Phase 1 Heritage Impact Assessment of farm Engelde Wilgeboomfontein 22, Portions of the Farm 23 and Remainder and Portion 2 of the farm Kliphuis, Prieska, NC Province.

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Executive Summary

A phase 1 heritage impact assessment was carried out on three farms near Prieska in the Northern Cape Province as part of a mining application for the removal of alluvial diamonds from ancient (cf. early Cenozoic) river terraces (diamond placers), located several tens of meters above the present level of the Orange River, where diamondiferous gravel deposits often occupy potholes along the banks of the river. A summary of potential heritage impacts (provided in table form) indicate that the study area is primarily represented by uncapped as well as potentially intact Stone Age archaeological assemblages and isolated finds (surface scatters), stone-walled structural remnants dating back to the early part of the 20th century, as well as graveyards and other historical structures older than 60 years.

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Introduction

A phase 1 heritage impact assessment was carried out on three farms near Prieska in the Northern Cape Province (**Fig. 1 & 2),** as part of a mining application for the removal of alluvial diamonds from ancient (cf. early Cenozoic) river terraces (diamond placers), located several tens of meters above the present level of the Orange River, where diamondiferous gravel deposits often occupy potholes along the banks of the river (**Fig. 3**).

The heritage 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 heritage information, aerial photographs and site records were consulted and integrated with data acquired during the on-site inspection.

The task also involved identification and assessment of possible heritage within the proposed project area, in accordance with section 9(8) and appendix 6 ("Specialist reports") of the NEMA EIA Regulations, 2014 , whereby the specialist report takes into account the following 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.

The study area is rated according to field rating categories as prescribed by SAHRA as well as according to a probability of impact methodology for assessing the Duration (time scale), Extent (spatial scale) and the Probability of occurrence of potential impacts (**Table 1**).

Locality data

1:50 000 scale topographic maps: 2922 DA Prieska Wes and 2922 BC Bloubosfontein.

1:250 000 scale geological map 2922 Prieska

Site coordinates (centroid measurements)

Kliphuis 29: 29°34'44.63"S 22°43'38.60"E

Engeldewilgeboomfontein 22: 29°32'25.60"S

Farm 23: 29°30'13.89"S 22°44'12.31"E

The study area is located approximately 5 km north of Prieska, between the right bank of the Orange River and the foothills of the Asbesberge mountain range.

Background

The geology of the region was compiled by Malherbe and Moen (1996) (**Fig. 4**). Oldest bedrock sediments in the area are made up of Transvaal Supergroup carbonate rocks (Late Archaean / Early Proterozoic, c. 2.56 Ga) and banded iron formations (BIF) that possibly reflect Early Proterozoic environmental conditions following iron deposition as a result of the build-up of free oxygen in the oceans by cyanobacterial photosynthesis. Localized outcrops of Early Permian Dwyka sediments represent valley and inlet fill deposits left behind on the Transvaal basement rocks by retreating glaciers about 300 million years ago (Visser *et al.* 1990; Johnson *et al.* 2006). Dwyka mudrocks have previously yielded trace fossils, including fish and invertebrate trackways and as well as micro-fossil remains (foraminifera, bryozoans, sponge spicules and radiolaria) and a variety of invertebrates (MacRae, 1999). Fossil plants include lycopods, Glossopterids, fossilized wood and plant micro-remains (spores and pollen) (Anderson and McLachlan 1976; MacRae 1999). Paleogene fossil assemblages are known from a crater-lake deposit within a volcanic pipe at Stompoor south of Prieska and include a diversity of fish, frogs, reptiles, insects, and palynological remains (Smith 1988). There is currently no record of fossil remains or exposures from Dwyka outcrop at Engeldewilgeboomfontein 22 and Farm 23 and Quaternary sediments in the area. Fluvial deposits from the ancient Koa Valley northwest of Prieska and south of Pofadder, has yielded fossil vertebrate bone as well as fossil wood (Maglio 1978; De Wit and Bamford 1993; Partridge and Maud 2000).

No Quaternary fossils have been explicitly reported from the vicinity of Prieska, but a fossilized horn core of an extinct alcelaphine has been retrieved from alluvial sediments along the Ongers River near Britstown, while Florisian type faunal remains have been excavated from an archaeological site at Bundu Farm Pan near Copperton (Brink *et al*. 1995; Kiberd 2006).

The archaeological heritage of the region is rich and varied and includes Stone Age archaeology, rock art localities, structural remnants dating back to the Anglo Boer War and its aftermath, as well as graveyards and other historical structures dating more than 60 years ago. The region has yielded numerous Early, Middle and Later Stone Age sites associated with pans, while the landscape in general is characterized by low density surface scatters (Beaumont 1995; Kiberd 2006). MSA surface scatters have also been recorded at Elswater, Brakfontein and Nuwejaarskraal near Douglas. Rock engravings have been recorded in the younger valley fills along the steeper slopes at Sandfontein 356. In addition, rock art sites have been recorded on a number of farms around Prieska, including Kleindoring, Wonderdraai and Omdraaisvlei (van Riet Low 1945). Further away, stone pipes and LSA artefacts have been recorded on the farm Doornkuil near Britstown, while prehistoric graves and clay pottery have been recorded along the Orange River in the vicinity of Douglas.

Results and Impact Statement

Below follows a summary of potential impacts at Farm 23, Engeldewigeboomfontein 22 and Kliphuis 29 based on the results of the field assessment (**Table 1**). Farm 23 is primarily underlain by banded ironstone, haematite, and chert layers located in the basinal facies of the Ghaap Group (Asbestos Hills Subgroup, Transvaal Supergroup) (**Fig. 5 #A**). Older strata lower down in the facies (e.g. Cambell Rand Subgroup) are exposed along the Orange River to the south and west at Engeldewigeboomfontein 22 and Kliphuis 29, and consist of stromatolite- and microfossil-bearing dolomite, dolomitic limestone and chert members, that were formed by the precipitation of carbonate rocks when colonies of stromatolites thrived in shallow, tropical marine environments towards the end of the Archaean Eon, 2.6 billion years ago (**Fig. 5 #B**). Localized outcrops of Early Permian Dwyka Group tillites, mudstones, sandstones and conglomerates (cf. Mbizane Formation, Karoo Supergroup, c. 320-290 Ma) are widespread at Engeldewigeboomfontein 22, while smaller outcrops have been recorded along the southern parts of Farm 23 (**Fig. 5 #C-D**). The Transvaal

Supergroup and Dwyka Group sediments in the region are generally considered to be moderately significant in terms of palaeontological heritage (SAHRIS Palaeontological Sensitivity Map, 2015) (**Fig. 6**).

The study area is generally devoid of surface calcretes. Superficial deposits capping the basement rocks are made up of variable clasts of surface gravels and scree, Quaternary sands (including small dune formations), and well-developed alluvial deposits flanking the Orange River (**Fig. 7**).

The archaeological footprint of the study area is primarily represented by uncapped as well as potentially intact Stone Age archaeological assemblages and isolated finds (surface scatters), stone-walled structural remnants dating back to the early part of the 20th century, as well as graveyards and other historical structures older than 60 years (**Table 2; Appendix 1**). The stone-walled ruins of two large historical terrains cover about 75 ha and 4.5 ha at Kliphuis 29 and Engeldewilgeboomfontein 22, respectively (**Table 3 & 4; Fig. 8**) The sites are associated with the asbestos mining industry that prevailed in the region more than a hundred years ago.

