

Phase 1 Heritage Impact Assessment of a proposed  
10MW Solar Facility at Grootspuit 252/0 near  
Allanridge, Odendaalsrus district, FS.



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## Executive Summary

- A Phase 1 Heritage Impact Assessment was carried out at Grootspuit 252 near Allanridge, where anticipated development calls for the construction of a new 10MW solar facility.
- A foot survey show no evidence of prehistoric structures, historical structures older than 60 years, rock engravings, graves or *in situ* Stone Age archaeological material, distributed as surface scatters on the landscape.
- There is no indication for the accumulation and preservation of intact fossil material within the Quaternary sediments (topsoils) covering the underlying sedimentary rocks.
- Underlying bedrock is represented by Ecca Group (Volksrust Formation) strata.
- The formation is characterized by the presence of plant but an absence of reptile fossils.
- 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.

## Introduction

At the request of H2ON Environmental Consultants, a Phase 1 Heritage Impact Assessment was carried out at a site on the farm Grootspuit 252 near Allanridge in the Free State Province, where anticipated development calls for the construction of a new solar facility (**Fig. 1**). The survey is required as a prerequisite for new development in terms of the National Heritage Resources Act 25 of 1999. A site visit and subsequent assessment took place in August 2012. 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.

## Description of the Affected Area

### Details of area surveyed

#### Locality data

1 : 50 000 topographic map **2726 DB Landskroon**

1 : 250 000 geological map **2726 Kroonstad**

The site is located at on the farm Grootspuit 252 next to the S161 road, 12 km east-northeast of Allanridge (**Fig. 2**). The affected area consists of approximately 120 ha of flat terrain and open veld currently used for pasture. (**Fig. 3**). The extent of the site is demarcated by the following coordinates (**Fig. 4**):

A	27°43'54.79"S	26°45'57.34"E
B	27°43'43.17"S	26°46'35.43"E
C	27°44'38.65"S	26°47'5.96"E
D	27°44'51.50"S	26°46'48.10"E
E	27°44'30.49"S	26°46'23.34"E

F 27°44'26.95"S 26°46'30.27"E

G 27°44'8.00"S 26°46'13.12"E

H 27°44'13.50"S 26°46'0.44"E

### Geology

The geology of the region has been described by (Schutte 1994) and is shown on the 1: 250 000 geological map 2726 Kroonstad (Council for Geoscience, Pretoria 2000).

The sedimentary rocks underlying the survey area are made up of grey to black silty shale with thin, usually bioturbated, siltstone and sandstone lenses and beds (Johnson *et al.* (2006) of the Upper Ecca Volksrust Formation (*Pvo*) (**Fig. 5**). It is generally accepted to be Middle Permian in age. The formation is a predominantly argillaceous unit which interfingers with the overlying Beaufort Group and underlying Vryheid Formation (Ecca Group). It represents a transgressive sequence consisting largely of mud deposited from suspension when large, swampy deltas were formed after Gondwana started to drift from the Antarctic region and rivers flowing into the inland Karoo Sea, deposited huge amounts of sediment along its shorelines.

The underlying sedimentary rocks are capped by Quaternary deposits younger than two million years in age. They comprise unconsolidated soils derived from the *in situ* weathering of the parent rocks, alluvial sediments found along water courses, and aeolian sands (Qs) (**Fig. 5 & 6**).

## **Background**

### **Palaeontology**

Although there are no records of fossil occurrences from the Volksrust Formation in the vicinity of the study area, the formation is characterized by the presence of plant fossils, with six genera, representing the glossopterids, cordaitaleans and possibly other seed fern groups (Bamford 2003). A pelecypod bivalve have been described

from the distal sediments of a prograding delta, at the Beaufort Group–Ecca Group boundary (Cairncross *et al.* 2005) and beetles (Coleoptera) have been recorded from the formation in Kwazulu-Natal (Ponomarenko & Mostovski 2005). Reptile fossils are absent from the formation.

