# ARCHAEOLOGICAL MITIGATION OF ARTEFACT SCATTERS ON ZWART BOOIS BERG ANNEX 475, KAKAMAS, NORTHERN CAPE

(Mitigation conducted under SAHRA collection permit No. 9/2/032/0001)

Prepared for

**AURECON SOUTH AFRICA (PTY) LTD**
1 Century City Drive
Waterford Precinct
Century City
7441

on behalf of
**KAKAMAS HYDRO ELECTRIC POWER (PTY) LTD**

17 January 2013

Prepared by

**Jayson Orton, Wesley Flear & Lita Webley**

**ACO Associates cc**
8 Jacob's Ladder
St James
7945

Phone (021) 706 4104
Fax (086) 603 7195
Email: Jayson.Orton@aco-associates.com

# EXECUTIVE SUMMARY


ACO Associates cc was requested by Aurecon South Africa (Pty) Ltd to conduct mitigation work for a proposed hydro electric power station that is to be constructed on the north bank of the Orange River approximately 11.5 km east of Kakamas, Northern Cape. The artefacts were on a gravel pavement some 170 m from the north bank of the Orange River in a very deflated area where bedrock protruded in places. Although three scatters were originally documented, one (ZBBA2) was too far from the development footprint and too ephemeral to merit sampling.

The other two (ZBBA1 & ZBBA3) were sampled on a single grid of 25 $m^2$ squares and the artefacts were collected by hand from the surface over a total area of 925 $m^2$. Two square meters were sieved to check for subsurface artefacts but only the very smallest artefacts obscured by the gravels were recovered. Sieving was not deemed beneficial and was discontinued.

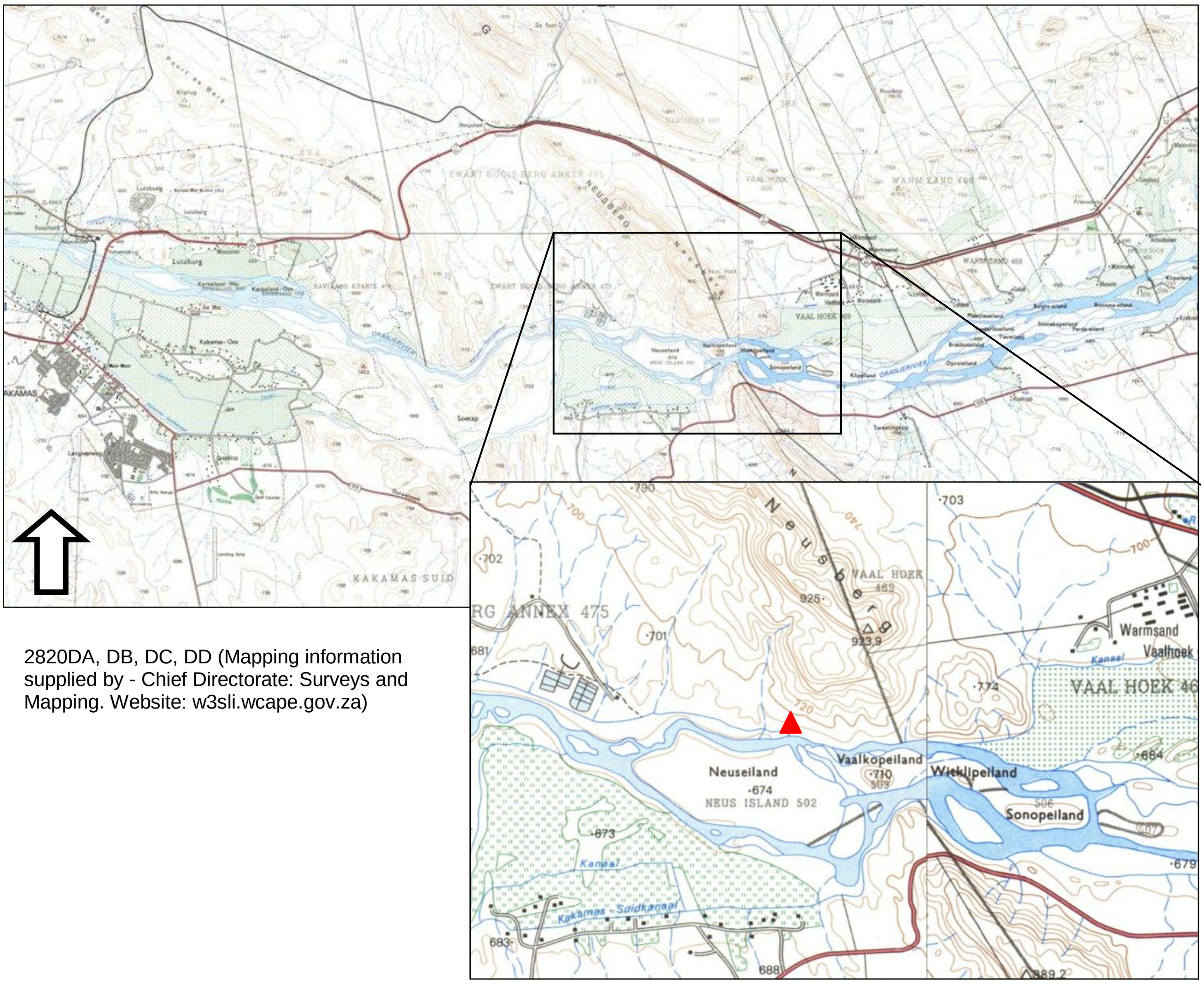
Altogether 559 artefacts were collected. The majority were in banded ironstone (75%) but silcrete, quartzite, hornfels and quartz were also present. Most artefacts were patinated to varying degrees indicating great age and also that they have been subjected to the influence of water during their history. Cores were very common, only slightly less so than whole flakes. Many cores were single platform and chopper types, which are generally indicative of the Oldowan period of the Early Stone Age. The remaining cores found were of the Levallois types. Although these cores can occur during the Acheulean period of the Early Stone Age, the absence of cleavers and hand axes from the collection suggests that they are more likely an indication of Middle Stone Age technology. A number of cobble artefacts showed only one or two flake scars. These are likely to indicate testing of cobbles to check for flaws. Retouched flakes were also present, although at times these were difficult to identify due to the large amount of edge-damage that many artefacts had sustained, either from use or through natural causes.