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Tables and Figures

Table 1. Summary of impact resulting from the within the survey area in terms of Extent, Intensity (the anticipated severity of the impact), Duration (the timeframe during which the impact will be experienced), Probability and general Mitigation. KH = Kliphuis 29, EW = Engeldewilgeboomfontein 22, F23 = Farm 23.

Farm	Heritage Impact	Extent	Intensity of development	Duration	Probability of impact	Mitigation
KH	Palaeontology	Local	**High:** Mining of early Cenozoic river terrace deposits	Permanent	**Moderate**: Where terrace gravels are underlain by Ghaap Group stromatolitic sediments **Low** Geologically recent Kalahari Group aeolian sands, alluvium not associated with terrace gravels	Avoidance of intact bedrock strata during mining of terrace gravels where possible. None
EW	Palaeontology	Local	**High:** Mining of early Cenozoic river terrace deposits	Permanent	**Moderate**: Where terrace gravels are underlain by Dwyka Group glacial sediments. **Moderate**: Where terrace gravels are underlain by Ghaap Group stromatolitic sediments **Low:** Geologically recent Kalahari Group aeolian sands, alluvium not associated with terrace gravels	Avoidance of intact bedrock strata during mining of terrace gravels where possible. Avoidance of intact bedrock strata during mining of terrace gravels where possible. None

F23	Palaeontology	Local	**High:** Mining of early Cenozoic river terrace deposits	Permanent	**Moderate**: Where terrace gravels are underlain by Dwyka Group glacial sediments. **Low:** Where terrace gravels are underlain by Ghaap Group banded iron formations **Low:** Geologically recent Kalahari Group aeolian sands, alluvium not associated with terrace gravels	Avoidance of intact bedrock strata during mining of terrace gravels where possible. None None
KH	Archaeology Historical	Local	**High:** Mining of early Cenozoic river terrace deposits	Permanent	**Moderate:** Isolated Stone Age stone tool surface assemblages; **Low:** Quaternary overbank sediments (Orange River) **Low-Moderate:** Quaternary sand dunes with potentially *in situ* stone tool assemblages / archaeological remains. **Low:** Visible historical sites (past historical settlements, stone-walled structures, cemeteries)	Recording, mapping & collection of artifacts in association before destruction; None (outside impact zone) Avoidance where possible and recording of fresh exposures before destruction Creation of buffer zones
EW	Archaeology Historical	Local	**High:** Mining of early Cenozoic river terrace deposits	Permanent	**Moderate:** Isolated Stone Age stone tool surface assemblages; **Low:** Visible historical sites (past historical settlements, stone-walled structures, cemeteries)	Recording, mapping & collection of artifacts in association before destruction; Creation of buffer zones
F23	Archaeology Historical	Local	**High:** Mining of early Cenozoic river terrace deposits	Permanent	**Moderate:** Isolated Stone Age stone tool surface assemblages; **Low-Moderate:** Quaternary aeolian sand overburden (grassy drainage areas) and well-developed dune formations with potentially *in situ* stone tool assemblages / archaeological remains. **Low** Visible historical sites (stone-walled structures, cemeteries)	Recording, mapping of artifacts; Avoidance where possible and recording of fresh exposures before destruction Creation of buffer zones

Table 2. Heritage sensitive areas identified within the survey area. Field ratings and appropriate recommendations, as prescribed by SAHRA, are provided for each item.

Site #	Appendix Fig. #	Feature	Coordinates		Field Rating / Grade	Recommendation
330		Mining area	29°31'34.48"S	22°42'17.24"E	-	-
331	1	Cemetery	29°31'28.42"S	22°41'25.44"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised It is recommended that the site be conserved without the developer having to comply with additional conservation requirements.
332	2	Pre-1960's Building structure	29°31'46.01"S	22°43'9.28"E	Generally Protected B	Recording before destruction; Should development necessitate impact on the site the developer should apply for a SAHRA Site destruction permit prior to commencement of construction.
337	3	Rectangular stone-walled foundations	29°31'46.01"S	22°43'9.28"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; The site should be conserved and avoided without the developer having to comply with additional conservation requirements.
345	4	Ruins historical settlement x13 stone-walled structures (4.5 ha)	29°32'58.57"S	22°42'58.91"E	Local Significance (LS) Grade 3A	Conservation (see Table 3); mitigation not advised; The site should be conserved and avoided without the developer having to comply with additional conservation requirements.
346	5	Ruins historical settlement	29°33'12.03"S	22°42'52.68"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised The site should be

		x2 stone-walled structures				conserved and avoided without the developer having to comply with additional conservation requirements.
347	6	Ruins historical settlement x1 stone-walled structures	29°33'21.59"S	22°42'59.46"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; The site should be conserved and avoided without the developer having to comply with additional conservation requirements.
348	7	Ruins historical settlement x2 stone-walled structures	29°33'35.57"S	22°43'16.46"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; The site should be conserved and avoided without the developer having to comply with additional conservation requirements.
355	8	Quaternary sand dunes and alluvium near Orange River	29°36'11.77"S	22°43'20.01"E	Generally Protected B	Recording before destruction; Should development necessitate impact on the site the developer should allow for inspection of fresh exposures by a heritage specialist as part of a Phase 2 assessment.
393	9	Modern homestead & stone-walled kraal structure	29°30'34.82"S	22°43'28.40"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; It is recommended that the site be conserved without the developer having to comply with additional conservation requirements.
396	10	Modern homestead & Cemetery	29°28'0.64"S	22°44'18.54"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; It is recommended that the site be conserved without

						the developer having to comply with additional conservation requirements.
404	11	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°30'15.28"S	22°43'42.08"E	Generally Protected B	Recording before destruction
405	12	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°30'12.00"S	22°43'41.61"E	Generally Protected B	Recording before destruction
408	13	Cemetery	29°30'30.91"S	22°43'11.88"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; It is recommended that the site be conserved without the developer having to comply with additional conservation requirements.
409	14	Low density stone tool occurrence; ratio = <10:1 (artefacts: m²)	29°30'31.50"S	22°43'15.91"E	Generally Protected B	Recording before destruction;
410	15	Historical Stone-walled kraal structure	29°30'29.70"S	22°43'17.44"E	Local Significance (LS) Grade 3A	Conservation; mitigation not advised; It is recommended that the site be conserved without the developer having to comply with additional conservation requirements;
411	16	Low density stone tool surface occurrence	29°30'27.38"S	22°43'24.36"E	Generally Protected B	Recording before destruction; Should development necessitate

		associated with intact alluvial deposits <10:1				impact on the site the developer should allow for inspection of fresh exposures by a heritage specialist as part of a Phase 2 assessment.
415	17	Slate quarry	29°31'15.00"S	22°42'30.80"E	Local Significance (LS) Grade 3B	Mitigation (part of site should be retained); The developer should apply for a SAHRA Site destruction permit prior to commencement of construction.
418	-		29°32'29.37"S	22°41'4.00"E	Generally Protected B	Recording before destruction;
419	18	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°32'28.83"S	22°40'48.88"E	Generally Protected B	Recording before destruction
420	18	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°32'46.00"S	22°40'43.55"E	Generally Protected B	Recording before destruction
421	19	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°31'40.14"S	22°43'44.81"E	Generally Protected B	Recording before destruction
422	19	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°32'8.32"S	22°43'31.27"E	Generally Protected B	Recording before destruction
423	-	Low	29°32'58.58"S	22°42'21.01"E	Generally	Recording before

		density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)			Protected B	destruction
424	-	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°33'44.38"S	22°42'31.84"E	Generally Protected B	Recording before destruction
425	-	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°34'24.81"S	22°43'23.03"E	Generally Protected B	Recording before destruction
426	-	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°34'37.22"S	22°43'14.92"E	Generally Protected B	Recording before destruction
427	-	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°36'15.19"S	22°42'59.72"E	Generally Protected B	Recording before destruction
428	-	Low density stone tool surface occurrence; ratio = <10:1 (artefacts: m²)	29°35'5.13"S	22°42'31.52"E	Generally Protected B	Recording before destruction
121 - 164	20 - 23	Ruins of historical settlement x 50+ stone-walled structures	29°34'33.69"S	22°42'47.39"E	Local Significance (LS) Grade 3A	Conservation (see Table 4); mitigation not advised; The site should be conserved and

		(75 ha)				avoided without the developer having to comply with additional conservation requirements.