The alluvial deposits of the Vaal and a number of its ancient tributaries, including the Vet, Doring and Sand Rivers, are well known for their unique record of the Pliocene and the Pleistocene, and numerous Late Neogene fossil localities are known from the region. Pliocene, river-deposited fossil occurrences have been identified in terrace gravels along the Vet River (Tierfontein) and the Sand River (Virginia Railway Cutting) (**Fig. 7 nos. 1 & 2**). More recent exploratory surveys along the Doring, Sand and Vet Rivers indicate moderately fossiliferous overbank sediments and erosional gullies that frequently contain fossil remains of a variety of Quaternary-aged mammals. Ancient pan sites at Mahemspan near the Vaal River and Whites near Hennenman have equally produced abundant Quaternary-aged mammal fossil remains (**Fig. 7 nos. 3 & 4**)

### **Archaeology**

The Stone Age archaeological footprint in the region is largely represented by the occurrence of open-site, Middle Stone Age (MSA) and Later Stone Age (LSA) assemblages that are mainly located near river drainages. Interestingly, a large number of MSA artifacts were found 2 m below surface at the Allanridge railway siding in 1953 (**Fig. 7 no. 5**). The material is stored at the National Museum in Bloemfontein. Unfortunately, the context of the assemblage is unknown. MSA as well as LSA artifacts, in association with mammal fossil remains, are also found in a series of erosional gullies along the Sand and Doring Rivers between Virginia and Theunisen (**Fig. 7 no. 6**).

There are no records of rock engravings known from the area. The ruins of a large complex of Late Iron Age settlements (OXF 1, Maggs 1976) are found at Strydfontein between Hennenman and Ventersburg (**Fig. 7 no. 7**). However, it is noted that the affected area is situated outside the western periphery of distribution of Late Iron Age settlements below the Vals River in the Free State (Maggs 1976).

## **Methodology**

A pedestrian survey was conducted in the affected area. The site generally lacked proper outcrop and exposures as a result of the flatness of the terrain. Common intrusive features like springhare hollows and aardvark dugouts were therefore also investigated for tell-tale signs of excavated archaeological / palaeontological material. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera, were used to record relevant data. Relevant archaeological and palaeontological literature and database information were assimilated for the report and integrated with data acquired during the on-site inspection.

## **Results of Survey**

Results are summarized in **Table 1**. The affected area is capped by unconsolidated topsoils with little or no sign of Volksrust Formation outcrop (*Pvo*). The absence of rocky outcrop is largely attributed to a lack of topographical relief in the area. The affected terrain is made up of flat, open veld, currently utilized for pasture. There is no indication for the accumulation and preservation of intact fossil material within the Quaternary sediments (unconsolidated topsoils). There is no evidence of *in situ* Stone Age or Iron Age archaeological material within the confines of the footprint. There are no indications of prehistoric structures or rock engravings within the footprint area. Historical buildings or structures older than 60 years are absent from the site.

Two small graveyards were recorded during the survey, but they are located outside the development footprint (**Fig. 8 & 9**). No graves or graveyards were found within the confines of the affected area.

### **Statement of Significance and Recommendations**

Impact on Quaternary sediments (unconsolidated topsoils) within the footprint will be extensive, but impact on potential *in situ* Quaternary fossils, archaeological material, prehistoric structures, historical structures, rock engravings or graves within the confines of the affected area is considered unlikely. The underlying sedimentary strata (*Pvo*) will be impacted by development if and when excavations into bedrock are required during the construction phase. Potential impact on fossil remains from the underlying sedimentary strata (*Pvo*) is considered to be low.

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**

- Bamford, M. 2003 Diversity of the Woody Vegetation of Gondwanan Southern Africa. *Gondwana Research* 7(1): 153 – 164.
- Cairncross *et al.* 2005. The Bivalve *Megadesmus* from the Permian Volksrust Shale Formation (Karoo Supergroup), northeastern Karoo Basin, South Africa. *South African Journal of Geology* 108 (4) 547-556
- Johnson *et al.* 2006. Sedimentary rocks of the Karoo Supergroup. **In:** M.R. Johnson, *et. al.* (eds). *The Geology of South Africa*. Geological Society of South Africa.
- Maggs T. M. O’C 1976. *Iron Age Communities of the Southern Highveld*. Occasional Publications of the Natal Museum No. 2. Natal Museum, Pietermaritzburg.

Partridge, T.C. & Maud, R.R. 2000. *The Cenozoic of Southern Africa*. Oxford Monographs on Geology and Geophysics No. 40.

Ponomarenko, A.G. & Mostovski, M.B. 2005. New beetles (Insecta: Coleoptera) from the Late Permian of South Africa. *African Invertebrates* 46. The Council of Natal Museum.

