

**Phase 1 Heritage Impact Assessment of a proposed new
22 km – long water pipeline between the Dermspruit
and the Bultfontein Water Treatment Works, Free State
Province.**

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Summary

A phase 1 Heritage Impact Assessment was carried out for a proposed new 22 km – long water pipeline between the Bultfontein Water Treatment Works and the treatment works near the Dirmspruit on the farm Luipaardsvallei 95, Free State Province. The proposed development will affect well-developed superficial deposits (Quaternary windblown sand) represented by trampled grassland or disturbed farmland where no fossils were observed. The footprint is regarded as of low palaeontological significance with regards to the Quaternary component. This is mainly due to a lack of suitable alluvial/fluvial deposits along the route. As far as the palaeontological heritage is concerned; the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint. In the unlikely event of fossil discovery within the Quaternary overburden (i.e. modern-looking but more or less lithified animal bones and teeth) during the construction phase of the development, a professional palaeontologist must be called in immediately to confirm and record the finds. The survey revealed no evidence of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings), prehistoric structures, graves or historically significant buildings older than 60 years within the boundaries of the proposed footprint. It is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (GP.C). As far as the archaeological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint.

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Introduction

A phase 1 Heritage Impact Assessment was carried out for a proposed new 22 km – long water pipeline between the Bultfontein Water Treatment Works and the treatment works near the Dermspruit on the farm Luipaardsvallei 95, Free State Province (**Fig. 1**). The assessment is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act (NHRA) 25 of 1999. The region's unique and non-renewable archaeological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources in the area to be developed, and that make recommendations for protection or mitigation of the impact of such sites.

The NHRA identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories relevant to the proposed development are listed in Section 34 (1), Section 35 (4), Section 36 (3) and Section 38 (1) of the NHR Act and are as follows:

34. (1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

35 (4) No person may, without a permit issued by the responsible heritage resources authority—

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- *b*) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

36 (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site
 - a) exceeding 5000 m² in extent; or
 - b) involving three or more existing erven or subdivisions thereof; or
 - c) involving three or more subdivisions thereof which have been consolidated within the past five years;
- The rezoning of a site exceeding 10 000 m²; or
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

Terms of Reference

The task involved the following:

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Methodology

The heritage significance of the affected area was evaluated on the basis of existing field data, database information and published literature. This was followed 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. Maps and aerial photographs (incl. Google Earth) were consulted and integrated with data acquired during the on-site inspection.

Field Rating

Site significance classification standards prescribed by SAHRA (2005) were used to indicate overall significance and mitigation procedures where relevant (**Table 1**).

Locality Data

Maps: 1:50 000 topographical map

1:250 000 geological map

Pipeline Coordinates (**Fig.2**):

- 1) 28°16'45.44"S 26° 8'25.18"E
- 2) 28°15'13.62"S 26° 8'39.82"E
- 3) 28°13'21.92"S 26° 9'0.80"E
- 4) 28°11'24.24"S 26° 9'18.77"E
- 5) 28° 9'58.72"S 26° 9'51.64"E
- 6) 28° 8'8.15"S 26°11'0.36"E
- 7) 28° 6'36.81"S 26°12'12.01"E
- 8) 28° 6'1.45"S 26°12'16.90"E

From the Bultfontein WTW (**Fig. 2 no.1; Fig. 3 & Fig. 4 no. 1**) the pipeline route transects degraded and disturbed terrain northwards along the R700 provincial road, to cross the Bultfontein-Hoopstad-Welkom intersection onto open grassland and patches of farmland (**Fig. 2 nos.1-2; Fig. 3 & Fig. 4 no. 2**). The footprint then runs along the western rim of a pan / deflation area (**Fig. 2 no.2 & Fig. 4 no. 3**) whereafter it continues along an existing track (**Fig. 2 nos. 3 – 6 & Fig. 5**) shortly before it reaches the Dirmspruit facility on the farm Luipaardsvallei 95 (**Fig. 2 nos.7 – 8 & Fig. 6**).

Background

The geology of the region has been described by Nolte (1995; 1: 250 000 scale geological map 2826 Winburg, Council for Geoscience, Pretoria, 1995). The area around Bultfontein is underlain by rocks and sediments of widely different geological ages (**Fig. 7**). According to the geological map substantial exposures of Permian Ecca shales (Tierberg Formation., *Pt*) are located the south and west of the pipeline footprint while the footprint itself is underlain by intrusive Jurassic dolerites (Jd, Karoo Dolerite Suite) in the south grading into thick deposits of Quaternary windblown sand (Qs) (including pandunes) to the north. The wind-blown sands represent the latest geological phase and are made up of the characteristically red-brown Kalahari sands (Hutton sands).

