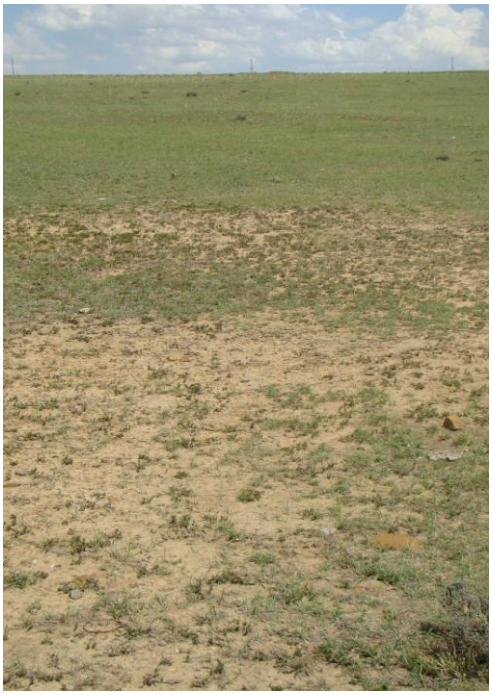
Phase 1 Palaeontological and Archaeological Impact Assessment of a proposed township extension at Tweeling, Free State Province.



Report prepared for:
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by

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Executive Summary

- At the request of NSVT Environmental Consultants in Bloemfontein, a Phase 1 Palaeontological and Archaeological Impact Assessment was carried out at a 22 ha site demarcated for the development of 417 erven, including general residential, business, community and public open spaces at the Mafahlaneng Township in Tweeling in the Free State Province.
- The field assessment indicates that the proposed development will primarily impact on Quaternary-age surface deposits. It is unlikely that the proposed development will significantly impact on potentially fossil-bearing bedrock unless deep trench excavations are conducted.
- There are no indications of Iron Age structures or rock engravings within the affected areas. There is also no evidence of historical structures or graves within the confines of the affected area.
- The terrain is not considered palaeontologically or archaeologically vulnerable.
- 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 NSVT Environmental Consultants in Bloemfontein, a Phase 1 Palaeontological and Archaeological Impact Assessment was carried out at a 8.3 ha site demarcated for the development of 417 erven including general residential, business, community and public open spaces at the Mafahlaneng Township in Tweeling 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 in November 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 palaeontological and archaeological significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information, published literature and maps. This was followed up by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes.

Description of the Affected Area

Details of developent and the area surveyed

Details of area surveyed

Maps: 1:50 000 topographical map 2728AD Tweeling

1:250 000 geological map 2728 Frankfort

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

A) 27°32'25.66"S 28°31'19.73"E
B) 27°32'29.96"S 28°31'33.00"E
C) 27°32'49.73"S 28°31'23.23"E
D) 27°32'52.51"S 28°31'29.05"E
E) 27°32'59.26"S 28°31'23.91"E

F) 27°32'52.14"S 28°31'11.70"E

The affected area is made up of 22 ha of open grassland situated next to the Mafahlaneng Township on the northern outskirts of Tweeling (**Fig. 3 - 4**). The site is moderately disturbed and is currently utilized for cattle grazing by the local population (**Fig. 5**).

Geology

The geology around Tweeling is made up of Late Permian sandstones (Normandien Formation *Pne),* Jurassic dolerite intrusions (*Jd,* Karoo Dolerite Suite), and superficial sediments of Quaternary age, made up of residual soils and alluvium (**Fig. 6)**. The Normandien Formation is distinguished by three sandstone members and one mudstone member and is interpreted to have been deposited by meandering streams flaked by wide, semi-arid floodplains (Groenwald 1990). The study area itself is underlain by Normandien Formation sandstones.

Background

Karoo Fossils

Rocks belonging to the Normandien Formation are assigned to the Dicynodon Assemblage Zone (AZ). This AZ is characterized by the presence of therapsid fossils including 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.

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

There are currently no records of Quaternary fossil localities in the vicinity of Tweeling.

Archaeology

Tweeling is situated just east of the Liebenbergsvlei River drainage, which along with the adjacent Wilge and Klip Rivers, is characterized by the presence of Type V, stone-

walled Iron Age settlement units (Maggs 1976a, b). Furthermore, stone pipes (smoking pipes), have been discovered on the farm Uitvlugt at the Liebenbergvlei River bridge crossing between Bethlehem and Harrismith, while bored stones have been recorded on the farms Platkopje and Lion 301 near Reitz, 30 km south of Tweeling. Rock art localities (paintings) have been recorded on the farms Amsterdam 56, Caverne 795 and Lovedale in the Reitz district south of Tweeling.