The mitigation of these artefact scatters is now deemed to be complete and the proposed development may proceed with no further heritage involvement required. It is recommended, however, that the developers attempt to keep the construction corridor as narrow as possible in order to prevent disturbance of archaeological material located further away from the development footprint. An area extending some 20 m north of the proposed canal is likely to be suitable in this regard.

## Contents

# 1. INTRODUCTION

ACO Associates cc was requested by Aurecon South Africa (Pty) Ltd to conduct mitigation work for a proposed hydro electric power station that is to be constructed on the north bank of the Orange River approximately 11.5 km east of Kakamas in the Northern Cape Province (Figure 1). The scatters were originally documented by Morris (2010) who assessed various alternatives for the proposed development.




2820DA, DB, DC, DD (Mapping information supplied by - Chief Directorate: Surveys and Mapping. Website: w3sli.wcape.gov.za)

**Figure 1:** Map showing the location of the mitigated stone artefact scatters. Kakamas is at the left side of the main map.

Three areas of artefact concentration were recorded by Morris (2010). For the purposes of mitigation they were named with an acronym after the farm on which they occur as follows:

- ZBBA1: 28°46'1.81"S 20°44'14.46"E
- ZBBA2: 28°46'0.88"S 20°44'19.18"E
- ZBBA3: 28°46'1.92"S 20°44'12.98"E

Figure 2 shows an aerial view of the project area and the locations of the three artefact scatters and Figure 3 a close-up.

