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

Report prepared for Phethogo Consulting Bloemfontein by Paleo Field Services, PO Box 38806 Langenhovenpark 9330

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

Contents

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 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). 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 assessment consists of a desktop study as well as pedestrian survey of the site. 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

Locality data

Maps: 1:50 000 topographical map 2729 DA Memel

1:250 000 geological map 2728 Frankfort

General Site Coordinates (**Fig. 3**):

A) 27°40'54.78"S 29°32'39.18"E

B) 27°39'41.38"S 29°33'31.22"E

C) 27°40'38.75"S 29°33'48.34"E

D) 27°41'1.63"S 29°33'23.21"E

E) 27°41'8.53"S 29°33'30.49"E

F) 27°41'17.09"S 29°33'21.30"E

The affected area is made up of 198 ha of open grassland divided by the Pampoenspruit 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 *Theriognathus* (Kitching 1995). According to Groenwald (1990), three fossil species, namely *Dicynodon lacerticeps*, *Theriognathus 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. It is however moderately significant form an archaeological point of view as many Stone Age quarry sites ("factory" sites) are found at the foot of dolerite hills where hornfels or other metasediments may be exposed as a result of contact metamorphism.

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 15th and 17th 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 (coordinates 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.

Impact Statement

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**).

Recommendation

There are no major archaeological or palaeontological grounds to suspend the proposed development. In the event where deep trench excavations could affect underlying sedimentary bedrock sediments, it is advised that newly uncovered objects of palaeontological significance must be reported to the relevant heritage authorities (SAHRA or FSPHRA).

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

References

Brink, J.S. and Rossouw, L. 2000. New trial excavations at the Uitzoek-Cornelia typ locality. *Navorsinge van die Nasionale Museum* 16(6): 141 – 156.

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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	High	Moderate - High	Low	Low
Dolerite Suite, *Jd* (Jurassic)	Permanent	None	Low	None	None
Mudstone, Sandstone; Normandien Formation, *Pn* (Permian)	Permanent	Moderate - High	Low	Low	Low

