

# **RECONNAISSANCE OF EARLY STONE AGE ARTEFACT CONTEXT**

**(REVIEW AND FIELD OBSERVATIONS)**

## **PROPOSED DEVELOPMENTS ON FARM BRAKKLOOF 443 PORTIONS 59, 62 & 63, PLETTENBERG BAY, WESTERN CAPE**

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**On behalf of**

**SHOCK PROOF INVESTMENTS 171 (PTY) LTD**

PO Box 1877, PLETTENBERG BAY, 6600

**22 May 2012**

## SUMMARY

Proposed development on Portions 59, 62 and 63 of the Farm Brakkloof No. 443, near Plettenberg Bay (Figures 1 & 2), triggered archaeological and palaeontological impact assessments (AIA & PIA) in terms of the National Heritage Resources Act (NHRA No. 25 of 1999). The AIA identified the occurrence of thousands of Early Stone Age (ESA) artefacts in the southern part of the study area, particularly on bedrock outcrop in the southwestern corner where an ESA tool-making “quarry” occurs (Figure 3) and a no-go zone was designated (Kaplan, 2010). A follow-up study by an ESA specialist was conducted, focussing on the spatial integrity and technological context of the main occurrence (Archer, 2012).

The follow-up report highlighted the occurrence of ESA artefacts everywhere on the property, with most hidden by vegetation or occurring within/beneath the topsoil. A test excavation programme was recommended in order to improve the assessment of the archaeological sensitivity of the entire study area. The question then arose as to where the test excavations should best be positioned. It was decided that the planning of the archaeological test-excavation programme would be informed by an initial reconnaissance of the ESA occurrences in relation to the Brakkloof Formation. Will Archer and I investigated the project area on the 24<sup>th</sup> April, 2012. This report presents the observations of this recce.

The desktop PIA highlighted previous work in the immediate area carried out during 1969-1971 by Karl Butzer and David Helgren, University of Chicago. They described a formation of ancient, weathered aeolianites (old dunes), viz. the Brakkloof Formation and its capping lateritic soil, the Brakkloof Palaeosol. However, the exact location of their “type/reference area” observations was not clear. The result of this recce identifies the Brakkloof Formation type area to be the so-called mined area (Figures 3 & 8), together with the surrounding slopes and scarps. The “mined area” is mainly natural in origin, the result of erosional gullying.

Some additional observations can be added to those of Butzer and Helgren:

- ESA artefacts occur within the *in situ* capping laterite (Brakkloof Palaeosol). The latter must then have formed subsequent to the distribution of ESA on the palaeosurface.
- ESA artefacts occur within the weathered, clayey mottled zone beneath the topsoil where the capping laterite is absent/removed.

To account for the distribution of ESA material in the profile, it is necessary to invoke the process of colluviation, involving easily-mobilized sediments with a slope and an upslope source of abundant ESA material. The features of the Brakkloof type-area terrain fit this scenario.

It is recommended that development not proceed in the eroded area that is the original type area of the Brakkloof Formation and the Brakkloof Palaeosol, pending the formulation of a Conservation Management Plan. Although it is unlikely that *in situ* ESA material is preserved, the context of the ESA is probably typical for the region. As such it is a valuable geoarchaeological laboratory for the understanding of such deposits. Its preservation will enhance the geoheritage value in the Plett area.

Geotechnical test pit logs and images, together with field inspection of “spoil” remaining around the now-infilled test pits, informed on the distribution of ESA material in the surrounding area. Given the general lack of archaeological material on Portion 59 and its lack of spatial integrity, no further archaeological mitigation, including test-pitting, is required on Portion 59 of the Brakkloof property.

The slopes on the eastern parts of portions 63 and 62, above the drainage line, are likely comparable to Portion 59 as regards the context and abundance of ESA material. This report defers to archaeological opinion on whether or not monitoring of development will be required, such as archaeological visibility revealed after bush clearing.

**DECLARATION BY THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS**

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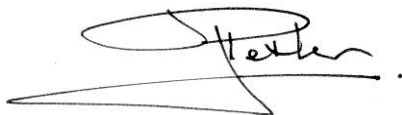
**Terms of Reference**

To investigate the context of middle Quaternary Early Stone Age artefacts in the upper part of the Brakkloof Formation, in order to establish the nature and likely extent of the ESA-bearing deposits and their relation to the Brakkloof Formation. Also involving assessment of the extent of the Brakkloof Formation, it's likely age and possible type section locales. The purpose is to inform the planned archaeological test-excavation programme which aims to improve the delineation of sensitivities in the project area.

**Declaration**

I ...**John Pether**....., as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in the compilation of the above report;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed to the EAP any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management act;
- have provided the EAP with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543, 2010.



Signature of the specialist

Date: 22 May 2012

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## INTRODUCTION

Shock Proof Investments 171 (Pty) Ltd proposes a mixed-use housing development on Portions 59, 62 and 63 of the Farm Brakkloof No. 443, near Plettenberg Bay (Figures 1 & 2). The proposed development site is within the current urban edge, but will have to be rezoned from “Agriculture” and subdivided. The Environmental Impact Assessment (EIA) process for the proposal is currently managed by Sharples Environmental Services CC. Aikman Associates Heritage Management is overseeing the Heritage Impact Assessment (HIA) of the proposed development.



**Figure 1. Location of the proposed development. Extract of 1:50000 3423AB\_1998\_ED3\_GEO.TIF. Chief Directorate: Surveys & Mapping.**

An Archaeological Impact Assessment (AIA) was carried out by Jonathan Kaplan of the Agency for Cultural Resource Management (Kaplan, 2010), in order to define archaeologically sensitive areas and guide any proposed development on the property. The AIA identified the occurrence of thousands of Early Stone Age (ESA) artefacts in the southern part of the study area, particularly on bedrock outcrop in the southwestern corner where a no-go zone was designated (Figure 3).

Following submission of the AIA to Heritage Western Cape (HWC), a site visit was undertaken by representatives of HWC and responses were issued (Appendices 1 & 2). Chief among these was that the site is unique and must be investigated by an ESA specialist. Accordingly, Will Archer was engaged to conduct a follow-up study, focussing on the spatial integrity and technological context of the main occurrence (Archer, 2012).

An important finding is that the artefacts were made in the immediate vicinity, but are no longer in a primary context, having been affected by movements such as erosion and downslope, colluvial processes. The follow-up report also highlighted the occurrence of ESA artefacts apparently everywhere on the property, with most hidden by vegetation or occurring within/beneath the topsoil. As the distribution of these “submerged” artefacts in the wider area

is not known, a test excavation programme was recommended in order to improve the assessment of the archaeological sensitivity of the entire study area (Appendix 3). The question then arose as to where the test excavations should best be positioned.

In the meantime, a desktop Palaeontological Impact Assessment had been completed (Pether, 2011). This study highlighted previous work in the immediate area wherein a formation of ancient, weathered aeolianites (old dunes) was recognized, viz. the “Brakkloof Formation” (Butzer & Helgren, 1972; Helgren & Butzer, 1977). Due to advanced weathering the fossil potential of the Brakkloof Formation is very low. However, a main feature is the occurrence of ESA artefacts within the upper layers/beds. Consequently, it was mooted that the test excavations be carried out in collaboration with geologists specializing in coastal-plain deposits and stratigraphy (Appendix 3).

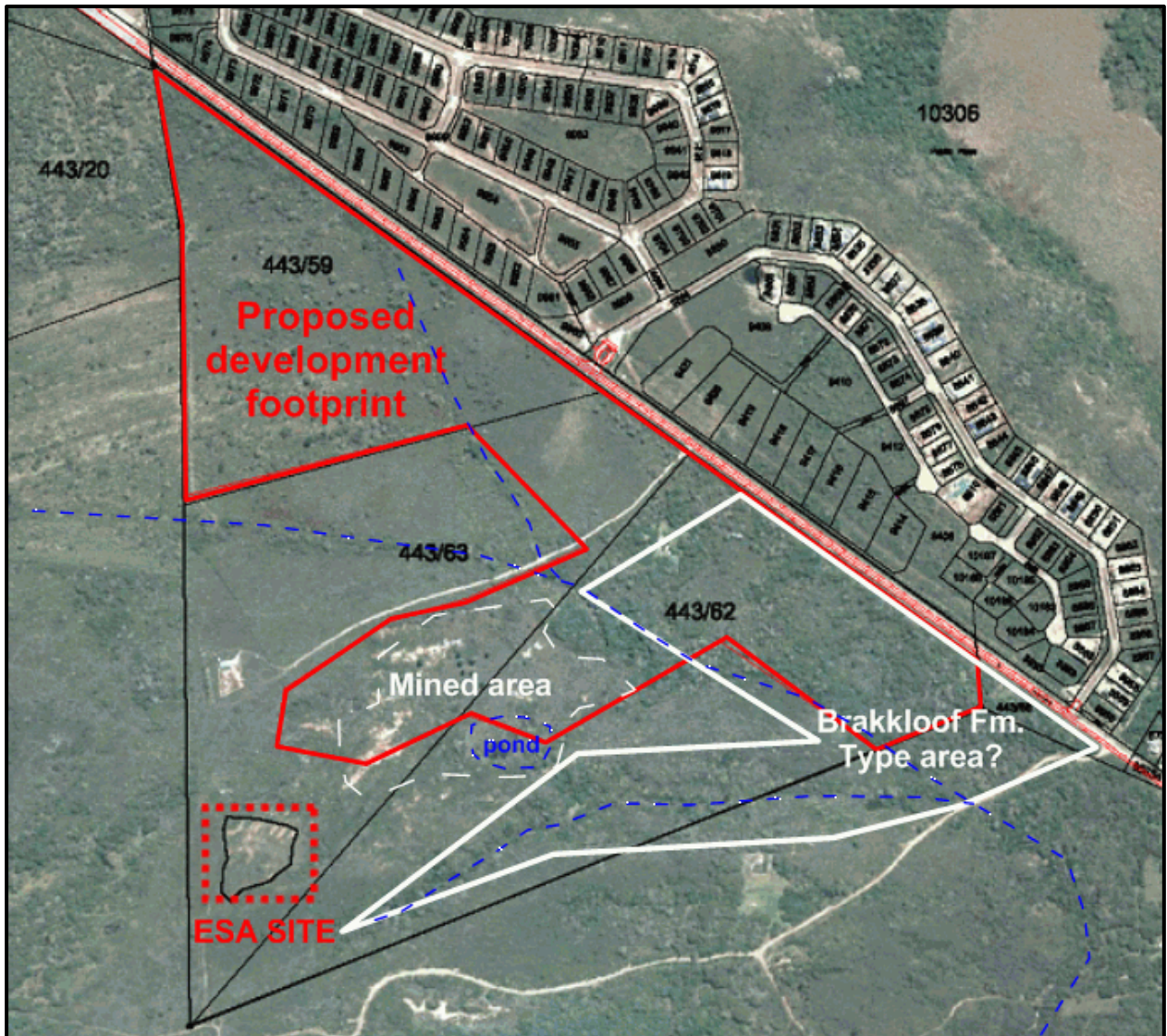
In subsequent discussions it was decided that the planning of the archaeological test-excavation programme would be informed by an initial reconnaissance of the ESA occurrences in relation to the Brakkloof Formation. Will Archer and I investigated the project area on the 24<sup>th</sup> April, 2012. This report presents the observations of this recce.

