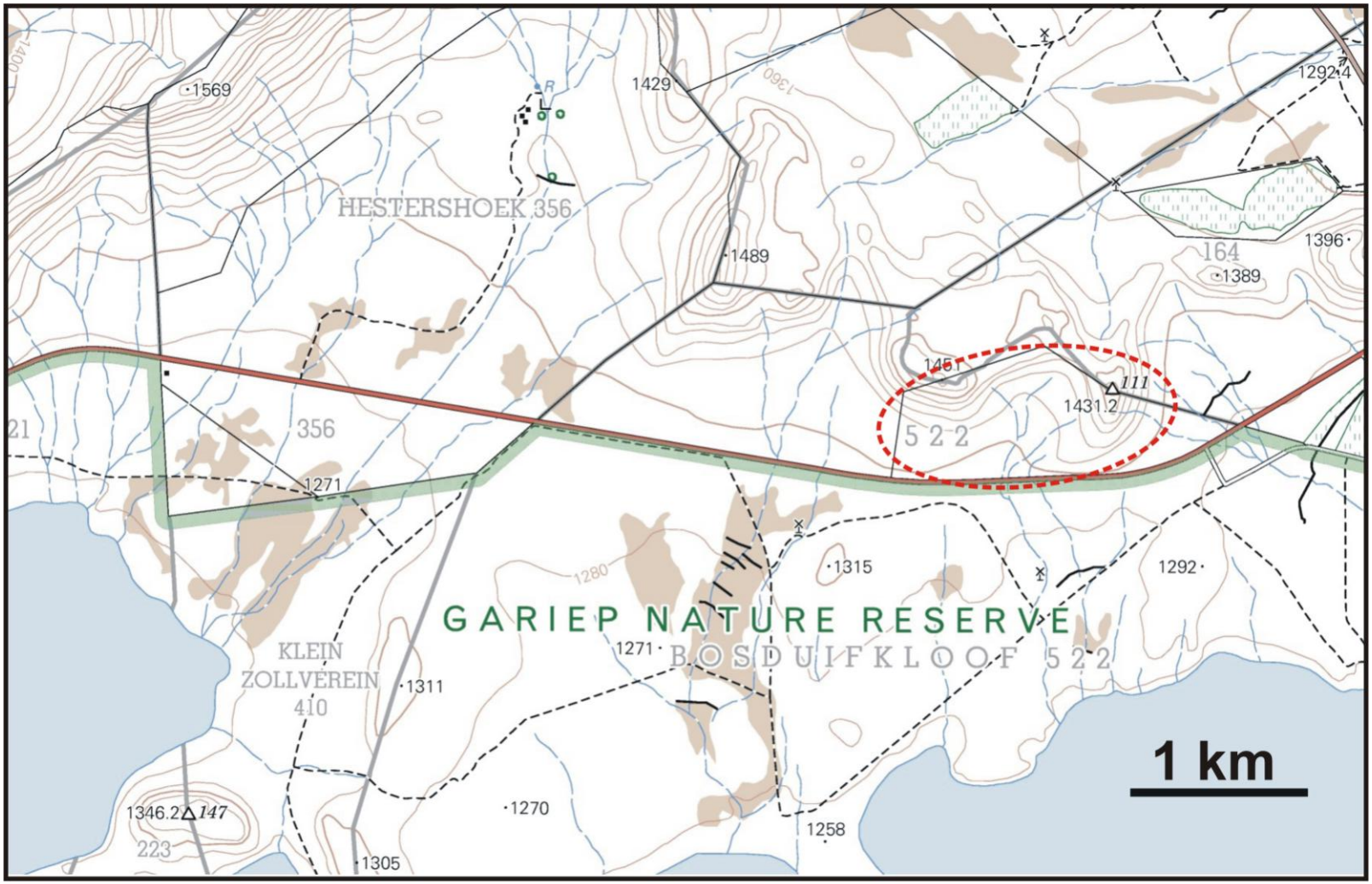


Figure 1. Portion of 1:50 000 scale topographic map 3025 DA Gariepdam of Bosduifkloof 522. The study area is marked by red ellipse.