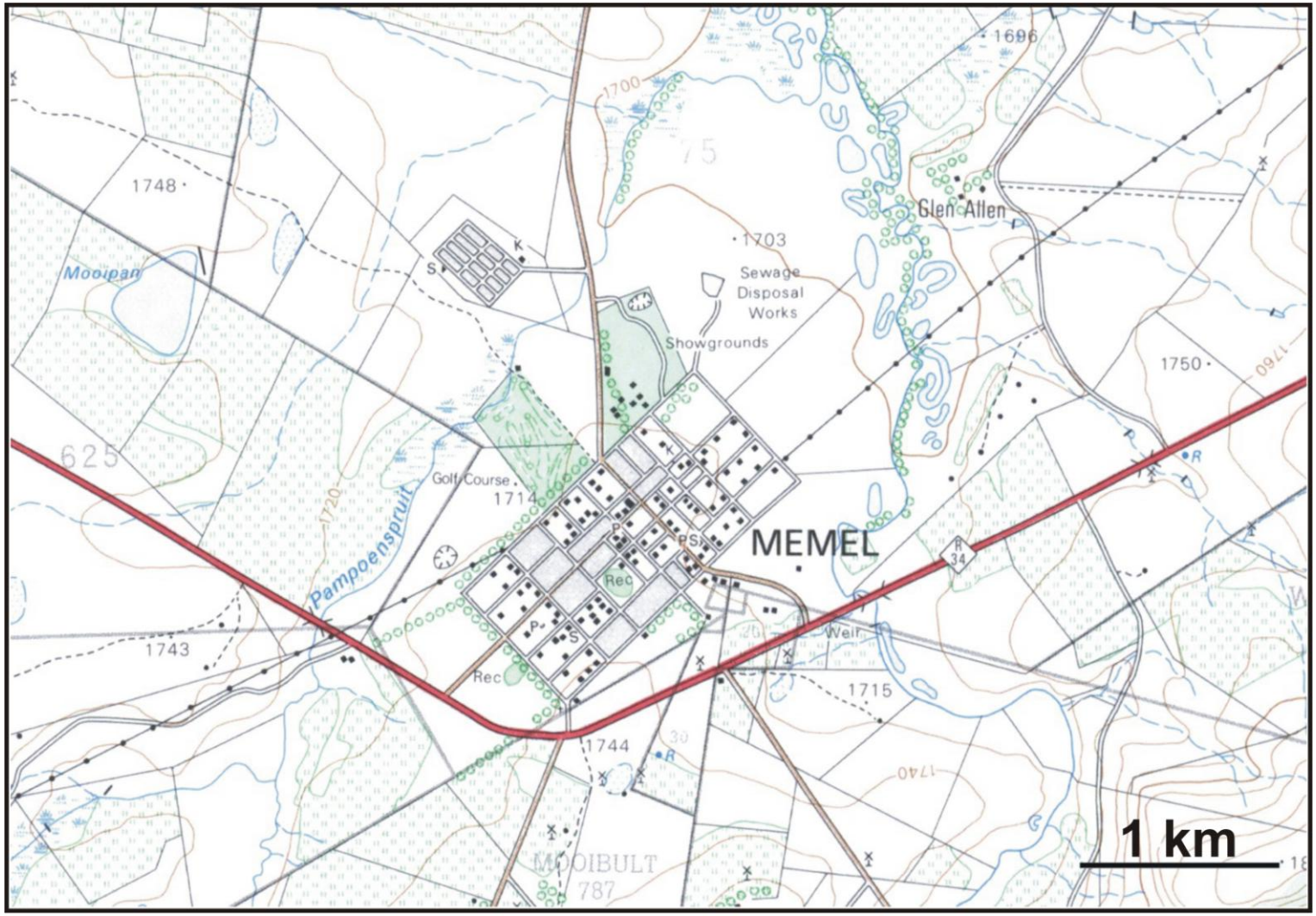

Figure 1. Portion of 1: 50 000 scale topographic map of Memel (2729DA Memel).

