Stone Age landscape use in the Olifants River Valley, Western Cape

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I know the meaning of plagiarism and declare that all of the work in this thesis, save for that which is properly acknowledged, is my own.

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Abstract

This thesis investigates changing patterns of landscape use throughout the Earlier (ESA), Middle (MSA) and Later Stone Ages (LSA) in the Olifants River Valley in the Western Cape, South Africa. Stone Age surface assemblages are all too often neglected in favour of stratified, datable cave sequences, overlooking important insights into changing behavioural patterns at a broader scale. The Olifants River Valley offers the opportunity for integrating a rich surface lithic record with excavated rock shelter occupation dating from the LSA and extending back into the early part of the MSA.

This thesis approaches Stone Age landscape use with reference to a hypothesis proposed by Hilary Deacon, framing the MSA within the context of earlier and later patterns of behaviour. Based on observations from sites across South Africa, Deacon described ESA landscape use as stenotopic, occupying a narrow ecological niche focused on permanent water sources, and LSA landscape use as eurytopic, making use of a much broader range of habitats but with a specific focus on rock shelters as domestic sites. Deacon suggested that the intervening MSA, in its later stages, shows a pattern that anticipated LSA landscape use, with an increasing emphasis on caves and a wider-ranging exploitation of resources across different environmental zones.

Surface surveys were carried out in the Olifants River Valley, mapping temporally diagnostic artefacts and their association with different topographic features. In this thesis, I test Deacon's model and show that it can be applied to the study area, observing distinctive preferences for certain sites and raw materials, and approaching changes in patterns of artefact discard from a technological perspective.

CHAPTER 1. INTRODUCTION

1.1 Introduction

Since early *Homo* first began making stone tools over a million years ago, the lithic residues of human behaviour have accumulated across the South African landscape, in caves and rock shelters, and at open sites. Few archaeologists have explored this million-year-long period of the human past as extensively and fruitfully as Hilary Deacon, one of South Africa's foremost archaeological researchers. Deacon's experience, initially as a geologist, and subsequently as excavator of over 13 important Stone Age sites, placed him in a rare, informed position from which he was able to approach human behaviour within the context of its long developmental trajectory. Out of this grew his interest in the emergence of modern human behaviour, spurred on particularly by the evidence from Klasies River Main Caves. This pointed to the later part of the Middle Stone Age (MSA) as the origin of many aspects of hunter-gatherer life and material culture that were seen in the Later Stone Age (LSA)[1] and continued among present-day Bushmen[2] populations (Deacon, H.J. 1995, 2001).

'Modern human behaviour' has become something of a buzzword in current archaeological research, pointing to the emergence of a suite of behaviours within the cognitive capacities of present day humans, and representing a significant advance from the abilities of earlier hominins (Henshilwood & Marean 2003). The MSA has been identified as a key transitional period in human development;

[1] The temporal groupings of Earlier Stone Age, Middle Stone Age, and Later Stone Age (hereafter abbreviated to ESA, MSA and LSA respectively) were introduced by Goodwin and van Riet Lowe (1929; Goodwin 1946a) to define the three broad periods of African prehistory, distinguished by their particular modes of technology and behaviour. These were intended to be the African alternative to the European terms Lower, Middle and Upper Palaeolithic.

[2] The terminology used to refer to indigenous hunter-gatherer groups is complicated by the historical baggage that it carries, with many of the original terms employed having derogatory implications. 'Khoisan' is often used to refer generally to speakers of click-languages, but this conflates separate herder (Khoi) and hunter-gatherer (San) populations, and has become particularly complicated when used in genetic studies (Mitchell 2010). 'Bushmen' applies specifically to hunter-gatherers and is the preferred term when referring to all groups, past and present, avoiding falsely lumping individual populations together under the name for a particular language group (Mitchell 2002b:18). The term !Kung is widely used to describe the Ju/'hoansi people of the NyaeNyae region of the Kalahari (Marshall 1976; Lee 1979), often treated as the archetypal hunter-gatherer society used for ethnographic parallels. 'Ju/'hoan', the name of their language, is favoured when referring to the group (Biesele 1993). '/Xam' refers to the people who used to inhabit the South African Northern Cape (Deacon & Deacon 1999).

fossil evidence indicates that anatomically modern *Homo sapiens* were present from around 200 ka[3], broadly coinciding with a new technological system of prepared core technology that signals the start of the MSA (McBrearty & Brooks 2000). Until relatively recently, the LSA was treated as the period when people first began to behave as modern humans, capable of complex composite stone tool technology and symbolism, leading a lifestyle comparable to modern hunter-gatherer societies (e.g. Clark 1988, 1989; Ambrose & Lorenz 1990; Klein 1995, 1999, 2000a, 2001). However, research over the past decade at a number of cave and rock shelter sites in South Africa has placed the first occurrence of many of these so-called ‘modern’ behaviours firmly in the MSA.

The sites currently at the forefront of MSA research include Sibudu Cave (Wadley 2005b, 2007, 2008; Wadley & Jacobs 2006; Jacobs *et al.* 2008b) in KwaZulu-Natal, Klasies River (Singer & Wymer 1982; Deacon, H.J. 1989, 1995; Wurz 1999, 2000, 2002), Blombos Cave (Henshilwood *et al.* 2001b; Jacobs *et al.* 2003; Jacobs *et al.* 2006; Villa *et al.* 2009) and Pinnacle Point (Marean *et al.* 2007; Marean *et al.* 2010; Jacobs 2010; Marean 2010) on the southern Cape coast, and Diepkloof Rock Shelter (Rigaud *et al.* 2006; Porraz *et al.* 2013a; Porraz *et al.* 2013b; Tribolo *et al.* 2013) on the west coast. These contain deep, well-dated sequences with a lithic record which provides the basis for a strong chronological framework, documenting complex patterns of change in the later part of the MSA. In addition, these and other sites have yielded evidence for symbolic behaviour in the form of engraved ochre (Henshilwood *et al.* 2002; Mackay & Welz 2008; Henshilwood *et al.* 2009; d'Errico *et al.* 2012c), engraved bone (d'Errico *et al.* 2001; Cain 2006; d'Errico & Henshilwood 2007; d'Errico *et al.* 2012b), engraved ostrich eggshell (Parkington *et al.* 2005; Texier *et al.* 2010; Texier *et al.* 2013), polished bone points (Henshilwood & Sealy 1997; Henshilwood *et al.* 2001a; d'Errico & Henshilwood 2007; Backwell *et al.* 2008; d'Errico *et al.* 2012b), and marine shell beads (Henshilwood *et al.* 2004; d'Errico *et al.* 2005; d'Errico *et al.* 2008; Vanhaeren *et al.* 2013)[4].

There has also been an emphasis placed on the role of marine foods in the MSA diet, drawing attention to numerous coastal sites with midden deposits (Marean *et al.* 2007; Jerardino & Marean 2010; Parkington 2010). Fluctuating sea levels as the earth’s climate moved through successive glacial-interglacial cycles caused the exposure of large areas of the coastal platform, extending up to 100 km from the present shoreline on the southern Cape coast, and 35 km on the west coast (van Andel 1989). Many of the caves which are providing the best preserved and datable MSA sequences

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3 ‘ka’ is the term used for ‘thousand years ago’ throughout this thesis. ‘Ma’ is used for ‘million years ago’. ‘BP’ denotes calibrated radiocarbon years before present.

4 Potentially older evidence of shell beads has been reported from sites in North Africa and the Middle East, dating from 100 to 70 ka (Vanhaeren *et al.* 2006; Bouzouggar *et al.* 2007; d'Errico *et al.* 2009). Interestingly, the shell species used to make beads in North Africa belong to the same genus – *Nassarius* – as those used in South Africa, although whether this holds any significance has yet to be demonstrated.

are located on the current southern Cape coastline, with MSA sites on the west coast including Elands Bay Cave (Volman 1981), and the collapsed shelter or open-air sites of Ysterfontein 1 (Klein *et al.* 2004; Avery *et al.* 2008; Wurz 2012), Sea Harvest and Hoedjiespunt (Volman 1978, 1981; Will *et al.* 2013). The assemblages at all of these west coast sites are distinctly MSA in character, but contain none of the diagnostic tools of the Still Bay or Howiesons Poort seen in the stratified caves on the southern coast such as Blombos and Klasies River. Instead, these are thought to date to MIS 5, between 130 and 71 ka (Wurz 2012; Will *et al.* 2013).

It has been argued that the nutritional benefits of exploiting the resources of the coastal environment provided a catalyst for human cognitive advances from already extant capabilities (Parkington 2001a, 2010; Parkington *et al.* 2004; Marean 2010, 2011). An alternative hypothesis is that the lowered sea levels caused during glacial periods drew populations onto an extended coastal plain to exploit marine resources along the shoreline, and these populations then became cut off by rising sea levels, setting the conditions for genetic drift, adaptation and innovation among the isolated populations (Compton 2011). In either case, the MSA, and in particular the MSA from around 100 ka, experienced significant shifts in behaviour – in terms of subsistence, material culture, technology and settlement patterns – which represent a major departure from earlier practices in the ESA and early MSA.

The limitations of current research and the landscape alternative

Two clear themes dominate current research programmes: a localised focus on excavating a small sample of caves, and a narrow regional window that emphasises the coastal area. Whilst stratified caves offer essential archives for past behaviour, archaeological research that is solely directed towards caves presents a problem for a contextual understanding of not only the MSA, but the whole Stone Age from a landscape perspective. In addition to well-preserved deep cave archives, South Africa also boasts large areas of the landscape with a rich surface record, often relatively undisturbed by farming or development. Usually the acknowledgement of these assemblages is limited to Cultural Resource Management impact assessments, and with the exception of a few major studies (e.g. Sampson 1985), surface stone tools represent a largely untapped source of information on past behaviour.

There is an understandable reluctance by many archaeologists to use surface archaeology because of real and necessary concerns about post-depositional disturbance, temporal mixing and the inability to assign chronometric dates to artefacts. However, cave sites themselves are not completely without disturbance and indeed, all cave deposits started off as surface archaeology prior to their burial (Straus 1979, 1990). Only a small proportion of the whole behavioural repertoire of past hunter-gatherers will have taken place in caves, and the abundance of stone tools on the surface attests to the presence of people in the wider landscape, leaving residues of a range of foraging, hunting and raw material procurement activities away from the cave.

Mitchell (2008) calls for research to operate at a wider scale which appreciates that hunter-gatherers are not tethered to a single site, but rather are mobile groups who utilise the landscape for different tasks in different places (Binford 1964). There is a focus on a handful of particularly rich sites, and these all too often remain to be set in their landscape contexts, with investigation of open sites in their vicinity either lacking or not incorporated into published interpretations. Mitchell and Stewart's work in Lesotho is beginning to address this, conducting a non-coastal, intensive regional study in the setting of the Maloti-Drakensberg, looking to combine four major excavated cave sites with MSA open sites (Mitchell 2008; Stewart *et al.* 2012). This work is complemented by the study of the northern Namaqualand area (Dewar & Stewart 2012) as part of a broader investigation into human adaptations to marginal environments, where conditions are arid and resources unpredictable, in contrast to the highly productive coastal and fynbos ecozones which yield many of the well-studied sites. An additional study in southern Namaqualand is targeting the Knersvlakte region, along the Varsche River, and intends to integrate excavations with landscape survey to look at the relationship between artefact distribution and the locations of rock shelters, water and raw material sources (Mackay *et al.* 2010; Orton *et al.* 2011; Steele *et al.* 2012). Exploring the patterning in areas that lie outside of fynbos and coastal regions will test whether the adaptations proposed for these uniquely rich resource areas are seen in other, harsher environments.

Other important landscape-based studies have been carried out along the west coast dune systems by Kandel, Conard and colleagues (Kandel *et al.* 2003; Dietl *et al.* 2005; Conard & Kandel 2006; Kandel & Conard 2012). They take an explicitly holistic approach to investigating past human "lifeways", incorporating all aspects of behaviour which have an effect on how people organised themselves on the landscape, with respect to their subsistence, technological and social needs. Their aim was to test whether surface lithic scatters in sand deflation hollows represented single, specific activity foci, or whether they were exposed areas of a continuous background scatter that covered the landscape.

There is a general movement towards encouraging a more dynamic perspective on past spatial behaviour which acknowledges that hunter-gatherers were mobile groups whose presence on the landscape left both ephemeral and more substantial residues of repeated occupation, reflecting different behavioural adaptations and traditions. However, open site studies are still very much subsidiary to cave excavations. In this thesis, I aim to demonstrate the value of surface artefact assemblages for developing our understanding of past human behaviour at a multi-scalar level, including specific occupation foci and the landscape in general. The patterning that this research identifies, and the questions which it raises, draws attention to the potential for integrating surface and excavated data in future research.

1.2 Aims

This study looks outside of the cave and sets human behavioural change in a landscape context, within the study area of the Olifants River Valley. This is achieved through the mapping of surface stone artefacts from which a pattern of landscape feature association can be discerned. Surface scatters are, often justifiably, treated with caution by archaeologists because they lack the spatial and temporal security of an excavated assemblage. This study addresses the problem of temporal resolution by identifying temporally 'iconic' markers, based on diagnostic artefacts from dated assemblages that serve as chronological anchors for surface artefacts. The issues surrounding spatial resolution will be negotiated by making a distinction between space and place (Parkington 1980; Parkington *et al.* 1988). Space is treated as the location where an artefact was, or is, which may have changed with post-depositional disturbances; place is regarded as a meaningful point in space, defined here by a focal landscape feature. It is this association between temporally iconic artefacts and landscape foci that is developed into a local-scale model for change in landscape use in the Olifants River Valley from the ESA to the LSA.

1.3 Starting hypothesis

This thesis takes as its starting point the model put forward by Hilary Deacon that human behaviour, as expressed through landscape use, developed from a "specialist" focus on water sources in the ESA, towards an increasingly "generalist" strategy that saw MSA and LSA populations distributed across the landscape (Deacon 1998:27; 2001; Deacon & Deacon 1999:86). This hypothesis draws attention to the MSA as a period when human behaviour took on characteristics that were previously associated with the LSA. As acknowledged by Deacon, the way in which people interact with their surrounding landscape is central to the rest of their behavioural system, determining access to subsistence resources, raw materials, and social organisation.

Deacon developed his framework out of a strong body of evidence assembled particularly through his own experience of the ESA sites of Amanzi Springs (Deacon 1970), Doornlaagte (Deacon, H.J. 1988), Elandsfontein (Deacon 1998) and Geelhoutboom (Deacon 1975), the MSA sites of Klasies River Main Cave (Deacon, H.J. 1989, 1995) and Boomplaas Cave (Deacon, H.J. 1979, 1995) which covered the transition from MSA to LSA, as well as Highlands Rock Shelter (Deacon 1976b), Kangkara Cave and Paardeberg Cave in the Langkloof Valley (Deacon 1976a) which contained MSA and LSA, and a further MSA excavation at the Howiesons Poort type-site (Deacon, J. 1995). The LSA sites excavated by Deacon included Scott's Cave (Deacon & Deacon 1963), Wilton Large Rock Shelter (Deacon, J. 1969, 1972), Melkhoutboom Cave (Deacon, H.J. 1969, 1976b), Springs Rock Shelter (Deacon 1976b) and Matjes River Rock Shelter (Döckel 1998) (see Maps 6.1 to 6.3 for site locations).

Deacon argued that the ESA exhibits a stenotopic, or specialist, pattern of landscape use where site location appears to have been more closely dictated by hydrology than in later periods, with most sites restricted to the bases of river valleys, pans, springs and other wetland areas, and on the coastal platform (Deacon 1998, 2001; Deacon & Deacon 1999). The reasons for this are likely to have been both ecological and behavioural. The large cobble clasts that were often favoured for the production of ESA stone tools are found in river gravels, and animal and plant resources would be concentrated in riverine areas during the more arid periods of the Early and Middle Pleistocene. Although a probable material restriction is the lack of water containers in the ESA, the narrow focus is taken as a more significant limitation placed on ESA groups who did not possess the social mechanisms needed to disperse across the landscape – behaviour that was mediated in later periods by the exchange of 'exotic' raw materials and artefacts to cement social relationships (Deacon & Wurz 1996, 2001). Thus, ESA people are marked out as the "non-modern outgroup" in the Stone Age spectrum (Deacon 2001:220).

In contrast, Deacon described landscape use in the LSA as eurytopic, or generalist, with sites found across a range of environmental niches in both upland and lowland settings (Deacon 1998; Deacon & Deacon 1999). Sophisticated lithic and non-lithic technology in the LSA facilitated behavioural flexibility, with the use of specialised tools opening up a broader spectrum of exploitable subsistence and material resources. Deacon recognised that MSA site distribution and resource use mimics the LSA more closely than it does the ESA, identifying a behavioural shift in the MSA that represented "a change in the perception of the potentials of the environment" (Deacon 1989:557). In particular, this involved the habitual occupation of cave and rock shelter sites, and an increased dietary breadth that targeted geophytes and opened up settlement ranges across the fynbos ecozone, describing a process where MSA people were "'mapping' themselves onto the landscape" (Deacon 1992a:261). Not only was the use of space more structured across the landscape in the MSA, but spatial partitioning can be observed within sites, with discrete hearths and middens such as those at Boomplaas and Klasies River resembling LSA shelter sites (Deacon, H.J. 1995). Deacon identified hearths as a domestic focus, which he went on to interpret as being the domain of women, inferring social organisation in terms of the nuclear family.

Although for Deacon the changing site preferences seen from the MSA onwards represents a broadening of landscape usage, I would argue that it instead indicates a different kind of stenotopic focus, shifting from the water source to the cave or rock shelter. This raises the need for a more careful consideration of the meaning of stenotopism and eurytopism and whether they are useful concepts.

1.4 Stenotopism and eurytopism

1.4.1 Background and critique of the model

Deacon built up the model of landscape use in his work for more than two decades before adopting the terms 'stenotopic' and 'eurytopic' to describe these contrasting behavioural patterns (Deacon 1998). These concepts are borrowed from evolutionary ecology and refer to the ecological niche occupied by a species; stenotopic species are specialists, occupying a narrow ecological niche, whereas eurytopic species are generalists, able to use a broader range of environments (Eldredge 1979; Vrba 1980; Wood & Strait 2004). The terms were first applied in archaeology to refer to the dietary adaptations of *Paranthropus* (*Australopithecus*) and *Homo* (Vrba 1980), and usage has tended to be confined to discussion of early hominin ecological adaptations and not to human behaviour in a broader time frame (Wood & Collard 1999; Wood & Strait 2004; Fuentes *et al.* 2010; Grove 2011).

The simple dichotomy of stenotopic specialists and eurytopic generalists immediately raises concerns. The terminology is restrictive in that it generalises all aspects of hominin or human behaviour under the umbrella of one adaptive strategy. The previous use of the term in ecology has recognised that there are different variables that can be regarded as stenotopic or eurytopic behaviour, a combination of which can then be used to define a species as *more* stenotopic or *more* eurytopic on a form of "sliding scale" (Eldredge 1979:14; Wood & Strait 2004). In Deacon's application of the concept, the aspect of behaviour that defines stenotopy and eurytopy is habitat choice, equating to landscape use; however, identifying stenotopic or eurytopic patterns is still not clear-cut. 'Landscape use' in this study can refer only to locations where artefacts have been found, or where there is archaeological evidence that humans must have visited an area to procure resources. Landscape use occurs at multiple scales, in terms of the broad biome or ecozone occupied, the general range within a landscape segment, and, at a finer-scale, task-foci at certain landscape points. Taking early *Homo* as a case in point, its distribution at the broadest landscape scale would seem to run counter to Deacon's assertion of ESA stenotopism: at a global level, early humans in the Acheulean are eurytopic, representing the first hominins to range outside of Africa into new latitudes, cross-cutting a range of climatic and environmental conditions (Cachel & Harris 1998). Similarly, regional studies, such as the well-studied East African savannah biome, indicate that early humans made use of a variety of upland and lowland, wetland and arid habitats (e.g. Rogers *et al.* 1994; Downey & Domínguez-Rodrigo 2002), reflecting eurytopic landscape use. However, within a local-scale river valley context, the early human landscape signature appears highly stenotopic and activity is focused narrowly around water sources (cf. Sampson 1985). Bearing this in mind, it is essential to define the spatial scale under consideration in order to compare stenotopic and eurytopic behaviour in relative terms.

The temporal scale when comparing change across the time span of the ESA, MSA and LSA also presents concerns. The archaeological record is subject to a loss of resolution through time, with an inherent bias in favour of the preservation of LSA material in comparison to the ESA which has been subject to geomorphic and taphonomic processes for over a million years. This is of particular concern in the context of surface assemblages where limited artefact visibility may create a false impression of stenotopism, with an apparent landscape focus instead reflecting a depositional environment where artefacts are either better preserved or more accessible to archaeologists (Kuman 2003). The reliance on temporally diagnostic tools in surface assemblages is also problematic since the visible landscape presence of different industries will be biased by variability in the number of identifiable formal tool types, the percentage of retouched tools in an assemblage and artefact size. For example, the paucity of diagnostic formal tools in the early MSA and early LSA leave these as poorly understood industries that run the risk of being "typologically invisible" (Kuman 1998:151) in an undatable open landscape setting (Wadley 1993). This is particularly significant when considering transition points, from the ESA to MSA, and MSA to LSA, and highlights the limitations of the tripartite framework that divides the South African Stone Age, itself constructed out of industries defined by distinctive type-fossils (Goodwin & van Riet Lowe 1929).

1.4.2 Stenotopism and eurytopism in the Olifants River Valley

In this thesis, I will use Deacon's framework to approach continuous change in human behaviour mapped over a single landscape. The observations on which Deacon based his hypothesis were strong but formed out of a collection of sites that were discontinuous in time and space. As a landscape-scale study, space is treated here as continuous and an attempt is made to look beyond the confines of a site as a unit in space and instead to map human presence on the landscape as marked by individual artefacts (cf. Dunnell 1992). Through the inclusion of the stone tool record from the ESA through to the LSA, spanning a period of a million years, the Stone Age will be approached as a continuous process within which temporal markers form the basis for comparing human behaviour, although bearing in mind that this only represents the sample of the whole archaeological record which has been preserved.

The Olifants River Valley offers the opportunity for a detailed landscape-scale study of a topographically complex area that affords a range of micro-scale landscape features. The notion of stenotopism and eurytopism will be tested at a local level, treating the preference for specific types of landscape feature as indicators of a specialist or generalist mode of landscape use. The area has been studied from a number of perspectives since the 1950s which provides strong background evidence for the presence of archaeological material dating from the ESA through to the LSA.

1.5 Focus and structure of this thesis

The MSA is a period of particular interest to this study because, in the way that it has been traditionally defined, it represents a transitional stage between anatomical and behavioural modernity (McBrearty & Brooks 2000; Deacon 2001). The Deacon model anticipates that ESA and LSA artefact locations will be situated at opposite ends of the behavioural spectrum; therefore, it would be expected that earlier MSA artefacts show a more ESA-like distribution and later MSA artefacts show a more LSA-like distribution, reflecting a shift towards fully modern human behaviour.

The earlier MSA is difficult to recognise because it lacks diagnostic type-fossils and instead relies on general features of the assemblage, such as the dominance of quartzite, as opposed to the fine-grained raw materials used in later periods (Volman 1981). In contrast, the later MSA contains temporally constrained and highly diagnostic tool forms in the form of bifacial points and backed geometric pieces, associated with the Still Bay and Howiesons Poort industries respectively.

The Still Bay and Howiesons Poort industries were, until recently, dated to two tightly constrained periods of 77 to 70 ka and 66 to 58 ka, with emphasis placed on the intervening hiatus and interpreted in terms of occupational pulses followed by the replacement of populations with the arrival of groups bearing a novel technological system (Jacobs *et al.* 2008a; Lombard *et al.* 2012). The growing number of dates now indicate that the timing of these industries is more variable and supports *in situ*, although still relatively rapid, technological adaptation by local populations (Porraz *et al.* 2013a; Porraz *et al.* 2013b). Although the new date range given for Diepkloof suggests that Howiesons Poort artefacts may occur in an overlapping time-frame with the Still Bay at other sites (~70 ka), at all of the sites where both Still Bay and Howiesons Poort occur – Diepkloof, Sibudu and Apollo 11 (Wadley 2007, 2008; Vogelsang *et al.* 2010) – the Still Bay always precedes the Howiesons Poort in the sequence, supported by the chronology proposed by Jacobs et al. (2008a) for the majority of southern African sites. Further concerns have been raised regarding the dose rates used to model background radioactivity and an underestimation of the error margins given for luminescence dates, highlighting that the ages for these industries may not be as discrete as frequently proposed (Guérin *et al.* 2013). For the purposes of this study, it is sufficient to regard the Still Bay and Howiesons Poort as temporally ordered traditions, characterised by bifacial and backed technological strategies, which can be distinguished as later MSA phenomena post-dating approximately 100 ka.

Deposits assigned to the Still Bay and Howiesons Poort are recorded in separate, dated rock shelter contexts within the wider study area (Mackay 2009; Högberg & Larsson 2011). The two periods have been marked out as showing rapid bursts of innovative behaviour, with shifts in technological organisation seen to represent a response to ecological stress caused by climatic variability (Jacobs & Roberts 2008; Jacobs *et al.* 2008a; Mackay 2009; McCall & Thomas 2012). The later MSA will be given special attention in this study because of the potential offered by bifacial points and backed pieces as iconic artefacts; firstly, for distinguishing between different types of MSA assemblage as a potential means of identifying earlier and later MSA sites; secondly, for understanding differences in technological and spatial organisation within the later stages of the MSA; and lastly, for illustrating the importance of combining surface and excavated data in order to understand these behaviours in their landscape context.

In conducting an investigation which incorporates the branches of both landscape and lithic studies, a careful review of methods and approaches in each field is a necessary starting point. In Chapter 2, the history of landscape archaeology, in its many forms, is outlined from a theoretical perspective, and the main practical and conceptual concerns surrounding surface artefacts are addressed. The second section of Chapter 2 establishes the 'iconic artefact' approach which forms the chronological framework for this surface study, contextualising it within the debates relating to terminology and typology in South African archaeology. Each of these sections is concluded with a summary of the approaches that are adopted in this study, serving as a foundation for the methods set out in Chapter 4.

Chapter 3 describes the background to the study area; its physical setting, past climatic record and research history. The substantial body of contextual information available from previous geological, ecological and archaeological studies justifies the study area as a suitable and interesting region for an investigation of landscape use which addresses the ESA, MSA and LSA, providing an appropriate setting for a test of Deacon's hypothesis.

Chapter 4 details the methodology used for conducting fieldwork and analysis of the field data. This draws on the principles and problems of landscape archaeology and typologically-orientated systems of lithic classification that were dealt with in Chapter 2. The criteria that were used to classify artefacts and landscape features are explained in this chapter.

The following three chapters present the evidence for landscape use in the ESA (Chapter 5), LSA (Chapter 6) and MSA (Chapter 7). In dealing with these periods out of their chronological sequence, the ESA and LSA are established as temporal 'book-ends' for the MSA, allowing them to be contrasted as extremes against which MSA behaviour can be assessed as more ESA-like or more LSA-like. Particular attention is given to the MSA because of the significant technological, anatomical and behavioural transitions which it encompasses, this being relevant to Deacon's model which proposes that developments in the later stages of the MSA anticipate the LSA. Each chapter begins by framing the period within Deacon's stenotopic-eurytopic framework, supported by current evidence from other sites in southern Africa. In the background discussion of the principal iconic artefact types for each period, these are established as diagnostic chronological markers based on evidence from excavated sequences.

The volume of maps which accompanies this thesis presents the distribution of artefacts in each of the surveyed segments of the study area, referred to throughout Chapters 5, 6 and 7 in the discussion of the main patterns of landscape use in each period. These observations are subsequently explored in relation to three major factors which affect settlement decisions: water availability, subsistence behaviour and raw material use. Each chapter is concluded with an assessment of the survey evidence against the initial model of landscape use proposed by Deacon for the period. Chapter 7 contains an additional section in its discussion, using a case study of the area Andriesgrond to demonstrate the potential offered by the direct comparison of an excavated cave and surface sites. Furthermore, the distinct types of surface assemblage found in different locations within the small but topographically variable area of the Andriesgrond koppie are used to support the overall trends of artefact and landscape feature association seen in the study area as a whole.

Chapter 8 brings together the patterns and interpretations put forward in the ESA, LSA and MSA chapters, approaching the succession of artefact-making traditions throughout the Stone Age from a technological standpoint. Alternative strategies of technological organisation, and their associated discard behaviour, are considered in relation to landscape use and raw material provisioning and used to explain the trends seen in iconic artefact distribution in the study area. The final chapter, Chapter 9, summarises landscape use as observed in the Olifants River Valley in relation to Deacon's original model. Following an assessment of the success of the study and its limitations, the chapter concludes with a discussion of some future lines of enquiry which could further develop and challenge the thesis of stenotopic and eurytopic landscape use.

CHAPTER 2. APPROACHES TO LANDSCAPE AND LITHICS

2.1 Introduction

In this thesis, I will draw on two disciplines within archaeology which serve as a guiding framework for the approaches taken in my methodology and interpretation: landscape archaeology, and typology as a system of lithic classification. 'Landscape archaeology' is a broad, umbrella term which encompasses many different theoretical and practical approaches to landscape-scale studies (cf. Rossignol & Wandsnider 1992; Ashmore & Knapp 1999; David & Thomas 2008a). Landscape – both in the sense of Cartesian space, and of socially meaningful place – provides the context for human activity and plays an active role in shaping the behaviour and choices of human groups. The material traces of this behaviour are indicative of a human presence on the landscape which, in the case of Stone Age hunter-gatherer populations, is primarily composed of lithic artefacts which occur in variable densities across the landscape. As surface artefacts, these present a number of challenges to the archaeologist in using them as meaningful analytical units for past human behaviour. These issues are principally spatial, in terms of whether an artefact's present location is representative of its original discard location, and temporal, in terms of determining the relative age of artefacts which have accumulated over a great time span in a surface palimpsest which cannot be chronometrically dated.

This chapter outlines the background against which contrasting theoretical traditions have addressed the archaeology of landscape, discussing the factors which affect the formation of surface assemblages, the interpretive challenges these present, and ways in which these may be overcome. The second section of the chapter examines the issues surrounding the use of surface artefacts as units of analysis, how these are assigned to typological categories, and their utility as chronological markers.

2.2 Approaches to landscape archaeology

"Landscape is a term which both invites and defies definition" (Gosden & Head 1994:113), exemplified by the myriad of ways in which it has been employed, both in archaeology and across other disciplines. The concept of landscape is a highly Westernised one, rooted in Renaissance art and thus emphasising the aesthetic qualities of natural space and its perception by humans (Cosgrove & Daniels 1988). In light of this, some processual archaeologists eschew the use of the term 'landscape archaeology', preferring to refer to their framework as a 'landscape approach', or 'spatial archaeology'. In so doing, they divorce themselves from the historical baggage which is seen to undermine the scientific methodology which itself places emphasis on ecological and geomorphological factors, as opposed to viewing landscape as a cultural phenomenon (Rossignol 1992; Rossignol & Wandsnider 1992).

In using the term landscape in this thesis, I refer to both the topographic and geographic aspects of physical space, but also as important is the human experience and interaction with this space across all dimensions of economic, social, cultural and symbolic life. People select places in the landscape to carry out activities within their daily lives based on the qualities that certain localities afford (cf. Gibson 1979; Ingold 1986, 2000; Blumenschine & Peters 1998). Some of these places will have been used repeatedly, creating a concentration of artefacts which leaves the signature of an archaeological site; other places will have been ephemeral locations which people passed through, leaving little material trace of their interaction with the space.

Debates in landscape archaeology have essentially been approached from two main standpoints: the economic perspective which was a feature of the 'New Archaeology', followed by the post-processual critique which advocated a more humanised approach to how people interacted with the landscape as a social space. The processual paradigm has persisted in landscape studies, particularly in America (Rossignol & Wandsnider 1992), and the post-processual archaeologies of landscape are diverse and should not be falsely homogenised (Ashmore 2002); furthermore, it must be emphasised that these are not the only approaches to what has become a broad and accessible branch of archaeology (David & Thomas 2008a). The greatest transformation in landscape approaches in recent years has been the application of GIS (Geographic Information Systems) which has advanced the analytical and interpretive potential of spatial studies, regardless of their theoretical stance (Conolly & Lake 2006; Mehrer & Wescott 2006).

Many of the issues at the core of conducting surveys and understanding the surface archaeological record cross-cut the different theoretical paradigms, and these require separate and detailed consideration. These include the ways in which archaeologists conceptualise surface assemblages which in turn shapes their survey and recording methodology, the human behavioural factors which affect artefact deposition and assemblage formation, the post-depositional taphonomic effects that have further blurred the residues of human behaviour, and how these depositional and post-depositional effects are influenced by the physical landscape setting.

2.2.1 Theoretical background

Processual approaches: landscape as environment

The spatial distribution of artefact types in relation to the cultural territories of different peoples was a theme that ran through the early cultural historical approaches to settlement archaeology (e.g. Kossina 1911; Childe 1925). With the development of the New Archaeology as a rigorous scientific discipline from the 1960s (Binford 1962), there was a concern with the region and site as units in space, and the environment as a context for human behaviour, but the term 'landscape' was rarely used (David & Thomas 2008b). Under the regional approach advocated by Binford (1964) and Butzer's (1964, 1982) ecological perspective in America, and the economic tradition in Britain under Clarke (1968) and Higgs (1975), archaeologists looked to understand settlement patterns and regional systems in terms of the interaction between humans and their environment. One of the more influential models – site catchment analysis – sought to understand past settlement patterns in terms of people's access to resources in regional systems of inter-related sites (Vita-Finzi & Higgs 1970; Higgs & Vita-Finzi 1972). In a South African context, it was against this background of site catchment analysis that Parkington's 'seasonal mobility' hypothesis was developed, looking in part at successive changes in the site catchment of the coastal site Elands Bay Cave with fluctuations in sea level and resource availability (Parkington 1977a, 1981).

The growing interest in conducting spatial studies required statistical methods for the systematic study of spatial patterning (Hodder & Orton 1976), accompanied by a stream of publications offering guidelines and sampling methodologies for conducting surface surveys, driven in particular by the growth of Cultural Resource Management in America (Redman 1975; Thomas 1975; Plog *et al.* 1978; Schiffer *et al.* 1978; Ammerman 1981; Lewarch & O'Brien 1981; Dunnell & Dancey 1983). In the early 1980s, landscape archaeology underwent huge conceptual changes in how 'sites' were approached, with a movement towards distributional rather than site-focused archaeology. This branch of discourse grew particularly in the context of East African palaeoanthropological stone and bone assemblages where there was an increasing realisation that the focus on sites, as discrete archaeological occurrences, was overlooking a large portion of the archaeological record (Foley 1981; Isaac 1981).

In line with the brief of processual archaeology, a concern with actualistic studies encouraged assemblage formation processes to be addressed from geomorphological (Butzer 1960, 1964, 1977), taphonomic (Schiffer 1976; Wood & Johnson 1978; Foley 1981; Behrensmeyer *et al.* 1986; Schick 1987) and ethnoarchaeological standpoints (Binford 1977, 1980, 1981; Yellen 1977; Kelly 1983). Binford's (1978b) Nunamiut ethnography and Yellen's (1977) studies of the !Kung have been influential in exploring aspects of site formation among mobile hunter-gatherer groups, offering insights into the temporality of occupation and reoccupation patterns, and the relationship between tool use and discard location.

Post-processual approaches: landscape as lived

Towards the end of the 1970s, there was a growing critique of the emphasis being placed on human interaction with the environment over human interaction with other humans. The post-processual movement in archaeology was dissatisfied with simply using the mapped distribution of sites and artefacts on a landscape to answer economic questions about social organisation and mobility, and instead addressed how humans were living in the landscape through the lens of social and cultural identity (Hodder 1978, 1982; Redman *et al.* 1978; Crumley 1979). Rather than being a passive backdrop for human economic activity, the landscape became viewed as active and invested with social meaning.

In post-processual approaches, ethnographic comparisons have been employed in a very different way to processual archaeology, promoting an awareness of the landscape as being embedded in social life, with people "transforming natural wilderness into cultural places and spaces many thousands of years ago, by the mythologizing, marking and mapping of landscapes" (Taçon 1999:33). In hunter-gatherer archaeology, where built structures or monuments were not used to modify the landscape, rock art has been the focus of early ways of marking the landscape (e.g. Deacon, J. 1988; Ouzman 1998; Taçon 1999). Ethnographies from various Australian aboriginal groups have been particularly informative in demonstrating how ancestral histories and myths form an integral part of the landscape, embodied in its physical features such as certain mountain peaks, caves, valleys and rock formations, with 'Dreaming tracks' forming pathways which link between people, places and stories (Rapoport 1975; Lewis 1976; Taçon 1999). The notion of the *axis mundi* (Eliade 1964), where the real, occupied world is believed to meet the spiritual upper and lower worlds, has been applied to such places, especially those marked by rock art and repeatedly visited as sacred places (Deacon, J. 1988; Ouzman 1998; Taçon 1999).

A dimension of landscapes which ethnographic cases serve to highlight is the sense of temporality, taken up by Ingold (1993), who looked to situate human activity in the context of past and present actions that are connected to places in the landscape. Through the concept of "dwelling", Ingold has tried to bridge the opposition between the natural, passive landscape and the landscape as culturally constituted, using the "taskscape" to express how people's activities form an interlinked array of tasks, analogous to the interlinked array of land features which compose the landscape. Other approaches, such as Tilley's (1994) phenomenology of landscape, reject outright the dualistic Western concepts of nature and culture and instead assert the primacy of the experience of the human body and its perception of its surroundings. Tilley's premise was that the human body is universal in its sensory capabilities and therefore archaeologists can engage in 'participant observation' to document their own bodily ethnographic experience of archaeological landscapes, opposing the empiricism of traditional science in favour of a more subjective stance (Tilley 2004).

Phenomenology and other 'hyper-interpretive' approaches (e.g. Edmonds 1999, 2004) have been criticised for pushing too far beyond the actual archaeological evidence, getting lost in personal imaginings and descriptive vignettes (Fleming 2006). Whilst putting people back into the landscape and challenging the default modern Western perception of landscape have been important reactions to come out of post-processual archaeologies, the discipline now treads a fine line between interpretive creativity and the sacrifice of scientific integrity. The application of GIS techniques in experiential approaches to archaeology may offer some middle ground, providing a quantitative tool for investigating sensory perception and movement through a landscape as it may be experienced by humans (Gillings 2012).

Current approaches: landscape and GIS

The most recent advances in approaches to landscape archaeology have grown out of the use of GIS as a technique for spatial analysis and for the visualisation of spatial data. The increasing precision of GPS for the collection of field data and the availability of high resolution aerial photographs are transforming the way in which spatial data can be manipulated and displayed, allowing the layering of information in a form of spatial stratigraphy that opens up new possibilities for comparison and analysis. The addition of digital elevation models, remote-sensing imagery and data on environmental characteristics such as geological and vegetation zones, hydrology and climate present further opportunities for spatial studies (Conolly 2008).

As a tool for quantitative modelling, GIS facilitates measures such as field of view (viewshed) and line of sight (intervisibility) between locations (Wheatley & Gillings 2000), as well as mapping potential pathways and movement across a landscape (e.g. Llobera 2000, 2001, 2003). As a supplement to this, the representation of the human visual experience of landscapes is being explored through using 3D imagery, 360 degree panoramic photographs and virtual reality (Cummings 2008). More sophisticated forms of modelling, such as agent-based modelling, allow one to run multiple computer simulations of land use within certain behavioural, energetic and environmental parameters, set in the context of GIS data which represent a real landscape (e.g. Lake 2000; Griffith *et al.* 2010). Statistical methods for analysing spatial patterns have been in use for several decades (e.g. Hodder & Orton 1976), but GIS software packages offer a quick and efficient way of conducting a wide range of spatial statistical tests, such as cluster analysis using nearest-neighbour (Clark & Evans 1954) and Ripley's *K* functions (Ripley 1977), as well as parametric and non-parametric tests of the relationships between different georeferenced datasets (Conolly & Lake 2006; Conolly 2008). GIS is now a fully integrated dimension of landscape archaeology and whilst not advancing landscape theory itself, it rather offers a framework open to all theoretical perspectives, with new potential for analytical techniques and effective ways for visual presentation of spatial studies.

2.2.2 Approaches to survey and surface study

Where artefacts are found today and where people were in the past is not a simple relationship, and is not dealt with by 'bigger picture' frameworks, such as that of stenotopism and eurytopism. In taking a landscape-level approach, one has to deal with a number of issues which disrupt the link between artefact location and human behaviour. In relation to the present study, two major questions arise in assessing an artefact found on the surface: how old is the artefact, and is it *in situ*? The former question is dealt with in a methodology orientated towards mapping 'iconic' temporally diagnostic artefacts. The latter requires some appreciation of the geomorphic conditions of the artefact location. These issues are pertinent to any surface study, but their implications are amplified by the great temporal span under consideration in this thesis since one can expect artefacts that date from around 1 Ma to have been differentially affected when compared with more recent artefacts dating in the order of thousands or hundreds of years old.

Conceptualising surface archaeology

A central and recurrent theme in landscape archaeology involving surface artefacts is how to approach their variable spatial distribution. It became clear to archaeologists, particularly those dealing with Stone Age hunter-gatherer remains, that the study of discrete sites as concentrations of artefacts is arbitrary and does not reflect the use of space at a landscape level (Clarke 1968). Artefact discard and distribution is in fact more or less continuous, although it can be expected that there will be concentrations at certain spatial foci (Foley 1981). This is described in Isaac's (1981) 'scatters between the patches' model, where certain areas of higher artefact density are identified within a background scatter across the landscape. In practice, the definition of the spatial boundaries of such patches is problematic, and the archaeological site becomes restrictive as an analytical unit. Alternative frameworks for addressing a continuous archaeological record have been conceptualised variously as off-site (Foley 1981), non-site (Thomas 1975) and siteless (Dunnell & Dancey 1983; Dunnell 1992) approaches, with the methodological focus shifting from recording the site to recording individual artefacts as the smallest unit of analysis – a principle followed in the present study.

Stern's (1993, 1994) notion of 'time averaging' and Roebroeks et al.'s (1992) 'veil of stones' express the problem that patches – based on Isaac's (1981) use of the term – could in fact be scatters imposed over existing scatters, composed of unrelated artefacts and conflating multiple scales of temporal information. The accumulation of artefacts which may be deposited in separate episodes, superimposed over the same physical space, forms a palimpsest (cf. Bailey 2007). Not only are artefacts added over time, but they are also removed by post-depositional processes, both natural and cultural (Schiffer 1972, 1983). The key problem with a palimpsest is how to establish whether artefacts are contemporaneous. One of the dangers is that an artefact accumulation runs the risk of being treated as made up of components of the same assemblage (Shott 2008), and at a broader scale, as components of the same settlement system, reflecting different activities of the same group (Holdaway *et al.* 2005). Ethnographic studies have made a substantial contribution to understanding mechanisms of short-term deposition, where the different types of spatial patterning of artefacts are observed to form through a mobile group's daily, seasonal and annual movements (e.g. Yellen 1977; Binford 1980).

Discard behaviour

The archaeological record forms from material that is discarded, either accidentally or intentionally, but as Isaac (1981) warns, the archaeological record is not a simple 'map' of where people discarded material objects when one takes into account both the palimpsest effect and post-depositional disturbance. Discard location can, at best, only indicate where an artefact was lost or thrown away, which does not necessarily equate to where it was made or used, offering an inherently skewed spatial picture. Locations that were used more intensively will accumulate more archaeological material, but whether this was due to occupation by a larger group generating more debris, or prolonged stays at the location, or frequent revisits is difficult to tease out. In the case of Stone Age surface assemblages, the record is largely restricted to the behavioural residues left by stone artefacts, representing only one material aspect of past people's lives. The factors which affect the discard and deposition of stone tools require examination in some detail in order to establish the interpretive potential and areas for caution when relating surface assemblages to past behaviour.

In the early archaeological work carried out on ESA sites in East Africa, areas with high concentrations of artefacts were interpreted as 'living floors' (Leakey 1971), and 'home bases' (Isaac 1971, 1978, 1981). To describe sites in such a way implies that they were the location of domestic activities, which are difficult to discern by the presence of stone tools alone. The sites in question, at Olduvai and Koobi Fora, were interpreted on the basis of accumulations of stone and cut-marked bone, but these could represent more task-specific butchery locations (Potts 1984, 1988; Bunn & Kroll 1986) or the residues of scavenged carnivore kills (Binford 1981).

Excavated cave sites provide the most frequent and more convincing evidence for what may be described as living sites, with the preservation of non-lithic materials and intra-site spatial patterning, such as hearths and bedding, being of particular importance in identifying domestic activities (Deacon, H.J. 1989, 1995; Goldberg *et al.* 2009). By the nature of the depositional environment offered by caves, preservation is increased in comparison to open sites, and consequently there is an inherent bias towards the association of living sites with cave and rock shelter foci. Open-air sites on the landscape are more of a challenge to recognise but they do exist; the excavated site of Florisbad has been interpreted as an open-air living site with evidence for a hearth feature, as well as knapping and butchery activity (Kuman *et al.* 1999; Henderson 1990). Dunefield Midden, a late LSA open site on the west coast, has provided a rare opportunity to map artefacts and campsite features with impressive spatial resolution (Parkington *et al.* 2009). However, for sites which do not have archaeological features, one would have to be confident about the function of stone tools to be able to identify domestic activities from concentrations of surface scatters alone, and living sites represent only a limited portion of total artefact discard and will reflect specific choices for site location.

The activity being carried out at a location will affect the type and number of artefacts left behind. One of the factors that this is dependent upon is the rate of tool exhaustion. Some tools have a longer use-life than others; for example, adzes have a relatively short use life since they wear down quickly through use and resharpening (Gould *et al.* 1971; Binneman & Deacon 1986). The use-life of an adze can be extended if the tool is reversed in its haft and both edges are used. Some activities will produce large quantities of debitage, as seen at tool production sites, but others will be more ephemeral, for example, areas where tool maintenance occurs involving minimal resharpening, and tool use which does not reach the point of tool exhaustion and abandonment. A key issue is that the eventual discard and find location of an artefact does not necessarily reflect where it was used, just as its form can represent any stage of its manufacture or use-life, thus it may be unfinished or exhausted (Dibble 1987).

As demonstrated by Binford (1973, 1977) through his Nunamiut ethnography, the artefacts used on a site and those discarded there may be completely different, depending on whether tools were designed for expedient use or were curated tools, carried to provision for anticipated future needs (Kuhn 1992, 1995). Curated tools typically involve a high investment in production costs, therefore if such a tool still had potential use left in it, it would be transported away from its place of use; if a tool with low production costs was exhausted and no longer of use, it would be discarded, leaving a biased representation of the tools actually in use at a locality (Binford 1979). Bifacial tools and radial cores that are designed to withstand frequent maintenance and provide a ready supply of flakes are typically regarded as curated tools (Binford 1979; Kelly 1988; Nelson 1991; Kuhn 1992, 1995). Artefacts of a more expedient nature would tend to include flakes that are minimally retouched to suit the task at hand, employed and discarded under conditions where resources were predictable (Binford 1979; Kuhn 1992, 1995).

Strategies of curation or expediency will be influenced by the availability of raw materials and the time that could be allocated to obtaining them, either through 'embedded procurement', in the course of other subsistence trips, or special procurement journeys (Binford 1979). Locally available raw materials may have suited the tool-makers' needs, but higher quality raw materials may have been preferred and transported over greater distances (Kuhn 1992, 1995). The relationship between the types of materials used for tools, and the location of primary and secondary raw material sources provides information about a group's ranging patterns (e.g. Ambrose & Lorenz 1990), or introduces the possibility of exchange relations with other groups (cf. Wiessner 1983).

The spatial implications of technological organisation may be seen through strategies of provisioning, where raw materials or finished tools were cached in certain locations that were revisited (Potts 1984, 1988), described as 'provisioning of place' by Kuhn (1992, 1995) and 'site furniture' by Binford (1979). This is contrasted with a strategy of individual provisioning (Kuhn 1992, 1995) where certain, usually curated, tools were preferentially carried as 'personal gear' (Binford 1979). The organisation of a group's mobility will play a major role in technological provisioning, depending on how frequent their movements are and over how great a distance, combined with the predictability and reliability of resources that are available in a new area (Kuhn 1992, 1995).

Based on ethnographic studies, Binford (1980) identified two contrasting mobility strategies: residential mobility, practiced by 'foragers' and logistical mobility, practiced by 'collectors'. Residentially mobile groups would have a main base camp from which groups radiated out in the course of the daily foraging round and when necessary, the entire group would move its camp to a new location. Logistically mobile groups made use of smaller task groups who would make special-purpose logistical forays away from the base camp, over distances that may exceed the range that could be covered in the daily foraging round. In terms of the stone tool assemblages that these different spatial configurations would leave behind, in theory, one would expect to find assemblages of different size and composition at locations which were used logistically and those that were more permanent base camps.

Various suggestions have been put forward for the type of technological system that suits each mobility strategy. In systems favouring curated tools, manufacture and some degree of maintenance is suggested to take place at residential bases, provided this is not a great distance from the raw material source (Binford 1979; Torrence 1983; Kelly 1988). Where the raw material source is not local, one could expect at least primary reduction to occur at the source or at 're-tooling' locations (Torrence 1989), or the use of intermediate caches to reduce transport costs (Binford 1979; Kuhn 1992, 1995). In locations where knapping and maintenance take place, one would expect to find tools discarded due to breakage during the manufacturing process, and exhausted and broken tools removed during rehafting. Technological expediency may be recognised at residential locations where cores are discarded at various stages of the reduction sequence prior to being exhausted (Nelson 1991).

Logistical sites are the loci for specific activities, therefore one can expect to find specialised tools which maximise the efficiency of the task, as opposed to general-purpose tools. Such sites may include kill or butchery locations, where transport costs are reduced by processing carcasses *in situ* (Nelson 1991). Curated tools that break during use may be discarded at the activity site, as will modular elements of hafted tools that can be easily replaced. Flakes produced expediently, specifically for the task, will display use-wear and will be left at the site if raw material and time conservation are not a priority. Ultimately, distinguishing the different types of site involved in a mobility system is difficult when considering surface sites alone, due to the palimpsest effect and the difficulties of relating contemporaneous sites. Where residential sites are available for excavation, particularly caves, these may offer insights into the activities which were not taking place at the base camp and direct attention to other possible locations on the landscape, emphasising the value in using surface and excavated data as complementary sources of information.

Taphonomic processes

Artefacts on the surface are vulnerable to external post-depositional influences, and this has led many archaeologists to treat surface assemblages with great caution, often regarding them as inferior sources of evidence compared to buried deposits. However, as Dunnell and Dancey (1983) point out, buried deposits themselves began as surface deposits and were exposed to these processes for an unknown length of time, prior to being subject to a new set of sub-surface processes. Additionally, artefacts that are currently on the surface may have been buried for a time and then subsequently re-exposed, with exposure obviously being critical to the archaeological visibility of artefacts.

Two issues come to the fore when considering post-depositional taphonomic processes: the type of processes that artefacts are exposed to, and the duration for which they are exposed to them (Lewarch & O'Brien 1981). Logic dictates that the longer the duration for which artefacts are on the surface, or indeed buried in deposits, the greater the potential effect of these processes, and this presents a problem when considering the extended time-scale of this study, spanning a million years. The relative scarcity of ESA material in caves has been suggested to be preservational in some environments (Kuman 2003; cf. Pickering *et al.* 2013) (discussed further in Chapter 5). In the study area, there are few deep, well-protected caves with the potential to preserve substantial depth of deposit, most being shallow rock shelters that have little undisturbed deposit, even from more recent occupation. This raises the possibility that artefacts from earlier periods may have been eroded or washed out; however, when the body of surface evidence is taken as a whole, the absence of ESA artefacts in the vicinity of rock shelter settings would suggest that they were not a primary focus of activity, as will be argued in Chapter 5.

The conditions which affect an artefact post-depositionally will vary considerably according to where it was discarded. Experimental archaeology has played a prominent role in the investigation of the effects of different factors on archaeological assemblages, both on the surface and in buried contexts. One of the most potentially disruptive forces to affect spatial integrity is water flow, causing downslope movement of artefacts over land and with the potential for significant lateral displacement in high-energy fluvial contexts (Rick 1976; Schick 1986; Petraglia & Nash 1987; Petraglia & Potts 1994). In both over-land and fluvial situations, artefact transport and redeposition is a potential problem, creating false associations between artefacts and their position in the landscape, and between unrelated artefact assemblages. Similarly, size-sorting disrupts the composition of an assemblage, with smaller, lighter elements transported further in an over-land setting (Rick 1976), but in river channels variable effects have been recorded according to water flow velocity (Schick 1986; Petraglia & Nash 1987; Petraglia & Potts 1994). Under slow to moderate water flow conditions, smaller artefacts are transported further, but under high energy conditions heavy objects such as cobbles and cores can also be moved a substantial distance (Schick 1986; Petraglia & Nash 1987; Petraglia & Potts 1994). This presents a great interpretive challenge to archaeologists studying assemblage formation in these settings. Not all of the consequences of fluvial disturbance are necessarily negative; the damming of the Olifants River at Clanwilliam has, through the seasonal rising and falling of the water level of the Dam, exposed ESA artefacts from the sandy sediments in which they were buried, having a positive effect on archaeological visibility (Orton & Hart 2005).

On a land slope setting, the absence of micro-debitage from an assemblage can reflect its removal by slopewash, but the additional caution stands that stone knapping activities which generate micro-debitage simply may not have occurred at that location (Dunnell & Stein 1989). Recent studies have examined artefact orientation (fabric analysis) as a measure of slope-related disturbance, although the results are currently more meaningful for assessing disturbance to buried rather than surface material (Lenoble & Bertran 2004; Lenoble *et al.* 2008). In the experimental study carried out by Rick (1976), the presence of grassy vegetation was found to slow downslope movement, but vegetation can also have a negative effect by reducing surface artefact visibility and root disturbance can affect the sub-surface movement of artefacts (Wood & Johnson 1978; Lewarch & O'Brien 1981). All of these effects are highly contextually dependent and require careful assessment to determine whether they may have substantially influenced the redistribution of artefacts. The gradient of the slope and whether there are potential sources of archaeological material higher up the slope are important indicators in this regard.

Disturbance by animals is a further source of concern. In the study area, animal burrows can cause considerable disruption, especially those of large mammals such as aardvark, although small rodent burrows are much more problematic in the context of the excavated record where stratigraphy can be substantially disturbed, with upward and downward displacement of artefacts through the deposits. The digging for geophytes by animals such as baboons displaces soil and affects surface visibility as well as potential artefact disturbance, and the trampling effect of large bovids can cause similar problems. Ethnographic and experimental work has also observed that trampling by humans can result in size-sorting of artefacts between the surface and sub-surface when in a sandy matrix (Yellen 1977; Gifford 1978). In addition to causing accidental disturbance, humans are also responsible for the deliberate removal and transportation of artefacts, frequently seen in the LSA through the reuse of large MSA flakes which were either collected from the surrounding landscape or 'mined' from older cave deposits (Kaplan 1987; Parkington & Poggenpoel 1987).

A phenomenon which is particularly apparent along the edge of the Olifants, below the high water level of Clanwilliam Dam, is the presence of calcretised, now degraded, termite mounds, termed heuweltjies. These features are prevalent across the landscape of the south-western Cape and can extend up to 20 m in diameter, with an above-ground height and below-ground depth each of up to one metre (Midgley *et al.* 2002). The erosive action of the Dam has caused the exposure of the calcretised mounds, and artefacts cemented into them are now eroding out as the heuweltjies degrade. Their formation and age are still subjects of debate, although radiocarbon dates have indicated that some near Clanwilliam Dam have an age range from 29.8 to 24.6 ka (Midgley *et al.* 2002), although much younger dates of 5500 to 4000 BP were obtained in an earlier study (Moore & Picker 1991). This raises interesting taphonomic questions since the artefacts most often incorporated into the mounds are large ESA handaxes and flaked cobble artefacts, with a lesser MSA presence observed, suggesting that these were on the surface, or sub-surface, when the heuweltjies formed, although artefact size and density may also play a role.

Physical setting

The physical setting in which artefacts are situated has an influence both on human behaviour in the past, and on the post-depositional processes that have acted on artefacts in the intervening period. The current local conditions of the landscape may have been markedly different at the time when artefacts were deposited, with the effect of environmental change and geomorphic processes being particularly important when considering deep time. Climatic fluctuations and the resultant impact on the environment would have offered different opportunities and imposed different restrictions on the landscape choices available to people throughout the past.

Water availability is likely to have been the greatest concern to hunter-gatherer settlement decisions. Permanent water sources which exist today may have been only ephemeral in the past; equally, palaeoriver channels and lakes may no longer exist, as demonstrated by good geomorphological evidence at East African sites such as Olduvai, where there has been extreme reorganisation of the landscape due to tectonic activity (Hay 1976; Ashley *et al.* 2009). In the case of the Olifants River, the underlying geology of relatively erosion-resistant Table Mountain Sandstone gives good grounds for presuming that its current course in the study area has not changed substantially since the ESA, allowing for some variation in sedimentation and vegetation where the river channel opens into a wider floodplain. Recent human activity, including the damming of the river at Clanwilliam and the invasion of alien vegetation species which now choke parts of the river channel, have had a marked impact on the current conditions around the river. The effects of these changes are, however, predictable and relatively recent, meaning that their overall impact on creating bias between the ESA, MSA and LSA is minimal.

The availability of different types of location for settlement will also have been variable. Rock shelters may not always have been suitable for occupation, due to factors such as erosion, collapse, sediment accumulation and proximity to essential resources (Straus 1979, 1990). Dunefields where sand deflation hollows have formed, revealing wind-deflated concentrations of artefacts, may have shifted considerably due to variation in the strength and direction of aeolian activity (Lancaster 1987; Chase & Thomas 2006, 2007). It is disputed whether currently deflated surfaces are merely a visible sample of a more continuous presence of artefacts across the landscape (Conard & Kandel 2006; Kandel & Conard 2012) or whether they represent deliberate occupation foci (Manhire 1984).

In a river valley such as the Olifants, the exposure of the floodplain (currently Clanwilliam Dam) will have been subject to variation under seasonal rainfall and longer-term climatic changes affecting precipitation levels. Artefacts have been found on the Olifants floodplain when the water level of the Dam is reduced to a channel at 13% capacity. Of particular relevance is the exposure of raw material sources along the edge of the river which may have been covered by water or sediment during some periods, this situation being suspected for silcrete terraces along the Olifants that are currently obscured.

Other environmental variables such as vegetation type and cover have been shown to have fluctuated with climate (detailed in Chapter 3, Section 3.3), affecting potential foraging resources and animal species available as prey targets. Thick vegetation or tree cover could also impede movement and visibility across certain segments of the landscape in the past; similarly, areas that were previously open but are now heavily vegetated will impact on the visibility of archaeological remains.

2.2.3 Landscape approaches in this thesis

In the above review of the history and concerns embedded in carrying out landscape studies, I have indicated the main factors which are sometimes cited as reasons against using surface artefacts in archaeological investigations. In establishing a constructive approach to these issues in this study, I follow the principle put forward by Lewarch and O'Brien (1981:312) that "surface materials should be considered as sources of potential information until proven otherwise." Furthermore, I take the positive, whilst not naïve, approach to spatial archaeology justified by Kvamme (2006): that human behaviour shows patterning in relation to its environments, both natural and social, and the archaeological record offers an opportunity for understanding how people interacted with their natural and social environments. GIS serves as a tool for mapping this information.

The landscape approach taken here treats the surface archaeological record as a continuous scatter of variable density, using individual artefacts as the smallest unit of analysis. However, it is also acknowledged that certain landscape settings do form a clearly defined site focus, such as a rock art site associated with a shelter or rock wall. Almost invariably, an artefact scatter will occur in association with this focus, although the limits of the scatter will likely to be hard to define, especially in situations where a steep talus slope accelerates downslope artefact erosion. For the purposes of organising the data in this study, certain landscape localities are recognised as discrete spatial foci, as in the case of rock shelters, and others as particularly dense concentrations of artefacts which are distinct from an otherwise sparse background scatter, and these have been recorded as separate sites. The archaeological significance of these arbitrarily designated areas as 'sites' is not assumed uncritically, although there are often strong indications that artefacts within the assemblage may be temporally related. The ways in which different sites have been defined are detailed in Chapter 4, Section 4.5, and the introduction to Appendix 1.

The surface artefact record which is being mapped, before taphonomic disturbance is taken into account, forms as a result of human tool-making, use and discard behaviour, which has been organised in considerably different ways through time (explored further in Chapter 8). Various factors, including raw material procurement, tool provisioning, mobility strategy and tool-using activities, will structure the pattern formed by discarded tools in open and buried contexts, and the relationships and relative importance of these different factors are not always easy to tease apart. In looking at temporal change from a larger-scale comparative perspective which includes the ESA, MSA and LSA, this study has the advantage of being able to determine repeated and contrasting patterns of tool distribution which, when complemented with the excavated evidence, is a means of approaching the relationship between technology and the use of space in relation to external factors such as climate, environment and resource availability.

All archaeological material, whether surface or sub-surface, is affected by post-depositional processes of some sort. This does not, however, automatically weaken the value of surface artefacts which are frequently disregarded for this reason. At a localised scale, the degree of disturbance affecting artefacts in the study area has been assessed as being minimal. The study area has not been subject to major disruptive geological processes such as tectonic activity (cf. Bailey *et al.* 2011), and its geology is relatively stable, with the effect of small-scale processes such as slopewash and erosion being easily observed in the field. The area's thin sandy soils and semi-arid climate contribute to a situation which favours artefact exposure, and the complex topography means that any downslope displacement is localised and its effect is predictable.

Overall, the fact that there are thousands of artefacts present on the land surface, distributed in varying densities across all sections of the landscape surveyed, and dating from the ESA through to the LSA, indicates that post-depositional processes are not completely obscuring surface archaeological traces from the landscape. The strategy adopted in this investigation, recording individual artefacts as opposed to sites, gives a clear indication of where artefacts are concentrated, and where isolated elements occur. The fact that certain artefact types show repeated patterning in their distribution indicates that there is analytical potential in their distribution.

2.3 The iconic artefact approach

The 'iconic artefact' approach adopted in this study is centred on temporally-specific artefact types, identified on the basis of diagnostic morphological and technological features. The principle behind the approach is that tools in otherwise undatable surface assemblages can be assigned a relative age based on artefact typologies from dated excavated sites. Several issues arise from this method: firstly, it requires iconic artefact types that are sufficiently restricted in time to be useful and reliable chronological markers; and secondly, the attributes that are used to define these artefact types must be clear and standardised.

2.3.1 Background to South African terminology

The identification of diagnostic *fossiles directeurs* is a long-established principle in constructing archaeological typologies. Early approaches in the culture-history tradition of archaeology tied these type-fossils to specific cultural units, as exemplified by Goodwin and van Riet Lowe's (1929) enduring sequence of Stone Age cultures for southern Africa. Their scheme grouped tools with a shared typology into cultures which were named after the site which characterised them best, and these were arranged chronologically within the Earlier, Middle and Later Stone Age periods [1] (Goodwin 1946b, 1958). The initial motivation behind the new scheme was to break away from European terminologies which had been imposed directly upon the South African record (Goodwin 1929), and whilst the resultant structure has broadly stood the test of time, French terms such as Acheulean and Levallois still persist in the African lexicon.

Multiple attempts have been made to overhaul the terminology and taxonomy of the African archaeological sequence which has only grown more complicated over the years. The Burg Wartenstein Symposium of 1965 set out to review and redefine the terms in use and how these were translated into a hierarchical system of classification (Clark *et al.* 1966; Bishop & Clark 1967). In addition to dropping the terms Earlier, Middle and Later Stone Age, one of the principal recommendations of the symposium was that terminology for culture-stratigraphic units, referring to technological groupings, should be kept separate from time-stratigraphic units, which should instead refer to chronology on a geological time-scale. An area where Burg Wartenstein failed to harness the potential to make advances in taxonomy was in the continued use of the presence of type-fossils to define a culture-stratigraphic unit. It was not until these later became regarded as a quantifiable component of an assemblage and were approached in terms of their relative frequencies, that a real move forward was made in identifying chronological and spatial variation at an assemblage level (Deacon, H.J. 1972; Deacon, J. 1972; Sampson 1974; Humphreys 1979).

The efficacy of the Burg Wartenstein model was also held back by the reliance on seriation to construct a relative chronology where chronometric dates were unavailable. The major advance in dating techniques, particularly in the past few decades, has prompted a renewed effort to address the terminology in use for the Stone Age sequences for South Africa and Lesotho (Lombard *et al.* 2012). In particular, this targets the MSA, for which there has been a recent proliferation of new evidence and increasingly reliable dates. These now require description and standardisation if progress is to be made in comparing between sequences, allowing the incorporation of poorly dated layers or undatable surface assemblages once a secure dated framework has been established. Lombard et al. (2012) call

[1] When Goodwin began to construct the scheme in 1923, initially only two divisions of the Stone Age – Earlier and Later – were intended. The Middle Stone Age was added in 1927 to account for the transition between the two whilst emphatically avoiding the use of the term Mousterian which, Goodwin felt, had no exact parallel in southern Africa (Goodwin 1958).

for a reassessment of the sequence on a three to five yearly basis, and propose to make full comparative data available online. One of the Burg Wartenstein proposals was an 'African typology card catalogue' as an aid to standardisation, but this was never fully developed; one hopes that the enhanced accessibility to digital material may make this new venture more successful than its precursors in communicating and implementing a standardised nomenclature.

In spite of the reluctance of many archaeologists to pigeonhole assemblages and individual artefacts into categories, descriptive systems are necessary to structure the analysis of archaeological material, exemplified by the recurring attempts to address the taxonomies in use. The focus on iconic artefacts adopted in this thesis is primarily a typological approach and as such is accompanied by a number of concerns and limitations which require discussion and mitigation.

2.3.2 The iconic artefact approach: limitations and alternatives

Limitations of an iconic artefact approach: typology vs. technology

One of the central issues in using a system of typological classification which relies on the identification of discrete formal tool types is how these types are defined. An inherent hazard of this approach is that it can assume that these are real, 'emic' categories (Spaulding 1953), whereby tools were made to conform to predetermined and standardised 'mental templates' held by their manufacturers (Mellars 1989, 1996b). This runs the danger of making functional assumptions in how tool types are distinguished (e.g. Clark 1959) and fails to allow for equifinality in finished artefact form (Davidson & Noble 1993). In reality, artefacts may be discarded at any stage in their reduction sequence, and retouched artefacts can therefore be seen to show continuous variability in their form (Jelinek 1976; Dibble 1987; Sackett 1988). This debate was most notoriously borne out over scraper morphology in the European Palaeolithic sequence (Dibble 1987; Rolland & Dibble 1990), but applies equally to the earliest stone tool industries where an Oldowan chopper can theoretically, through progressive reuse and reduction, move through the morphological types of a chopper, to a discoid, to a proto-biface, to a handaxe (Potts 1991). On this basis, the categories employed in typologies must be acknowledged as being 'etic' (Ford 1952, 1954), based on arbitrary divisions imposed by archaeologists for the purposes of analysis (Hayden 1984).

The division of artefacts into categories may be a sustainable method when there are a sufficient number of recognisable tool forms to build into a typology, but not all industries contain distinctive retouched tools. Even for those industries which do have characteristic formal elements, they often make up only a tiny fraction of the overall assemblage which can impose serious constraints on classification (Wurz 2000). This, Wurz (2000) has argued, provides grounds for advocating a technological over a typological approach, particularly for core preparation-based industries where the focus is on creating standardised blanks of a predetermined shape and size with little need for retouch, such as the LSA Robberg and many MSA industries.

Clark (1968) devised a technological system of classification recognising five modes: Mode 1 consisted of flake and core or chopping-tool industries, Mode 2 of bifacial technology, Mode 3 of prepared core technology, Mode 4 of blade technology, and Mode 5 of microlithic technology. This technologically-based scheme provided a framework within which the many local variations of cultures and industries could be compared at a general level, without relying on the association of specific tool types with specific temporal periods; however, it is not without its flaws. Shea (2013) has pointed out that Clark's Modes obscure variation by grouping together morphologically similar tools made using significantly different methods. Its greatest limitation, though, is that classification is based on the most derived technological component in an assemblage, subscribing to a unidirectional, evolutionary representation of technological change. In his alternative model, Shea has defined nine categories (designated modes A to I), similarly designed to bypass the 'culture' concept and be globally applicable, but also intended to "simply describe variation in toolmaking strategies at a given point in time" (Shea 2013:178). In this respect, it has the potential to serve as a standardised descriptive tool which allows lithic assemblages to be characterised, free from premature cultural associations.

The need for less specialised and more widely applicable taxonomies has been addressed by Conard et al. (2004) who developed a "unified lithic core taxonomy", structured around different core reduction sequences. The new system was partly intended to deal with the terminological barriers which face the internationally diverse range of researchers working in South Africa, but it was also designed so that technological products of the ESA, MSA and LSA could be described using the same terminology, which is of particular importance for analysing mixed surface assemblages. The simplified main categories of inclined, parallel and platform cores represent a significant departure from more conventionally used and complicated systems, and this may be one reason why the scheme has not been put into practice more frequently. A further restriction is that in its current form, the taxonomy only includes cores which make up a small, albeit significant, proportion of a whole assemblage, meaning that it must be used in conjunction with other systems which apply to flake products.

Limitations of an iconic artefact approach: examples from the MSA

The issue of relying on identifiable chronological markers has become especially pertinent in the context of renewed interest in the Still Bay and Howiesons Poort MSA industries, recognised by their highly diagnostic type-fossils bifacial points and backed pieces. In a review conducted by Jacobs et al. (2008a), new OSL (optically stimulated luminescence) ages were taken for sites from across southern Africa containing Still Bay and Howiesons Poort deposits, motivated by a series of new excavations, the reanalysis of previously excavated lithic assemblages and advances in dating techniques for older deposits. Jacobs et al. (2008a:235) described layers containing bifacial points and backed pieces as "marker horizons", based on the presence of the iconic artefacts within a tightly constrained temporal bracket. From this, they interpreted the Still Bay and Howiesons Poort as two short, discrete units, separated by a period of several thousand years.

Although seemingly supported by the OSL dates, the problem of making the simple assumption that diagnostic type-fossils can be assigned to constricted time periods has been highlighted by conflicting dates generated for the extended MSA sequence at Diepkloof (Porraz *et al.* 2013b; Tribolo *et al.* 2013). In this instance, a full technological analysis revealed that the previous OSL dates which had identified a Still Bay industry – primarily based on the presence of bifacial points – at around 71 ka (Jacobs *et al.* 2008a), in fact, when reassessed alongside TL (thermoluminescence) dates, demonstrated a significantly earlier origin for the Still Bay with the persistence of bifacially worked pieces into the Howiesons Poort (Tribolo *et al.* 2013). Similarly, the simple equation of backed segments with the Howiesons Poort was shown to be more complicated when a longer, multi-phased Howiesons Poort was recognised in the Diepkloof sequence, some of which did not contain backed pieces (Porraz *et al.* 2013b).

The definition of iconic type-fossils becomes more complex with other, less clearly defined industries of the MSA, with many of the problems encountered in an icon-based approach exemplified in the case of unifacial points which are tentatively, although not uniquely, associated with the post-Howiesons Poort. Unifacial points, as identified in the South African MSA typology, are considered as a single tool class, including categories which would, under the Bordes (1961) typology employed by European Palaeolithic archaeologists, be distinguished as Mousterian points, convergent scrapers, *déjeté* scrapers, Tayac points and other retouched pointed forms (Villa & Lenoir 2006). As such, the tool forms included under the umbrella of 'unifacial point' encompass considerable variability which may overlook differences of technological, functional or chronological significance (Conard *et al.* 2012). Unifacial points have been identified as tending to occur in higher frequencies in the post-Howiesons Poort (Mackay 2009), but they are also reported from other points in the MSA sequence (Mackay 2012; Porraz *et al.* 2013b). There are no other unique identifying features of the post-Howiesons Poort which remains an informally defined industry showing considerable regional variability (cf. Lombard et al. 2012), its most notable feature being the absence of backed pieces which is problematic as a 'negative' definition. Recent efforts to separate out internal variation in unifacial point forms within post-Howiesons Poort assemblages may be one step towards observing the post-Howiesons Poort in positively-defined terms (Conard *et al.* 2012; see Chapter 7, Section 7.3.3).

Applications of alternative methods in surface studies

Whilst the advantages of an iconic artefact approach make it a robust and appropriate method to employ in some contexts, it is not the only approach that has been applied to surface artefact studies in South Africa. Sampson's (1985) Seacow (Zeekoe) Valley survey is one of the most comprehensive landscape studies to have been carried out in southern Africa, covering nearly 5000 km^2, and tackling the time period from the ESA to the LSA, as in the present study of the Olifants River Valley. The method Sampson used for assigning ages to sites involved correlating surface artefacts with excavated sites from a scheme developed for the Orange River Valley which formed an overlapping chronological sequence (Sampson 1972, 1974, 1985). This seriation approach was necessary because the Karoo geology does not support the formation of caves with the potential for deep archaeological sequences and so sites with shallow deposits were built into a relative stratigraphy, with radiocarbon dates available for some of the more recent periods (Sampson 1970). Sampson's approach was site-orientated, assigning assemblages at a site to an industry based on the presence of iconic formal tools, but he encountered difficulty with several excavated and surface sites which could not be integrated into the stratigraphic sequence owing to a lack of diagnostic formal tools. In these instances, he was "forced, very unwillingly" to assign relative ages based on basic flaking technology and patination, further suggesting that the thickness of the patination rind on hornfels could be developed into an absolute measure, although this suggestion remains undeveloped (Sampson 1985:9; cf. Pineda *et al.* 1997).

There are considerable overlaps between Sampson's approach, using recognisable iconic tools identified from the local excavated sequence, and the approach adopted in this thesis, and in many other surface studies. The occurrence of different types of iconic tools is useful in being able to indicate a human presence at a certain location across multiple temporal periods. Other methods have been developed to supplement this, attempting to demonstrate contemporaneity within and between assemblages. In their study of surface assemblages in the sand deflation hollows at Geelbek and Anyskop, Dietl et al. (2005) used the concept of the 'raw material unit' to identify lithic artefacts which can be said to derive from a single raw material nodule and thus be contemporary with each other. This technique uses both refitting and non-refitting pieces which display distinctively similar characteristics of colour, texture, inclusions and cortex which can be attributed to the same nodule of raw material (Conard & Adler 1997). The grouping of artefacts according to raw material unit is of analytical value when considering a palimpsest situation within a contained site area, as with a deflation hollow, but it would be more difficult in application to a continuous surface scatter of the sort addressed in the present study.

Another method devised for assessing the relative ages of surface artefacts is Hardaker's (2011) 'Edge Test'. This measures the degree of weathering to the edge of an artefact by calculating the loss of 'section mass', this being a measure of the surface area of the predicted unweathered edge. The test is founded on the assumption that in an arid environment where artefacts are subject to attrition from wind-blown sand, artefacts which have been exposed for a longer period of time will show a greater loss of section mass, allowing comparison of the relative ages of artefacts within a single assemblage. There are substantial restrictions to the circumstances in which this test can reasonably be applied; it is unsuitable for retouched edges, edges that have been subject to a high degree of use-wear prior to discard, or artefacts that have experienced fluvial rounding. It also requires consistency in the raw materials being compared since different materials will weather at different rates. The limitations of the test and its inaccuracies are acknowledged and it is still under refinement (Hardaker 2011), but its pitfalls highlight the challenges in aging surface artefacts and the need for novel methods to be developed.

2.3.3 The iconic artefact approach in this thesis

The approach adopted in this thesis uses the work of Parkington (1980), Mazel (1978; Mazel & Parkington 1981) and Manhire (1984) as a basis for the foundation principle of using iconic artefacts. This research compared formal tool frequencies across space and time in the Olifants River Valley and Sandveld regions, demonstrating that surface artefacts could be identified by tool type and meaningful comparisons could be made with excavated samples. It is acknowledged that some degree of chronological resolution is sacrificed in using surface assemblages, but the critical point is that there are distinct tool types which can be recognised in excavated assemblages and can be transferred to an open site context. In the present study, formal tools were identified as iconic artefacts, but diagnostic technological features were also regarded as iconic of certain time periods. Iconic tool types have application when treated as analytical units and must encompass some level of variability that allows for differences in raw material type, reduction intensity, regional style and idiosyncrasies of the tool-maker. The iconic tool types, their definitions and chronological associations are detailed in Chapter 4, Section 4.8.

The debate over how to construct and implement taxonomic systems is extensive and necessary, but it must be remembered that classification is simply a methodological tool and does not, in itself, offer explanations for variation and change in lithic technology (Parkington 1993; Conard *et al.* 2004; Lombard *et al.* 2012; Shea 2013). It is, however, essential that the terms that archaeologists use are clearly defined and standardised if we are to be able to carry out meaningful comparisons between assemblages and sites in looking at the bigger picture mechanisms that influence human behavioural change over time.

2.4 Conclusion

The approaches to landscape survey and lithic classification which are followed in this thesis have been formed on the basis of an extensive and critical evaluation of each field of study. Against this background, I have developed a method which is appropriate to the study area and the aims of the investigation, treating the landscape as a continuous space and recording a human presence at the level of individual artefacts. Through the identification of temporally diagnostic iconic artefacts, these can be linked to the dated sequence provided by excavated sites in order to situate the surface record in a relative chronological context. This chapter has also addressed the spatial and temporal concerns which arise in relation to the use of open site data. Overall, these concerns are deemed to have been adequately mitigated by the methods and approaches taken, and the interpretive limitations of the surface record have been taken into account throughout the rest of this thesis.

CHAPTER 3. BACKGROUND TO THE STUDY AREA

3.1 Introduction

This chapter presents the background to the study area, detailing its physical characteristics, climatic history, and previous archaeological research in the area. The Olifants River Valley is a well-resourced area in comparison to the Sandveld to the west and Karoo to the east, with a major perennial water source, productive fynbos vegetation and readily-available flakeable stone. Consequently, it has been inhabited since the ESA, with occupation throughout the Pleistocene and Holocene leaving a rich archaeological record which has been the subject of extensive investigations for the past six decades.

In this chapter, the study area is introduced and the resources which made the area attractive for human settlement are outlined. It is important to acknowledge that the availability of these resources would have fluctuated through time as a result of changing climate, therefore the climatic record from 1 Ma is summarised in order to provide a context for behavioural change. This can only be presented at the relatively coarse scale of the Winter Rainfall Zone for the Early and Middle Pleistocene since there is little evidence specific to the region, but the local record for the study area improves in the Late Pleistocene and Holocene. The following section of the chapter outlines the research history of the study area, using the excavated record to provide a background context and establish a chronological framework for the iconic artefacts identified in surface assemblages. The final section of the chapter defines the extent of the core study area and describes the six main survey areas, in advance of the methods set out in Chapter 4.

3.2 Geographical and physical characteristics of the study area

3.2.1 Location

The study area is located in the Olifants River Valley in the Western Cape of South Africa and centres on a core area surrounding Clanwilliam Dam (Map 1; Map 2). The Olifants is a large perennial river, joined by several tributaries on its eastern side, including the Rondegat and Jan Dissels Rivers. Rainfall runoff from the mountains and numerous springs feed a network of drainage channels incised into the Table Mountain Sandstone bedrock. In the study area, the Olifants is separated from the coastal Sandveld to the west by the Olifants River Mountains, and to the east the Cederberg Mountains, bordered by the Pakhuis Mountains to the north. East of the Cederberg is the Doring River Valley which marks a shift to a more arid zone, bordering the Karoo.

