Phase 1 Palaeontological Impact Assessment of a section of the farm Holsloot 47 near Prieska, NC Province.

Report prepared for

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Executive Summary

A Phase 1 Palaeontological Impact Assessment was carried out on a section of the farm Holsloot 47 near Prieska in the Northern Cape Province. The assessment pertains to the application for prospecting rights for mining diamondiferous river gravels in the area. The field assessment shows that the study area is underlain by Tertiary gravel deposits with a high potential for vertebrate fossils that are also much localized and rare but highly significant. Given the nature of fossil distribution within the intact alluvial gravels, it is not possible to exactly predict the buried fossil content of an area other than in general terms unless fresh exposures indicate otherwise. Accordingly the affected area is rated *Generally Protected A (GP.A).* The exposure and subsequent reporting of fossils to the relevant heritage authorities for excavation and recording can be considered a positive palaeontological impact provided that proper mitigation measures are put in place. It is therefore advised that excavations into calcrete deposits and underlying palaeo-gravels are accompanied by palaeontological monitoring on a regular basis through spot checks of freshly exposed sediments.

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Introduction

A Phase 1 Palaeontological Impact Assessment was carried out on a section of the farm Holsloot 47 near Prieska in the Northern Cape Province (**Fig. 1).** The assessment pertains to the application for prospecting rights for mining diamondiferous river gravels in the area. The heritage impact assessments is a pre-requisite for any development which will change the character of a site exceeding 5 000 m2 in extent, as prescribed by the National Heritage Resources Act (Act 25 of 1999). The task involved identification and mapping of possible heritage resources within the proposed project area, an assessment of their significance, related impact by the proposed development and recommendations for mitigation where relevant.

Methodology

The palaeontological significance of the affected area was evaluated through a desktop study and carried out 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. Relevant information, aerial photographs and site records were consulted and integrated with data acquired during the on-site inspection.

Terms of Reference

- Identify and map possible palaeontological and archaeological 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.

Field Rating

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

Details of Area Surveyed

Locality Data

1 : 50 000 scale topographic map: 2923 CA Rooisloot

1:250 000 scale geological map: 2922 Prieska

General Site Coordinates (**Fig. 1):**

A) 29°33'29.96"S 23° 3'8.41"E

B) 29°34'8.97"S 23° 3'15.14"E

C) 29°35'34.13"S 23° 0'55.43"E

D) 29°34'38.92"S 23° 0'30.96"E

The study area is located is located 30 km NE of Prieska and about 5km SE from the southern banks of the Orange River (**Fig. 1**). The site is located on an ancient river terrace where Tertiary river gravels are mined for alluvial diamonds (**Fig. 2**).

Background

Potentially fossiliferous rocks within the broader Prieska - Douglas region include Early Permian marine sediments of the lowermost Ecca Group (Prince Albert Formation) and Tertiary alluvial gravels of the Orange River (McLachlan and Anderson 1973, Visser *et al.* 1977-78, 1990; Zawada 1992; Johnson *et al*. 2006). According to the 1:250 000 geological map 2922 of Prieska the study area is capped by Tertiary terrace (alluvial) gravels (*flying bird symbol)* and calcretes (*T-Qc*) as well as Quaternary sand and sandy soil deposits (*Qs*) (**Fig. 3**).

Miocene and younger, Plio-Pleistocene alluvial gravels of the Orange River and Vaal River are highly fossiliferous in places. A Middle Miocene vertebrate locality is found in proto-Orange River gravel deposits on the Namibian side of the Orange River at Arrisdrift, about 40 km northeast of Oranjemund (Hendey 1984; Pickford & Senut 2003), while a rich Plio-Pleistocene fossil fauna have been retrieved from sandy lenses found within alluvial gravel terraces along the Vaal River between Barkly West and Warrenton (Cooke 1949; Maglio and Cooke 1978; Partridge and Maud 2000). Here, the so called “High-Level Gravels” have yielded several extinct vertebrate taxa including proboscidians *(Mammuthus subplanifrons* and *Elephas iolensis),* suids (*Notochoerus capensis*) and a variety of bovids. .