Table 3. Site coordinates of the historical stone-walled settlement at Engeldewilgeboom 22.

#	Farm	Feature	Coordinates	
A	**EW**	North-western boundary	29°32'55.52"S	22°42'50.87"E
B	**EW**	Northern boundary	29°32'57.91"S	22°43'5.64"E
C	**EW**	Northern boundary	29°33'1.91"S	22°43'7.60"E
D	**EW**	North-eastern boundary	29°33'3.40"S	22°43'4.51"E
E	**EW**	Eastern boundary	29°33'0.64"S	22°43'1.50"E
F	**EW**	Eastern boundary	29°32'59.47"S	22°42'52.13"E

Table 4. Site coordinates of the historical stone-walled settlement at Kliphuis 29.

#	Farm	Feature	Coordinates	
A	**KH**	North-western boundary	29°34'4.00"S	22°42'3.96"E
B	**KH**	Northern boundary	29°34'3.94"S	22°42'24.56"E
C	**KH**	Northern boundary	29°34'17.24"S	22°42'41.86"E
D	**KH**	North-eastern boundary	29°34'5.27"S	22°42'54.75"E
E	**KH**	Eastern boundary	29°34'10.84"S	22°43'2.80"E
F	**KH**	Eastern boundary	29°34'27.42"S	22°42'47.72"E
G	**KH**	South-eastern boundary	29°34'33.69"S	22°42'47.39"E
H	**KH**	Southern boundary	29°34'32.61"S	22°42'32.37"E
I	**KH**	Southern boundary	29°34'21.85"S	22°42'18.58"E
J	**KH**	South-western boundary	29°34'10.94"S	22°42'2.76"E

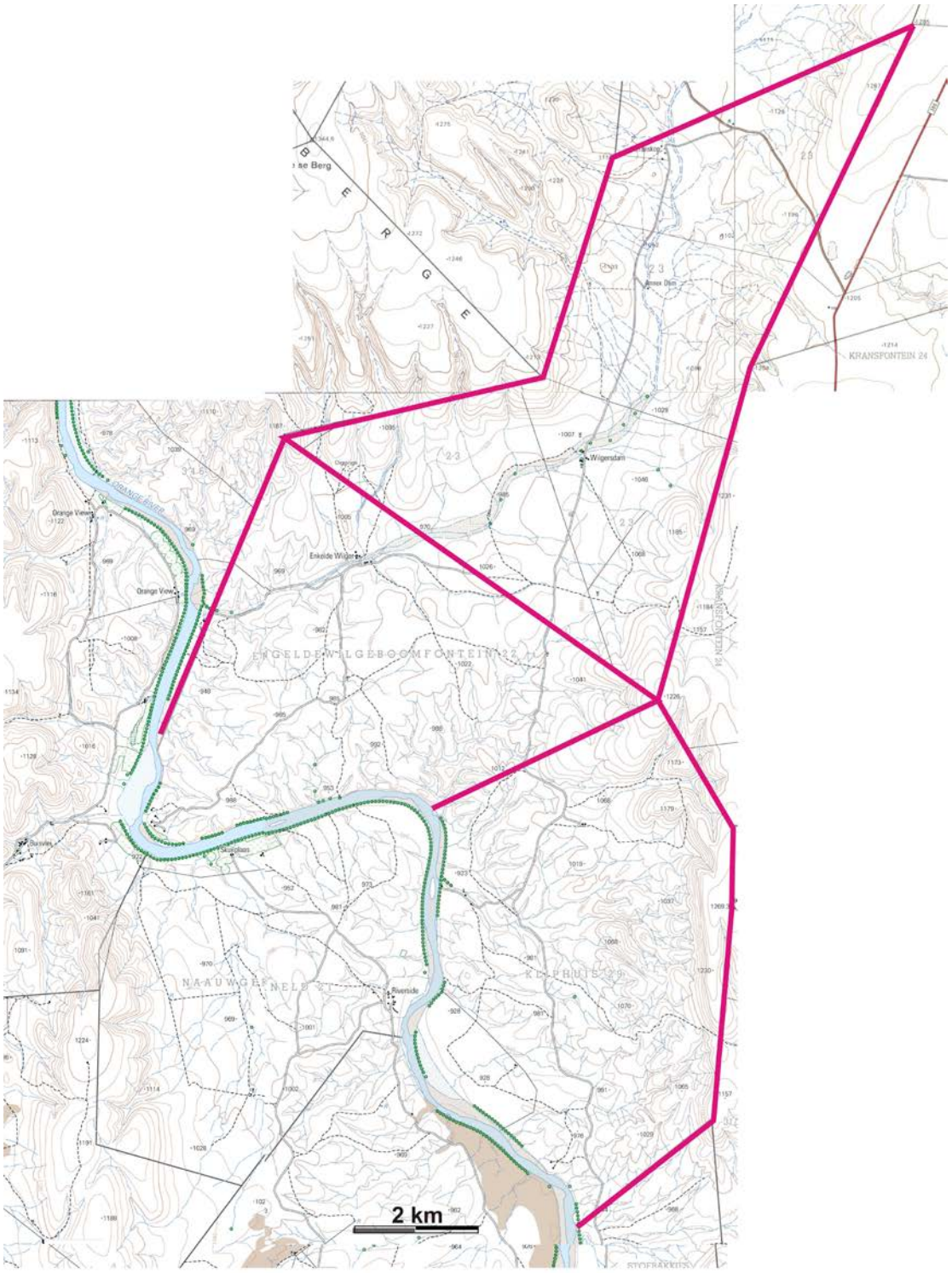

Figure 1. Map of Kliphuis 29, Engeldewilgeboomfontein 22 and Farm 23 (portion of 1:50 000 scale topographic map 2922 AD Prieska Wes and 2922 2922 BC Bloubosfontein).