Figure 2. Aerial view of the region (study area is marked by rectangle).

Figure 3. Panoramic view of the study area, looking southeast (A) and northwest (B).

Figure 4. Panoramic view from the study area, looking south towards the Gariep Dam.

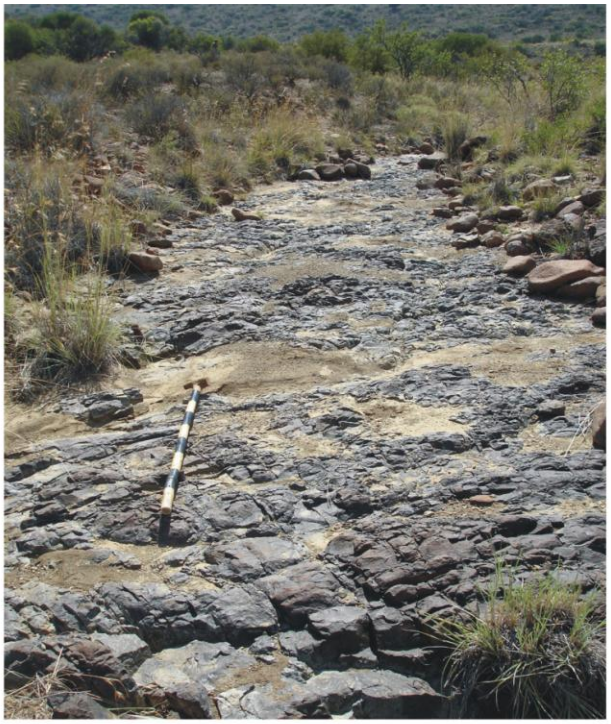


Figure 5. The affected area is underlain by Late Permian Beaufort Group sediments primarily made up of bluish-grey to grey-green mudrocks and lenticular sandstones.

Figure 6. Superficial deposits of Quaternary to Recent age blanket the underlying bedrock.

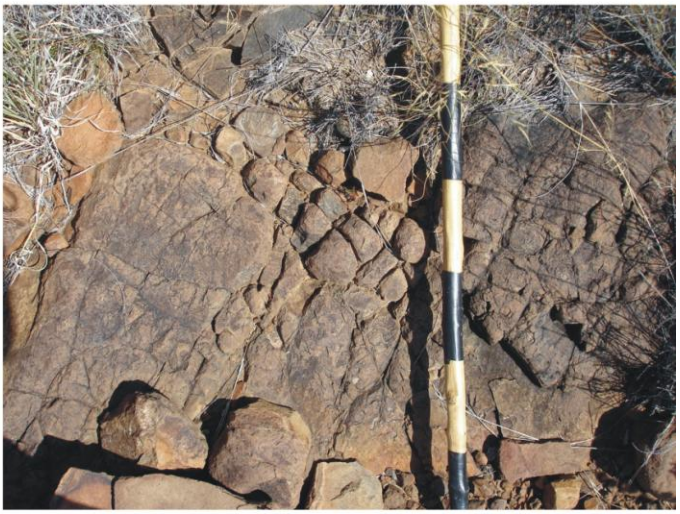


Figure 7. Dykes and sills of resistant Jurassic dolerites determine the relief of the study and surrounding area.