3.2.2 Hydrology

Rainfall occurs predominantly between May and September and precipitation varies because of the orographic effects of the mountains, resulting in three rainfall zones (Map 3). The highest current mean annual precipitation of 1500 mm falls in the Cederberg Mountains, with 550 mm in the Olifants River Mountains to the east, and 360 mm in the Olifants River Valley itself (Nakhwa 2005). The Olifants receives considerably higher annual rainfall than the 150 mm in the Sandveld and Doring River areas. Clanwilliam Dam exploits the natural floodplain of the Olifants to the south of Clanwilliam, constructed in 1932 with the Dam wall raised to its present height in 1966 (Morant 1984).

3.2.3 Geology

The Olifants River Valley lies within the Cape Fold Belt Mountains, formed of sedimentary Table Mountain Group quartzitic sandstones, Bokkeveld Group shales and siltstones and Witteberg Group quartzites and shales (Visser & Theron 1973; Visser 1989) (Map 4). The quartzite koppies and sandstone outcrops which flank the Dam have weathered along the bedding joints to create the many caves and rock shelters suitable for habitation and as painting sites. Along the east side of the Olifants, a ridge of Bokkeveld Group bedded shales and siltstones has been preserved, visible in the study area as the low, rounded shale hills at Augsburg.

The high iron content of the geology causes the bedrock to weather to a red colour, and iron-rich quartzite (ferricrete or ironstone) outcrops occur along the Kransvleikloof tributary which joins the Olifants at the northern end of Clanwilliam Dam. Small nodules of iron-rich ochreous rock are found across the study area, occurring as both globular haematite and bedded shale fragments. Ochre sourcing surveys identified a potential primary source of pigmentaceous shale in the upper beds of the Karooberg shale formation at Augsburg.

The predominantly quartzitic geology means that quartzite is a readily available raw material for tool-making in the study area. Lenses of conglomerate quartz pebbles and, less frequently, cryptocrystalline silicates (CCS) occur within the sandstone formations, providing a source of small flakeable stone nodules. A more abundant source of CCS pebbles occurs along the Doring River, which joins the Olifants 40 km north of the Dam, carrying Karroid rocks from the Dwyka tillites and Ecca shales and sandstones. Hornfels cobbles are also found in the Doring and in the Olifants north of the confluence, with a possible primary source of hornfels in the dolerite dyke which runs across the Bokkeveld shales on the eastern side of the Pakhuis Mountains. Silcrete is commonly found in the form of stone artefacts but its sources in the study area are not well known. Silicified river terraces occur near the Olifants estuary to the north (Roberts 2003), and one of the known outcrops along the river in the study area suggests that these terraces are present elsewhere along the river, though they may not be currently visible owing to the raised water level of Clanwilliam Dam.

3.2.4 Ecology

The study area is noted for its high level of plant endemism, falling within the Fynbos Vegetation Biome with Karroid plant communities occurring on the shales (Acocks 1953; Mucina & Rutherford 2006) (Map 5). Soils in the area are generally thin and nutrient-poor, composed of degraded sandstone, with plants tending to be arid-adapted as a consequence. Geophytic plants with underground storage organs such as bulbs, corms and tubers, are a significant component of the fynbos ecozone and played an important role in past diets and behaviour, with the possible management of fynbos by fire to promote re-growth (Deacon 1983, 1992a).

The plant communities show considerable localised variability based on soil structure, water availability, drainage, and altitude. On the mountain slopes, vertical zonation in vegetation sees tall proteoid shrubs on the foothills and low altitude ranges, which gives way to lower-standing ericoid and restioid vegetation at higher altitudes and on exposed ridges (Taylor 1996). Manhire (1984) and Asmus (2003) note that in rock art surveys of the Olifants River Mountains and the Cederberg, rock art was generally only found within the lower altitude range – Asmus gives 450 m as the maximum altitude in his observations – within the limits of the proteoid zone. Isolated trees are also found in the proteoid zone, forming closed scrub forest in rocky kloofs where there is protection from fire (Mucina & Rutherford 2006). Woodland vegetation would have been more widespread than present under certain climatic conditions. The Clanwilliam cedar tree (*Widdringtonia cederbergensis*) was common east of the Olifants until historical times and charcoal from Elands Bay Cave in the Sandveld to the east indicates that afromontane woodland was present from around 40 ka until 20 ka (Cowling *et al.* 1999; Parkington *et al.* 2000). Riverine forest currently occurs along the narrow rocky river valleys of the Olifants tributaries, such as the Jan Dissels at Warmhoek (Milton 1978), and it is likely that the thick floodplain vegetation of restioids and riparian grasses seen on the Olifants floodplain towards Citrusdal would also have covered the floodplain at Clanwilliam Dam at various times in the past.

3.3 Climate and environment

The time-span under consideration has seen considerable climatic change, affecting past environments and, consequently, whether regions were suitable for human settlement, as well as affecting local landscape use. Populations would have been particularly susceptible to fluctuations in rainfall, with both the amount of rain and its seasonality determining water availability, with an effect on the productivity of vegetation and the type and size of animal communities that it can support (Jochim

1976). Temperature also impacts on resource availability, with a higher effective temperature improving bioproductivity (Binford 1980; Kelly 1995), and low sea surface temperatures increasing marine productivity (Kirst *et al.* 1999).

3.3.1 Mechanisms of climatic variation

At a global scale, climatic variation has been characterised by the alternation between cold 'glacial' and warm 'interglacial' periods, with changes in the volume of polar ice dictating sea levels, temperature and rainfall. During glacial periods, sea levels were lowered as water became locked up in polar ice-caps, temperatures were lower and rainfall levels decreased, creating pronounced aridity at low latitudes. Interglacials were periods of warming, with melting ice causing sea levels to rise, with general trends towards increased humidity and precipitation (Shackleton & Opdyke 1973).

Global temperature, and the growth or reduction of polar ice, is affected by the amount of solar radiation, or insolation, received by the earth. This is influenced by three forces relating to the earth's orbit: eccentricity, obliquity and precession (Imbrie & Imbrie 1980). The eccentricity of the earth's orbit determines variation in the distance between the earth and the sun, with a periodicity of around 100,000 years. Obliquity, or the axial tilt of the earth in its orbit, shifts over a 41,000 year cycle and impacts on the degree of seasonality, with the greatest effects experienced at higher latitudes. Lower latitudes are affected most by precession, caused by the wobble of the earth as it spins on its axis, varying over a 19,000 to 23,000 year period. Precessional changes cause either the northern or southern hemisphere to be closer to the sun during the summer, altering the timing of the equinoxes and solstices and affecting seasonal variability (Imbrie & Imbrie 1980). When the eccentricity of the earth's orbit is increased, this amplifies the effect of precession, causing greater variation in insolation.

As a mid-latitude region, southern Africa is strongly affected by changes in precipitation, in addition to temperature, during fluctuations between glacial and interglacial phases (Deacon & Lancaster 1988). The situation of South Africa and the Western Cape in particular, where the cold waters of the Atlantic meet the warm Indian Ocean, creates a highly seasonal climate due to the mixing of these oceanic currents. The westerlies are the major wind system which derive from the oceanic convergence and define the seasonal boundary between the winter and summer rainfall zones. The study area lies within the Winter Rainfall Zone which currently affects the southern and western edges of South Africa, experiencing over two-thirds of its annual precipitation during the winter months of April to September (Chase & Meadows 2007). In the past, the spatial extent of the Winter Rainfall Zone is thought to have varied under the effect of changing glacial and interglacial conditions. During glacial periods, the westerlies would have been displaced northwards towards the equator, leading to increased humidity and a greater proportion of winter rainfall (Shi *et al.* 2001; Stuut *et al.* 2002; Stuut *et al.* 2004). Coupled with this, wind strength is thought to have increased during colder periods (Shi *et al.* 2001; Stuut *et al.* 2002; Chase & Thomas 2006, 2007). The pattern would have been reversed under interglacial conditions, with the westerlies migrating southwards, decreasing the extent of the Winter Rainfall Zone (Chase & Meadows 2007).

The following review of climates of the past 1 million years will be largely be restricted to sites and proxies relevant to the Winter Rainfall Zone and, where possible, the west coast and Cederberg region in particular. Evidence for Early and Middle Pleistocene climates specific to South Africa is sparse, but marine and terrestrial evidence improves from the last glacial cycle onwards. Temperature data for the Southern Hemisphere derives from the Antarctic EPICA Dome C ice core, extending 800 ka, (EPICA 2004; Jouzel *et al.* 2007) and the Vostok ice core, up to 420 ka (Petit *et al.* 1999). Marine sediment cores from the Atlantic coast, west of Namibia, provide proxy evidence for precipitation and wind intensity based on pollen (Shi *et al.* 2001) and sediment deposition (Stuut *et al.* 2002; Stuut *et al.* 2004) covering the past 135 ka and 300 ka respectively. Finer-grained inferences about regional palaeoenvironments are possible for later time periods, based on botanical evidence dating from MIS 4 at Klein Kliphuis (Bowdery 2009; Mackay 2009), MIS 3 at Elands Bay Cave (Cowling *et al.* 1999; Parkington *et al.* 2000) and from MIS 2 throughout the Holocene in the Cederberg (Meadows & Sugden 1991, 1993; Scott & Woodborne 2007a, b).

3.3.2 Climates and environments of the past 1 million years

Early and Middle Pleistocene climate

Global climates experienced an extreme shift in the periodicity of glacial-interglacial cycles at about 1 Ma to 900 ka, termed the Mid-Pleistocene Revolution, when global ice volume increased and the duration of a climatic cycle changed from 41,000 years to 100,000 years long (EPICA 2004). Within each cycle, glacial conditions lasted for about 90,000 years, followed by a shorter interglacial period of about 10,000 years (deMenocal 2004) (Figure 3.1).

Climatic conditions prior to 1 Ma have been associated with the restricted settlement of early hominins, prevented from expanding into the southern and western parts of South Africa by a drier climate (Klein 2000b); however, it remains problematic that there are few well-dated sites with climatic proxy indicators in the Winter Rainfall Zone from this period. The high sea levels experienced before 1 Ma offer a likely reason for the apparent absence of hominin occupation of the southern and western coastal plains, only exposed in a punctuated series of low sea levels, leading up to the first major low sea-stand during the MIS 16 glacial, 651 to 621 ka (Klein *et al.* 2007; Compton 2011).

MIS	Start age (ka)	Glacial / interglacial
1	11	Interglacial
2	24	Glacial
3	57	Interglacial
4	71	Glacial
5a	85	Interstadial
5b	95	Stadial
5c	105	Interstadial
5d	118	Stadial
5e	127	Interglacial
6	186	Glacial
7	242	Interglacial
8	301	Glacial
9	334	Interglacial
10	364	Glacial
11	427	Interglacial
12	478	Glacial
13	528	Interglacial
14	568	Glacial
15	621	Interglacial
16	659	Glacial
17	712	Interglacial
18	760	Glacial
19	787	Interglacial
20	810	Glacial
21	865	Interglacial
22	1 030	Glacial

Figure 3.1 Ages for Marine Isotope Stages (MIS) derived from low-latitude marine oxygen isotope stack (after Bassinot et al. 1994). Note that there is some variability in dates cited in different sources for MIS stages from different ocean cores and calibrations.

Another major shift in the global climatic regime occurred at around 427 ka, at the boundary between MIS 12 and MIS 11, seeing a further increase both in ice volume and in the duration and amplitude of fluctuations between cold, dry glacial and warm, wet interglacial conditions (EPICA 2004). MIS 11 was an exceptionally long and warm interglacial period, representing a particularly dramatic change after the cold trough at the end of MIS 12 (EPICA 2004; Roberts *et al.* 2012). The prolonged high sea-stand of MIS 11 would have made the coastal plains inaccessible during this period and may in part be responsible for the absence of earlier deposits from coastal caves particularly along the southern coast, also affected later by the high sea level of MIS 5e (Fisher *et al.* 2010; Compton 2011; Roberts *et al.* 2012; cf. Pickering *et al.* 2013).

The MIS10 glacial at 365 ka was followed by the interglacial MIS 9 at 334 ka. Antarctic ice cores indicate that MIS 9 was similar to MIS 5e, with a warm period of around 4000 years followed immediately by a rapid drop in temperature, with cooling then becoming more gradual (Petit et al. 1999). Evidence from Duinefontein which corresponds to MIS 9 supports a more humid climate, with the water-table 2 m higher than present, forming a wetland environment with diverse vegetation and fauna (Butzer 2004).

The glacial period covered by MIS 8, 301 to 242 ka, is poorly resolved climatically but represents a critical time for the emergence of archaic human morphology, such as the *Homo helmei* specimen from Florisbad (Grun *et al.* 1996; Foley & Lahr 1997), with anatomically modern humans identified from about 200 ka (McDougall *et al.* 2005). This period also saw significant changes in technology with the cessation of handaxe production and the initiation of a range of so-called 'modern' behaviours that mark the transition from the ESA to the MSA (McBrearty & Brooks 2000).

The interglacial MIS 7, 242 to 186 ka, was a warm period with a relatively high sea level, although temperatures were slightly cooler than present (Jouzel *et al.* 2007). The MIS 6 glacial shift from 186 ka marked the onset of one of the longest and coldest glacials, seeing an increase in rainfall and the expansion of the Winter Rainfall Zone with the northward migration of the westerlies (Chase & Meadows 2007). Pollen from sea cores indicate a cool and moist period (Shi *et al.* 2001), and sedimentary evidence supports a more humid climate on the west coast (Stuut *et al.* 2002; Stuut *et al.* 2004). This period coincides with early occupation of caves along the southern Cape coast, with evidence for shellfish consumption at Pinnacle Point from 162 ka[1], indicating that humans were exploiting the marine environment from at least MIS 6 (Marean *et al.* 2007; Marean 2010). The upwelling of cold, nutrient-rich water to the surface of the sea during glacial times would have enhanced marine productivity, with the spatial extent of upwelling at its greatest during MIS 6 and MIS 2 (Kirst *et al.* 1999). On the west coast, lithics from Elands Bay Cave are thought to derive from MIS 6, showing that coastal cave occupation was not just restricted to the southern coast (Volman 1981).

Late Pleistocene climate

The last glacial cycle commenced around 127 ka with MIS 5, divided into a series of alternating cold stadial (MIS 5d and 5b) and warm interstadial (MIS 5c and 5a) periods each of about 10,000 years

[1] The original date given for this layer at Pinnacle Point Cave 13B was ~164 ka (±12 ka) (Marean *et al.* 2007), and although this date is widely cited, it has subsequently been revised to 162 ka (±5 ka) (Jacobs 2010; Marean 2010).

(Lambeck *et al.* 2002). Pollen records from the west coast do not reflect significant changes in vegetation with these fluctuations, rather showing a gradual increase in dry-adapted plants, consistent with the generally warm and arid conditions of an interglacial (Shi *et al.* 2001). Deglaciation at the end of MIS 6 caused sea levels to rise rapidly, reaching their peak in MIS 5e at approximately 5 m higher than present (van Andel 1989; Waelbroeck *et al.* 2002). From this time there is increased evidence for cave use and shell midden deposition at sites such as Ysterfontein (Klein *et al.* 2004; Avery *et al.* 2008; Wurz 2012), Sea Harvest and Hoedjiespunt (Volman 1978; Butzer 2004) on the west coast, and Klasies River (Deacon, H.J. 1989, 1995; Wurz 2000), Die Kelders (Feathers & Bush 2000; Marean *et al.* 2000), Nelson Bay Cave (Volman 1981) and Pinnacle Point (Marean *et al.* 2007; Marean 2010) on the south coast, although the caveat remains that earlier deposits may have been washed out (Hendey & Volman 1986; cf. Pickering *et al.* 2013).

During the MIS 5a interstadial, from around 85 ka, temperatures began to decline towards full glacial conditions of MIS 4 which lasted from 71 to 57 ka, marking a significant shift in palaeoenvironments of the west coast region (Petit *et al.* 1999; Chase & Meadows 2007; Jouzel *et al.* 2007). Sea levels were reduced, exposing the coastal plains along the south and west coasts, along with a considerable drop in sea surface temperature (Kirst *et al.* 1999). Humid and windy conditions associated with greater rainfall caused high levels of sediment deposition both offshore and increased activity in the coastal dunefields (Shi *et al.* 2001; Stuut *et al.* 2002; Chase & Thomas 2006, 2007).

Phytolith evidence from Klein Kliphuis provides a local record for the Olifants River Valley (Bowdery 2009; Mackay 2009). Within the MSA sequence spanning approximately 66 to 33 ka (Mackay 2011a), the period 65 to 62 ka was the wettest, characterised by a mixture of shrubs, trees and grasses taken to indicate water was available close to the site. This was followed by a dry period with a decrease in phytoliths of all types from 62 to 60 ka. At 60 to 58 ka, at the beginning of MIS 3, moisture levels increased and grass phytoliths indicate a marked expansion in grassland and a reduction in shrubs. Subsequent conditions were generally drier, with an increase in shrubs and trees and fewer grasses.

From 60 to 57 ka, Antarctic ice cores indicate global temperature increase followed by a cooling trend which eventually culminated in the Last Glacial Maximum (Petit *et al.* 1999; Jouzel *et al.* 2007), although temperatures show considerable variability within this period. Sea surface temperatures reached their minimum in the period 50 to 35 ka, with the upwelling of nutrient-enriched water reaching its maximum intensity (Kirst *et al.* 1999). Rainfall would have been relatively high for most of MIS 3, the period 60 to 40 ka being particularly moist, although conditions are suggested to have been drier than those of MIS 4 (Stuut *et al.* 2002). Charcoal from Elands Bay Cave indicates an afromontane forest environment under wet conditions from before 40 ka, up to 20 ka, with a range of species which require a prolonged rainfall period throughout the year indicating a reduction in seasonality (Cowling *et al.*

1999; Parkington *et al.* 2000). Temperatures became cooler from 40 to 20 ka, although rainfall levels were not significantly reduced (Chase & Meadows 2007).

MIS 2, from 24 to 11 ka, saw the onset of the Last Glacial Maximum, reaching its coldest at about 20 to 18 ka when temperatures were 5^{o}C lower than present and conditions markedly drier (Deacon & Lancaster 1988). The transition to glacial conditions was rapid, with sea level lowered by 30 to 40 m within 1000 to 2000 years (Lambeck *et al.* 2002). The pollen from hyrax midden sequences from the Pakhuis Pass on the northern fringe of the Cederberg offers a detailed record of the effect of fluctuating temperature and moisture on vegetation communities during MIS 2 and MIS 1 (Scott & Woodborne 2007a, b). From 22 ka, conditions were cold and dry with asteraceous and fynbos species prevailing. A brief rise in temperature and humidity followed at around 20 ka, with a subsequent period of cooling and drying accompanied by an increase in grass species. The effect of global ice melting and sea level rise from 19 to 16 ka caused increased rainfall, when warmer conditions from 16 ka allowed the growth of woody scrub vegetation and a relative decline in fynbos (Lambeck *et al.* 2002; Scott & Woodborne 2007a, b). This shift is the most dramatic change in vegetation seen in the Pakhuis record, but interestingly, a comparable transition is not observed in the wetland core pollen records from the high-altitude central Cederberg (Meadows & Sugden 1991, 1993). In contrast to the northern Cederberg record, the evidence from central Cederberg samples suggest that there was general stability in climate and environmental composition over the past 14,000 years, the most notable shift being the long-term decline of the Clanwilliam cedar tree *Widdringtonia cederbergensis* (Meadows & Sugden 1991, 1993; Meadows *et al.* 2010; Quick *et al.* 2011). This may be due to a more stable rainfall regime at the higher elevations of the central Cederberg, whereas the Pakhuis Pass is subject to the rain shadow effect of the mountains and may have experienced some periods of increased summer rainfall (Cowling *et al.* 1999; Scott & Woodborne 2007a, b).

Holocene climate

The Holocene is unique for being the longest and most stable interglacial of the past 420,000 years (Petit *et al.* 1999). The early Holocene, from 12 to 10 ka, experienced high moisture levels in the Cederberg until around 9 ka, when vegetation shifted towards succulent and scrub plants indicating increased aridity (Scott & Woodborne 2007a, b). The charcoal record from Elands Bay Cave on the coast indicates mesic vegetation and proteoid fynbos between 13.6 to 8 ka, which then is replaced by asteraceous shrubs and dry-adapted thicket by 4200 BP (Cowling *et al.* 1999; Parkington *et al.* 2000). Temperature and aridity reached their peak during the Holocene Altithermal, 8000 to 4000 BP, with sea level at its maximum around 7500 to 6500 BP when it was around 3 m higher than present (Compton 2001; Scott & Woodborne 2007a, b). The Pakhuis area experienced a series of fluctuations in moisture levels, moving towards asteraceous vegetation until cooler conditions between 5000 to 2000 BP prevailed with an increase in succulent plants. This was followed by a trend towards wetter conditions, with higher levels of grass pollen after 2000 BP and an increase in asteraceous and fynbos plants over the past 1000 years (Scott & Woodborne 2007a, b).

3.3.3 Climate and environment in context

The climatic record from global and regional proxies provides an essential background context for considering change at a macro-level, indicating the alternation between glacial periods when conditions were cold and wet in the Winter Rainfall Zone, and interglacials which were comparatively warm and dry. At a micro-level, however, the evidence for environmental change in the study area is restricted, both in its relevance at the local scale and in its temporal resolution. This situation will improve as the faunal and botanical record from additional excavated sites expands (e.g. Bowdery 2009; Mackay 2009), together with the reconstruction of past vegetation communities based on pollen from hyrax middens which is being extended to cover earlier periods (e.g. Scott & Woodborne 2007a, b; Meadows *et al.* 2010; Quick *et al.* 2011).

Certain factors will have distinguished the Olifants River Valley from its neighbouring regions throughout time, regardless of temporal fluctuations in climate and environment. At a regional scale, differences in temperature and precipitation between different areas are primarily determined by latitude and altitude – two factors which are not subject to change through time (Mitchell 1990). On this basis, and combined with the orographic effects of the Olifants River Mountains and Cederberg which flank the river, the Olifants is acknowledged as an area of higher precipitation than the Sandveld and Karoo in the past, which implies that it would be a more favourable area for human settlement under comparatively arid conditions. The Olifants River itself is a major perennial river today, in contrast to the minor water courses of the Sandveld to the west and seasonally variable Doring to the east. The relative levels of drainage can reasonably be expected to have retained this difference throughout the past, although overall water availability was affected by oscillating glacial and interglacial cycles.

Similarly, the geological contrasts between the Table Mountain Sandstone and shale-dominated landscapes to the east of the study area will have existed throughout the past (Map 4), providing the same range of raw materials – although this does not take into account the visibility and accessibility of particular sources. The underlying geology also affects the nature of the area's soil, which in turn determines the vegetation communities which can be supported (Acocks 1953; Cowling 1983; Mucina & Rutherford 2006). The study area sits on what is currently the boundary between fynbos and succulent karoo vegetation types (Map 5). The presence of coarse-grained, nutrient-poor sands formed from the Table Mountain Sandstone bedrock is a major factor in determining the distribution of fynbos vegetation, which also has a strong resilience to variation in annual rainfall (Cowling 1983). In contrast to the general stability shown by fynbos, non-fynbos vegetation communities would not have been limited to Table Mountain Sandstone-derived soils, and thus subject to greater variability in their distribution (Quick *et al.* 2011). The specific composition of different plant communities will have fluctuated alongside temperature and precipitation (as discussed in the previous section); however, the stability of the geological and topographic setting will mean that the study area did not experience change at an extreme level.

Overall, the greatest impact that environmental change would have had on populations occupying the area would have been related to resource productivity. Given the general paucity of direct evidence for this at a localised scale, this investigation uses the stone tool record as a proxy for behavioural adaptations to the abundance, predictability and distribution of subsistence resources in the study area through time. Not only will this study examine the distribution of stone tools on the landscape, it will also address the particular technological strategies which were adopted in response to variation in resource pressures (discussed in Chapter 8). Whilst climatic change will not be treated as a dominant theme in this thesis, human behavioural responses throughout the ESA, MSA and LSA will, however, be interpreted in relation to environmental conditions where there is relevant and sufficient supporting evidence from the archaeological record to do so.

3.4 Archaeological research in the study area

There is a well-established background of archaeological research in the study area, originating with interest in the rock art for which the area is now so famous, and later developing into an extensive spatial study of regional settlement patterns across the Olifants, Sandveld and Karoo zones (see Map 1). The systematic recording of rock art in the Cederberg area began in the 1940s with surveys carried out by Johnson, Rabinowitz, Sieff and others (Johnson & Rabinowitz 1955; Johnson *et al.* 1959). These surveys were largely exploratory in their aims, covering large areas of land in great detail, and the application of the data to quantitative studies was only later taken up in the 1960s, with an investigation into the distribution of handprints published by Maggs (1967a, b). During the course of rock art surveys in the late 1960s and 1970s, cave and rock shelter sites which had the potential for excavation were sought by Parkington and a team from UCT, with excavation commencing in 1968 at the site of De Hangen, a cave on the eastern side of the Pakhuis Mountains, east of the Olifants River (Parkington & Poggenpoel 1971).

This was the first in a series of LSA 'bedding and ash' sites to be excavated, so called because of the typical arrangement of grass bedding around a central hearth. In addition to bedding material, large amounts of plant waste from geophytes such as Iridaceae suggested that these were a major food source

(Parkington 2001b). The fauna was of also particular interest, with strong seasonality indicated in the exploitation of dassies (rock hyrax) and tortoises, suggesting a late spring to late summer occupation period. The presence of marine shell some 60 km inland prompted the investigation of cave sites on the west coast, including Elands Bay where, again, a strongly seasonal pattern emerged in the fauna which included seals and black mussels, in this case indicating a winter occupation period (Parkington 1976, 1980, 1981). This 'seasonal mobility hypothesis' was tested at a number of coastal and inland caves, including Andriesgrond (Mazel 1977, 1978; Parkington 1978; Anderson 1991) and Renbaan (Kaplan 1987) in the study area, and Klipfonteinrand 1 (Thackeray 1977; Volman 1981) and Klipfonteinrand 2 (Nackerdien 1989) to the east of the Pakhuis Mountains on the Karoo fringes (site locations given in Map 1). Parkington's interpretation was contested by Sealy and van der Merwe (1985, 1986, 1988) who, based on stable carbon isotope ratios present in human bones from LSA burials, argued for the generally static occupation of the coast or mountains by separate hunter-gatherer populations. The relatively high ^{13}C isotope ratio present in individuals buried at the coast indicated a predominantly marine resource-based diet for much of their lives; the high ^{12}C isotope levels from inland burials reflected a diet of terrestrial resources. Although the debate continues and opinion remains divided, the seasonal mobility model remains the most compelling framework for approaching the Holocene archaeological record of the Western Cape (Parkington 1991, 2001b; cf. Sealy & van der Merwe 1992).

This work became incorporated into a wider research programme in the 1970s and 1980s carried out by the Spatial Archaeology Research Unit (SARU) at UCT, combining rock art surveys, surface artefact surveys, and excavations in a large-scale spatial study investigating settlement patterns in the LSA. The lithic record from the excavated sites supported the exploitation of different resource sets in coastal and inland zones, with high frequencies of adzes in the inland Olifants River Valley sites taken as proxy evidence for a greater reliance on plant foods, with adzes being used for the production of digging sticks used to obtain underground tubers and corms (Parkington 1980; Mazel & Parkington 1981). In the coastal zone, the presence of adzes was far less pronounced, instead with a relative increase in backed segments and bladelets seen in Sandveld deflation hollow sites (Manhire 1984). The pattern observed in the excavated data was supported by surface artefact counts from sites across the Olifants River Valley (Mazel 1978; Mazel & Parkington 1981) and the Sandveld, which also looked for finer-grained patterning between different landscape settings such as sand deflation hollows, talus slopes and open koppies (Manhire 1984).

Under SARU, rock art research was approached from a distributional perspective, using the spatial data to compare frequencies of motifs, such as decorated handprints, group scenes, conflict scenes and domesticated animals, between the coastal and mountain zones, interpreting these patterns in the context of social responses to hunter-gatherer and herder contact within the past 2000 years (van Rijssen 1980; Manhire 1981, 1998; Manhire *et al.* 1983; Manhire *et al.* 1985; Manhire *et al.* 1986).

The MSA was not a primary research interest in much of this earlier work. Howiesons Poort and post-Howiesons Poort layers underlying the LSA were identified at Diepkloof in the Sandveld (Parkington & Poggenpoel 1987), and at Klein Kliphuis in the study area (van Rijssen 1992). Klipfonteinrand 1 yielded stratified early MSA layers, classified by Volman (1981) as MSA 2b, in addition to several Howiesons Poort backed pieces, and early MSA layers were also present at Elands Bay Cave on the west coast (Volman 1981). MSA material was found within the LSA deposits at many of the bedding and ash sites, with the reuse of large MSA flakes for adzes in the LSA (Mazel 1977; Kaplan 1987), even extracting MSA pieces directly from earlier deposits at Diepkloof (Parkington & Poggenpoel 1987).

Hollow Rock Shelter (Evans 1993, 1994) is the only shelter site in the area with Still Bay deposits containing a large sample of bifacial points, underlain by pre-Still Bay layers. Recent re-excavation of the site has produced more secure dates for the deposits (Högberg & Larsson 2011). Renewed excavations at Klein Kliphuis (Mackay 2009, 2010, 2011a) and Klipfonteinrand 1 (Mackay 2012) have aimed to readdress the MSA in the region, obtaining new dates and increasing the artefact samples. Mackay's comparison between MSA sites across the Doring, Olifants and Sandveld zones has approached behavioural responses to different environments from an ecological and technological stance in a similar line of investigation to that of Parkington's LSA study covering the same areas.

The UCT Field School has been active in the study area, conducting surveys between 2000 and 2008, with numerous investigations carried out as UCT undergraduate and postgraduate research projects. The area Warmhoek has received particular attention, with detailed rock art surveys by Asmus and Meister (Asmus 2003), mapping of surface artefacts by Conder (2002) and Schutz (2002), and a surface artefact collection from the site Procession Shelter (WH5) by a Field School[2]. Surface artefacts were mapped by Munn (2005) at the LSA shelter complex on the eastern edge of Clanwilliam Dam (DAME8) and Archer (2005) examined an ESA artefact scatter on the western Dam edge at Driehoek (DAM12)[3].

[2] Artefacts thought to be the collected sample were identified in the UCT storerooms and part of the GPS point data were found, but unfortunately not enough information was available to link the artefacts with their find locations and therefore they could not be incorporated into this study.

[3] Data from surface artefact studies by Conder, Munn and Archer were added to the data set for this thesis, detailed in Chapter 4.

In addition to research-driven surveys, Archaeological Impact Assessments carried out by UCT's Archaeological Contracts Office and other contract units have covered large portions of the landscape. This has been of particular value in surveying the edges of Clanwilliam Dam in advance of the proposed raising of the Dam wall which will cause considerable flooding to low-lying areas above the current high water mark (Orton & Hart 2005).

All of the previous survey research has been integrated into a digital archive by Wiltshire (2005, 2011). This archive captured all of the site records, photographs and GPS point locations into a single database, with spatial information allowing sites to be plotted on a GIS platform. One of the problems arising from such a dense and diverse accumulation of study in the area is that the data was not recorded in a standardised format, which makes it difficult utilise and compare between studies. Research was carried out with different aims and, since rock art was the main focus of many of the surveys, this created bias towards coverage of areas most likely to yield painted sites. In addition, artefacts at these sites were often given only a casual mention, if they were acknowledged at all, leaving site records in variable states of completeness. A further problem is that the spatial data that is a prerequisite of GIS studies was not always available for sites recorded prior to the widespread use of GPS, as was the case for much of the early survey work when sites were plotted manually on maps which is of limited precision and accuracy, particularly in areas of high topographic complexity.

Wiltshire's database has attempted to manage the heterogeneity of previous records by storing all the available data in a standardised recording form, with separate forms for each recording episode. The information contained within the database has provided an essential backbone for this study which has in turn been able to rectify inaccurate site locations and add detail to incomplete records, as well as offering a new layer of artefact-level data.

3.5 Defining the study area

The core study area for this thesis is centred on Clanwilliam Dam, from the Dam wall at the north of the Dam, to the confluence of the Rondegat and Olifants to the south (Map 2). Further exploratory surveys along the Olifants continued north to the Olifants Doring confluence, and south of Citrusdal to Tienrivieren (Map 1). The western extent of the core study area is the Puts valley off the Kransvleikloof River, and the eastern extent is Dwarsrivier, on the Jan Dissels east of Warmhoek. Surveys focused on detailed coverage of six main areas: Clanwilliam Dam (Maps 7.1 to 13.2), Andriesgrond and Malgashoek (Maps 14.1 to 15.2), Driehoek (Maps 16.1 to 18.2), Puts (Maps 19.1 and 19.2), Warmhoek (Maps 20.1 to 20.4), and Augsburg (Maps 21.1 and 21.2).

3.5.1 Clanwilliam Dam

The current floodplain of Clanwilliam Dam covers a section of the river between Ramskop in the north and Rondegat in the south. The maximum extent of the floodplain was surveyed in May when the water level in the Dam was 13%, prior to the rainy season. Along most of its length, the Dam edge consists of gently sloping sandy beach with bedrock exposures, patches of rounded river cobbles and heuweltjies (fossilised termitaria). The effect of the seasonal rising and lowering of the water level has uncovered artefacts, predominantly from the ESA and MSA, although LSA sites are found where there are rock shelters which occur as rocky site complexes at Dam East (sites DAME5 to 10), further south on the eastern bank (DAME25 and 26) and on the western bank at Nooitgedacht (DAM19 to 21).

Previous surveys have recorded some 20 sites on the eastern side and 21 sites on the western side of the Dam, below or on the high water mark, most of these marking clusters of artefacts which gives an impression of discrete sites along the Dam edge. The method of plotting individual artefacts implemented in this study enabled a more continuous picture of where artefacts occurred in high or low densities which is particularly relevant for addressing questions about why artefact accumulations occur at certain points along the river – in terms of taphonomic and behavioural factors.

Also included in the Dam area was Ramskop, a prominent koppie raised over 100 m above the Olifants River on its eastern side, topped with an isolated rocky outcrop formed of clustered boulders. MSA material was reported in the site record, and its setting offered the opportunity to investigate another highly visible koppie locality similar to the Andriesgrond koppie (see Section 3.5.2 below). There is a broad view over the Olifants and surrounding areas, particularly Malgashoek and Andriesgrond on the opposite bank. The closest water source is the Olifants River, accessed down a steep slope.

3.5.2 Andriesgrond and Malgashoek

The cave at Andriesgrond[4], excavated in 1977 and 1978 by Parkington and colleagues, is a bedding and ash site with an LSA sequence that extends to at least 14 ka, with further basal MSA material. The cave itself is situated at the base of a prominent koppie overlooking the river and is a visible landmark from much of the surrounding landscape. An additional four rock art sites and artefact scatters had been recorded on the koppie, making it of interest to this study for its potential for integrating the excavated and surface artefact data. The landscape around the koppie is mostly featureless with low scrub

[4] The area has subsequently been renamed Bokwater.

vegetation, and its nearest water source besides the Olifants is a seasonal gully around 800 m from the main cave site.

The area Malgashoek[5] continues to the north of Andriesgrond and consists of a number of tiered, raised rocky platforms with high potential for rock shelters at their base. A surface artefact collection from the main cave site (MG5) was included in Mazel and Parkington’s (1981) surface samples, and at least seven rock art sites had been recorded in the area. Water would be available seasonally in the gullies which run between the rocky platforms, as well as collecting in water catchment basins on the eroded rock surface.

3.5.3 Driehoek, Kransvleikloof and Renbaan

This area covered a 5 km stretch on the west side of the Olifants, up to 3 km away from the river, mostly falling on the farm Driehoek. The Kransvleikloof River flows seasonally into the Olifants and has a marshy floodplain below the steep cliff-line of Driehoek. A bedding fault runs along the rock band 100 m above the river, creating a series of eight shelters with rock art which constitute the Kransvleikloof sites. The rocky platform above this ridge forms a gently sloping koppie which overlooks the Olifants, with two main courtyard areas (KVK1 and KVK2) containing concentrations of artefacts.

Renbaan Cave (Renbaan 2) is a tunnel-like bedding and ash site excavated by Parkington in 1979, situated high up on a cliff that drops steeply to a kloof below, leaving only a limited talus scatter (Kaplan 1987). An additional shelter site (Renbaan 1) overlooks the Kransvleikloof River from high up on the cliff, south of the Kransvleikloof sites. Sloping rocky platforms to the east form the focus for artefacts scattered across their surface, offering a wide view of the Olifants, with water catchment basins and low shelters (Renbaan 3) at the base along a seasonal gully.

Driehoek possesses a series of high, steep cliff features set several kilometres back from the river. These represent a distinctly different type of landscape feature which is highly visible from other points along the Olifants. The ridge along the top of these cliffs offers a commanding view over the Olifants and Kransvleikloof but is an inaccessible area with no substantial shelter features where it was not expected that artefacts would be found; however, a thin presence of artefacts was recorded across the rocky platforms on the plateau top. Ten rock art and artefact scatter sites have previously been recorded in the Driehoek cliff area but not all could be relocated in surveys for this study.

[5] The area has subsequently been renamed Bakserug.

3.5.4 Puts

Puts is situated 6 km away from the main Olifants River course, in a narrow valley with a seasonal river which feeds the Kransvleikloof tributary of the Olifants. The area is a rocky complex of sites arranged along several sub-parallel gullies, with shelters along the gully edges and raised rocky platforms sloping towards the valley base. Eight rock art sites have been recorded in the area, all concentrated in the north-western end of the valley although the rocky exposures extend to the south east. The valley runs along the intersection between geological strata which contain a conglomerate with larger nodules of CCS than those noted elsewhere in the study area, creating a distinct raw material profile.

3.5.5 Warmhoek

Warmhoek is on the Jan Dissels River, a perennial tributary of the Olifants on its western side. The area has been investigated extensively by UCT Field Schools owing to its numerous artefact scatter and rock art sites, with 19 sites recorded on rocky outcrops across the koppies and in the rock band along the river. It falls at an intersection between succulent karoo and fynbos vegetation, with dense riparian vegetation in the Jan Dissels channel. Only the area on the south side of the Jan Dissels was covered in detail in these surveys.

3.5.6 Augsburg

The Augsburg floodplain is around 3 km to the north east of the Olifants, bounded by the Jan Dissels River and the low shale Karooberg koppie, forming a flat vegetated area with a strip of wetland along its northern edge. The area is highly disturbed by agricultural activity, particularly along the stream. Handaxes were reported to have been found in the fields (J. Parkington pers. comm. 2011), offering the potential for comparison with the ESA sites on the floodplain of the Olifants. The shale formation does not form rock shelters, the closest shelter-bearing rock outcrops being over 3 km away. The shale itself was investigated as a primary source of pigmentaceous ochre.

3.5.7 Supplementary survey areas

Additional small-scale surveys were carried out to cover landscape settings that were not otherwise common in the core study area, such as deflation hollows, and to test landscape associations that were predicted based on previous survey findings (Map 2). Deflation hollows were surveyed at Rietvlei (Maps 22.1 and 22.2) and Welverdiend (ORV2) on the east side of the Olifants north of the Dam wall (indicated on Map 2), at Zypherfontein on the west near the confluence of the Olifants and Doring, and at Dwarsrivier (DWR7) on the Jan Dissels west of Warmhoek (Maps 23.1 and 23.2). Other locations along the Olifants, at Citrusdal and further to the south, were surveyed for ESA artefacts based on previous reports from Petersfield and Tienrivieren (Map 2). To the north of the Olifants-Doring confluence, ESA and MSA artefacts were found in a stream bed at Driefontein (Map 2). The rocky area, Tierkloof, to the north of Malgashoek had not been investigated by archaeologists previously, although non-archaeologists had reported rock art in the area, and it was used to test predicted landscape settings of LSA and MSA sites and artefacts. Additional rock shelter sites were surveyed on the Olifants between Clanwilliam and Algeria, at Rondegat (RG3), Kriedouwkrantz (KR9) and DAM27 (Maps 24.1 and 24.2).

CHAPTER 4. METHODOLOGY

4.1 Introduction

This chapter details the methods applied to field surveys and post-fieldwork data processing, based on the principles and approaches explored in Chapter 2. The aim of the study was to map changing landscape use over time, using diagnostic iconic stone tools as a proxy measure of human presence on the landscape. Field methods were designed to maximise the potential for artefact recovery, targeting areas where high concentrations of artefacts occurred and, within these artefact concentrations, focusing on the identification of iconic tools which could be assigned to a specific temporal period. The aim was therefore not to map every single artefact, rather to gain a relative understanding of associations between types of artefact and types of place.

4.2 Survey design

Before any fieldwork was undertaken, the site database compiled by Wiltshire was consulted and areas of interest were identified on the basis of previous site recordings, potential for surface artefact recovery, and the inclusion of a range of landscape features. The information provided by the excavated record in the area was also examined at an early stage in order to establish the presence of iconic tools in dated sequences.

The first phase of surveys targeted sites where previous recordings indicated that there were rich surface assemblages and therefore there was a high likelihood of encountering iconic temporal markers. The primary aim was to gain familiarity with the surface archaeological record of the study area in order to assess the nature and volume of material available on the landscape to inform future surveys. A secondary consequence of this was to gauge the reliability of data provided by the site database, which raised two important issues. Firstly, that the GPS co-ordinates recorded for sites were not always correct, sometimes by a margin of over 100 m; and secondly, that records for rock art sites did not always acknowledge the presence of a stone tool assemblage.

Having carried out these exploratory surveys, the second phase of fieldwork involved a more detailed survey of six areas (listed in Chapter 3, Section 3.5; shown on Map 2), covering a range of landscape features, with high potential for iconic markers which would enable a comparison of the relationships between different types of tool and different types of place. As fieldwork progressed and experience of the area and the associations between artefacts and landscape foci accumulated, predictions were formed and tested in the field, enabling the construction of a model of local-scale landscape use preferences. In addition to the principal survey areas, supplementary site visits were carried out in the final phases of the study to test the patterns observed in the main study area at other points along the Olifants River.

4.3 Field survey methods

Surveys were carried out on foot by a team of between two and nine fieldworkers with varying levels of archaeological experience. The variation in experience of artefact recognition and identification was managed through regular checks in the field, and the detailed photographic recording process meant that artefact identification could be verified and standardised during the data processing phase with minimal loss of information (cf. Gnaden & Holdaway 2000). The usual survey formation was for the team to walk individual tracks, spaced at several metres apart at least, in order to ensure maximum coverage of an area. This formation was not always possible where thick vegetation, steep slopes or rock features restricted the path but it was resumed wherever possible and GPS tracks make it clear when this was the case. Surveyors carried hand-held GPS units (Garmin EtrexH and 60CSx) to record their walk-paths so that areas that were surveyed but contained no artefacts could be distinguished from unsurveyed areas.

Survey paths were walked between ‘positive’ landscape features, meaning features that could have afforded some useful quality to people in the past; for example, shelter, water, vantage point and raw material. This covered featureless, ‘negative’ areas of landscape with no apparent rock or water focus, in between the positive features. The survey method allowed the coverage of a wide area that included a cross-section of landscape features, with previously recorded sites used as anchor points for the paths. The approximate route of the survey path was determined prior to going into the field, based on known sites and positive landscape features with high archaeological potential, identified on high-resolution aerial photographs. These aerial photographs, together with the GPS locations of previously recorded sites, were accessible in the field on a GPS-enabled Apple iPad.

The topographic complexity of the study area, together with the research questions being asked, meant that a method utilising a probabilistically drawn sample of survey squares across the landscape was unsuitable for this study. Although such methods have the advantage of reducing survey bias, the survey conditions and research aims benefited from a more flexible strategy which could be informed by both previous knowledge about an area and experience accumulated in the field, in a judgement-based strategy (Redman 1975). Where certain types of landscape feature were found to repeatedly yield high numbers of artefacts, these were targeted preferentially over areas which consistently contained few artefacts (Sampson 1985).

External factors introduced some challenges to data collection which must be taken into account with regard to survey coverage and artefact recovery. Seasonal conditions in the study area produce pronounced change in temperature, vegetation density and, on edge of the Dam, water level. Where it was possible, areas were surveyed on multiple occasions at different times of year when visibility or accessibility improved, in order to increase artefact recovery (Ammerman 1981). The photographic record ensured that any duplicated artefacts could be identified.

One of the concerns raised about surface artefacts is the possible discrepancy between their original location on discard and their current location on recovery (Wood & Johnson 1978). The distorting effect of taphonomic processes on artefact location is most disruptive at an intra-site level, which was not of primary significance in this study. Of greatest concern was any potential movement of iconic artefacts away from their principal landscape focus. During the course of surveys, precautions were taken to record where disturbance was either highly likely or obvious from the present conditions, such as downslope erosion or water washing. In cases such as slopewash, the potential source of eroding material was identified where possible, although in most cases the maximum displacement distance was relatively short.

4.4 Artefact recording methods

Artefacts were recorded in the field and left *in situ*. In the first phase of surveys, only iconic artefacts were recorded, but it quickly became apparent that this strategy risked leaving some areas with moderately dense lithic scatters unrecorded because of an absence of diagnostic pieces, therefore the second phase of surveys paid more attention to recording the background scatter as well, to contextualise the iconic finds and give a relative sense of density and the spatial extent of an artefact scatter. When an artefact scatter was encountered, a central point would be identified where the artefact density was at its highest, and the search would systematically radiate out from this point, with wire flags used to mark artefact locations prior to their being recorded. Where artefact scatters were too dense or extensive to survey completely within the constraints of time and resources, an appropriate sample was recorded, either at the densest point, or at intervals along a transect line. The specific details of sampling decisions were recorded in each instance, given in Appendix 1. Absolute artefact counts were not a necessity for the research aims of this study, therefore any variability in survey intensity incurred through sampling did not fundamentally compromise the interpretive potential of the data collected.

Iconic artefacts were recorded individually unless found very close together, and non-iconic artefacts were recorded collectively, with one field record for artefacts found within an approximate 1 m radius of a recorded GPS waypoint. The field record was captured photographically, recording a GPS waypoint for the artefact together with the date, site code (based on previous recordings in the database), brief description relevant to its landscape location, artefact description and recorders' initials. This was written in erasable marker on laminated graph paper. Digital methods of recording artefact information directly onto a Palmtop computer in the field were experimented with in the first phase of fieldwork, but this was found to be more time-consuming and less reliable, so the graph paper method was adopted. A digital camera was used to photograph artefacts on their dorsal and ventral faces, with appropriate additional photographs of the profile or perimeter in the case of cores and bifaces, and details of retouch, platform faceting and other noteworthy features. A more expedient recording strategy was employed when time pressures in the field necessitated, whereby an artefact would be photographed on the ground next to the GPS unit so that the current waypoint number was captured. The additional information about the artefact was then attached to the photographic record in the data processing phase. Throughout the course of surveys, the surrounding landscape was documented photographically to provide contextual information for the artefacts and their setting.

4.5 Data capture

GPS data were transferred from the Garmin units to computer using open-source software (Easy GPS), and were then converted using an online facility (GPS Visualizer) to a format that could be imported into a Microsoft Excel spreadsheet. The GPS points were then matched to the data recorded in the digital photographic record and details recorded on an Excel spreadsheet. Each digital photograph was coded with its waypoint number, photograph number and artefact type to create a photographic archive that can be searched for these terms using the Windows Explorer search facility. The spatial data in the spreadsheet could be filtered by different categories and the vector points imported as overlays into the GIS platforms Global Mapper (v. 13.0) and ArcGIS (v. 10.1).

A note on 'sites'

The application of an artefact-level recording strategy in this study aimed to alleviate the issue of where a 'site' began and ended. However, in order to organise the data and acknowledge the presence of high density clusters of artefacts, site numbers were assigned to artefact concentrations. Many of these had existing site numbers from Wiltshire's site database, which were modified for new sites close to these locations with the suffix A, B, C, etc., and for sites in new locations, numbering was continued from the last number given in the database. For diffuse scatters of artefacts between concentrations, the suffix a, b, c, etc. was used to denote an ephemeral artefact presence. All surveyed sites, with a description of the assemblage, landscape setting and survey conditions, are listed in Appendix 1. The frequencies of the artefacts recorded in each locality are given in Appendix 2.

4.6 Data management

Many of the GPS waypoints recorded multiple non-iconic artefacts under a single point, therefore these had to be manually ‘scattered’ in order to represent the artefact spread on a map in a visually discernible way. Each artefact was given a new co-ordinate that kept the original location to its first three decimal places (within 10 m), with the subsequent three digits of the co-ordinate generated using Microsoft Excel’s random number function. In an attempt to minimise loss of resolution, the randomisation process initially replotted the points to within a 1 m^2 area of their original recorded location but this rendered no significant improvement on the visual presentation of the points so the scatter area was extended to 10 m^2. After the points were replotted, they were checked carefully against a high-resolution aerial photograph to ensure that their new location did not give a false impression of their actual landscape feature association.

Although the stated accuracy of the Garmin GPS units is given as 3 m, their actual recording accuracy is reduced by a number of factors affecting satellite reception, for example, when signal is reflected by rock formations or other obstructions, or when satellite geometry is poor. For the purposes of this study, greater GPS accuracy was not necessary because it is acknowledged that surface artefacts will show some degree of displacement due to taphonomic processes, and in an area such as Clanwilliam with high disturbance potential, particularly due to farming, the use of more accurate Differential GPS equipment would be largely irrelevant to the questions being investigated.

Survey track-logs (walk-paths) can be plotted in a GIS platform as simple ‘join the dots’ lines, but when inaccurate points are taken into account, as discussed above, these will distort the track path. Linear track-logs from the GPS units were overlain on aerial photographs and erroneous points were removed manually. A 5 m zone to each side of a recorded track path was deemed an appropriate buffer, taking into account GPS accuracy and that not every surveyor was carrying a GPS unit to record their path. The combined area covered by all buffered track-logs was digitised to represent the survey area, distinguishing between areas surveyed where no artefacts were found and unsurveyed areas. Where occasional waypoints were found to lie outside of the survey area polygon, the original uncorrected waypoint and track-log records were compared to identify the source of the discrepancy and corrections made accordingly.

4.7 Supplementary data sets

In addition to the artefact data collected in surveys for this study, data from previous studies in the area were made available. These data had to be treated with some caution, since the recording methods and conventions varied from those employed here, and there were no photographic records against which to check duplicate recordings and consistency in the criteria used in artefact identification between studies. Furthermore, differences in research aims between studies meant variation in the data fields that were recorded.

Spatial data gathered by Conder (2002) at Dam East (DAME5 to 10) and Warmhoek, and Archer (2005) at Dam West were added to the survey data. Data recorded by Munn (2005) at Dam East was problematic to integrate directly because artefacts were recorded with near-complete survey coverage of a small area in front of a complex of rock shelters. This produced a disproportionate amount of artefact data compared to the level of recording detail deemed appropriate in surveys for this study. On this basis, Munn's data has been kept separate from the main body of survey data and used as a supplement to support the patterns observed. Mackay (unpublished data 2005) provided artefact data from surveys of the MSA site at Dam East (also recorded by Munn), with photographs that could be checked for duplicates against artefacts recorded in the current surveys. These artefacts were not recorded by individual GPS point, but could be combined with Munn's data for the purposes of displaying points on a map. Mackay also supplied data for bifacial points at Renbaan, Dam West, and survey transects walked across the Sandveld between Elands Bay Cave and Diepkloof.

4.8 Definitions and criteria used in classification

Artefact definitions are after Mazel (1978), Volman (1981, 1984), J. Deacon (1984a), Manhire (1984) and Mackay (2009), unless otherwise stated. Each of the iconic artefact types is described in further detail in Chapters 5, 6 and 7.

4.8.1 Non-iconic artefacts

Core

An artefact with three or more negative flake scars.

Flake

An artefact that has been struck from a core, displaying positive percussive features including a platform and ventral face with a bulb of percussion.

Chunk

An artefact with one or two negative flake scars, or a broken fragment of a core.

4.8.2 Iconic artefacts

Iconic artefacts included both retouched tools and unretouched forms of flaking debitage produced by temporally identifiable technological strategies. In addition to flaked stone artefacts, artefacts of non-flaked stone and other materials were also recorded.

Formal tools

Adze

A flake with steep step-flaked retouch along at least one lateral margin, forming a straight or concave edge. Double or 'slug' adzes may be worked on both edges where they have been reversed in haft, taking a bi-concave shape. Adzes are typical of the late Holocene LSA but may make use of older MSA flakes, with reuse identifiable by double patination or a residual faceted platform (Kaplan 1987; Wadley 1992; Parkington 1998).

Backed piece

A flake usually of bladelet proportions with abrupt blunting retouch of 90 degrees or more along at least one edge. Backed segments are crescentic with backing around the curved edge and a straight sharp chord. Backed bladelets have straight parallel sides with backing along one or both laterals. Other pointed, trapezoid and truncated forms occur. In this study, drills are also included within the backed piece category, referring to a bladelet backed along both margins to form a blunt point. Backed pieces are a feature of the Howiesons Poort MSA and late Holocene LSA, the Howiesons Poort pieces typically being larger than those of the LSA (Wurz 2000; Mohapi 2008).

Bifacial point

A flake or core with bifacial retouch or invasive flaking to both faces, forming a point at one or both ends. They typically show bifacial and bilateral symmetry. Bifacial points are characteristic of the Still Bay MSA where they are described as bifoliate or lanceolate, possessing a lenticular cross-section (Villa *et al.* 2009).

Handaxe

A large flake or core with bifacial flaking around the perimeter, usually forming a point at the distal end. Cleavers are included with handaxes in this study, possessing a straight cutting edge at the distal end. Other large bifacial and unifacial core or large cutting tools are included in this study, referred to as handaxe roughouts or rough bifaces by other researchers (Hardaker 2011). Handaxes are an Acheulean ESA tool, showing greater symmetry and refinement in the later Acheulean when fine-grained raw materials were more commonly used (Volman 1981; Klein 2000b).

Scraper

A flake with unifacial retouch on the dorsal face along a portion of its perimeter to form a convex edge, with retouch generally at an angle of 30 to 90 degrees. Sub-categories applied in this study describe the position of the retouch on a flake, as predominantly side or end, relative to the platform. Thumbnail scrapers are small convex scrapers, usually less than 20 mm in maximum dimension. Backed scrapers are small convex scrapers with backing retouch along the margin opposite the scraper edge. Scrapers occur in all time periods, but they become more common and more refined in later periods, with thumbnail and backed scrapers occurring in the Holocene LSA (Deacon 1976b; Orton 2009).

Unifacial point

A flake with unifacial retouch or invasive flaking on the dorsal face, retouched to a point at the distal end. Occasionally there is some minimal basal thinning on the ventral face. Unifacial points are found in the MSA and tend to be more common in the post-Howiesons Poort (Mackay 2011a; Conard *et al.* 2012).

Cores

Bipolar core

A core where flakes or bladelets are struck against an anvil, as opposed to free-hand percussion. There is no visible platform and crushing or splintering occurs at opposing ends. Bipolar cores are frequently made of quartz in the Late Pleistocene LSA (Orton 2006; Villa *et al.* 2012).

Bladelet core

A core with removals of bladelet proportions, bladelets having a maximum dimension of 25 mm. Bladelets can be struck from a platform, often as a bullet-shaped single platform core, or may be produced using the bipolar technique. Bladelet cores are a feature of microlithic industries, particularly the Late Pleistocene and Holocene LSA (Deacon 1978; Mitchell 1988).

Radial core

A core with two convex hemispheres of sub-equal volume, with all flake removals struck centripetally from the perimeter at the intersection of the two hemispheres. Radial cores represent a loosely defined and variably used category. The common feature is that the core is hemispheric with flake removals on either face struck from the intersection of the two hemispheres, as opposed to being struck from a platform. Within the morphological category of radial cores, two different technological strategies can be distinguished: discoidal (also called disc or discoid) and Levallois cores – specifically, a recurrent centripetal Levallois core (Boëda 1993).

'Levallois' is an inconsistently defined term, originating in the context of the European Middle Palaeolithic and subsequently applied to prepared core industries in Africa and the Middle East which has introduced new levels of variability (Copeland 1983; Van Peer 1991; Chazan 1997). Levallois technology is generally regarded as a method of core reduction directed towards the production of a blank of predetermined form, achieved by the careful preparation of the striking platform prior to the blank removal (Bordes 1961; Tixier 1967). This encompasses a number of different techniques, each of which is directed towards the manufacture of a specific end product, such as a flake, point or blade. In light of the problems of classification encountered due to the variability in production techniques and end product morphology, Levallois technology was redefined in terms of a 'volumetric concept' which is based on aspects of core geometry (Geneste *et al.* 1990; Boëda 1993). This requires that a Levallois core is conceived of as two hierarchically organised hemispheres, each possessing an irreversible role in the reduction process: one hemisphere provides the surface for preparation of the striking platform, and the other hemisphere provides the surface from which the end product is detached.

One of the techniques, mentioned above, is the recurrent centripetal method, which forms a core which may be defined morphologically as a radial core, but technologically conforms to the spatial rules of the Levallois concept. A discoidal core differs in that there is no hierarchy between the flaking surfaces, which can be used interchangeably for preparation and production during the same reduction sequence (Boëda 1993). Morphologically, discoidal cores typically have a steeper convexity than centripetal Levallois cores, and both hemispheres are of roughly equal volume. Mellars (1996a) suggests that the differentiation between a Levallois and discoidal core is one of degree rather than kind, often with discoidal cores involving some special preparation of the flaking surface, and many cores are in fact intermediate in their flaking strategy and form. For this reason, and due to the ambiguity in terminology applied to the South African record as discussed below, hemispheric cores that are radially flaked from the perimeter are grouped together in this study under the umbrella term 'radial core'.

As Volman (1981) observed, and as is still often the case, Southern African core classification systems follow a rather loose definition of what constitutes a Levallois core. Cores that are included within the radial core category in this study, as in Volman's system, may be identified as Levallois by other researchers. Under the alternative classification system set out in Conard et al.'s (2004) 'unified lithic core taxonomy', the category of inclined cores would describe cores with flake removals at an inclined angle of around 45 degrees relative to a plane of intersection between the two surfaces. This would include Boëda's discoidal cores, but Levallois cores, on the other hand, would fall in the category of parallel cores, which have two surfaces where removals are parallel to the plane that intersects the two surfaces. This system has not been widely adopted and the use of the terms radial and Levallois remain inconsistent. Minichillo (2005) differentiates between radial cores which produce *déjeté* flakes, and Levallois cores which produce convergent flakes. Volman's (1981) system also used a collective definition of radial cores to describe cores which produced flakes with intersecting dorsal scars. Mackay (2009) distinguishes Levallois cores by the presence of one or more scars extending for more than half of the length of the core, produced late in the reduction sequence, resulting from the preferential removal of a prepared flake.

Whilst radial cores are typically regarded as an MSA feature (Volman 1981; Mackay 2009), they can occur in the ESA (Kuman 2001). Levallois or, as it is more commonly known in an African context, prepared core technology, becomes more prevalent across the ESA to MSA transition (McBrearty 1988; Tryon *et al.* 2005; Wilkins *et al.* 2010). As the MSA advances, radial cores increase in frequency in an assemblage and are more refined, often making use of fine-grained raw materials such as silcrete (Wurz 2002; Villa *et al.* 2010; Wilkins *et al.* 2010; Clarkson 2013).

Single platform core

A core with a single working platform from which flake removals are struck. These can be removals of bladelet proportions. Opposed platform cores have two working platforms worked from opposite ends. Single platform cores in fine-grained raw materials are common in the LSA and often have bladelet removals (Deacon 1978; Mitchell 1988; Orton 2006).

Flake products

Blade

A flake more than twice as long as it is wide, usually with parallel lateral sides and dorsal scars running parallel to its long axis. Flakes of blade proportions but without parallel sides are classified in this study as elongated flake-blades. Blades typically occur in the MSA and are a particular feature of the Howiesons Poort (Wurz 2002; Soriano *et al.* 2007; Porraz *et al.* 2013b).

The classification of blades has been identified as a problematic area in terminology (Mackay 2006). Although the basic morphological characteristic is elongation with a ratio of length twice the width, distinctions have been made to separate blades made using soft hammer percussion (Wurz 1999), and to emphasise technical blades with parallel dorsal ridges (Bar-Yosef & Kuhn 1999).

Bladelet

A narrow, parallel-sided flake more than twice as long as it is wide, less than 25 mm in length. Microlithic bladelets in fine-grained raw materials are frequent in the LSA (Deacon 1978; Mitchell 1988; Orton 2006).

Flake with faceted platform

A flake with a striking platform displaying two (dihedral) or more facets formed by preparatory retouch from the dorsal surface prior to flaking. Faceted platforms are a feature of MSA technology (Volman 1981).

Levallois point

A flake with converging lateral edges forming a point, produced through the preparation of a Levallois point core. Point production and use of the Levallois technique are features of the MSA (Volman 1981; Wurz 2002; Wilkins *et al.* 2012).

Notched or denticulated flake

A flake with one or more retouched notches along its margins. These are often the only retouched form in early MSA assemblages but are not exclusive to this period (Volman 1981; Wurz 2002, 2012).

Other iconic artefacts

Bored stone

A stone of quartzite, sandstone or mudstone with a bored bi-conical central hole which was typically used to weight a digging stick, associated with the LSA (Mazel & Parkington 1981; Ouzman 1997).

Grindstone

A smoothed stone or cobble, usually of quartzite or sandstone, flattened on at least one face by grinding. Upper and lower grindstones were used in pairs, like a pestle and mortar, with large sandstone slabs used as lowing grinding surfaces showing smoothing, polishing and often a groove through repeated use. Grindstones were typically used in the LSA although they are known from later MSA sites (Parkington & Poggenpoel 1971; Mitchell *et al.* 1998; Wadley 2005b; Henshilwood *et al.* 2011).

Grooved stone

A cobble or slab with one or more elongated grooves ground into the surface, used for smoothing ostrich eggshell beads and straightening arrow shafts of bone, wood and reeds in the LSA (Inskeep 1987; Orton 2008b; d'Errico *et al.* 2012a).

Ochre

A pigmentaceous iron-rich rock, often found with striations and grinding facets where powder has been extracted for use as pigment, used for rock art, and other uses, such as a binding agent in hafting adhesive (Lombard 2007; Henshilwood *et al.* 2011; Bonneau *et al.* 2012). Ochre occurs as globular haematite nodules and soft bedded shales, in a range of colours from yellow to brown, but mostly red. Ochre use is known from the MSA onwards, becoming more common in the LSA (Watts 1998; Barham 2002b; Dayet *et al.* 2013).

Ostrich eggshell (OES)

Ostrich eggshell is found as broken fragments from food waste, sometimes burnt, but it was also used to make water containers and ostrich eggshell beads. Engraved ostrich eggshell flasks are known from the Howiesons Poort and LSA, and beads were produced during the LSA (Kandel & Conard 2005; Orton 2008b; Texier *et al.* 2013).

Pottery

Pottery is found as broken fragments, sometimes with incised decoration, burnished or ochred. Pottery dates from the LSA less than 2000 years ago (Parkington 1980; Yates *et al.* 1994).

Rock art

Rock art in the study area takes the form of fine-line paintings, handprints, finger-painting, finger-dots and crayon lines, found on rock shelters, caves, rock walls or boulders. Fine-line painting is generally regarded as an earlier tradition than handprints and finger-painting, which are suggested to post-date contact between hunter-gatherers and Khoi herders around 2000 BP (Manhire *et al.* 1983).

4.8.3 Secondary iconic features

In support of the principal temporally diagnostic artefact forms, additional artefact types were recognised to be indicative of certain periods. This level of classification was assigned to ‘non-iconic artefacts’ which, although not as distinctive as retouched tools, could be given a temporal association based on technological features, raw material and assemblage context. The more ambiguous ‘ESA/MSA’ and ‘MSA/LSA’ categories are useful insofar as they identify artefacts that are not LSA or ESA, in each respective case. The value of this secondary scale was to bolster the usable data which could be gained from artefacts which would otherwise be treated as ‘undiagnostic’.

ESA

In addition to bifaces, a range of quartzite cobble tools are recognised as ESA, including split cobbles, cobbles with a few flake removals, choppers, and large quartzite flakes which are often cortical.

ESA/MSA

Artefacts are classified as indeterminate ESA or MSA where large quartzite flakes and cores occur in a setting alongside other diagnostic ESA and MSA artefacts, where size and dorsal scarring are not suggestive of a more secure temporal identification. Radial and discoidal cores may also be considered indeterminate in this context.

MSA

MSA artefacts are identified by technological features such as platform faceting, elongated flake-blade and blade products, and complex dorsal scarring, with intersecting or convergent scars, and parallel dorsal scars on blades. Bifacially worked pieces that are not strictly bifacial points may be associated with the Still Bay. Flake size was used as a tentative indicator, including large quartzite and silcrete flakes (greater than 40 mm in maximum dimension) where appropriate given the context of the assemblage. Relative patination was also taken into consideration in assemblages shown to be of mixed time periods based on other iconic features, but patination is highly dependent on local conditions so can only be assessed on an intra-assemblage basis.

LSA

In artefact scatters in rock shelter and talus settings, small flakes (less than 35 mm if complete, and 25 mm if broken) of silcrete, quartz, CCS and hornfels were classified as LSA. Irregular or multi-platform cores with small flake removals typical of LSA-sized flakes were also included as LSA. Pièces esquillées, flakes showing chisel-like bipolar crushing at opposing ends, were considered to be LSA where they occurred within an otherwise LSA assemblage. Although pièces esquillées have been traditionally regarded as an LSA artefact, they have recently been shown to be present in the Howiesons Poort, reducing their efficacy as an LSA iconic artefact (Langejans 2012).

4.8.4 Raw materials

Six main raw material types are recognised to have been used in artefact manufacture in the study area:

Quartzite

Quartzite is derived from metamorphosis of the quartzitic sandstone bedrock that forms the primary geology of the area and hence is the most commonly found raw material. It occurs as river cobbles along the Olifants and quartzite nodules are also found across the landscape as scree on rocky slopes. At Andriesgrond, the quartzite bedrock of the cave itself was flaked for use as tools. Quartzite is a coarse-grained rock which restricts the degree to which it can be finely retouched, but the material is hard, durable and flake edges are more abrasion-resistant than other finer-grained rocks (Braun *et al.* 2009).

Ferricrete

Ferricrete or ironstone is an iron-enriched quartzite, known only to outcrop in the study area along the Kransvlei river where it joins the Olifants. Flaking can be seen directly off the outcrops along the river, with an isolated boulder surrounded by debitage representing an extensive 'knapping site'. Iron-rich quartzite cobbles also occur on the Jan Dissels floodplain at Augsburg.

Quartz

Quartz occurs as conglomerate pebbles in the Table Mountain Sandstone formations, with larger nodules of 50 to 80 mm observed in localised survey areas such as Warmhoek and Driehoek. As a macrocrystalline rock, quartz does not fracture conchoidally, and the brittle conglomerate pebbles are easily splintered using the bipolar knapping technique. Vein quartz is of higher quality and occurs in quartzitic geology, indicating a potential source for the crystal quartz which is occasionally found.

Cryptocrystalline silicate (CCS)

Cryptocrystalline and microcrystalline forms of quartz also occur in the conglomerate, with the most notable conglomerate-rich band observed in the study area found at Puts, where CCS pebbles are larger and more abundant than elsewhere. More generally, CCS-type rocks such as chalcedony, chert, jasper and agate, are derived from the Karoo Formation which occur outside of the study area. These are common in the river gravels of the Doring which join the Olifants at the confluence, 40 km to the north of the Dam. CCS tends to be homogeneous and as such breaks predictably with conchoidal fracture, producing sharp edges and allowing it to be finely worked (Orton 2008c).

Silcrete

Silcrete is a silica-rich indurated soil duricrust, formed when silica in the soil dissolves and then recrystallises in a cemented crust, occurring as rafts or as silicified river terraces (Roberts 2003). A silcrete outcrop below the high water mark on the Olifants River at Rondegat is likely to be a silicified river terrace as described by Roberts (2003) for sources recorded further north at the mouth of the Olifants River. Additional points along the river have yielded concentrations of large cortical chunks of silcrete, and although no primary source could be located it may have been below the water level. At Kriedouwkrantz, several large silcrete rocks were observed by the side of the road, with possible further examples in a rock-strewn field. It is worth noting that cobble testing on the river near this point had failed to identify any silcrete cobbles (A. Mackay pers. comm. 2012). Further outcrops are likely to exist away from the river given the abundance of silcrete artefacts on the landscape, with a silcrete boulder observed in the centre of Clanwilliam, about 1.8 km from the Olifants (Porraz *et al.* 2008).

Some of the silcrete artefacts found on the landscape show cortex derived from cobbles, and although no cobbles were found along the Olifants at Kriedouwkrantz or Bulshoek Dam (A. Mackay pers. comm. 2012), water-abraded cobbles of coarse-grained yellow silcrete were found along the Jan Dissels floodplain. This material is rarely seen in the form of artefacts away from this location, with the more common silcrete being a fine-grained light grey type. Silcrete occurs with considerable variability in matrix and colour (cf. Schmidt *et al.* 2013; Porraz *et al.* 2008), and pink and variegated varieties are also commonly found as artefacts in the area. Silcrete can undergo a colour change when heated, becoming pink to deep red with a glossy sheen (Brown *et al.* 2009: Supporting Online Material), but not all red silcrete artefacts are thermally altered, as is the case for the red silcrete at the MSA deflation hollow site (ORV2) on the Olifants north of the Dam. Heat treatment has been shown to improve the knapping properties of silcrete, making it flake more predictably for the production of finely retouched tools (Brown *et al.* 2009; Mourre *et al.* 2010; cf. Schmidt *et al.* 2013).

Hornfels

Hornfels, also known as indurated shale or lydianite, is a metamorphosed shale formed under high temperatures in dolerite dykes and sills. The closest potential primary outcrop to the study area is from a dolerite dyke that intersects the Bokkeveld shales east of the Pakhuis Mountains. Hornfels forms in the shales of the Karoo Formation and may occur under induration of the Bokkeveld shales as well. Karoo-derived hornfels cobbles occur in the Doring River and join the Olifants north of the confluence. Flaked hornfels cobbles have been found in surveys on the eastern edge of Clanwilliam Dam, in the same location as a concentration of silcrete nodules thought to be derived from a primary source. It is uncertain where these cobbles originated in the Olifants gravels or were transported to this location from another source, but the latter is more likely. Hornfels has a fine grain and breaks with conchoidal fracture into very thin-edged flakes (Wadley & Kempson 2011).

4.8.5 Landscape features

The distinction between specific landscape feature types runs the danger of artificially segmenting a continuous landscape, particularly in a complex environment where features such as rocky outcrops and water sources may occur alongside each other, and the proximity of several features may have made the locality attractive for people in the past. For analytical purposes, and based on the recurrence of artefacts in particular settings, the following major landscape feature types were identified as offering different opportunities as foci for Stone Age activity.

Cave or rock shelter

A recess in a rock formation, forming a partly enclosed area sheltered by an overhang which may contain an accumulation of archaeological deposit or sterile sediment. Caves tend to be deeper than rock shelters, although the distinction is generally arbitrary in a southern African context (cf. Straus 1990). The talus slope in front of a cave or rock shelter begins beyond the drip-line and usually contains an artefact scatter.

Sward

A sandy or grassy, but otherwise mostly unvegetated, open area that occurs in front of rock shelters or rock outcrops, thought to be formed by dassie activity (Milton 1978).

Rocky platform

A flat or sloping open rock platform with an uneven eroded surface which provides shallow catchment basins in which water and sediment collect. Rocky platforms are usually raised and may occur on top of a koppie, offering a good vantage point over the surrounding area, and may have rock shelters along the base. The rocky platform itself is taken to be the focus for activity where there are no shelters or alternative rock foci.

Rocky outcrop

A cluster of rocks or boulders that form a focus on the landscape. Shelters and caves may be part of a rock outcrop. Outcrops may form vertical rock walls, and enclosed or semi-enclosed courtyard features.

River

The perennial water courses in the study area are the Olifants River (now Clanwilliam Dam) and Jan Dissels River, which runs into the Olifants north of the Dam. Additional seasonal tributaries join the Olifants at Kransvleikloof and Rondegat.

Deflation hollow

A sand dune or drift containing sub-circular wind-eroded depressions. The wind winnows out sand from underneath artefacts which rest on a single deflated surface.

4.9 Conclusion

Chapter 4 has described the methods applied to the collection and subsequent handling of data in this study. This chapter also defines the categories used in the classification of artefacts, raw materials and landscape features. Surveys were designed to treat the landscape as a continuous space, recording at the artefact rather than site level, and artefacts were organised according to a typologically-based system. This methodology aimed to reinforce the landscape and iconic artefact approaches put forward in Chapter 2, and, supported by the geographical and historical background outlined in Chapter 3, this provides a robust framework for the study.

The next three chapters address the ESA, LSA and MSA. These periods are taken out of chronological sequence so that the MSA can be assessed in relation to the ESA and LSA as 'non-modern' and 'modern' behavioural extremes respectively. The model of stenotopic and eurytopic landscape use proposed by Deacon is taken as a starting point for approaching each period. This is followed by a presentation of the survey results for the study area and an evaluation of the behavioural implications of the patterning which these results show.

CHAPTER 5. THE EARLIER STONE AGE

5.1 Introduction

The first stone tools are known from 2.6 Ma in East Africa (Semaw 2000) and 2 Ma in the South African karstic caves (Herries *et al.* 2009). However, these crude chopper-like cobble tools and cores are often minimally flaked and, in the South African river gravel context in which most open site ESA artefacts are found, these are effectively "typologically invisible" (Kuman 1998:151). The handaxe or biface is the most recognisable iconic feature of the Acheulean ESA tool-kit, made on large flakes or directly from river cobbles. The oldest Acheulean in South Africa is estimated to date to around 1.7 to 1.4 Ma at Sterkfontein (Kuman & Clarke 2000)[1], but most other known sites are thought to be younger than 1 Ma, most likely less than 600 ka (Kuman *et al.* 2005). The hominin tool-makers associated with the earliest assemblages are *Homo erectus*, with fossil specimens known from the caves in the Sterkfontein area (Kuman & Clarke 2000).

5.2 Context: Stenotopism in the ESA

There is a long recognised and well-evidenced association between ESA artefacts and riverine and lacustrine settings. Among the first stone tool assemblages studied in South Africa were the Acheulean artefacts from the river gravels of the Eerste River and Stellenbosch surrounds (Péringuey 1900) and the Vaal River (van Riet Lowe 1937), this study of river valleys being inspired by European work on the Acheulean of the Thames and Somme. The East African river and lake margin sites, which preserve stone artefacts and fossil bones in bedded volcanic tuffs, have provided the foundation for many critical developments in approaches to open sites at a landscape scale and address taphonomic disturbances, particularly in fluvial contexts (e.g. Foley 1981; Isaac 1981; Rogers *et al.* 1994; Peters & Blumenschine 1995; Blumenschine & Peters 1998; Johnson & McBrearty 2012).

In the South African record, the majority of sites are known from alluvial settings, along the Vaal River basin (Helgren 1978) and the Seacow Valley (Sampson 1985), on pan margins such as Doornlaagte (Deacon, H.J. 1988; Mason 1988a) and Kathu Pan (Beaumont 1990a), a spring depression at Amanzi

[1] Potential dates of 1.8 to 1.1 Ma have recently been obtained through cosmogenic nuclide and palaeomagnetism for the Oldowan layers at Wonderwerk Cave (Chazan *et al.* 2012; Matmon *et al.* 2012).

Springs (Deacon 1970), near-coastal dunefields with waterholes at Elandsfontein (Deacon 1998; Klein *et al.* 2007) and Duinefontein 2 (Cruz-Uribe *et al.* 2003), and in the coastal dunes at Geelhoutboom (Deacon 1975) and Cape Hangklip (McNabb *et al.* 2004). Whilst Deacon's angle is that water sources exerted the principal pull on ESA settlement, Kuman (2007) suggests instead that sites are most visible close to good raw material sources, these often being river gravels. If early humans were using sites further from gravel sources, it is unlikely that they were transporting and accumulating stone in sufficient quantities to leave archaeologically visible sites (Kuman 2003).

There are four Acheulean cave occurrences at the Cave of Hearths, Montagu Cave, Wonderwerk and Olieboompoort, the former three all preserving stratified deposits and potential evidence of the control of fire (Kuman 2007). The fossil-bearing cave sites in the Sterkfontein area do not represent cave habitation, although the entrances may have been attractive for shade and vegetation. The caves are situated close to the Blauwbank River, where river gravels were transported from for tool-making (Kuman 2003, 2007).

There is some conflict between the emphasis placed by Deacon and others on early humans' apparent habitat preference for river valleys and wetlands, and the indication that many of the areas they inhabited were characterised by mosaic habitats (Wood & Strait 2004; Bailey *et al.* 2011). The "weed-like" ability of *Homo erectus* to move into and colonise new environments is attested to by their expansion out of Africa, and would suggest that they were quite the opposite of habitat specialists (Cachel & Harris 1998:121). However, Deacon suggests that the "narrow linear distribution" of populations along river valleys facilitated their dispersal even at low population densities (Deacon & Deacon 1999:86). Deacon and Deacon (1999) argue that *Homo erectus* was so secure in their specialised habitat niche that there was no pressure driving innovation which allowed the persistence of the Acheulean tool form – the handaxe – over a million-year time-span.

5.3 Iconic artefacts of the ESA

5.3.1 Handaxes

Handaxes are typically bifacially flaked large cutting tools, made on cores or large flakes, with sharp cutting margins which converge to a rounded or pointed tip (Wynn 1995). In practice, the identification of handaxes follows a looser definition, including unifacially worked artefacts and shapes ranging from triangular to ovate forms (Leakey 1971; Clark & Kleindienst 2001). Other large bifacial cutting tools include cleavers, usually made on a large flake with a specifically prepared straight cutting edge at the distal end (Clark & Kleindienst 2001; Inizan *et al.* 1999).

Handaxes are a geographically widespread and temporally persistent phenomenon, with both regularity and variability in shape approached in terms of intended form (Wynn 1995), the by-product of the core reduction strategy (Davidson & Noble 1993), and a result of raw material constraints (McPherron 2000). Interpretations have also inferred social and cultural significance from handaxe form, identifying them as signals of group affiliation (Gamble 1999), demonstrations of fitness in sexual selection (Kohn & Mithen 1999; cf. Nowell & Chang 2009) or 'trustworthiness' (Spikins 2012). Symmetry is an important feature of handaxes, particularly emphasised in the more heavily reduced and refined Later Acheulean tools which are often thinner in cross-section and may have employed soft hammer flaking (Klein 2000b). Localised industrial variants in the Later Acheulean that anticipate MSA prepared core technology are identified as the Victoria West and Fauresmith, the latter characterised by smaller, highly symmetric handaxes (Herries 2011).

As bifacial tools, handaxes represent a maintainable tool form with a potentially long use-life, also functioning as a core for flake production (Jelinek 1977; Bleed 1986; Kelly 1988; Schick & Toth 1993). They are generally proposed to be butchery tools used in tasks that required a heavy-duty cutting edge, inferred from the context of handaxes alongside cut-marked bones (Klein *et al.* 2007) and supported by experimental replication (Schick & Toth 1993; Shea 2007; Archer 2010). Besides butchery, handaxes were put to a wider range of uses including working wood or sedge (Keeley & Toth 1981; Domínguez-Rodrigo *et al.* 2001). Use-wear studies indicate that the same tool may have been used for different tasks on a variety of materials along different portions of its edge (Keeley 1993). The design of a handaxe shows some role for portability, its form minimising weight whilst maximising cutting edge length (Jones 1994); similarly, it could be used as a core that could be transported to provide a supply of flakes in areas where raw material availability was unpredictable (Jelinek 1977; Davidson & Noble 1993; Schick & Toth 1993).