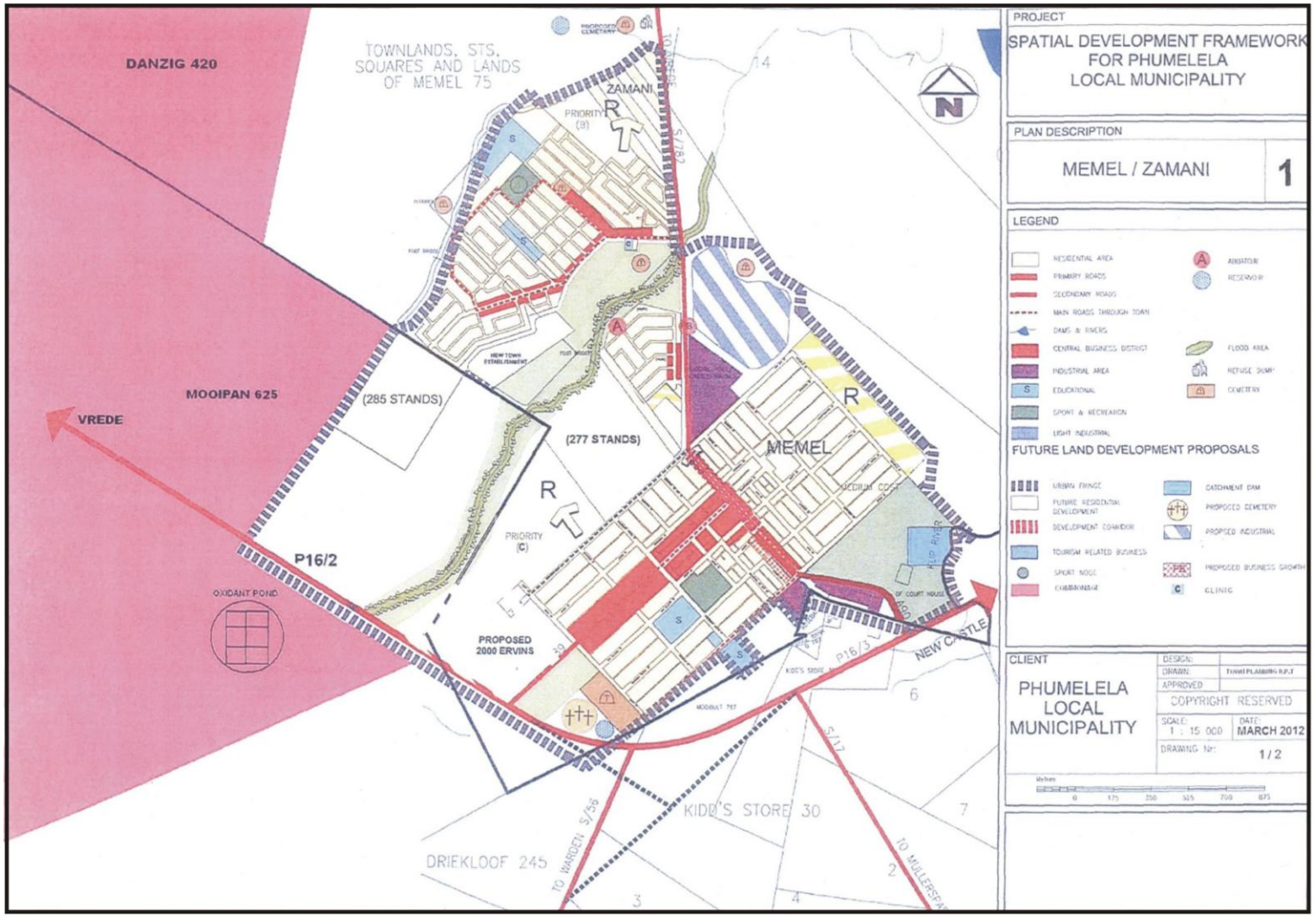

Figure 2. Layout of proposed development at Memel.

