

Palaeontological Desktop Study of Verkykerskop, Free State Province.

Report prepared for
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Executive Summary

- At the request of MDA Environmental Consultants, a Palaeontological Desktop Assessment was carried out for the village of Verkykerskop, located between Harrismith and Memel, northeastern Free State Province.
- The desktop evaluation indicates that Verkykerskop lies within the outcrop belt of the Normandien Formation (late Permian Schoondraai and Harrismith Members) and overlying Tarkastad Subgroup rocks (early Triassic Verkykerskop and Driekoppen Formations).
- The potentially fossil-bearing Normandien Formation is generally considered to be of high palaeontological sensitivity whereas the overlying Verkykerskop and Driekoppen Formations are not.
- Locally, younger unconsolidated sediments consist of Quaternary – age residual soils while alluvium occurs east and southeast of Verkykerskop.
- It is expected that infrastructure development at Verkykerskop will primarily impact on Quaternary-age residual soils of little palaeontological significance.
- Fossiliferous Normandien Formation outcrop and Tarkastad Subgroup rocks may also be impacted where excavations into bedrock is required.

Introduction

At the request of MDA in Bloemfontein, A Palaeontological Desktop Assessment was carried out at Verkykerskop in the Free State Province where planned development calls for the extension of its residential area (**Fig. 1**) The extent of the proposed development (over 5000 m²) falls within the requirements for a Heritage Impact Assessment (HIA) as required by Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act (Act No. 25 of 1999).

Description of the Affected Area

Locality Data

Maps: 1:50 000 topographical map 2729 CD Verkykerskop

General Town Coordinates: 27°55'17.01"S 29°17'4.64"E.

Verkykerskop is situated in the northeastern Free State along the R722 road between Harrismith and Memel (**Fig. 2**).

Geology

The geology of the region has been described by Muntingh (1989) and is lithostratigraphically subdivided into the lower Normandien Formation and upper Tarkastad Subgroup. From oldest to youngest, the geology around Verkykerskop is made up of Late Permian sandstones (Normandien Formation *Pn*: type profile from nearby Normandien Pass between Memel and Harrismith), early Triassic sandstones of the Tarkastad Subgroup (*Trv*, *Trd*), Jurassic dolerite intrusions (*Jd*, Karoo Dolerite Suite), Quaternary alluvium (flying bird symbol, **Fig. 3**) and residual soils. The Normandien Formation is distinguished by three sandstone members (Frankfort *Pf*, Roinek *Pr*, Schoondraai *Ps*) and one mudstone member (Harrismith *Trh*) and is interpreted to have been deposited by meandering streams flanked by wide, semi-arid floodplains (Groenwald 1990). The overlying Tarkastad Subgroup is represented by coarse to fine-grained sandstones of the Verkykerskop Formation (*Trv*) and mudstones and subordinate sandstones of the Driekoppen Formation (*Trd*).

Background

Karoo Fossils

Biostratigraphically, rocks belonging to the Normandien Formation are assigned to the Dicynodon Assemblage Zone. This assemblage zone (AZ) is characterized by the presence of a number of therapsids, including both *Dicynodon* and *Theriongnathus* (Kitching 1995). According to Groenwald (1990), three fossil species, namely *Dicynodon lacerticeps*, *Theriongnathus platyceps* and *Prorubidgea maccabei*, are present in the Schoondraai Member of the Normandien Formation, while *Lystrosaurus murrayi* sans *Dicynodon lacerticeps* is present in the overlying Harrismith Member (**Fig. 4**). No vertebrate fossils have been found in the Verkykerskop and Driekoppen Formations (Tarkastad Subgroup).

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.

Late Cenozoic Deposits

Small, fossil rich alluvial exposures (Cornelia Formation) have been recorded near the Vaal River, about 75 km northwest of Verkykerskop. These Quaternary deposits are characterized by several distinct fossil mammal species, including *Stylochoerus compactus*, *Connochaetes laticornutus* and *Megalotragus eucornutus* (Butzer *et al.* 1974; Brink & Rossouw 2000). There is currently no record of Cornelia Formation sediments in the vicinity of Verkykerskop.