Fossils from the Tierberg Formation are poorly represented and occur mainly as sparsely distributed and generally not diverse assemblages of trace fossils (Anderson 1976; De Beer *et al.* 2002; Viljoen 2005; Johnson *et al.* 2006). These ichno-assemblages include arthropod trackways and associated resting impressions, fish swimming trails, horizontal epichnial furrows often attributed to gastropods, as well as a variety of different kinds of small burrows. Impressions of *Gondwanidium validum* and pieces of *Dadoxylon* have been discovered between Douglas and Belmont, south of Kimberley (McLaren 1976). Sponge spicules, fish scales and disarticulated microvertebrate remains from calcareous concretions have also been recorded (Zawada 1992, Bosch 1993).

Dolerite, in the form of dykes and sills, is common throughout the region. Regarded as feeders of Drakensberg lavas, dolerites have no palaeontologically potential. It is however moderately significant from 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.

Quaternary-age surface deposits in the region can be highly fossiliferous in places, especially those that are directly related to fluvial environments, springs or pans (**Fig. 8**). Fossil assemblages are frequently made up of an assortment of mammalian bones and teeth and associated stone tools. Intrusive features such as fossilized hyena lairs are sometimes located outside the present river valleys along calcified pan dunes (Scott & Brink 1991). Spring deposits, such as the archaeologically rich spring mound sediments at Florisbad northwest of Bloemfontein and Baden Baden north of

Dealesville, may contain late Pleistocene mammal vertebrate remains, coprolites, plant microfossils (pollen and phytoliths) and *in situ* stone tool artefacts (Brink 1988; Scott & Rossouw 2005) (**Fig. 9**).

Fluvially derived overbank sediments of the Modder and Vet Rivers contain fossil remains of a variety of extinct mammals, and associated coprolites (Churchill *et al.* 2000) (**Fig. 8**). In addition, the alluvial sediments are also valuable sources of open-site Stone Age archaeological assemblages. 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 eroding out of dongas in the overbank sediments (Rossouw 2006; De Ruiter *et al.* 2011) (**Figs. 10 & 11**).

There are no records of rock engravings in the vicinity of the survey area. Bultfontein is situated outside the periphery of distribution of Late Iron Age settlements in the Free State. Ruins of Late Iron Age settlements are found on several farms between 80 km and 100 km to the east and northeast of Bultfontein, such as the stone kraal settlements at Doornpoort near Winburg and the large settlement complex at Strydfontein between Hennenman and Ventersburg (Maggs 1976; **Fig.12**).

Field Assessment

The proposed development will affect well-developed superficial deposits (Quaternary windblown sand) represented by trampled grassland or disturbed farmland where no fossils were observed (**Fig. 13**). The survey revealed no evidence of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings), prehistoric structures, graves or historically significant buildings older than 60 years within the boundaries of the proposed footprint.

Impact Statement & Recommendation

The pipeline footprint is regarded as of low palaeontological significance with regards to the Quaternary component. This is mainly due to a lack of suitable alluvial/fluvial deposits along the route. As far as the palaeontological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint. In the unlikely event of fossil discovery within the Quaternary overburden (i.e. modern-looking but more or less lithified

animal bones and teeth) during the construction phase of the development, a professional palaeontologist must be called in immediately to confirm and record the finds. In the meantime, ex situ remains must be wrapped in paper towels or heavy duty tin foil and stored in a safe place. The material should not be washed or cleaned in any way. In *situ* material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet until further confirmation by the palaeontologist.

The pipeline footprint is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (GP.C). As far as the archaeological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to within the boundaries of the development footprint.

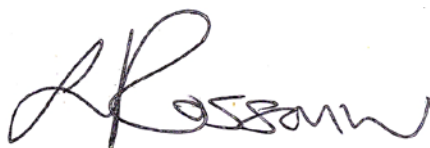
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DECLARATION OF INDEPENDENCE

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 and have no conflicting interests in the undertaking of the activity.



