

Phase 1 Palaeontological and Archaeological Impact  
Assessment of the proposed township extension at  
Zamani, Memel, Phumelela Local Municipality, Free  
State Province.

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## Executive Summary

- A Phase 1 Heritage Impact Assessment was carried out in Memel where anticipated development calls for the development of 2000 erven for the proposed Zamani Township extension.
- The site is situated near and within a densely populated residential area where the landscape has been disturbed by suburban development and prior building activities.
- There is no evidence of intact or capped Stone Age archaeological material or Quaternary fossil remains within the confines of the affected areas.
- There are no indications of Iron Age structures or rock engravings within the affected areas.
- There is also no evidence of graves, graveyards or historical structures within the confines of the affected areas.
- It is also unlikely that the proposed development will significantly impact on potentially fossil-bearing bedrock because of substantial Quaternary overburden and underlying dolerite bedrock.
- However, in the event where deep trench excavations could affect underlying Normandien Formation strata, it is advised that newly uncovered objects of palaeontological significance must be reported to the relevant heritage authorities (SAHRA or FSPHRA).
- There are **no major archaeological or palaeontological grounds** to suspend the proposed development.
- **The site** has been sufficiently recorded, mapped and documented in terms of conditions necessary for a Phase 1 heritage impact assessment and **can be accessed for development**.
- Recommended Grading: General Protection C (Field Rating IV C)

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## **Introduction**

At the request of Phethogo Consulting in Bloemfontein, a Phase 1 Palaeontological and Archaeological Impact Assessment was carried out at a 198 ha site demarcated for the development of 2000 erven at Memel in the Free State Province (**Fig. 1-2**) The extent of the proposed development (over 5000 m<sup>2</sup>) 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). The site visit and subsequent assessment took place during October 2013. The task involved identification of possible archaeological and paleontological sites or occurrences in the proposed zone, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

### **Methodology**

The desktop study provides an assessment of known and potential palaeontological and archaeological heritage within the study area, with recommendations for mitigation where considered necessary. The assessment is based on existing field data and published scientific literature. The geology represented within the study area was determined from published literature and associated geological maps. Relevant archaeological and palaeontological information were assimilated for the report and integrated with data acquired during the on-site inspection.

## **Description of the Affected Area**

### **Details of development and the area surveyed**

#### Details of area surveyed

Maps: 1:50 000 topographical map

Location Data:

The affected area is made up of 198 ha of open grassland divided by the Pampospruit that runs between Memel and the Zamani Township (**Fig. 3 - 4**).

### **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 the affected area is made up of Late Permian sandstones (Normandien Formation *Pn*: type profile from

nearby Normandien Pass between Memel and Harrismith), Jurassic dolerite intrusions (*Jd*, Karoo Dolerite Suite), Quaternary alluvium (flying bird symbol, **Fig 5**) and residual soils. The Normandien Formation is distinguished by three sandstone members (Frankfort *Pf*, Rooinek *Pr*, Schoondraai *Ps*) and one mudstone member (Harrismith *Trh*) and is interpreted to have been deposited by meandering streams flaked by wide, semi-arid floodplains (Groenwald 1990).

## **Background History**

### **Karoo Fossils**

Biostratigraphically, rocks belonging to the Normandien Formation are assigned to the Dicynodon Assemblage Zone (**Fig. 6**). The Assemblage Zone (AZ) is characterized by the presence of 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. 7**).

### **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 50 km northwest of Memel (**Fig. 8**). 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 Memel.

The archaeological footprint in the region is mainly represented by rock art sites and large numbers of Iron Age settlements that were built largely of stone. Rock paintings have been recorded in the Vrede and Warden districts on the farms Boschfontein 262, Stille Woning 365 and Goedgegeven 164.

Labeled Type N by Maggs (1976), the oldest Iron Age settlements from the north-eastern corner of the Free State provided radiocarbon dates going back to between the 15<sup>th</sup> and 17<sup>th</sup> century A.D. (**Fig. 9**). Named after Ntsuanatsatsi hill, the legendary

place of origin of the Fokeng people, which is situated between Frankfort and Vrede (Type site OU1, farm Helena, Maggs 1976), Type N settlement units are characterized by primary enclosures arranged in a ring linked by secondary walling thus forming a large secondary enclosure in the middle (**Fig. 10**). Pioneer missionaries Arbousset and Daumas reported on many stone ruins at Ntsuanatsatsi and also mentioned two other significant landmarks in the region that are relevant to pre-colonial Basotho history, namely Peme (Leeukop) and Sefate (Verkykerskop) (Dreyer 2001). Type N settlements subsequently led to Type V settlement units (Type site OO1 Makgwareng, Lindley District), after the former were replaced or converted into a new settlement pattern (Maggs 1976) (**Fig. 10**). Type V settlements spread out further to the south and east, but did not extend further than the Vet River and the Drakensberg escarpment.