The PIA did not address the issue of whether or not the ESA artefacts are *in situ*. This report therefore includes the previous account of the Brakkloof Formation by Butzer and Helgren in more detail.



**Figure 2. Simulated oblique aerial view of the setting of the site on portions of Brakkloof Farm, looking towards the north. From Google Earth.**

The landscape setting of Farm Brakkloof is a broad valley eroded in the edge of the Coastal Platform by a local drainage (Figure 2). In the northern corner elevations just exceed 100 m asl. and in the southwestern corner elevations are ~90 m asl. Three local drainage lines rise in the higher ground in the west and north and traverse the site to exit near the eastern apex at ~50 m asl. (Figure 3).



**Figure 3. The project area and preliminary development footprint, the main ESA site or “quarry” area, the mined area exploited for road construction material and speculative location of the Brakkloof Formation type exposures.**

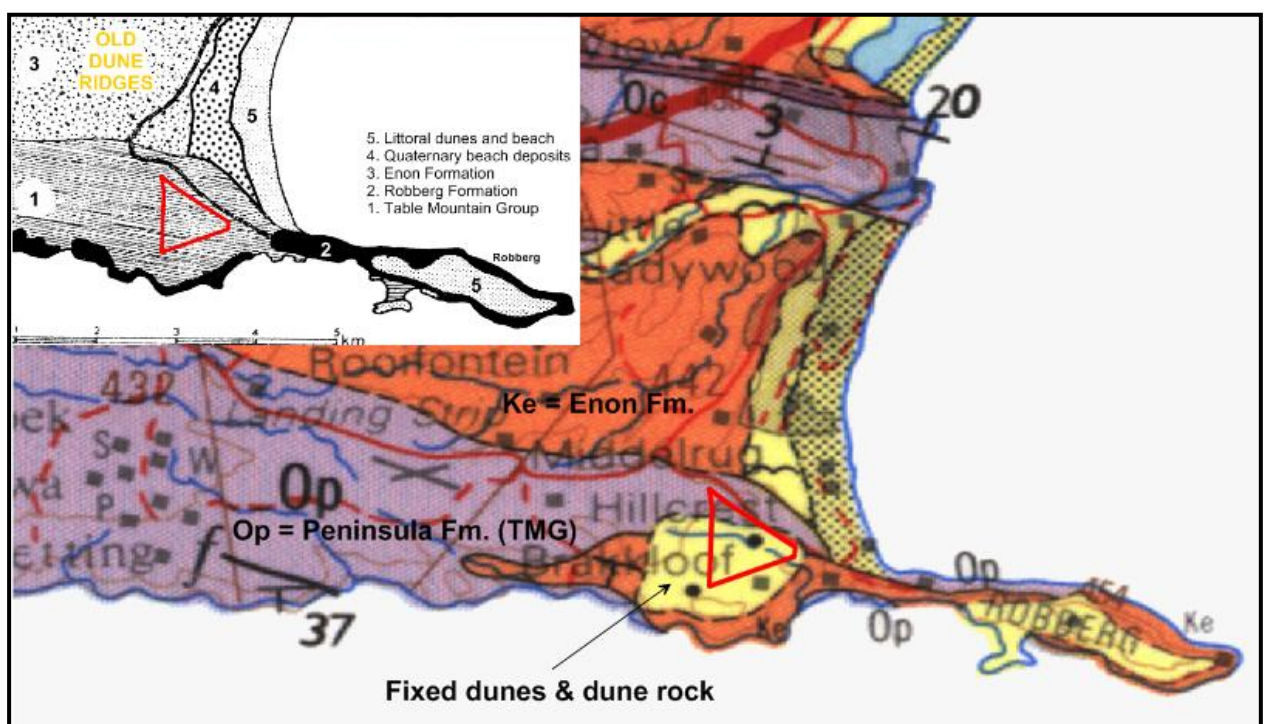
In the south-central part of the project area is a low-lying area of more rugged terrain which is an abandoned quarry for road construction material (Figure 3, mined area). This was evidently quarried up to about the middle 1990s (Aikman Associates, 2012). An area of ponding occurs in the sump of the quarried area. This recent quarry is not be confused with the ESA “Quarry” Site on exposed bedrock on high ground just to the southwest (Figure3).

In the mined area are large numbers of ESA tools that are primarily associated with what are apparently large (gravel) spoil dumps left over from the gravel quarrying (Kaplan, 2011).

## GEOLOGICAL SETTING

### The Bedrock

The regional geological setting has been presented in the PIA and is only summarised here. According to the 1:250 000 Geological Series map (Figure 4), the bedrock underlying the northern part of the area is sandstones and quartzites of the early Ordovician (~480 Ma) Peninsula Formation of the Table Mountain Group (TMG). The southern portion of the site is underlain by late Jurassic to early Cretaceous deposits of the Uitenhage Group. These deposits relate to the breakup of the supercontinent Gondwana between about 155 Ma and 134 Ma. Another bedrock map of the area shows the site entirely underlain by the TMG Peninsula Formation (Figure 4, inset), with the Robberg Formation only of the Uitenhage Group confined to the coast.



**Figure 4. Geology of the area. Extract of 1:250 000 Geological Series 3322 Oudtshoorn. Council for Geoscience (Geological Survey), Department of Mineral & Energy Affairs, 1979. Inset adapted from Rust & Reddering (1985).**

Nevertheless, it is pertinent that over most of the area the bedrock is deeply weathered (Geotechnical Report, Paton, 2011) and covered by soil or weathered deposits. The exposed fresh bedrock observed in the project area occurs in the eroded drainages, particularly in the southwestern part of the area, where the ESA material occurs most visibly.

### The Brakkloof Formation

Overlying the bedrock on the property Brakkloof 443 is an area depicted as “Fixed dunes and dune rock”, shown in yellow with a wide black dot pattern (Figure 4). On this map this category includes dunes and coversands of widely differing ages. For instance, in the Wilderness embayment the depicted category includes deposits of late Miocene age (~10 Ma) or older that occur on the inner coastal plain surface, as well as including the prominent dune cordons at the coast which are of middle and late Quaternary ages. The proximity to the coast of the “Fixed

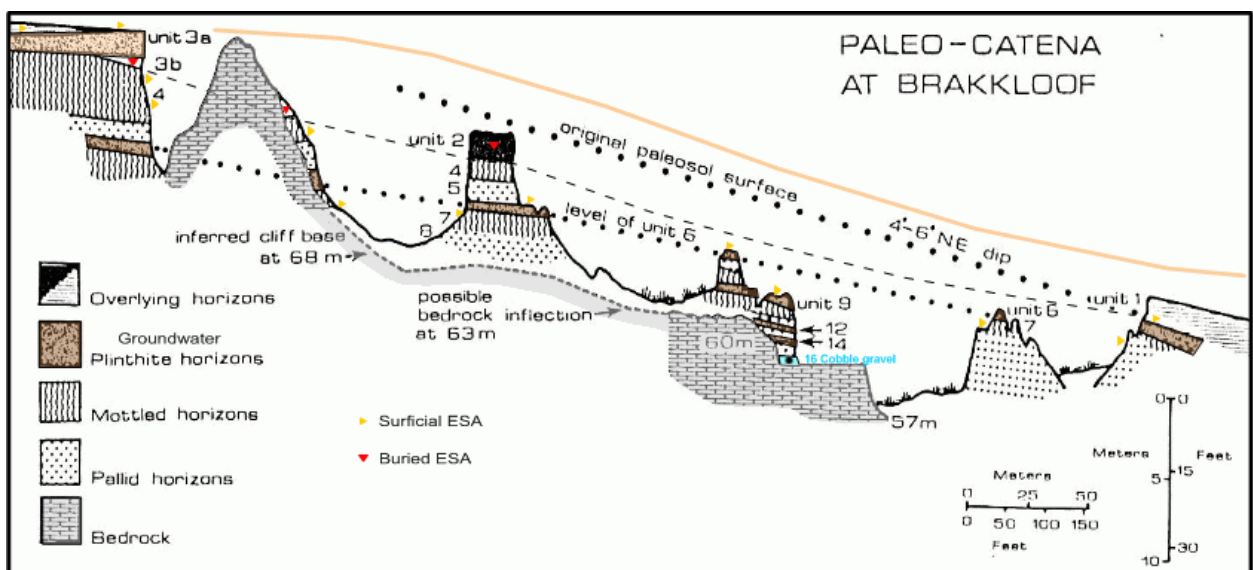
dunes and dune rock” on Brakkloof suggests that the dune deposits are part of the younger coastal-plain record.

Karl Butzer and David Helgren, both from the University of Chicago (Anthropology and Geography departments) carried out fieldwork in the Plettenberg Bay area during the period 1969-1971. Their quite detailed observations, reported in Butzer & Helgren (1972) and Helgren & Butzer (1977), remain the main source of information on the coastal plain deposits around Plettenberg Bay. Particular attention was given to ancient soil markers (palaeosols) in relation to the geomorphology.

Butzer and Helgren examined the deposits on Brakkloof and named these old dunes the “**Brakkloof Formation**” (Butzer & Helgren,1972). The type area (reference area) was loosely designated as the “*area of that name just west of Robberg*” where “*some 10 m of aeolianite rest on a fresh beach platform with nips at 57, 60 and 63 m and veneered with beach cobbles*”. The exposures were in gullies eroded in the footslope of a subdued dunal terrain formed by intensively weathered sands aeolian sands that overlie the littoral terrace.

The aeolianite was interpreted as having been derived from the littoral when sea level fell from the ~60 m level (sea-level regression). Subsequently the aeolianite was profoundly weathered, with formation of pedogenic clays and no unweathered deposit remains. The “skeletal” quartzite-derived sands are medium-grained in the lower part and have an increasing content of fine sand upwards.

Superimposed on the Brakkloof Formation aeolianite is the “**Brakkloof Soil**”, a plinthite or lateritic soil profile (see laterite in glossary).