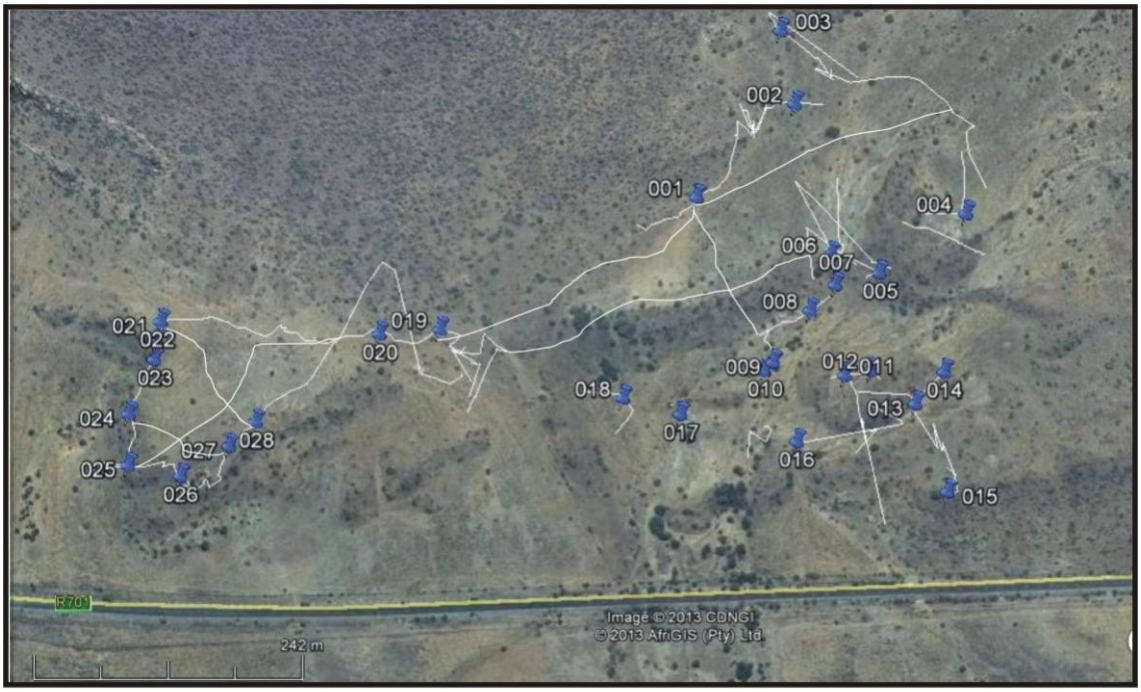


Figure 8. Tracks logged via GPS during the survey.

