PHASE 2 SPECIALIST STUDY OF AFFECTED STONE AGE LOCALITY AT SITE SA02, A DEMARCATED SURFACE AREA, ON THE FARM NOOITGEDACHT 469 (WOON 469)

PROPOSED SISHEN WESTERN WASTE ROCK DUMPS
SISHEN IRON ORE MINE
KGALAGADI DISTRICT MUNICIPALITY
NORTHERN CAPE PROVINCE

Dr Maria van der Ryst and Siegwalt Küsel

JANUARY/FEBRUARY 2013

Habitat
LANDSCAPE ARCHITECTS
sustainable planning • innovative design

Stefan du Toit • Siegwalt Küsel
Pr.L.Arch (SA) Reg No: 20152 Pr.L.Arch (SA) Reg No: 20162
63 Olympus Country Estate, Ajax Street, PRETORIA, South Africa
P.O. Box 40937, GARSFONTEIN EAST, 0060, South Africa
info@habitatdesign.co.za • Fax: 0866 200 486

du Toit Küsel Landscape Architects t/a Habitat Landscape Architects Reg no: 2010/136323/23

Assessment conducted under:

Section 35(4) of the National Heritage Resources Act No. 25 of 1999
SAHRA Permit No. Ref: 9/2/074/0001
Case ID: 864
Permit ID: 164

Commissioned by:

Sishen Iron Ore Company (SIOC) (Pty) Ltd
AGES (Pty) Ltd Gauteng

Compiled by:

Dr Maria van der Ryst
PhD (Archaeology) Wits
Accredited professional archaeologist for the SADC Region Member No. 158
Principal Investigator Stone Age
Principal Investigation Iron Age
Field Director Historic Period

and

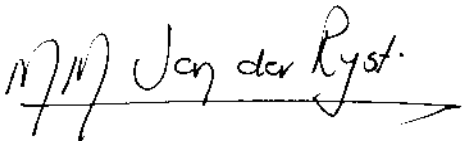
Siegwalt Küsel
Pr L Arch (SA) Reg. No. 20182
BA (Hons) (Archaeology)
Habitat Landscape Architects

Reviewed by:

.....
Nelius Kruger (AGES (Pty) Ltd

Declaration

Maria van der Ryst and Siegwalt Küsel are independent specialist consultants and are in no way connected with the client.



Dr Maria van der Ryst
PhD (Archaeology) Wits

ASAPA-accredited Professional Archaeologist
for the SADC region Member No. 158
CRM-accredited by ASAPA:
Principal Investigator (PI):Iron Age Archaeology
Principal Investigator (PI):Stone Age Archaeology
Field Director (FD):Colonial Period Archaeology

Affiliation:
Senior Lecturer: Archaeology Division
Department of Anthropology and Archaeology UNISA

Siegwalt U Küsel
Pr (L Arch) SACLAP Reg. 20182

BL Landscape Architecture
BA (Hons) Archaeology (*Cum laude*)

Affiliation:
Habitat Landscape Architects

Executive summary

Purpose

This report details the results of a Phase 2 mitigation undertaken at a demarcated surface area of locality SA02 on the farm Nooitgedacht 469 (Woon 469). The Phase 2 was requested by the Sishen Iron Ore Company (SIOC) (Pty) Ltd and AGES (Pty) Ltd following on recommendations emanating from a Phase 1 Archaeological Impact Assessment (AIA) conducted by AGES Gauteng[1].

Background

The AIA of surface portions of the farms Gamagara 541, Onverwacht 540 (Fritz 540 Portion 1) and Nooitgedacht 469 (Woon 469) in the Kgalagadi District Municipality of the Northern Cape Province was requested by the Sishen Iron Ore Mine in an area where waste dump facilities for the mine, namely the Western Waste Rock Dumps project, were proposed. During the Phase 1 survey archaeological occurrences were identified that will be impacted upon by the proposed waste rock dump (Kruger 2012). At locality SA02 lithic scatters were documented around and in a pan close to a dam and borehole. It was recommended that 'a limited Phase 2 Specialist Study be considered for these occurrences. Such a study should minimally include the systematic documentation of surface material by a qualified Stone Age specialist' (Kruger 2012:6).

Dr Maria van der Ryst of UNISA and Siegwalt Küsel of Habitat Landscape Architects were subsequently appointed to undertake the documentation at the pan site SA02 and to provide a Phase 2 report on the significance of this locality. In this Phase 2 report the authors comment on the heritage occurrences at the study area and make recommendations on the significance of the archaeological findings in accordance with the National Heritage Resources Act (NHRA) (Act No. 25 of 1999).

Summary

The Phase 2 investigations confirmed the presence of a transient Later Stone Age (LSA) of low to medium significance, very low incidences of Middle Stone Age (MSA) tool types and ephemeral utilization during the Earlier Stone Age (ESA) at locality SA02 (S27°43'13.7" E22°57'12.7). Visits to the area by hunting and gathering groups over a long period of time created an overlay of episodic events that resulted in low-density scatters of artefacts.

The methodology applied in the Phase 2 was based on probabilistic random sampling (Richardson and Gajewski 2003). The aim was to establish a spatial distribution pattern and assess the density of lithics to ensure that the

[1] Kruger, N. 2012. *Sishen Western Waste Rock Dumps: Sishen Iron Ore Mine, Kgalagadi District Municipality, Northern Cape Province*. Phase 1 Archaeological Impact Assesment Report. Compiled by N Kruger for AGES (Pty) Ltd.

sampling process delivered a representative collection and reliable data. The main sampling methodology was fieldwalking a series of transects across the pan, the pan margins and higher-lying areas to record and sample artefacts. All observed higher-density lithic clusters were also subjected to sampling. Fieldwalking or sample traverse provides a broad sense of lithic distributions in areas with relatively low lithic densities (Hardaker 2011). The survey of SA02 indicates generally low densities of lithic scatters. Of a total 157 sampled squares the majority of squares 55% (n = 86) contained no lithics; 33% (n = 52) exhibited low densities of < 10 lithics; 10% (16) had medium densities of 10-20 lithics and only 2% (n = 3) contained more than 20 lithic elements.

The configuration of a landscape influences utilization patterns. The survey established that the main archaeological occurrences were on the pan periphery and in particular higher-lying land surfaces that provided observational vantages. Depositional and post-depositional processes resulted in a relatively random distribution of artefactual material with no apparent clustering in activity areas that suggests, for example, living floors or knapping areas. Whereas there is no real patterning in the spatial distribution of lithics, some of the clusters with higher densities do tend to occur on higher-lying surfaces around the pan.

Whereas there is a representative range of cores that includes radial, multi-directional pebble and bladelet cores and a single MSA prepared centripetal (Levallois) core, the relatively frequencies for manuports, chunks and waste materials from stone tool knapping do not reflect large-scale production of tools. Most lithic scatters contain relatively low densities of waste. The waste materials that were collected during sampling probably derived from the expedient manufacturing or essential tools as required by activities and the resharpening of tools. This is most probably because the SA02 locality does not contain good sources of toolstone. The closest source of raw materials is the nearby Gamagara River. Toolstone where probably sourced and preliminary knapped closer to the river and suitable cores, preforms and formal tools carried to the pan locality.

This is borne out by the statistical analysis of the lithic sample. The sampled lithics (total n = 527) produced indices of 25% for debitage (discarded material from the reduction process and from the shaping of tools), 9% cores (or objective pieces), 26% flaked blank forms (detached pieces) and 40% formal stone tools. The formal component dominates the sample. This is an inverted trend as formal tools generally account for <10% of any assemblage with debitage in the form of waste from stone tool production forming the major component. During the Phase 2 all surface lithic elements had been collected from the designated squares, including small chips and spalls. While various site formation processes may have contributed to this patterning, the most likely explanation is that there was not intensive production of artefacts on account of the lack of raw materials. The pan locality was probably intermittently visited for short periods during which most of the formal tools and preforms were carried as part of toolkits. The presence of knapping debris in addition reflects some measure of

on-site knapping of tools required for subsistence tasks and tool resharpening during the probably cyclic occupations. The LSA lithic scatters demonstrate the use of a range of materials that include jasper, banded ironstone and cryptocrystalline silicas (CCS) with lesser frequencies of other rock types such as quartzite. MSA lithics were mainly produced on banded ironstone and quartzite.

This report also includes background information on the Stone Age archaeology of southern Africa and the local region in order to contextualize the heritage resources of the area under investigation. A synopsis of relevant heritage legislation and conservation policies is also provided.

Recommendation

Within the context of the above discussion, locality SA02 is deemed of low to medium cultural significance (NHRA 1999: Act 25:2(vi)) at the local scale. It is the considered opinion of the heritage team that the lithic sample obtained through the Phase 2 assessment is representative and that further mitigation will not add more qualitative data. No additional archaeological mitigation is accordingly recommended

Subject to the approval of this Phase 2 Specialist report by the South African Heritage Resources Agency (SAHRA) it is accordingly recommended that an application for a destruction permit should be approved for sites SA01 to SA04 in order for infrastructural developments of the Western Waste Rock Dumps Project proposed by the Sishen Iron Ore Mine to proceed.

Qualifications

- The lithic localities identified the Phase 1 AIA were extensively investigated during the Phase 2 mitigation and specialist study. Archaeological deposits usually occur below ground level. In the event that future construction or mining activities reveal any buried sites or skeletal material, development activities should be halted and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf*. National Heritage Resources Act (NHRA) Act No. 25 of 1999, Section 36 (6).

- A copy of this report will be lodged with SAHRA as stipulated by the NHRA Act No. 25 of 1999, Section 38 (especially subsection 4). The recommendations contained in this document will be reviewed by SAHRA in order to consider the significance of Site SA02 prior to issuing a destruction permit.

Contents

List of figures

Glossary, acronyms, abbreviations and basic stone tool terminology

AIA Archaeological Impact Assessment
EIA's Environmental Impact Assessments
HIA Heritage Impact Assessment

Archaeological remains can be defined as any features or objects resulting from human activities, which have been deposited on or in the ground, reflecting past ways of life and are older than 100 years.

Conservation as used in this report in relation to heritage resources 'includes protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance' (NHRA 1999: Act 25:2iii).

Cultural significance means 'aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance' (NHRA 1999: Act 25:2(vi).

Development means any 'physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being' (NHRA 1999: Act 25:2(viii).

Heritage. Heritage resources have lasting value in their own right and provide evidence of the origins of South African society. They are limited and non-renewable. The NHRA section 32, p. 55 defines these as an 'object or collection of objects, or a type of object or list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object'.

These include historical places, objects of archaeological, cultural or historical significance; objects to which oral traditions are attached and which are associated with living heritage; objects of scientific value, fossils, etc.

NHRA. National Heritage Resources Act.

SAHRA. South African Heritage Resources Agency.

The Act means the National Heritage Resources Act, 1999 (Act No. 25 of 1999).

The Stone Age: ESA (Earlier Stone Age), **MSA** (Middle Stone Age), **LSA** (Later Stone Age).

List of abbreviations

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
EIA	Environmental Impact Assessment
ESA	Earlier Stone Age
HIA	Heritage Impact Assessment
LSA	Later Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
SAHRA	South African Heritage Resources Association
ka	Thousand years before present, a date
ky	=Thousand years

1 Introduction and background to the project

A previous AIA of surface portions of the farms Gamagara 541, Onverwacht 540 (Fritz 540 Portion 1) and Nooitgedacht 469 (Woon 469) in the Kgalagadi District Municipality of the Northern Cape Province had been requested by the Sishen Iron Ore Mine at Kathu in an area where waste dump facilities for the mine, namely the Western Waste Rock Dumps Project, were proposed (see Figs 1 and 2). During the Phase 1 survey archaeological occurrences were identified that will be impacted upon by the proposed waste dump[2]. At various localities lithic scatters were documented (see Figs 1 and 2). At locality SA02 the clustering of Stone Age lithics around and in a pan close to a dam and borehole was deemed important.

In view of the significance of nearby sites such as Kathu Pan and Kathu Townlands (Beaumont 1991, 2004; Beaumont and Vogel 2006; Porat et al. 2010; Chazan et al. 2012, Wilkins and Chazan 2011) the archaeologists who conducted the Phase 1 AIA consequently recommended that 'a limited Phase 2 Specialist Study be considered for these occurrences. Such a study should minimally include the systematic documentation of surface material by a qualified Stone Age specialist' (Kruger 2012:6). A Phase 2 is required in terms of the National Heritage Resources Act (Act No. 25 of 1999, section 35) and guidelines for mitigation (see South African Heritage Resources Agency (SAHRA) 2007:4 APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports).

Following on the initial Phase 1 AIA, Habitat was commissioned to undertake the Phase 2. In terms of Section 35(4) of the National Heritage Resources Act (Act 25 of 1999) SAHRA issued a permit (Ref: 9/2/074/0001) 'for the recording and controlled statistical sampling of site SA02 on Farm Nooitgedacht (Woon) 469' (SAHRA 2012). The permit conditions further stipulated that '[A]ll archaeological material collected, as well as field notes and records, will be curated by the McGregor Museum in Kimberley. Temporary storage may be allowed at the Museum for Anthropology and Archaeology of the University of South Africa while analyses are undertaken' (SAHRA 2012).

