CULTURAL HERITAGE RESOURCES IMPACT ASSESSMENT OF MANGANESE MINING AREAS ON THE FARMS BELGRAVIA 264, SANTOY 230,GLORIA 226 AND NCHWANING 267, AT BLACK ROCK,NORTH OF KURUMAN, KGALAGADI DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

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EXECUTIVE SUMMARY

A Cultural Heritage Resources impact assessment was done on the farms Belgravia 264, Santoy 230, Gloria 220 and Nchwaning 267 at Black Rock north of Kuruman, Northern Cape.

The area is mainly Kalahari sand veld and dunes. The above farms are part of the same manganese ore body.

The original Black Rock mine represents the early history of manganese mining in South Africa. The mine technique used was both open cast and underground mining. A large cemetery for mine workers is also present as well as a small isolated cemetery with three graves. The mines of the area are world renown for unique minerals which are found nowhere else.

Stone Age material was found at a large quarry on the banks of the Ga-Mogara River. This included Early and Middle Stone Age material.

It is recommended that:

(a) The Black Rock mine be declared a National Heritage Site

(b) The original mine be made assessable to the public

(c) The history of the mine and its structure be fully documented in a Phase II cultural heritage resources impact assessment

(d) A heritage management plan be compiled for the original mine

(e) Geological specimens of associated mines be collected, preserved and exhibited in a mine building converted into a safe place as a museum. This exhibition facility can also exhibit the Stone Age and mining history of the area.

(f) The cemeteries be maintained and cleaned on a regular basis

(g) A watching brief is recommended for the archaeological sites. It is also recommended that no development, mining or quarrying should take place within a 100m distance from the middle of the Ga-Mogara River.

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1. DEFINITION

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

2. PROTECTED SITES IN TERMS OF THE NATIONAL HERITAGE RESOURCES ACT, ACT NO. 25 OF 1999

The following are the most important sites and objects protected by the National Heritage Act:

a. Structures or parts of structures older than 60 years.
b. Archaeological sites and objects.
c. Paleontological sites.
d. Meteorites.
e. Ship wrecks.
f. Burial grounds.

g. Graves of victims of conflict.
h. Public monuments and memorials.
i. Structures, places and objects protected through the publication of notices in the Gazette and Provincial Gazette.
j. Any other places or objects, which are considered to be of interest or of historical or cultural significance.
k. Geological sites of scientific or cultural importance.
l. Sites of significance relating to the history of slavery in South Africa.
m. Objects to which oral traditions are attached.
n. Sites of cultural significance or other value to a community or pattern of South African history.

3. METHODOLOGY

All relevant maps and documents on the site were studied. The site was visited and visually inspected.

4. RESULTS

The mining town of Black Rock lays some 80km north west of Kuruman and 20km north of Hotazel. The area is mainly Kalahari sand veld and dunes with mixed vegetation of grass and bushveld. According to mine officials the sand is up to 60 meters deep at places. It is a very arid region with no permanent rivers.

4.1 Historical Background.

The first Geologist to have surveyed the Northern Cape was Dr. A. W. Rogers of the Geological Commission of the Cape Colony in 1906. One of the features he noted was a small hill called Black Rock and reported on the presence of manganese ore at the base of the hill. In 1940 Associated Manganese Mines of South Africa acquired the manganese outcrop known as Black Rock and shortly afterwards started mining the deposit (Cairncross & Dixon 1999:61). The ore is extracted by both underground and open cast operations, mines in the area include Wessels, N'Chwaning I, N'Chwaning II, Black Rock, Hotazel, Langdon, Devon, Perth, Smartt, Adams, Mamatwan(largest opencast mine in the area), Middleplaats and Gloria (opened in 1978).

The stratabound ore deposits of the Kalahari Manganese field represent the largest land bound sedimentary manganese deposits in the world and originated from a single episode of manganese deposition about 2200 million years ago. A widespread hypothermal event occurred in the north western portion of the Kalahari Manganese field 1300 million years ago with temperatures reaching a maximum of 450 degrees centigrade in the Wessels, N'Chwaning and Black Rock areas. This event resulted in the upgrading of the Manganese-content of the ore and produced a wide range of rare minerals as well as mineral assemblages (Cairncross & Dixon 1999:63). Of the approximately 150 minerals, 10 have to date only been found in the Kalahari manganese field and a further 26 are found at four or fewer mineral localities worldwide (Cairncross & Dixon 1999:67).

4.2 Black Rock Mine

A large black outcrop of Manganese ore is the outstanding feature in the landscape of the Black Rock mining area. This outcrop was mined since the 1940's both by open cast (see photograph 1) and underground mining (see photograph 2). The outcrop and mine is situated at S27° 07' 34.4" and E22° 49' 59.6. The original mines are not in use any more and the site is used for water storage and communication masts.

At S27° 07' 46.5" and E22° 49' 57.5" is the main entrance to the incline shafts to the underground mining area (see photograph 3). This area is important from a mining and geological history point of view. The underground tunnels are at present used for water storage.

The original Black Rock outcrop and mining represent an important part of the mining history of Manganese mining in South Africa.

4.3 Cemeteries

Two cemeteries were recorded. The first cemetery is near the Black Rock outcrop at S27° 07' 28.7" and E22° 49' 45.9". The area is fenced off and has some 60+ graves. The graves are those of black mine workers who died at the mine. The graves are unmarked with no tombstones. Only one grave has a date of 8/7/74. The cemetery most probably represents the graves of black mine workers from the 1940's to the

1970’s (see photographs 4 and 5). The graves are not visited any more by relatives as no grave goods are present. Most probably these graves are from migrant mine workers from far afield. No information could be obtained from mine officials on the graves though the mine must have a record in its archives.

A second small cemetery is located in the mines’ nature reserve at S27° 10’ 29” and E22° 48’ 28.2” (see photograph 6). The one grave has a date of September 1926 and is the grave of Diederick Johannes Pretorius. What is strange about this cemetery is that we could find no remains of a homestead or settlement nearby. The cemetery is in open bushveld. This is very strange as early European cemeteries are always near a farm settlement.