Field Assessment

The field assessment shows that the central and eastern part of the study area is capped by palaeontologically insignificant surface gravels and sandy soils (**Fig. 4 & 5**) as well as calcretes that covers older gravel packages (“palaeo-gravels) which may contain potentially fossil-bearing sandy lenses (**Fig. 4 & 6**) To the west of the study area surface gravel deposits and calcretes are capped by well-developed aeolian sand and sandy soils of low palaeontological significance (**Fig. 7 & 8).**

Impact Statement and Recommendations

The study area is underlain by Tertiary gravel deposits with a high potential for vertebrate fossils that are also much localized and rare but highly significant. Given the

nature of fossil distribution within the intact alluvial gravels, it is not possible to exactly predict the buried fossil content of an area other than in general terms unless fresh exposures indicate otherwise. Accordingly the affected area is rated *Generally Protected A (GP.A).* The exposure and subsequent reporting of fossils to the relevant heritage authorities for excavation and recording can be considered a positive palaeontological impact provided that proper mitigation measures are put in place. It is therefore advised that excavations into calcrete deposits and underlying palaeo-gravels are accompanied by palaeontological monitoring on a regular basis through spot checks of freshly exposed sediments.

References

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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

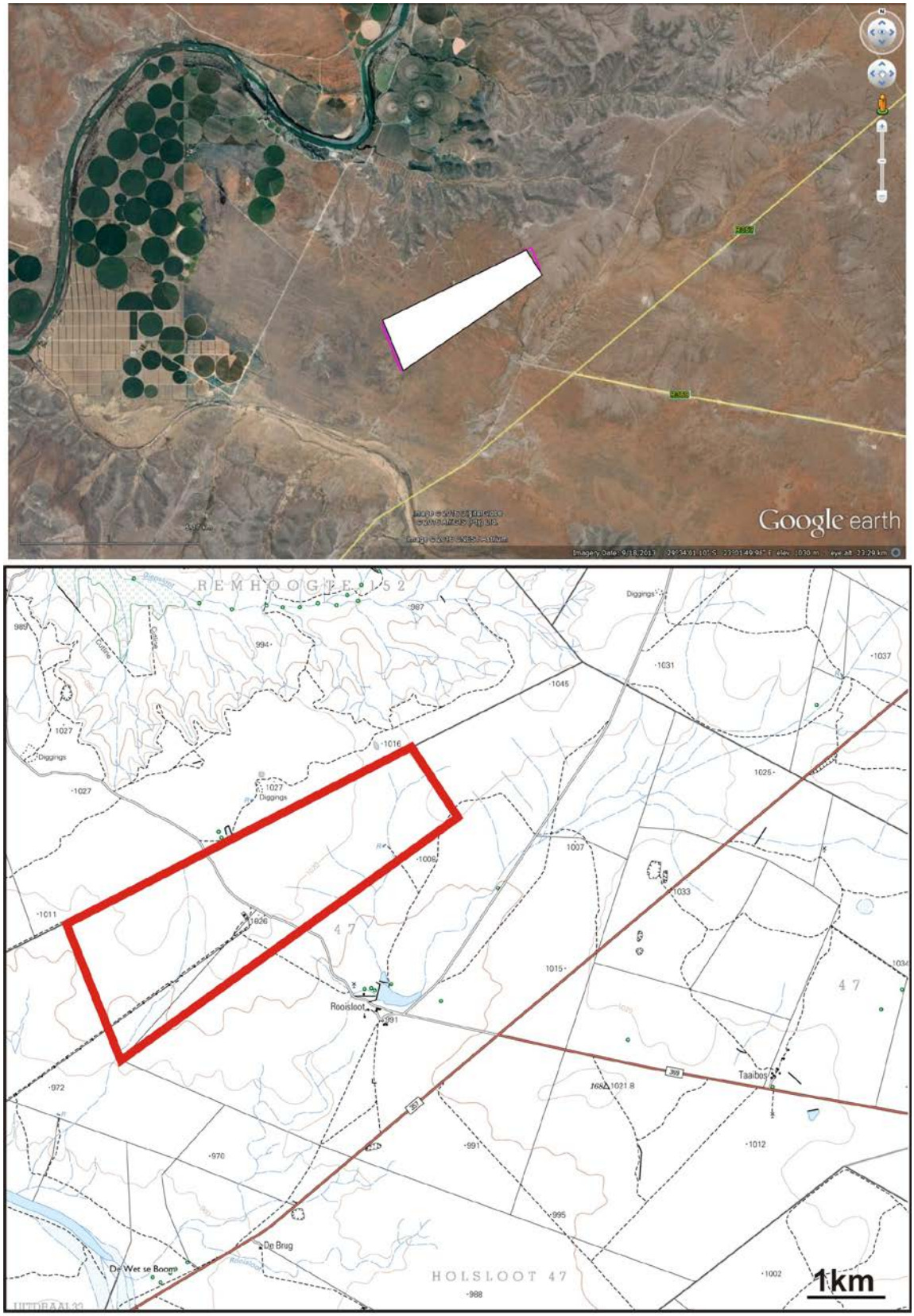
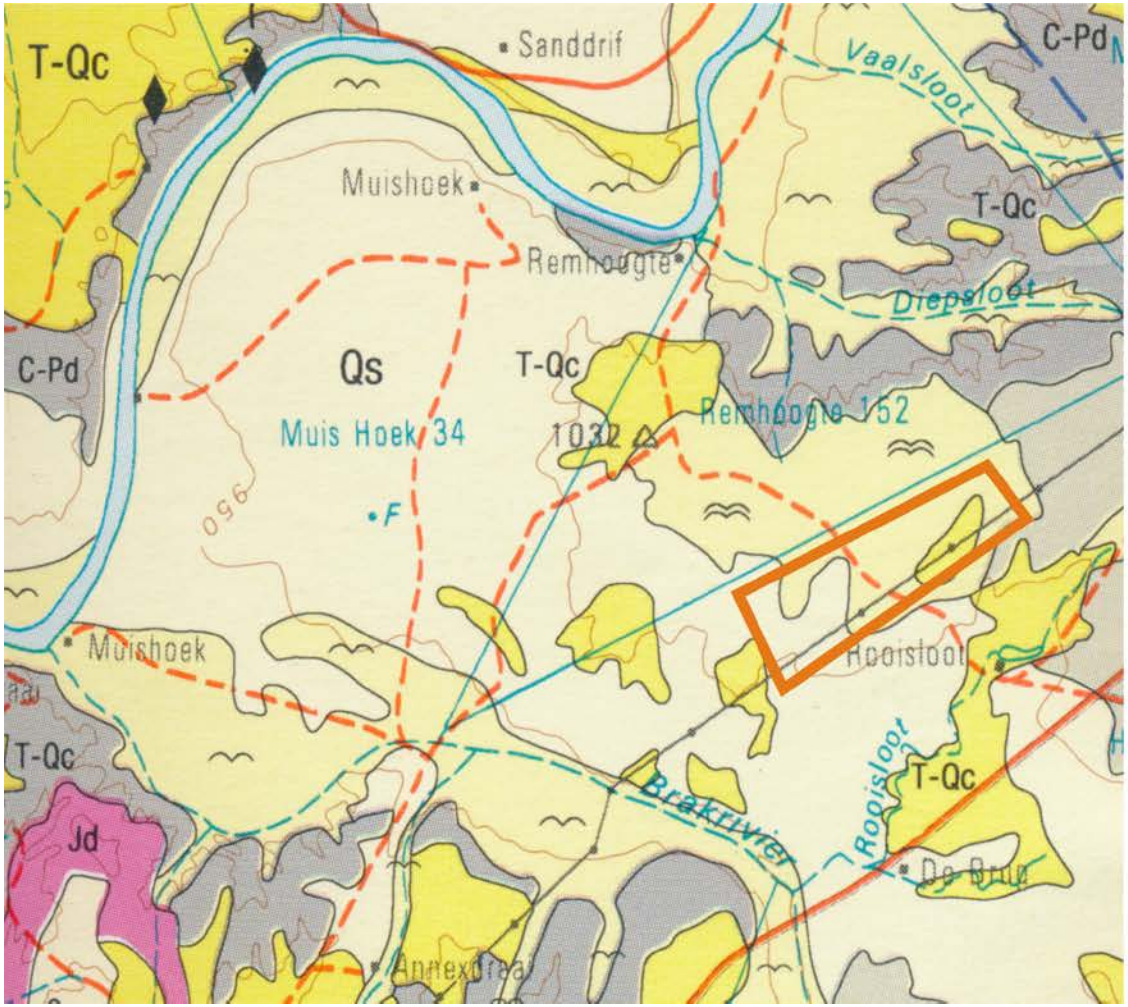
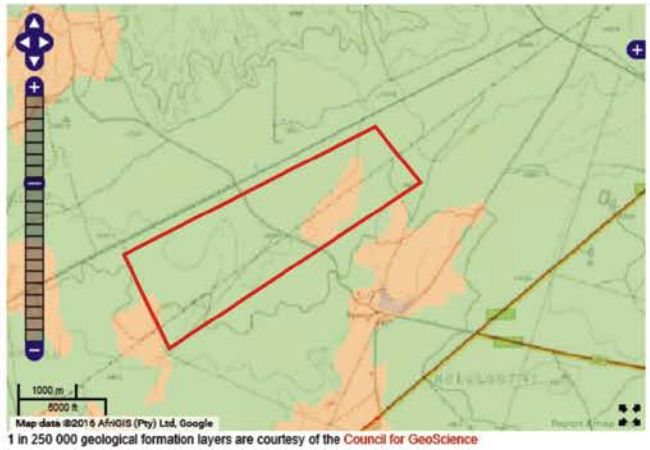