Field Assessment

The affected area is underlain by Normandien Formation bedrock (*Pne),* capped by superficial, residual soils (**Fig. 8**). 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 art within the footprint area. There is also no evidence of informal graves or historical structures older than 60 years (the town was established in 1920) within the confines of the footprint. The site is currently used for cattle grazing by the local community. Modern structures recorded during the survey include a water trough and informal kraals (**Fig. 9**).

Impact Statement

Potential impacts are summarized in **Table 1**. The field assessment indicates that the proposed development will primarily impact on Quaternary-age surface deposits. It is unlikely that the proposed development will significantly impact on potentially fossil-bearing bedrock unless deep trench excavations are conducted. Impact on potentially intact Stone Age archaeological remains, Iron Age structures or Quaternary fossils is considered unlikely. The terrain is not considered palaeontologically or archaeologically vulnerable.

Recommendation

In accordance with the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) there is no above-ground evidence of building structures older than 60 years, Stone Age archaeological remains, Iron Age structures, Rock art or Quaternary fossils within the demarcated area.

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).

References

Groenewald, G.H. 1990. Gebruik van palaeontologie in litostratigrafiese korrelasie in die Beaufort Groep, Karoo opeenvolging van Suid Afrika. *Palaeontologia africana* 27: 21 – 30.

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Tables & Figures

Table 1. Summary of potential impacts at the site.

Rock type / Age	Duration of Development	Palaeontological significance	Archaeological significance	Palaeontological Impact at site	Archaeological Impact at site
Residual soils (Quaternary)	Permanent	Medium -Low	Medium - High	Low	Low
Ecca Group, Normandien Formation (Late Permian)	Permanent	Medium -High	Low	Low	Low