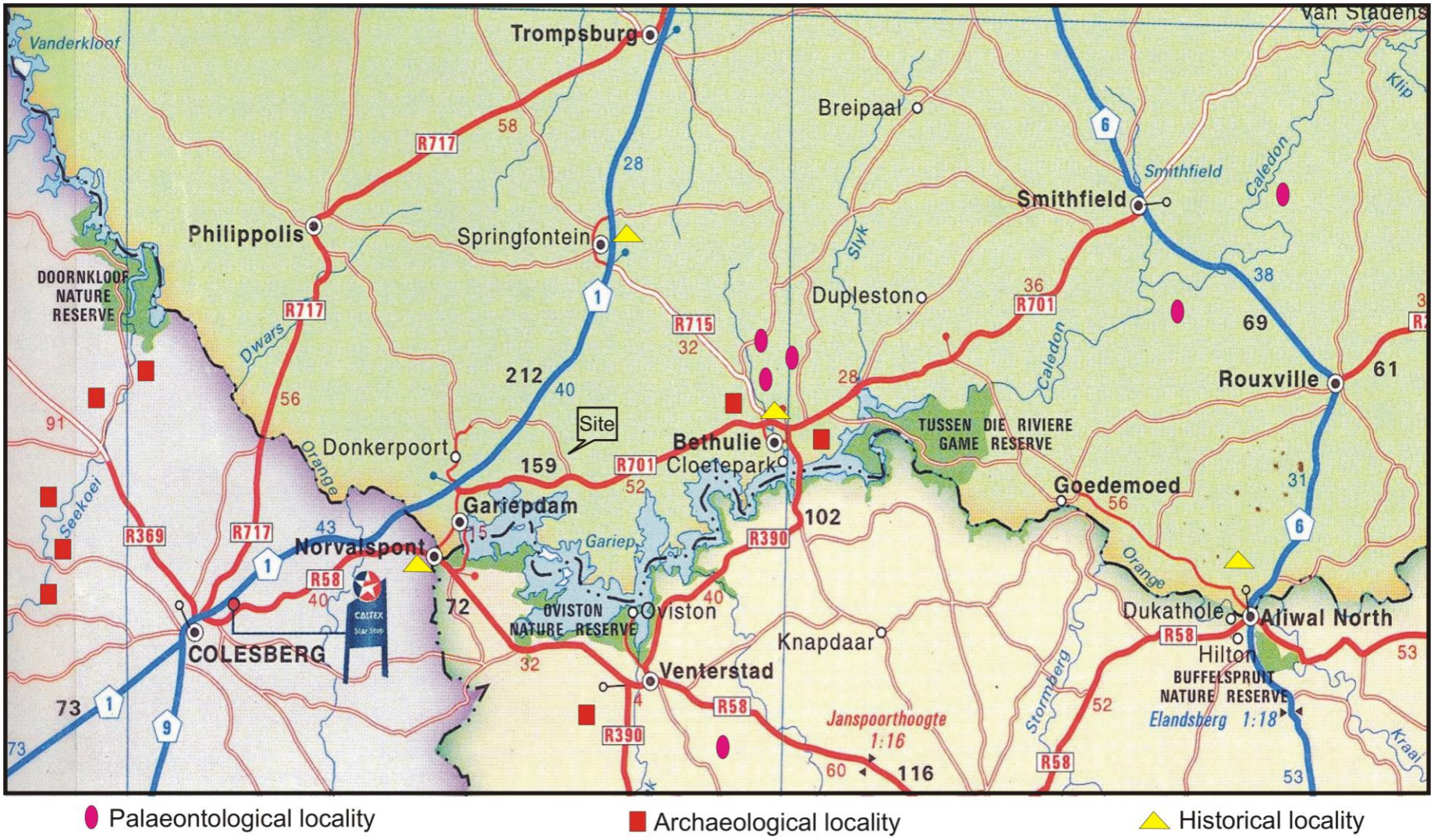


Figure 9. Major palaeontological and archaeological localities in the region relative to the position of the study area.