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Tables & Figures

Table 1. 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

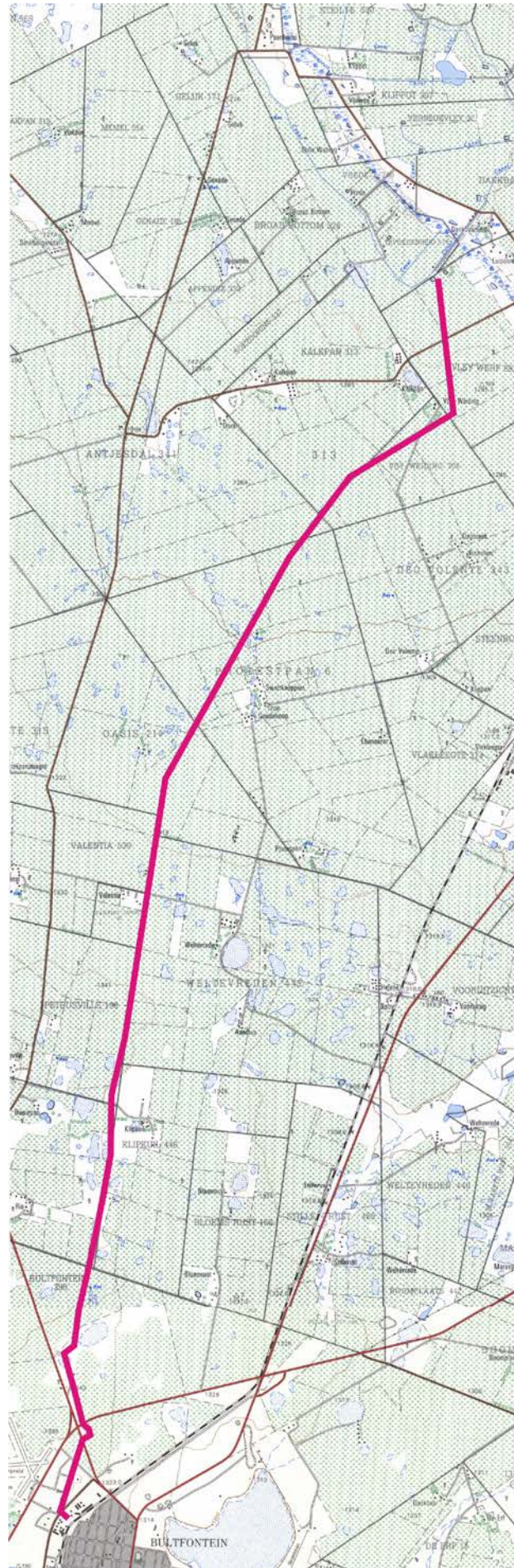


Figure 1. Map of the proposed pipeline route (portions of 1:50 000 scale topographic maps 2826 AA Protespan and 2826 AC Bultfontein).



Figure 2. Aerial view of the proposed pipeline footprint.