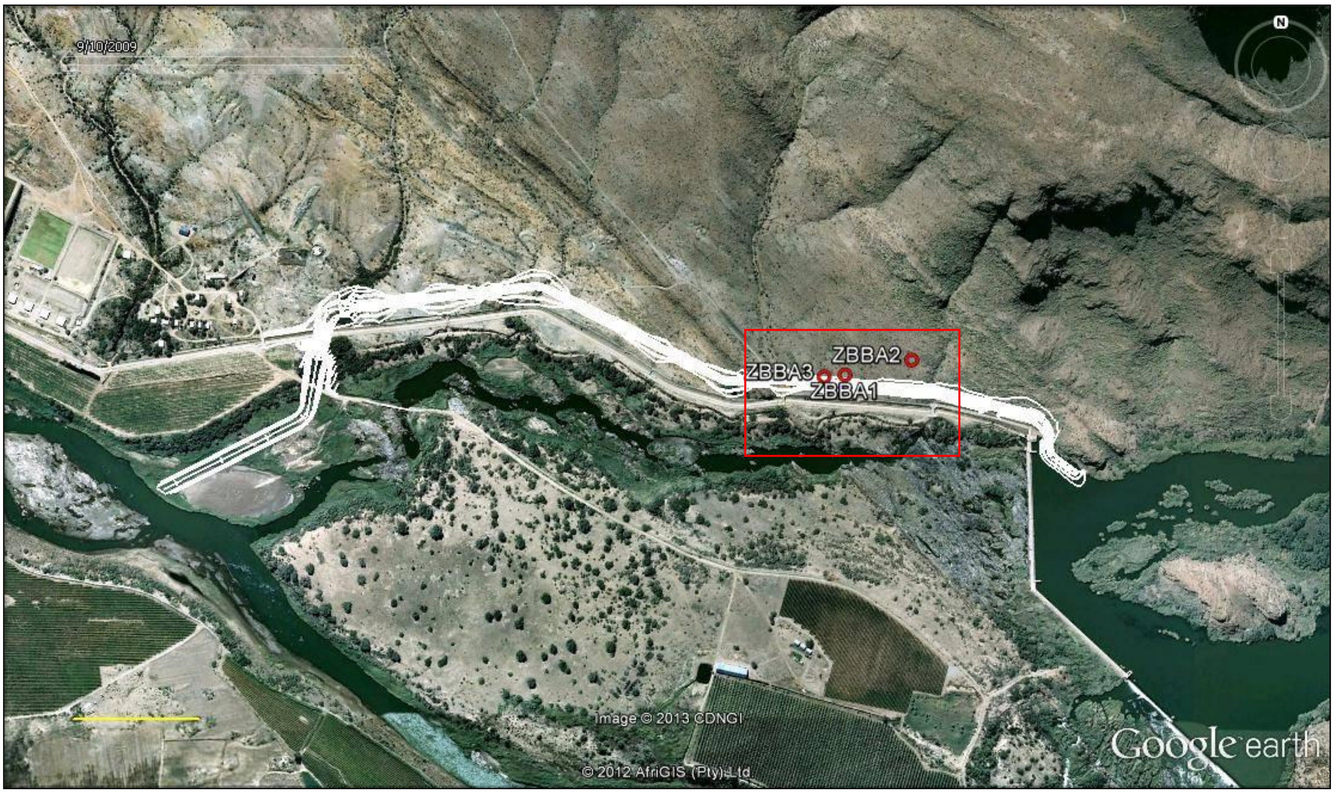



**Figure 2:** Aerial view of the project area showing the development footprint (white lines) and the three artefact scatters recorded by Morris (2010, red labelled circles). The yellow bar for scale at lower left is 250 m long. The boxed area is enlarged in Figure 3.


**Figure 3:** Aerial view of the boxed area in Figure 2. ZBBA1 & ZBBA3 will be impacted but ZBBA2 is away from the proposed development. The yellow bar for scale at lower left is 50 m long.

### 1.1. Terms of reference

Morris (2010) recommended collection of any scatters that would be impacted by the development. Two of the three points he identified would be directly impacted. The South African Heritage Resources Agency issued a comment on the initial report supporting the recommendations. As such, ACO Associates cc were appointed to conduct the mitigation and ensure that, from a heritage point of view, the site was cleared for development to begin.

## 2. METHODS

### 2.1. Field sampling

The area around ZBBA1 and ZBBA3 was sampled, while ZBBA2 was omitted because (1) it seems to be far enough away from the proposed development that it will not be impacted and (2) on inspection by us we could not locate any area suitably dense enough to merit collection.

The sampled area was treated as a single site and a grid of 25 $m^2$ squares was laid out (Figure 4). Altogether there were 37 squares with a total sampled area of 925 $m^2$. A small dry water course ran through the western part of the site in the ‘7’ and ‘8’ columns, while a disturbed area occupied the ‘12’ and ‘13’ columns. The latter were not excavated. The grid was only extended when the numbers of artefacts available for collection were deemed sufficient. In all, 559 flaked stone artefacts were collected providing an overall density of 0.60 artefacts per square meter.

