

**Palaeontological Desktop Assessment of the proposed
new 5 km-long section of the Aries power line near
Kenhardt, Northern Cape Province.**

Report prepared for HCAC Consultants
by
Palaeo Field Services
PO Box 38806
Langenhovenpark
9330

23 / 08 / 2017

Summary

The proposed development footprint is underlain by glacially related Dwyka Group sediments considered to be of low to moderate palaeontological sensitivity. It is capped by superficial deposits of moderate to high palaeontological sensitivity where unweathered gravelly to sandy alluvial deposits sediments occur. For that reason water courses, depression margins and pan dune deposits are considered to be palaeontologically sensitive and it is advised that a Phase 1 Palaeontological Impact Assessment is conducted for the structure locations marked 12TRA 7 to 12TRA 9, 12TRA 13, 12TRA 20 and 12TRA 24 before the start of any excavations so that potential palaeontological remains can be identified, recorded and removed.

Introduction

The report is a preliminary assessment of potential palaeontological impact with regard to planned power line infrastructure development located about 38 km west-southwest of Kenhardt in the Northern Cape Province (**Fig. 1**). The assessment is required as a prerequisite for new development in terms of the National Heritage Resources Act 25 of 1999. The Act 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 relevant to the proposed development are listed in Section 34 (1), Section 35 (4), Section 36 (3) and Section 38 (1) of the Act, which also include the protection of geological and paleontological sites as well as palaeontological objects and material, meteorites and rare geological specimens. According to the SAHRIS Palaeo Sensitivity Map of South Africa (2016), the proposed development footprint is located within an area considered to be of moderate palaeontological sensitivity and for that reason requires a palaeontological desktop assessment

Methodology

Geological maps were used to pin point fossil-bearing rocks within the study area. The palaeontological significance of the affected area is evaluated using existing field data, database information and published literature. Potential impact on palaeontological heritage resources was determined by the scale of the proposed development and the palaeontological sensitivity of the relevant rock units that may be affected.

Locality data

1:50 000 scale topographic maps 2920 BD Grootriet and 2920DB Sonderhuis

1:250 000 scale geological map 2920 Kenhardt

Site coordinates (**Fig. 2**): A) 29°29'41.92"S 20°47'25.11"E to B) 29°32'4.56"S 20°46'54.93"E.

The study area is located 38 km west-southwest of Kenhardt on the farm Klein Zwart Bast 188.

Background

According to the 1:250 000 scale geological map 2920 Kenhardt, the study area is underlain by glacially derived sediments of the Permo-Carboniferous Mbizane Formation (Karoo Supergroup, *C-Pd*) (Slabbert *et al.* 1999) (**Fig. 3**). The glacially-related sediments of the Mbizane Formation is regarded as a heterolithic unit recognized in the upper part of the Dwyka Group and is characterized by mudstone and sandstone successions, tillites and conglomerates that were laid down when Dwyka glaciers scoured out valleys and depressions in pre-Karoo rocks during the Permo-Carboniferous, *c.* 300 Ma years ago (Von Brunn & Visser 1999). The Mbizane Formation is not considered to be highly fossiliferous, but low diversity non-marine ichnofossil assemblages have been recorded as well as scarce vascular plant remains associated with *Glossopteris* Flora, while palynomorphs are also likely to be present within finer-grained mudrock facies (MacRae 1999; Almond and Pether 2008). Superficial sediments are made of downwasted bedrock sediments, Kalahari Group pedocretes, aeolian sand and alluvium, as well as remnants of Tertiary and Quaternary (Miocene to Pleistocene) fluvial systems related to infill deposits (drainage depressions) of the Carnarvon Leegte and associated gravel terraces of the palaeo- Sak River which was once part of the ancient Koa Valley, situated about 140 km due west of the study area (De Wit *et al.* 2000) (**Fig. 4**). Fossils associated with these Late Cenozoic drainage systems include mammals, reptiles, fish, molluscs, petrified wood and ichnofossils (De Wit *et al.* 2000; De Wit 1999; De Wit and Bamford 1993). Anthracothere and fossil wood remains, suggesting subtropical environments during the Lower to Middle Miocene, have been recovered from basal alluvial gravels in the Geelvloer Palaeovalley near Brandvlei located 120 km due south of the study area, where it links up with the Koa Valley palaeodrainage system

through Commissioners Pan (**Fig. 5**). Several mammal types including Miocene Gomphothere tooth fragments, a giraffid ossicone, bovid, rhinocerotid and tortoise remains as well as crocodile teeth fragments have been recovered from gravels at Bosluispan in the upper reaches of the Koa Valley. Younger sediments associated with Plio-Pleistocene drainage systems (alluvium, pan sediments) in the region may also occasionally yield vertebrate fossil remains. Mammalian teeth and bones of mainly grazers have been recovered from basal gravels in the Carnavon Leegte (Maglio & Cooke 1978) while Late Pleistocene faunal remains associated with Stone Age artefacts have been recovered from pan sediments at Bundu Farm near Copperton (De Wit 1999; Kibberd 2006).