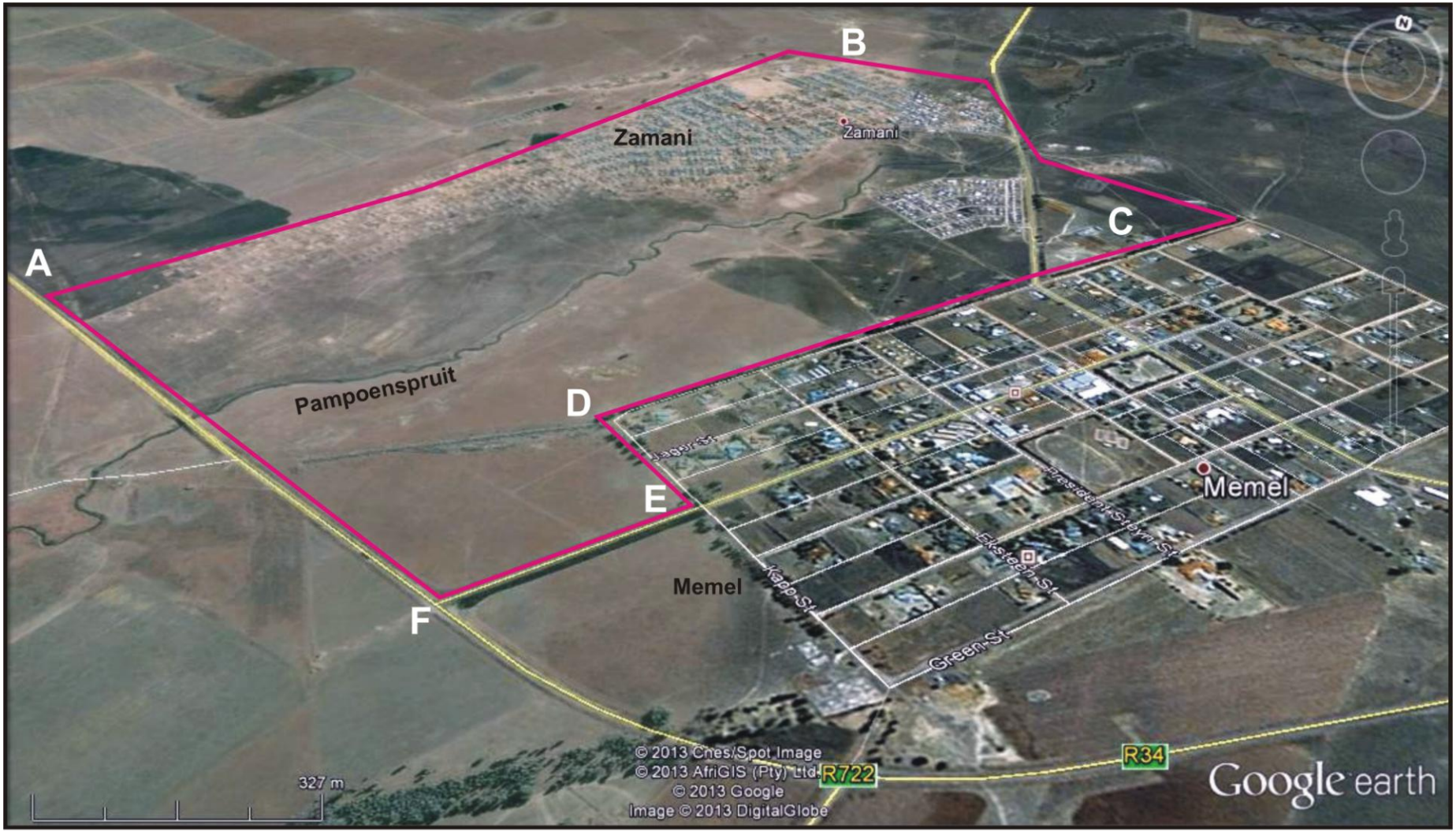

Figure 3. Aerial view of the proposed study area.