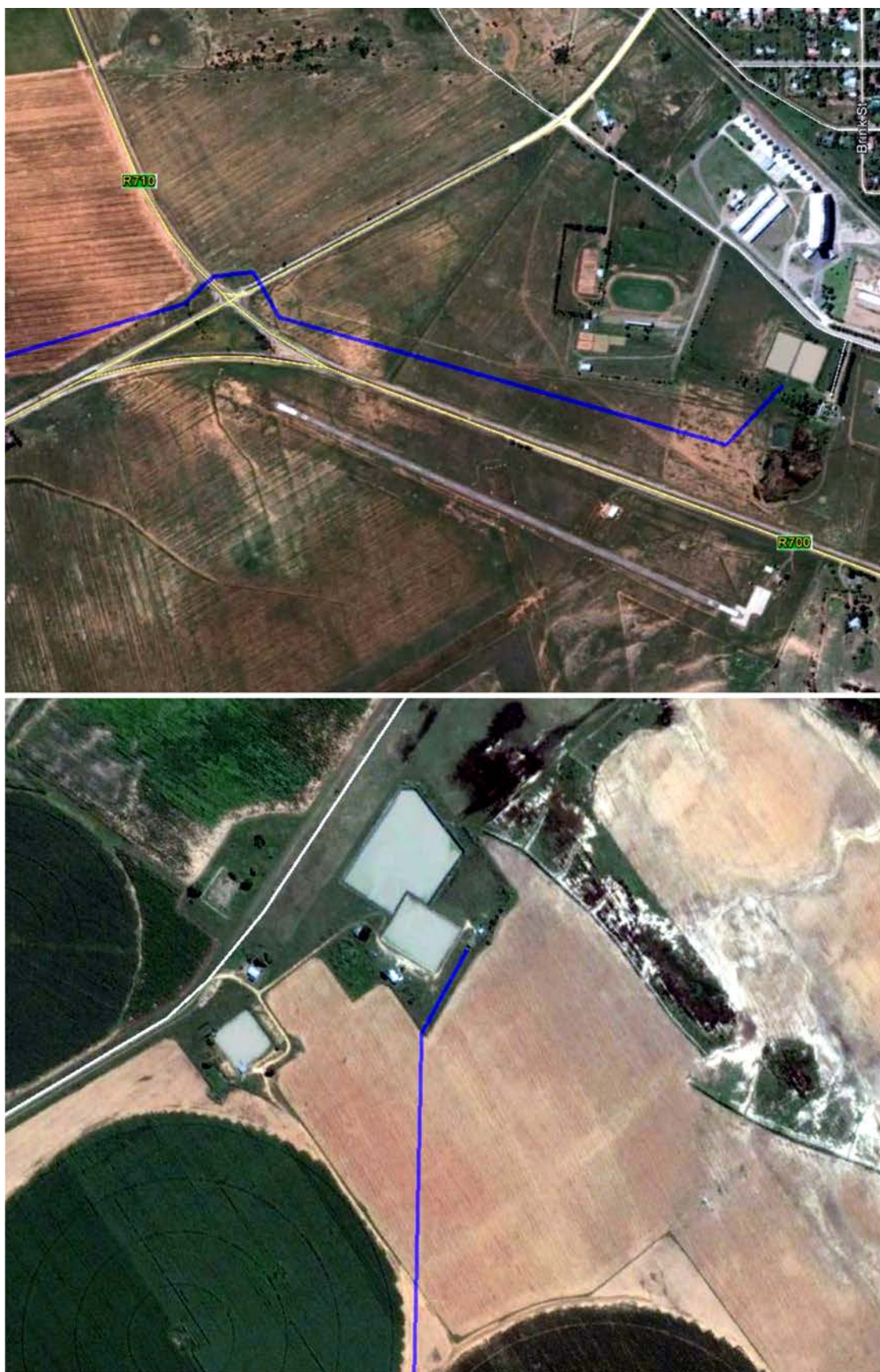


Figure 3. Aerial view of the terminal points at the Bultfontein WTW (top) and the Luipaardsvlei facility (below).



Figure 4. General view of the pipeline route starting at the Bultfontein WTW (top left) crossing open farmland northwest of the Bultfontein-Hoopstad-Welkom intersection (top right) and skirting the western rim of a pan/deflation area (below).