Impact Statement

The desktop investigation indicates that the study area is underlain by glacially related Dwyka Group sediments considered to be of low to moderate palaeontological sensitivity. It is capped by superficial deposits considered to be of moderate to high palaeontological sensitivity where unweathered gravelly alluvial deposits and pan sediments occur. For that reason, water courses, depression margins and pan dune deposits located within the development footprint are considered to be potentially palaeontologically sensitive (**Fig. 6**) It is advised that a Phase 1 Palaeontological Impact Assessment is conducted for the structure locations marked 12TRA 7 to 12TRA 9, 12TRA 13, 12TRA 20 and 12TRA 24 (**Table 1**) before the start of any excavations so that potential palaeontological remains can be identified, recorded and removed.

References

- De Wit, M.C.J. 1996. The distribution and stratigraphy of inland alluvial deposits in South Africa. *African Geoscience Review* 3(2): 175 – 189.
- De Wit, M.C.J. and Bamford, M. 1993. Fossil wood from the Brandvlei area, Bushmanland as an indication of palaeoenvironmental changes during the Cainozoic. *Palaeont. africana* 30: 81 – 89.
- De Wit, M.C.J., Marshall, T.R. and Partridge, T.C. 2000. Fluvial Deposits and Drainage Evolution. **In:** T.C.Partridge & R.R. Maud (Eds). *The Cenozoic of Southern Africa*. Oxford Monographs on Geology and Geophysics No. 40, 55 – 72.

- 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.
- Kiberd, P. 2006. Bundu Farm: a report on archaeological and palaeoenvironmental assemblages from a pan site in Bushmanland, Northern Cape, South Africa. *South African Archaeological Bulletin* 61: 189-201.
- MacRae, C. 1999. *Life Etched in Stone*. Geological Society of South Africa, Linden, South Africa.
- Maglio, V.J. and Cooke, H.B.S. 1978. Evolution of African Mammals. Cambridge, Mass. Harvard University Press.
- Slabbert *et al.* 1999. Die Geologie van die gebied Kenhardt. Explanation to 1:250 000 geology sheet 2920 Kenhardt. Council for Geoscience, Pretoria.
- Visser, J.N.J. 1989. The Permo-Carboniferous Dwyka Formation deposition by a predominantly subpolar marine ice sheet. Southern Africa. *Palaeogeography, Palaeoclimatology Palaeoecology* 70: 377 – 391.
- Von Brunn, V. & Visser, J.N.J. 1999. Lithostratigraphy of the Mbizane Formation (Dwyka group). *South African Committee for Stratigraphy, Lithostratigraphic Series No. 32*, Council for Geoscience, Pretoria.

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.

A handwritten signature in black ink, appearing to read 'L Rossouw', with a large, stylized initial 'L'.

23 / 08 / 2017

Tables & Figures

Table 1. Potentially sensitive structure locations.

Structure loc. number	Coordinates	
12TRA 7	29°30'15.22"S	20°47'13.48"E
12TRA 8	29°30'22.09"S	20°47'11.09"E
12TRA 9	29°30'29.17"S	20°47'8.61"E
12TRA 13	29°30'56.17"S	20°46'59.18"E
12TRA 20	29°31'44.81"S	20°46'45.81"E
12TRA 24	29°32'4.92"S	20°46'48.72"E