Schutte, I.C. 1994. Geologie van die gebied Kroonstad. Explanation to 1: 250 000 scale geological sheet 2726 Kroonstad, 84 pp. Council for Geoscience, Pretoria.



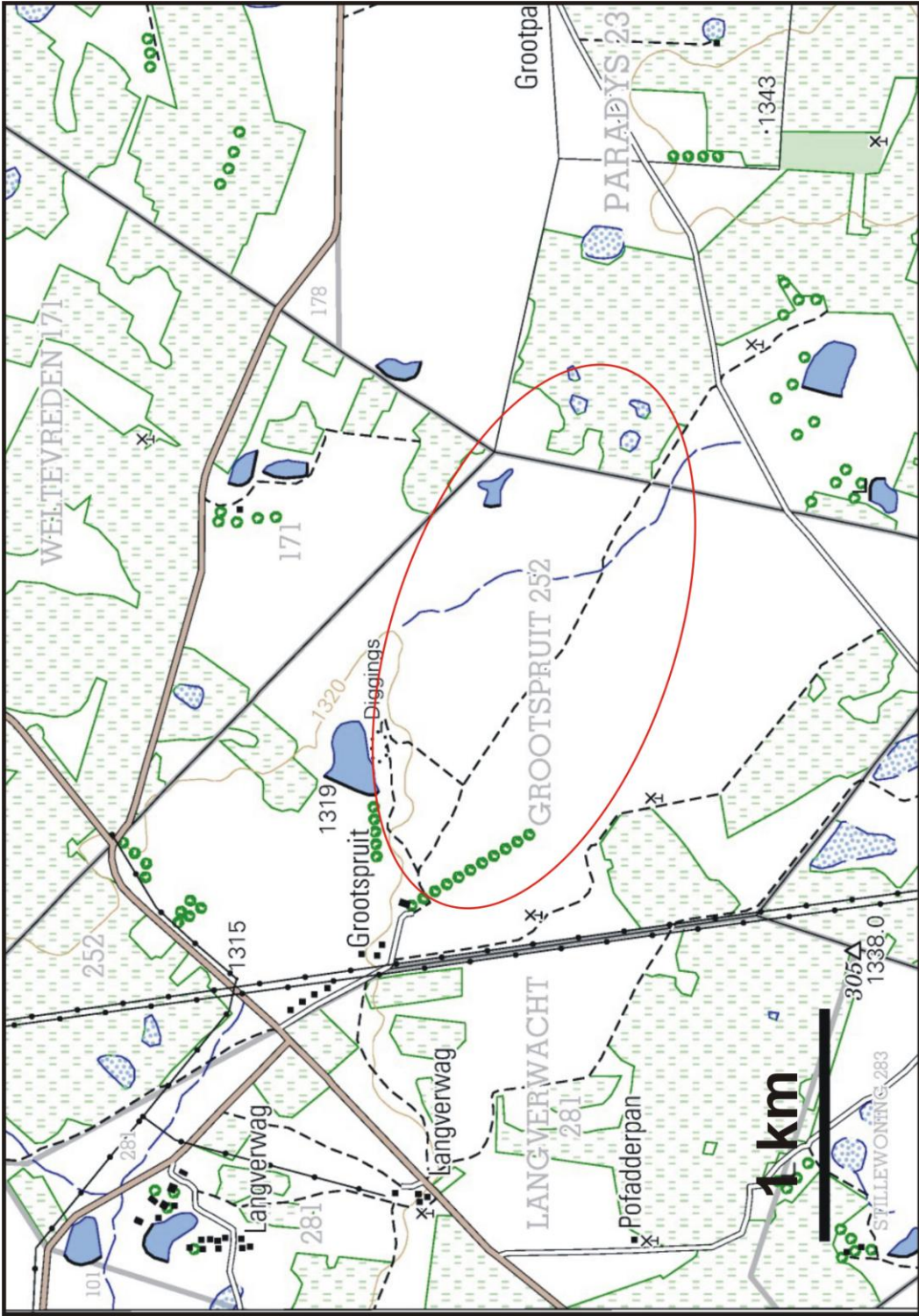


Figure 1. Portion of 1 : 50 000 scale topographic map 2726 DB Landskroon.

