

Palaeontological desktop study of the proposed redevelopment of the Prieska Copper Mine (PCM) at Copperton near Prieska, NC Province.

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Summary

The proposed development footprint is underlain by Precambrian metamorphic rocks and Permo-Carboniferous Karoo Supergroup sediments capped by aeolian sand. The planned development will impact non-fossiliferous metamorphic rocks and superficial deposits (aeolian sand) of low to very low palaeontological sensitivity. As far as the palaeontological heritage is concerned, the proposed development may proceed with no further palaeontological assessments required.

Introduction

The report is a preliminary assessment of potential palaeontological impact with regard to planned redevelopment of the Prieska Copper Mine. Planned operations would initially exploit the near-surface (down to 105 m below surface) zone of the Copperton Deposit that was left unmined to serve as the underground mine's crown pillar. Then mining will advance to the deeper (>900 m below surface) sulphide resources that remained after the mine was shut down in 1991 (**Fig. 1 & 2**).

1:50 000 topographic map 2922CD Copperton

1:250 000 geological map 2922 Prieska

Site coordinates: 29°57'51.86"S 22°18'19.06"E

Methodology

The assessment was carried out in accordance with National Heritage Resources Act 25 of 1999 with the aim to assess the potential impact on palaeontological heritage resources that may result from the proposed development. The palaeontological significance of the affected

areas were evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature.

Assumptions and Limitations

The assessment provided within this report is based upon a desktop study without the benefit of a site visit. As such, the presentation of geological units present within the study area is derived from 1:250 000 geological maps that may vary in their accuracy. It is also assumed, for the sake of prudence, that fossil remains are always uniformly distributed in fossil-bearing rock units, although in reality their distribution may vary significantly.

Geology

According to the 1:250 000 scale geological map of the area (2922 Prieska), the proposed development footprint is underlain by Precambrian basement rocks that are metamorphic in origin (*Ms*, *Mv*, *Mu*) and sedimentary bedrock strata represented by small outcrops of the Permo-Carboniferous Mbizane Formation (*C-Pd*, Dwyka Group, Karoo Supergroup) that are capped Late Cenozoic (Quaternary) superficial deposits of the Gordonia Formation (*Qg*) (**Fig. 3**).

Palaeontology

The Precambrian metamorphic rocks (*Ms*, *Mv*, *Mu*) are not considered to be palaeontologically significant. The glacially-related sediments of the Mbizane Formation (Dwyka Group, *C-Pd*), is regarded as a heterolithic unit recognized in the upper part of the Dwyka Group of the Karoo Supergroup 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 (Almond and Pether 2008). Superficial deposits are primarily represented by windblown Gordonia Formation (Kalahari Group) sand, surface gravels and alluvium along stream incisions. The geologically recent aeolian sand overburden in the region is generally not considered to be fossiliferous. Localized fossil-rich alluvial exposures, assigned to the Quaternary have been retrieved from

alluvial sediments along the Ongers River near Britstown, while Florisian type faunal remains have been excavated from an archaeological site at Bundu Farm Pan near Copperton (Brink *et al.* 1995; Kiberd 2006).

Impact Statement

The desktop investigation indicates that the proposed development will mainly impact non-fossiliferous Precambrian metamorphic rocks and superficial deposits (aeolian sands) of low to very low palaeontological sensitivity. The impact area is not situated in or near pan deposits (considered to be potentially fossiliferous in the region).

Recommendations

As far as the palaeontological heritage is concerned, the proposed development may proceed with no further palaeontological assessments required. If, in the *unlikely* event that localized fossil material is discovered within the sandy overburden during the operational phase of the project, it is recommended that a professional palaeontologist be called to record and rescue the fossils where necessary.

References

- Almond, J.E. & Pether, J. 2008. *Palaeontological heritage of the Northern Cape*. Interim SAHRA technical report, 124 pp. Natura Viva cc, Cape Town.
- Brink, J.S., de Bruijn, H., Rademeyer, L.B. and van der Westhuizen, W.A. 1995. A new *Megalotragus priscus* (Alcelaphini, Bovidae) from the central Karoo, South Africa. *Palaeontologia africana* 32: 17-22
- 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.
- Von Brunn, V. & Visser, J.N.J. 1999. Lithostratigraphy of the Mbizane Formation (Dwyka group). *South African Committee for Stratigraphy, Lithostratigraphic Series No. 32*, 10 pp. 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', written in a cursive style.