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

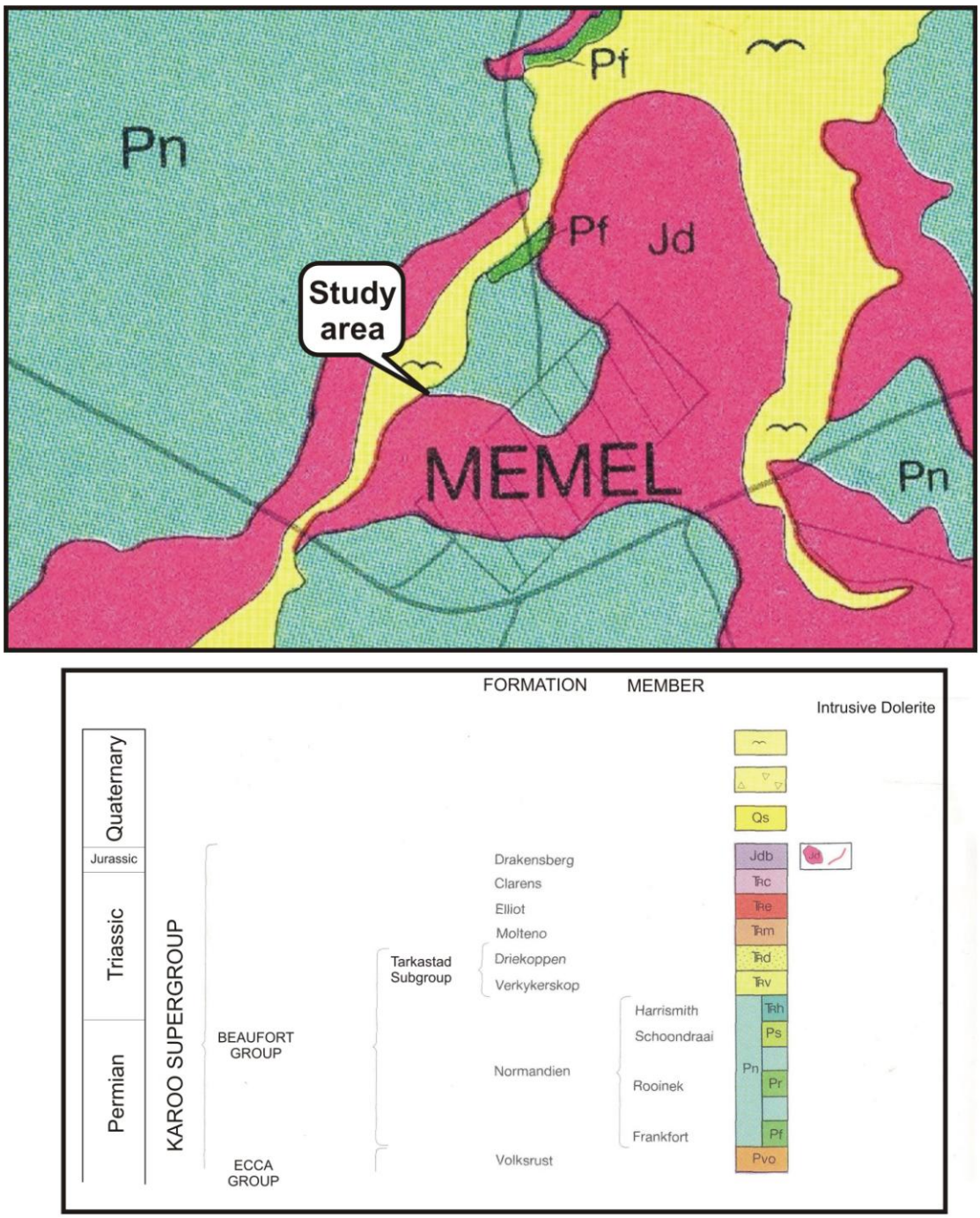

Figure 5. Portion of 1:250 000 scale geological map 2728 Frankfort. From oldest to youngest, the geology around the affected area is made up of Permo-Triassic sandstones (Normandien Formation, Pn, Beaufort Group), Jurassic dolerite intrusions (Jd, Karoo Dolerite Suite), Quaternary alluvium and residual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

