

A Phase 1 Heritage Impact Assessment of proposed
installation of new irrigation pivots and associated
infrastructure on portion 0 and 2 of the farm Waterford
229 outside Hopetown, NC Province.

Dr L Rossouw
National Museum Bloemfontein
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Summary

A Phase 1 Heritage Impact Assessment was carried out for the proposed installation of new irrigation pivots and associated infrastructure next to existing ones on portion 0 and 2 of the farm Waterford 229 outside Hopetown in the Northern Cape Province. The study area has already been heavily disturbed by the previous agricultural activities (installation of pivots). The proposed development will primarily affect geologically recent soils (alluvium and wind-blown sand), Impact on potentially intact archaeological remains or Quaternary fossils is considered unlikely. A singular, weathered Middle Stone Age flake blade was recorded on the degraded substrate, but no evidence was found of *in situ* or capped Stone Age artifacts. 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 within the confines of the footprint. The extent of the proposed upgrade is considered low in terms of palaeontological and archaeological impact. The terrain is not considered palaeontologically or archaeologically vulnerable and is assigned a site rating of Generally Protected C.

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Introduction

A Phase 1 Heritage Impact Assessment was carried out for the proposed installation of new irrigation pivots and associated infrastructure next to existing ones portion 0 and 2 of the farm Waterford 229 outside Hopetown in the Northern Cape Province (**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). 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 with a field assessment by means of a pedestrian survey and investigation of all exposed sections within the footprint. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes.

Site significance classification standards prescribed by SAHRA (2005) were used to indicate overall significance and mitigation procedures where relevant (**Table 2**).

Description of the Affected Area

Maps: 1:50 000 topographical map 2924 CA Hopetown

1:250 000 geological map 2924 Koffiefontein

General Site Coordinates: 29°36'9.97"S; 24°05'41.56"E

The site covers about 670 ha of agricultural land located on the northern bank of the Orange River and south of the R385 road outside Hopetown (**Fig. 2 & 3**).

Geology

The region is underlain by Precambrian, Ventersdorp Supergroup lavas (Allanridge Formation, *Ra*), which is composed of resistant-weathering, dark green lavas and

associated pyroclastic rocks (Zawada 1992) (**Fig. 4**). The Ventersdorp lavas are unconformably overlain by Dwyka Group tillites of the Mbizane Formation (C-Pd), a largely heterolithic unit recognized in the upper part of the Dwyka Group of the Karoo Supergroup (Von Brunn & Visser 1999; Visser et al. 1977-78, 1990; Zawada 1992; Johnson et al. 2006). It represents valley and inlet fill deposits left behind on Ventersdorp basement rocks by retreating glaciers about 300 million years ago. These Dwyka-aged palaeovalleys bear evidence of glaciated pavements, consisting of well-preserved polished surfaces striations on basement rocks, which abound throughout the area (McLachlan and Anderson 1973). Localized outcrops of Early Permian, Whitehill Formation mudrocks (Ecca Group, *Ppw*) generally occur near Jurassic dolerite contact zones (Zawada 1992). Dolerite, in the form of dykes and sills, is common throughout the region. Fossils from the Whitehill Formation (Ecca Group) include mesosaurid reptiles, crustaceans, palaeoniscoid fish, fossil wood and leaves (*Glossopteris*), sponge spicules and ichnofossils (Cole and Basson 1991). According to the 1:250 000 geological map 2924 Koffiefontein, the study area is underlain by Mbizane Formation sediments (C-Pd, covered by Late Cenozoic superficial deposits made up of calcretes, surface limestones, scree (*Qc*), Kalahari Group sand, surface gravels and alluvium along stream incisions (Orange River).

Background

The Mbizane Formation is not considered to be highly fossiliferous, but low diversity non-marine ichnofossil assemblages have been recorded as well as scarce vascular plant remains associated with *Glossopteris* Flora, while palynomorphs are also likely to be present within finer-grained mudrock facies (Almond and Pether 2008). Regarded as feeders of Drakensberg lavas, dolerites are not palaeontologically significant and can be excluded from further consideration in the present evaluation. On the other hand, dolerite outcrop can be regarded as archaeologically significant since Stone Age lithic artifacts in the region are mostly made of hornfels, a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area. As a result, stone tool factory sites are commonly found near dolerite-shale contact zones. In addition, rock engravings in the region are consistently found on dolerite.