This report details the results of the Phase 2 investigation in the footprint of the proposed waste rock dump. It describes the methodology applied in the assessment of the archaeological occurrences, provides an account of the sampling of a representative lithic collection and contextualizes the archaeological history of the Northern Cape. The results of the specialist study on the Stone Age lithics sampled at SA02 are presented in the form of

[2] Kruger, N. 2012. *Sishen Western Waste Rock Dumps: Sishen Iron Ore Mine, Kgalagadi District Municipality, Northern Cape Province*. Phase 1 Archaeological Impact Assesment Report. Compiled by N Kruger for AGES (Pty) Ltd.

statistical analyses of the findings together with a synopsis of the typological and technological attributes of the Stone Age lithics. We also give a brief overview of applicable heritage legislation and conservation policies.

A copy of the report will be submitted to the South African Heritage Resources Agency (SAHRA). Note that the Phase 2 report and the recommendations contained in the document will be reviewed before SAHRA can issue a destruction permit for localities with lithic occurrences that will destroyed by future mining infrastructural development.

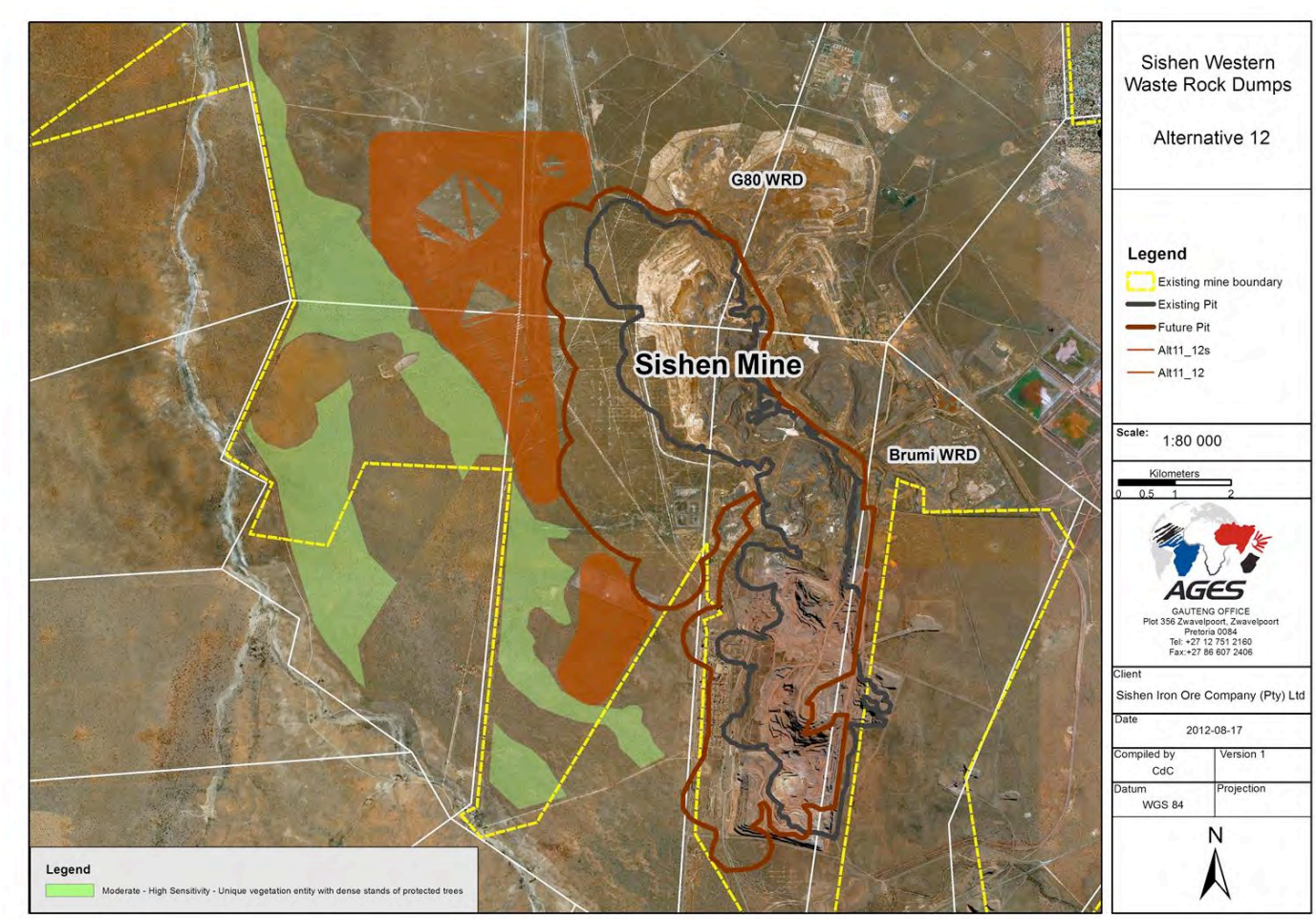


Figure 1 Map indicating the location of the project area subject to the Sishen Western Waste Rock Dumps project (Courtesy of SIOC and AGES).

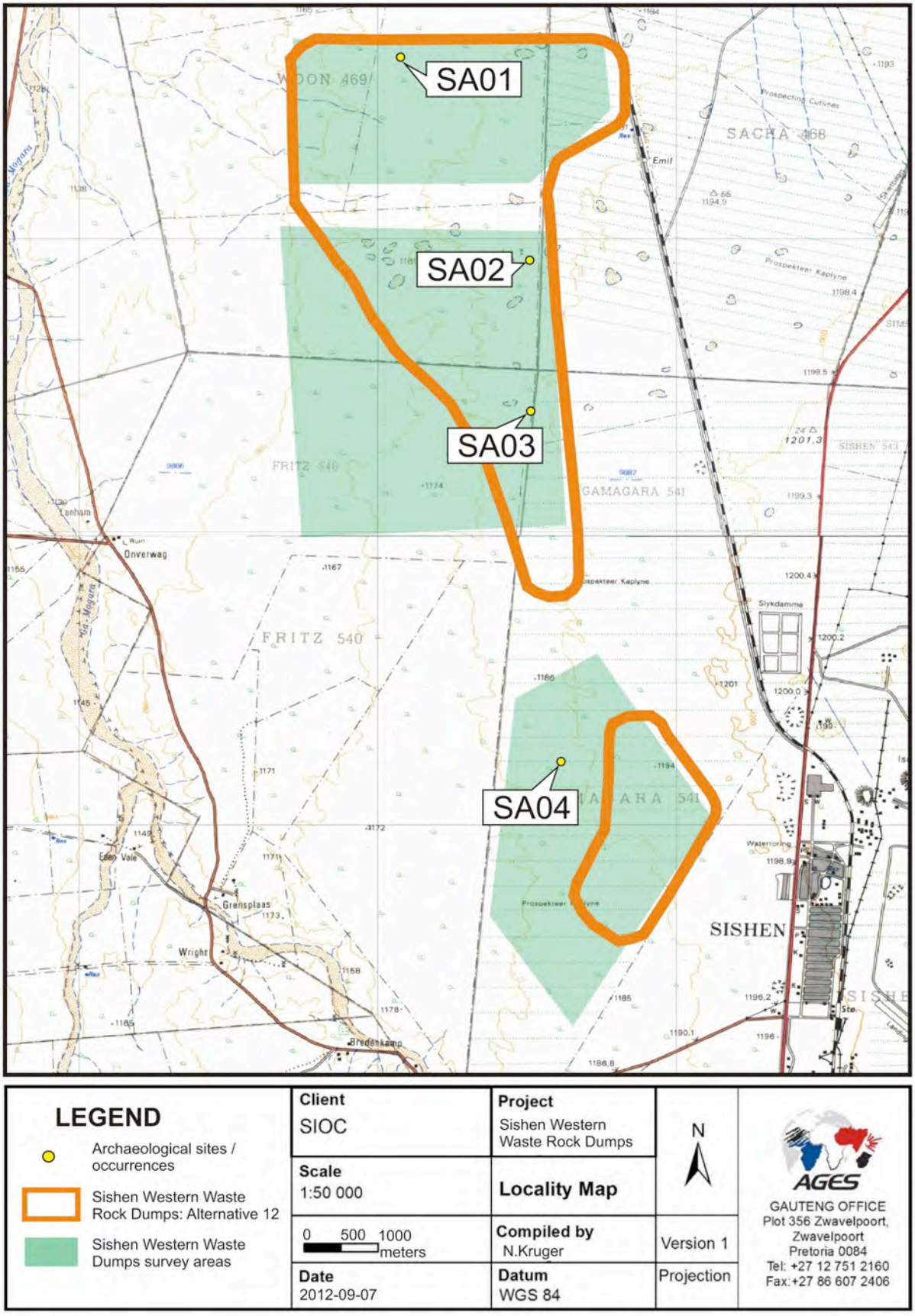


Figure 2 2722DD 1:50 000 Map with the location of archaeological sites in relation to the Sishen Western Waste Rock Dumps Project (Courtesy of SIOC and AGES).

2 Terms of reference

- Following the recommendations of the Phase 1 AIA assessment Habitat was commissioned to undertake the Phase 2 mitigation for SIOC and AGES (Pty) Ltd Gauteng. The focus of the Phase 2 was to conduct a sampling programme of lithics around a pan at Site SA02.

- A permit (Ref: 9/2/074/0001) was issued by SAHRA to do a surface collection or excavations in order to obtain representative samples of artefactual material.

- The main aim was to recover and scientifically analyze a large enough sample of artefactual material at SA02 to form a general idea of the age, significance and broader cultural meaning of the archaeological sites that will be impacted upon by the proposed development.

- Careful planning can minimize the impact of archaeological surveys on development projects by selecting options that cause the least amount of inconvenience and delay. Permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that measures are in place to ensure that the archaeological sites that will be impacted upon by the development have been adequately recorded and sampled.

- SAHRA stipulated that the collection has to be lodged at the McGregor Museum at Kimberley (See Annexure 2). Dr David Morris, Head of Archaeology has agreed that the McGregor Museum will store the archaeological sample at a fee determined by the Museum under conditions where the collection will be curated and made available for future research, education and promotion of our cultural heritage according to SAHRA's (2007:4) *Minimum Standards: the Archaeological Component of Heritage Impact Assessment Reports*.

- Based on the outcome of the Phase 2 a comparative rating of significance will be assigned to heritage resources as prescribed in the National Heritage Resources Act (Act 25 of 1999).

- The heritage practioners that were commissioned to conduct the Phase 2 will recommend appropriate mitigation measures in accordance with the guidelines of the Act.

3 Research methods and limitations

3.1 Methodology

Prior to conducting the fieldwork a detailed desktop assessment, reappraisal of the previous and a literature study of sources on the archaeology of the region were conducted. Based on our understanding of the archaeology and history of the broader region a Phase 2 methodology was developed, adjusted and refined. Whereas the primary impacts associated with the waste rock dump operations will be limited to the footprint area identified through assessment of various alternatives, we undertook a reappraisal of previously identified sites.

The following methodology was applied during the sampling the lithics:

- The AIA report (Kruger 2012) provided the necessary background. The first stage of the Phase 2 assessment comprised revisiting each of the previously identified archaeological sites on the first day of the site visit. Areas with lithic scatters identified during the AIA (Kruger 2012) were fieldwalked and appraised to establish the nature and extent as well as the likelihood of subsurface deposits.

- Other sites within the area such as Springbok Pan and Kathu Townlands were also visited for comparative purposes. (See Fig. 3 where we photographed archaeological material exposed during a geotechnical investigation close to the Kathu Townlands site. This was presumably to investigate the subsurface geological formation in view of the subsequent development of a new township. Note the depth of the outcrop and also handaxes and roughouts).

Figure 3 Archaeological material exposed during a geotechnical investigation close to the Kathu Townlands site.

- Once we gained an understanding of the archaeological footprint we focussed on recording and sampling Site SA02 as the locality for which a permit for sampling was issued by SAHRA.

- The sampling of the lithics was undertaken over three days. Lithics were collected along seven grids/lines.

- At SA02 lithics were found to occur dispersed within and around the pan. Investigation of the distribution pattern established that the stone tools were principally present on the current landsurface.

- Investigations at a number of rodent burrows confirmed that faunal bioturbation has not exposed subsurface cultural materials. In some parts of the site topsoil had been removed during the construction of embankments to channel rainwater into the pan to maximize water-holding capacity. These exposed strata also contained no evidence of artefactual remains. In view of the shallow underlying calcareous floors Shovel Test Pits for sampling were therefore not feasible.

- Several sampling methods were applied.
    - The first sampling was undertaken within a grid of eight square metres in an area where more dense lithics were observed.
    - Six survey transects were then walked to determine and document the distribution of stone tools and lithic manufacturing waste. At intervals of 10 metres a 1-meter drawing frame was used to collect all lithic elements distributed within a square meter.
    - In order to obtain representative samples a further random selection process was used. A 1-meter frame was placed over areas with higher densities of lithics. All lithics from within the grid were systematically collected and bagged.
    - Areas sampled were recorded by a combination of techniques and included recording localities with a hand-held GPS system, marking locations on the aerial photographs and surveying positions with a dumpy level.

Figure 4 Existing infrastructure at the pan. Note the exposed calcareous floors.

Figure 5 Sampling at SA02 using a 1-metre grid and typical view of lithics on surface.

Following the Phase 2 assessment at ZKD the lithics were subsequently analyzed during January/February 2013. Standard archaeological procedures and methodologies were used.

- All the collected lithics were brushed/washed to remove dust and other accretions and then rebagged according to squares within the grid and labelled.

- Each bagged sample was decanted on a laboratory table. The lithics were provisionally sorted into classes, further subdivided according to categories, counted and bagged. The lithics were classified according to the currently accepted typological system (based on Deacon 1984a, 1984b; Wadley 2005) and refined for site-specific attributes and technology.