Significance of Impacts and Recommendations

Verkykerskop lies within the outcrop belt of the Normandien Formation (late Permian Schoondraai and Harrismith Members) and overlying Tarkastad Subgroup rocks (early Triassic Verkykerskop and Driekoppen Formations). The potentially fossil-bearing Normandien Formation is generally considered to be of high palaeontological sensitivity whereas the overlying Verkykerskop and Driekoppen Formations are not. Locally, younger unconsolidated sediments consist of Quaternary – age residual soils while alluvium occurs east and southeast of Verkykerskop. Quaternary alluvial deposits along the Meul River, located 6 km southeast of Verkykerskop, may contain Quaternary fossil mammal remains.

It is expected that infrastructure development at Verkykerskop will primarily impact on Quaternary-age residual soils of little palaeontological significance. However, fossiliferous Normandien Formation outcrop and Tarkastad Subgroup rocks may also be impacted where excavations into bedrock is required.

References

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Table 2. Summary of potential impacts at Verkykerskop.

Rock type / Age	Duration of Development	Overall Palaeontological significance	Palaeontological Impact at site
Alluvium, Residual soils (Quaternary)	Permanent	Low	Low
Dolerite Suite, <i>Jd</i> (Jurassic)	Permanent	None	None
Mudstone, Sandstone; Normandien Formation, <i>Pn</i> (Permian)	Permanent	Moderate - High	Moderate
Mudstone, Sandstone; Verkykerskop Formation (Trv), Driekoppen Formation (Trd) Tarkastad Subgroup (Triassic)	Permanent	Low	Low



Figure 1. Portion of 1:50 000 scale topographic map 2729 CD Verkykerskop of the village of Verkykerskop.

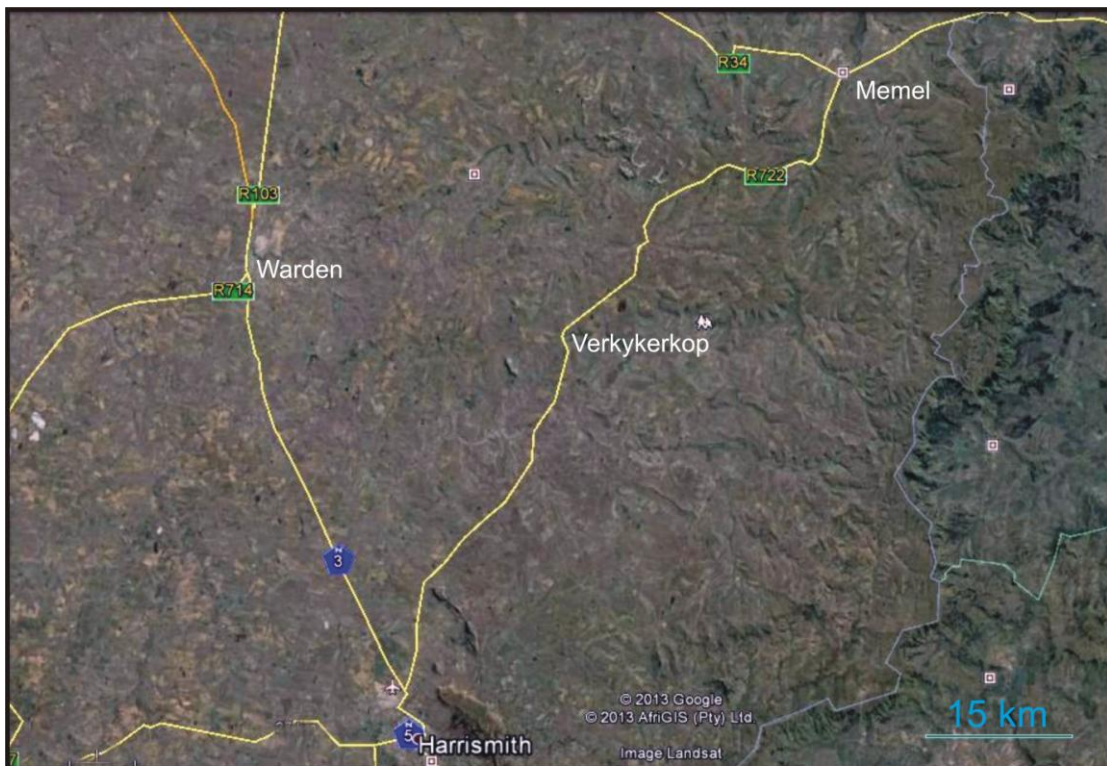


Figure 2. Position of Verkykerskop in relation to other towns in the northeastern Free State.