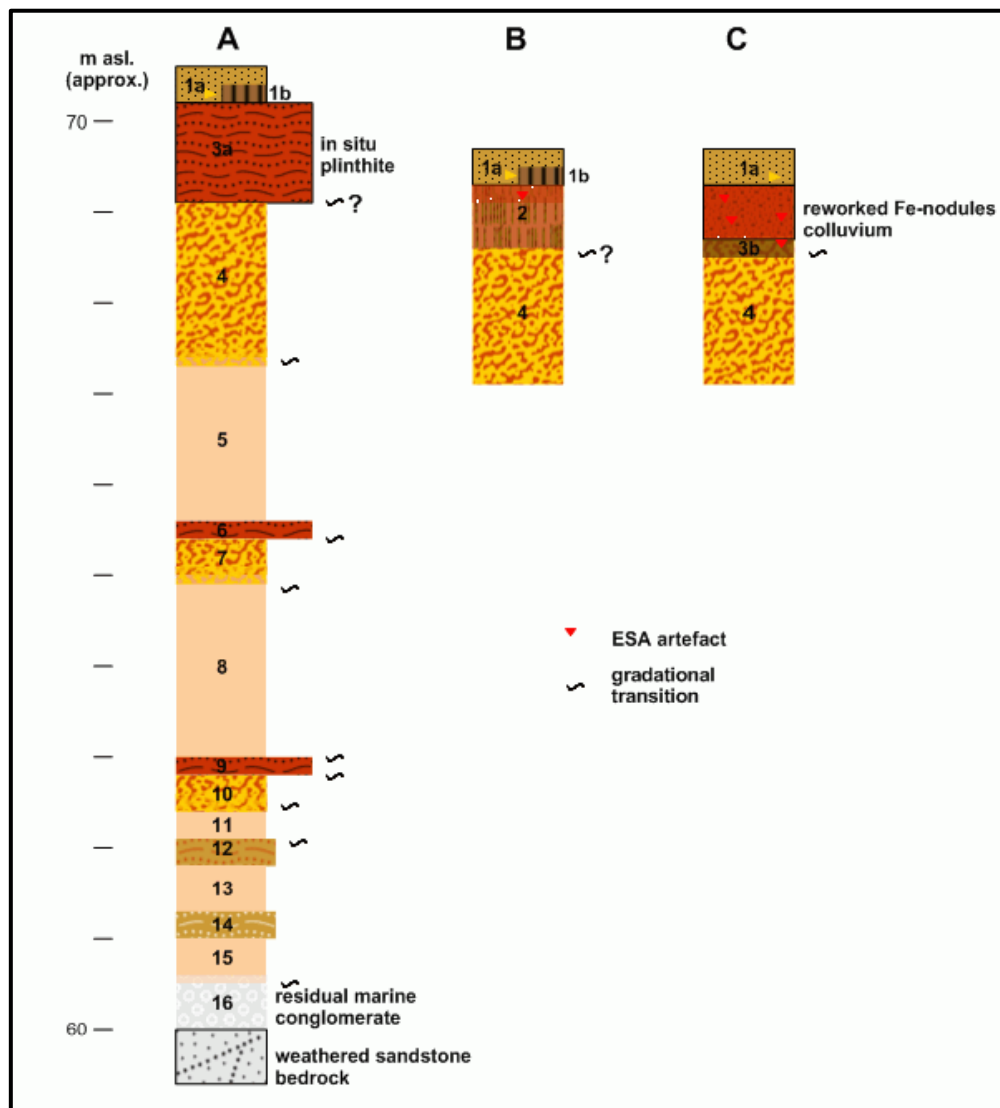


**Figure 5. The Brakkloof Formation at the type area on Brakkloof. Adapted from Fig. 2 of Helgren & Butzer (1977).**

The Brakkloof Soil is a laterite with a characteristic, upper plinthite or Fe-oxide rich horizon, underlain successively by mottled and pallid horizons. Helgren & Butzer (1977) presented a composite type section based on their observations in the gullies (Figure 5 and Appendix 4). The described “type” soil profile (Figure 6D-6F) lacks the capping, primary plinthite horizon (eroded off), but otherwise the underlying soil horizon was perceived as intact. However, many exposures nearby show 0.5-1.3 m of reworked ferruginous nodule gravel overlying the lower horizons in a truncated profile.

In Figure 6D the primary plinthite unit 3a is shown in place, underlain by the associated mottled horizon (4) and pallid horizon (5). Where the primary plinthite unit 3a has been removed, unit 2 is present and is a brown, sandy clayey soil with coarse prismatic structure (Figure 6E). Unit 3b is also a dark-brown sandy clay loam and it underlies colluvium of Fe-nodules derived by erosion and reworking of 3a (Figure 6F).

Underlying the capping, pedogenic laterite profile are four additional apparent plinthite horizons and associated mottled and/or pallid horizons - units 6-15. Plinthite units 6 and 9 are hard ledge-formers in the eroded area, units 12 and 14 are just slightly hard. These plinthites slope into the drainage at 4-6° and are interpreted as “groundwater oxidation horizons”, *i.e.* groundwater ferricretes associated with lateral flow of groundwater in the catchment. They were interpreted to have resulted from a sequentially-lowering water table, as the gully system was cut during later Quaternary times.



**Figure 6. The Brakkloof Formation, adapted after Helgren & Butzer (1977). A: Section including primary capping laterite. B & C: Sections with primary capping laterite not preserved.**

The upper, pedogenic laterite (3a, 4, 5) indicates intense chemical weathering - warmer, wetter climate (5°C higher, 60-80% more rain), geomorphic stability and a vegetated surface (Butzer & Helgren, 1972).

The Brakkloof Formation was regarded as the 2<sup>nd</sup> generation of aeolianites in the region, younger than the 1<sup>st</sup> generation represented by the aeolianites beneath the Knysna Forest and capped by the Knysna Soil. Butzer & Helgren regarded the Brakkloof Formation as widespread on the coastal platform. Figure 7 shows their mapped extent surrounding the Piesang Rivier valley, where the deposits are shown on hill tops and flanks. Inland “*coarse alluvial fans ... interfinger with Brakkloof eolianites along the footslopes of the Outeniqua and Tzitzikamma mountains*”. Presumably the correlations were based on the presence of a lateritic profile formed in youngest generation of the older, weathered aeolian sands. Butzer & Helgren speculate that during the deposition of the Brakkloof Formation, the Knysna Forest-type vegetation must have been substantially eliminated.



**Figure 7. The Brakkloof Formation in the Piesang valley, as depicted by Butzer & Helgren, 1972.**

To the writer’s knowledge, the “Brakkloof Formation” has not been revisited and has no formal status with the S.A. Committee for Stratigraphy. Despite this “neglect”, there are sound reasons that it should have formal status, but these will be elaborated elsewhere.

In the PIA (Pether, 2011), it was speculated that the type exposures examined by Butzer & Helgren might have been in gullies in the banks of the drainages in the southern part of the project area (Figure 3), but no erosive scars can be distinguished in aerial images of that thickly-bushed area. It was also mentioned that exposures must exist around the edges of the mined-out area (Figure 3).

## **Age Constraints from Sea-level History**

The evidence of sea-level history from the Plett area presented by Butzer and Helgren overall accords with that from the west coast of Namaqualand where the marine deposits have been extensively exposed by diamond mining. There three large marine formations were deposited during progradation from sea levels that reached ~100 m, ~50 m and ~30 m asl. These elevations are the levels to which the old shorelines have now been uplifted by tectonic forces. They are dated to ~16-15 Ma (late Early Miocene), ~5-4 Ma (early Pliocene) and 3.3-3.0 Ma (mid-Pliocene), respectively (Pether *et al.*, 2000). This dating information was not available to Butzer and Helgren and at that stage the coastal deposits were considered to be younger.

The Brakkloof type area at about 60 m asl. would have been inundated during the high sea levels of the Mid-Miocene Climatic Optimum ~16 Ma, when the outer Coastal Platform was produced. It was also within range of early Pliocene high sea level and the “60 m Beach” of Butzer and Helgren likely correlates with this transgression maximum, uplifted slightly higher *cf.* the West Coast. On this basis the maximum age of the Brakkloof Formation is early Pliocene, contemporaneous to subsequent to the decline of sea level from the early Pliocene high.

The “*fresh beach platform with nips at 57, 60 and 63 m and veneered with beach cobbles*”, as depicted in Figure 5, implies that the edge of the Coastal Platform was already incised to some degree before erosion of the “nips” and deposition of the marine conglomerates. It also suggests that the bedrock was already weathered, as the weathering profile was evidently removed, exposing bedrock still relatively fresh today. Butzer and Helgren also speculated that the formation of the Brakkloof Palaeosol (primary capping laterite) may correspond with the “30 m Beach”. Updated, this is a correlation with the Mid-Pliocene Climatic Optimum or global warming ~3.3-3.0 Ma.

An early to mid-Pliocene age for the Brakkloof Formation and its capping laterite cannot be verified with existing data, but if accepted, the ESA association must have come about much later (mid-Quaternary, post ~1.0 Ma).

No definite marine cobble gravel beds were observed in the field nor were intersected in the test pits. However, they may easily have been missed in a cursory field visit in the thickly-bushed conditions.

## **GEOTECHNICAL TEST PIT EXPOSURES**

For geotechnical investigations 22 slit-trench test pits (Figure 8) were dug with an excavator during March 2011, with the results reported in Paton (2011). The geotechnical report included informative logs and colour images of the test pits. Several test pit sites were visited during this investigation, but the pits had been backfilled, evidently for safety compliance reasons. Nevertheless, remaining spoil showed evidence of the prevalence and nature of exhumed lateritic nodules and quartzite clast material. The latter were mostly artefacts of some sort. The discussion below refers to the geotechnical report, with mention of some field observations. Images of the test pits from Paton (2011) are reproduced and annotated as Figure 9 which is provided as a separate pdf file.

### **Test Pits 1-8**

These pits pertain to the slopes north of the mined area and chiefly to Portion 59. TPs 3, 5, 7 and 8 are quite similar profiles. TPs 4 and 6 are distinctive in the development of a horizon of darker red-brown hue, with ferruginous nodules – a plinthite horizon. “Sporadic Fe-nodules were reported from TPs 5, 7 and 8. In the field, soft nodules were observed at TPs 6, 7 and 8, while those at TP4 were harder. Occasional quartzite cobbles were recorded from TP5. Very minor quartzite clast material, including artefacts, was seen in the field at TPs 4 and 7.

At TP5 the quartzite cobbles were reported from Unit B, from below the grey topsoil unit A, in association with Fe-nodules and thus evidently from within the weathering profile. Quartzite cobbles were also reported from Unit B of TP2 and some of these were seen in the field beside the pit, together with artefacts. Similarly, weathered deposits with some quartzite material apparently also occur in the profile at TPs 4 and 7.