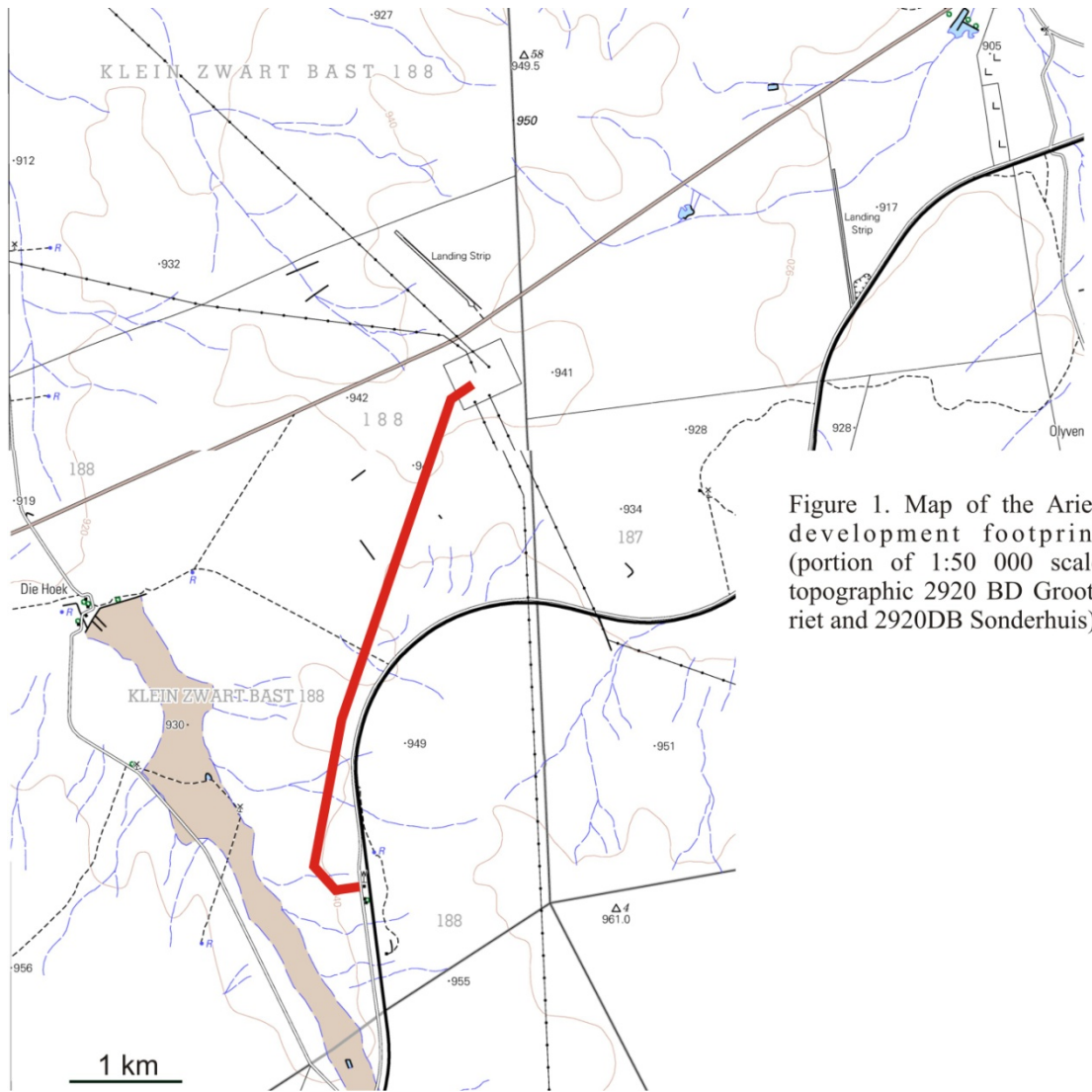


Figure 1. Map of the Aries development footprint (portion of 1:50 000 scale topographic 2920 BD Grootriet and 2920DB Sonderhuis).