4.4 Stone Age Archaeology

During the survey lithic occurrences were found to be localised. However, there is always the possibility that sub-surface archaeological sites may be revealed through the proposed mining activities. Should archaeological artefacts or skeletal material be found in the area during construction activities, such activities should be halted, and a cultural heritage practitioner notified in order for an investigation and evaluation of the find(s) to take place (*cf*. NHRA (Act No. 25 of 1999), Section 36 (6)).

The survey determined that stone artefacts were not prolific within the area of the proposed development and mainly isolated specimens were found. Only one locality with evidence of knapping/utilisation was identified within the footprint. The lithics occurred within pebble and gravel levels overlying the calcrete formations within the ancient river bed of the Ga-Mogara River (see photograph 7 and 8) (S27° 10’ 39.0” E22° 54’ 53.6”). The lithics apparently eroded from a borrow pit of approximately 500 x 100 meters in the river bed where materials for road construction/building purposes have been removed. The lithics occurred within a broad pebble band on the edge of the calcrete borrow pit and have evidently been exposed from an underlying horizon during the quarrying activities. Due to the density of good quality raw material in the form of pebbles significant knapping activities took place over time as evidenced by high frequencies of in particular cores.

The collection represents a mix of mainly ESA and MSA cores, flakes, blades and waste from stone tool knapping and other lithic reduction processes. Flakes, blades and bladelets are the main products of any stone reduction process. The collection includes one example that seems similar to a ESA chopper, but is more likely to be a pebble core with flake removals as the Oldowan is known from only a few sites. A number of formal ESA tool types were present among the exposed lithics. Most of the formal tools are typical ESA Acheulean handaxes, or large cutting tools (LCT's). These handaxes/bifaces are classified as formal tools, because they have been shaped or transformed into a specific shape and have been given a cutting edge through secondary retouch (i.e. by removing small flakes). Significant numbers of the MSA flakes and blades retain faceted striking platforms that indicate the use of the core preparation technique. These tool types are accordingly discussed in more detail.

(For detail backgrounds on the Stone Age of the Northern Cape see Annexure A)

ESA Acheulean large cutting tools (see photograph 9)

The emergence of LCT manufacture was earlier in sub-Saharan African than elsewhere (N Rolland in McNabb et al 2004:670). Handaxes and cleavers were manufactured on a cobble/pebble core or on a flake. LCT's varied considerably in size and shape. Some constraints on the morphology of the tool include the quality of available raw material, the size and shape of the pebble or core stone, the nature of the blank produced and the skill of the individual knapper. The majority of LCT's received a minimum of secondary shaping. Cleavers were typically made on side-struck flakes obtained from large cores and minimally shaped. Handaxes with focus on the convergent tips were shaped through invasive flaking and secondary retouch and were most likely to be resharpened or trimmed to extend their use-life. Some bifaces were manufactured, transported and discarded without much resharpening (McNabb et al 2004:669). Resharpening results in size reduction and can account for smaller handaxes in a collection. However, small refined handaxes is also a characteristic of the Fauresmith industrial complex.

Some Acheulean handaxes were evidently shaped to obtain balance or symmetry (T Wynn in McNabb et al 2004:672). It is argued that symmetry or near-symmetry could reflect the handwork of more skilled artisans (McNabb et al 2004:668). Many of the handaxes from the Northern Cape certainly exhibit near-symmetry and examples from Kathu Pan made on banded jasper/ironstone are particularly fine.

MSA prepared cores and flaked pieces (see photographs 10 and 11)

The collection shows a high frequency of prepared cores characteristic of MSA technologies. The prepared core technique was used during the MSA to produce triangular flake blanks and blade blanks. Some of the flake and blade blanks from the Assmang locality do exhibit such faceted striking platforms that typify core preparation characteristic of Levallois-type cores. Levallois reduction technology is based on the preparation of a core by systematic shaping to produce a conical or convex shape with a continuous striking platform around most of the perimeter of the selected nodule. Multiple flakes can be systematically removed from the prepared platform, with the conical objective piece maintaining its shape so that minimal repreparation is required before subsequent removals (Andrefsky 2005:148-9). The detached flakes exhibit attributes such as a faceted platform that derives from the technology used in core preparation. The size of raw materials selected for a core influences the kind or reduction technology used (Andrefsky 2005:151-5). Levallois core reduction requires relatively large objective pieces, and the technique is not suitable for the generally small nodules of cryptocrystalline materials, which were the preferred rock types during the LSA.

It is not in all the examples possible to assign firm associations of the lithics with specific Stone Age periods. The relative high frequency of long flake-blades may, however, be significant. These tool types may either be ascribed to the Fauresmith Industrial Complex, which is transitory between the ESA and MSA, or forms part of a fully developed MSA (Mitchell 2002).

The collection is dominated by local cryptocrystalline silica rock types, which are fine-grained good knapping materials. Jaspers are particularly abundant and used for the bulk of the lithics. Local rock types were generally used at most Stone Age localities with small numbers of tools occasionally made on rocks imported to the region or manufactured at other localities and then brought back (Beaumont 2004).

In the Northern Cape ESA assemblages, including the Fauresmith, tend to occur as lag deposits on the margins of seasonal rivers, semi-permanent water holes or pans. Such assemblages commonly represent the accumulated remains of numerous reoccupations over possibly many thousands of years. The particular locality from where the hand axes in the collection originate reflects the correlation of Acheulean sites with sources of water and an environment that could provide animal and plant foods (Deacon 1988:643-647; Mason 1988:626-30; McNabb et al 2004:656).

In this region stone tools often occur within calcrete zones underlying the modern surface of unstratified red aeolian sands (Deacon 1988:643-647; Mason 1988:626-30). Previous research in the Hotazel area confirmed localised occurrences of low-density Stone Age scatters along the exposed calcrete areas in dry riverbeds (PGS Heritage Unit:2009).

During the Phase 1 Heritage assessment under review only one archaeological sensitive area was identified and which seemed to be restricted to a zone within the bed of the Ga-Mogara River. A representative collection of mostly ESA and MSA artefacts have been documented at this locality. The large cutting tools evidently form part of an Acheulean assemblage. However, the collection is not large enough for the MSA tools to be assigned to particularly phases within the MSA. The range of tool types, the diversity of raw materials used as well as the presence of formal tools types reflect various instances of site utilisation over a very long period of time. As the lithics were uncovered during quarrying it is probably that sub-surface assemblages may be present. The calcretes should accordingly be marked as archaeological-sensitive areas.

