ARCHAEOLOGICAL MITIGATION AT THE TRONOX NAMAKWA SANDS MINE, VREDENDAL MAGISTERIAL DISTRICT, WESTERN CAPE

Required as per conditions of approved Environmental Management Plans.

HWC Case No.: 110804JB09M

Report for:

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17 April 2017

EXECUTIVE SUMMARY

1. **Site Name**

Tronox Namakwa Sands Mine, Brand-se-Baai. Mining areas as follows

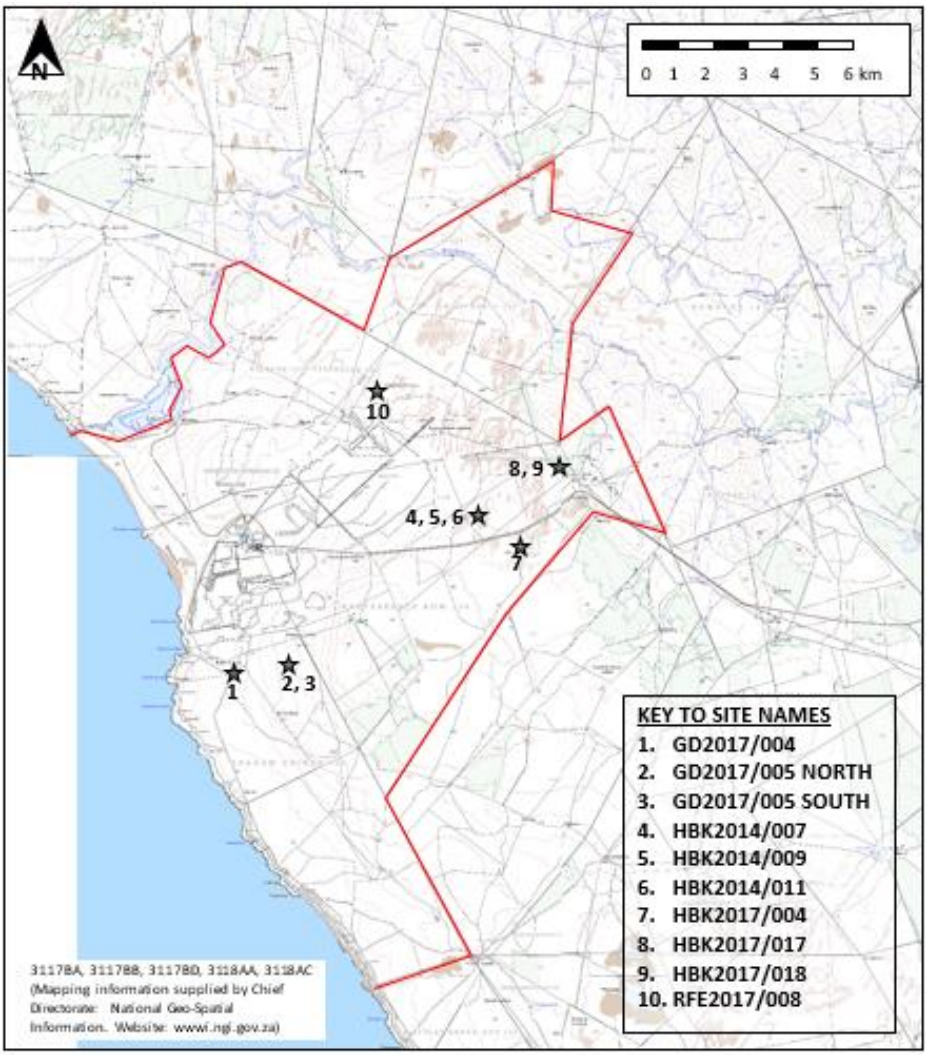
- 'NE of Die Kom' (mining area under approved 2012 EMP)
- 'Joetsie 2' (mining area under approved 2012 EMP)
- Soutpan 1 (mining area under approved 2002 EMP but new site found)
- West Mine (mining area under approved 2002 EMP but new sites found)

2. **Location** (Street address/farm name, town/district, erf number and GPS coordinates)

Graauw Duinen 152/1, Hartebeeste Kom 156/1, Hartebeeste Kom 156/2, Hartebeeste Kom 156/3. The mine is located 40 km northwest of Koekenaap within the Vredendal Magisterial District. Centre points for the mining areas are:

- S31° 18' 20" E17° 54' 30" (West Mine, central point between sampled sites)
- S31° 16' 22" E17° 58' 46" (NE of Die Kom, sampled site)
- S31° 15' 07" E18° 59' 46" (Joetsie 2, central point between sampled sites)

3. **Locality Plan**



Locations of sites sampled as part of this mitigation project.

4. Description of Proposed Development

Open-cast mining of heavy minerals takes place by stripping and stockpiling topsoil, removing the underlying sand which is then processed to remove the heavy minerals. The unwanted tailings are returned to the mine void for backfilling. Once the surface is appropriately sloped, the topsoil is replaced for re-vegetation of the area to commence.

5. Heritage Resources Identified

The sampled sites include three Early Stone Age (ESA) sites and seven Later Stone Age (LSA) sites. All can be described as artefact scatters, although some of the LSA sites also include scatters of shell in varying densities. A significant component of the ESA collections was the many hand-axes recovered. These allow an excellent opportunity to study this artefact type – only two other locations in western South Africa have produced large numbers of hand-axes. The LSA sites will contribute to a better understanding of the region's recent prehistory but will need to be considered within the framework of a wider study.

6. Anticipated Impacts on Heritage Resources

The remains of the sites would be completely destroyed by mining.

7. Recommendations

The following recommendations are made:

- Mining should be allowed to proceed in the mining areas referred to as 'NE of De Kom' and 'Joetsie 2';
- The three currently protected sites in the 'Langlaagte' mining area may be mined;
- The single site in the 'Soutpan 2' mining area may be mined;
- The three sampled sites in the West Mine may be mined;
- The environmental staff at the mine should walk the exposed hardpan areas in the West Mine to determine whether there are any other concentrations of ESA artefacts present. If present these should be recorded by an archaeologist who should make recommendations as to whether further study is required and the nature and extent of such study; and
- If any archaeological material or human burials are uncovered during the course of mining then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

8. Author and Date

Jayson Orton, ASHA Consulting (Pty) Ltd, 17 April 2017

Glossary

Background scatter: Artefacts whose spatial position is conditioned more by natural forces than by human agency.

Bifacial: An artefacts that was created by flaking both of its faces.

Cleaver: a bifacially flaked, sharp-edged tool type typical of the Early Stone Age.

Columella: The central part of a gastropod shell (e.g. snail shells).

Cretacious: A geological period beginning some 145 million years ago and ending around 66 million years ago.

Dorsal ridge: The lines running down the dorsal surface of a flake as a result of previous flake removals.

Dorsal surface: The older surface of a flake that was exposed prior to its removal from the core.

Early Stone Age: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

Haft: A handle – usually of wood or bone – into which a stone artefact was fastened.

Hand-axe: A bifacially flaked, pointed stone tool type typical of the Early Stone Age.

Holocene: The geological period spanning the last approximately 10-12 000 years.

Hominin: a smaller group consisting of modern humans, extinct species of humans and all their immediate ancestors.

Later Stone Age: Period of the Stone Age extending over the last approximately 20 000 years.

Middle Stone Age: Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

Pleistocene: The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

Retouch: Secondary flaking (retouch) is used to shape a flake into a 'formal tool'.

Unifacial: An artefacts that was created by flaking only one of its faces.

Ventral surface: The newly formed surface of a flake that results after it is detached from a core.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BAR: Basic Assessment Report

CRM: Cultural Resources Management

ECO: Environmental Control Officer

EIA: Environmental Impact Assessment

EMP: Environmental Management Plan

ESA: Early Stone Age

GPS: global positioning system

HIA: Heritage Impact Assessment

HWC: Heritage Western Cape

LSA: Later Stone Age

MSA: Middle Stone Age

NEMA: National Environmental Management Act (No. 107 of 1998)

NHRA: National Heritage Resources Act (No. 25) of 1999

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

Acknowledgements

Dr John Almond is thanked for discussion of the geology of the area and rock types represented within the Early Stone Age hand-axe collection.

Contents

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Tronox Mineral Sands (Pty) Ltd to carry out an archaeological mitigation program at their Namakwa Sands Mine located at Brand-se-Baai in southern Namaqualand, Vredendal Magisterial District (Figures 1 & 2). The mitigation was required following a survey that was undertaken as part of the requirements of an approved Environmental Management Plan (EMP).

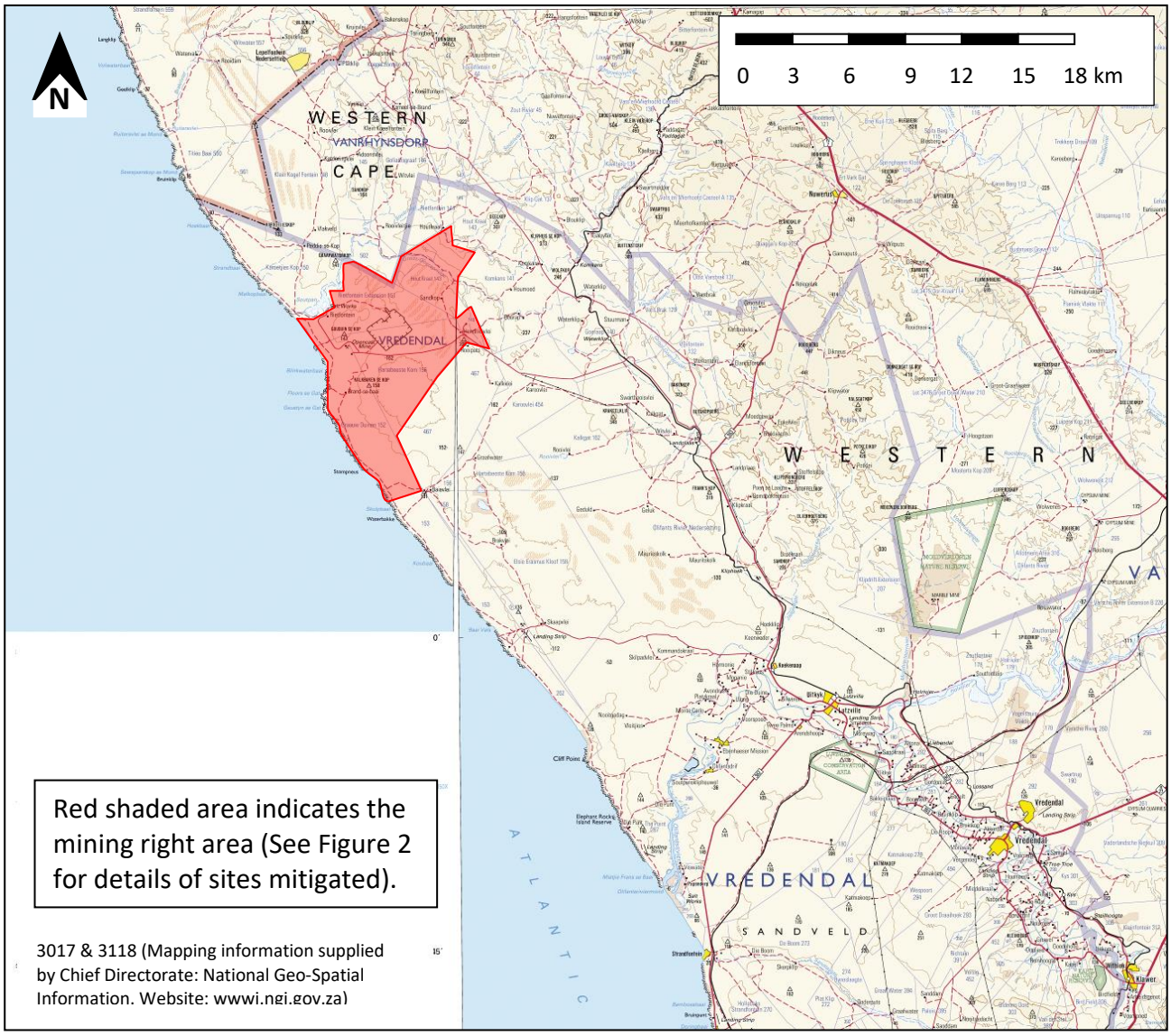


Figure 1: *Map showing the location of the Namakwa Sands Mine in southern Namaqualand.*

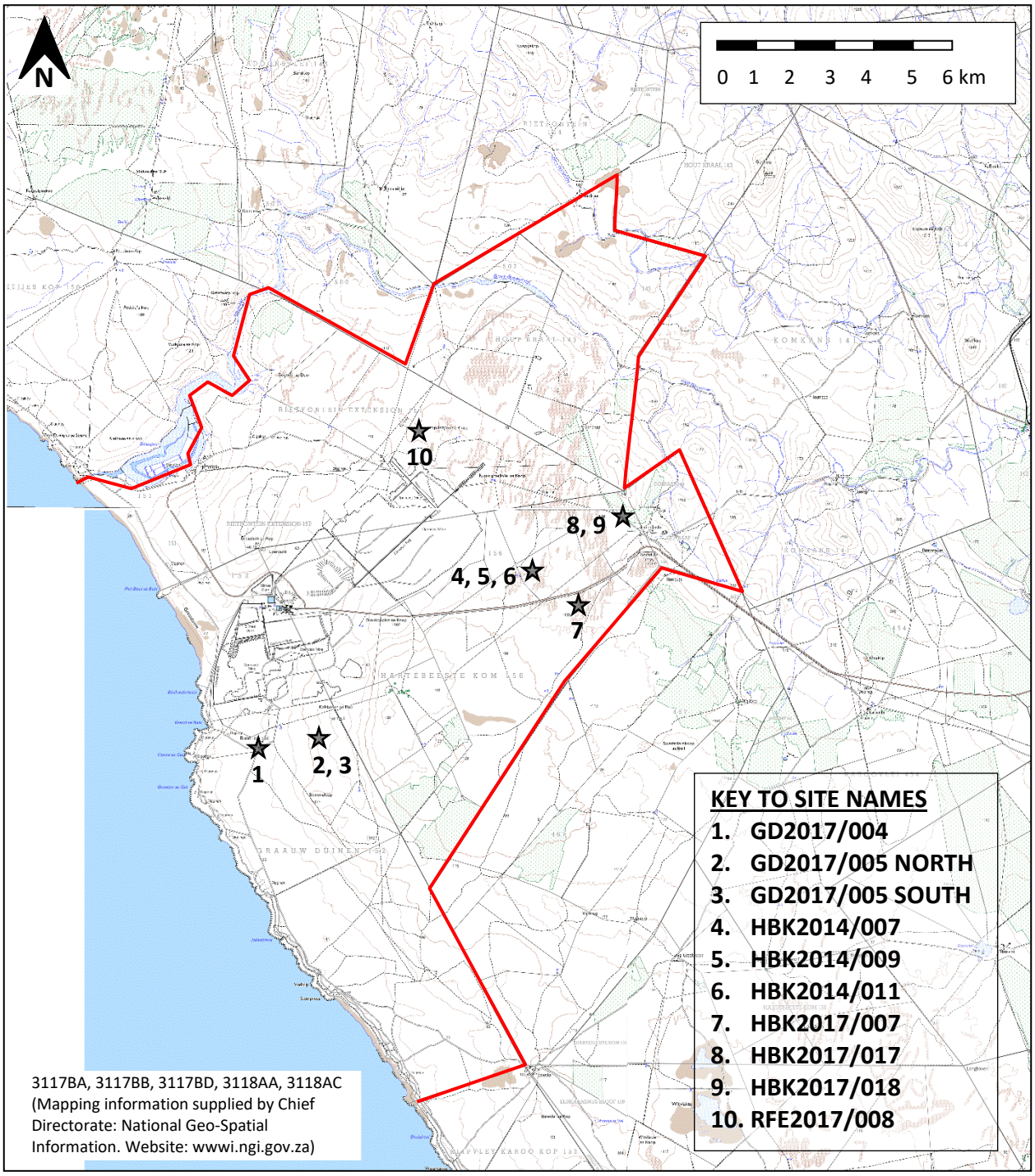


Figure 2: *1:50 000 topographical map of the Namakwa Sands Mine area showing the approximate locations of the mitigated archaeological sites (stars). The red outline indicates the boundary of the mining right area.*

1.1. Project description

Tronox Mineral Sands (Pty) Ltd operates an open-cast heavy mineral mine. The process is briefly as follows:

- The sand is mined by means of front end loaders and dumped onto conveyors which take it to the plant for processing;

- The sand is processed to extract the heavy minerals and the tailings are returned to the mining area by conveyor or truck;
- The tailings are dumped back into the mined out areas; and
- Once the area is appropriately leveled, topsoil is replaced and rehabilitation undertaken.

The ground surface is thus completely disturbed with no opportunity for the preservation of archaeological sites unless the relevant areas are completely avoided.

1.2. Terms of reference

Tronox Mineral Sands (Pty) Ltd asked ASHA Consulting (Pty) Ltd to apply for the necessary workplan approval and conduct the relevant archaeological mitigation as stipulated in the survey report compiled in early 2017 (Orton 2017). This was to allow for approval from Heritage Western Cape (HWC) for mining areas referred to as 'NE of De Kom' and 'Joetsie 2' as required under the 2011 approved EMP, as well as to request approval from HWC for the destruction of the three known archaeological sites currently under protection from mining in the 'Langlaagte' mining area and the new sites recently discovered in a mine trench in the 'Soutpan 1' mining area and the West Mine which has already been cleared for mining.

1.3. Scope and purpose of the report

This report is intended to:

- Describe the archaeological sites that have been mitigated as well as their contexts;
- Describe the findings of the excavations and discuss them in their local and regional contexts; and
- Provide information that will allow HWC to make an informed decision with regards to mining in these areas and the destruction of the other known archaeological sites.

1.4. The author

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in the Western Cape and Northern Cape provinces of South Africa since 2004 (Please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

1.5. Declaration of independence

ASHA Consulting (Pty) Ltd and its consultants have no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

2. METHODS

2.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:50 000 maps were sourced from the Chief Directorate: National Geo-Spatial Information.

2.2. Fieldwork

The locations of the sites were loaded onto hand-held GPS receivers to enable them to be relocated in the field. The excavations and surface collections were carried out from the 27th March to the 3rd April 2017 by two archaeologists. The present author was assisted on site by Mr Chester Kaplan.

The fieldwork methodology for those sites where full excavation took place was as follows:

- An excavation grid was laid out (generally in a north-south orientation) using long tape measures in order to enable spatial control. The archaeological sites were excavated in 1 m^2 squares;
- On some sites we found many manuports – generally in quartzite, but also in sandstone – and, because of their bulk and uninformative nature, we discarded these on site after examining them for signs of use. However, their dimensions were recorded to the nearest cm and photographs of examples were taken. Such rocks were sourced from the local landscape where outcrops are noted from time to time. Small fragments of non-artefactual stone were retained in the collections;
- All excavated material was sieved through a 1.5 mm mesh sieve to enable recovery of the smallest finds;
- The residue in the sieve was then generally sorted on site, although some bulks were returned to Cape Town for sorting due to time constraints on site. All archaeological materials were placed into labelled plastic Ziploc bags for later analysis and storage.

In those instances where surface collections were undertaken the following methodology was employed:

- A grid was laid out (generally in a north-south orientation) using long tape measures in order to enable spatial control. The archaeological sites were excavated in 1 m^2 squares;
- All archaeological materials were collected from the surface of the sites;
- Where wind-blown sand had accumulated this was excavated and sieved through a 3.0 mm sieve in order to ensure that no artefacts were missed;
- All finds were placed into labelled plastic Ziploc bags for later analysis and storage.

2.3. Analysis

The large Early Stone Age (ESA) collections have not yet been fully analysed. It is intended, because of the importance of the material, to conduct a more detailed analysis of the hand-axe collection than would have been possible under normal cultural resource management (CRM) conditions. The

planned analysis involves a typological identification of all artefacts but, importantly, it will also include the capturing of various measurements from the hand-axes. Having such a large collection is very unusual and it is anticipated that, aside from all the other artefacts, a study of hand-axe morphology alone will be meaningful and important in the context of South African archaeology.

The analyses of the Later Stone Age (LSA) and other materials was conducted as follows:

- Stone artefacts were analysed typologically following the classes listed in Orton (2012). Note that small, non-artefactual stones were retained in the collections but not recorded in the analyses;
- Marine shells were counted to obtain a minimum number of individuals for each species and the total weight of shell in each square was recorded;
- Ostrich eggshell beads were measured to obtain their maximum width and minimum aperture diameters following Yates (1995). In addition, for reasons described in Orton (2008), their thicknesses were also measured;
- Ostrich eggshell fragments were counted and weighed;
- Charcoal fragments were weighed only because they sometimes tended to break up which means that counting fragments would be meaningless;
- Bone fragments were counted and weighed;
- Historical rusted metal fragments were weighed only because they tended to break up very easily in the sieve and during sorting, while other metal items were counted only;
- Historical glass and ceramic fragments were counted.

3. ARCHAEOLOGICAL CONTEXT

This section of the report contains the desktop study which provides the background regional context to the area and assists in understanding the newly excavated sites. It focuses solely on Stone Age archaeology since other periods are not relevant.

All three Stone Ages are represented in the archaeological record of Namaqualand. Early Stone Age (ESA) stone artefacts, including the well-known hand-axes and cleavers, are known from generally deflated or eroding areas throughout the region from the Richtersveld in the north to the Knersvlakte in the south and along the entire coastal stretch (Orton & Webley 2009; Halkett 2002a, 2006; Morris, 2004; Morris & Webley 2004; Orton & Halkett 2004; Halkett 2000a). These are usually isolated occurrences in secondary contexts, although sizeable scatters of ESA material have been located at Kleinsee, some 190 km north-northwest of the present study area (Halkett 2002a), and in the Knersvlakte, some 70 km to the east-southeast (Orton, personal observation). One ESA artefact scatter and quarry site surrounding a silcrete outcrop was excavated in the Namakwa Sands Mine area (Hart & Halkett 1994). Interestingly, the site at Kleinsee was revealed in the same context as the material described in the present report.

Middle Stone Age (MSA) material is also fairly widespread. Significant known sites include Spitzkloof in the Richtersveld (Dewar & Stewart 2012, 2017), sites with bifacial points from near Koingnaas (Halkett & Orton 2005) and from the Knersvlakte (Mackay et al. 2010) and the collapsed rock shelter deposit at VR003 (Steele *et al.* 2012, 2016). Rare and significant MSA sites containing shell and bone have been reported from the southern half of the Namaqualand coast (Halkett 2000b, 2001; Halkett et al. 1993; Hart & Halkett 1999), while a few other MSA sites are known from further north (Dewar 2008). One MSA site has been excavated in the Namakwa Sands Mine (Halkett *et al.* 1993).

Throughout the southern parts of the Namaqualand Sandveld MSA artefacts are found in areas where the unconsolidated sands have been removed (Hart 2007; Orton 2010a, personal observation). The artefacts have deflated downwards and collected on the harder layer beneath. Some ESA material would also be found in such contexts.

Later Stone Age (LSA) sites are abundant throughout Namaqualand and particularly in areas within close proximity of the coast. Many surveys in the coastal region have revealed thousands of shell middens and scatters in various contexts including sand dunes, deflation hollows, cliff tops and in open, flat areas (Halkett 2000b, 2002b, 2006; Halkett & Hart 1997; Hart 1999, 2003, 2007; Orton 2010b, 2010c; Orton & Halkett 2004; Orton & Webley 2012a, 2012b; Patrick & Manhire 2014; Parkington & Poggenpoel 1991). Sites with reasonable amounts of shell on them can be found as far as 10 km inland. LSA sites include a wider variety of finds than earlier sites because their younger age means that preservation is better. Such finds include stone artefacts, bone tools, ostrich eggshell beads and water flask fragments, pottery and food waste including animal bones, rock lobster mandibles and, of course, large quantities of shellfish. These sites offer excellent opportunities to explore and better understand the recent pre-colonial history of the area with certain richer sites being particularly informative (e.g. Dewar 2008; Dewar et al. 2004; Orton 2012, 2014). More ephemeral sites also have a story to tell because they might relate to a particular time period or segment of an annual migration cycle that is not recorded at larger sites (Orton 2007c).