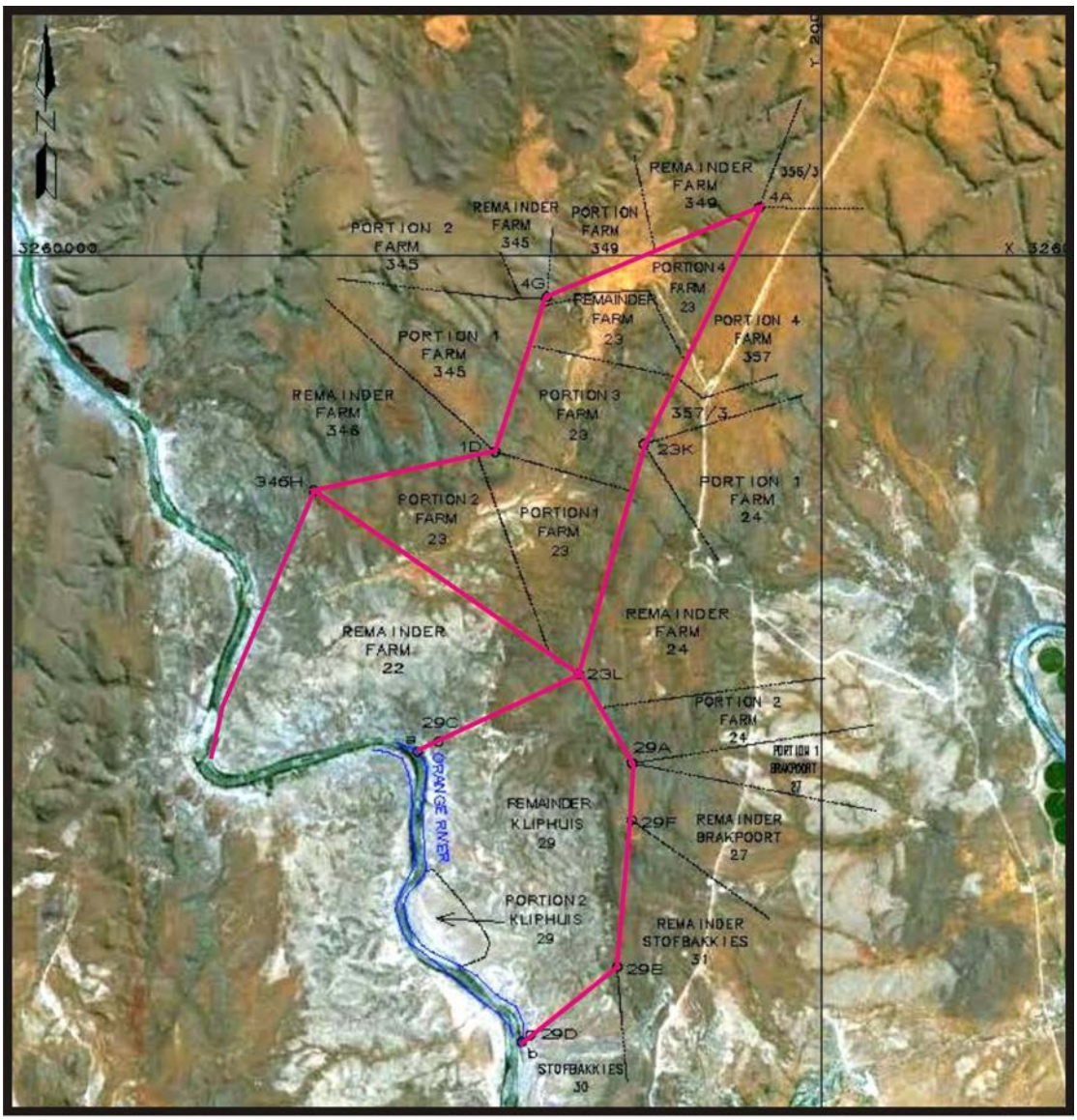

Figure 2. Aerial view and layout of the study area (Google Earth).

Figure 3. Aerial and general view of the existing mining area at located at the border between Engeldewilgeboomfontein 22 and Farm 23, where diamondiferous gravel deposits are located several tens of meters above the present level of the Orange River.

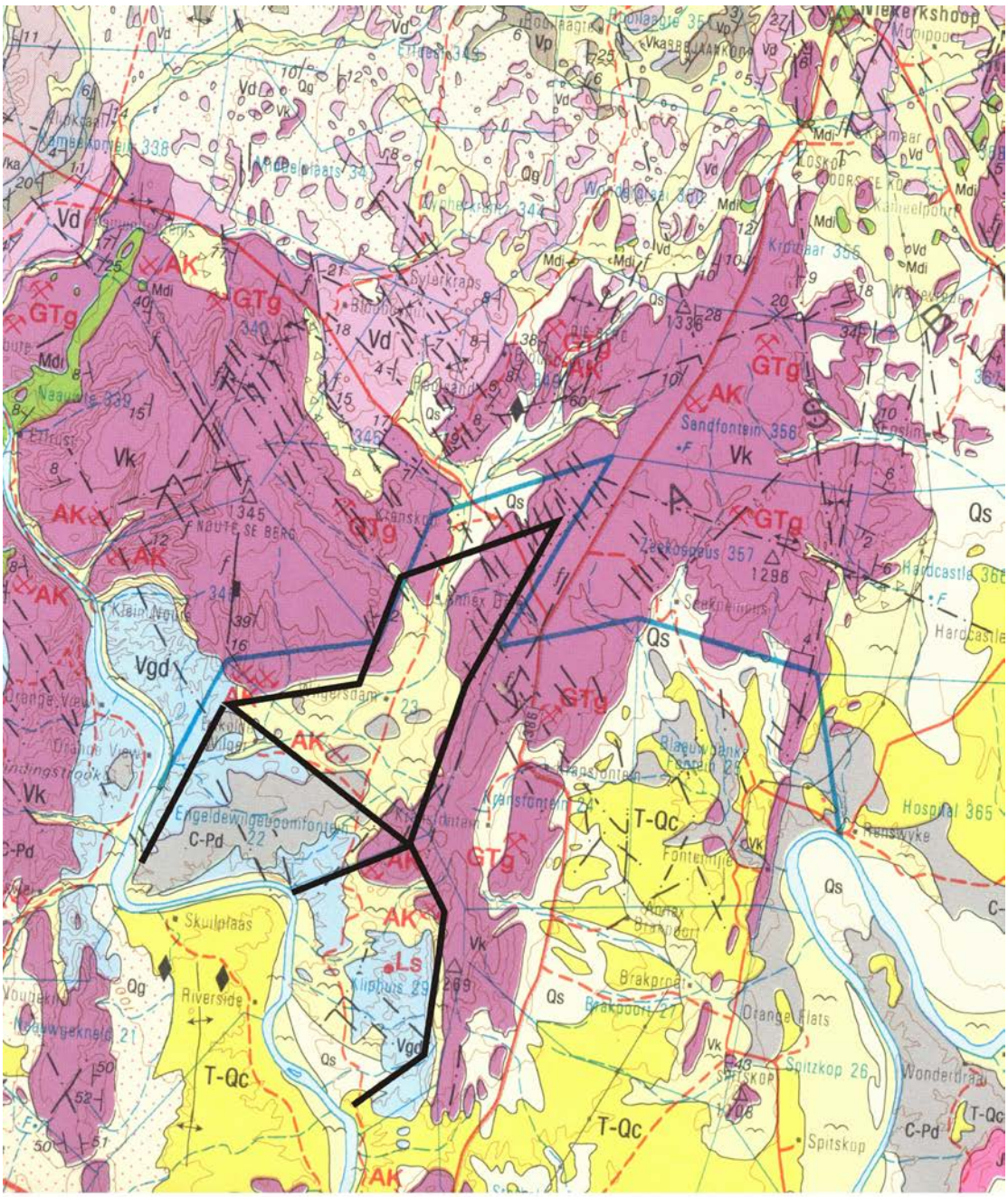

Figure 4. Oldest bedrock sediments in the area are made up of Late Archaean / Early Proterozoic carbonate rocks and banded iron formations (BIF) of the Ghaap Group (*Vgd, Vk,* Transvaal Supergroup). Localized outcrops of Early Permian Dwyka sediments (*C-pd,* Karoo Supergroup*)* represent valley and inlet fill deposits left behind by retreating glaciers about 300 million years ago. Superficial deposits are made up of variable clasts of surface gravels and scree, Quaternary sands and alluvial overbank sediments along the Orange River (portion of 1:250 000 scale geological map 2922 Prieska).