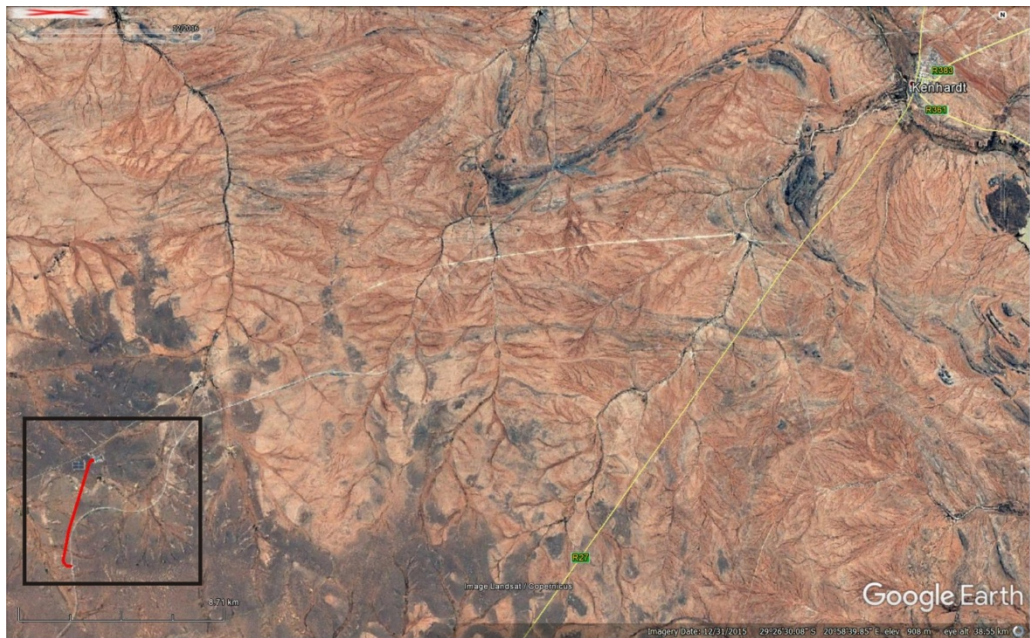


Figure 2. Aerial view of the proposed development footprint.