Archaeological work already carried out at Brand-se-baai has resulted in the recording of many archaeological sites in the region. Some of these have been salvaged prior to mining. Several shell middens have been excavated from along the coastal strip (Halkett *et al.* 1993), while a number of sites from further inland have also been sampled (Hart & Halkett 1994; Hart & Lanham 1997; Orton 2015a, 2015b, 2015c). As expected, all the radiocarbon dates obtained on the LSA sites date to the latter half of the Holocene mirroring the pattern evident on the northern part of the coast (Orton 2012). It is surprising, however, that only two post-date 2000 years ago – such recent dates are dominant elsewhere. The oldest date from the area was obtained from a deflation hollow site, HBK2014/015, and showed occupation around 4500 BC (Orton 2015d).

Further inland LSA archaeological material is usually found associated with landscape features such as river valleys, deflation hollows, or rocky outcrops where these are present. Only one very rich deflation hollow has been located in Namaqualand and this was close to Kleinzee in the north (Orton 2007b). Near Elands Bay to the south of Namaqualand there are large numbers of hollows preserving much archaeological material (Manhire 1987a, 1987b). Along the Buffels River, near Kleinzee, Orton (2007b) excavated a number of hollows containing light traces of recent occupation – most sites had pottery demonstrating an age of less than 2000 years. None of these was particularly significant. In southern Namaqualand most recorded deflation hollows contain rather ephemeral artefact scatters (Hart 2007; Hart & Halkett 1994; Hart & Orton 2005), but in the Namakwa Sands East Mine a number of hollows have been found to contain very important sites. Further inland, the Knersvlakte has revealed a few LSA sites in rock shelters and one in the open. These all occur along the Varsche River valley (Orton 2012; Orton *et al.* 2011).

Rock art occurs in various parts of Namaqualand (Morris & Webley 2004; Rudner & Rudner 1968; Webley 1984; Orton 2013) with the nearest to the study area being in a valley a few kilometres east of the current study area (Orton 2012, 2013). Two painted sites exist on the north bank of the Oliphants River, southwest of Koekenaap, with the larger one once having contained an extremely

significant archaeological deposit that has now been all but completely destroyed (Orton 2012, 2013).

Pre-colonial burials occur all over South Africa but are particularly frequently encountered in coastal dune systems, no doubt as a result of the soft sand that was easy to excavate by hand. Most burials are discovered accidentally during the course of development and are therefore wholly or partly disturbed without a proper record being made. Only one burial has been discovered in Namaqualand during archaeological excavations and this one, near Kleinzee, revealed grave goods in the form of an ostrich eggshell bead bracelet, two Conus shells (often used as decorative items) and a bone melon knife (Orton 2007a). It is surprising that none have yet been found at the Namakwa Sands Mine. Just one burial is known to have been found in the area, although its precise location is remains uncertain (Morris 1992).

Although the extensive work carried out along the northern Namaqualand coastline has allowed a relatively robust cultural sequence to be described there (Dewar 2008; Orton2012), this sequence is very different to that documented to the south of Namaqualand. As a result, the intervening area is important because we do not yet know where the archaeological signature changes and why it does this. The region is critical to the understanding of the spread of domestic stock within the last 2000 years (Orton 2012) and more observations from southern Namaqualand may help to answer questions still remaining. It remains to consolidate the suite of known observations for the Namakwa Sands area into a broader archaeological record for the region.

One of the most important sites discovered at Namakwa Sands is HK11, a small rock shelter site in the eastern part of the mine (Figure 9). This site has an extensive talus slope and contains a wide variety of archaeological materials (Hart & Orton 2007). It has yet to be excavated, but is protected within a no-go zone. Another important site is RFE2014/007. This site lies atop a dune ridge, also in the East Mine, and was found to contain many European trade goods including well in excess of 600 glass trade beads. Just seven glass beads had been recovered from the Namaqualand coastline before this site was excavated (Orton 2012, 2014). Excavations at this site have progressed sporadically over the last two years with a total of 250 m^2 having now been excavated. The excavation has shown very strong spatial patterning and promises to reveal interesting features of recent LSA communities. A third significant site is HBK2015/015 (mentioned above) which contained a very spectacular mid-Holocene-aged stone artefact assemblage with large numbers of retouched tools (Orton 2015a).

4. FINDINGS OF THE EXCAVATIONS

This section describes each of the excavated archaeological sites in turn, providing excavation details as well as a description of the findings. Note that the three ESA sites are only described in general terms and that a full description will be presented at a later stage.

4.1. GD2017/004

4.1.1. Site description

This site was a scatter of predominantly ESA stone artefacts located on an area of exposed hardpan that has never been mined (Figure 3). This is because a farm house and associated outbuildings

occur there. The buildings were no doubt built on the hardpan because it offered a firmer foundation than the aeolian sands in the rest of the area (Figure 4). Although the density of artefact scatter was somewhat variable, the total area of the main scatter was some 50 m north-south by 25 m east-west. Other lower density scatters occurred in the vicinity. The site is on the coastal plain at the western foot of a hill. It was noticeable on site that raised areas tended to have fewer artefacts, while depressions and gullies contained elevated frequencies, especially of smaller artefacts.

Figure 3: *View of GD2017/004 looking towards the northeast. Mine dumps are visible in the background to the left and natural hills occur in the distance to the right.*

Figure 4: *View of GD2017/004 looking towards the southeast with a mine dump and farm buildings in the background. Wind-blown dunes have accumulated around the house.*

4.1.2. Excavation details

Excavation date:	• 27th March 2017

Excavated area:	• Total = 75 m2 (see Figure 5) & isolated artefact collection
	  ○ Patch A = 10 m^2
	  ○ Patch B = 51 m^2
	  ○ Patch C = 14 m^2

Excavation strategy:	• Grid laid with baseline running approximately north to south. • Surface collection within grid squares targeting densest patches of scatter; and • Surface collection and mapping of isolated artefacts (hand-axes) from within approximately 50 m of the grid. All had their grid squares estimated.
Sieve size:	• 3 mm used only when necessary to ensure that artefacts were not missed beneath small accumulations of wind-blown sand in tiny erosion gullies.
Finds summary:	• Stone artefacts

4.1.3. Stone artefacts

The assemblage that was collected included many flakes and other artefacts that are the product of stone tool manufacture. There were also some cores. Most of these artefacts were in quartz, quartzite the second most common material. Importantly, a number of hand-axes were found (e.g. Figures 6 to 13). These were made on various materials including quartzite, sandstone, quartz and quartz porphyry. A small quartzite pebble was unifacially flaked and was probably going to be too small to have been a hand-axe (Figure 14). It looks unfinished, and may have been intended as a small unifacial cobble tool. Two hammer stones were also recovered. Both of them had a flake removal that had been caused by hammering (e.g. Figure 14). Also among the finds was a small upper grindstone (Figure 15). It has a red stain on its grinding surface that may be either from the red sediment or from ochre – this was not clear.

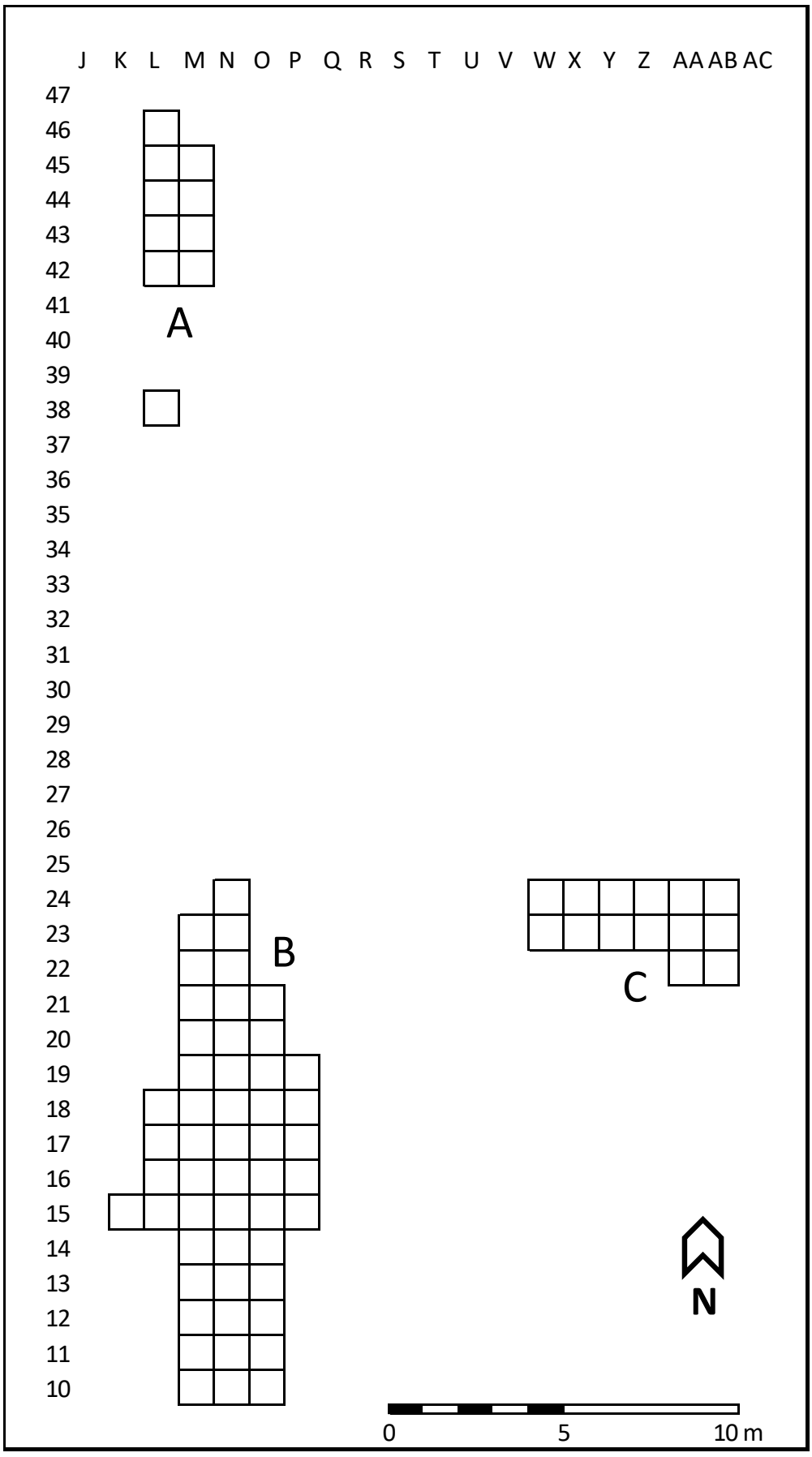


Figure 5: *Plan of GD2017/004 showing the sampled areas.*

Figure 6: *Quartzite hand-axe from AB23.Scale in cm & mm.*

Figure 9: *Quartz hand-axe from H1.Scale in cm & mm.*

Figure 10: *Lateral view of a quartzite hand-axe from K15. This artefact is unusually fat. Scale in cm & mm.*

Figure 7: *Quartzite hand-axe from AM13. It was made on a cobble and preserves a large portion of the original cobble cortex. Scale in cm & mm.*

Figure 8: *Sandstone hand-axe from AR22.Scale in cm & mm.*

Figure 11: *Quartz porphyry hand-axe with a large break (lower left). Scale in cm & mm.*

Figure 12: *Quartzite hand-axe from ZG25. Scale in cm & mm.*

Figure 13: *Unifacially flaked quartzite cobble from L46. It seems incomplete. Scale in cm & mm.*

Figure 14: *'Other' hammer stone from M21. A flake has been detached through use and hammering damage occurs on the opposite side as well. Scale In cm & mm.*

Figure 15: *A small quartzite upper grindstone from Z24. It was not possible to tell whether the stain is from sediment or ochre. Scale in cm & mm.*

4.2. GD2017/005 North

4.2.1. Site description

This site was a large scatter of ESA stone artefacts spread across an area of hardpan that had been exposed some years before by mining. Subsequent to mining the wind had deflated the last remaining sand resulting in exposure of the artefacts on the hard surface (Figures 16 to 18). The site lies on the western slopes of a hill, not far from its crest. The artefacts were distributed in highly

variable densities across the site but the density showed a clear drop-off outside of the sampled area. The main scatter was some 70 m north to south and 30 m west to east. Low density scatter did continue beyond the gridded area, especially towards the west, east and northeast (Figure 19).

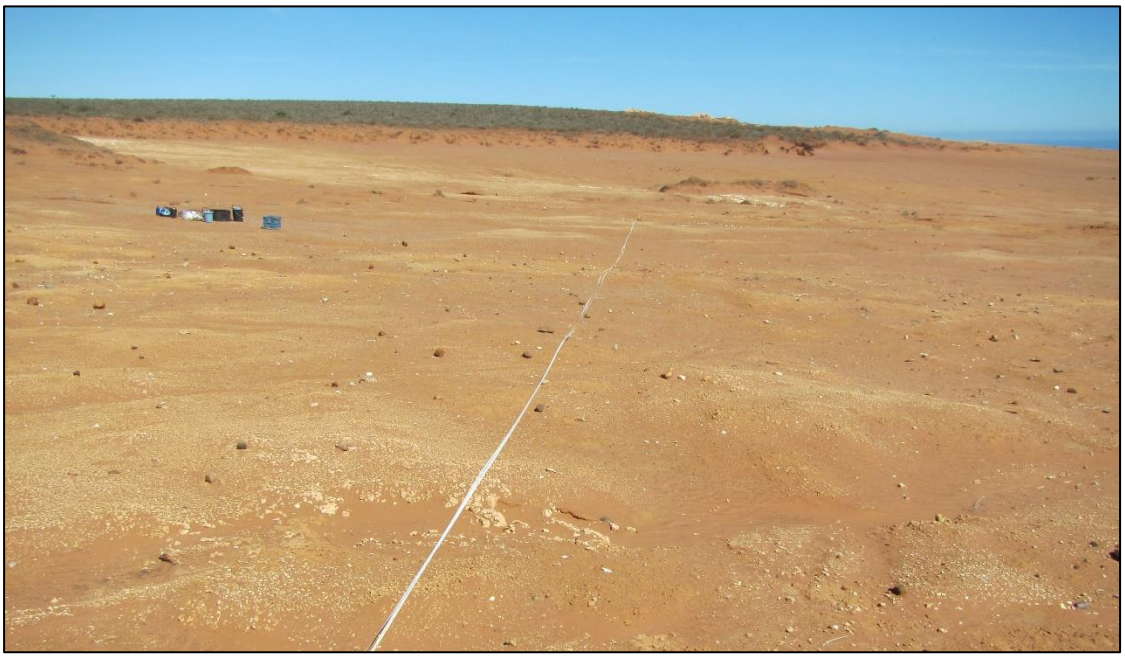


Figure 16: *View across the site towards the south down the baseline.*

Figure 17: *View of the surface with a hand-axe in a low density area that was not excavated. The scale bar is 0.5 m.*

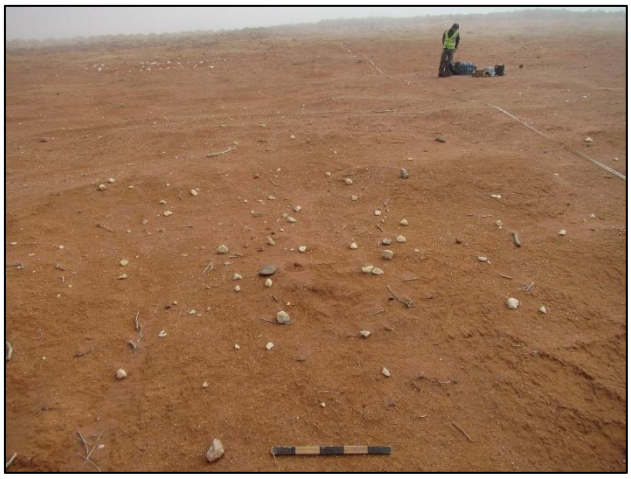


Figure 18: *View towards the north of the high density quartz scatter excavated as Patch F. The scale bar is 0.5 m.*

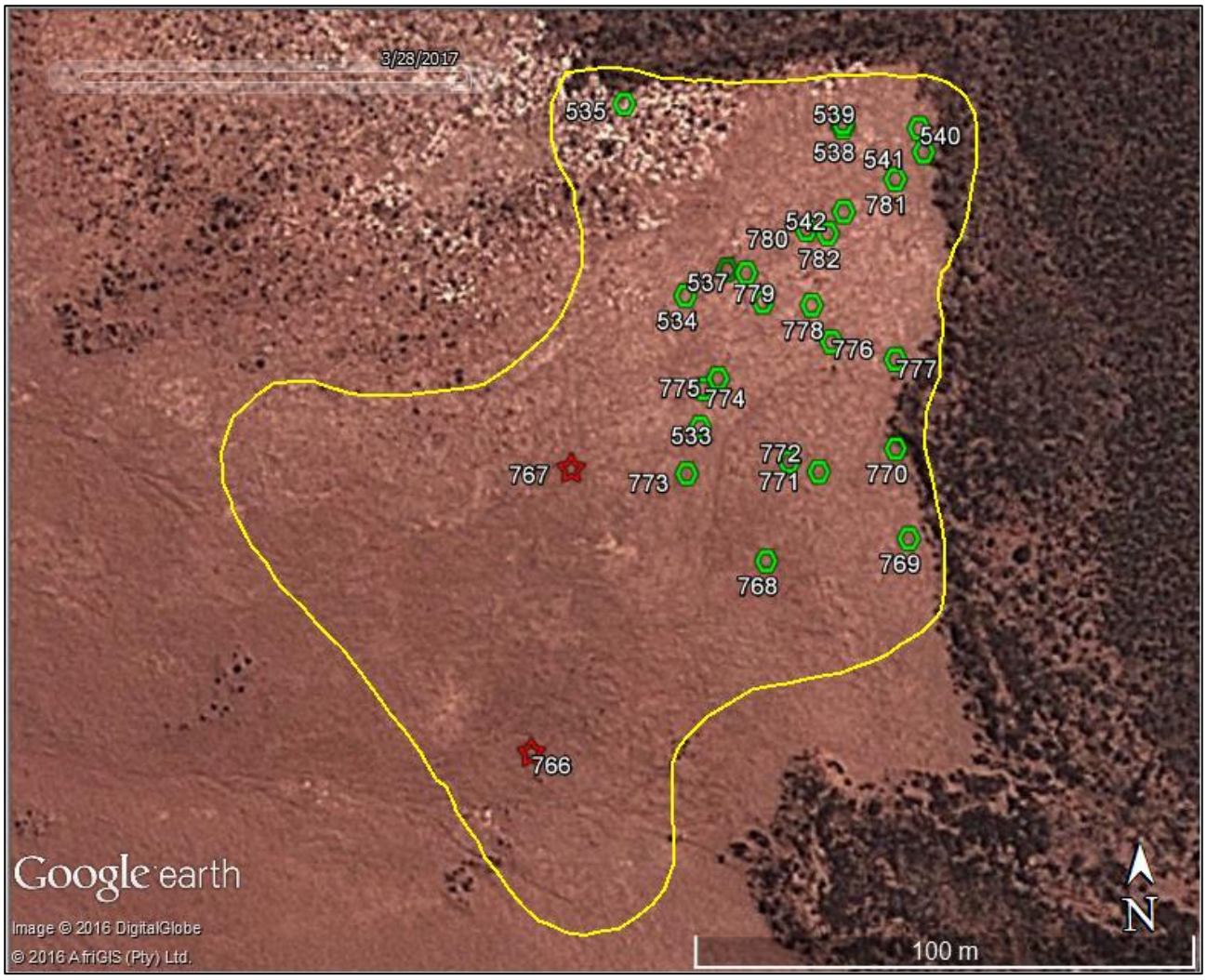


Figure 19: *Aerial view of GD2017/005 North showing the approximate edge of the broader scatter (yellow outline), the location of the sampling grid (north [square Z90] and south [square Z30] marked by red stars), and the locations of isolated artefacts collected to the east and northeast (green symbols). The pale colour in the north is an exposure of calcrete.*

4.2.2. Excavation details

Excavation date:	• 27th & 28th March 2017

Excavated area:	• 163 m^2 (see Figure 19) & isolated artefact collection
	  ○ Patch A = 12 m^2
	  ○ Patch B = 54 m^2
	  ○ Patch C = 18 m^2
	  ○ Patch D = 16 m^2
	  ○ Patch E = 13 m^2
	  ○ Patch F = 14 m^2
	  ○ Patch G = 36 m^2

Excavation strategy:	• Grid laid with baseline running approximately north to south. • Surface collection within grid squares targeting densest patches of scatter; and • Surface collection and mapping of isolated artefacts (mostly hand-axes) from within approximately 100 m of the grid. Some, especially close to and to the west of the grid had their grid squares estimated, while towards the northwest, where hand-axes occurred up to 100 m away from the grid, GPS readings were taken.
Sieve size:	• 3 mm used only when necessary to ensure that artefacts were not missed beneath small accumulations of wind-blown sand in tiny erosion gullies.
Finds summary:	• Stone artefacts

4.2.3. Stone artefacts

The seven excavated patches produced a large assemblage. It appears as though most scatters had fairly even proportions of quartz and quartzite (e.g. Figures 20 to 22), although quartz will undoubtedly still be most common altogether. In contrast, however, one scatter – Patch F – was a strongly quartz dominated scatter (Figure 18). A number of cores were recovered from this site. Many were made on small cobbles of quartzite or quartz (Figure 23), but a few were on blocks of the same rock types (Figures 24 & 25). One artefacts was peculiar in that it appears to have started out as a small hand-axe but got turned into a core at a later stage after the tip broke. The break was reworked but not in a way that produced another point suggesting that the new focus may have rather been to obtain flakes (Figure 26).