To the northwest of Hopetown the landscape is dissected by the ancient Koa Valley, a Miocene relic with remnants of Cenozoic fluvial deposits that has produced fossil

vertebrate bone as well as fossil wood. Southwards, the Koa Valley joins an extensive system of pans fossil where vertebrate fossil remains have been identified. No fossils have been explicitly reported from late Cenozoic alluvial deposits near Hopetown yet, but a variety of fossil fauna have been retrieved from alluvial gravel terraces along the Lower Vaal River basin northeast of Kimberley (Cooke 1949; Maglio and Cooke 1978; Partridge and Maud 2000). Here, gravel terraces contain sandy lenses that have yielded several extinct vertebrate taxa including proboscidians (*Mammuthus subplanifrons* and *Elephas iolensis*), suids (*Notochoerus capensis*) and a variety of bovids.

The Stone Age archaeological footprint is well-represented north of Hopetown and around Kimberley by Early and Middle Stone Age localities from lacustrine and alluvial contexts as well as rock engravings on dolerite outcrop (**Fig. 5**). Engraving sites have been recorded on a number of farms in the Hopetown district, including Beeshoek, Brandfontein Disselfontein, Doornbult Karee Kloof, Lemietskop and Rooikop.

Hopetown itself was established in 1854. The town experienced a boom after the discovery of diamonds 1866 and 1868, which led to the famous diamond rush of the 1870's. The historical Orange River Station and blockhouse lie on the southern bank of the Orange River, 12 kilometres east of Hopetown. South of the station lies the Doornbult concentration camp, established in 1901 by the British, which housed at least 1600 people during the Anglo-Boer War.

Field Assessment

The field assessment indicates that the study area has already been heavily disturbed by the previous agricultural activities (installation of pivots) (**Fig. 6**). A singular Middle Stone Age flake blade was recorded on the degraded substrate, but no evidence was found of *in situ* or capped Stone Age artifacts. 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 within the confines of the footprint.

Impact Statement and Recommendation

The field assessment indicates that the proposed pivot development will primarily affect geologically recent soils (alluvium and wind-blown sand) (**Table 1**). Impact on

potentially intact Stone Age archaeological remains or Quaternary fossils is considered unlikely. The extent of the proposed upgrade is considered low in terms of palaeontological and archaeological impact. The terrain is not considered palaeontologically or archaeologically vulnerable and is assigned a site rating of Generally Protected C (**Table 2**).

References

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DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project.



04 / 10 / 2017

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, Alluvium (Quaternary) | Permanent | High | High | Low | Low |
| Mbizane Formation tillites (Dwyka Group) Early Permian | N/A | Low | Low | None | None |
| Allanridge Formation lavas, <i>Ra</i> (Ventersdorp Supergroup) Precambrian | N/A | Low | High | None | None |

Table 2. Field rating categories as prescribed by SAHRA.

| Field Rating | Grade | Significance | Mitigation |
|------------------------------|--------------|--------------------------|--|
| National Significance (NS) | Grade 1 | - | Conservation; national site nomination |
| Provincial Significance (PS) | Grade 2 | - | Conservation; provincial site nomination |
| Local Significance (LS) | Grade 3A | High significance | Conservation; mitigation not advised |
| Local Significance (LS) | Grade 3B | High significance | Mitigation (part of site should be retained) |
| Generally Protected A (GP.A) | - | High/medium significance | Mitigation before destruction |
| Generally Protected B (GP.B) | - | Medium significance | Recording before destruction |
| Generally Protected C (GP.C) | - | Low significance | Destruction |