12 / 10 / 2017

Figures

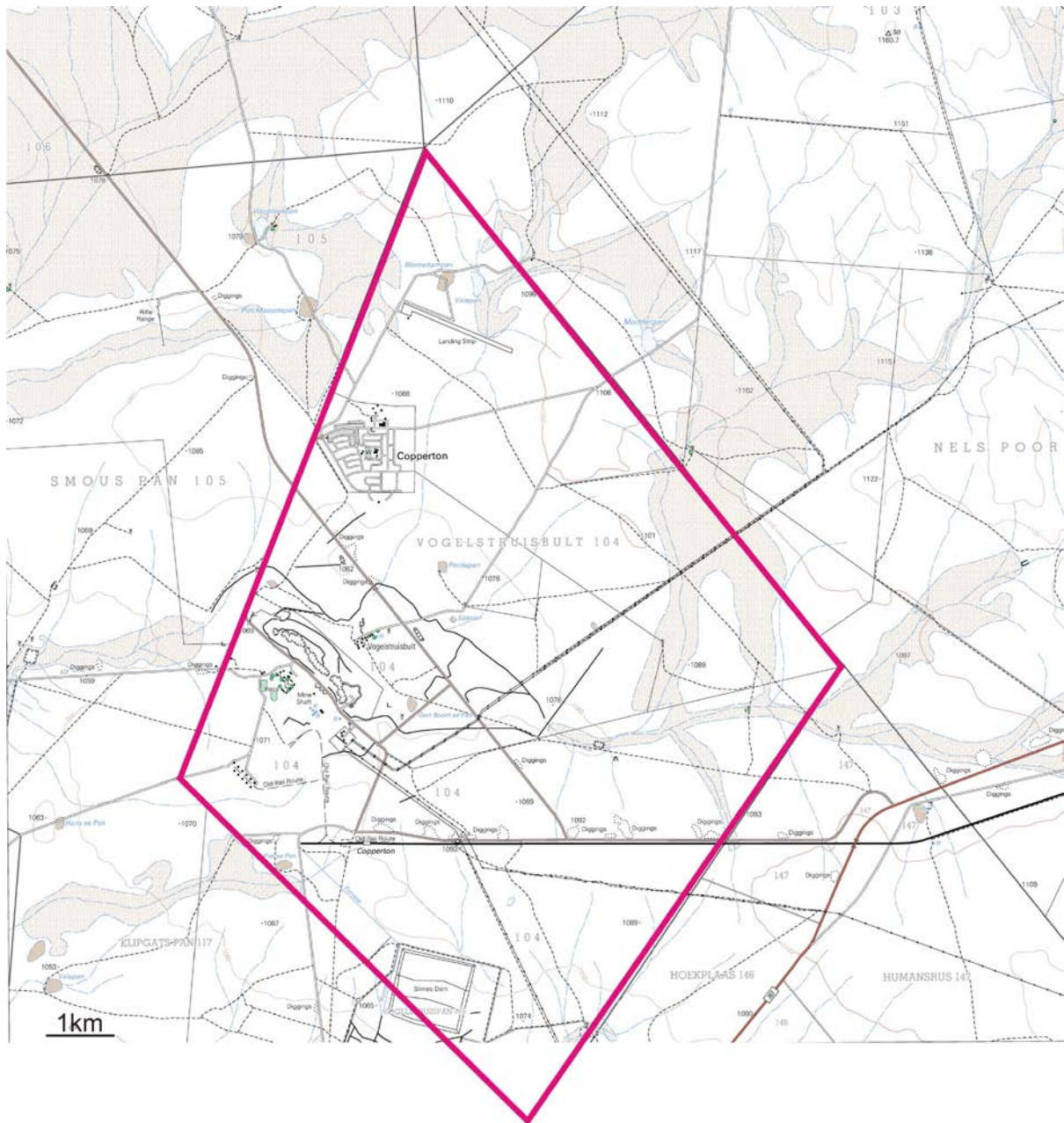


Figure 1. Map of the study area (portion of 1:50 000 scale topographic 2922CD Copperton).