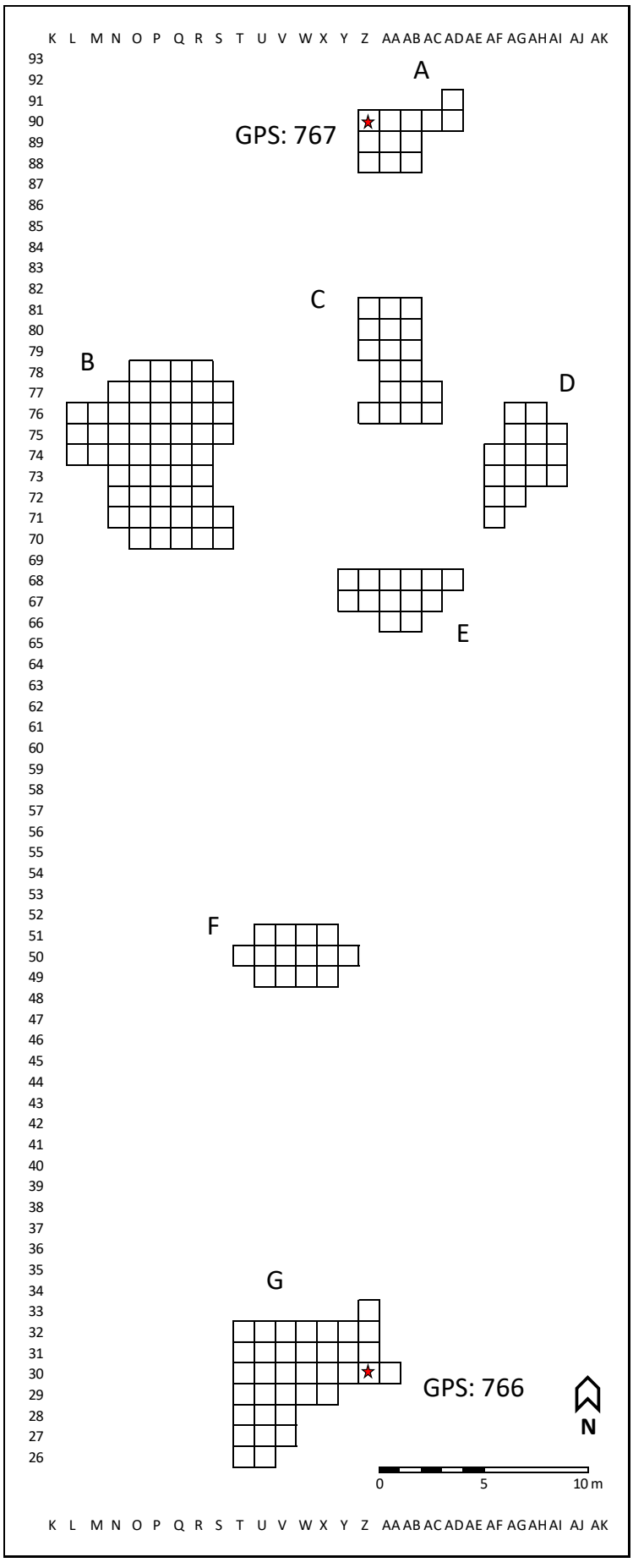


Figure 19: *Plan of GD2017/005 North showing the sampled areas. The two red stars denote GPS points taken to locate the grid relative to artefacts collected from the surface.*

Figure 20: *The artefacts collected from N71 (Patch B). Quartz, quartzite and silcrete occur. Scale in cm & mm.*

Figure 21: *The artefacts collected from T31 (Patch G). Quartz, quartzite and silcrete occur. Scale in cm & mm.*

Figure 22: *The artefacts collected from R70 (Patch B). Quartz, quartzite and silcrete occur. Scale in cm & mm.*

Figure 23: *Three quartz cores from Y67 (Patch E), all made on small cobbles. Scale in cm & mm.*

Figure 24: *A quartz core made on a block of vein quartz from Z90 (Patch A). Scale in cm & mm.*

Figure 25: *A quartzite core from S70 (Patch B). Scale in cm & mm.*

Figure 26: *Opposite sides of a quartzite artefact from 776A that appears to have started as a hand-axe as evidenced by the base (arrowed) which probably broke and then had further flakes removed from the break, turning the artefact into a core. Scale in cm & mm.*

Two flakes were singled out because they appear to be MSA in age rather than ESA. The first is an odd-shaped denticulate which has six notches in its margins (Figure 27). The second is a very characteristic triangular flake with convergent dorsal ridges (Figure 28).

Figure 27: *The dorsal (left) and ventral (right) surfaces of a quartzite denticulate from AF71 (Patch D). Scale in cm & mm.*

Figure 28: *A quartzite flake displaying typical MSA characteristics from AY93. Scale in cm & mm.*

The most important feature of the collection is undoubtedly the many hand-axes that were recovered. They show tremendous variety in both shape and materials (Figures 29 to 46). A number of the hand-axes have cortex present, either deliberately or perhaps because they were not quite finished (e.g. Figures 33, 37 to 39, 42 & 44). The former is undoubtedly the more common reason. The majority of hand-axes were made on cobbles and have sufficient cortex present to demonstrate this, but a few may have originated from large flakes. This is often very difficult to determine because the shaping of the tool has removed the identifying features of the original flake. This feature was determinable on one hand-axe, however (Figure 43). Considering the number of broken hand-axes, it was perhaps surprising that just two tips were found (Figure 47 & 48).

Figure 29: *A quartzite hand-axe from AA79 (Patch C). The tip is snapped. Scale in cm & mm.*

Figure 30: *A quartzite hand-axe from AI75 (Patch D). Scale in cm & mm.*

Figure 31: *A quartzite hand-axe from AK90. Scale in cm & mm.*

Figure 32: *A quartzite hand-axe from AK124. Scale in cm & mm.*

Figure 33: *A sandstone hand-axe from AR74 with cortex present. Scale in cm & mm.*

Figure 34: *A quartzite hand-axe from C68 and made on a flat slab of rock. Scale in cm & mm.*

Figure 35: *A silcrete hand-axe from J81. Scale in cm & mm.*

Figure 36: *A quartzite hand-axe from S76 (Patch B). Scale in cm & mm.*

Figure 37: *A silcrete hand-axe from O78 (Patch B) with some cortex present. Scale in cm & mm.*

Figure 38: *A quartz porphyry hand-axe from 772. Scale in cm & mm.*

Figure 39: *A quartzite hand-axe from 777 with considerable cortex present. Scale in cm & mm.*

Figure 40: *A poorly-formed quartzite hand-axe from 779 with its tip broken. Scale in cm & mm.*

Figure 41: *A CCS hand-axe from AA120. It is morphologically a hand-axe but has been worked down to a very small size. Scale in cm & mm.*

Figure 42: *A quartzite hand-axe from YM81. Scale in cm & mm.*

Figure 43: *A silcrete hand-axe from ZF84 and made on a cortical flake. Scale in cm & mm.*

Figure 44: *A silcrete hand-axe from AH90 displaying cobble cortex. Scale in cm & mm.*

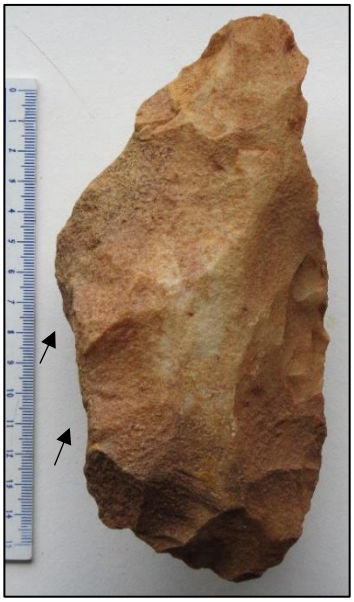


Figure 45: *An oddly-shaped sandstone hand-axe from ZP88. The arrowed surface is cortical.*

Figure 46: *A gneiss hand-axe from Z33 (Patch G). Scale in cm & mm.*

Figure 47: *Quartzite hand-axe tip from 782. Scale in cm & mm.*

Figure 48: *Sandstone hand-axe tip from 770. Scale in cm & mm.*

Figure 49 shows a hand-axe that appears to have never been completed. A small section remains unworked, either because it just was not finished or because it did not present an appropriate platform for further reduction – an examination of the artefact suggests that the latter explanation does not appear applicable in this instance. The hand-axe in Figure 50 is interesting for two reasons. Firstly it looks to be made in banded iron formation, a type of rock not available in the Western Cape Province but which might perhaps have been carried downstream as a river cobble by the palaeo-Orange River which used to flow through the Knersvlakte (De Wit 1999). The second reason it is interesting is that it was reworked long after its original manufacture. The bulk of the artefacts is well-patinated, but two fresh scars are evident near its tip. A few hand-axes were found in an unknown rock type that is perhaps igneous in origin but is here termed 'other'. This rock seems to be prone to shattering, presumably from thermal expansion and contraction over many millennia. Figure 51 shows an example where many of the fragments were still found lying alongside the artefact. Because of the crumbly nature of the rock it is unfortunately not possible to refit the fragments to the base of the tool.

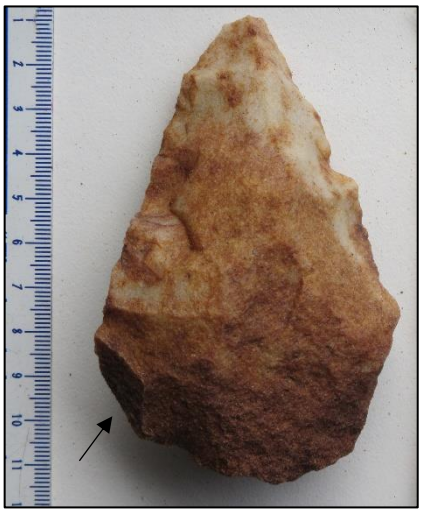


Figure 49: *A quartzite hand-axe from AD91 that appears to have not been finished with an unworked portion remaining near the base (arrow). Scale in cm & mm.*

Figure 50: *A hand-axe from D81 that is possibly on banded iron formation. It has had two flakes removed from its tip (arrows) well after the original manufacture. Scale in cm & mm.*

Figure 51: *An 'other' hand-axe made from O76. It has shattered, perhaps from thermal expansion and contraction, but the base is preserved. Scale in cm & mm.*

Cleavers were uncommon with just three being found (Figures 52 to 54). Although the bulb of percussion is generally flaked away during manufacture of the artefact, the thin distal edge, thick base and presence of a large surface often opposed by cobble cortex suggests that these artefacts were most commonly made on large flakes removed from cobbles.

Figure 52: *A quartzite cleaver from ZH89. Scale in cm & mm.*

Figure 53: *The ventral surface of a quartz porphyry cleaver from ZP86. The dorsal surface is mostly cortex. Scale in cm & mm.*

Figure 54: *The dorsal surface of a quartzite cleaver from 771. Scale in cm & mm.*

Many unworked cobbles and rock fragments were found on the site and these seemed to also occur more widely suggesting a natural deposition at some point, perhaps by the palaeo-Orange River during the Cretacious (see Section 5). It was difficult – because of the archaeology present – to ascertain whether there was any change in density of natural stone in the vicinity of the site. However, it was clear that a number of hammer stones were present on the site (Figures 55 to 57). A few grindstones and grindstone fragments were also found. Figure 58 shows an upper grindstone with light grinding evident but which was also used as a hammer stone; this use resulted in the removal of a flake from the one end. Figure 59 shows half a lower grindstone typical of the type of grindstones found on LSA sites throughout the region. Some of these artefacts might possibly date to the LSA, although typical LSA flaked artefacts were not recovered from the excavations.

Figure 55: *A quartzite hammer stone from AA66 (Patch E). Both ends are damaged. Scale in cm & mm.*

Figure 56: *A quartzite hammer stone from AA77 (Patch C). Both ends are damaged with a flake removed from the upper one. Scale in cm & mm.*

Figure 57: *A quartzite hammer stone and fragment from AB66. Scale in cm & mm.*

Figure 58: *A quartzite upper grindstone / hammer stone from P75. The surface in view is lightly ground, while a flake has been removed from the hammered end of the cobble. Scale in cm & mm.*

Figure 59: *B44 quartzite lower grindstone. Scale in cm & mm.*

Some artefacts were found to have a thin calcrete veneer adhering to their surfaces which indicates that they have been there long enough for the process of calcrete formation to have commenced on their surfaces. However, a single hand-axe was found on top of a calcrete bed in the far north of the site suggesting that large scale calcrete formation occurred prior to the deposition of the artefacts.

4.2.4. Marine shell

Square P75 had a single fragment – the columella – of a *Burnupena* sp. shell. It was probably mineralised but this is not easy to determine with certainty.

4.3. GD2017/005 South

4.3.1. Site description

This site was a large scatter of ESA stone artefacts spread across an area of hardpan that had been exposed some years before by mining. Subsequent to mining the wind had deflated the last remaining sand resulting in exposure of the artefacts on the hard surface (Figures 60 to 61). The site lies on the western slopes of a hill, not far from its crest. The artefacts were distributed in variable densities across the site but the density showed a clear drop-off outside of the sampled area. Although there were some concentrations, it was quite apparent that there were no patches as dense as those encountered at GD2017/005 North. The area at GD2017/005 South from which artefacts were collected was some 270 m north to south and 200 m west to east (Figure 62).

Figure 60: *View upslope towards the east showing the surface of GD2017/005 South.*

Figure 61: *View downslope towards the west showing the surface of GD2017/005 South.*

4.3.2. Excavation details

Excavation date:	• 27th March 2017
Excavated area:	• Isolated artefact collection only.
Excavation strategy:	• Surface collection and mapping of isolated artefacts (mostly hand-axes). GPS readings were taken for each artefact. A few of the artefacts (e.g. cores) were photographed in the field and not collected.
Sieve size:	• n/a
Finds summary:	• Stone artefacts

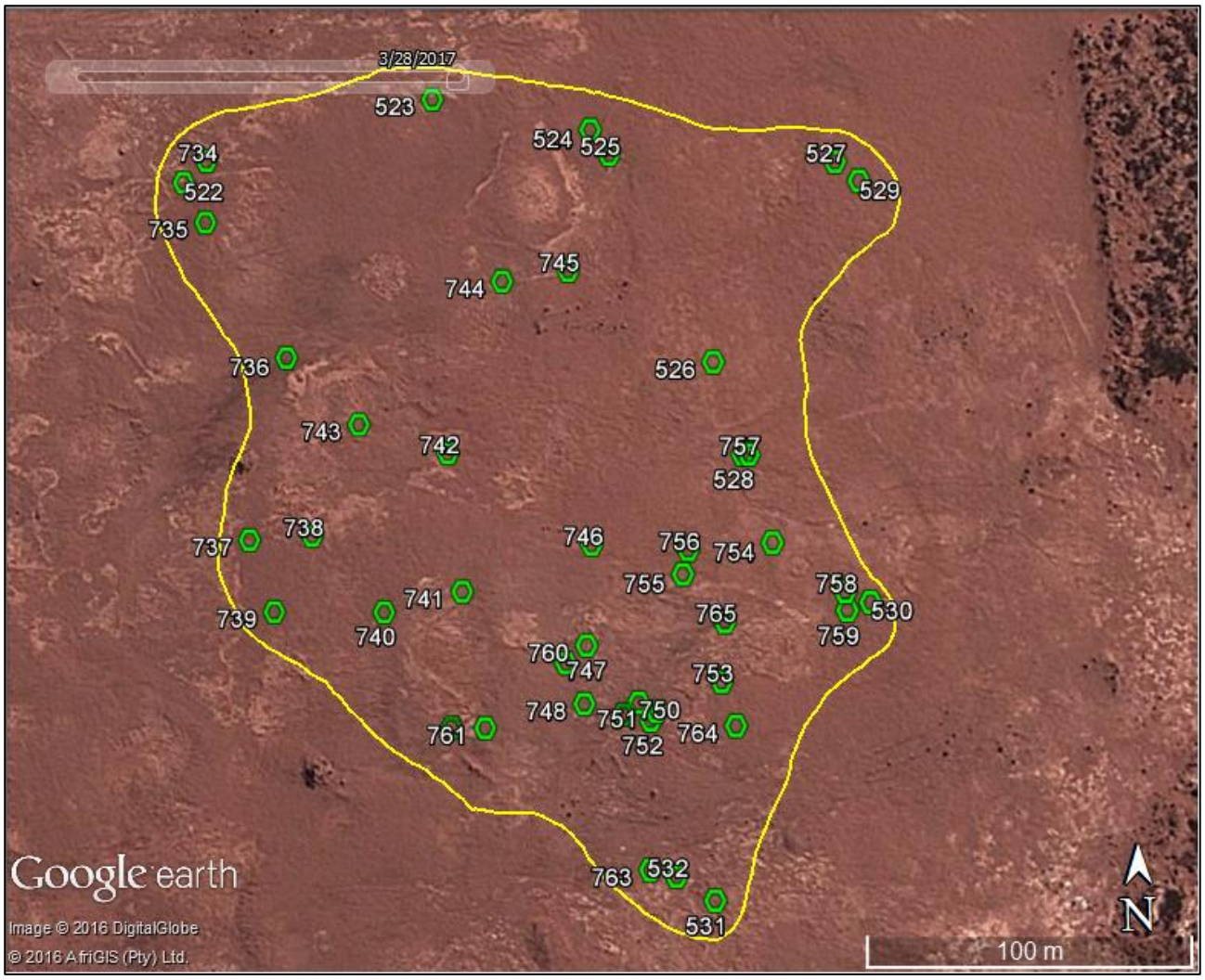


Figure 62: *Aerial view of GD2017/005 South showing the approximate edge of the broader scatter (yellow outline), and the locations of the artefacts collected (green symbols).*

4.3.3. Stone artefacts

The sample collected from this site includes mainly hand-axes, although a few cleavers, cores and blades were also collected. Most of these artefacts were in quartzite, although quartz was noted to be fairly common amongst the general scatter on the site. Figures 63 to 66 show some of the cores. Cores made on cobbles were notably common across the site. A particularly interesting core was a large single platform blade core that is assumed to date to the MSA (Figure 66). Figure 67 shows an especially large blade that is likely ESA in origin. Many hand-axes were found (e.g. Figures 68 to 83). These were made on various materials including quartzite, sandstone, quartz, quartz porphyry and even one on hornfels. They were made on cobbles (core tools) and also sometimes on large flakes (flake tools). A small quartzite pebble was bifacially flaked, and, although seemingly incomplete, it was likely intended as a hand-axe (Figures 80 to 81). One hand-axe was found in the side wall of a small erosion gully (Figure 82) suggesting that there is likely to be further material beneath the surface. We also received some cleavers (Figures 84 to 89). These are also large bifacial tools but are far less commonly found than hand-axes. They were, proportionally, more common here than at GD2017/005 North.

Figure 63: *A quartzite cobble core from waypoint 734. Scale in cm.*

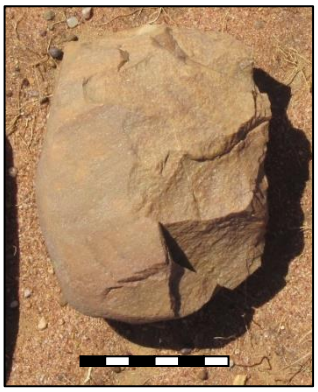


Figure 64: *A quartzite core from waypoint 740. Scale in cm.*

Figure 65: *A quartzite core from waypoint 740. Scale in cm.*

Figure 66: *A quartzite single platform blade core from waypoint 527 as viewed from below and from the side. Scale in cm & mm.*

Figure 67: *A very large sandstone blade from waypoint 746. Scale in cm & mm.*

Figure 68: *A sandstone hand-axe from waypoint 522. Scale in cm & mm.*

Figure 69: *An unusually small quartzite hand-axe from waypoint 744. Scale in cm & mm.*

Figure 70: *A small silcrete hand-axe from waypoint 755. The arrowed surface is stained and flakes have been removed from it suggesting it to have been part of the original artefact and not a break. Scale in cm & mm.*

Figure 71: *A large quartzite hand-axe made on a cobble and retaining a small amount of cortex on its base (arrow) from waypoint 523. Its tip has snapped off. Scale in cm & mm.*

Figure 72: *A fine-grained quartzite hand-axe made on a cobble and retaining some cortex around its base (arrows) from waypoint 736. The tip has broken off. Scale in cm & mm.*

Figure 73: *A hornfels hand-axe made on a cobble from waypoint 753. Both faces are similar and a small damaged area on the base suggests either an abandoned attempt at working the base or that it was used as a hammer stone. Scale in cm & mm.*

Figure 74: *A large quartzite hand-axe from waypoint 761. Scale in cm & mm.*

Figure 75: *A quartzite hand-axe from waypoint 763. The base has broken and then been reworked. The tip is also missing. Scale in cm & mm.*

Figure 76: *A quartzite or 'other' hand-axe from waypoint 758. It has been partially shattered, possibly by thermal expansion and contraction. Scale in cm & mm.*

Figure 77: *A quartz hand-axe from waypoint 524. Scale in cm & mm.*

Figure 78: *A probable unfinished hand-axe in sandstone made on a large flake from waypoint 532. Scale in cm & mm.*

Figure 79: *A quartzite hand-axe from waypoint 742. Rather unusually, the base has broken off. Scale in cm & mm.*

Figure 80: *A small quartzite biface made on a cobble from waypoint 755. It may be an unfinished hand-axe. Scale in cm & mm.*

Figure 81: *A small quartzite biface made on a cobble from waypoint 755. Cobble cortex is preserved. Scale in cm & mm.*

Figure 82: *The only artefact found in the side of an erosion gully (waypoint 756).*

Figure 83: *Quartzite hand-axe from waypoint 756. Scale in cm & mm.*

Figure 84: *A quartz porphyry cleaver from waypoint 745. It was made on a flake off of a cobble and preserves cortex over most of its dorsal surface. Scale in cm & mm.*

Figure 85: *The ventral surface of the quartz porphyry cleaver from waypoint 745 showing the bulb of percussion (arrowed). Scale in cm & mm.*

Figure 86: *A quartzite cleaver from waypoint 753. It seems to have been made on a large flake. The base of the tool broke and has been reworked. Scale in cm & mm.*

Figure 87: *The dorsal surface of the quartzite cleaver from waypoint 753. Scale in cm & mm.*

Figure 88: *A quartzite cleaver from waypoint 751. Scale in cm & mm.*

Figure 89: *A quartzite cleaver from waypoint 741. It was made on a large flake with this being the dorsal surface. Scale in cm & mm.*

4.4. HBK2014/007

4.4.1. Site description

The site consisted of a small scatter of artefacts clustered in the north-eastern part of a small, partly vegetated deflation hollow of no more than 35 m by 30 m maximum dimension. Although the sandy surface was quite loose with the bushes trapping new wind-blown sand, it appeared as though the archaeology was confined to the upper 5 cm of sand. There was light artefact scatter to the north and northeast of the excavated area but over the remainder of the deflation hollow we saw only occasional isolated artefacts.