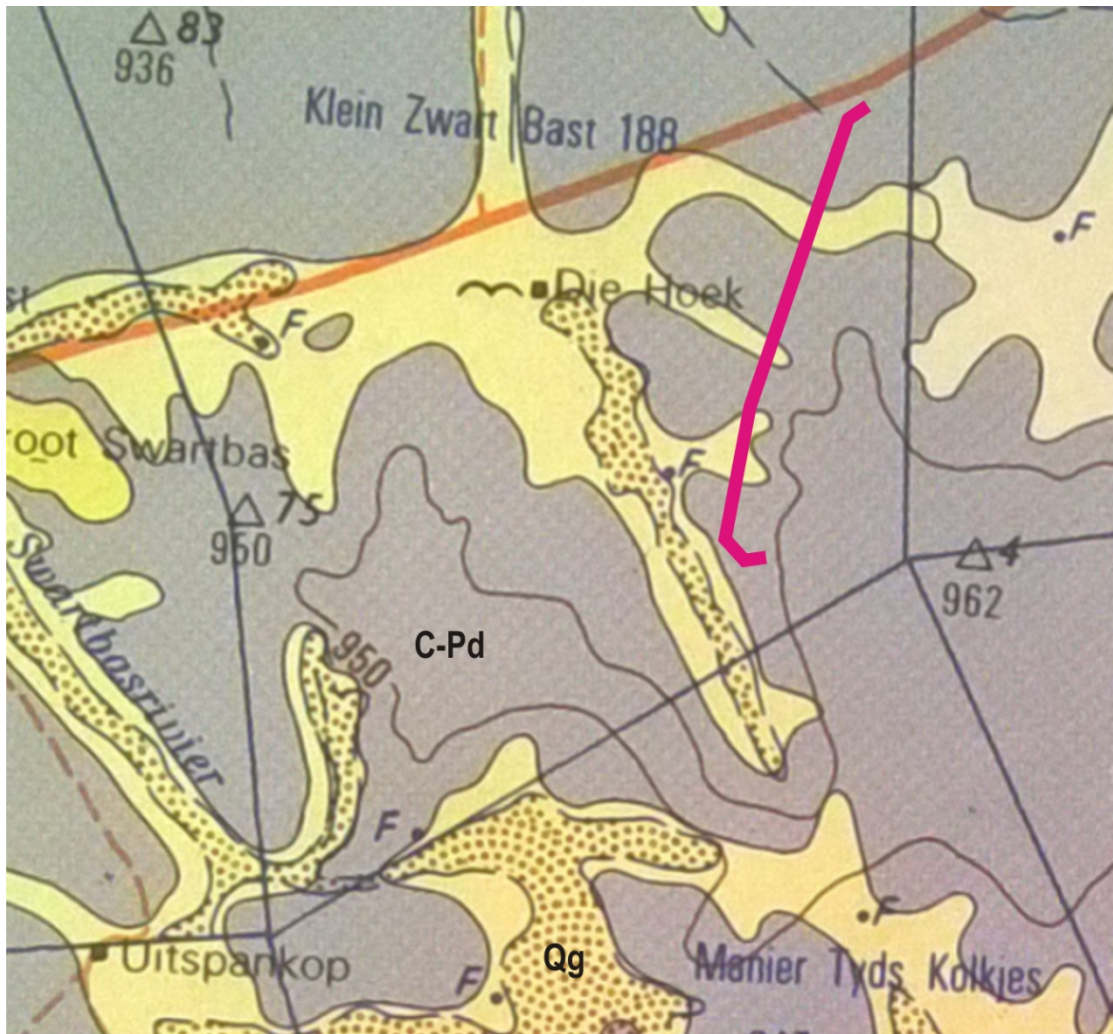


Figure 3. Portion of 1:250 000 scale geological map 2920 Kenhardt, showing that the study area is underlain by glacially derived sediments of the Permo-Carboniferous Mbizane Formation (Karoo Supergroup, *C-Pd*). Superficial sediments are made up of downwasted bedrock sediments, Kalahari Group pedocretes, Quaternary aeolian sand (*Qg*) and alluvium. Remnants of Tertiary and Quaternary (Miocene to Pleistocene) fluvial systems related to infill deposits (drainage depressions) of the Carnarvon Leegte and associated gravel terraces of the palaeo-Sak River are common in the area (not shown on map).