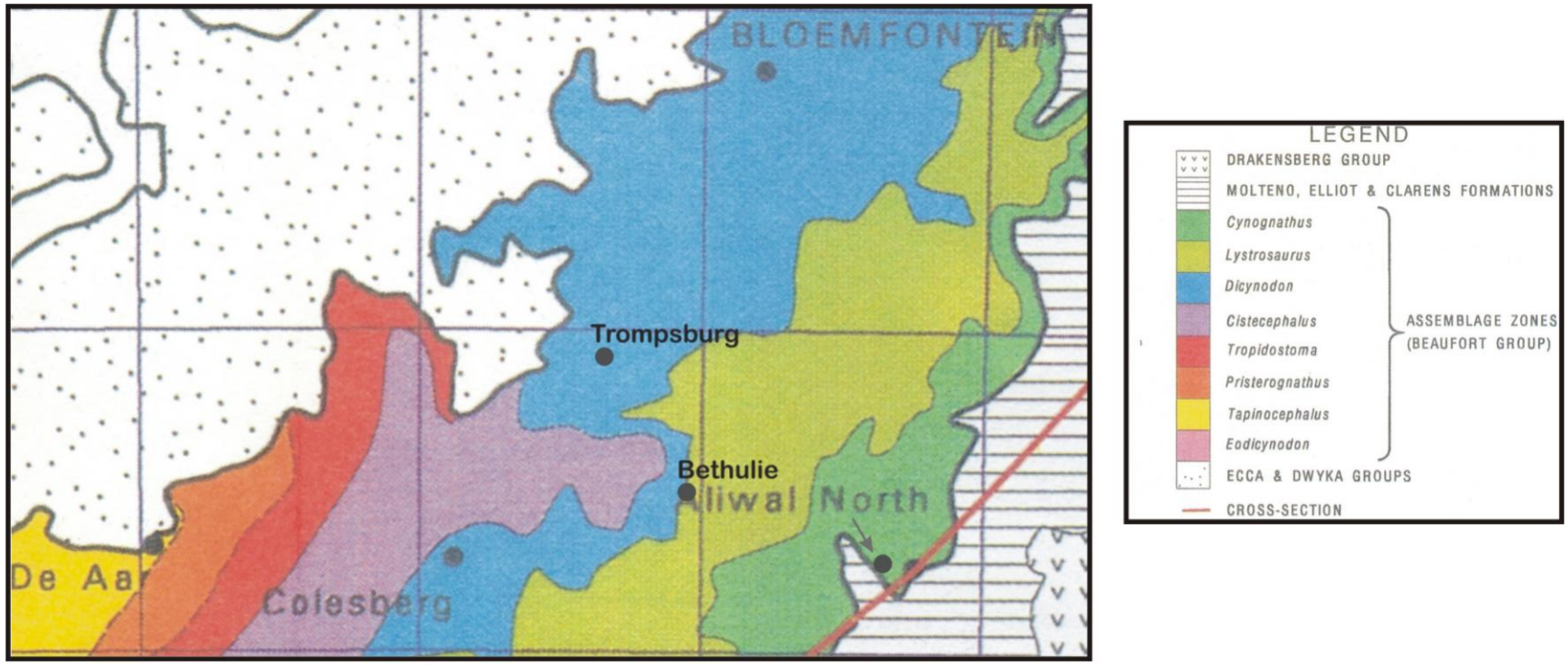


Figure 10. Geographical distribution of vertebrate biozones of the Beaufort Group between Colesberg and Bloemfontein (after Rubidge 1995).

Table 1. Summary of results (see **Fig. 11**).

Nr on Map	**Feature**	**Coordinates**
1	Section of rampart	S30 32 57.5 E25 38 08.9
2	Cartridge	S30 32 56.8 E25 38 09.8
3	Individual stone tool	S30 32 50.4 E25 38 24.5
4	Individual stone tool	S30 32 47.7 E25 38 27.7
5	Individual stone tool	S30 32 45.7 E25 38 27.2
6	Individual stone tool	S30 32 50.9 E25 38 33.4
7	Individual stone tool	S30 32 52.5 E25 38 30.6
8	Individual stone tool	S30 32 52.0 E25 38 29.0
9	Individual stone tool	S30 32 52.9 E25 38 29.1
10	Individual stone tool	S30 32 54.2 E25 38 16.0
11	Surface locality with multiple stone tools	S30 32 57.4 E25 38 27.9
12	Surface locality with multiple stone tools	S30 32 56.6 E25 38 24.0