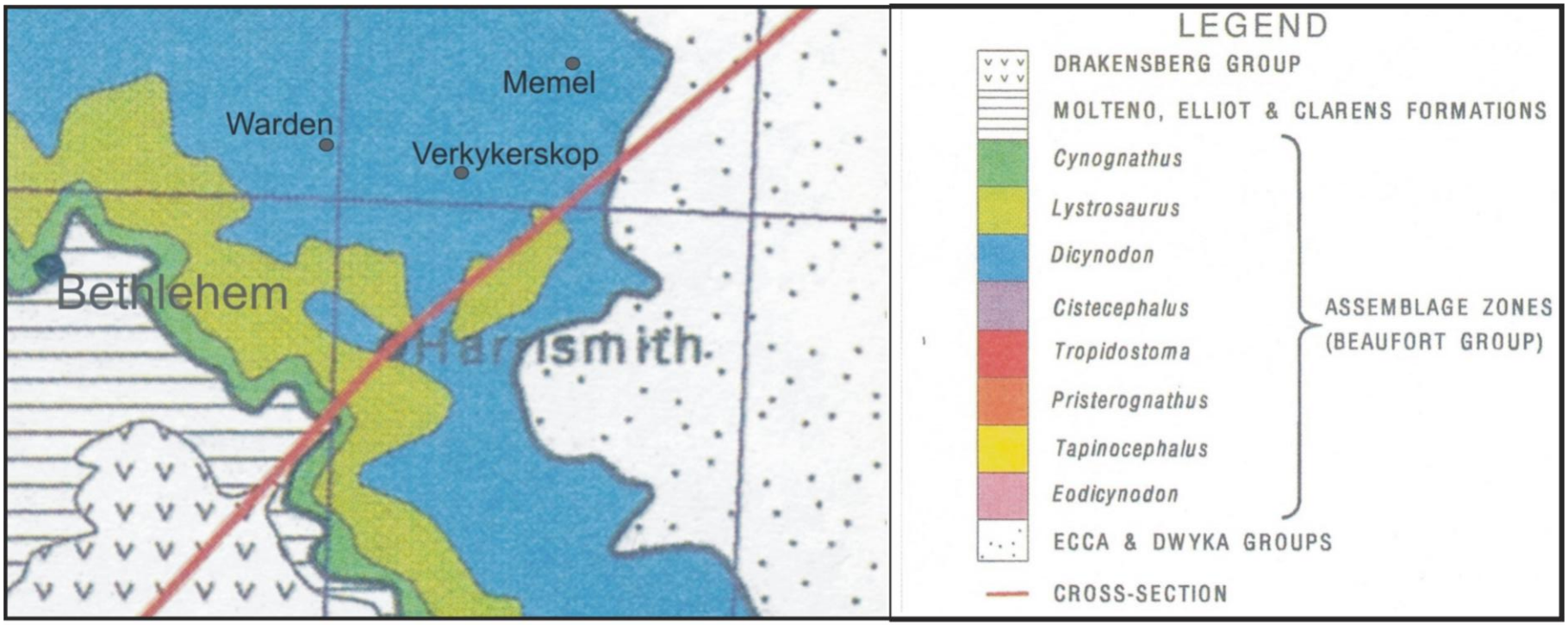

Figure 6. Geographical distribution of vertebrate biozones of the Beaufort Group between Memel and Bethlehem (after Rubidge 1995).