It has been pointed out that the collection contains tool types that may originate from the Fauresmith industry. However, the small size of the collection and the fact that it clearly exhibits a mix of tools from various periods preclude positive identification. The Fauresmith is represented by only a limited number of excavated sites. A lack of excavated and well-documented open air sites from the interior with regional representative stratigraphic sequences inhibits the identification of regional patterns within the various phases of the Stone Age. Reliable dates for the Fauresmith are also lacking and issues like typology need to be investigated (Mitchell 2002:229-230).

5. EVALUATION

5.1 Black Rock Mine

Black Rock Mine represents the worlds' largest land bound sedimentary manganese deposit. This manganese field also has 10 minerals which have been found nowhere else in the world as well as another 26 very scarce minerals. As such this manganese deposit and original mines at Black Rock are unique and not only of national but also of international geological importance.

5.2 Cemeteries

The two cemeteries are important from a local point of view. They are both fenced off and cared for by the mine.

5.3 Stone Age Site

The Stone Age site is representative of similar sites occurring near water. As such the site as well as possible sites all along the banks of the Ga-Mogara River represents a very long period of human occupation. These sites are at least of regional importance.

6. DISCUSSION AND RECOMMENDATIONS

6.1 Black Rock Mine

As already stated the black Rock Manganese deposit represents the largest land bound sedimentary manganese deposit in the world. The Black Rock mine also represents the earliest mine of its kind in the area. Together the geological deposit as well as the historic mine is of international importance. This is made even more important with the unique and scares minerals occurring in the associated mines. It is therefore recommended that as part of the mines public and community responsibility the original Black Rock mine be:

(a) Declared a National Heritage Site

(b) The original mine be made assessable to the public

(c) The history of the mine and its structures be fully documented in a Phase II cultural heritage resources impact assessment

(d) A heritage management plan be compiled for the original mine

(e) Geological specimens of associated mines be collected, preserved and exhibited in a mine building converted into a safe place as a museum. This exhibition facility can also exhibit the Stone Age and mining history of the area.

6.2 The cemeteries

The two cemeteries are already fenced in. The mine should upkeep and cleans the cemeteries on a regular basis. (For detail on grave legislation see annexure B)

6.3 Stone Age

A watching brief is recommended for the locality under review.
It is also recommended that no development, mining or quarrying should take place within a 100m distance from the middle of the Ga-Mogare River.

If any development should take place in the 100 metre zone a full phase II archaeological heritage impact assessment must be undertaken.

7. SITE INFORMATION

Owners contact details: Assmang Ltd **P.O.Box 104** **Santoy** **8491**
Developers contact details: **N/A**
Consultants contact details: **N/A**
Type of development (e.g. low cost housing project, mining etc.) **Mining**
Whether rezoning and/or subdivision of land is involved: **N/A**
Full location of Province, Magisterial District/Local Authority, property (e.g. farm, erf name and number: **Northern Cape, Kgalagadi District Municipality** **Belgravia 264 – Title deed T541/1940** **Santoy 230 – Title deed no 1491/1970** **Gloria 226 – Title deed no 506/1966** **Nchwaning 267 – Title deed no 541/1940** **Nchwaning 267 – Title deed no 1491/1970**
Location map must have the polygon of the area to be surveyed on it and full

geographical coordinates for all relevant points and where applicable indication of the area to be developed (footprint):
If possible an aerial photograph of the specific area showing the location of all site. **See Google maps**

8. MAPS (see pages 23 - 25)

9. PHOTOGRAPHS (see pages 17 – 22)

10. REFERENCES

1/50 000 Maps 2722 BB and BD

Google Earth

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PHOTOGRAPHS

No. 1 Opencast section on Black Rock kopje. One of the water reservoirs is also visible in the right hand top corner.

No. 2 Example of underground mining.