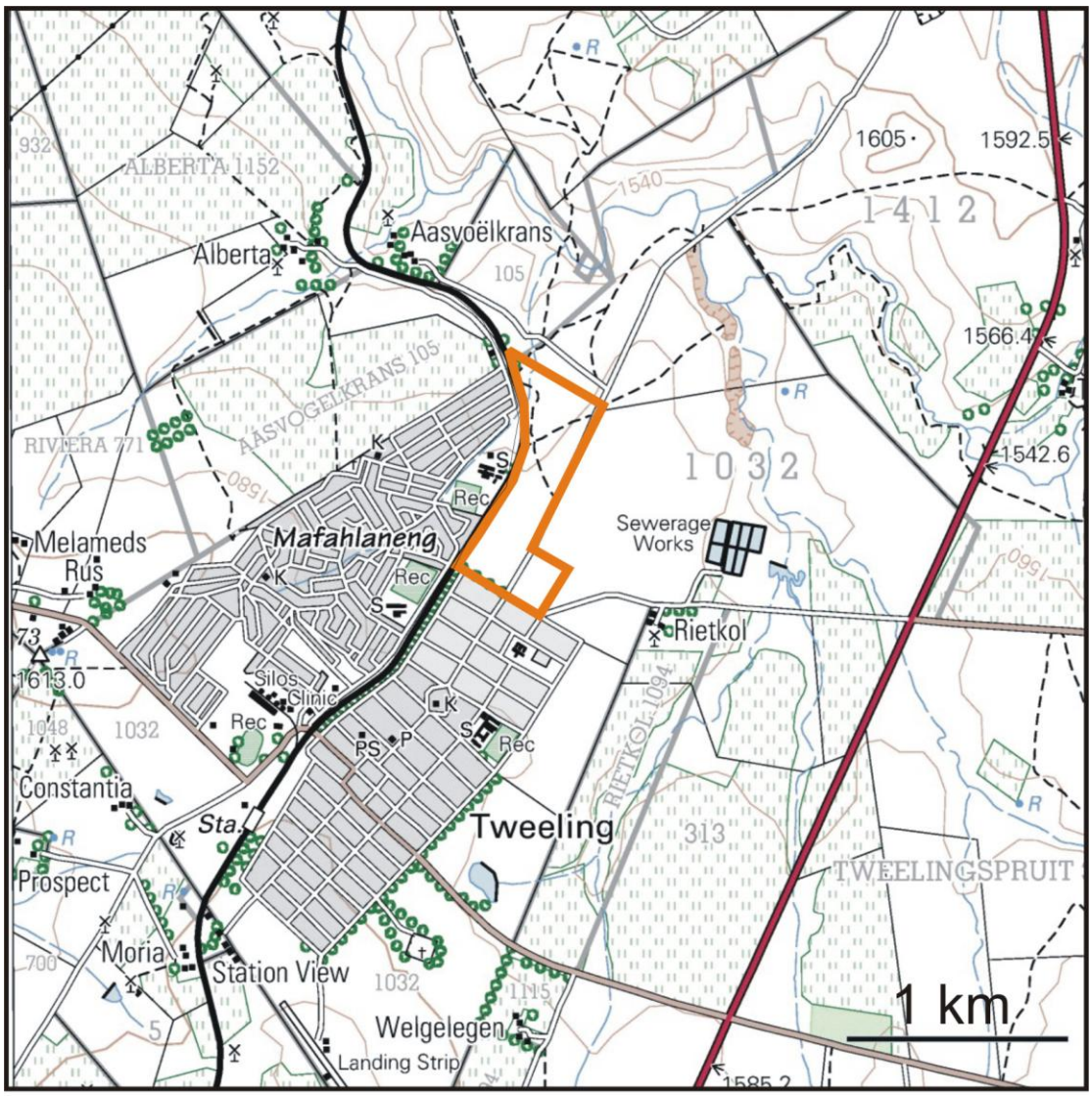

Figure 1. 1:50 000 scale topographic map of the study area (2728 DA Tweeling).

Figure 2. Layout of the proposed development.