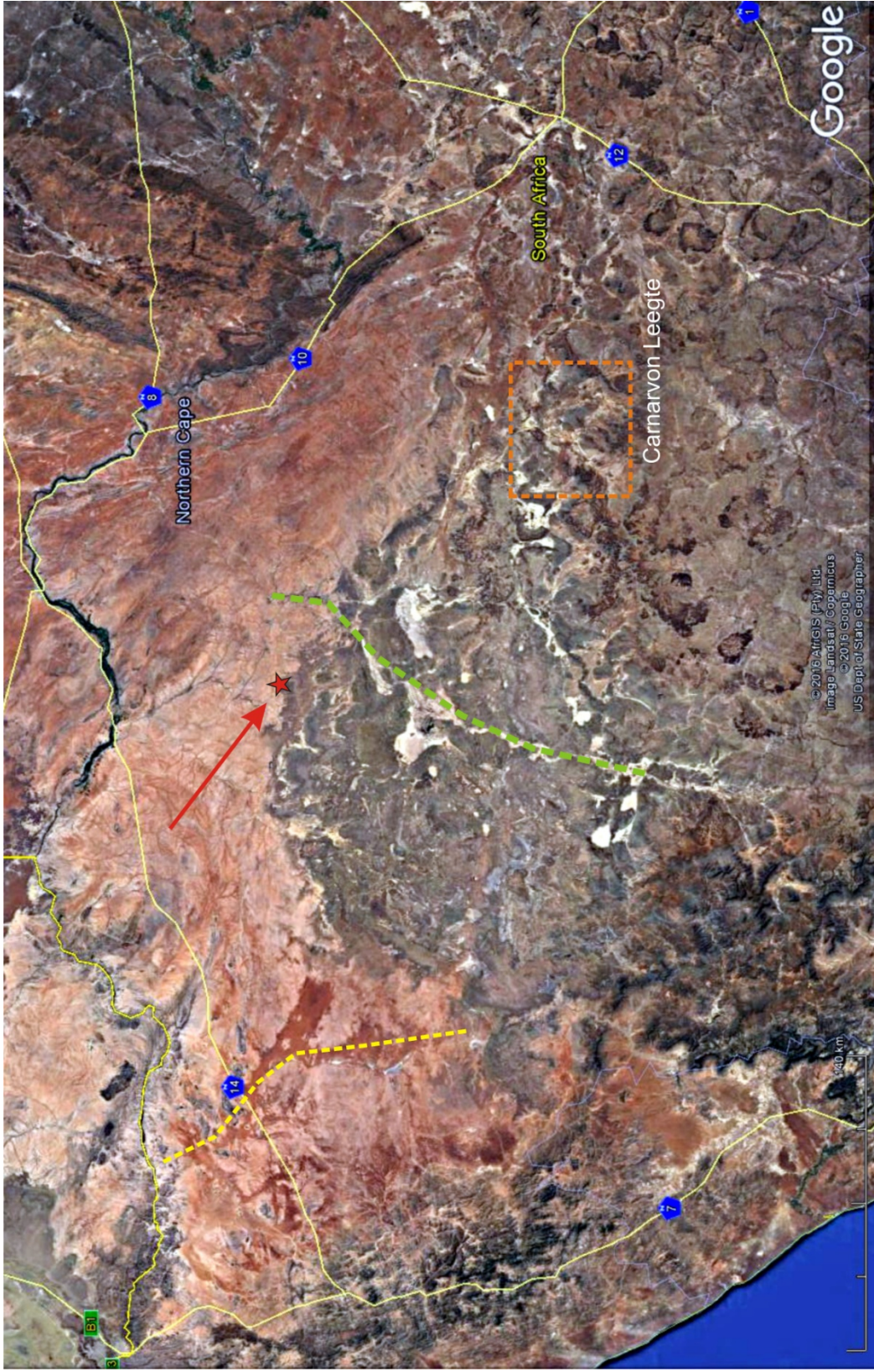


Figure 4. Tertiary Sak River and Koa Valley fluvial systems (green and yellow line, respectively) Aries footprint marked by red star.

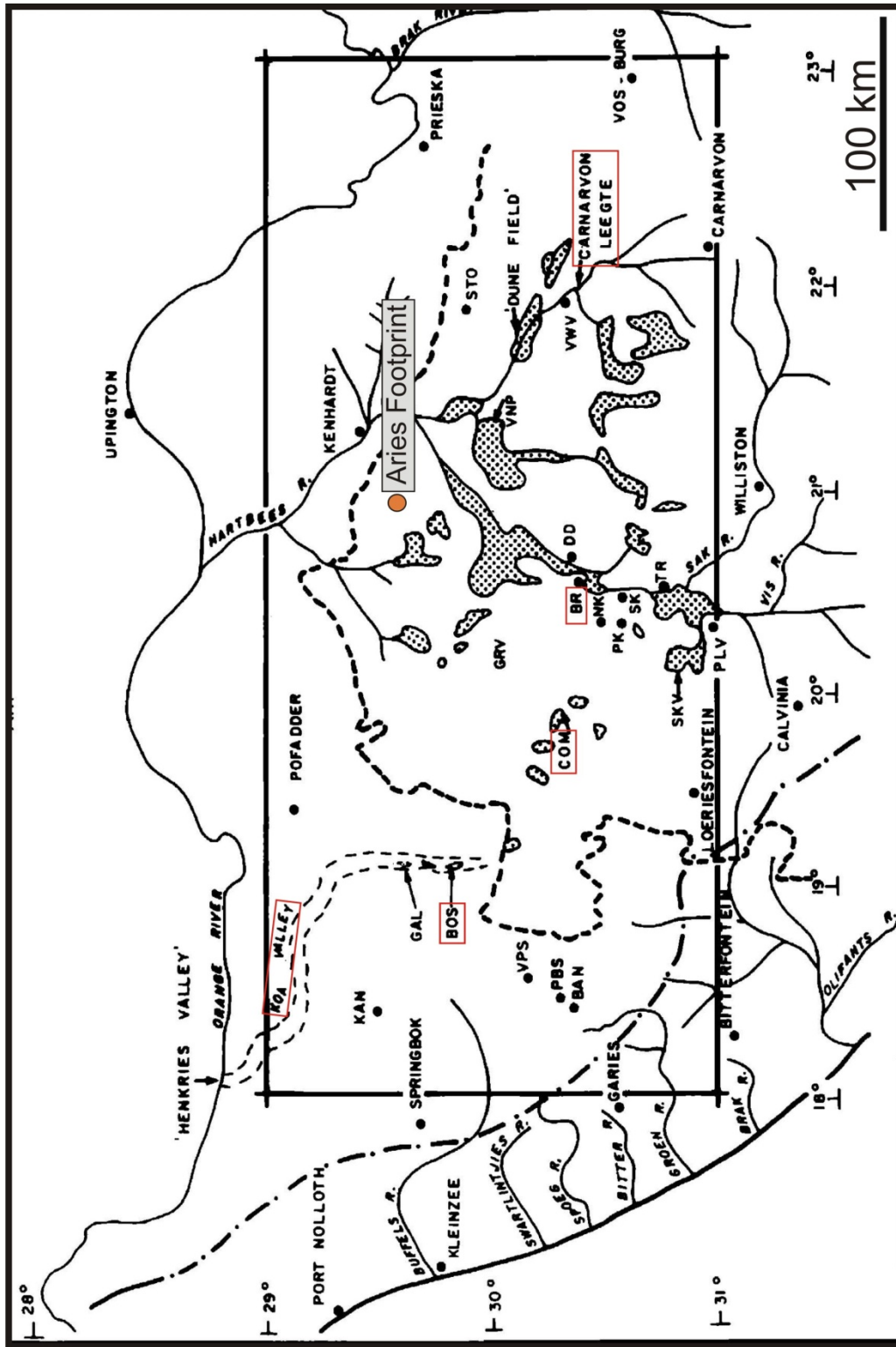


Figure 5. Sites and localities associated with potentially fossil-bearing Tertiary fluvial sediments, BR = Brandvlei, COM = Commissioners Pan; BOS = Bosluispan (after De Wit 1999).