## **Results of Survey**

The foot survey is summarized in **Fig. 11 - 13**. Potentially fossil-bearing bedrock (Normandien Formation) and intrusive dolerites are largely covered by Quaternary-age alluvium and residual soils (topsoils), but outcrop is visible along the Pampoemspruit (**Fig. 14**). The affected area has been severely disturbed by informal settlement and cattle grazing. There is no evidence of intact or capped Stone Age artefacts, Iron Age structures or Quaternary fossils within the confines of the footprint. There are no indications of prehistoric structures or rock engravings within the footprint area. Except for a modern graveyard located in the Zamani Township at S27 40 08.4 E29 33 42.7, there is also no evidence of graves, graveyards or historical structures older than 60 years within the confines of the footprint.

## **Statement of Significance**

Potential impacts are summarized in **Table 1**. Impact on potentially intact Stone Age archaeological remains, Iron Age structures or Quaternary fossils is considered unlikely. It is also unlikely that the proposed development will significantly impact on potentially fossil-bearing bedrock because of substantial Quaternary overburden and underlying dolerite bedrock (**Fig. 15**). However, in the event where deep trench excavations could affect underlying Normandien Formation strata, it is advised that newly uncovered objects of palaeontological significance must be reported to the relevant heritage authorities (SAHRA or FSPHRA).

## Recommendation

Recommended Grading: General Protection C (Field Rating IV C)

There are no major archaeological or palaeontological grounds to suspend the proposed development. The site has been sufficiently recorded, mapped and documented in terms of conditions necessary for a Phase 1 heritage impact assessment and can be accessed for development.