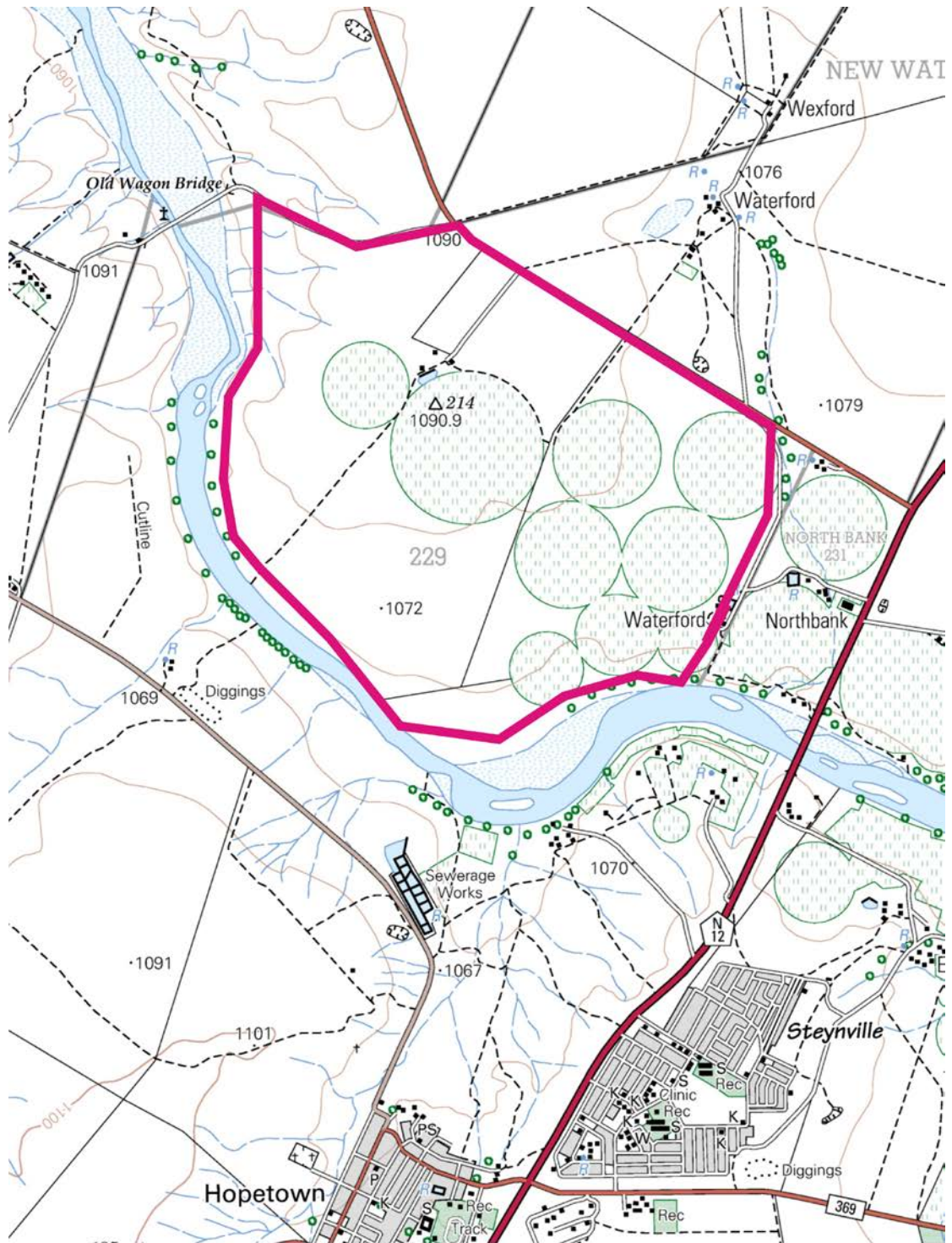


Figure 1. Map of the proposed footprint (portion of 1:50 000 scale topographical map 2924 CA Hopetown).