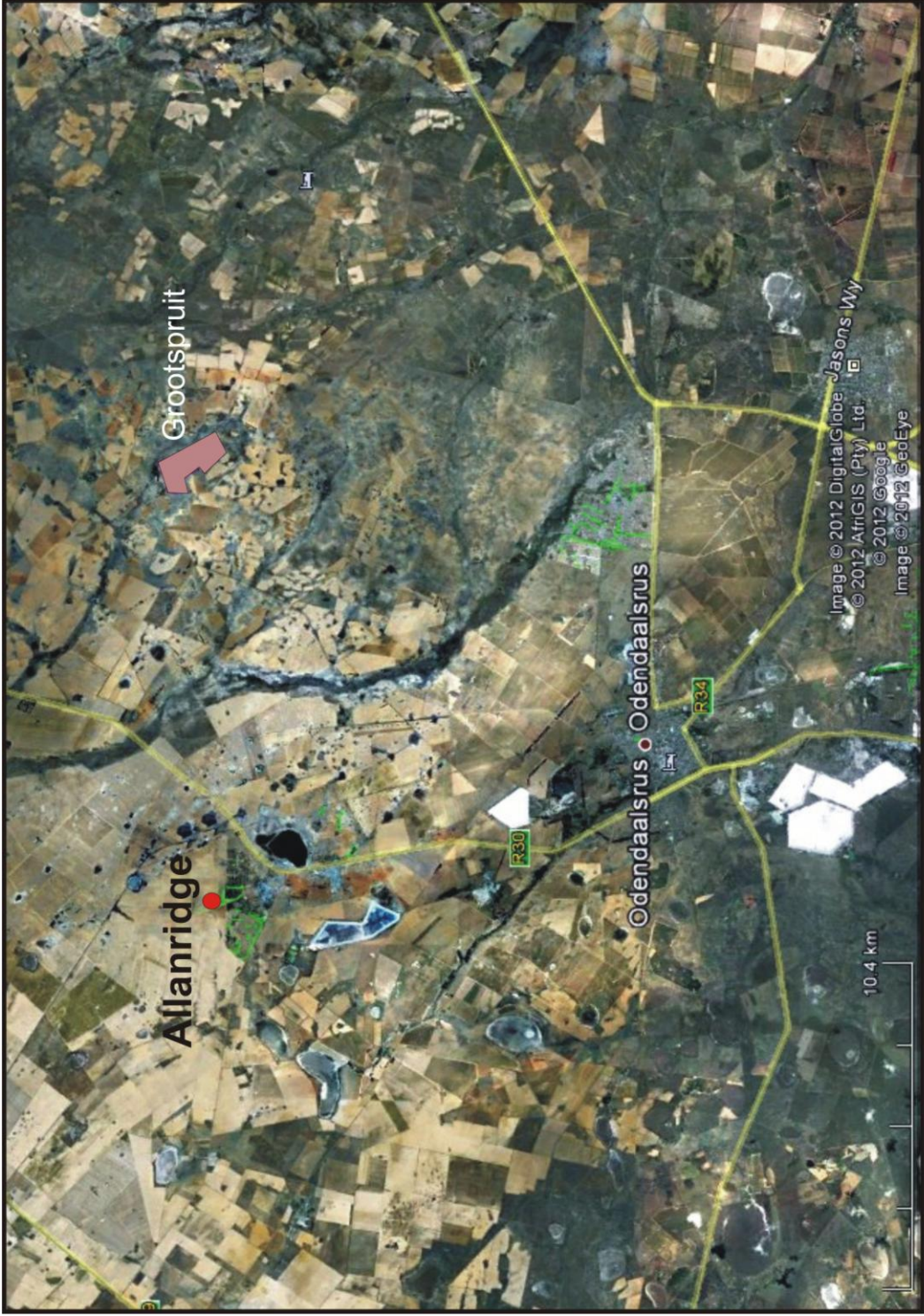


Figure 2. Aerial view of the affected area in relation to the position of Allanridge.



Figure 3. The affected area consists largely of flat terrain and open veld used for pasture.