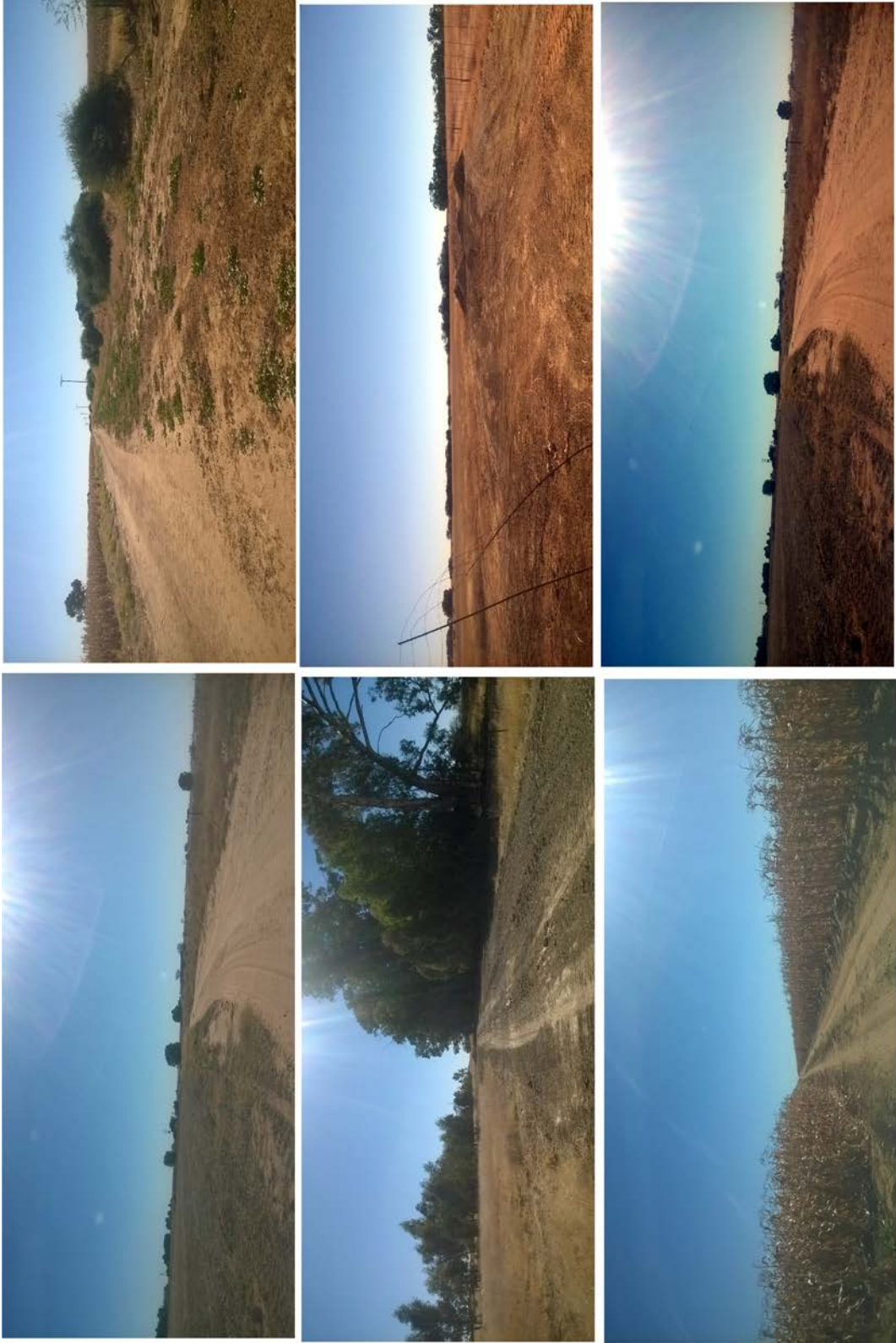


Figure 5. General view of the pipeline route going north (Fig. 2, section 3 - 6).



Figure 6. The facility near the Dermspruit at Luipaardsvallei, looking north towards the dams (top) and southeast towards the pumphouse (below).