Figure 90: *View across HBK2014/007 towards the southwest showing the excavation area situated in the northeast corner of the deflation hollow.*

Figure 91: *View of the artefact scatter looking towards the northwest.*

4.4.2. Excavation details

Excavation date:	• 28th March 2017
Excavated area:	• Total = 19 m^2 (see Figure 92)
Excavation strategy:	• Grid laid with baseline running approximately north to south; • Hand-excavation of sand to at least 5 cm depth within grid squares; and • Sieving of all deposit to recover the archaeology.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts

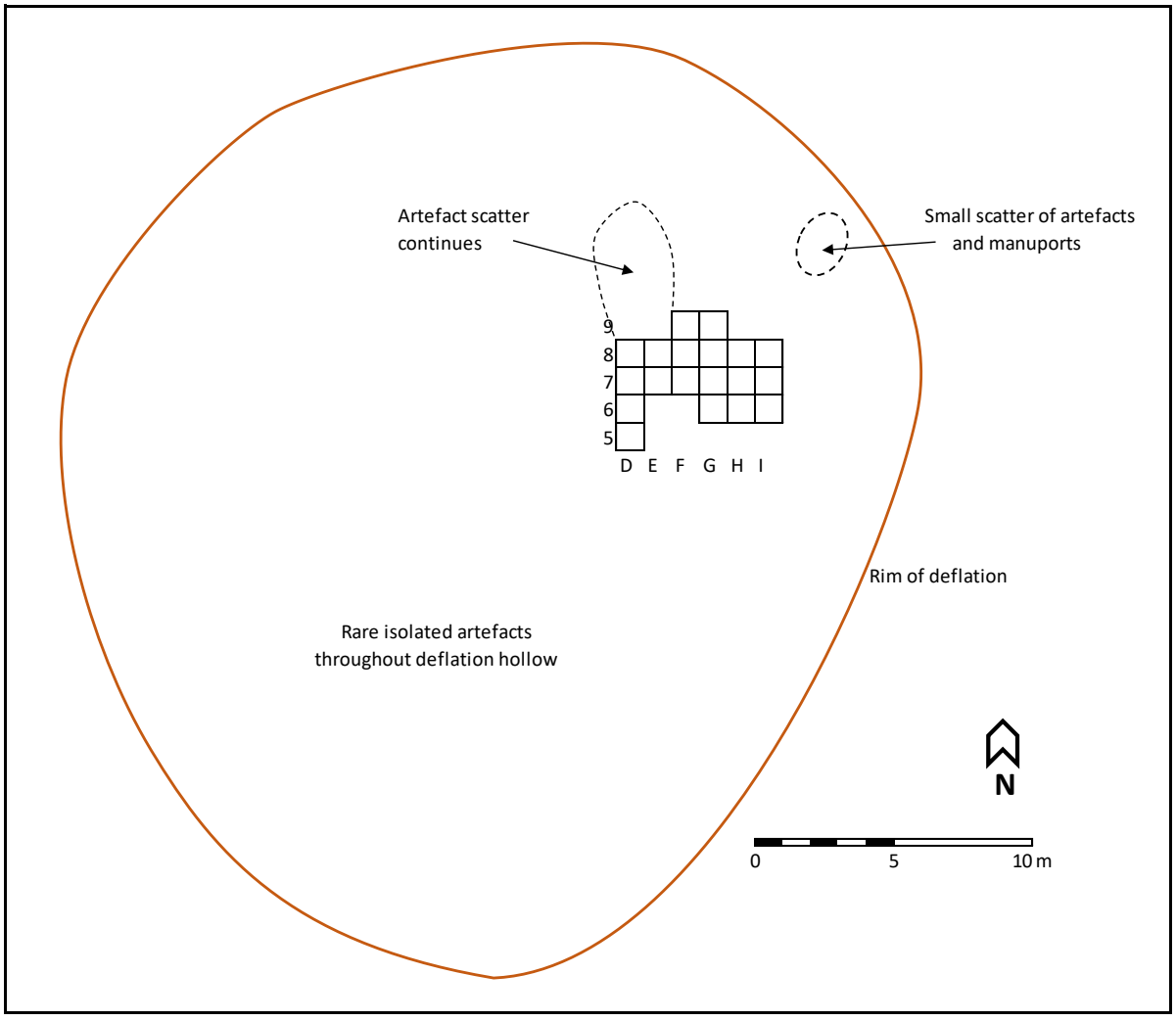


Figure 92: *Plan of HBK2014/007 showing the excavated area.*

4.4.3. Stone artefacts

This site yielded a collection of mostly quartz flaked stone artefacts but with small contributions (totalling less than 5%) from all other materials (Table 1). There was just one retouched item, a small

quartz backed flake with a broken tip. The quartz irregular core was made on a cobble rather than a block of rock, while one of the single-platform cores was also used as a hammer stone. The only other flaked item of interest was the quartzite single platform core which was made on an older flake that must have been collected somewhere (Figure 93). Interestingly, flakes in this same material were absent from the site so it was not flaked there. The quartz manuport was also an older flake that was collected somewhere but it showed no secondary working. A number of quartzite manuports were present. These were all lumps of rock collected from a bedrock exposure (Figure 94). They were recorded and then discarded on site. Most were blocky, but one was a small iron-rich conglomeratic rock. Such bedrock exposures have been seen from time to time during surveys in the area. Although this sort of rock has also been associated with recent activity in some deflation hollows, there seems no reason in this instance for this to have been the case. There were also two very tiny fragments of ochre.

Table 1: *Typological analysis of stone artefacts from HKB2014/007.*

Class	Quartz	Quartzite	Silcrete	CCS	Sandstone	Ochre
Backed flake	1					
Bipolar core	1					
Single platform core	4	1				
Irregular core	2					
Blade	1					
Bladelet	11					
Flake	110	10		1		
Chunk	46					
Chip	203	3	1	2		
Total	**379**	**14**	**1**	**3**		
% material	**95.5**	**3.5**	**0.3**	**0.8**		
Hammer stone	1*					

* The quartz hammer stone is made on one of the single platform cores.

Figure 93: *A quartzite single platform core from square D8 that was made on an older flake. Scale in 1 cm intervals.*

Figure 94: *The quartzite manuports that were discarded on site. Scale in 2 cm intervals.*

Figure 95 shows the spatial distribution of stone artefacts across the excavated area. It is evident that there is a slightly elevated concentrations of artefacts in the south-eastern part with the rest being fairly uniform.

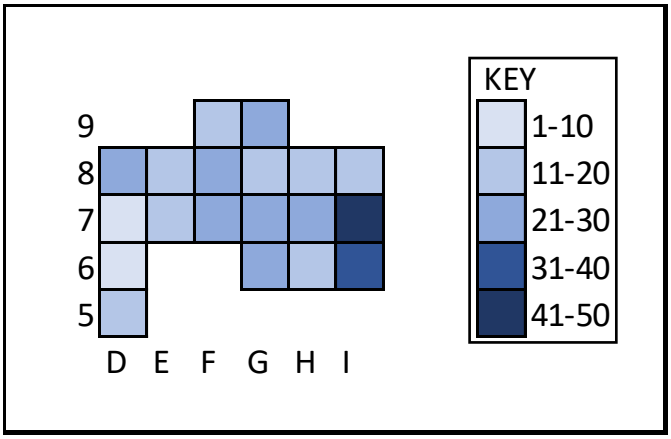


Figure 95: *Plan of HKB2014/007 showing the density of flaked stone artefacts.*

4.5. HBK2014/009

4.5.1. Site description

The site consisted of a series of small interlinked deflated areas with interspersed clumps of vegetation all within the bounds of a larger deflation hollow measuring approximately 40 m by 45 m. The densest artefact scatter was located within the southern part of the greater hollow in a narrow 'corridor' between a higher part of the dune and a smaller vegetation-covered dune within the greater deflation hollow (Figure 96). Aside from the main scatter of artefacts, there were also two areas of lower density scatter stretching towards the west in 'corridors' within the greater hollow. These were also sampled. To the east was a very low density scatter that was briefly sampled, while in other areas there were only occasional isolated artefacts. Within the western part of the greater deflation hollow there was a large dune that extended back to the western rim of the hollow. A few shells and a manuport were seen on top of it, while a handful of limpet shells were noted slumping down its eastern side towards the main excavation area (Figure 97). A test cutting was made into this dune in order to determine whether there was a subsurface lens but this showed that the shells were contained within loose slumping surface sand, while the sand more than about 10 cm below the surface was very well consolidated and completely sterile.

Figure 96: *View towards the north of the area of densest shell and artefact scatter. The scale bar is 0.5 m.*

Figure 97: *View of shells and grass slumping down a dune alongside the excavation.*

4.5.2. Excavation details

Excavation date:	• 29th March 2017

Excavated area:	• Total = 48 m^2 (see Figure 98)
	  ○ 31 m^2 from the main shell and artefact scatter; and
	  ○ 17 m^2 from surrounding lower density areas.

Excavation strategy:	• Grid laid with baseline running approximately north to south; • Hand-excavation of sand to at least 5 cm depth within grid squares; and • Sieving of all deposit to recover the archaeology.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts • Marine shell • Ostrich eggshell • Charcoal • Bone

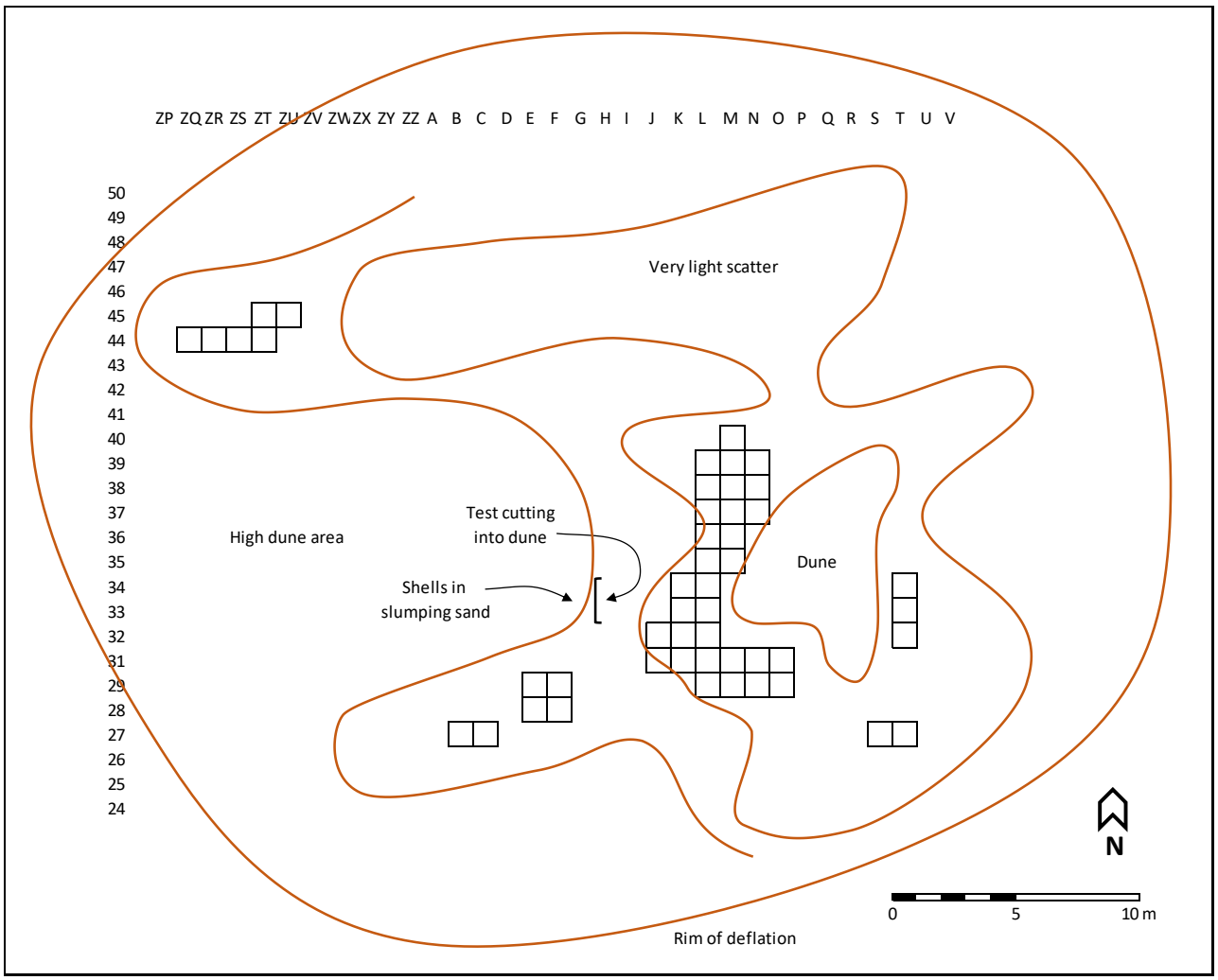


Figure 98: *Plan of HBK2014/009 showing the excavated areas.*

4.5.3. Stone artefacts

A large flaked artefact assemblage of 5210 artefacts was recovered from the excavation of HBK2014/009 (Table 2). The vast majority of the assemblage was made from quartz with all other materials totalling less than 6%. A particular feature of this site is the very large collection of retouched artefacts which were evenly split between scrapers (28) and backed tools (27). The other items were three adzes, a denticulate and a miscellaneous retouched piece. Just six retouched tools were made in CCS; all the rest were in clear quartz which, along with the very high overall quartz frequency, supports the presence of a Group 3 assemblage (following Orton 2012). However, Group 3 assemblages are usually more strongly dominated by backed tools which make it difficult to place this assemblage temporally. It might be slightly less than 2000 years old.

Sidescrapers were most common among the scrapers, with many of them having a broken end. This likely means that retooling was occurring at the site whereby people were making new scrapers to insert into hafts (handles) and disposing of the damaged ones. The majority of scrapers were elongated in shape, with those that were whole revealing a fairly consistent size and shape (Figure 99). A few, however, did not necessarily conform to the usual pattern (Figure 100).

Table 2: *Typological analysis of stone artefacts from HKB2014/009.*

Class	Quartz	Quartzite	Silcrete	CCS	Sandstone	Other
Sidescraper	19			1		
Miscellaneous scraper	1					
Scraper fragment	5			2		
Segment	2					
Backed bladelet	6					
Backed point	12					
Backed bladelet fragment	3					
Curve-backed flake	1					
Backed piece fragment	3					
Adze				3		
Denticulate	1					
Miscellaneous retouched piece	1					
Bipolar core	17			2		
Single platform core	12	3	1			
Single platform bladelet core	1					
Irregular core	12					
Edge-damaged bladelet	1					
Edge-damaged flake	5					
Blade	7	1				
Bladelet	169	6	1	5	1	1
Flake	1489	99	24	22	34	8
Chunk	467	39	1	3	6	1
Chip	2634	41	4	23	4	6
Total	**4868**	**189**	**31**	**61**	**45**	**16**
% material	**93.4**	**3.6**	**0.6**	**1.2**	**0.9**	**0.3**
Hammer stone fragment						1
Grindstone fragment						1
Lower grindstone						

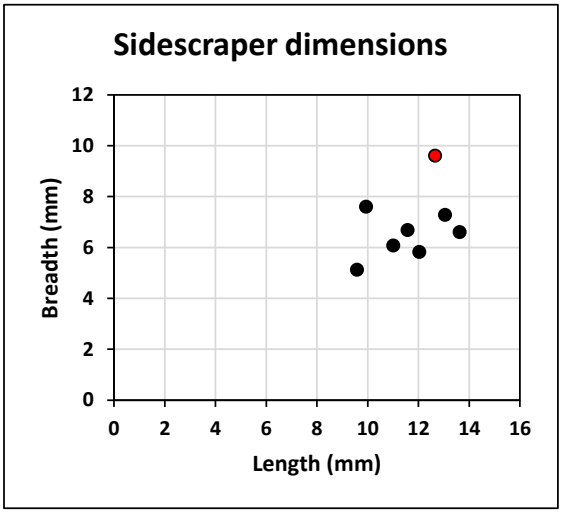


Figure 99: *Scatter plot of whole sidescraper dimensions showing the fairly consistent pattern in shape and size. The black dots represent those made in quartz and the red dot is the CCS one.*

Figure 100: *Four quartz sidescrapers from square L31 and showing some of the diversity in shape. Scale in cm & mm.*

The backed artefacts were dominated by backed points, but there were half as many backed bladelets as well. The whole backed points also display some consistency in their dimensions (Figure 101). These artefacts are typically long and thin (Figures 102 & 103). One of the backed bladelets was atypical in that its distal end was retouched to form a rounded shape (Figure 104). Segments are most frequently found in sites dating to the mid-Holocene, but do rarely occur on later sites.

The quartz denticulate was not a typical one like those described from Jakkalsberg N in the Richtersveld (Orton & Halkett 2001). Instead it is a core fragment that has had three small notches retouched into one edge of the break.

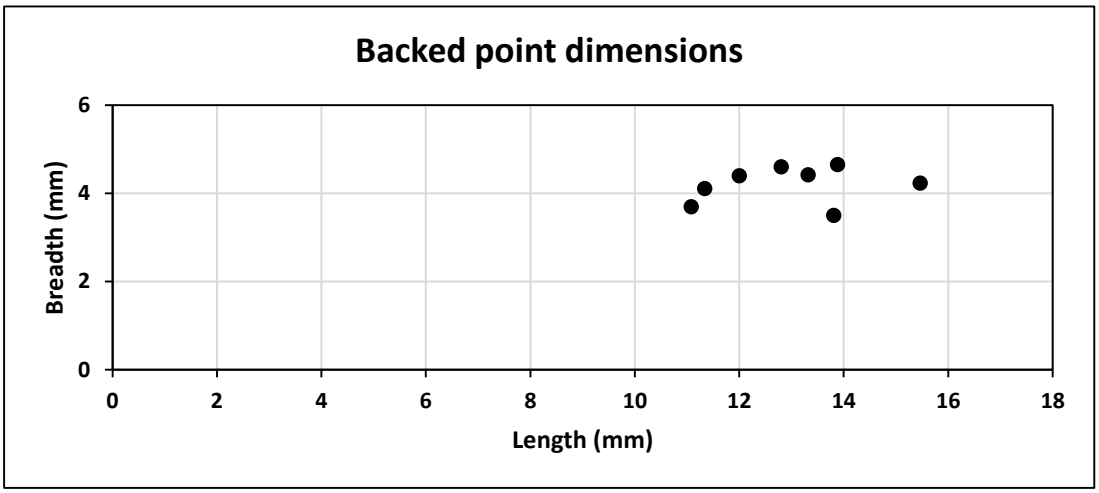


Figure 101: *Scatter plot of whole backed point dimensions showing the fairly consistent pattern in shape and size.*

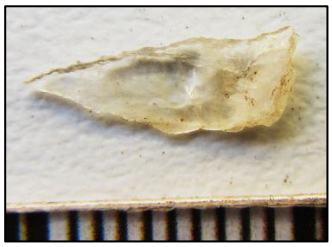


Figure 102: *Backed point from J31. Scale in mm.*

Figure 103: *Two quartz backed points from square F27. Scale in mm.*

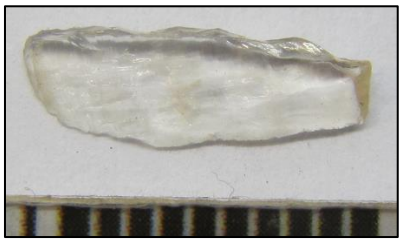


Figure 104: *Backed bladelet from square L31 with the proximal end broken (right) and the distal end retouched in to a rounded shape (left).*

Among the remaining artefacts there were many blades (>25 mm long) and bladelets (up to 25 mm long). There is a clear absence of bladelet cores from the assemblage (just one bladelet core was found) and it was evident that, despite the relatively high proportion of bladelets (10.6% of all flakes and blades) these artefacts were not being deliberately made. Figure 105 shows the range in shape and size of all blades and bladelets from one square (K31). There are very few with straight, parallel sides which suggests that the majority were produced by chance during flaking. Many also appeared more like splintered pieces of quartz with longitudinal splits evident. Such artefacts were probably mostly the product of bipolar flaking – the site has a fairly high proportion of bipolar cores when compared to other sites in the area (Orton 2015a, 2015b).

Figure 105: *A blade (left) and eleven bladelets from square K31.*

An unusual inclusion in the assemblage was a heat-treated CCS flake (Figure 106). Heat-treatment is seldom observed during the LSA and in Namaqualand. Heating certain types of stone before flaking them improves the qualities of the stone allowing greater control in the form of the flakes that are produced. The silcrete core was atypical in the sense that it was an older artefact (also a core) that was collected and reused (Figure 107).

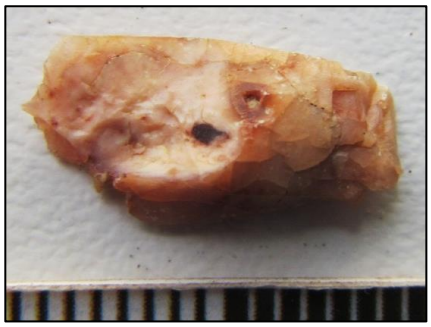


Figure 106: *A heat-treated CCS flake from M29 displaying the 'crazing' that occurs in a fire. Scale in mm.*

Figure 107: *An older silcrete core (original flaking shown by blue arrows) that was collected and reused (black arrows show recent flaking). Scale in cm & mm.*

The density of all stone artefacts (Figure 108) and of all retouched tools (Figure 109) was plotted. This showed that the majority of artefacts – and thus activity on the site – occurred in the southern part of the site. This density mirrored the visible surface scatter, although on the slope in the southwest (near square F28) it is apparent that more artefacts were present beneath the surface than we had realised, no doubt because of the reduced stability of the sloping dune face.

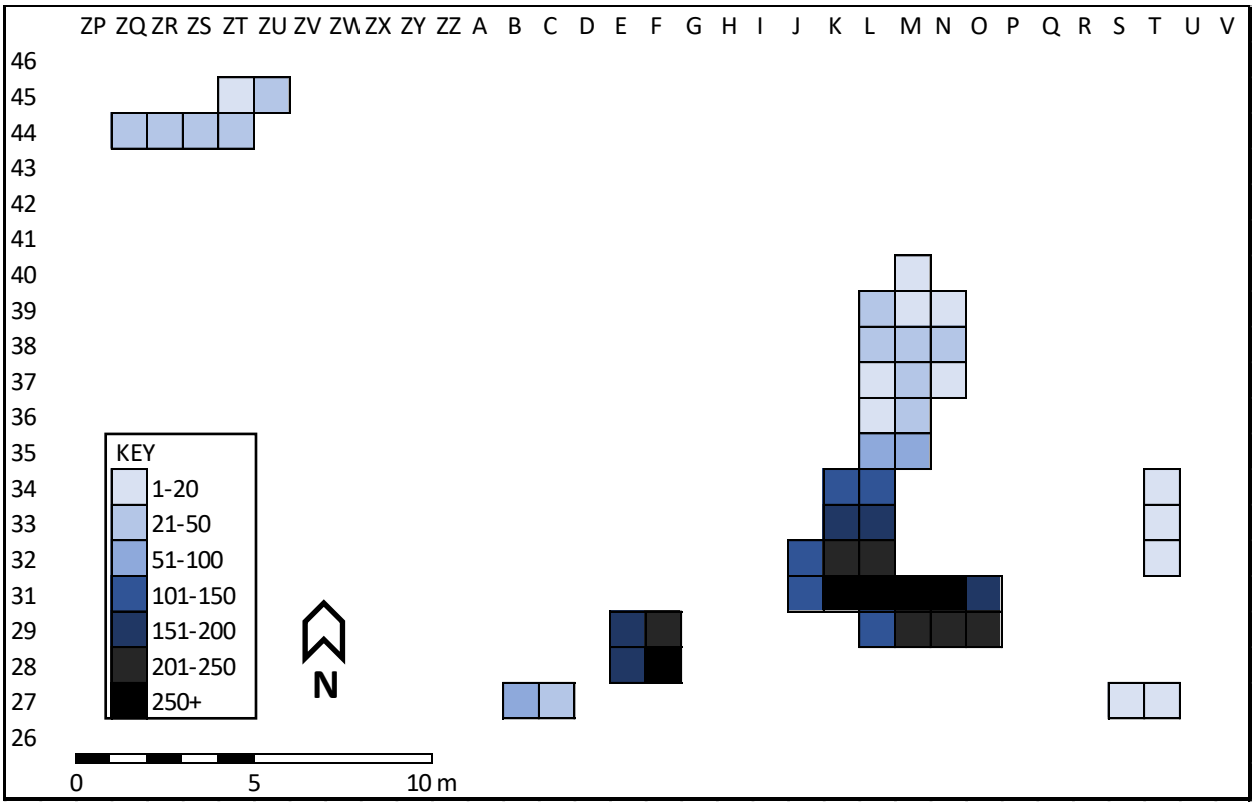


Figure 108: *Plan of HKB2014/009 showing the density of flaked stone artefacts.*

The site also had many small fragments of red/brown rock, some of which had qualities suggesting they may have been collected for use as pigment (ochre). There were 42 red ochre pieces recorded and a further one black pigment. Only one fragment of ochre looked as though it may have been ground, although actual striations were not visible.