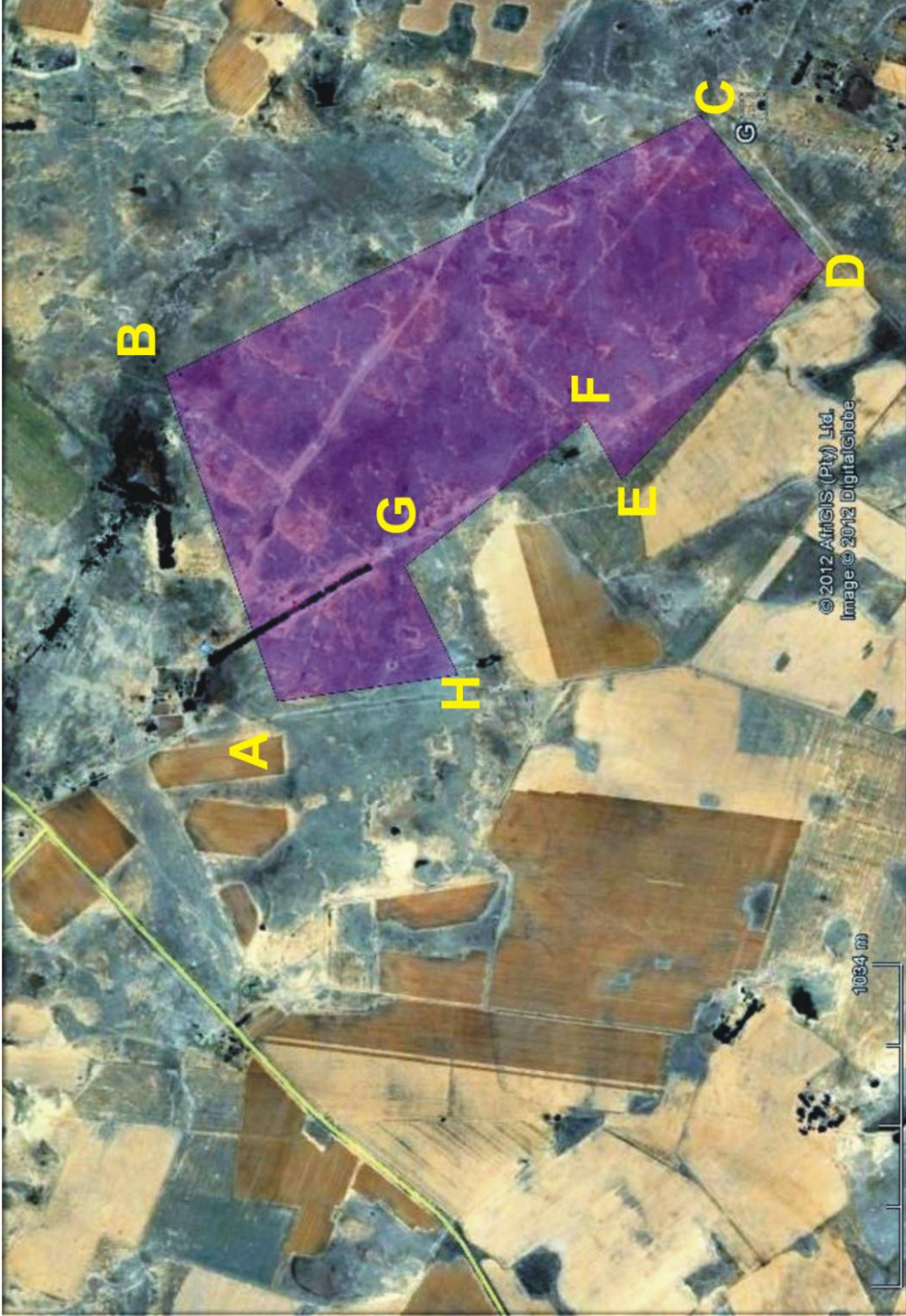


Figure 4. The affected area consists of approximately 120 ha of flat terrain and open veld currently used for pasture.