No. 3 Entrances to the main underground sections of the mine

No. 4 Unmarked graves of Black mineworkers

No. 5 Though the cemetery is fenced off it should be maintained

No. 6 Small cemetery in the nature reserve

No. 7 View over the quarry

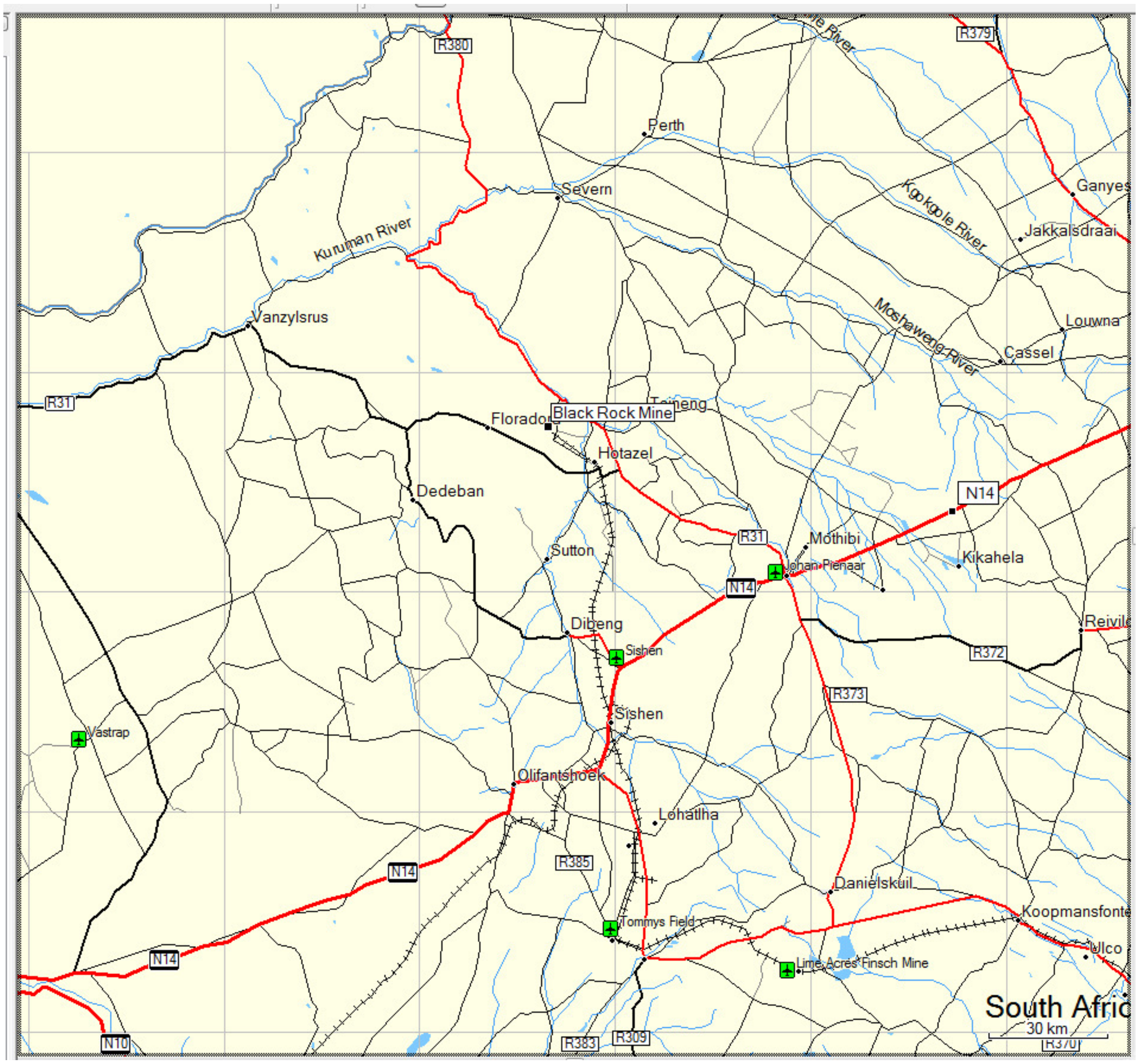
No.8 The pebble and gravel level overlying the calcrete formation

No. 9 Early Stone Age tools

No. 10 Middle Stone Age cores

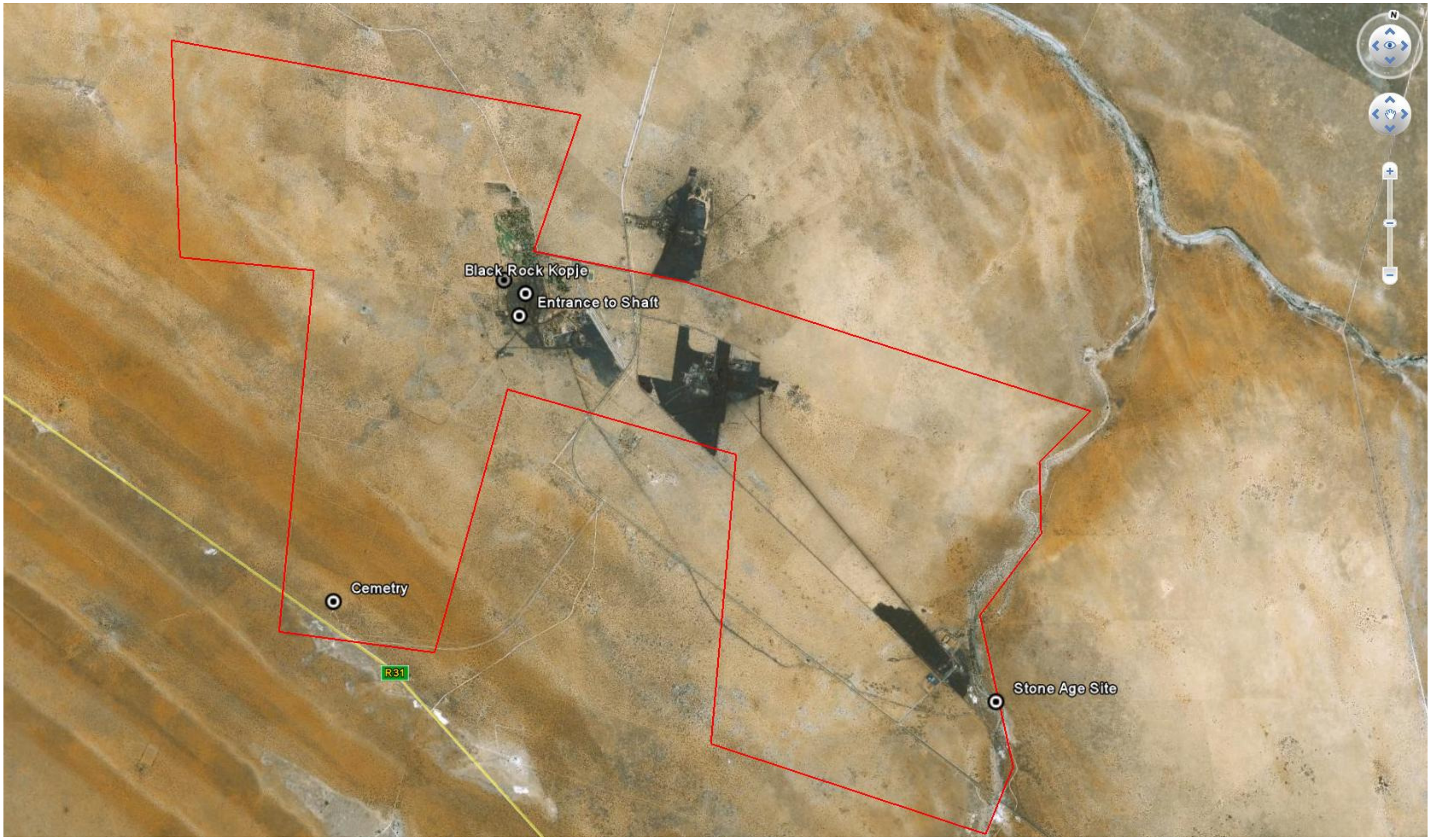
No. 11 Middle Stone Age flakes

MAPS



Route map to Black Rock

Detail map of the Black Rock mining area



General map of the area surveyed

Annexure A

Heritage Assessment for Assmang

Specialist report on the Stone Age of the Northern Cape

by

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Commissioned by
AFRICAN HERITAGE CONSULTANTS

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The Stone Age sequence of the Northern Cape

Introduction: note on the chronology of the southern African Stone Age

Archaeological traces in the form of mostly stone tools suggest a widespread presence for tool-producing Plio-Pleistocene hominins[1] in the Northern Cape. The archaeology of this region is dominated by millions of stone tools that derived from the very early occupations by stone tool-manufacturing hominins up to the intensive utilisation by hunter-gatherers until the recent past. The upland savannas of southern Africa are seen as a focal region of biological and cultural evolution during this period (Beaumont and Vogel 2006).