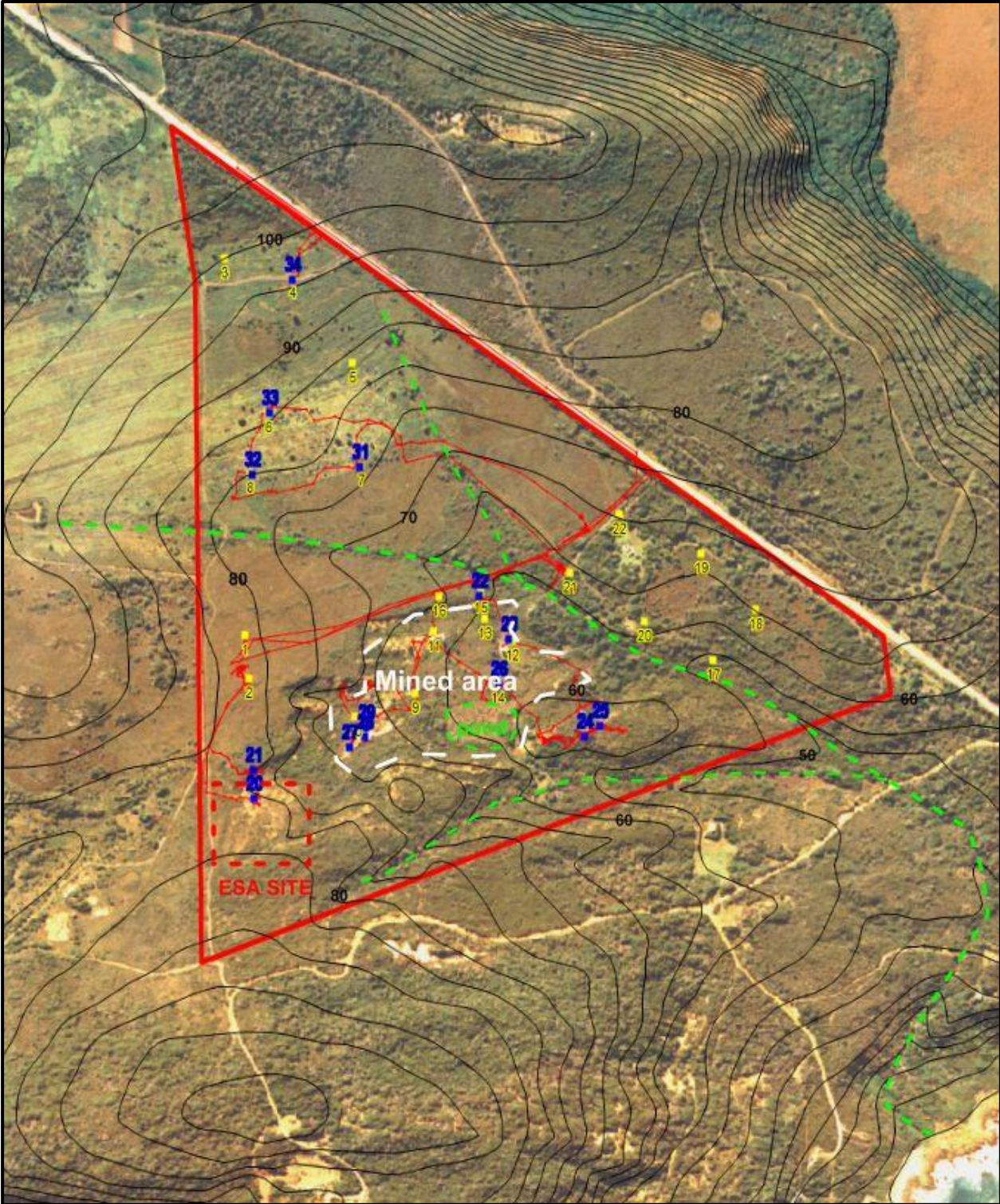


Figure 8. The project area using an older aerial image as a backdrop, when the bush cover was less dense. Test pits: yellow markers 1-22. Waypoints 25/04/2012: blue markers 20-34. Track plot: thin red line. Image: 1069\_DWAF\3423ab8 & 13, 1999/08/31; with 5 m contours - Chief Directorate: Surveys & Mapping.

The quartzite material is unambiguously recorded from within the Unit B advanced-weathering profile. Much of the quartzite material includes worked pieces. This suggests that the upper part of the “residual soil” is a deposit, probably mainly of colluvial origin. Figure 9 shows tentative distinctions of the weathered, quartzite-bearing deposit in the test pits. It seems reasonable to assume that the high ground sampled by TPs 1-8 mostly includes a weathered colluvial deposit beneath the topsoil that includes sparse to very sparse ESA artefacts.

### **Test Pits 17-22**

Test pits 17-22 are situated on the SW-sloping slope on Portion 62, opposite the mined area (Figure 8). At TP21 the topsoil and some boulders rest on fresh sandstone bedrock. At TP18, a thin (0.4 m) pedogenic ferricrete overlies sandstone bedrock. This layer differs in texture and hue from the mottled, thick weathering-profile material of the general area and is likely a much younger development. The lateritic weathering profile has been eroded away at these sites.

At TP20, a thin (0.5 m), red plinthite overlies weathered bedrock. Upslope at TP22 the topsoil is closely underlain by weathered bedrock. A potential colluvial deposit is not readily evident; if present, it is thin and cryptic. At TP 17, a weathered deposit, 0.9 m thick with basal cobbles and boulders, overlies weathered bedrock. At TP19, the topsoil was underlain by clayey material, evidently lacking Fe-nodules, but containing occasional rounded sandstone cobbles that suggest it may incorporate a weathered colluvial deposit.

It seems that the weathering profile has been stripped from places on this slope (TPs 18, 21), but residual weathering profile is preserved (TPs 20, 22) which locally includes weathered deposit, probably mainly colluvium (TPs 17, 19). Assuming there was a sparse ESA content in the upper part of the weathering profile, much of it has now been relocated towards the drainage by erosion.

### **Test Pits 9-16**

On the edge of the mined area, TP15, unit B under the topsoil is clay-rich with sporadic Fe-oxide segregations and occasional cobbles. A few artefacts, evidently unearthed, were observed in the field, suggesting that unit B is a deposit. The underlying unit C was regarded as weathered bedrock. TP16, upslope and also on the edge of the mined area, resembles TP15 B in the upper part, but instead passes down into weathered yellow material with red mottles.

At TP12 isolated cobbles appeared in unit B (weathered yellow material with red mottles) and the presence of artefacts at the site was confirmed in the field. The pit terminated in a plinthite horizon with dark, hard Fe-nodules.

At TP14 the pit exposed identical material *cf.* TP12 and the presence of rounded pebbles was reported. TP14 is sited next to a spoil dump, the surface of which is mantled with Fe-nodules and scattered artefacts. However, the dense, compact mottled material underlying the surface of the dump appeared to be *in situ*. This is evidently confirmed by the test pit in which the material is definitely *in situ*. Excavation was difficult beyond 1.4 m and the pit was terminated in perceived weathered bedrock.

At TP10, ~0.5 m of compact yellow sand overlies a mottled zone and the pit was terminated at 1.2 m on hard sandstone bedrock. TPs 9 and 11 expose identical profiles of light-coloured yellow and grey material of fissile appearance and apparently compact and *in situ*. At TP13, similar material underlies a thickness of compact yellow sand *cf.* TP10. There is some resemblance to the “bedrock?” underlying TP15.

In summary, TPs 12 and 14 are interpreted to be *in situ* deposits and to be the lower part of the Brakkloof Formation. Similar material is exposed in TP16. The TP15 profile appears somewhat atypical, but includes artefacts; it may be a soil formed in a younger colluvium. Young, redeposited sands seem to occur at TPs 10 and 13. The material exposed in TPs 9 and 11

(and in 15 & 13?) could be pallid weathering zones of the lower Brakkloof Formation. The geotechnical report described this facies as intact “transported alluvium”.

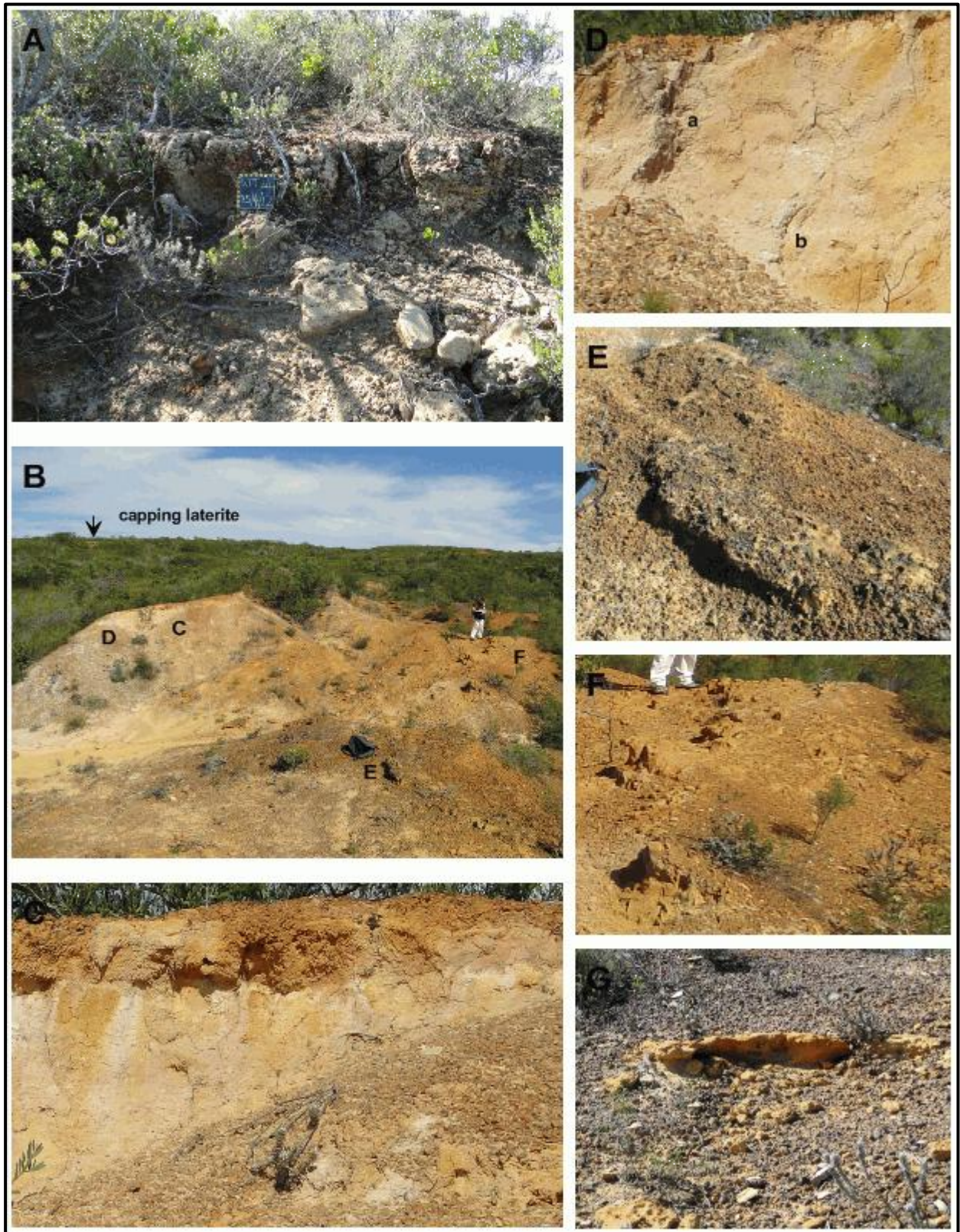
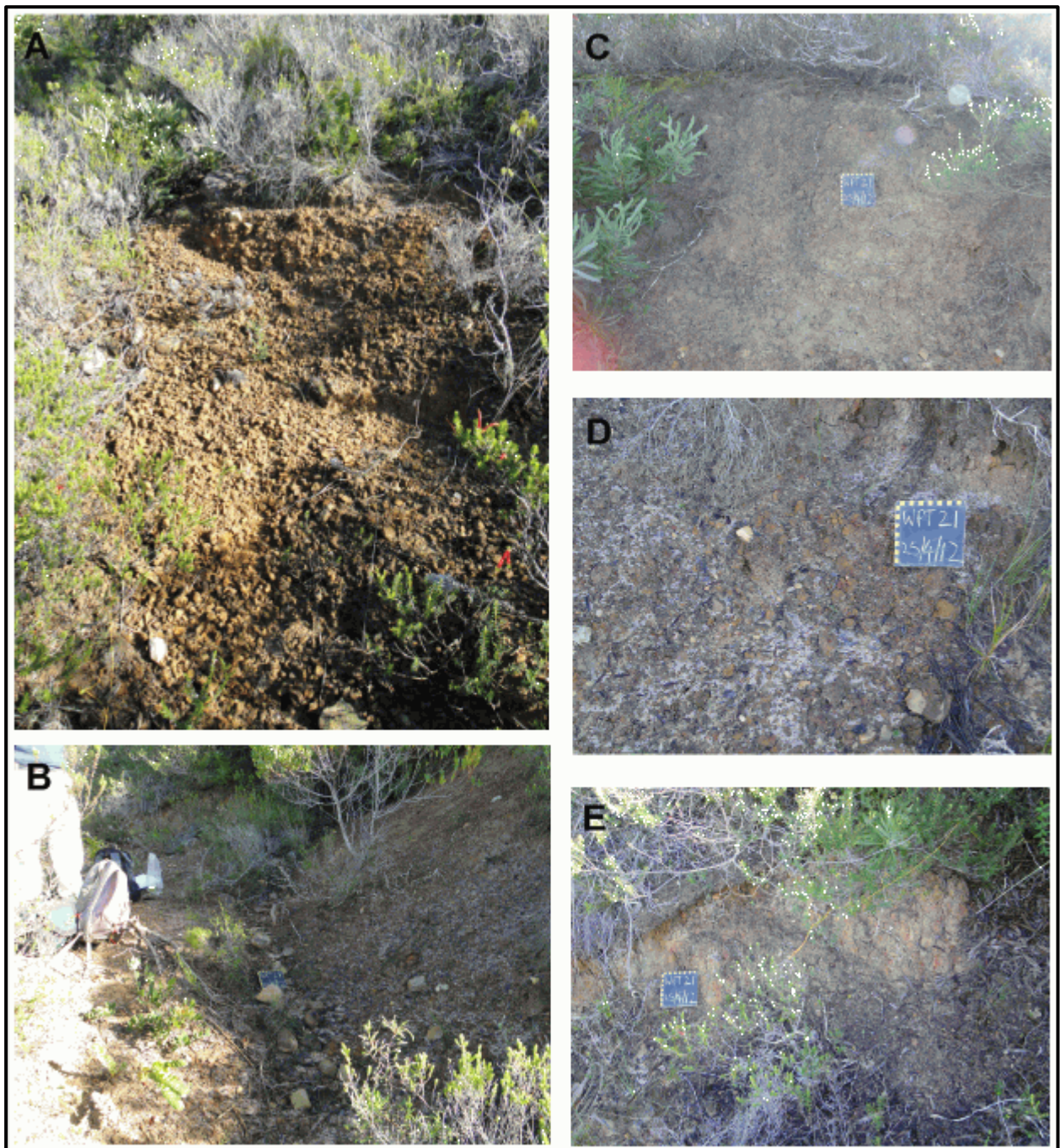