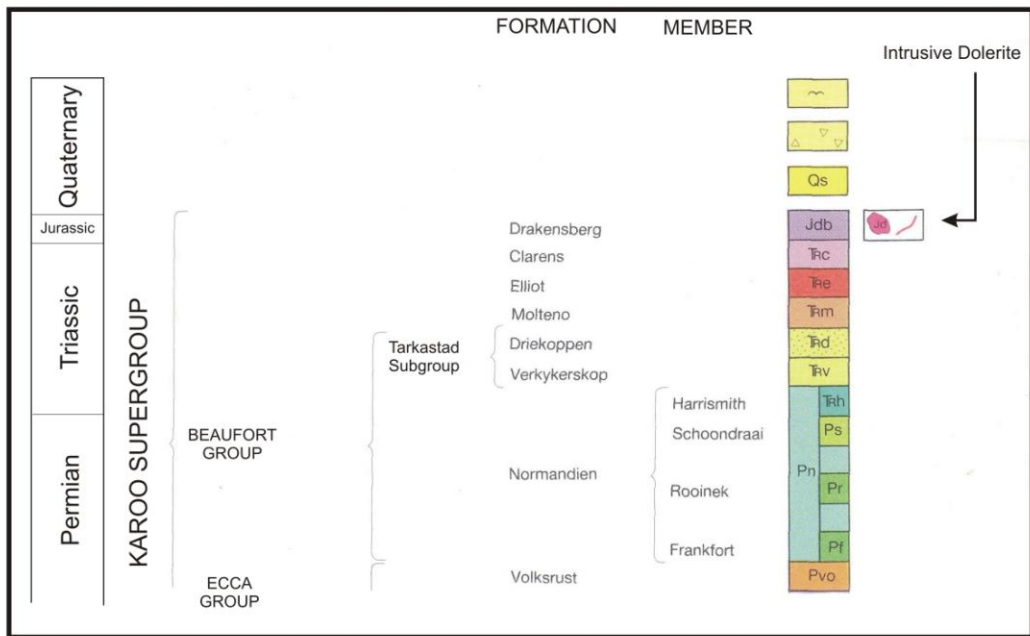
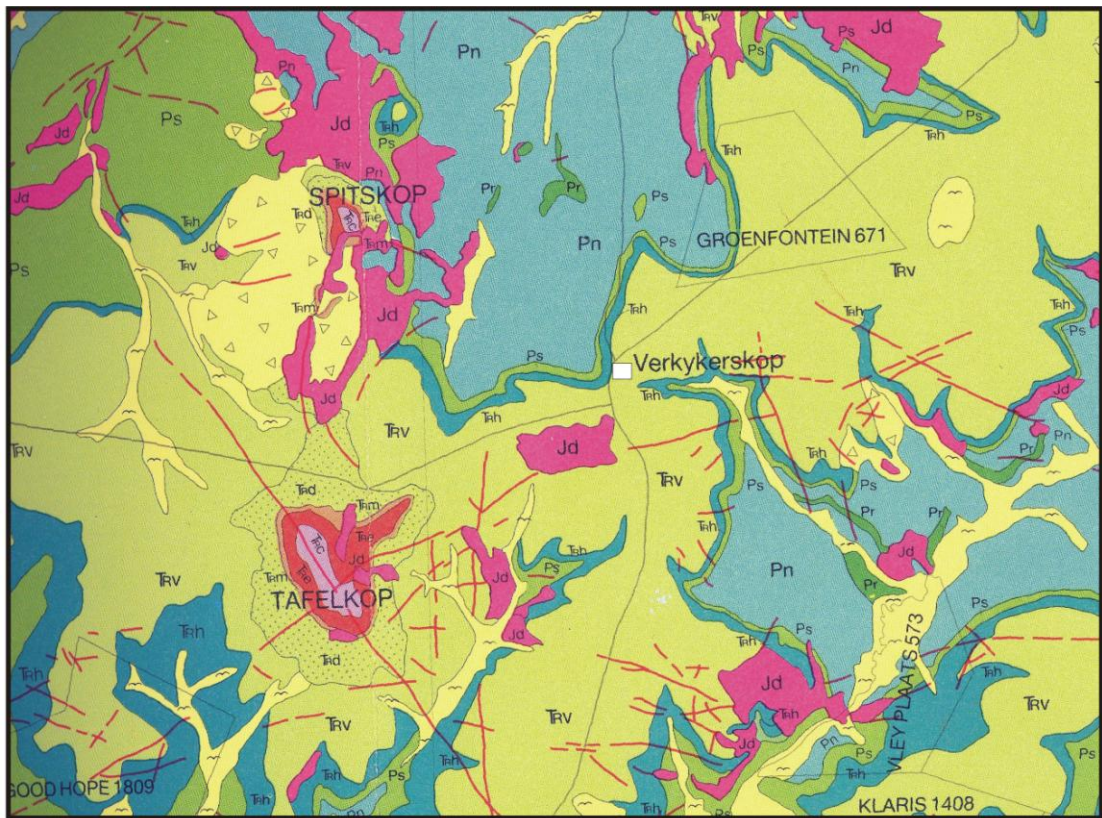