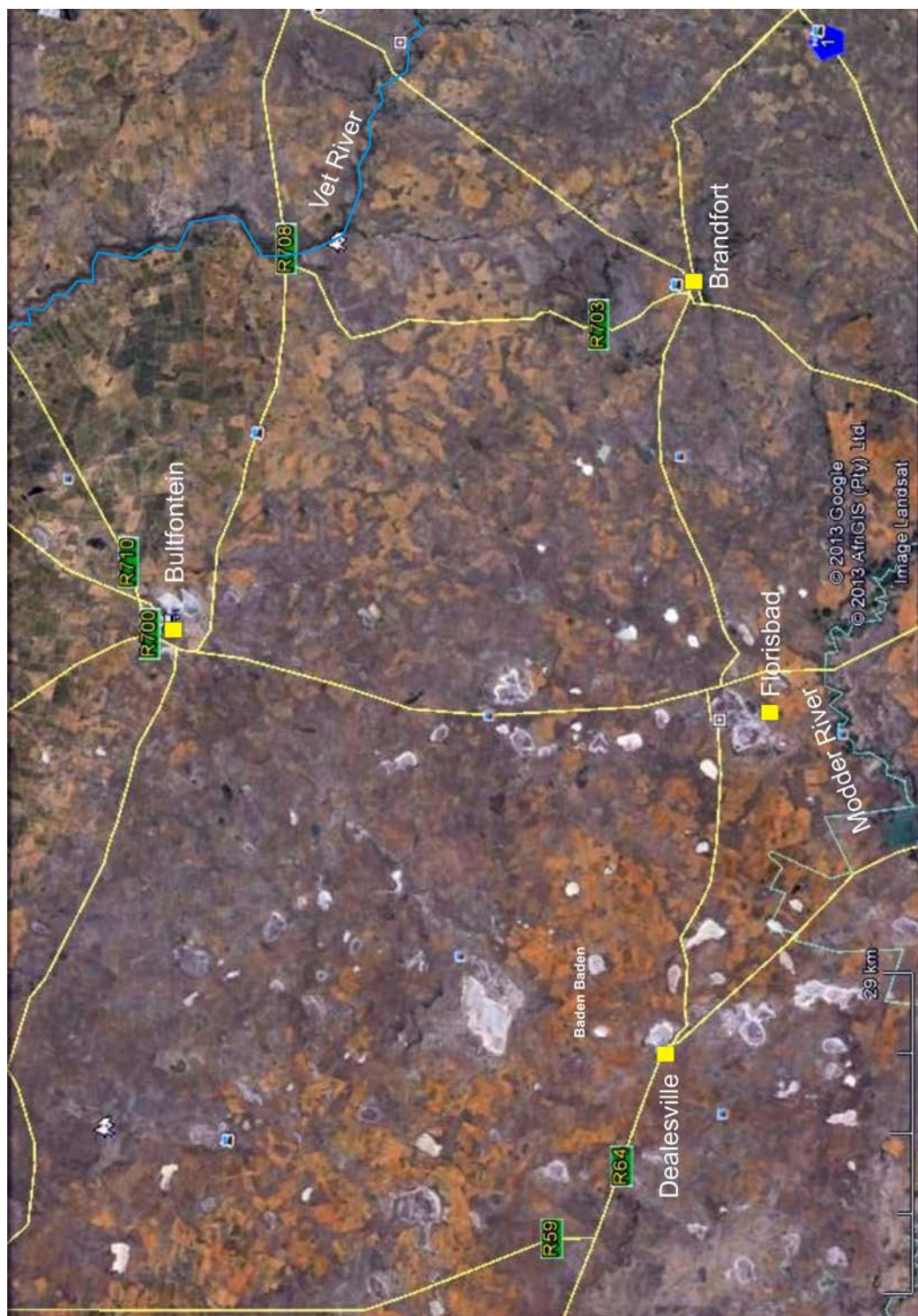


Figure 8. Major rivers pans and spring sites in the region of Bultfontein.

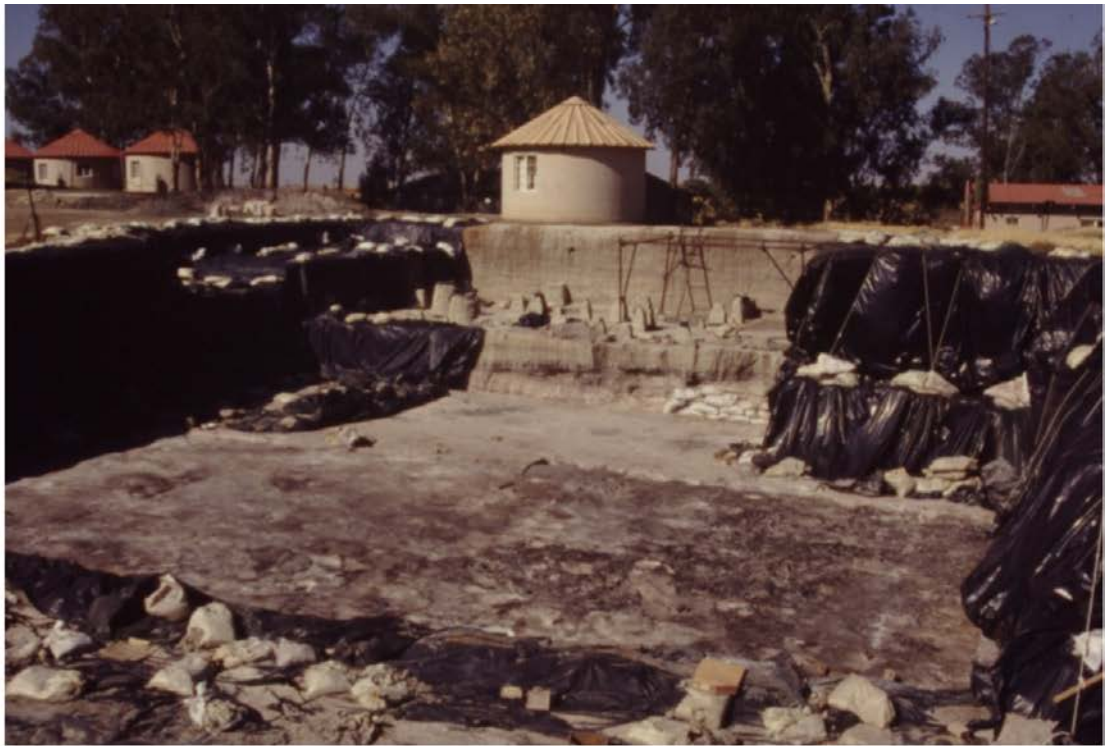


Figure 9. The palaeontological and archaeological exposures at Florisbad (above) and Baden Baden (below).