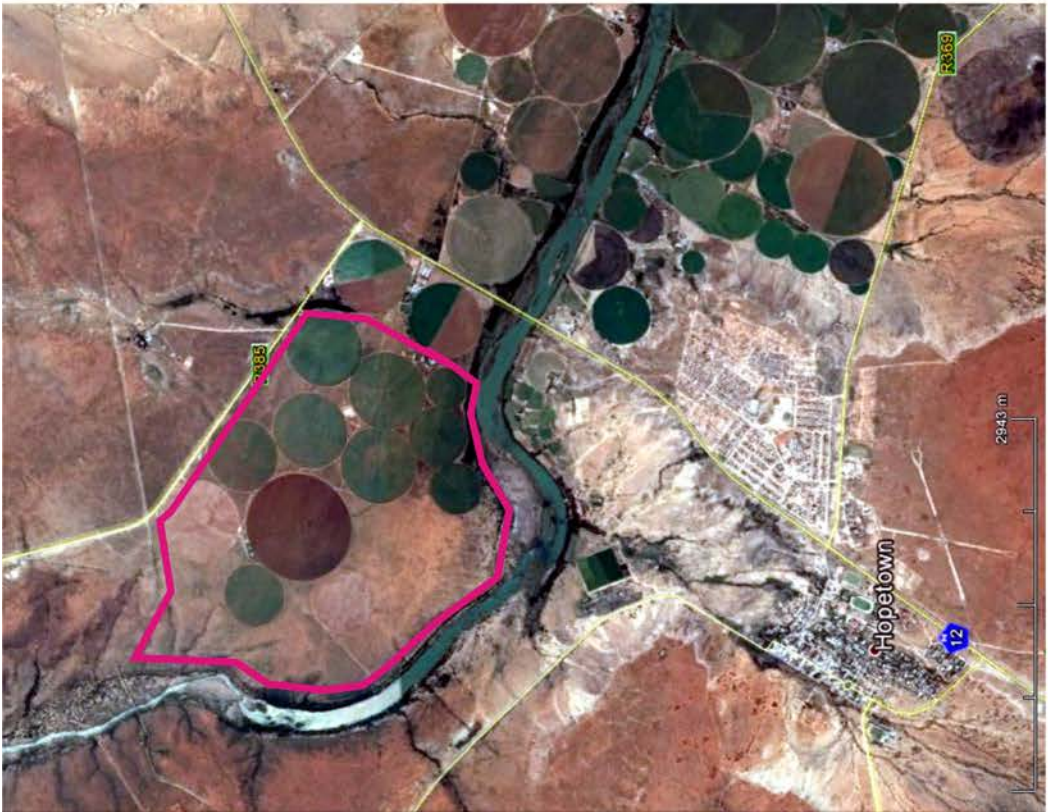


Figure 2. Aerial view of the study area.