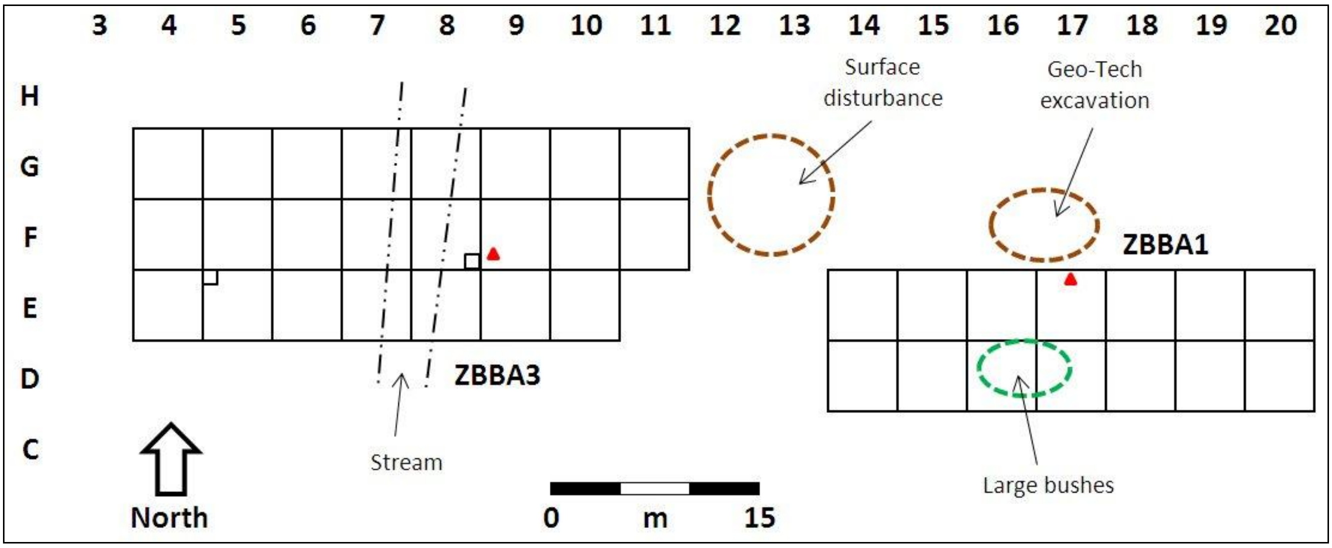



**Figure 4:** Grid layout at ZBBA3 & ZBBA1. The Orange River lies to the south of the grid about 150 m away and uphill is generally towards the northeast.

Given the surface appearance of the site, a decision was made to collect artefacts by hand without sieving. In order to check that this decision was justified, two 1 $m^2$ squares were excavated below surface level and sieved. These came from E5 and F8 as shown in Figure 4 and yielded vast quantities of gravel and extremely few artefacts (3 and 10 respectively). This decision is thus deemed to have been the appropriate one.

### 2.2. Laboratory analysis

Since the archaeologists conducting the field work (JO and LW) were both Later Stone Age specialists, the third author (WF) was invited to conduct the analysis reflected in Section 4 of this report. He is a graduate student at the University of Cape Town and has studied lithic assemblages dating to the Middle and Early Stone Ages. The analysis was done at the University of Cape Town.

# 3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The artefact scatter was found to occur on a dense gravel pavement with occasional small outcrops of bedrock protruding from the surface (Figures 5 to 7). The gravel was composed of two primary components: (1) small slabs of country rock that are the product of erosion of the earth's surface and (2) pebbles of banded ironstone that are obviously of fluvial origin. The pebbles may relate to a phase when the Orange River was much larger and covered this area or they may be eroding out of another younger rock unit. Bushes were present in places but only once did a large bush prevent access to the ground surface within the grid area (see Figure 4). The scatter occurs on a gently sloping area at the foot of a hill and about 150 m north of a small branch of the Orange River (Figure 8). The main channel is a further 700 m to the south. The river bank in this area is very steep and generally quite bushy, but the construction of two canals has disrupted the natural appearance of the bank (see Figure 3).

**Figure 5:** View towards the east from square F4.

**Figure 6:** View towards the east from square E14. The geotechnical excavation is visible to the right.

**Figure 7:** View of the ground surface in square F5 showing the gravel there. The scale bar is in 10 cm intervals.

**Figure 8:** View towards the east from the south side of the small branch of the river that flows past the site. The red oval indicates the approximate position of the site.

# 4. ANALYSIS

## 4.1. Assemblage Composition

A total of 559 lithic artefacts was recovered from the sample area. Raw materials included chert, banded ironstone, hornfels, quartz, quartzite and silcrete. Initially, chert and ironstone artefacts were separated, but it became clear that the chert was derived from the banded ironstone. It is common to find banded Ironstone formations with amorphous silica rich layers such as chert (Harnmeijer 2003). It is for this reason that these two raw materials are counted together as banded ironstone. By doing this the banded ironstone formation then accounts for 75% (Figure 8) of the raw materials recovered with 418 artefacts. Silcrete accounts for 9% with 48 artefacts, quartzite is 7% with 41 artefacts, hornfels accounts for 6% of the artefacts with 34 pieces and quartz represents only 3% of the assemblage with 18 artefacts.