Figure 1. Aerial view (top) and map(bottom) of the study area at Holsloot 47 (portion of 1:50 000 scale topographic map 2923CA Rooisloot).

Figure 2. General view of a part of the existing mining area, looking northwest at GPS #088.





1 in 250 000 geological formation layers are courtesy of the Council for GeoScience

For more information, go to How to Use the Palaeontological (fossil) Sensitivity Map

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 3. Locality of the study marked on portion of 1:250 000 scale geological map 2922 Prieska (left, orange rectangle) and on portion of the SAHRIS palaeosensitivitymap (above, red rectangle).

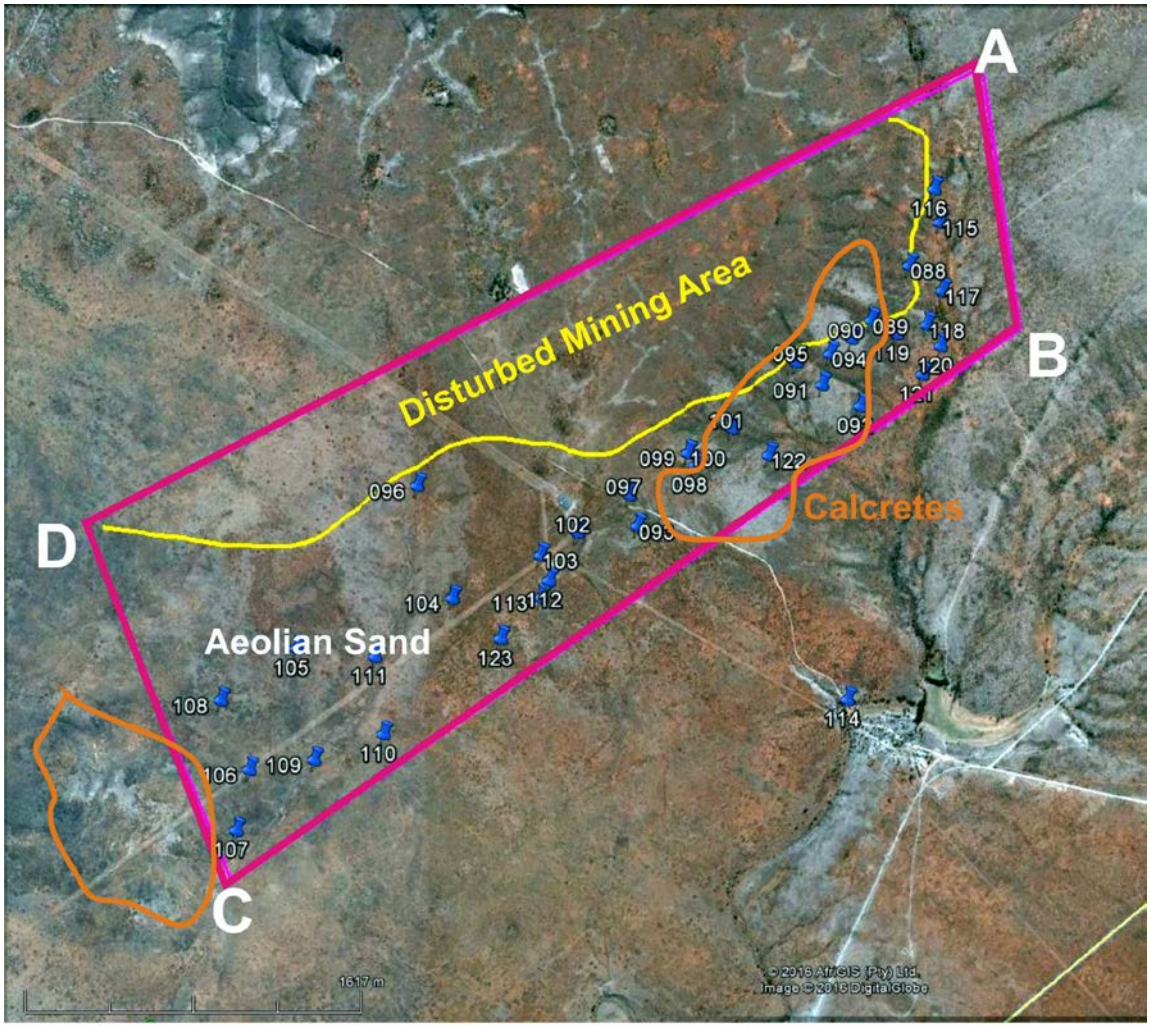


Figure 4. Aerial view of the study area. Relevant observations were recorded using a Garmin Etrex Vista GPS hand model.

Figure 5. Polymict surface gravels and sandy soils with abundant calcrete fragments.
(Scale 1 = 10 cm)