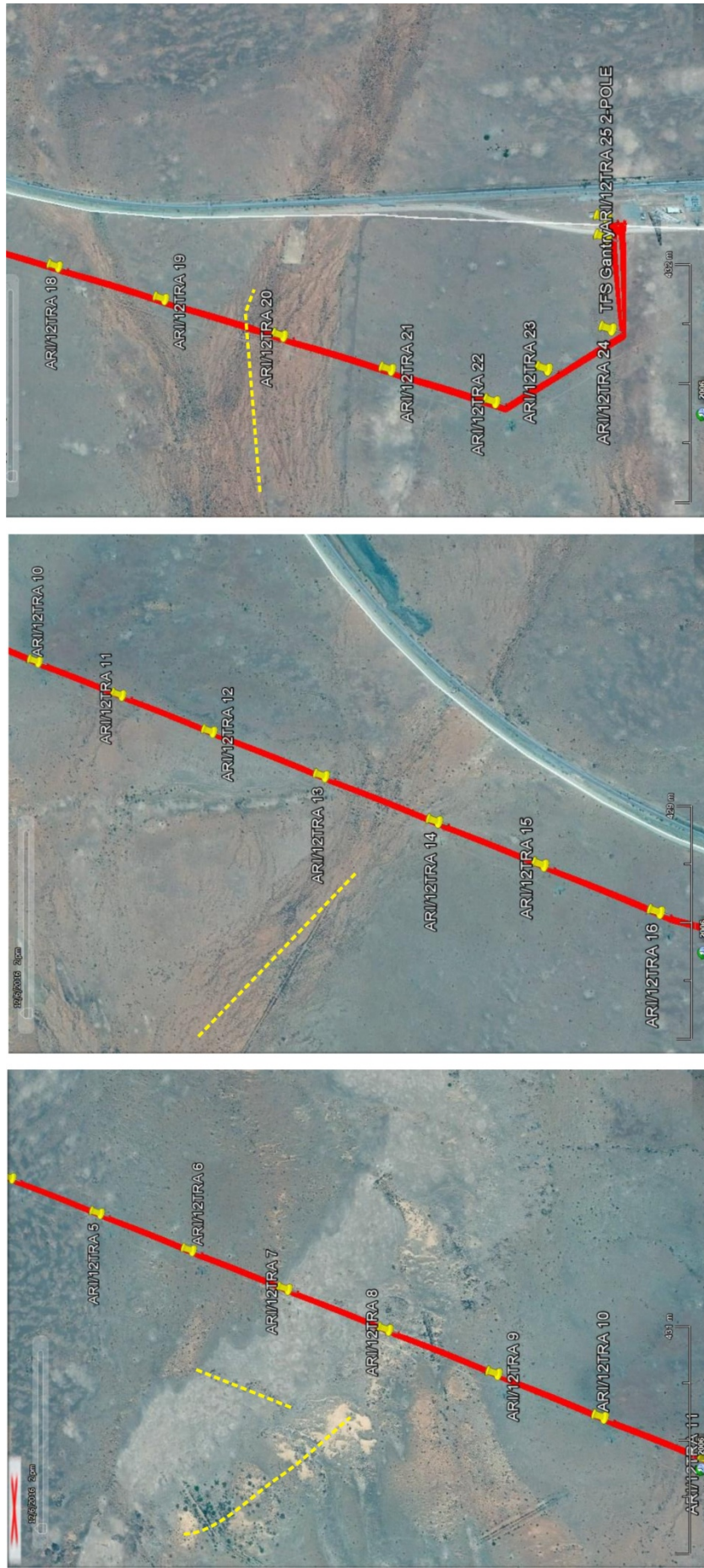


Figure 6. Potentially sensitive areas include water courses, linear depressions and well-developed pan dune deposits.