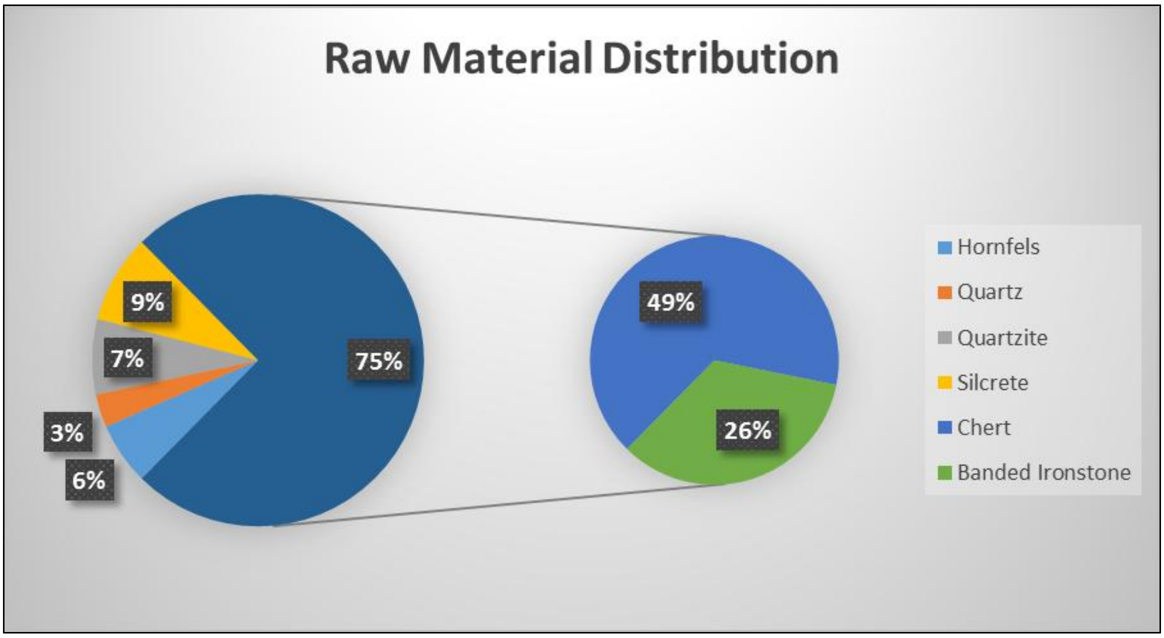



**Figure 8:** Percentages of raw materials.

Artefacts were classified as either whole flakes or cores. Angular fragments as well as split or snapped flakes were not classified in order to avoid counting parts of a single flake as multiple flakes. Figure 9 shows the numbers of artefacts classified as either whole flake or core and it also reflects the number of retouched pieces. Flakes have been defined as a piece of rock removed from a core either by percussion or pressure (Andrefsky 2005). Cores have been defined as the rock being reduced by the removal of flakes (Andrefsy 2005).

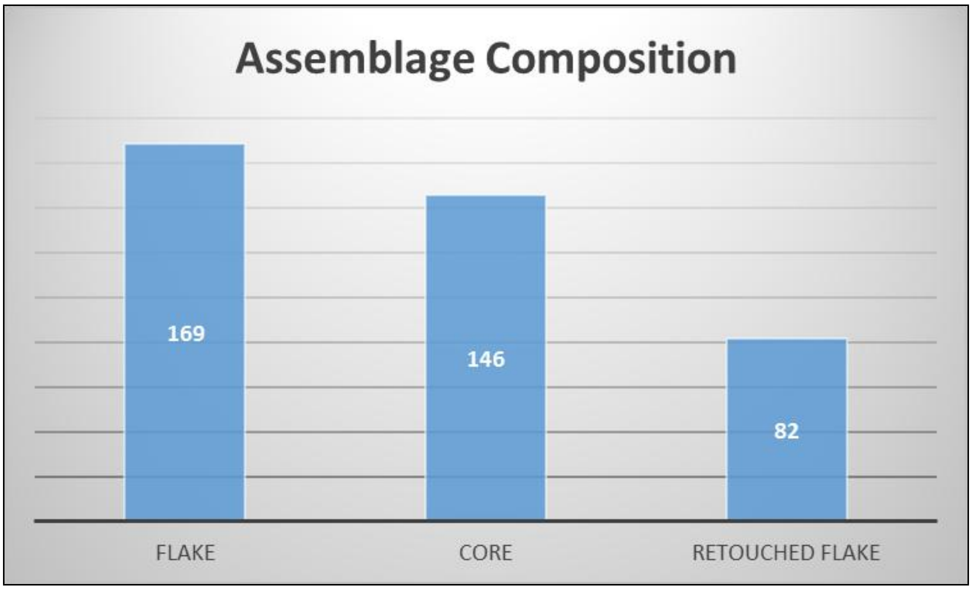



**Figure 8:** Assemblage composition at ZBBA.

Nearly a third (30.2%) of the total collection is comprised of whole flakes while just over a quarter (26.1%) of the collection was classified as cores; 48.5% of the whole flakes had signs of retouch along their margins.

A total of 28 Levallois cores were recovered, some examples can be seen in Figure 9. Levallois technology is a way in which to reduce a core whereby predetermined flakes are produced through the prior shaping of the core surface (Inizan *et al.* 1999; Van Peer 1992). Platform cores and chopper-cores were also recovered, indicating an Early Stone Age component to the site as well (Figure 10).