Figure 3. Portion of 250 000 scale geological map 2728 Frankfort. From oldest to youngest, the geology around Verkykerskop is made up of Late Permian sandstones (Normandien Formation, *Pn*), early Triassic sandstones of the Tarkastad Subgroup (*Trv*, *Trd*), Jurassic dolerite intrusions (Karoo Dolerite Suite, *Jd*), and Quaternary alluvium (flying bird symbol).

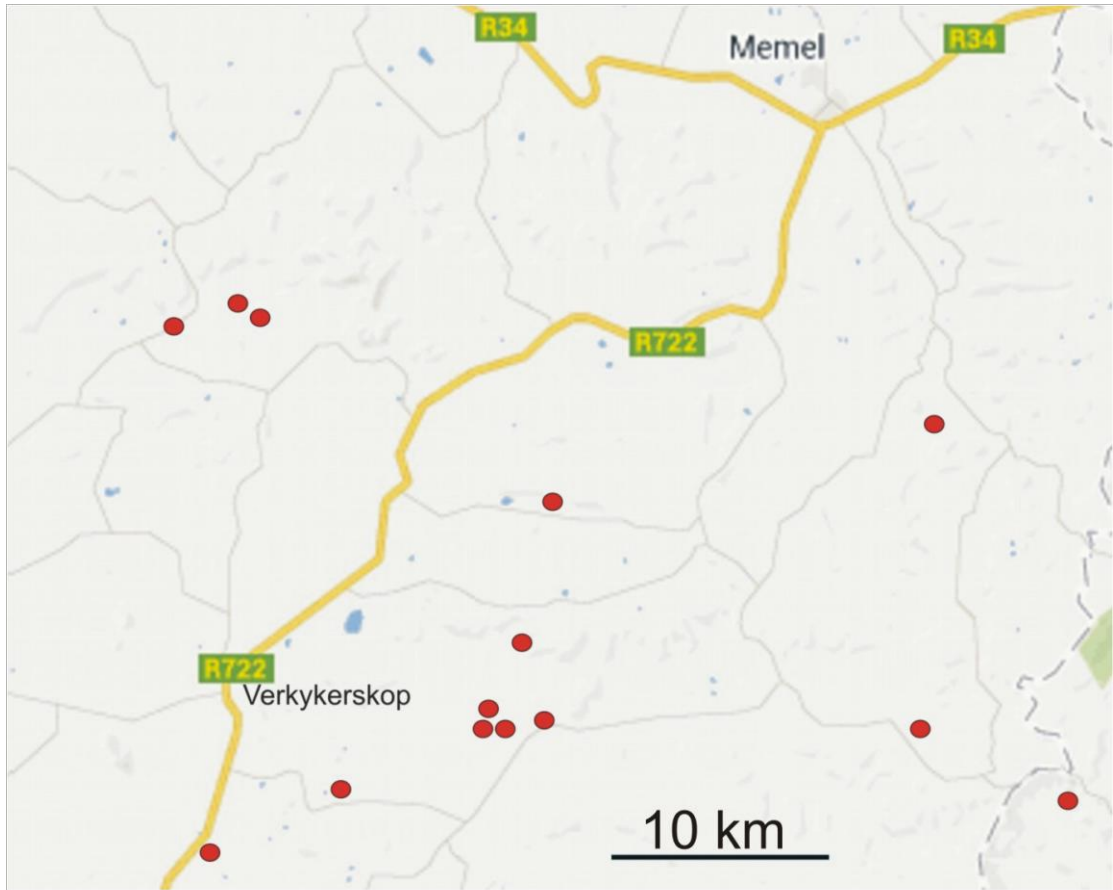


Figure 4. Karoo fossil vertebrate localities recorded near Verkykerskop (Groenewald 1990).



Figure 5. Fossil-rich alluvium of the Cornelia Formation exposed at the Brakspruit southeast of Villiers.