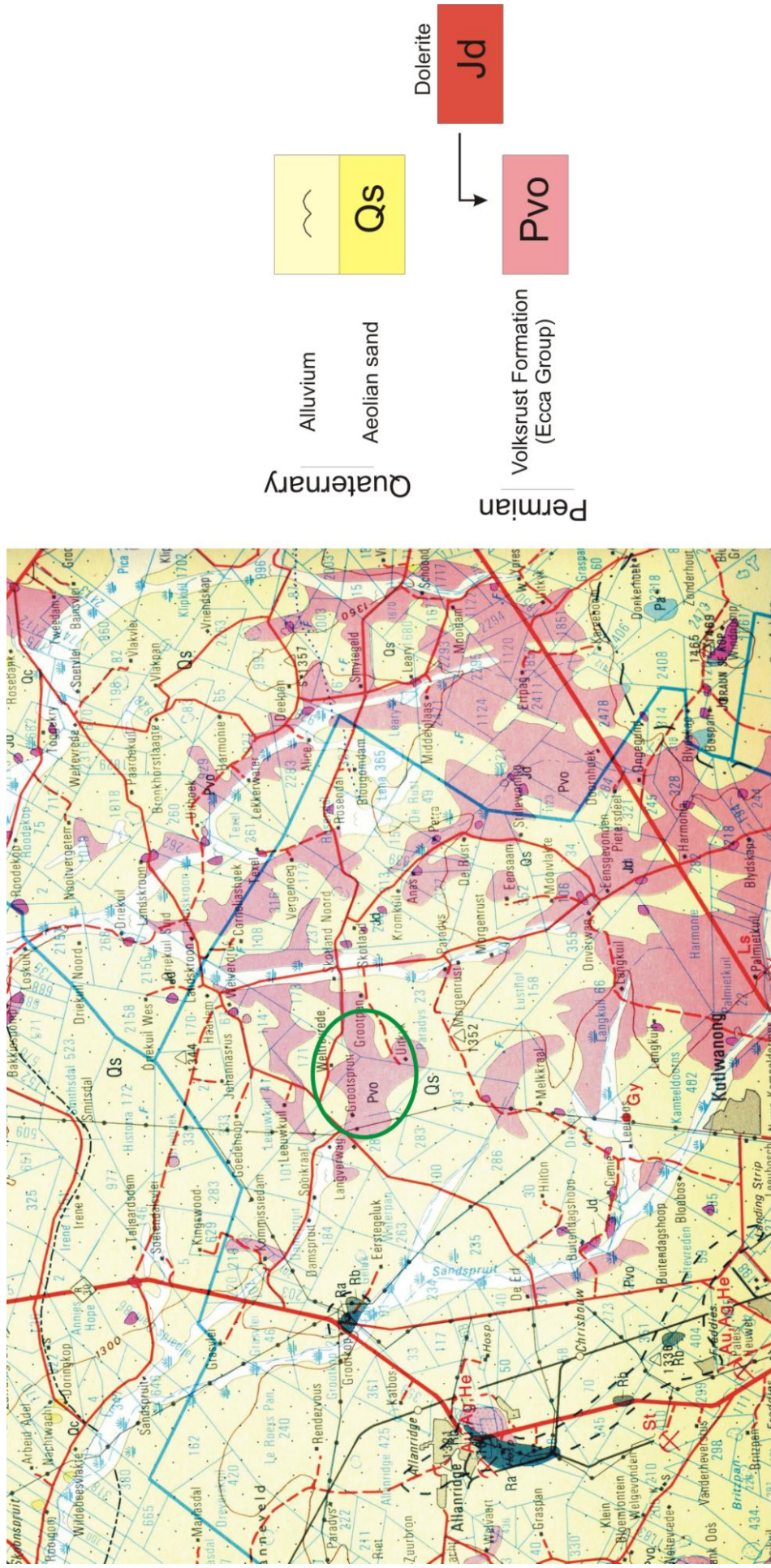


Figure 5. Portion of 1:250 000 scale geological map of the region (2726 Kruonstad).

