

**Phase 1 Heritage Impact Assessment for establishment
of new agricultural pivots on the farm Duikersvlei near
Douglas, NC Province.**



Report prepared by
Paleo Field Services
PO Box 38806
Langenhovenpark
Bloemfontein 9330
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Summary

A Phase 1 Heritage Impact Assessment was carried out for a proposed new agricultural pivot on the farm Duikersvlei near Douglas in the Northern Cape Province. The proposed development covers 70 ha of open veld located about 2 km due east of the Orange River and 17 km south of Douglas. The site lies within a historically as well as prehistorically significant landscape, on rocks considered to be of moderate (Dwyka tillites) to low (Allanridge Formation lavas) palaeontological sensitivity. However, the proposed development will exclusively affect a geologically recent soil mantle in the form of well-developed wind-blown sands of the Quaternary Kalahari Group, Gordonia Formation that in this case is not considered to be paleontologically or archaeologically sensitive. The site is assigned a rating of Generally Protected C.

Introduction

A Phase 1 Heritage Impact Assessment was carried out for a proposed new agricultural pivot on the farm Duikersvlei near Douglas in the Northern Cape Province (**Fig 1**). The region's unique and non-renewable archaeological and palaeontological 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 including archaeological and palaeontological sites in the area to be developed, and that make recommendations for protection or mitigation of the impact of the sites.

Legislative framework

The primary legal trigger for identifying when heritage specialist involvement is required in the Environmental Impact Assessment process is the National Heritage Resources (NHR) Act (Act No 25 of 1999). The NHR Act requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures over 60 years of age, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects.

The Act 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 of development listed in Section 38 (1) of the NHR Act are:

- 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;
- Exceeding 5000 m² in extent;
- Involving three or more existing erven or subdivisions thereof;

- Involving three or more subdivisions thereof which have been consolidated within the past five years;
- Costs of which will exceed a sum set in terms of regulations by the South African Heritage Resources Agency (SAHRA).
- The rezoning of a site exceeding 10 000 m².
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

If a heritage resource is likely to be impacted by a development listed in Section 38 (1) of the NHR Act, a heritage assessment will be required either as a separate HIA or as the heritage specialist component (AIA or PIA) of an EIA.

The significance or sensitivity of heritage resources within a particular area or region can inform the EIA process on potential impacts and whether or not the expertise of a heritage specialist is required. A range of contexts can be identified which typically have high or potential cultural significance and which would require some form of heritage specialist involvement. This may include formally protected heritage sites or unprotected, but potentially significant sites or landscapes. The involvement of the heritage specialist in such a process is usually necessary when a proposed development may affect a heritage resource, whether it is formally protected or unprotected, known or unknown. In many cases, the nature and degree of heritage significance is largely unknown pending further investigation (e.g. capped sites, assemblages or subsurface fossil remains). On the other hand, it is also possible that a site may contain heritage resources (e.g. structures older than 60 years), with little or no conservation value. In most cases it will be necessary to engage the professional opinion of a heritage specialist in determining whether or not further heritage specialist input in an EIA process is required.

Methodology

The 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 (site visit) of the affected area. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant archaeological and palaeontological information, maps, Google Earth images and site records were consulted and integrated with data acquired during the on-site inspection.

Terms of reference:

- 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.

Site significance classification standards, as prescribed by SAHRA, were used for the purpose of this evaluation (**Table 1**).

Locality Data

1 : 50 000 scale topographic map 2923BB_Douglas

1 : 250 000 scale geological map 2922 Prieska

The proposed development covers 70 ha of open veld located about 2 km due east of the Orange River and 17 km south of Douglas (**Fig. 2 & 3**).

GPS coordinates (**Fig. 2**):

- A) 29°14'45.38"S 23°47'51.24"E
- B) 29°14'40.96"S 23°48'33.12"E
- C) 29°14'57.95"S 23°48'40.23"E
- D) 29°15'7.07"S 23°47'59.10"E

Background

Palaeontology

Potential occurrences: Late Neogene vertebrate fossils associated with intact river terrace gravels; Quaternary vertebrate fossils associated with Pleistocene alluvial deposits, pans and springs.