Figure 10. Late Pleistocene alluvial deposits along the Modder River (A) containing lower molar of extinct giant wildebeest *Megalotragus priscus* (B) and giant buffalo *Homoioceras antiquus* (C) and fossilized carnivore coprolite (D).



Figure 11. A Middle Stone age flake blade (above) and Later Stone Age core eroding from dongas along the Modder River.

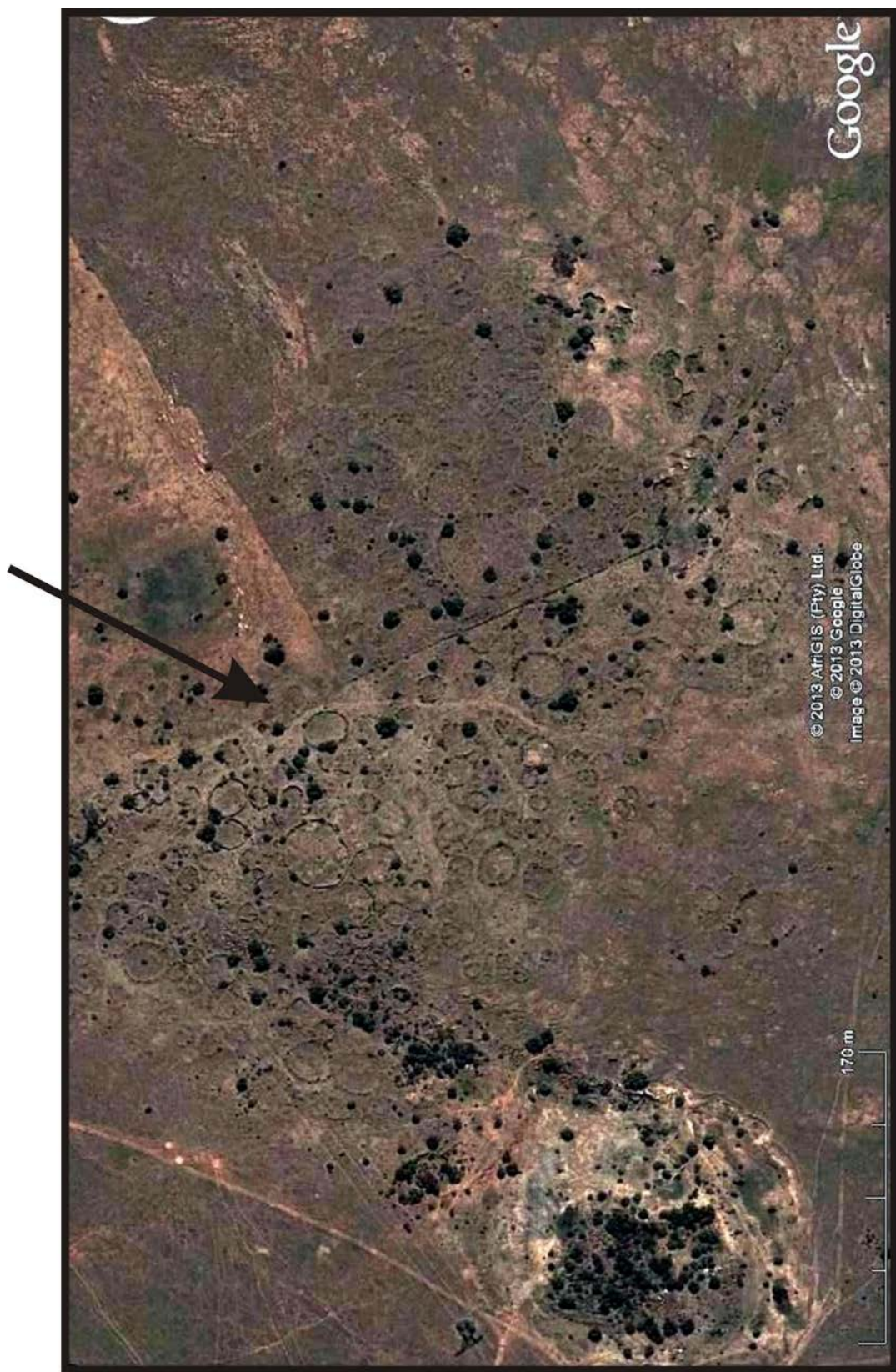


Figure 12. Large settlement complex between Hennenman and Ventersburg (Maggs' Type Z type site OXF1).