5.4 ESA artefact distribution in the study area

The principal landscape setting for ESA artefacts in the study area was in association with a river or floodplain. A total of 60 handaxes and 58 other large bifacial tools were found along both the Olifants and Jan Dissels Rivers, together with other ESA core and flake tools. The comparative absence of ESA artefacts away from the river, with just three cases, supports Deacon's proposal of stenotopism at a very localised scale, although factors of preservational bias cannot be ruled out.

5.4.1 Olifants River (Clanwilliam Dam)

The most pronounced presence of ESA material recorded in the study area is focused on the Olifants River itself, with a roughly continuous scatter of variable density extending along the length of the present Clanwilliam Dam (surveyed from the Dam wall to the confluence of the Rondegat River 10 km to the south), on both the western and eastern banks (Maps 7.1 to 13.2). This pattern of ESA artefact distribution continues along the river valley further to the south (Orton & Hart 2005).

These artefacts are found among the river gravels, on exposed bedrock carapace, or cemented into fossil termitaria, and are likely to be exposed from overlying sand by the effect of the rising and falling water level of the Dam (Orton & Hart 2005). Artefacts occur in concentrations where there are dense patches of rounded quartzite river cobbles which form the principal raw material source for tool production. Isolated artefacts also occur along on the beach in between the main concentrations (Figures 5.1 and 5.2).

Spatial integrity

The primary spatial association along the river appears to be between unworked cobbles and artefacts. There is potential patterning in the frequent occurrence of these concentrations on the northern side of tributaries entering the Olifants River, which may be a consequence of a change in velocity of the river flow which causes the river to shed material in its bedload (Petraglia & Potts 1994). The question that follows is whether these represent accumulations of river cobbles which were then exploited as raw materials by tool-makers, or whether both unworked and worked cobbles were transported and deposited together in a secondary context.

Size-sorting can indicate whether an assemblage has been transported, with smaller artefacts winnowed out and leaving a lag of larger material (Schick 1986, 1987). The co-occurrence of small flake elements alongside cobble cores and core tools, in addition to unworked cobbles, suggests that there has been little sorting and transportation of artefacts. Schick (1986, 1987) observed that dispersal and disaggregation of artefacts of different sizes and morphologies is the most common effect of fluvial disturbance, although it is possible for winnowed material to reaggregate with larger elements downstream. The degree of edge-rounding seen on artefacts is an indicator of whether they have been subject to increased abrasion through transport (Stein 1987). Where artefacts retain sharp edges, they are likely to have experienced minimal transport. Given the relatively fresh appearance of the edges of most of the artefacts, and the low incidence of double patination to indicate more recent edge damage, it can be inferred that artefacts have not been subject to transportation, and there is therefore a reasonable degree of spatial integrity to ESA artefact distribution on the edge of the river.

Figure 5.1 Quartzite cobble beds on the edge of the Olifants River (Clanwilliam Dam, DAME17)

Figure 5.2 Cobble artefacts at DAME17

Figure 5.3 Quartzite handaxe with river cobble cortex on one face (DAME17)

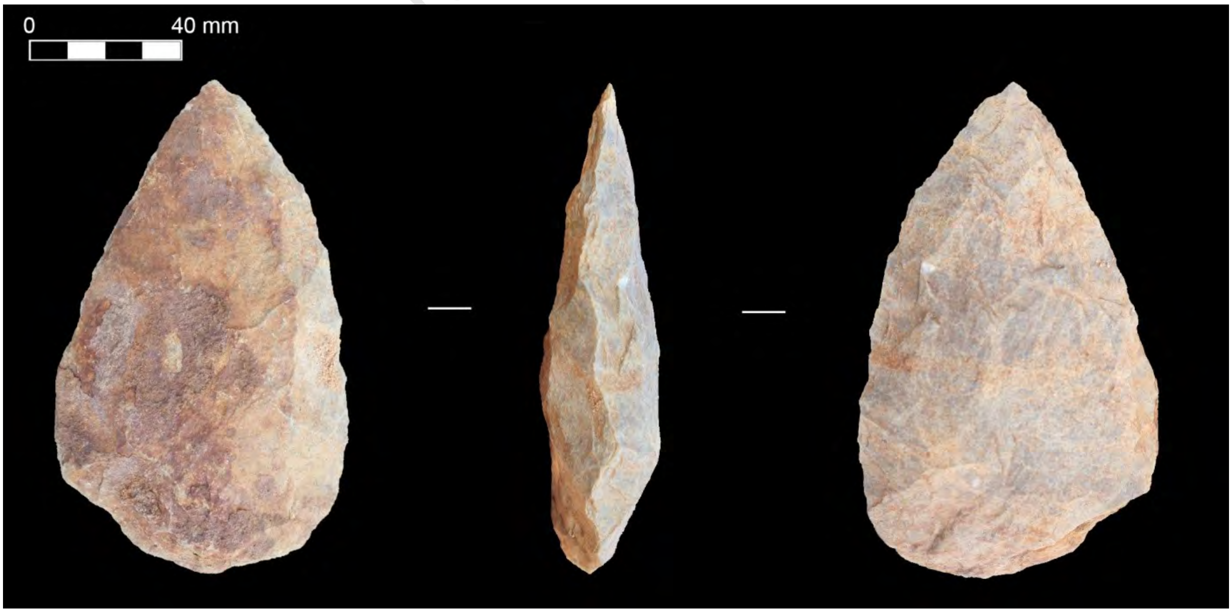

Figure 5.4 Silcrete handaxe (DAME11)

Figure 5.5 Courtyard on a rocky platform at KVK1 with ESA an assemblage in the cobbles

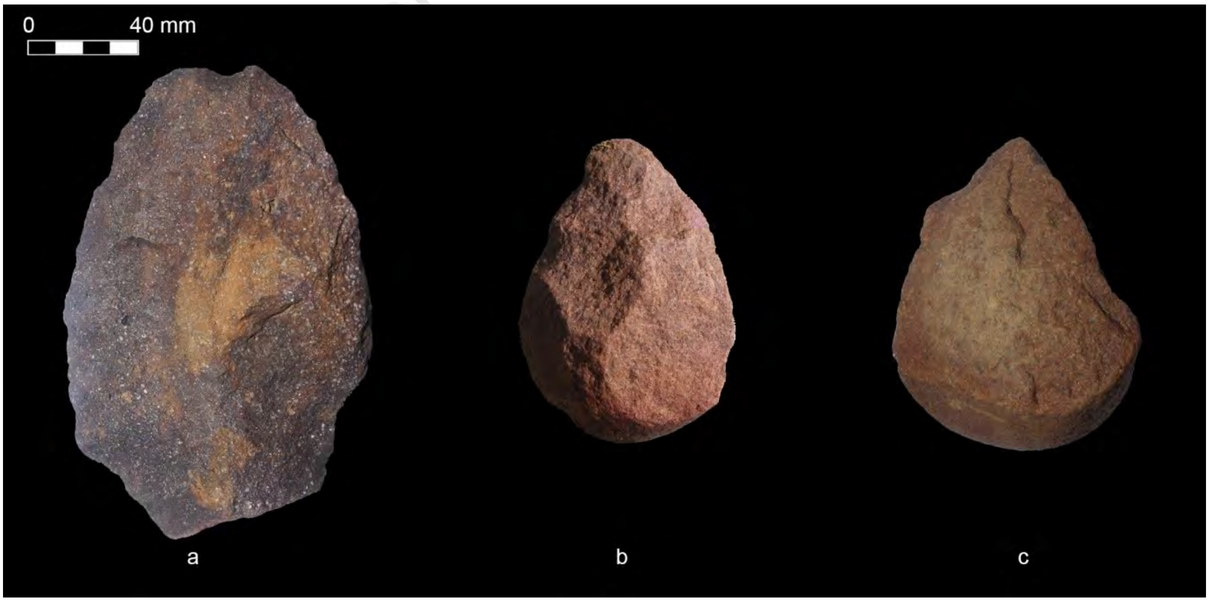

Figure 5.6 KVK1 handaxes: (a) ferricrete end-struck flake, (b) and (c) quartzite scree cobbles

Figure 5.7 Elevated rocky platform at Driehoek with a diffuse, ephemeral flake scatter (DR8b)

Figure 5.8 Quartzite biface (DR8b)

Figure 5.9 Rocky platform on top of the Andriesgrond koppie (AG1A)

Figure 5.10 Ferricrete handaxe (AG1A)

Figure 5.11 Ferricrete boulder and knapping site (DAM8)

Figure 5.12 Water catchment basin on top of the Andriesgrond koppie, a day after rain (AG1A)

Artefacts

Handaxes, cleavers, bifaces, unifaces, choppers and large irregular cores were identified as ESA material. Artefacts ranged in flaking intensity from minimally worked cobble cores, which have one or two flake removals and retain most of their cortex, to invasively flaked bifaces which have less cortex and may take a pointed shape typical of a handaxe. Pointed, extensively shaped handaxes were present in around equal proportions to roughly shaped bifaces and unifaces which may be termed 'roughouts' in some studies. Cores and flakes can present a problem in distinguishing between ESA and MSA forms, since discoidal cores – often large and rough in their appearance owing to the coarse grain of the quartzite cobbles – are associated with the technology of both periods. These, along with unretouched quartzite flakes with no diagnostic characteristics such as platform faceting, were classified as 'ESA/MSA' – a useful category only insofar as it distinguishes these artefacts from the LSA and, typically, the later MSA post-100 ka.

Raw materials

The main raw material type for all ESA artefacts was in the form of water-worn quartzite cobbles, present in the river gravels of the Olifants. Handaxes and bifaces were most commonly made on split cobbles which then showed further bifacial reduction, although some are on large end-struck flakes (Figure 5.3). Two handaxes were made of silcrete, both being invasively bifacially flaked, with a sharp edge and a relatively high degree of symmetry (Figure 5.4). Based on characteristics such as flaking intensity, refinement and symmetry, these could be described as Later Acheulean. The only other raw material type identified as being used for ESA artefacts was ferricrete, represented by three bifaces (Figures 5.6 (a) and 5.10). Given the apparently restricted distribution of outcroppings, with only one known on the Olifants River in the study area, these artefacts offer some interesting insights into raw material transport at a localised scale. One of these bifaces was found close to the source at the knapping site at DAM8 (Figure 5.11), but the two other bifaces were found in the only ESA find-locations to occur some distance away from the river, discussed further below (Section 5.4.3).

5.4.2 Jan Dissels River

A much smaller sample of ESA artefacts was found on the Jan Dissels floodplain at Augsburg (Maps 21.1 and 21.2). The floodplain itself is currently used for agriculture and the distribution of visible artefacts is highly restricted. The area experiences a large amount of run-off from the surrounding topography, with streams from the Taaiboschkraal River draining onto the floodplain to the south of the Karooberg shale ridge. Fluvial disturbance is evident from the spatial separation of large cobbles and cobble core artefacts, and small gravels with flake elements, but the relative effect that agricultural activity has had on this is difficult to judge.

The raw materials are different to those available along the Olifants, with quartzite cobbles generally more irregular in morphology than the ovoid Olifants River cobbles, and the quartzite itself tends towards an iron-rich, ferricrete-like type, although it differs from the Olifants ferricrete outcrops in having a fine-grain with no visible quartz grains in the matrix. Rounded cobbles of coarse-grained yellow silcrete occur in this area which have not been observed as cobbles and only rarely as artefacts elsewhere in the study area, although one of the two silcrete handaxes on the Olifants is in a similar material.

5.4.3 Non-riverine locations

Three occurrences of ESA artefacts were recorded away from the river floodplain in the core study area; all were situated on rocky platforms on top of raised koppies from which the Olifants River is visible. A small assemblage of ESA artefacts was located in a semi-enclosed courtyard area on top of the rocky koppie at Kransvleikloof (KVK1), approximately 2.5 km from the main channel of the Olifants and 500 m from the seasonal Kransvleikloof tributary, with additional minor seasonal gullies within 200 m (Maps 17.1 and 17.2; Figure 5.5). The assemblage included a handaxe, two bifaces, and three other cores of ESA type, although it is expected that more ESA artefacts were present but not visible due to disturbance of the sediment by baboons. One biface was made of ferricrete, likely to be derived from the source around 1 km to the north, and the other artefacts were made of quartzite and quartzitic sandstone present as scree cobbles in the courtyard and its immediate surrounds (Figure 5.6). The courtyard also contained MSA and LSA artefacts, and no further ESA artefacts were located in surveys of the surrounding open koppie area. This could mean that the courtyard was a favourable activity locus on the koppie, potentially because it offered protection from the wind and acted as a trap for scree cobbles which could be used as raw material, but equally it could suggest that ESA artefacts are present in the same location as the cobbles because they have been protected from downslope displacement by the courtyard.

The two further instances of bifaces on rocky koppies are affected less by taphonomic concerns, instead raising questions over their temporal designation. A single quartzite biface was found on an open rocky platform on a ridge between the Kransvleikloof and Olifants Rivers (DR8b) (Maps 16.1 and 16.2; Figure 5.7). Very few artefacts were recorded across the koppie, mostly silcrete and quartzite flakes of probable MSA association. The biface is made on a hard quartzite cobble likely to derive from the quartzite scree found on the koppie which is of poor quality for flaking, only allowing for small flake removals, many of which end in step-terminations (Figure 5.8). Another broken, irregular core made on a similar quartzite cobble was the only other artefact found nearby, and both could reasonably be attributed to the ESA or early MSA. Several low rocky outcrops forming a courtyard complex occur upslope about 100 m to the west on the top of the ridge which would offer some shade, although no artefacts were found in the vicinity, and apart from the rocky platform itself, the koppie is largely devoid of notable landscape foci.

A ferricrete biface situated on top of the Andriesgrond koppie is a unique find in the area, occurring about 1.2 km from the ferricrete outcrop and 1.2 km from the main channel of the Olifants (Maps 14.1 and 14.2; Figure 5.9). The biface, of approximately 90 mm in length, is finely worked with bifacial flaking along both edges and a narrow rounded tip, with some residual cortex on the central portion of both faces (Figure 5.10). It is atypical as a handaxe compared to the other examples in the study area, and shows some similarities to the small finely-flaked handaxes attributed to the Late Acheulean Fauresmith Industry, although it lacks the high degree of symmetry which is generally characteristic of these artefacts (Herries 2011). An alternative possibility is that it could be an MSA bifacial artefact, given the prevalence of other MSA material across the rocky platform on the koppie top. Identifying artefacts at the boundary between the ESA and MSA is problematic, and the time period is not represented in the excavated record in the study area. This biface is treated as an ambiguous ESA or MSA artefact, being an ESA-like form but found in a landscape setting more typical of the MSA.

The location of these bifaces, and the fact that they are made on different raw materials to the cobbles available on the Olifants River, gives some indication of ESA behaviour on the landscape in a broader sense – away from the river. It is interesting to note that there is little evidence for the transportation and discard of river-cobble bifaces any substantial distance away from the cobble banks, but ferricrete from the source on the river was transported over 1 km away in two cases. The position of these artefacts at high, rocky points reflects a wider use of resources on the landscape, although the vast difference in artefact frequency shows that behaviour involving tool manufacture and use was heavily weighted towards the river.

5.5 ESA artefact distribution outside of the study area

ESA artefacts were observed on the Olifants River at additional points to the north and south, confirming that the presence of ESA artefacts is not a phenomenon restricted to the Dam area (Map 2). A small scatter was recorded in a shallow dried-up stream bed on a hill above the Olifants at Driefontein, near the confluence of the Olifants and Doring Rivers, 45 km north of Clanwilliam Dam. Both ESA and MSA artefacts were present, with ESA tools in quartzite, an iron-enriched quartzite and silcrete, including handaxes, bifaces, and a uniface.

Handaxes and other cobble artefacts were reported from the river floodplain at Petersfield in Citrusdal, 35 km south of Rondegat, in a relatively flat and open wetland setting, forming several distinct concentrations with thinner scatters in between (Kaplan 2009). Similarly, at Tienrivieren a further 30 km to the south, an extensive scatter of ESA cobble artefacts was found on the floodplain of the Thee River tributary, containing an unusually high proportion of bifaces (Halkett 2011). All of these sites occur in open areas with no prominent rocky outcrops or rock shelters close by, the floodplain being the focus for artefacts, with raw materials readily available.

Further ESA occurrences are reported in a riverine context in the wider area, at Nuwerus on the Brandkraals River to the south east of the Cederberg, at Donkerbos on the Riet River east of the Kouebokkeveldberg[2] (Map 1), and along the Berg River further to the south (Hart 1984). Furthermore, preliminary surveys along the Biedouw River to the west of the Cederberg identified a strong ESA presence on the river floodplain (personal observation). The area is located at the boundary between the Table Mountain Sandstone and Bokkeveld shales, and early stages of research in this area indicates a preference for higher-quality quartzites that do not derive from river cobbles, but rather outcrop on terraces above the river. Further work in the area offers potential for a closer examination of ESA behaviour in terms of the relationship between raw material sources and river channels.

5.6 Factors affecting ESA landscape use patterns

The strongly river-orientated pattern of ESA artefact distribution seen in the study area suggests that the Olifants River was a major focus for activity. As stated by Deacon (1989), there is no evidence for the presence of water containers in the ESA, which would have placed a significant limitation on how and where people moved about the landscape. However, the availability of raw materials along the river, together with the specific repeated association between ESA tools and unworked cobbles, suggests that this was a particularly attractive feature of the riverine setting. The Olifants River presents a very specific juxtaposition of resources for ESA people which were not necessarily available in other areas of the landscape, at a local or regional scale. It is therefore important to try to distinguish the relative significance of water, food resources and raw materials in determining ESA behavioural patterns and the material signature this has left on the landscape.

[2] Sites NWRS1 and NWRS8 recorded by Wiltshire in 2007 and 2008, and DKB1 to DKB5 recorded by Kaplan in 2009.

5.6.1 Water availability

A perennial river, such as the Olifants, serves as a reliable source of water – essential to ESA people particularly if they did not have containers for carrying water. There is a general indication of increased aridity coincident with the Acheulean (deMenocal 2004), making water availability an important feature determining human settlement with the likely effect of tying human populations to reliable water sources. In the study area, the present-day landscape has many gullies which channel seasonally dependent water flow from higher slopes. In addition, the eroded sandstone surface of koppies and rock outcrops form water catchment basins which fill following rain (Figure 5.12). Water is also available in succulent plants and underground storage organs, known to be exploited by modern hunter-gatherers in arid climates (Story 1958; Youngblood 2004). If these locally and seasonally available water sources were available in the ESA, this would allow access to water at a local scale, enabling ranging away from the Olifants River in a daily foraging round.

It has been argued, however, that ESA settlement, particularly in the Acheulean, does not show the tethering to water that is supposed by Deacon. In Sampson's (1985, 2001) exhaustive study of the Seacow Valley, he identifies an avoidance of spring eyes as site foci in the ESA, in contrast with later settlement which clusters strongly around springs. Sampson (2001) attributes this to an Acheulean strategy of predator avoidance, since water sources would have attracted dangerous carnivores along with prey. This danger was mitigated in the LSA by settling on ridge-tops overlooking the springs and employing other defensive strategies such as the use of fire (see O'Connell *et al.* 1988 for ethnographic support based on the strategies employed by the Hadza; cf. Tunnell 1996). Sampson (2001) does concede that some stretches of riverbank appear to be the primary landscape focus for sites, but that they do not represent a convincing "pull" on the overall pattern of Acheulean settlement for the region.

5.6.2 Subsistence

Water sources would have been of strategic importance for early human subsistence behaviour. As scavengers, early humans would have been largely dependent on kills made by other carnivores, with water sources acting as a likely focal point for many of these encounters (Blumenschine 1987). The artefact concentrations that frequently occur in riverine settings have been interpreted as butchery sites, in line with a 'least effort' strategy for transporting carcasses away from their find location (Blumenschine 1987). However, once they had obtained a carcass, early humans would have been at risk from other scavenging carnivores, such as hyenas, and it may therefore have been necessary to transport carcasses to safer locations (Bunn & Ezzo 1993; Potts 1984, 1988). O'Connell et al. (2002) observed that many multiple-carcass processing sites of the Hadza hunter-gatherers occur on a floodplain or river channel, but the Hadza rarely situate their base camp closer than 10 to 20 minutes walk from a permanent water source because of the dangers from carnivores in this type of setting. This strategy of predator avoidance is emphasised in Sampson's (2001) interpretation of the Seacow Valley Acheulean which tends to be located some distance from water sources.

Besides scavenging opportunities, riverine and wetland environments offer other resources for foragers. Wrangham et al. (2009) suggested that geophytes available in wetland habitats may have played a significant role in the ESA diet as "fallback foods" (cf. Deacon 1983). These are present in the modern fynbos ecozone, and underground storage organs can be extracted with the aid of a digging stick, as used in the LSA, ethnographically, and also observed in chimpanzees (Hernandez-Aguilar *et al.* 2007). Whilst resources may have been clumped around water sources, the ability of Acheulean humans to exploit a variety of widely spaced resources is attested to by the transport of handaxes, presumably for foraging tasks, resulting in their discard across the landscape. Handaxes are found as isolated occurrences on the plains and mountains or plateaux in the Seacow River Valley (Sampson 2001) and Zebra River Valley (Hardaker 2011), supporting their use as a portable tool.

5.6.3 Raw materials

In the Olifants River Valley, cobbles which were used preferentially for raw materials occur along the river channel and adjacent floodplain. The pattern of raw material use for the Olifants River assemblages indicates that locally available materials were exploited expediently, with many cobbles exhibiting only minimal flaking and found clustered with unworked river cobbles. Tool manufacture and discard took place at the source, with no need for raw material transport over long distances. Additional isolated occurrences of bifaces elsewhere on the landscape suggest that quartzite scree cobbles encountered away from the river were utilised on a more infrequent and opportunistic basis.

The transport of raw materials has received a great deal of attention in the ESA, with the Acheulean marked out from earlier periods as displaying 'long-distance' transport of distances over 10 km from source to discard location (e.g. Rogers *et al.* 1994; Blumenschine *et al.* 2003; 2008; Archer 2010). The implication is that hominins were making use of dispersed resources – both raw material, and the subsistence resources which stone tools were used to extract. A point rarely emphasised yet important to note is that when raw material is shown to have been transported over a distance of, for example, 10 km from source, this does not necessarily imply a single, goal-directed transport journey (Sept 1992). Handaxe technology has been regarded as a strategy of provisioning individuals with a portable, maintainable tool, and as a core providing a ready supply of flakes in areas where raw material availability is scarce or unpredictable (Jelinek 1977; Kelly 1988). In the Olifants and other river valleys, the near-continuous presence of suitable raw materials along the course of the river provided a focal point in the landscape around which other activities could be organised with the knowledge that stone was always nearby. In environments where flakeable stone resources are poor, the accumulation of artefacts in specific localities have been described as deliberate ‘stone caches’ to provide a reliable source of stone, reducing transport costs and provisioning risks (Potts *et al.* 1999).

The dunefield site of Elandsfontein on the west coast represents a setting where raw materials were not available locally to the place of artefact discard, demanding a more complex organisation of landscape use. Elandsfontein played a central part in Deacon’s hypothesis of landscape use which emphasised its role as a water source, with an associated assemblage of over 160 handaxes and other bifacial tools, along with a substantial fossil faunal assemblage containing cut-marked bones (Deacon 1998; Klein *et al.* 2007; Archer 2010). Raw material sourcing and geochemical tests have indicated that primary outcrops for silcretes and granites used for tool-making are only available within 10 km and over 25 km from the site (Braun *et al.* 2008; Archer 2010). A wide range of raw materials were used, taking the form of river cobbles as well as flakes quarried from primary sources and riverine boulders, with rivers currently present only at a distance greater than 10 km from the site (Archer 2010). The Elandsfontein assemblage represents the persistent use of a locality, likely to be a focal landscape place for both humans and animals attracted to the water hole, an association also seen at Duinefontein 2 (Cruz-Uribe *et al.* 2003). The strategy of raw material provisioning necessitated by the occupation of Elandsfontein emphasises the draw of water sources on ESA populations even where this required significant investment in the transport of stone. Nevertheless, Elandsfontein represents an exception to a prevailing pattern where ESA sites are usually situated within less than a few kilometres of raw material sources.

In contrast, the large-scale landscape study carried out by Sampson (1985, 2001) in the Seacow River Valley suggests that localities close to water sources were selected against, with an association between Acheulean artefacts and hornfels outcrops emphasised over sites close to spring eyes and river channels. The majority of Acheulean artefacts identified in the Seacow Valley are made of hornfels and attributed to the Final Acheulean, showing typological similarity to the small symmetrical handaxes of the Fauresmith, together with a prepared core component. Sampson also reports seven assemblages of flaked siltstone which include larger, thicker bifaces and true cleavers, suggested to represent earlier Acheulean occupation in the upper river valley where siltstone suitable for tool-making is more readily available. He suggests that the earliest populations to enter the area were pre-adapted to a riverine habitat, making use of the siltstone raw materials and permanent water sources to which they were comfortably adapted. Later, during MIS 7, these groups “learned” the new potentials of the landscape and expanded into the central valley (Sampson 2001:33), showing the exploitation of hornfels outcrops for biface production and a less water-bound distribution which might be seen to anticipate a broader pattern of landscape and raw material use more typical of the MSA. Within the Olifants River Valley study area, the Later Acheulean and Fauresmith period are only tentatively represented, with three examples of handaxes in silcrete and ferricrete that show greater refinement than the typical river cobble bifaces, but these materials were also sourced from the edge of the river. Sampson's study identifies a preference for raw material procurement over proximity to water in the Late Acheulean, in an environment where the distributions of high-quality stone and water are not spatially concurrent.

5.7 Conclusion

The repeated riverine association for ESA artefacts in the study area and comparable river valleys indicates that this setting was attractive to ESA populations. The river is both a source of water and of raw materials; in the Olifants River Valley context, it would appear that strategies employed in the ESA did not need to prioritise water or raw material provision, unlike suggestions for studies in other areas (Sampson 1985, 2001).

It is clear that there is a real pattern of high concentrations of ESA artefacts in the context of water sources, but the rare occurrences where Acheulean deposits have been preserved in caves, such as Montagu Cave, Wonderwerk, Olieboompoort and Cave of Hearths, hint at wider-ranging use of the landscape that may be biased by issues of preservation (Klein 2000b; Kuman 2003). The absence of large caves such as these in the study area, combined with the scarcity of caves and shelters in many of the open plains-based habitats inhabited by *Homo erectus* may be interpreted as showing less of a reliance on caves for shelter that in the MSA and LSA, with the need for shelter, shade and safety met in other landscape settings. Alternatively, Klein (2000b) observes that in many caves with MSA and LSA deposits, these rest directly on bedrock and not on sterile deposits which could be an indication that the ESA record has been washed out and therefore ESA use of caves is underrepresented archaeologically. The dense accumulations of artefacts in many open localities, such as Power's Site and others in the Vaal River Basin (Power 1955; Deacon 1975; Helgren 1978; Deacon & Deacon 1999), combined with repeated occupation episodes seen at Montagu Cave and Cave of Hearths (Keller 1973; Mason 1988b; McNabb *et al.* 2004), indicate that preferred locations were returned to, possibly on a seasonal basis as water availability fluctuated (Deacon 1975). However, the overall picture of Acheulean settlement has been described as opportunistic and transient compared to later periods (Potts 1994; Sept 1998), with an emphasis placed on the highly mobile lifestyles of early hominins leaving a widespread but ephemeral presence (Kandel & Conard 2012).

Although Deacon's terminology identifies ESA landscape use as narrow in its focus on water sources, on a regional scale this encompasses a wide range of environments, from inland river valleys like the Olifants and Seacow, to dunefield ponds such as Elandsfontein on the west coast. Local-scale preferences for specific landscape features have been suggested in other ESA landscape studies which go beyond the provision of resources such as water and stone. On the Hackthorne Plateau on the Limpopo River, sandstone koppies (which in the terminology of the present study would be described as rocky outcrops) are identified as "central places", close to a variety of resource zones and offering such properties as shade for knapping and other activities, and a vantage point over the surrounding area (Le Baron *et al.* 2010; Pollarolo *et al.* 2010). Similarly, at the dune site of Anyskop on the west coast near Langebaan, the raised hilltop location could have made it attractive for its potential for observing animals or other hominin groups, given that water and raw materials unavailable in the immediate vicinity(Kandel & Conard 2012). When considering the localised complexities of ESA landscape use against the MSA and LSA, its distribution shows a tight concentration around water sources and a concern for raw material provision that is less restrictive in later periods when sites are more widely dispersed.

In the study area, the need for both workable raw materials and access to water does not appear to have been a tension in defining the strategy for landscape use in the ESA. If stone artefacts were transported in the course of obtaining food resources, their presence on the landscape has not been recognised, with the exception of the isolated biface on a ridge at Driehoek (DR8b), and the koppie courtyard assemblage at KVK1 which combines a ferricrete biface transported 1 km from the closest known source and other bifaces which could have been knapped from cobbles *in situ*. When drawing generalisations about ESA landscape use at a broader scale, however, it is worth bearing in mind the caveat emphasised by Kuman (2003), that the ESA record that is preserved, observed and selectively published in scientific studies may be creating an apparent stenotopism that masks the wider-ranging landscape habits of ESA hominins.

CHAPTER 6. THE LATER STONE AGE

6.1 Introduction

Although chronologically, the ESA is followed by the MSA, the LSA is discussed before the MSA in order to represent the two opposing and contrasting ends of the Stone Age spectrum. The transition points between the ESA and MSA, and the MSA and LSA are problematic to pinpoint, and the broad trends of behavioural change are better analysed when the artificially imposed temporal boundaries are not the focus of change.

The LSA is defined variously as starting from 40 ka (Wadley 1993; Villa *et al.* 2012) to 20 ka (Deacon & Deacon 1999), but sites in the study area contain LSA deposits with dates from 14.8 ka at Andriesgrond (Anderson 1991), and in the broader west coast region, the site Faraoskop, situated around 30 km to the west of Clanwilliam, has early LSA dating to 16.5 ka (Manhire 1993) and Elands Bay Cave on the coast has Late Pleistocene deposits from 13.6 ka, and a less well established sequence from 45 to 20 ka (Parkington 1990b). The latter two sites show an occupation hiatus from 10.8 ka at Faraoskop, 7900 BP at Elands Bay Cave, followed by reoccupation around 4400 BP (Parkington 1977a; Manhire 1993). During this coastal hiatus, dates of around 5500 BP indicate occupation at inland sites including Renbaan (Kaplan 1987) and Klipfonteinrand 1 (Thackeray 1977).

The part of the LSA which this thesis will primarily focus on is the mid to late Holocene, which has a strong presence in the study area from 3500 BP (Parkington 1987). The main temporal sub-division in the LSA is based on the introduction of pottery around 1800 BP. This marks not only the arrival of a new form of material culture, but a period of inferred social upheaval based on the supposed, but not necessarily universal, tensions between hunter-gatherer and herder peoples (Parkington *et al.* 1986). This had consequences for population displacement and dispersal in the landscape at a regional scale, with more evidence of occupation in the interior which may suggest this served as an inland refugium for populations forced away from the coast. As the LSA record for South Africa is too great in scope for consideration in this thesis, a segment of the Western Cape, from the west coast around Elands Bay, eastwards towards the Karoo, will be used as the contextualising framework against which to consider the LSA of the study area.

6.2 Context: Eurytopism in the LSA

Deacon's argument for eurytopism in the LSA was based on a broadening of the landscape areas utilised by hunter-gatherer groups. There is a rich LSA record across the different ecological zones of South Africa (e.g. Deacon 1976b; Deacon 1984a; Sampson 1985; Mitchell *et al.* 1998), seeing variable regional settlement patterns as populations responded to fluctuating climatic conditions during the terminal Pleistocene and Holocene. Patterns of landscape use are hypothesised to have been internally complex, with models for seasonal movement proposed which emphasise economic strategies of resource scheduling (Parkington 1977a), and social mechanisms of aggregation and dispersal (Wadley 1987, 1989). There is increased regionalisation in LSA material culture traditions – giving rise to a glut of different industrial names (Sampson 1974; Deacon 1984a, b) – with the suggestion that this represents the implementation of stylistic differences to distinguish between neighbouring social groups and express socio-cultural boundaries (Deacon, J. 1972; Deacon 1978, 1984a, b; cf. Wiessner 1983).

One notable feature of LSA landscape use preferences is the proliferation of the use of rock shelters, with repeated occupation episodes of the same sites showing a preference for returning to the same points on the landscape (Deacon, H.J. 1995). This LSA attention to rock shelters offers a high level of preservation and consequently produces a richer record from which to observe landscape use patterns and trends in artefact making. It must be noted that by nature of its relatively recent position in time, the LSA may show a disproportionately eurytopic presence on the landscape owing to increased visibility and better preservation, which must be remembered when comparing the LSA record with that of earlier periods.

From a regional perspective, LSA eurytopism is displayed in the occupation of sites at the coast, in the near-coastal Sandveld, the Cape Fold Mountain Belt, and the interior Karoo, with the habitual movement between environmental zones in a seasonal round proposed for certain periods of the Holocene LSA (Parkington 1977a, 1987). In the true sense of eurytopism, this reflects behaviour that exploits a range of habitat niches (Eldredge 1979; Vrba 1980; Wood & Strait 2004). However, whilst the broad-scale picture is one of eurytopism, the local-scale distribution of sites on the landscape shows a high level of selectivity for the types of situation most suitable for habitation, exhibiting a type of stenotopic specialisation specific to the conditions and potentials of the local environment. For example, in the Elands Bay area on the west coast, it is possible to observe temporal trends in stenotopic preferences, with the types of 'place' that were selected for use by LSA groups shifting in focus between larger caves, small rock shelters, sand deflation hollows, and shell 'megamiddens' at different points in time (Parkington 1980, 1987).

The spatial studies by Mazel (1978; Mazel & Parkington 1981), Parkington (1980), and Manhire (1984) have provided detailed insights into the landscape-scale distribution of artefacts in the west coast and Olifants regions, identifying patterning in types of assemblages and their landscape feature associations. Mazel and Parkington (1981) identified three principal tool types as markers of LSA occupation, occurring in varying frequencies across space: adzes, backed pieces and scrapers. In their regional model, adzes tended to be most prevalent in the mountainous region of the Olifants River Valley, within the present study area, in contrast with the Sandveld where they occurred in sand deflation hollows in much lower proportions. Manhire's (1984) focus on specific landscape features within the Sandveld showed that adzes occurred in high numbers in rock shelter contexts, with much lower numbers in sand deflation hollows. Conversely, backed pieces – mostly backed segments and bladelets – were recorded in comparatively high numbers in Sandveld deflation contexts compared with their low incidence in the mountainous zone. Scrapers were a ubiquitous tool, with thumbnail scrapers contributing to a large portion of the assemblage. This research combined different sources of evidence, including artefacts and rock art, from both surface and excavated sites, which proved successful in building a hypothesis of landscape use that has, broadly, stood the test of time (Parkington 2001b; cf. Sealy & van der Merwe 1985; 1986, 1988, 1992; Jerardino 2010), and provides a platform, both in its methods and results, which guides the approach taken to the LSA in this study.

6.3 Iconic artefacts of the LSA

The LSA saw the introduction of two aspects of the material record that can offer spatial and temporal specificity that is lacking in earlier periods. Rock art represents an archive of evidence that has remained spatially constant. Unlike surface artefacts, rock art is not subject to spatial displacement or burial and therefore can be regarded as an anchor point in space for the positive identification of an LSA presence in that location. Pottery offers an equivalent temporal anchor, known from the excavated record to post-date 2000 BP, associated with the arrival of pastoralism (Deacon 1984b). Both of these sources of evidence carry their own disadvantages; rock art is difficult to date, although depictions of sheep introduced after 2000 BP and colonial imagery give some indication of later art. Whilst pottery can offer a *terminus post quem* for a sealed deposit, it is still problematic in a palimpsest surface assemblage where some of the material may have been discarded earlier, and its spatial integrity is subject to the same ambiguity that affects other surface artefacts. Rock art and pottery do, however, offer an additional layer of spatial and temporal information for associated lithic artefacts which is important in reconstructing local and regional scale site distributions and observing temporal change within the LSA.

The stone artefact record of the LSA, particularly the industry classified as the Wilton, is characterised by a wider range of artefact forms and higher proportion of retouched tools than in earlier pre-Holocene assemblages. The three principal tool forms which occur together to form a 'typical' LSA assemblage in the Western Cape are adzes, backed pieces and scrapers, with other diagnostic LSA tool forms occurring less frequently (Parkington 1980; Mazel & Parkington 1981; Manhire 1984).

6.3.1 Rock art

The rich painting tradition of the Western Cape has been recorded in detail in surveys of the Cederberg mountains and the rocky outcrops of the Sandveld (Manhire *et al.* 1983; Yates *et al.* 1994). The main limiting factor on the distribution of rock art is the availability of suitable rock surfaces on which to paint, with rock art found in caves, shelters, rock walls and isolated boulders.

The dating of rock art images is problematic and the images themselves represent a palimpsest of multiple painting episodes which carries with it the same cautions as a surface stone tool assemblage. A small number of absolute ages provide a temporal bracket for painting traditions; at Steenbokfontein, on the west coast, a fine-line painted slab was buried in deposits giving a minimum age of 3600 BP (Jerardino & Swanepoel 1999), and a finger-painted image from Bushman's Kloof in the Cederberg gave a direct radiocarbon date of 500 BP (van der Merwe *et al.* 1987). The vast majority of paintings are thought to date to within the last 7000 years, most of which are likely to be substantially younger, continuing up until colonial times within the last 300 years (Parkington & Manhire 2003). The best dating indication for rock art has been through the construction of relative chronologies based on the superpositioning of images that can be related to the arrival of pastoralism around 2000 BP (Manhire *et al.* 1983; Manhire 1998).

Two main painting traditions are distinguished in the Western Cape: fine-line painted images, and handprints. Fine-line paintings utilised a brush or other implement to produce images of considerable detail, typically representations of animals and human figures. Often these are arranged in complex panels of different motifs, and may use multiple colours on a single image. Handprints are positive prints produced by the application of paint directly onto the hand, usually occurring as clusters of prints on a panel. Metric studies indicate that they were produced by sub-adults, involving multiple individuals, which has led to their interpretation in relation to puberty and initiation rites (Manhire 1998; Meister 2003). The superpositioning of handprints over earlier fine-line paintings indicates that they are a later phenomenon (van Rijssen 1984; Manhire 1998), and some suggestion has been made that pastoral Khoi groups may have been the authors of the handprint tradition (van Rijssen 1984). However, the presence of handprints in the interior where the rugged landscape was not suitable pasture for sheep, combined with the fact that many of the sites with handprints also contain fine-line imagery, suggests that the same population was responsible, even if separated in time (Manhire 1998). Manhire (1983; 1998) suggests that if Khoi people were responsible for handprints, it would be the decorated handprints that are almost exclusively found on the coastal plain extending to the mountain fringes; however, subsequent surveys in the Doring River area have found inland occurrences which may mean they are a temporally-specific rather than population-specific phenomenon (Wiltshire 2011). The shift in rock art tradition has been viewed as a social response to cope with the incursion of new populations and territorial and resource stress (Manhire *et al.* 1983; Manhire 1984).

The depiction of fat-tailed sheep provides another source of relative dating of rock art since these must necessarily post-date around 2000 BP. The earliest presence of sheep in the Western Cape is dated from sheep bones at Spoegrivier in Namaqualand to between 2400 and 2100 BP (Sealy & Yates 1994; Vogel *et al.* 1997), and at Blombos Cave on the southern Cape coast to 1960 BP (Henshilwood 1996). Painted images of sheep are almost exclusively found in the inland mountainous region, as opposed to the coastal plain of the Sandveld, which prompts interesting questions surrounding their authorship since sheep were most commonly pastured in the lowland coastal areas (Manhire *et al.* 1986; Yates *et al.* 1993). This observation has been challenged by Jerardino based on sheep paintings at Steenbokfontein, arguing that the apparent inland distribution is biased by poor preservation at coastal sites due to harsher environmental conditions (Jerardino & Swanepoel 1999). Sheep are always painted in the fine-line tradition and usually occur alongside other fine-line-painted motifs, which supports their being painted by extant hunter-gatherer groups rather than incoming herder populations.

6.3.2 Pottery

The introduction of pottery into the local archaeological record occurs from around 1700 BP which has been associated with a hunter-gatherer move away from the coast towards the mountains, where occupation in 'bedding and ash' sites seems to intensify (Parkington 1980, 1987; Manhire 1984). Similar dates have been obtained at coastal sites, placing the first evidence of pottery as slightly younger than sheep, between about 1800 and 1600 BP (Yates *et al.* 1994).

Pottery is recorded in low frequencies in the upper levels of all excavated 'bedding and ash' sites in the region: at Andriesgrond from around 1700 BP (Parkington 1980), 1150 BP at Renbaan (Kaplan 1987), 1990 to 1230 BP at Klein Kliphuis (van Rijssen 1992), and 1800 to 1430 BP at Klipfonteinrand 2 (Nackerdien 1989). Pottery occurs by far in its highest frequencies within the last few hundred years, with peaks from 450 BP at De Hangen (Parkington & Poggenpoel 1971), and 230 BP at Putslaagte in the Doring River catchment to the east (Yates *et al.* 1994). The use of pottery signals changing practices in the storage and cooking of food which has implications for shifts in mobility and subsistence behaviour.

Figure 6.1 LSA artefacts from the excavated assemblage at Andriesgrond Cave (AG1): (a) silcrete adze, double-sided, (b) and (c) silcrete and CCS backed bladelets, (d) and (e) silcrete thumbnail scrapers, (f) silcrete MSA flake, reused as an adze, (g) two CCS backed bladelets with mastic residue, hafted back-to-back

6.3.3 Adzes

Adzes are found in particularly high numbers in late Holocene layers at bedding and ash sites of the mountainous regions of the Western Cape (Figure 6.1 (a) and (f)). At excavated sites such as Andriesgrond, De Hangen and Renbaan, the association of high frequencies of wood shavings and wooden artefacts with adze-rich layers supports their suggested use as wood-working tools (Mazel & Parkington 1981). This is corroborated by historical and ethnographic accounts which document the use of flake tools with a deep semi-circular notch, used as a spoke-shave to shape bows, wooden shafts and handles for tools and projectiles, and also bone arrow points (Dunn 1880, 1931; Stow 1905). Comparable scraper-adze tools have been observed in wood-working activities among Australian Aborigines (Clark 1958; Gould 1968). Microwear studies have identified wood polish on the working edge of adzes, most likely caused by chiselling and planing actions, supported by experimental comparisons (Binneman 1983; Binneman & Deacon 1986). Mastic traces on adzes indicates they were hafted for use, seen on numerous tools from Andriesgrond, with several examples from southern Cape caves found preserved in their hafts (Clark 1958; Deacon 1966; Binneman 1983). As a temporal phenomenon, adzes occur in assemblages dating after 5000 BP, as at Klipfonteinrand 1 (Thackeray 1977), but 3500 BP is identified as a key date when their numbers increase (Parkington 1980), becoming even more common in post-pottery layers after 2000 BP (Anderson 1991; Kaplan 1987; Nackerdien 1989).

At numerous mountain-region sites where high numbers of adzes and wood-shavings occur together, there is also a substantial amount of plant material, especially the remains of edible geophytes (Mazel & Parkington 1981). Based on this pattern seen at Andriesgrond, De Hangen and Renbaan in particular, it has been inferred that one of the types of wooden implement made with adzes were digging sticks, which were used to excavate underground bulbs, corms and tubers for food.

The pattern of plant food abundance at shelters in the mountainous region contrasts with the relative paucity of plant material from Diepkloof and Elands Bay Cave in the Sandveld, coinciding with a relatively low adze presence at these sites (Mazel & Parkington 1981; Manhire 1984). Mazel and Parkington proposed that this was a reflection of different dietary patterns and activity-scheduling between the two regions. In the mountainous fynbos zone, an emphasis was placed on plant foods, requiring the manufacture and maintenance of digging sticks which in turn required a high number of adzes, whereas in the Sandveld area both geophytes and woody plants suitable for the production of wooden tools were relatively scarce.

A further factor is that when comparing Sandveld and mountain tool proportions, it may be significant that the coarse, stony mountain soil would cause digging sticks to wear out faster than those used in sand, so more adzes would be used in the production of replacement sticks. In a study of the digging sticks used by the Hadza of northern Tanzania, Vincent (1985) recorded that digging sticks that were unweighted by bored stones wore down at an average rate of 7 cm per digging episode, with a use-life of about eight digging excursions. This rate of wear will vary according to the type and quality of the wood used, and the compactness and nature of the soil; in this region, the soil is considerably more compact and stony than in the Kalahari where Lee (1979) observed that digging sticks used in soft sands can last up to six months. If adzes were indeed used in digging-stick maintenance, then one would expect to find adzes at the location where stick sharpening took place, being discarded when no longer useful.

6.3.4 Bored stones

Bored stones are linked to adzes through their association with digging sticks, used as weights to assist with digging in coarse ground[1]. The large rounded stones were held in place on a digging stick shaft with a wooden peg (Dunn 1931), a rare example of which was found *in situ* with a bored stone at Andriesgrond. It is important to note that ethnographic studies indicate that digging sticks are not always weighted with bored stones; Bleek (1924) observed that in the soft sand of the Kalahari, pointed hardwood sticks would suffice, but in mountainous areas with more stony soil, women would tip their stick with a buck's horn or weight it with a bored stone or *!Kwe*. Bored stones on digging sticks can be seen depicted in rock art images carried by women, supporting their general association as a female artefact, but ethnographic cases indicate that they were also used by men (Steyn 1971) and children (Bleek 1924). They are rarely found in excavated deposits owing to the nature of their use with digging sticks for gathering tubers and other underground plant foods out on the landscape, and therefore they can be expected to be found as isolated, often broken, artefacts, discarded in the open when they were no longer useful.

6.3.5 Backed pieces

In Mazel and Parkington's model, the relative frequency of adzes was contrasted against backed pieces (Figure 6.1 (b) and (c)). Where rock shelter sites in the mountains had a high proportion of adzes, taken to represent a subsistence system dominated by plant foods, deflation hollow sites in the Sandveld had a high proportion of backed pieces, interpreted within a model of seasonal mobility to represent a greater

[1] Other uses for bored stones besides digging stick weights have been proposed, and given the great range of sizes observed, with some specimens weighing 16 kg, it is likely that they served different purposes (Hromnik 1984, 1986; van der Merwe 1985, 1987; Ouzman 1997). Given that the majority weigh about 1.5 kg, this would be reasonable for the function of a digging stick weight.

emphasis on small game hunting in the Sandveld. The function of LSA backed pieces as arrow tips is supported by ethnographic and historic evidence (Dunn 1873, 1880), though use-wear also indicates their use as hafted cutting tools such as knives, with some indication that they were used to cut wood or sedge, or hide (Wadley & Binneman 1995).

In a comparison between the dimensions of LSA and Howiesons Poort backed pieces from Jubilee Shelter in North West Province, Mohapi (2008) argues that if the LSA pieces represent arrow armatures, they would need to have been hafted transversely, or back-to-back in pairs, since as single inserts they would not have had sufficient penetrating force to kill large prey without the additional use of poison. A single transversely-hafted backed piece dating to around 1800 BP was found at Adam's Kranz Cave (Binneman 1994), and the pattern of back-to-back hafting was observed among the /Xam by Dunn (1873, 1880). Two CCS backed pieces were found in a pair at Andriesgrond with mastic along both backed edges, indicating that they may have been joined together back-to-back (Figure 6.1 (g)).

In the Sandveld model developed by Manhire (1984), it is suggested that backed piece-rich assemblages in open deflation hollow sites pre-date adze-rich assemblages in rock shelters, with an occupation period predominantly between 4000 and 1700 BP. This is based on correlation between backed piece-rich layers at Tortoise Cave which strongly resemble the assemblage composition of deflation hollows (Robey 1984, 1987), whereas later adze-rich layers contain pottery and are similar to the post-2000 BP layers at sites such as Andriesgrond and Renbaan (Kaplan 1987; Anderson 1991). The suggested age of these deflation hollow scatters is tightened to 4300 to 3500 BP by Jerardino (1996), based on the reassessment of the Tortoise Cave assemblage and compared with the 3000 to 2000 BP assemblages from the coastal sites Pancho's Kitchen Midden and Steenbokfontein Cave.

6.3.6 Scrapers

Scrapers represent a temporally ubiquitous and morphologically variable category of retouched tool. Mazel and Parkington (1981:23) have described scrapers as a form of "background noise", suggesting that in the case of assemblages where scrapers dominate the formal tool count, this does not reflect a particular prevalence of scraper-based activities, rather an absence of other tasks requiring specialist tool forms. Thumbnail scrapers – small convex scrapers of less than 20 mm made in fine-grained raw materials – occur in high frequencies in excavated assemblages of the LSA Wilton period (Deacon 1984b) (Figure 6.1 (d) and (e)). The high degree of standardisation shown by thumbnail scrapers has been interpreted in terms of their use as a specialised tool (Mitchell 2000). Owing to their small size, they would most likely have been hafted for use, as indicated by mastic traces and one rare example preserved in a lump of mastic in its haft at Boomplaas (Deacon & Deacon 1980). In many cases, mastic traces extend right up to the working edge of the scraper, indicating that it was sharpened while in haft (Clark 1958; Deacon & Deacon 1980).

Observers of the /Xam describe circular flake tools that were large enough to be "gripped by [their] outer edge between the fore-finger and thumb… used in the preparation of their skin mantles and bags, in scraping and clearing away any extraneous matter adhering to skin" (Stow 1905:73). Scrapers are also suggested to have been used for "scraping bows and arrows into shape; in the manufacture of their bone-spoons, awls, arrow tips" (Dunn 1880:13), although it is not clear whether these varied uses were directly observed. Additional suggestions have been put forward for the use of scrapers in processing plant foods (Deacon 1976b), inferred from high frequencies in layers where plant foods are abundant at inland shelter sites, compared with their scarcity at some – but not all – coastal sites, where shellfish were the major dietary alternative to plants (Mazel 1978; Mazel & Parkington 1981). Mazel and Parkington remain unconvinced that scrapers have a significant role to play in the processing of plants, citing Elands Bay Cave as an example of a coastal site where scrapers are the dominant retouched tool yet there is little evidence for plant foods.

Evidence for hide preparation comes from leather items found at sites with good preservation, such as De Hangen (Parkington & Poggenpoel 1971) and Faraoskop (Manhire 1993) close to the study area, and an early garment is dated to 5000 BP at Melkhoutboom (Deacon 1976b). Scrapers come in a great range of shapes and sizes, but there are few functional reasons why there should be such variability, particularly where trends through time are considered. Ethnographic case studies indicate that a reasonable distinction might be drawn between large heavy-duty scrapers and small light-duty scrapers in a tool kit (Brandt 1996), but this would not account for temporal variation which sees a shift from large round scrapers in the Terminal Pleistocene to tiny thumbnail scrapers in the mid to late Holocene. In attempting to make sense of the shifts in scraper form, Hilary Deacon (1976b) recognised three 'homeostatic plateaux', defined as the Robberg, Albany and Wilton industries, which he related to hunting patterns, as seen in the faunal record, which represented adaptive adjustments to three broad periods of climatic change. Janette Deacon (1972; 1978, 1984a), on the other hand, explained trends in dominant scraper types as a product of style, reflecting broad-scale socio-economic change.

There are some scraper forms which are chronologically sensitive in their occurrence. Duckbill or 'Woodlot' scrapers are a distinctive scraper form from the early Holocene, associated with the Oakhurst Industry, with dates of 12,100 to 9300 BP from sites in Lesotho (Mitchell *et al.* 1994; Mitchell 2000), and common in Eastern and Western Cape assemblages from 9000 to 7000 BP (Deacon 1984a). They are characterised by steep, adze-like retouch along both edges, suggested to be to facilitate hafting (Opperman 1987; Parkington *et al.* 1987), although they have also been proposed to be multi-purpose scraping and wood-working tools (Bousman 1991). The utility of duckbill scrapers as temporal markers in the study area is limited since none were located during surveys, although one was identified in separate surveys in a small open scatter in the Biedouw River Valley on the Bokkeveld shales to the east.

Backed scrapers are another temporally specific scraper type, typical of the mid- to late mid-Holocene. These are found in high numbers in west coast assemblages from 5700 BP at Diaz Midden where backed scrapers dominate the scraper category, with more common dates falling between 5100 and 3400 BP (Orton & Compton 2006; Dewar 2007; Orton 2009). In the southern Cape as well, at both Nelson Bay Cave (Inskeep 1987) and Byneskranskop (Schweitzer & Wilson 1982), backed scrapers occur most frequently in layers aged between 6500 and 3200 BP. In surveys carried out in the study area, backed scrapers are present but infrequent, most often found in assemblages with backed pieces and thumbnail scrapers. Given their low frequencies compared to other scraper and artefact types, it is difficult to make a case for their specifically representing a mid-Holocene age in this context.

6.4 LSA artefact distribution in the study area

6.4.1 Rock art

Rock art forms an important aspect of the LSA record in the study area, and owing to the extensive recording efforts of previous research, its distribution is well understood for the region and offers a starting point for approaching LSA settlement. Within an approximate 10 km radius of Clanwilliam Dam, over 500 rock art sites have been recorded[2], with 87 known sites in the core survey areas of the study area (Maps 28.1 and 28.2). A large number of these sites (51) have associated artefactual material, although often this amounts to a thin scatter or a few isolated artefacts. Living sites are less common, with only 19 shelters showing a build up of substantial quantities of artefacts and occupation debris. A site with paintings is generally not more than a few hundred metres from an occupation site, and it is more common for rock art sites to occur in clusters around rocky outcrops than to occur in isolation. Thus, the pattern of site distribution in the LSA shows pockets of activity in what may be termed site complexes, incorporating related loci where painting, artefact production and use, and habitation took place. This is seen, for example, at Andriesgrond, where the main cave shows intensive and repeated episodes of painting and domestic occupation, but four additional ‘satellite sites’ with rock art occur elsewhere on the koppie with little to no domestic debris (Maps 14.1 and 14.2). These are in shelters that are either very small or relatively inaccessible, and are likely to have been used for different purposes to the main cave living site, even if they were not in use at the same time.

[2] Based on information compiled in Wiltshire’s site database

Figure 6.2 Bands of Table Mountain Sandstone form lines of shallow overhangs and rock shelters (KVK 5, 6, 7 and 8)

Figure 6.3 Flat, open area with a dense LSA scatter in front of a rocky outcrop at Puts (PT5)

Figure 6.4 CCS conglomerate nodules in gravels at Puts, maximum size ~50 mm

Figure 6.5 South-westernmost sand deflation hollow at Rietvlei with a dense and extensive artefact scatter

The distribution of rock art sites is necessarily dependent upon the presence of suitable rock surfaces for painting. The underlying Table Mountain Sandstone geology of the region clearly made the area attractive for its potential for painting, with a much less restrictive geology in this sense than the Sandveld or Karoo. The geology is characterised by cliff-like features and rocky kloofs and gullies, with exposed bands of rock often forming linear arrangements of shelters offering potential as occupation locations (Figure 6.2). Parkington and Manhire (2003) have emphasised the importance of water sources in the positioning of rock art sites, observing that the distribution of paintings follows the courses of rivers, tributaries and streams. In the study area, LSA sites tend to occur more frequently along the narrow rocky gullies and tributaries as opposed to the main course of the Olifants River, with the exception of points along the Olifants where shelter-bearing rocky outcrops occur (Maps 27.1 and 27.2). At Warmhoek, Puts and Kransvleikloof, LSA sites are situated along the Jan Dissels and Kransvleikloof tributaries, but at Warmhoek and Puts in particular, sites are also aligned along smaller gullies and streams. In highly rocky areas such as Malgashoek, Renbaan and Driehoek, the focus is on minor, seasonal water courses, with potential for the additional collection of water in eroded depressions on the rock surfaces (as seen in Figure 5.12). The patterns observed suggest that it is the presence of suitable rock shelters, related to the occurrence of a water course, that informed LSA occupation site preferences in the area.

Having used the distribution of rock art to observe a broad outline for LSA activity on the landscape, it is necessary to look more closely at the stone artefact assemblages at shelter sites which identify them as domestic foci, both in terms of the artefact composition and the fine-grained spatial patterning.

Artefacts

The dominant tool form in LSA shelter assemblages surveyed was the adze, which occurred in flake scatters alongside thumbnail scrapers and occasional backed pieces. LSA core types were also often found in these assemblages, including single and multi-platform cores for the production of small flakes, and bladelet cores. Additional artefacts included bored stones, grindstones, ochre with evidence of utilisation in the form of striations and grinding facets, ostrich eggshell and marine shell fragments. These LSA assemblages are typically found on the talus slopes and swards in front of caves and rock shelters, and reflect the range of material commonly found in greater quantities in the deposits of excavated sites (Maps 27.1 and 27.2).

Although there is a repeated association between LSA stone tool assemblages and rock shelters, there is some indication that a relatively flat open area was of greater importance for the location of an activity area than the presence of an overhang, particularly for tasks involving the use of adzes. In five localities, a site with a high frequency of adzes occurs in front of a rock wall with no discernible overhang, but which would provide some shade or protection from the elements. Instead, these areas offer a flat open space suitable for carrying out tasks that have generated a large number of discarded tools. These frequently occur where rock shelters themselves do not have a suitable open area on an associated talus or sward. For example, at Puts, there is a very low incidence of adzes in the small rock shelters which hare confined within a series of narrow rocky gullies. The site PT5 occurs at the head of one of the gullies, with an open clearing in front of a rock wall where there is an artefact scatter similar in composition to a typical rock shelter assemblage, with a particularly high frequency of adzes, 52 of which were recorded (Maps 19.1 and 19.2) (Figure 6.3). A comparable observation is made by Manhire (1984:76) for some of the Sandveld koppie sites where, based on the location of artefact concentrations, a relatively flat open activity space appears to be prioritised over a shelter.

One LSA assemblage, DAM10, is anomalous to the typical patterns observed, dominated by scrapers and situated on the edge of the river, next to a low cluster of boulders but this is not substantial enough to offer shelter or much shade (Maps 9.1 and 9.2). The closest rocky outcrop is approximately 1.2 km to the south east, although the rock shelters there are small and do not show intensive occupation, and there have been no occupiable shelters noted within at least a 3 km radius on the western side of the river. The ten scrapers identified were the only formal tools present, including thumbnail, backed, side and end forms, mostly in silcrete but with quartz and CCS examples. The flake scatter was small and relatively concentrated and included cortical pieces and a noteworthy number of large but extensively flaked cores in hornfels, silcrete and quartzite, as well as two quartzite grindstones. This assemblage is unique in both its situation and composition, suggesting it was a different type of place (*sensu* Parkington 1980) to the domestic shelter sites.

Raw materials

A far broader range of raw materials were used in the LSA than earlier periods, but for the most part artefacts were made in fine-grained raw materials which were suited to the production of small flakes with sharp edges, particularly silcrete and CCS. Silcrete is thought to derive from sources on the edge of the Olifants, and it is possible that additional outcrops were present away from the river. LSA tool-makers also found a source of silcrete in the reuse of older large MSA flakes which were collected off the landscape and used particularly for adzes. The types of CCS used are not limited to those available in local conglomerates (Figure 6.4), as is the case for the few CCS artefacts found from the MSA, instead comprising rocks such as chert and chalcedony deriving from the volcanically-altered Karoo shales that are not available in the Olifants. Similarly, hornfels does not occur naturally in the Olifants south of the Doring confluence and its occurrence most likely represents pieces that have been transported by human agents. Quartz was used for retouched tools more frequently than in the MSA, utilising both quartz conglomerate pebbles and quartz crystals. Quartzite and ferricrete appear to have been virtually ignored for use for flaked stone tools. Cobbles of quartzite and sandstone tend only to be used for bored stones, grindstones and hammer stones.

The location of LSA artefacts in the study area does not show a close tie to the location of local raw material sources and, overall, supports a picture of a high level of raw material transport. There is some indication that silcrete chunks were removed from a source on the Olifants at DAME16A and 16B, with large, unreduced cortical pieces found concentrated in two localities along a short 500 m stretch of the beach, with no substantial *in situ* knapping debris in the way of cores or flakes (Maps 10.1 to 11.2). A thin scatter of small silcrete debitage pieces was present in the wash line on the beach, but in the absence of larger material, it is possible that this, together with occasional pottery fragments, had been washed up by the river from another location upstream. The absence of cores and larger flakes could indicate that chunks of silcrete were removed from a source on the river and taken back to the living areas for tool-making, which would be supported by the consistent presence of cortical pieces in scatters at rock shelters. An additional point of interest was in the presence of numerous hornfels pieces with cobble cortex at DAM16B, alongside the silcrete, indicative of transportation from at least 40 km away.

With a few exceptions, there is little evidence for extensive knapping sites in non-domestic contexts. One reason for this could be that it is difficult to recognise LSA artefacts in a non-domestic setting if retouched tools are absent. Occasional open sites with high quantities of knapping debris and LSA-type bladelet and small flake cores do occur, such as at Andriesgrond (AG4B) and Driehoek (DR11A), although no raw material sources were identified in these locations (Maps 14.1 to 14.2 and 16.1 to 16.4).

6.4.2 Deflation hollows

Sand deflation hollows have played an important comparative role in the regional studies between the Sandveld and Olifants, being an integral feature of the dunes of the coastal and near-coastal region (Manhire 1984). Rock outcrops and koppies are far more infrequent in this area in comparison to the Cape Fold Mountain Belt, and conversely, sand dunes are rare in the Olifants study area. Where they do occur, they are mostly along the Olifants River to the north of Clanwilliam Dam where there is no shelter from the Olifants River Mountains to the west and so wind-blown sand can accumulate.

The most prominent site surveyed was at Rietvlei, near the Bulshoek Dam, where artefacts were recorded in three deflation hollows along the Rietvlei River, a tributary that feeds the Olifants (Maps 22.1 and 22.2) (Figure 6.5). Only a small sample of the total artefacts was recorded, including 10 adzes, 9 backed pieces, and 24 scrapers. The whole scatter consists of many thousands of artefacts on the deflated surface, which in addition to the formal tools mentioned, included a large quantity of small debitage, raw material chunks – possibly manuports derived from the Doring River confluence 20 km to the north – and numerous upper and lower grindstones. Proportionally, the frequency of backed pieces is substantially higher than in LSA assemblages from any other locality in the study area. In this respect, this deflation hollow assemblage follows the classic backed piece-rich pattern observed for the Sandveld (Mazel & Parkington 1981; Manhire 1984), although there has been limited possibility for testing this further in the study area. Of the other deflation hollows in the Olifants area that were investigated, Dwarsrivier (DWR7), on the Jan Dissels River, had only a thin scatter that was lacking in formal tools (Maps 23.1 and 23.2), and Welverdiend (ORV2), a deflated sand drift on the edge of the Olifants, had a substantial artefact scatter but of MSA character (Map 2). The presence of sandy areas with deflation hollows becomes more pronounced further north, towards the Doring confluence, with an extensive dune area at De Neus where five LSA assemblages were recorded by Parkington (1980) (Map 1). An interesting observation drawn from a comparison of these assemblages is that two (DN3 and DN4) resemble the assemblage composition typical of other LSA shelter and talus slope sites in the Olifants River Valley, but two others (DN1 and DN2) show tool frequencies which are more characteristic of Sandveld deflation hollow assemblages (Parkington 1980; Mazel & Parkington 1981). If the chronological pattern proposed by Manhire (1984) for the Sandveld applies to this landscape setting, the two assemblage types may indicate an earlier phase of occupation at De Neus, leaving backed piece-rich assemblages, and a later phase which is dominated by adzes which are a more common feature in rock shelters after 3500 BP (Parkington 1980; Manhire 1984).

The contrast between deflation hollows and rock shelters as landscape features means that they would have been attractive for settlement for different reasons in areas where both were available options, with these preferences interpreted as reflecting temporal trends or the scheduling of activities in different locations in the Sandveld and on the west coast (Manhire 1984; cf. Jerardino 1996). Deflation hollows are unlikely to have been occupied whilst they were actively eroding; rather, it is suggested that they were used in the LSA during periods where an already deflated dune was stabilised by vegetation and moisture retention (Lancaster 1987). Along the Olifants River, the few recorded deflation hollow assemblages occur in places where the floodplain widens and there are no rocky outcrops offering suitable rock shelters for occupation close to the river. It is possible that the presence of sand deflation hollows to the north simply represented an alternative landscape focus for LSA activities which would be seen in the study area to the south if more deflation hollows were present, and it would be a point of interest as to whether assemblages had higher frequencies of adzes or backed pieces, offering possible insights into the relationship between rock shelter and deflation hollow sites in an inland, mountainous setting – in contrast to the Sandveld. Currently, Dwarsrivier offers the only opportunity for this comparison, and there were very few formal tools present in the two deflated areas which contain artefacts (Manhire 2004).

6.5 Factors affecting LSA landscape use patterns

The distribution of LSA sites over the landscape in the Olifants River Valley is widespread, present in all of the areas surveyed around the Olifants and its tributaries. In contrast to the ESA, LSA groups show less of an interest in the Olifants River itself, instead expanding into the tributaries and kloofs, making more explicit use of areas of complex rocky topography. It is the rocky features on the landscape that form the focal points of the LSA, with activities that left behind substantial quantities of lithic debris outside rock shelters which can be interpreted as domestic sites (Parkington & Manhire 2003). The domestic context is central to the way that LSA groups organised their use of the landscape, with these sites being the home-bases to which resources such as water, food and raw materials were transported for processing and use. Consequently, the LSA record presents itself in tight clusters of artefacts at their point of discard, even though the materials present were likely to be obtained from widely dispersed sources reflecting an altogether broader use of the landscape. The repeated use of rock shelters along rivers offers one dimension of information about preferred living sites in the LSA, but the artefacts themselves contain a further level of information about the scale of landscape use, explored here through considering the procurement of water, subsistence and raw materials. These resources are available in the vicinity of the Olifants River but it appears that LSA hunter-gatherers operated at a wider scale.

6.5.1 Water availability

LSA hunter-gatherers were not as constrained in their proximity to a permanent water supply as in the ESA since by this point in time containers for transporting water had long been in use. Water flasks made from hollow ostrich eggshells have been found at many LSA sites, including De Hangen (Parkington & Poggenpoel 1971). In the Sandveld, a cache of four complete ostrich eggshells was found buried in a shelter at Bruinkop (Manhire 1984), and five were found at the shell midden Connie's Limpet Bar (Parkington 2006; Jerardino *et al.* 2009). Other similar caches have been identified and dated to the historical period (Rudner 1953; Morris 1994; Henderson 2002), and their use is documented ethnographically in the Kalahari (Yellen 1977; Lee 1979). Notably, these caches frequently come from areas such as the Sandveld and Karoo which are comparatively arid environments.

In regional context, the Olifants would have provided a far more stable source of water than rivers in the Sandveld to the west and Karoo to the east, where low rainfall combined with poorly developed drainage systems due to porous ground surfaces meant that only the more prominent streams would have held water during the dry season. Sites are frequently found at the mouths of the Sandveld rivers such as the Verlorenvlei, Langvlei and Jakkals where freshwater estuaries create environments rich in resources following the winter rains (Parkington 1976). The seasonal lake at Verlorenvlei was of particular importance, demonstrated by the densely occupied sites of Diepkloof and Elands Bay Cave (Parkington 1987, 1990b). During periods of pronounced aridity, such as the mid-Holocene (7900 to 4400 BP), the archaeological evidence would support a general depopulation of the Sandveld and coastal area around Elands Bay at least[3], suggesting instead a movement towards reliable water sources such as the Olifants.

Consequently, the concentration of fresh water, animal and plant resources in Sandveld environments created a more marked riverine focus than in the Olifants where higher rainfall and mountain run-off ensured that a wider network of water courses were filled for a greater portion of the year, with water itself being less of a concern, allowing other factors to inform settlement choices.

6.5.2 Subsistence

Subsistence strategies in the LSA have been placed in the context of regional settlement patterns, with groups scheduling their activities according to the seasonal availability of particular resources such as geophytes and shellfish (Parkington 1977a). The overall landscape use pattern may be viewed in terms of inland and coastal organisation, as opposed to riverine and non-riverine, although certainly the concentration of plant and animal resources around water courses would have been exploited. The ability to carry water on one's person in the course of the daily foraging round would have enabled hunter-gatherers to increase their forays away from reliable water sources if necessary. Coupled with the use of animal skin bags, like those frequently depicted in rock paintings (Parkington & Manhire 2003) and knotted string bags, as found at Scott's Cave and Melkhoutboom from at least 6000 BP (Deacon 1976b, 1993) and from Diepkloof (Parkington 1977a), greater quantities of food could be carried back to the home base.

It is argued that the subsistence round in the study area had an emphasis on underground storage organs, as evidenced by plant remains at Andriesgrond (Anderson 1991), De Hangen (Parkington & Poggenpoel 1971) and Renbaan (Kaplan 1987). The importance of plant food in Kalahari hunter-gatherer diets is well documented, contributing as much as 80% to the total food procured (Lee 1968; Tanaka 1980; Silberbauer 1981). In the mountain fynbos, geophytes would have been a particularly abundant and reliable resource, although they would have required considerable effort to obtain, even

[3] Although there is an apparent hiatus in cave settlement in the well-studied Elands Bay area, mid-Holocene dates of 6170 BP and 5130 BP have been obtained from Steenbokfontein and Doorspring respectively, which may indicate coastal settlement further north during this period, or alternatively the use of open sites as opposed to caves (Jerardino 1996; Jerardino & Yates 1996; Kaplan 1994).

with the aid of bored stone-weighted digging sticks (Parkington 1977a, 1980). Parkington (1977b) notes that *Watsonia*, *Chasmanthe* and related corm-bearing plants are usually found in moist locations, particularly along stream courses and in valley-bottom floodplains, therefore settlement focused in these areas may have decreased foraging distances. Plants in the genus *Watsonia* may also have played an important role in the hunter-gatherer diet because their productivity can be increased by periodic burning which encourages new growth, a practice observed in ethno-historic accounts of hunter-gatherers inhabiting the fynbos (Thom 1954) and proposed to stretch back through the LSA potentially to the later MSA (Deacon 1976b, 1993).

The main bulk of faunal remains at sites in the study area indicate that dassies and tortoises were the most heavily exploited fauna, targeted particularly during the summer months (Parkington 1977a). Dassies would have been common around the rocky areas favoured for living sites, and tortoises are encountered in the veld, most active in the summer, and both would have been easily collected. Bows and arrows, tipped with backed stone artefacts, were used for hunting game, and other techniques such as snares and traps were almost certainly employed, with rock art images also depicting small antelope approaching nets – a strategy that is suggested to have been particularly effective if game could be funnelled along the narrow kloofs that are frequent in the mountains (Manhire *et al.* 1985). Sampson (1985) suggested that the Wilton-aged sites in the Seacow Valley were intentionally placed some distance away from water sources so as not to frighten game and jeopardise hunting opportunities. Robertshaw (1979) makes the suggestion for the Sandveld that a shortage of water during the dry season would cause game to aggregate around permanent water sources, which, if also applicable to the Olifants River (Manhire 1984), may be a contributing factor towards the relative avoidance of settlement on the Olifants itself during the LSA.

The Olifants River has numerous endemic species of freshwater fish that known to have been exploited by the Soaqua in historical times (Parkington 1977b), with fish bones, although not many, found at De Hangen (Parkington & Poggenpoel 1971). At Nelson Bay Cave and other sites along the southern Cape coast, grooved stones have been identified as net sinkers (Deacon 1984a; Inskeep 1987) although these have not been noted at any inland sites. Occasional marine shellfish remains are found at shelters throughout the Olifants River Valley, with a 'package' of black mussel shells, wrapped in leaves and bound with plant fibre twine, excavated from De Hangen (Parkington & Poggenpoel 1971). Whilst it is unlikely that shellfish would have survived the long journey from the coast in an edible condition, their repeated occurrence at mountain sites attests to contact with the coast directly or with other people who did visit the coast.

6.5.3 Raw materials

The microlithisation of the LSA toolkit had great implications for both the type and quantity of raw material that was needed for tool-making. Cores used for the production of bladelets for backed pieces and small flakes for thumbnail scrapers would only have required small nodules of stone, and these could be easily transported over large distances. Fine-grained raw materials were preferred for their superior fracture properties, and whilst silcrete is available from the Olifants terraces, CCS and hornfels do not occur in the Olifants gravels and therefore would have to be brought in from at least as far as the Doring River. The use of non-local[4] or 'exotic' raw materials involves the transport of raw materials either by a mobile group, or in exchange between populations who have different raw material resource bases; both of which have implications for the distribution of LSA people on the landscape.

In the study area and Sandveld region, the presence of hornfels is a particularly useful indicator of contact with the interior Karoo, with tools termed 'naturally backed knives' being made from hornfels derived from dolerite dykes in the Karoo and not a secondary cobble source. Naturally backed knives are D-shaped, side-struck flakes removed from horizontally bedded Karoo shale, the angular cortex creating the natural back (Parkington *et al.* 1988; Parkington 1990b). These occur in the late Pleistocene LSA assemblages at Elands Bay Cave from about 13,600 until 8000 BP, indicating transport or exchange links between the coast and the Karoo; however, after 8500 to 8000 BP, naturally backed knives become rare which suggests a break in contact with the interior (Parkington 1990b; Orton 2006). This timing coincides with a period of increased aridity which is hypothesised to have restricted movement (Parkington 1990b).

A complementary situation may be seen at Aspoort, situated on the edge of the Karoo, to the south of the Olifants study area, in an area where silcrete does not occur locally yet it is well-represented in the mid-Holocene at the base of the artefact sequence (Smith & Ripp 1978; Parkington *et al.* 1988). In the later Holocene, however, silcrete is absent and the assemblages are exclusively composed of locally available rocks such as hornfels and CCS. Klipfonteinrand 1 can be seen to occupy a frontier position, on the margins of the Karoo and Olifants zones and as a result, showing a mixed raw material profile. In mid-Holocene, assemblages contain silcrete, hornfels and CCS, but after the introduction of pottery,

[4] The term 'non-local' is repeatedly used but poorly defined, with distances of ">25 or 50 km" (Minichillo 2006:360) and 40 km (Gamble 1993; Ambrose 2002, 2006; Porraz *et al.* 2008) commonly cited, but often the distance is not specified or site-specific. As such, the notion of 'non-local' has been deemed by some to be "too vague to be heuristically useful" (Delagnes *et al.* 2006:52). Determinations of distance in raw material procurement are problematic if, if raw material sourcing surveys are even carried out, a closer source is not documented.

hornfels is the dominant material, again, supporting a picture of diminished raw material transport and limited mobility (Parkington *et al.* 1988).

The Olifants River Valley offers a strategic situation that sits between the two major raw material zones dictating access to silcrete and Karoo-derived hornfels and CCS, reinforcing its potential role as an aggregation locus, particularly given its permanent water supply. Aggregation events have been inferred from paintings of group scenes, depicting groups numbering 15 or more people, which are concentrated in the Olifants River Valley (Parkington 1977b; Manhire *et al.* 1983).

It is frequently proposed for the LSA that social relationships were mediated through the exchange of gifts in a model drawn from the Ju/'hoansi practice of *hxaro* (Wiessner 1977, 1983). *Hxaro* is a system of delayed-return, reciprocal gift exchanges between partners in a social network spread over great spatial distances, designed to maintain social relationships, kinship ties and provision for assistance in times of resource or social stress. Typically, it is explicitly symbolic artefacts such as ostrich eggshell beads that have been identified as exchange artefacts, both ethnographically (Wiessner 1977) and archaeologically (Wadley 1987, 1989; Mazel 1989; Mitchell 1996a), but arguments have been put forward for items such as bone points and backed microliths since arrows a *hxaro* item among the Ju/'hoansi (Wiessner 1977, 1983). In a study of LSA sites in the Transvaal, Wadley (1987, 1989) identified sites with high numbers of such exchange items as aggregation sites, and those with few as dispersal sites, but also argued for an intensification of exchange relationships as a medium for buffering risk in times of environmental stress. Mazel (1989) put forward similar arguments for the Thukela Basin, also suggesting that *hxaro*-like exchange became increasingly important in the colonisation of new environments, with groups needing to maintain relationships over greater distances.

The reference to lithic materials in *hxaro*-like exchange is frequently made, but must be treated with caution since ethnographically, raw materials are not noted among gift items (Mitchell 2003), although this does not discount their being involved in other types of exchange (Bousman 2005). The use of non-local lithic materials has, however, been invoked as a means of conferring 'added value' onto items involved in exchange partnerships as an expression of style (Deacon & Wurz 1996; cf. Wiessner 1983). Further to communicating style in social relationships, non-local lithic materials have been suggested to signal an association with the specific place on the landscape where the material was quarried (Hall 2000), with ethnographic reference drawn from Australian aboriginal groups to whom quarries are considered sacred and central to a group's identity (Gould & Saggers 1985). This sort of connection with places on the landscape could be relevant to highly mobile groups who relocated between a series of sites, seeing the periodic reoccupation of certain favoured places.

6.6 Conclusion

The pattern of LSA landscape use in the study area can be described as eurytopic in Deacon's sense of the term, since LSA sites are widely distributed across different segments of the landscape. However, there is also an aspect of stenotopism to LSA site choice, with a very specific set of conditions which appear to be repeatedly met by rock shelters which were used as living sites. The overwhelming majority of shelter sites with a substantial amount of LSA material were caves or overhangs which had a rock surface suitable for painting, a flat activity area in front of the shelter or very close by, and were located close to a source of water – a pattern also noted by Manhire (1984) for the Sandveld. Furthermore, when rock shelters were surveyed in the Olifants River Valley which did not meet these criteria, they very rarely contained more than a few LSA artefacts, if any.

At a localised scale, LSA landscape use shows an untethering from the places where resources were situated on the landscape, with domestic sites serving as a central place to which resources were brought and then processed, as attested to by high frequencies of formal tools that were involved in these tasks. A practical reason why such mobility was possible was due to the use of ostrich eggshell containers and animal skin bags to carry water, tools and gathered resources over greater distances in the course of the foraging round. This stands in contrast to the ESA where there is no evidence for these aids to transportation and consequently activity involving stone tools is clustered much closer to resource procurement locations. A more significant difference between the ESA and LSA, however, was that LSA people possessed social strategies which allowed them to disperse across the landscape, and subsequently re-aggregate. Gamble's (1998) notion of a 'release from proximity' is especially relevant in describing mechanisms that were employed in the LSA, "where social relations came to be stretched across time and space" (Gamble 1998:438). The diminished size of artefacts and their portability may well have played a role in this.

It is suggested that in the dry season, people inhabiting the Olifants River Valley would have been more restricted to the main valley, providing a hypothesised aggregation scenario whereby groups could exchange items and marriage partners prior to dispersal along the minor tributaries away from the river and into the fringe environments of the Karoo to the east and coast to the west where different resources were on offer (Parkington 1977b). Overall, LSA landscape use shows a more structured use of space than observed in earlier periods, marking places on the landscape with rock art and revisiting sites as part of a proposed seasonal round (Parkington 1977a).

Janette Deacon (1988; Deacon & Deacon 1999) applies the concept of 'topophilia' to describe the affinity that people feel towards particular places in the landscape (Tuan 1974). The ethno-historic testimonies of /Xam informants from the Northern Cape Karoo describe the relationships between particular landscape features, the mythological explanations for their forms, and metaphorical meanings embedded in rock engravings that were related to these places – particularly associated with water and rainmaking (Deacon, J. 1988). These accounts indicate that certain places were repeatedly used because they not only had practical value for providing water in an arid environment, but also because of powerful connotations attached to place in folklore. Whilst it is precarious to translate this directly onto the rock art and favoured places of the LSA in the Olifants River Valley given the temporal and spatial disjuncture, there is a repeated presence of rock shelter sites with paintings and artefactual debris along rocky river valleys in the Cape Fold Mountain Belt area. Parkington and Manhire (2003) have emphasised the presence of water as being more significant in site choice than factors such as a shelter's aspect or view over the surrounding area, with an apparent avoidance of rock shelters in remote areas at high altitudes in the mountains where water was not in immediate, easy supply.