- The materials collected through this methodology were processed through applying descriptive and analytical criteria. The data were logged in Excel spreadsheets and subjected to statistical analyses. An inventory of cultural material was drawn up.

3.2 Limitations

All possible surface archaeological features and occurrences were investigated. In line with the nature of archaeological resources it is probable that mining and the development of associated infrastructure are likely to reveal subsurface sites, human remains or areas of high-density stone tool distributions. In the event that any major archaeological feature is exposed all construction work should be stopped. A suitably qualified professional archaeologist should be contacted to undertake specialist investigations in line with the SAHRA Act (Act No. 25 of 1999).

4 The regional Stone Age context

4.1 Overview of the southern African Stone Age

Archaeological traces in the form of mostly stone tools suggest a widespread presence for tool-producing Plio-Pleistocene hominins3 in southern Africa. This important part of the prehistory of southern Africa, known as the Stone Age, is chronologically divided into the ESA, MSA and LSA. The ESA is characterized by the use of large stone cutting tools (LCT), in particular handaxes, but also cleavers and tool types such as scrapers. Following on the ESA the MSA typologies represent greater specialization in the production of stone tools, in particular flake, blade and scraper tools and also in a more extended range of specialized, formal tools. Regional lithic style, evidence for symbolic signalling, polished bone tools, portable art and decorative items are apparent during the MSA. During the LSA small (microlithic) tools, bone tools and weapon armatures and a range of decorative items as well as rock art were produced. Ceramics were used and/or produced by hunters and Khoekhoe herders towards the terminal phases of the LSA over a period of around 2000 years. The southern African Stone Age sequence can be divided into the following periods:

Period	**Approximate dates**
Earlier Stone Age (ESA)	more than 2 million years ago - 250 000/200 000 years ago
Middle Stone Age (MSA)	200 000/250 000 years ago – 20 000 years ago to around the Last Glacial Maximum (LGM) in some
Later Stone Age (LSA) (Includes Rock Art) Hunter-gatherer and herder groups	>20 000 – 200 years ago and up to historic times in certain areas

[3] The term “hominin” instead of the customary term “hominid”, acknowledge that African apes, including human ancestors, are closer to each other phylogenetically than any of them are to orang-utans (Mitchell 2002). The term hominid includes all the higher primates (chimps, gorillas, orang-utans, ancestral human types and ourselves), while hominin refers to those genera which evolved **after** the split with the chimps.

In addition to the conventional Stone Age division (Deacon 1984a, 1984b) used for southern Africa assemblages, a typological classificatory system of five successive Modes that describe **broad** patterns in stone tool manufacture is currently applied (Barham and Mitchell 2008:16). This system avoids the association of particular tools with bounded periods of time. Processes of cultural and technological change were probably more gradual and continuous in the past, given that certain tool types are not restricted to a specific period so that developments within the various periods represent continuous processes of change. Any one assemblage can accordingly contain artefacts of various Modes (please refer to Annexure 1 for more detail on modes of lithic technology). An extensive suite of radiometric dates as well as lithostratigraphic, faunal and palaeoenvironmental data that are now available support premises for considerable variation in the beginning and end dates of the various Stone Age industries of southern Africa (Mitchell 2002; Hardaker 2011).

4.2 The Kathu region

The following framework provides an overview of major Northern Cape Stone Age sites in the general region of the study area. The data are then applied to contextualise the archaeological occurrences identified within the footprint of the proposed development.

Ghaap Plateau

In addition to the well-known Taung localities some important fossiliferous and lithic-bearing breccias have recently been found on the Ghaap Plateau (Herries et al. 2007; Johnson *et al.* 1997). A multi-disciplinary project involving Australian, British and South African researchers has been initiated to investigate the palaeoanthropological potential of the Ghaap escarpment (Herries et al. 2007; Curnoe 2012).

Wonderwerk Cave

One of the best-known sites in the region is the Wonderwerk Cave in the Kuruman Hills. The cave extends horizontally for 139 m and was formed by an ancient solution cavity in the dolomite formation (Beaumont 2004). Excavations since the 1940s, which became more focussed as from 1976 to 1993, revealed a stratified series of deposits that accumulated up to a depth of about seven metres and are divided into nine Major Units (Beaumont and Vogel 2006). The application of a range of dating methods points to a complex cultural succession. The following cultural stages have been identified at Wonderwerk: an LSA at 1-12.5 kyr (kyr = thousand years ago), the MSA at around ~70 to >220 kyr, the Fauresmith to ~270-500 kyr and an ephemeral Acheulean at >0.78 myr BP (Beaumont and Vogel 2006). An interdisciplinary project initiated in 2004 aims at dating the ESA deposits in particular, using a range of radiometric techniques, and will also focus on analysing the lithic faunal and botanical remains recovered from these strata (Chazan et al 2008). The Wonderwerk

deposits also contain portable stone slabs with anthropogenic markings (Chazan and Horwitz 2010; Jacobson et al 2012).

The lithic succession at Wonderwerk serves as a benchmark for the Stone Age sequence of the Northern Cape. It comprises an uppermost LSA sequence that contains Ceramic LSA, Wilton and Oakhurst (Humphreys and Thackeray 1983). Some of the cave deposit has been removed by guano diggers, which destroyed several important archaeological levels. The MSA levels that were still intact yielded blades and unifacial MSA points. The ESA sequence contains the usual large cutting tools and includes a transitional Fauresmith assemblage with blades, large scrapers and radially- prepared cores.

Whereas the paintings at Wonderwerk are in a poor state of preservation the Northern Cape region is known for the many open-air rock engraving sites. The landscape settings of the engraved sites include the glaciated andesite pavements at Driekopseiland and also koppies and rock outcroppings surrounded by extensive plains, often in close proximity to pans such as Wildebeest Kuil (Morris 1988, 2002, 2012).

Kathu

The Kathu sites contain significant ESA Acheulean and Fauresmith assemblages (Beaumont 1991, 2004; Chazan et al. 2012; Wilkins and Chazan 2012). Archaeological and palaeoenvironmental data from Kathu Pan and Kathu Townlands were used to reconstruct changes over time in the prehistoric environment (Beaumont 2004). Associated faunal remains with some of the Acheulean include *Elephas recki recki*. These animals disappeared at sites in East Africa such as at Olorgesailie, Kenya, at around 600 000/800 000 years ago (Beaumont 2004; McNabb 2004). Biostratigraphy or faunal correlation is often used to date the southern African sites and gives some indication of the approximate age of some of the associated assemblages. The transitional Fauresmith at Kathu Pan has been dated to ca. 500 000 BP (Porat et al. 2010). Kathu Pan is formed by a shallow depression with an internal drainage and a high water table. North-east of Kathu newly-found ESA sites with LCT's and an associated range of tools occur in sand quarries and on a hilltop at Uitkoms Farm and the Bestwood locality (Chazan et al 2012). The new residential and commercial developments at Bestwood demonstrate the importance of Phase 2 heritage studies in the Kathu region.

The LCT's from this area often contain very fine handaxes with some superb examples produced on banded ironstone. Lithics in some of the Acheulean deposits, but also in MSA levels, display a shiny silica skin. At Kathu Townlands an outcropping of banded ironstone that covers a large area of around 25 km contains enormous quantities of flaked items (see also Fig. 3). This phenomenon is ascribed to the use of the high-grade bedrock jasper and ironstone as a source for raw materials and is supported by the high incidence of handaxe roughouts

(Beaumont 2004). The prepared core technique was used to produce the spectacular small handaxes, long blades, convergent flakes/points, scrapers found in Fauresmith collections.

MSA tools were also recovered from the Kathu localities (Beaumont 2004). Surface sites around Kathu exhibit a palimpsest of prehistoric utilization and may contain lithics from all periods in the Stone Age succession. From the AIA and Phase 2 studies conducted at SA02 it is evident that Stone Age artefacts from all three these periods are present on the mine property, although a somewhat ephemeral presence is suggested for the ESA and MSA at SA02. In section 5 we will focus on the Stone Age archaeology of SA02 with particular reference to the LSA since sites from this period dominate the archaeology of this locality.

Shelter sites

Rockshelters along the escarpment mostly contain LSA and herder occupation deposits (Humphreys and Thackeray 1983; Herries et al. 2007). The LSA of the Northern Cape is well researched (Humphreys and Thackeray 1983; Herries et al. 2007). Small rock shelters with occupations dating to the Holocene occur along the Ghaap Escarpment. A few of these have been excavated including Burchell's Shelter (Humphreys 1975) and Dikbosch I and II (Humphreys and Thackeray 1983). Burchell's Shelter has been occupied during historic times and travellers such as Burchell himself observed some of the Bushmen present within this region (Humphreys 1975:10, 16). Burchell, in describing their dress, wrote that they wore sandals and that their skin karosses were reddened with ochre (Humphreys 1975:16). It is evident from the archaeological investigations at Burchell's Shelter that only small groups occupied this locality and the artefacts and food remains demonstrate that they exploited a wide range of animals and collected plant foods, snakes and lizards, ostrich eggshell eggs and harvested termite eggs.

The shelters of Dikbosch I and the smaller locality of II are located on the edge of the Ghaap escarpment (Humphreys and Thackeray 1983). To the north of Dikbosch I is a stream bed below a waterfall that would have represented a good water source during prehistoric times. The occupational sequence at the bigger shelter shows a regular use of this locality throughout the major part of the Holocene. The preservation of organic materials is good and the artefactual remains demonstrate a range of hunting and gathering and also probably ritual activities. The excavations at Dikbosch II suggest intermittent and ephemeral occupations (Humphreys and Thackeray 1983:171).

While the region has some good painted sites, the Northern Cape is particularly known for its wealth of open-air rock engraving sites (Morris 1988, 2002, 2012).

4.3 Notes on the topography, geology and farming practices

Only aspects of the geology that are pertinent to the archaeological assemblages are referred to. The research area consists of mainly calcrete-capped plains on red Hutton soils. Numerous small shallow pans, also known as dolines, of 100 to 200 m in diameter with a couple of larger pans, occur over most of the Kathu region. A doline is an enclosed depression that forms in mostly carbonate rock types. The two main types of dolines are identified on the mechanism of their formation, namely a dewatering-type and surface saturation-type dolines. A third kind, known as an incompletely developed sinkhole, has a similar surface appearance as the other two forms but is caused by the erosion of subsurface materials (www.geoscience.org.za).

In the Northern Cape Province, carbonate rocks mainly comprise the Campbell Rand Subgroup (Ghaap Group, Transvaal Supergroup), with an age of ~ 2600–2400 Ma. The Iron Ore deposits of the Northern Cape occur in the Griqualand West basin of the Transvaal Supergroup. Iron Ore occurrences are found within the Ghaap Group, which is uncomfortably overlain by the Postmasburg Group, which contains the Manganese-bearing Hotazel Formation (Astrup et al. 1998).

The Gamagara River, a major non-perennial waterway transects the landscape south and west of the Sishen Iron Ore Mine. The preferred toolstone materials used during prehistory are mostly of igneous or metamorphic origin. Blocks and nodules of suitable raw materials can be sourced along outcrops and water courses where the rocks have been dumped through water action. Outcrops of the Ongeluk Formation that forms part of the Griqualand West Sequence contains amygdaloidal andesitic lavas interbedded with tuff, agglomerate, chert and jasper. Outcrops of the Banded Iron Formations of the Asbestos Hills Subgroup of the Ghaap Group have been extensively used for stone tool manufacture over millions of years.

At Site 02 there are also boreholes, a dam and water troughs near the pan, which reflect former farming and mining practices. In some parts of the site topsoil had been removed during the construction of embankments to channel rainwater into the pan to increase the water-holding capacity. These activities have exposed the subsurface, in some areas up to the underlying calcrete floor. An apparent paucity of subsurface lithics suggests a long-term stability of the current land surface (Hardaker 2011).

5 The Stone Age at SA02

5.1 The Phase 1 AIA

During the Phase 1 AIA lithic scatters were identified in the survey area. The Phase 2 focussed on the areas within the footprint of the proposed waste rock dump. The methodology has already been explained in 3.1 above. The discussion in this section will focus on the results of the sampling procedures.

5.2 The Phase 2: Findings and discussion on SA02 assemblage

Pan areas formed the focus of prehistoric landscape utilization. Chazan et al. (2012) caution that the current scope of mining mineral resources that is accompanied by infrastructural developments and increasing demands for new housing at Kathu and neighbouring regions will seriously impact on the area's unique archaeological resources. Whereas important open-air and sealed sites have been recorded during the early period of investigation at Kathu (Beaumont 1990, 2004) there are also yet undiscovered subsurface archaeological sites. It is therefore particularly important that landscape settings that had been preferred during prehistory and that will be impacted upon by mining and associated infrastructural developments are subjected to a rigorous heritage assessment. We have not allocated a rating of high significance to the Stone Age occurrences at Site SA02. However, the data recorded contribute to our knowledge of landscape use and in particularly the LSA utilization of resources. It is apparent that prehistoric people ranged over large territories that included pan settings. The Kathu landscape is marked by an overlay of ephemeral utilization of seasonal resources and intensively exploited viable lithic resources such as the Gamagara River, outcrops and quarries with abundant material, for example surfaces of fine-grained bedrock at Kathu Townlands and Bestwood (Chazan et al. 2012; Wilkins and Chazan 2012).

The lithic assemblage from SA02 exhibits an overall LSA character yet together with MSA elements such as triangular flakes, a secondary retouched MSA point and blades. The co-occurrence of these surface-collected tool types reflects landscape use over long periods of time by different groups. Some of the lithics have patina or an oxidised cortical layer due to the erosional context from which they originated.