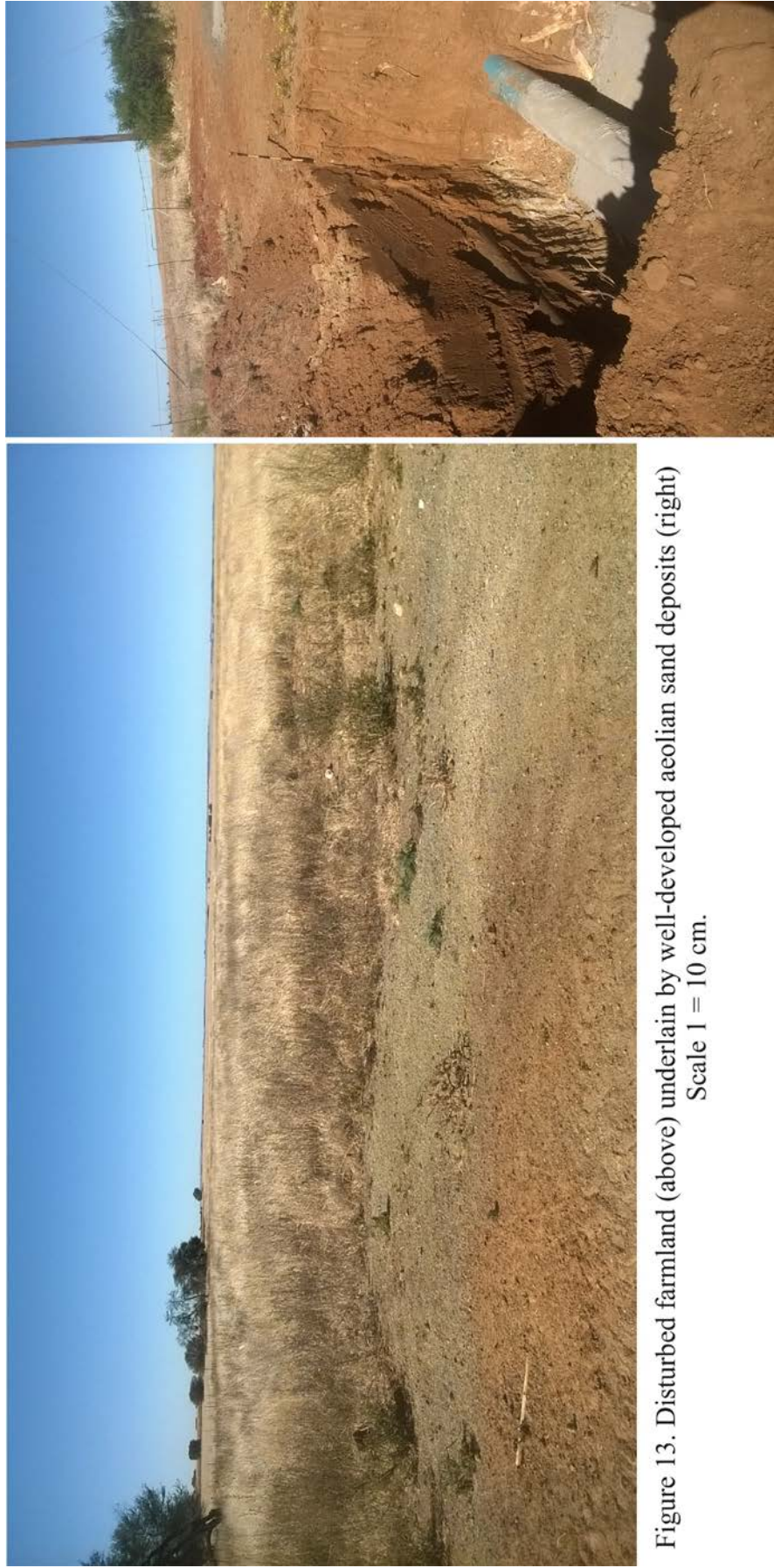


Figure 13. Disturbed farmland (above) underlain by well-developed aeolian sand deposits (right)
Scale 1 = 10 cm.