The release from proximity to resources, and in social terms, in the LSA is most likely the tail end of a process which began in the MSA (discussed in Chapter 7). The picture is overwhelmingly one of increased mobility which allowed LSA groups to balance access to water, food and raw materials without having to prioritise one resource over the others – a greater concern in the ESA reflected by the general stenotopic focus on water sources. When contrasted with the ESA, LSA landscape use is eurytopic because it is operating at a broader regional level with greater behavioural flexibility, but the type of place selected for occupation fills a very narrow rock shelter-based niche in the Olifants River Valley. In other environments, such as the Sandveld and Karoo where there are fewer shelter-bearing rock outcrops, LSA sites show alternative settlement choices such as sand deflation hollows and other open air sites (Manhire 1984; Sampson 1985). This stenotopic focus on rock shelters as a specific landscape feature creates highly clustered pockets of LSA artefacts at domestic sites where activities took place, leaving very little material on the landscape at large. Evidence from excavated sites in the form of faunal and botanical remains, and stone raw materials indicate that LSA groups operated at a wide spatial scale, resulting in the movement of people and resources over great distances.

Chapter 7. The Middle Stone Age

7.1 Introduction

The MSA has long presented a challenge in its definition because of the apparent disparities between the timing of major technological, anatomical and behavioural changes that occurred between the ESA and the LSA. These developments are important because they have all been identified as major steps towards human modernity (Foley & Lahr 1997, 2003; McBrearty & Brooks 2000). Consequently, a thorough consideration of the MSA needs to address its transitions, from the ESA and to the LSA, in order to contextualise the momentous changes that occurred *within* the MSA. It is this internal change which makes the MSA a particularly interesting period to address in terms of the nature and pace of modern human development, and how this can be identified archaeologically.

It was only relatively recently that the potential antiquity of the MSA in sub-Saharan Africa was recognised by researchers. This was hampered by the limits of radiocarbon dating which, until the last decade, was restricted to a maximum date of about 40 ka (Beaumont & Vogel 1972; Vogel & Beaumont 1972; Higham *et al.* 2006). Prior to the 1970s, it had been thought that the African MSA was contemporaneous with the European Upper Palaeolithic which began around 35 ka, marked by the first occurrence of anatomically modern humans in Europe (Klein 1970). The implication that modern humans emerged in southern Africa before 100 ka was disregarded for a long time, but the refinement of luminescence dating techniques (Wintle 2008) and the addition of genetic evidence which shows a convergence of mitochondrial (Cann *et al.* 1987; Atkinson *et al.* 2009), Y-chromosome (Underhill *et al.* 2000) and autosomal (Witherspoon *et al.* 2006) DNA lineages at around 200 ka lends support to an older MSA.

The earliest known anatomically modern human fossils currently come from East Africa, dating to 195 to 160 ka (White *et al.* 2003; McDougall *et al.* 2005). In South Africa, fossil humans showing anatomically modern characteristics are known from Klasies River Main Cave, dated to 115 to 110 ka and 90 to 75 ka (Deacon & Geleijnse 1988; Grün *et al.* 1990; Feathers 2002), Border Cave, dated to 74 ka (Grün *et al.* 2003), and Pinnacle Point, dated between 170 and 91 ka, although, in the latter case, provenience within this range is uncertain (Marean *et al.* 2004; Marean *et al.* 2007). The temporal relationship between anatomical modernity and behavioural modernity is a complex issue which has sparked great debate (e.g. Klein 1995; Foley & Lahr 1997, 2003; McBrearty & Brooks 2000), largely hinging on how 'modernity' is defined, and how this relates to the period which has been designated 'the MSA'.

Initially, the MSA was identified in "negative" terms, marked by the absence of ESA handaxes and LSA microliths from its assemblages (Minichillo 2005:29). Goodwin and van Riet Lowe (1929) acknowledged the presence of convergent flakes (points) with faceted platforms, and retouched points which constituted the main formal tool class of the MSA (also Volman 1981). Most significant, however, was the emergence of prepared core technology, which demonstrated a particular sort of technological behaviour which distinguished the MSA from the ESA and LSA. Prepared core technology is typically associated with the Levallois technique in European terminology, describing a technological strategy directed towards the production of flakes of a predetermined size and shape following a particular set of conventions in the organisation of the core (cf. Volman 1984:219; Boëda 1993) [1]. The significance of the production of predetermined flakes, possessing a degree of standardisation, meant that they could serve as replaceable components of hafted tools. In the absence of any preserved hafts, however, secure evidence for hafting has not yet been recognised until later in the MSA in the form of mastic traces (Wadley *et al.* 2004; Lombard 2005a, 2006a, 2007). An early date of 500 ka has been obtained at Kathu Pan for lithic points, including retouched unifacial points, displaying basal modification and impact fractures which are consistent with being hafted and potentially used as spears (Wilkins *et al.* 2012). The adoption of hafted tools is also a possible explanation for the demise of the handaxe, providing a more versatile alternative for the previously ubiquitous tool (Deacon & Deacon 1999).

The replacement of bifacial technology by prepared core technology was not a simple transition. Whilst prepared core technology is generally regarded as the technological marker for the MSA, it is now acknowledged that prepared cores actually originated in the late ESA, occurring alongside handaxes in a number of regional transitional industries, such as the Fauresmith and the Sangoan (Clark 1988; McBrearty 2001; Tryon & McBrearty 2002, 2006; Tryon *et al.* 2005). Early evidence dating to 285 ka in the Kapthurin Formation in Kenya shows the interstratification of handaxe- and prepared core-bearing layers (Tryon & McBrearty 2002, 2006). Although not dated radiometrically, late ESA to early MSA technology at Kudu Koppie shows a difference between the Levallois reduction strategies employed during the ESA and those in the MSA, seeing a greater diversity of methods in the MSA, and also a decrease in core and end product size (Wilkins *et al.* 2010). The origins of prepared core technology in the ESA implies that it developed out of the manufacture of large flake blanks for

[1] See also the discussion concerning radial cores in Chapter 4, Section 4.8.2

producing handaxes and cleavers (Kuman 2001). The method of producing large flakes in the Victoria West industry was for a long time described as using a “proto-Levallois” technique (Goodwin & van Riet Lowe 1929; van Riet Lowe 1945; McNabb 2001); however, it has been suggested that “para-Levallois” is a more suitable term which acknowledges the convergent evolution of prepared core technology (Leakey 1936; Lycett 2009). The Victoria West is a regionally-restricted industry, with its characteristic side-struck *hoenderbek* (hen beak), high backed and end-struck *pêrdehoef* (horse hoof) cores recognised only in the South African Northern Cape interior (McNabb 2001; Kuman 2001). What it serves to highlight, through these distinctive core forms, is that prepared core technology is likely to have had multiple origins within pre-existing Acheulean industries.

The production of elongated flake products, described as blades[2], has also been documented at some of these late ESA to early MSA sites, with dates from 545 to 509 ka in the Kapthurin Formation (Johnson & McBrearty 2010), and 464 ka at Kathu Pan (Porat *et al.* 2010; Wilkins & Chazan 2012). The significance of blade production may be overstated in these early industries since it is not the dominant reduction strategy and although laminar products are elongated, with a length greater than twice the width, their morphology does not show the typical parallel-sides associated with later blade technologies. More convincing evidence for laminar technology can be seen from 400 to 200 ka at Qesem Cave in Israel (Shimelmitz *et al.* 2011). Previously, blade technology was thought to require a degree of technological skill and planning capacities possessed only by *Homo sapiens*, with the emergence of blade technology equated with the European Upper Palaeolithic (Mellars 1989, 1996a; Schick & Toth 1993). The early evidence for blade production seen towards the end of the ESA at sites in South Africa, East Africa, North Africa and the Near East points to the convergent evolution of blade technology and no exclusive link with modern human behaviour (Bar-Yosef & Kuhn 1999).

Blade technology becomes a more prominent feature of the MSA as time progresses, as seen in the sequence at Klasies River where blades become common from 110 to 115 ka, reaching maximum frequency in the Howiesons Poort (Feathers 2002; Wurz 2002). Substantial numbers of blades of bladelet proportions are reported earlier than the Howiesons Poort, from 162 ka, at Pinnacle Point (Marean *et al.* 2007; cf. Brown *et al.* 2012a). By the ‘classic’ Howiesons Poort[3], core reduction was dominated by blade production through the use of soft-hammer percussion. Together with the manufacture of backed bladelets and segments, this method of blade production represented a

[2] Definition of blades given in Chapter 4, Section 4.8.2

[3] The ‘classic’ Howiesons Poort has been specified as the period 70 to 65 ka when the Howiesons Poort is widespread across southern Africa south of the Limpopo River, showing a similar manifestation between sites (Lombard 2005b; Soriano *et al.* 2007; Porraz *et al.* 2008; Porraz *et al.* 2013a; Porraz *et al.* 2013b).

significant shift in technological organisation during the MSA which set it apart from earlier periods (Wurz 2002; Soriano *et al.* 2007; Villa *et al.* 2010; Porraz *et al.* 2013b; cf. Mackay 2008).

Further complicating our understanding of what truly defines MSA technology, the recognition of backed 'microlithic'[4] artefacts in some MSA assemblages has highlighted the need for the definition of the MSA to be reassessed with regard to its distinction from the LSA (Deacon 1989; McBrearty & Brooks 2000). The start of the LSA was previously defined by the first incidence of backed segments and bladelets (Goodwin & van Riet Lowe 1929), and on this basis, the occurrence of backed pieces in the Howiesons Poort led to its being regarded as a transitional industry between the MSA and LSA (Clark 1959). With the subsequent improvement of dating methods and evidence from additional sites, it has become clear that the Howiesons Poort was not the immediate precursor to the LSA, but was succeeded by a return to MSA-like technologies without the production of backed pieces. Rather than representing a kind of technological regression or devolution at the end of the Howiesons Poort (Henshilwood 2005; McCall 2007; Mellars 2007; cf. Lombard & Parsons 2010, 2011), this reinforces the impression of multiple, punctuated episodes throughout the MSA and LSA which are characterised by a proliferation of backed microlithic technology (Ambrose 2002; Hiscock & O'Connor 2006; Hiscock *et al.* 2011; cf. Mellars 2006).

The earliest backed pieces are suggested to date between 300 and 200 ka at Kalambo Falls and Twin Rivers in Zambia, associated with the Lupemban industry (Clark & Brown 2001; Barham 2002a), although the dates and stratigraphy have been called into question (Herries 2011; Barham 2012). In contrast to those of the Howiesons Poort, these are not standardised artefacts (Wurz 1999, 2000), but they occur alongside large quantities of ochre which, in Howiesons Poort contexts, has been associated with the production of hafting adhesive, and, therefore, could indicate earlier origins for the complex technical behaviour involved in the hafting process (Barham 2002a, b; Wadley 2005a). Stronger evidence comes from Pinnacle Point 5-6, where backed bladelets have been dated to 71 ka and are

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[4] The application of the term 'microlith' is variable and potentially problematic since, in a southern African context for example, the Howiesons Poort and much smaller LSA Robberg and Wilton microlithic industries are lumped together under the same term (Wurz 2000; Ambrose 2002; Hiscock *et al.* 2011). Typically, microliths include bladelets, although the dimensions that distinguish between blades and bladelets differ between researchers (see Brown *et al.* 2012b), and they may be produced on truncated blades or flakes (Kuhn 2002). Where microliths are retouched, this usually takes the form of steep blunting (backing) to one or more edges, producing a range of geometric shapes (Kuhn & Elston 2002). Clark's (1985) definition of Mode 5 microliths includes bladelets up to 50 mm in length, although most are less than 30 mm. Ambrose (2002) makes a distinction between microliths which occurred during the MSA from at least 70 ka, and "truly microlithic industries" (2002:21) which appeared later, in eastern Africa from 50 to 40 ka, and the "true microblades" (2002:12) of the LSA Robberg, although he does not specify the dimensional grounds for this separation. Deacon (1984a) regards backed microliths as having a length of 25 mm or less, specifically referring to LSA industries.

regarded as predating and being separate from the Howiesons Poort which starts at 64 ka (Brown *et al.* 2012a). This pre-Howiesons Poort designation may warrant revision following the long chronology for the Howiesons Poort now proposed for Diepkloof, spanning 109 to 52 ka and marked by considerable internal change (Porraz *et al.* 2013b; Tribolo *et al.* 2013; cf. Jacobs *et al.* 2008b; see also Wadley & Harper 1989; Parkington 1990a; Soriano *et al.* 2007).

Beyond purely technological implications, the presence of standardised backed segments in the Howiesons Poort has been heralded as a sign of modern behaviour, based on inferred social and symbolic communication through shared artefact conventions and concepts of value expressed through certain raw materials (Wurz 1999, 2000, 2002, 2008; McBrearty & Brooks 2000). The Howiesons Poort and the preceding Still Bay display a range of other behaviours suggestive of symbolism and complex cognitive abilities, from which the capacity for fully syntactical language has been inferred (Henshilwood & Marean 2003; Henshilwood & Dubreuil 2009). The Still Bay features the earliest known engraved 'art', shell beads and polished bone points (d'Errico *et al.* 2005; d'Errico & Henshilwood 2007; d'Errico *et al.* 2008; Henshilwood *et al.* 2009; d'Errico *et al.* 2012b), all of which were identified as novel behaviours that marked the Upper Palaeolithic in Europe and were used to construct a 'trait list' of what constitutes fully modern human behaviour (Mellars 1973, 1989; Deacon, H.J. 1995, 2001).

This issue became central to the debate about the origins of modern human behaviour, with strong objections raised to a 'Eurocentric' trait list being translated directly into the African record, in which anatomically modern humans have a much longer chronology (Deacon, H.J. 1989, 1995, 2001; McBrearty & Brooks 2000; Wadley 2001). The apparently new and revolutionary behavioural features that are seen in Europe around 35 ka with the arrival of modern humans can, in fact, be seen to arise gradually throughout the MSA and in different locations across Africa (McBrearty & Brooks 2000). In spite of the evidence to the contrary, some still propose a late origin for modern human behaviour arguing that, although the fossil evidence indicates that anatomical modernity had been reached by 200 to 150 ka, the development of fully modern cognitive abilities did not occur until 40 to 50 ka (Klein 1995, 1999, 2000a, 2001; Ambrose 1998, 2001). The precise cause of this apparently sudden cognitive change is poorly evidenced, but a neural mutation has been suggested (Klein 1995).

Identifying the transition from the MSA to the LSA is problematic, particularly because there are few known rock shelter sites, and iconic tool types are scarce which hampers its recognition at open sites (Mitchell 1988; Wadley 1993). The principal technological change sees a shift from prepared core-based to bladelet-based reduction strategies, particularly the bipolar technique, as seen at Border Cave after 56 ka (Villa *et al.* 2012), and in 'transitional' layers from about 25 ka at Rose Cottage Cave (Clark 1997, 1999), Sehonghong (Mitchell 1994), and Umhlatuzana (Kaplan 1990). Interestingly, all of these sites are on the interior and eastern side of South Africa, falling within the Summer Rainfall Zone, where the sequence suggests that the region saw episodic occupation (Mackay 2009). In contrast, Elands Bay Cave is the only site on the west coast which has evidence for occupation at 25 ka, following a long occupational hiatus which commenced prior to 40 ka[5]. The industry has transitional characteristics in that prepared cores continue to be present in very low numbers between 25 and 16 ka although the assemblage is predominantly microlithic quartz (Mackay 2009; Parkington & Yates n.d.). The layers overlying the post-Howiesons Poort at Klein Kliphuis also show a combination of MSA technology and an increase of quartz and bipolar reduction, but ages and stratigraphy for this part of the sequence are poorly resolved (Mackay 2009).

Whilst technological change can be seen as a gradual shift between the MSA and LSA, the abrupt disappearance of other non-lithic artefacts, first seen in the MSA but previously thought to characterise the LSA, is rather puzzling. After the early appearance of engraved designs, shell beads and polished bone points in the Still Bay and Howiesons Poort, these 'symbolic' artefacts are largely absent from the archaeological record until after 12 ka. The few exceptions indicate that this knowledge was not lost, such as the painted slabs dated to 25 ka from Apollo 11 which represent the oldest known parietal art (Wendt 1976), possible ostrich eggshell beads from 42 ka layers at Boomplaas, although these may be intrusive from the overlying LSA (Deacon, H.J. 1995), ostrich eggshell beads from East Africa from 50 to 40 ka (Ambrose 1998), and bone tools from Border Cave at 44 ka (d'Errico *et al.* 2012a). The general absence of this behaviour, then, may be a result of preservation or sampling bias, given the relatively low number of sites that date to this transitional period, or it may indicate that groups had a lesser need for the symbolic artefacts used to negotiate social relationships in earlier and later periods (Mitchell 2008).

The LSA is regarded to have fully commenced once a particular "package" of behaviours with modern ethnographic analogues had accumulated (Deacon & Deacon 1999:109; Villa *et al.* 2012). The co-occurrence of these behaviours, which included painted and engraved art, beads, pendants, polished bone tools, grooved stones, bored stones, bow and arrow technology, and the formal burial of the dead, is taken to represent a fundamental shift in human behaviour that sets the LSA apart from the MSA (Deacon & Deacon 1999). Concerns have been voiced that modern Kalahari San ethnography and early ethno-historic accounts are over-used, and projecting them even beyond the pre-colonial LSA, let alone

[5] Radiocarbon dates for layers earlier than ~25 ka give infinite ages >40 ka, although the MSA material is likely to date to the early part of the MSA (Volman 1981). Currently these are the only ages available for Elands Bay Cave, although luminescence dates for the earlier layers are in progress.

into the Howiesons Poort[6], assumes an unrealistic level of cultural conservatism (Humphreys 2005, 2007; Mitchell 2008). There is, however, some value in approaching behavioural modernity by working backwards from unequivocally modern behaviour and associated material culture, which is observed in present hunter-gatherers, to develop a chain of inference back through the LSA and towards the MSA (Deacon, H.J. 1995, 2001). In this way, the gradual shifts which permeate through all aspects of behaviour – not just recognised in certain artefacts – can be assessed in terms of a qualitative change in behaviour.

7.2 Context: Eurytopism in the MSA

In his assessment of the sequence at Klasies River, Deacon identified a strong trend for behaviour that resembled the LSA and was therefore to be regarded as 'modern' (Deacon, H.J. 1995). He observed this continuity in behaviour most clearly in the MSA record from Klasies River where, in the Howiesons Poort layers, he recognised evidence for storeyed domestic hearths, active hunting of bovids of all sizes, exploitation of plant resources including fire-management of fynbos, colour symbolism through ochre use, artefacts which may have been involved in reciprocal exchange systems, and social organisation based around the nuclear family with mechanisms for the aggregation and dispersal of groups (Deacon, H.J. 1989, 1995, 2001). The long MSA sequence at Klasies River, extending from 115 to 50 ka (Feathers 2002), highlighted the Howiesons Poort as the point at which numerous behaviours converged that would not have been out of place in an LSA context, with a similar case presented for Boomplaas which had LSA deposits overlying the Howiesons Poort (Deacon, H.J. 1995).

The cave setting of these two sites illustrates a more widespread trend for cave settlement in the MSA, beginning around 115 ka at Klasies River, with earlier dates from 162 ka from other coastal caves such as Pinnacle Point 13B (Marean 2010). The overlapping settlement of areas in the MSA and LSA, often with reoccupation of the same caves, presents what Deacon described as a pattern of eurytopic landscape use (Deacon, H.J. 1995, 1998). As MSA groups increasingly took advantage of the resources of the fynbos and coast-line, they were no longer restricted to the concentration of resources along river valleys and other water sources, as seen in the ESA and at many early MSA sites, such as Florisbad and Kathu Pan (Beaumont 1990a; Kuman *et al.* 1999). The extent of the fynbos biome across the southern and Western Cape, between the Cape Fold Mountain Belt and the coast, accounts for the wide range of MSA and LSA settlement in this region.

[6] Ethnographic analogies have been drawn for a *hxaro*-like system of exchange (Deacon, H.J. 1995; Wurz 1999; cf. Mitchell 2003; Solomon 2006) and shamanism in the Howiesons Poort (Lewis-Williams & Pearce 2004; Lewis-Williams 2006; cf. Parkington 2005; Solomon 2006).

7.3 Iconic artefacts of the MSA

The later industries of the MSA are notable for the presence of time-sensitive artefact types which occur as part of distinctive technological systems. Radial cores, producing flakes with convergent scars, faceted platforms and Levallois-type flakes and points, are identifiers of the MSA in general but are difficult to position within a finer-grained chronology. Blade production also occurs throughout the MSA but there are characteristic reduction systems, such as that seen in the classic Howiesons Poort (Soriano *et al.* 2007; Villa *et al.* 2010; Porraz *et al.* 2013b).

Bifacial points and backed pieces are regarded as horizon markers of the Still Bay and Howiesons Poort respectively, although new indications from the sequence at Diepkloof show that neither industry is as tightly temporally constrained or homogeneous as had previously been thought (Porraz *et al.* 2013b; Tribolo *et al.* 2013; cf. Jacobs *et al.* 2008a). Unifacial points are generally regarded as a post-Howiesons Poort tool type, but they are known to occur throughout the MSA and therefore their temporal designation within the MSA comes with a caveat.

7.3.1 Bifacial points

Bifacial points have attracted a great deal of attention as a highly distinctive, temporally-restricted stone tool form, occurring alongside an array of innovative behaviours at cave sites (Henshilwood 2012). Although the bifacial foliate or lanceolate point is regarded as the iconic *fossile directeur* of the Still Bay industry, generally dated to between 70 and 77 ka (Jacobs *et al.* 2008a; Lombard *et al.* 2012), it now appears that a much older and potentially more complex chronology is suggested, with TL dates of 109 ka (Porraz *et al.* 2013b; Tribolo *et al.* 2013), and the presence of bifacially worked pieces recorded in layers assigned to the Early Howiesons Poort (Porraz *et al.* 2013b). Additionally, bifacial points are known from sites without a formally recognised Still Bay industry, occurring in the lowest Howiesons Poort layers at Nelson Bay Cave (Volman 1981), the pre-Howiesons Poort at Klasies River (Wurz 2002), and pre-Howiesons Poort 'Pietersburg' layers at Border Cave (Beaumont *et al.* 1978), with a resurgence of bifacial points in the final MSA at Sibudu around 35 ka (Villa *et al.* 2005; Wadley 2005b). Whilst bifacial points do occur in low numbers at various stages of the MSA, point production peaks in the Still Bay, preceding the Howiesons Poort, when bifacial points are the principal retouched tool form (Mackay *et al.* 2010). Stratified Still Bay occurrences, though few, are found across South Africa, with well-dated shelter sequences currently limited to Hollow Rock Shelter (Evans 1994; Högberg & Larsson 2011), Blombos (Henshilwood *et al.* 2001b; Villa *et al.* 2009), Diepkloof (Rigaud *et al.* 2006; Mackay 2009; Porraz *et al.* 2013b) and Sibudu (Wadley 2007), with a variant including serrated-edged points at Umhlatuzana (Lombard *et al.* 2010). Bifacial points have been widely reported as isolated surface finds in dunefield settings (Minichillo 2005; Kandel & Conard 2012), and are found in large quantities at the open-air manufacturing site of Soutfontein in the Knersvlakte (Mackay *et al.* 2010).

Bifacial point production generally used initial hard hammer percussion, followed by marginal soft hammer flaking (Villa *et al.* 2009; Högberg & Larsson 2011), but technological studies of bifacial points have identified the use of novel manufacturing techniques, with the application of pressure flaking to enable finer shaping of points from Blombos in the final stages of working, following initial heat treatment of silcrete to improve the flaking quality of the material (Mourre *et al.* 2010). Heat treatment has in fact been observed from 162 ka at Pinnacle Point, but it is suggested that its regular use was from 72 ka, coinciding with the Still Bay at other sites (Brown *et al.* 2009; cf. Schmidt *et al.* 2013). Both pressure flaking and heat treatment relate to the use of silcrete which is the dominant material at Blombos, but at Diepkloof and Hollow Rock Shelter, points are often made of locally available quartzite and quartz and these techniques are less apparent (Porraz *et al.* 2013b).

Based on macrofracture and tip cross-sectional area analysis, bifacial points have been interpreted as hunting weapons (Shea 2006; Villa *et al.* 2009; Mackay *et al.* 2010; Högberg & Larsson 2011), or as hafted cutting tools (Minichillo 2005; Porraz *et al.* 2013b), or as both (Lombard 2006b). Residue and use-wear analysis on broken points from Sibudu indicate they were hafted for use as thrusting or throwing spears, but unbroken double-pointed specimens may have been used as hafted butchery knives since few show impact fractures typical of hunting weapons (Lombard 2006b). Bifacial technology is often cited as a technological strategy suited to multifunctionality, versatility and maintainability (McCall & Thomas 2012) with bifacial points being curated and undergoing frequent resharpening (Porraz *et al.* 2013b), potentially whilst remaining in haft (Minichillo 2005; Villa *et al.* 2009). Some interpretations of bifacial points go beyond their functional uses as spears or knives, with a symbolic role suggested owing to the extreme thinness of some of the points (Marean & Assefa 2005; Minichillo 2005) and implied in the use of non-local or high-quality raw materials to invest 'added value' in items for exchange (Henshilwood & Dubreuil 2011; cf. Wiessner 1983).

7.3.2 Backed pieces

Backed pieces are the diagnostic tool of the Howiesons Poort which, together with a range of other 'precocious' features such as blade-based technology, bone tools and intensive ochre use, meant that for a long time it was believed to be transitional to the LSA (Clark 1970; Parkington 1990a). The sequence from Klasies River demonstrated that this was not the case, showing that the Howiesons Poort was overlain by MSA industries without backed pieces which resembled the technology of earlier MSA periods (Singer & Wymer 1982; Deacon 1989; Wurz 2000). A recent series of OSL dates obtained by Jacobs et al. (2008a) from sites across South Africa indicated a short, constrained period for the HP, lasting from around 65 to 59 ka, separated from the Still Bay by about 6000 years. The evidence from Diepkloof, however, indicates that the Howiesons Poort was not as homogeneous an entity as thought, with a long sequence displaying considerable internal change spanning the period 109 to 52 ka (Porraz *et al.* 2013b; Tribolo *et al.* 2013).

Backed pieces are made on blade or bladelet blanks as part of a blade-orientated technological system, taking a range of geometric forms, most typically as crescent-shaped segments and trapezoid pieces (Wurz 2000; cf. Mackay 2008). The relative standardisation in form shown by these design types, their resemblance to LSA arrow points and associated changes in subsistence patterns have placed them at the centre of a debate over whether they were hafted for use as arrows (Lombard & Phillipson 2010; Lombard 2011). The results of replication experiments suggest that backed pieces could have been hafted in numerous arrangements with respect to the haft, forming a range of pointed and barbed implements that may have had functional differences (Pargeter 2007). In support of this, studies on the tip cross-sectional area values of artefacts from Sibudu, Umhlatuzana and Rose Cottage Cave are used to propose various specialised uses as arrows, darts (thrown with spear-throwers), and spears (Mohapi 2008). Specific patterning between segments in different raw materials has been observed at Sibudu, where it is argued that quartz segments hafted transversely could have functioned as arrowheads, with larger hornfels and dolerite used either as spear points or diagonally-hafted barbs on hand-held thrusting spears (Lombard 2007; Wadley & Mohapi 2008). Micro-residues on backed pieces from Sibudu and Umhlatuzana indicate that they were hafted to shafts of bone or wood, and that various mastic recipes were used according to whether an ochre-binder was needed to produce a stronger adhesive (Lombard 2007, 2008). The presence of animal residues on the sharp, unbacked edge of many of the backed pieces from Sibudu supports their use as hunting weapons or butchery knives (Lombard 2008). Comparable residue and use-wear studies on the backed assemblage from Diepkloof places an emphasis on their function as knives, rather than projectiles, with evidence of being used to cut and scrape hard and soft animal bone and tissue, and wood (Charrié-Duhaut *et al.* 2013; Igreja & Porraz 2013).

The interpretation that backed pieces were used as arrow tips in the Howiesons Poort has been challenged by analysis of the assemblage from Klasies River, where there is a very low incidence of impact fractures consistent with use as projectiles (Villa *et al.* 2010). Villa et al. (2010) express concern regarding the absence of backed pieces in the period immediately following the Howiesons Poort where a return to hafted unifacial spear points and the apparent abandonment of the bow and arrow would mark an unlikely technological regression.

It seems most likely that backed pieces were used for a range of hafted composite tools, with the standardisation observed in their shape and size a technological consequence of being replaceable elements in a haft. Alternative arguments for standardisation have been put forward with symbolic implications; Wurz (1999, 2000) argues that size selection of blanks at Klasies River reflects an expression of style to communicate social information through artefact form. There is also strong selectivity in the use of fine-grained raw materials for backed pieces at Klasies River, in contrast to locally abundant quartzite which dominates the rest of the assemblage (Wurz 1999, 2000), with a similar pattern of selection seen at Diepkloof (Mackay 2011a; Porraz *et al.* 2013b). This is interpreted as having non-functional significance, reflecting social convention and embedding symbolic meaning in artefacts which could have been involved in reciprocal gift exchange relationships (Deacon 1989; Deacon & Wurz 1996; Wurz 1999, 2000).

7.3.3 Unifacial points

The tool class of unifacial points subsumes a wide range of morphologically variable tools, including any flake that has been shaped unifacially to form a point. Retouch may be marginal or invasive, often including marginally retouched Levallois points, and points with bifacial thinning at the bulb may also be classified as unifacial (Volman 1981; Mohapi 2005; Villa & Lenoir 2006). The process of bifacial point manufacture described by Högberg and Larsson (2011) and Porraz et al. (2013b) raises the possibility that some of the more invasively worked unifacial points could represent unfinished bifacial points which were first flaked entirely on one face but discarded prior to flaking the second (usually ventral) face, which may be pertinent where bifacial and unifacial points occur together.

Unifacial points are not as closely diagnostic of a temporal period as bifacial points are for the Still Bay and backed pieces for the Howiesons Poort, but they are generally regarded as the principal tool type of the post-Howiesons Poort, with dates from around 58 ka at Sibudu, 56 ka at Rose Cottage Cave (Jacobs *et al.* 2008a) and 52 ka at Diepkloof (Tribolo *et al.* 2013). Whilst unifacial points are present in almost all units at Klein Kliphuis, they rise in frequency to become the dominant tool of the early post-Howiesons Poort (Mackay 2009, 2010) and are found throughout the post-Howiesons Poort at Rose Cottage Cave (Soriano *et al.* 2007) and Sibudu (Cochrane 2006; Conard *et al.* 2012). Unifacial points are very rare in the post-Howiesons Poort (MSA III) at Klasies River, although Villa et al. (2010) note that convergent blades occur which could represent an alternative point form. Retouched unifacial points are found below and during the Howiesons Poort at Klasies River (Singer & Wymer 1982; Wurz 2000; Villa *et al.* 2010) and are reported outside of the post-Howiesons Poort at other sites (Conard *et al.* 2012; Mackay 2012; Porraz *et al.* 2013b).

A recent attempt has been made to distinguish between morphologically different unifacial points, with two forms, 'Tongati' and 'Ndwedwe', argued to be "as distinctive and well defined as that of the tools that distinguish the Still Bay and Howiesons Poort" at Sibudu (Conard *et al.* 2012:197). Although points that resemble the Tongati form, with short triangular ends, have been identified in the post-

Howiesons Poort at Diepkloof, Ndwedwe points are absent, recommending caution when drawing comparisons between a combination of point types which may be highly localised to the sequence at Sibudu and not representative components of a distinct industry (Conard *et al.* 2012; Porraz *et al.* 2013b). Technological analysis of the Sibudu assemblage has revealed different strategies of tool maintenance in the two point forms; short-pointed Tongati-type points were reworked with attention to maintaining the angle of the point, and elongated Ndwedwe-type points were retouched to keep the length of the laterals (Conard *et al.* 2012). This is interpreted to reflect separate unifacial point types which may have served different tasks.

Unifacial points from the post-Howiesons Poort at Sibudu and Rose Cottage Cave have been interpreted as spear points on the basis of metrical and macrofracture analysis (Lombard 2005a; Mohapi 2005, 2008; Villa *et al.* 2005); however, narrower, thinner unifacial points from the final MSA at Rose Cottage Cave are within the range of arrowheads (Mohapi 2005; Villa & Lenoir 2006). Evidence for hafting of unifacial points comes from mastic traces identified through residue analysis (Lombard 2005a, 2006a), hafting polish (Conard *et al.* 2012), and basal thinning on the ventral face which would aid attachment to a haft using plant twine, or an adhesive incorporating resin and ochre (Lombard 2004, 2005a; Villa & Lenoir 2006).

Unifacial points raise an interesting technological consideration, reflecting a return to point-based technology following the backed tool-orientated Howiesons Poort industry. Functionally, they may fulfil the same role as a bifacial point if used as a hunting spear or cutting edge, similarly for unretouched Levallois points which are frequent in the post-Howiesons Poort (Villa *et al.* 2010). The replacement of bifacial and backed technologies with unifacially and unretouched pointed tool forms may relate to patterns in raw material procurement and tool curation, as opposed to a change in the functional requirements of tools or any diminished technological or cognitive capability of humans following the innovative bursts of the Howiesons Poort and Still Bay.

7.4 MSA excavated record in the study area and surrounds

The excavated record for the study area provides combined evidence of occupation spanning the MSA, documenting the use of caves and rock shelters, representing a shift from the ESA. Currently the earliest excavated MSA is from Klipfonteinrand, classified by Volman (1981) as MSA 2b. The assemblage is quartzite rich and contains denticulates and large convergent flakes (Mackay 2009, 2012). Unifacial points with soft hammer flaking were found in pre-Howiesons Poort layers from both Parkington's 1969 excavation and Mackay's 2011 to 2012 excavations, with some overlap with the Howiesons Poort as well. This stands in contrast with the general post-Howiesons Poort association for unifacial points; in fact, Klipfonteinrand appears to have been abandoned during the post-Howiesons Poort. Howiesons

Poort artefacts were found in the overlying layers but there is no intermediate Still Bay, despite its presence at Hollow Rock Shelter only 5 km to the west. The deposit at Hollow Rock Shelter is not deeper than 200 mm, but contains a large number of Still Bay bifacial points, with an underlying pre-Still Bay containing scrapers, denticulates and blades (Evans 1994; Mackay 2009). Preliminary OSL dates of 72 to 80 ka are consistent with the general timing of the Still Bay industry (Högberg & Larsson 2011).

Both Klipfonteinrand and Hollow Rock Shelter are situated on the eastern side of the Pakhuis Mountains, in a different resource catchment to the Olifants River Valley sites in terms of water, vegetation, and raw material availability. This area experiences lowered rainfall due to the rainshadow effect of the mountains, and the primary water source closest to both sites is the highly seasonal Brandewyn River.

Klein Kliphuis is located in the Olifants River Valley, 7.5 km north of Clanwilliam Dam, and it contains both Howiesons Poort and post-Howiesons Poort layers, overlain by late Holocene LSA (Mackay 2006; Orton & Mackay 2008; Mackay 2009, 2010). The Howiesons Poort contained a high density of backed artefacts, and unifacial points were the principal tool found in the post-Howiesons Poort. An unusual 'hybrid' artefact form, described as a bilaterally backed point, displays a combination of backing retouch with a point morphology, occurring during a short transitional period when backed pieces and unifacial points are present in the same layers (Mackay 2011a). Layers pertaining to the period following the post-Howiesons Poort, around 40 to 20 ka, are present at Klein Kliphuis, but stratigraphic difficulties mean that interpretation has thus far been limited (A. Mackay pers. comm. 2013). The industry present in this period may be analogous to the 'final MSA' as described by Wadley (2005b) for layers at Sibudu which date to 42 to 33 ka (Mackay 2009).The end of the MSA is a period which is currently poorly resolved for this area of the Western Cape.

Other shelter sites in the Olifants River Valley contain evidence of MSA occupation; at Andriesgrond, there is an MSA component in the excavated cave material clustered in the basal layers, although the stratigraphy is poor and undated. Given the abundance of surface MSA material on the area surrounding the cave, Andriesgrond is discussed in greater detail below (Section 7.5.5). Additionally, ground-penetrating radar surveys suggest that there is substantial depth to the deposit at Rondegat and Kriedouwkrantz caves, on the Olifants River south of Clanwilliam Dam, which may indicate the presence of MSA deposits, supported by substantial quantities of MSA artefacts on the talus slope at Kriedouwkrantz (A. Mackay pers. comm. 2012).

Figure 7.1 Bifacial points from Dam East (DAME8A): (a) broken bifacial point tip, (b) complete bifacial point, (c) bifacial point, reworked, (d) and (e) broken bifacial point butts. All silcrete.

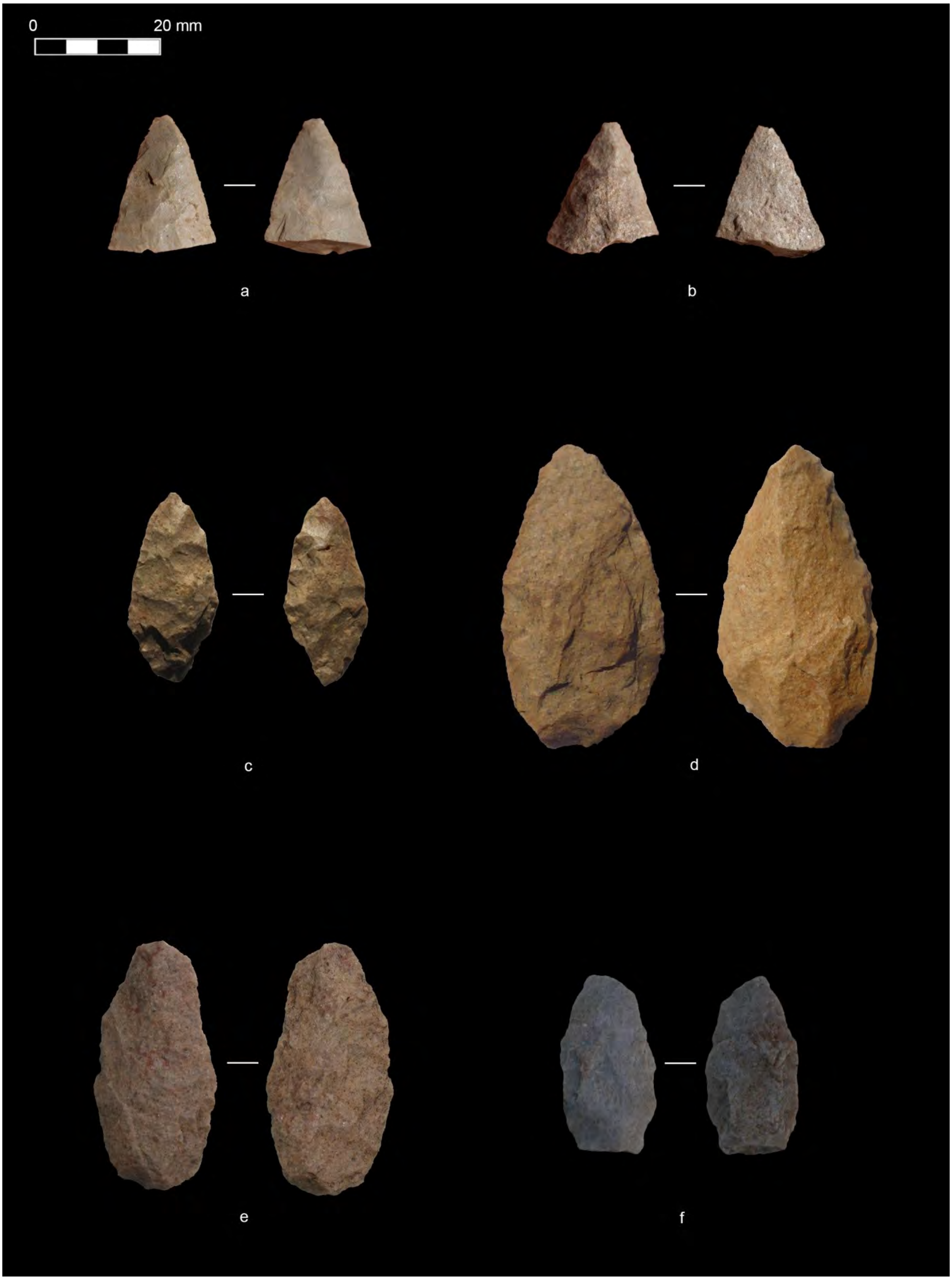

Figure 7.2 Bifacial points from AG3A: (a) and (b) bifacial point tips, (c) complete bifacial point; MG5A: (d) complete bifacial point; Augsburg: (e) complete bifacial point; PT5: (f) complete bifacial point. All silcrete.

Figure 7.3 Unifacial points from DAME8A: (a), (c) and (d) unifacial points, reworked, (e) unifacial point; (b) DAME13B: unifacial point. All silcrete.

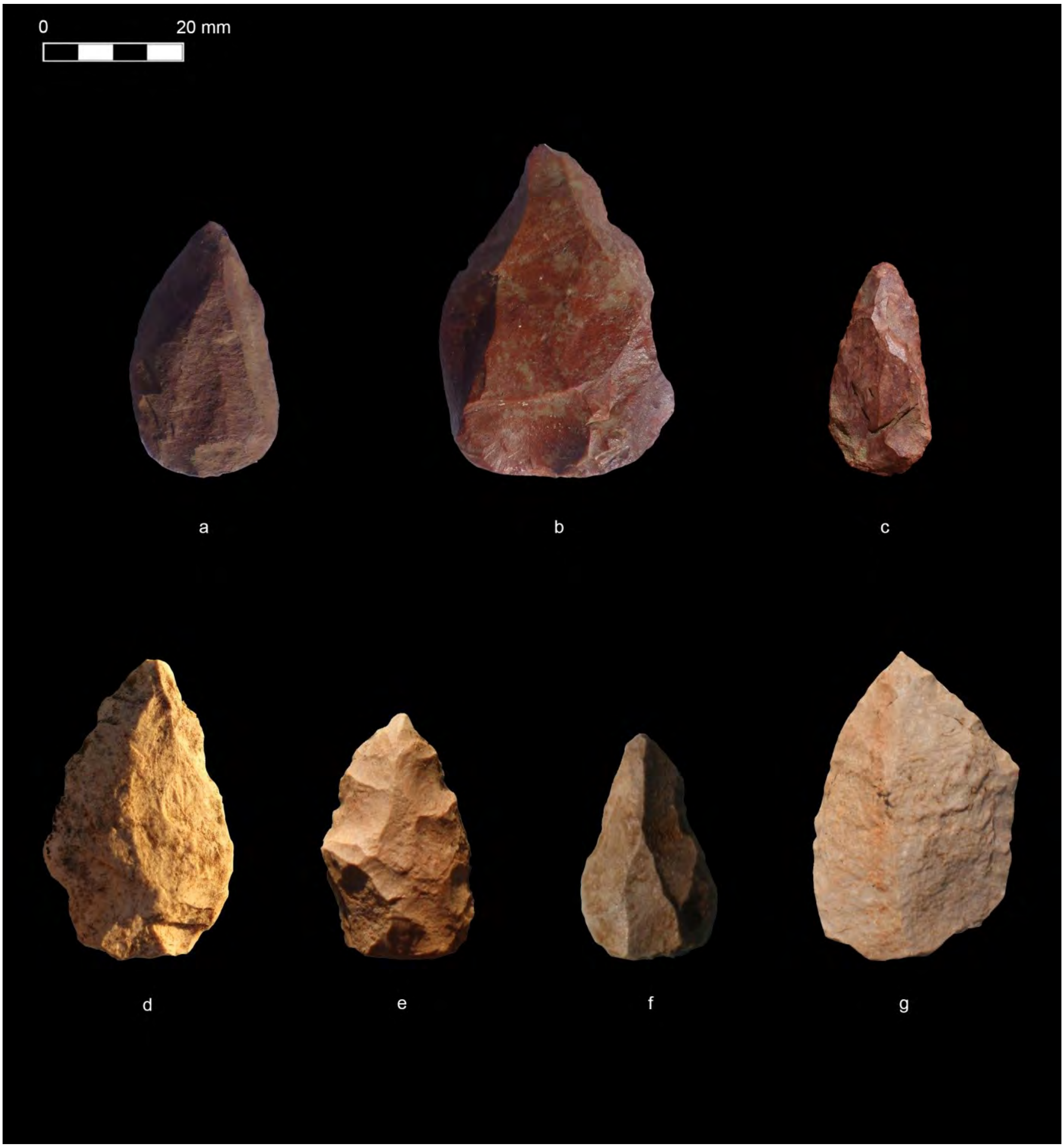

Figure 7.4 Unifacial points from MG5: (a) unifacial point, (b) unifacial point, notched; MG4: (c) unifacial point, heat-treated silcrete; Ramskop: (d) unifacial point, weathered silcrete; DR6A: (e) unifacial point; WH8: (f) unifacial point; (g) unifacial point, reworked. All silcrete.

Figure 7.5 Unifacial points from AG3A: (a) complete unifacial point, (b) complete unifacial point, reworked tip, (c) broken unifacial point tip, notched, (d) and (e) broken unifacial point butts. All silcrete.

Figure 7.6 Dam East (DAME8A) bifacial point site on the Olifants River (Clanwilliam Dam), facing east

Figure 7.7 DAME8A bifacial point site area, facing north

Figure 7.8 Elevated rocky platform at Warmhoek (WH21), facing north

Figure 7.9 Sheltered area with a concentration of MSA silcrete artefacts on top of the Andriesgrond koppie (AG1A) on the southern side, above AG9A, facing north west

Figure 7.10 View of the Olifants River, Driehoek and Kransvleikloof areas from the location depicted in Figure 7.9 on the Andriesgrond koppie, facing south

Figure 7.11 AG3A clearing in front of a rocky outcrop on the north side of the Andriesgrond koppie, facing east

Figure 7.12 AG3A, viewed from on top of the Andriesgrond koppie, facing north west

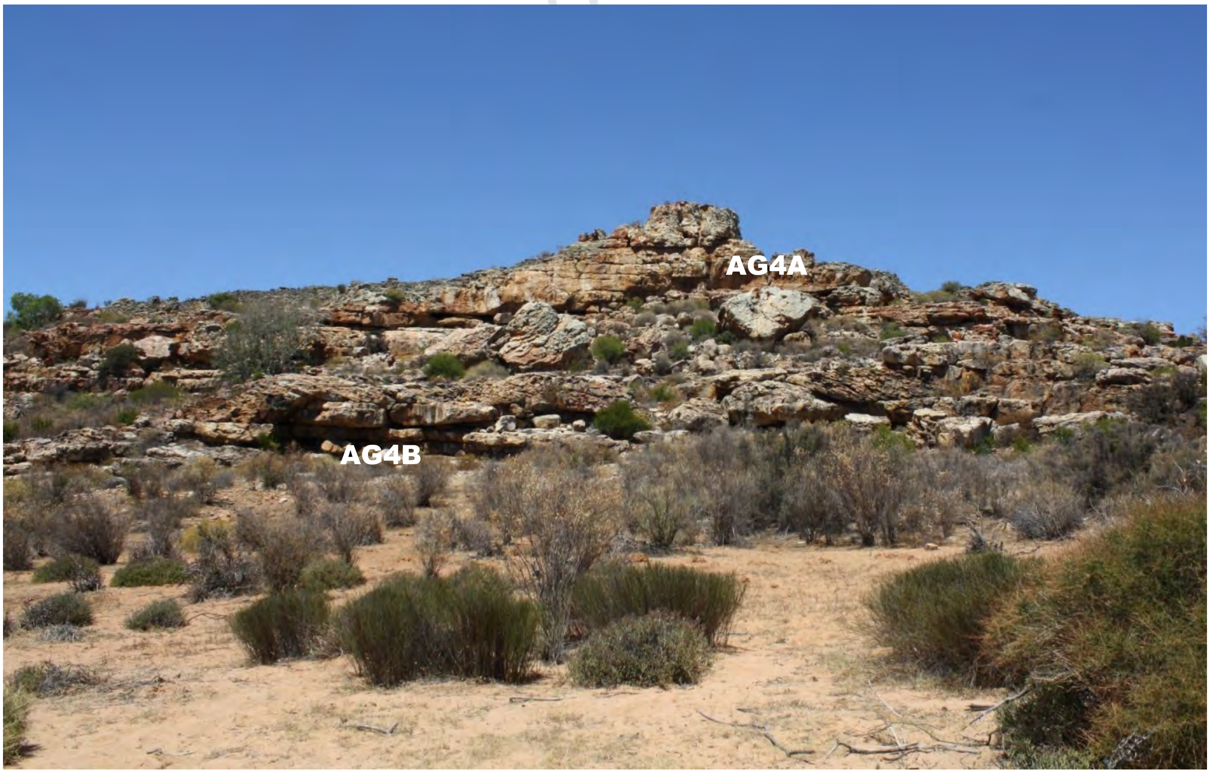

Figure 7.13 AG4A hollow boulder shelter and AG4B rock outcrop on the north side of the Andriesgrond koppie, facing south

Figure 7.14 AG4A hollow boulder shelter

Figure 7.15 AG9A clearing with scatter around the boulder, viewed from above, facing south

Figure 7.16 MSA artefacts from Andriesgrond Cave: (a) quartz unifacial point, (b) and (c) quartzite unifacial points, (d) and (e) hornfels unifacial points, (f) silcrete reworked unifacial point, (g) and (h) silcrete backed segment and truncated backed piece, possibly Howiesons Poort, (i) and (j) retouched hornfels flakes with faceted platforms, (k) to (o) hornfels blades and flakes with faceted platforms.

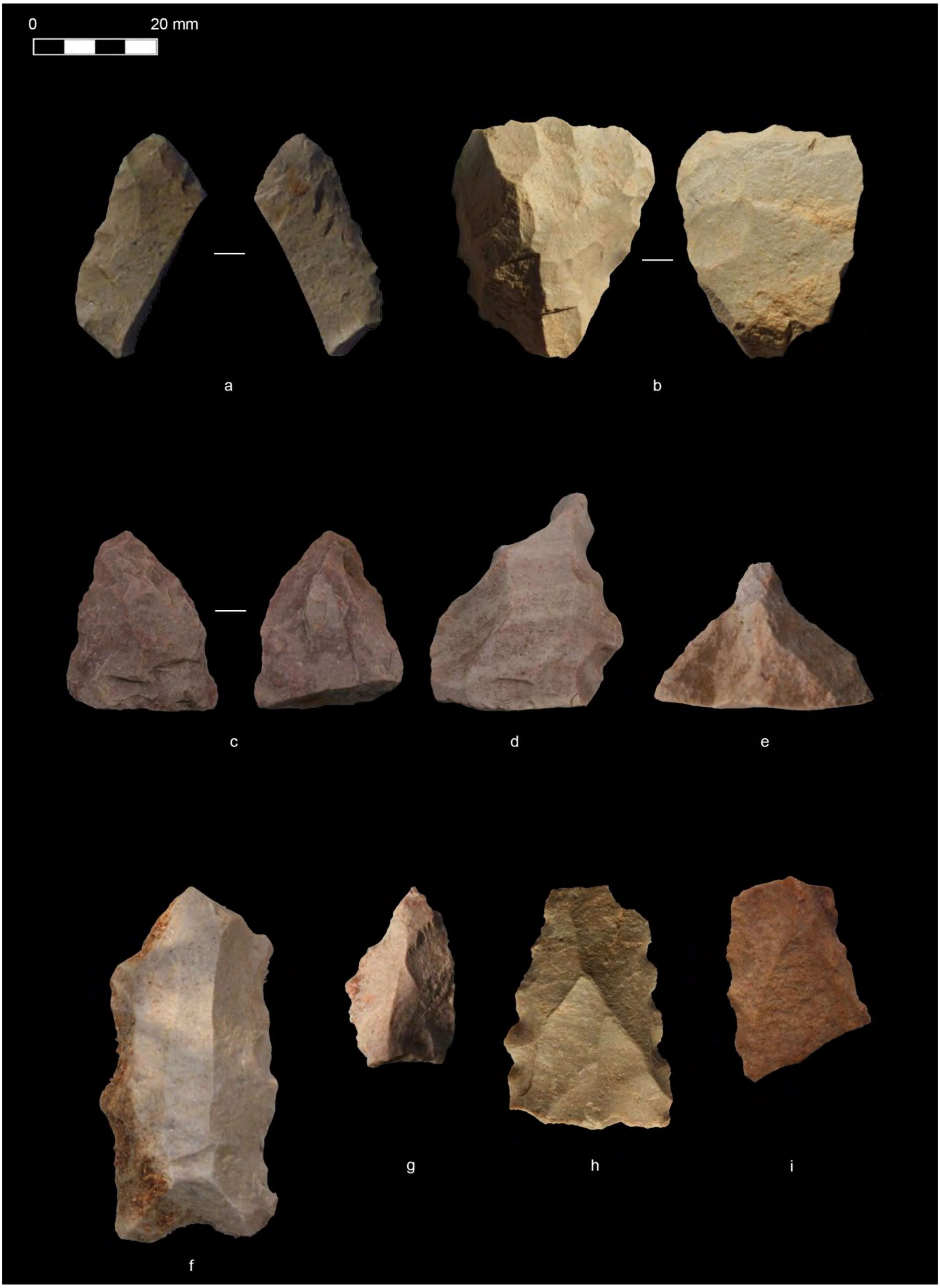

Figure 7.17 Bifacial and notched tools from AG3A: (a), (b) and (c) bifacially worked pieces, (d) notched unifacial point, (e) round-ended retouched flake, (f) blade with a retouched point and notches along both edges, (g) denticulated point, (h) flake with notches along both edges; from Andriesgrond Cave excavation: (i) flake with retouched notches along both edges. All silcrete.

7.5 MSA artefact distribution in the study area

MSA artefacts had a widespread and variable distribution on the landscape, present on the edge of the Olifants River, but also reflecting a wider-ranging use of rocky areas and open veld away from the river and its tributaries (Maps 26.1 and 26.2). The variation seen in the MSA may be taken to represent changing strategies of landscape use, but this is difficult to measure given that there are so few temporally specific artefact markers, and these are clustered in the later MSA. The presence of bifacial points, unifacial points and backed artefacts offer some temporally anchored windows on specific periods; however, the absence of these diagnostic tools from an MSA assemblage does not preclude that assemblage from dating to the periods when those artefact types were manufactured. In this regard, excavated assemblages can play a particular role in bolstering the information that can be gained from a surface assemblage by providing the contextual trends in technology and raw materials which accompany certain diagnostic tools.

The distribution of MSA artefacts reflected three broad patterns, focused on the Olifants River, rock shelters, and on open, often raised, rocky areas, informally termed rocky platforms. In the first two settings – the river and rock shelters – MSA artefacts often occur alongside either ESA or LSA artefacts respectively; however, the third setting, which incorporates much more remote segments of the landscape, is not observed in the ESA or LSA to any strong degree. These rocky areas were not necessarily tied to the presence of a river, or a shelter, which served as frequent foci for activity in the ESA and LSA respectively. Instead, in the MSA, the focus for artefact discard was apparently the rocky surface itself in certain settings.

Artefacts

The most common MSA artefacts were radial cores and flakes with faceted platforms which were mostly made of silcrete. These reflect a persistent MSA presence, and although these artefacts can only be generalised as MSA, the use of fine-grained raw materials such as silcrete is noted to be a trend in the later MSA industries (Henshilwood *et al.* 2001b; Minichillo 2006; McCall 2007; Porraz *et al.* 2013b).

Bifacial points provided the clearest chronological marker for surface assemblages, and 63 were found across the landscape, with one exceptional bifacial point manufacturing site at Dam East (DAME8A)[7]

[7] The total number of bifacial points includes 23 which were located in the present surveys, with data for an additional 40 provided by A. Mackay.

(Figures 7.1 and 7.2). Unifacial points of a range of morphologies occurred as single finds within assemblages showing MSA characteristics, and these may tentatively be attributed to the post-Howiesons Poort, although for reasons detailed previously in Section 7.3.3, this association remains cautious (Figures 7.3 and 7.4). Backed pieces would usually serve as a clear chronological marker, but Howiesons Poort backed pieces were noticeably absent from the landscape, in spite of their presence in excavated shelters in the region, such as Klein Kliphuis (Mackay 2009). In paying specific attention to bifacial points, backed pieces, and, to some extent, unifacial points, there is potential for observing a finer-grained picture of changing landscape use preferences during the MSA.

Raw materials

MSA artefacts are made in a wider range of quartzite types than ESA artefacts, most likely because quartzite sources were not restricted to the cobbles on the river's edge. Besides river cobbles, quartzite is derived from scree cobbles found in rocky areas, as well as being flaked directly off the bedrock of the cave at Andriesgrond and many other sites. Often cases of this are difficult to date, but a large bedrock boulder buried in early MSA deposits at Klipfonteinrand showing flake removals is one situation where a date can be inferred (Mackay 2012).

Ferricrete from the source at DAM8 on the Olifants was exploited by MSA tool-makers, with a scatter of MSA debitage at the site (Figure 5.11), as well as evidence of transport in the form of radial cores and MSA flakes up to 5 km from the source, although the majority are found within 1.5 km.

Silcrete is overwhelmingly the most common MSA material, with silcrete radial cores and MSA flakes frequently found across the landscape, as well as constituting most of the MSA retouched tools. The abundance and wide range of silcrete types observed suggests that it derives from different sources. Numerous pieces are reddened, suggestive of heating to improve the flaking quality of the rock (Brown *et al.* 2009; Schmidt *et al.* 2013).

Other fine-grained raw materials were poorly represented in the surface samples, with a single CCS bifacial point noted at DAME8A, made on a type of CCS that is noted to occur as fairly large pebbles in the local Table Mountain Sandstone conglomerate (Figure 6.4). The apparently low incidence of CCS and quartz may partly be a factor of visibility since these materials were used at other MSA sites in the wider region (Mackay 2009; Mackay *et al.* 2010). Also, the locally available nodules of CCS and quartz observed in the study area are relatively small and poor quality in comparison to the materials available in the Doring catchment. Given the local abundance and exploitation of silcrete, this appears to be the fine-grained raw material of choice.

Hornfels presents an interesting case, with no MSA hornfels artefacts recorded in surface surveys, with one exception of a brown hornfels flake on the Dam edge, but hornfels is found in MSA deposits at Klein Kliphuis, Klipfonteinrand (Mackay 2009) and Andriesgrond (see Section 7.5.5). In the basal layers at Andriesgrond there are numerous long, thin blades and two unifacial points, amongst other large MSA-like flakes, which draws attention to the absence of hornfels from the rich MSA presence on the landscape around the koppie. This raises several potential scenarios: either hornfels was rarely used and its discard was restricted to the cave, which seems unlikely, or hornfels is affected by poor preservation on the surface in the study area. Under the semi-protected setting of a shelter formed of a hollow boulder at AG4A, a split cobble of shale-like, light grey material may represent a degraded form of hornfels, found alongside an MSA blade assemblage almost exclusively of silcrete. At Hollow Rock Shelter and Klein Kliphuis, a white, friable clayey material in the lower MSA levels is reported (Evans 1993; Mackay 2009) which may be a further indication of preservation bias of MSA hornfels artefacts.

7.5.2 Olifants River

MSA artefacts found along the edge of the Olifants River tend to follow one of the following two patterns: either they occur alongside ESA artefacts in a mostly quartzite-based assemblage, or they are found close to LSA site locations and the assemblage is predominantly silcrete.

The most diagnostic artefact types of the MSA are found on the edge of the Olifants in situations which follow the LSA preference for areas close to rocky outcrops with shelters overlooking the river. The MSA associated with these points appears to be less closely tied to the shelters than the LSA, with quite substantial MSA silcrete assemblages occurring on the water's edge, as is the case at Dam East (DAME8), DAME13 and DAME13B, and at Nooitgedacht (DAM19A and DAM21C) (Maps 8.1 to 9.2, and 12.1 to 13.2) .

A dense assemblage of bifacial points was recorded at DAME8A, located on the beach below a complex of shelters (Figures 7.5 and 7.6). The high concentration of at least 50 bifacial points was sampled from a cluster within a more widespread scatter of mixed MSA and LSA material, including other bifacially worked pieces, radial cores and unifacial points (Figures 7.1 and 7.3). The high proportion of broken and reworked pieces, along with the large amount of silcrete debitage, has prompted it to be interpreted as a manufacturing site. The site also contained the only Howiesons Poort-like backed piece found as a surface find in the study area (Mackay unpublished data 2005). The shelter complex at the top of the slope was used intensively in the LSA, based on the quantity of lithic debris present, and the concentration of MSA material at the base of the slope does not preclude that sedimentation or downslope erosion has obscured evidence for MSA use of the shelters themselves. The high quantity of silcrete on the edge of the river raises the possibility that there was a raw material source nearby, although it is no longer visible, potentially buried or submerged by the current Clanwilliam Dam.

Although the other MSA silcrete assemblages on the Olifants River are not as dense as at DAME8A, it is notable that the scatters at DAME13 and DAME13B occurs on the Dam edge 500 m below a series of rocky shelter complexes (Maps 9.1 and 9.2). This locality contains blades and unifacial points, supporting a later MSA designation. DAM19 and DAM21C are both represented by a thin but extended scatter of flakes with faceted platforms along the river's edge, noted as being in close proximity to an extensive open scatter on the ridge upslope by the rocky outcrops of Nooitgedacht[8], and another MSA scatter upslope along the stream tributary (DAM18) (Maps 12.1 to 13.2).

In contrast to the silcrete and retouched tool-rich MSA assemblages, a more generalised MSA is found in assemblages mostly composed of coarse-grained quartzite tools, utilising quartzite cobbles as a raw material source in a comparable manner to the ESA. Radial and discoidal cores, and flakes with faceted platforms and convergent scars serve as tentative indicators of the MSA in such contexts since there is some blurring of the boundary between late ESA and early MSA technology. These assemblages contain almost none of the later MSA markers such as bifacial or unifacial points, with denticulates and occasional scrapers being the only retouched tools.

The ferricrete outcrops along the edge of the river were exploited in the MSA, at DAM8 where there is extensive debitage around a boulder, and at the top of the slope above the river at DAM7. Ferricrete artefacts, such as radial cores and Levallois points, were widely transported across the landscape, including to rocky platforms on koppies, as at Kransvleikloof and Andriesgrond.

7.5.3 Rock shelters

A large portion of MSA activity appears to be orientated around rocky areas, with artefacts frequently found in scatters outside rock shelters. Many of these shelters have rock art and assemblages which show a strongly LSA character, with the MSA component generally less pronounced. Occasional unifacial points and bifacial points occur, along with radial cores and flakes with faceted platforms. Some of the MSA flakes found at LSA shelter sites show double patination where they have been reused as adzes, and may have been transported from other locations on the landscape as an easy source of large blanks. The MSA use of rock shelters shows an overlap in landscape use patterns with the LSA,

[8] Recorded as site CDW36 by Orton and Hart (2005) although the area was not surveyed in the course of this study.

with the LSA overprinted on MSA assemblages which, in a surface scatter context, may make the MSA less easily visible.

The cave site Andriesgrond has a small but significant MSA component within the mostly LSA assemblage. At a landscape level, MSA artefacts are abundant on the surface, but show less of a presence in the cave itself; the LSA shows the inverse. This will be discussed as a case study in Section 7.5.5, comparing excavated and surface assemblages at a fine-grained scale within a single 500 by 500 m area.

7.5.4 Rocky platforms

A distinctive distribution specific to the MSA is seen in artefact scatters on raised open rocky platforms, often at relatively high elevations. These scatters are lacking in formal tools or LSA artefacts, consisting of large, usually silcrete flakes, some of which have faceted platforms, in addition to radial cores, occasional blades and preferential Levallois flakes and points. This pattern was repeated in every area surveyed where rocky platforms were a feature of the landscape. Where the base of the rocky platform formed overhangs, often LSA artefacts would be present, but the focus of MSA tool discard was on the raised rock surface.

The key aspect of this setting is that there are no rock shelters or other focal features higher up the slope that might have offered an alternative draw on past landscape users. This weakens the argument that artefacts on the rocky platform could be in a secondary context, having eroded from an original source upslope. At Andriesgrond (AG1A), the rocky surface on the top of the koppie is covered with silcrete and quartzite artefacts, particularly concentrated in a sheltered area on its southern side that offers a wide view over the Olifants River and surrounding landscape (Figures 7.8 to 7.10). Whilst some of these raised rocky platform scatters, such as AG1A, suggest they were repeatedly used foci for knapping and other activities, they also occur as more ephemeral scatters, as at Driehoek (DR8b), where there is a low density of MSA flakes across the ridge at the highest point of the rocky plateau, in a fairly remote setting (Figure 5.7). One of the potential attractions of rocky platforms may have been their elevation and the view that this afforded over the surrounding landscape, allowing people to see the location of game and other human groups. Other features may have been desirable as well, such as the collection of water in eroded catchment basins on the rock surface (Figure 5.12) and the relative ease of movement across an open rocky area, as opposed to negotiating the often thick vegetation.

The use of elevated rocky platforms is documented in the Sandveld by Manhire (1984:73), who draws particular attention to the open koppie site at Wolfberg where there was a dense MSA scatter, deemed to resemble the Howiesons Poort assemblage from Diepkloof (cf. Parkington 1977a). A rocky plateau on the koppie was covered by a general silcrete scatter, becoming particularly concentrated in a shallow depression at its southern end. The assemblage comprised mostly waste material with a relatively high proportion of utilised flakes and blades. Very few formal tools were present, but among them were a number of large, minimally backed segments and angular trapezoids, mostly broken but complete specimens were generally larger than 20 mm. Both the setting of the site and the general characteristics of the assemblage mirror the pattern of MSA rocky platform assemblages seen in the study area, although, interestingly, no Howiesons Poort backed pieces have been identified in these assemblages in the Olifants River Valley. Wolfberg could offer an important link with these frequently observed rocky platform scatters that otherwise are difficult to give a temporal association within the MSA given the absence of formal tools.

Further MSA sites that fit a similar description in their location and assemblage type are reported by Smith (1993) from high elevation situations in the wider Cederberg area, mostly south of Citrusdal. Assemblages including radial cores, large flakes with faceted platforms and no formal tools were located on flat deflated surfaces on raised terraces, noted to be spatially separated from any LSA occurrences. The main difference between these and assemblages in the study area is that they are composed mostly of local quartzite, whereas silcrete is more common in the study area on the Olifants and in Manhire's (1984) Sandveld sites, suggesting different access to raw materials although similar patterns of landscape use are observed.

7.5.5 Case Study: Andriesgrond

The area, Andriesgrond, offers the opportunity for directly comparing an excavated cave assemblage with an extensively surveyed segment of the landscape, defined by a prominent koppie. The main cave contained LSA bedding and ash features in layers where adzes were the dominant tool form and pottery indicated post-2000 BP activity. The MSA component of the total assemblage is small but includes flakes with faceted platforms, blades, radial cores, five unifacial points and two Howiesons Poort-like backed pieces. These were particularly concentrated in the basal layers, in spall-rich deposit lying on the bedrock, but they were also interspersed throughout the LSA sequence, along with MSA flakes with clear signs of reuse in the LSA.

Five different concentrations of MSA artefacts can be distinguished around the koppie, each characterised by different topographic features (detailed in Appendix 1) (Maps 14.1 and 14.2). In summary, AG1A is a general MSA scatter of quartzite and silcrete on the top of the koppie, AG3A is a point-rich assemblage including bifacial, unifacial and other point forms, AG4A is a blade-rich assemblage contained under a hollow boulder, AG4B is a mixed MSA and LSA assemblage mainly of silcrete, and AG9A is an extensive scatter of general MSA silcrete artefacts across an open area at the base of the koppie (Figures 7.9 to 7.15).

The excavated lithic assemblage and collections from the talus slope were reanalysed with the aim of identifying the MSA which was reported in previous analyses (Mazel 1977; Parkington 1978; Anderson 1991) in order to compare it with the MSA surface lithic material. The analysis of the whole assemblage will not be included in this thesis, but five points arising from the MSA material warrant particular discussion.

Frequency and reuse of MSA artefacts

Numerically, artefacts which can be securely attributed to the MSA on typological grounds number only 50, with a further 46 which may be regarded as secondary iconic MSA artefacts, amounting to 0.7% of the assemblage total. Surface collections made in 1977 from four 4 by 5 m areas on the talus in front of the cave include a slightly greater proportion of MSA silcrete artefacts (1.2%), comprising radial cores, flakes with faceted platforms, notched and bifacially flaked pieces, totalling 25, with an additional 3 reused MSA artefacts.

The reuse of MSA flakes in the LSA is observed on flakes displaying double patination and other MSA technological features such as the presence of faceted platforms on flakes used for LSA formal tools. These features are seen most often on adzes, with 62 of the total (25.6%) manufactured using MSA flakes, mostly of silcrete. The abundance of MSA artefacts on the landscape in the Andriesgrond area would have offered an easy supply of ready-made blanks that LSA people made use of. Even so, there appears to have been a concern for raw material conservation in the LSA with 31% of adzes showing reversal in their haft and use on both edges, and of these, 24% were made on reused MSA flakes.

Bifacial and unifacial points

The excavated sample contained five unifacial points in the basal layers, one of quartz, two of quartzite and two of hornfels (Figure 7.16 (a) to (e)). An additional silcrete artefact, originally identified as an awl or borer, may be a broken unifacial point that appears to have been reworked across the break to form an asymmetric point (Figure 7.16 (f)). These artefacts provide an interesting point of comparison with a point-rich surface assemblage, AG3A, where bifacial points were present, and unifacial points were considerably different in dimensions, raw materials, and the nature and extent of the retouch.

The area AG3A is an open sandy clearing next to a rock outcrop to the north of the main koppie where there is an MSA scatter which contains a high proportion of points and bifacially flaked artefacts. These included two silcrete bifacial point tips, both broken and of a similar size, distal point angle and workmanship, and a third complete silcrete bifacial point, 31 mm long, with a possible impact burination on its tip (Figure 7.2 (c)). There were two complete unifacial points, one of which was reworked, and two broken point butts (Figure 7.5). In addition to these 'classic' bifacial and unifacial points, an additional nine point forms were identified, of which five were notched or denticulated and two were bifacially worked (Figure 7.17). Other pieces of note include two bifacially worked, round-ended pieces that could be broken point butts and a broken elongated flake with a series of regular notches along both edges, which is paralleled by a notched flake from the excavated sample (Figure 7.17 (h) and (i)). The relatively high proportion of reworked and broken artefacts at this site suggests that some form of re-tooling activity occurred here. There is a considerable amount of small debitage, although this was not recorded in detail in surveys, but a low frequency of cores and artefacts in early stages of reduction imply that initial point manufacture was not a major activity here. It is evident that pointed and denticulated tool forms were of particular significance at this site, and these are typical of the MSA in general.

Bifacial points are diagnostic of the Still Bay, and unifacial points are common in the post-Howiesons Poort, although their presence here alongside bifacial points makes a chronological association with the post-Howiesons Poort more cautious. The substantial differences between the excavated unifacial points and the surface unifacial points are suggestive of separate manufacturing traditions, which, it could be speculated, may represent temporally distinct phenomena. The fact that unifacial points are a diverse and variably defined category of artefacts makes comparison with other sites complicated, but an avenue for future investigation would be to compare the morphology and raw materials of excavated and surface points with those from Klein Kliphuis and Klipfonteinrand, as well as surface unifacial points from the rest of the study area. The identification of variation at a finer-scale, and a tightening of how unifacial points are defined, has the potential to reveal patterning within this 'umbrella' tool class which is currently of limited use when assigning an age to surface artefacts.

Backed pieces

Within the excavated assemblage, a silcrete backed segment and a truncated backed bladelet may be identified as Howiesons Poort since they are morphologically distinct and considerably larger than any of the LSA backed microliths present in the assemblage (Figure 7.16 (g) and (h)). The only other backed piece found on the landscape in the study area which is attributable to the Howiesons Poort was recorded at Dam East (DAME8A) by Mackay (unpublished data 2005). This absence is conspicuous, particularly when contrasted with the usual occurrence of Howiesons Poort backed pieces in high densities. Taphonomic processes are a weak explanation for their low frequency in Andriesgrond Cave since no additional backed artefacts were observed on the talus slope, either in the surface collections or surveys. The indication is that the manufacture of backed pieces did not occur in the shelter at Andriesgrond, and none of the debitage from the surface sites is strongly suggestive of backed piece manufacture either. People were clearly present in the study area during the Howiesons Poort, since backed pieces are numerous at Klein Kliphuis and present, albeit in lower frequencies, at Klipfonteinrand (Mackay 2009, 2012).

The Howiesons Poort is a time period which remains to be resolved in the study area in terms of its signature on the landscape, and the two artefacts from Andriesgrond – an area which likely saw frequent reoccupation throughout the MSA – point to the need to look for other means of identifying the Howiesons Poort beyond its iconic backed pieces if it is to be recognised outside of rock shelters (discussed further in Chapter 8). Core reduction would be one means of investigating this further, and although cores are infrequent in the excavated assemblage, blade cores and blades are present at the shelter AG4A and warrant further investigation.

Blades and hornfels

The cave assemblage contained a number of pointed and elongated flake products, some with an almost parallel-sided blade morphology. Although 72 elongated flakes were identified as blades in the previous analysis (Anderson 1991), the reanalysis identified only nine artefacts as true MSA blades, with faceted platforms and convergent tips, and a further six elongated flakes with faceted platforms (Figure 7.16 (k) to (o)). A quartzite opposed-platform blade core was also present, although it is unprovenanced. A notably high proportion of elongated products were made of hornfels, which is especially interesting given the virtual absence of MSA hornfels artefacts from surface assemblages, not just at Andriesgrond, but in the whole of the study area.

The excavated blade component is particularly interesting when contrasted with a blade-rich assemblage which was identified at AG4A, approximately 300 m to the north west around the edge of the koppie (Figures 7.13 and 7.14). This assemblage is contained within a low shelter underneath a hollow boulder and numbers well over 200 artefacts in what is presumed to be a relatively closed setting. The hollow boulder resembles Hollow Rock Shelter, 23 km to the north west, which contained MSA deposits rich in bifacial points and also had a blade component, including hornfels blades. The AG4A assemblage has not been analysed in great detail beyond a general characterisation, but it features a significant number of long blades in silcrete and fine-grained quartzite and is a unique occurrence among the surveyed assemblages in both the Andriesgrond area and the broader study area.

Summary

The relationships between the excavated and surface assemblages at Andriesgrond have been shown to be complex, but each has yielded particular information which would not have been appreciated from a study of the cave or landscape alone. The different surface assemblages present at Andriesgrond and their localised context around the koppie reflects trends in the relationship between certain assemblage types and landscape features which are seen repeatedly across the study area. This includes the concentration of LSA artefacts in association with the cave, with very few LSA formal tools in the surrounding area in spite of thorough searching. Where LSA artefacts do occur in small numbers, at AG3 and AG4B, they are in typically LSA locations, in front of a small shelter with rock art on its exterior (AG3), and a flat, sheltered area in front of a low rocky outcrop (AG4B). The assemblage AG1A on the top of the koppie replicates a frequently observed situation where MSA silcrete assemblages are located on raised rocky platforms, with no apparent alternative landscape focus or source. The situation of the AG1A assemblage eliminates all possibilities of being in secondary context from a source upslope, being the highest point, which reinforces the suggestion that this reflects a real MSA landscape preference. Other elements are unique, such as the point-rich scatter at AG3A. This site has raised important questions, both specific to the locality, and of more general application to the investigation of the relationship between surface and excavated assemblages, relating to raw material selection and preservation, technological traditions, and the reliability of iconic artefacts. The most significant point highlighted by the Andriesgrond area, however, is the small-scale temporal and spatial variation which can be observed when a particular topographically-varied segment of the landscape is studied in detail.

7.6 Factors affecting MSA landscape use patterns

MSA artefacts are present across all of the surveyed landscape, both along the edge of the Olifants and Jan Dissels Rivers and in the rocky areas and higher topography further away from the water courses. Where there are concentrations of MSA artefacts on the edge of the Olifants, these appear to be specifically exploiting outcrops of silcrete and ferricrete, and quartzite cobbles. The MSA also shows the use of rock shelters which were often subsequently reused during the LSA. From the excavated record, rock shelters emerge as playing a domestic role in the later part of the MSA, with hearths, middens and bedding indicating that some shelters served as important long-term occupation foci (Deacon 1989; Goldberg *et al.* 2009; Miller *et al.* 2013). This suggests a significant shift in how groups organised themselves spatially and socially on the landscape, seeing an increasing focus on caves and rock shelters as fixed places to which a mobile group would return, both in the course of a local, short-term foraging round, and in terms of residential moves at a regional scale.

Broadly, the pattern of artefact distribution suggests that rock shelters were used as domestic sites, manufacturing sites were situated at raw material sources on the river, and other activities involved the consistent but low intensity use of rocky areas, particularly at high points in the landscape. The long duration of the MSA means that a great deal of change and variability is encompassed under one broad technological grouping, with the start and end points of the MSA being particularly poorly understood. Periods within the MSA experienced extreme and rapid climatic fluctuation which would have had a variable impact on resource distribution and availability, prompting populations to adapt their behavioural strategies accordingly. The pace of behavioural change appears to accelerate from around 100 ka and is maintained for the duration of the Still Bay and Howiesons Poort, with a range of innovations marking an increasingly LSA mode of behaviour.

7.6.1 Water availability

A growing body of evidence indicates that MSA people had ostrich eggshell containers which could have been used as water flasks, as in the LSA. Although there are no complete eggshells, fragments have been found with perforations suggestive of an opening hole which could be plugged and then carried or cached to provision for a future need for water (Wendt 1972; Parkington *et al.* 2005; Texier *et al.* 2010; Texier *et al.* 2013). The most substantial and impressive evidence comes from Diepkloof, where ostrich eggshell fragments engraved with geometric designs occur from the Early Howiesons Poort levels dating from 109 ka, persisting until the Late Howiesons Poort 52 ka (Texier *et al.* 2010; Texier *et al.* 2013). The significance of marking eggshells in what has been described as the oldest known graphic tradition may have been a signal of identity, ownership or perhaps indicated the container's contents, and it anticipates a practice seen in the LSA and among modern Kalahari hunter-gatherers (Deacon *et al.* 1976; Schweitzer & Wilson 1982; Humphreys & Thackeray 1983; Texier *et al.* 2010; Texier *et al.* 2013).

Diepkloof is located in the Sandveld where water is scarce outside of the winter rainfall season, and the Early Howiesons Poort evidence for water containers is interpreted in terms of a more general shift in behavioural organisation, encompassing changes in mobility and resource procurement (Porraz *et al.* 2013a; Texier *et al.* 2013). The only other MSA site currently with evidence for engraved and perforated ostrich eggshell flask fragments is in the Howiesons Poort at Apollo 11 in south-western Namibia, also a semi-arid environment where water-carrying technology would have been a distinctly advantageous adaptation (Wendt 1972; Vogelsang *et al.* 2010).

As in the LSA, the Olifants River would have been a more secure source of water than the rivers in the Sandveld and Karoo areas to the west and east. Rainfall levels fluctuated considerably throughout the Late Pleistocene and under conditions of aridity or resource stress, MSA populations who were technologically untethered from water sources would have been able to deal with resource uncertainty by moving into areas of unreliable or unpredictable water supply, both in the course of the daily foraging round where they could make use of wider sections of the landscape, and in residential moves into new environments.