Figure 10. A: Primary capping laterite. B: “Spoil heaps” at WPT29 - eroded Brakkloof Formation . C: *In situ* pallid-zone. D: *In situ* pallid-zone; a – intact fissure fill; b – relict biogenic feature. E: Remnant of intact lateritic layer on crest of heap. F & G: Intact layering.



**Figure 11. Exposures around WPT21. A: Capping of reworked laterite nodules. B: Released artefacts. C: Topsoil unit. D & E: Underlying weathered (mottled zone) unit.**

## **THE MINED AREA**

The “primary” plinthite (Figure 5 & 6, Unit 3a) is present along the southern margin of the mined area, where it caps the interfluvium between the mined area and the drainage that parallels the southern boundary of the project area. At WPTs 24 and 25 it forms a cemented, vesicular layer at the top of the slope, <0.5 m thick (Figure 10A). In addition to its reduced thickness, it is undergoing retrogressive weathering, being leached of appearance and crumbling apart. Notably, artefacts occur on top of it, within it and on the eroding slope below it.

The reduced, retrograde laterite at WPTs 24 and 25 is quasi-contiguous with the lateritic gravel-strewn surface that occurs on the saddle around the exposed bedrock ESA Quarry area (Figure

8) and within which ESA artefacts are embedded in an apparently random manner. Nearby the exposed bedrock littered with ESA material (WPT20) is the head of a stream, the left bank of which exposes a section of the profile lapping off the bedrock (WPT21, Figure 8). Beneath the topsoil, a crumbling lateritic horizon is exposed (Figure 11A) which contains embedded quartzite material. The slope formed on the softer, underlying mottled zone is littered with artefacts (Figure 11A, B). Slightly downstream the lateritic horizon has been removed and thick topsoil (Figure 11C) overlies the mottled unit (Figure 11D, E). Small sandstone clasts distributed in the mottled material suggests that is a colluvium. Artefacts on its surface are apparently derived from it.

The “spoil dump” on the lower slope of the interfluvium at WPT 26 is mentioned above (TP14) and is *in situ* Brakkloof Formation. The spoil dumps around WPTs 27-29 exhibit features that suggest they are fundamentally *in situ* material (Figure 10B). This includes an exposure of a pallid horizon (Figure 10C & D) and preserved bedding such as thin plinthite layers and ledge-formers of slightly harder, yellow sands (Figure 10E-G).

It is concluded that most of the “spoil dumps” are of natural origin, although undoubtedly disturbed in some places. They are erosional remnants (mini-interfluviums) between dongas eroding back into the Brakkloof Formation. It is the lower, groundwater-affected part of the Brakkloof Formation that is exposed (Figure 5, below unit 6). The poor vegetation cover on these heaps suggests that active erosion continues. The Fe-nodules and artefacts strewn on the heap surfaces is erosional residue derived from overlying beds by the removal of finer material.

Moreover, it is clear that the mined area, together with the surrounding slopes and scarps, is mainly natural in origin and is the gullied type area of the Brakkloof Formation described by Butzer and Helgren. Evidently the mining involved collection of the eroded and washed down lateritic nodule material – a desirable road material. In contrast, the clayey sands are unsuitable for construction purposes.

## CONTEXT OF THE BRAKKLOOF ESA ARTEFACTS

Butzer and Helgren (1972) reported isolated Acheulean (ESA) finds in the Brakkloof Formation:

- In the Piesang valley – cleaver biface in the pallid horizon of the Brakkloof Palaeosol.
- N2 cutting on Matjiesfontein - hematite-stained cleaver in Brakkloof Palaeosol mottled zone.

They speculated that primary ESA occurrences may eventually be discovered in the Brakkloof Formation – presumably more than the occasional isolated occurrence. For the Brakkloof type site, the artefacts on the surface “*may well have been derived from the eolianite*”. However, the artefacts in a “*geological context*” (*i.e.* buried) “*are all reworked into colluvial horizons of plinthite nodules*”.

ESA artefacts were recorded from the topsoil unit 1, unit 2, unit 3b and in the reworked laterite bed (Figures 5 & 6), but not from the primary capping laterite (Butzer & Helgren, 1977). However, the presence of ESA in the *in situ* capping laterite and closely derived from it was observed during this investigation. It is supported by the occurrence of ESA in the lateritic gravel formed by reworking of the capping laterite.

Units 2 and 3b occur where the capping laterite has been removed or reworked. It seems likely that these units represent subsequent, “secondary” soil horizons superimposed on the underlying mottled horizon/unit 4. This would imply that the upper part of unit 4 contains ESA material. This seems to be the case at WPT21. Weathered mottled-zone deposits extending to TP2 and onto the slopes of Portion 59 (TPs 4, 5, 7) can be considered a lateral extension of the capping Brakkloof Palaeosol. The mottled-zone deposits contain sparse quartzitic clasts,

including artefacts. Some of the artefacts must have occurred in the topsoil (unit 1), such as the MSA artefact found at TP4. However, any ESA in the topsoil has been derived from the underlying weathered, mottled material.

There is an impression that the density of artefacts corresponds with the amount of erosion. In the “mining area”, where the gully interfluvial abut the retreating mini-escarpment they are higher and less eroded and appear to have fewer exhumed artefacts on their slopes *cf.* on top of the more reduced, lower, distal interfluvial remnants. This does not imply that artefacts are distributed throughout the deposit. A sporadic, irregular artefact content in the upper part of the Brakkloof profile would tend to be focussed downwards within an evolving, expanding gully system. Conceivably, the higher concentration of artefacts where the Brakkloof profile is more eroded reflects more the wider area of the palaeosurficial deposits that have been removed.

## ARCHAEOLOGICAL OBSERVATIONS

### Terms of Reference

The terms of reference for the archaeological component of this study were to:

- Assess the proposed association of archaeological materials with the Brakkloof Formation.
- Preliminarily assess the likely antiquity of associated artefacts based on their technological characteristics.
- Preliminarily assess the spatial integrity of Middle-Pleistocene artefacts associated with the Brakkloof Formation.
- Assess the potential for *in situ* Middle-Pleistocene archaeological deposits occurring on Portion 59 of the Brakkloof property and, contingently, the need for future mitigation on this portion.

### Archaeological Findings:

The objective of this field-trip was the interrogation of the geological context of Middle-Pleistocene archaeological material on the Brakkloof property. Consequently archaeological finds in themselves are of ancillary relevance to this report.

All artefacts identified in this study were produced on quartzite.

Archaeological findings associated with the *in situ* primary laterite included:

- At WPT24. Two diagnostic Middle-Pleistocene large bifacial cutting tools (Figure 12A). Both were produced on large side-struck flakes: diagnostic ventral features such as bulb remnants and the ‘ring crack’ or point of percussion enabled identification of the blanks that were used to produce these artefacts. They both had clearly recently eroded from the nearby laterite encasing deposit.
- At WPT25. One undiagnostic flake was embedded in the primary laterite (Figure 12B). All technological features were obscured by encasing sediments. It is not possible to suggest what industry this flake might be associated with.
- A hammer-stone with two pitting facets. This artefact had clearly recently eroded from the *in situ* primary laterite as there are traces of adhering ferruginous sediments across its surface (Figure 12C).