**Figure 9:** Some Levallois cores from ZBBA. Scale in 1 cm intervals.

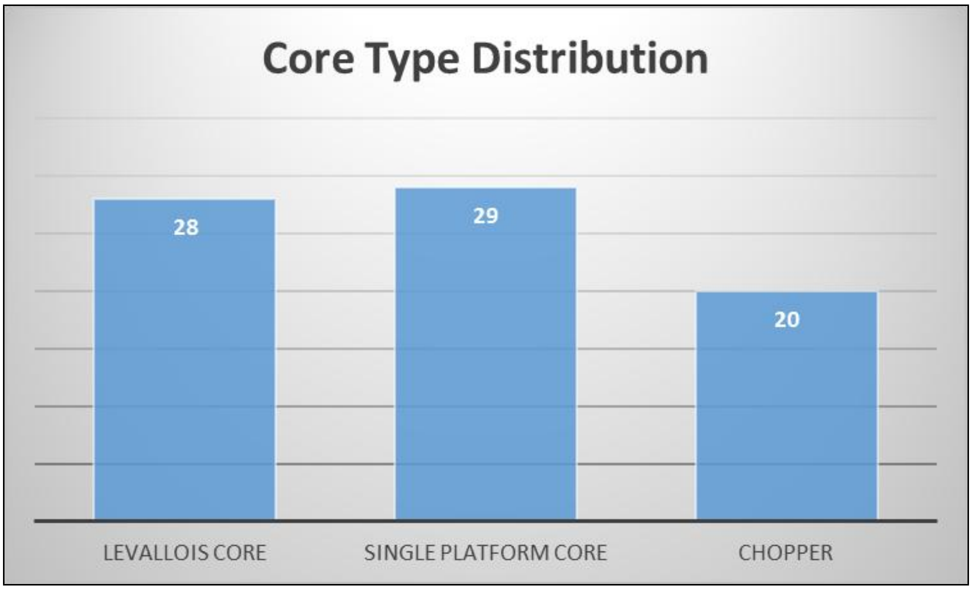



**Figure 10:** Proportion of core types present at ZBBA.

### 4.2. Taphonomy

Most artefacts were affected by weathering (Figure 11). The two most prevalent types of weathering were gloss patina and riverine cortex Gloss patina can be caused by two processes: it can either be caused by the absorption of dissolved silica from the surrounding *in situ* environment, or by the dissolving and then re-precipitation of siliceous material of the artefact surface (Howard 2002). River patina is an intense lustre on an artefacts' surface, created indirectly by abrasion as a result of contact with water-borne materials travelling through the water, and water-flow tumbling of an artefact. The chemical process of dissolution of an artefacts' surface is more directly responsible for the development of river patina (Howard 1999).

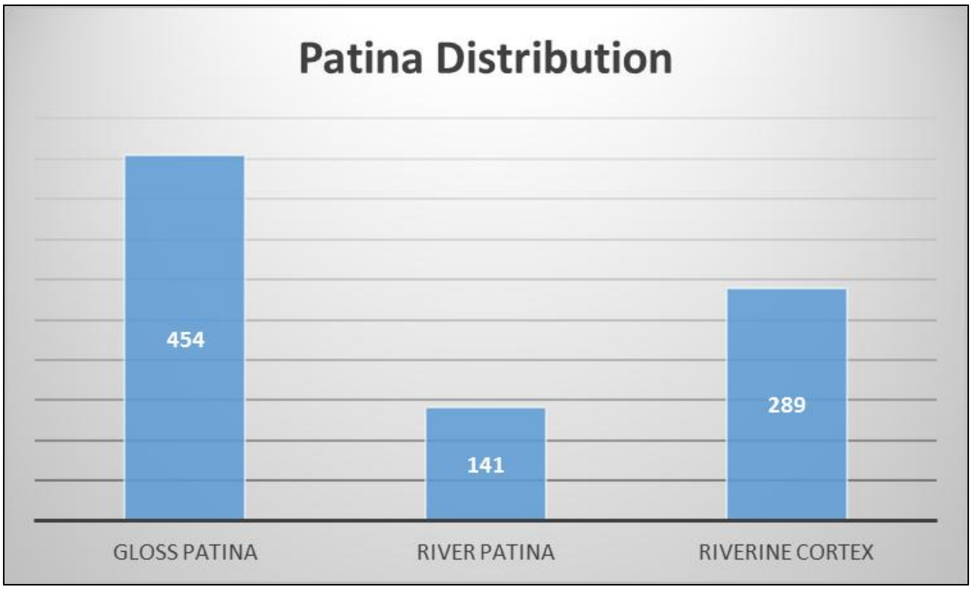



**Figure 11:** Numbers of artefacts with gloss patina, river patina and riverine cortex at ZBBA.

The presence or absence of river patina was also recorded on artefacts which exhibited signs of exploitation after the formation of the river patina. As river patina forms on any siliceous rocks from a river, this would allow us to determine whether or not the raw material was sourced from the river or not. For ease of reference, this was recorded as riverine cortex. In this case riverine cortex differs from river patina in the sense that river patina is formed on already-made artefacts and distorts the features of the artefacts, due to the abrasion the artefact suffers.

It is important to note that multiple patinas and types of patinas can exist on the same artefact (Howard 2002). Either due to different stages in the formation of the patina, or due to different formation processes. A cobble from a river with river patina can be used, discarded and then develop gloss patina (Plate 2).