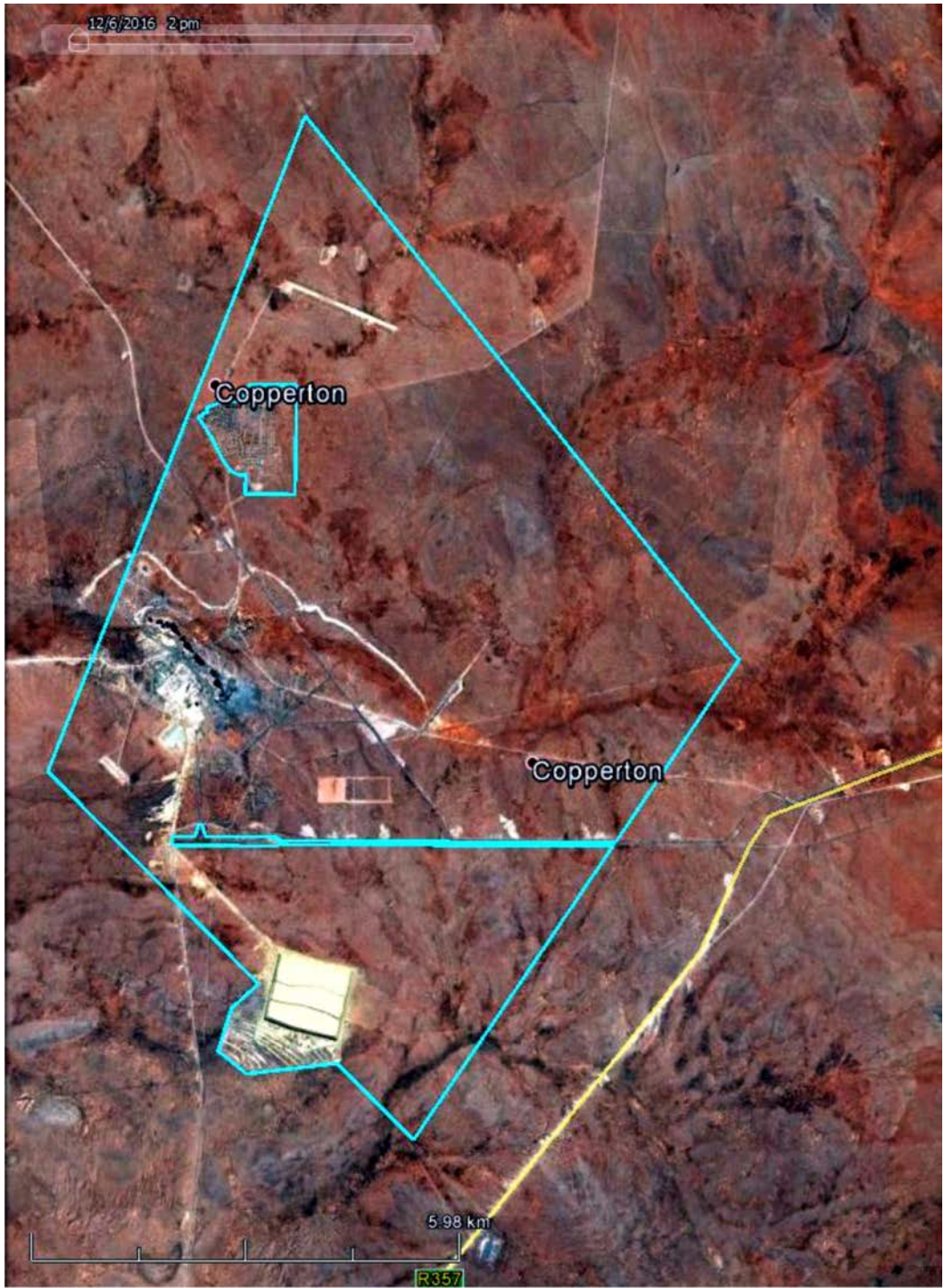


Figure 2. Aerial view of the study area.