This important part of the prehistory of southern Africa, known as the Stone Age, is chronologically divided into the Early (ESA), Middle (MSA) and Later Stone Age (LSA). The ESA is characterized by the use of large stone cutting tools, In particular handaxes and cleavers. The MSA represents greater specialization in the production of stone tools, with flake, blade and scraper tools and also a more extended range of formal tools. During the LSA small, microlithic tools 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.

The Three-Age system

In 1929 Goodwin and Van Riet Lowe created time frameworks for the Stone Age archaeology of southern Africa at a stage when there were no chronometric dating methods available. They constructed a three-age division to describe variability and successive phases of stone tool use. The typology developed to construct these culture-historical frameworks was based on the formal attributes of the stone tools present in assemblages that were apparently from different, time-successive periods. *Fossiles directeurs* (Dunnell 1986) are constructed by the *ad hoc* selection of attributes relating to the shape of the lithic (lithic=stone) object. It was the use of such *fossiles directeurs* that enabled Goodwin and Van Riet Lowe (1929) to create a chronological division of the southern African lithics into the ESA, MSA and LSA. These terms are still widely used to describe the southern African lithic occurrences.

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[1] 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.

The functions of the various classes of artefacts within each of these periods are usually inferred by morphology and lithic tool names typically imply use for a specific task (and often a single function), for example a handaxe or a scraper. A term such as "scraper" refers to the morphological shape as well as to the function of the artefact. Different shapes of, for example scrapers, often result from use and the resharpening of tools rather than different mental templates. Such functional interpretations are often correct, but the form of an artefact does not necessarily match its inferred function. Lithic studies support multi-functional usage of tools with form not always equating assumed function (Andrefsky 2005:201).

An alternative framework: modes of stone tool production (based on Barham and Mitchell (2008)

For some time now researchers have been dissatisfied with the current Three-Age classificatory system that implies rigid boundaries and subsumes the similarities but also the diversities that are usually present within the various periods. Increasing evidence for a quite markedly time lag apparent in some regions for the transition into new industries, e.g. for a late continuation of the MSA in some regions in southern Africa, led to the revival of the use of **modes** to describe technological stages (Barham and Mitchell 2008:16).

In 1969 Grahame Clarke developed a system of five successive modes that describe **broad** patterns in stone tool manufacture. The system avoids the association of particular tools with bounded periods of time and emphasizes that processes of change were probably more gradual and continuous 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, e.g. in an Acheulean assemblage there may be mostly Mode 2 bifacially-worked tools, but also Mode 3 (Levallois debitage) and Mode 5 (blades). An MSA assemblage can have all of these plus Mode 5 artefacts (Willoughby 2008).

However, our current use of the terminology proposed by Goodwin and van Riet Lowe (1929) is so widely cited in the literature and still applied by archaeologists working in southern African contexts that the following system of Modes as set out in Table 1 is merely an alternative framework that can be used in conjunction with the well-established terminology for the different stages of the southern African Stone Age.

Note that this classification system may be particularly applicable for CRM purposes and perhaps easier to understand for people outside the field of archaeology:

Table 1	**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

Table 2 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 (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.

Overview of the southern African Stone Age sequence

Table 3 Archaeological context: sequence and definitions

Period	**Approximate dates**
Early Stone Age	more than 2 million years ago - 250 000/200 000 years ago
Middle Stone Age	200 000/250 000 years ago – 25 000 years ago to around the Last Glacial Maximum (LGM) in some regions
Later Stone Age (Includes San Rock Art)	25 000 years ago - AD 200 and up to historic times in certain areas

The Early Stone Age

The two major stone tool industries associated with the ESA are the Oldowan and the Acheulean. The gracile and robust australopithecines are the earliest kinds of hominins to occur in southern African Plio-Pleistocene deposits at around 3 million years ago (mya) while specimens of the genus *Homo* are present at around 2 mya (Mitchell 2002:47). However, we cannot be sure which of the early hominin species produced the tools. The hand morphology of the early South African hominins exhibits precision gripping, which would have enabled tool manufacture. Chimpanzees both use and make tools, and it is therefore very likely that all hominins had this ability (Barham and Mitchell 2008).

The Oldowan

Oldowan assemblages, which are representative of some of the oldest type of stone tools from the ESA, have been recovered from only a few localities in southern Africa. Oldowan assemblages are informal and a restricted range of artefacts includes mainly hammer stones, chunks, chips, flakes (of which some exhibit retouching), as well as cores. This is the period during which both robust australopithecines and early *Homo* are found at these sites. It is generally assumed that the tools were made by *Homo habilis*.The most typical tool of this industry is the **chopper**, where both sides of a cobble were worked to obtain an irregular chopping edge. It is an all-purpose, generalised chopping tool with a sharp edge effective for cutting and chopping. Flake tools form part of Oldowan assemblages and could have been used for a variety of activities

Flaked and detached pieces: In ESA assemblages it can be difficult to distinguish between some tool types, for example between a chopper tool and a pebble core with negative flake removal scars. Some researchers accordingly prefer to call the cores/objective stone blocks from which flakes have been removed "**flaked pieces**" (FPs) while the flakes detached from the objective piece and the flakes, blades, etc. that have been removed are termed "**detached pieces**" (DPs) (Willoughby 2008).