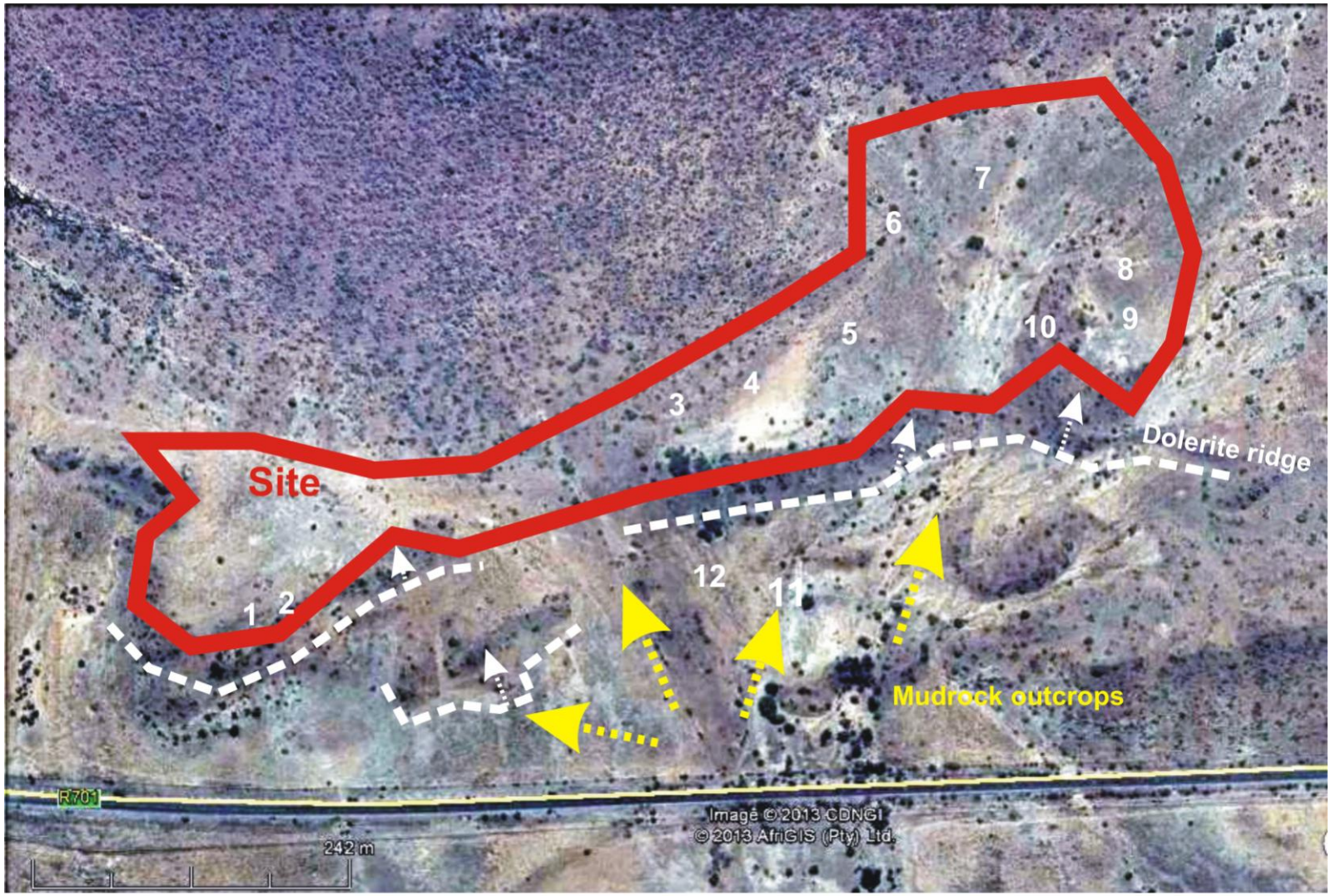


Figure 11. Map of archaeological features recorded.

Figure 12. There is no evidence for the accumulation and preservation of intact fossil material within the Quaternary sediments (topsoils) covering underlying bedrock.

Figure 13. An approximately 5 metre long structure, resembling a ≤ 1m high rampart and constructed from dolerite cobbles, is located near the south-western margin of the site.

Figure 14. A spent cartridge, identified as a .303 Ball Cordite Mark II, produced between 1893 and 1904 by the Royal Laboratory (Woolwich Arsenal), Kent, England.