A 1-metre grid square was placed along walked transect lines at intervals of 10 metre and subsequently also on several areas with high-density lithics. By plotting the counts of all lithic elements a relative density per square metre was established and rated on a scale of low (< 10), medium (10-20) and high (> 20). The result of the survey on a selection of the pan sites indicates generally low densities of lithic scatters as demonstrated below.

Density of lithic elements per square meter at SA02				
Squares with no lithics	**Low densities < 10 lithics**	**Medium densities 10-20 lithics**	**High densities >20 lithics**	**Total number of sampled squares**
86	52	16	3	157
55%	33%	10%	2%	

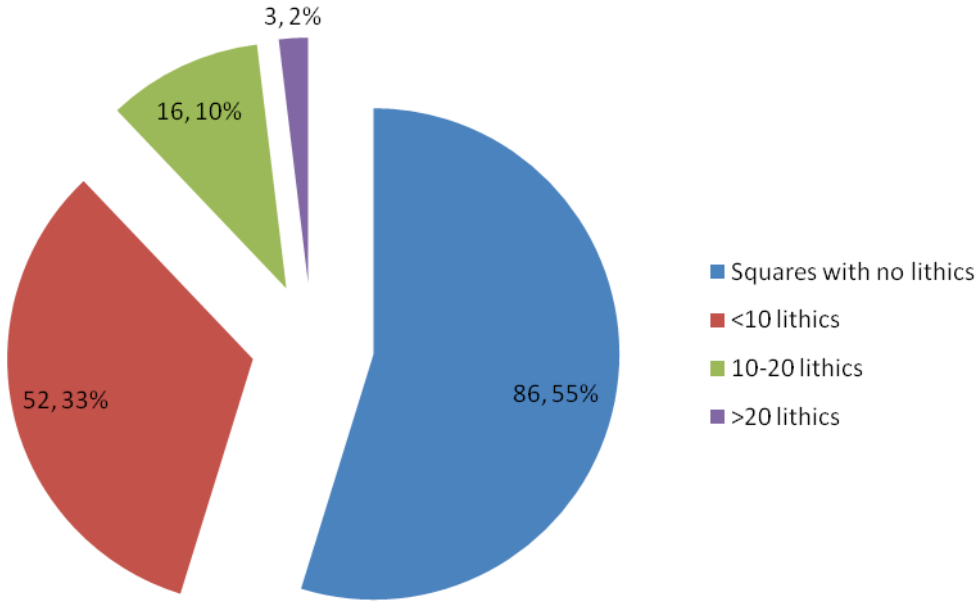


Figure 6 Relative densities of sampled squares.

The lithics sampled at SA02 represent a full reduction continuum, although primary tool production is not significant. Tool types include toolstone manuports and debitage from knapping/resharperning of tools, cores, flakes, low quantities of blades and bladelets, and formal tools. The mainly LSA stone tool typology with some MSA tools demonstrates a palimpsest of utilization of available resources with a focus on pan localities. At other sites in the region where pans were sampled (Van der Ryst and Küsel 2011) it became evident that pans on the periphery of the drainage lines contain higher densities of stone tools and knapping debris. A very limited number of ESA tool types were identified during the preliminary investigation of surface localities within the general area.

The following table and pie chart illustrate the frequencies of tool types from each of the areas that were sampled.

Table 1
Relative percentages of debitage, cores and tool types for the SA02 lithic assemblage

Square	Waste	Core	Flake	Blade	Bladelet	MSA convergent	Awl	Borer	Scraper	Spokeshave	Adze	Segment	Hammerstone	Total
1	4	2	0	0	0	0	0	0	10	0	0	0	0	**16**
2	5	1	0	2	0	1	0	0	5	0	0	0	0	**14**
3	2	0	0	1	1	1	0	0	4	0	0	0	0	**9**
4	0	1	1	0	0	0	0	0	6	0	0	0	0	**8**
5	3	1	0	1	0	0	0	0	5	0	0	0	0	**10**
6	3	0	3	0	0	0	0	1	1	0	0	0	0	**8**
7	4	2	2	0	0	0	1	3	8	0	0	0	0	**20**
8	1	1	2	0	0	0	0	1	4	0	0	0	0	**9**
9	3	3	3	0	2	0	0	0	1	0	0	1	0	**13**
10	0	2	2	0	1	0	1	0	1	0	0	0	0	**7**
11	5	1	1	0	2	0	0	0	9	1	0	0	0	**19**
12	11	2	4	0	3	0	0	0	8	1	0	0	0	**29**
13	6	1	1	3	1	0	0	2	11	2	1	0	0	**28**
14	8	0	2	0	0	0	2	2	6	0	0	0	0	**20**
15	8	3	6	0	0	1	0	1	6	0	0	0	0	**25**
16	4	2	0	0	0	0	0	1	0	1	0	0	0	**8**
20	3	0	1	0	0	0	1	0	1	0	0	0	0	**6**
22	2	1	1	0	0	0	0	2	0	0	0	0	0	**6**
23	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
27	0	0	6	0	1	0	0	1	0	0	0	0	0	**8**
28	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
34	1	1	0	0	0	0	0	0	0	0	0	0	0	**2**
35	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
36	2	0	2	0	0	0	0	0	1	0	0	0	0	**5**
38	1	1	1	0	0	0	0	1	0	0	0	0	0	**4**
39	1	0	2	0	0	0	0	0	1	0	0	0	0	**4**
40	1	1	0	1	0	1	0	0	0	0	0	0	0	**4**
55	3	1	5	0	0	1	0	0	1	0	0	0	0	**11**
60	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**
64	2	0	1	0	0	0	1	0	0	0	0	0	1	**5**
65	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
66	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
69	1	0	0	0	0	0	0	0	1	0	0	0	0	**2**
70	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
72	4	1	1	0	0	1	1	0	0	0	0	0	0	**8**
82	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**
83	1	1	1	0	0	0	0	0	1	0	0	0	0	**4**
84	5	0	3	0	0	0	0	0	0	0	0	0	0	**8**
85	0	0	0	0	0	0	1	0	1	0	0	0	0	**2**
86	4	1	5	0	3	0	1	1	4	0	0	0	0	**19**
87	5	0	1	0	0	0	1	0	5	0	0	0	0	**12**
88	1	1	0	0	0	0	0	0	2	0	0	0	0	**4**
89	0	0	0	0	0	0	0	0	4	0	0	0	0	**4**
90	1	0	5	0	0	0	0	3	3	0	0	0	0	**12**
91	0	0	3	0	0	0	0	1	1	0	0	0	0	**5**
92	1	1	0	0	0	0	0	0	3	0	0	0	0	**5**
93	1	1	1	0	0	0	0	0	1	0	0	0	0	4
94	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
95	0	1	0	1	0	0	0	0	2	0	0	0	0	**4**
96	0	1	2	0	0	0	0	0	3	0	0	0	0	**6**

97	0	0	3	0	0	0	0	0	0	0	0	0	0	**3**
98	4	1	0	0	0	0	0	3	5	0	2	0	0	**15**
99	4	2	5	1	0	0	0	0	0	6	1	0	0	**19**
100	5	2	0	0	0	0	1	1	5	0	0	0	0	**14**
108	0	0	0	0	0	1	0	0	1	0	0	0	0	**2**
109	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**
113	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**
122	1	0	3	0	0	0	1	0	1	0	0	0	0	**6**
129	0	1	1	0	0	0	0	0	1	0	0	0	0	**3**
131	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
132	0	0	0	0	0	0	0	0	2	0	0	0	0	**2**
143	2	0	1	0	0	0	0	0	0	0	0	0	0	**3**
149	1	0	0	0	0	0	0	1	0	0	0	0	0	**2**
150	0	0	2	0	1	0	0	0	0	0	0	0	0	**3**
151	0	0	1	0	0	0	0	0	1	0	1	0	0	**3**
152	0	0	1	0	0	0	0	0	1	0	0	0	0	**2**
153	0	0	1	0	0	0	1	0	0	0	0	0	0	**2**
154	1	0	0	0	0	0	0	1	2	0	0	0	0	**4**
155	3	2	2	0	0	0	0	0	0	0	1	0	0	**8**
156	1	2	3	2	0	0	0	0	3	0	1	0	0	**12**
157	3	0	3	1	0	0	0	0	7	0	0	0	0	**14**
Total	**133**	**47**	**97**	**14**	**15**	**8**	**14**	**27**	**152**	**11**	**7**	**1**	**1**	**527**
%	**25**	**9**	**18**	**3**	**3**	**2**	**3**	**5**	**29**	**2**	**1**	**<1**	**<1**	**100**

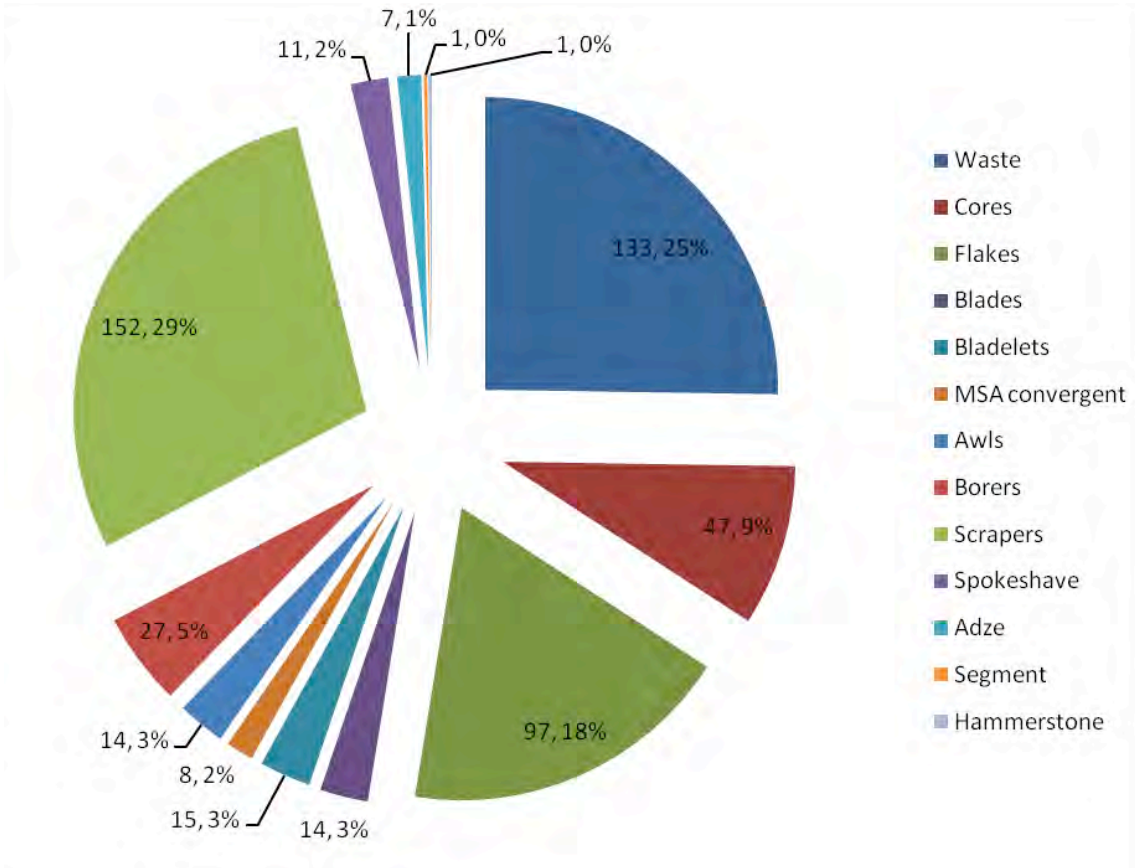


Figure 7 Relative percentages of debitage, cores and tool types for the SA02 lithic assemblage

The raw materials used for the production of lithics tools are mainly yellow, brown and red jasper and banded ironstone, with lower indices for quartzite, hornfels, cryptocrystalline silicas (CCS) such as opalines, and quartz. The following table and pie chart illustrate the frequencies of raw materials from the areas that were sampled.