## References

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## Tables & Figures

**Table 1.** Summary of potential impacts at the site.

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



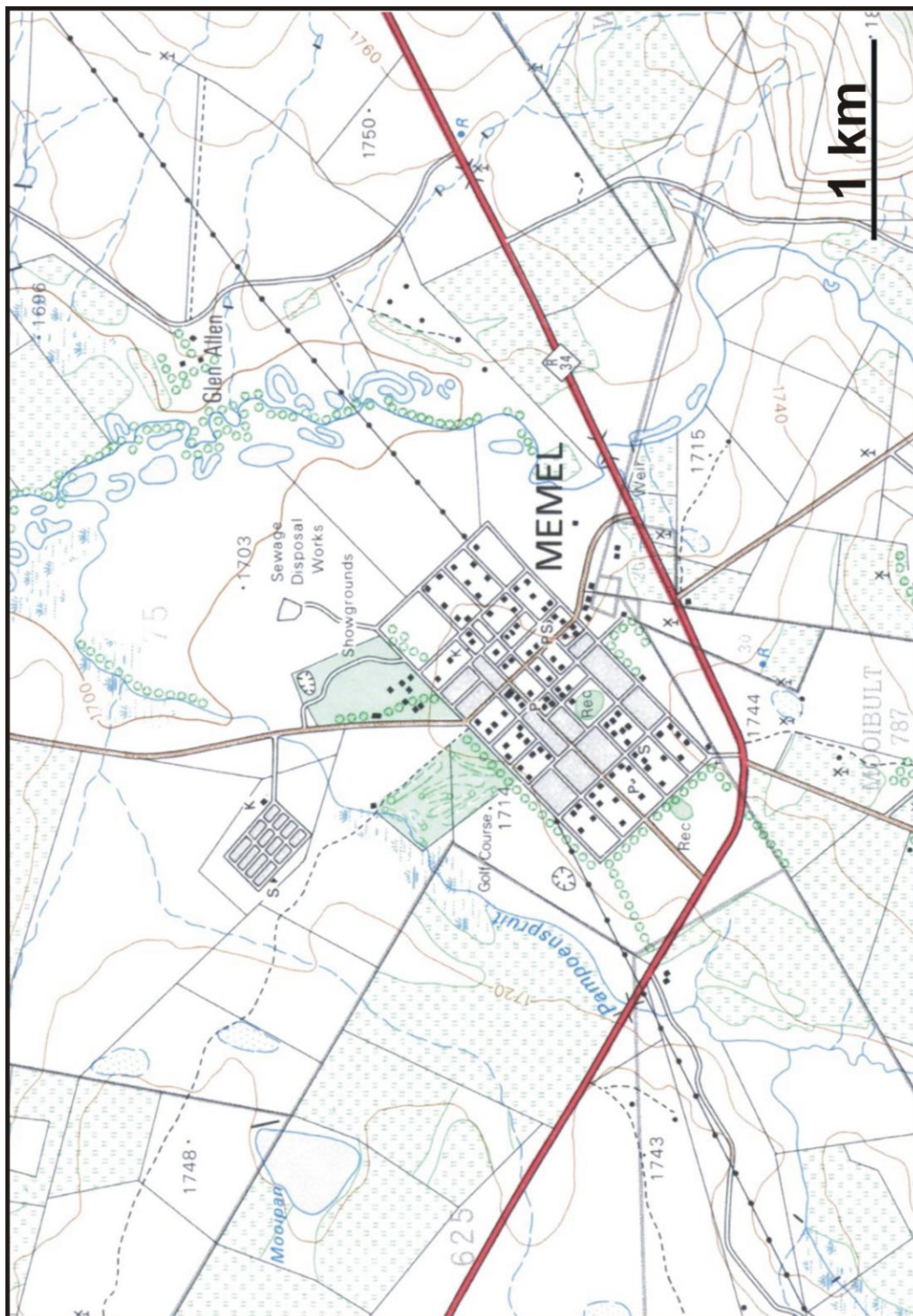


Figure 1. Portion of 1: 50 000 scale topographic map of Memel (2729DA Memel).

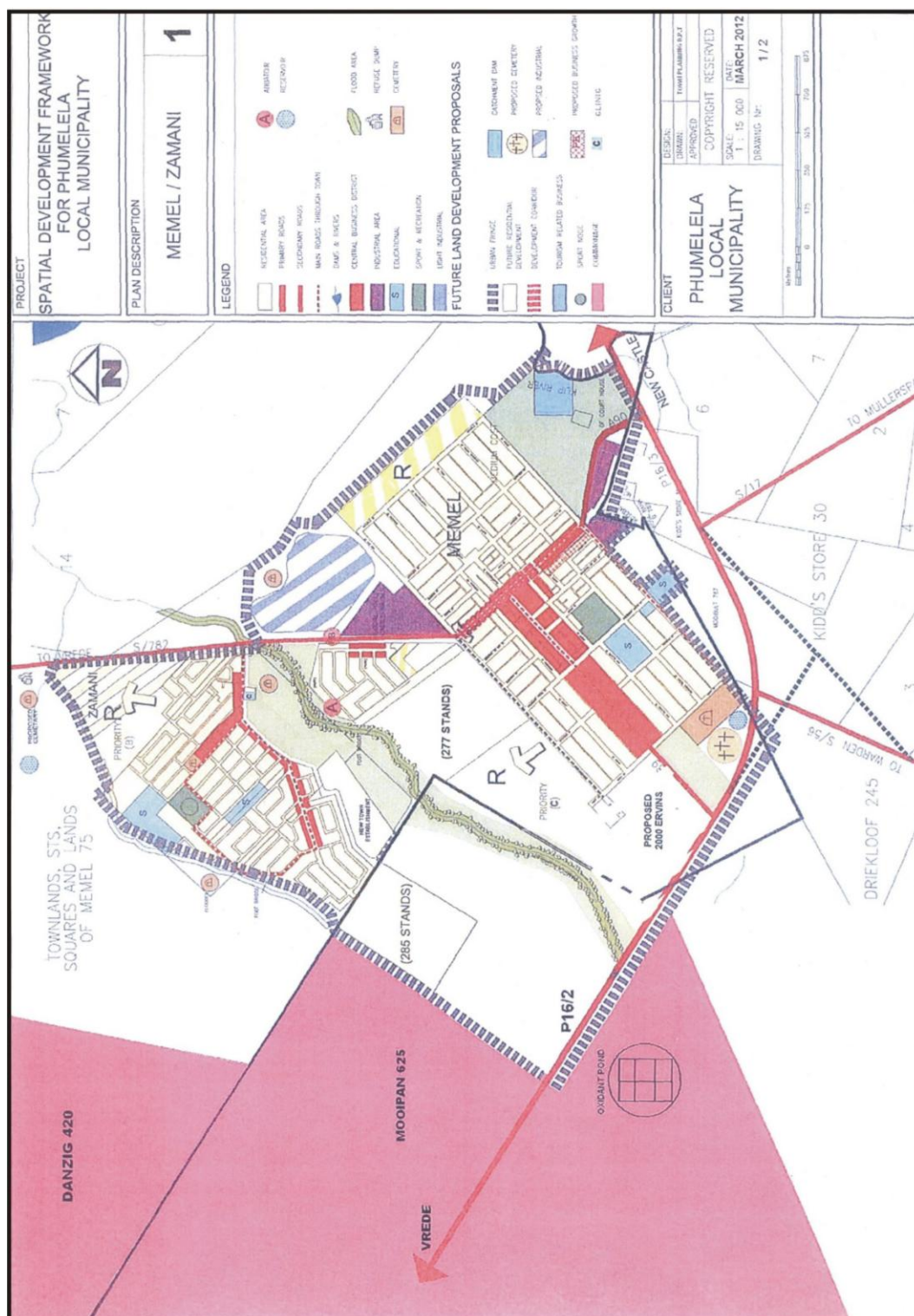






Figure 3. Aerial view of the proposed study area.