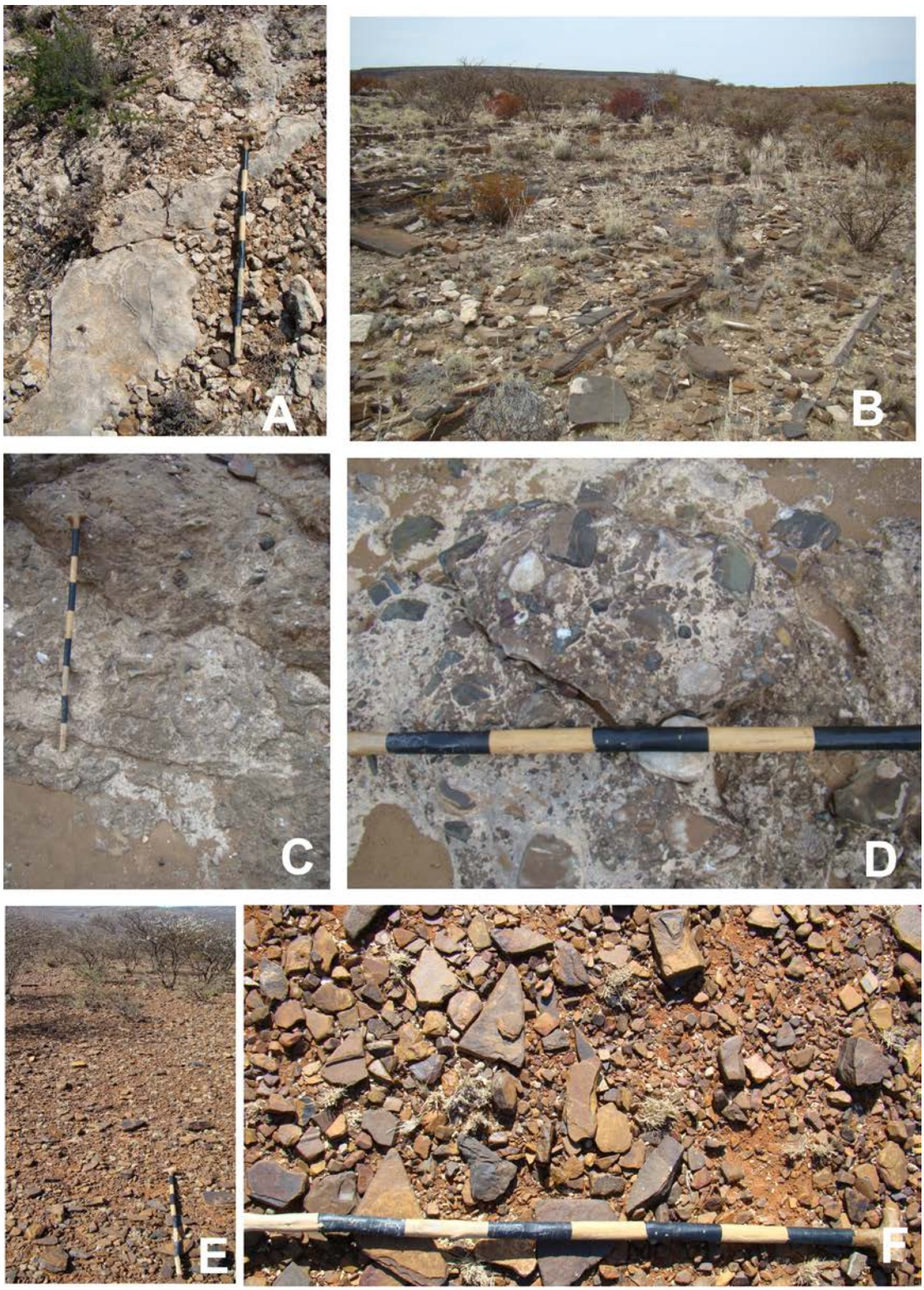

Figure 5. Basement rocks are represented by Ghaap Group carbonate rocks and banded iron formations (A & B) as well as Dwyka Group tillites and conglomerates (C & D). Surface gravels and scree are widespread on the landscape (E & F).

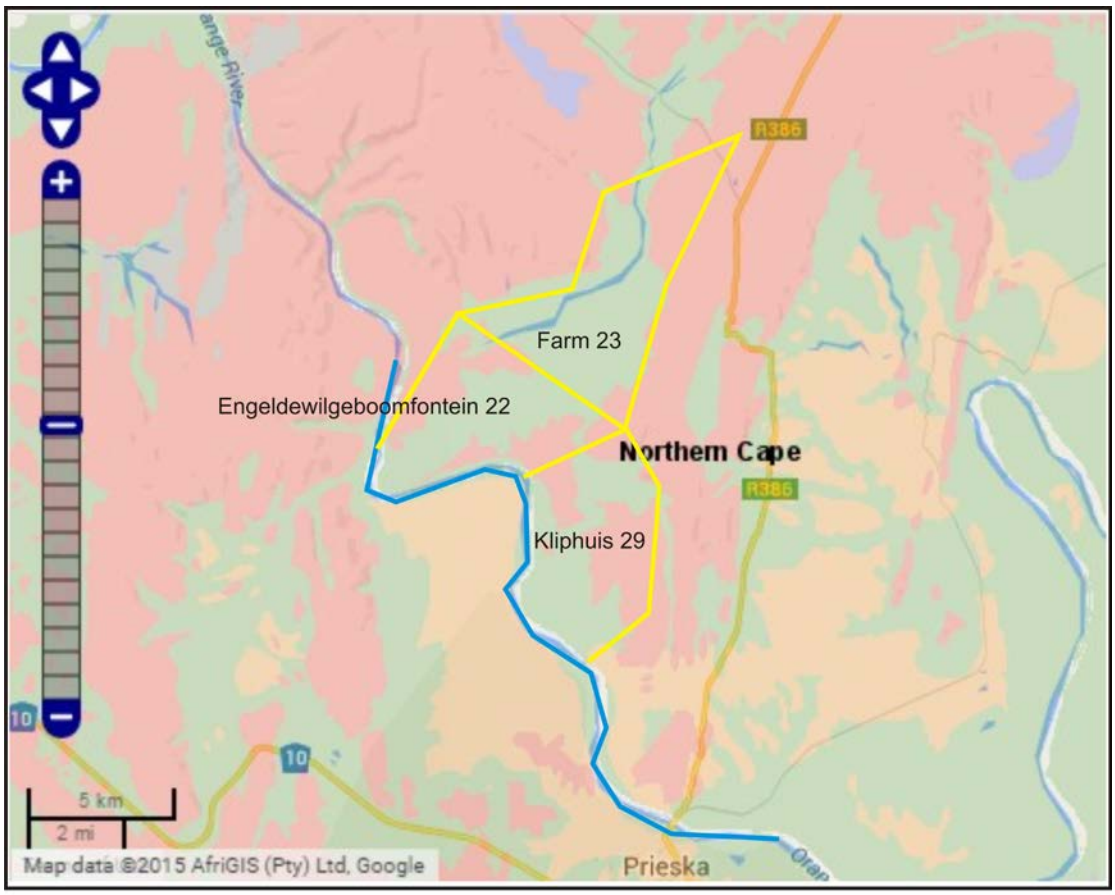

Figure 6. Indication of palaeontological potential at the study area according to the SAHRIS Palaeontological Sensitivity Map (2015) . Red = high palaeontological sensitivity, Green = moderate palaeontological sensitivity.