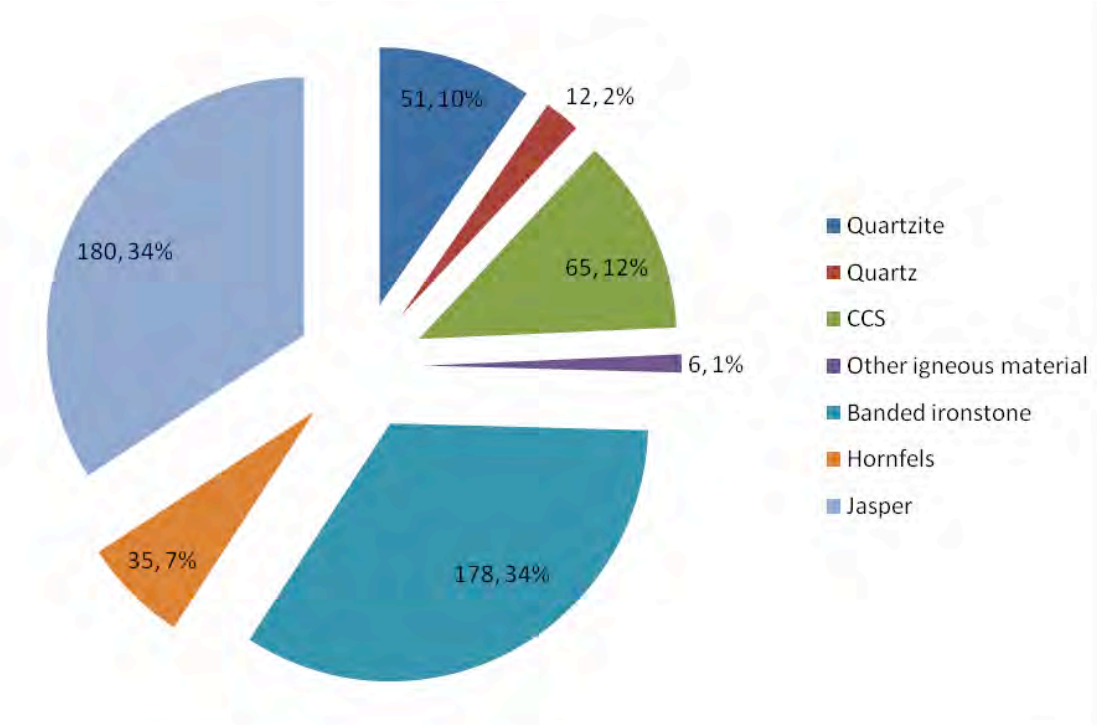


Figure 8 Relative percentages of raw material usage for the SA02 lithic assemblage

Table 2
Relative percentages of raw material usage for the SA02 lithic assemblage

Square	Quartzite	Quartz	CCS	Other igneous	Banded ironstone	Hornfels	Jasper	TOTAL
1	0	1	1	0	3	0	11	**16**
2	2	0	0	1	1	0	10	**14**
3	3	0	0	0	0	0	6	**9**
4	0	0	1	0	0	1	6	**8**
5	3	0	1	0	0	0	6	**10**
6	2	0	0	0	1	0	5	**8**
7	1	0	4	1	0	0	14	**20**
8	0	0	0	0	0	1	8	**9**
9	0	3	7	0	0	0	3	**13**
10	0	0	4	0	2	1	0	**7**
11	4	0	1	0	5	0	9	**19**
12	0	0	6	0	3	1	19	**29**
13	3	1	5	0	4	5	10	**28**
14	2	1	0	0	7	0	10	**20**
15	1	0	4	0	16	1	3	**25**
16	0	0	1	0	3	1	3	**8**
20	0	0	1	0	2	1	2	**6**
22	1	0	0	0	1	0	4	**6**
23	1	0	0	0	0	0	0	**1**

27	0	0	2	0	5	0	1	**8**
28	1	0	0	0	0	0	0	**1**
34	0	0	0	1	0	0	1	**2**
35	0	0	1	0	0	0	0	**1**
36	1	0	0	0	0	0	4	**5**
38	0	0	0	0	3	0	1	**4**
39	0	0	0	0	2	0	2	**4**
40	1	0	0	0	1	1	1	**4**
55	4	0	0	2	2	0	3	**11**
60	0	0	1	0	0	0	0	**1**
64	0	0	3	0	1	1	0	**5**
65	0	0	0	0	1	0	0	**1**
66	0	0	0	0	1	0	1	**2**
69	0	0	0	0	1	0	1	**2**
70	0	0	0	0	0	0	1	**1**
72	1	0	1	0	4	1	1	**8**
82	0	0	0	0	1	0	0	**1**
83	1	0	1	0	2	0	0	**4**
84	1	0	0	0	5	0	2	**8**
85	0	0	0	0	1	0	1	**2**
86	0	1	1	0	13	0	4	**19**
87	1	0	2	0	5	1	3	**12**
88	1	0	0	0	2	0	1	**4**
89	0	0	0	0	4	0	0	**4**
90	1	0	3	0	4	1	3	**12**
91	0	0	0	0	4	0	1	**5**
92	0	0	1	0	4	0	0	**5**
93	0	0	0	0	0	4	0	**4**
94	0	0	0	0	1	0	0	**1**
95	1	0	0	0	2	0	1	**4**
96	1	0	0	0	4	0	1	**6**
97	0	0	0	0	2	1	0	**3**
98	2	1	1	0	8	2	1	**15**
99	2	1	1	0	13	0	2	**19**
100	1	0	4	0	5	3	1	**14**
108	1	0	0	0	1	0	0	**2**
109	0	0	0	0	1	0	0	**1**
113	0	0	1	0	0	0	0	**1**
122	1	0	0	0	3	1	1	**6**
129	0	0	1	0	1	0	1	**3**
131	0	0	0	0	0	0	1	**1**
132	0	0	1	0	1	0	0	**2**
143	0	0	0	0	1	0	2	**3**
149	1	0	0	0	1	0	0	**2**
150	0	0	1	0	2	0	0	**3**
151	0	0	2	0	0	0	1	**3**
152	0	0	0	0	1	0	1	**2**
153	0	0	0	0	1	1	0	**2**
154	0	0	0	0	4	0	0	**4**
155	0	2	1	1	0	4	0	**8**
156	2	1	0	0	7	1	1	**12**
157	3	0	0	0	5	1	5	**14**
Total	**51**	**12**	**65**	**6**	**178**	**35**	**180**	**527**
%	**10**	**2**	**12**	**1**	**34**	**7**	**34**	**100**

The survey established that the main archaeological occurrences were centred on the pan periphery and higher-lying areas. Some of the clusters with higher densities do tend to occur on higher-lying areas around the pan. The distribution patterns do not reflect living floors, used by individual households or stone knapping locales. There is no indication of the intensive production of lithics as all lithic scatters contain relatively low densities of waste and formal tool types. This is most probably because the immediate area does not contain good sources of toolstone and the closest source of raw materials is the Gamagara River. A lack of lithic raw material imposes constraints on for example seasonal occupation cycles (Hardaker 2011) and core reduction technologies (Wilkens and Chazan 2012).

This is borne out by the statistical analysis of the lithic sample. The sampled lithics (total n = 527) produced indices of 25% for debitage (discarded material from the reduction process and from the shaping of tools), 9% cores (or objective pieces), 26% flaked blanks (detached pieces) and 40% formal stone tools. The formal component dominates the sample. This is an inverted trend as formal tools generally account for <10% of an assemblage with debitage in the form of waste from stone tool production forming the major component. During the Phase 2 all surface lithic elements had been collected from the designated squares, including small chips and spalls. While various site formation processes may have contributed to a lack of smaller waste products, the most likely explanation is that there was not intensive production of artefacts on account of the lack of raw materials. The pan locality was probably intermittently utilized over a long period of time that covers the ESA, MSA and LSA but with more regular visits during the LSA.

5.3 Typology and technology

- **Cores**

At least three negative flake removal scars are required to classify a block of material as a core. Chunks that were modified or clearly used to obtain blanks but have less than three flake/blade removals consequently fall outside the core category and are classified as waste/debitage. Stages of core reduction are represented in the amount of dorsal cortex on the core surface, core rejuvenation/preparation flakes and primary cortical flake and blade blanks. In core rejuvenation the striking platform is tidied for further knapping and this process produces core preparation/rejuvenation flakes. Such flakes are usually bulky with a number of flake scars from previous removals on the dorsal surface. Dorsal cortex results from chemical of mechanical weathering of the surface (Andrefsky 2005).

Cores (n = 47) account for 9% of all the lithic. The sample also contains a number of core rejuvenation flakes. Whereas the data certainly demonstrate that stone tool knapping took place at SA02 the relative quantities of waste material do not reflect intensive stone tool manufacturing. Three diagnostic LSA bladelet cores (Fig. 9)

and small radial cores (Fig. 10) and were also recovered. Note that the term diagnostic refers to tool types that can be allocated securely to a specific period based on typological or technological attributes. Multi-directional pebble cores (Fig. 11) are more numerous.

Figure 9 Bladelet cores.

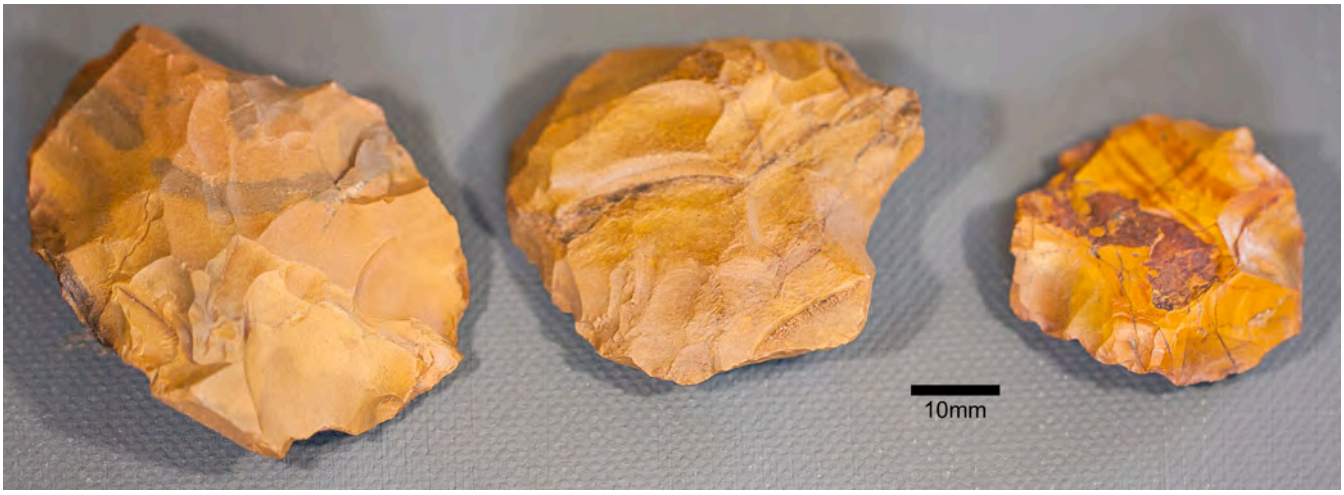
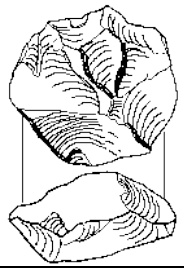


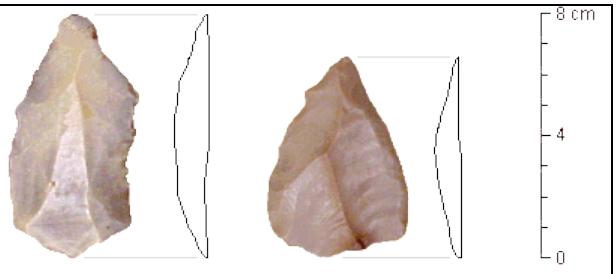
Figure 10 Radial cores.

Figure 11 Multidirectional cores.

Other core types include a few typical MSA prepared Levallois-type cores that were used to deliver flake and blade blanks and the characteristic MSA convergent flakes produced from prepared cores.



An example of a radial/disk-shaped core where multiple flakes have been removed http://archserve.id.ucsb.edu



The two flakes illustrated above were removed from a Levallois core shaped to produce a triangular or convergent flake http://anthro.palomar.edu/homo2/mod_homo_3.htm

Figure 12 MSA prepared core.

- **Hammerstone**

Only one hammerstone was recovered (Fig. 13). A hammerstone is used in stone tool knapping or in the processing of foods and substances such as ochre. Identifying criteria for hammer stones include a regular spherical or oval morphology with impact scarring or percussion marks. Impact fractures and scars on archaeological specimens resulted from deliberate, forceful contact between two surfaces, such as hammering, crushing and pounding (Van der Ryst 2006).

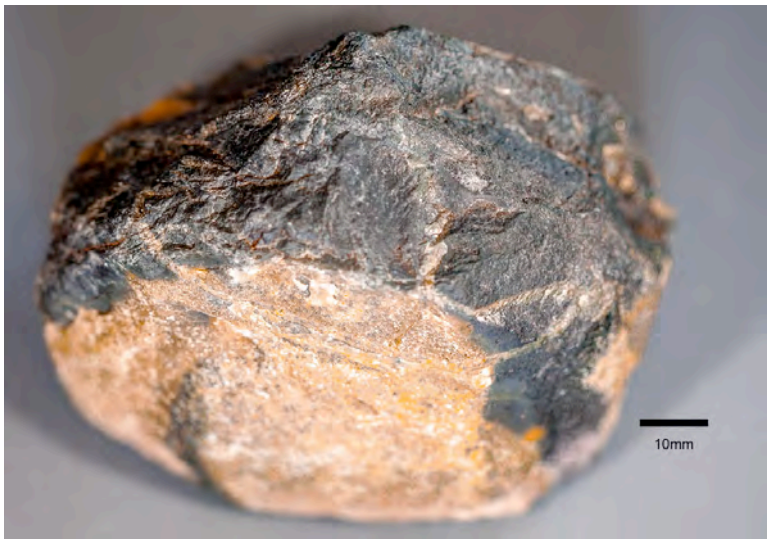


Figure 13 Hammerstone.

- **Debitage**

Debris from stone tool production, the reworking of primary blanks into tools and also resharpening of tools, generate waste and account for a large proportion of the lithics in any assemblage. A conservative figure of 25% (n = 133) for all imported pebbles, chunks of raw materials and waste from stone tool production suggests that tool production was not intensive at SA02. During the Phase 2 all surface lithic elements had been collected from the designated squares, including small chips and spalls. A relatively low level of waste products suggests that there was not intensive production of artefacts through the lack of a nearby source of suitable raw materials.

- **Flaked products from knapping**

Flakes, bladelets and blades are the main products of any reduction process. A flake form is the detached section of rock removed from a core by percussion or pressure (Andrefsky 2005). A total of 26% (n = 134) for all detached pieces without retouch in the SA02 sample demonstrates that flake blanks feature prominently. Note that the different flake forms are divided into flakes, MSA flakes, blades, bladelets. Some of the flake blanks have been utilized, demonstrating their use as expedient tools. Some of the flake and blade blanks exhibit

faceted striking platforms that result from the centripetal pattern of flake removals used to prepare cores before a particular flake or blade was removed, as discussed above.