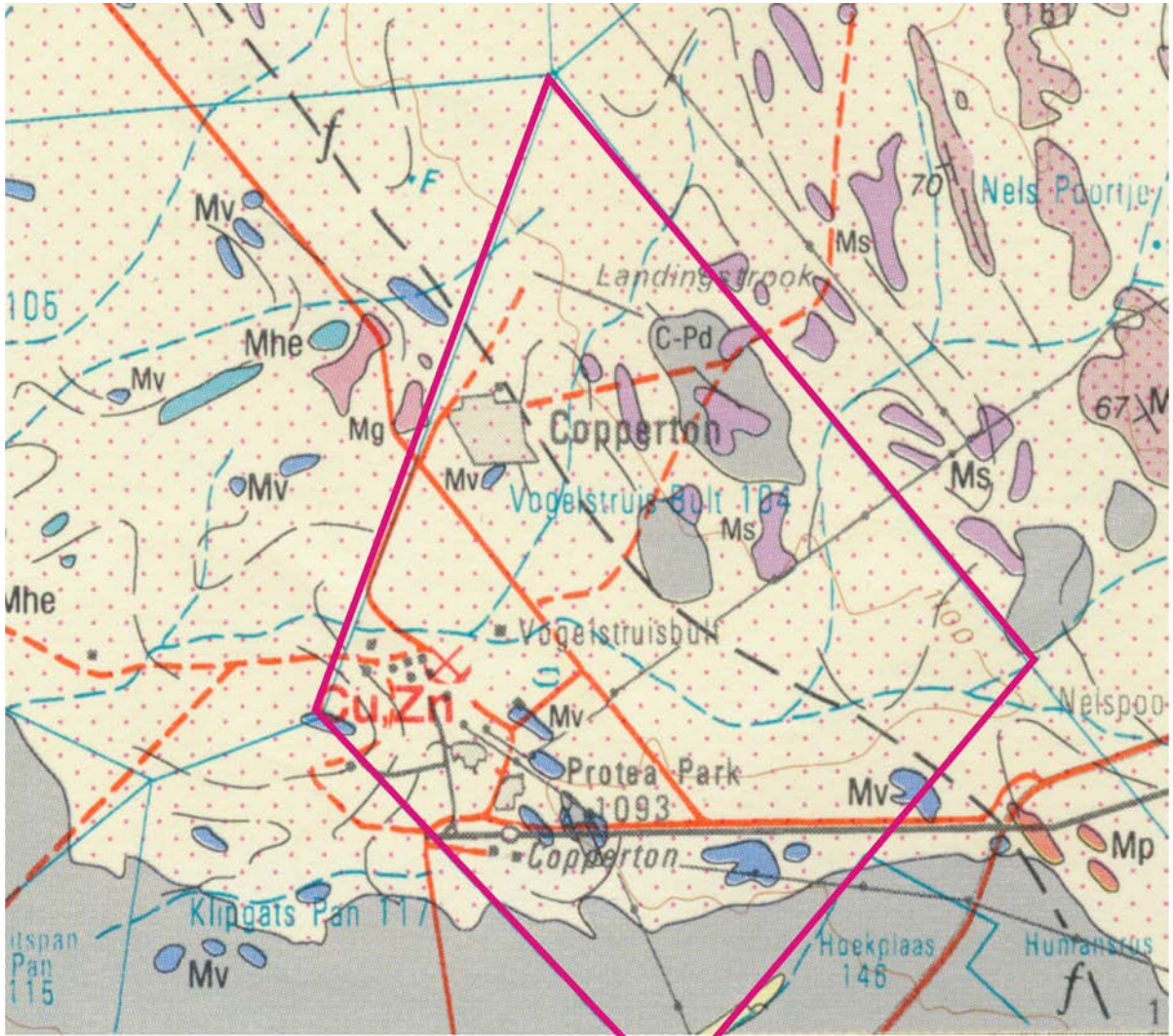


Figure 3. According to the 1:250 000 scale geological 2922 Prieska, the site is underlain by Precambrian metamorphic basement rocks (Ms, Mv, Mu) and sedimentary bedrock strata represented by small outcrops of the Permo-Carboniferous Mbizane Formation (C-Pd, Dwyka Group, Karoo Supergroup), all capped Late Cenozoic (Quaternary) superficial deposits of the Gordonia Formation (Qg).