Photographed archaeological findings associated with *ex situ* ferruginous gravels include:

- At TP15. A side-struck flake blank with 30% cortex remaining on its dorsal surface (Figure 12D). Side-struck flakes were often used as blanks to produce large bifacial cutting tools (Handaxes and Cleavers) during the Middle-Pleistocene of the Western

Cape, and are often associated with Middle Pleistocene sites that occur close to exploited raw-material sources (Archer & Braun 2010).

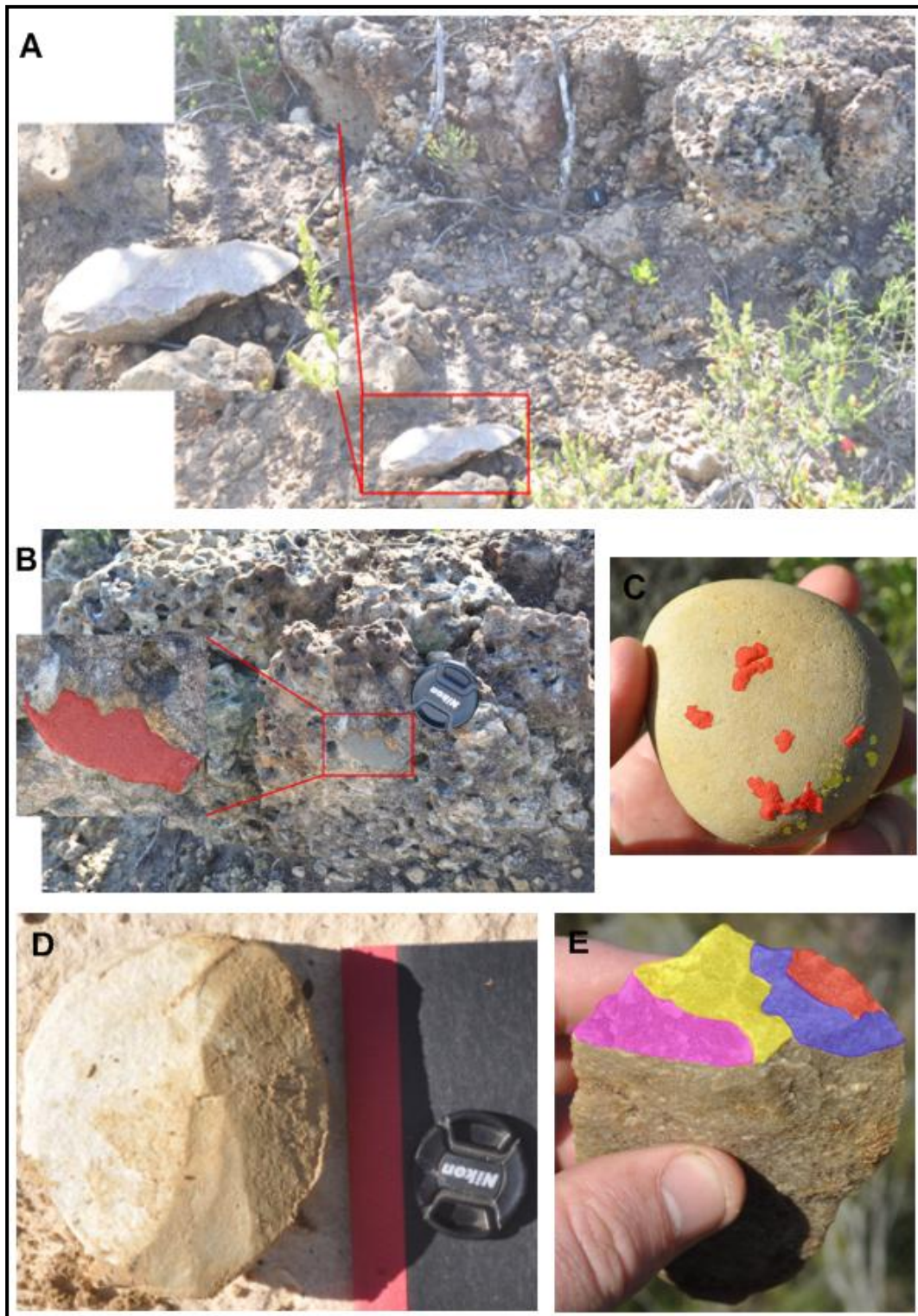


Figure 12. A: Diagnostic Acheulean Middle-Pleistocene artefact eroded from *in situ* capping laterite (locality WPT24). B: Un-diagnostic flake, with its ventral surface facing upwards, embedded in *in situ* laterite (locality WPT 24). C: Hammer-stone eroded from *in situ* laterite. Adhering ferruginous sediments are high-lighted in red and characteristic 'pitting' that enabled identification of the lithic as an artefact high-lighted in yellow (locality WPT 25). D: Side-struck flake blank exposed in geotechnical trench TP15. E.

**Flake with converging dorsal scars and a multi-faceted platform on Portion 59. One would expect to find such flakes in Middle Stone Age industries. Colours on the platform represent remnants of each preparation facet. This artefact was identified near TP4.**

The few archaeological materials observed on Portion 59 were all *ex situ*.

- A flake with a faceted platform and converging dorsal scars that suggest it was produced through the application of an alternating core reduction strategy was identified at TP4 on Portion 59. The platform is multi-faceted (Figure 12E). Discoidal and bi-directional cores are the by-products of alternating core reduction. Although discoidal cores are occasionally present in Middle-Pleistocene assemblages this is unusual. They are more characteristic of Middle Stone Age (Late Pleistocene) industries. This flake – in being struck from a discoidal core – is unlikely to be associated with the Middle Pleistocene assemblages on the Brakkloof property.

## DISCUSSION

The description of the Brakkloof Formation by Butzer and Helgren (1972, 1977) accords with the exposures seen on during cursory field observations on Portions 62 and 63 of Brakkloof 443. It is clear that the mined area, together with the surrounding slopes and scarps, is mainly natural in origin and is the gullied type area of the Brakkloof Formation described by Butzer and Helgren.

Some additional observations can be added:

- ESA artefacts occur within the *in situ* capping laterite. The latter must then have formed subsequent to the distribution of ESA on the palaeosurface.
- ESA artefacts occur within the weathered, clayey mottled zone beneath the topsoil where the capping laterite is absent/removed.

To account for the distribution of ESA material in the profile, it is necessary to invoke the process of colluviation, involving easily-mobilized sediments with a slope and an upslope source of abundant ESA material. The features of the Brakkloof type-area terrain fit this scenario.

The evidence suggests that, subsequent to the deposition of the original aeolianite in the valley, a substantial colluvial “mantle” formed on the aeolianites as they were “downwasted” by runoff and slumping. Poorly-vegetated aeolianites are modified by rain splash, surface wash, piping and gullyng, reducing dune crests and forming thick colluvial mantles and fans on lower slopes. Slope angle is less important than binding vegetation, the intensity of rainfall and surface-sand water repellency (Pye & Tsoar, 1990).

Prior to (and during?) this initial period of denudation of the Brakkloof aeolianite, ESA material was available at and on the palaeosurface around the production site. This material was incorporated as the unconsolidated sands were washed downhill. The lateritic Brakkloof Palaeosol then formed largely within the colluvial mantle, so that buried ESA now occurs in the laterite and in the upper part of the underlying mottled zone (unit 4, Figures 5 & 6).

When considering the ESA extent, the distinction between the original aeolianite (main Brakkloof Formation), its colluvial mantle (uppermost Brakkloof Formation) and the Brakkloof Palaeosol (capping laterite and underlying mottled zone) must be kept in mind. The depositional age of the Brakkloof Formation aeolianite may be as old as early-mid Pliocene (5-4 Ma), correlating with the regression from the early Pliocene sea-level high, or it may be of some younger Pliocene age. However, in terms of current observations, the palaeosurface on the underlying aeolianite existed during ESA times and was sufficiently cohesionless to be

remobilized into a colluvium. This may suggest that the deposition of the aeolianite did not greatly pre-date the ESA activity, *i.e.* it is of earlier Quaternary age.

Previous observations, and the current investigation, support the contention/working hypothesis that the ESA material does not occur in the primary aeolianite, but in the colluvial mantle. Excavations in the heaps (gully interfluvies), that expose the underlying and lower part of the Brakkloof Formation, can test for the presence/absence of ESA within them.

It seems that the occurrence of ESA in a primary context, *i.e.* preserved where discarded on an occupied palaeosurface, has low probability of being preserved. The “late” palaeosurface/s would have been within and on top of the Brakkloof Palaeosol, which itself has been partly to entirely reworked. Test profiles in close proximity to the ESA production site have yet to be examined, but just nearby an exposure shows a capping of reworked laterite (WPT21). The predicted gradients in ESA content can be tested by a survey of the ESA content and density in the capping laterite fringing the eroded Brakkloof type area, and that on the slope immediately below it. If small-scale cut & fill gully accompanied colluviation, “runs” of ESA could have formed within the lower colluvial unit.

The Brakkloof Palaeosol extends onto Portion 59 where it appears that a weathered colluvial deposit beneath the topsoil includes sparse to very sparse ESA artefacts. On Portion 62, on the slope east of the drainage line, the weathering profile has been stripped in places, but weathered colluvial deposits are preserved locally. Assuming there was a sparse ESA content in the upper part of the weathering profile, much of it has now been relocated towards the drainage by erosion. This thickly-bushed area must still be examined, but will probably, like Portion 59, have low archaeological priority.

Concerning the extent of the aeolian Brakkloof Formation, a widespread distribution extending from the 60 m Platform at the coast, to the upland foothills of the Cape Fold Mountains, was perceived by Butzer & Helgren (1972). Comparison of the available geological map (Figure 4) and Figure 7 shows that the distribution of the Brakkloof Formation is patchy and such detail is not included in the geological map, although it may exist in unpublished “working” maps. Thus a map showing the wider extent of the Brakkloof Formation is not readily at hand.

On a regional scale, there is likely to be a sporadic ESA content in the lateritic Brakkloof Palaeosol (*cf.* Portion 59), seen as occasional isolated occurrences in preserved profiles, or scatters of exhumed artefacts in eroding areas. A close spatial association of a resource locus/bedrock window and surrounding palaeosurfaces on aeolianites and its colluvium, as at Brakkloof, is not altogether unique. In the Keurboomsrivier Forest Reserve ~120 m asl., ESA is associated with rounded quartzite cobble-gravel outcrops and nearby ESA occurs in a bed of lateritic nodules (Davies, 1971). Exposures along the N2 just east of the Keurbooms River show reddened aeolianite capped with a thick laterite, with Acheulean (ESA) in the base of the laterite layer and MSA on top (Davies, 1971). Other occurrences of “Late Acheulean” associated with eroding, old reddened aeolianite and ferricrete are mentioned.

Other exposures of the Brakkloof Formation, such as in nearby quarries, have not been visited, but would better inform on the wider abundance of ESA material. The “other half” of the Brakkloof ESA that has been shed westwards from the ESA Quarry should be investigated. The drainage that exits the project area must carry ESA and the nature of this should inform about selective transport, such as smaller-sized elements.