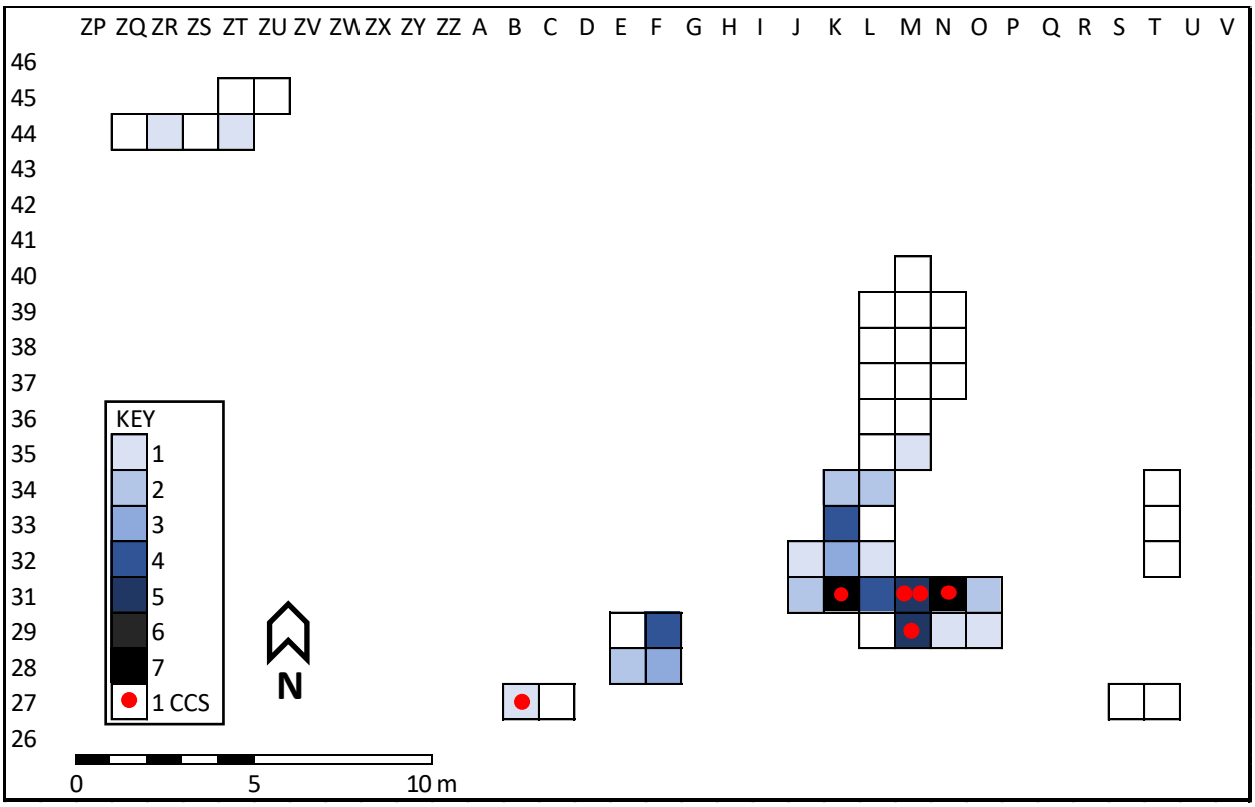


Figure 109: *Plan of HKB2014/009 showing the density of retouched stone artefacts and the locations of those made in CCS.*

4.5.4. Marine shell

The excavation produced 758.9 g of marine shell. The shell was very fragmented and in poor condition with the majority of fragments being limpet apices which tend to be stronger than the side walls of the shells. There were 352 individual shells counted and they belonged to four species, all limpets (Table 3). *C. granatina* dominated strongly, although it should be noted here that there were many unidentifiable limpets which may have belonged to either species. What is clear is that the larger *S. argenvillei* and *S. barbara* limpets were seldom carried to the site. This focus on two species is because the ratio of meat weight to shell weight is higher for *C. granatina* and *S. granularis*. The spatial distribution of shell by weight follows the distribution of stone artefacts (Figure 110). Anomalies are easily explained by the occurrence of the larger species. For example, square M40 has an *S. argenvillei* shell in it, while square K34 has both an *S. argenvillei* and an *S. barbara*.

Table 3: *Marine shell species frequencies from HBK2014/009.*

Species	**n**	**%**
C. granatina	198	56.3
S. granularis	87	24.7
S. argenvillei	8	2.3
S. barbara	1	0.3
Unidentifiable limpets	58	16.5

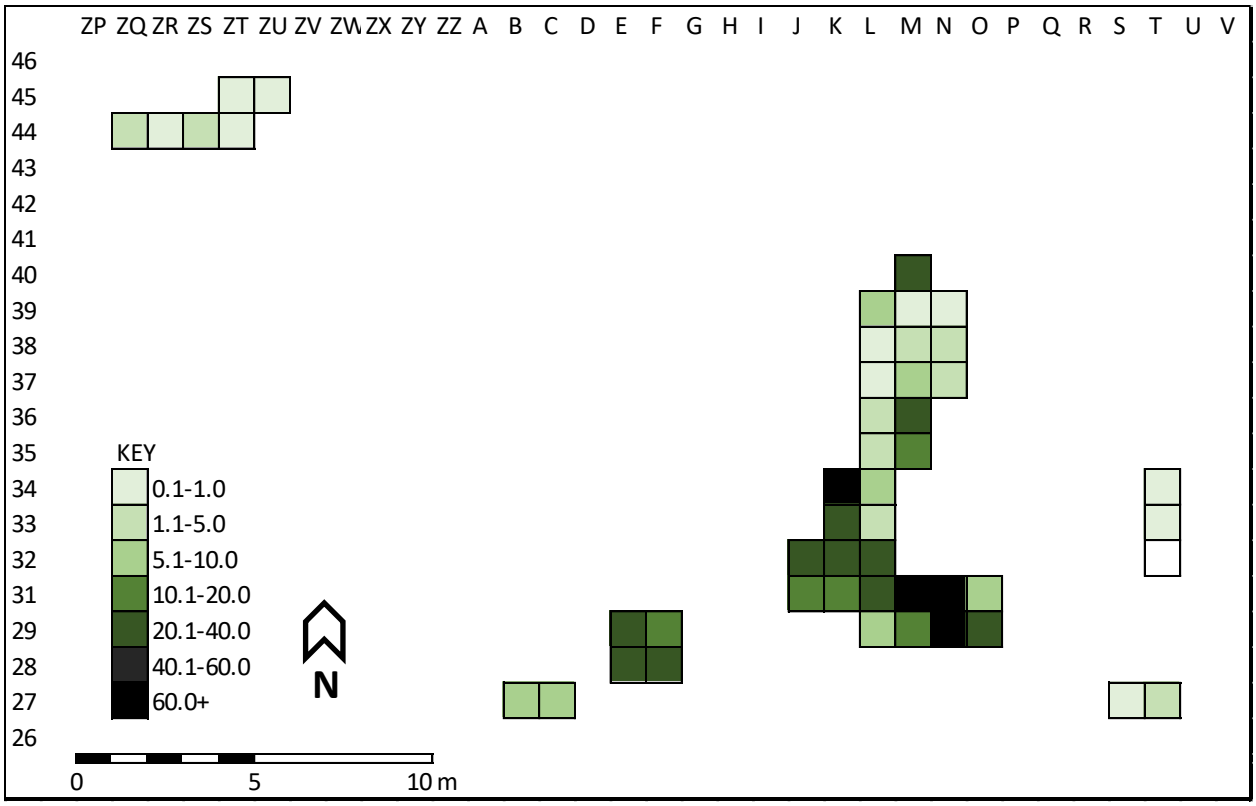


Figure 110: *Plan of HKB2014/009 showing the density of marine shell by weight (g).*

4.5.5. Ostrich eggshell

Four fragments of ostrich eggshell weighing a total of 2.0 g were found in the southern part of the site (squares C27 & K31). They do not merit further discussion.

4.5.6. Charcoal

In the south-western part of the site, we recovered 5.5 g of charcoal fragments. Charcoal was only preserved from this one part of the site and this is likely because of the degree of deflation experienced from all other areas. There was no evidence of a hearth or any concentration of ash.

4.5.7. Bone

Two tiny burnt bone fragments were found in square F28, in the same area as the charcoal. Together they weighed no more than 0.1 g and they were too small to be identifiable in any way.

4.5.8. Radiocarbon dating

This site is well worth obtaining an age for because of its rich stone artefact assemblage. A shell sample has been selected from square L31 and will be sent to DirectAMS for dating. The sample was comprised of a single countable *C. granatina* shell weighing 2.1 g.

4.6. HBK2014/011

4.6.1. Site description

The site was located in a very large deflation hollow of about 40 m by 60 m maximum dimension and oriented in a southeast to northwest direction (Figures 111 & 112). The rim of the hollow is higher along its north and west sides. The archaeological material was mostly clustered in the north-eastern part with the largest scatter actually occurring on the sloping dune face very close to the rim of the hollow. Smaller, lower density scatters occurred to the south and west of this area, while a scatter of ostrich eggshell fragments occurred in the north-western part of the deflation hollow. The site was heavily deflated with the archaeological material largely confined to the upper 1-2 cm of sand. There were only occasional isolated artefacts present over the remainder of the deflation hollow.

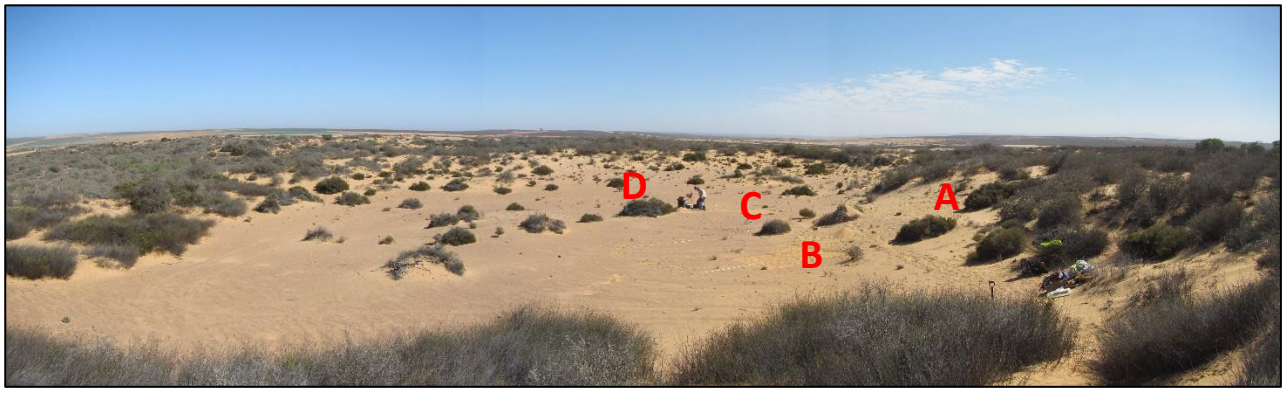


Figure 111: *View across the HBK2014/011 deflation hollow looking along its length towards the northwest. The four excavated patches are labelled.*

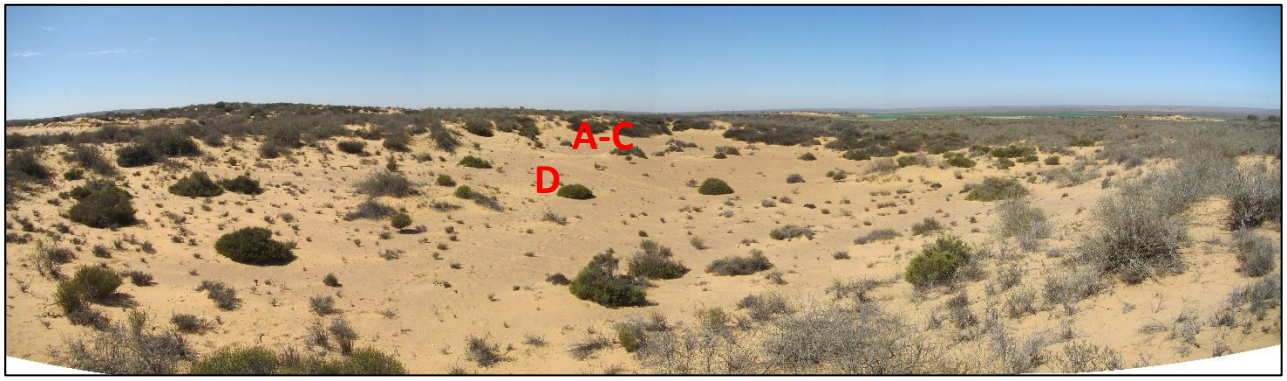


Figure 112: *View across the HBK2014/011 deflation hollow looking along its length towards the southeast. The four excavated patches are labelled.*

4.6.2. Excavation details

Excavation date:	• 30th March 2017

Excavated area:	• Total = 43 m^2 (see Figure 113)
	  ○ Patch A: 24 m^2;
	  ○ Patch B: 6 m^2;
	  ○ Patch C: 6 m^2; and
	  ○ Patch D: 7 m^2.

Excavation strategy:	• Grid laid with baseline running approximately north to south; • Hand-excavation of sand to about 5 cm depth in Patch A and about 2 cm depth over the remainder of the site within grid squares; and • Sieving of all deposit to recover the archaeology.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts • Marine shell • Ostrich eggshell

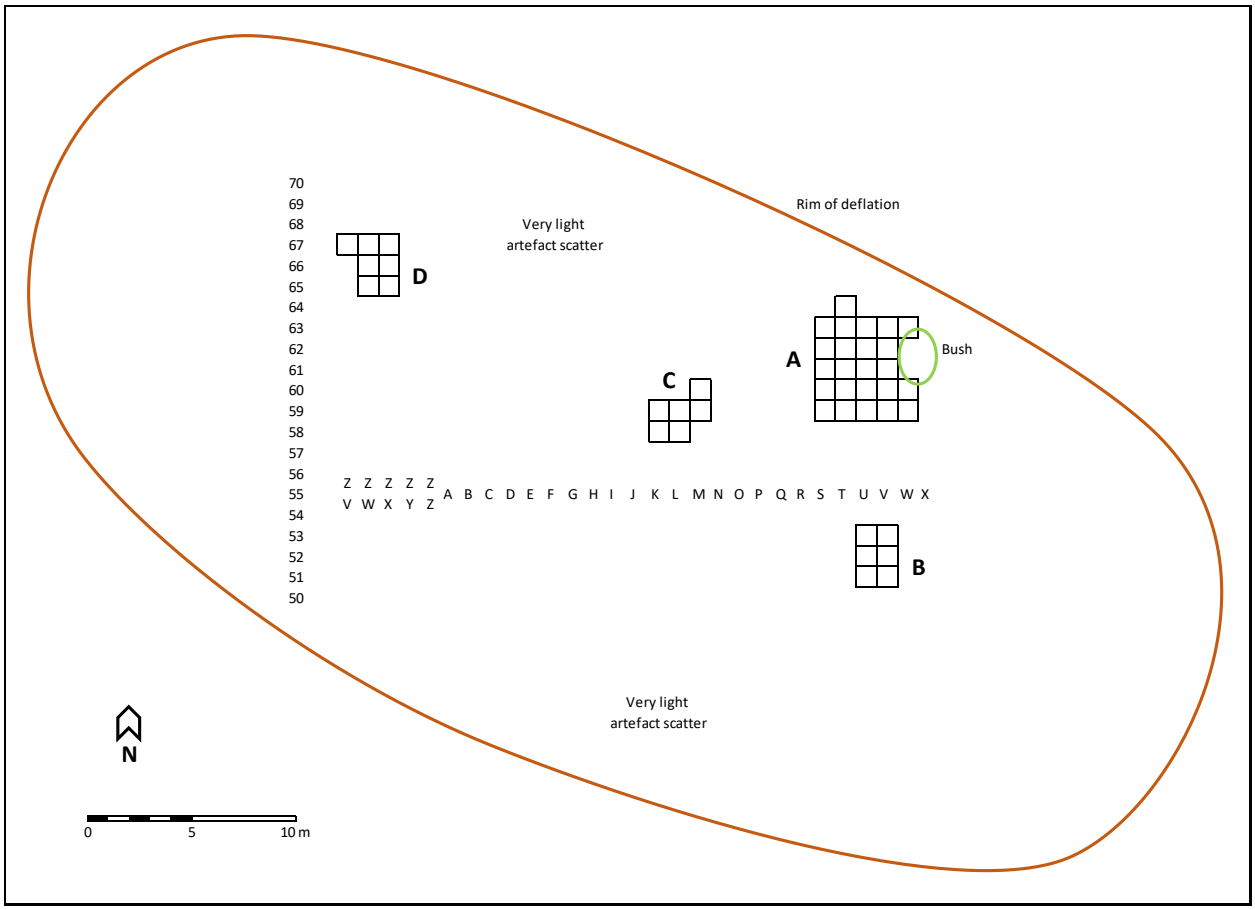


Figure 113: *Plan of HBK2014/011 showing the excavated areas.*

4.6.3. Stone artefacts

This site produced a small assemblage of 283 flaked stone artefacts (Table 4). They were almost all in quartz, with one of the three other artefacts clearly having been collected elsewhere and not even flaked on the site. This was a silcrete biface (Figure 114). It is quite likely that the artefact is in fact an ESA hand-axe which was not completely worked because the shape of the blank (which had a sharp edge along one margin) meant that this was not necessary in order to achieve the desired form. There was minimal fresh damage along the sharp, unworked edge showing some reuse of the piece. Aside from the flaked assemblage, there were also nine pieces of ochreous rock, two of which were refitting halves of a pebble. Two quartzite hammer stones and one in quartz were also found in the excavation, while another quartzite hammer stone was collected from the surface of square Z57. Retouched artefacts were entirely absent.

Table 4: *Typological analysis of stone artefacts from HKB2014/011.*

Class	Quartz	Quartzite	Silcrete	Other
Single platform core	3			
Irregular core	1		1	
Blade	1			
Bladelet	15			
Flake	74			
Chunk	24			2
Chip	162			
Total	**280**	**0**	**1**	**2**
% material	**98.8**	**0.0**	**0.3**	**0.7**
Hammer stone	1	2		

Figure 114: *Opposite sides of the silcrete biface. The recent damage is on the edge indicated by the arrows.*

Stone artefacts were most frequently encountered in patch A with Patch D having very few. There were just eight artefacts – all quartz chips – in the seven squares of Patch D.

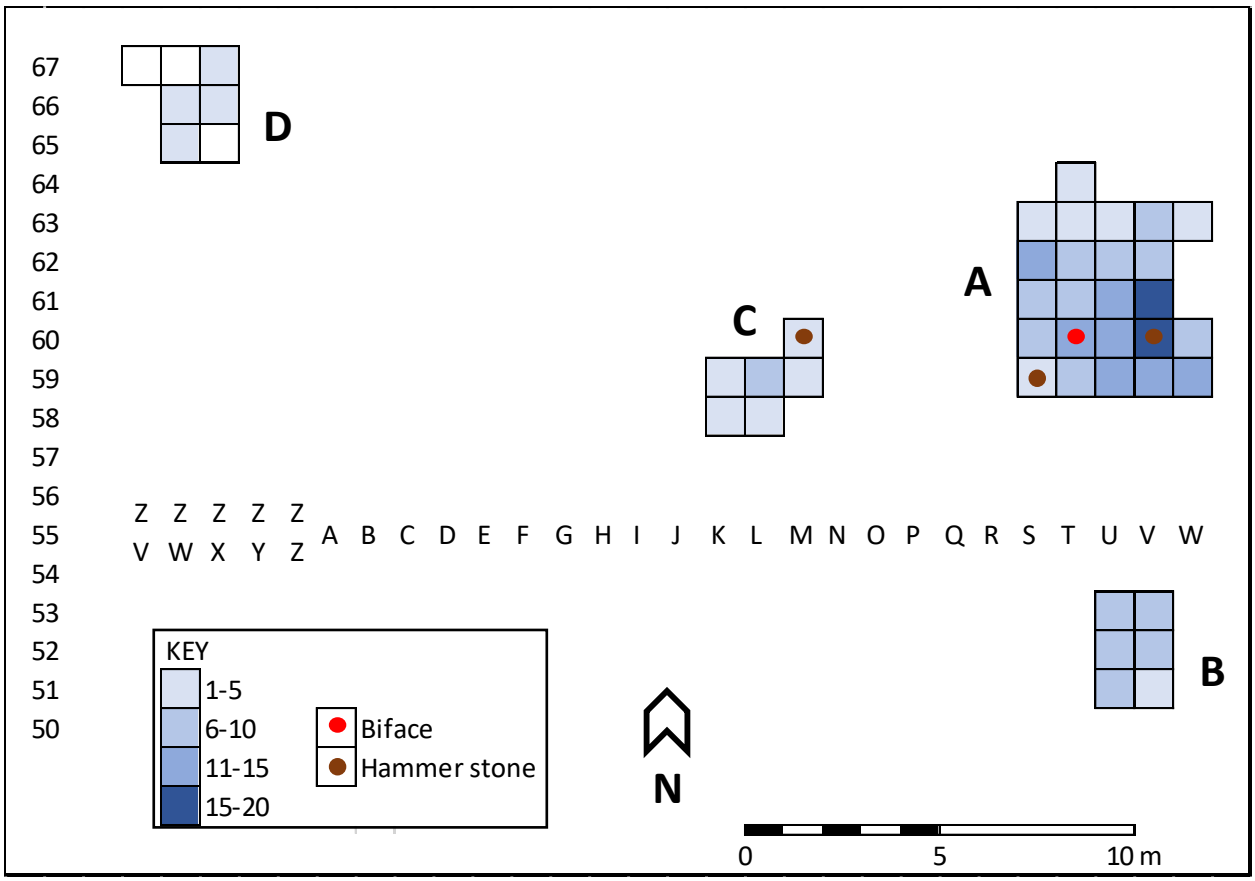


Figure 115: *Plan of HKB2014/011 showing the density of flaked stone artefacts. The positions of the silcrete biface and three hammer stones are also indicated.*

4.6.4. Marine shell

Marine Shell was present in only very small quantities in Patches A, B and C. In all, just five squares contained shell fragments. Once again apices were better preserved than other fragments, although a single whole *S. argenvillei* shell weighing 60.4 g did occur. Other countable shells included two *C. granatina* and two *S. granularis*. The total shell weight was 61.5 g.

4.6.5. Ostrich eggshell

Thirty-four ostrich eggshell fragments – two of them burnt – were found in Patch D. Their total weight was 21.5 g. There were no fragments in any of the other Patches but a collection of eight ostrich eggshell beads was recovered from Patch A. Following Orton (2012), they were all classed as 'very large' beads. Table 5 provides summary statistics for the beads, while Figure 117 provides a visual indication of the size range. The beads were very thin (mean = 1.29 mm) which indicates that they were very well-worn and had been in use on a necklace for a long period of time. Beads are known to have been used as trade goods between groups and it is possible that this is the reason for the weathered nature of the beads compared to the unworked fragments which were generally in good condition (Figure 118). The alternative is that the fragments relate to a different and later occupation. The large size of the beads suggests that the site is relatively recent and likely dates within approximately the last 1500 years.