- *Flakes*

An index of 18% (n = 97) for unretouched flakes in the SA02 sample demonstrates that flake blanks feature prominently. Two main categories of flakes were used in the analysis, namely endstruck and sidestruck, cortical and non-cortical, with relevant subdivisions. Some flakes have been expediently used as evidenced by utilization damage. Flakes without further trimming/retouch were used for a variety of tasks on materials such as wood, meat and bone. The production of flake blanks was likely not only for expedient use, but also to fashion other formal tools, and in particular scrapers (Van der Ryst 2006).

A few flakes with faceted striking platforms that derived from prepared cores are clearly MSA tools (Fig. 16). The presence of water-worn/oxidised cortical surfaces on some of the tool types that have been classified as MSA supports an older date for them. Colour contrast was occasionally present on specimens where a surface has been protected by long-term face-down orientation (Hardaker 2011).

- *Bladelets*

Small bladelets generally form part of LSA assemblages. At SA02 an index of 3% (n = 15) for bladelets demonstrate a low significance. A few of the bladelets exhibit retouch or utilization (Fig. 14). Bladelets were often systematically produced as blanks, which are also suggested by the three bladelet cores recovered at SA02. Bladelets could also have functioned as inserts for composite tools. Concentrations of bladelets at other sites suggest a flaking technique during which many blanks were detached from a core, or perhaps that bladelets were kept in a small bag or container (Deacon and Deacon 1999; Mitchell 2002). Bladelets can also be produced as debitage during secondary retouch when a blank is shaped into a formal tool.

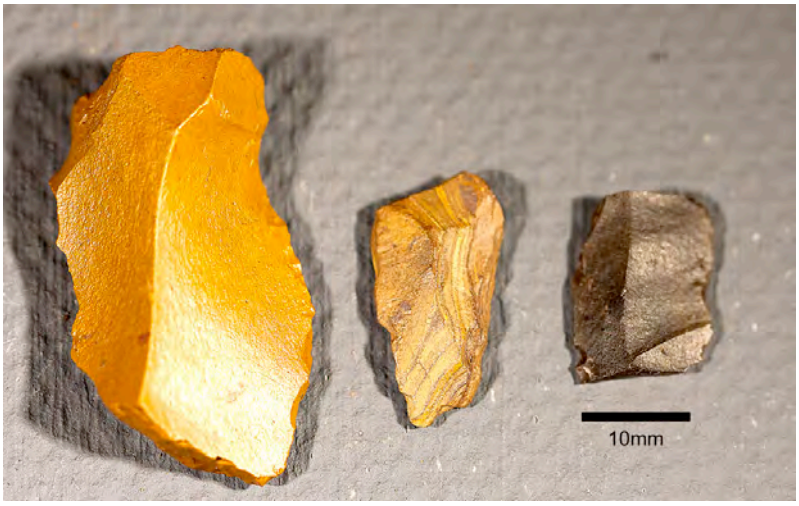


Figure 14 Bladelets and a broken bladelet.

- *Blades*

Blade production is integral to MSA blades and most LSA assemblages. The SA02 sample delivered only 3% (n = 14) blades (Fig. 15). Several that exhibit faceted striking platforms derived from MSA prepared cores. A current research project at Kathu Pan 1 established a date of 500 000 years for a Fauresmith blade assemblage where blades were systematically removed from prepared cores (Porat et al. 2010; Wilkens and Chazan 2012). This is not only the oldest dated Fauresmith assemblage but also the earliest evidence for a blade-dominated industry. Some of the flaked blades were subsequently retouched to produce points (Wilkens and Chazan 2012).

Figure 15 Blades.

- **Convergent flakes and points**

The SA02 assemblage contains 2% (n = 8) convergent flakes. Some have evidence of utilization and one specimen was retouched to produce a unifacial point (Fig. 16). Convergent flakes and pressure-flaked unifacial and bifacial points produced on prepared cores are distinctive MSA tool types. These diagnostic tools are seen as a technological innovation and were presumably used as projectile points on wooden spears (Lombard et al. 2004). Microscopic studies on a sample of MSA points from Sibudu Cave in KwaZulu-Natal support this premise (Wadley et al. 2009).

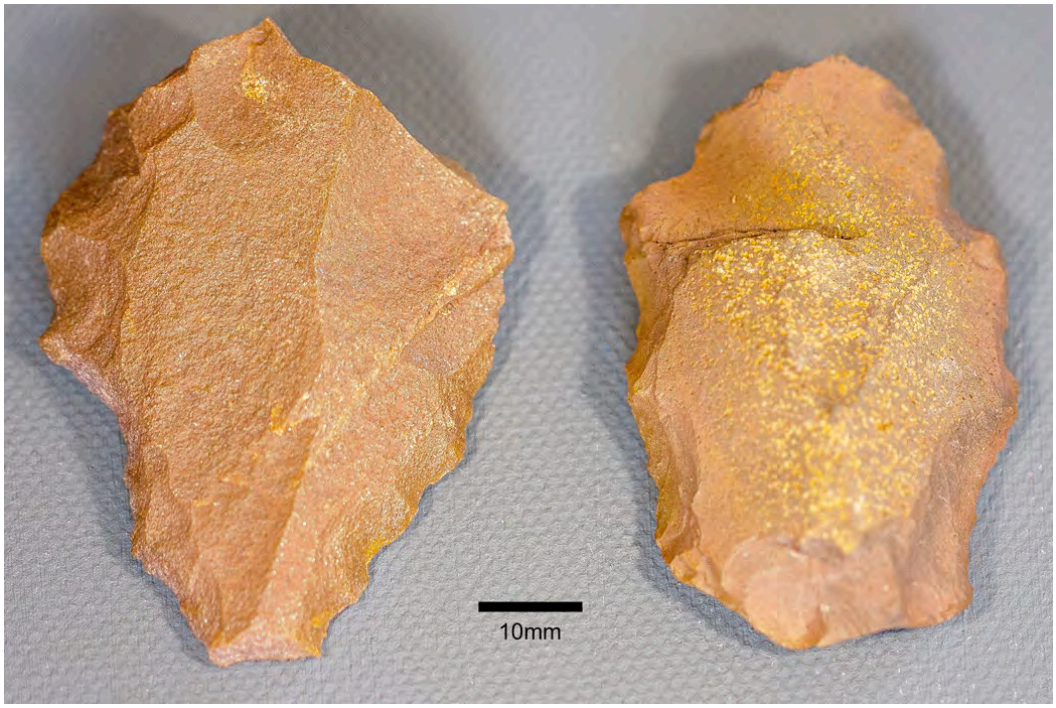


Figure 16 MSA point and MSA utilized flake.

- **Formal tools**

Note that the functions of the various classes of artefacts within each period are usually inferred by morphology and that lithic tool names typically imply use for a specific task, for example a scraper or an awl. A term such as scraper refers to the morphological shape as well as to the function of the artefact. Such functional interpretations are often correct, but the form of an artefact does not necessarily match its inferred function. Different shapes and sizes of tools, for instance scrapers, often result from use and the resharpening of implements rather than different mental templates. Lithic studies support multi-functional usage of tools, with form not always equating assumed function (Andrefsky 2005:201). (See also Annexure 1 for definitions of the major products of stone tool manufacture).

A formal component of 40% (n = 212) for tool types with secondary retouched tools, subdivided into scrapers, awls, borers, spokeshaves, adzes and segments, is exceptional. This is an inverted trend as formal tools generally account for <10% of any assemblage. The high index for formal tools at SA02 suggests that the people who visited this locality carried toolkits with formal tools and possible cores of good quality with them. The tools were used for various subsistence activities and resharpened. Debitage from stone tool knapping demonstrate that supplementary tools were also fashioned when required. The statistics from the lithic analysis and the patterning of lithics at the pan do not support extensive knapping facilities at this locality.

- **Scrapers**

Scrapers are ubiquitous in any Stone Age collection. These tool types with a convex scraper edge had a wide application ranging from the production of wooden hafts for composite tools, other woodworking activities and the processing of skins. Scrapers are often not diagnostic to a particular period. Most of the scraper types, such as small thumbnail and long endscrapers, at SA02 represent typical examples from the LSA. Scrapers are also integral to any MSA assemblage. At SA02 scrapers (n = 152, 29%) occur in all size ranges (Figs 17-20) so that some of the large-medium and medium scrapers are probably MSA specimens. Criteria used in the classification of scrapers types were (1) *size* (Medium-large >30 mm; Medium 20-25 mm; small <25 mm), (2) *morphology* and (3) *the extent of retouch*. Sidestruck flakes have been frequently used to produce scrapers (Fig. 18). The sample also contains examples of core scrapers. After having been used as objective pieces to generate flakes, as attested by numerous negative flake scars, the specimens were subsequently retouched to form a scraper edge (Fig. 17).

Figure 17 Core scrapers.

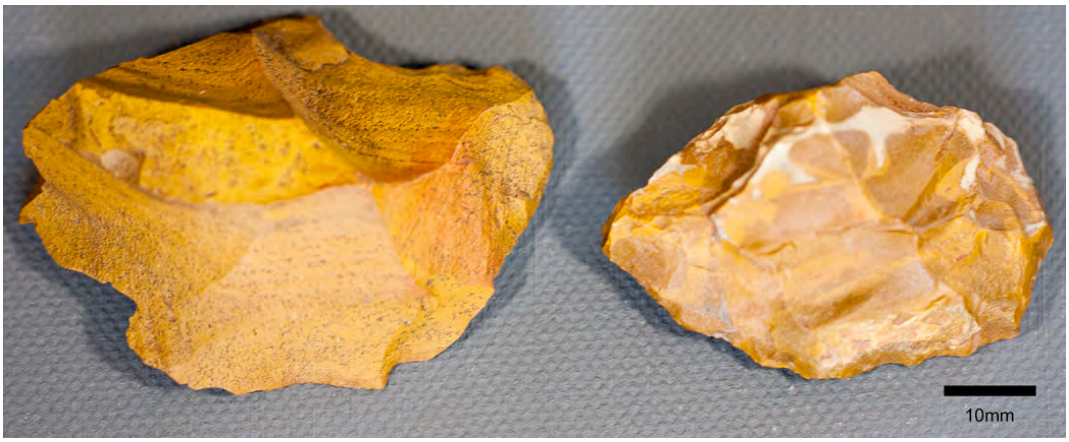


Figure 18 Medium sidescrapers.

Figure 19 Medium endscraper. Inset shows retouch detail.

Figure 20 Small scrapers.

- **Awls and borers**

The assemblage contains quantities of awls (n = 14, 3%) and borers (n = 27, 5%). These tool types, with focus on and retouch of the distal tip, were presumably used for a variety of tasks. Awls >30 mm are more common in MSA assemblages (Fig. 21) while borers <30 mm are integral to the LSA (Fig. 22). These tool types, with focus on and retouch of the distal tip, were presumably used for a variety of tasks. Common ethnographic applications include their use as piercers in the manufacture of clothing, reed matting and to make holes in ornamental objects of bone and shell.

Figure 21 Awls.

Figure 22 Borers.

- **Adzes and spokeshaves**

The collection also contains adzes (n = 7, 1%) (Fig. 24). Adzes generally display a steeper retouch than is found in scrapers. A number of Spokeshaves (n = 11, 2%), or notched scrapers, form part of the SA02 sample (Fig. 23). This tool type is also referred to as hollow scrapers and possibly functioned alike to adzes (Deacon 1984a). The characteristic concave edge may have facilitated wood shaving. Spokeshaves are more customary in assemblages from the last 2000 years. Functional applications of these tool types were probably woodworking and the sharpening of implements, such as digging sticks during the LSA (Stow 1910; Deacon and Deacon 1999).

Figure 23 Spokeshaves

Figure 24 Adzes

- **Segment**

The assemblage contains a single broken segment on quartz (Fig. 25). This specimen exhibits the sharp chord and blunted arch found on archaeological specimens (Deacon 1992; Deacon and Deacon 1999). Segments probably featured in hunting, being used as stone inserts for arrows. Some segment specimens on glass and stone, which were made by the /Xam bushmen from the Breekwater prison in Cape Town, were fixed with mastic onto a haft; according to the Bleek records quartz points were used for arrowheads (Bleek and Lloyd 1911).

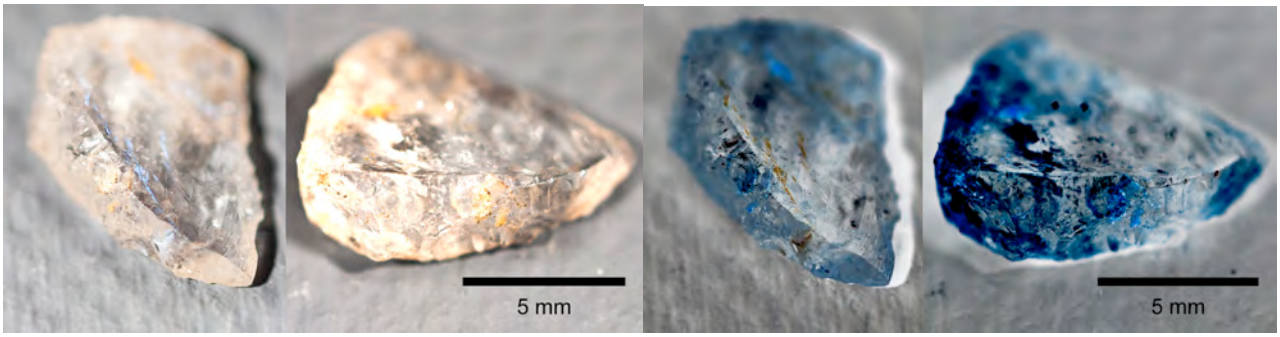


Figure 25 Segment and invert showing backing

6 Legislative framework

6.1 Archaeological resources

The National Heritage Resources Act (NHRA) (Act No. 25 of 1999, section 35) details the assessment and management of all heritage resources, including intangible heritage, in southern Africa. All archaeological remains, artificial features and structures older than 100 years and historic structures older than 60 years are protected by this Act. The legislation requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are

protected (SAHRA2007:2). No archaeological artefact, assemblage or settlement (site) may be moved or destroyed without the necessary approval from the SAHRA.