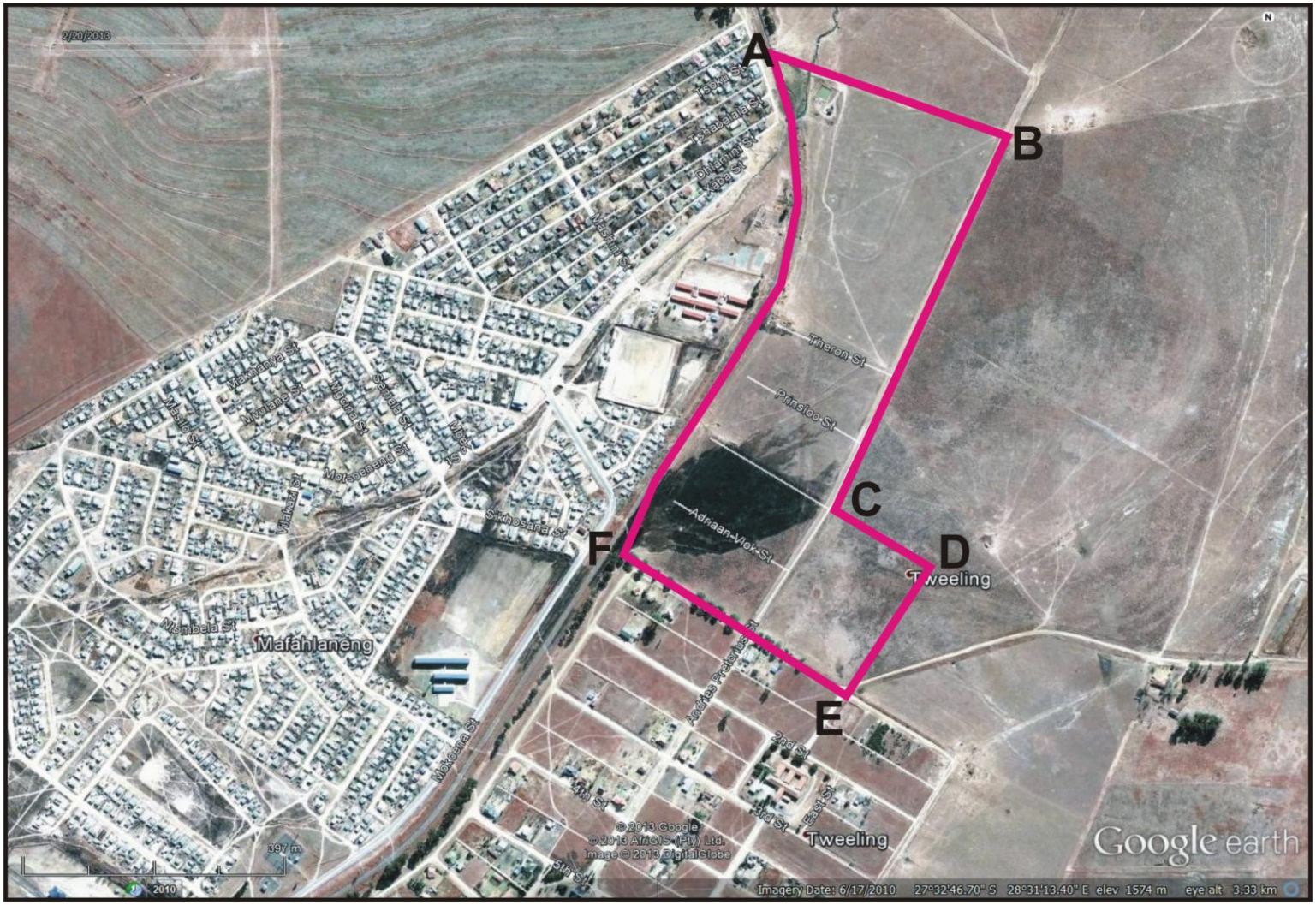

Figure 3. Aerial view of the affected area at Mafahlaneng.

Figure 4. The study area looking northwest (above) and southeast (below).

Figure 5. The affected area is capped by superficial and unconsolidated Quaternary sediments (topsoils). The site is moderately disturbed and is currently utilized for cattle grazing.