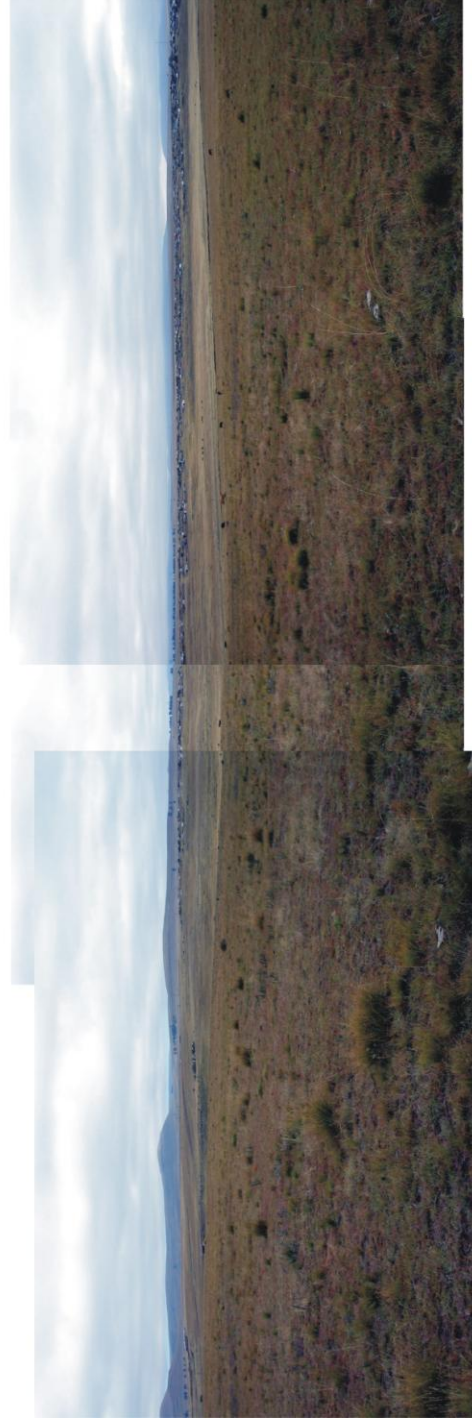
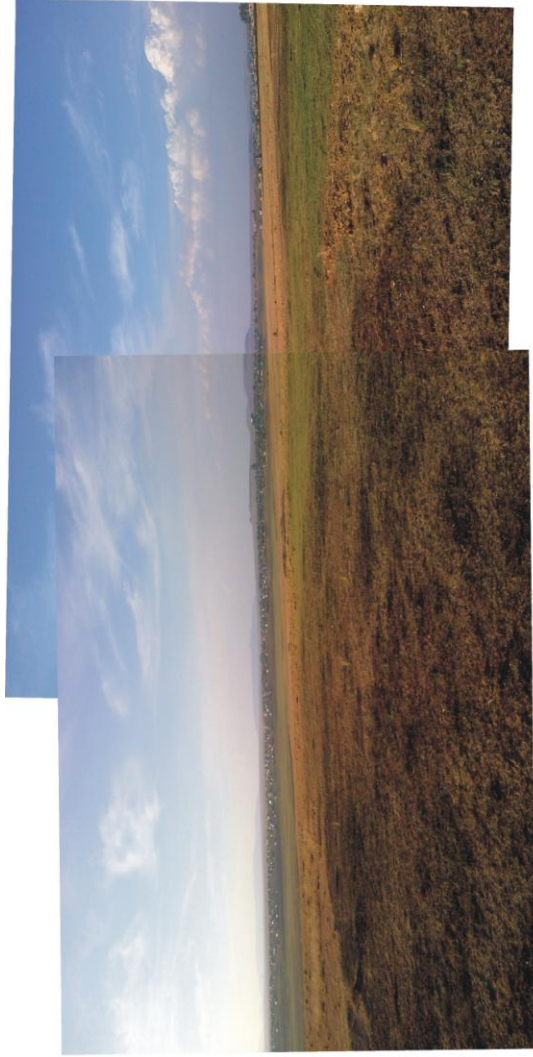


Figure 4. Panoramic view of the study area, looking north (above) and west (below).