Dating of an altered, very weathered colluvium by OSL techniques is problematic: the sand grains were not all bleached and the background radioactivity changed as minerals were weathered away and new clays formed. Furthermore, quartz grains in older aeolianite become saturated w.r.t. trapped electrons and thus limit the range of the standard OSL technique. Newer, related thermoluminescence (TL) techniques have greater range. Recently, reddened and lateritized aeolianite near Knysna (Makhulu Quarry), generally equivalent to the Brakkloof

Formation, have produced an ITL result indicating an age >1.7 Ma (Carr *et al.*, 2010). Interestingly, an exposure 5 km west of Makhulu Quarry at Simola showed ~4 m of laterized aeolianite with Acheulean (ESA) in the base of the section (Holmes *et al.*, 2007). In view of the ~1 Ma duration of the ESA, it is not unexpected that ESA material may occur on top, within and below older aeolianites of various ages in the landscape.

Mature laterite nodules have been dated using (U+Th)-<sup>4</sup>He (Pidgeon *et al.*, 2004), raising the possibility of dating the major palaeosols. The identification of potential dating techniques will need further research on available and emerging techniques, as well as a better understanding of the deposits, their weathering and available datable mineral phases.

## RECOMMENDATIONS

The following recommendations are made by the archaeologist (Will Archer) consequent to the brief field investigation:

1. Given (1) the general lack of archaeological material on Portion 59 and (2) its lack of spatial integrity, no further archaeological mitigation – including test-pitting - is required on Portion 59 of the Brakkloof property.
2. The archaeologically sensitive ‘no-go’ zones on portions 62 and 63 need to be substantially extended to include localities previously identified as mining spoil heaps. This needs to be undertaken in close collaboration with a geologist.
3. The archaeological sensitivity of portions 62 and 63 needs to be generally re-evaluated regarding the potential for *in situ* Middle-Pleistocene materials, pending recommendations by a geologist.
4. The heritage management plan for portions 62 and 63 needs to be developed in close collaboration with a geologist.

The slopes on the eastern parts of portions 63 and 62, above the drainage line, are likely comparable to Portion 59 as regards the context and abundance of ESA material. This report will defer to archaeological opinion on whether or not monitoring of development will be required, such as archaeological visibility revealed after bush clearing.

It is recommended that development not proceed in the eroded area that is the original type area of the Brakkloof Formation and the Brakkloof Palaeosol, pending the formulation of a Conservation Management Plan. Although it is unlikely that *in situ* ESA material is preserved, the context of the ESA is probably typical for the region. As such it is a valuable geoarchaeological laboratory for the understanding of such deposits. Its preservation will enhance the geoheritage value in the Plett area.

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## GLOSSARY

~ (tilde): Used herein as “approximately” or “about”.

Aeolian: Pertaining to the wind. Refers to erosion, transport and deposition of sedimentary particles by wind. A rock formed by the solidification of aeolian sediments is an aeolianite. Also spelt eolian.

AIA: Archaeological Impact Assessment.

Alluvium: Sediments deposited by a river or other running water.

Archaeology: Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

asl.: above (mean) sea level.

Bedrock: Hard rock formations underlying much younger sedimentary deposits.

Calcareous: sediment, sedimentary rock, or soil type which is formed from or contains a high proportion of calcium carbonate in the form of calcite or aragonite.

**Calcrete:** An indurated deposit (duricrust) mainly consisting of Ca and Mg carbonates. The term includes both pedogenic types formed in the near-surface soil context and non-pedogenic or groundwater calcretes related to water tables at depth.

**Clast:** Fragments of pre-existing rocks, e.g. sand grains, pebbles, boulders, produced by weathering and erosion. Clastic – composed of clasts.

**Colluvium:** Hillwash deposits formed by gravity transport downhill. Includes soil creep, sheetwash, small-scale rainfall rivulets and gullying, slumping and sliding processes that move and deposit material towards the foot of the slopes.

**Coversands:** Aeolian blanket deposits of sandsheets and dunes.

**Duricrust:** A general term for a zone of chemical precipitation and hardening formed at or near the surface of sedimentary bodies through pedogenic and (or) non-pedogenic processes. Examples are calcrete, laterite and silcrete.

**ESA:** Early Stone Age. The archaeology of the Stone Age between 2 000 000 and 250 000 years ago.

**EIA:** Environmental Impact Assessment.

**EMP:** Environmental Management Plan.

**Fluvial deposits:** Sedimentary deposits consisting of material transported by, suspended in and laid down by a river or stream.

**Fm.:** Formation.

**Fossil:** Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the disturbance or structure produced in sediments by organisms, such as burrows and trackways.

**Heritage:** That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

**HIA:** Heritage Impact Assessment.

**Laterite:** Soils in which iron oxides are concentrated and segregated in the form of mottling, nodules/pisoliths and cementation. Distinctive by various reddish, dark-brown to yellow-brown hues. The name laterite is derived from Latin - *later* = brick, which alludes to the brick-like hues. Also called plinthite (Greek *plinthos* = brick). Also known as ferricrete, iron pan, “oukclip” or “koffiekclip”, ngubane and murrum. A warm, sub-humid to humid climate with a distinct dry season and a wet season is commonly associated with laterite formation. Intermittent wetness from a fluctuating water table gives rise to the reduction and mobilization of iron and its migration and reprecipitation. It may form as a residue after removal of silica and alkalis (relative iron enrichment, pedogenic form) or by deposition from solution (absolute iron enrichment, groundwater form). Relict pedogenic laterite commonly caps old, nearly-flat land surfaces that had an impeded drainage with a fluctuating, seasonally-high water table. Groundwater forms have strongest expression in middle to lower slope positions in the landscape. (from Soils of South Africa, Fey)

**LSA:** Late Stone Age. The archaeology of the last 20 000 years associated with fully modern people.

**LIG:** Last Interglacial. Warm period 128-118 ka BP. Relative sea-levels higher than present by 4-6 m. Also referred to as Marine Isotope Stage 5e or “the Eemian”.

**Midden:** A pile of debris, normally shellfish and bone that have accumulated as a result of human activity.

MSA: Middle Stone Age. The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.

OSL: Optically stimulated luminescence. One of the radiation exposure dating methods based on the measurement of trapped electronic charges that accumulate in crystalline materials as a result of low-level natural radioactivity from U, Th and K. In OSL dating of aeolian quartz and feldspar sand grains, the trapped charges are zeroed by exposure to daylight at the time of deposition. Once buried, the charges accumulate and the total radiation exposure (total dose) received by the sample is estimated by laboratory measurements. The level of radioactivity (annual doses) to which the sample grains have been exposed is measured in the field or from the separated minerals containing radioactive elements in the sample. Ages are obtained as the ratio of total dose to annual dose, where the annual dose is assumed to have been similar in the past.

Palaeontology: The study of any fossilised remains or fossil traces of animals or plants which lived in the geological past and any site which contains such fossilised remains or traces.

Palaeosol: An ancient, buried soil whose composition may reflect a climate significantly different from the climate now prevalent in the area where the soil is found. Burial reflects the subsequent environmental change.

Palaeosurface: An ancient land surface, usually buried and marked by a palaeosol or pedoconcrete, but may be exhumed by erosion (e.g. wind erosion/deflation) or by bulk earth works.

Peat: partially decomposed mass of semi-carbonized vegetation which has grown under waterlogged, anaerobic conditions, usually in bogs or swamps.

Pedogenesis/pedogenic: The process of turning sediment into soil by chemical weathering and the activity of organisms (plants growing in it, burrowing animals such as worms, the addition of humus *etc.*).

Pedoconcrete: A duricrust formed by pedogenic processes.

PIA: Palaeontological Impact Assessment.

Plinthite: see Laterite. The term plinthite is usually employed by soil scientists to refer to a well-defined zone of iron oxides enrichment in the soil profile. There are various permutations of definitions in soil classification systems.

SAHRA: South African Heritage Resources Agency – the compliance authority, which protects national heritage.

Stone Age: The earliest technological period in human culture when tools were made of stone, wood, bone or horn. Metal was unknown.

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## GEOLOGICAL TIME SCALE TERMS

ka: Thousand years or kilo-annum ( $10^3$  years). Implicitly means “ka ago” *i.e.* duration from the present, but “ago” is omitted. The “Present” refers to 1950 AD. Generally not used for durations not extending from the Present. Sometimes “kyr” is used instead.

Ma: Millions years, mega-annum ( $10^6$  years). Implicitly means “Ma ago” *i.e.* duration from the present, but “ago” is omitted. The “Present” refers to 1950 AD. Generally not used for durations not extending from the Present.

Holocene: The most recent geological epoch commencing 11.7 ka till the present.

Pleistocene: Epoch from 2.6 Ma to 11.7 ka. Late Pleistocene 11.7–126 ka. Middle Pleistocene 135–781 ka. Early Pleistocene 781–2588 ka (0.78-2.6.Ma).

**ICS-approved 2009 Quaternary (SQS/INQUA) proposal**

**C**

ERA	PERIOD	EPOCH & SUBEPOCH	AGE	AGE (Ma)	GSSP	
<b>CENOZOIC</b>	<b>QUATERNARY</b>	<b>HOLOCENE</b>				
		<b>PLEISTOCENE</b>	Late	'Tarantian'	0.012	Vrica, Calabria Monte San Nicola, Sicily
			M	'Ionian'	0.126	
			Early	Calabrian	0.781	
			Gelasian	1.806		
			Piacenzian	2.588		
			Zanclean	3.600		
			5.332			
	<b>Ng</b>	<b>PLIOCENE</b>				

Quaternary: The current Period, from 2.6 Ma to the present, in the Cenozoic Era. The Quaternary includes both the Pleistocene and Holocene epochs. The terms early, middle or late in reference to the Quaternary should only be used with lower case letters because these divisions are informal and have no status as divisions of the term Quaternary. The sub-divisions 'Early', 'Middle' or 'Late' apply only to the word Pleistocene. As used herein, early and middle Quaternary correspond with the Pleistocene divisions, but late Quaternary includes the Late Pleistocene and the Holocene.

Pliocene: Epoch from 5.3-2.6 Ma.

Miocene: Epoch from 23-5 Ma.

Oligocene: Epoch from 34-23 Ma.

Eocene: Epoch from 56-34 Ma.

Paleocene: Epoch from 65-56 Ma.

Cenozoic: Era from 65 Ma to the present. Includes Paleocene to Holocene epochs.

Cretaceous: Period in the Mesozoic Era, 145-65 Ma.