7.6.2 Subsistence

A central feature of Deacon's (1989, 1993; 1995) argument for modern behaviour in the MSA, in particular the Howiesons Poort, was an increase in diet breadth to include shellfish and geophytes, covering a subsistence range that was comparable to the LSA. The evidence from Klasies River in the form of carbonised geophyte remains in hearth contexts and shellfish in midden deposits showed the exploitation of both coastal and fynbos resources. This reflects a population that occupied a broad ecological niche in a eurytopic pattern of landscape use. It is important to bear in mind the effect of time on the preservation of faunal and botanical remains, meaning that later deposits may show evidence for a greater range of resources simply because more is preserved. However, when subsistence remains are considered alongside changes in technology and spatial organisation, the indication is that the MSA was a time of increasingly varied resource use in comparison to earlier periods.

For Deacon (1989), the primary motivation behind MSA colonisation of the fynbos ecozones was for the high volume and diversity of plant resources that it offered. Digging sticks have been shown ethnographically to be used in the extraction of underground geophytes, with wooden digging sticks dating from 40 ka at Border Cave (Villa *et al.* 2012). If the absence of earlier evidence for these tools is not simply an issue of preservation, this could indicate a less intensive exploitation of underground plants in the MSA than in the LSA. Deacon (1989, 1993; 1995) suggests that MSA people were managing the fynbos growth through intentional burning to increase geophyte productivity, although there is limited direct evidence for this.

Plant resources such as geophytes are rich in carbohydrates[9] but low in protein, so high-nutrient foods were necessary to supplement the diet, with an important role for shellfish in this respect. Parkington (2010) has emphasised the importance of the incorporation of shellfish and other marine-based foods into the human diet, not just for the behavioural shift it represents in anticipating LSA foraging strategies, but for the nutritional benefits it offered. Shellfish are known to be rich in long-chain fatty-acids which are linked to enhanced brain connectivity and they play an essential role in the brain

[9] Nutritional chemistry analyses indicate that carbohydrate content is seasonally variable, with the highest carbohydrate levels occurring in the winter (K. Kyriacou pers. comm. 2013).

development of human offspring during the third trimester of pregnancy and first year of life (Broadhurst *et al.* 2002). The introduction of these nutrients into the early human diet is suggested to be associated with encephalisation, not in the increase of brain size as seen in earlier hominin evolution, but in enhancing the synaptic connectivity of modern brains with cognitive consequences for abilities such as forward planning and innovation (Parkington 2006, 2010).

The earliest evidence of coastal cave use is seen under the harsh conditions of MIS 6, with shellfish exploitation at Pinnacle Point from 162 ka prompting the suggestion that the coast became a refugium for human groups, situated at the interface between marine and geophyte availability allowing for year-round exploitation of resources from both zones (Parkington 2001a, 2010; Parkington *et al.* 2004; Marean *et al.* 2007; Marean 2010). The strategic use of sites positioned at the convergence of different ecological zones is also seen at Diepkloof, which is situated on the Verlorenvlei River, 14 km from the present coastline but substantially further during low sea stands (Porraz *et al.* 2013a). Although it was not truly a coastal site, a range of shellfish, marine birds and mammals were exploited during the MSA, in addition to a range of faunal and plant resources from the rich riverine environment (Cartwright 2013; Steele & Klein 2013). The evidence for coastal settlement in the MSA draws attention to the role of fluctuating sea levels and human responses in their patterns of landscape use. The exposure of the coastal plains in MIS 6 and MIS 4 would have created an extended and fertile landscape that would have attracted terrestrial game and provided new foraging opportunities (Marean 2010; Compton 2011).

In spite of the evidence for the wider dietary range in the MSA, encompassing the same breadth as the LSA, there is some resistance to describing MSA subsistence behaviour as ‘modern’ (Klein 1995, 2000a, 2001). Klein makes the argument that MSA populations did not display the same level of subsistence intensification as LSA populations, demonstrated by smaller sizes of shellfish (patella) and tortoise bones and a limited ability to catch fish and birds (Klein 1994, 1995; Klein & Cruz-Uribe 1996; Klein *et al.* 2004). This does not necessarily reflect a behavioural inability to maximise on the potential of these resources, rather it may indicate a low population density or, in the case of catching fish and birds, a greater investment in higher-ranked sources of protein (Deacon, H.J. 1995).

Klein’s arguments extend to MSA hunting of terrestrial game, which he interprets to show a diminished hunting ability that was limited to close-range encounters with prey and consequently a reduced ability to target large, dangerous species (Klein 1976, 1989). MSA hunting technology typically involved hafted points which were used as hand-thrown or thrusting spears (Lombard 2006b; Villa & Lenoir 2006; Wadley & Mohapi 2008). This would necessitate being in close range to game, and would therefore require a different pattern of movement across the landscape compared with hunting techniques that allow for a greater distance between hunter and prey. Arguments have been put forward for the development of projectile technology in the MSA, with a debate now surrounding the potential

Howiesons Poort origins of the bow and arrow (Lombard & Phillipson 2010; Lombard 2011, 2012). Bow and arrow technology would have been a significant advance in "niche-broadening" hunting behaviour (Shea & Sisk 2010:101), allowing the targeting of a wider range of prey species from a distance, with a greater effective range than hand-delivered weapons.

Faunal evidence from the Still Bay and Howiesons Poort indicates a shift to include smaller prey species, with small bovids including steenbok and grysbok, and other small mammals such as hyrax, molerats and hares (Henshilwood *et al.* 2001b; Parkington *et al.* 2005; Steele & Klein 2013). The focus on small prey has been linked to arguments for increasing specialisation in hunting technology (Dusseldorp 2012; cf. McCall & Thomas 2012), including the proposed bow and arrow innovation, and, based on circumstantial evidence, the inferred use of snares and traps (Wadley 2010) which would have allowed hunters to hunt remotely.

Overall, there is a picture of increasing diversification in the range of subsistence resources and the means by which it was obtained in the MSA, particularly in the Still Bay and Howiesons Poort. When comparing MSA and LSA subsistence patterns, it is noteworthy that both MSA and LSA populations occupied the same landscape segments, as seen in the Western Cape settlement of the Olifants River Valley, Sandveld and Karoo (Mackay 2009). Both populations were able to exploit the same resources in each environmental niche at a broader scale, although there were differences in the technologies that were available in different periods. The origins of bow and arrow technology forms a central feature of current debate about differences between MSA and LSA hunting capabilities. There is not yet sufficient evidence to indicate whether MSA groups were moving between inland and coastal areas as part of a seasonal round, as proposed for the LSA, and this is an important avenue for future research (Parkington *et al.* 2004).

7.6.3 Raw materials

In contrast to the relative technological stasis over the time-span of the ESA, the MSA is marked out by dramatic shifts in technology, seeing the emergence of prepared cores, blades, points and backed pieces and, critically, the hafting of tools (Lombard 2005a, 2006b, a; Pargeter 2007; Wilkins *et al.* 2012). In addition, new techniques such as pressure-flaking (Mourre *et al.* 2010) and heat treatment of silcrete (Brown *et al.* 2009; Schmidt *et al.* 2013) show an understanding and management of the properties of fine-grained rocks.

A major change associated with the later part of the MSA is the increased use of fine-grained raw materials, most conspicuous in Howiesons Poort and, to a lesser degree, Still Bay assemblages (e.g. Wurz 1999, 2000; Villa *et al.* 2009). Fine-grained raw materials are desirable in that they usually fracture predictably, are suitable for fine retouch and produce a sharper edge than coarse-grained materials. Sometimes these materials may occur locally to a site, but often the superior properties of fine-grained stone make it energetically worth investing in travelling greater distances to non-local sources[10]. Long-distance procurement may occur within a system of increased mobility, either gathered during the course of other foraging activities in an embedded procurement strategy, or on special provisioning trips, or alternatively it may be obtained through long-distance trade or exchange networks (Ambrose & Lorenz 1990; Minichillo 2006).

Silcrete has been noted as becoming increasingly prevalent in later MSA assemblages, showing a preference for material with superior fracture qualities and the development of new technologies to improve its flaking potential (Brown *et al.* 2009; Mourre *et al.* 2010; Schmidt *et al.* 2013). Silcrete was used for the manufacture of bifacial points at Blombos from the Still Bay, obtained from a source at least 20 to 30 km from the site (Henshilwood *et al.* 2001b; Villa *et al.* 2009), but the long-distance provisioning of silcrete is a feature more frequently seen during the Howiesons Poort.

In the Howiesons Poort at Klasies River there is strong selectivity towards using silcrete for backed pieces in an otherwise quartzite-dominated assemblage, interpreted as having no functional advantage but rather showing added exchange value (Deacon & Wurz 1996; Wurz 1999, 2000). Here, silcrete use has been argued to show an investment in raw material procurement by travelling greater distances to obtain non-local raw materials, reflecting an increase in home range size and mobility which is suggested to be a risk-reducing response to the poor climate of MIS 4 (Ambrose & Lorenz 1990). The description of raw materials as 'non-local' can be ambiguous and requires substantiation through raw material sourcing, particularly where interpretations emphasise the role of transport distance. The interpretation of Klasies River silcrete procurement was revised by Minichillo (2006) following sourcing which revealed silcrete in secondary context in the form of beach cobbles, available close to the site. Rather than negating the argument for silcrete having added value, this model places the investment in search-time rather than distance to source.

The surface record of the study area shows a marked increase in the use of silcrete, with sources on the river terraces of the Olifants implying that it is locally available at multiple locations along the river. The bifacial point manufacturing site (DAME8A) is almost exclusively comprised of silcrete, suggesting the locality was used for its proximity to a silcrete source. Almost all of the bifacial points recorded in the study area were made of silcrete, although the variation in colour and grain-size suggest that it was derived from multiple sources. At Hollow Rock Shelter, bifacial points are made from

[10] Also see Chapter 6, Section 6.5.3, footnote 4.

locally available quartzite and non-local silcrete in roughly equal proportions, with a small number of quartz points (Högberg & Larsson 2011). The bifacial knapping debitage at the site is mainly quartzite, indicating that quartzite bifacial point manufacture took place at the site, but the small number of silcrete flakes suggests that primary reduction occurred at a different location, possibly closer to the silcrete source, and transported to the site. The open-air bifacial point manufacturing site at Soutfontein is predominantly made up of quartz, which outcrops close to the site, and silcrete, which is common as secondary cobbles. The pattern of raw material use in the study area follows the trend observed for the Still Bay whereby locally occurring materials are used, but with greater attention paid to fine-grained materials where it was available. By comparison, the Howiesons Poort marks a shift to greater investment in non-local raw material procurement.

The identification of raw material sources in the study area and surrounds still requires a great deal of work in order to better understand the movement of people and raw materials between different resource areas. There has already been some progress in silcrete sourcing along the terraces of the Olifants, but its wider availability on the landscape is still largely unknown (Porraz *et al.* 2008; Porraz *et al.* 2013b). Hornfels offers a further opportunity for sourcing studies, since it is not locally available but does form a component of MSA assemblages in the study area, at Klein Kliphuis and Andriesgrond, and at Klipfonteinrand and Hollow Rock Shelter, closer to the Doring River catchment and the nearest known hornfels source. Mackay (2009, 2010) identified a peak in hornfels use at Diepkloof and Klipfonteinrand during the Howiesons Poort, at a time when rock shelter sites across the Olifants, Sandveld and Karoo were occupied. Interestingly, the pattern is different at Klein Kliphuis which is located at an intermediate distance from the Doring source in comparison to the other two sites. Here, hornfels use only peaks after 25 ka, although there is a brief spike in the relative proportion of hornfels in the assemblage after 55 ka when one hornfels unifacial point occurs (Mackay 2009).

The transport of hornfels from at least as far as the Doring catchment to Diepkloof in the Sandveld is suggestive of increased mobility during the Howiesons Poort; however, the absence of hornfels at Klein Kliphuis implies reduced transport of hornfels from the Doring to the Olifants at this time. Since the habitual movement between the Sandveld and Doring areas would necessarily involve travelling through the Olifants, the pattern seen at Klein Kliphuis runs counter to expectations (Mackay 2009). This may be a result of poor preservation of hornfels in the deposits, or may indicate separate artefact manufacturing traditions and raw material preferences between groups occupying the Sandveld and the Olifants (Mackay 2009, 2011b).

Some potential patterns may also be observed in the use of hornfels for particular implement types, alleviating the concern that poor preservation may be causing bias *within* layers. For example, at Hollow Rock Shelter, hornfels is used for blade production but not bifacial points (Högberg & Larsson

2011), and at Andriesgrond, hornfels blades and two unifacial points were present in the excavated sample whereas the surface assemblages featuring blades and points are silcrete dominated. At Diepkloof, hornfels bifacial thinning flakes were found in the cave deposits, but no bifacial points themselves, prompting the suggestion that points were transported for use elsewhere (Porraz *et al.* 2013b). Hornfels appears to have been used very rarely for the manufacture of bifacial points in the study area and surrounds, even in areas where hornfels is locally available. At Sibudu in KwaZulu-Natal, hornfels is one of the principal raw materials used throughout the MSA sequence, and during the Still Bay, constitutes 32% of the total retouched tools (Wadley 2007). However, only 22% of bifacial tools are made of hornfels, instead showing a preference for coarser-grained dolerite and quartzite. Given the relative local abundance of hornfels and its high proportion of use for other retouched tools at Sibudu, this might suggest that it is not as well suited to bifacial tools as other materials, being more prone to breakage and requiring frequent resharpening (Wadley 2007; Wadley & Kempson 2011). At the Western Cape sites, hornfels was used for unifacial points and backed pieces but not for bifacial tools, which may be behaviourally significant to the Still Bay.

7.7 Conclusion

Within the context of Deacon's framework, the MSA can be seen to show a eurytopic pattern of landscape use in the study area. The focus on particular features, such as the Olifants River and rock shelters, are suggestive of the structured use of space for different activities, such as raw material procurement and domestic sites, and also suggest temporal trends. The iconic artefacts of the later MSA offer the potential for recognising finer-grained patterning, with MSA silcrete- and point-rich assemblages occurring at points on the river where there are also rock shelters. In the wider landscape, bifacial and unifacial points are often found at rock shelter sites, supporting Deacon's (1989, 1995, 1998) observation that an increased use of shelters as domestic foci towards the end of the MSA anticipates the LSA.

The apparent behavioural shift towards using rock shelters may partly reflect the improved depositional conditions of some shelters for preservation in comparison to open sites. This has the effect of opening up a wider range of evidence for the extent of behaviour, as seen in the later MSA. It is a challenge to determine whether the absence of evidence for some behaviours which are represented by organic materials is a factor of diminished preservation in earlier MSA layers, since cave occupation is documented on the southern Cape coast from 162 ka at Pinnacle Point and 115 ka at Klasies River. However, as a whole, there appear to be associated shifts in technology, subsistence, occupation density and symbolic behaviour which become most apparent in the Still Bay and Howiesons Poort. This indicates a change in behaviour at a generalised level towards qualities shared with the LSA and unequivocally modern humans (Deacon 2001). Not only can this be observed within cave sequences, but also at a landscape level.

The rise in the number of Howiesons Poort shelter sites compared to occupation in earlier periods may be, in part, a result of preservation, but the absence of diagnostically Howiesons Poort artefacts from the landscape suggests that this was a shelter-orientated period. Currently there are no Howiesons Poort sites recorded in the Karoo (Sampson 1985; cf. Beaumont 1990a, b), which may be significant since the Karoo boasts few rock shelters. In contrast, the bifacial point manufacturing site at Dam East (DAME8A), together with a recently reported comparable open site at Soutfontein (Mackay *et al.* 2010), suggest that we should be looking to the landscape for more evidence of the Still Bay which currently is known from only a handful of rock shelter sites. The technological and behavioural implications of these differences within the MSA are discussed further in Chapter 8.

Clark (2001:91) offers a bigger picture perspective of MSA settlement across Africa, observing that sites are often located on the boundary between more than one different ecosystems, describing this either as a strategy to maximise available resources, or as a "'half-way' house" for groups moving between seasonal resource patches. He also notes that shelter sites were often located some distance away from water sources to avoid disturbing game. Diepkloof is one of many shelter sites which exemplifies this situation, making use of the intersection of both the coastal and inland resources, located above the Verlorevlei estuary (Porraz *et al.* 2013a). This may be taken to represent a truly eurytopic mode of behaviour, with the exploitation of multiple environmental niches from a single location being the behaviour of landscape generalists (Deacon 1998).

Parkington (2010) emphasises the importance of the exploitation of marine resources in the MSA, with occupation of the coastal and near-coastal regions and a preference for rock shelters which precociously mimics the LSA. Parkington identifies two major contrasts in MSA spatial distribution: between an ESA and early MSA association with rivers and pans, and a later MSA and LSA preference for rocky areas. At a larger scale, this extends to a strong early MSA presence in the interior at open sites, and a predominantly later MSA occupation of the Cape Fold Mountain Belt and coastline. The survey results from the Olifants River Valley indicate that this pattern goes beyond the use of rock shelters, and points to a special role for elevated rocky platforms in the MSA – a distribution which has also been observed in the Sandveld and wider Cederberg region (Manhire 1984; Smith 1993), and in the Zebra River Valley in Namibia (Hardaker 2011).

MSA surface assemblages are undervalued in current research since often the finer chronological association of these assemblages is difficult to discern. However, surface assemblages offer a great deal of potential information on MSA behavioural preferences and change through time which should not be shied away from because of the lack of contextual information. In fact, archaeologists should be developing alternative ways of tapping this potential information which offers important landscape context to excavated shelter sites.

CHAPTER 8. LITHIC TECHNOLOGY AND LANDSCAPE USE

8.1 Introduction

Chapters 5, 6 and 7 presented the results of mapped artefact distributions for the ESA, LSA and MSA across a single landscape – a segment of the Olifants River Valley centred on Clanwilliam Dam. A study such as this, which encompasses such an expansive time span, presents the opportunity for considering behavioural change through time at a broader scale than is generally allowed by an excavated site. Clear patterns are evident from the distribution of iconic tools relating to each temporal period which show repeated associations with specific types of location and, overall, reflect a trend of landscape use which becomes less tethered to the Olifants River. This chapter considers the change in Stone Age people's use of the Olifants landscape through time from the perspective of technological organisation, since this can be related directly to the stone tools observed on the landscape and the known locations of raw material sources.

8.2 Technological organisation and landscape use

The organisation of lithic technology is a wide field of study, dealt with from many theoretical and analytical perspectives (e.g. Nelson 1991; Andrefsky 2009), but in essence, it addresses the ways in which people organised their stone tool-making behaviour within the context of their natural and social environment. A particular concern in the hunter-gatherer economy is risk, referring to the probability that resource needs may not be met (Bousman 1993). Strategies employed in technological organisation can buffer against the potential costs incurred by shortfall in resources by investing variously in stages of the tool manufacturing process, from raw material procurement, to tool production and maintenance

An effective technological system is one where the tool-user is always provisioned with tools suitable for the task in hand, and that the tool can be depended upon to be in a functional state (Kuhn 1992, 1995). If a tool-user is not equipped with an appropriate and functional tool, he or she runs the risk of missing out on opportunities for resource procurement, which, under conditions where resources are either unpredictable or unreliable, could be a catastrophic cost for survival (Torrence 1989). Various ways of reducing the likelihood of this risk, or reducing the severity of its effects, have been identified in strategies for tool design, raw material conservation and tool provisioning (e.g. Binford 1977, 1978a, 1979; Bleed 1986, 2002; Kelly 1988; Torrence 1989; Kuhn 1992, 1995; Bamforth & Bleed 1997).

Three of the principal factors which influence the choice of technological strategy are the distribution of knappable raw materials on the landscape, the type of tasks for which tools are needed, and the spatial and temporal predictability of these tasks (Kuhn 1992, 1995). These are by no means the only influences, but they provide a robust basis for approaching the lithic record left behind on the landscape, drawing information from an artefact's raw material, morphology, technology, discard frequency and discard location. Stone tools are only a part of the evidence for past lifeways and some aspects about them are difficult to interpret, such as their function (e.g. Lombard 2006b; Lombard & Pargeter 2008), but other aspects can be instructive in considering broader patterns of mobility, resource economy and technological complexity (e.g. Binford 1980; Kelly 1983; Andrefsky 1994) .

The effect of climatic change on the distribution and productivity of resources is an important temporal dimension when addressing the reasons *why* technological strategies may have changed; however, given the scope of the time period under consideration in this thesis, and the poor resolution of much of the climatic sequence for the study area, the variation in the availability of water and subsistence resources will not be explored in detail. Raw materials are a static resource by comparison[1], with largely the same range and distribution of raw materials available in the study area from the ESA to the LSA. Access to different raw material sources would therefore be determined by different mobility patterns. The mapping of raw material sources and stone tool discard locations can therefore provide a proxy indicator for human movement across the landscape.

8.2.1 Technological strategies

In Chapter 2, I discussed some of the ways in which different technological strategies have been conceptualised by archaeologists in relation to patterns of artefact discard. I summarise the most pertinent concepts here and expand on approaches specifically to provisioning, scheduling and risk reduction through tool design, before then applying these ideas to the Olifants River Valley.

Binford's (1973, 1977, 1979) notion of expedient and curated technology was closely tied to mobility, in terms of raw material procurement and economy. An expedient strategy required minimal energetic outlay in the production of blanks and tools, with a low level of retouch and maintenance prior to discard reflecting little pressure for the economic use of raw materials. In contrast, curated tools involved a considerable investment in time and energy, and as a result were designed to withstand frequent maintenance and remain in use for a prolonged period. This initial investment was a viable

[1] Some variation in availability may derive from processes which include the secondary transport of raw materials in river gravels, the covering or exposure of sources by water or sediment, the exhaustion of sources, and the erosion of clasts from conglomerates creating new sources.

strategy under circumstances where raw material supplies were not guaranteed, therefore its conservation was advantageous.

Kuhn (1992, 1995) distinguishes between two strategies for ensuring that a tool-user is equipped with the necessary technology: through the provisioning of individuals, or the provisioning of place. Under conditions where subsistence resources are unpredictable, and the situations when tools will be needed cannot always be anticipated, the provisioning of individuals with 'personal gear' (Binford 1977, 1979) is the favoured strategy. Where resource distribution is more predictable, the provisioning of specific places or 'gearing up' locations reduces transport costs (Binford 1980). Not only does this involve scheduled places for tool production, but this also occurs at scheduled times, when there is no time pressure to carry out other subsistence activities, therefore attention can be directed towards technology (Torrence 1983, 1989). When resources are unpredictable, maintenance of personal gear has to be carried out on a more *ad hoc* basis, in between subsistence tasks.

The risk involved in resource procurement may be related to resource unpredictability or resource scarcity, which require different measures to reduce the probability or the severity of failure respectively (Bamforth & Bleed 1997). Each of these contingencies can be managed through the adoption of a suitable tool design system: a maintainable design which can be repaired easily to ensure it remains functional, or a reliable design which has redundant or parallel components to guarantee its functionality in case one part should fail (Bleed 1986, 2002; Bamforth & Bleed 1997). Maintainability and reliability are not mutually exclusive design goals, but one may be prioritised over the other in the overall strategy which is employed (Bleed 1986; Torrence 1989). Maintainable technologies are designed for fast and easy repair so that the tool is always ready for use, this being a particularly important strategy if the need for a tool is either continuous or unpredictable. Reliable systems are suitable when the need for a tool is predictable and scheduled, and tool production and maintenance can be organised in separately scheduled sessions during 'downtime' (Torrence 1983, 1989; Bleed 1986, 2002).

A contrast is often drawn between bifacial and backed microlithic technology as two strategies for high-investment curated artefacts, meeting the design criteria of maintainable and reliable tools respectively. Throughout the southern African Stone Age, during periods which show a high level of artefact curation, there are shifts between bifacial- and backed microlith-orientated technological systems. The start of the Acheulean in the ESA is marked by bifacial technology and the production of highly maintainable handaxes, which is accompanied by a trend of increasing mobility and raw material transport (Bousman 1993; Schick & Toth 1993; McCall 2012). Bifacial tools reoccur in the Still Bay period of the MSA as hafted, maintainable bifacial points (Mackay 2009; McCall & Thomas 2012). The earliest example of a reliable technological system can be identified in the Howiesons Poort, characterised by the large-scale production of backed microliths (Bousman 1993; Mackay 2009; McCall & Thomas 2012). Backed tool production is also a feature of the Holocene Wilton, featuring backed bladelets and segments (Bousman 2005; Lombard & Parsons 2008).

Bifacial technology is typically regarded as a strategy for the production of maintainable tools, economising on raw material, and designed to be sharpened or repaired as needed so that the tool is always ready for use (Bleed 1986; Kelly 1988). Bifacially worked tools have a cutting edge that is more durable than an unretouched edge which can also withstand a high degree of resharpening, giving it a long use-life (Kelly 1988). Since bifacial technology is often employed when resource availability is uncertain, bifacial tools benefit from being multi-functional, allowing their use for a range of tasks. Where raw material supply is unpredictable, bifacial tools can be transported for use as cores which suits a residentially mobile system where extended stays are required in lithic resource-depauperate areas, or long logistical forays when the minimum amount needs to be carried (Kelly 1988).

Backed technology falls under a reliable system, designed not to fail when needed, and involving multiple redundant parts or easily replaceable components (Bleed 1986). Multi-functionality is also suggested to be an advantageous property of backed technology, with mixed evidence for the hafting of backed pieces in a range of configurations and their use for different purposes (e.g. Lombard & Pargeter 2008; Wadley *et al.* 2009; Igreja & Porraz 2013), although specialisation according to different raw material types and sizes has also been proposed (Mohapi 2008; Wadley & Mohapi 2008). A blade-based system of core reduction allows for the batch-processing of standardised elements, minimising the set-up costs involved in the preparation and reduction of the core (Bleed 1986, 2002). Production and maintenance is scheduled for 'down-time' when other activities do not need to be carried out, and occur at particular 'tooling up' locations (Torrence 1983, 1989; Bleed 1986).

These high-curation technologies are interspersed with industries where the investment in tool retouch is considerably lower, as in the post-Howiesons Poort where unifacial points are common, and the terminal Pleistocene Robberg industry, where bladelets are mass-produced but rarely retouched (Mackay 2009). The effect of climatic variables on shifting technological trends has been explored, although there are no clear, repeated associations between certain technological systems and either glacial or interglacial periods (McCall 2007; Jacobs & Roberts 2008; Mackay 2009; Hiscock *et al.* 2011; McCall & Thomas 2012; Mackay & Hallinan 2013). Whilst environmental change, and its resultant impact on resource availability and predictability, is important in driving changes in technology and mobility, no one system or other appears to be more suited to particular conditions; rather, it appears that the transitions between MIS stages were more susceptible to major technological reorganisations as groups adapted to uncertain conditions (Mackay 2009).

8.2.3 ESA artefact distribution and technology

The dominant pattern of ESA artefact distribution is along the Olifants River, clustered in higher density in locations where there are rich cobble beds. These assemblages contain cobble cores which generally reflect early stages of reduction, most retaining over half of their cortical surface. The majority of bifaces are in the roughout stage of handaxe production, with reduction focused more on one face or edge than the other, lacking either bilateral or bifacial symmetry, and often with a cortical butt. Handaxes that show highly refined flaking are rare in the sample recorded in the study area, but two finely flaked silcrete handaxes occurred amongst other ESA cobble assemblages on the river. Two additional ferricrete handaxes were among the few handaxes found away from the river, both showing a greater degree of reduction than the typical quartzite artefacts.

As discussed in Chapter 5, the river forms an important convergence point for different resources: water, subsistence opportunities, and raw material for stone tool manufacture. The Olifants appears to have offered a situation to ESA hominins where they were not forced to prioritise access to one essential resource over another, as may be the case in areas which are more arid, or with stone of poor quality for knapping. In terms of provisioning, the ESA assemblages on the river favour locations where raw material was abundant, and therefore there was little need for attention to be paid to raw material conservation. This resulted in minimally reduced cores and bifacial tools, and expediently produced flakes which may have been used for processing tasks on-site. The bifacial form of a handaxe is designed to provide an easily maintainable tool, with bifacial reduction allowing the edge to withstand more intensive resharpening than a unifacially worked edge. Handaxes can also be used as cores, provisioning the individual with a portable supply of flakes in locations where the availability of knappable raw materials was uncertain (Kelly 1988; Schick & Toth 1993).

Whilst tools in the early stages of reduction are common at raw material sources, one would expect to find highly reduced handaxes discarded at locations that are further away from the source (McCall 2012). This is the case for the two ferricrete artefacts at AG1A and KVK1, but the other bifacial tools attributed to the ESA are made on quartzite scree cobbles which are found in rocky areas of the landscape. Although only a small sample of artefacts identified as ESA were found away from the river, the indication is that artefacts made of raw materials for which sources are relatively restricted show a greater degree of curation than those made on quartzite materials which are readily available. What is interesting is that no handaxes made of river cobbles were observed away from the Olifants or Jan Dissels floodplains. This may be because other raw material sources across the landscape were known to be available, or that artefacts made from river cobbles were transported and used at other locations, but not discarded there. Given the extensive coverage of varied segments of the landscape away from the Olifants River, the very specific distribution of river cobble artefacts can be regarded as a behavioural pattern and not a product of sampling bias.

When the patterning of ESA artefacts in the study area is considered in relation to that observed in other landscape studies in southern Africa (e.g. Sampson 1985; Archer 2010; Le Baron *et al.* 2010; Hardaker 2011), the overall picture is that raw material provisioning patterns were highly specific to the local resources available. In areas where river cobbles were freely available, there was no need for additional energy expenditure in locating and transporting materials and tools if the raw material source itself was a suitable location for other activities. This is the situation for the Olifants River Valley, not just in the study area but also observed along the river to the north and south, and this pattern is frequently observed in other South African river valleys (e.g. van Riet Lowe 1937; Power 1955; Helgren 1978).

In areas where there were no river cobbles suitable for tool-making, this does not appear to have deterred Acheulean groups from settling there, provided there was an alternative water source. This situation may be put forward for Elandsfontein, where stone was quarried from sources at least 10 to 25 km away from the eventual place of artefact discard, also making use of an unusually diverse variety of raw materials (Archer 2010). The Acheulean settlement of the Seacow River Valley also shows a preference for higher-quality materials, obtained directly from hornfels quarries which, Sampson (1985, 2001) argues, show a preferential selection for quarries located further away from water sources.

An opportunity to further investigate the preferential use of different raw materials in the ESA arises in the Biedouw River Valley, to the east of the Olifants. Preliminary surveys have pointed towards specific patterns of quartzite use for ESA tools, favouring high-quality fine-grained quartzites which outcrop some distance away from the current river channel, with less frequent use of the lower-quality quartzite from the cobble beds of the river itself. The river valley is much wider than the Olifants, allowing for the course of the palaeo-Biedouw river on the easily-eroded shale bedrock to have varied considerably through time, and the exposure and access to cobble beds and rock outcrops may also have been variable through time. Further research in the area will target the issue of raw material sources and artefact manufacture, investigating whether there are technological differences between artefacts made on quartzite from cobbles and from outcrops. At a global scale, trends have been observed which show the adaptation of Acheulean technology to suit the properties of the available raw materials (Sharon 2008), and a consideration of this at a local scale, within the Biedouw, and regional scale, within the general Cederberg area, would be an interesting line of enquiry.

8.2.4 MSA artefact distribution and technology

The distribution of MSA artefacts reflects tool discard across a much wider segment of the landscape than is seen in the ESA. Raw material procurement still appears to have a focus on the river, but the transport of artefacts over greater distances, and their subsequent discard when they were no longer useful, shows that rocky areas were frequently visited by people in the MSA. Rock shelters play an increasing role as what could, for the later part of the MSA at least, be described as a domestic focus. The MSA also shows a unique pattern of discard on elevated rocky platforms or koppies in areas which bear little to no evidence for a habitual ESA or LSA presence.

The later stages of the MSA show distinctive curation strategies of retouched tool forms which reflect different ways that groups organised themselves, their raw material procurement and their tool production, use and discard on the landscape. Two strategies stand out: the bifacial point-orientated Still Bay, and the backed piece-orientated Howiesons Poort. The technology of the Still Bay and Howiesons Poort involves a high level of technological investment in terms of time and energy expended in raw material procurement and tool production. This represents a departure from previous and subsequent MSA tool-kits which are low-investment by comparison, with little emphasis on retouched tools and non-local raw materials.

Prepared core technology

Prepared core technology is marked out as the innovation which defines the MSA, representing a very particular technological strategy geared towards the production of predetermined flakes. The initial investment in setting up the striking platform of the core is rewarded by the end product which takes a desired form requiring little or no subsequent retouch. Prepared cores fulfil the role of a curated, transported technology, carried to provision individuals with raw material which is organised to produce specific end products when needed (Binford 1979; Kuhn 1994; Wallace 2006; Porraz *et al.* 2008).

The frequency at which radial cores and flakes struck from radial cores occur, dispersed across the landscape in rocky areas in particular, supports the suggestion that this technological system fitted into a high mobility lifestyle, characterised by short occupation episodes and frequent residential moves within a large area (Kuhn 1992, 1995; Porraz *et al.* 2008) . The increased use of caves during the MSA indicates that these were occupation foci where specific activities were carried out, but radial cores served as a portable source of flakes for tasks that took place in the wider landscape.

Bifacial points

Bifacial points, characteristic of the Still Bay, are maintainable and versatile tools, suited to being carried by individuals for use in a range of tasks (Lombard 2006b; Mackay 2009; Villa *et al.* 2009; Porraz *et al.* 2013b). Bifacial points were found mostly in two types of situation in the study area: as isolated, often broken finds on the open landscape, and in large numbers at a manufacturing site on the Olifants River. The isolated points, usually distal tips, may be interpreted as being broken during use and discarded since they were no longer usable. The manufacturing site at Dam East (DAME8A) may be described as a tooling up site (*sensu* Torrence 1989), exploiting a probable silcrete source on the Olifants where points were produced and then transported for subsequent use (Mackay & Hallinan 2013). The large number of points, very few of which were complete, were made almost entirely on silcrete and represented all stages of the reduction sequence, including minimally reduced roughouts, broken points and points that had been reworked. The recycling of broken tools supports their role as curated artefacts. Silcrete unifacial points were also present in quite substantial numbers, as well as the only surface Howiesons Poort-like backed artefact in the study area. Whilst it is possible that the area saw prolonged and repeated use throughout the later part of the MSA, including the Howiesons Poort and post-Howiesons Poort, it is also possible that these artefacts are contemporaneous with the bifacial points since they are known to occur in low frequencies in the Still Bay at excavated sites (Wadley 2007; Villa *et al.* 2009; Högberg & Larsson 2011; Porraz *et al.* 2013b). Here, the palimpsest nature of open sites becomes a limitation on understanding the use of the site at a finer chronological resolution within the later part of the MSA.

Raw material procurement in the Still Bay tends towards the use of locally available raw materials, as seen at the only other reported open-air manufacturing site at Soutfontein, where bifacial point production appears to have targeted locally available quartz outcrops and silcrete cobbles (Mackay *et al.* 2010; Mackay & Hallinan 2013), as well as the excavated sites Diepkloof, Hollow Rock Shelter and Sibudu (Wadley 2007; Högberg & Larsson 2011; Porraz *et al.* 2013b). This would fit with a residentially organised strategy, with the apparent curation of fine-grained rocks but limited investment in travel to obtain it (Porraz *et al.* 2013b). Blombos is an exception in that the bifacial point assemblage is dominated by silcrete which sourcing indicates is only available 20 to 30 km from the shelter.

Although these sites are currently the only securely identified Still Bay occurrences[2], the four rock shelters and two open sites all contain high numbers of bifacial points, with a low ratio of complete to

[2] Umhlatuzana in KwaZulu-Natal and Apollo 11 in Namibia contain bifacial point assemblages which may be attributable to the Still Bay (Lombard *et al.* 2010; Vogelsang *et al.* 2010).

broken points. This suggests a provisioning strategy involving tooling up at specific manufacturing locations close to a raw material source (Mackay 2009; Mackay & Hallinan 2013). Finished bifacial points were then used to provision individuals who carried them as a portable, maintainable and versatile tool which could be resharpened as needed, and eventually discarded when it broke or reached its threshold for resharpening.

An additional role for bifacial points as cores is suggested by the very low incidence of cores in Still Bay layers at Blombos and Sibudu (Kelly 1988; Henshilwood *et al.* 2001b; Wadley 2007; Mackay 2009). Measurements of flake scars on bifacial points from Diepkloof and Hollow Rock Shelter indicate that these would have produced flakes of a similar size to those from radial (Levallois) cores late in their reduction sequence (Mackay 2009; Porraz *et al.* 2013b; cf. McCall & Thomas 2012). Although the sample of sites is currently only small, the relative absence of cores in bifacial point-rich layers raises two possible scenarios which are relevant to a landscape-scale study: firstly, that cores were discarded on the landscape as opposed to in shelters, and secondly, that bifacial points held a dual purpose as cores.

Backed pieces

Backed pieces from the Howiesons Poort are rare as surface finds in the study area, in spite of their presence in rock shelter sequences close by, such as Klein Kliphuis (Mackay 2009, 2010, 2011a), and the general abundance of MSA material on the surface. Only a single surface artefact has been recorded, and since it occurs amongst predominantly Still Bay material at the Dam East manufacturing site, it may not be specifically attributable to the Howiesons Poort. This pattern has also been observed in the Sandveld in surface surveys conducted by Mackay (unpublished data) between Elands Bay Cave and Diepkloof, the latter containing large quantities of backed pieces in MSA deposits (Mackay 2009; Porraz *et al.* 2013b). Only three backed pieces were found on the landscape: one was at the base of a talus slope, less than 500 m from the current shoreline, the second was around 20 m from the mouth of a rock shelter on a koppie ridge to the south, and the third was on the open veld. Low numbers of backed pieces were reported at the open dunefield sites of Anyskop and Geelbek on the west coast, with ten and six backed segments identified in each locality respectively (Dietl *et al.* 2005; Kandel & Conard 2012). At Anyskop, these occurred alongside 90 other artefacts “ascribed to the Howiesons Poort based on typology, technological parameters and the affiliation of raw material units whose certainty is ascribed” (Kandel & Conard 2012:21), although this attribution is admitted to be tentative. The open koppie assemblage at Wolfberg in the Sandveld (discussed in Chapter 7, Section 7.5.4) also contains MSA artefacts identified as Howiesons Poort (Manhire 1984).

The low frequency of backed pieces in open contexts in both the Olifants and Sandveld areas contrasts with the high density in which they typically occur in rock shelter sequences, at Klein Kliphuis, Diepkloof, and numerous other shelter sites, most of which are located along the southern Cape coast or in inland mountainous regions (Lombard 2005b). One unusual and currently unresolved case which does not fit this pattern of bulk discard is the cave site Klipfonteinrand, situated to the east of the study area, where backed pieces are present but in low numbers (Mackay 2009, 2012). Backed pieces are designed to be expedient components within a composite tool that can be discarded and replaced when they break (Bleed 1986, 2002). This low rate of backed piece curation might seem to create a scenario for a high incidence of discarded artefacts as they were replaced by new elements; however, the absence of backed pieces on the landscape indicates that discard took place in specific locations. The bulk discard of backed pieces in rock shelters may mark these out as manufacturing or re-tooling locations when they occur in combination with high rates of blank production and manufacturing debris (Torrence 1983, 1989; Mackay 2009; Mackay & Hallinan 2013).

McCall and Thomas (2012) suggest that Howiesons Poort landscape use was logistically organised, with longer term residential sites used as a base from which specialised logistical forays could be made to target specific resources, which required reliable tools. However, the archaeological signature of these logistical sites is unclear. It could be suggested that the unusual artefact profile with few backed pieces at Klipfonteinrand, positioned between the Karoo and the Cape Fold Belt Mountains, was one such logistical camp where backed piece production was not the emphasis. The procurement of fine-grained exotic or non-local raw materials is often cited as a feature of the Howiesons Poort (e.g. Wurz 1999; McCall 2007; Porraz *et al.* 2013b), and Klipfonteinrand occurs in a frontier setting with access to hornfels and CCS from the Karroid rocks carried by the Doring River.

The dates for the Howiesons Poort generally coincide with a period of deteriorating climate, towards the end of MIS 4. An additional risk-reducing role has been suggested for backed pieces, as items given in reciprocal exchange relationships (Deacon 1989, 1993; cf. Ambrose & Lorenz 1990). The increased use of fine-grained raw materials, with potentially higher procurement costs, is suggested to have added symbolic value to the exchange items (Deacon & Wurz 1996; Wurz 1999). The networks formed through these partnerships facilitated not only the exchange of artefacts, but also the sharing of information which may have been critical for improving knowledge about the location of resources, making their distribution more predictable (McCall 2007). This would have meant that particular resources could be targeted on logistical forays, with a need for reliable, task-specific tools.

Unifacial points

In explaining the abandonment of the complex technological strategies involving bifacial point and backed piece production, McCall (2007) suggests that as climatic conditions ameliorated, there was no longer a need for maintaining these information-sharing networks, seeing a decline in symbolic artefacts and a return to low-cost technologies. The tool form typically associated with the post-Howiesons Poort period is the unifacial point, although this is more due to the scarcity of other retouched tools, rather than being a prevalent and strongly diagnostic feature of the industry, occurring throughout the MSA. In contrast to bifacial points and backed pieces, unifacial points are not found in large numbers at tooling up sites in either open-air or rock shelter settings. Instead, they are found in relatively low frequencies in a variety of different locations on the landscape and in shelter assemblages.

Unifacial points can be described as maintainable tools, but in comparison to bifacial points, they are able to withstand less resharpening before the edge angle becomes too steep to maintain (Dibble 1987; Kuhn 1990; Clarkson 2002; Mackay 2009). The focus of retouch on unifacial points tends to be directed towards the tip, whereas bifacial points are flaked across the whole surface of both faces, creating a usable bifacial edge around the entire perimeter (Mackay 2009; Conard *et al.* 2012). This strategy further reduces the retouch capacity of a unifacial point if it must retain a specific angle or morphology, as described for Tongati and Ndwedwe point types in the post-Howiesons Poort at Sibudu (Conard *et al.* 2012).

One of the potential roles of bifacial points is as cores, generating usable flakes larger than 15 mm from retouch (Mackay 2009). This is less likely to be the case for unifacial points which typically produce much smaller retouch flakes, although Conard et al. (2012) suggest that a lateral thinning flake removed from a thick Tongati-type unifacial point could be used as a blank for a new Tongati point. The central features of unifacial point technology appear to be variability of form and flexibility in the selection of blanks for point manufacture, indicated by the technological analysis of the Sibudu post-Howiesons Poort assemblage. Whilst unifacial points are often regarded as hafted spear tips (Lombard 2005a; Mohapi 2005, 2008; Villa *et al.* 2005), the different point morphologies present within the same technological system suggest that they were designed to fulfil different functions (Conard *et al.* 2012).

Unifacial points may be regarded as recurring components throughout the MSA, found in toolkits requiring a lower initial technological investment than bifacial and backed technologies which have high production costs, therefore unifacial points did not need to be produced *en masse*. The maintainability of unifacial points gave them some potential for curation, although not to the same degree as bifacial points. The variation in morphology, technology and temporal affinity seen in unifacial points, which currently remain grouped together under one umbrella category, makes them a difficult tool class to understand.

8.2.5 LSA artefact distribution and technology

LSA artefact distribution is identified as being highly cave-orientated, centring on particular focal points around which tool discard is clustered. Rock shelters and caves are specific places on the landscape, making them a landmark which could be easily returned to. The use of these foci as domestic sites is supported not only by the concentrations of artefacts which occur there, but also the range of artefacts present which reflect different types of activity. Sand deflation hollows are also recognised as foci for LSA activity, although these landscape features are rare in the study area, becoming more common to the north of the Clanwilliam Dam area. The higher rate of backed pieces at Rietvlei, compared to other sites mimics the pattern seen in the Sandveld which has been interpreted in terms of differences in activity scheduling (Parkington 1980), or temporally distinct occupation (Manhire 1984). The characteristic shared by rock shelters, deflation hollows and – at the coast – shell middens, is their role as a central place. Whilst LSA artefacts tend to be restricted to these concentrations and are generally not found on the landscape at large, the types of tool and raw materials present reflect the use of the wider landscape in resource procurement and other activities.

The main technological shift seen in the LSA is microlithic bladelet production, producing much smaller bladelets and cores than those described as bladelets in the Howiesons Poort (Wadley 1996; Mitchell 1995; Deacon 1984a). Bladelet technology allows the production of standardised end products which, whether subsequently retouched or used unretouched, most likely served as replaceable elements in hafted composite tools (Bleed 1986; Mitchell 2000; Bousman 2005; Lombard & Parsons 2008; Pargeter 2011). A number of different hafting configurations have been explored, suggested as multiple lateral inserts along a projectile or longitudinally hafted weapon tips (Lombard & Parsons 2008; Pargeter 2011), and use wear also indicates their use as cutting tools, most likely hafted sequentially, parallel to the haft, to create a longer cutting edge (Wadley & Binneman 1995; Binneman 1997; Binneman & Mitchell 1997; Mitchell 2002a). When a tool features parallel systems with multiple redundant parts, this increases its reliability since it would still be functional should one element break (Bleed 1986, 2002). The standardised inserts themselves are flexible components if they could fulfil alternative roles as tips, barbs or blades (Pargeter 2011).

The Late Pleistocene Robberg, is one such bladelet-rich industry, containing very few retouched artefacts (Manhire 1993; Orton 2006; Pargeter 2011). It has been noted that Robberg sites are rarely observed on the landscape (Wadley 1993; cf. Orton 2008a), and indeed, shelter sites in the study area and the more general west coast area are also relatively scarce, reported from Faraoskop and Elands

Bay Cave to the west, and Putslaagte 8 and Klipfonteinrand to the east (Manhire 1993; Orton 2006; A. Mackay pers. comm. 2013). The discard frequencies of artefacts and cores in these assemblages reach particularly high levels in MIS 2 (Mackay & Hallinan 2013; Mackay unpublished data), indicative of large-scale production and discard at rock shelter localities. This parallels the trend seen in the Howiesons Poort, when backed pieces are discarded in large numbers in shelters during MIS 4, also a glacial period.

It is important to acknowledge that although bladelets are regarded as a typical feature of late Pleistocene industries, they are in fact not the dominant product found in an assemblage which is usually composed mainly of large, irregular flakes (Deacon, H.J. 1995; Mitchell 1995; Wadley 1996). This raises the possibility that Robberg-aged assemblages are simply not recognised on the landscape, in a scenario previously suggested in Chapter 7 for the Howiesons Poort, with both of these industries involving batch-production of small elements with a strong rock shelter presence. Sampson's (1985) landscape surveys of the Seacow Valley identified no Robberg open sites; similarly there were no Howiesons Poort open sites identified in the region. The relaxation of time-stresses under wetter glacial conditions may have allowed for the scheduling of tool production and maintenance at specific tooling up sites, resulting in the emphasis on shelter sites seen in the archaeological record (Orton 2008a; Mackay 2009). Mackay (2009) suggests a system of logistical mobility for the period, viewing the presence of poorer quality raw materials, high levels of core reduction, and low frequencies of high-investment retouched tools, as least-cost technologies (cf. Binford 1980; Mitchell 2000).

Single platform, often pyramidal, bladelet cores facilitated the batch-production of large numbers of bladelets, but the bipolar reduction technique was also used, extending the use-life of cores that were otherwise too small for flaking by free-hand percussion (Deacon 1984a; Mackay 2009). This technique was particularly suitable for use on lower quality, locally occurring materials such as quartz pebbles from conglomerates, especially if reduced mobility constrained the procurement opportunities for fine-grained raw materials (Barham 1987; Orton 2008a).

The Robberg was followed by more informal, expedient technologies in the early Holocene, but the Wilton industry of the later part of the Holocene shows a greater investment in more curated technology. Microlithic artefacts are retouched more frequently, with thumbnail scrapers and backed pieces mounted on hafts with mastic (Deacon 1966; Binneman 1994). In the case of backed tools, such as bladelets and segments, the steep backing retouch helps mastic to adhere to the tool surface (Wadley *et al.* 2004). Unretouched bladelets – as used in the Robberg – would also have served adequately as replaceable components of composite hafted tools, being easily removed and inserted into slotted hafts (Lombard & Parsons 2008; Pargeter 2011), therefore the additional effort which was put into the backing retouch may have had more than just a functional purpose.

Backed segments are suggested to have been involved in exchange relationships, with style embedded in their shapes and added value associated with high quality raw materials (Wadley 1989; Deacon & Wurz 1996; Ambrose 2002). As discussed in the context of the Howiesons Poort, technology is not the only means for minimising risk (Torrence 1989), and the practice of *hxaro* provides an ethnographic example of a social alternative, described by Wiessner (1977, 1982) for the Ju/'hoansi. In establishing a formal relationship with a partner through the reciprocal exchange of gifts, this created a social obligation to share resources during times of stress. Whilst the limitations of treating *hxaro* as an analogue for Stone Age behaviour have already been discussed in Chapter 6, it is nevertheless important to acknowledge that social strategies involving non-technological artefacts, such as beads and bone points (Mazel 1989; Wadley 1989), could also serve as risk reduction measures. Given the high level of mobility inferred for the LSA (e.g. Parkington 1977a), and the small, portable nature of their toolkit, microlithic artefacts would be a suitable medium for exchange, as "small things remembered" (Ambrose 2002:19).

A further dimension to consider is the use of other forms of technology besides stone tools, such as bone tools. In the Holocene LSA, a rise in bone points has been related to their use in exchange networks as a risk minimising strategy (Wadley 1987, 1989; Mitchell 1996b, 2000). Bone technology has earlier origins in the MSA, with polished bone points dating to the Still Bay at Blombos (Henshilwood *et al.* 2001a; Henshilwood *et al.* 2001b). The polishing process applied to the bone points appears to serve no functional purpose, instead viewed as giving added value to the artefact, with the suggestion that bone points had a symbolic role as exchange artefacts in the MSA as well as the LSA (d'Errico & Henshilwood 2007; McCall 2007). In the earliest Still Bay levels at Blombos, polished bone points occur in relatively high numbers, declining as bifacial point frequency increases later in the Still Bay sequence (Henshilwood *et al.* 2001a; Minichillo 2005; d'Errico & Henshilwood 2007). This inverse relationship between bone points and bifacial points suggests they served as alternative, rather than complementary forms of technology in the Still Bay. Both bone points and bifacial points are interpreted as spear heads, as opposed to arrow heads, in the Still Bay.

Bone tools are known from the Howiesons Poort layers at Klasies River and Sibudu, and in post-Howiesons Poort and LSA transitional layers at Border Cave (Backwell *et al.* 2008; d'Errico *et al.* 2012a; d'Errico *et al.* 2012b). Some of these specimens are likened in dimensions and technology to LSA and ethnographic arrow points and link-shafts, used to support the suggestion that MSA bone points from the Howiesons Poort onwards could have functioned as arrows (d'Errico & Henshilwood 2007; Backwell *et al.* 2008; Bradfield & Lombard 2011; cf. d'Errico *et al.* 2012b). The larger bone points, such as the Sibudu specimen, could be used as arrows for small game hunting, but the smaller, more slender specimens, found only after 40 ka, would require the use of poison to be effective – an innovation currently associated with the LSA (Backwell *et al.* 2008; d'Errico *et al.* 2012a; Villa *et al.* 2012). In technological terms, bone arrow points would be more maintainable, although less flexible tools than stone tips; however, they require a significant output of energy in manufacture and are generally less effective than stone in causing fatal wounds to prey, having to be used with poison (Lombard & Parsons 2008; Villa *et al.* 2012).

In summarising the relationship between stone and bone technology in the MSA, the Still Bay indicates a preference for maintainable tools, not only in stone but previously in bone, potentially used as spear points. In contrast, the situation in the Howiesons Poort, at Sibudu at least, suggests that reliable, microlithic stone tools were used in conjunction with maintainable bone point technology. It has been proposed that the bone points in the post-Howiesons Poort at Border Cave reflect the replacement of stone arrow tips used in the Howiesons Poort (Wadley & Mohapi 2008; Lombard 2008; Lombard & Phillipson 2010). The Robberg, on the other hand, presents a scenario where a rise in polished bone points coincides with a sharp decrease in bladelets and bladelet cores after 12 ka, as seen at Nelson Bay Cave and Elands Bay Cave (Deacon 1984a; Mitchell 1988). This is interpreted in terms of a shift towards the use of bone-tipped arrows rather than stone hunting weapons (Mitchell 1988)[3]. Based on current evidence, bone technology may have served as a high-investment, maintainable component in the toolkit at various times during the LSA and later MSA. In the Still Bay and Later Holocene Wilton, relatively high numbers of bone points appear to reflect their significant role as hunting weapons – as spears and arrows respectively – used as an alternative to stone. In the Howiesons Poort and Robberg, both bone points and stone-tipped weapons may have been used as arrows, acting as parallel technologies suited to the same task, further increasing reliability.

8.3 Conclusion

This chapter has used principles of technological organisation to frame the patterning of stone tool distribution observed in the study area. All hunter-gatherer populations have to deal with the risk of scarce or unpredictable resources, with the options of altering their strategy of mobility to increase their chance of encountering resources, and their tools to ensure their success in obtaining resources when they are encountered. The notions of provisioning (Torrence 1989; Kuhn 1992, 1995) and tool design (Bleed 1986, 2002; Bamforth & Bleed 1997) have been particularly useful conceptual tools for

[3] A contrasting situation is observed at Sehonghong in Lesotho, where pre-12 ka layers contain a sizeable assemblage of polished bone points, described as a cache, alongside high frequencies of bladelets. These may have been used as arrow points or link-shafts (Mitchell 1995).

approaching the different strategies that were employed to ensure that individuals were equipped with appropriate functional tools when they needed them.

The iconic artefact approach has been particularly well suited to identifying the repeated appearance of certain tool forms, such as bifacial artefacts as ESA handaxes and Still Bay bifacial points, and backed microliths in the Howiesons Poort and LSA. The alternation between these distinctive strategies of tool design can be viewed in terms of the need for a toolkit composed of maintainable or reliable tools in response to changes in the availability and configuration of resources (Bleed 1986; McCall & Thomas 2012; Bousman 2005; Mackay 2009).

In considering the ESA, MSA and LSA in the previous three chapters, patterns of landscape use were explained in terms of access to water, food and raw materials, identified as the main resources which were essential to all hunter-gatherer groups. Whilst the availability of water and subsistence resources is affected by environmental change due to fluctuating glacial and interglacial conditions, the distribution of raw material sources in the Olifants River Valley and its neighbouring areas has, for the most part, offered the same possibilities for tool-making to people occupying the area in the ESA, MSA and LSA. The changes in preference for raw materials in different periods can therefore be related to changing levels of mobility, taking people to areas where certain types of stone were available, and the relative importance of investing time and energy into raw material procurement. The variation observed within the later part of the MSA, which has been of interest throughout this thesis, is of particular relevance here.

It has been hypothesised that during periods of resource stress, people will be prepared to make a greater investment in stone tool technology, incurring higher production costs but benefiting from an improved success rate in obtaining subsistence resources (e.g. Mackay & Marwick 2011). Conversely, when resources were abundant and predictable, there would be less pressure in resource procurement and therefore technologies could be low-cost and more expedient. An interesting feature of the southern African record during the MSA and early part of the LSA is that the technological strategies which were actually employed do not meet these expectations (Mackay & Marwick 2011). The most costly technologies of this period involved the production of bifacial points in the Still Bay, and backed pieces in the Howiesons Poort. These occur towards the beginning and end of MIS 4 respectively, in a glacial period which would have seen a need for high-cost technologies to manage risks in resource procurement – as expected. However, when conditions were arguably at their coldest in the middle of MIS 4 between the Still Bay and Howiesons Poort, and during the Robberg in MIS 2, technology is more expedient in its nature (Mackay & Marwick 2011).

The factors which influence technological organisation, then, are clearly complicated and likely affected by social as well as environmental factors, which are harder to model based on the evidence available. It is also noted that there is some danger in singling out bifacial points and backed pieces which represent only part of the whole technological system employed at the time, with prepared core and blade technologies playing important roles in the MSA. These iconic tool forms do, however, provide the opportunity for identifying technological change at a finer resolution within the MSA, and the distinctive landscape signatures which they reflect are further points of interest with regard to tool provisioning (Mackay & Hallinan 2013).

By looking at the situations and frequencies in which artefacts were discarded, using both the surface and excavated records, patterns can be observed in terms of the location and scheduling of tool maintenance and repair (Torrence 1983, 1989). In the context of the Still Bay and Howiesons Poort, as demonstrated in Chapter 7 and explored above, bifacial points are interpreted as tools which provisioned individuals, carried around the landscape and widely discarded as isolated finds, whereas backed pieces provisioned shelters which were used as locations for scheduled re-tooling activity (Mackay & Hallinan 2013). Whilst these proposed patterns require the investigation of more assemblages in order to expand the currently small sample, the discussion in this chapter has highlighted the potential of combining the evidence from rock shelters and the landscape to look at changing strategies in technology, provisioning and mobility at a more integrated level.

CHAPTER 9. CONCLUSION

9.1 Introduction

The previous chapter began with a comparison of the technological and landscape use strategies employed in the ESA, MSA and LSA, subsequently discussing the distinctive signatures of the later MSA Still Bay and Howieons Poort industries in more detail. In this chapter, I readdress Deacon's proposed framework of stenotopic and eurytopic landscape use and assess the usefulness of the concept at different spatial and temporal scales, drawing together the evidence for the ESA, MSA and LSA. In the conclusion to this thesis, I discuss whether this study has been successful in its aim to construct a model of landscape use for the study area through the mapping of temporally diagnostic surface artefacts, and I explore some of the wider implications and potential directions that it has raised for future research.

9.2 Stenotopism and eurytopism reconsidered

Deacon's contrast between stenotopic and eurytopic landscape use offers one framework for viewing the shift from the narrow, stenotopic ESA distribution around the river, to the widespread, eurytopic LSA distribution across a greater topographic range of the landscape. The MSA, in Deacon's model, shows an increasingly eurytopic use of the landscape, anticipating the behaviour of the LSA, and reflecting humans who were cognitively 'modern'. The notion of stenotopic and eurytopic landscape use was originally proposed as a generalised observation based on sites across South Africa, taking water sources as the central feature by which landscape use strategies were differentiated, contrasting the ESA and LSA (Deacon 1998). From the later part of the MSA, people's attention shifted to caves and rock shelters, seeing the increasing occupation and reoccupation of shelters which became domestic foci (Deacon, H.J. 1989, 1995, 2001).

In the ESA, the lithic record shows that raw material sourcing, knapping, tool use and discard took place primarily along the river in a roughly continuous, linear distribution, forming denser clusters where cobbles were particularly abundant. In contrast, the LSA was centred on specific points on the landscape, with caves and rock shelters serving as places to which raw materials and subsistence resources were transported for knapping, for the use of stone tools to produce other tools, resource extraction and subsequently were the place of tool discard.

One of the most striking distinctions which can be drawn between ESA and LSA technological systems, albeit at a coarse level, is the size of tool being produced and the implications this has for the portability of raw materials and finished tools. ESA tools were made from large cobble clasts which would have been unwieldy to carry over substantial distances. The bifacial form of the handaxe does, in theory, meet the criteria for a portable, maintainable and versatile tool, useful for its sharp cutting edge, pointed tip and as a core for flake production (Jelinek 1977; Kelly 1988; Schick & Toth 1993). Bifaces are efficient in terms of their mass to cutting edge ratio, and although they individually tend to be large artefacts, this means that only a single handaxe would need to be carried at a time (Nelson 1991). The result is that they show a narrow, stenotopic distribution with little discard taking place on the open landscape, but rather with discard clustered around the raw material source.

LSA technology, on the other hand, was geared towards the production of small bladelets and flakes from microlithic cores. Certain periods within the LSA featured large, informal flake-based industries, but the Robberg and Wilton are notable for their microliths which were used as inserts in composite tools, in unretouched and backed forms respectively. At a regional scale, Deacon identifies the LSA as showing a broader distribution across the landscape; however, based on the local-scale distribution of surface artefacts, the LSA shows a very restricted landscape distribution. If stenotopism is measured by the range of landscape settings in which artefacts are found, then the LSA appears to be as focused on rocky areas as the ESA is on rivers. The concentrations of artefacts at rock shelters in particular, marks the location of knapping, tool use and discard for many artefacts. This includes the use of tools, such as adzes, to manufacture other tools, such as digging sticks, bows and other wooden items. What sets the localised, stenotopic signature of the LSA apart from that of the ESA is that raw materials were brought in from other areas of the landscape.

The transport of CCS and hornfels from at least 40 km away from the study area reflects the high mobility of LSA hunter-gatherers, moving between different ecological niches, which accords with Deacon's original notion of eurytopism (Deacon 1998; Deacon & Deacon 1999). In the LSA, portability plays a significant role in the general microlithisation of the toolkit; smaller tools required smaller nodules of raw material which would be advantageous if materials were transported over large distances. It is interesting to ask what the driving force behind microlithic artefact production in the LSA was; whether it was dictated by the task for which tools were required, such as projectile points, or whether small clasts of fine-grained raw material forced the production of smaller tools. Whilst Nelson (1991) has suggested that the size of artefacts may be more determined by their intended use than by maximising portability, Newman (1994) argues that flake size is related to the distance that the raw material must be transported, and therefore smaller tools reflect a need for a portable toolkit.

The increased use of finer-grained raw materials during the LSA in the study area could reflect either of these scenarios. In comparison to coarse-grained quartzite and poor quality quartz, fine-grained raw materials are better suited to the production of smaller, more refined tools since they produce much thinner flakes with a greater degree of flaking control, and less wastage of raw material in the resharpening process. Although fine-grained silcretes were available in the Olifants area, LSA people still chose to transport CCS and hornfels over considerable distances from Karoo-derived rock sources. Whilst fine-grained stone was increasingly used towards the later part of the MSA, evidence for the procurement of non-local CCS and hornfels in any substantial quantity is sparse.

In comparison with the LSA, then, the MSA shows less evidence for mobility between resource zones, as reflected by raw material transport. However, the comparative scarcity of this evidence in surface assemblages does not mean that people in the MSA were not moving between these regions. A system of logistical mobility is suggested for this period based on the excavated sites of Klein Kliphuis and Diepkloof. These show an increase in the exploitation of fine-grained materials, and the deliberate preference of higher-quality materials over those available locally (Mackay 2009). Instead of being mobile at a regional scale, the widespread distribution of MSA artefacts within the surveyed area of the Olifants River Valley, indicates high mobility at a local scale, involving the extensive transport of artefacts around the landscape. Both bifacial points and composite tools incorporating backed pieces suited portability: bifacial points were multi-purpose tools which provisioned the individual for a wide range of tasks, and backed pieces were small replaceable elements which could be discarded when they broke, with parts of the tool ensuring that it remained functional until re-tooling could take place. A pattern unique to the MSA is the presence of discarded flakes and cores at remote locations in elevated, rocky areas of the landscape. This would seem to reflect the habitual transport of curated prepared cores, which were discarded casually when they were no longer needed. Radially and bifacially worked cores are noted to hold an important role in transported toolkits (e.g. Binford 1979; Kuhn 1994), and the discard of prepared cores and related end products in open site locations is observed elsewhere in the Western Cape region, interpreted as reflecting a highly mobile use of the landscape (Dietl *et al.* 2005; Kandel & Conard 2012; Porraz *et al.* 2008).

Overall, the MSA has left a broad, eurytopic signature on the landscape, although the additional insights offered by the temporally distinctive Still Bay and Howiesons Poort industries show the focused use of specific places, considered here within the context of technological provisioning. In the Still Bay, re-tooling occurred at open sites located at raw material sources, seen at Dam East in the study area, and supported by Soutfontein in the Knersvlakte (Mackay *et al.* 2010). In the Howiesons Poort, on the other hand, re-tooling appears to have taken place in rock shelters, reflected by the assemblages at Klein Kliphuis and Diepkloof (Mackay & Hallinan 2013). Outside of these two identifiable, high-investment technological systems, a generalised MSA composed of prepared cores and expedient flake products shows a more casual pattern of discard across the landscape, with a particular interest in elevated rocky platforms. Deacon identified the later part of the MSA as showing a shift towards the occupation of caves which anticipated their use as domestic sites in the LSA (Deacon, H.J. 1989, 1995). Whilst the intensity of cave occupation does seem to increase – or at least the evidence is better preserved – in comparison to earlier periods, the open site record draws attention to more complex contrasts in how people used the landscape *within* the MSA.

9.3 Assessing the current study

This thesis aimed to investigate changing landscape use patterns throughout the Stone Age, with a particular interest in the MSA as a transition point between ESA and LSA behavioural capabilities. This was achieved through the mapping of temporally diagnostic artefacts in surface assemblages, comparing topographically varied segments of the landscape in order to identify localised preferences for certain features. Based on the quantity of artefacts that were located on the surface, and the distinctive distributions shown by temporally diagnostic pieces, this study has demonstrated that surface artefacts are a rich source of information which are particularly well-suited to a temporally broad comparison of landscape use patterns.

The caveats and limitations of a surface study have been considered in all stages of this project, acknowledging that a reliance on temporally diagnostic artefacts sacrifices some degree of chronological resolution and is dependent upon a tightly resolved excavated sequence for comparison. During some periods, the excavated sample is small and contains few distinctive artefact types which are suitable iconic markers, as in the early MSA and late Pleistocene LSA. In other periods, such as the Still Bay and Howiesons Poort, there is an increasing diversity of dates emerging for a still small sample of sites, and the wider-scale implications for the chronology remain to be resolved (Jacobs *et al.* 2008a; Tribolo *et al.* 2013).

In addition to concerns about chronological control, there is also the potential for spatial bias, where artefacts are differentially visible or buried, *in situ* or displaced. This will vary according to the depositional conditions specific to their discard location, and the length of time for which they have been subject to post-depositional processes. In most situations in the study area, the spatial displacement of artefacts is deemed to be minimal, occurring only at a very localised scale, if at all. It is possible that the accumulation of sediments may have buried some artefacts, obscuring iconic tools, particularly those from older periods. However, the presence of artefacts from all periods, across almost all segments of the landscape surveyed, does suggest that a substantial portion of the archaeological record is visible. The variable densities in which these artefacts occur is interpreted as reflecting behavioural preferences (although cf. Schiffer 1983; Roebroeks *et al.* 1992; Stern 1994).

In cases where artefacts have obviously been affected by disturbance, this is generally the result of downslope movement, animal digging, or related to fluctuations in the level of the Dam. Overall, the landscape situation which characterises the distribution of each type of iconic artefact is repeatedly observed across the different areas surveyed, also supported by data from supplementary sites. This is strongly persuasive that there are real and meaningful patterns to be observed and interpreted, at least within the Olifants River Valley landscape. The distinct trends seen on the landscape in different periods are important as complementary evidence to excavated sites which currently dominate Stone Age research – a balance which needs to be readdressed.

9.4 Extending the study

In order to test the patterns observed for the Olifants River Valley and advance our understanding of the variables which influenced landscape use, the study area needs to be compared with other areas. Surveys in supplementary areas to the north and south along the Olifants River served as an effective test in landscape settings which were comparable to the study area, as observed for the MSA and LSA in the rocky area Tierkloof, and the ESA in a stream-bed at Driefontein.

The Cederberg area borders a number of contrasting ecozones which are already the subject of other current investigations: in the Sandveld to the west, where Elands Bay Cave and Diepkloof are located, the Karoo fringes to the east, where Klipfonteinrand, Putslaagte 8 and Mertonhof Rock Shelter are being investigated, the Knversvlakte to the north, with the open site Soutfontein and excavations at Varsche Rivier 3, and further north in Namaqualand, at Spitzkloof Rock Shelter (Mackay *et al.* 2010; Orton *et al.* 2011; Dewar & Stewart 2012; Mackay 2012; Steele *et al.* 2012; Parkington *et al.* 2013; Schmid 2013). These sites are particularly targeting the MSA, but as this study has shown, a comparative framework, facilitated by the inclusion of the ESA and LSA as well, offers a bigger picture contrast between time periods within the same spatial area. To take the current study further, then, a spatial comparison at a greater scale needs to be added to the temporal comparison. The emerging excavated record for these regions surrounding the Olifants River Valley offers a good opportunity for setting these sites into their landscape context.

When considering future work from a methodological standpoint, a problem encountered in the current study was how to adopt a sampling strategy for recording artefacts which was appropriate to the variability seen between different assemblages. Ultimately, the strategy used aimed to record a representative, although not exhaustive sample of the artefacts present at a site; therefore, if a substantial number of iconic tools were present in an assemblage, these were mapped individually and the background flake scatter was noted but not recorded. In cases where iconic tools were sparse, the whole assemblage would be studied and recorded in greater detail so that technological features, relative frequencies of artefacts and raw materials could be used to assess the character of the assemblage and assign a tentative age where possible. Standardising this recording procedure between different types of assemblage would be beneficial in future work since it would allow more explicit comparisons to be drawn between open and excavated sites. One potential way of achieving this, in cases where assemblages are particularly dense, would be to record every artefact within a 1 m^2 sample square in order to determine the relative proportions of raw materials, percentage of cortex, artefact frequencies and technological characteristics in more detail. A disadvantage of adopting more comprehensive sampling strategies in data collection is that it would reduce the spatial extent of the landscape which could be covered in surveys due to time constraints in the field. Any methodological developments will therefore have to be careful to reach a compromise between maximising the survey area and maximising the survey detail, in accordance with the specific research questions being asked.

Another way in which the study could be enhanced is to conduct more sophisticated GIS analyses in order to realise the full potential of the spatial data. The application of new analytical techniques will need to ensure that the strategy for data recovery in the field aligns with the parameters required by certain statistical tests. For example, some potentially useful methods of point-pattern analysis, such as Ripley's K test for spatial randomness, or kernel density analysis as a measure of point intensity, depend on completely mapped data which is not a viable expectation for individual artefacts mapped in surface surveys under the conditions of the study area (Conolly & Lake 2006). Given the problems encountered with spatial analyses carried out at an artefact level, more appropriate techniques worth pursuing may be those which use spatial data at the site level.

Viewshed and intervisibility analyses would be constructive ways of investigating the relationships between visible landscape features at a macro-scale (e.g. Wheatley & Gillings 2000). One example would be to measure intervisibility between rock art sites or rock shelters, since these represent fixed points on the landscape which are not compromised by disturbance in the way that individual artefacts might be. Another possibility would be a viewshed analysis of the areas which are covered by MSA scatters on rocky platforms, addressing the question of whether the visible extent of the landscape, or the visibility of certain features such as the Olifants River, were important characteristics in determining the use of these areas, testing whether they held a role as vantage points. Both of these examples would engage with spatial data at a static level; a more ambitious goal would be to approach space in the way that a dynamic human agent would, in terms of movement through the landscape. This could address visibility in relation to movement (e.g. Llobera 2003), but additional dimensions such as accessibility (e.g. Llobera *et al.* 2011), or pathways over variable topography and terrain (e.g. Wood & Wood 2006) may also be interesting avenues for comparing potential human use of different landscapes.

In considering movement across the landscape at a regional scale, artefacts of a particular raw material could be mapped in relation to known sources, using artefact frequency and cortex percentage as additional factors in assessing the intensity of raw material transport (e.g. Rissetto 2012). Based on the current Olifants River Valley study area, along with its neighbouring regions, there are distinct spatial differences in raw material availability which would make a comparison of raw material transport and mobility between these areas a profitable line of enquiry. Silcrete is scarce to the west and east of the Olifants River, but hornfels and CCS are more prevalent in the Karoo, with secondary cobbles carried by the Doring River. Quartz also outcrops in the Biedouw Valley to the east (personal observation) and in the Knersvlakte to the north (Mackay *et al.* 2010), whereas nodules are only small and of poor quality in the Olifants study area. By incorporating the iconic artefact approach – as a way of placing surface and excavated artefacts within a relative chronology – into a spatial study of raw material distribution and transport, the changes in mobility and provisioning strategy across space and time could be approached for the region from a new perspective.

The potential for advancing the ways of using of surface artefact data offers exciting prospects for future work, with possibilities both in drawing comparisons with excavated data, and in exploring more sophisticated methods of spatial analysis. This thesis has demonstrated the importance of landscape archaeology to the study of the Stone Age, adopting an approach which treats the evidence from excavated cave sequences and surface assemblages as complementary sources of information for past behaviour.

9.5 Conclusion

In conclusion to this thesis, I return to Deacon's framework of stenotopism and eurytopism and assess whether it has been a useful and relevant concept for this study, and its potential for wider application. The hypothesis that ESA landscape use can be described as stenotopic and the LSA as eurytopic is supported by the evidence observed in the Olifants River Valley. However, a key issue to arise from this study is the importance of defining the scale at which the stenotopic-eurytopic framework is being applied. In uses of the concept elsewhere, handaxe-making Acheulean hominins have in fact been described as eurytopic in their landscape use when compared with their Oldowan predecessors (Wood & Strait 2004; Grove 2011). Clearly, whether a signature is judged to be specialist or generalist in its distribution is dependent upon the scale of comparison. Therefore, whilst within the ESA the Oldowan appears to be more stenotopic than the subsequent Acheulean, when the ESA – characterised by Acheulean handaxes – is compared with the MSA, it may be regarded as stenotopic relative to the eurytopic MSA. To take this idea further, if the study were being carried out in a region where a landscape investigation could be extended from the Stone Age to include agriculturalist communities as well, it would be expected that the relative concepts of stenotopism and eurytopism would shift in order to accommodate the whole extent of the behavioural spectrum observed.

The temporal scale, then, is important to define when applying Deacon's model. In spatial terms as well, the issue of local, regional or an even wider scale must be resolved before the terms stenotopic and eurytopic can be used in a meaningful comparative context. In selecting the Olifants River Valley as the study area, this immediately creates the association between ESA landscape use – at a regional scale – and the Olifants River. This alone is not a rigorous test of Deacon's model since, in its original form, it addressed settlement across the whole of South Africa, seeing the ESA selection of regions with water sources as a significant indicator for stenotopism. What this study has done, is take Deacon's model and apply it to a single landscape to examine its relevance at a local scale. Distinctions have therefore been made between specific landscape features, such as the Olifants River, smaller tributaries, caves, and rocky koppies. The micro-scale of the approach extends also to the recording of individual artefacts, rather than sites at a more generalised scale, which has enabled associations between specific tool types and specific landscape features to be identified. At this resolution, it has been possible to frame iconic artefacts which relate to different technological strategies within their landscape context. Raw material procurement, tool use, and tool discard may take place at different places on the local landscape, and therefore whether a narrow or broad spatial range is actually being exploited must take into account the whole cycle of tool production and use.

An important lesson to be learnt from Deacon was his principle of approaching the African Stone Age in its local context, looking for continuity between MSA, LSA and ethnographic San hunter-gatherers (Deacon, H.J. 1989, 1992, 1995, 2001). Given his own direct experience of ESA, MSA and LSA sites, Deacon was one of few archaeologists to be in a strong position to develop a viable framework which approached human behavioural development at this time-scale. Since very few archaeological studies address the ESA, MSA and LSA simultaneously from a comparative perspective, Deacon's overview, with specific reference to landscape use, has offered a valuable guide for bridging the research paradigms which tend to separate not only these periods, but also researchers from different continents (e.g. Mitchell 2002b, 2005, 2008; de la Torre & Mora 2009; Lombard *et al.* 2012). On this basis, and based on the evidence presented in this thesis, I conclude that the model of stenotopism and eurytopism as presented by Deacon is a constructive starting point for a temporally wide-ranging investigation into Stone Age behaviour at a landscape level.

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Appendix 1. Descriptions of surveyed sites

SITE NO.	DESCRIPTION
CLANWILLIAM DAM EAST	
DAME1	**Dam East 1:** The site refers to the area below Ramskop campsite, on the sandy beach above the cobble and bedrock line. There is a thin scatter of mostly silcrete flakes, with MSA features. The site database records ESA cobble tools, including a handaxe, on the Dam edge amongst the cobbles and broken bedrock, but very few were identified during surveys (minimum Dam level 16%). 25/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME1a	North along the beach from **DAME1**, two isolated silcrete flakes with faceted platforms were found amongst the cobbles. 25/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME1b	Further north from **DAME1a**, an isolated handaxe and two cobble cores were found amongst a thin broken bedrock patch mid-way up the beach. One of the cores was a silcrete nodule with water-abraded cobble cortex and a few flake removals. 25/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME2	**Dam East 2:** The site refers to the area slightly further south along the beach from **DAME1**. The sand at the top of the slope had a continuation of the silcrete scatter at **DAME1**, including an LSA single platform core. At the base of the cobble line on the Dam edge, there were a few ESA cobble tools and highly patinated silcrete flakes, probably MSA. 25/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME5	**Dam East 5: "Procession Shelter"** The site is a low overhang along the line of rocky outcrops at the top of the slope above the Dam. The overhang is too small and low for occupation, with a long boulder in front of the rock art panel. The rock art depicts a procession. A thin flake scatter was observed in the general area, which is heavily vegetated, and a bifacial point tip was found just to the north of the overhang. The area below the rocky outcrop, which includes the shelter sites DAME5, 6, 7 and 8, was surveyed in detail by Munn (2005) with an extensive LSA scatter recorded, including a high proportion of formal tools. *Note: The areas **DAME NM** and **DAME AM** refer to artefact data collected by UCT students and Mackay.* 09/05/11: EH, KS Survey coverage: Casual survey, recording only iconic artefacts.

DAME8	**Dam East 8:** The site is at the southernmost end of the rocky outcrop above the Dam. The main overhang has rock art, and an LSA artefact scatter extends down the steep sandy talus slope towards the beach. The scatter was recorded in detail by Munn (2005) and is composed mainly of silcrete flakes and small elements. A few MSA artefacts were recorded, including a radial core and Munn reports a number of retouched points, but the assemblage is predominantly LSA with no pottery. The site has seen a lot of disturbance since it is easily accessible and has been visited by UCT students and a project involving Clanwilliam school children. 10/04/11: EH, KB, KS 20/04/11: EH, KB Survey coverage: General survey, recording only iconic artefacts.
DAME8A	**Dam East 8A: Bifacial point site** The site is at the base of the talus slope on the beach, directly below **DAME8**. There is a very dense scatter beginning just below the cobble line and extending right to the water line (minimum Dam level 17%, but points were found above the 60% line on 20/06/11). The assemblage is predominantly MSA silcrete and has a significant bifacial point component, including pieces which represent different stages of the manufacturing process, and broken, reworked pieces. Over 40 bifacial points were recorded by Mackay et al. in 2005 when the Dam level was quite high (estimated to be 40-50%), but few complete points were relocated in the survey and could not be matched with Mackay's artefact photographs. Unifacial points present could represent the post-Howiesons Poort, but may be associated with the bifacial points since many are reworked following a breakage. Artefacts are found in the sand between and under cobbles, and also eroding out of a large heuweltjie at the top of the beach. In addition to MSA material, there are some ESA quartzite cobble cores, large flakes and possible handaxe roughouts. The ESA component increases towards the southern end of the site, running into the artefact concentration at **DAME11**. The large quantity of silcrete suggests that there may be a silcrete source near the site, now submerged under the Dam. 10/04/11: EH, KB, KS 20/04/11: EH, KB 13/05/11: EH, WF 20/06/11: EH, RB, CH, RL, LS 22/05/12: EH, JM Survey coverage: Detailed survey, recording only iconic and retouched artefacts.
DAME11	**Dam East 11:** The site is along the Dam edge to the south of **DAME8A** (Dam level 30-60%). The area is sandy beach, with dense patches of cobbles and sandstone bedrock, with several large degrading heuweltjies. The scatter is more or less continuous with **DAME8A**, but is divided from the southern end of the large heuweltjie and boulder outcrop on the beach. The assemblage is dense, containing ESA and MSA artefacts, with the only probable LSA artefact being a bladelet core. The ESA artefacts include handaxes, cobble cores and a cleaver in quartzite, and one silcrete handaxe, with bilateral and bifacial symmetry and extensive retouch on both faces, suggesting a Late Acheulean age. Other handaxes are cruder quartzite cobble forms, some with a large amount of residual cortex. MSA artefacts include radial cores and denticulates, some of which have heavily retouched notches, some have single-blow notches. There is a substantial quantity of retouched silcrete pieces, some of which could be classified as scrapers, and some are bifacially worked. The scatter becomes less dense to the south along the beach although the cobbles continue, eventually ending a few hundred metres to the south. *Note: Faceted platforms were not recorded in this survey so the MSA component may be under-represented.*

DAME11 contd.	18/04/11: EH, KB 09/05/11: EH, KB 22/05/12: EH, JM Survey coverage: General survey, recording only iconic and retouched artefacts.
DAME13	**Dam East 13:** The site is below a circular stone threshing floor on the beach where an artefact scatter extends down to the water-line (Dam level 30-60%). The area is mostly sandy with some cobble patches and degraded heuweltjies. Artefacts are mostly silcrete and quartzite flakes and cores, with MSA artefacts including radial cores and flakes with faceted platforms. There are also a lot of larger flakes, some of which are retouched or denticulated. There is a less obvious LSA component to the assemblage, with the only formal tools observed an adze and a thumbnail scraper. There was no notable ESA presence recorded. 12/06/11: EH, RB, CH, RL, LS Survey coverage: Detailed survey, recording only iconic and retouched artefacts.
DAME13A	**Dam East 13A:** The area to the north of **DAME13** is a stretch of sandy beach with patches of cobbles and broken bedrock chunks, in greater density than to the south. Artefacts include choppers, handaxes, radial cores, single platform and other rough cores, and large quartzite flakes. They are predominantly made on quartzite river cobbles, but some other types of quartzite and silcrete were noted. The artefacts become less frequent as the cobble density on the beach decreases. There are a number of degraded heuweltjies on the beach but there were no artefacts observed to be cemented into them. 12/06/11: EH, RB, CH, RL, LS Survey coverage: General survey, recording all artefact types.
DAME13a	There were only two artefacts recorded along the Dam edge between **DAME11** and **DAME13A**, these being ESA cobble artefacts. The slope of the beach had a very steep gradient, and the surface was mainly covered with angular sandstone bedrock fragments, with very few quartzite cobbles suitable for knapping. 22/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME13B	**Dam East 13B:** There are two scatters on the beach to the south of **DAME13**, one higher up the beach in the sand (but still below the high water mark), and the second in the cobbles and degraded heuweltjies on a spur projecting into the Dam (Dam level 17%). Both scatters contain MSA silcrete and quartzite artefacts, including radial cores, blades (pointed and with parallel dorsal ridge scars), elongated flakes and unifacial, Levallois and 'oakleaf' points. There are some small scrapers and a bored stone which suggest an LSA presence. There are also some historical or modern ceramic and glass fragments on the beach. 15/05/11: EH, KB 22/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME13b	There were two isolated artefacts along the beach between **DAME13B** and **DAME15**. One is a possible MSA flake with faceting. 22/05/12: EH, JM Survey coverage: General survey, recording all artefact types.