The geology of the study area is shown on the 1: 250 000 geology map 2922 Prieska (**Fig. 4**). The region is underlain by Precambrian, Ventersdorp Supergroup lavas (Allanridge Formation, *Ra*), composed of resistant-weathering, dark green lavas and associated pyroclastic rocks. The lavas are generally exposed along stream incisions and high-lying outcrops where the formation is represented by coarse and blocky surface gravels that resulted from *in situ* weathering and downwasting. The Ventersdorp lavas are

unconformably overlain by Dwyka Group tillites of the Mbizane Formation, (*C-Pd*, Visser *et al.* 1977-78, 1990; Johnson *et al.* 2006) which represents valley and inlet fill deposits left behind on Ventersdorp basement rocks by retreating glaciers about 300 million years ago. While the lavas are not palaeontologically sensitive, glacial pavements that record the movement of the Dwyka ice sheets across the Ventersdorp basement rocks needs to be preserved as geological sites. Weathered Dwyka sediments contain bluish-grey unbedded tillite with sparse to concentrated boulder-sized and smaller erratics which are occasionally capped by well-developed and crudely bedded calcrete hardpan. Locally laminated lenses of bedded tillites are ascribed to glaciolacustrine and fluvio-glacial origin (Visser *et al.* 1977 – 78). The glacial tillites of the Dwyka Group are not considered to be palaeontologically sensitive, 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). The Precambrian basement lavas and overlying Karoo Supergroup rocks are mantled by windblown Kalahari Group sand (Qs), surface gravels and alluvium. Geologically recent (Quaternary) alluvial sediments along the banks of the Orange River are made up well-developed sandy deposits with gravel to boulder size lenses (cf. reworked Dwyka Group and Allanridge Formation) of varying thicknesses. Similar overbank deposits along major river courses in the central interior can be highly fossiliferous in places (Broom 1909 a, b; Cooke 1955; Maglio and Cooke 1978; Churchill *et al.* 2000; Rossouw 2006).

Archaeology

Potential occurrences: *Intact Stone Age open sites; burial cairns, unmarked graves, pastoralist kraals, rock engravings on andesite.*

The Stone Age archaeological footprint in the region is represented by Early, Middle and Later Stone Age sites associated with pans and alluvial contexts, while away from rivers, the landscape in general is characterized by low density surface scatters (Beaumont 1995; Kiberd 2006). The base and lower levels of Kalahari Group sands which cover vast areas in the region, have produced localized densities of Middle Stone Age artefacts, especially around the lower Vaal basin (Beaumont and Morris 1990). The incidence of Early as well as Later Stone Age surface scatters are also common along the lower Vaal and middle Orange River basins, which highlights the antiquity and continuity of human occupation on the landscape. Rock engravings in the region consistently occur on Ventersdorp andesites but also on dolerites at Wonderdraai and

Omdraaisvlei near Prieska and De Kalk, Kentani, Mazelsdontein and Readsdrift near Douglas, as well as Driekopseiland on the Riet River near Plooyburg. Engravings have also been recorded on a number of farms in the Hopetown district, including Beeshoek, Brandfontein Disselfontein, Doornbult Karee Kloof Lemietskop and Rooikop. Multiple rock engraving sites are found on the dolerite hills flanking the Riet River west of Plooyburg. Archaeological records and historical eyewitness accounts show evidence of Bushman hunter-gatherer and Khoi herder occupation in the region prior to European settlement (Sampson 1972; Elphick 1977) while early travelers frequently encountered Koranna, Griqua and Bushmen groups in the region (Burchell 1824; Skead 2009). Isolated burials and clay pottery have been recorded along the Orange River at St. Clair in the vicinity of Douglas (Humphreys 1982). Iron Age occupation is absent from the region as the most southerly distribution of Iron Age settlement in the northern Cape was limited to north of the Orange River by the end of 18th century (Maggs 1974; Humphreys 1976). The Orange River area between Douglas and Hopetown also lies within the confines of the historical Albania Settlement of Griqualand West that lasted from 1866 to its demise in 1878 (Kurtz 1988).

Field Assessment

The site is capped by a well-developed and unconsolidated aeolian overburden considered not conducive for preservation of Quaternary fossils (**Fig. 5**). There are no indications of *in situ* Stone Age sites, prehistoric structures, rock art or exposures of glacial striations within the footprint area. There is also no above ground evidence of informal graves, cairns or historically significant structures older than 60 years within the confines of the footprint.