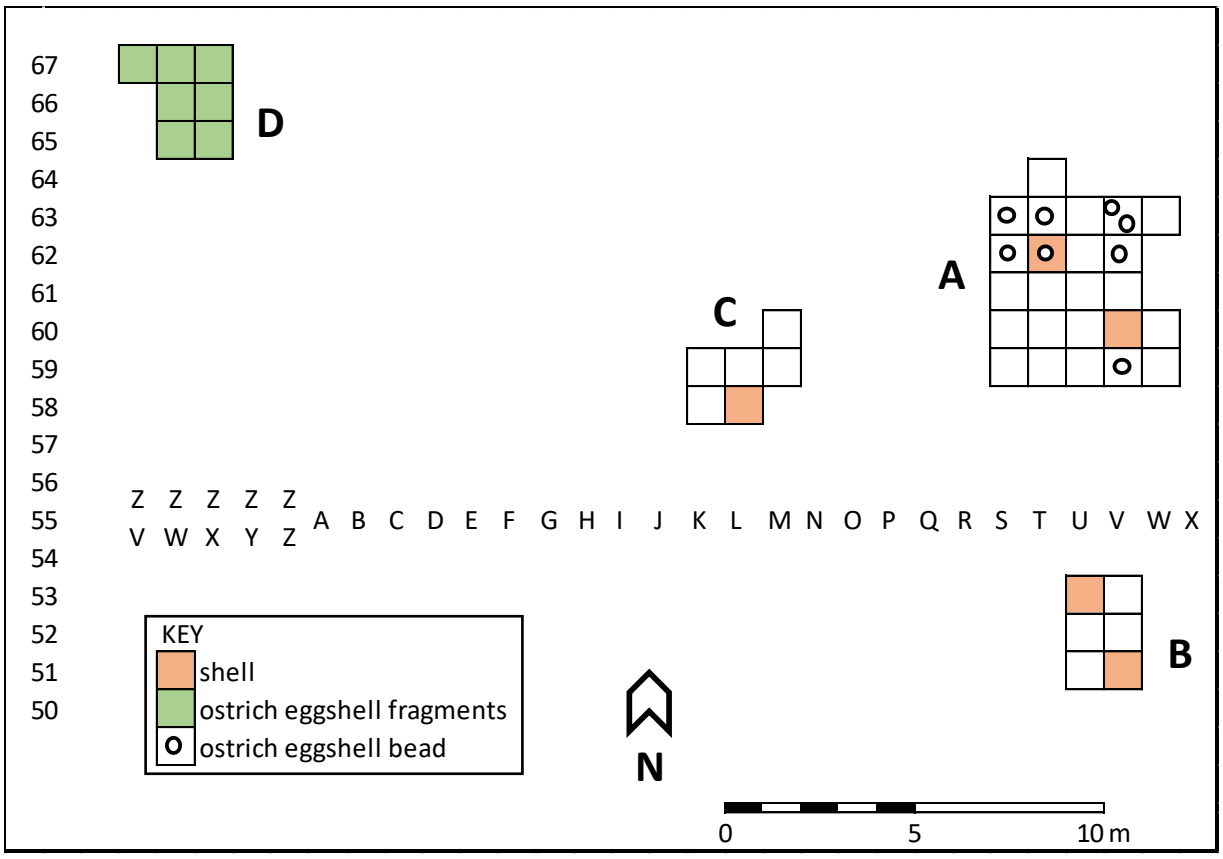


Figure 116: *Plan of HKB2014/011 showing squares containing marine shell and ostrich eggshell fragments, as well as the locations of all beads.*

Table 5: *Summary statistics for the eight ostrich eggshell beads from HBK2014/011, Patch A.*

	External diameter	Aperture diameter	Thickness
Mean	8.73	3.16	1.29
Standard deviation	0.51	0.23	0.15
Maximum	9.37	3.55	1.48
Minimum	7.94	2.86	1.07

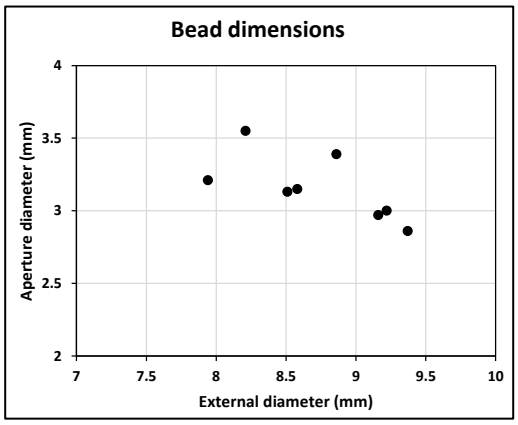


Figure 117: *Scatter plot of ostrich eggshell bead dimensions from HBK2014/011, Patch A.*

Figure 118: *An ostrich eggshell fragment (square ZW66) and two beads (V63). Scale in cm & mm.*

4.7. HBK2017/007

4.7.1. Site description

The broader site is made up of two interlinked deflation hollows with the northern one being larger than the southern one. The southern one has very low rims (maybe 1-1.5 m maximum above the deepest point and is about 20 m by 30 m in dimension. The larger hollow has rims up to about 3-4 m tall, especially on the west side, and its dimensions are about 45 m by 25 m. The excavated site consisted of an elongated scatter of artefacts clustered along the western edge of the smaller deflation (Figure 119). The surface was very well deflated and there was a consolidated sterile sand surface about 3-5 cm below the surface. The archaeology did not extend into this surface and this was thus the depth to which we excavated. There was light artefact scatter to the east of the excavated area, while the northern deflation hollow contained even fewer artefacts.

The deflation hollow contained large numbers of small reddish-coloured quartzite rocks (Figure 121). We also found a fair number of small pieces of cement across the site, including within the excavated area. Occasionally these red rocks had cement adhering to them. For this reason we did not collect or record any of the non-flaked rocks. There is a source of these rocks a short distance to the south of the hollow and we have no way of knowing which rocks were brought in recently and which not.

Figure 119: *View towards the south across the length of the excavated area of HBK2017/007. The second and larger deflation lies behind the viewer.*

Figure 120: *View northwards across HBK2017/007 showing the excavation area (green arrows) and the larger hollow in the distance (red arrow).*

Figure 121: *View of the surface of HBK2017/007 in the southern half of the excavated area showing the many red quartzite rocks.*

4.7.2. Excavation details

Excavation date:	• 1st April 2017
Excavated area:	• 46 m^2 (see Figure 122)
Excavation strategy:	• Grid laid with baseline running approximately north to south; • Hand-excavation of sand to at least 5 cm depth within grid squares; • Sieving of all deposit to recover the archaeology; and • All unworked rocks were discarded because some were found to have cement adhering to them.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts • Marine shell • Metal • Glass • Ceramic

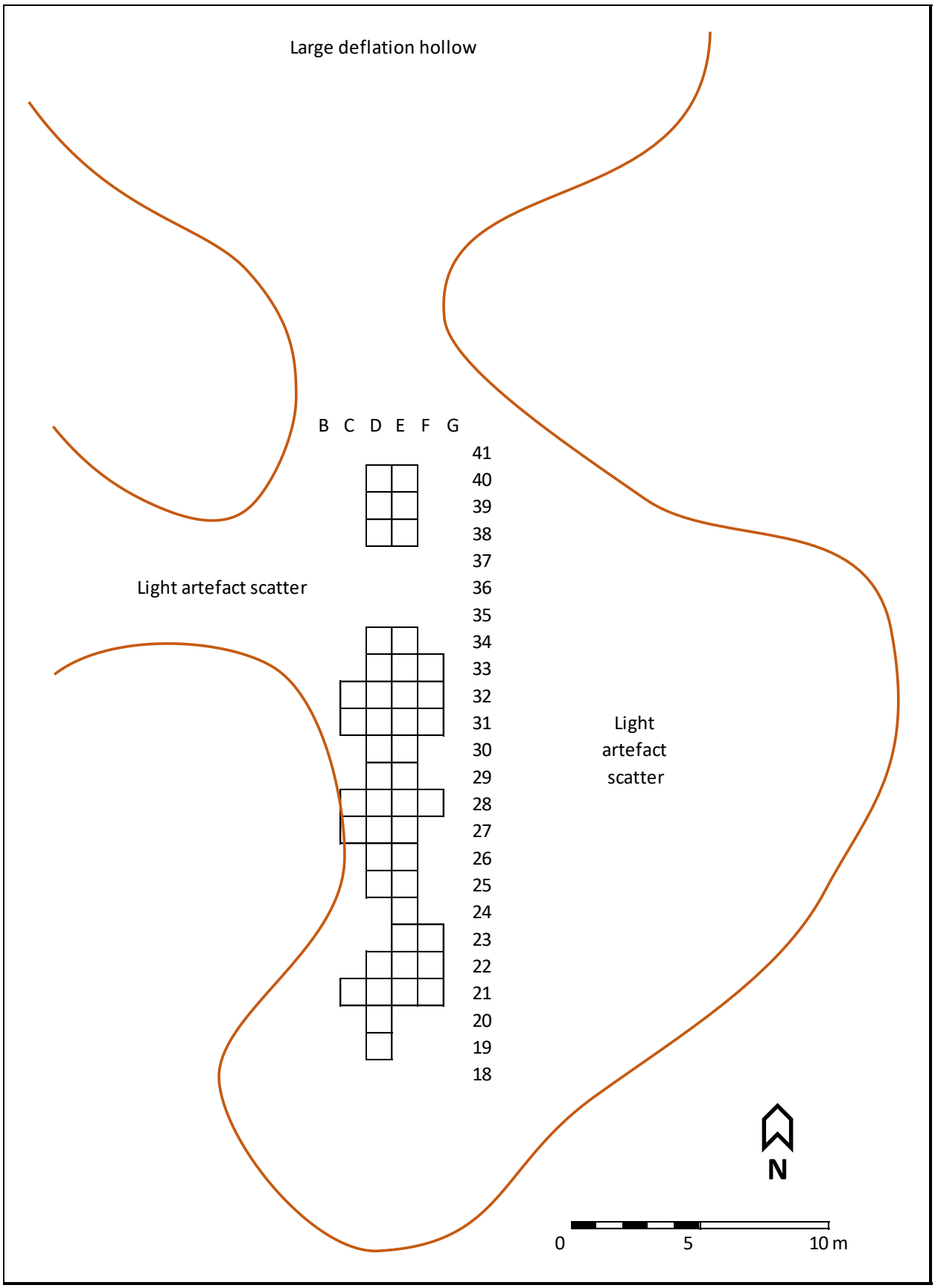


Figure 122: *Plan of HBK2017/007 showing the excavated area.*

4.7.3. Stone artefacts

An assemblage of 2775 flaked stone artefacts was collected from the site (Table 6). It was very strongly dominated by quartz, but a range of other materials were also present. It was notable that many artefacts were partly of quartz and partly of quartzite showing that quartz was being collected from a seam within quartzite bedrock (Figures 123 & 124). Such artefacts were generally classified according to whichever material dominated.

Table 6: *Typological analysis of stone artefacts from HKB2017/004.*

Class	Quartz	Quartzite	Silcrete	CCS	Sandstone	Other
Backed point			2	2		
Backed bladelet	1		1			
Backed flake	2					
Bipolar core	5					
Single platform core	8	1				
Irregular core	5					
Edge-damaged chunk	1					
Blade	12	1				
Bladelet	80	3	2	1		
Flake	791	37	4	4	9	3
Chunk	328	19	1			
Chip	1432	9		4	5	1
Total	**2665**	**71**	**10**	**11**	**14**	**4**
% material	**96.0**	**2.6**	**0.4**	**0.4**	**0.5**	**0.1**
Hammer stone	1					
Upper grindstone						
Lower grindstone						

Figure 123: *The stone artefacts from square F22. Scale in cm & mm.*

Figure 124: *The dorsal surface of a quartz flake with much quartzite present. Scale in cm & mm.*

Just eight retouched artefacts were found. All were backed with three being in quartz and the rest in silcrete and CCS. This suggests that, despite the high frequency of quartz overall, the site may relate to Orton's (2012) Group 1 assemblages. Interestingly, though, Silcrete and CCS were only minimally flaked, if at all, on the site because no cores were found and their total artefact numbers are both very low. The most common type was backed points with two each in silcrete and CCS (Figures 125 & 126). A silcrete one was interesting because it was also lightly retouched in two places on its sharp edge, while one in CCS had a section missing from its sharp edge (Figure 126).

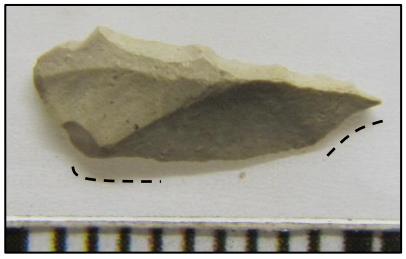


Figure 125: *A silcrete backed point from square D19. It has short retouched sections on is sharp edge above the dotted lines. Scale in mm.*

Figure 126: *A CCS backed point from square E22 with a broken tip at right and damage to its sharp edge (above the dashed line). Scale in mm.*

The edge-damaged chunk was classified as this for want of a better option. It was scraper-like but had a very short 'retouched' edge. It also looked a bit like a core but any flakes removed from it would have been far too small to be useable (3-4 mm maximum). It is thus assumed that the scars were the result of damage from some sort of use.

Figure 128 shows that the density of flaked stone artefacts increases dramatically towards the south. The surface indications showed the same pattern: a dense scatter of artefacts was confined to the 'passageway' between the dune to the west and a clump of bushes to the east.

4.7.4. Marine shell

Thirteen squares contained shell but the overall quantity was extremely small. The minimum number of individual shells was six, all of them *C. granatina*. The only other species identified was *S. argenvillei* which was represented by a single fragment. The total shell weight was 9.7 g. The shell was concentrated in the southern part of the site.

4.7.5. Metal

Six small fragments of rusty metal were found across the site. They were widely distributed (Figure 129). They are no doubt of recent origin.

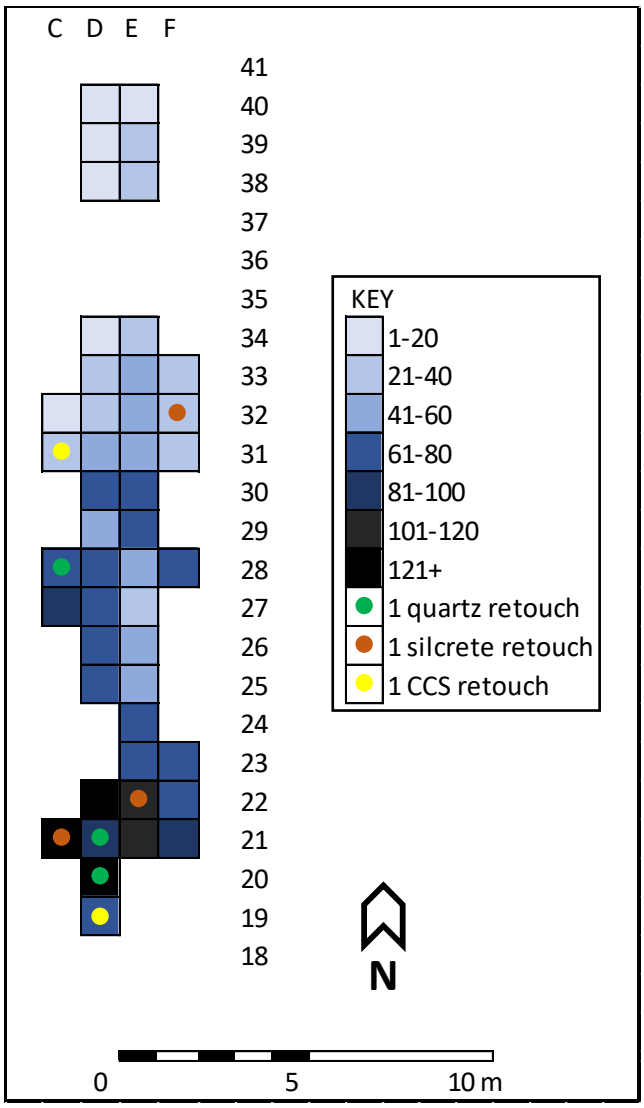


Figure 127: *Plan of HKB2017/004 showing the density of flaked stone artefacts. The positions of all retouched artefacts are also indicated.*

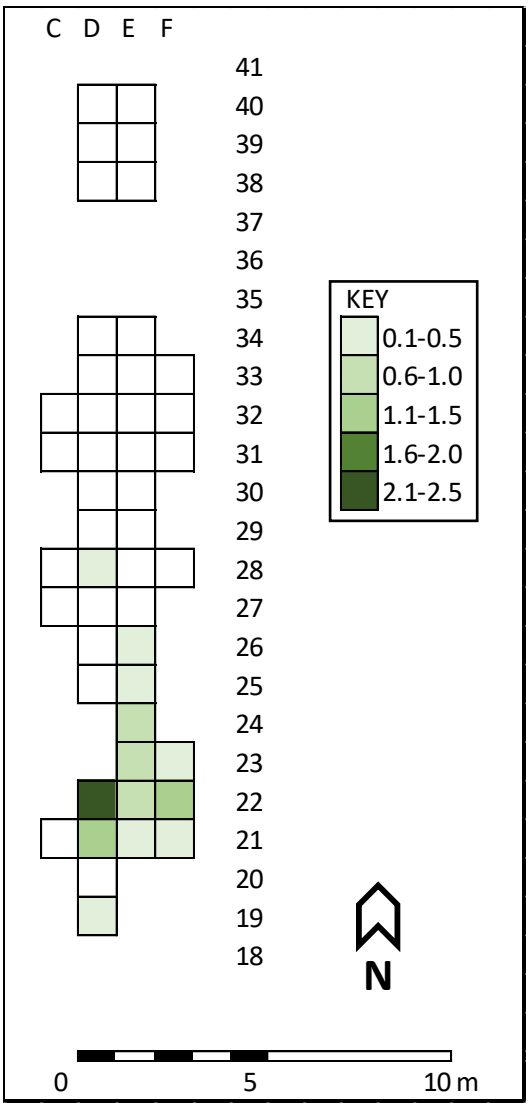


Figure 128: *Plan of HKB2017/004 showing the density of marine shell by weight (g).*

4.7.6. Glass

Eight glass fragments were found. They consisted of both clear, flat glass as well as curved bottle glass. All were clear except one which was very light green in colour. One of the curved fragments was very thin. The glass was distributed across the site and (Figure 129) is no doubt modern in origin.

4.7.7. Ceramic

A single refined earthenware fragment was found at the northern end of the site (Figures 129 & 130). It is likely British creamware with an origin in the 19th century (Klose & Malan 2009), although it was likely dropped relatively recently.

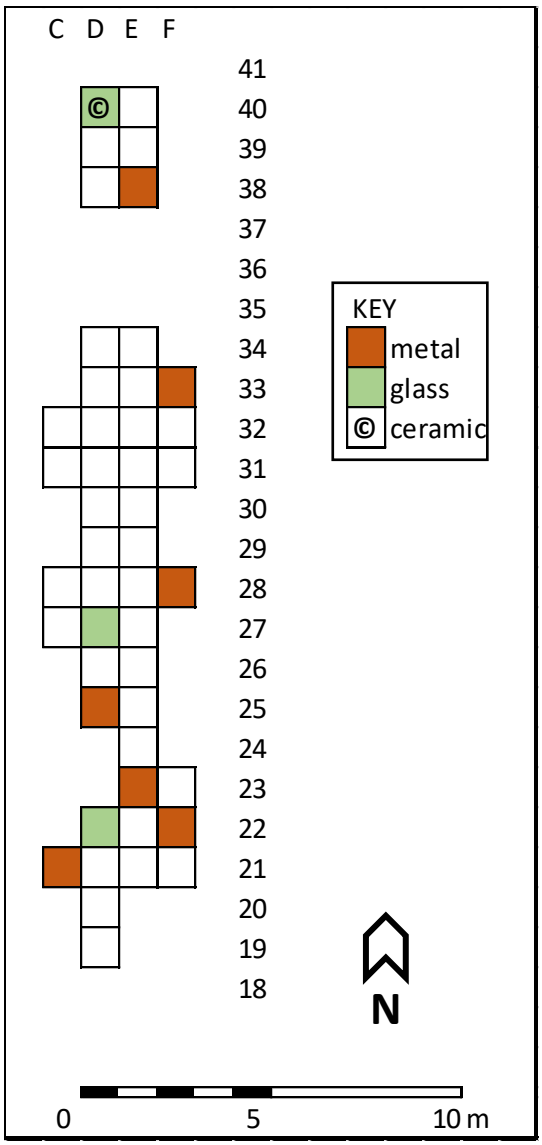


Figure 129: *Plan of HKB2017/004 showing the distribution of metal, glass and ceramic finds.*

Figure 130: *The ceramic fragment from HBK2017/007. Scale in cm.*

4.8. HBK2017/017

4.8.1. Site description

This site was a small, discrete scatter of stone and shell located in a very small, weakly defined deflation hollow of some 8 m by 5 m dimension. The hollow lay on the crest of a south-southwest to north-northeast-trending dune ridge which is some 60-80 m wide (Figure 131).

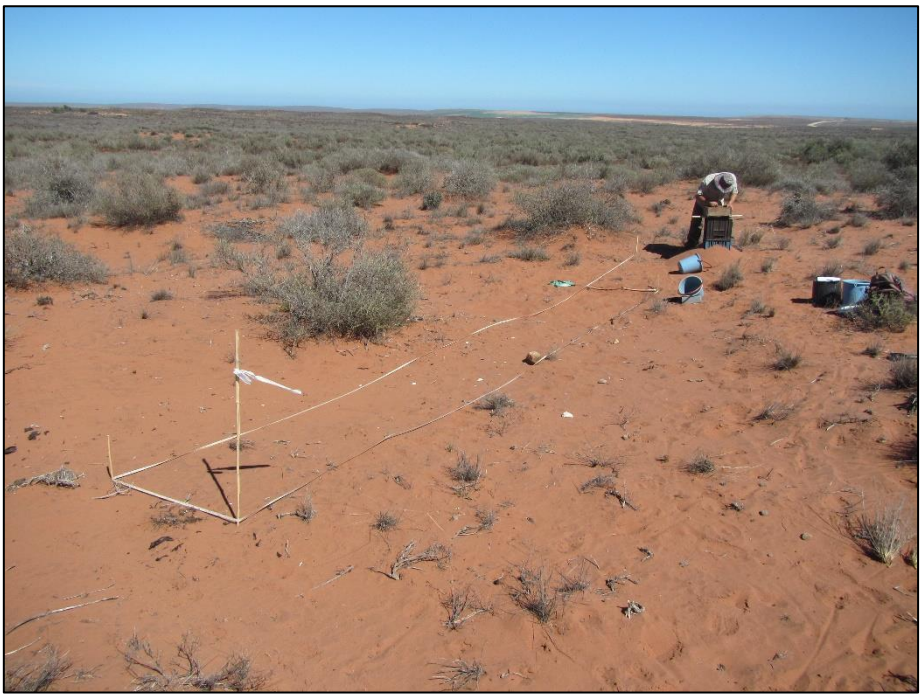


Figure 131: *View towards the southwest across the small deflation at HBK2017/017.*

4.8.2. Excavation details

Excavation date:	• 3rd April 2017
Excavated area:	• 12 m^2 (see Figure 132)
Excavation strategy:	• Grid laid with baseline running approximately west to east; • Hand-excavation of sand to no more than 5 cm depth within grid squares; and • Sieving of all deposit to recover the archaeology.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts • Marine shell • Ostrich eggshell • Metal • Charcoal

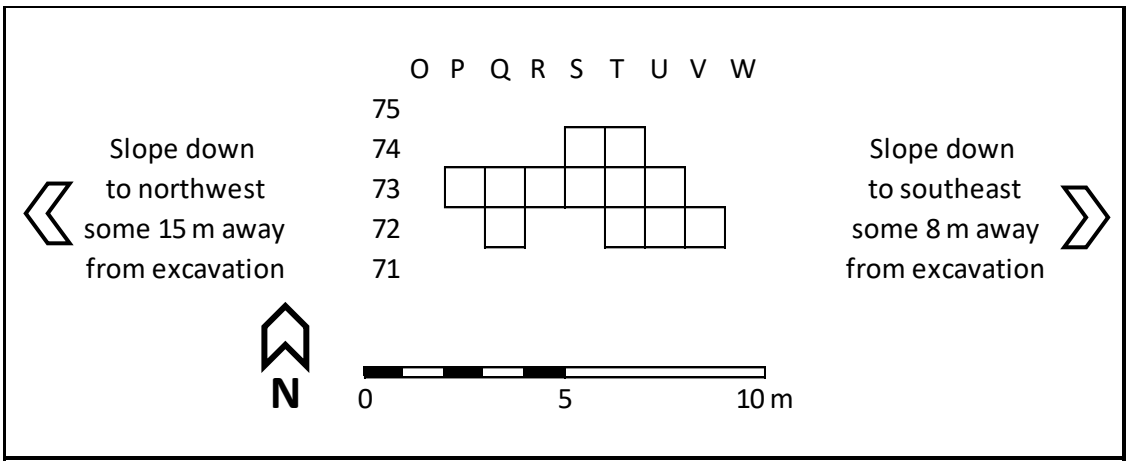


Figure 132: *Plan of HBK2017/017 showing the excavated area.*

4.8.3. Stone artefacts

The site yielded a small collection of 109 flaked stone artefacts (Table 7). It was quartz-dominated with much of the remainder being quartzite. There was just one retouched item, a scraper fragment made in CCS. One quartzite core was present. It was made on an older artefact – seemingly of the same type – that was collected and reused (Figure 133). The anvil was a block of quartzite of about 17 cm by 9 cm by 9 cm that was lightly damaged on its working surface (Figure 134). It was found with the worked surface facing up.