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# APPENDIX 1

Our Ref: HM/EDEN/BITOU/PLETTENBERG BAY/BRAKKLOOF 443/PTNS 59, 62 & 63

Enquiries Andrew Hall  
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Unique ID: 1280  
Unique Case ID: 1138



## Case Status: Assessment Stage

01 March 2011

Mr Dupre Lombaard  
Calidris Development Management Services (Pty) L  
PO Box 1201  
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6600

AIA: PROPOSED DEVELOPMENT OF PTNS 59, 62 & 63, BRAKKLOOF, PLETTENBERG BAY, BITOU, EDEN

The above matter was discussed at the Heritage Western Cape Archaeology, Palaeontology and Meteorites (APM) Permit Committee meeting held on 01/03/2011. In terms of section 35(4) of the National Heritage Resources Act (Act 25 of 1999):

It was noted that:

1. M. Leslie and J. Lavin met with J. Kaplan at Brakkloof for a site visit on 21 February 2011.
2. A site report was presented by M. Leslie.
3. An ESA specialist should investigate the site in terms of integrity of the ESA site.
4. The area outlined as having heritage significance by J. Kaplan may need to be extended. It does not fall within the development footprint as communicated to us.
5. There is evidence of amateur archaeological collection of ESA artefacts from the site.
6. We are awaiting an HIA from H. Aikman.

It was agreed that:

1. Dr D. Roberts will investigate the site in terms of geology. Dr. J. Almond indicated that we specifically require comment with regard to the status of the Brakkloof formation and whether there is a need to conserve a type section.
2. Mr W. Archer is prepared to investigate the site in terms of ESA archaeology
3. The site outlined as having heritage significance should be fenced off.
4. The southern area is sensitive and we are awaiting more information in order to determine how extensive this heritage sensitive area is.
5. Further mitigatory measures may be required upon receipt of this information.
6. A Final Comment will be issued on receipt of the HIA.

## APPENDIX 2

Our Ref: HM\EDEN\BITOU\PLETTENBERG BAY/BRAKKLOOF 443\  
PTNS 59, 62 & 63

Tracking No: 110801JL08  
Case ID: 1136  
Unique Letter ID: 1438  
Enquiries: Jenna Lavin  
Tel: 021 483 9685  
E-mail: [jlavin@pgwc.gov.za](mailto:jlavin@pgwc.gov.za)



7 September 2011  
Mr H. Aikman  
Aikman Associates  
PO Box 140  
Tulbagh  
6820

### RESPONSE TO NID

#### NID: PROPOSED DEVELOPMENT OF PTNS 59, 62 & 63 ON ERF 443, BRAKKLOOF, PLETTENBERG BAY, BITOU, EDEN

The above matter was discussed at the Heritage Western Cape staff meeting held on 2 September 2011. In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999):

It was noted that:

1. An AIA by J. Kaplan was seen by HWC in July 2010 and a site visit was conducted in Feb 2011
2. The proposed development consists of an integrated resort and residential neighbourhood, in 3 phases, each with its own character over 56ha in total
3. Several thousand Earlier Stone Age artefacts have been located on the property in addition to large numbers of Middle and Later Stone Age artefacts
4. The road along the northeast boundary of the site leads to the Robberg Peninsula and is of scenic significance

Heritage Western Cape (HWC) agreed that:

An HIA is required consisting of a visual impact assessment providing direction on appropriate landscape architectural design, a palaeontological assessment in terms of impact to the Brakkloof formation as well as an archaeological impact assessment to be conducted by a Early Stone Age specialist.

Yours faithfully

Andrew Hall  
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## APPENDIX 3

Our Ref: HMEDEMBITOU\PLETTENBERG BAY\BRAKKLOOF 443\PTNS 59, 62 & 63

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Date: 22 March 2012  
Case No: 110718JL20  
Auto IDs: 1136 - 1773



### INTERIM COMMENT

In terms of section 38(8) of the National Heritage Resources Act (Act 25 of 1999)  
and the Western Cape Provincial Gazette 6061, Notice 298 of 2003

**Attention:** Mr Henry Aikman  
Aikman Associates  
PO Box 140  
Tulbagh  
6820

**CASE NUMBER:** 110718JL20

**HIA: PROPOSED DEVELOPMENT OF PTNS 59, 62 & 63, BRAKKLOOF, PLETTENBERG BAY, BITOU, EDEN**

The matter above has reference.

Heritage Western Cape is in receipt of your correspondence on the above matter, dated 29 February 2012.

1. The application is to develop the property for housing. Three potential development clusters are proposed with the balance of the property consisting of conservation corridors
2. The proposed development is consistent with the Bitou SDF and the Plettenberg Bay USP
3. The site is in the vicinity of Robberg Nature Reserve (Nelson Bay Cave and Robberg Cave)

### INTERIM COMMENT

The Committee does not support the proposal, in its current forms, and requires that an amended site layout be designed and assessed by both visual and heritage practitioners and that a final heritage impact assessment report be submitted to HWC.

However, given the very considerable significance of the Earlier Stone Age (ESA) archaeological deposits, before any further work, urban design or assessment is carried out, a full archaeological test-excavation programme must be undertaken in collaboration with HWC. This must establish the extent and nature of the ESA deposits and determine if they are in situ; undertake a density assessment, necessary sampling and analysis; and establish what area of the site must be protected, or mitigated, and what the buffer zones should be, so as to inform future management planning. This must be done in collaboration with Dr John Pether and Dr Dave Roberts to establish the geological parameters, the age of the ESA deposits and the possibility of OSL dating; and to assess the extent of the 'Brakkloof Formation' and the possible need for a Brakkloof Formation 'type section'.

An up-dated HIA report must be submitted to HWC for assessment.

## APPENDIX 4

Unit 1A. Ochric A horizon of modern soil. 40 centimeters thick, brown, slightly humic loam, which is slightly hard and has weakly developed columnar structure. Locally forms a discontinuously wavy-banded, colluvial wash with eolian components.

Unit 1B. Argillic B horizon of modern soil. 0-20 centimeters thick, brown to dark grayish brown, clay loam; 0.5 percent "free"  $\text{Fe}_2\text{O}_3$ . Slightly hard, with strong very coarse prismatic structure and humic skins on the ped faces. This is an older clay wash, subjected to considerable clay illuviation.

Where no plinthite horizon is preserved, Unit 1A or 1B overlies:

Unit 2. Primary clay wash. 75 centimeters thick, strong to yellowish brown, sandy clay loam and clay; 5.6 percent "free"  $\text{Fe}_2\text{O}_3$ . Slightly hard, with strong, coarse prismatic structure; in addition, the clayey facies has slickensides and clay skins. The top 20 centimeters have been altered by later illuviation and have dark reddish to very dark grayish brown (5YR-10YR 2/1.5-2) or dark gray (10YR 4/1) humic films on ped faces; this zone contains occasional Acheulian artifacts.

Where a plinthite horizon is preserved, Unit 1A or 1B overlies:

Unit 3A. Primary plinthite horizon. 90-130 centimeters thick, red or reddish brown, sandy clay, sandy loam, or sandy clay loam as a matrix to very hard pebble-grade, reddish yellow (7.5YR 6-7/6-8) plinthite nodules. In general, this horizon has been secondarily humified, attaining a grayish brown (10YR 4.5/2) to brown (7.5YR 4/2) color. In most areas the capping plinthite horizon is an autochthonous development, but colluvially reworked areas also exist.

Locally developed beneath a section of colluvially derived plinthite nodules is:

Unit 3B. 0-20 centimeters thick, dark brown, sandy clay loam. Slightly hard, with evidence of discontinuous bedding and humate darkening of ped faces and rootlet hollows; includes Acheulian artifacts. The transition to Unit 4 is smooth and gradual.

Below both Units 2 and 3 are Units 4 through 17:

Unit 4. Primary mottled horizon. 110-220 centimeters thick, reddish yellow, yellowish brown, yellow, red, or light gray, sandy clay loam or clay; 1.7 percent "free"  $\text{Fe}_2\text{O}_3$ . Slightly hard, with moderate, prismatic structure, and extensively mottled. In better-drained areas, this unit grades laterally and downward into 120 centimeters of yellow sandy loam, with 0.8 percent "free"  $\text{Fe}_2\text{O}_3$ , which is slightly hard, with mottling or reddish yellow (7.5YR 6/7), very pale brown (10YR 7/4), and red (2.5YR 5/6). The transition to Unit 5 is smooth and diffuse.

Unit 5. Primary pallid horizon. 170-190 centimeters thick, light gray, sandy clay; 0.2 percent "free"  $\text{Fe}_2\text{O}_3$ . Slightly hard, with very coarse platy structure. The upper 70 centimeters have widespread, light yellowish brown to red (10YR 6/4, 2.5YR) mottling, and the lower 100 centimeters have weak, diffuse yellow or brownish yellow (10YR) mottling. The transition to Unit 6 is wavy and clear.

Unit 6. Second plinthite horizon. 20 centimeters thick, red (7.5R 4-5/6, 10R 5/7), weak red (7.5R 4/2), or strong brown (7.5YR 5/6), sandy clay loam; 1.8 percent

- "free"  $\text{Fe}_2\text{O}_3$ . Hard to very hard, forming a jagged, eroded surface within the gully. The transition to Unit 7 is smooth and gradual.
- Unit 7. Second mottled horizon. 30-50 centimeters thick, reddish yellow, sandy clay loam; 1.7 percent to 4.8 percent "free"  $\text{Fe}_2\text{O}_3$ . Slightly hard, with red (2.5YR 5/6) and weak red (10R 4/4) mottling. Grading downward, the color becomes brownish yellow. The transition to Unit 8 is smooth and diffuse.
- Unit 8. Second pallid horizon. 200 centimeters thick, very pale brown to white or light gray, sandy clay loam; 0.6 percent "free"  $\text{Fe}_2\text{O}_3$ . Slightly hard, with weak prismatic structure and intensive, brownish yellow mottling of the exterior of the ped faces. The transition to Unit 9 is gradual.
- Unit 9. Third plinthite horizon. 20 centimeters thick, same as Unit 6.
- Unit 10. Third mottled horizon. 40 centimeters thick, same as Unit 7.
- Unit 11. Third pallid horizon. 30 centimeters thick, same as Unit 8.
- Unit 12. Fourth plinthite horizon. 30 centimeters thick, brownish yellow, sandy loam. Slightly hard, with wavy bands of red (2.5YR 5/6) and white mottles. The transition to Unit 13 is smooth and clear.
- Unit 13. Fourth pallid horizon. 50 centimeters thick, brownish yellow, sandy clay loam. Slightly hard, with light gray (10YR 7/2) mottling. The transition to Unit 14 is smooth and clear.
- Unit 14. Fifth plinthite horizon. 75 centimeters thick, brownish yellow to red, sandy clay loam. Slightly hard, with fine white (10YR) mottling. The transition to Unit 15 is smooth and clear.
- Unit 15. Fifth pallid horizon. 130 centimeters thick, pinkish gray, sandy loam. Slightly hard, with reddish yellow (7.5YR) mottling. The transition to Unit 16 is irregular and diffuse.
- Unit 16. Basal debris. 45-60 centimeters thick, light gray grading downward to white, silty clay loam. Slightly hard. Serves as matrix to cobble-grade gravel of subrounded to rounded sandstone and quartzite, representing a beach remnant on a wave-cut platform.
- Unit 17. Bedrock. White (10YR 8/1) homogenous, intensively weathered, medium-grade sandstone (Cretaceous, Uitenhage Series).