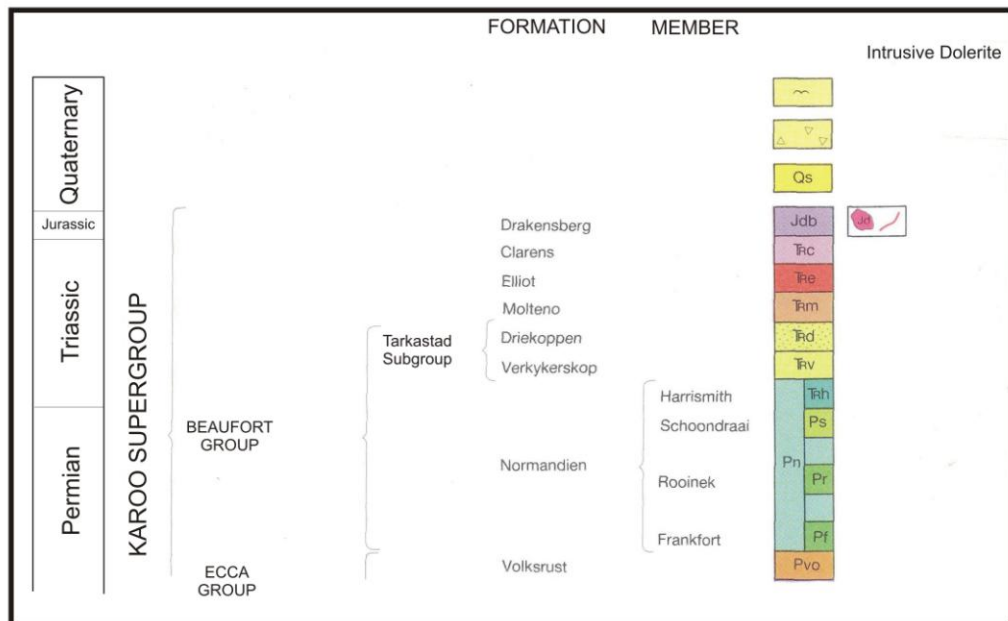
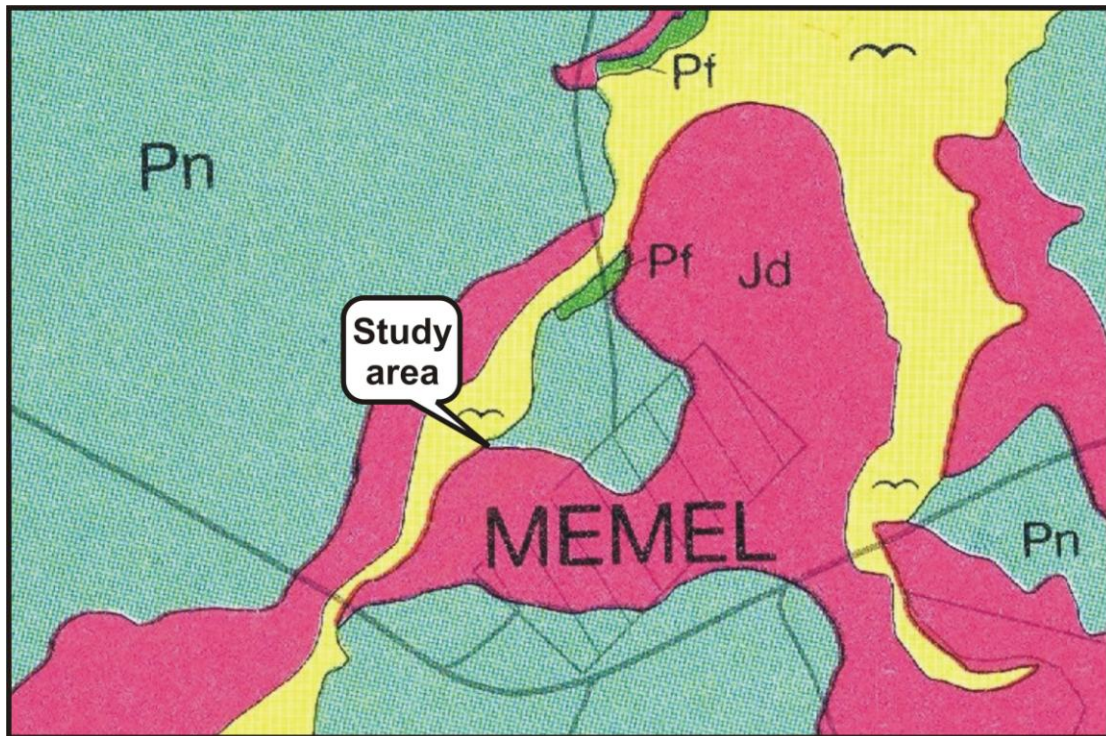