Table 7: *Typological analysis of stone artefacts from HKB2017/017.*

Class	**Quartz**	**Quartzite**	**Silcrete**	**CCS**	**Other**
Scraper fragment				1	
Single platform core		1			
Irregular core	1				
Bladelet	3	1			
Flake	24	3			1
Chunk	3	1			
Chip	68	1	1		
Total	**99**	**7**	**1**	**1**	**1**
% material	**90.8**	**6.4**	**0.9**	**0.9**	**0.9**
Hammer stone	1	1			
Anvil		1			

Figure 133: *The quartzite single platform core from HBK2017/017.*

Figure 134: *The quartzite anvil from HBK2017/017. It is approximately 17 cm long.*

Figure 135 shows the density of flaked stone artefacts. Because the total numbers were fairly low, there are no clear concentrations anywhere.

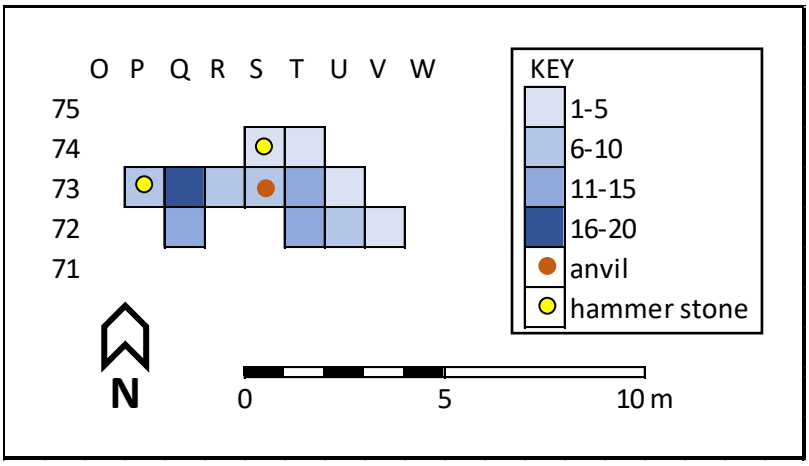


Figure 135: *Plan of HKB2017/017 showing the density of flaked stone artefacts. The positions of all retouched artefacts are also indicated.*

4.8.4. Marine shell

The site contained a light scatter of shell throughout the excavated area. There were 32 countable individuals and the total shell weight was 61.7 g. Table 8 shows that the two common limpet species were present along with a single whelk (*Burnupena* sp.).

Table 8: *Marine shell species frequencies from HBK2017/017.*

Species	**n**	**%**
C. granatina	23	71.9
S. granularis	3	9.4
Unidentifiable limpet	5	15.6
Burnupena sp.	1	3.1

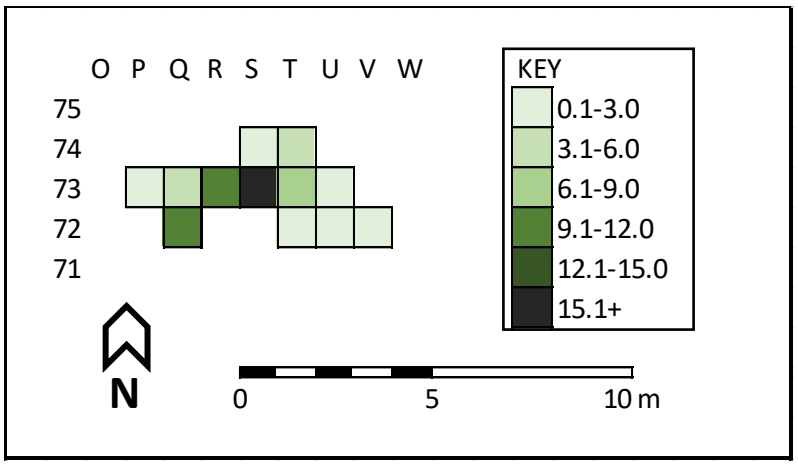


Figure 136: *Plan of HKB2017/017 showing the density of marine shell by weight (g).*

4.8.5. Ostrich eggshell

Seven fragments of ostrich eggshell weighing a total of 0.5 g were found in four squares spread across the site.

4.8.6. Metal

A single small fragment of rusty metal was found in square P73. It is undoubtedly of recent origin.

4.8.7. Charcoal

Charcoal weighing a total of 1.5 g was found in three squares in the eastern half of the scatter. Given the presence of metal here (and indeed its frequent occurrence at HBK2017/018), it is likely that the charcoal is of recent origin.

4.9. HBK2017/018

4.9.1. Site description

This site presented as a series of very low density surface shell and stone artefact scatters on the crest of a south-southwest to north-northeast-trending dune ridge (Figure 137). Some scatters were in vague deflations, while others were just on flat areas. There is also a small amount of archaeology extending down the eastern side of the dune but the site does not reach to the western slope of the dune.

Figure 137: *View towards the south acrossHBK2017/018.*

4.9.2. Excavation details

Excavation date:	• 2nd & 3rd April 2017
Excavated area:	• 38 m^2 (see Figure 138)
Excavation strategy:	• Grid laid with baseline running approximately west to east; • Hand-excavation of sand to variable depth within grid squares. In some areas the material was confined to the upper 3-5 cm, while in the two largest excavated patches the archaeology continued to around 7-10 cm depth; • Choice of squares was guided by both the visible presence of material on the surface as well as the availability of spaces between the bushes; and • Sieving of all deposit to recover the archaeology.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts • Marine shell • Ostrich eggshell • Metal • Charcoal

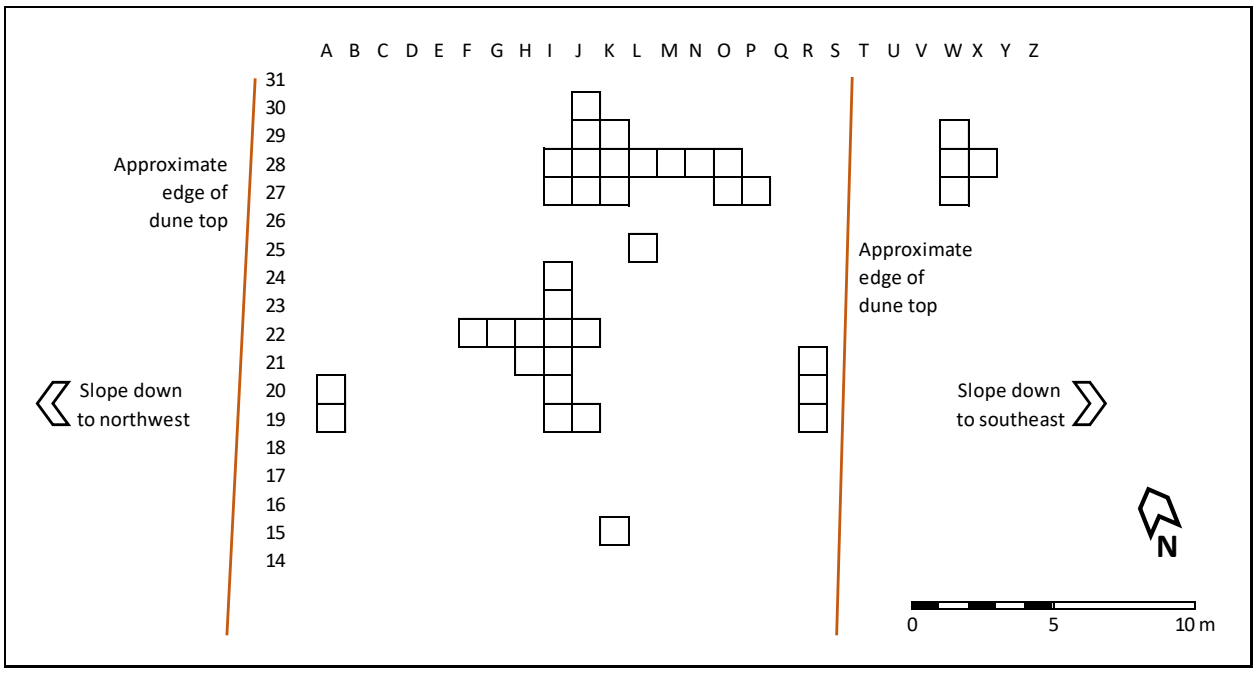


Figure 138: *Plan of HBK2017/018 showing the excavated areas.*

4.9.3. Stone artefacts

There were 1088 flaked stone artefacts recovered from the excavation, the vast majority of which were in quartz (Table 9). These included twelve retouched tools, all made in clear quartz. Scrapers – all of them sidescrapers – dominated strongly. It is thus difficult to assign the assemblage to one of Orton's (2012) Groups because one of the main feature of both Groups 1 and 3 are present, while one each is absent. It was noticeable that many of the sidescrapers were made on bladelets. Scrapers and backed tools occurred on both of the two northern patches and there is no evidence to suggest that the excavated patches are unrelated. They might, however, have related to a series of visits over a short space of time, or perhaps over several years. A single lower grindstone was found on the site. It was a grooved grindstone, although both sides had been ground (Figures 139 & 140). The grooved side was found facing down. It is normal to find the ground side or, as in this case, the more heavily ground side facing down. The flat side has a red stain on it but this is not ochre; rather, it appears to be a natural iron stain. The grindstone's dimensions were approximately 24 cm by 17 cm by 6 cm. A fragment of a faceted upper grindstone was also found, but it was found across the site some 9 m away.

Figure 141 shows the density of flaked stone artefacts across the site. It is evident that there were several places where stone artefacts were worked. The positions of retouched tools indicates that these were discarded in association with all the dense patches of artefacts.

Table 9: *Typological analysis of stone artefacts from HKB2017/018.*

Class	Quartz	Quartzite	Silcrete	CCS	Sandstone	Other
Sidescraper	8					
Backed point	2					
Backed bladelet	1					
Miscellaneous retouched piece	1					
Bipolar core	1					
Single platform core	6					
Irregular core	2					
Edge-damaged flake	1					
Blade	3		1			
Bladelet	18		1			
Flake	230	33	13	1		1
Chunk	65	6	1	1		1
Chip	717	10	3	7	1	
Total	**1011**	**47**	**18**	**9**	**1**	**2**
% material	**92.9**	**4.3**	**1.7**	**0.8**	**0.1**	**0.2**
Upper grindstone fragment		1				
Lower grindstone		1				

Figure 139: *The lower grindstone from HBK2017/018. This surface was found facing down. Scale = 15 cm.*

Figure 140: *The lower grindstone from HBK2017/018. This surface was found facing up. Scale = 15 cm.*

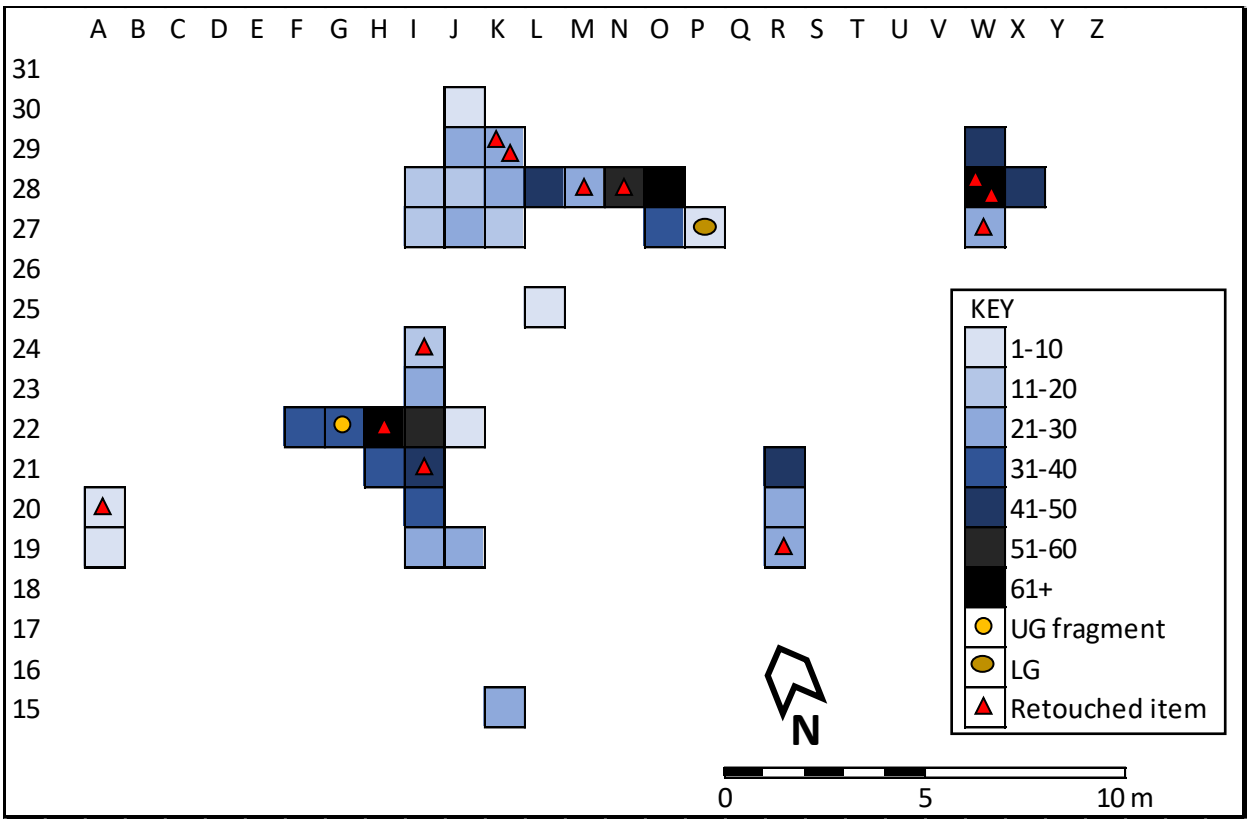


Figure 141: *Plan of HKB2017/018 showing the density of flaked stone artefacts. The positions of the two grindstones and all retouched items are also indicated.*

4.9.4. Marine shell

Marine shells were found across the site with a total of 133 countable individuals being recorded. These belonged to the three most common limpet species as well as to the black mussel. The total weight of shell recovered was 223.7 g and this was spread across the site but with two areas of greatest concentration. The black mussel shells are an unusual inclusion.

Table 10: *Marine shell species frequencies from HBK2017/018. For* C. meridionalis *(black mussel) the left/right hinges are counted.*

Species	**n**	**%**
C. granatina	45	33.8
S. granularis	76	57.1
S. argenvillei	2	1.5
Unidentifiable limpet	7	5.3
Choromytilus meridionalis	1/3	2.2

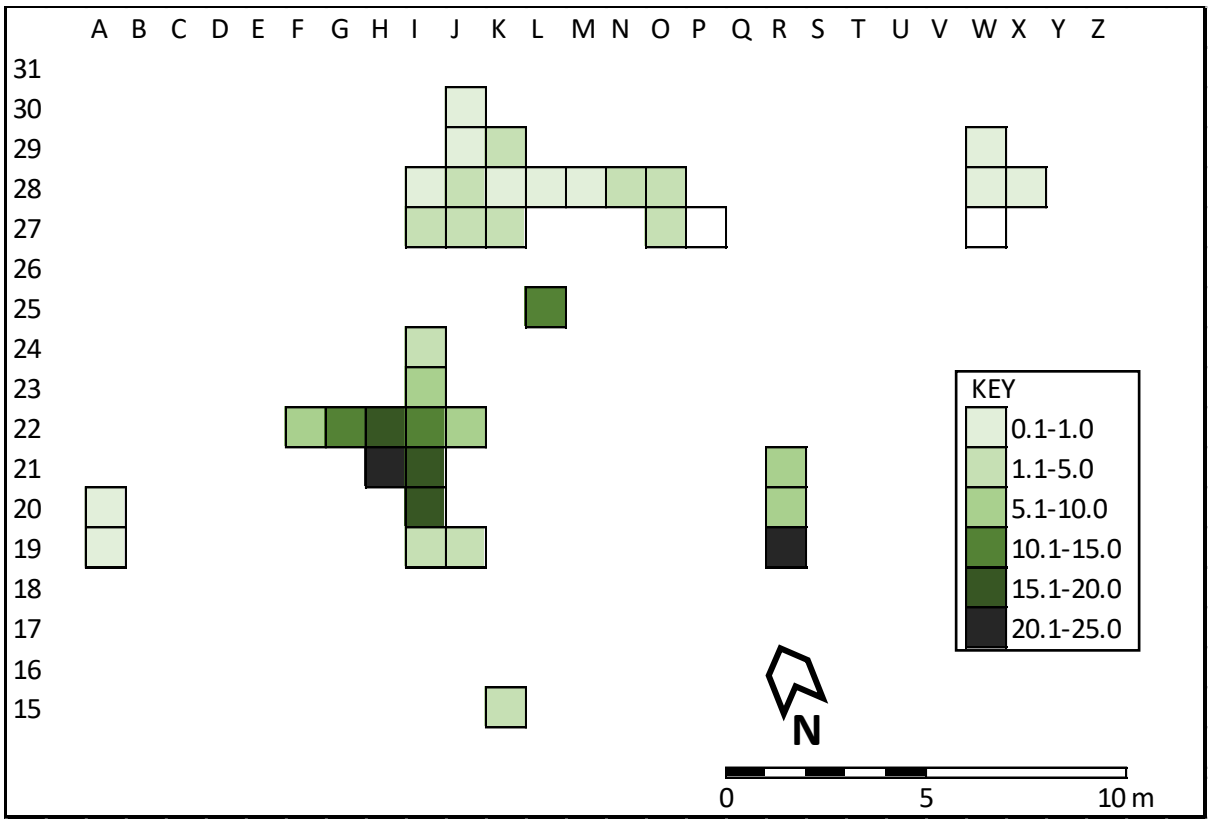


Figure 142: *Plan of HKB2017/018 showing the density of marine shell by weight (g).*

4.9.5. Ostrich eggshell

Thirty ostrich eggshell fragments weighing 10.0 g were found. None were modified. They were mostly in the southwestern part of the site (Figure 143).

4.9.6. Metal

There were large numbers of rusted metal fragments found on the site. They were mostly in the central part of the site, on the crest of the dune ridge (Figure 144). The fragments were mostly flat, but a number were slightly curved. Several folded sections were also found (Figure 145) and these prompted the suggestion that the metal represents the remains of a 44 gallon drum (or similar) that was left on the dune in the past. It must be emphasized that there were very many tiny pieces of metal (many of them no doubt broke up further during sieving) and that during sorting we only collected those that were greater than approximately 1 cm long. Half of a press stud (Figure 146) and two eyelets (presumably from a shoe; Figure 147) were also found near the largest concentration of metal fragments.

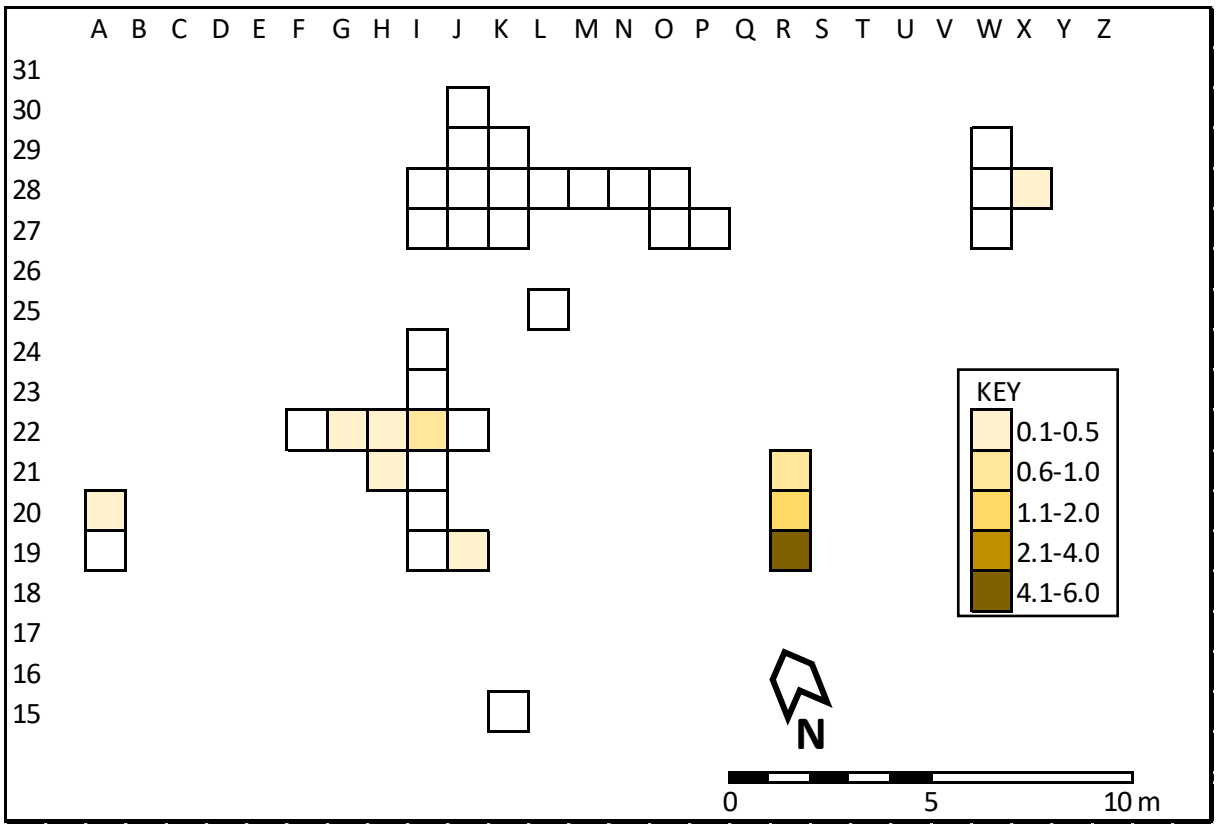


Figure 143: *Plan of HKB2017/018 showing the density of ostrich eggshell by weight (g).*

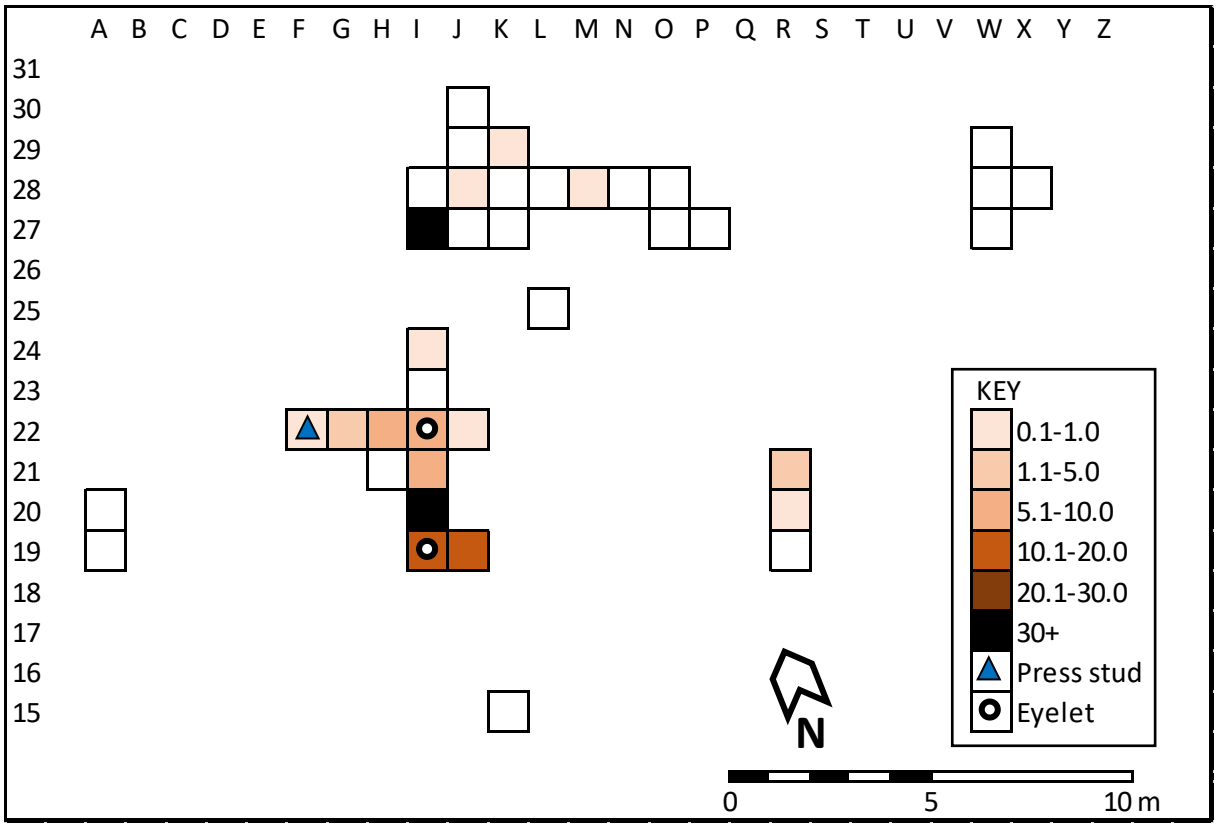


Figure 144: *Plan of HKB2017/018 showing the density of metal fragments by weight (g) and other metal items.*

Figure 145: *Flat and folded rusty metal fragments from square I21. Scale in cm.*

Figure 146: *Press stud from square F22. Scale in mm.*

Figure 147: *Eyelet from square F22. Scale in mm.*

4.9.7. Charcoal

Many fragments of charcoal weighing a total of 16 g were found across the site. Although spread across all the excavated areas, there were more in the northern patch than elsewhere.