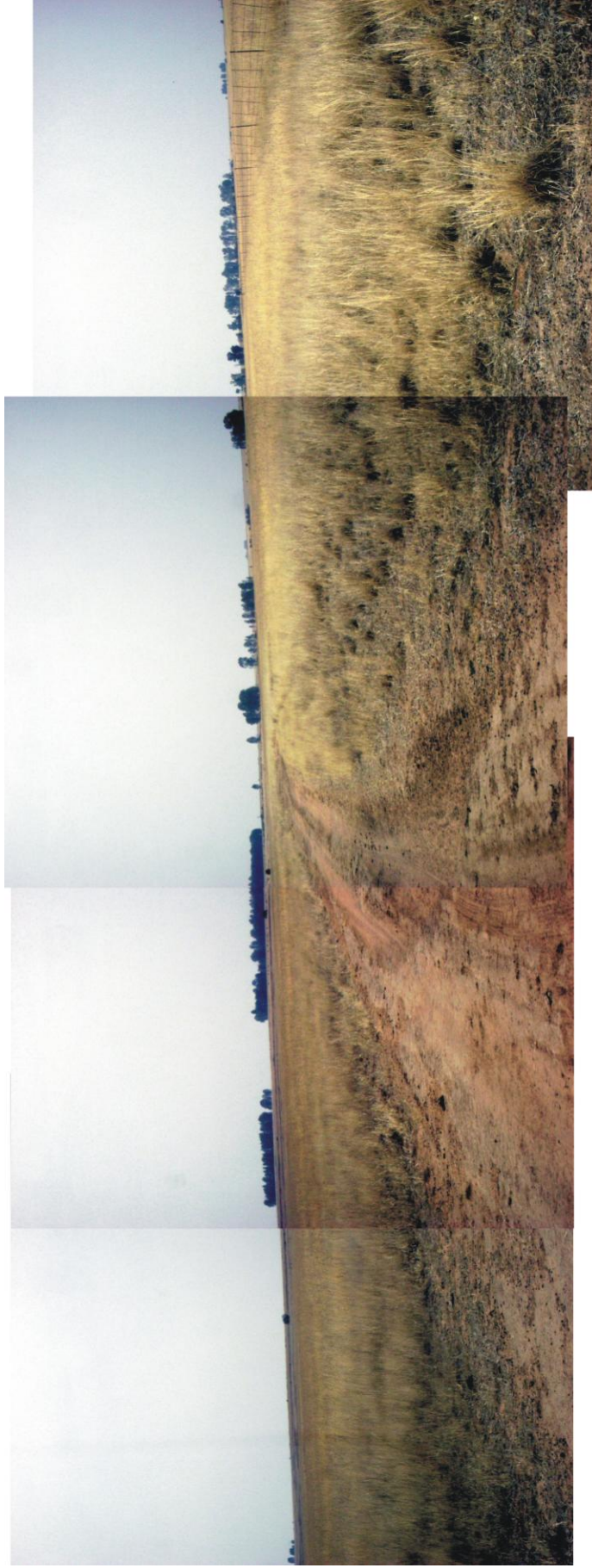


Figure 6. The underlying sedimentary rocks at the site are capped by Quaternary deposits younger than two million years in age. They comprise unconsolidated soils derived from the *in situ* weathering of the parent rocks and aeolian sands (Qs).

Table 1. Heritage impact table for proposed development.

<b>Rock type / Age</b>	<b>Duration of Development</b>	<b>Palaeontological significance</b>	<b>Archaeological significance</b>	<b>Impact Probability</b>	<b>Mitigation</b>
Aeolian sands, Alluvium / (Quaternary)	Permanent	Low	Low	Low	None
Shale, siltstone, Sandstone / Ecca Group (Permian)	Permanent	Medium	Low	Low	None