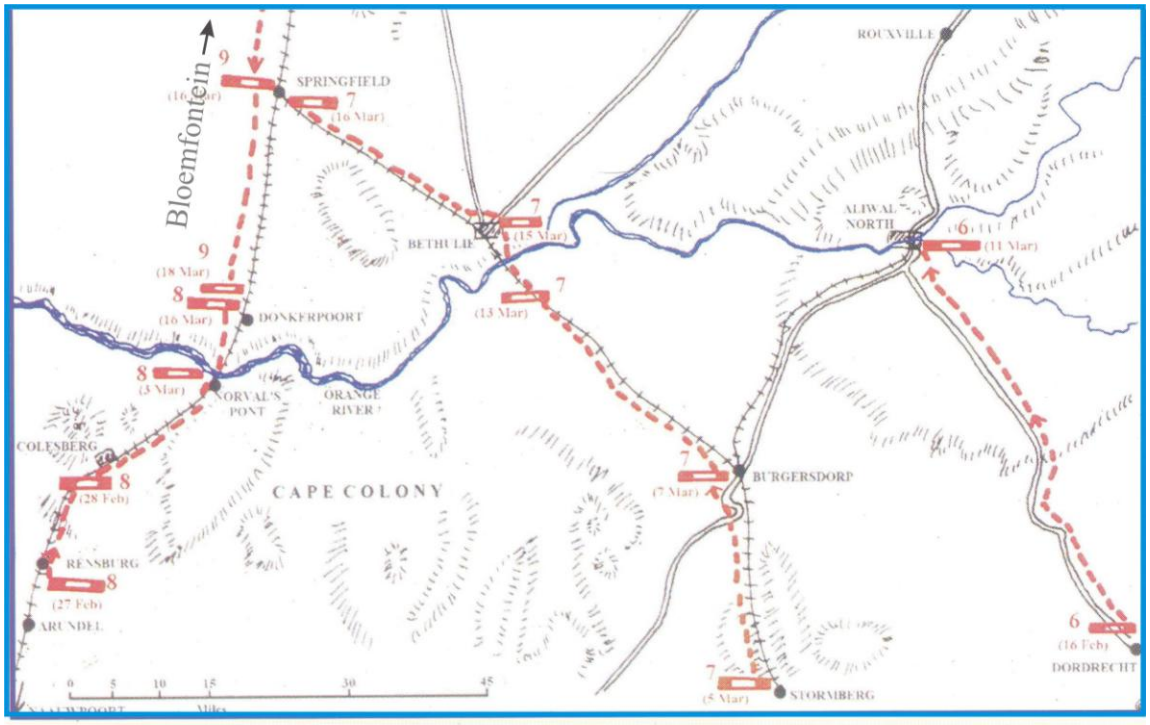


Figure 15. British advance on Bloemfontein 5 - 15 March1900.

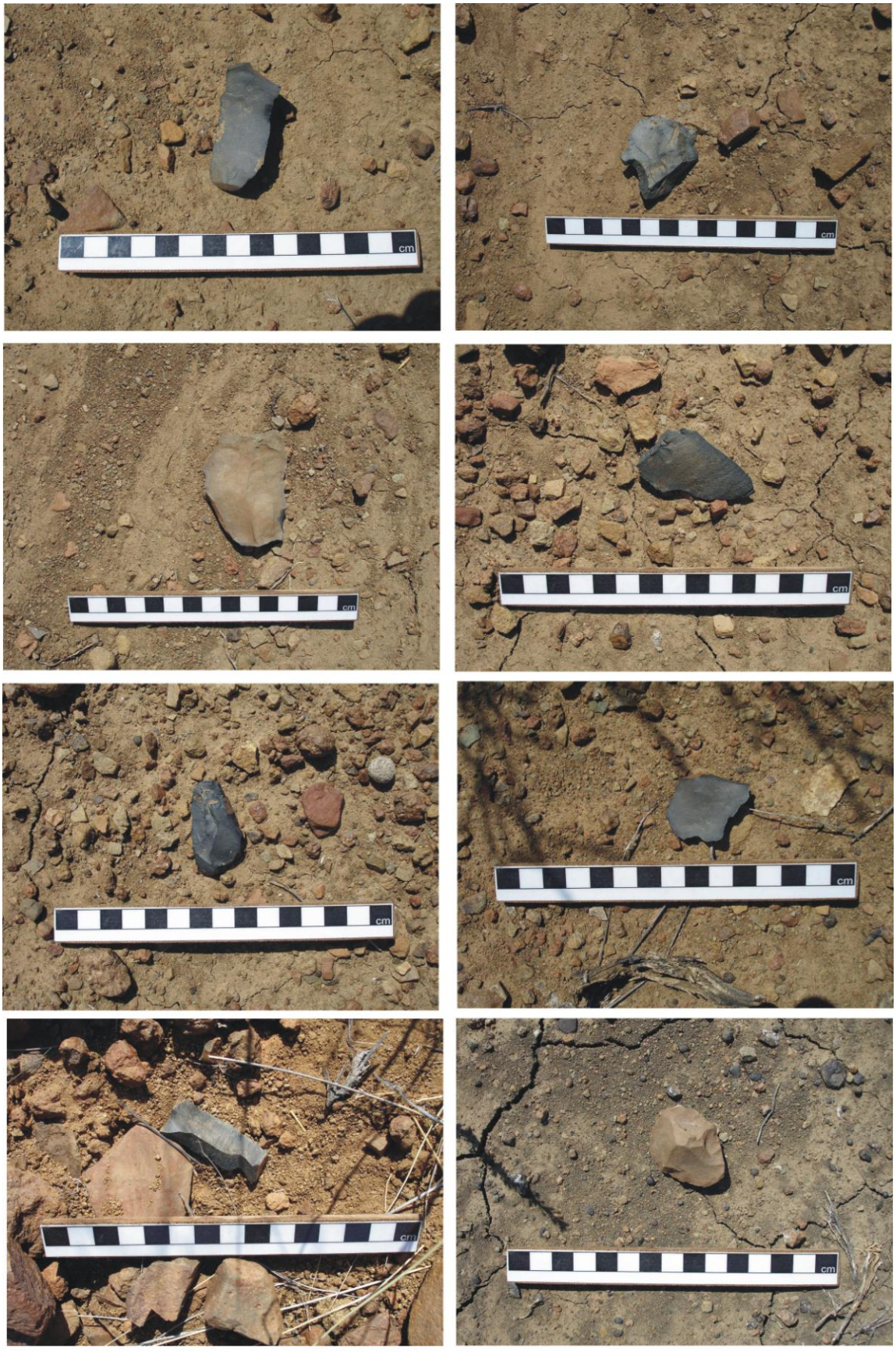
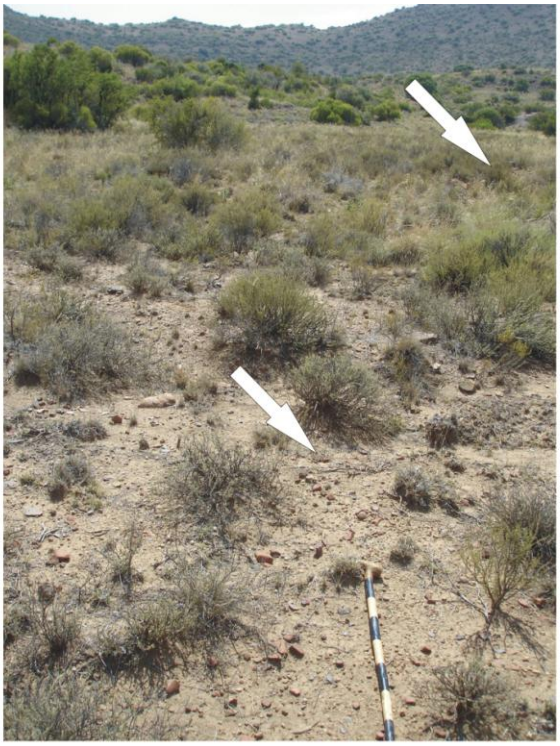