The presence of cutmarks on animal bones, but also microwear and functional studies, suggest that flakes without any secondary retouch are multi-functional tools and employed in scraping, cutting and also butchering (Mitchell 2002:56). Bone tools are also a feature of these early assemblages. A study of wear patterns on long-bone bone flakes suggests their use in termite collecting (Backwell and d'Errico 2001).

The Acheulean

The Acheulean industry developed from the Oldowan industry. The transition from *Homo habilis* to *Homo erectus* appears to have been closely associated with the development of a new stone tool technology about 1.5 mya. The handaxes and cleavers that typify the Acheulean represent the first lithic expressions to have a wide geographic spread (Deacon and Deacon 1999). For more than a million years the characteristic Acheulean handaxes and cleavers were produced. Mitchell (2002:59) says that the Acheulean is "[p]robably the longest-lasting artefact tradition ever created by hominins" and found "from Cape Town to north-western Europe and as far as India between 1.4 and 0.2 mya". These large tools are considered a product of social learning within cooperating groups (McNabb et al 2004:653). Acheulean tools appear more standardized and to have been shaped by regular blows, rather than random strikes as in the case of the Oldowan. However, the 2.5 million-year-old artefacts from Gona in East Africa, associated with *Homo habilis,* are not obviously more rudimentary than the 1.8 million-year-old artefacts from Olduvai (Deacon and Deacon 1999:77).

Large cutting tools (LCT) of the Acheulean made their appearance nearly synchronous with that of *Homo ergaster* at 1.8 mya (McNabb et al 2004:653). The characteristic lithics of this period are collectively called **bifaces** as they show secondary flaking/retouch on both surfaces where flakes have been removed to shape and sharpen the tools. These artefacts were made to a pattern and according to Deacon and Deacon (1999:79) they "mark the beginnings of style". Pointed bifaces are known as **handaxes**, and bifaces with a wide, transverse cutting edge are termed **cleavers**. The handaxe is often a core tool made by removing many flakes off both sides of a pebble to produce a pear/almond-shaped tool with sharp cutting edges all the way around and a pick-like point. They were also made on flakes, particular during the later phases. The handaxe was a versatile tool and probably used for many different functions.

Flake tools were also used during the Acheulean period. There is evidence that flakes were not just the by-products of making core tools; rather, these flakes were deliberately struck from a core and then retouched to sharpen the edges. The Acheulean is characterised by a wider variety of tools, including chisels, anvils, awls and scrapers. The Acheulean toolmaker was also aware of the need to select materials carefully and fine-grained rocks, in particular igneous rocks, were chosen above any others for the manufacture of tools.

A new method of flaking was developed during this period. Instead of using a rock harder than the core from which the tool was to be made, the toolmaker used the soft-hammer percussion technique. By using a material like bone, wood or horn it is possible to knock flakes off with much greater precision than when using a harder rock. This basic toolkit remained the same for about 1.4 million years.

The Fauresmith

The Fauresmith is regarded to represent a transitional phase between the ESA and MSA, and have some technological and typological elements of the latter. There is a tendency towards smaller tools and small handaxes in particular seem to a characteristic feature of the Fauresmith. Assemblages include refined handaxes, long blades, convergent flakes/points, scrapers and prepared cores used in the manufacture of these tool types. This combination of Modes 2 and 3 makes it a likely transitional industry (Barham & Mitchell 2008:229).

The Middle Stone Age

Within the long span within of the MSA, older and younger assemblages are apparent. The earliest MSA assemblages date to around 250/200 000 years ago, but are more widespread from the Last Interglacial (OIS 5) (Mitchell 2002:80). A fourfold scheme is mostly used to describe subdivisions within the southern African MSA lithic assemblages. There is much variability in raw material usage and artefact morphology, and often low frequencies of formally retouched artefact types. During the MSA cores were prepared in order to produce pre-determined shaped blanks which were subsequently used to manufacture different tool types. The characteristic triangular flakes were used to produce retouched unifacial and bifacial points. Long narrow blade flakes occur in a range of sizes. They were used for different activities without any further trimming, but also shaped into specialised tool types.

Long MSA sequences from a particular site often do not exhibit clear technological and typological divisions and also may not contain all the different MSA sub-divisions (Thackeray 1992:397-8). Within the MSA regional traditions, such as Stillbay and the microlithic Howiesons Poort, have been identified. The origins of modern culture and language are associated with the emergence of anatomical modern humans, *Homo sapiens*, during the MSA.

The Later Stone Age

The major changes are the replacement of MSA lithic technologies by LSA microlithic stone-working traditions and the widespread signs of symbolic and ritual activity in the form of art and decorative items, and in particular objects made for personal adornment, such as pendants and the ubiquitous ostrich eggshell beads (Mitchell (2002:106),. The transition from the MSA to the LSA is vague. Dates proposed for the transitional period range from around 60/40 000-20 000 years ago and are based on a series of dates obtained through different dating methods, palaeoclimatic inferences, as well as lithic technologies and diagnostic tool types as artefactual markers of a particular period. LSA lithic technology is marked by the use of sophisticated knapping techniques, microlithisation, composite tools and a more varied range of raw materials for a greater range of tools as well as higher relative frequencies for bone and shell artefacts (Deacon 1984).

The Stone Age archaeology of the Northern Cape

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

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 2004:31). Excavations since the 1940, which became more focussed as from 1976 to 1993, revealed a stratified series of deposits that accumulated up to a depth of about 7 metres and are divided into nine Major Units (Beaumont and Vogel 2006). The application of a range of dating methods points to an LSA at 1-12.5 kyr (kyr=thousand years ago), the MSA at around ~70 to >220 kyr ago, the Fauresmith to ~270-500 kyr ago and a ephemeral Acheulean at >0.78 myr BP (Beaumont and Vogel 2006). An interdisciplinary project initiated in 2004 aim 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 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. Some of the cave deposit has been removed by guano diggers, which destroyed some of the 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 Fauresmith assemblage with blades, large scrapers and radially prepared cores. Whereas the paintings at Wonderwerk are in a poor state of preservation, the region has some good engraving and painted sites.