Figure 5. Portion of 1:250 000 scale geological map 2728 Frankfort. From oldest to youngest, the geology around the affected area is made up of Permo-Triassic sandstones (Normandien Formation, Pn, Beaufort Group), Jurassic dolerite intrusions (Jd, Karoo Dolerite Suite), Quaternary alluvium and residual soils. The Normandien Formation is distinguished by three sandstone members (Frankfort Pf, Rooinek Pr, Schoondraai Ps) and one mudstone member (Harrismith Trh).

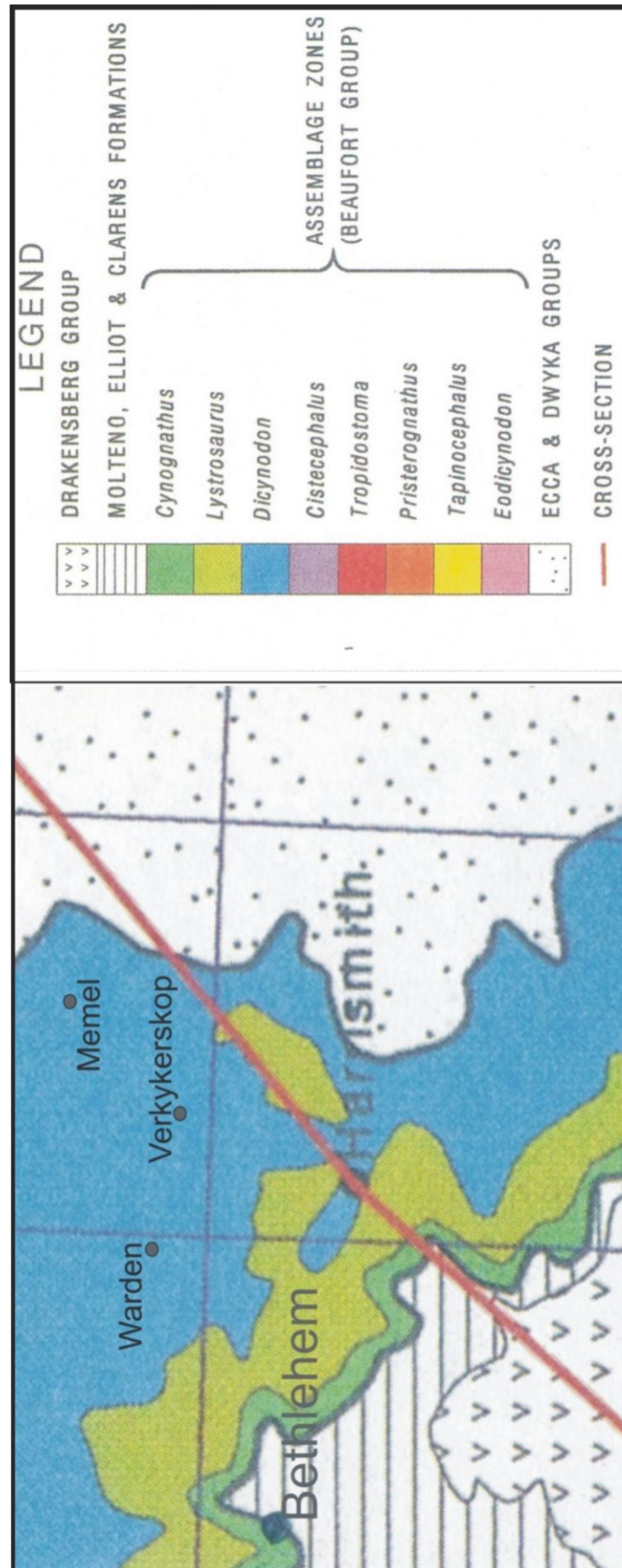


Figure 6. Geographical distribution of vertebrate biozones of the Beaufort Group between Memel and Bethlehem (after Rubidge 1995).