Figure 7. Superficial sediments made up of windblown or fluvial Quaternary sandy deposits are widespread on Farm 23 (top left and right) while geologically recent overbank sediments are well-developed along the Orange River at Kliphuis 29 (center left and bottom).

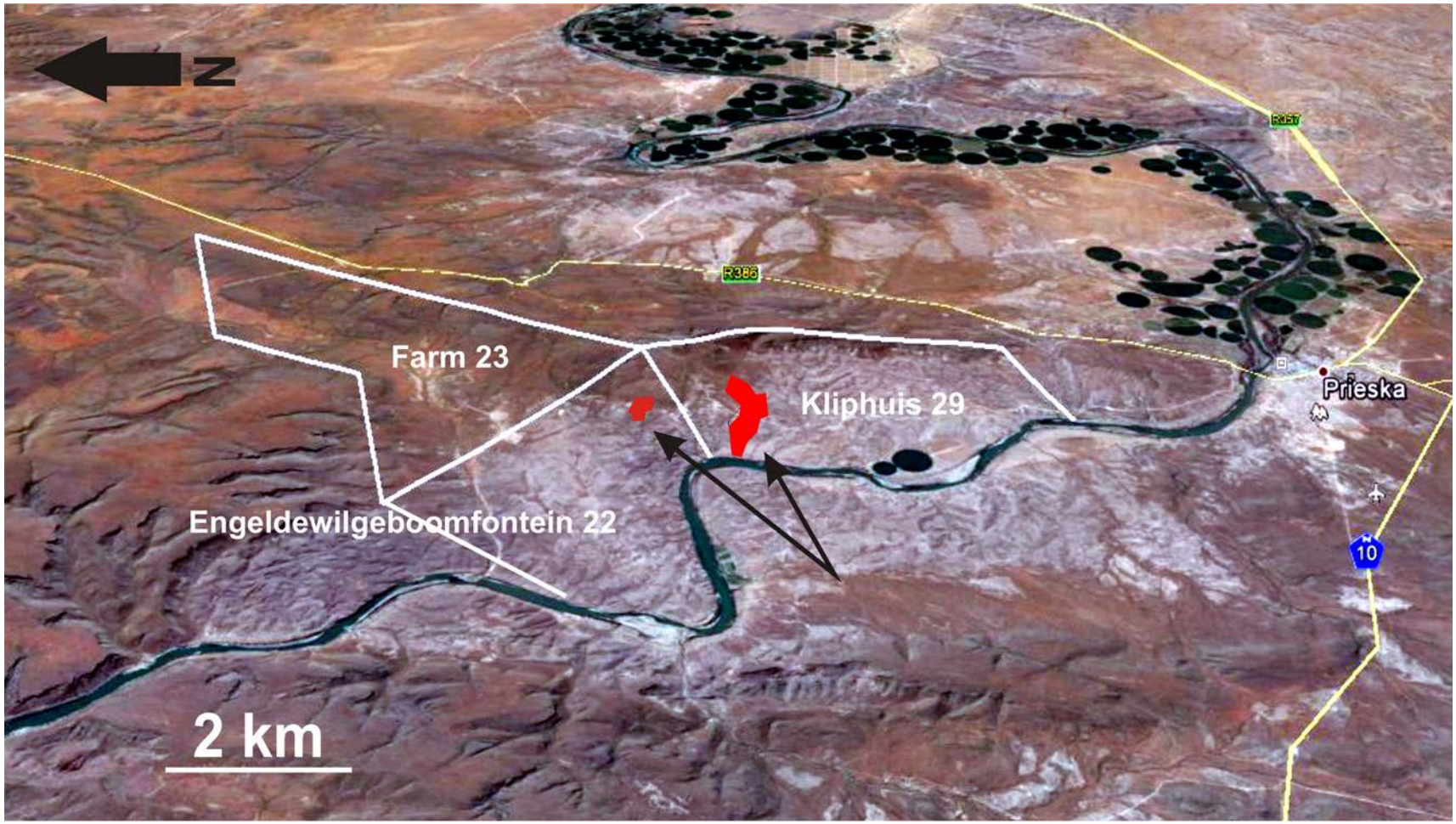

Figure 8. Locality map of the ruins of two historical stone-walled complexes at Kliphuis 29 and Engeldewilgeboomfontein 22 (Google Earth).

Appendix 1

Figure 1. Site #331. Historical cemetery, Engeldewilgeboomfontein 22.

Figure 2. Site #332 Pre-1960's farm worker house with modern steel window frames, Engeldewilgeboomfontein 22.

Figure 3. Site #337. Rectangular stone-walled foundations, Farm 23.

Figure 4. Site #345. Ruins of historical settlemrnt approximately 4.5 ha in size, Engeldewilgeboomfontein 22.

Figure 5. Site #346. Cluster of stone-walled ruins, Engeldewilgeboomfontein 22.

Figure 6. Site #347. Stone-walled ruins, Engeldewilgeboomfontein 22.