**Figure 12:** Levallois core with invasive flaking, river patina in the central area with the characteristic lustre of gloss patina on the flake scars. Scale in 1 cm intervals.

Over 80% of artefacts in this collection were affected by weathering in some form (Figure 11). Although gloss patina (Howard 2002; Howard 1994; Stapert 1976) is the most prevalent form of surface modification, river patina (Howard 1999) affects 25% of all artefacts. Clearly indicating that a large portion of the sampled area either had a large amount of water moving though for a prolonged period of time, or these artefacts were secondarily deposited. As only 25% of the material is affected, the latter is more likely.

Nearly 52% of the artefacts had signs of riverine cortex indicating that the raw material used to make the artefact was sourced from a river; in this case it is assumed that either the Orange River once covered the lower slopes of the hill leaving the pebbles behind or that the pebbles are eroding from a parent rock.

None of the quartz artefacts recovered displayed any signs of weathering and this can be explained in one of two ways. Perhaps the quartz is very durable and so is resistant to the weathering. While this may explain the absence of gloss patina, it is unlikely to account for the absence of evidence for river patina which would almost certainly develop had the artefacts been fluvially reworked. The alternative is that the quartz artefacts are from a younger time period. Honea (1964) stated that, broadly speaking, artefacts that are more affected by patination are older, while artefacts with little or no patination are relatively younger. Relative to each other, the patination on the Levallois artefacts and chopper-cores appear to be no different, suggesting that these two are broadly contemporaneous; this is, however, very unlikely. A possible explanation for this is that the raw materials for both are derived from a river system, both chopper-cores and Levallois cores are made from riverine pebbles or cobbles. This explains the intense riverine cortex found on both types of artefact. The gloss patina formation is in an advanced stage, both Levallois and chopper-cores have an intense lustre. The amount of lustre becomes difficult to quantify if both artefacts are at such an advanced stage. As Honea (1964) states, they are relatively much older than everything else.

The presence or absence of retouch was recorded but this was complicated by the extensive amounts of edge damage found on many of the pieces. For this reason, retouch was only recorded on artefacts where a clear initiation on the negative flake scar was present, and the retouch was systematic, such as multiple flake scars along a lateral margin. Edge damage can be caused by use (Tringham 1974) or mechanical action, such as trampling or movement through a river (Mcbrearty 1998). It was also recorded whether or not artefacts were smaller than 20mm, this was done in order to determine if any winnowing of the assemblage had taken place, 166 artefacts smaller than 20mm were recorded. This, combined with the low number of flakes relative to cores (Figure 8), suggests that some of the smaller elements of the assemblage have been removed, either during periods of raised Orange River levels, or through continual erosion from surface run-off.

### 4.3. Technology

Specific core types present included Levallois, single platform cores and chopper-cores. Chopper-cores (Figure 13) are artefacts that are made on rolled pebbles or cobbles, with a number of either unifacial or bifacial flake removals, leaving a large portion of the cortex intact (Kuman 1996). Chopper and platform cores form an important part of Oldowan technology in the Early Stone Age (Kuman 1996).

**Figure 13:** Examples of the chopper-cores from ZBBA.

The Levallois cores are all made on the banded ironstone, with the exception of two that are made on hornfels. The Levallois pieces were also all made from river derived cobbles with a hierarchical flaking pattern as is typical of Levallois technology. The presence of these artefacts would place the assemblage firmly in the Middle Stone Age (Kuman 2006; Clark, 1988). Prepared core technology has also been found in the Acheulean up to 500kya (Tryon 2006), but the absence of large cutting tools, such as handaxes and cleavers make it unlikely that the Levallois cores are this old. It is far more likely that these cores are from the Middle Stone Age period, beginning around 270kya and ending around 22kya (Reynolds *et al.* 2003). The Levallois cores are all tabular and aimed at producing flakes. There were also signs of cobble testing, with cobbles having one or two flake scars at one end (Figure 14). This is done in order to check the quality of the raw material as the riverine cortex can obscure flaws in the rock.

**Figure 14:** Riverine cobble with signs of testing.

# 5. CONCLUSIONS AND RECOMMENDATIONS

The mitigation has collected a good sample of the artefacts present in the study area. Locally sourced banded ironstone is by far the dominant material used in artefact manufacture here. Analysis reveals that many artefacts likely pertain to the Middle Stone Age; the Levallois cores are particularly telling in this regard. However, the presence of chopper cores and platform cores suggests an older component from the Early Stone Age. Occasional artefacts with very little patination on their surface may even be much younger. The surface patina on many of the older artefacts suggests that the site has been covered by water at times.

With a good record of the pre-colonial archaeology present at the site, there is no reason to require any further protection of it. The proposed development may thus proceed with no further heritage work required. Every effort should be made to keep the construction footprint as small as possible such that the disturbance corridor does not extend much beyond the planned construction area (an area of no more than 20 m north of the proposed canal edge is likely to be suitable). Further sensitive artefact scatters may be present further north but the above precaution would ensure that they are protected from harm.