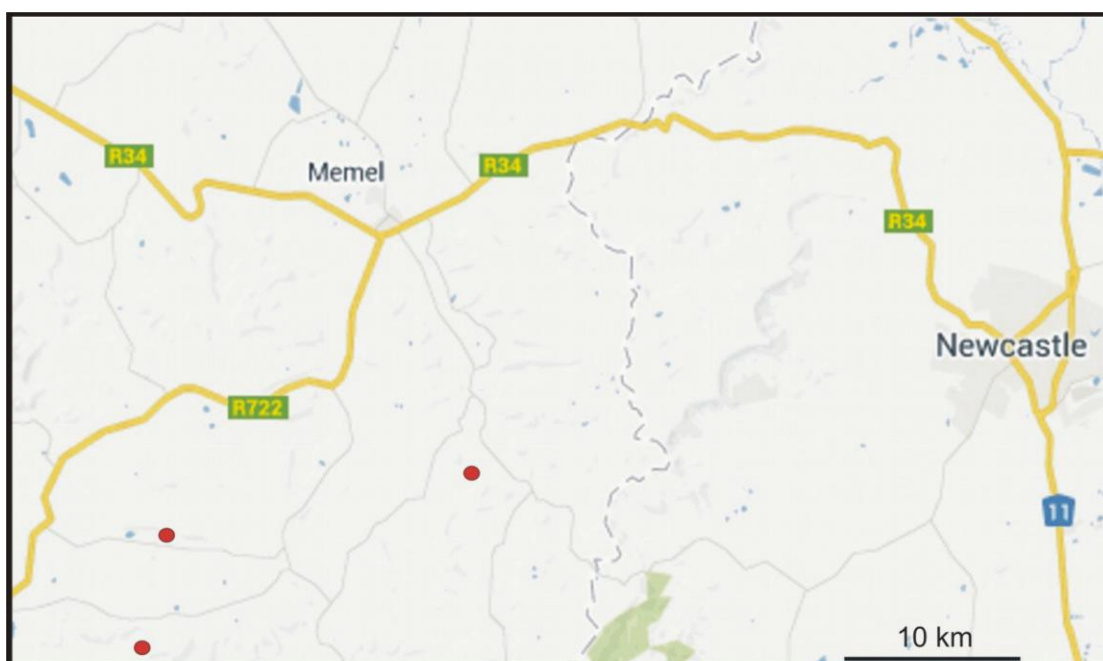


Figure 7. Karoo vertebrate fossil localities found in the vicinity of Memel (Groenewald 1990).



Figure 8. The fossil-rich Cornelia Formation type site locality near Cornelia.