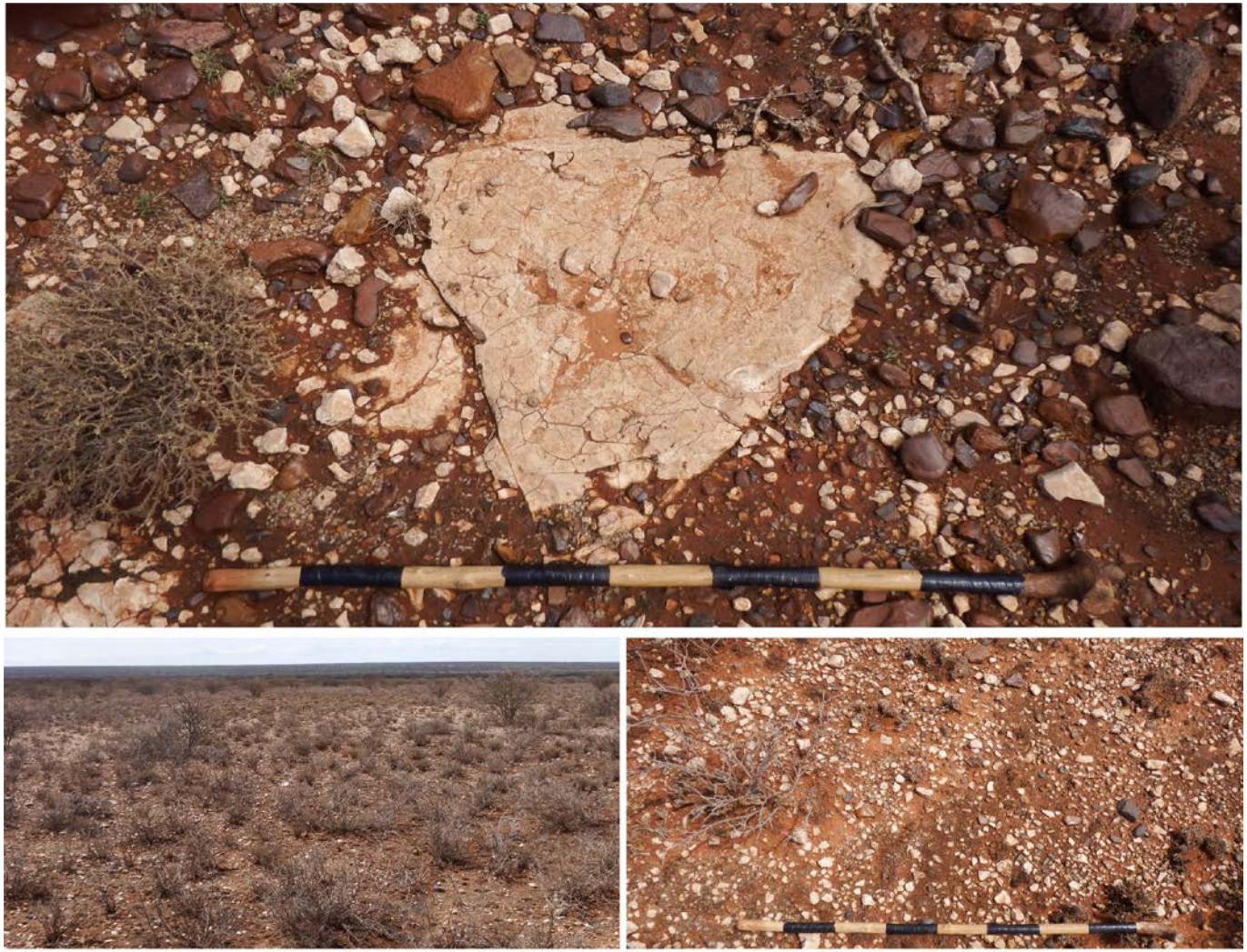


Figure 6. The central and eastern part of the study area are capped by calcretes (GPS # 90 - # 100) that covers older gravel packages (top). Unconsolodated overburden consists mainly of polymict surface gravels and sandy soils. Scale 1 = 10 cm.

Figure 7. Well-developed calcrete deposits exposed near the western boundary of the study area (GPS # 106 - # 108) are capped by a thick veneer windblown sand. Scale 1 = 10 cm.