# 6. REFERENCES


Andrefsky, W. 2005. Lithics: Macroscopic Approaches to Analysis. Cambridge: Cambridge University Press.

P.B. Beaumont, P.B., Vogel J.C. 2006. On a timescale for the past million years of human history in central South Africa. South African Journal of Science: 102 (B): 217-228.

Clark, J.D. 1988. The Middle Stone Age of East Africa and the beginnings of regional identity. Journal of World Prehistory 2: 235-305.

Clark, J.D. 2001. Variability in primary and secondary technologies of the Later Acheulian in Africa. In: Milliken, S. & Cook, J. (Eds.) A Very Remote Period Indeed: Papers on the Palaeolithic Presented to Derek Roe: 1-18. Oxford: Oxbow Books.

Harnmeijer, J.P. 2003. Banded Iron Formation: A Continuing Enigma of Geology. University of Washington.

Honea, K. 1964. The Patination of Stone Artifacts. Plains Anthropologist 9:14-17.

Howard, C.D. 2002. The Gloss Patination of Flint Artefacts. Plains Anthropologist 47: 283-287.

Howard, C.D. 1999. River Patina on Flint Artefacts: Features and Genesis. Plains Anthropologist 44: 293-295.

Howard, C.D. 1994. Natural Indicators of Lithic Artifact Authenticity. North American Archaeologist 15: 321-330.

Inizan, M.L., Reduron-Ballinger, M., Roche, H., & Tixier, J. 1999. Technology and Terminology of Knapped Stone. Préhistoire de la Pierre Taillée, Tome 5.*Nanterre. CREP*.

Kuman, K.  2001. An Acheulean factory site with prepared core technology near Taung, South Africa. South African Archaeological Bulletin 56: 8–22

Kuman, K. 1996. The Oldowan industry from Sterkfontein: raw materials and core forms. In: Pwiti, G. & Soper, R. (Eds.) Aspects of African Archaeology: Papers from the 10th Congress of the Panafrican Association for Prehistory and Related Studies: 139–146. Harare: University of Zimbabwe Press.

McBrearty, S. 1991. Recent research in western Kenya and its implications for the status of the Sangoan industry. In: Clark, J.D. (ed.) Cultural Beginnings. Approaches to understanding early hominid lifeways in the African savanna: 159-176. Bonn: Romish Germanisches Zentralmuseum.

McBrearty, S., Bishop, L., Plummer, T., Dewar, R., & Conard, N. 1998. Tools underfoot: Human trampling as an agent of lithic artifact edge modification. American Antiquity, 63 108-129.

McBrearty, S. 1991. Recent research in Western Kenya and its implications for the Status of the Sangoan industry. In: Clark, J.D. (Ed.) Cultural Beginnings, Dr. Rudolf Habelt GMBH, Bonn, pp. 159–176

McNabb, J. 2001. The shape of things to come: a speculative essay on the role of the Victoria West phenomenon at Canteen koppie, during the South African earlier stone age. In: Milliken, S. & Cook, J. (Eds.) A Very Remote Period Indeed: Papers on the Palaeolithic Presented to Derek Roe: 37–46. Oxford: Oxbow Books.

Morris, D. 2010. Heritage Impact Assessment of the proposed Hydropower station on the Orange River at Neus Island on the farm Zwartbooisberg, east of Kakamas, Northern Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. Kimberly: McGregor Museum.

Reynolds, S.C., Vogel, J.C., Clarke, R.J., & Kuman, K.A. 2003. Preliminary results of excavations at Lincoln Cave, Sterkfontein, South Africa. South African Journal of Sciience 99: 286–288.

Stapert, D. 1976. Some Natural Modifications on Flint in the Netherlands. Palaeohistoria 18: 7-41.

Tringham, R., Cooper, G., Odell, G., Voytek, B., & Whitman, A. (1974). Experimentation in the formation of edge damage: a new approach to lithic analysis. Journal of Field Archaeology 1: 171-196.

Tryon, C.A. 2006. ‘Early’ Middle Stone Age lithic technology of the Kapthurin Formation (Kenya). Current Anthropology 47: 367-375

Tryon, C.A., McBrearty, S., & Texier, P.J. 2005. Levallois lithic technology from the Kapthurin Formation, Kenya: Acheulian origin and Middle Stone Age diversity. African Archaeological Review 22: 199-229.

Van Peer, P. 1992. The Levallois Reduction Strategy. Madison: Prehistory Press.

Volman, T.P. 1984. Early prehistory of southern Africa. In: Klein, R.G. (Ed.): Southern African Prehistory and Paleoenvironments: 169–220. Rotterdam: A.A. Balkema.

# 7. INVESTIGATION TEAM

Fieldwork: J. Orton
L. Webley

Laboratory analysis: W. Flear