Impact Statement and Recommendation

The site lies within a historically as well as prehistorically significant landscape, on rocks considered to be of moderate (Dwyka tillites) to low (Allanridge Formation lavas) palaeontological sensitivity. However, the proposed development will exclusively affect a geologically recent soil mantle in the form of well-developed wind-blown sands of the Quaternary Kalahari Group, Gordonia Formation that in this case is not considered to be paleontologically or archaeologically sensitive. The site is assigned a rating of Generally Protected C (**Table 1**).

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DECLARATION OF INDEPENDENCE

Paleo Field Services act as an independent specialist consultant and do not 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. Paleo Field Services has no interest in secondary or downstream developments as a result of the authorization of this project.



04/ 10 / 2022

Tables and 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 |

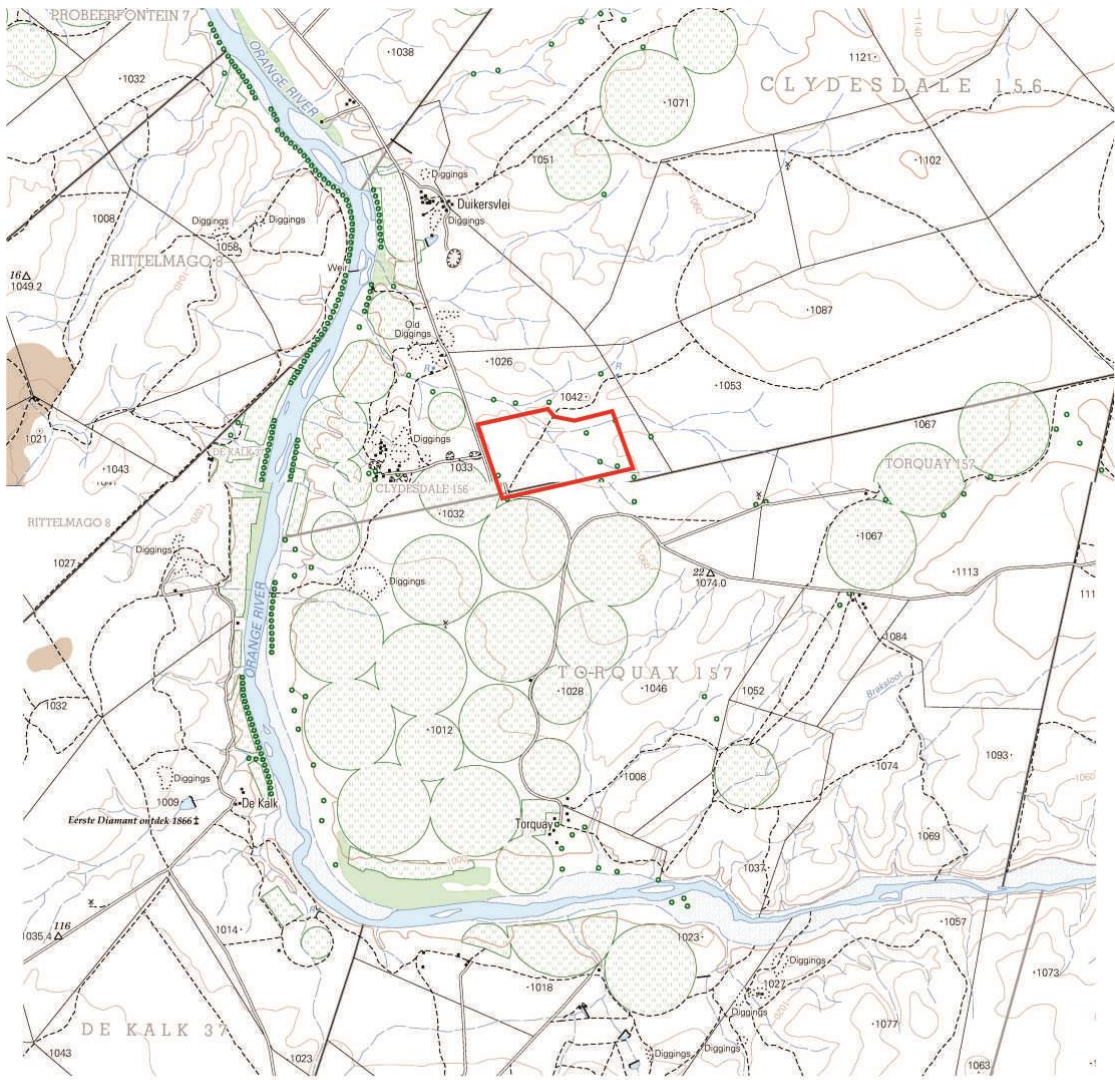


Figure 1. Proposed development area marked on portion of 1:50 000 topographic map 2923BB Douglas.