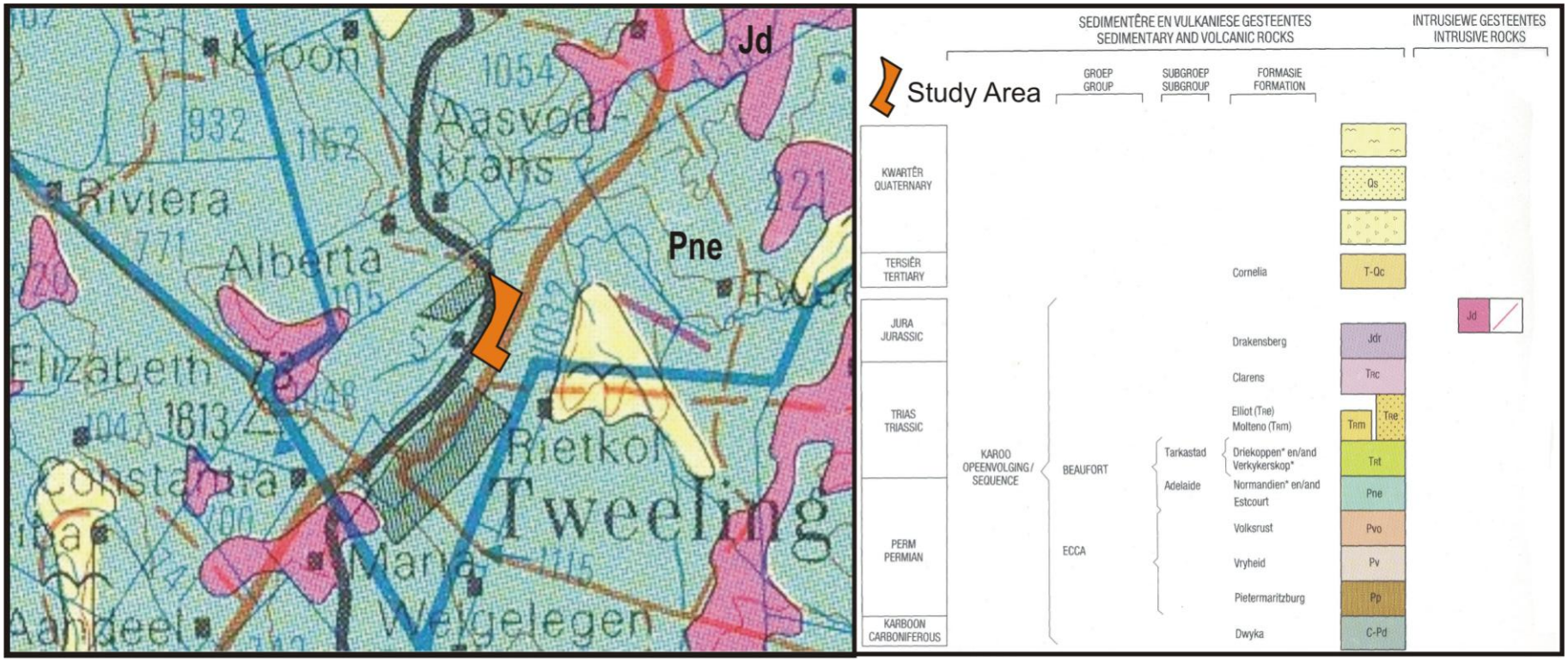

Figure 6. Geology of the area around Tweeling (portion of 1:250 000 scale geological map 2728 Frankfort). From oldest to youngest, the geology around the affected area is made up of Permo-Triassic sandstones (Normandien Formation, *Pne*, Beaufort Group), Jurassic dolerite intrusions (*Jd*, Karoo Dolerite Suite) and superficial sediments of Quaternary age, made up of residual soils and alluvium (flying bird symbol).

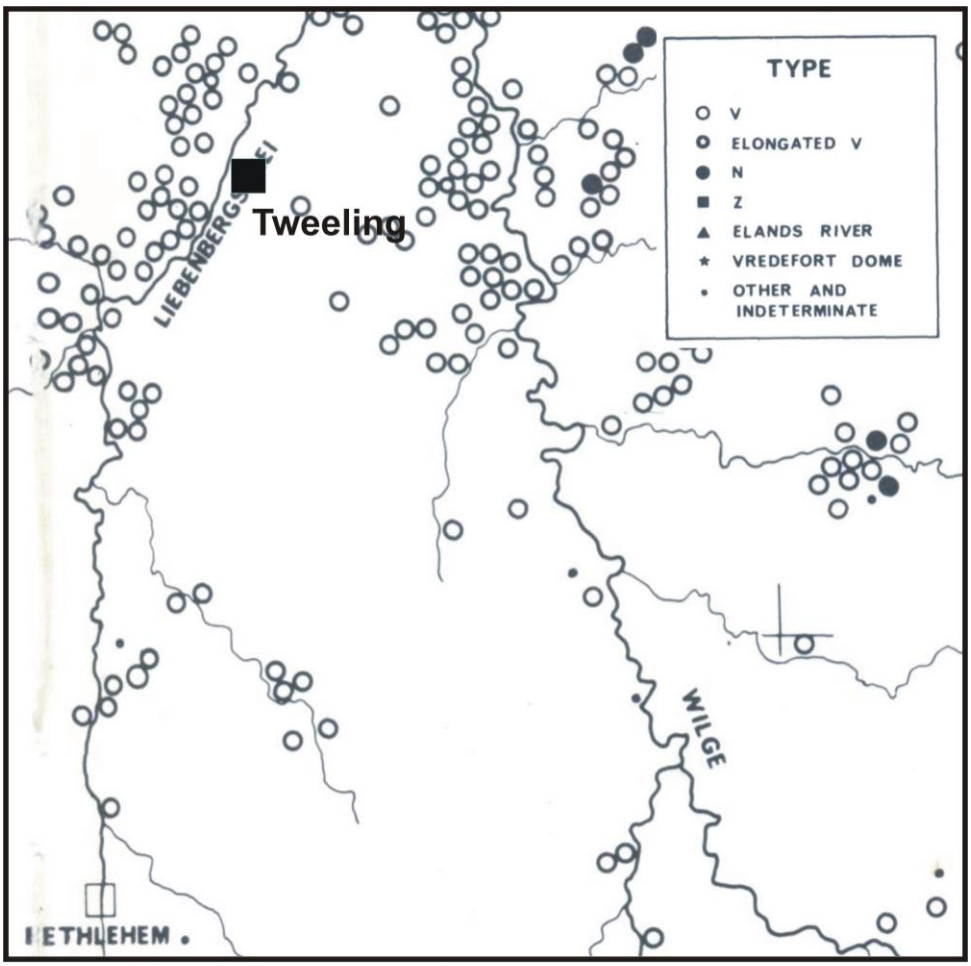

Figure 7. Distribution of Iron Age settlement types near Tweeling (after Maggs 1976).

Figure 8. Sewerage plant located near the northwestern corner of the study area, looking east; grass-covered residual soils, looking south (middle); erosional gullies located north of the study area (above). The gullies show no evidence of Quaternary fossil material.

Figure 9. The site is currently used for cattle grazing by the local community. Modern structures recorded during the survey include a water trough and informal kraals.