Figure 16. Stone tools recorded as individual, uncapped surface occurrences within the affected area (approximately 1 artefact for every 100 m walked). Raw material = hornfels.



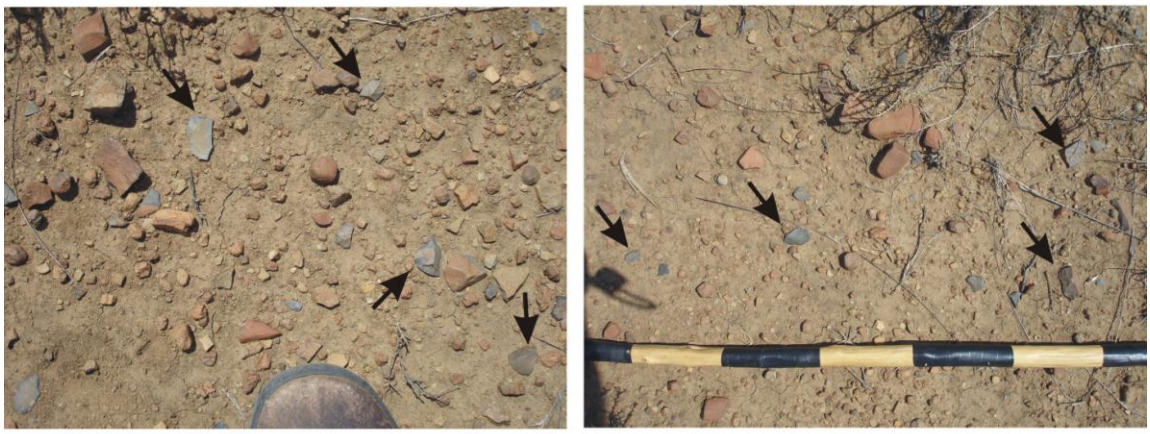


Figure 17. A potential LSA surface site, made up of two lithic clusters covering about 50 m^2, located south of and beyond the boundary of the study area.