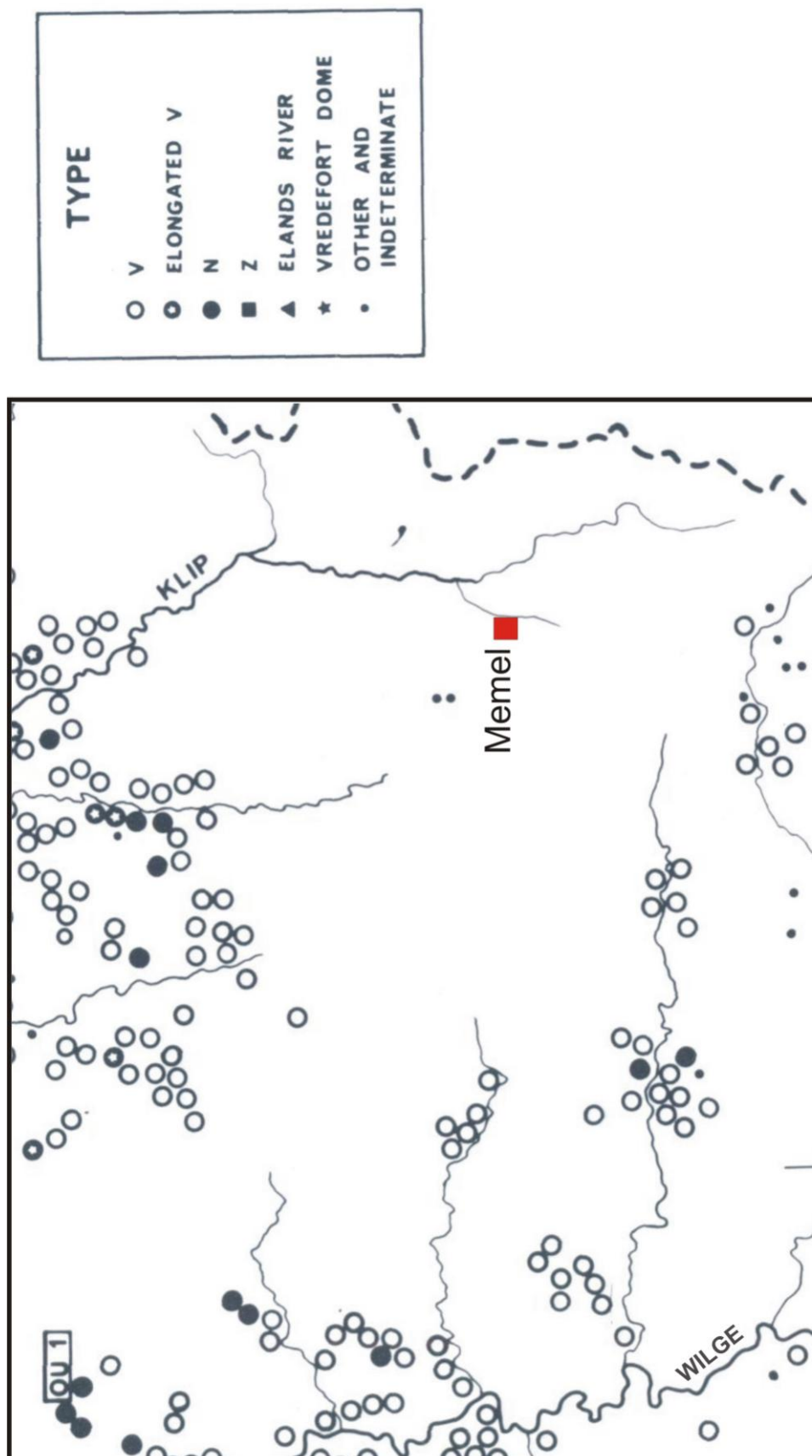


Figure 9. Distribution of Iron Age settlements near Memel (after Maggs 1976)



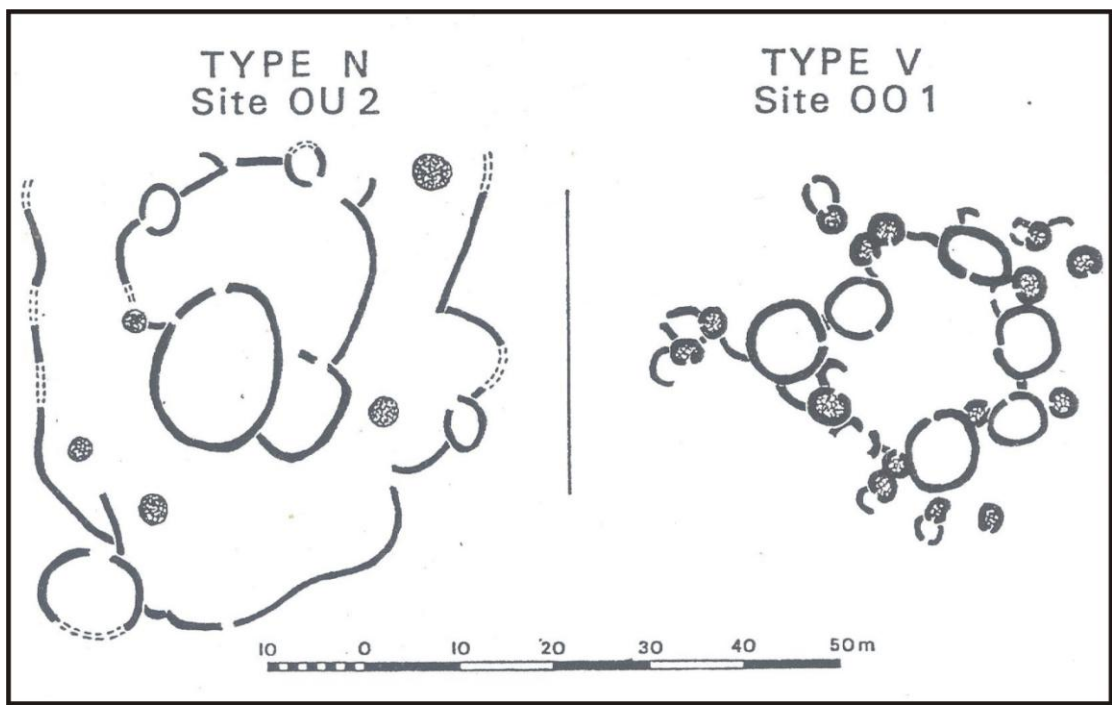


Figure 10. Iron Age settlement types found in the northeastern Free State (after Maggs 1976).



Figure 11. Zamani Township along the east bank of the Pampoenspruit





Figure 12. The site largely consist of open featureless grassland.





Figure 13. Looking northwest towards Zamani (above), the Pampospruit, looking southwest (middle) and along a Eucalyptus tree line, looking northeast (below).



Figure 14. Normandien Formation outcrop exposed along the Pampospruit.





Figure 15. Potentially fossil-bearing bedrock (Normandien Formation) and intrusive dolerites are largely covered by Quaternary-age alluvium and residual soils (topsoils).