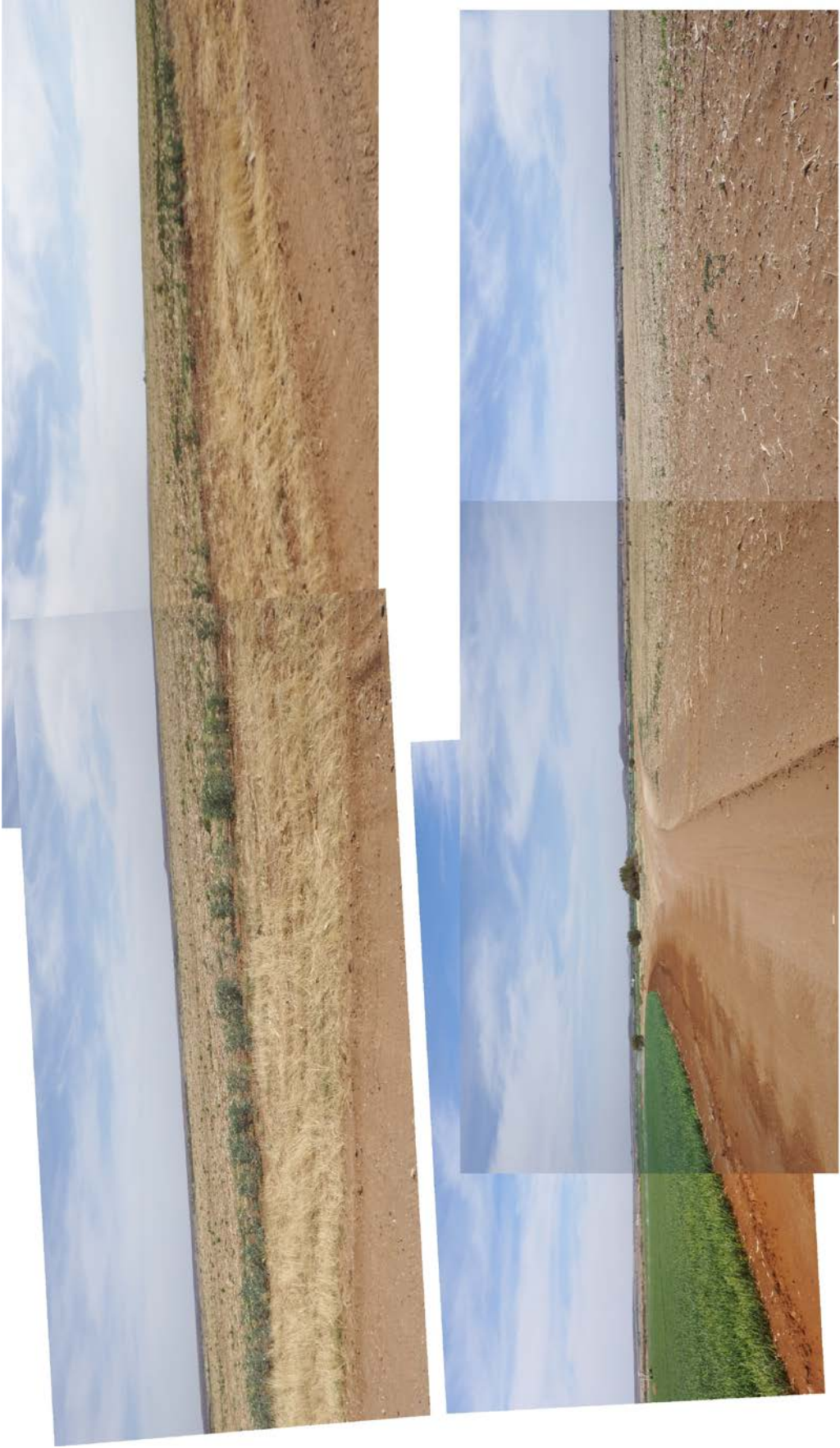


Figure 3. General view of the study area.