The Kathu region

The Kathu sites contain significant ESA Acheulean and Fauresmith assemblages. Archaeological and palaeoenvironmental data from Kathu Pan and Kathu Townlands were used to reconstruct changes over time in the prehistoric environment (Beaumont 2004:50. 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: 51; McNabb 2004:656). This provides a relative date for the lithic assemblage. Biostratigraphy or faunal correlation is often used to date the southern African sites and gives some indication of the approximate age of the associated assemblages.

The LCT's from this area often contain very fine handaxes with some superb examples produced on banded ironstone. In some of the Acheulean deposits, but also in MSA levels, lithics display a shiny silica skin. One particular site at the Kathu Townlands covers a large area and contains an estimated minimum of 10 billion flaked items. This is ascribed to the use of the high-grade bedrock jasper as a source for raw materials and this is supported by the high incidence of handaxe roughouts (Beaumont 2004:52).

The prepared core technique was used to produce the spectacular small handaxes, long blades, convergent flakes/points, scrapers found in the Fauresmith collections. Some MSA tools were also recovered from the Kathu localities (Beaumont 2004).

Pigment mining

Pigments such as ochre and specularite were widely used and the specularite mines at Tsantsabane/Blinkklipkop and Doornfontein 1 near Postmasburg were rich and well-known ore sources that were quarried extensively over a long period of time (Beaumont and Morris 1990:65-74; Mitchell 2002:256-7; Morris 2004). Dunn (1931:110) was told that 'it was from here that the Bushmen and other natives for hundreds of miles obtained their supplies of specular iron ore, which becomes red when burnt'. The pigment was bartered and exchanged for goods such as iron knives, assegais, axes, tobacco, copper and iron and copper ornaments and beads (Campbell 1822:Vol II; Burchell 1967; Arbousset and Daumas 1968). Investigations at Blinkklipkop established a date of AD 800 for the utilization of this particular rich source Thackeray et al 1983; Beaumont and Morris 1990).

The LSA at the pigment mines

The use of earth pigments, and in particular ochre and specular haematite, is universal (Watts 2002:1). Pigments, but moreover the exceptional pieces of engraved and ground incised pieces of ochre from MSA contexts at sites such as Wonderwerk attest to the time-depth of such practices (Mitchell 2002:99). Specular haematite was extensively mined by at least 40 000 BP at Ngwenya/Lion Cavern, Swaziland (Mitchell 2002:99). Quarrying of ore bodies often destroy earlier evidence for the utilisation of the resource. The investigations at Blinkklipkop near Postmasburg in the Northern Cape (Thackeray et al 1983; Beaumont and Morris 1990) established a date of AD 800 for the utilization of this particular rich source. The mainly late Holocene lithic sequences at the mining localities are characterised by informal tool types with low frequencies of formal tools. Some of these were most likely to have been used in the mining and processing of the pigments. Pottery and items of European origin have also been recovered (Morris 1990:67-70). The LSA of the Northern Cape is well researched (Humphreys and Thackeray 1983) but is not discussed in more detail in this report in view of the very low numbers of artefacts from this period found during the survey undertaken for Assmang.

The Stone Age archaeology of Assmang

During the survey lithic occurrences were found to be localised. However, there is always the possibility that sub-surface archaeological sites may be revealed through the proposed mining activities. Should archaeological artefacts or skeletal material be found in the area during construction activities, such activities should be halted, and a cultural heritage practitioner notified in order for an investigation and evaluation of the find(s) to take place (*cf*. NHRA (Act No. 25 of 1999), Section 36 (6)).

The survey determined that stone artefacts were not prolific within the area of the proposed development and mainly isolated specimens were found. Only one locality with evidence of knapping/utilisation was identified within the footprint. The lithics occurred within pebble and gravel levels overlying the calcrete formations within the ancient river bed of the Ga-Mogara River. The lithics apparently eroded from a borrow pit of approximately 500 x 100 meters in the river bed where materials for road construction/building purposes have been removed. The lithics occurred within a broad pebble band on the edge of the calcrete borrow pit and have evidently been exposed from an underlying horizon during the quarrying activities. Due to the density of good quality raw material in the form of pebbles significant knapping activities took place over time as evidenced by high frequencies of in particular cores.

The collection represents a mix of mainly ESA and MSA cores, flakes, blades and waste from stone tool knapping and other lithic reduction processes. Flakes, blades and bladelets are the main products of any stone reduction process. The collection includes one example that seems similar to a ESA chopper, but is more likely to be a pebble core with flake removals as the Oldowan is known from only a few sites. A number of formal ESA tool types were present among the exposed lithics. Most of the formal tools are typical ESA Acheulean handaxes, or large cutting tools (LCT's). These handaxes/bifaces are classified as formal tools, because they have been shaped or transformed into a specific shape and have been given a cutting edge through secondary retouch (i.e. by removing small flakes). Significant numbers of the MSA flakes and blades retain faceted striking platforms that indicate the use of the core preparation technique. These tool types are accordingly discussed in more detail.

ESA Acheulean large cutting tools

The emergence of LCT manufacture was earlier in sub-Saharan African than elsewhere (N Rolland in McNabb et al 2004:670). Handaxes and cleavers were manufactured on a cobble/pebble core or on a flake. LCT's varied considerably in size and shape. Some constraints on the morphology of the tool include the quality of available raw material, the size and shape of the pebble or core stone, the nature of the blank produced and the skill of the individual knapper. The majority of LCT's received a minimum of secondary shaping. Cleavers were typically made on side-struck flakes obtained from large cores and minimally shaped. Handaxes with focus on the convergent tips were shaped through invasive flaking and secondary retouch and were most likely to be resharpened or trimmed to extend their use-life. Some bifaces were manufactured, transported and discarded without much resharpening (McNabb et al 2004:669). Resharpening results in size reduction and can account for smaller handaxes in a collection. However, small refined handaxes is also a characteristic of the Fauresmith industrical complex.

Some Acheulean handaxes were evidently shaped to obtain balance or symmetry (T Wynn in McNabb et al 2004:672). It is argued that symmetry or near-symmetry could reflect the handwork of more skilled artisans (McNabb et al 2004:668). Many of the handaxes from the Northern Cape certainly exhibit near-symmetry and examples from Kathu Pan made on banded jasper/ironstone are particularly fine.