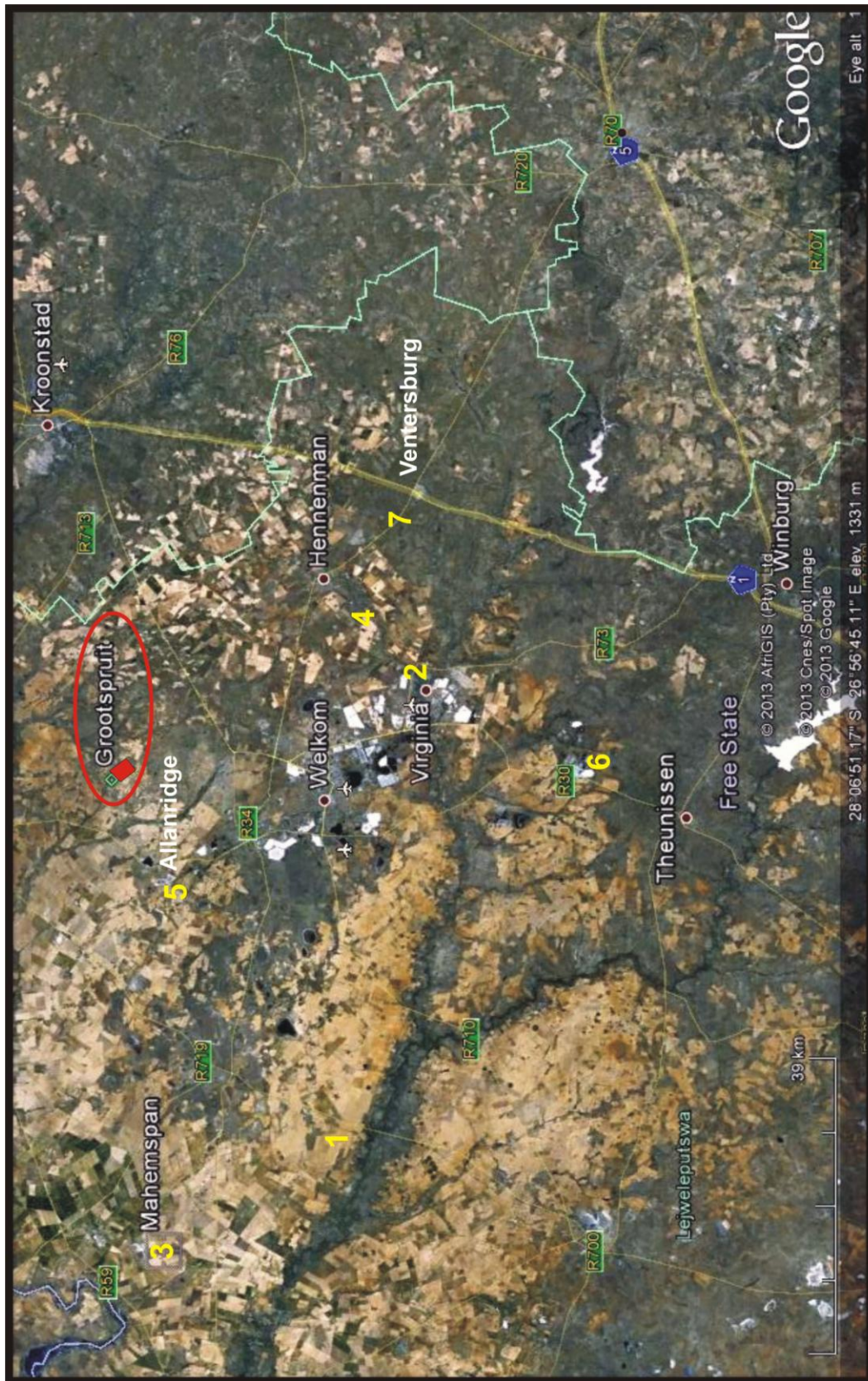


Figure 7. Locality map of known palaeontological and archaeological sites in the region.





Figure 7. A small, dilapidated cemetery located outside the confines of the footprint ( S27 43 43.9 E26 46 13.8).



Figure 8. Map showing locality of two farm cemeteries near the affected area  
(1 = S27 43 43.9 E26 46 13.8; 2 = S27 44 44.1 E26 47 6.9)

## Appendix 1: Additional figures



The study area, looking south.



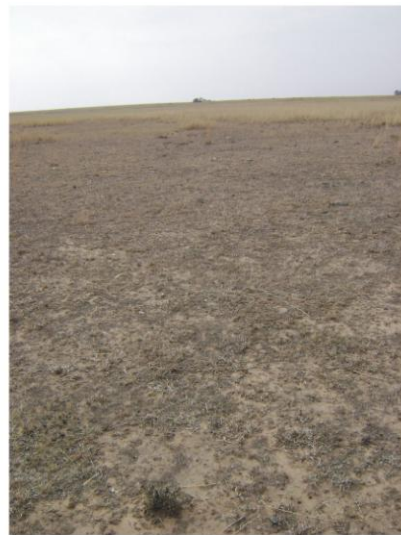
The study area, looking west.



Example of MSA artifacts found 2 m below surface at the Allanridge railway siding in 1953 (ventral aspect).



Common intrusive features like springhare hollows and aardvark dugouts investigated for tell-tale signs of excavated archaeological / palaeontological material.



The absence of rocky outcrop is largely attributed to a lack of topographical relief in the area. The affected terrain is made up of flat, open veld, currently utilized for pasture.