DAME15	**Dam East 15:** The area from **DAME13B** to the south was covered at two levels, one along the waterline (EH), and one along the top of the sandy beach, on the upper level of the walled old Citrusdal road (KB). On the lower level along the Dam edge (Dam level 17%), the cobble concentration starts at a prominent bedrock outcrop on the beach and continues to the south. There were quartzite cobble cores, choppers, bifaces and flakes in a more or less continuous scatter, interrupted by short stretches of beach sand with no cobbles. A number of the bifacial cores could be classified as handaxe roughouts. Artefact frequencies increase as cobble density increases, with a particular cluster of handaxes noted at a point where several heuweltjies occur at the top of the beach, on the border with the vegetation line. There are artefacts cemented into the heuweltjies and concreted mudstone, including a finely-flaked handaxe made on yellow coarse-grained silcrete. KB reported no artefacts along the upper level of the beach until this point. 15/05/11: EH, KB 22/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME16	**Dam East 16** The area referred to is the stretch of beach south of **DAME15**, with cobbles continuing in patches and thin drifts below rocky cliff-like outcrops (although not forming shelters) at the top of the beach. There is a continuous presence of artefacts along the beach, although not in any great density. Mostly these are ESA cobble cores and flakes, with occasional MSA artefacts including a radial core and flakes with faceted platforms. 22/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME16a	The scatter which makes up **DAME16** ends when the rock outcrop at the top of the beach and the cobbles on the beach finish. Where the cobble beds resume to the south, there were three ESA cobble tools and a flake with a faceted platform. 22/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME16A	**Dam East 16A:** *(new site no.)* This area is located below the 'Clanwilliam Waterfront' slipway, south of the Caleta Cove inlet, on a major bend in the river. The sandy beach has small silcrete and quartz flakes, a silcrete adze, single platform core and pottery fragments in wash lines, and these are likely to have been deposited due to a change in the energy of the river where it bends. There are no rocky features or concentrations of artefacts higher up on the beach to suggest a focal point to the scatter. There are numerous chunks of cortical silcrete, suggesting that there is an outcrop nearby. The rock outcroppings were surveyed but no potential silcrete sources were identified, although Guillaume Porraz and others have recorded silcrete terraces on the edge of the river in the general area, slightly further to the south. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME16B	**Dam East 16B:** *(new site no.)* This area is very similar to **DAME16A** in that it has lines of washed-up artefacts on the beach, together with chunks of silcrete with outcrop cortex. There are two silcrete scrapers, some pottery fragments and a large number of small flakes in silcrete and quartz, with some hornfels. An interesting and unusual artefact presence was a number of hornfels slabs and cores deriving from river cobbles. Given that hornfels cobbles are not known to be present in the Olifants gravels, it is possible that these have been brought in to the location which may have been targeted for the potential (although un-located) silcrete source. In cobble beds to the southern end of the area, where

DAME16B *contd.*	there is a small inlet, only two ESA cobble artefacts were found, one of which was a handaxe with a cortical butt. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME16b	There is a thin but continuous presence of ESA quartzite artefacts on the beach, amongst patches bedrock exposure with relatively sparse cobble beds. One cobble core can be classified as a handaxe roughout. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME16c	A cluster of ESA cobble artefacts and smaller flake was recorded where the cobble density on the beach increased. The beach meets the veld above the high water mark in a gentle slope, with small rocky outcrops visible and although not covered in this survey, there are a lot of rock art sites in the Rondegat area recorded on the site database. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME17	**Dam East 17:** The area has very dense cobble beds, with several large heuweltjies causing cemented concentrations of both cobbles and artefacts. There is an unusually high frequency of handaxes, although many of these are very rough in form. Other artefacts include cobble cores, choppers and flakes, dominated by quartzite river cobbles. A thin MSA component to the assemblage is suggested by a few silcrete flakes. The artefacts grade in and out of the concentration as the cobble density increases and decreases along the beach. There is a similar ESA assemblage – also handaxe rich – directly opposite the site on the western Dam edge at DAM12 and DAM14. 13/06/11: EH, RB, SB, CH, RL, LS 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME17A	**Dam East 17A:** The cobbles along the beach thin out to the south of the concentration at **DAME17**, but a patch of increased density is identified at **DAME17A** where there is a cluster of ESA cobble artefacts. There is a much lower proportion of handaxes to other cobble tools in this assemblage than at **DAME17**, but the assemblage is also smaller. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME17a	The Olifants River enters the area affected by the Dam along this stretch of the river. The lateral extent of the river floodplain is much narrower, and a steep bank along the edge of the river separates the cobble beds – at the top of the slope – from the river itself. There are relatively high frequencies of cobbles mixed with angular bedrock fragments at the top of the bank, raised above the river, but the frequency of artefacts is low. Only a few isolated ESA cobble artefacts were observed.
DAME18	A large heuweltjie has ESA cobble artefacts cemented into and eroding out of it. There are no other cobble patches on the beach, except for those associated with the heuweltjie; this is interesting in terms of the post-depositional relationship between heuweltjies and artefacts. Artefacts were mostly quartzite cobble cores with some flakes. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.

DAME18A	**Dam East 18A:** The next area with high cobble density occurs about 1 km to the south of **DAME17A**, just to the north of the point at which the Rondegat River joins the Olifants. As the frequency of river cobbles increases on the lower portion of the beach, the frequency of ESA cobble artefacts also rises. These are mostly cobble cores, with one handaxe and several flakes recorded. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME19	There is a high density of cobbles on the Olifants bank at the head of the Rondegat inlet, at the top of a steep bank. This area is raised above and separated from the river bed by a craggy bedrock outcropping. ESA artefacts are mostly cobble cores. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME19a	An isolated silcrete flake on a steep, otherwise empty sandy beach, on the north side of the Rondegat inlet into the Olifants. 23/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME20A	**Dam East 20A:** *(new site no)* The area is an open, relatively flat stretch of sandy beach on south side of the Rondegat inlet, surveyed when the river level was low (Dam at 16%, although this location is at the southernmost end of the Dam). ESA cobble tools occur in clusters, eroding out of degrading heuweltjies which protrude above the sand (possibly the reason for artefact visibility). There is one dense cobble line, unrelated to heuweltjies, lower down the beach to the south. Most of the cobbles in this accumulation are minimally worked ESA cobble artefacts, with some more reduced cores and four handaxes. 25/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME20	**Dam East 20:** An outcrop of sandstone bedrock occurs on the sloping river bank, just to the south of the Rondegat inlet. There are ESA cobble tools lower down on the slope amongst bedrock outcroppings, and smaller, lighter pieces are higher up the beach slope in pebbly wash. The assemblage contains smaller quartzite and silcrete flakes which are likely to be MSA, with radial cores and flakes with faceted platforms recorded. There was also a number of pottery fragments, likely to have been washed onto the beach along with small pebbles and flaking chips, rather than being *in situ*. Pottery was also recorded on the beach directly opposite on the west side of the river, where there are a large number of LSA sites in the rocky areas directly above the river. 25/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAME20a	Two isolated flakes were observed in the veld in a survey path walked away from the river.
DAME25	**Dam East 25:** There is an area of rocky outcrops above the Dam on its eastern side, forming complexes of courtyards and overhangs. The site is a low, tunnel-like shelter with a thin artefact scatter, mostly in sandy area on its eastern side. There is charcoal graffiti over faded rock art in crack between two rock walls. Artefacts are LSA with adzes being the only formal tools noted. This includes an unusually shaped hornfels double adze which forms a three points. There is a large notched flake (unlike any other flakes in the assemblage) which would is likely to come from a prepared core, suggesting MSA.

DAME25 *contd.*	14/05/11: EH, KB Survey coverage: General survey, recording iconic and retouched artefacts only.
DAME25A	**Dam East 25A:** *(new site no.)* There is an ephemeral silcrete scatter in a sloping sandy courtyard enclosed by rock outcrops and boulders, located higher up the slope from **DAME25**. There were no iconic artefacts seen but a few large silcrete flakes and a denticulate were recorded and may suggest MSA. The site is a small shelter underneath a cluster of leaning boulders, containing a few flakes and some small debitage on thin sandy deposit. There is charcoal graffiti and a modern fire has been lit inside the shelter. 14/05/11: EH, KB Survey coverage: General survey, recording iconic and retouched artefacts only.
DAME26	**Dam East 26:** The site is the only substantial large shelter observed in the rocky area, most being only low or shallow overhangs. It is located at the lowest level of a series of rocky outcrops with enclosed courtyards on the slope above the Dam, about 100-200 m above the beach. The shelter walls are badly damaged by graffiti in white and blue paint, and black marker, and there is a lot of modern debris in the shelter. Consequently, the rock art is in very poor condition and the deposit in the shelter is highly disturbed. There is an extensive flake scatter on the large open sandy area in front of the shelter, mostly silcrete with a high frequency of CCS flakes. Artefacts are LSA, with adzes, small finely retouched scrapers, and thin pottery, including an ochred rim piece with incised lines. 14/05/11: EH, KB 12/06/11: EH, RB, CH, RL, LS Survey coverage: General survey, recording iconic and retouched artefacts only.
DAME26A	**Dam East 26A:** *(new site no.)* The site is a very low shelter on the northern side of **DAME26**, directly next to sandy track. The overhang is under a small rock outcrop, ~1 m high. There is a thin artefact scatter on the sandy clearing around the outside of the outcrop and neighbouring small boulders. Flakes are mostly LSA silcrete, with one thumbnail scraper and a fragment of pottery with incised lines. *Note: Several flakes look adze-like from the photographs but were not recognised as adzes in the field.* 15/05/11: EH, KB Survey coverage: General survey, recording all artefact types.
DAME26B	**Dam East 26B:** *(new site no.)* The site is a small shelter with a tree in front, slightly further up the slope behind **DAME26**. The talus is steep and an adze-rich LSA artefact scatter extends down the slope. The artefacts include an unusually shaped backed piece. There are also pottery, OES and mussel shell fragments, and possible rock art, although it is very faded and barely visible. 14/05/11: EH, KB Survey coverage: General survey, recording iconic and retouched artefacts only.

CLANWILLIAM DAM WEST	
DAM1a	**DAM1** is recorded on the site database as being to the south of the Dam wall, amongst broken sandstone bedrock low down on the beach. The record describes flakes, cores and a broken MSA blade, although nothing substantial was located when the area was surveyed, other than a rough handaxe. **Dam1a** refers to the occasional isolated artefacts occurring along the western Dam edge (Dam level 16%), south of **DAM1** and continuing below Andriesgrond. 10/04/11: EH, KB, KS 19/04/11: EH, KB, KS 14/05/11: EH, KB Survey coverage: General survey, recording all artefact types.
DAM5	**Dam West 5:** (Andriesgrond) The area is a clearing at the base of the north-facing rock wall, at Andriesgrond, above the Dam. The site database records rock art (**DAM4**) but this was not relocated on surveys. There is a patchy scatter of artefacts, mostly silcrete but some quartzite, and is likely to be mostly MSA, based on radial cores and flakes with faceted platforms, although an LSA component is indicated by pottery. 19/06/11: EH, RB, CH, RL, LS 04/04/12: EH, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DAM5A	**Dam West 5A:** (Andriesgrond) The area is at the base of the rocky outcrop, below **DAM6**, and t the south east of DAM5. There is a flake scatter of moderate density, almost entirely of silcrete, containing LSA adzes and thumbnail scrapers. There is a small recessed shelter in the outcrop, but it is not large enough for occupation. 04/04/12: EH, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DAM6	**Dam West 6:** (Andriesgrond) The area is on top of the rocky outcrop which forms the cliff at **DAM6**. There is a rocky platform covered in scree cobbles, and artefacts are clustered around a flat boulder which, conceivably, the tool-maker sat on while knapping, with a wide view of the Olifants River to the south. Based on the presence of a radial core, and the general technology of the flakes, the scatter is more likely to be MSA than LSA. 04/04/12: EH, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DAM6A	**Dam West 6A:** (Andriesgrond) The area is on top of the rocky outcrop which forms the cliff at DAM5. There is a flake scatter on the sandy clearing, with patchy areas of rocky platform. The assemblage is mostly silcrete, and contains a bladelet core, utilised ochre, and MSA artefacts represented by radial cores and flakes with faceted platforms. 04/04/12: EH, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DAM7	**Dam West 7:** The area is a sandy flat stretch of beach, with extensive exposures of bedrock jutting out into the Dam, situated below Andriesgrond and just to the north of the Kransvlei inlet. There is a widespread scatter across the area, where there are patches of cobbles. ESA artefacts tend to cluster in these patches, with handaxes and cobble tools present, as well as MSA flakes and radial cores made on quartzite river

DAM7 *contd.*	cobbles. There are MSA flakes with faceted platforms made of silcrete on the promontory. Several small silcrete scrapers may be LSA, generally found on the sand rather than among the cobbles. There was also a yellowed quartz pebble with an incised groove. It is unusual to have ESA, MSA and – potentially – LSA artefacts in the same location on the Dam edge, and this may be related to its relative proximity to Andriesgrond sites which are both MSA and LSA, and its position as a projecting point between the Kransvlei inlet and the Olifants. There is a small concentration of predominantly MSA artefacts, with faceted platforms, at the top of the slope on the grassy beach, directly below Andriesgrond farm. 11/05/11: EH, KS Survey coverage: General survey, recording all artefact types.
DAM7a	There are small flakes chips of silcrete, quartz and CCS washed up in the pebble line on the beach, together with a non-local CCS retouched piece. A low density of artefacts continues along the Dam edge to the west, on the beach and on the steeper rocky slope, on the north side of the Kransvlei inlet. 21/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAM7b	There is a ferricrete boulder which has been used for flaking directly. There are other ferricrete chunks all the way along the beach on the northern edge of the Kransvlei inlet, but there are no further knapping sites which resemble **DAM8**. 21/05/12: EH, JM Survey coverage: General survey, recording all artefact types.
DAM8	**Dam West 8:** (MSA quarry site) The area is a knapping site, focused on a ferricrete boulder with a flake and small debitage scatter around. The site is located on the north side of the Kransvleikloof inlet which joins the Olifants. The assemblage is mostly ferricrete, but there are some clusters of grey silcrete and a CCS manuport with a double patination. Flakes include denticulates, retouched flakes and a marginally retouched Levallois point which suggest an MSA association. A handaxe denotes an ESA presence. 08/04/11: EH, KB, KS 09/05/11: EH, KB, KS, WF, school 20/06/11: EH, CH, RB, LS, RL Survey coverage: General survey, recording iconic and retouched artefacts only.
DAM8a	On the south side of the Kransvleikloof inlet, the only artefact recorded on the empty sandy beach was a retouched silcrete flake. Further to the south, the beach has numerous heuweltjies, with no associated artefacts and very few cobble concentrations and no artefacts. A single isolated handaxe was the only artefact identified. 10/04/11: EH, (KB, KS) 21/05/12: EH, (JM) Survey coverage: General survey, recording all artefact types.
DAM8A	**Dam West 8A:** The area is high up near the top of the beach on the western side of the protruding sand bar at Driehoek. There is a thin scatter amongst angular bedrock debris, just below the vegetation line (under the tree). The scatter is diffuse and mostly comprises silcrete and quartz. There are several small scrapers which could be MSA or LSA, and radial cores. 14/05/11: EH, KB 21/05/12: EH, JM Survey coverage: General survey, recording all artefact types.

DAM10	**Dam West 10:** There is an open scatter on the sandy beach, near to a cluster of boulders. The assemblage contains artefacts made of silcrete, quartz, CCS, hornfels and quartzite, and is distinctly LSA. The assemblage is rich in scrapers, with end, side, thumbnail and backed scrapers, all showing very refined retouch and made of silcrete, CCS and quartz. There are numerous small debitage flakes, and some larger cores, including three of hornfels – a non-local material. There are also two quartzite grindstones. A notable feature of the site is that it has no adzes – unusual for an LSA assemblage in the study area, and more reminiscent of a Sandveld-type assemblage. The site database records an MSA component to the scatter but no diagnostic elements were noted, seeming to be dominated by LSA. 12/05/11: EH, KS Survey coverage: General survey, recording iconic and retouched artefacts only.
DAM10a	Further up the beach from **DAM10**, towards the vegetation line, there are some considerably older looking flakes and cores on quartzite but the survey of this area was not extensive. **DAM10a** also refers to the area along the eastern side of the Driehoek sandy spur, where there were a small number of artefacts dispersed along the beach. These are mostly ESA cobble artefacts. 12/05/11: EH, KS Survey coverage: General survey, recording iconic and retouched artefacts only.
DAM11	**Dam West 11:** The site is between rocky outcrops on the north side of the Driehoek inlet. This area has the only large rocky features in this part of the landscape. There is an artefact scatter down a steep sandy slope, likely to be derived from a small, low overhang under a boulder. The assemblage is small, and artefacts are LSA. There are a low number of adzes and a thumbnail scraper, also pottery, ochre, OES and a grindstone which is located underneath the overhang. 03/04/12: EH, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DAM12	**Dam West 12:** The area extends along the edge of the 'bump' on the Driehoek side of the river, between the Kransvleikloof and Driehoek inlets. There is a continuous presence of ESA artefacts, varying in frequency according to the density of quartzite cobbles. There are numerous handaxes, recorded by Archer (2005), on the upper portion of the beach, and a quartzite bifacial point. The greatest concentration of handaxes is on the northern side of the Driehoek inlet, located where it joins the Olifants. The handaxes and roughouts are amongst cobbles and raised bedrock outcropping. There are also the remains of a low stone wall perpendicular to the water line. The area was surveyed when the Dam level was at 40% and at 20%, but the artefact scatter may continue below the water line at its south-westernmost point. *Note: Archer (2005) recorded the ESA artefacts towards the north of this area, although this did not include the dense concentration by the inlet. The iconic artefacts are included in the mapped data.* 16/06/11: (EH), CH 03/04/12: EH, RL, LS, TvZ [2005: WA] Survey coverage: General survey, recording all artefact types.
DAM13	**Dam West 13:** There is a stretch of sandy beach with patches of broken bedrock fragments, interspersed with cobbles. Relatively few ESA cobble cores were recorded owing to the low cobble frequency, although this included one handaxe roughout. The scatter ends when bedrock fragments become very dense, just to the north of a small inlet into the Olifants.

DAM13 *contd.*	*Note: The sites are numbered out of sequence as they are encountered from north to south along the beach;* ***DAM13*** *and* ***DAM13A*** *occur to the south of* ***DAM14*** *and* ***DAM15****.* 24/05/2012: EH, JM Survey coverage: General assessment, recording only iconic artefacts.
DAM13A	**Dam West 13A:** The beach has a moderate density of small angular bedrock fragments and a very low number of ESA cobble tools. There are a few isolated cobble cores along the beach, but few naturally occurring cobbles so a high presence of artefacts is not expected. *Note: The sites are numbered out of sequence as they are encountered from north to south along the beach;* ***DAM13*** *and* ***DAM13A*** *occur to the south of* ***DAM14*** *and* ***DAM15****.* 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM14	**Dam West 14:** The area is at the end of the Driehoek orchards, on the beach on the south side of the inlet. There are large outcroppings of sandstone bedrock low down on the beach, and heuweltjies towards the upper part. There are cobble patches across the area, with the typical ESA quartzite cobble assemblage including flakes, cores, a cleaver, and very rough handaxes. There are also some silcrete flakes, a broken blade and more refined flakes, including a large and very thin hornfels flake with parallel blade-like scars on the dorsal. The silcrete and hornfels artefacts suggest an MSA presence. There were no artefacts found around the inlet, where the cobbles thin out. The absence of cobbles is likely to be due to hydrological factors; it is possible that there are no artefacts because there were no cobbles for raw material. 16/06/11: EH, RB, CH, RL, LS 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM15	**Dam West 15:** There is an isolated rocky outcrop above the beach on the edge of the orchards. The outcrop forms a semi-enclosed courtyard area, and has no substantial overhang. Although the site database records ESA and MSA quartzite material, similar to that found on the beach, only a few LSA artefacts were identified in surveys. The ground surface had poor visibility due to vegetation, and owing to the proximity of the orchard, there is considerably high potential for disturbance. 03/04/11: EH, RL, LS, TvZ Survey coverage: General survey, recording iconic artefacts only.
DAM16	**Dam West 16:** The beach is covered by small angular bedrock fragments, with relatively few cobbles, down to the water line. There is a low frequency of ESA cobble tools until the density of cobbles increases further south along the beach. This peaks with a concentration of river cobbles and ESA flaked cobble artefacts, including one handaxe, and the density then grades out as bedrock fragments increase again further towards the south. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM17	**Dam West 17:** There is a dense concentration of river cobbles amongst am exposure of broken bedrock on the lower part of the beach. Although there is a high density of ESA cobble cores and flakes, there were no handaxes observed.

DAM17 *contd.*	Survey coverage: General survey, recording all artefact types. 24/05/2012: EH, JM
DAM17A	**Dam West 17A:** There is a thin but continuous scatter of ESA cobble artefacts along the middle of the sandy beach, continuing down to the water line. Cobbles and broken bedrock chunks occur in large patches, culminating in a very dense cobbled area with degraded heuweltjies located high up at the top of the beach, on the northern side of the kloof which inlets into the river. There is a high frequency of cobbles which show only minimal ESA flaking, with numerous handaxes and handaxe roughouts as well. The presence and density of cobble tools on the beach correlates with the presence of naturally occurring cobbles, which grade in and out along the beach. Artefacts do not tend occur in great density where there is only broken bedrock unless this is accompanied by cobbles. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM18a	**Dam West 18a:** The site database records an open site, **DAM18**, up the kloof which leads into the Olifants. This site was not surveyed owing to its poor accessibility, but it is described as a predominantly MSA assemblage with notched pieces, blades and flake-blades, with a limited LSA component which includes an adze. The artefacts are loosely focused around a boulder, but most are scattered down the sandy slope. Two flakes, possibly MSA, were recorded in isolation in the vegetated sandy slope of the stream course, below the rocky outcrops along the kloof. Survey coverage: General survey, recording all artefact types.
DAM19A	**Dam West 19A:** The area is to the south of the stream inlet into the river, where the sandy beach has small artefacts in pebbly wash lines. There is a jumbled rock outcrop in the middle of the beach as a possible site focus, though the area's position at the confluence with an inlet may be a hydrological factor affecting the wash of small artefacts onto the beach. There is lots of small silcrete debitage, but also a substantial component of larger MSA silcrete and quartzite flakes with faceted platforms and complex dorsal scarring, and elongated blade-like pieces (some broken). One handaxe roughout was recorded, but no other ESA observed, likely due to the absence of cobble patches in the area. There are also numerous pottery fragments, which seems to be a recurring pattern in patches of wash on empty sandy areas near inlets into the river. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM19	**Dam West 19:** When the presence of cobbles on the beach resumes, to the south of **DAM19A**, there is a small ESA artefact cluster of minimally worked cobble cores. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM20	**Dam West 20:** The area is a rocky outcrop above the beach, with a long shallow overhang, with two fig trees and rocks in front. There is an artefact scatter of moderate density on the relatively steep talus slop, which leads down to a flat sward at a lower level. There is faded rock art in the main shelter, and a boulder overhang with very well preserved fine-line art occurs around the edge of the rock outcrop, to the north west. The artefacts associated with the shelter were mostly LSA, comprised of small flaking debitage in silcrete, quartz and CCS, which are found in pebbly wash on the talus in front.

DAM20 *contd.*	24/05/2012: EH, JM Survey coverage: General survey, recording iconic artefacts only.
DAM20A	**Dam West 20A:** The beach below the rocky outcrops at **DAM20A** has a stretch with a near-continuous presence of ESA cobble tools amongst the broken bedrock outcroppings. There is one main cluster of ESA in a cobble patch at the northern end of the area, also with a possible MSA silcrete flake and an LSA CCS single platform cores. There were very few silcrete flakes in this area in general, with only one recorded. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM21A	**Dam West 21A:** There are flat, broken sandstone bedrock outcroppings on the beach, separated by sandy patches and cobble clusters. Silcrete flakes are more numerous in this area than further to the north, and have MSA features. There is a possible adze on an MSA silcrete flake; this is out of character with the rest of the assemblage. Since there is one other marginally step-flaked flake (possibly also on a recycled flake) that also does not resemble a typical adze, these may not be truly iconic of an LSA association. There is a largely empty stretch of sandy beach between **DAM21A** and **DAM21B**. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM21B	**Dam West 21B:** The beach has a stretch of broken sandstone bedrock outcropping, flat to begin with at the northern end, then becoming raised and angular at its mid-point, and flattening out to the south. Artefacts are found among the broken fragments and cracks; these are mostly ESA cobble cores, with a cluster of MSA quartzite and silcrete flakes with faceted platforms at the top of the beach, above the densest rocky area. The beach has clusters of pebbly wash which contain smaller silcrete elements. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.
DAM21C DAM21C	**Dam West 21C:** The area is on the beach below Nooitgedacht where there are several patches of broken rock and degraded heuweltjies on the grass line at the top of the sandy beach. There are ESA cobble tools amongst the cobble patches, with a thin scatter of smaller silcrete debitage flakes and some larger MSA pieces in the wash line on the sand. There are few iconic artefacts present, except for one pottery fragment, MSA faceted platforms and an unusual bifacial point. This is a bifacially worked pointed tool, but has an atypical morphology to usual bifacial points, with a wide square base. Flaking is bifacial and continuous around the perimeter but quite large removals (more akin to the bifacial working seen on a handaxe handaxe), and the tip is finely pointed. An MSA attribution is reasonable, but it cannot be securely identified as Still Bay. The site database records a number of rock art sites and rock shelters on the rocky outcrops to the east of the river. One courtyard on an outcrop directly above the beach was surveyed as the possible location of rock art site **NG7**, but no artefacts or rock art were identified. 24/05/2012: EH, JM Survey coverage: General survey, recording all artefact types.

ANDRIESGROND	
AG1	**Andriesgrond 1: Main cave** The main cave is an LSA bedding-and-ash site, excavated by Parkington et al. in 1977 and 1978. The cave contains a well-preserved and varied range of rock art motifs with many superimposed images, described by Anderson (1991) and Hahndiek (in prep.). The excavated deposit has dates from ~14,000 BP to 300 BP, with an MSA component also present. Formal tool frequencies are cited in Parkington (1980) and Parkington and Mazel (1981). The lithic assemblage is described in greater detail by Mazel (1978), also with specific reference to four talus collections which were made, and Anderson (1991) provides an analysis of the lithics and other excavated material. The lithic assemblage was also reassessed in the course of the present study, but details are not included in this thesis. A study of the ochre from the excavated assemblage is being carried out by Hahndiek (in prep.), correlating the colour and streak properties of utilised and non-utilised ochre with the rock art in the cave and surface ochre found in surveys of the surrounding area. A general assessment of the extensive artefact scatter on the grassy talus slope below the site was carried out, but a full survey of iconic artefacts was not conducted because the density of artefacts was too great, and four collections had been made in 1978 and their locations were unknown. Two randomly selected 3m by 3 m squares (A and B) were sampled for formal tools near the top of the talus slope. Survey transects for the location of ochre were walked across talus, recording both utilised and unutilised ochre. 14/06/11: EH, RB, SB, CH, RL, LS Survey coverage: Two 3 x 3 m sample squares from the talus, recording iconic artefacts only.
AG1A	**Andriesgrond 1A: On top of main koppie** *(new site no.)* The uneven, eroded rocky platform on top of the main Bobbejaanskop koppie has a series of stepped levels with an artefact scatter of variable density across the surface. The scatter mostly comprises silcrete and a dark coarse-grained quartzite with a high iron content (some pieces could be labelled ferricrete), and artefacts are predominantly broken flakes with some elongated flake-blades. The assemblage has a strongly MSA character, with radial cores and flakes with faceted platforms present in silcrete and quartzite. There were no LSA formal tools recorded, with the exception of one pottery lid fragment from above main cave. A small, finely flaked ferricrete handaxe occurred as a unique find in the middle of the koppie. The situation of the scatter on top of the koppie means that artefacts can be assumed to be broadly *in situ*, although some downslope wash creating concentrations in eroded depressions is likely. A particularly dense concentration of artefacts occurs on a slightly lower level on the southern side of the koppie, in a setting which was observed to be well protected from the wind and offering a wide view over the Olifants River and surrounding landscape. Artefacts in this area were of an unpatinated silcrete and featured a substantial number of bifacially worked pieces. It is possible that this may be the source of material found on the open area AG9A directly below; however, the location on the koppie top is in a relatively contained setting with no substantial slope which suggests that downwards erosion would be limited. 10/02/12: EH, WA, RB, CH, JM 16/06/12: EH, KA, VF, JM, SO, JS, JvD, CW, JW Survey coverage: Near-total survey coverage, recording all artefact types.
AG2	**Andriesgrond 2:** Rock art in small raised shelter of two figures: a small elephant and a man with a bag. 18/06/12: EH, RB, CH, RL, LS

AG2A	**Andriesgrond 2A: Slope between two koppies** *(new site no.)* An open scatter at the base of the slope extends between the main koppie (below **AG2** rock art) and the rocky outcrop to the west. Surveys were not carried out in great detail but a relatively dense artefact scatter was observed on the slope amongst scree cobbles and rubble. The artefacts identified were mostly flakes and retouched flakes, with not many iconic tools. The high frequency of silcrete and presence of faceted platforms suggests that there is an MSA component to the assemblage, but also the presence of small CCS retouched pieces is suggestive of the LSA. 18/06/11: EH (RB, CH, RL, LS) 13/02/12: EH, RB, CH, JM Survey coverage: General survey, recording iconic and retouched artefacts only.
AG3	**Andriesgrond 3:** Rock art on the outside wall of the rock outcrop. 18/06/11: EH, RB, CH, RL, LS
AG3A	**Andriesgrond 3A: MSA points** *(new site no.)* The site is an open sandy clearing by a rock outcrop on the northern side of the main koppie. There is a small triangular shelter with no discernible deposit and a small number of associated LSA artefacts, with LSA rock art in an unusual situation on the outside wall of the rock outcrop. The scatter extends across the clearing, about 30 m to the north of the rock outcrop. The assemblage is silcrete-dominated and has a high number of retouched points: three bifacial points (two are broken proximal portions, one is complete, with maximum length of 31 mm), four unifacial points (two are broken distal portions), and nine other point-forms, of which five are notched or denticulated and two are bifacially worked. The unifacial points mostly have marginal edge retouch, although two are thicker with more invasive working which might suggest early stages of bifacial point production, abandoned due to breakage. Two bifacial pieces may be reworked bifacial points. There were also numerous radial cores and a large quantity of small flakes and debitage, although these were not surveyed properly. The co-occurrence of typically Still Bay and post-Howiesons Poort artefacts in this locality raises questions regarding patterns of behaviour and site choice within the MSA. From a diagnostic standpoint, it addresses whether the generalised association of bifacial points with the Still Bay and unifacial points with the post-Howiesons Poort is tenable when assessing surface occurrences or whether these temporal affinities must be considered with greater caution. 18/06/12: EH, RB, CH, RL, LS 10/02/12: EH, WA, RB, CH, JM Survey coverage: Detailed survey, recording iconic and retouched artefacts only.
AG3a	Area to the north west of **AG3A**, with a diffuse artefact scatter on the open, vegetated sand. There is no apparent landscape feature association other than the rock outcrop just to the south. The assemblage comprises mostly broken silcrete flakes, including some faceted platforms, and some thin blade-like pieces. 10/02/12: EH, WA, RB, CH, JM Survey coverage: General survey, recording all artefact types.
AG4	**Andriesgrond 4: Leaning boulder overhang** The site is an overhang formed by a leaning boulder, situated on a raised rocky ledge on north east side of main koppie, above sandy terrace. There is a thin layer of sand with scree cobbles on the rock ledge, with large scrub bushes. The site database reports rock art on the leaning boulder which is the likely focus of the material but it could not be investigated properly because of a cobra. The artefacts on the ledge included silcrete and dark quartzite or ferricrete flakes and pottery, including one very large piece. An MSA component may be indicated by some of the larger silcrete flakes which show bifacial working, one faceted platform and several thin spally blade-like pieces.

AG4 *contd.*	13/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
AG4a	The area on the rock ledge between the leaning boulder overhang (**AG4**) and hollow boulder overhang (**AG4A**) has a thin scatter of silcrete and quartzite, with one faceted platform flake. The scatter continues to the north down the relatively steep slope with scree cobbles onto a rocky platform with thin sand covering artefacts in eroded depressions. The assemblage includes silcrete and dark quartzite or ferricrete flakes, elongated flake-blades and radial cores. Note that this is more typical of the other general MSA scatters around the koppie and not like the assemblage at **AG4A**. 13/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
AG4A	**Andriesgrond 4A: MSA hollow boulder** *(new site no.)* The site is a low shelter underneath a hollow boulder, on the same rock ledge as **AG4**, less than 10 m further west. There is a build up of large cobbles in front of the shelter, with a lag of cobbles and artefacts inside, with a maximum of 50 mm of sediment, likely disturbed by water runoff through the boulder. The shelter contains well over 200 artefacts in what is presumed to be a relatively closed setting, with very few artefacts found on the slope directly below a small hole at the back of the shelter. The assemblage is strongly MSA in character, its most notable feature being a significant number of large blades of very weathered silcrete and fine-grained quartzite, some of which have faceted platforms. Other MSA artefacts include pointed flakes with convergent dorsal scars, elongated flakes with parallel dorsal scars, faceted platforms and large cores with blade-like removals, on silcrete and quartzite. Two pieces of ground ochre were also found near the opening to the shelter, and there was one nodular ochre piece inside. There were no LSA artefacts observed. 13/02/12: EH, RB, CH, JM Survey coverage: Detailed survey, recording all artefact types.
AG4B	**Andriesgrond 4B: Rock outcrop** *(new site no.)* The site is in front of a rock outcrop which forms a sheltering rock wall but with no substantial overhang. There is a dense scatter comprising mostly undiagnostic broken flakes and small debitage of silcrete, dark quartzite, ferricrete and occasional quartz. The MSA component includes a broken bifacial point tip, flakes with faceted platforms and radial cores. The only iconic LSA artefact in front of the rock outcrop was a single platform bladelet core. The scatter continues on the open sandy terrace above the outcrop, on a gentle slope below the main koppie. The scatter is less dense than on the lower level, but the material is similar. One adze and a bipolar core were identified. It is possible that some of the material derives from the rocky ledges (**AG4**), hollow boulder shelter (**AG4A**) and Cobra shelter (**AG4C**), higher up the side of the main koppie. 18/06/11: EH, (RB, CH, RL), LS 13/02/12: EH, RB, CH, JM Survey coverage: Near-total survey coverage of the lower level, recording all artefact types; general assessment only on the upper level.
AG4C	**Andriesgrond 4C: Cobra shelter** *(new site no.)* The overhang is on a raised rock ledge, about 10 m above ground, on the north side of main koppie, to the east of a fig tree. There is a small collection of silcrete flakes, four of which have faceted platforms. 18/06/11: (EH), RB, CH, RL, (LS) 10/02/12: EH, WA, RB, CH, JM Survey coverage: General survey, recording all artefact types.

AG4c	There are a few isolated flakes on the rock ledge running around the edge of the main koppie. 10/02/12: EH, (WA), RB (CH, JM) Survey coverage: General assessment, recording all artefact types.
AG9	**Andriesgrond 9: "Finger dot cave"** The site is a long overhang high up on the southern side of the koppie, up the steep, uneven rock-face. Surveys did not relocate the finger dot rock art recorded on the database. There were very few artefacts visible in shelter but they may be obscured by a thick layer of dassie droppings. It is also possible that artefacts have been washed out onto the rocky slope of the koppie – observed directly below the shelter – and could be the source of some of the material on the open area **AG9A**. Artefacts found amongst the rocky scree on the slope of the koppie below the shelter included LSA pottery fragments and MSA radial core, unretouched point and large ferricrete flake with a faceted platform. 18/06/12: (EH), RB, (CH), RL, LS 10/02/12: EH, WA, (RB), CH, (JM) Survey coverage: General assessment, recording all artefact types.
AG9A	**Andriesgrond 9A: Boulder shelter** *(new site no.)* The area has an extensive silcrete scatter spread over a relatively flat open space below the south-western side of the koppie, with a potential focus for the scatter being an isolated 'shelter' of boulders with a flat top. The assemblage is composed mostly of flakes and broken elongated flakes and blades, mainly silcrete but also some quartzite and quartz. Many of the flakes have faceted platforms, also with other features resulting from prepared cores, although relatively few cores themselves were observed. The scatter is strongly MSA but there were no bifacial or unifacial points to indicate a more specific temporal association. It is possible that at least some of this material has washed out of the shelter **AG9** high up above the site on the rock wall of the koppie which is now virtually empty of artefacts, or from the top of the koppie itself where there is a particularly dense cluster of MSA silcrete artefacts at the southern edge of **AG1A**. 18/06/12: EH, (RB), CH, (RL, LS) 10/02/12: EH, WA, CH, RB, JM Survey coverage: Near-total survey coverage, recording all artefact types.
AG9a	The **AG9A** scatter continues to the west but becomes less dense. The assemblage is much the same, including MSA with faceted platforms, blades, snapped flakes and blades, a flake with a burin spall removal and a dos limité flake. 10/02/12: EH, WA, CH, RB, JM Survey coverage: General survey, recording all artefact types.

MALGASHOEK	
MG3	**Malgashoek 3: Rock art on overhang** *(MGH3 on database)* There is a rock art site on a high rock wall with a shallow overhang, on an outcrop at the far west of the Malgashoek area. No associated artefacts were observed, although there was an ephemeral scatter of flakes further down the slope, **MG3a**. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey.
MG3a	There is a low density of flakes leading down the slope from **MG3** towards **MG8** (which has an extensive scatter). Some are large silcrete flakes which may be MSA, and there is an LSA single platform bladelet core. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.
MG4	**Malgashoek 4: "Cobra Cave"** The site is a prominent cave in a clearing next to the N7, opposite the Dam wall. There is a raised terrace (or sward) immediately outside the cave, with an open area on the lower level below. There is an extensive scatter of flakes, mostly silcrete but also CCS, hornfels, quartz and some quartzite. There were some bladelets of quartz and CCS, and also frequent ochre chunks, particularly in the cave. The inside of the cave is very scrappy with burnt material, dassie droppings and recent rubbish. There is some faded rock art underneath graffiti and soot from fires. There were numerous upper grindstones (some broken) and large silcrete, quartzite and hornfels flakes recorded inside the cave. Larger flakes and faceted platforms suggest an MSA component, along with elongated flakes-blades, and flakes with a double patination through reuse as adzes. One large patinated silcrete blade with a faceted platform resembles the blade assemblage from **AG4A**. 04/02/12: EH, RB, KK, RL, JM, JP 14/02/12: EH, CH, JM Survey coverage: General survey, recording all artefact types.
MG4a	A few artefacts were recorded up the slope of the gully to the north west of **MG4**. A rocky outcrop to north has a rough stone wall extending from the main rock cluster, although there were few artefacts in this area. The rocky platform to the south west of **MG4** has a few sparse silcrete flakes – probably MSA. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG5	**Malgashoek 5: Main cave** *(MGH5 on database)* The site is a long, high double shelter with a shallow overhang and screened by bushes in front. There are rich rock art panels extending across the walls of both shelters. There is some sandy sediment but no substantial deposit and few artefacts under the overhang. Below the shelter, there is a wide open gully with a long talus slope and a very dense and extensive artefact scatter. The survey sampled this in three transects, spaced roughly 5 m apart, with artefacts within a 1 to 2 m radius recorded at points every 5 m down the slope. The assemblage is mixed MSA and LSA, with probably more LSA flakes higher up the slope than in the assemblage **MG5A** further down the rocky platform. There were relatively few formal tools for the volume of artefacts, with only a few scrapers and an adze. There were also MSA radial cores and LSA bladelet cores. 05/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.

MG5a	The scatter below MG5 thins out considerably lower down the talus slope, into the sandy gully, but the material is much the same. 05/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG5A	**Malgashoek 5A:** *(new site no.)* The area is a rocky platform at the western end of the middle/south-eastern rocky platform, on the south side of the gully. The extensive artefact scatter is possibly a continuation of the talus scatter from **MG5**, although there is a much stronger MSA component to this assemblage, with radial cores, two unifacial points and a bifacial point. Artefacts are mostly undiagnostic flakes and broken flakes in silcrete and quartzite, with no LSA formal tools observed. The higher relative density of material that is attributable to the MSA, found on the rocky platform lower down the slope (compared with the sandy talus slope) may be due to their being on the slope for a longer length of time; similarly, for the greater degree of patination of flakes lower down slope. 05/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG5B	**Malgashoek 5B: Small LSA shelter** *(new site no.* The site is a small double shelter, raised on a rock wall above the **MG5** talus to the south. The smaller, eastern shelter joins the larger shelter at the back and itself contains little material. The larger shelter to the west has some deposit and a small artefact scatter on the surface inside the shelter, comprising mainly silcrete flakes, with some hornfels, quartz and CCS. There is pottery and several adzes on the slope immediately below the shelter ledge, which distinguishes it from the MG5 talus material which does not contain any adzes or pottery. There is also ochre, burnt bone, tortoise carapace, marine shell fragments and ostrich eggshell on the slope, clustered below the shelter. 05/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG8	**Malgashoek 8: Shelter at top of ridge** *(MGH4 on database)* The site is an overhang on a rocky outcrop, to the south east of **MG3**. There is rock art in the shelter, and large boulders in front with some vegetation cover and a level sandy floor. This gives way to a relatively steep sandy talus slope which has a dense artefact scatter, in stepped levels retained by rocks. The assemblage is typical LSA, with adzes and thumbnail scrapers, and no pottery. Artefacts are mostly silcrete, but some quartz, CCS, hornfels and quartzite. Most flakes are medium to small, but with some larger, often more patinated flakes, and a few dark quartzite elongated flake-blades suggesting an MSA component. Since there are no MSA cores or other artefacts, these may be scavenged flakes brought to the site for reuse as adzes in the LSA. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.
MG11	**Malgashoek 11: "Olive eland torso"** The site is an overhang on a raised ledge on the northern edge of the middle/south-eastern rocky platform, in the gully below the **MG5** talus. There is a finely painted olive-coloured eland torso and white legs, but the head is not visible. There were no artefacts in the overhang but there was a small scatter in the open sandy area in the gully below the rock ledge. These were mostly silcrete, including some MSA-like elongated flake-blades. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types

MG11A	**Malgashoek 11A: Sandy terrace** *(new site no.)* The area is a sandy terrace or sward below the middle/south-eastern rocky platform, on its northern edge. An artefact scatter extends across the terrace, comprising mainly silcrete flakes (most of which are broken), with some quartz and very little quartzite. Some MSA features were observed, as faceted platforms, a Levallois point and elongated flake-blades. There were almost no cores, which is unexpected given the large quantity of flaking debitage. There is also a low overhang underneath the boulders at the top of the sandy terrace, immediately below the rocky platform. Three cores were found under the boulder, including one LSA CCS irregular core, with very small removals. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG11a	An ephemeral scatter over the lower middle/eastern rocky platform, continuing further up the slope. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types
MG11B	**Malgashoek 11B:** The area is at the eastern end of the middle/south-eastern rocky platform, where there is a flake scatter of moderate density, mostly collected in pockets with small pebbly pieces and small flaking debitage, suggestive of some effect of slope wash. Slightly sloping rocky platform with eroded depressions and high rocky protrusions. Moderately dense flake scatter; artefacts mostly collected in thin sand accumulations in depressions with lots of small pebbly pieces with small flakes/debitage suggesting slope wash. Large, patinated MSA-like flakes. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types
MG11b	The site is an open sandy area to the south of the middle/south-eastern rocky platform, bounded by the raised edge of the rocky platform above. The artefact scatter contains large MSA-like flakes, including a preferential Levallois flake. There is also a low overhang on the edge of the rocky platform, at ground level with rocks in front, about 1 m high but extending back quite deep under the platform. An irregular core with large flake removals was recorded inside the overhang. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types
MG13	**MG13: South-eastern rocky platform** The area is at the southern end of the south-eastern rocky platform, with a thin scatter across the surface of the sloping rocky area, forming small pockets of artefacts in eroded depressions on the rock surface. There is a low, shallow overhang on the rock wall formed by a raised level of the rocky platform above, and there are some artefacts on the vegetated area in front, with a concentration in a rocky depression directly below. This includes radial cores, flakes with faceted platforms and a broken bifacial point. A thin but persistent MSA scatter of similar material extends across the rocky platform to the north and east. *Note: **AG5** rock art site is located underneath the eastern edge of the rocky platform.* 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG13a	The area is along the northern edge of the south-eastern rocky platform, including the raised rocky platform and the lower level in front of the rock wall that the platform forms. There are several shallow shelters along the rock wall but no artefacts; possibly if there was any material it has washed further down the slope. There is a thin scatter of mixed MSA and LSA material across the area, mostly silcrete. The only diagnostic pieces observed were radial cores.

MG13a *contd.*	04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types.
MG13b	There is a thin artefact scatter in a sandy gully below the south-eastern rocky platform. On a projecting rocky platform at the end of the gully, there is a dense accumulation of flakes and small debitage around some protruding rocks (artefacts too dense to record). This accumulation is probably due to slopewash but it is still associated with the rocky platform, from higher up. 04/02/12: EH, RB, KK, RL, JM, JP Survey coverage: General survey, recording all artefact types
MG14	**Malgashoek 14: Middle/western rocky platform** The area covers the middle/western rocky platform, which has several tiered levels going upslope (downslope to the east of **MG8**). The flake scatter has some large MSA-like flakes and faceted platforms, and there is a bladelet core on the rocky platform further up the slope. A boulder with a small overhang also contains artefacts (recorded by RL and JP). The assemblage is likely to be mixed MSA and LSA material, but there were no formal tools identified. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.
MG14a	There is a thin scatter of mixed MSA and LSA material in the sandy gully below the rocky platform, to the south east (north of the **MG5** talus). The assemblage includes small quartz flakes and MSA silcrete flakes with faceted platforms, and there is also a radial core on the rocky platform between **MG14** and the gully at **MG14a**. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.
MG14A	**Malgashoek 14A:** The area is a rocky platform raised above a sandy gully, at the the western end of the middle/western rocky platform (south east of **MG8**). The platform slopes slightly to the east, and has thin patches of sand in eroded depressions and low rocky protrusions across the surface. There is a thin flake scatter with some large MSA-like patinated silcrete flakes but otherwise no diagnostic artefacts. 06/02/12: EH, RB, KK, (RL, JP) Survey coverage: General survey, recording all artefact types.
MG14B	**Malgashoek 14B:** This refers to the sandy terrace along the north edge of the middle/western rocky platform, in the gully at the base of the rocks. There is a diffuse scatter of material across the area, with the most diagnostic pieces being MSA-like large, heavily patinated silcrete flakes. Other flakes are largely undiagnostic but there may be an LSA component of less patinated pieces. The scatter continues down the slope to a broken rocky platform on a lower level which has more MSA-like material, including large flakes with bifacial retouch. Lower down the sandy gully there are more very large MSA quartzite flakes. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.
MG15	**Malgashoek 15: Westernmost rocky platform** The area is a high rocky outcrop with a rocky platform, located at the westernmost edge of the Malgashoek area. There is a thin scatter of artefacts, mostly of small undiagnostic flakes (many broken), with varying degrees of patination. There is a flat, ridged rocky platform exposed at the base of the outcrop, covered by sand and vegetation with a few similar flakes. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.

MG15a	The area is a sandy terrace to the south of the westernmost rocky platform. There is a thin scatter of relatively small flakes, mostly of silcrete with a few of quartz. 06/02/12: EH, RB, KK, RL, JP Survey coverage: General survey, recording all artefact types.

DRIEHOEK	
DR1	**Driehoek 1:** The site is a shallow overhang on the **e**astern side of an isolated rock outcrop (**DR2** is on the southern side of the same outcrop). There is no deposit under the overhang which offers limited shelter, and there is some poorly preserved rock art. There is a thin artefact scatter on the flat rocks and sandy area in front of the outcrop, containing MSA-like silcrete and quartzite flakes with several faceted platforms. In general the assemblage is small with very few diagnostic artefacts. 01/04/12: EH, JM Survey coverage: General assessment, recording all artefact types.
DR2	**Driehoek 2:** The site is a low, deep shelter on a rock ledge, located on the southern side of a rock outcrop (**DR1** is on the eastern side). There is a protruding sandy, rocky terrace in front of the outcrop, containing a thin scatter of mostly MSA material (radial cores, faceted platforms, large patinated silcrete and quartzite flakes). A bifacially worked silcrete piece, with a faceted platform, could be a small broken bifacial point, but the distal end is broken. The only LSA artefacts recorded were two pieces of pottery and a small single platform core. There is some rock art under the overhang at the western end of the shelter with handprints on the ceiling. 01/04/12: EH, JM Survey coverage: General assessment, recording all artefact types.
DR2a	On the western side of the rock outcrop with **DR1** and **DR2**, there is an isolated quartzite upper grindstone. 01/04/12: EH, JM Survey coverage: General assessment, recording all artefact types.
DR5	**Driehoek 5:** The site is a long, high overhang on raised rock ledge part way up the cliff face of the main Driehoek koppie, to the west of **DR6**. There is rock art along the exposed rock wall which extends along the ledge outside the overhang; images include a finely painted bichrome eland torso and legs. There is a small cluster of artefacts in the shallow organic deposit (mostly dassie dung) with roof spall in the western corner at the front of the overhang. Artefacts include a few silcrete, quartz and CCS flakes, a piece of utilised ochre, and some burnt bone. Pottery fragments indicate a late LSA date. An adze on a large silcrete flake is probably a re-used MSA flake with a double patination. A thumbnail scraper has tiny step-flakes on the retouched end; similar step-flaking occurs on thumbnail scrapers from **DR7**. This is unusual compared to all other sites in the study area. There is also a large, highly polished lower grindstone in the middle of the shelter. 01/04/12: EH, JM Survey coverage: General assessment, recording all artefact types.
DR5A	**Driehoek 5A:** *(new site no.)* The scatter is on the stepped rock ledges and sandy slope, downslope from **DR5**. The assemblage is similar in nature to **DR6A** and may be washed down from the shelter **DR5** (or **DR4**, a shelter higher and further to west but not revisited on surveys). Flakes are relatively large, of silcrete and quartzite, and there is a possible MSA component represented by elongated flakes and radial cores on quartzite cobbles. A single platform core is the only iconic LSA artefact, but assemblage is likely to be mixed given its situation below the LSA overhang. 01/04/12: EH, JM Survey coverage: General assessment, recording all artefact types.

DR6A	**Driehoek 6A:** *(new site no.)* The area referred to is the extensive sandy slope below the main koppie, below the main rock art site (**DR6**) half-way up the cliff face (visible from below but only accessible from above). The artefacts below are probably washed out of the shelter which has no deposit or artefacts in it, or the artefacts are otherwise related to it. There is a cluster of coarse quartzite scree cobbles which includes artefacts, particularly MSA-like radial and irregular cores. The artefact density on the general slope is high but the survey focused on recording only iconic artefacts. There was a high frequency of quartzite cobble and silcrete radial cores, and also flakes with faceted platforms, suggesting MSA. A single unifacial point may suggest a post-Howiesons Poort element, but it is different in morphology to the more typical point form, being relatively thick, small and with steep, invasive retouch. There is a large sandstone lower grindstone (possibly *in situ*, being too heavy to be washed down slope and unlikely to derive from the shelter up the cliff above), although there are few LSA iconic artefacts which is surprising given the prominent LSA shelter above. There are, however, a lot of quartz flakes and cores around which may be LSA, including a quartz backed bladelet. The scatter covers the whole of the sandy slope below the main koppie, although density is variable, with concentrations particularly where there are patches of cobble wash. The source of this wash is not clear since the slope is relatively shallow, but gullies run down between the large koppies and may be the cause. 01/04/12: EH, JM Survey coverage: General assessment, recording all artefact types.
DR6a	A thin scatter of broken silcrete flakes extends across the sandy slope amongst the vegetation. Some of the flakes have faceted platforms. 01/04/12: EH, JM Survey coverage: General assessment, recording iconic artefacts only.
DR7	**Driehoek 7:** The site is a small overhang on north west side of an isolated rock outcrop, with tall bushes in front, obscuring the rock art. The flat sandy clearing in front of the sandy clearing with rich artefact scatter. There is organic charcoal-rich deposit under overhang, with numerous pieces of burnt tortoise carapace and bone. The scatter contains lots of silcrete, quartz and CCS flakes and small debitage, with a relatively high frequency of retouched pieces. Adzes were common, and particularly notable are two adzes which are also retouched at one end to form an end scraper. There was also one quartz adze which is unusual. Four thumbnail scrapers had step-flaked retouch on the scraper edge – with a similar example at **DR5**, and not noted anywhere else in surveys. This could suggest some special function for thumbnail scrapers particular to this site. 02/04/12: EH, KK, RL, LS, TvZ Survey coverage: Detailed coverage, recording iconic artefacts only.
DR8	**Driehoek 8:** The site database describes a "shallow overhang with high roof with a huge fig tree in front. Sandy level floor with small trees and bushes. Rock art but almost no artefacts." This site – on a rock outcrop south east of DR7 – was not relocated on the survey, although the small rock outcrops were surveyed and no rock art and only a few artefacts were observed. 02/04/12: EH, KK, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DR8a	There are a series of small, isolated rocky outcrops upslope from **DR7** (and **DR8**) along the track which crosses the rocky platform which is covered with sandy patches. A few artefacts were found among the general presence of quartzite cobble slopewash, and although no obviously diagnostic

DR8a *contd.*	pieces were found, they are most likely to be early MSA. One large quartzite cobble flake (possibly a Kombewa flake, with two ventral faces, one of which has additional flake removals) was located on the sandy track higher up from the main open rocky platform area which was surveyed. There were no shelters or artefacts identified at any of the rock outcrops surveyed nearby. 02/04/12: EH, KK, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DR8b	The area referred to is across the gully from **DR7** and up a steep high cliff to the south west. The location offers a wide view of the Olifants River/Clanwilliam Dam, to the north and south. There is a very ephemeral flake scatter on the open, sloping rocky platform and in the patches of vegetated sand along the edge, with isolated silcrete and quartzite flakes, probably MSA (with faceted platforms) and one large quartzite bifacially worked cobble, which could be called a biface and associated with the ESA. There are several rock outcrops at the highest point of the ridge (slightly over to the Kransvlei side) but where were no associated artefacts found, which was surprising given two potential overhangs on Kransvlei side. The artefact association is more likely to be with the rocky platform itself given the lack of other landscape features as foci – any slopewash can only be derived from higher up the rocky platform. The scatter continues along the ridge at the highest point of the rocky platform to the north, with more artefacts which are likely to be MSA. 02/04/12: EH, KK, RL, LS, TvZ Survey coverage: General survey, recording all artefact types.
DR11	**Driehoek 11:** *(new site no.)* To the north of the main koppie, there is a lower level terrace, with a rock wall at the intersection between the two levels. There is a small shallow overhang (with a fig tree) on the rock wall, with a sandy slope covered in quartzite scree cobles and artefacts. There was too much dry vegetation in the overhang to observe any artefacts on the ground, but at least some of the material on the slope is likely derived from the overhang. The survey only mapped diagnostic artefacts within the dense flake scatter, recording radial cores and large MSA flakes with faceted plaforms. There were also large irregular cores made of coarse quartzite cobbles. 31/03/12: EH, JM Survey coverage: General survey, recording all artefact types.
DR11b	A low density scatter continues from **DR11** across the sandy clearing, along the rock wall, including MSA radial cores and flakes with faceted platforms. *Note: 5 additional GPS points were taken (recording similar material) but the photos and artefact details are missing.* There is a concentration of artefacts around a raised, eroded rocky protrusion on a patch of rocky platform, between the lower level of the terrace and the upper terrace below the main koppie. There is a high proportion of quartzite flakes, also silcrete, with MSA features. The accumulation may be due to slopewash across the sandy terrace. 31/03/12: EH, JM Survey coverage: General survey, recording all artefact types.
DR11A	**Driehoek 11A:** *(new site no.)* The site is just above the base of the sandy gully to the north of the main series of koppies and cliffs at Driehoek. There is a scatter running down the sandy slope from **DR11** by the rock wall, with a concentration on a clearing or sward on the sandy slope. Artefacts are mostly silcrete, with some quartzite. The assemblage is mixed, containing small LSA flake and bladelet cores, and also larger MSA flakes with faceted platforms.

DR11A *contd.*	31/03/12: EH, JM Survey coverage: General survey, recording all artefact types.
DR11a	There were a few isolated flakes on the high, tiered cliffs at Driehoek, across the gully from Renbaan. One small flake collection could be MSA, located on a rocky platform with sandy patches, above the second gully. 31/03/12: EH, JM Survey coverage: General survey, recording all artefact types.

KRANSVLEIKLOOF	
KVK1	**Kransvleikloof 1: Courtyard with ESA** The site is a courtyard area enclosed by rock outcrops on the rocky platform, north east of **KVK2**. The rocky floor slopes slightly towards the north with an accumulation of sediment and coarse quartzite scree cobbles in the northern corner. Artefact visibility was reduced on the second visit to the site (09/02/12) due to disturbance by baboons digging. The assemblage contains ESA, MSA and LSA artefacts, with the larger ESA elements concentrated towards the lower end of the courtyard to the north, and the smaller pieces scattered more in the southern area. The ESA artefacts included three handaxes, one of which was made of ferricrete, and quartzite cobble choppers and cores. MSA artefacts included radial cores and flakes with faceted platforms and were mostly of silcrete, with some probable LSA artefacts and smaller flaking debitage. The location is unusual for ESA artefacts, which are usually found closer to the river, but the scree cobbles in the courtyard would fulfil the need for raw materials. The site is about 1.5 km from the ferricrete outcrop on the Kransvleikloof inlet into the Olifants at **DAM8**, the most likely source of raw material for the ferricrete handaxe. 10/05/11: EH, WF 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.
KVK1a	An ephemeral scatter on the upper level of the rocky platform between courtyards **KVK2** and **KVK1**. The material is probably washed down from or associated with one or both of the courtyard sites. MSA artefacts included a radial core and large patinated flakes, LSA artefacts included a thumbnail scraper. 11/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
KVK1b	An ephemeral MSA-like scatter down the slope of the rocky platform, below **KVK1** and **KVK2** at the top of the ridge. 11/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
KVK2	**Kransvleikloof 2: Underground cave** The site is a flat, sunken sandy courtyard area between rock outcrops that form a raised rocky platform around the edges. It is located slightly further upslope and to the south of **KVK1**. There is a small, low overhang (about 1 m high) on the eastern edge of the courtyard, with fine dusty deposit inside. There is a blackened area on the back wall of the overhang, recorded on the site database as a group scene with seven figures, although this could not be discerned from the survey. A low 'wall', formed of a line of stones, had been constructed against a gap in the back wall of the overhang. WA climbed through the gap into a cave which opened up to a few metres in height and extends 30 to 40 m underneath the rocky platform, sloping downwards. There is another small opening to the cave at the edge of the rocky platform further down the slope. There were some artefacts in the cave under the rock, but these may have been washed in from the courtyard. The artefact scatter in the courtyard is mainly concentrated near the overhang and consists mostly of silcrete but also with quartz, hornfels and CCS. There is a large quantity of pottery concentrated in front of the overhang, including one decorated and one rim fragment. Adzes are densest in the northern end of the courtyard, and other LSA artefacts include very small finely retouched CCS scrapers. There was a broken slab-like grooved stone of a material similar to mudstone. There is a probable MSA presence shown by some larger patinated silcrete flakes, one showing double patination with step-flaking retouch. A point, showing utilisation damage more than deliberate flaking, has an impact burination at its tip. The site database also records a large OES bead

KVK2 *contd.*	and several pieces of black and white mussel shell, although these were not noted in surveys. A thin artefact scatter continues down the slope of the rocky platform to the north (**KVK1b**). 09/02/12: EH, WA, RB, CH 11/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
KVK2a	An ephemeral scatter across the rocky platform directly up the slope from the Driehoek track. The artefacts are mostly MSA-like pieces, including a radial core, flakes with faceted platforms, elongated flakes, and large quartzite and silcrete flakes with a high degree of patination. There were no LSA formal tools observed. A ground piece of ochre could be LSA or MSA given its association with other MSA artefacts. The scatter is likely to have been affected by slopewash, but the only major sites upslope were **KVK1** and **KVK2**. 11/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
KVK2A	**Kransvleikloof 2A:** The site refers to the area on the sloping rocky platform below the **KVK2** courtyard, to the north. The material is mostly LSA and likely to be washed down from or associated with the LSA site upslope. There are some MSA artefacts, including larger patinated silcrete flakes, which may be associated with the rocky platform itself. There are rocky outcrops on the eroded platform in the form of raised rock protrusions and 'columns', but none appear to be a specific focus for artefacts, although they may have been used for shade or shelter from the wind. The only formal tools observed were a thumbnail scraper and an adze, but several pieces of utilised ochre which is interesting given that there is no rock art or suitable painting surfaces on the heavily eroded rock in the area (unless the sandstone has weathered subsequently, which is considered unlikely given the usual careful selection of sites for paintings). 11/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
KVK3	**Kransvleikloof 3:** The site is a low, angular overhang underneath a rock wall with a relatively flat but vegetated sandy area in front. The artefact scatter is thin and only one adze was recorded. The record on the site database reports quartzite and silcrete chunks and flakes which are identified as MSA, but this was not observed on surveys. 10/05/11: EH, WF Survey coverage: General survey, recording iconic artefacts only.
KVK5	**Kransvleikloof 5:** The site is a low shelter at the base of the rock band (with a large fig tree at the northern end of the site, and rock art of yellow elephants in a recess at the southern end). There is an extensive sloping sandy area in front of the site, with a sloping rocky platform which steps down in several short terraced levels. The area is sandy with bushes and small rocks, and the slope leads down to the Kransvleikloof tributary. The artefact scatter is very dense, with a survey strategy adopted which recorded artefacts at points with a 1 to 2 m radius, spaced at roughly 5 m intervals. This concentrated particularly on the drip-line along the edge of the rock outcrop, and the area at the top of the sandy slope. The scatter is mainly LSA, with large numbers of adzes, also thumbnail scrapers, a backed segment and backed drill. There was a relatively high incidence of non-local CCS and hornfels. There was an MSA component, including chunky irregular quartzite cores, mainly found further down the slope on the rocky platform. The scatter is continuous from **KVK7A**, although of increased density, and continues south along the sandy terrace towards **KVK6**.

KVK5 *contd.*	09/02/12: EH, RB, CH Survey coverage: Detailed survey, recording all artefact types at sample points.
KVK5a	An ephemeral scatter across the rocky platform above **KVK5** and the other shelter sites along the rock band. Artefacts are mostly identifiable as MSA, with a radial core, flakes with faceted platforms and large heavily patinated silcrete elongated flakes. A broken bored stone was found in the open vegetation on 10/05/11 but no associated artefacts were recorded (note that GPS tracks were not recorded on this survey). 10/05/11: EH, WF 11/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
KVK6	**Kransvleikloof 6:** The site is located on an open sandy clearing, directly to the south of and potentially continuous with **KVK5**, along the edge of the rock outcrop. There is a low overhang recessing into the rock outcrop which has a rocky ledge and an soily, humic deposit. The site database records handprint rock art and faded smudges although these were not observed in the survey. There were numerous pieces of highly weathered OES (although the nature and extent of weathering varied between pieces) and one ochred pottery fragment inside the overhang, together with a concentration of larger scree cobbles and stones in front of the overhang. Amongst these were large MSA artefacts, cores, grindstones and potential hammerstones. The site database also notes a complete bored stone, although this was not relocated. The assemblage on the sandy clearing contains flakes with faceted platforms and elongated flakes, with MSA flakes showing double patination through use and secondary retouch. This assemblage is of high density and predominantly composed of small flakes and debitage, mostly silcrete but hornfels and CCS were also relatively frequent. LSA formal tools included backed pieces (a trapezium and backed scraper), small very finely retouched end scrapers, and a large number of adzes, mostly in silcrete and CCS. There were also several pieces of utilised ochre. No pottery or OES was found on the clearing away from the overhang. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.
KVK7A	**Kransvleikloof 7A:** *(new site no.)* The area is one concentration of a roughly continuous scatter along the base of the rock band above the Kransvleikloof River. The scatter is on a tiered sandy terrace below a rock wall, with an upper and lower level separated by a low rock ledge. The artefacts are mostly silcrete, with some dark quartzite and small quartz, CCS and hornfels flakes and small flaking debitage. The only formal tools observed were several adzes. There is an MSA component represented by large flakes and elongated flake-blades with faceted platforms. The scatter continues along the terraces towards **KVK5**. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.
KVK8	**Kransvleikloof 8:** The site is on the rock band to the south of **KVK11** (and **KVK9**: the site database description identifies a small, overhang on the rock ledge with a few rock art images, marked by a fig tree in a crack in rock face. The site was not recognised in the survey). The database record for KVK8 notes a small, hidden overhang on the rock ledge with several handprints on the roof (although the handprints were not observed). There is a thin scatter of silcrete flakes on the terrace below, down a rocky slope with soily sediment. A bladelet core was found further round the rock band where it meets a gully from the east. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.

KVK8A	**Kransvleikloof 8A:** *(new site no.)* The area is further along the rock band from **KVK8**, where a gully meets the rock band and causes an indentation to east. There is a small cluster of mostly small silcrete flakes. There was also one large MSA elongated flake-blade and a broken large flake. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.
KVK10	**Kransvleikloof 10:** The site is the northernmost overhang along the rock band, above the Kransvleikloof River which joins the Olifants. The site is a fairly long overhang with a few ochre rock art streaks (according to the database record). There were a few undiagnostic flakes of hornfels, quartz and silcrete on the terrace below the overhang, down a rocky slope with soily sediments. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.
KVK10a	Only a few isolated artefacts were observed in quite extensive transects walked across the rocky platform away from the more prominent rock features. A large quartzite flake and a grooved quartz pebble were found on the open vegetated slope behind **KVK10** on the rock band. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.
KVK11	**Kransvleikloof 11:** The site is an overhang about 18m south of **KVK10**, with crayon lines and rock art figures on the roof, described on the database record. The only artefacts seen (a few metres further round the rock band) were two chunky irregular silcrete cores. 09/02/12: EH, WA, RB, CH Survey coverage: General survey, recording all artefact types.

RENBAAN	
RB1	**Renbaan 1: Renbaan Open** The site is a high, shallow-roofed overhang at base of a rock wall with an extended sandy, vegetated talus slope which gives way to a steep rocky cliff edge around 80 m downslope. There is currently a large beehive on the roof of the overhang (documented in the first site record in 1958). Previous records identify handprint rock art although this was not observed on two visits to the site. There is a widespread scatter down sandy talus slope of variable density, mainly composed of silcrete flakes and small debitage, with some larger MSA-like flakes (also radial cores and faceted platforms) towards the edge of the talus slope, just above cliff edge. Mackay et al. recorded two silcrete bifacial points (**Renbaan 4**) but these were not relocated, although Mackay's data is included in the dataset for the present study. The majority of the assemblage is likely to be early Holocene LSA given the low frequency of adzes and absence of pottery, with very few formal tools. A bored stone broken during the manufacturing process was found under the shelter. The shelter itself appears to contain very little deposit. 10/05/11: EH, WF 12/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
RB2	**Renbaan 2: Renbaan Cave** The site is an LSA bedding and ash site within a tunnel-like cave, excavated by Parkington et al. in 1979, detailed by Kaplan (1987). The cave is located at the top of a steep slope overlooking the kloof below, and is difficult to locate when approaching along the contour from the north west (access is probably easier from above the site directly to the north). LSA artefacts were present on the lower part of talus slope to south-east of the cave, just above the steep slope into the kloof which probably accounts for the general paucity of talus material. The cave currently contains a lot of microfaunal remains but few artefacts were noted on the surface and immediately in front of the site. *Note: the camera battery ran out so there are not photographic records for all artefacts.* 13/05/11: EH, WF Survey coverage: General survey, recording iconic artefacts only.
RB2a	Along the bottom of the kloof, from **Renbaan 1** towards **Renbaan 2** and **Renbaan 3**, there is a sandy clearing up the slope to the south, in front of a rock outcrop with an overhang. Thick vegetation in front of the rock outcrop restricted a close survey of the area, but several MSA-like flakes were located in the slopewash near the base of the kloof, which is likely due to the steep gradient of slope. The general absence of artefacts on the sandy clearing or sward in front of the rock outcrop was surprising, but downslope erosion cannot be ruled out. 12/02/12: EH, RB, CH, JM Survey coverage: General survey, recording all artefact types.
RB3	**Renbaan 3:** The site is a very low overhang at base of a rocky platform, next to a wide sandy gully which is a seasonal drainage channel. A flat, open sandy clearing in front of the overhang contains the greatest density of artefacts, giving way to a rocky platform which slopes gently towards the gully. There is very little material under the overhang itself except for several grindstones. The lithic assemblage is dominated by silcrete adzes, with some dark iron-rich quartzite (verging on ferricrete), quartz and CCS. A minor MSA component is present, with a radial core, flakes with faceted platforms and large flakes and elongated flake-blades (broken) in dark, iron-rich quartzite and silcrete showing greater patination than the LSA artefacts. Wiltshire's database record for the site also notes a broken bored stone although this was not relocated.

RB3 *contd.*	13/05/11: EH, WF. 12/02/12: EH, RB, CH, JM. Survey coverage: General survey, recording all artefact types.
RB3A	**Renbaan 3A:** *(new site no.)* The site is an overhang on a rock outcrop formed by a large boulder, further north along the wide sandy gully from **Renbaan 3**. There is a shallow recess under the overhang with rock art – two elongated lines, possibly figures. There are a few flakes in front, possibly washed down gully slope. 12/02/12: EH, RB, CH, JM. Survey coverage: General survey, recording all artefact types.
RB3B	**Renbaan 3B:** *(new site no.)* The site is an overhang on rock outcrop formed by a large boulder (with a tree in front), further north along the wide sandy gully from **Renbaan 3** and **3A**. There are lots of dry leaves under the overhang which obscure any artefacts that may be on the ground. A pottery fragment and a few flakes were observed. 12/02/12: EH, RB, CH, JM. Survey coverage: General survey, recording all artefact types.
RB4	**Renbaan 4: Still Bay points** [not relocated in current surveys] Two complete Still Bay-type bifacial points were recorded on the slope below **Renbaan 1** overhang by Mackay et al. One of the points is noted to have soft-hammer flaking. A minor MSA component to the assemblage below **Renbaan 1** was noted in February 2011 surveys of the area, although non-iconic artefacts were not recorded. [21/06/05: AM, JP, WA, NM]
RB5A	**Renbaan 5A:** The site is behind **Renbaan 3** at the base of the rocky platform, where there is a concentration of artefacts in front of the low rock wall which forms a partial courtyard. A thin scatter extends down into the vegetated area in front. It is possible that the artefacts are slopewash off the rocky platform, but the relative shelter of the location may also have made it a suitable primary site for activity. Flakes are silcrete and dark iron-rich quartzite or ferricrete. The material is mostly MSA, including radial cores and faceted platforms, with some smaller cores which could be LSA. There is an ochre smear on a smooth recess in the rock wall further east from the main concentration, also with a few artefacts in front. 31/03/12: EH, JM Survey coverage: General survey, recording all artefact types.
RB5B	**Renbaan 5B:** The rocky platform above **Renbaan 3** is covered by a thin flake scatter, with artefacts concentrated in the sand at its base. Flakes were clustered in eroded dips with sediment suggesting there has been slopewash, but there are no notable landscape features upslope to suggest a prior association for artefacts. Several flat sandy areas between rocky platform levels on the slope could be foci for activity rather than simply where artefacts have accumulated post-depositionally. There were some small LSA-like platform cores at the base of the slope; otherwise artefacts are MSA, with radial cores, faceted platforms and large quartzite and heavily patinated silcrete flakes. 31/03/12: EH, JM Survey coverage: General survey, recording all artefact types.

RB5C	**Renbaan 5C:** The site is a rock outcrop at the top of the slope, on a ridge between Renbaan (rocky platform) to the north east, and a gully down to Driehoek (cliffs) on the south west side. There was a ferricrete Levallois point found on the sand above the outcrop, with a few additional artefacts (possibly MSA but not diagnostic) on the sward and sandy slope below the outcrop on the Renbaan side. 31/03/12: EH, JM. Survey coverage: General survey, recording all artefact types.

PUTS	
PT1	**Puts 1: Finger painting** There is finger-painted and crayon-line rock art on a shallow overhang, on a sloping ledge on the rock wall above the northenmost gully. The recess is low down, almost at ground level. There are no artefacts in the gully, which likely experiences considerable seasonal water flow. 28/03/12: EH, KK, JM. Survey coverage: General survey.
PT2	**Puts 2: Tunnel shelter** The site is a tunnel-like shelter on a ledge on the northern rock wall of the gully. The shelter has a sloping rock floor with cobbly wash and roof spall, together with a small artefact assemblage. This includes a probable LSA and MSA component, with a bladelet and a radial core being the most indicative artefacts present. There were also some ochre pieces, including one with utilisation striations. Rock art in the shelter depicts a line of yellow figures wearing karosses on the outer (south) wall, and finger-painted lines which may be figures on the ceiling on the north side. 28/03/12: EH, KK JM Survey coverage: General survey, recording all artefact types.
PT2A	**Puts 2A: Hollow boulder** *(new site no.)* There is a rocky platform on the north side of the tunnel shelter, through the opening. A thin artefact scatter extends down the sloping rocky surface, with MSA-like flakes including a faceted platform. To the north of the rocky platform, there is an isolated boulder, hollow underneath, with several faded rock art images. 28/03/12: EH, KK JM Survey coverage: General survey, recording all artefact types.
PT2a	There is an ephemeral flake scatter in a sandy clearing between a rock outcrop and boulder, and the west end of the northernmost gully. These are mostly silcrete, but none of the artefacts are diagnostic. 28/03/12: EH, KK JM Survey coverage: General survey, recording all artefact types.
PT2B	**Puts 2B:** *(new site no.)* There is a thin but widespread scatter across the sloping rocky platform to the east, at the base of the rock outcrops and gullies. The scatter contains MSA artefacts, including flakes with faceted platforms and a preferential Levallois flake. The assemblage likely contains mixed MSA and LSA material, mostly in silcrete. A broken bored stone was found on the northern edge of the rocky area. 28/03/12: EH, KK JM Survey coverage: General survey, recording all artefact types.
PT3	**Puts 3: Two women** Fine-line rock art depicting two headless women, outside of a tunnel shelter in small triangular recess, on the north side of the gully from **PT6**. One woman is carrying a digging stick. Note that this motif is imitated at **PT4** in a later, cruder style. There are also several indeterminate figures and finger dots. Pottery is noted at the site in the database record but no artefacts were found in the survey. A single adze and radial core were noted nearby. 07/06/11: EH, CH 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.

PT4	**Puts 4: Main cave** Shelter with rock floor. Main cave. There are a number of very rich rock art panels in a variety of distinct styles. Motifs include male and female lines of figures carrying digging sticks and other sticks and bows, trance-related figures, and a crude imitation of the two women motif at **PT3**, in a style which depicts fingers on hands. The shelter forms a raised rocky ledge, with a rock floor and very few artefacts, but adjacent to this is a relatively deep but very low shelter extending back into the rock, containing a thin dusty deposit. Artefacts were found washed out in the sandy gully just below the shelter ledge, mainly silcrete flakes, and also an upper grindstone. 29/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT4A	**Puts 4A:** *(new site no.)* The site describes a general scatter on the slope between the edge of a rocky platform and a sandy gully. The LSA component included bladelet, single- and opposed- platform cores; MSA artefacts included radial cores and faceted platforms on flakes and an MRP. The small flake assemblage was mainly in silcrete, with some quartzite and local CCS. 28/03/12: EH, KK, JM 29/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT4a	There was a thin scattering of flakes recorded in a sandy rocky gully between rock outcrops. These were mostly silcrete, with one in dark quartzite, and one faceted platform. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT4B	**Puts 4B:** *(new site no.)* The site is a long, low (1 m high), shallow overhang underneath a rocky platform, further along the outcrop to the west from **PT4**. Artefacts were predominantly silcrete flakes, with one small radial core, an irregular core and a piece of ochre with no apparent signs of working. There were also two pieces of pottery found together in the open in the sandy clearing between **PT4** and **PT4B**. 29/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT5	**Puts 5:** The area is a relatively flat sward in front of a rock outcrop, at the base of the upper rocky platforms. The site database records the site **PT5** to be in this location, describing a shallow overhang on a rock ledge, with boulders along the front with indeterminate paintings. No shelter or rock art were identified here, but an extensive artefact scatter on the sward was recorded. This included a very large number of adzes – more than noted at any other site in the Puts area. Many adzes are double-sided and very narrow, indicating their discard very late in their use life. Several adzes are also on large scavenged MSA flakes, and there is also a high frequency of CCS adzes (more than at other sites). Other formal tools included a quartz backed piece, scrapers and MRPs. There were LSA bladelet and single platform cores, and also MSA radial cores and flakes with faceted platforms. A find of note was a small silcrete bifacial point found on the outer edge of the sward (possibly washed down off the rocky platform). Most artefacts were in silcrete, but there was some CCS, both from the local conglomerate and non-local types. There are a pebbles eroded from the conglomerate, and there are signs of slope wash, so some of the material, particularly on the fringes, may have been displaced from higher up the gully or rocky platform.