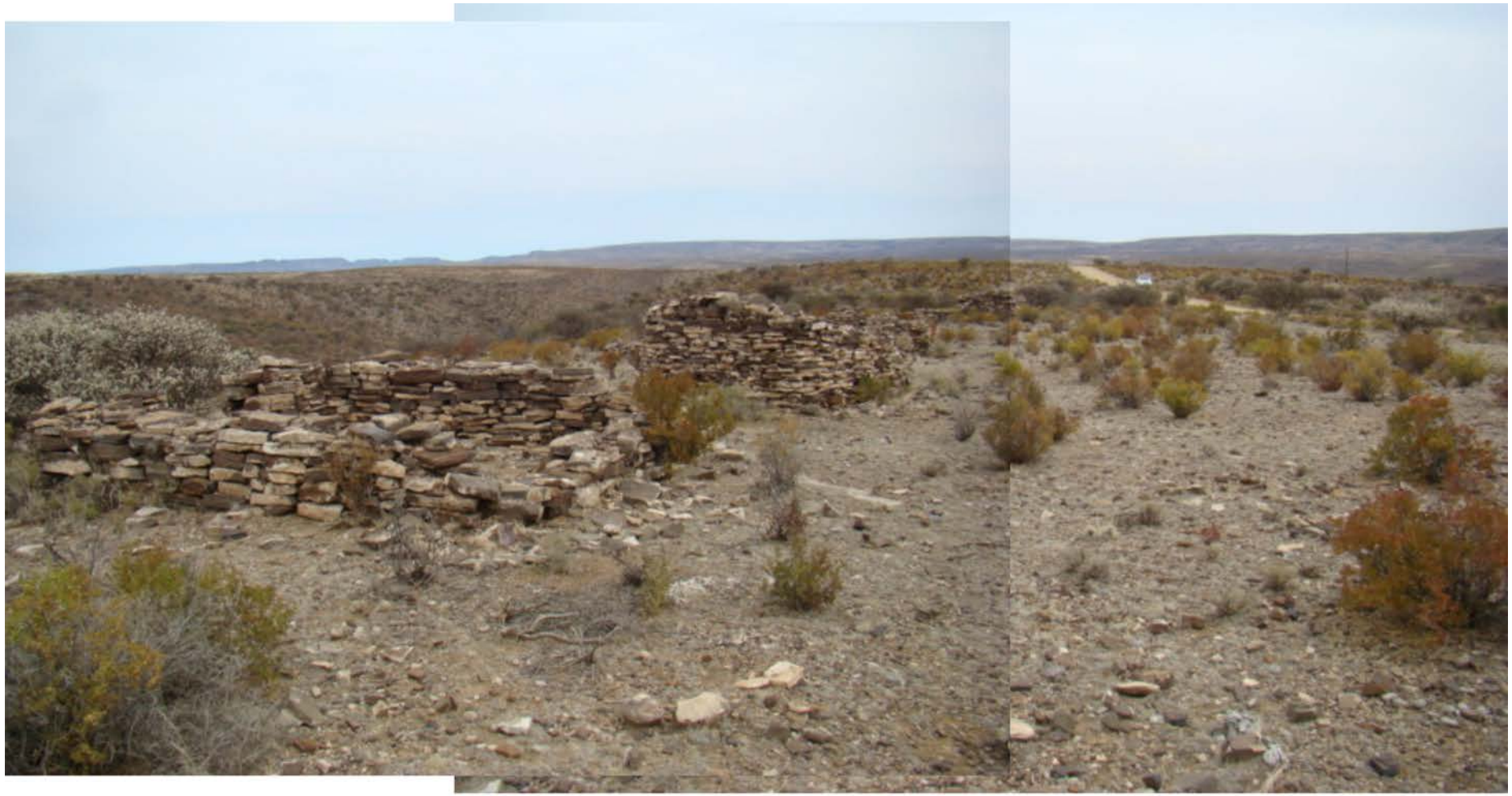

Figure 7. Site #348. Stone-walled ruins at Engeldewilgeboomfontein 22.

Figure 8. Quaternary sand dunes and well-developed alluvial deposits, Orange River, Kliphuis 29.

Figure 9. Site #393. Stone-walled kraal structure, Farm 23.

Figure 10. Site #396. Modern homestead with cemetery, Farm 23.

Figure 11. Site #404. Low density stone tool surface occurrence. Ratio = <10:1 (artefacts: m²)

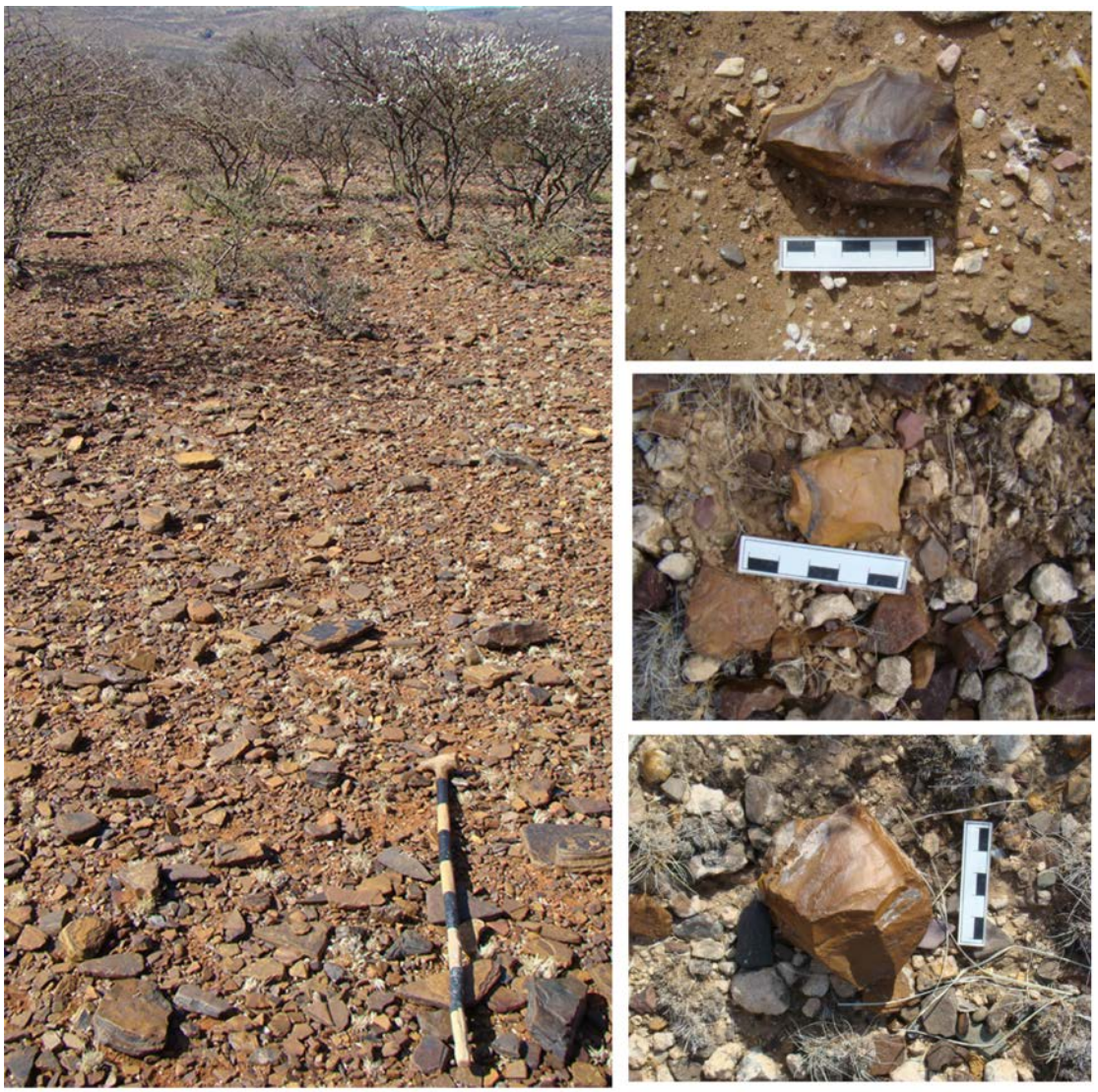

Figure 12. Site #405. Low density stone tool surface occurrence. Ratio = <10:1 (artefacts: m²)

Figure 13. Site #408. Farm cemetery, Farm 23

Figure 14. Site #409. Low density stone tool surface occurrence. Ratio = <10:1 (artefacts: m²)

Figure 15. Site #410. Stone-walled kraal structure near homestead, Farm 23.

Figure 16. Site #411. Low density stone tool surface occurrence possibly associated with intact alluvial deposits at drainage area near homestead, Farm 23.

Figure 17. Site #415 Old slate quarry used for building material for the construction of historical stone-walled structures in the area.