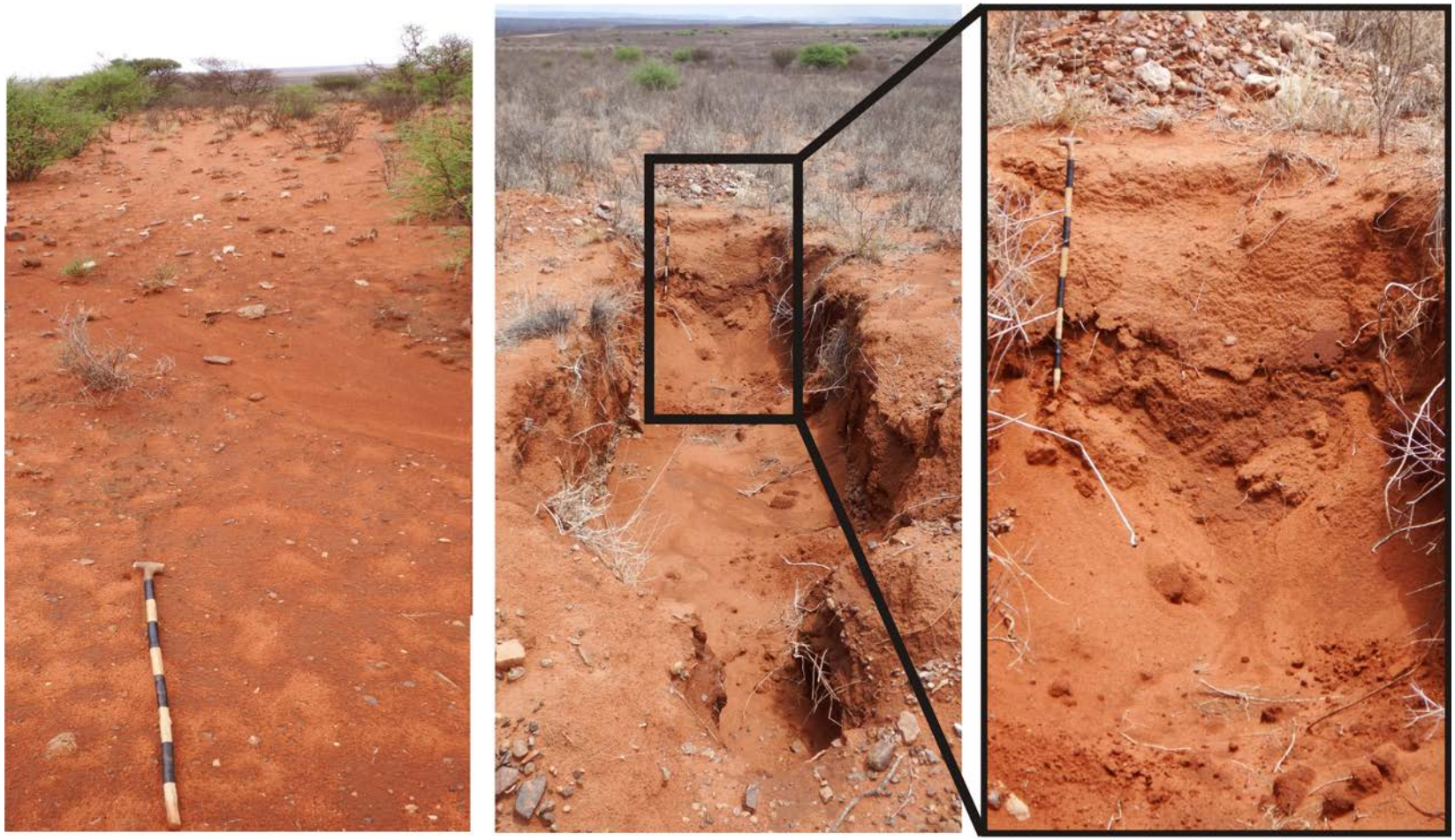


Figure 8. Quaternary wind-blown sand on top of older gravel deposits near GPS #104. Scale 1 = 10 cm.