PT5 *contd.*	30/03/12: EH, KK, JM Survey coverage: Detailed coverage, recording iconic artefacts only.
PT5A	**Puts 5A:** *(new site no.)* The site is higher up the rocky platform to the east, at the base of the rock outcrops and gullies, east of **PT5**. The assemblage contains mostly silcrete flakes, also with a scraper, two faceted platforms and radial cores. There also other cores, including one in coarse ferricrete, and some retouched flakes. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT6	**Puts 6: Fingerdot lines** Rock art site on a raised ledge of the rocky platform, above the gully. The panel is under a low shallow recess in the rock wall, reached through a tunnel. The art is formed of multiple concentric and interweaving lines and patches of finger dots in several different colours, also several faded fine-line figures. There were no artefacts noted. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT6A	**Puts 6A:** *(new site no.)* There is a tunnel shelter through the rocky outcrop across the gully, north from the **PT6** rock art site. Below the shelter along the edge of the rock wall in the gully, there was a high density of pottery amongst cobbles, probably a lag deposit washed through the tunnel shelter. There were very few visible flakes but a number of pieces of ochre and OES. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT6a	Along the rock wall east of PT6, along a ledge, the rocky platform slopes down between a boulder and the rock wall, with an artefact scatter running down the slope. The slope ends in a shelter-like space underneath the rocky platform. The scatter contains highly patinated silcrete flakes, with evidence of mineralisation occurring in the run-off along the rocky platform surface. There is a small number of flakes, including one with a faceted platform, and utilised and unutilised ochre. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT6B	**Puts 6B:** *(new site no.)* The site is between a crack in the rocks along the gully, leading to very low shelter under the rocky platform. This continues back and opens out further along the gully into a larger cave. There is some faded rock art around the entrance, including faint red smears and a black figure with a kaross and white face. There is a small artefact assemblage in the crack between the rocks, including silcrete flakes, ochre and an unusual large polished CCS cobble grindstone. This highly polished black material is seen at another site in the Puts area but has not been noted elsewhere in the Olifants survey area. The scatter continues in the gully below, along the rock ledge and the rocky platform by the boulders. The substantial but diffuse assemblage contains adzes, scrapers, bipolar and single-platform cores, faceted platform flakes, and ochre including one utilised piece. Most of the artefacts are silcrete, with occasional quartz, local CCS and hornfels. 29/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.

PT7	**Puts 7: Bowmen with arrows** Rock art on a rock wall next to a low shelter, above a raised rocky ledge along the gully. The panel depicts figures carrying bows next to parallel lines of arrows, in quite a thick fine-line style. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT7A	**Puts 7A:** *(new site no.)* Rock art site on a rock wall with a low overhang and rock ledge above the gully. The art depicts red figures and faint arrow-like lines. 28/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT9	**Puts 9:** *(new site no.)* The area is very rocky, generally forming semi-enclosed courtyards in between large free-standing boulder outcrops. The courtyards are currently quite overgrown with scrubby vegetation and orange sand. Artefacts include elongated flakes, some with blade or bladelet scars, faceted platforms, and flakes with radial dorsal scar patterns. The assemblage is mostly silcrete, of varying types, with a few quartzite and quartz flakes. 29/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.
PT9A	**Puts 9A:** *(new site no.)* The artefact scatter is in a courtyard formed between boulder outcrops. The assemblage contains a number of notched and denticulated large MSA-like flakes, as well as elongated pieces. Artefacts are mostly silcrete, with a few dark quartzite flakes, and one large crudely flaked dark purple cobble core. There is also a small radially flaked bladelet core on a piece of green CCS from the local conglomerate, still retaining some dark red cortex. Other core types include single-platform bladelet cores and radial cores in silcrete. One boulder outcrop forms a small overhang, with two cores underneath. 29/03/12: EH, KK, JM Survey coverage: General survey, recording all artefact types.

WARMHOEK	
WH5	**Warmhoek 5: "Procession Shelter"** The site focus is a prominent large boulder with a tunnel-like shelter, on the rocky platform near the Jan Dissels river (opposite the weir, on the southern bank). The rock art consists of a procession scene on underside of main boulder with an isolated figure round back of boulder on the outside. Most of the artefacts around the shelter were collected by a UCT field school in 2003 (Parkington pers. comm. 2011). Artefacts labelled 'Procession Shelter'/'PS' were located in the UCT stores but it has not been possible to reconcile the numbered artefact bags with the numbered GPS points in the field-notes without further information. A short survey identified a small number of adzes, flakes, debitage, pottery fragments and utilised ochre close to the shelter, but more artefacts, including backed bladelets, were found down the sloping rocky platform towards the Jan Dissels. Artefacts were mostly LSA but there were several larger quartzite MSA-like flakes and cores, particularly when approaching the site from the south east. 20/06/11: EH, RB, CH, RL, JEP, LS Survey coverage: General survey, recording iconic and retouched artefacts only, although most artefacts removed by a UCT collection.
WH5a	An ephemeral flake scatter on the sandy slope, to the east of **WH5**. No diagnostic pieces but large flakes of dark quartzite and silcrete are more suggestive of MSA than recent LSA. Further upslope, there is a low density scatter in the drip-line of a low, raised overhang on a rocky outcrop; possibly LSA with small retouched hornfels and quartz flakes. 03/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH5A	**Warmhoek 5A:** *(new site no.)* Upslope from **WH5**, surface artefacts increase in density. There is a possible focus to the scatter at a rock outcrop on the slope, but artefacts seem primarily to cover the sandy vegetated slope with no apparent association with a rock shelter or other prominent feature. The slope is moderately steep so the effect of some slopewash can be expected. The material is generally MSA in character, with radial cores, flakes with faceted platforms and large patinated silcrete flakes. The large quantities of broken flakes and small debitage means that assigning a time period to most of the assemblage difficult. Results from this survey concur with Conder's (2005) survey which recorded a high density of MSA material in this location (named 'olive tree gully'). *Note: Data from Conder's survey which extends to the north were included as **WH OT**.* 08/02/12: EH, RB, CH, KK, JM Survey coverage: Detailed survey, recording all artefact types.
WH5b	An ephemeral, undiagnostic silcrete flake scatter on the rocky platform upslope between **WH5A** and **WH5B**. 03/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH5B	**Warmhoek 5B:** *(new site no.)* There is an extensive artefact scatter on the raised rocky platform below a large, high rock outcrop. The artefacts are mostly silcrete which is heavily patinated or mineralised, with a white greasy-looking residue and yellowing, particularly at the edges. One flake was made of an unidentified black, glassy raw material. Radial cores, faceted platforms, large flakes and an absence of any LSA formal tools suggest an MSA affinity. There is a fairly large, open overhang on the main rocky outcrop but it is relatively exposed and

WH5B *contd.*	contains no artefacts which are likely to have been washed out and contribute to the scatter on the rocky platform below. This area is also recorded in Conder's (2005) survey as 'Euryops Shelter'. 08/02/12: EH, RB, CH, KK, JM Survey coverage: General survey, recording all artefact types.
WH5c	An isolated pottery fragment between **WH5** and **WH6,** in the sand along the Jan Dissels river channel. 03/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH7	**Warmhoek 7: "Sheep Shelter"** *(also Warmhoek G on database)* The site is a shelter on the north-eastern side of the main rock outcrop at the top of the slope, with rock art of post-Colonial age depicting sheep. The artefact scatter below the shelter is mostly flakes and small debitage, but not as dense as might be expected, perhaps due to the slope. Very few formal tools were identified; Conder (2005) mapped a thumbnail scraper, adze and pottery in the general flake scatter. The site database record notes that there is a background MSA component to the general LSA scatter in the area. 31/01/12: EH, RB, JM [2005: AC, JEP] Survey coverage: General survey, recording all artefact types. Data from a detailed survey by Conder were also included.
WH7A	**Warmhoek 7A: Slope below Sheep Shelter** *(new site no.)* There is a thin, continuous flake scatter across the broken rocky platform next to path that leads upslope to the rocky outcrop with **WH7** and **WH10**. The ground surface has small flat patches of exposed TMS on a sandy slope (not an extensive open rocky platform area), with thick scrub vegetation and cobbly scree. The survey mapped artefacts at three intervals up the slope. No iconic tools were identified, but the large size of heavily patinated silcrete flakes (although many are broken), the presence of elongated flake-blades and dark quartzite flake with faceted platforms would suggest a possible MSA association. Two silcrete flakes had what appear to be deliberate burin spall removals. 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types
WH8 .	**Warmhoek 8:** *(also Warmhoek H on database)* There is a series of three adjacent shelters: the first shelter, to the left of the tree, has some deposit, the middle shelter contains rock art and some deposit, and the end shelter has no rock art but some ashy deposit (from the site database). There is a dense artefact scatter extending across a gently sloping clearing in front of shelters, becoming steeper above the stream gully to the north. The survey focused mainly on the clearing but also included some of the upper ledges of the slope above the gully. The assemblage is mostly a typical LSA shelter scatter, with adzes, thumbnail scrapers, backed pieces), but there are also two silcrete unifacial points, radial cores and faceted platforms which are suggestive of the later MSA, and there are other MSA sites within view. There are numerous pieces of ground ochre, found in the shelters, and OES fragments and thin pottery. The area was mapped in detail by a UCT fieldschool and Conder (2005). *Note: Data from Conder were included for parts of the area not covered in surveys, mapped as* ***WH AL****.* 20/06/11: EH, RB, CH, RL, JEP, LS

WH8 *contd.*	[2005: AC, JEP] Survey coverage: Detailed survey, recording all iconic and retouched artefacts only.
WH8a	An open sandy clearing or sward above **WH8** with a thin scatter containing MSA features. 01/02/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH8b	Area to the west of **WH8** with an ephemeral undiagnostic silcrete flake scatter. 01/02/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH9	**Warmhoek 9:** *(also Warmhoek I on database)* The area is about 250 m down the sandy slope to the north west of the main rock outcrop (with **WH7** and **WH10**). There is an MSA scatter across the gently sloping rocky platform, next to a rock outcrop formed of boulders. Artefacts are concentrated particularly in the sandy slopewash t the base of the rocky platform, but there is no obvious source above the rocky platform itself. The flakes are large and highly patinated, many broken, and there is a large irregular core. Conder's (2005) survey also recorded an MSA flake scatter on the rocky platform, identifying radial cores. 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH9a	An isolated elongated, retouched silcrete flake, found below the **WH9** rocky platform. 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH10	**Warmhoek 10: "Candle Cave"** *(also Warmhoek J on database)* The site is about 10 m west of **WH7**, in a shelter inside the rocky outrcrop, with a passage leading through the rock to the east. There is handprint rock art, but no visible artefacts. The site database record notes that there is a general scatter of MSA all along the ridge. 31/01/12: EH, RB, JM Survey coverage: General survey.
WH10A	**Warmhoek 10A: Thunderstorm shelter** *(new site no.)* The shelter is about 10 m further west from **WH10**, around the side of the main rock outcrop. There is a small collection of artefacts in the shelter, amongst lots of roof spall. Nothing is clearly diagnostic but there are large flakes, some with parallel dorsal scars and heavy patination, which would suggest MSA. Condor's (2005) survey recorded an undiagnostic flake scatter down the slope to the north east, with one adze at the top of the slope. These may be associated with the shelter. *Note: Data from Conder is mapped as **WH AG**.* 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH10B	**Warmhoek 10B: New rock art figure** *(new site no.)* The site is in a deep shelter, to the south west around the rock outcrop form **WH10A**. There is a faded rock art figure and crayon lines further along the wall. The only artefact was a hornfels flake. 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.

WH10a	Isolated flakes on open sandy talus, suggesting a thin ephemeral scatter across the area. 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH11	**Warmhoek 11: "Handprint shelter"** *(also Warmhoek K on database)* The site was not included in current surveys but artefacts were recorded by Conder (2005). The site database record describes a small boulder with a sloping roof overhang. The floor beneath the overhang is sandy and water washed, and a sandy slope outside leads down to the stream. There is a moderate scatter on the slope around the overhang, mostly silcrete but also hornfels, CCS and quartz. Adzes and pottery indicate the later part of the LSA. [2005: AC, JEP]
WH12	**Warmhoek 12:** *(also Warmhoek L on database)* The site is on a rock outcrop with two adjacent shelters, along the ridge to the south east of **WH8**. The larger shelter has rock art; the smaller shelter on the north east side has ashy deposit. The area is now overgrown with bushes in front of the shelters; therefore survey data collected by Conder (2005) were used for the site. The large open sward in front of the shelters has a dense artefact scatter, extending down the slope (becoming **WH12A**). Artefacts are LSA, with adzes, pottery and an OES bead and 'copper object' recorded on the database. There are also several MSA-like elongated flake-blades present. *Note: the mapped data around shelter and sward are from Condor's survey.* 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types. Data from a detailed survey by Conder were also included.
WH12A	**Warmhoek 12A:** The area is a sandy slope below the sward at **WH12**. There is a flake scatter which is likely to be mixed LSA and MSA, but there were no formal tools noted. The most diagnostic indication comes from MSA faceted platforms and large elongated flake-blades with a heavier patination. 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH12B	**Warmhoek 12B: Rock outcrop by fig tree** *(new site no.)* There is a rock outcrop between the outcrops with shelters **WH8** and **WH12**, although there is no shelter in this case. There were no artefacts found by the rock outcrop but there was a flake scatter directly below, further down the slope. The rock outcrop is a likely focus and source of slopewash (although the slope has a very shallow gradient). The area is open sand with moderate low vegetation cover. There were no iconic artefacts but large flakes and blades and faceted platforms suggest MSA. 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH13	**Warmhoek 13:** *(also Warmhoek M on database)* The site is a small rock outcrop with a fig tree and bushy screen in front, south east along the ridge from **WH12**. There is a small sward and sloping sandy area in front of the outcrop, with an ephemeral flake scatter. The only formal tools recorded were adzes. 02/02/12: EH, RB, KK, JM [2005: AC, JEP] Survey coverage: General survey, recording all artefact types.

WH13a	An ephemeral scatter on the slope to the east of **WH13**, towards **WH14**, probably MSA. 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH13b	There is an ephemeral scatter lower down the ridge (towards the gully), below **WH13**. This includes several large split quartzite cobbles and MSA flakes, in a continuation of the scatter downslope from **WH14**. 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH14	**Warmhoek 14: "Honeymoon suite"** *(also Warmhoek N on database)* The site is a rock outcrop along the ridge from **WH12** and upslope to the east of **WH13** (opposite **WH21** and the high cliffs on the other side of kloof). There is a rock wall with a high, shallow overhang at a right angle, with a porcupine lair in a small hole at back of shelter. The database record notes that there is faded rock art on the wall, although this was not observed in the survey. The level sandy sward in front of the overhang has a scatter of moderate density, mostly small silcrete flakes but some hornfels and CCS, and the only formal tools were several adzes. The sward breaks into a relatively steep talus slope, with broken patches of rock exposure. The MSA component increases further down the slope, with clusters of large flakes and elongated flake-blades with faceted platforms, and radial cores. 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH14a	The artefact scatter continues below **WH14**, down the sandy slope with broken rocky platform patches. Artefacts are mostly identified as MSA flakes. 02/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH19	**Warmhoek 19:** The site is at the top of the koppie, with large rock outcrops along either side. A scatter extends down a wide sandy slope, mostly comprised of silcrete, but also with other materials. Quartz and CCS conglomerate pebbles of flakeable size occur in the sand in the area. The assemblage contains a mixture of MSA and LSA silcrete flakes displaying varied levels of patination. The only diagnostic artefacts were MSA flakes with faceted platforms. The absence of LSA formal tools may be due to there being no rock shelters on the rocky outcrops. 03/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH19a	An isolated retouched flake on the far east side of the koppie. The survey path crossed the open veld with no landscape features, and this was the only flake encountered. 03/02/12: EH, RB, KK, JM Survey coverage: General survey, recording all artefact types.
WH20	**Warmhoek 20:** *(new site no.)* The area is a courtyard enclosed on three sides by boulder outcrops, with no shelters but some low, shallow overhangs. The enclosed area is relatively flat, giving way to a gentle slope at the northern end. There is no thick vegetation, with soily sediment (not sand) that has probably sedimented over more artefacts. The flake scatter across the courtyard is thin, but iconic tools include a quartz bipolar core, adzes and bladelet (LSA), and two faceted platform flakes (MSA). 01/02/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.

WH20a	A single broken flake was found below a rock wall, on a rock outcrop with a fig tree. 01/02/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH20b	An open area with no associated landscape features on the sandy vegetated slope. There were a few MSA flakes (one faceted platform) and a piece of ground ochre – an unusual find location for utilised ochre. 01/02/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH21	**Warmhoek 21:** *(new site no.)* The site is on a high rocky platform at the top of a ridge. There is quartzite cobble scree and a light covering of sand in patches on the platform, with high vegetation around the edge to the north. There was no potential source for the material higher up the rocky platform, which slopes gently in a northerly direction. There are some protruding rock formations, but no shelters or alternative landscape foci, besides the rocky platform itself. The assemblage is MSA, with no LSA. Flakes are of silcrete and dark quartzite, including large flakes with faceted platforms, radial cores, irregular cores and elongated flake-blades. 01/02/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.
WH	Two isolated flakes in the bottom of a seasonal stream. One flake has a faceted platform. The context is disturbed. 31/01/12: EH, RB, JM Survey coverage: General survey, recording all artefact types.

SUPPELEMENTARY SURVEY AREAS	
AUGSBURG	**Augsburg:** The area is farmed by the agricultural school so only small areas can be considered to be relatively undisturbed, the rest being planted with crops. One segment of unfarmed field was open sand with low vegetation. Towards the north-eastern end of the field, there were patches of small gravelly material, including quartzite flakes. This is situated in the course of seasonal drainage gullies so the smaller, lighter elements are likely to have been affected by water washing. Conversely, the larger artefacts are concentrated towards the south-western end of the field, where there are large bifacial cores, choppers, discoidal and radial cores, and a handaxe. The assemblage is strongly ESA, and marks an additional ESA assemblage in a floodplain setting – as is the case for the Olifants River. In the open sandy area, covered with scrubby vegetation, a thin presence of artefacts was recorded along the transect surveyed. These were mostly undiagnostic silcrete and quartzite flakes, but there were some faceted platforms to indicate MSA. Towards the Jan Dissels river, the density of small silcrete flakes and debitage increased, clustered in sandy patches just above the river. A single bifacial point was an isolated find to the east of the Augsburg area. It was found next to an overgrown stream, in an open area with thick vegetation and sandstone rocks. No other artefacts were found, although the survey of this area was not extensive. An end scraper and radial core were isolated finds on the south-western side of the shale koppie, identified during ochre sourcing surveys which walked transects up the slope. 19/04/11: EH 08/06/11: EH, CH 21/06/11: EH, JM 26/05/12: EH, JM 17/08/12: EH, JS, JvD, JW 18/08/12: EH, JvD, JW Survey coverage: General survey, recording all artefact types.
RIETVLEI	**Rietvlei:** The area is a series of sand deflation bays, located north of Clanwilliam to the west of the N7. Parkington and Manhire sampled some of these in the 1970s. The first deflation bay (nearest the road) contained adzes, but there were no adzes found in further bays containing artefacts. In the first and second bays, there were large chunks of very weathered sand-blasted ochre, with utilisation striations. The furthest bay to be surveyed (third away from road) contained thousands of artefacts, including lots of small pieces of debitage. The main raw materials were CCS – of many different types, derived from the Karoo rocks likely carried by the Doring – crystal quartz and silcrete. There was very little quartzite but a few chunky cores and flakes could be suggestive of the MSA. Other artefacts are clearly LSA, with a high number of small thumbnail scrapers and backed pieces. The differential presence of adzes is suggestive of an early and late Holocene division of site use. There are some unusual raw materials not seen at other sites in the Clanwilliam Dam area, probably brought in by the confluence with the Doring, resembling the range of materials seen at Putslaagte 1, a surface scatter on the Doring (M. Shaw pers. comm. 2013; pers. obs). 21/06/11: EH, CH, RB, LS, RL, JP 15/06/12: EH, JS, JW Survey coverage: General survey, recording only iconic and retouched artefacts.

DWR7	**Dwarsrivier 7:** The site is one in a series of deflation bays on the east side of the Jan Dissels, south east of Augsburg and east of Warmhoek. The site database record by Manhire described an MSA assemblage – unusual since typical deflation assemblages are LSA. The survey found only one bay with a thin scatter of artefacts, mostly LSA-looking pieces. The most diagnostic were two pièce esquilleés, upper and possible lower grindstones. There was a lot of quartz and pieces of abraded ochre. 15/06/12: EH, JS, JW Survey coverage: Detailed survey, recording all artefact types.
DAM27	**Dam West 27:** The focus to the site is a rocky outcrop with a shallow overhang and a relatively flat sandy area in front. There are small boulders on the clearing, which extends down to river. The site database recorded ESA, MSA and LSA artefacts, but no ESA was recorded, even next to the river, and the scatter is generally very thin. Most of the flakes are undiagnostic, in quartzite, silcrete and quartz. There are adzes and a rim fragment of thin pottery clustered around a boulder in front of the shelter. Other tools include a quartz backed scraper and thumbnail scraper found together, further away from the outcrop towards the river. There is some faded rock art on the rock wall of the outcrop. 13/06/11: EH, RB, SB, CH, RL, LS. Survey coverage: General survey, recording iconic artefacts only.
KR9	**Kriedouwkrantz 9:** The site is a large cave on the eastern back of the Olifants, clearly visible from the western bank but easily missed when approaching from the top of the outcrop. The cave is located around 30 m above the river, with a large tree to the right. The deposit in the cave is disturbed with recent faunal remains, but GPR indicates that there is considerable depth of deposit (A. Mackay pers. comm. 2012). Artefacts inside the shelter are mostly flakes and many are broken. They are mainly made of silcrete with some quartzite, quartz, CCS and hornfels. The walls of the cave have numerous rock art panels, though some are quite faded. There is an extensive scatter down the talus slope in front of the cave, including large quartzite flakes and cores which could be early MSA. A range of different quartzites are used, some are the typical Olifants River quartzite cobbles seen along the Dam edge but there are additional types present. The distal portion of a silcrete bifacial point was also found on talus slope, indicating a later MSA Still Bay presence. There are also small MRPs and bladelets on the talus, indicative of the LSA and likely to have been washed out of the cave. 13/05/11: EH, CH, RB, RL, LS, SB 15/0612: EH, JS, JW Survey coverage: General survey, recording all artefact types.

Appendix 2. Artefact and raw material frequencies at surveyed sites

SITE NO.	ARTEFACT	RAW MATERIAL							TOTAL LITHICS	OTHER MATERIAL		
		Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other		Pottery	Ochre	OES
CLANWILLIAM DAM EAST												
RAMSKOP	Adze				9	1	2		**12**			
	Scraper (thumbnail)				1				**1**			
	Unifacial point				1				**1**			
	Core (bladelet)				2				**2**			
	Core (radial)		1		6				**7**			
	Core (single platform)				4				**4**			
	Flake (faceted platform)	2			6				**8**			
	MRP (faceted platform)				1				**1**			
	Flake (Levallois point)	1							**1**			
	Core	1			10				**11**			
	Chunk				9		1		**10**			
	Flake	5		4	305	5	7	4	**330**			
	Bladelet				1				**1**			
	Flake (notched)				2				**2**			
	Pièce esquillée						1		**1**			
	MRP				2			2	**4**			
	Ochre (utilised)										1	
	Ochre										7	
DAME1	Core (radial)				2				**2**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				3				**3**			
	Chunk				4				**4**			
	Flake	1			8				**9**			
	Blade (notched)				1				**1**			
DAME1a	Flake (faceted platform)				2				**2**			
DAME1b	Handaxe	1							**1**			
	Core	1			1				**2**			
DAME2	Handaxe	1							**1**			
	Core (radial)				2				**2**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				5				**5**			
	Blade (faceted platform)				1				**1**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
DAME2 *contd.*	Core	1			1				**2**			
	Chunk	1			6				**7**			
	Flake	2			12				**14**			
DAME5	Adze				1				**1**			
	Bifacial point				1				**1**			
DAME8	Adze				7	1	3		**11**			
	Backed bladelet				2				**2**			
	Scraper (backed)				1				**1**			
	Scraper (end)				1				**1**			
	Scraper (side)				3		1		**4**			
	Scraper (thumbnail)						1		**1**			
	Core (bipolar bladelet)					1			**1**			
	Core (radial)				1				**1**			
	Core (single platform)	1			1				**2**			
	Core				2				**2**			
	Flake	1							**1**			
	Blade		1						**1**			
	OES											1
DAME8a	Handaxe	1							**1**			
	Core (radial)	1			2				**3**			
	Core	1							**1**			
DAME8A	Bifacial point				11		1		**12**			
	Unifacial point				5				**5**			
	Handaxe	2							**2**			
	Scraper (side)				3				**3**			
	Core (bladelet)				1				**1**			
	Core (radial)	2			2				**4**			
	Flake (faceted platform)	1			1				**2**			
	Core	1			1				**2**			
	Core (chopper)	1							**1**			
	MRP				8		1		**9**			
	Bored stone							1				
DAME11	Handaxe	2			1				**3**			
	Cleaver	1							**1**			
	Core (bladelet)				1				**1**			
	Core (radial)	1			5				**6**			
	MRP (faceted platform)				1				**1**			
	Flake (faceted platform)				4				**4**			
	Core	1			4				**5**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAME11 *contd.*	Chunk	1							**1**			
	Flake	2			4				**6**			
	Blade				1				**1**			
	Flake (notched)				2				**2**			
	MRP				3				**3**			
DAME13	Adze				1				**1**			
	Scraper (side)				1				**1**			
	Scraper (thumbnail)				1				**1**			
	Core (radial)	2			5				**7**			
	Flake (faceted platform)				3				**3**			
	Core	3		1	3				**7**			
	Flake	3		1	18				**22**			
	Blade	2							**2**			
	Flake (notched)				2				**2**			
	MRP				3		1		**4**			
DAME13A	Handaxe	2							**2**			
	Core (radial)	1			1				**2**			
	Core (single platform)	1							**1**			
	Flake (faceted platform)				1				**1**			
	Core	10			1				**11**			
	Core (chopper)	8							**8**			
	Flake	18			12				**30**			
	Flake (notched)				1				**1**			
	MRP							1	**1**			
DAME13a	Core	2							**2**			
DAME13B	Unifacial point				1				**1**			
	Scraper (side)	2			4				**6**			
	Scraper (thumbnail)				2				**2**			
	Core (radial)	2			3				**5**			
	Flake (Levallois point)	1							**1**			
	Flake (faceted platform)				5	1			**6**			
	Core	10			1				**11**			
	Flake	7		1	12				**20**			
	Blade	3			10		1		**14**			
	Flake (notched)	1			2				**3**			
	MRP				3		1		**4**			
	Bored stone							1				
DAME13b	Core				1				**1**			
	Flake				1				**1**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAME15	Handaxe	5			1				**6**			
	Core	24			1				**25**			
	Core (chopper)	38							**38**			
	Flake	20			3				**23**			
	Flake (notched)	1							**1**			
DAME16	Core (radial)				1				**1**			
	Flake (faceted platform)	1			1				**2**			
	Core	10							**10**			
	Chunk				2				**2**			
	Flake	5			2				**7**			
	Flake (notched)				1				**1**			
	Ochre										1	
DAME16A	Adze				1				**1**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				1				**1**			
	Chunk	3							**3**			
	Flake	2	1	2	22	4	3	1	**35**			
	Blade (notched)				2				**2**			
	MRP				1				**1**			
	Pottery									14		
DAME16a	Flake (faceted platform)				1				**1**			
	Core	3							**3**			
DAME16B	Handaxe	1							**1**			
	Scraper (end)				1				**1**			
	Scraper (side)				1				**1**			
	Core (single platform)				1				**1**			
	MRP (faceted platform)				1				**1**			
	Core	2		1	1				**4**			
	Chunk	1			18	3	1		**23**			
	Flake	3		4	37	3			**47**			
	Blade				1				**1**			
	MRP				3				**3**			
	Pottery									3		
DAME16b	Handaxe	1							**1**			
	Core	9							**9**			
	Flake	1			1				**2**			
DAME16c	Core	3							**3**			
	Flake	4							**4**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAME17	Handaxe	26							**26**			
	Core	51			3				**54**			
	Flake	7			2				**9**			
DAME17A	Handaxe	1							**1**			
	Core	17			1				**18**			
	Flake	6							**6**			
DAME17a	Core	5							**5**			
	Flake	1							**1**			
DAME18	Core	24							**24**			
	Flake	6							**6**			
DAME18A	Handaxe	1							**1**			
	Core	45							**45**			
	Flake	5							**5**			
DAME19	Core	35							**35**			
	Flake	2							**2**			
DAME19a	Flake				1				**1**			
DAME20	Handaxe	3							**3**			
	Core (radial)	2							**2**			
	Flake (faceted platform)	3			2				**5**			
	Blade (faceted platform)	1							**1**			
	Core	23							**23**			
	Chunk				3				**3**			
	Flake	40			10			1	**51**			
	Blade	1							**1**			
	Pottery									6		
DAME20A	Handaxe	4							**4**			
	Core	260							**260**			
	Core (biface)	1							**1**			
	Chunk				1				**1**			
	Flake	13			4				**17**			
DAME20a	Flake	1			1				**2**			
DAME25	Adze				2	1			**3**			
	Scraper (side)					1			**1**			
	Flake (notched)	1							**1**			
	Ochre										1	
DAME25A	Flake (notched)				1				**1**			
	Flake				2				**2**			
	Blade				1				**1**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAME26	Adze				5	1	2		**8**			
	Scraper (end)						1		**1**			
	Scraper (side)				2				**2**			
	Scraper (thumbnail)				1				**1**			
	Pièce esquillée				1				**1**			
	MRP				2				**2**			
	Pottery									3		
	Ochre										1	
	OES											1
DAME26A	Scraper (thumbnail)				1				**1**			
	Core				1				**1**			
	Flake				14				**14**			
	Pottery									1		
DAME26B	Adze				14	2			**16**			
	Backed piece				1				**1**			
	Pottery									3		
	OES											2

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
CLANWILLIAM DAM WEST												
DAM1a	Handaxe	1							**1**			
	Flake (faceted platform)				1				**1**			
	Flake	1							**1**			
	Blade	1							**1**			
DAM5	Core (radial)				1				**1**			
	Flake (faceted platform)	2			5				**7**			
	Core		1						**1**			
	Flake	9	7	2	41			1	**60**			
	Blade	1			3				**4**			
	Pièce esquillée					1			**1**			
	MRP								**1**			
	Pottery									3		
	Ochre										1	
DAM5A	Adze				10		1		**11**			
	Scraper (thumbnail)				1				**1**			
	Core (single platform)				2				**2**			
	Flake (faceted platform)	1			1				**2**			
	Core				1				**1**			
	Chunk				2				**2**			
	Flake	1	2	2	72	4			**81**			
DAM6	Core (radial)				1				**1**			
	Core	1							**1**			
	Chunk				1				**1**			
	Flake	1			14				**15**			
DAM6A	Core (bladelet)				1				**1**			
	Core (radial)				2				**2**			
	Flake (faceted platform)	1			4				**5**			
	Core				4				**4**			
	Flake	3			57				**60**			
	Blade				3				**3**			
	Ochre (utilised)										1	
DAM7	Handaxe	3							**3**			
	Scraper (end)				2				**2**			
	Scraper (side)				2				**2**			
	Core (radial)	2	1						**3**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)	1			9				**10**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAM7 *contd.*	Core	25	2	1	4				**32**			
	Core (biface)	5	1						**6**			
	Chunk	2			9				**11**			
	Flake	45	1	3	41				**90**			
	Blade	1			3				**4**			
	Flake (notched)				2				**2**			
	MRP						1		**1**			
	Grooved stone			1								
DAM7a	Flake (faceted platform)				1				**1**			
	Flake	1			1				**2**			
	Flake (notched)				1				**1**			
DAM7b	Core		1						**1**			
	Chunk		6						**6**			
	Flake		1						**1**			
DAM8	Handaxe		1						**1**			
	Core (radial)		1						**1**			
	Flake (Levallois point)		1						**1**			
	Flake (faceted platform)		2						**2**			
	Blade		2		1				**3**			
	MRP	1	5				1		**6**			
DAM8A	Scraper (end)				2				**2**			
	Core (radial)				2				**2**			
	Core			2	2				**4**			
	Chunk				3				**3**			
	Flake			2	5				**7**			
DAM8a	Handaxe	1							**1**			
	MRP				1				**1**			
DAM10	Scraper (backed)				1				**1**			
	Scraper (end)				3		1		**4**			
	Scraper (side)				1				**1**			
	Scraper (thumbnail)			1	2		1		**4**			
	Core (single platform)	1							**1**			
	Core		1		1	3			**5**			
	Flake	1		2	25	1	1		**30**			
	Grindstone	2										
DAM10a	Core	6	1						**7**			
	Flake	2							**2**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
DAM11	Adze				6		1		**7**			
	Scraper (thumbnail)				1				**1**			
	Core	1			1		1		**3**			
	Chunk				1				**1**			
	Flake			1	16	1	2		**20**			
	Flake (notched)				1				**1**			
	MRP				3				**3**			
	Pottery									1		
	Ochre (utilised)										1	
	Ochre										4	
	OES											1
	Grindstone	1										
DAM12	Handaxe	40							**40**			
	Cleaver	4							**4**			
	Bifacial point	1							**1**			
	Core (radial)	10							**10**			
	Flake (faceted platform)				1				**1**			
	Core	74			2	1			**77**			
	Core (chopper)	27							**27**			
	Flake	19			6				**25**			
	Flake (notched)				1				**1**			
	Hammerstone	6							**6**			
DAM13	Handaxe	1							**1**			
	Core	10							**10**			
DAM13A	Core	14							**14**			
	Flake	1							**1**			
DAM14	Handaxe	4							**4**			
	Cleaver	1							**1**			
	Core (radial)	1							**1**			
	Flake (faceted platform)	1							**1**			
	Core	45							**45**			
	Chunk				1				**1**			
	Flake	7			4	1			**12**			
	Blade				1				**1**			
DAM15	Adze				1		1		**2**			
	Core (single platform)						1		**1**			
	Flake	1			1				**2**			
	Pottery								**1**	1		

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAM16	Handaxe	1							**1**			
	Core	108							**108**			
DAM17	Core	116							**116**			
	Flake	3							**3**			
DAM17A	Handaxe	6							**6**			
	Core	66							**66**			
	Flake	11			1				**12**			
	MRP				1				**1**			
DAM18a	Flake	1			1				**2**			
DAM19	Core	9							**9**			
DAM19A	Handaxe	1							**1**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				6		1		**7**			
	Core	2			1				**3**			
	Flake	10		1	17				**28**			
	Blade	1			1				**2**			
	MRP				4	1			**5**			
	Pottery									10		
	Ochre										2	
DAM20	Adze				4				**4**			
	Scraper (thumbnail)						1		**1**			
	MRP (faceted platform)				1				**1**			
	Core				2				**2**			
	Flake	1		1	1		3		**6**			
	MRP				3				**3**			
	Ochre										2	
DAM20A	Handaxe	2							**2**			
	Core (single platform)						1		**1**			
	Core	51							**51**			
	Chunk				1				**1**			
	Flake	14		1	3				**18**			
DAM21A	Adze				1				**1**			
	Core	11			1				**12**			
	Chunk				2				**2**			
	Flake	8			12				**20**			
	Blade				1				**1**			
	MRP				1				**1**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAM21B	Flake (faceted platform)	3							**3**			
	Core	13							**13**			
	Flake	15			3	1			**19**			
DAM21C	Flake (faceted platform)	2			2				**4**			
	Core	50			3				**53**			
	Chunk				1				**1**			
	Flake	24	1		17		1		**43**			
	Blade				1				**1**			
	MRP	1			3				**4**			
	Pottery									1		

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
ANDRIESGROND												
AG1	Adze				9		1		**10**			
	Scraper (end)				1				**1**			
	Scraper (thumbnail)				1				**1**			
	Flake	3			26	4	5		**38**			
	MRP				1				**1**			
	Pottery									15		
	Ochre (utilised)										2	
	OES											2
	OES bead											1
AG1A	Handaxe		1						**1**			
	Core (bipolar bladelet)				1				**1**			
	Core (radial)				7				**7**			
	Core (single platform)				3				**3**			
	Flake (Levallois point)				1				**1**			
	Flake (faceted platform)	5			26				**31**			
	Core	7			41				**48**			
	Chunk	1			13				**14**			
	Flake	56		2	531		3	1	**593**			
	Blade	2			23				**25**			
	Bladelet				1				**1**			
	MRP				2				**2**			
	Pottery									1		
AG2A	Scraper (side)				2				**2**			
	Scraper (thumbnail)				1				**1**			
	Core (bipolar bladelet)				1				**1**			
	Core (radial)				2				**2**			
	Flake (faceted platform)				3				**3**			
	Core				1				**1**			
	Flake				3				**3**			
	Flake (notched)				1				**1**			
	MRP			1	2	1	2		**6**			
AG3A	Adze				3				**3**			
	Bifacial point				3				**3**			
	Unifacial point				5				**5**			
	Scraper (thumbnail)				1				**1**			
	Core (radial)		1		4				**5**			
	MRP (faceted platform)				3				**3**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
AG3A *contd.*	Core				2				**2**			
	Flake						1		**1**			
	Flake (notched)	1							**1**			
	MRP	1		1	8	1			**11**			
	Hammerstone	1										
AG3a	Core (radial)				1				**1**			
	Flake (faceted platform)				5				**5**			
	Core				2	1			**3**			
	Flake	5		1	58		1		**65**			
	Blade				2				**2**			
	Hammerstone	1										
	Ochre										1	
AG4	Faceted platform				1				**1**			
	Core	1			2				**3**			
	Flake	3			32				**35**			
	Pièce esquillée				1				**1**			
	Pottery									2		
AG4A	Blade (faceted platform)	1			2				**3**			
	Flake (faceted platform)				3				**3**			
	Core	12			24				**36**			
	Flake	24		2	183				**209**			
	Blade	7			13				**20**			
	MRP				4				**4**			
	Ochre (utilised)										3	
AG4a	Core (radial)				2				**2**			
	Flake (faceted platform)				2				**2**			
	Core	1			8				**9**			
	Flake	14			45				**59**			
	Ochre (utilised)										1	
	Ochre										1	
AG4B	Adze					1			**1**			
	Bifacial point				1				**1**			
	Core (bipolar)				1				**1**			
	Core (radial)				3				**3**			
	Flake (faceted platform)				21				**21**			
	Core	2			42				**44**			
	Flake	102	2	4	867	6	1		**982**			
	MRP				5				**5**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
AG4B *contd.*	Pièce esquillée				1	1			**2**			
	Ochre (utilised)										1	
	Ochre										2	
AG4C	Flake (faceted platform)				4				**4**			
	Flake	1			14				**15**			
	MRP				1				**1**			
AG9	Core (bipolar)	1							**1**			
	Core (radial)	1			1				**2**			
	Flake (faceted platform		1						**1**			
	Core				1				**1**			
	Flake	1	1		9				**11**			
	Pottery										2	
	Ochre										1	
AG9A	Core (radial)				2				**2**			
	Flake (faceted platform)				15				**15**			
	Blade (faceted platform)				1				**1**			
	Core				3				**3**			
	Flake			2	35				**37**			
	Blade				2				**2**			
	Flake (notched)				2				**2**			
	MRP				4				**4**			
AG9a	Flake (Levallois point)				1				**1**			
	Flake (faceted platform)	1	2		12				**15**			
	Flake	1		1	29		1		**32**			
	Blade				2				**2**			
	Flake (notched)				2				**2**			
	MRP				2				**2**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
MALGASHOEK												
MG3	Flake				1				**1**			
MG3a	Core (bladelet)				1				**1**			
	Flake			1	21				**22**			
MG4	Adze				14				**18**			
	Backed segment				1				**1**			
	Scraper (end)	2			4	2			**4**			
	Scraper (side)				2				**2**			
	Scraper (thumbnail)				4				**4**			
	Unifacial point				1				**1**			
	Core (radial)				3				**3**			
	Flake (faceted platform)				2				**2**			
	Blade (faceted platform)				1				**1**			
	Core	4			6	2			**12**			
	Flake	11		11	143	18	15		**198**			
	Blade	1			1				**2**			
	Bladelet			1			2		**3**			
	Flake (notched)				2				**2**			
	MRP	1			11	1			**13**			
	Grindstone	8										
	Pottery									5		
	Ochre (utilised)										2	
	Ochre										28	
MG4a	Flake (Levallois point)				1				**1**			
	Flake (faceted platform)				1				**1**			
	Core				1				**1**			
	Flake				1				**1**			
	Ochre									1		
MG5	Adze				1				**1**			
	Scraper (end)				1				**1**			
	Scraper (side)				1				**1**			
	Core (bladelet)				1				**1**			
	Core (radial)				2				**2**			
	MRP (faceted platform)				1				**1**			
	Core	2			23				**25**			
	Chunk				3				**3**			
	Flake	33		12	406	3	3		**457**			
	Bladelet				1				**1**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
MG5 *contd.*	Flake (notched)				2				**2**			
	MRP				5				**5**			
MG5A	Bifacial point				1				**1**			
	Unifacial point				2				**2**			
	Core (bladelet)				1				**1**			
	Core (radial)		1		2				**3**			
	Core (single platform)				1				**1**			
	Core	2			3				**5**			
	Chunk				3				**3**			
	Flake	34		5	295	2	1		**337**			
	Pièce esquillée				1				**1**			
	MRP				6				**6**			
MG5a	Scraper (side)				1				**1**			
	Flake	1		5	37				**43**			
	Blade				1				**1**			
	MRP				1				**1**			
MG5B	Adze				2		1		**3**			
	Scraper (end)				1				**1**			
	Core (bipolar)					1			**1**			
	Core				3				**3**			
	Flake	2		5	82	4	2		**95**			
	Bladelet						1		**1**			
	Hammerstone	1					1					
	Pottery									14		
	Ochre										3	
	OES											4
MG8	Adze				18	1			**19**			
	Scraper (end)				1				**1**			
	Scraper (side)				1				**1**			
	Scraper (thumbnail)				2				**2**			
	Core (single platform)	1			2				**3**			
	Core				7				**7**			
	Chunk				6		1		**7**			
	Flake	25	1	13	233	13	6		**291**			
	Flake (notched)				1				**1**			
	MRP				7				**7**			
	Ochre										2	
MG11	Core (radial)				2				**2**			
	Core				1				**1**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
MG11 *contd.*	Flake	2			42	2			**46**			
MG11A	Flake (Levallois point)				1				**1**			
	Flake (faceted platform)				1				**1**			
	Core	1			5		1		**7**			
	Chunk				1				**1**			
	Flake	1		7	277	1			**286**			
	Blade				4				**4**			
	Bladelet				2				**2**			
	MRP				8				**8**			
MG11a	Flake (faceted platform)				2				**2**			
	Core			1	2				**3**			
	Flake			1	14		1		**16**			
	MRP				2				**2**			
	Hammerstone	1										
MG11B	Flake (pref. Levallois)				1				**1**			
	Core	1			2				**3**			
	Chunk				1				**1**			
	Flake	5		3	224				**232**			
	MRP				2				**2**			
	Ochre										1	
MG11b	Scraper (side)				1				**1**			
	Core (bladelet)				1				**1**			
	Core				1				**1**			
	Flake			1	33				**34**			
MG13	Bifacial point				1				**1**			
	Core (bladelet)				3				**3**			
	Core (radial)	1			10				**11**			
	Core (single platform)	1							**1**			
	Flake (faceted platform)				2				**2**			
	Blade (faceted platform)				1				**1**			
	MRP (faceted platform)				2				**2**			
	Core	2		1	9				**12**			
	Core (biface)	1							**1**			
	Flake	5			37		1		**43**			
	Blade				1				**1**			
	Flake (notched)				1				**1**			
	MRP				5				**5**			
	Ochre (utilised)										1	

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
MG13a	Core (bladelet)				1				**1**			
	Core (radial)				1				**1**			
	Core				2				**2**			
	Flake			1	29				**30**			
MG13b	Core				1				**1**			
	Flake	2			14				**16**			
MG14	Core (bladelet)				3				**3**			
	Flake (faceted platform)				1				**1**			
	Core	3			10				**13**			
	Flake	7		2	95				**104**			
	MRP				2				**2**			
MG14A	Core	1			3				**4**			
	Chunk				1				**1**			
	Flake	3			25				**28**			
MG14a	Core (radial)				1				**1**			
	Flake (faceted platform)				2				**2**			
	Flake	2		2	14				**18**			
	MRP				2				**2**			
MG14B	Flake (faceted platform)	1							**1**			
	Core	1			3				**4**			
	Chunk				1				**1**			
	Flake	4		1	25		1		**31**			
	MRP				2				**2**			
	Ochre										1	
MG15	Flake				10				**10**			
	MRP				1				**1**			
MG15a	Flake			2	8				**10**			
	MRP				1				**1**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
DRIEHOEK												
DR1	Core (single platform)				1				**1**			
	Flake (faceted platform)	1			1				**2**			
	Core			1					**1**			
	Flake	6			3				**9**			
	MRP	1							**1**			
	Ochre (utilised)										1	
DR2	Core (radial)				3				**3**			
	Flake (faceted platform)				2				**2**			
	MRP (faceted platform)				1				**1**			
	Chunk				1				**1**			
	Flake	2			1				**3**			
	MRP				2				**2**			
	Pottery									2		
DR2a	Grindstone	1										
DR5	Adze				1				**1**			
	Scraper (thumbnail)				1				**1**			
	Flake			1	4				**5**			
	MRP						1		**1**			
	Pottery									7		
	Ochre (utilised)										1	
	Grindstone	1										
DR5A	Core (radial)	2							**2**			
	Core (single platform)				1				**1**			
	Flake	6			14				**20**			
	MRP				1				**1**			
	Ochre (utilised)										1	
	Ochre										1	
DR6A	Backed bladelet			1					**1**			
	Unifacial point				1				**1**			
	Core (bladelet)				3				**3**			
	Core (radial)	3	1		9				**13**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				4				**4**			
	Core	5		3	5				**13**			
	Flake			2					**2**			
	Flake (notched)				1				**1**			
	MRP				2				**2**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DR6A *contd.*	Grindstone	1						1				
	Ochre										1	
DR6a	Flake (faceted platform)				1				**1**			
	Bladelet				1				**1**			
	Flake (notched)				1				**1**			
	MRP				3				**3**			
DR7	Adze			1	38	2	1		**42**			
	Backed drill				1				**1**			
	Scraper (end)				1		1		**2**			
	Scraper (thumbnail)			2	5				**7**			
	Flake (faceted platform)				1				**1**			
	Pièce esquillée				1				**1**			
	MRP				1				**1**			
	Pottery									12		
	Ochre (utilised)										5	
	OES											1
DR8a	Core (radial)	1							**1**			
	Core				1				**1**			
	Chunk				1				**1**			
	Flake	1							**1**			
	Flake (notched)				1				**1**			
	MRP				1				**1**			
	Ochre (utilised)										1	
DR8b	Flake (faceted platform)	1			1				**2**			
	MRP (faceted platform)				1				**1**			
	Core	1							**1**			
	Core (biface)	1							**1**			
	Flake	4			3			1	**8**			
DR11	Core (radial)	1			1				**2**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				4				**4**			
	Flake (pref. Levallois)				1				**1**			
	Core	2							**2**			
	Flake	1							**1**			
	Blade				1				**1**			
	MRP				2	1			**3**			
	Ochre (utilised)										1	

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DR11A	Core (bladelet)				6				**6**			
	Core (single platform)				1				**1**			
	Core (opposed platform)				1				**1**			
	Flake (faceted platform)				12				**12**			
	Core				1				**1**			
	Chunk				5				**5**			
	Flake	15		2	133		1		**151**			
	Blade				1				**1**			
	MRP				6				**6**			
DR11a	Flake	1			5				**6**			
	Flake (notched)				1				**1**			
DR11b	Core (bladelet)				1				**1**			
	Core (radial)				1				**1**			
	Flake (faceted platform)				4				**4**			
	Core				2			1	**3**			
	Flake	6	1		8				**15**			
	Ochre										1	

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
KRANSVLEIKLOOF												
KVK1	Handaxe	2	1						**3**			
	Core (radial)	2							**2**			
	Flake (faceted platform)	1			4				**5**			
	MRP (faceted platform)				1				**1**			
	Core	10			1				**11**			
	Flake	16			42				**58**			
	MRP				2	1			**3**			
	Grindstone	1										
KVK1a	Core (radial)	1							**1**			
	Core				3				**3**			
	Flake	8		1	21				**30**			
	MRP				1				**1**			
KVK1b	Core (radial)		1						**1**			
	Core				1				**1**			
	Flake				1				**1**			
KVK2	Adze				13	2	1		**16**			
	Scraper (end)						1		**1**			
	Scraper (thumbnail)						1		**1**			
	Core				2				**2**			
	Chunk				3				**3**			
	Flake	11		4	100	23	13		**151**			
	MRP				8	2	2		**12**			
	Grindstone	1										
	Grooved stone							1				
	Pottery									34		
	Ochre (utilised)										2	
	Ochre										18	
	OES											4
KVK2A	Adze				1				**1**			
	Scraper (thumbnail)			1			1		**2**			
	Core (bladelet)				1				**1**			
	Core				2				**2**			
	Flake	31		2	97	17	12		**159**			
	Blade	2			2				**4**			
	Bladelet				3				**3**			
	MRP				1				**1**			
	Ochre (utilised)										4	

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
KVK2A *contd.*	Ochre										4	
KVK2a	Core (radial)				1				**1**			
	Core				1				**1**			
	Flake				6				**6**			
	Ochre										1	
KVK2b	Flake (faceted platform)				1				**1**			
	Flake	1			2				**3**			
	Ochre (utilised)										2	
KVK3	Adze				1				**1**			
KVK5	Adze				11		2		**13**			
	Backed drill					1			**1**			
	Scraper (end)						1		**1**			
	Scraper (side)				1				**1**			
	Flake (faceted platform)				1				**1**			
	Core	5			3	1			**9**			
	Chunk	1							**1**			
	Flake	34		8	230	40	9		**321**			
	Blade				2				**2**			
	Bladelet			1	1				**2**			
	MRP				5				**5**			
	Ochre										14	
KVK5a	Core (radial)		1						**1**			
	Flake (faceted platform)				1				**1**			
	Core				1				**1**			
	Flake				8				**8**			
	Blade				1				**1**			
	Bored stone							1				
	Ochre									1		
KVK6	Adze	1			23	3	9		**36**			
	Backed piece				1				**1**			
	Scraper (backed)				1				**1**			
	Scraper (end)				1				**1**			
	Scraper (side)				5				**5**			
	Core (bladelet)				1				**1**			
	Flake (faceted platform)	1	1		2				**4**			
	Core				3				**3**			
	Chunk	2							**2**			
	Flake	30		8	192	32	18		**280**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
KVK6 *contd.*	MRP				8		3		**11**			
	Grindstone	1										
	Pottery									1		
	Ochre (utilised)										3	
	Ochre										12	
	OES											10
KVK7A	Adze				3				**3**			
	Core (bipolar)				1				**1**			
	Flake (faceted platform)	1			2				**3**			
	Core				4		1		**5**			
	Chunk				2				**2**			
	Flake	50		11	113	6	2		**182**			
	Blade				1				**1**			
	Bladelet			1	1				**2**			
	MRP				4				**4**			
	Ochre										7	
KVK8	Core (bladelet)				1				**1**			
	Flake	1			12				**13**			
	Bladelet				1				**1**			
	Flake (notched)				1				**1**			
	Ochre										1	
KVK8A	Flake				12				**12**			
KVK10	Core				2				**2**			
	Flake			1	2	1			**4**			
KVK10a	Flake	1			1				**2**			
	Grooved stone	1										

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
RENBAAN												
RB1	Adze				2				**2**			
	Scraper (side)				2				**2**			
	Core (radial)	1			1				**2**			
	Flake (faceted platform)	1			3				**4**			
	Core	1			18	1			**20**			
	Flake	25		1	260	25	3		**314**			
	Blade	1			1				**2**			
	Flake (notched)				1				**1**			
	MRP				3				**3**			
	Bored stone	1										
	Grindstone	1										
	Ochre										6	
RB2	Adze				6		1		**7**			
	Scraper (end)				1				**1**			
	Scraper (side)				1				**1**			
	Scraper (thumbnail)				2				**2**			
	Flake (notched)				1				**1**			
RB2a	Flake				4				**4**			
	MRP				1				**1**			
RB3	Adze				34	1	2		**37**			
	Scraper (end)				1				**1**			
	Scraper (side)				2				**2**			
	Scraper (thumbnail)				1				**1**			
	Core (bipolar)						1		**1**			
	Core (bladelet)				1				**1**			
	Core (radial)		1		2				**3**			
	Flake (faceted platform)		1		1				**2**			
	Core	5			9				**14**			
	Chunk	1			9				**10**			
	Flake	45	2	6	208	4	16		**281**			
	Flake (notched)				2				**2**			
	MRP				6				**6**			
	Grindstone	4										
	Hammerstone	1										
	Ochre (utilised)										1	
	Ochre										19	

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
RB3A	Flake	3			5				**8**			
RB3B	Flake	2			2				**4**			
	Pottery									1		
RB4	Bifacial point				2				**2**			
RB5A	Core (radial)	2			7				**9**			
	Core (single platform)				2				**2**			
	Flake (faceted platform)	1			4				**5**			
	Core	5			7				**12**			
	Chunk				9				**9**			
	Flake	5			56				**61**			
	MRP				5				**5**			
RB5B	Core (radial)	1							**1**			
	Flake (faceted platform)				2				**2**			
	Core	1			2				**3**			
	Chunk				2				**2**			
	Flake	5			13				**18**			
	MRP				2				**2**			
	Ochre (utilised)										1	
	Ochre										1	
RB5C	Flake (Levallois point)		1						**1**			
	Flake	2			1				**3**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
PUTS												
PT2	Core (radial)	1							**1**			
	Chunk				3				**3**			
	Flake	1	1	2	8				**12**			
	Ochre (utilised)										1	
	Ochre										2	
PT2A	Flake (faceted platform)	1							**1**			
	Core						1		**1**			
	Flake	1		1	12	1			**15**			
	MRP				1				**1**			
	Ochre										1	
PT2a	Core						1		**1**			
	Flake			1	7				**8**			
	MRP				1				**1**			
PT2B	Core (bladelet)				1				**1**			
	Flake (faceted platform)				5				**5**			
	Flake (pref. Levallois)				1				**1**			
	Core			1	6				**7**			
	Chunk				5				**5**			
	Flake	5		10	87		8		**110**			
	Flake (notched)				1				**1**			
	Pièce esquillée				2				**2**			
	MRP				1				**1**			
	Bored stone							1				
	Ochre (utilised)										1	
PT3	Adze				1				**1**			
	Core (radial)				1				**1**			
PT4	Core (single platform)				1				**1**			
	Flake (faceted platform)				1				**1**			
	Flake	1		1	13				**15**			
	Grindstone	1										
PT4A	Core (bladelet)				1				**1**			
	Core (radial)				2				**2**			
	Core (single platform)				1				**1**			
	Core (opposed platform)				1				**1**			
	Flake (faceted platform)	2			5				**7**			
	MRP (faceted platform)				1				**1**			
	Core	1			1				**2**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
PT4A *contd.*	Chunk				2				**2**			
	Flake	1		2	11		1	1	**16**			
PT4a	Flake (faceted platform)				1				**1**			
	Flake	1			3				**4**			
PT4B	Core (radial)				1				**1**			
	Core				1				**1**			
	Flake	3		1	25			1	**30**			
	Pottery									2		
	Ochre										1	
PT5	Adze				43		9		**52**			
	Backed piece			1					**1**			
	Scraper (backed)				1				**1**			
	Scraper (end)				2				**2**			
	Scraper (side)	1			2				**3**			
	Scraper (thumbnail)				5		1		**6**			
	Bifacial point				1				**1**			
	Core (bladelet)				4				**4**			
	Core (radial)	1			9				**10**			
	Core (single platform)				2				**2**			
	Flake (faceted platform)				5				**5**			
	MRP (faceted platform)				1				**1**			
	Core				4				**4**			
	MRP	1			17			1	**19**			
PT5A	Scraper (side)				1				**1**			
	Core (radial)		1		1				**2**			
	Flake (faceted platform)				2				**2**			
	Core				7				**7**			
	Chunk				1				**1**			
	Flake	1			41		1		**43**			
	MRP				2			1	**3**			
PT6A	Flake	1			2				**3**			
	Pottery									12		
	Ochre										4	
	OES											2
PT6a	Flake (faceted platform)				1				**1**			
	Flake	4		2	12				**18**			
	Ochre (utilised)										1	
	Ochre										2	

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
PT6B	Adze				8			1	**9**			
	Scraper (end)				2				**2**			
	Scraper (side)				1				**1**			
	Scraper (thumbnail)						1		**1**			
	Core (bipolar)				1				**1**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				4				**4**			
	Core				2				**2**			
	Chunk				2		1		**3**			
	Flake			3	41	2	10	1	**57**			
	Flake (notched)				2				**2**			
	MRP				2		1		**3**			
	Grindstone						1					
	Ochre (utilised)										1	
	Ochre										2	
PT9	Core (bipolar)				1				**1**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				3				**3**			
	Core				1				**1**			
	Chunk				1				**1**			
	Flake	2		4	33		1		**40**			
	Flake (notched)				1				**1**			
PT9A	Core (bladelet)				1				**1**			
	Core (radial)				3				**3**			
	Flake (faceted platform)				2				**2**			
	Core	1			3		1		**5**			
	Chunk				6				**6**			
	Flake	1			22				**23**			
	Flake (notched)	1			3				**4**			
	MRP				1				**1**			
PT9a	Core (bladelet)				1				**1**			
	Flake (faceted platform)				1				**1**			
	Chunk				1				**1**			
	Flake				6				**6**			
PT9b	Core (opposed platform)				1				**1**			
	Flake (faceted platform)	1			3				**4**			
PT9c	Core (radial)				1				**1**			
	Core				1				**1**			
	Flake	1			7				**8**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
PT10	Core (radial)	1			2				**3**			
	Flake (faceted platform)				9				**9**			
	Core	1							**1**			
	Chunk				1				**1**			
	Flake				17				**17**			
PT10a	Flake				2				**2**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
WARMHOEK												
WH5	Adze				9	1	1		**11**			
	Backed piece						2		**2**			
	Scraper (thumbnail)				1				**1**			
	Pottery									2		
	Ochre (utilised)										3	
WH5A	Core (radial)				4				**4**			
	Core (single platform)				1				**1**			
	Flake (faceted platform)				5				**5**			
	Core	3		1	60				**64**			
	Chunk				41				**41**			
	Flake	5		1	294				**300**			
	Flake (notched)	1			3				**4**			
	MRP				14				**14**			
	Grindstone	1										
WH5a	Flake (faceted platform)				1				**1**			
	Flake			1	5				**6**			
	MRP					1			**1**			
WH5B	Core (radial)				4				**4**			
	Flake (faceted platform)				1				**1**			
	Core				7			1	**8**			
	Flake	7			138				**145**			
	Blade				1				**1**			
	MRP				4				**4**			
WH5b	Flake (notched)				1				**1**			
	Flake	1			8				**9**			
WH5c	Pottery									1		
WH7	Flake (faceted platform)				1				**1**			
	Flake				13				**13**			
WH7A	Flake (faceted platform)	1							**1**			
	Core				7				**7**			
	Flake				38	1	1		**40**			
	Flake (notched)				1				**1**			
	MRP				2	1			**3**			
WH8	Adze				55	6	1		**62**			
	Backed piece			1	3				**4**			
	Scraper (backed)				1				**1**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
WH8 *contd.*	Scraper (end)				1		1		**2**			
	Scraper (side)				6				**6**			
	Scraper (thumbnail)			4	9		3		**16**			
	Unifacial point				3				**3**			
	Core (bipolar)				4				**4**			
	Core (bladelet)				1				**1**			
	Core (radial)				2				**2**			
	Core (single platform)				2				**2**			
	Core					1			**1**			
	Flake (notched)				1				**1**			
	Pièce esquillée				1				**1**			
	MRP				1	1			**2**			
	Grindstone	2					1					
	Pottery									17		
	Ochre (utilised)										8	
	Ochre										1	
	OES											3
	Schist (manuport)						1					
WH8a	Scraper (end)				1				**1**			
	Core (radial)				1				**1**			
	Flake (faceted platform)				3		1		**4**			
	Flake				2				**2**			
WH8b	Flake			2	10				**12**			
	MRP				1				**1**			
WH9	Core				4				**4**			
	Flake				4				**4**			
WH9a	MRP				1				**1**			
WH10A	Core				2				**2**			
	Flake	2			9				**11**			
WH10a	Scraper (end)				1				**1**			
	Flake				2				**2**			
WH10B	Flake					1			**1**			
WH12A	Core				1				**1**			
	Chunk				7				**7**			
	Flake	3		1	46	1			**51**			
	MRP				1				**1**			
	Ochre										3	
WH12B	Flake (faceted platform)				1				**1**			
	Chunk				1				**1**			

SITE NO.	ARTEFACT	Quartzite	Ferricrete	Quartz	Silcrete	Hornfels	CCS	Other	Tot. Lithics	Pottery	Ochre	OES
WH12B *contd.*	Flake				21				**21**			
	MRP				3				**3**			
WH13	Adze				1				**1**			
	Flake			1	1				**2**			
	Flake (notched)				1				**1**			
WH13a	Chunk				1				**1**			
	Flake				4				**4**			
WH13b	Flake (faceted platform)				1				**1**			
	Core	2							**2**			
	Flake				5				**5**			
WH14	Adze				1				**1**			
	Core (radial)				2				**2**			
	Flake (faceted platform)				2				**2**			
	Core				4				**4**			
	Chunk				1				**1**			
	Flake	2		2	111	11	4		**130**			
	Blade				2				**2**			
	Bladelet						1		**1**			
	Flake (notched)				3				**3**			
	MRP				1	1	2		**4**			
	Ochre										3	
WH14a	Blade (faceted platform)				1				**1**			
	Flake	1			10				**11**			
	MRP				1				**1**			
WH19	Flake (faceted platform)				2				**2**			
	Chunk				1				**1**			
	Flake	8		6	117	2	4	1	**138**			
	Bladelet				1				**1**			
	MRP				2				**2**			
WH19a	MRP				1				**1**			
WH20	Adze				1	1			**2**			
	Flake (faceted platform)				2				**2**			
	Core (bipolar)			1					**1**			
	Flake			1	2				**3**			
	Bladelet			1					**1**			
	Grindstone							1				
WH20a	Flake (faceted platform)				1				**1**			
	Flake				4				**4**			
	Ochre (utilised)										1	

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
WH21	Core (radial)				1				**1**			
	Flake (faceted platform)				4				**4**			
	Blade (faceted platform)				2				**2**			
	Core	2			10				**12**			
	Flake	4		1	19				**24**			
	Blade				2				**2**			
WH	Flake (faceted platform)				1				**1**			
	Flake				1				**1**			

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
SUPPELEMENTARY SURVEY AREAS												
AUGSBURG	Handaxe	3							**3**			
	Bifacial point				1				**1**			
	Scraper (end)				1				**1**			
	Core (radial)				4				**4**			
	Flake (faceted platform)	3			6				**9**			
	Flake (pref. Levallois)				1				**1**			
	Core	42	1		10				**53**			
	Core (biface)	1							**1**			
	Chunk	1			2				**3**			
	Flake	44			82				**126**			
	Flake (notched)	2			2				**4**			
RIETVLEI	Adze				4		6		**10**			
	Backed piece			1	4		4		**9**			
	Scraper (backed)				1				**1**			
	Scraper (side)				1		3		**4**			
	Scraper (thumbnail)			3	5		10	1	**19**			
	Core (bipolar)						1		**1**			
	Core (radial)	1			2				**3**			
	Core (single platform)						1		**1**			
	Core				3				**3**			
	Flake	1							**1**			
	Flake (notched)						1		**1**			
	MRP						1	1	**2**			
	Grindstone	5										
	Ochre (utilised)										3	
DWR7	Core			1	1				**2**			
	Chunk				1				**1**			
	Flake	4		2	19			1	**26**			
	Bladelet				1				**1**			
	Pièce esquillée				1		1		**2**			
	Grindstone	2						1				

SITE NO.	*ARTEFACT*	*Quartzite*	*Ferricrete*	*Quartz*	*Silcrete*	*Hornfels*	*CCS*	*Other*	*Tot. Lithics*	*Pottery*	*Ochre*	*OES*
DAM27	Adze				8				**8**			
	Scraper (backed)			1					**1**			
	Scraper (thumbnail)			1					**1**			
	Core				1				**1**			
	Flake	4		3	10	4	3		**24**			
	Grindstone	1										
	Pottery									1		
KR9	Adze				1	1	1		**3**			
	Backed piece			1					**1**			
	Scraper (thumbnail)				1		1		**2**			
	Bifacial point				1				**1**			
	Flake (faceted platform)				1				**1**			
	Core	1			1				**2**			
	Flake	13			9	3	2		**27**			
	Bladelet						1		**1**			
	MRP				10	1	1		**12**			

Stone Age landscape use in the Olifants River Valley, Western Cape

Emily Hallinan

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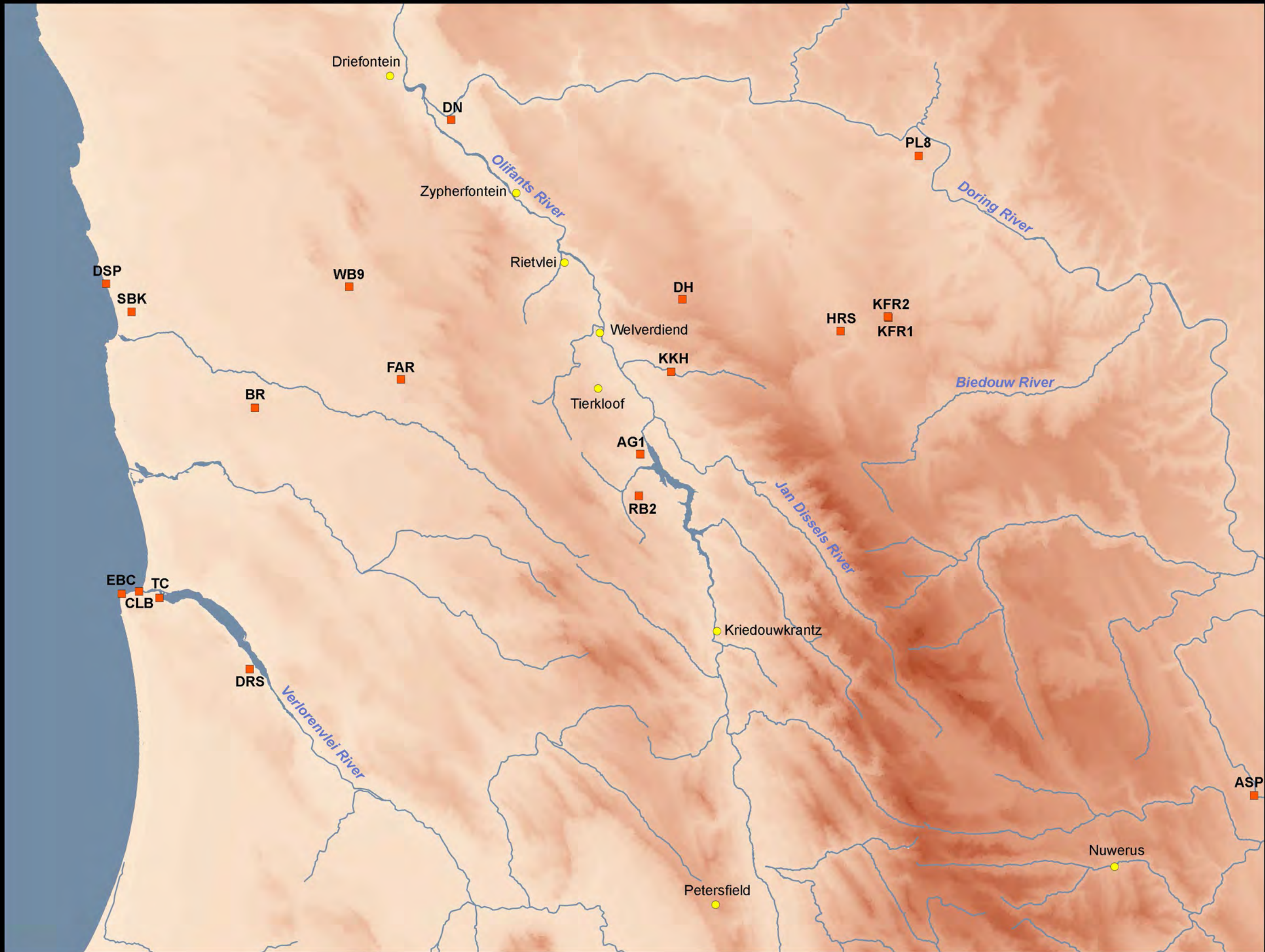
VOLUME 2.

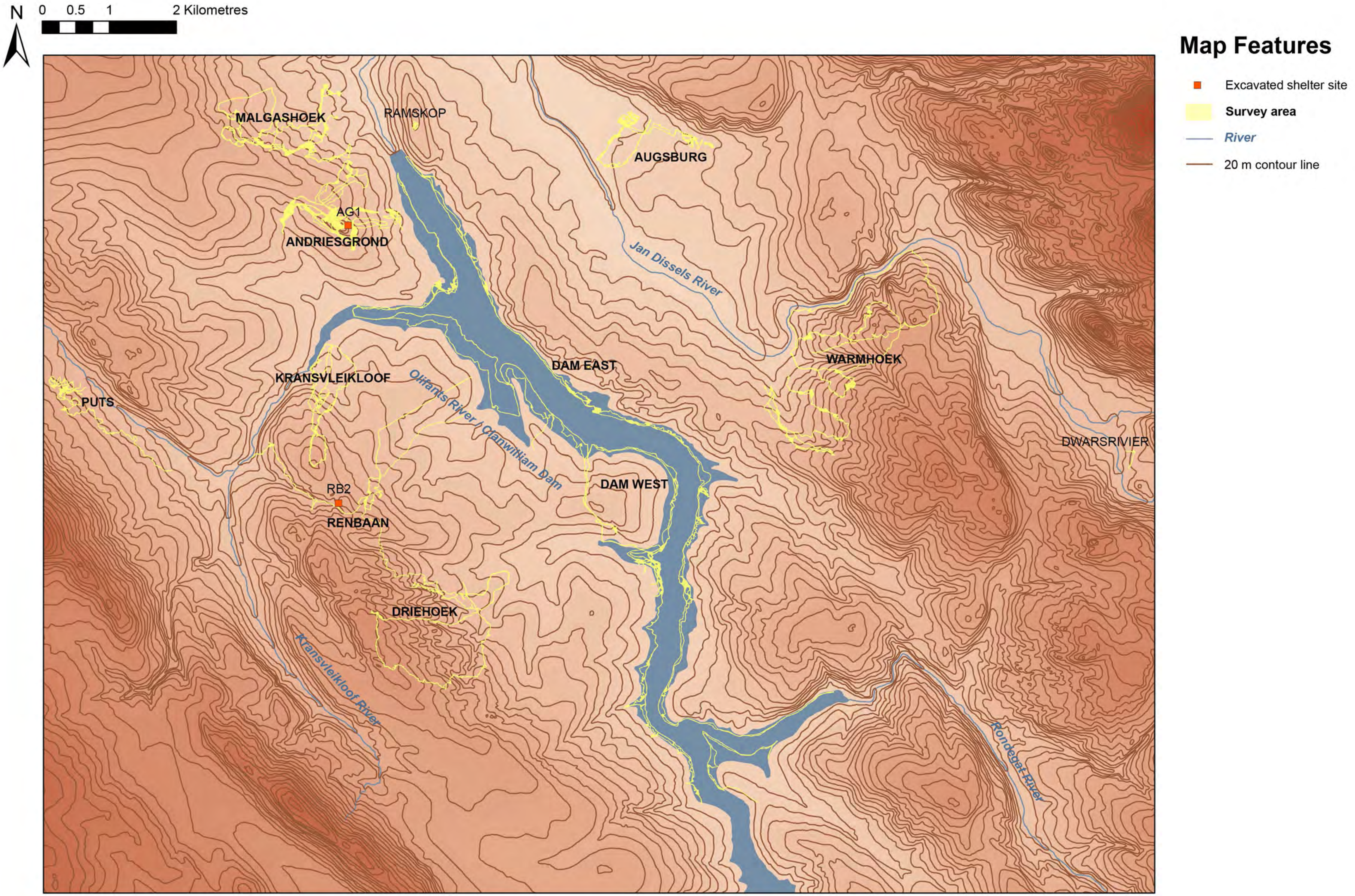
ACCOMPANYING MAPS

Thesis presented for the degree of Master of Philosophy
Department of Archaeology, University of Cape Town

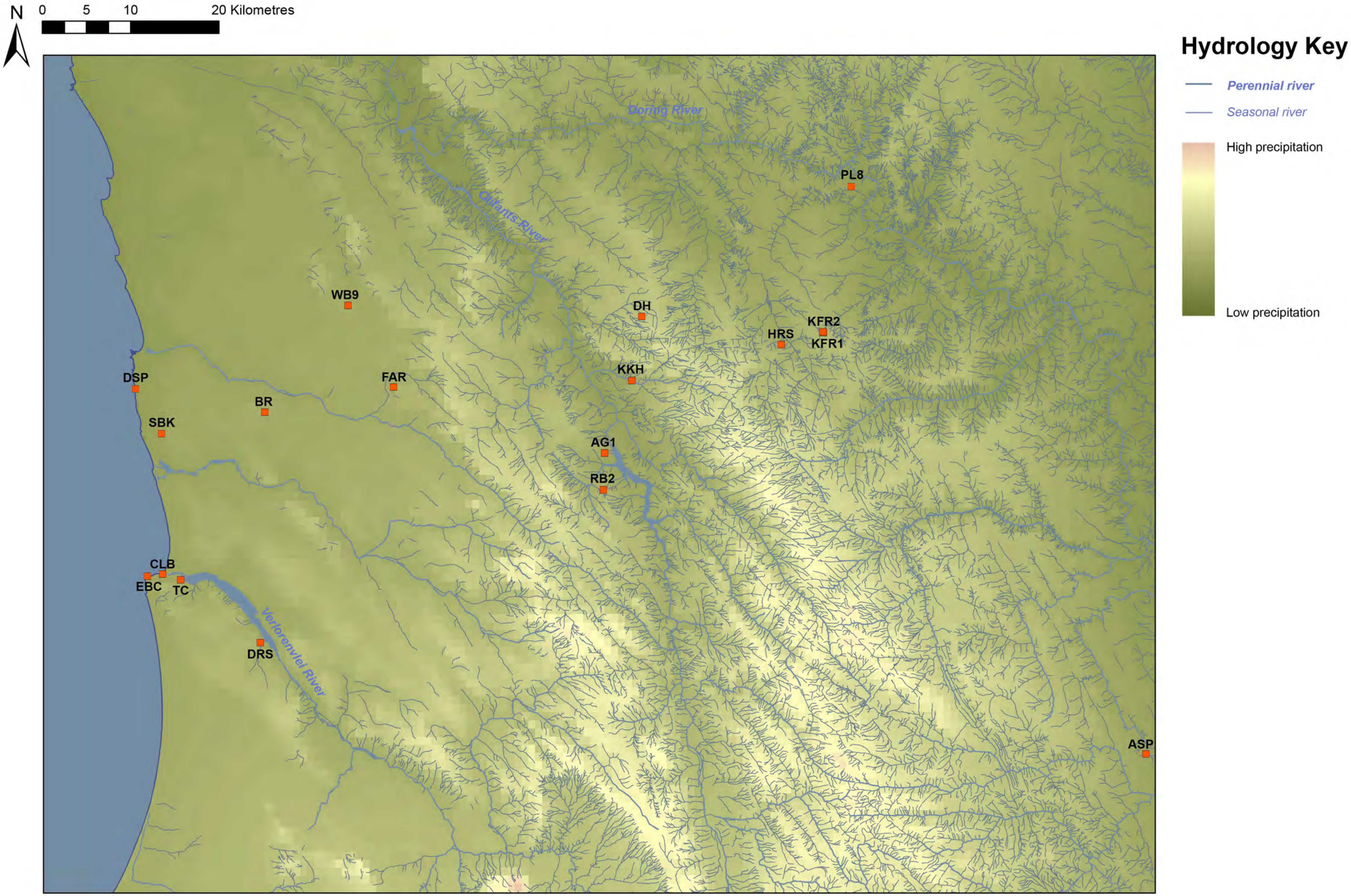
Supervisor: Prof. John Parkington

List of Maps in Volume 2.