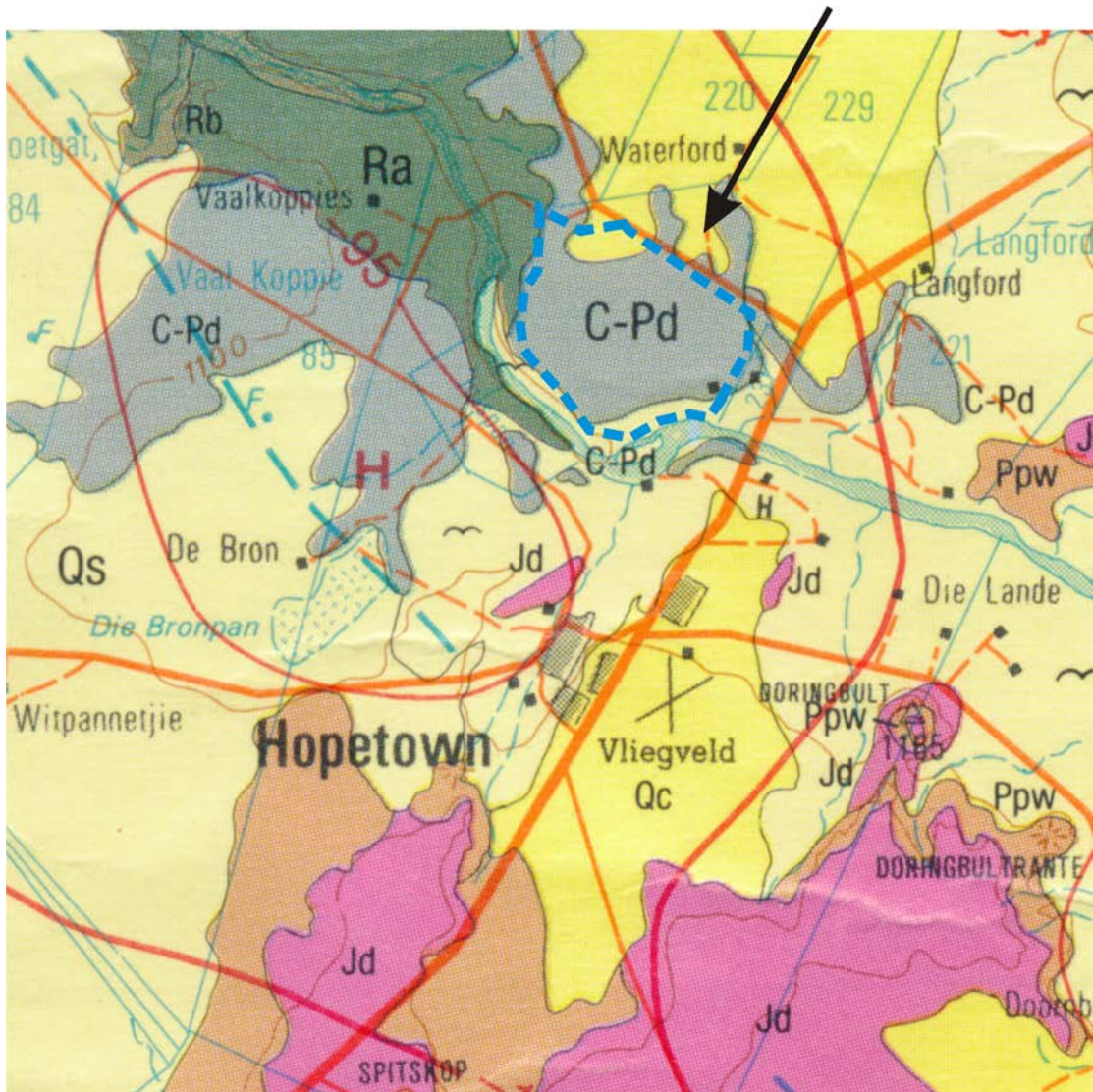


Figure 4. Portion of 1: 250 000 geological map 2924 Koffiefontein (Council for Geoscience, Pretoria). The area around Hopetown is underlain at depth by Precambrian lavas of the Allanridge Formation (Ventersdorp Group, *Ra*) as well as Dwyka tillites (Mbizane Formation, *C-Pd*) and basal Ecca mudrocks (Whitehall Formation, *Ppw*) of the Karoo Supergroup. The basement lavas and Karoo sediments are largely overlain by Late Cenozoic superficial deposits made up of calcretes, surface limestones, scree (*Qc*), wind-blown sand and alluvium.



1. Pniel, Nooitgedacht & Powers Site - ESA, MSA and LSA
2. Canteen Koppie - ESA
3. Rooidam - ESA
4. Biesiesput - MSA
5. Driekopseiland - Glacial straitions, Rock engravings
6. Doornlaagte - ESA
7. Kareevloer - ESA, MSA
8. Alexandersfontein - 'palaeo-lake'
9. Liebensraum - ESA
10. Wildebeestkuil - Rock engravings
11. Witpan - Rock engravings
12. Orange River Station, Blockhouse & Concentration Camp

Figure 5. The Stone Age archaeological footprint is well-represented north of Hopetown and around Kimberley by Early and Middle Stone Age localities from lacustrine and alluvial contexts as well as rock engravings on dolerite outcrop.



Figure 6. General view of degraded terrain caused by previous agricultural activities (top, below left) and a singular, weathered Middle Stone Age flake blade recorded *ex situ* (below right).