Human remains older than 60 years are protected by the National Heritage Resources Act Section 36. Human remains that are less than 60 years old are protected by the Human Tissue Act (Act 65 of 1983 as amended).

The following sections of the South African Heritage Resources Act, 1999 (Act 25 of 1999) must be noted:

Structures
34. (1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

Archaeology, palaeontology and meteorite
35.(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

Burial grounds and graves
36.(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
(c) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.*

7 Findings and recommendations

The foregoing discussion on the findings and the analysis of the archaeological sample from the immediate area of the pan and surrounds demonstrate that Site SA02 is of low to medium significance. The survey and transects confirmed generally low-densities of stone tools on the plains and the periphery of the pan. Only 3 (2%) of the 157 sampled squares exhibited high densities of >20 lithics per square meter. The presence of waste from stone tool manufacture, a range of core types, and the relative quantities of flaked forms such as flakes, blade and bladelets, demonstrate small-scale *in situ* stone-tool production. The typology of the LSA at SA02 conforms to most assemblages from this period. The relative low numbers of lithics recovered during the sampling are statistically insignificant and cannot be used to make inferences on any particular LSA industry. The sample contains a representative range of formal stone tools. The formal LSA tool types are mostly represented in a range of scraper forms, borers, adzes and spokeshaves as well as a single segment. The sample recovered from SA02 represents a palimpsest of utilization by various groups over time interspersed with long absences. The locality was probably mostly visited when the pan held water and also when berries and underground plant foods could be harvested. The MSA sample is small and while typical MSA tool types such as convergent flakes, blades and awls, are present these are ubiquitous at most localities with a MSA signature and cannot be used to propose a relative date for the MSA utilization. In addition, we observed no evidence for buried deposits in the areas where earlier infrastructural activities had exposed subsurface soil levels. Surface sites that have lost all organic or stratigraphic contexts are also notoriously difficult to date (Hardaker 2011).

Within the context of the above discussion, locality SA02 is deemed of low to medium cultural significance (NHRA 1999: Act 25:2(vi)) at the local to regional scale. We have evidently not removed all lithics from this locality. However, it is the considered opinion of the heritage team that the lithic sample obtained through the Phase 2 assessment is representative and that further mitigation will not add more qualitative data. No additional archaeological mitigation is accordingly recommended.

Subject to the approval of this Phase 2 Specialist report by the South African Heritage Resources Agency (SAHRA) it is accordingly recommended that an application for a destruction permit should be approved for site SA01 to SA04 in order for infrastructural developments of the Western Waste Rock Dumps Project proposed by the Sishen Iron Ore Mine to proceed.

8 References

Andrefsky, W. 2005. *Lithics. Macroscopic approaches to analysis.* 2nd ed. Cambridge: Cambridge University Press.

Astrup, J., Hammerbeck, E.C.I. and Van den Berg, H. (1998). Iron. In M.G.C. Wilson and C.R. Anhaeusser (Eds) *The mineral resources of South Africa*, Handbook 16, Council for Geoscience, Pretoria, pp 402-415.

Beaumont, P.B. 1990. Kathu Pan. In P.B. Beaumont and D. Morris (Eds) *Guide to archaeological sites in the Northern Cape*: 75–100. Kimberley: McGregor Museum.

Beaumont, P. 2004. Kathu Pan and Kathu Townlands/Uitkoms. In P.B. Beaumont and D. Morris (Eds) *Archaeology in the Northern Cape: some key sites*. Kimberley: McGregor Museum, 50-53.

Beaumont, P.B. and Vogel, J.C. 2006. On a timescale for the past million years of human history in central South Africa. *South African Journal of Science* 102: 217–28.

Bleek, W.H.I. and Lloyd, L.C. 1911. *Specimens of Bushman folklore*. Collected by the late W.H.I. Bleek PhD and L.C. Lloyd edited by the latter. London: George Allen & Co.

Chazan, M, Hagai, R, Matmon, A, Porat, N, Goldberg, P, Yates R, Avery, M, Sumner, A and Horwitz, LK. 2008. Radiometric dating of the Earlier Stone Age sequence in Excavation I at Wonderwerk Cave, South Africa: preliminary results. *Journal of Human Evolution* 55(1):1-11.

Chazan, M. and Horwitz, L.K. 2010. Milestones in the development of symbolic behaviour: a case study from Wonderwerk Cave, South Africa. *World Archaeology* 41 (4), 521-539.

Chazan, C., Wilkins, J., Morris, D. and Berna, F. 2012. Bestwood 1: a newly discovered Earlier Stone Age living surface near Kathu, Northern Cape Province, South Africa. *Antiquity* 86(331). Antiquity Gallery.

Council for Geoscience. www.geoscience.org.za.

Curnoe, D. 2005. Beyond Taung: Palaeoanthropological research at Groot Kloof, Ghaap Escarpment, Northern Cape Province, South Africa. *NYAME AKUMA* 64: 58-56

Deacon, J. 1984a. *The Later Stone Age of southernmost Africa*. Oxford: BAR International Series 213.

Deacon, J. 1984b. Later Stone Age people in southern Africa. In R.G. Klein (Ed.) *Southern African prehistory and Paleoenvironments*. Rotterdam: AA Balkema, pp 221-328.

Deacon, J. 1992. *Arrows as agents of belief amongst the /Xam Bushmen*. Cape Town: South African Museum, Margaret Shaw Lecture 3.

Deacon, H.J. and Deacon, J. 1999. *Human beginnings in South Africa: uncovering the secrets of the Stone Age*. Cape Town: David Philips.

Hardaker, T. 2011. *New approaches to the study of surface palaeolithic artefacts: a pilot project at Zebra River, Western Namibia*. Oxford: Archaeopress.

Herries, A.I.R. 2011. A chronological perspective on the Acheulian and its transition to the Middle Stone Age in Southern Africa: The question of the Fauresmith. *International Journal of* Evolutionary Biology. Article ID 961401, 2012: 1-25. doi:10.4061/2011/961401.

Herries, H., Curnoe, D., Brink, J., Henderson, Z., Morris, D., Van Reyneveld, K. and Hodge, E. 2007. Landscape evolution, palaeoclimate and Later Stone Age occupation of the Ghaap Plateau escarpment, Northern Cape Province, South Africa. *Antiquity* 81(313), no page numbering.

Jacobson, L., De Beer, F.C., Nshimirimana, R., Horwitz, L.K. and Chazan, M. 2012. Neutron tomographic assessment of incisions on prehistoric stone slabs: a case study from Wonderwerk Cave, South Africa. *Archaeometry*. doi: 10.1111/J.1475-4754.2012.00670.x.

Johnson, B.J., Miller, G.H., FogeL, M.L. and Beaumont, P.B. 1997. The determination of late Quaternary paleoenvironments at Equus Cave, South Africa, using stable isotopes and amino acid racemization in ostrich eggshell. *Palaeogeography, Palaeoclimatology, Palaeoecology.* 136: 121-37.

Kruger, N. 2012. *Sishen Western Waste Rock Dumps: Sishen Iron Ore Mine, Kgalagadi District Municipality, Northern Cape Province*. Phase 1 Archaeological Impact Assesment Report. Compiled by N Kruger for AGES (Pty) Ltd.

Lombard, M., Parsons, I. and Van der Ryst, M. 2004. Middle Stone Age lithic point experimentation for macro-fracture and residue analysis: the process and preliminary results with reference to Sibudu
Cave points. *South African Journal of Science* 100(3/4)159-166.

McNabb, J., Binyon, F. and Hazelwood, L. 2004. The large cutting tools from the South African Acheulean and the question of social traditions. *Current Anthropology* 45(5):653-677.

Mitchell, PJ. 2002. *The archaeology of southern Africa*. Cambridge: Cambridge University Press.

Morris, D. 1988. Engraved in place and time: a review of variability in the rock art of the Northern Cape and Karoo. *South African Archaeological Bulletin* 43:109-121.

Morris, D. 2002. Driekopseiland and 'the rain's magic power': history and landscape in a new interpretation of a Northern Cape rock engraving site. MA diss,, University of the Western Cape, Cape Town.

Morris, D.R.N.M. 2012. *Rock art in the Northern Cape: the implications of variability in engravings and paintings relative to issues of social context and change in the precolonial past*. PhD diss., University of the Western Cape.

Porat, N., Chazan, M., Grün, R., Aubert, M, Eisenmann, V. and Horwitz, L.K. 2010. New radiometric ages for the Fauresmith industry from Kathu Pan, southern Africa: implications for the Earlier to Middle Stone Age transition. *Journal of Archaeological Science* 37: 269–283.

Richardson, M. and Gajewski, B. 2003. Archaeological sampling strategies. *Journal of Statistics Education* [Online]11(1). http://www.amstat.org/publications/jse/v11n1/richardson.html.

SAHRA. 1999. *National Heritage Resources Act No. 25 of 1999*. Cape Town: RSA Government Gazette.

SAHRA. 2007. *SG 2.2 SAHRA APM Guidelines: Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports.* (www.sahra.org.za).

SAHRA. 2012. Permit. Woon 469, Kumba Sishen Iron Ore Mine, Northern Cape Province Our Ref: 9/2/074/0001

Schmitz, M.D. and Bowring, S.A. 2004. Lower crustal granulite formation during Mesoproterozoic Namaqua-Natal collisional orogenesis, southern Africa. *South African Journal of Geology* 107(1-2): 261-284. DOI: 10.2113/ 107.1-2.261.

Stow, G.W. 1910. *The native races of South Africa* (Edited by G.M. Theal). London: Swan Sonnenschein & Co.

Van der Ryst, M.M. 2006. *Seeking shelter: hunter-gatherer-fishers of Olieboomspoort, Limpopo, South Africa.* PhD diss., Johannesburg: University of the Witwatersrand.

Van der Ryst, M.M and Küsel, S.U. 2011. *Specialist report on the Stone Age and other heritage resources at Kolomela, Postmasburg, Northern Cape*. Commissioned by African Heritage Consultants.

Wadley, L. 2005. A typological study of the final Middle Stone Age stone tools from Sibudu Cave, Kwazulu-Natal. *South African Archaeological Bulletin* 60(182):51-63.

Wadley, L, Hodgskiss, T and Grant M. 2009. Implications for complex cognition from the hafting of tools with compound adhesives in the Middle Stone Age, South Africa. *PNAS* 106(24): 9590–9594.

Wilkins, J. and Chazan, M. 2012. Blade production ~500 thousand years ago at Kathu Pan 1, South Africa: support for a multiple origins hypothesis for early Middle Pleistocene blade technologies. *Journal of Archaeological Science* 39(6): 1883-1900.

ANNEXURE 1

Basic stone tool terminology

A core is a block of raw material from which flake-blades or bladelets have been removed. It is classified as a core only if there are at least three negative flake removal scars. Cores generally show much morphological variability and the size of raw materials influences the kind or reduction technology used (Andrefsky 2005)

A flake is a fragment of stone which has been removed from a core. Such a blank can be used to manufacture a variety of tools. The tiny flakes removed when shaping a flake blank are also called flakes (see retouch below). Flakes, but also bladelets and blades, are the main products of any reduction process.

Detached flakes are often classified as debitage or waste (Andrefsky 2005). However, flakes were undoubtedly used for a variety of tasks on wood, meat and bone as suggested by artefact function studies and supported by ethnographic accounts (Van der Ryst 2006).

Retouch is when small flakes or chips are removed from a blank flake in order to shape or transform a flake into a tool. Retouch shows in tiny regular negative scars on the tool.

Blank is a piece of stone (a flake) that has been removed from a core. It can potentially be modified through further shaping into a specific type of formal tool.

Other lithic terms used in this document*:*

Acheulean. A second phase of the ESA associated with Large Cutting Tools such as handaxes and usually with early *Homo* species.

Anatomically Modern Humans (AMH). We use the term to describe fossils that clearly belong to the species *Homo sapiens sapiens*. Some physical anthropologists include all populations whose physique lies within the range of variation of living people and fossil forms of pre-modern humans, such as the Neandertals, in the singe subspecies *Homo sapiens sapiens*, whereas others prefer species names such as *Homo neanderthalensis* for archaic types. The term AMH has fewer biological implications and it is therefore generally used for fossils that clearly belong to the same species as us (UNISA AGE2701 2009).

Artefacts. Traces of hominin behaviour in the form of tools.

Backing. A blade or flake that has been intentionally dulled on one margin (similar to a knife blade).

Biface. A tool with two surfaces (faces) that meet to form one cutting edge.

Bifacial trimming. Secondary shaping on both surfaces. A **uniface** exhibits trimming only on one surface, commonly the ventral surface.