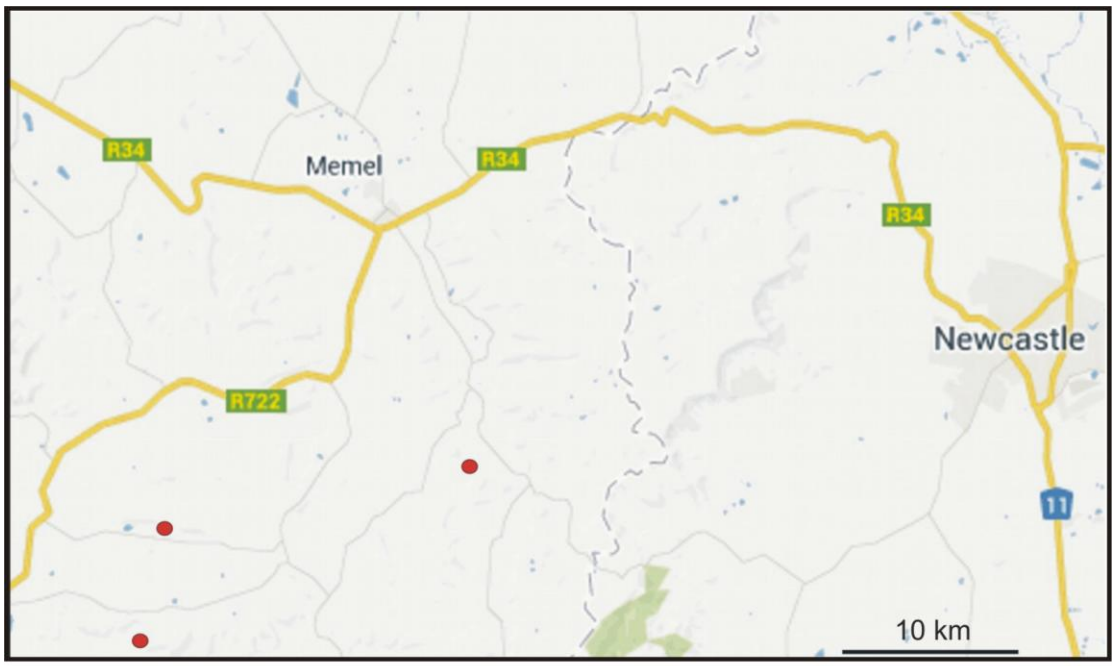

Figure 7. Karoo vertebrate fossil localities found in the vicinity of Memel (Groenewald 1990).