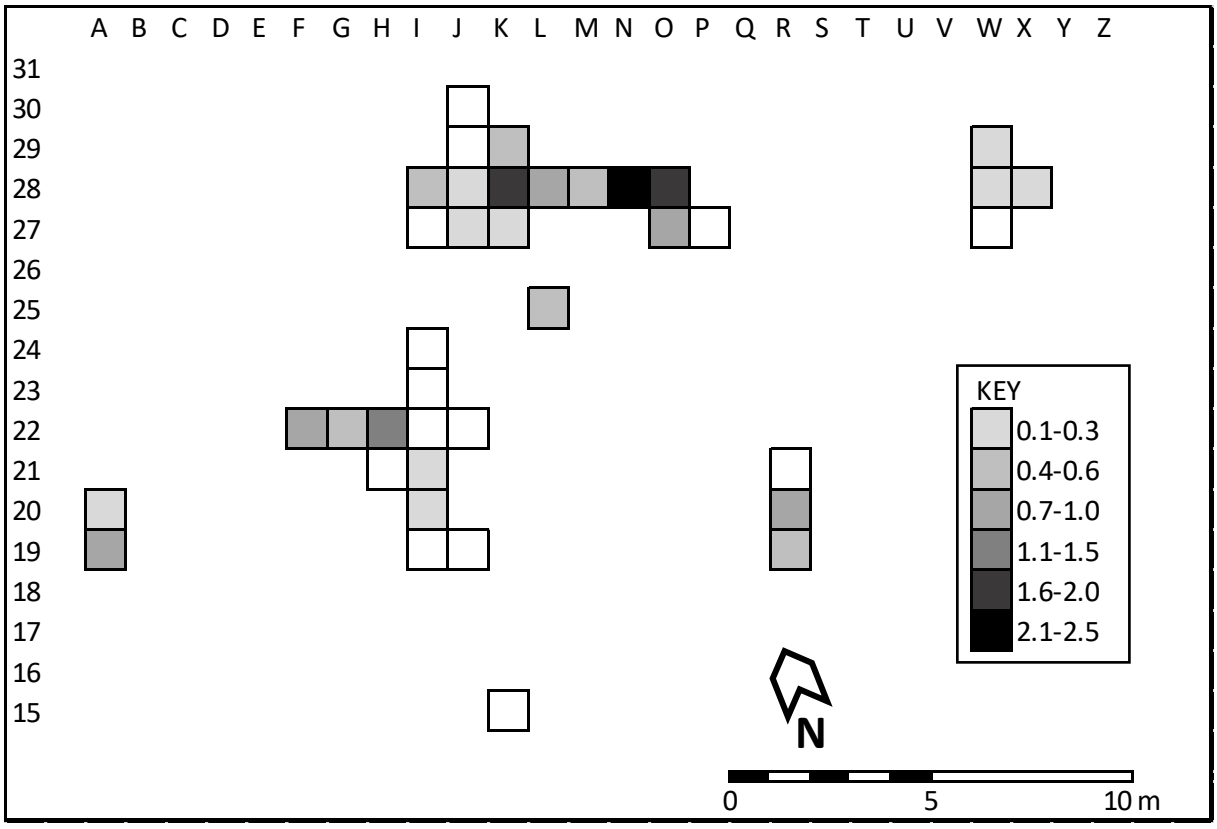


Figure 148: *Plan of HKB2017/018 showing the density of charcoal fragments by weight (g).*

4.9.8. Radiocarbon dating

This site is worth obtaining an age for because of its rich stone artefact assemblage. A shell sample has been selected from square H22 and will be sent to DirectAMS for dating. The sample was comprised of a single countable *C. granatina* shell weighing 4.2 g.

4.10. RFE2017/008

4.10.1. Site description

This site was accidentally discovered after a mine trench was made through a sand dune. A scatter of shell was revealed slumping down the north wall of the trench (Figure 149). There was no shell visible on the untouched surface away from the trench but some shell was present immediately along the edge where the topsoil (*c.* 5 cm worth as required prior to mining) had been cleared. It was in this area that we conducted a test excavation (Figure 150). The scatter in the trench extended for about 17 m, although the densest part was some 10-12 m long. The shell and artefacts had mostly gathered near the base of the lumping slope (Figure 149).

Figure 149: *View towards the west along the base of the slumping trench wall showing the accumulated shell (arrowed).*

Figure 150: *View towards the west along the top of the trench showing the area in which a test excavation was carried out.*

4.10.2. Excavation details

Excavation date:	• 30th March 2017
Excavated area:	• 1 m^2 (see Figure 151) + sieved surface collection in trench.
Excavation strategy:	• A single square meter test excavation was conducted to 20 cm depth; • Hand-excavation of sand to 20 cm depth in the test excavation and from wherever archaeological material was visible in the slumping deposits; and • Sieving of all deposit to recover the archaeology.
Sieve size:	• 1.5 mm used throughout.
Finds summary:	• Stone artefacts • Marine shell

4.10.3. Stone artefacts

The test excavation produced no stone at all. From the slumping material in the trench we recovered 111 artefacts, of which the vast majority were in quartz (Table 11). There were four retouched artefacts, three of which were scrapers. The fourth was not readily identifiable as either a scraper or backed piece but the latter seems more likely. One hammer stone and one ochreous nodule were also found. The hammer stone was quite heavily battered. It was hammered on one end and on one side, while an old break on the cobble provided a blunt edge that was also well-used.

Table 11: *Typological analysis of stone artefacts from RFE2017/008.*

Class	**Quartz**	**Quartzite**	**Sandstone**	**Other**
Sidescraper	1			
Scraper fragment	2			
Miscellaneous retouched piece	1			
Bipolar core	1			
Bladelet	3			
Flake	43	1	1	1
Chunk	14			1
Chip	42			
Total	**107**	**1**	**1**	**2**
% material	**96.4**	**0.9**	**0.9**	**1.8**
Hammer stone		1		

4.10.4. Marine shell

Only a few fragments of black mussel were found in the test excavation, all of it within a few cm of the surface. The slumping material contained 78 countable shells. Unlike any of the other sites reported here, the shellfish was dominated by black mussel (*C. meridionalis*). The shell, and especially the mussel shell, was in very poor condition which was also unusual given that the site has only been exposed to the elements (in recent times at least) for less than 12 months. The shells look weathered which may be a sign that they lay on the surface for some time prior to being buried by aeolian sand during the late Holocene. We know from the nearby RFE2014/007, located 150 m to the east, that material dating to the last few hundred years has been buried up to 15 cm deep (Orton 2015a).

Table 12: *Marine shell species frequencies from RFE2017/008. For* C. meridionalis *(black mussel) the left/right hinges are counted.*

Species	**n**	**%**
C. granatina	16	20.5
S. granularis	1	1.3
S. argenvillei	3	3.8
S. barbara	2	2.6
Choromytilus meridionalis	47/56	71.8

5. DISCUSSION

5.1. Early Stone Age sites

The ESA material from Graauw Duinen is very important in the context of southern African ESA studies. Two other fairly large hand-axe collections exist from western South Africa. One was recovered from the vicinity of Kleinsee and, like the present collection, had been revealed when mining removed the sand from above the hardpan deposits. Subsequent deflation of the remaining sand revealed the artefacts lying on the hardpan (Halkett 2002a). There the majority of hand-axes were made on quartzite and silcrete with other materials found to be very rare. Sources of silcrete were also present on site. Hardpan deposits are relatively common in Namaqualand (Ellis & Schloms 1982) but are generally covered in a thin sand layer and are thus seldom accessible for study. ESA artefacts have been reported from the interface of hardpan and covering sands along the margins of borrow pits. These pits have been excavated into the hardpan deposits resulting in deflation of the recent sands around edges of the pits (personal observation). Importantly, such material has generally been ascribed to 'background scatter' but we can now confidently say that concentrations do occur and that these likely indicate the approximate positions of occupation sites.

The other large collection comes from the famous Elandsfontein site, near Langebaan. There, hand-axes and other ESA artefacts have been found in association with fossil bones (Archer & Braun 2010; Braun *et al.* 2013). The material was excavated from beneath sand dunes that have blown over the Pleistocene surface.

The Namakwa Sands collection provides an excellent and rare opportunity to study the ESA in this part of South Africa where it is typical to only find occasional diagnostic artefacts. The biggest concentration known to the present author in southern Namaqualand is at a site on the northern edge of the Varsche River in the Kersvlakte where approximately ten hand-axes were seen (personal observation).

The material at Namakwa Sands is likely present over an extensive area but only a small proportion of the exposed hardpan deposits has been examined. It was clear, however, that the artefacts do not form a continuous scatter but are clustered in certain areas. Without a larger study it is not possible to determine whether there are specific landscape features with which the ESA material is associated.

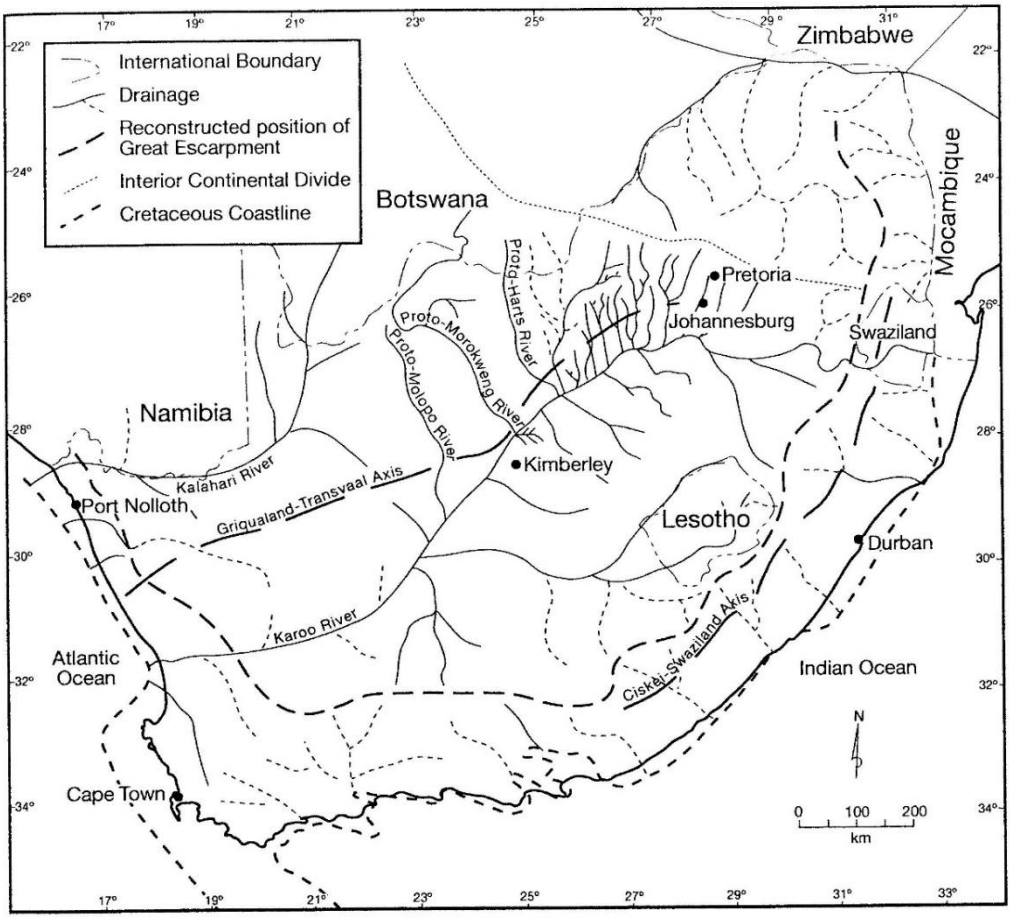
The collection offers opportunities to study different hand-axe production technologies. Most of the hand-axes seem to have been made on cobbles as evidenced by the presence of cortex on many of them. Some hand-axes, however, may well have been made on large flakes. The cleavers all appear to have been made on flakes as this was necessary in order to achieve an unretouched sharp distal edge.

The hand-axes show great variety in size. They vary from about 85 mm long to about 225 mm long. This is a greater range than that recorded by Halkett (2002a) at Kleinsee where the hand-axes ranged from 100 mm to 185 mm long, but a few with their tips missing were estimated to be slightly longer, up to about 198 mm.

Hand-axes are general part of an industry known as the Acheulean. The smallest hand-axes have been ascribed to a later industry referred to as 'Fauresmith' but this term has become

misunderstood and confused over the years (Underhill 2011). Small hand-axes are known to have been produced during the later part of the ESA but with our present sample all having been collected from a single undated surface there is unfortunately no opportunity to explore chronology and change through time.

An interesting aspect of the Namakwa Sands collection is the great variety in stone materials utilised in the production of hand-axes. As expected, quartzite does dominate, as is the case in other collections. However, several other rock types have been used here, including gneiss which is very much unexpected. This indicates that the hominins who produced the hand-axes were not very selective and made use of whatever was available. The range of materials is far greater than what is observed in LSA sites and may indicate a wider area having been used to source materials or, perhaps more likely, it indicates differences in the local topography during the middle Pleistocene when exposures of palaeo-Orange River gravels may have been exposed and available for use within easy walking distance of the study area. During the Cretaceous period the Orange River (referred to as the Karoo River by De Wit et al. (2000; see Figure 151) used to flow through the Knersvlakte where it has left deposits of cobbles that include an immense variety of materials (personal observation).



Reconstruction of the mid-Cretaceous drainage of southern Africa (after Partridge, 1998).

Figure 151: *Map showing the palaeo-Orange (Karoo) River. Source: De Wit* et al. *(2000).*

5.2. Later Stone Age sites

The LSA sites reported here contribute to the growing body of data from the area. The central part of Namaqualand is far better understood (Dewar 2008; Orton 2012), both because of the greater quantity of CRM work that has been carried out there as well as the substantially larger number of radiocarbon dates that have been obtained. The dates assist greatly in understanding the cultural sequence because assemblages can be placed into an approximate temporal order. However, with continued excavation, analysis and dating of LSA sites from Namakwa Sands and the surrounding region we are beginning to build a picture of the local sequence. Importantly, it is starting to show that there may be subtle differences to the pattern seen in central Namaqualand but this will require greater in-depth analysis of the broader results to clarify. One aspect that seems to be emerging is that Orton's (2012) three lithic Groups are not clearly defined in this area. Although he acknowledged that there were a small proportion of sites in his sample from the Kleinsee-Koingnaas area in which two or more Groups appeared to be combined, this seems to be the rule in southern Namaqualand rather than the exception. The relationship between the cultural sequence in southern Namaqualand and those from elsewhere will only be fully understood in the context of a wider study on the region's prehistory.

The two most informative sites will be radiocarbon dated but, because this takes a few months to complete, the results will be communicated to HWC in a letter once available.

6. CONCLUSIONS

This report describes the results of excavations carried out in advance of open-cast mining at Namakwa Sands. Although no detailed analysis of the ESA material has been presented as yet, the report does outline the extent of the fieldwork conducted and briefly notes the important features of the collected assemblages. The LSA material has been analysed and described in full. It is concluded that the archaeological mitigation work has been conducted successfully and that sufficient work has been done to characterise each of the sites reported. The on-going analysis of the ESA material will make an important contribution to the study of that period in South Africa. The LSA sites will contribute to a growing body of knowledge pertaining to the west coast of South Africa and assist in understanding the application of regional patterns to different parts of western South Africa where some elements of local cultural sequences are in common throughout the region, while others differ from place to place.

7. RECOMMENDATIONS

The following recommendations are made:

- Mining should be allowed to proceed in the mining areas referred to as 'NE of De Kom' and 'Joetsie 2';
- The three currently protected sites in the 'Langlaagte' mining area may be mined;
- The single site in the 'Soutpan 2' mining area may be mined;
- The three sampled sites in the West Mine may be mined;

- The environmental staff at the mine should walk the exposed hardpan areas in the West Mine to determine whether there are any other concentrations of ESA artefacts present. If present these should be recorded by an archaeologist who should make recommendations as to whether further study is required and the nature and extent of such study; and
- If any archaeological material or human burials are uncovered during the course of mining then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

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APPENDIX 1 – Curriculum Vitae

Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 40 Brassie Street, Lakeside, 7945
Telephone: (021) 788 8425
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

Birth date and place: 22 June 1976, Cape Town, South Africa
Citizenship: South African
ID no: 760622 522 4085
Driver's License: Code 08
Marital Status: Married to Carol Orton
Languages spoken: English and Afrikaans

Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science)	1997
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

Memberships and affiliations:

South African Archaeological Society Council member	2004 –
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
ASAPA Cultural Resources Management Section member	2007 –
UCT Department of Archaeology Research Associate	2013 –
Heritage Western Cape APM Committee member	2013 –
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –
Fish Hoek Valley Historical Association	2014 –

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)
  Stone Age archaeology (awarded 2007)
  Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)
  Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP)

- Accredited Professional Heritage Practitioner

Fieldwork and project experience:

Extensive fieldwork as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

<u>Phase 1 surveys and impact assessments:</u>

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

<u>Phase 2 mitigation and research excavations:</u>

- ESA open sites
  - Duinefontein, Gouda
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

APPENDIX 2 – GD2017/005 GPS CO-ORDINATES

GD2017/005 NORTH

Waypoint	Co-ordinates
766	S31 18 13.3 E17 55 01.9
767	S31 18 11.4 E17 55 02.2
533	S31 18 11.2 E17 55 03.2
534	S31 18 10.3 E17 55 03.1
535	S31 18 09.1 E17 55 02.7
536	S31 18 10.2 E17 55 03.4
537	S31 18 10.2 E17 55 03.6
538	S31 18 09.3 E17 55 04.3
539	S31 18 09.2 E17 55 04.3
540	S31 18 09.3 E17 55 04.9
541	S31 18 09.5 E17 55 04.9
542	S31 18 09.8 E17 55 04.3
768	S31 18 12.1 E17 55 03.7
769	S31 18 11.9 E17 55 04.8
770	S31 18 11.3 E17 55 04.7
771	S31 18 11.5 E17 55 04.1
772	S31 18 11.4 E17 55 03.9
773	S31 18 11.5 E17 55 03.1
774	S31 18 10.9 E17 55 03.3
775	S31 18 10.9 E17 55 03.4
776	S31 18 10.6 E17 55 04.2
777	S31 18 10.8 E17 55 04.7
778	S31 18 10.4 E17 55 04.1
779	S31 18 10.4 E17 55 03.7
780	S31 18 09.9 E17 55 04.0
781	S31 18 09.6 E17 55 04.7
782	S31 18 09.9 E17 55 04.2

GD2017/005 SOUTH

522	S31 18 17.7 E17 54 47.3
523	S31 18 16.9 E17 54 50.5
524	S31 18 17.3 E17 54 52.5
525	S31 18 17.6 E17 54 52.7
526	S31 18 19.8 E17 54 53.9
527	S31 18 17.7 E17 54 55.4
528	S31 18 20.8 E17 54 54.2
529	S31 18 18.0 E17 54 55.7
530	S31 18 22.3 E17 54 55.7
531	S31 18 25.4 E17 54 53.8
532	S31 18 25.1 E17 54 53.3
734	S31 18 17.5 E17 54 47.6
735	S31 18 18.1 E17 54 47.6
736	S31 18 19.6 E17 54 48.6

737	S31 18 21.6 E17 54 48.1
738	S31 18 21.5 E17 54 48.9
739	S31 18 22.3 E17 54 48.4
740	S31 18 22.3 E17 54 49.8
741	S31 18 22.1 E17 54 50.8
742	S31 18 20.7 E17 54 50.6
743	S31 18 20.3 E17 54 49.5
744	S31 18 18.9 E17 54 51.3
745	S31 18 18.8 E17 54 52.2
746	S31 18 21.7 E17 54 52.4
747	S31 18 22.9 E17 54 52.0
748	S31 18 23.3 E17 54 52.3
749	S31 18 23.4 E17 54 52.7
750	S31 18 23.3 E17 54 52.9
751	S31 18 23.4 E17 54 53.1
752	S31 18 23.5 E17 54 53.1
753	S31 18 23.1 E17 54 53.9
754	S31 18 21.7 E17 54 54.6
755	S31 18 22.0 E17 54 53.5
756	S31 18 21.7 E17 54 53.6
757	S31 18 20.8 E17 54 54.3
758	S31 18 22.2 E17 54 55.4
759	S31 18 22.4 E17 54 55.4
760	S31 18 22.7 E17 54 52.3
761	S31 18 23.6 E17 54 51.0
762	S31 18 23.6 E17 54 50.6
763	S31 18 25.1 E17 54 53.0
764	S31 18 23.6 E17 54 54.1
765	S31 18 22.5 E17 54 54.0