Figure 2. Aerial view and layout of the study area.



Figure 3. General view of the site, looking east.

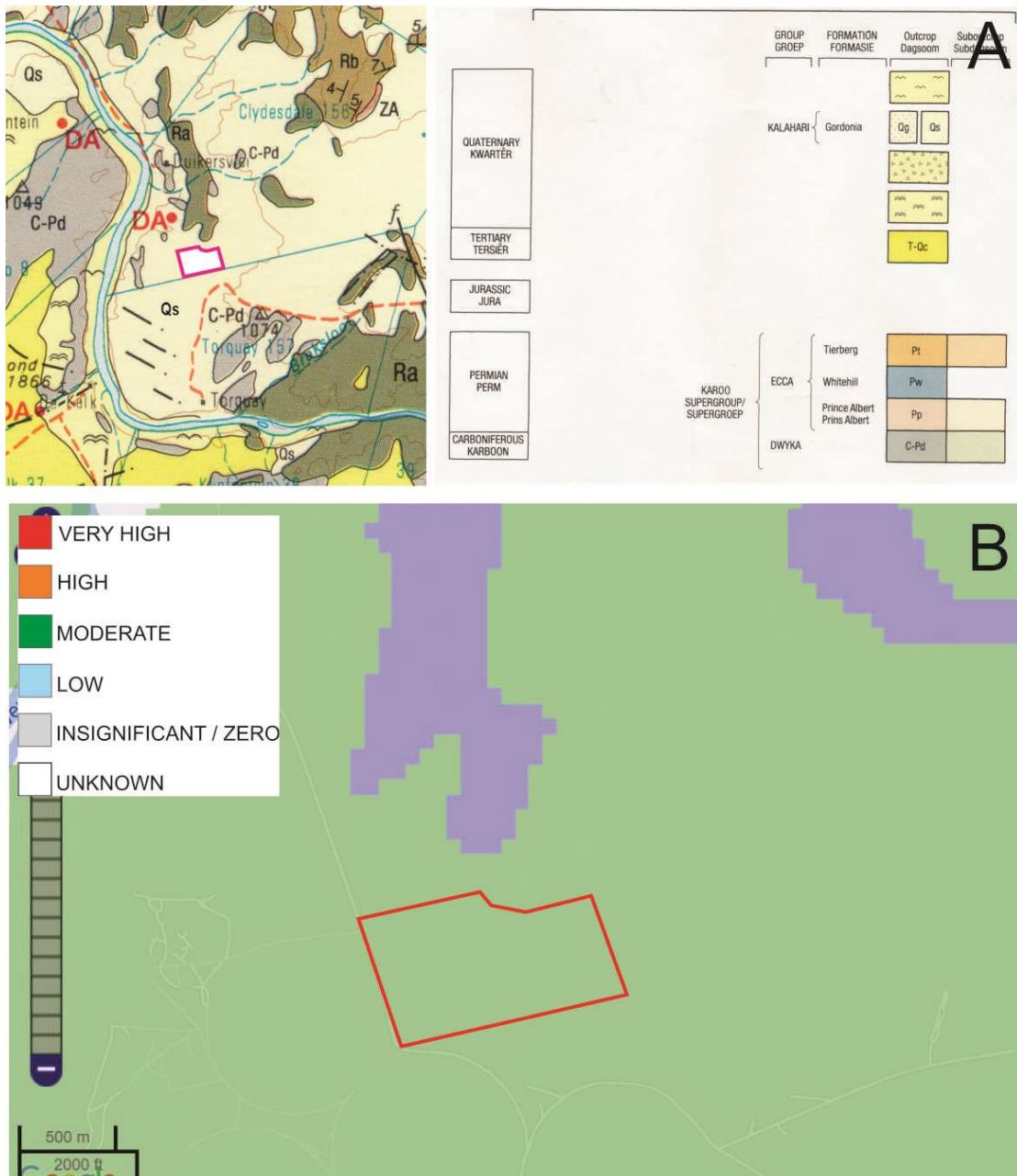


Figure 4. **A.** Study area marked on portion of 1 : 250 000 scale geological map 2922 Prieska. The region is underlain by Precambrian, Ventersdorp Supergroup lavas (Allanridge Formation, *Ra*) that are unconformably overlain by Dwyka Group tillites of the Mbizane Formation (*C-pd*). These rocks are mantled by windblown Kalahari Group sand (*Qs*), surface gravels and alluvium. **B.** SAHRIS palaeosensitivity map indicating rocks and sediments considered to be of moderate (Dwyka tillites, Quaternary overburden) to low (Allanridge Formation lavas) palaeontological sensitivity.