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

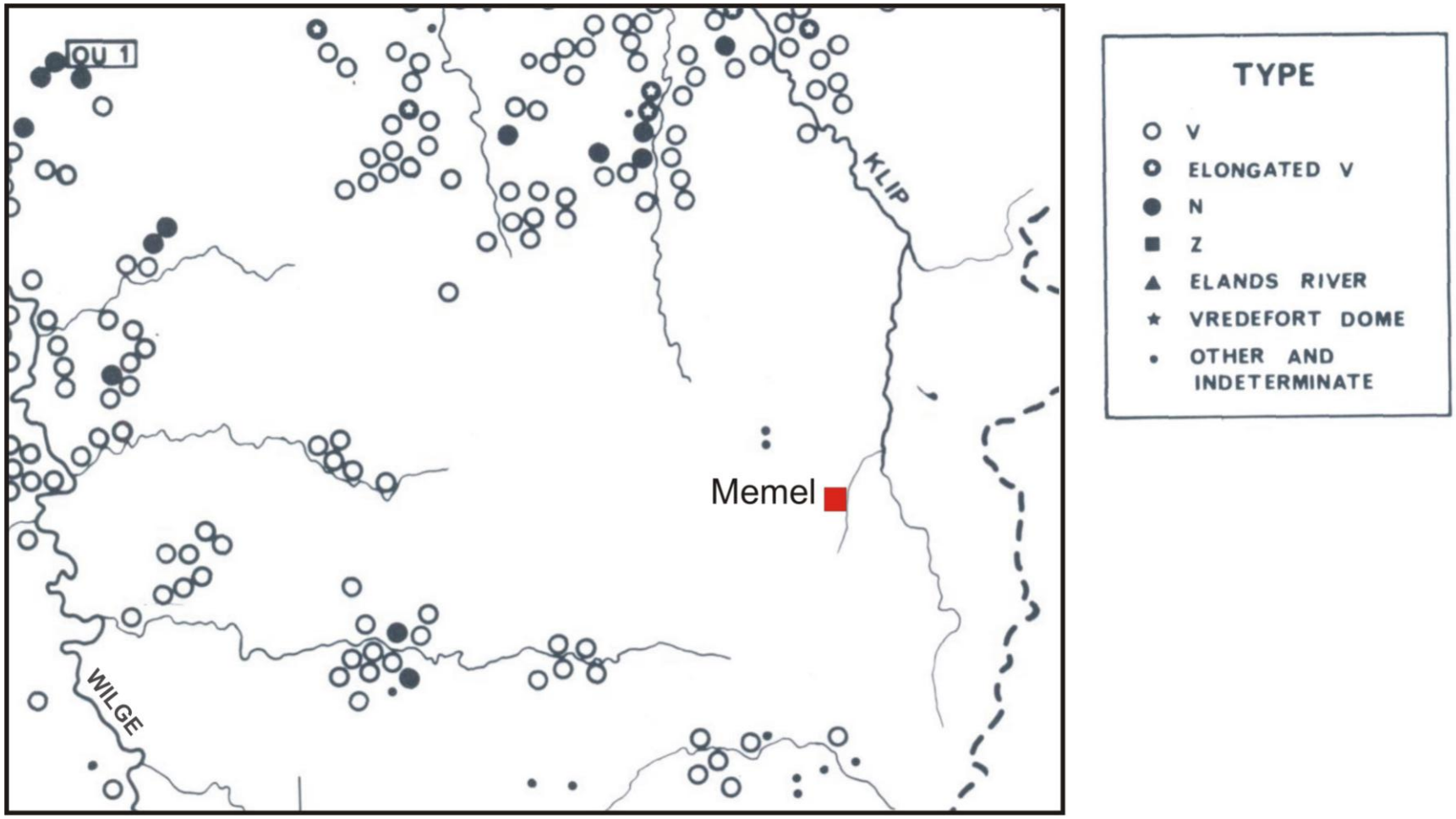

Figure 9. Distribution of Iron Age settlements near Memel (after Maggs 1976)

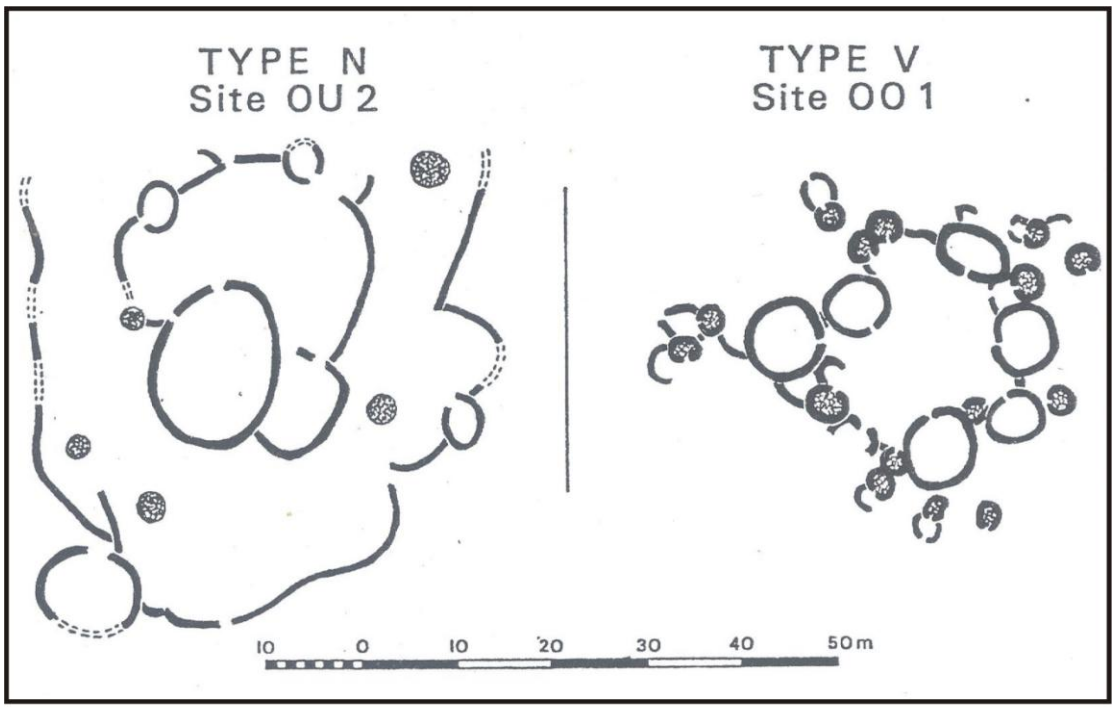

Figure 10. Iron Age settlement types found in the northeastern Free State (after Maggs 1976).

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 Pampoenspruit, looking southwest (middle) and along a Eucalyptus tree line, looking northeast (below).

Figure 14. Normandien Formation outcrop exposed along the Pampoenspruit.

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