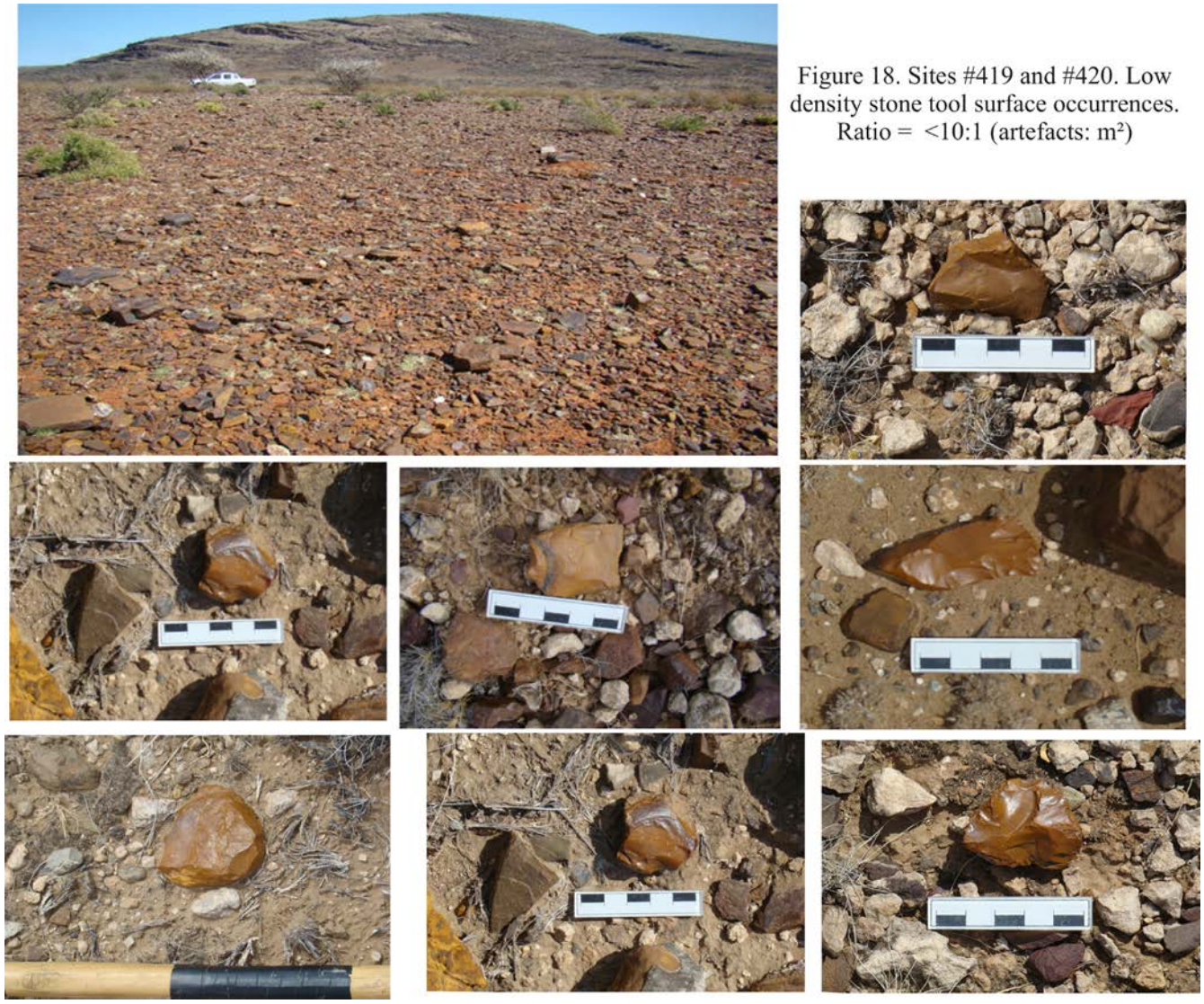

Figure 18. Sites #419 and #420. Low density stone tool surface occurrences. Ratio = <10:1 (artefacts: m²)

Figure 19. Sites #421 and #422. Low density stone tool surface occurrences. Ratio = <10:1 (artefacts: m²)

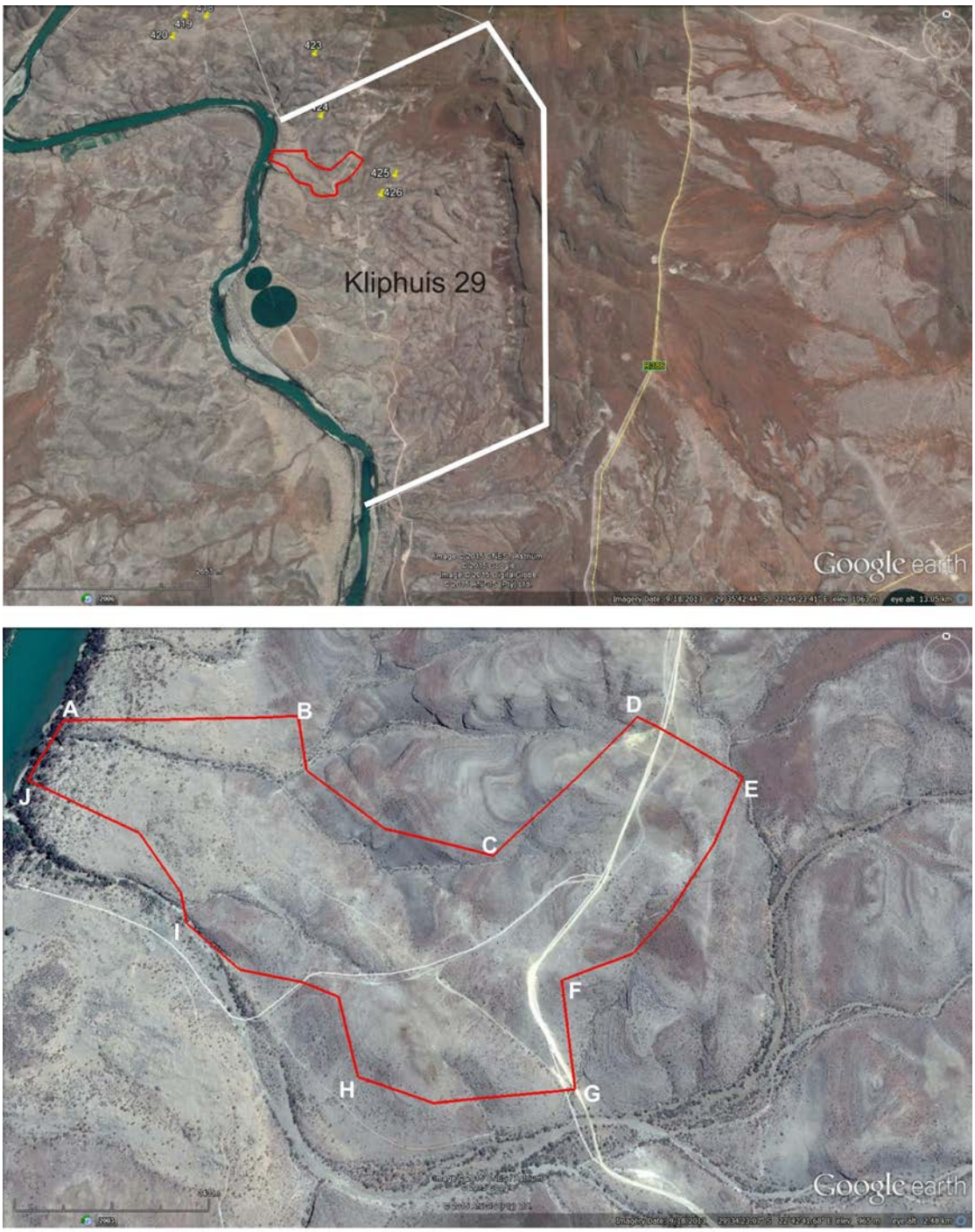

Figure 20. Site #121-164. Aerial view and layout of a complex of stone-walled ruins that covers an area of about 75 ha on the farm Kliphuis 29.

Figure 21. Site #121-164. Stone-walled ruins at Kliphuis 29. The site is associated with the asbestos mining industry that prevailed in the region more than a hundred years ago.

Figure 22. Site #121-164. Stone-walled ruins at Kliphuis 29. The site is associated with the asbestos mining industry that prevailed in the region more than a hundred years ago.

Figure 23. Site #121-164. Stone-walled ruins at Kliphuis 29. The site is associated with the asbestos mining industry that prevailed in the region more than a hundred years ago.