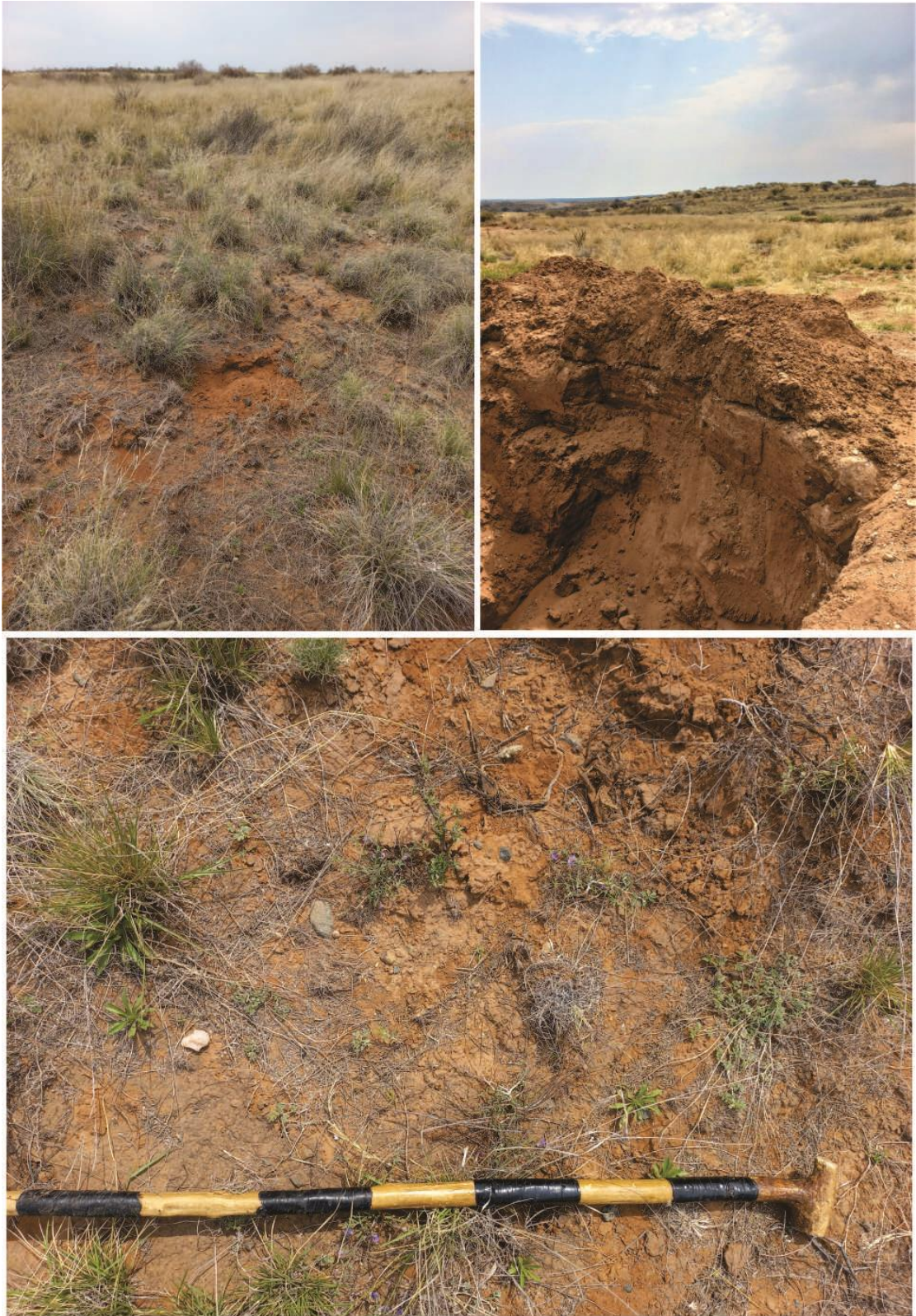


Figure 5. The site is capped by a well-developed and unconsolidated aeolian overburden of variable depth.