Blade. A flake with parallel or sub-parallel sides that is at least twice as long as it is wide.

Cortex. A chemical or mechanical weathered surface on stone.

Debitage refers to waste from stone tool manufacture.

Distal. The tip of a flake or tool.

Dorsal. The side of a flake or detached piece with scars of previous flake removals or the side showing the original cortex/skin of the rock in the case of a primary (first in the sequence) flake.

Fauresmith. A transitional industry at the interface of the ESA and the MSA that dates to around 250 000/200 000 years ago. Prepared cores and small well-made handaxes are usually a feature of this phase.

Hominin. Members of the Homininiae, the subfamily to which humans belong.

Howiesons Poort. A MSA microlithic industry with tools made on fine-grained stone that date to around 60 000/65 000 years ago. At sites where a Howiesons Poort phase is present, it is often found interleaved between macrolithic MSA tools of earlier and later phases.

Knapper/knapping. A knapper is a skilled craftsperson who produces stone flakes and formal tools through a reduction process, known as knapping.

Lithic means stone and is derived from Greek.

Oldowan. The earliest phases of the ESA. It is characterized by the use of chopper tools made on pebbles by early hominins.

Proximal. The section of a flake or a tool that contains the striking platform and the bulb of percussion/bulbar scar of the fracture zone.

Stratigraphy. The ordered layering of units, e.g. the building up of a deposit over successive visits to a locality. The sequence of strata is used to relatively date the layers and the materials in layers to older and more recent occupations.

Systematic random sampling. It is a probabilistic sampling process that requires the ordering of units by randomly selecting a unit from among ordered units such as a grid square. Archaeologists often prefer systematic samples because they are quick to select and give good coverage or an even spread of a site. The archaeologist must cognisant of possible topographical, geological or other features in the sampling interval that may match some regularity in the data (Richardson and Gajewski 2003).

The possibility of stratification/strata should always be taken into account. In probabilistic **systematic random sampling** restricted random samples are collected to obtain a more accurate estimate than possible with completely random samples. Subgroup units are formed and a simple random sample of units is selected from within each subgroup. For example, the archaeologist may select a representative sample to be taken from the north and the south end of a site or from deeper levels to determine stratification. The definition of strata could be based on any property or on a combination of properties, such as geology or elevation or any aspect that is thought likely to affect the parameters under study, for example the density or particular spatial distribution of artefacts at a site (Richardson and Gajewski 2003).

Striking platform. The area where a flake or blade was struck to remove it from the core.

Typology. A systematic classification scheme used to order different types according to their characteristics in a relational system.

Ventral. The smooth surface of a detached piece with no evidence of previous flake removals. It usually contains a flake scar, the **bulb of percussion** that forms as a result of the force exerted to remove the flake from a core.

Archaeological context: sequence and definitions

Period	Approximate dates
Earlier Stone Age	more than 2 million years ago - 250 000/200 000 years ago
Middle Stone Age	200 000/250 000 years ago – around 20 000 years ago to even the Last Glacial Maximum (LGM) in some regions
Later Stone Age (Includes San Rock Art) Hunter-gatherer and herder groups	>20 000 – 200 years ago and up to historic times in certain areas

Modes of lithic technology (after JCD Clark 1969) (Barham and Mitchell 2008:16)

		Notes on different Modes
Mode 1	Pebble tool industries using choppers and simple flakes struck off pebbles	Mode 1 and 2: mostly **ESA**
Mode 2	Bifacially-worked tools (handaxes and cleavers) produced from large flakes and cores	**ESA Acheulean** Transitional industries such as the **Fauresmith:** a blend of Mode 2 and 3
Mode 3	Flake tools produced from prepared cores	Mode 3 and 4: mostly **MSA**
Mode 4	Punch-struck blades that may be retouched into various specialised tool types	
Mode 5	Microlithic components of composite artefacts, often backed or otherwise retouched	Mode 5: mostly **LSA**, elements of Mode 4, particularly during the early stages, are quite prominent

Chronological framework for the Stone Age of South Africa		
Cultural sequence	**Approximate dates**	**Characteristics**
Later Stone Age		**>30 000 BP up to the historic period**
Late Holocene assemblages with or without ceramics: • **Interior Wilton** • **Post-Wilton/ Post-classic Wilton** • **Smithfield**	2000 BP to historic times	*Hunter-gatherer assemblages:* • Stone tools are mostly microlithic and made on fine-grained stone materials. • The Interior and Post-Wilton have small scrapers with some backed bladelets but segments are rare. Adzes are relatively common. • The Smithfield contains long scrapers and backed bladelets. • May contain grass-tempered hunter-gatherer ceramics. Often contain farmer ceramics, metal objects and glass trade beads obtained through contact. • Bone, animal skin and wood and plant materials were used to produce weapons, household implements and ornaments and a range of tools were made to be used in the manufacture thereof. • Upper and lower grindstones, nutting stones, hammer stones, anvils and punches and groundstone objects such as bored stones and lithic rings. • Abundant ochre and specularite for secular, ceremonial and cosmetic use • Rock art. ***Khoekhoe assemblages*** • Marked by ceramics, often with spouts and conical bases. • Lithic tool assemblages contain mostly informal tools on coarse-grained stone • OES and shell ornaments • Ochre and grooved ochre grindstones • Khoekhoe finger-painted rock art
Interior Wilton **Post-Wilton** **Post-Classic Wilton**	4000-2000 BP	• No ceramics • Small scrapers, bladelets, a range of backed tools, lithic segments. • Most of the assemblages contain similar organics, groundstone, OES, bone tools, etc. such as mentioned above.
Wilton	8000-4000 BP	• Small scrapers, many bladelets, a range of backed tools, many lithic segments. • Most of the assemblages contain similar organics, groundstone, OES, ornaments, bone tools, etc. such as mentioned above
Oakhurst Regional industries include Albany, Kuruman and Lockshoek	12 000-8000 BP	• Mostly non-microlithic and on coarser-grained stone. • Characteristic large adzes and scrapers. Scrapers often D-shaped, or sidescrapers. • Knapping often on large in situ blocks of stone. • Few backed tools. • Many assemblages marked by a range of polished bone tools.
Robberg Mostly at coastal sites	<18 000-12 000 BP	• Unretouched bladelets. • Characteristic bladelet cores. • Some backed bladelets and few segments. • A small range of scrapers in an otherwise informal assemblage. • An otherwise informal assemblage with <5% retouch
Early Later Stone Age	<30 000-12 000 BP	• High variability with often a mix of LSA and MSA tool forms. Not all researchers acknowledge ELSA assemblages as an unambiguous expression of the LSA.

Middle Stone Age	**250 000 to <20 000 BP**	
Marked by regional variability. Note that terms such as Still Bay, Mossel Bay, Klasies Rivier etc. are used for regional complexes. Prepared cores are commonly used and flaked products often retain the characteristic faceted striking platform that derives from this technique. Cognitive, cultural and physical modernity with the development of *Homo sapiens sapiens.*		
MSA3	60 000-<20 000 BP	Prepared cores, convergent flakes, blades. Formal tools include unifacial and bifacial points, scraper forms, awls, adzes. Common use of ochre.
Howiesons Poort	Around 60 000-65 000 BP	Microlithic with blade technology. Backed tools such as segments, and blades. Points are rare.
MSA2	60 000-<80 000 BP	Regional variability. Prepared cores, convergent flakes, large blades. Denticulate flakes are particularly abundant at coastal sites.
MSA1	<100 000-250 000 BP	Much regional variability. Prepared cores, large blades, convergent flakes.
Interface of the MSA/ESA: Transitional Fauresmith	**250 000/200 000 BP**	
Small handaxes. Convergent flakes and blade forms produced on prepared cores. A range of formal tools.		
Earlier Stone Age	**>2 million-250 000/200 000 BP**	
Hominins include the Australopithecine and Paranthropus species, *Homo habilis, Homo ergaster/erectus*, and archaic *Homo*.		
Acheulean	1.5-<250 000 BP	• **Large cutting tools or bifaces** such as handaxes, cleavers and picks. • A range of more formal tools that include many scraper forms. • Large numbers of flakes.
Oldowan	<2-1.5 million years BP	• Chopper tools on cobbles or pebbles. • Little control of design other than the reduction of cores. • Proto-handaxes. • A variety of flakes.

ANNEXURE 2

REQUEST TO DEPOSIT ARCHAEOLOGICAL OR RELATED OBJECTS OR COLLECTIONS AT THE MCGREGOR MUSEUM
(Including request for McGregor Museum Accession Number and Site Number)

Name of Applicant:[4] **Van der Ryst Maria Magdalena**

Position: **Senior lecturer: Archaeology Division**

Institutional address: **Department of Anthropology and Archaeology PO Box 392 UNISA 0003**

Telephone: **012 429 6418** Fax: **012 429 6091** Cell: **082 4953420**
email:**vdrysmm@unisa.ac.za**

If application is being made on behalf of a student, name of student:

……..

Project title: Phase two archaeological assessment Woon 469, Kumba Sishen Iron Ore Mine, Northern Cape Province

Object/s or Material to be deposited at the Museum (attach details on separate sheet):[5]

Mostly Middle Stone Age lithics. The project is pending until a permit has been issued by SAHRA. The material will be analysed according to standard archaeological protocol. On completion of the project (January-March 2013, the material will be deposited at the McGregor Museum. A report on the project will be lodged at the Museum.
Declaration:

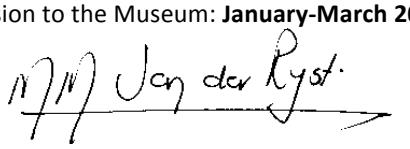
I **Maria Magdalena van der Ryst** full name of applicant)
hereby undertake to:
1. Acknowledge and comply with McGregor Museum acceptance policy (including curatorial, access, sampling and loans policies) and/or any permit or legislation at provincial or national level;
2. Ensure that all material to be deposited/donated has been acquired in a legal manner and that copies of relevant documentation will be submitted (e.g. copy of the excavation permit or registration of private collection issued by SAHRA).
3. Make payment of the stipulated box tariff for curation.
4. Clean, mark and package material in accordance with Museum standards and requirements as indicated in the acceptance policy (or provide for this work to be done). Marking on artefacts should include at least the relevant McGregor Museum accession number – to be supplied – and basic co-ordinates for each item (e.g. square and stratum reference). In assigning an accession number, the Museum will also provide a Site Number where relevant. The McGregor Museum will provide standard size boxes for the material to be deposited.
5. Lodge with the museum, along with the object/s or collection/s, all relevant documentation (copies of notes, analysis sheets, graphic and photographic documentation, correspondence, report(s)/publication(s) or any other pertinent material, digital and hard-copy) as part of the archive relating to the collection. This usually would take place once the researcher has published results and/or otherwise completed work on the material (for which a reasonable period might be agreed upon, open for further negotiation with the Board of Trustees).
6. Note that restrictive conditions of deposition/donation are not encouraged and may be cause for refusal: in no case will restrictions requested by the researcher/donor be accepted without a termination date.
7. Ensure that the McGregor Museum Kimberley is acknowledged as long-term repository in any report, publication or thesis and that a copy of any such report or publication is lodged with the McGregor Museum in due course.

If the material is to be analysed or researched at another venue in the short term, please state where and by which date it is expected it would be deposited at the museum:

[4] **Supervisor to apply on behalf of undergraduate or honours students. Researchers not attached to an academic institution or museum should provide at least two references.**

Temporary storage venue: **UNISA**

Date for expected submission to the Museum: **January-March 2013**

Signature of applicant: 

Place: **PRETORIA** Date: **20 December 2012**

Approved by: …….

Signature: …… Date: ……

Position: …….

Request for Accession Number (for object or assemblage) and/or Site Number:

Brief description of object or assemblage for which accession number is sought:

Middle Stone Age lithics

Name of Site (Cadastral name included if possible) for which Site Number is sought:
District Northern Cape Province Map Number 2722DD Farm Name Fritz 540

Geographic Co-ordinates of Site:
Co-ordinates S27°43'13.7" E22°57'12.7"
See attached document for map
(Please make further copies of this section if more than one collection/assemblage and/or more than one site should pertain).

Extract from Collections Policy:

7 ACCEPTANCE OF COLLECTIONS AND DONATIONS

i. All material deposited/donated will become the full legal property of the McGregor Museum Board of Trustees.

ii. The Museum will accept items and collections conforming to its acquisition policies from researchers, contract archaeology projects and members of the public, subject to the following principles, guidelines and requirements:
   a) All material to be deposited/donated must have been acquired in a legal manner and copies of relevant documentation submitted therewith (copy of the excavation permit or registration of private collection issued by SAHRA).
   b) The donor will declare acceptance of the Museum's curatorial, access, sampling and loans policies.
   c) In the case of material coming to the Museum as a result of research/excavation, and in terms of a permit issued by SAHRA:
      - The researcher and Museum should enter into a formal deposition agreement, prior to, and as part of the permit application, as required by SAHRA.
      - The Museum will charge a once-off curation fee per box. The fee will be to the account of the researcher.
      - The researcher will be responsible for cleaning, marking and packaging of material in accordance with Museum standards and requirements set out in the deposition agreement (or providing for this work to be done).
      - The researcher will be responsible for lodging all relevant documentation (copies of notes, analysis sheets, graphic and photographic documentation, correspondence, report(s)/publication(s) or any other pertinent material) with the Museum as part of the archive relating to the collection, at a time as stipulated in the deposition agreement.
   d) Restrictive conditions of deposition/donation are not encouraged and may be cause for refusal. In no case will restrictions, requested by the researcher/donor be accepted without a termination date.