MSA prepared cores and flaked pieces

The collection shows a high frequency of prepared cores characteristic of MSA technologies. The prepared core technique was used during the MSA to produce triangular flake blanks and blade blanks. Some of the flake and blade blanks from the Assmang locality do exhibit such faceted striking platforms that typify core preparation characteristic of Levallois-type cores. Levallois reduction technology is based on the preparation of a core by systematic shaping to produce a conical or convex shape with a continuous striking platform around most of the perimeter of the selected nodule. Multiple flakes can be systematically removed from the prepared platform, with the conical objective piece maintaining its shape so that minimal repreparation is required before subsequent removals (Andrefsky 2005:148-9). The detached flakes exhibit attributes such as a faceted platform that derives from the technology used in core preparation. The size of raw materials selected for a core influences the kind or reduction technology used (Andrefsky 2005:151-5). Levallois core reduction requires relatively large objective pieces, and the technique is not suitable for the generally small nodules of cryptocrystalline materials, which were the preferred rock types during the LSA.

It is not in all the examples possible to assign firm associations of the lithics with specific Stone Age periods. The relative high frequency of long flake-blades may, however, be significant. These tool types may either be ascribed to the Fauresmith Industrial Complex, which is transitory between the ESA and MSA, or forms part of a fully developed MSA (Mitchell 2002).

The collection is dominated by local cryptocrystalline silica rock types, which are fine-grained good knapping materials. Jaspers are particularly abundant and used for the bulk of the lithics. Local rock types were generally used at most Stone Age localities with small numbers of tools occasionally made on rocks imported to the region or manufactured at other localities and then brought back (Beaumont 2004).

Discussion and recommendations

In the Northern Cape ESA assemblages, including the Fauresmith, tend to occur as lag deposits on the margins of seasonal rivers, semi-permanent water holes or pans. Such assemblages commonly represent the accumulated remains of numerous reoccupations over possibly many thousands of years. The particular locality from where the handaxes in the collection originate reflects the correlation of Acheulean sites with sources of water and an environment that could provide animal and plant foods (Deacon 1988:643-647; Mason 1988:626-30; McNabb et al 2004:656).

In this region stone tools often occur within calcrete zones underlying the modern surface of unstratified red aeolian sands (Deacon 1988:643-647; Mason 1988:626-30). Previous research in the Hotazel area confirmed localised occurrences of low-density Stone Age scatters along the exposed calcrete areas in dry riverbeds (PGS Heritage Unit:2009).

During the Phase 1 Heritage assessment under review only one archaeological sensitive area was identified and which seemed to be restricted to a zone within the bed of the Ga-Mogara River. A representative collection of mostly ESA and MSA artefacts have been documented at this locality. The large cutting tools evidently form part of an Acheulean assemblage. However, the collection is not large enough for the

MSA tools to be assigned to particularly phases within the MSA. The range of tool types, the diversity of raw materials used as well as the presence of formal tools types reflect various instances of site utilisation over a very long period of time. As the lithics were uncovered during quarrying it is probably that sub-surface assemblages may be present. The calcretes should accordingly be marked as archaeological-sensitive areas.

It has been pointed out that the collection contains tool types that may originate from the Fauresmith industry. However, the small size of the collection and the fact that it clearly exhibits a mix of tools from various periods preclude positive identification. The Fauresmith is represented by only a limited number of excavated sites. A lack of excavated and well-documented open air sites from the interior with regional representative stratigraphic sequences inhibits the identification of regional patterns within the various phases of the Stone Age. Reliable dates for the Fauresmith are also lacking and issues like typology need to be investigated (Mitchell 2002:229-230). A watching brief is therefore recommended for the locality under review. Should development proceeds within this general area any subsequent finds should be assessed by a Stone Age specialist.

Annexure B

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ARCHAEOLOGY, GRAVES AND THE LAW

- In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

(a) destroy, damage, alter, exhume or remove from its original position of 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 or 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, or any equipment which assists in the detection or recovery of metals.

- Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations.
- Exhumation of graves must conform to the standards set out in the Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925). Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place.
- A registered undertaker can only handle human remains or an institution declared under the Human Tissues Act (Act 65 of 1983 as amended).
- Unidentified/unknown graves are also handled as older than 60 until proven otherwise

THE PROCESS/STEPS THAT ARE TAKEN

SITE VISIT: WHAT IS DONE DURING THIS SITE VISIT?

Physical documentation of graves prior to exhumation: Photographic, GPS, Site Maps, Final counting etc…

Determining context of graves: If any, are they associated with other sites such as farmhouses/structures etc…

SITE SIGNS AND ADVERTISEMENTS

Notices (in compliance with the National Heritage Resources Act) must be placed on the site/s, indicating the intent of relocation. This must be in at least 3 languages and has to be up for a minimum of 60 days.

As part of the preliminary social consultation, newspaper ads as well as radio announcements has to be made as well

This is in order that family members/descendants, if any, can reply/come forward to indicate if any of the graves belong to them

SOCIAL CONSULTATION

If any individuals responded during initial consultation/public participation, then full social consultation undertaken. This will include speaking to individuals regarding graves, their family wishes, getting consent for relocation/reburial etc…

It could also include an Open Day/Traditional Ceremony (or more than one if necessary)

PERMIT APPLICATIONS

Undertakers permits applied for and obtained during social consultation

Only after all necessary documents, family consent obtained, landowner letter, can SAHRA Permit be applied for and obtained. A few weeks should be budgeted for this.

EXHUMATION & RELOCATION

When permits obtained physical exhumation, investigation and reburial commences

THE ARCHAEOLOGICAL INVESTIGATION OF BURIALS: DOCUMENTATION FORM

This form contains the following information for each burial:

Feature/Burial No **Site Name/No** **GPS Reading** **Farm Name/No**

Province **Location of new cemetery**

It also includes information on the

Burial Type

Burial Dimensions

Grave Type

Grave Dimensions

Associated sites/features

Specimens or grave goods found

The state of preservation and percentage completeness of the human skeletal material

Sex and Age of the individual

Further Remarks

Information on the headstone and grave dressing (if any)

Photographs of each grave, headstone (if any), the skeletal remains, grave goods etc… are also taken and used in the final documentation