Driefontein
DN
Olifants River
Zypherfontein
PL8
Doring River
Rietvlei
DSP
WB9
DH
SBK
KFR2
HRS
KFR1
Welverdiend
KKH
FAR
Biedouw River
BR
Tierkloof
AG1
RB2
Jan Dissels River
EBC
TC
CLB
Kriedouwkrantz
DRS
Verlorenvlei River
ASP
Nuwerus
Petersfield

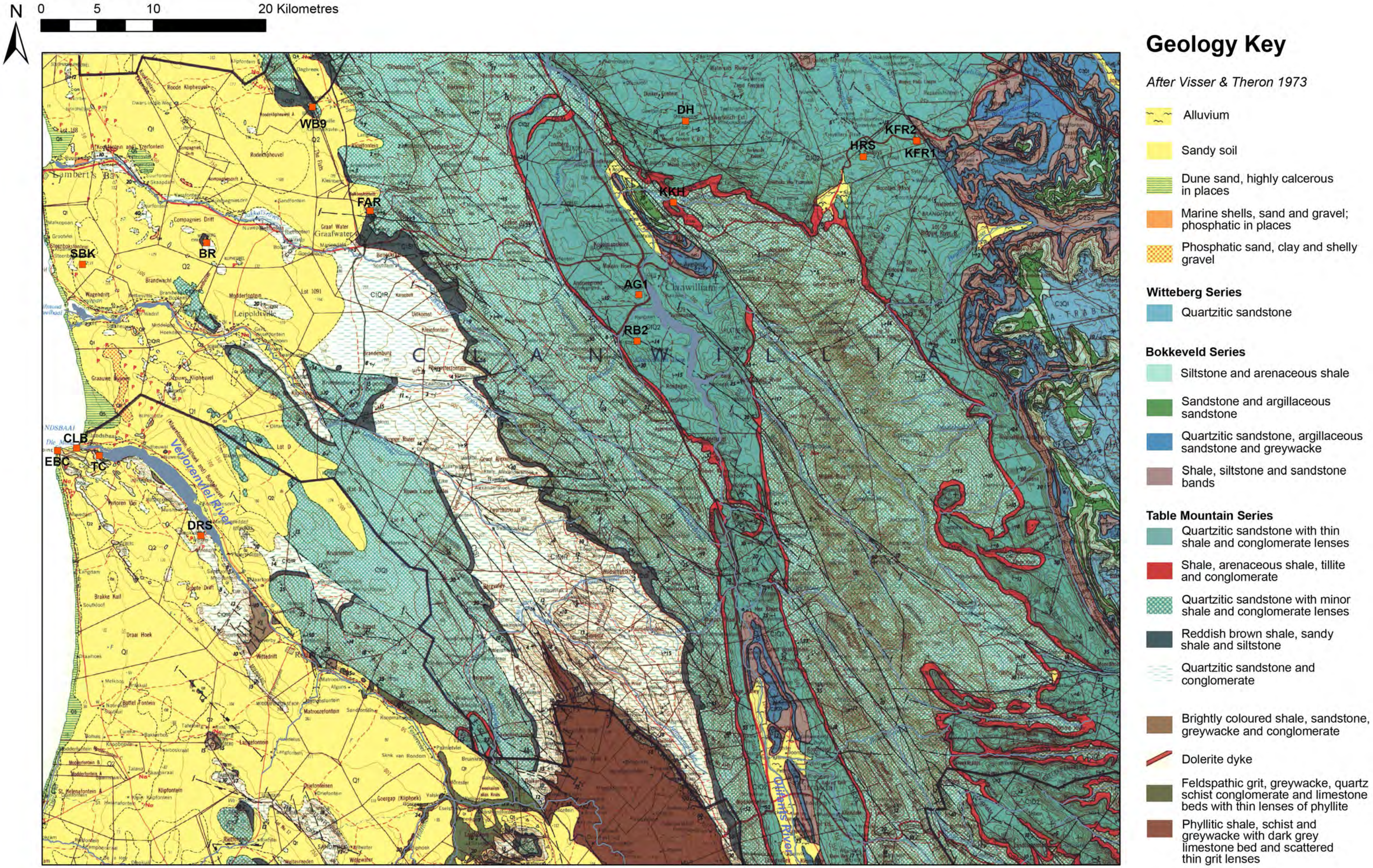


Map 2 Location of excavated sites and surveyed areas in the study area



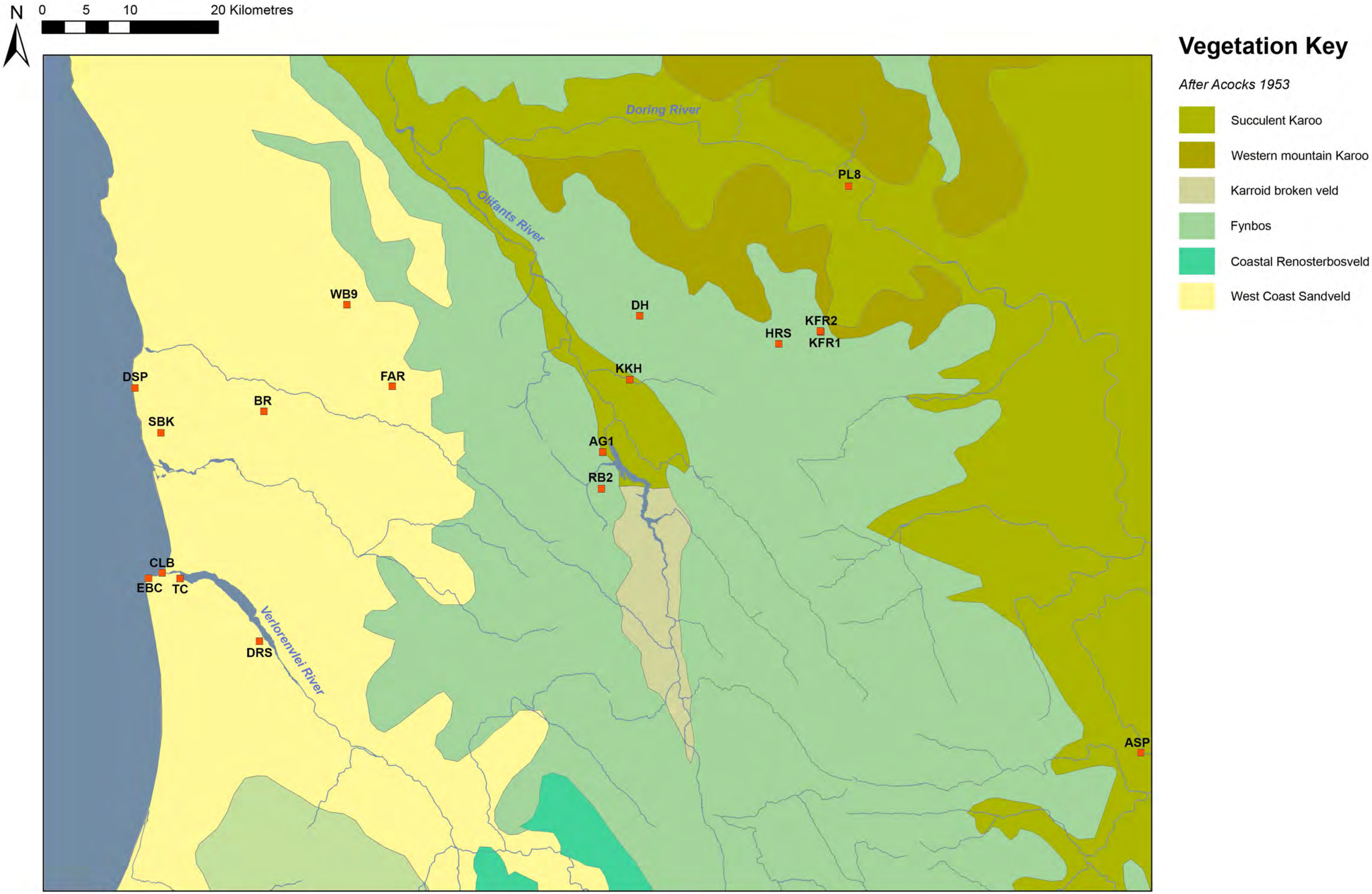
Map 3 Hydrology and relative annual precipitation of the study region, Western Cape, South Africa

See Map 1 for site numbers



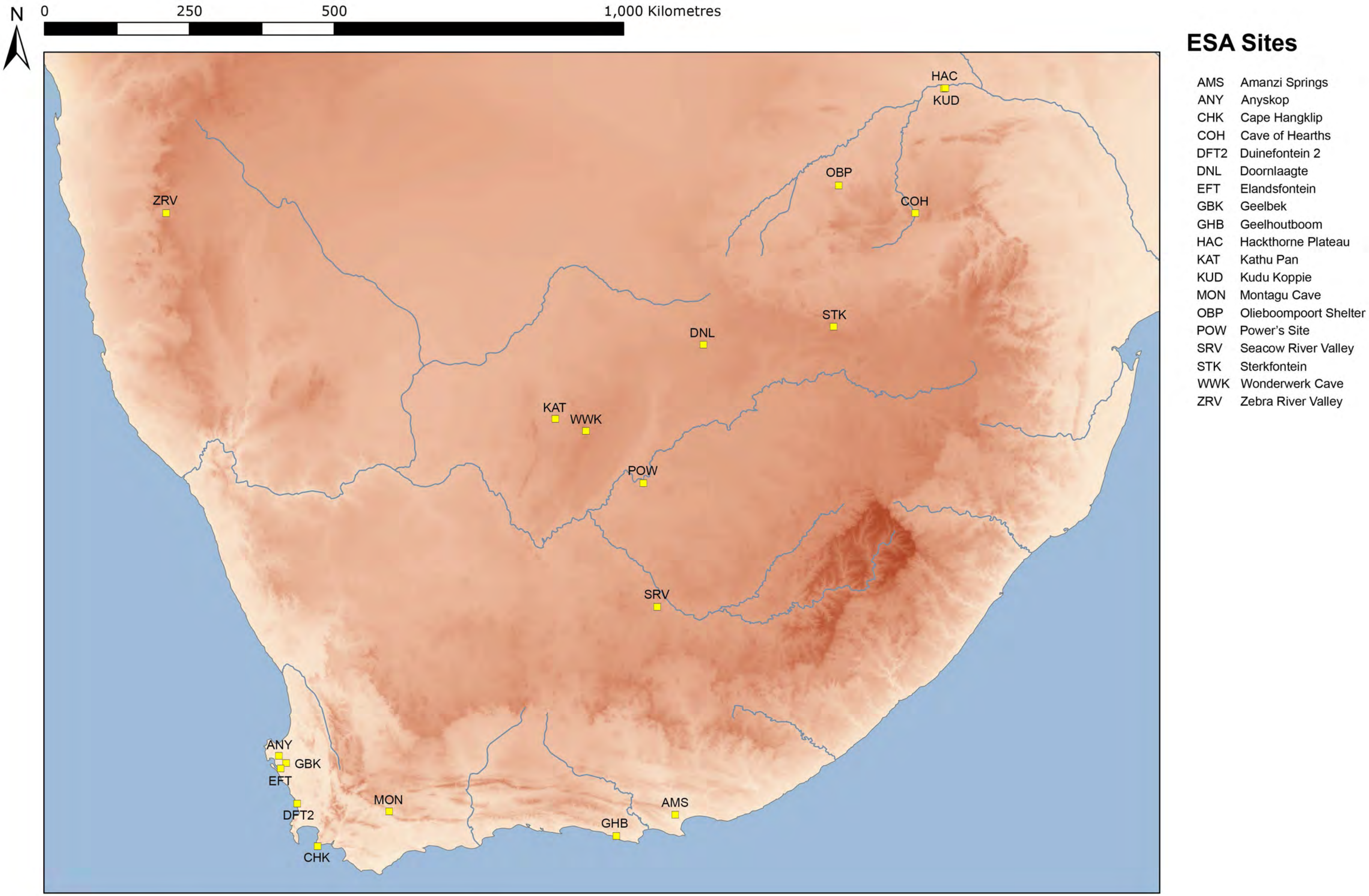
Map 4 Geology of the study region, Western Cape, South Africa (after Visser & Theron 1973)

See Map 1 for site numbers

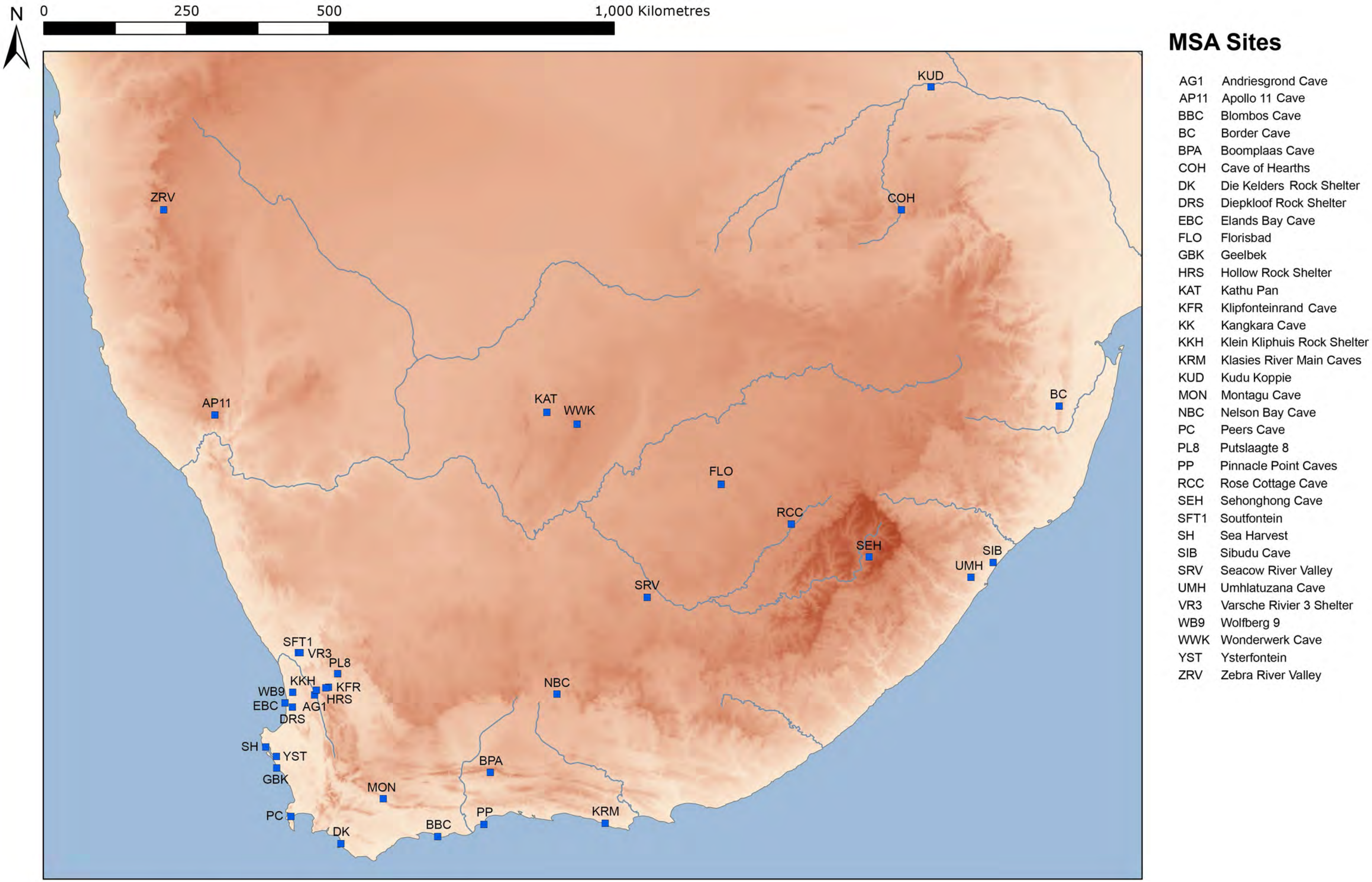


Map 5 Vegetation of the study region, Western Cape, South Africa (after Acocks 1953)

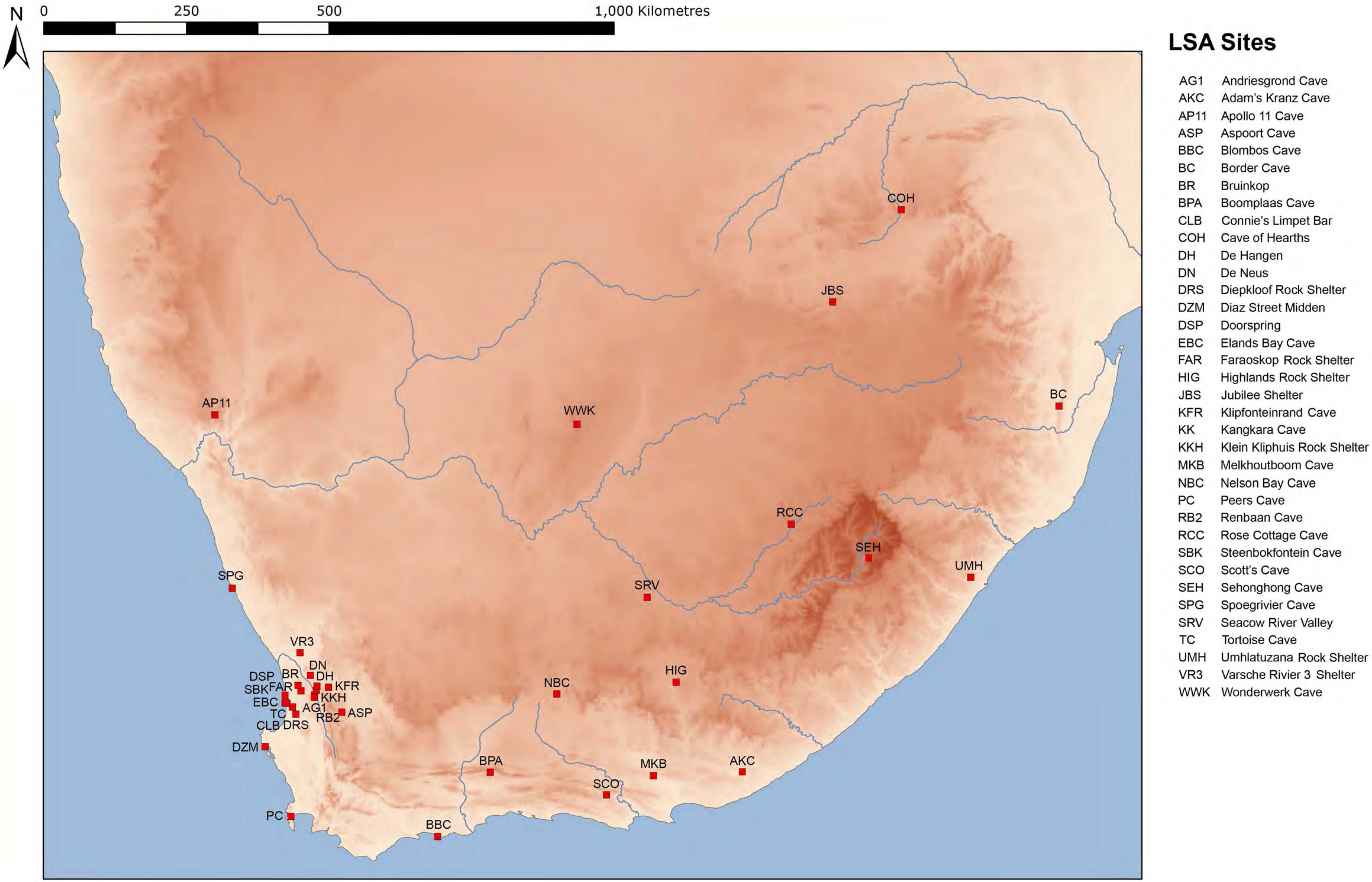
See Map 1 for site numbers



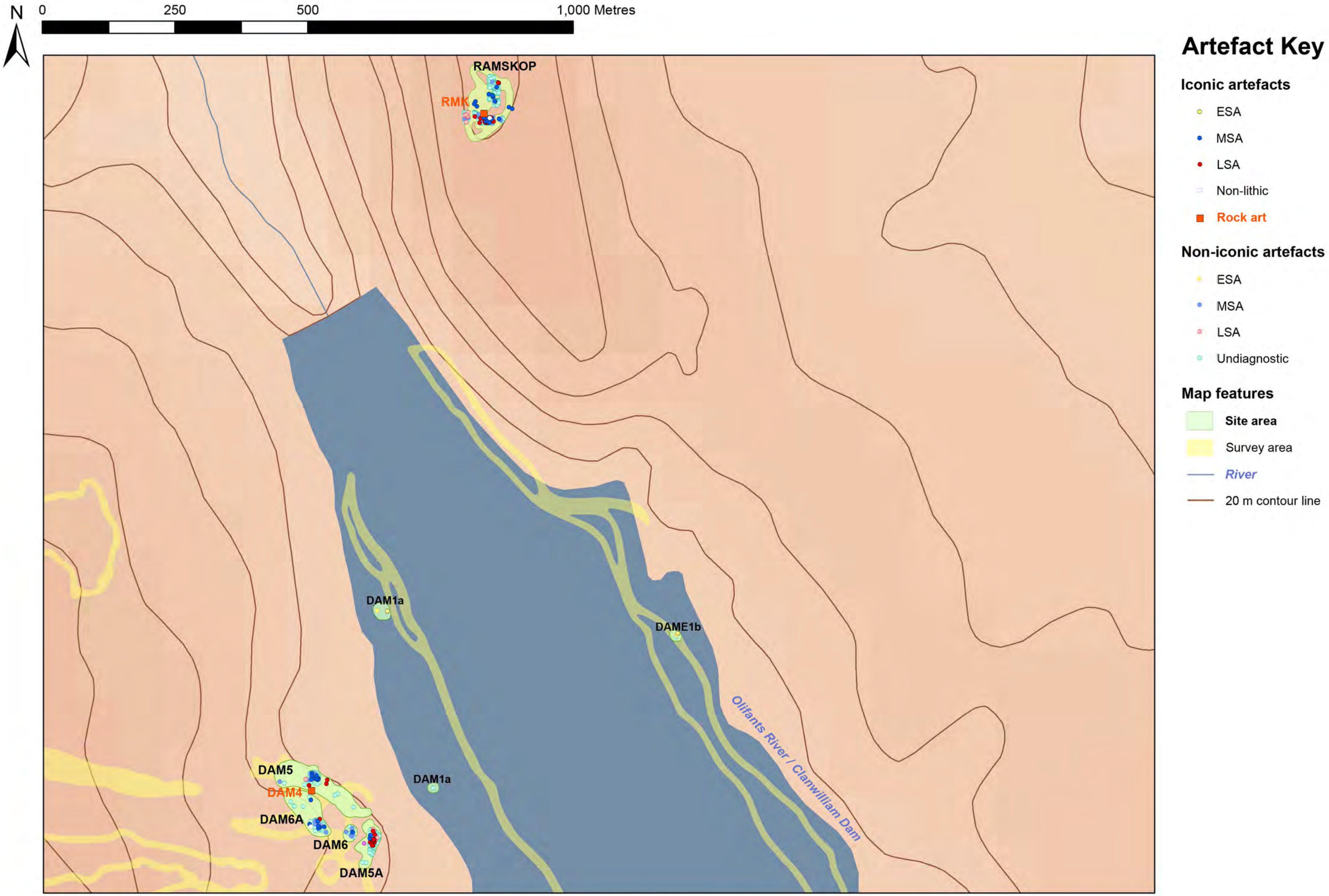
Map 6.1 Location of ESA sites in southern Africa mentioned in the text



Map 6.2 Location of MSA sites in southern Africa mentioned in the text

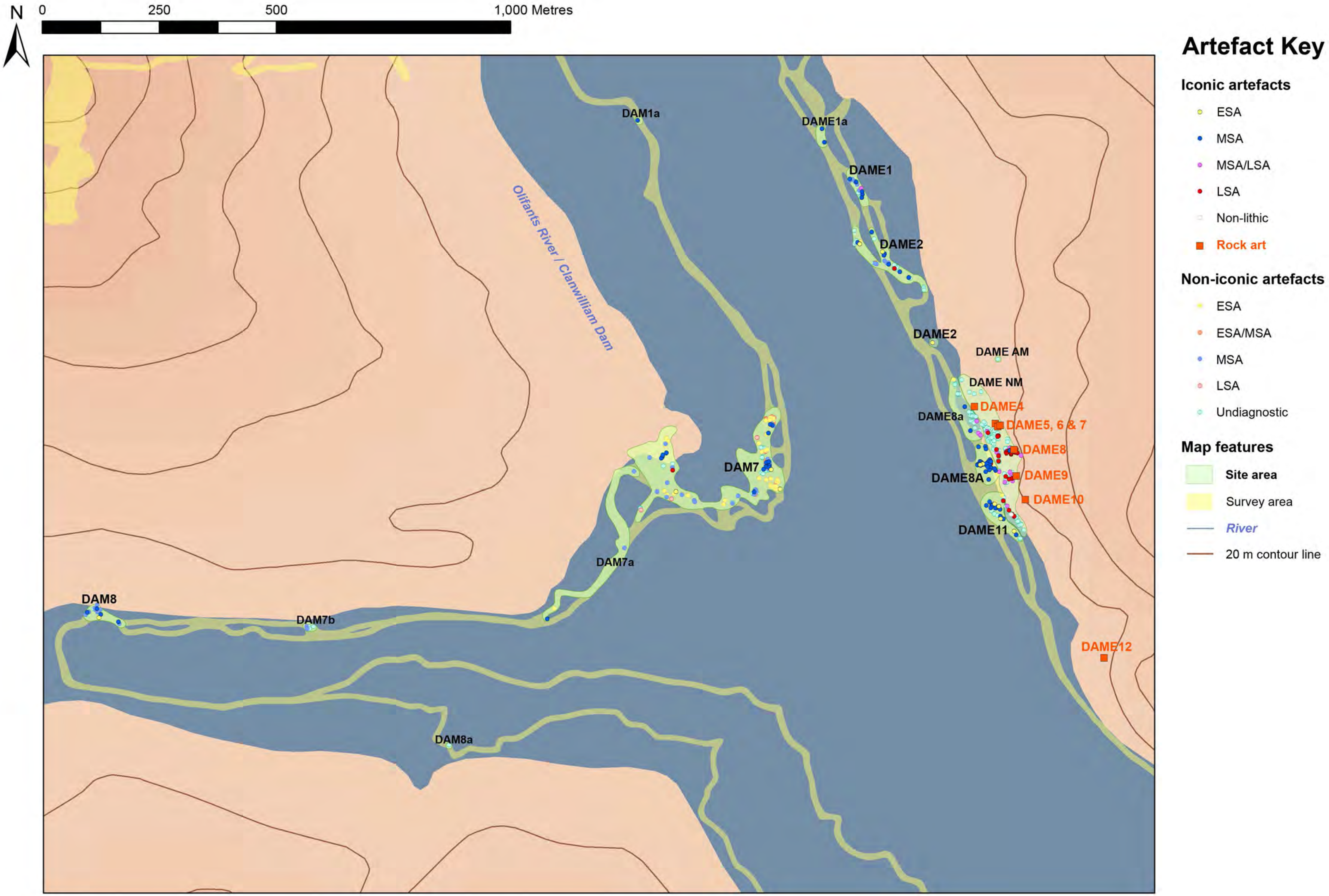


Map 6.3 Location of LSA sites in southern Africa mentioned in the text



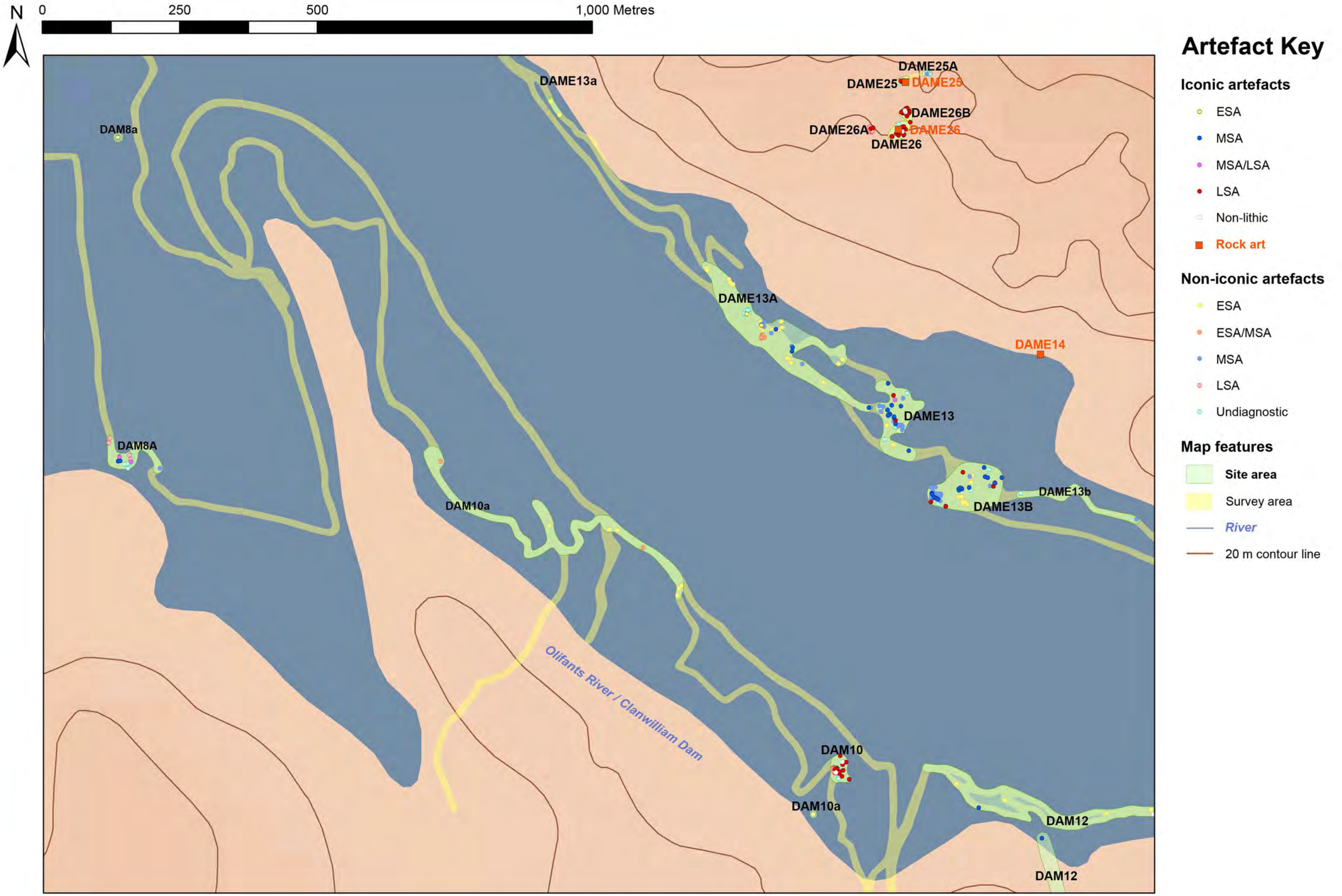
Map 7.1 Survey areas and site numbers in the Clanwilliam Dam area: Ramskop, Dam East (DAME1b) and Dam West (DAM1a to DAM6A)

Map 7.2 Aerial photograph view of the Clanwilliam Dam area: Ramskop, Dam East (DAME1b) and Dam West (DAM1a to DAM6A), showing iconic artefacts

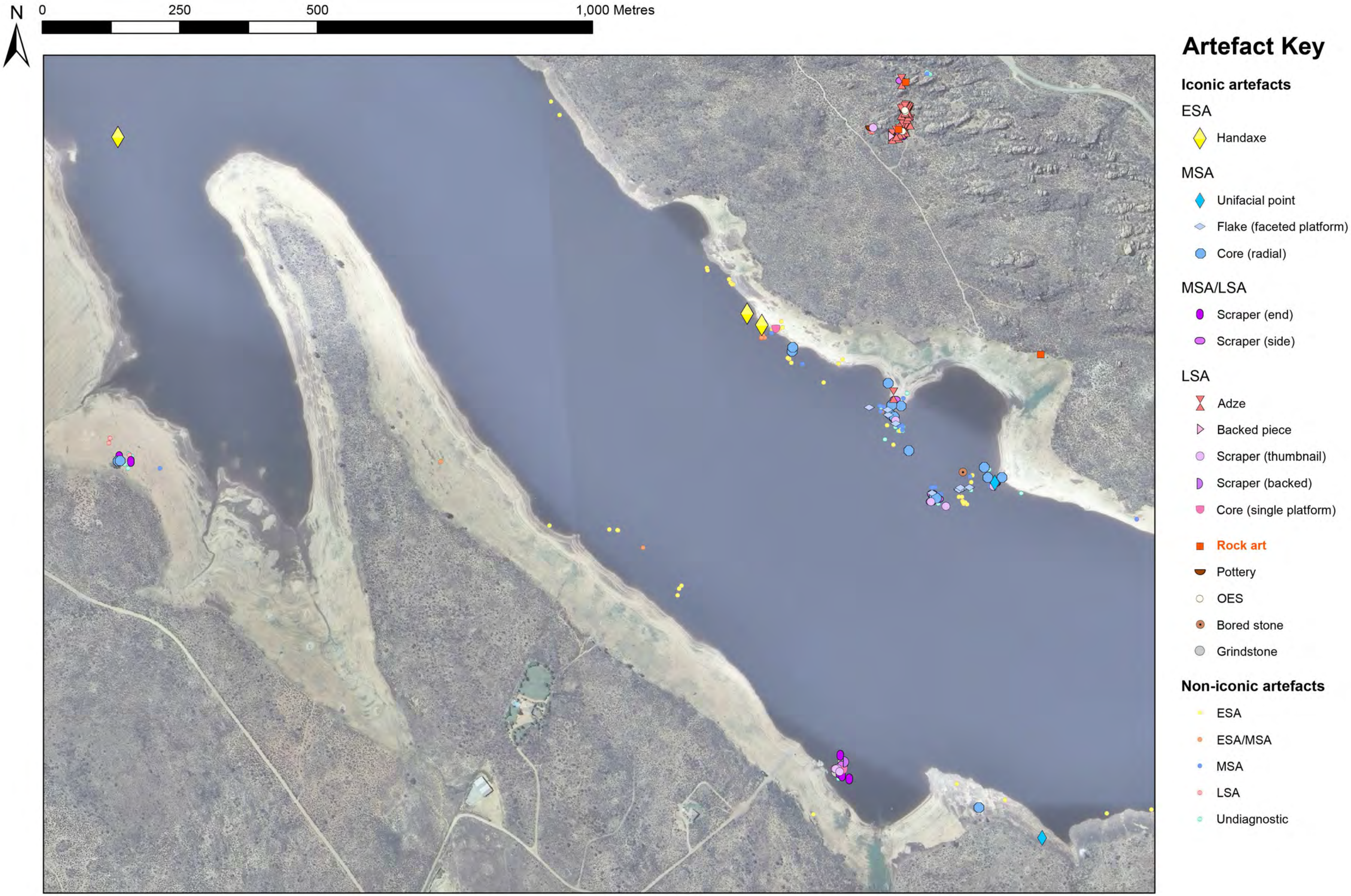


Map 8.1 Survey areas and site numbers in the Clanwilliam Dam area: Dam East (DAME1a to DAME12) and Dam West (DAM1a to DAM8a)

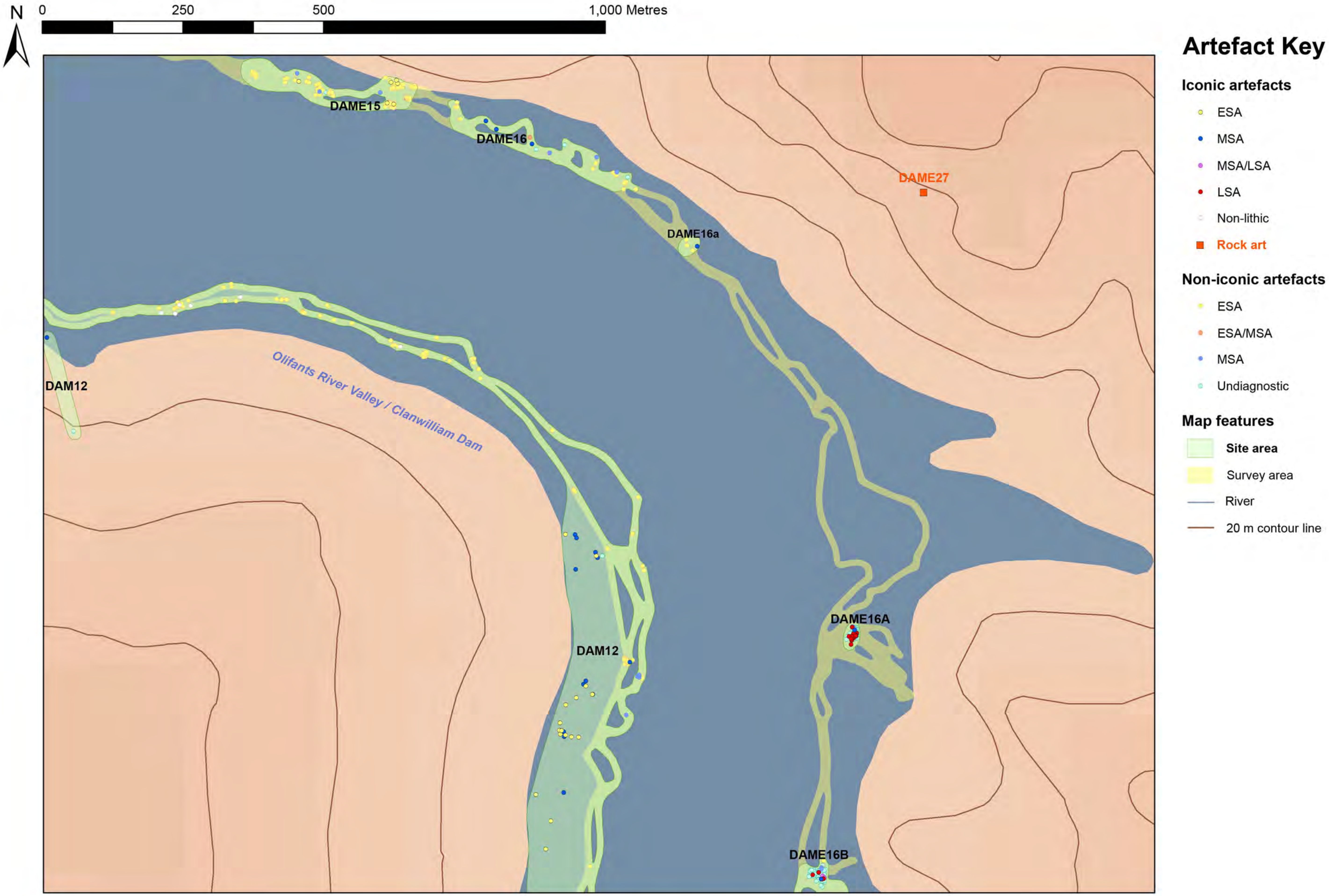
Map 8.2 Aerial photograph view of the Clanwilliam Dam area: Dam East (DAME1a to DAME12) and Dam West (DAM1a to DAM8a), showing iconic artefacts



Map 9.1 Survey areas and site numbers in the Clanwilliam Dam area: Dam East (DAME13a to DAME14, and DAME25 to DAME26B) and Dam West (DAM8a to DAM12)

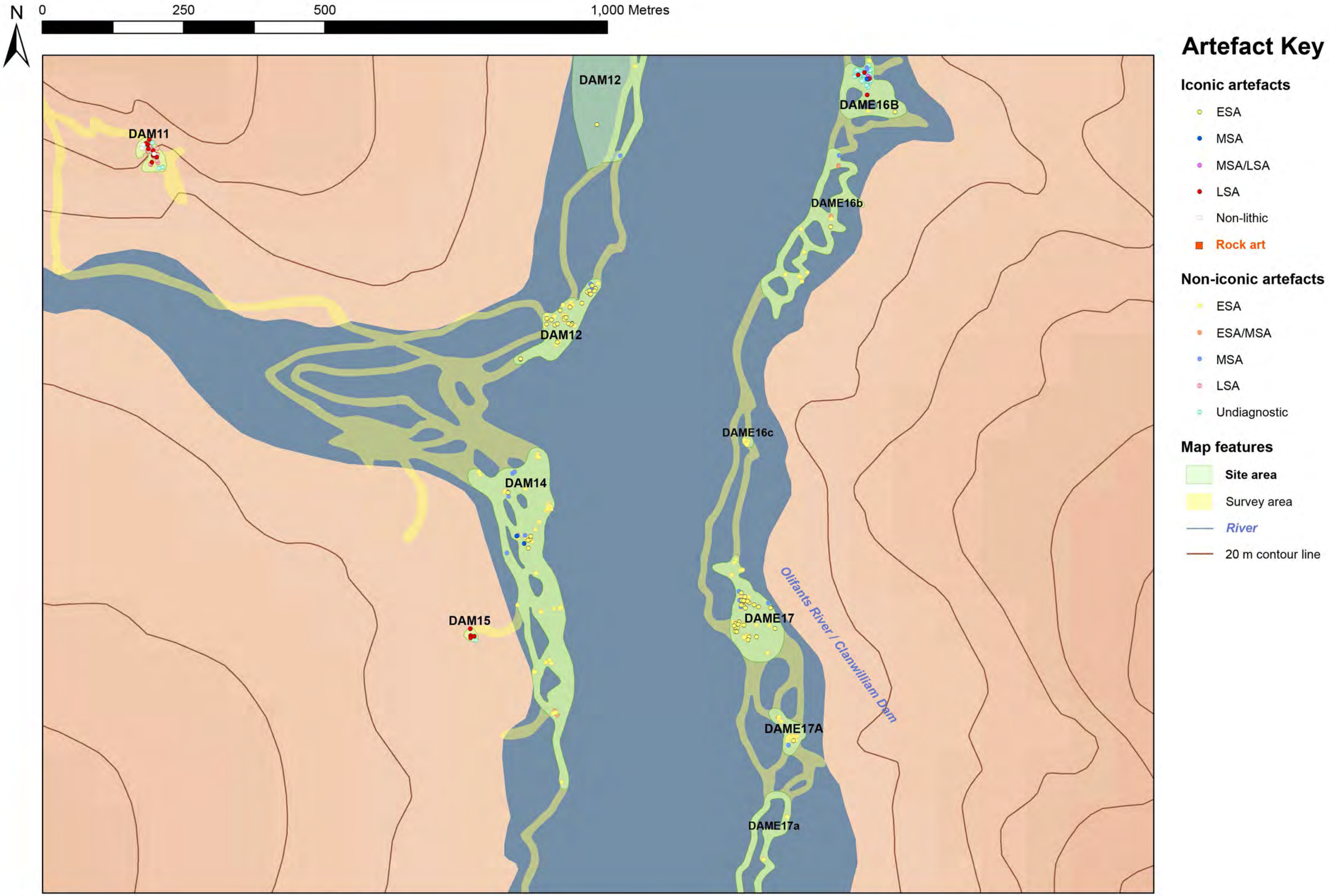


Map 9.2 Aerial photograph view of the Clanwilliam Dam area: Dam East (DAME13a to DAME14, and DAME25 to DAME26B) and Dam West (DAM8a to DAM12), showing iconic artefacts

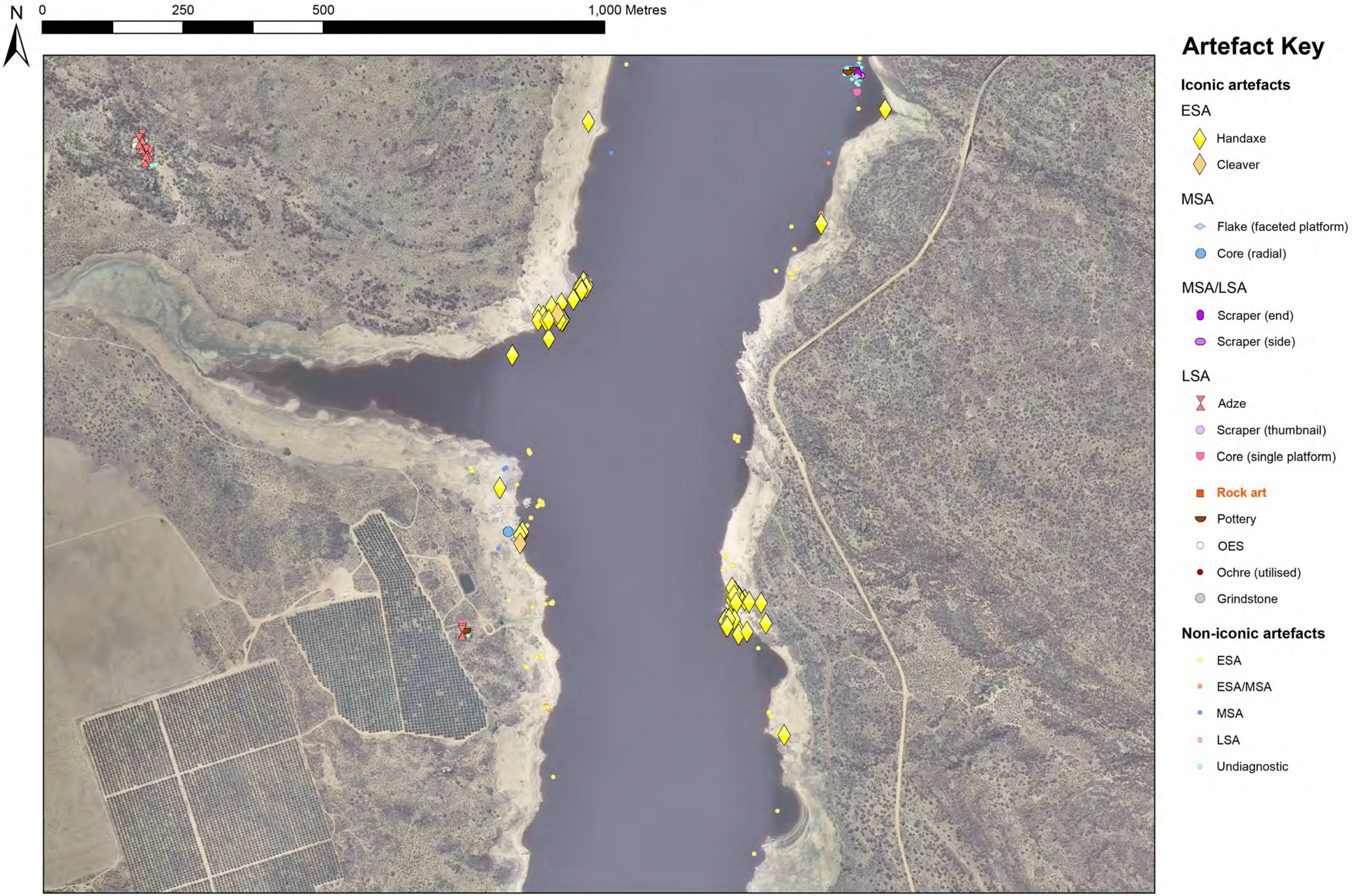


Map 10.1 Survey areas and site numbers in the Clanwilliam Dam area: Dam East (DAME15 to DAME16B, and DAME27) and Dam West (DAM12)

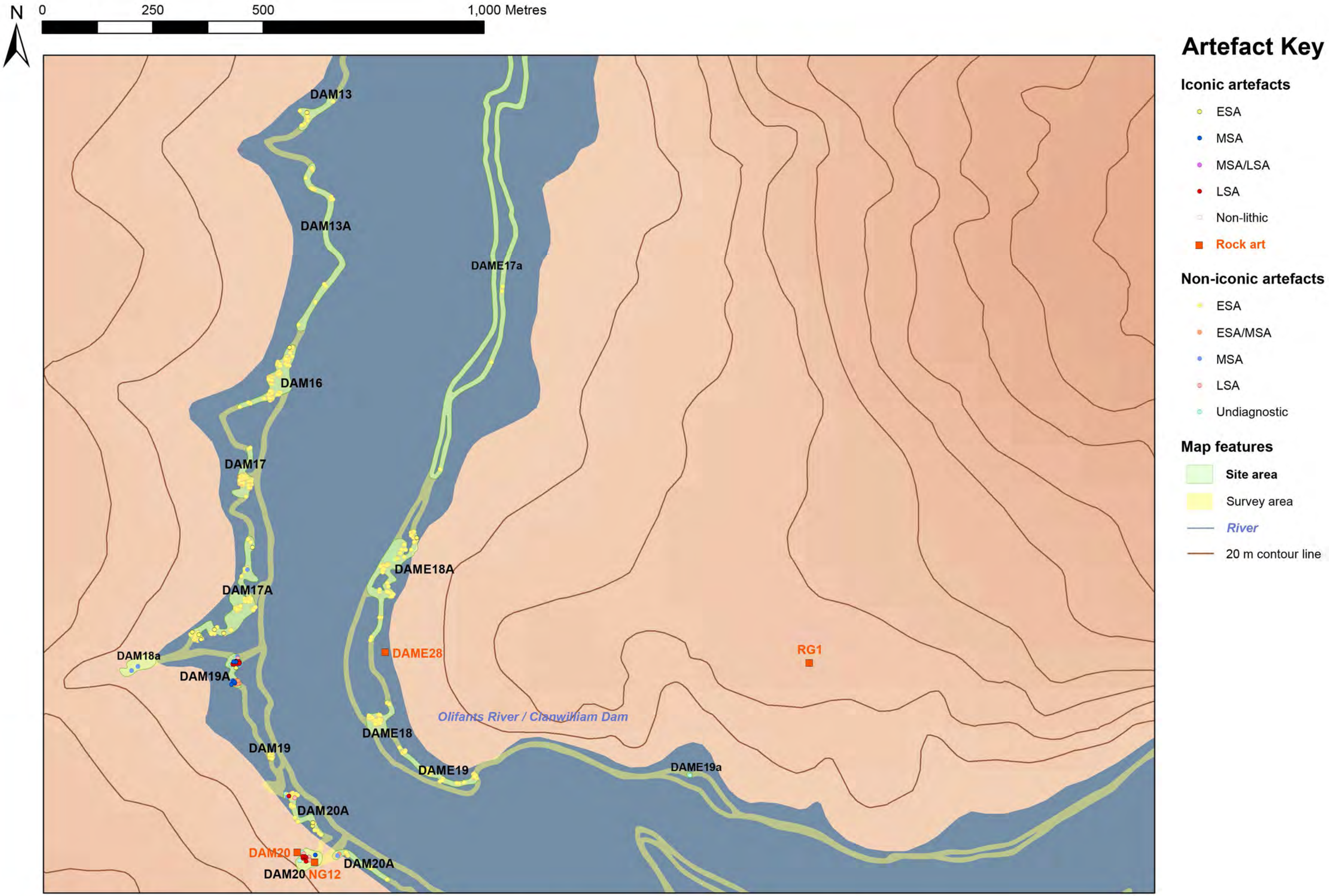
Map 10.2 Aerial photograph view of the Clanwilliam Dam area: Dam East (DAME15 to DAME16B, and DAME27) and Dam West (DAM12), showing iconic artefacts



Map 11.1 Survey areas and site numbers in the Clanwilliam Dam area: Dam East (DAME16B to DAME17a) and Dam West (DAM11 to DAM15)



Map 11.2 Aerial photograph view of the Clanwilliam Dam area: Dam East (DAME16B to DAME17a) and Dam West (DAM11 to DAM15), showing iconic artefacts

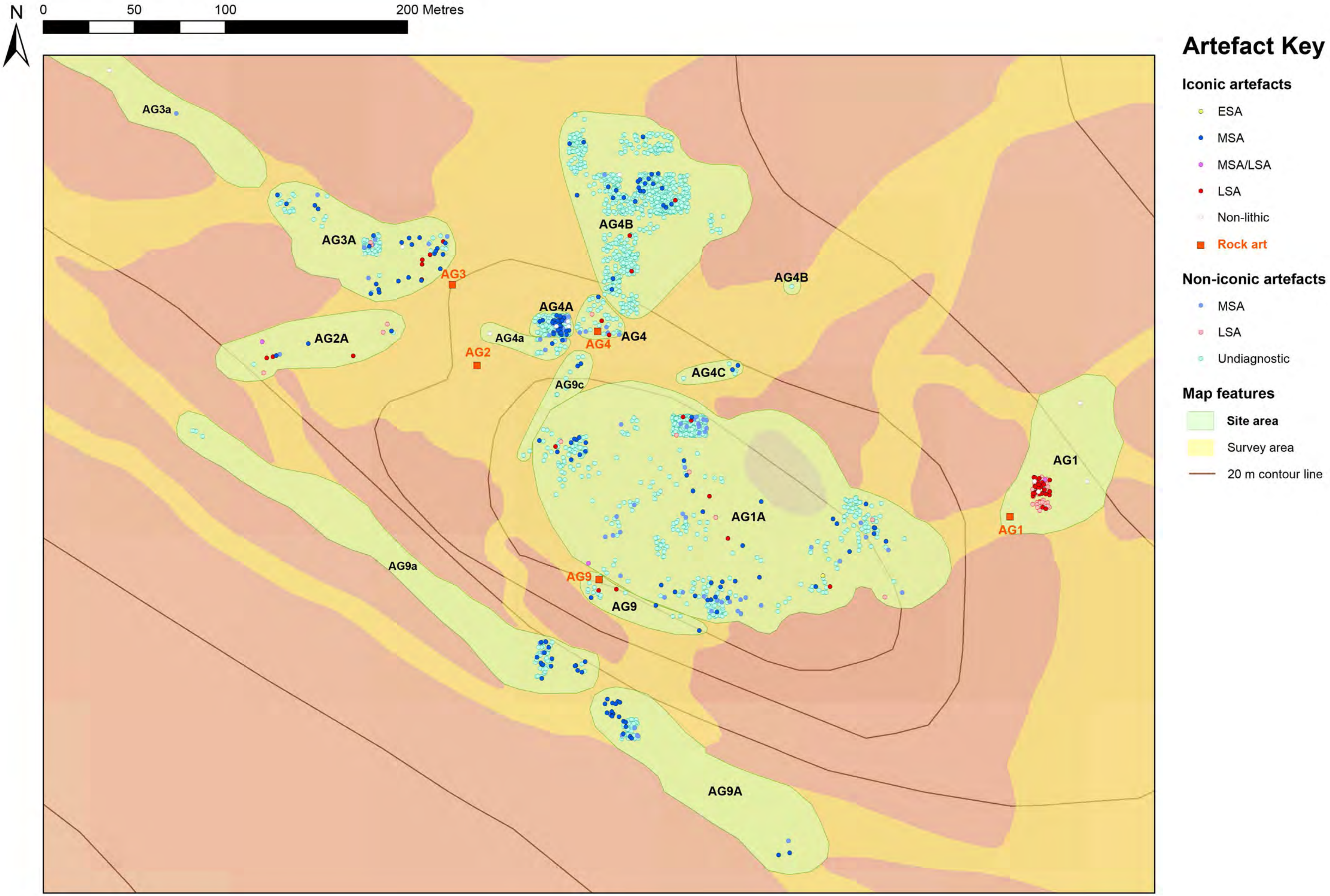


Map 12.1 Survey areas and site numbers in the Clanwilliam Dam area: Dam East (DAME17a to DAME19a) and Dam West (DAM13 to DAM20A)

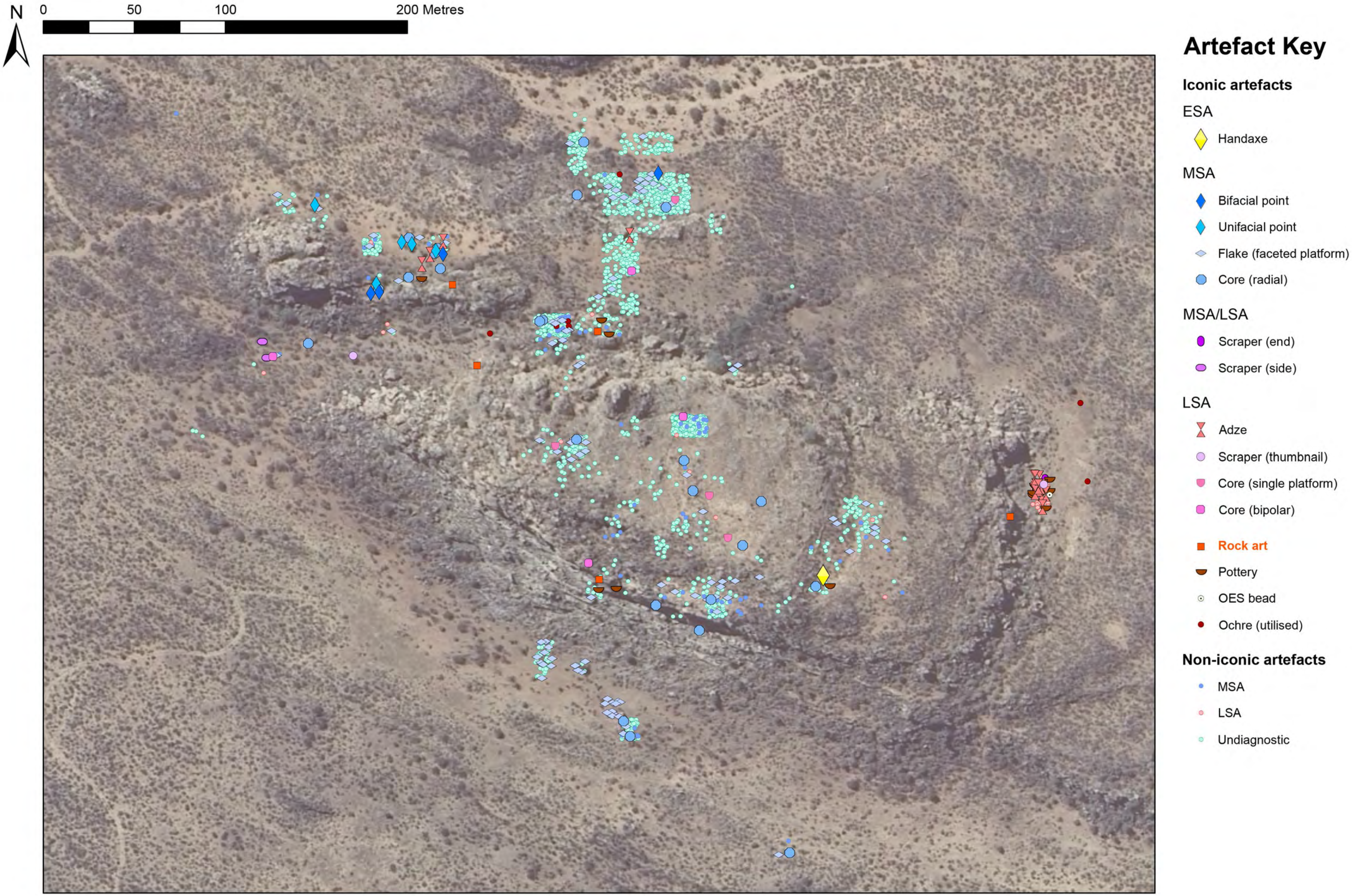
Map 12.2 Aerial photograph view of the Clanwilliam Dam area: Dam East (DAME17a to DAME19a) and Dam West (DAM13 to DAM20A), showing iconic artefacts

Map 13.1 Survey areas and site numbers in the Clanwilliam Dam area: Dam East (DAME20A to DAME20a) and Dam West (DAM20 to DAM21C)

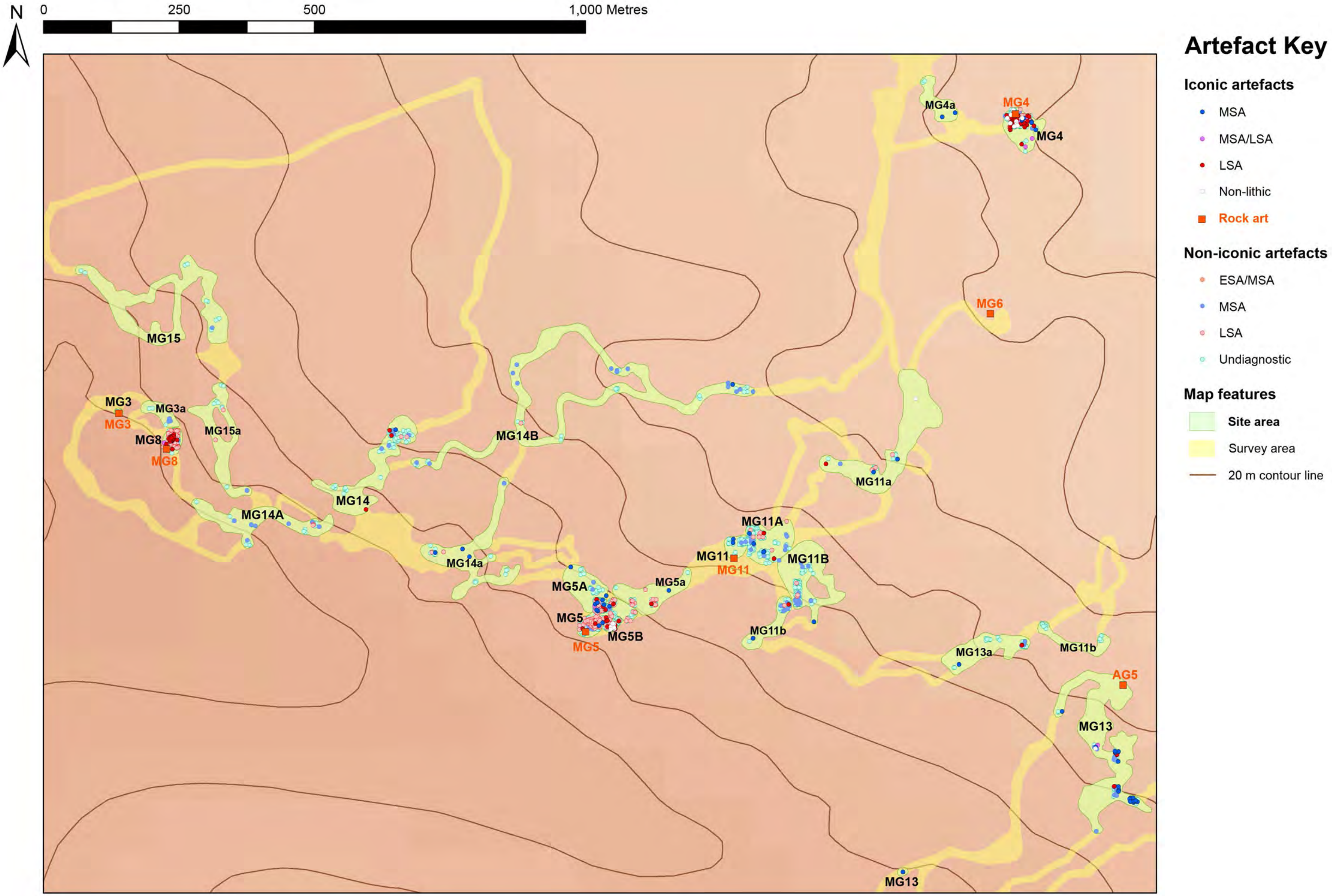
Map 13.2 Aerial photograph view of the Clanwilliam Dam area: Dam East (DAME20A to DAME20a) and Dam West (DAM20 to DAM21C), showing iconic artefacts



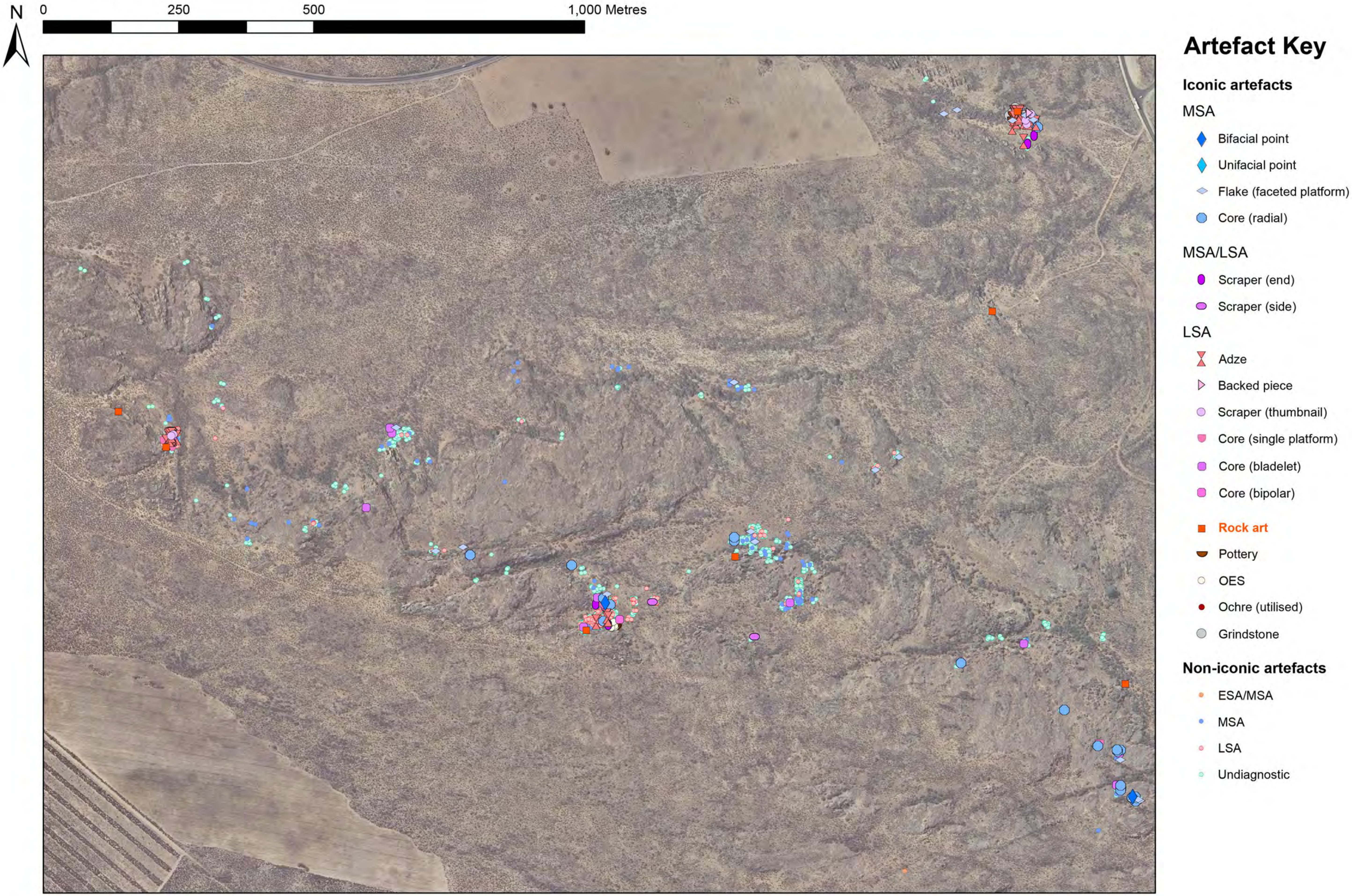
Map 14.1 Survey areas and site numbers in the Andriesgrond area (AG1 to AG9A)



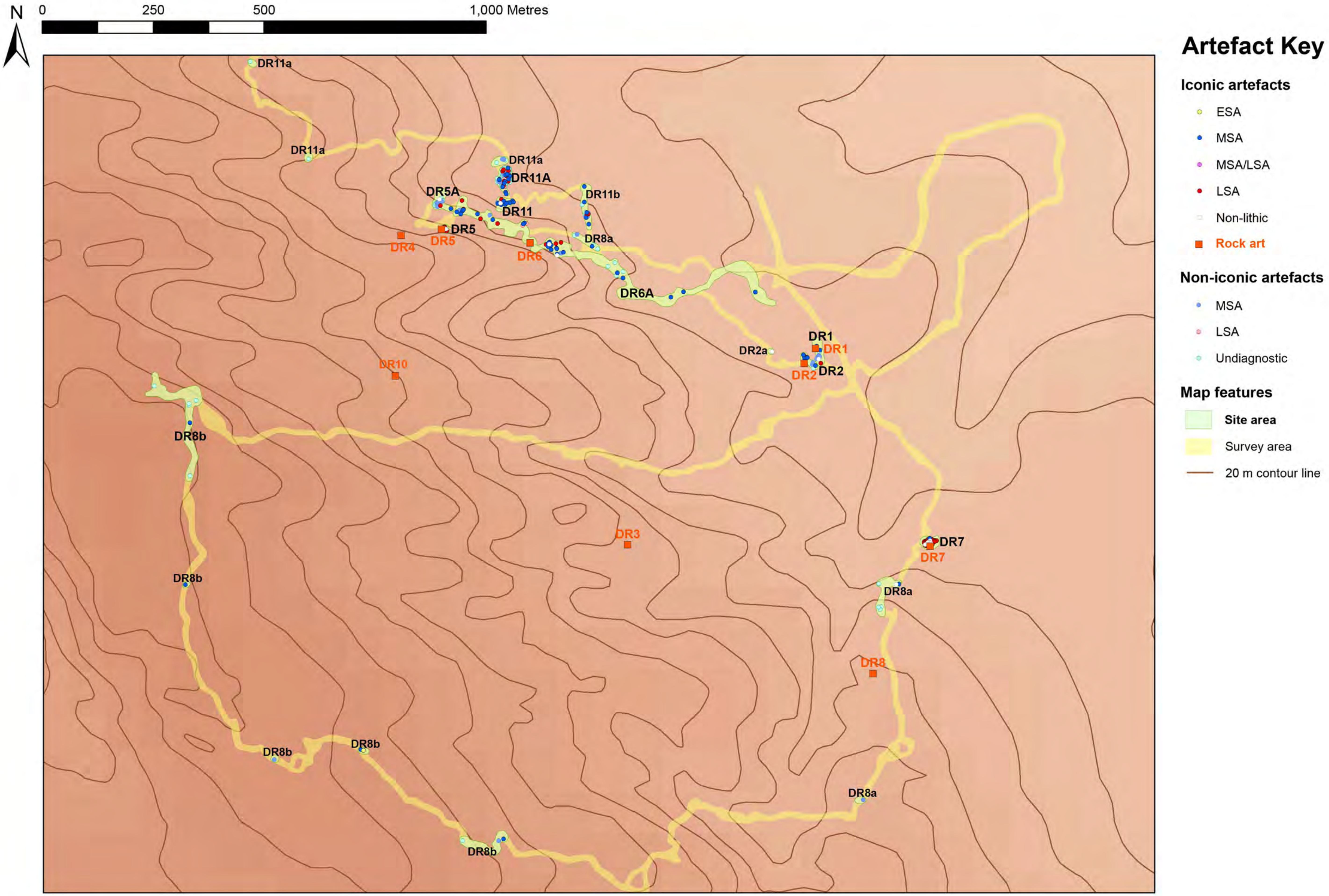
Map 14.2 Aerial photograph view of the Andriesgrond area (AG1 to AG9A), showing iconic artefacts



Map 15.1 Survey areas and site numbers in the Malgashoek area (MG3 to MG15a)

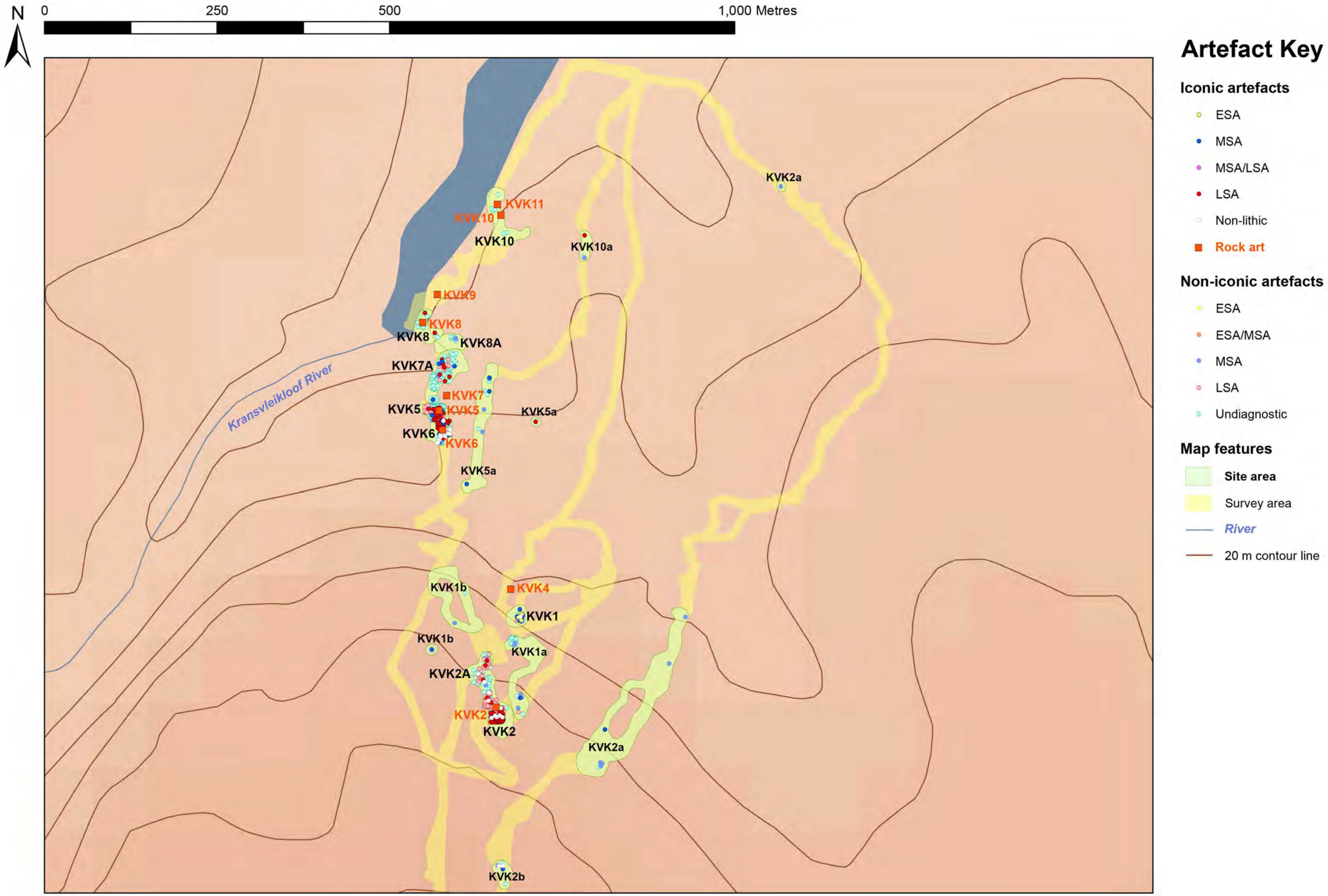


Map 15.2 Aerial photograph view of the Malgashoek area (MG3 to MG15a), showing iconic artefacts

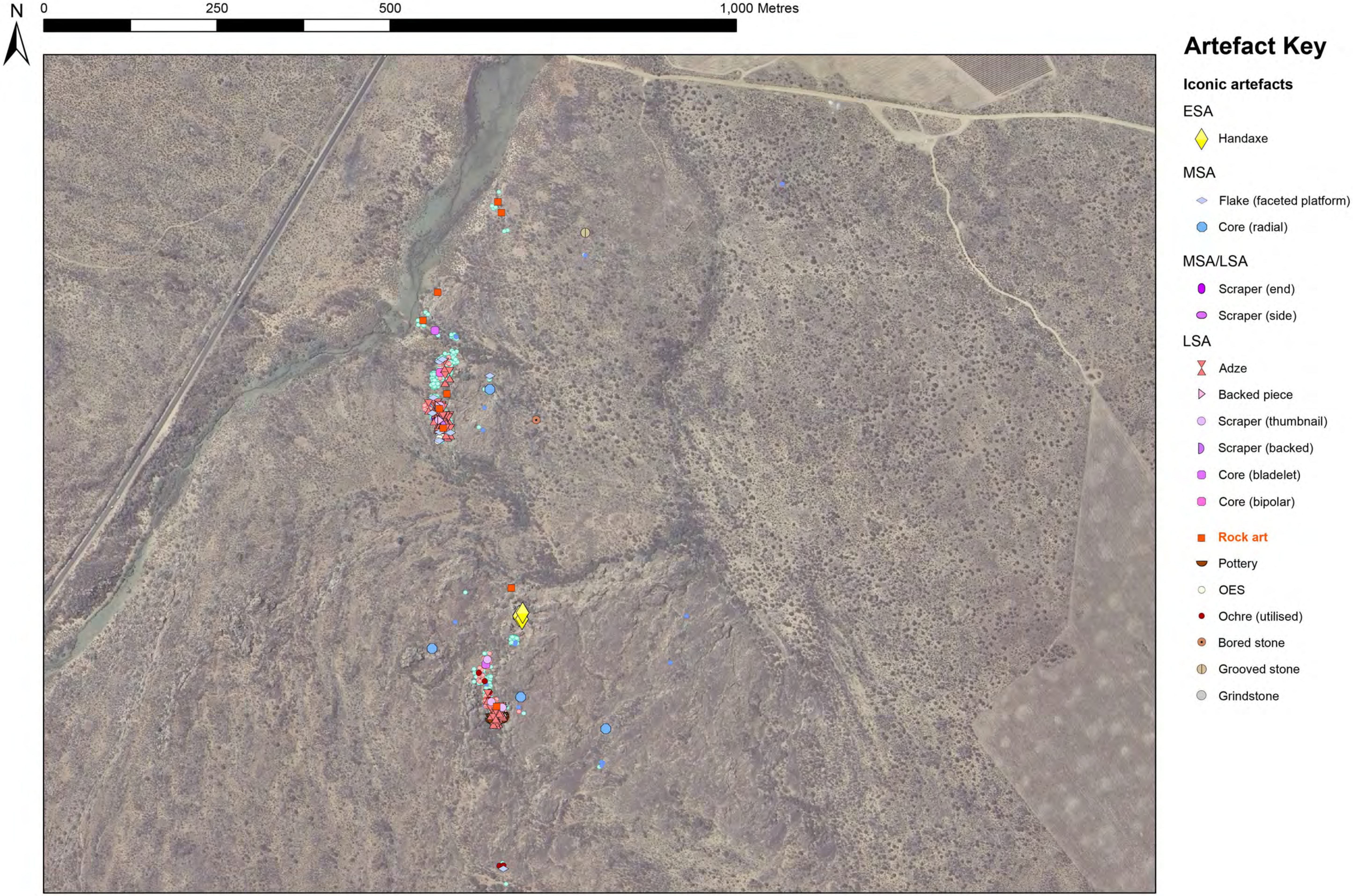


Map 16.1 Survey areas and site numbers in the Driehoek area (DR1 to DR11b)

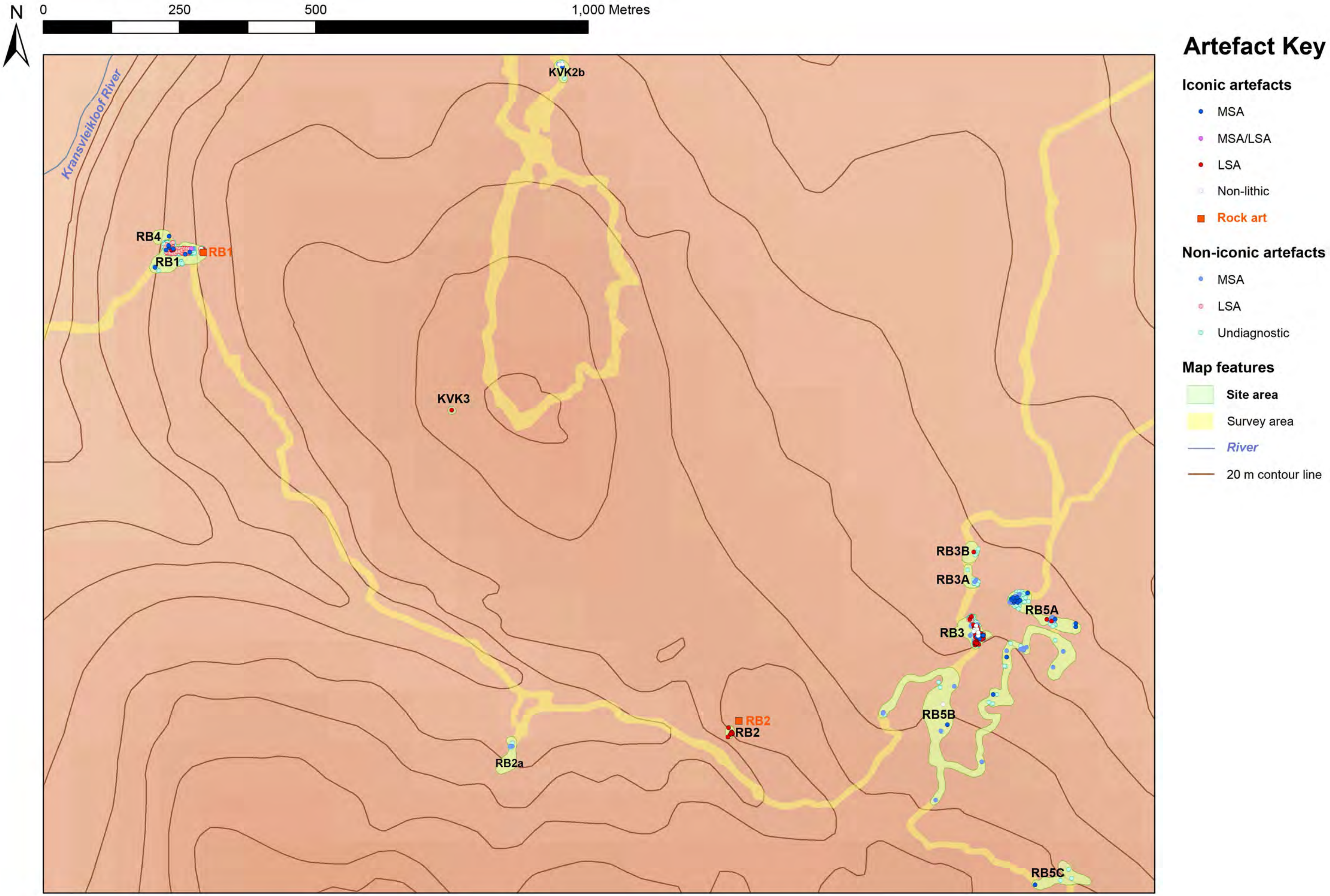
Map 16.2 Aerial photograph view of the Driehoek area (DR1 to DR11b), showing iconic artefacts



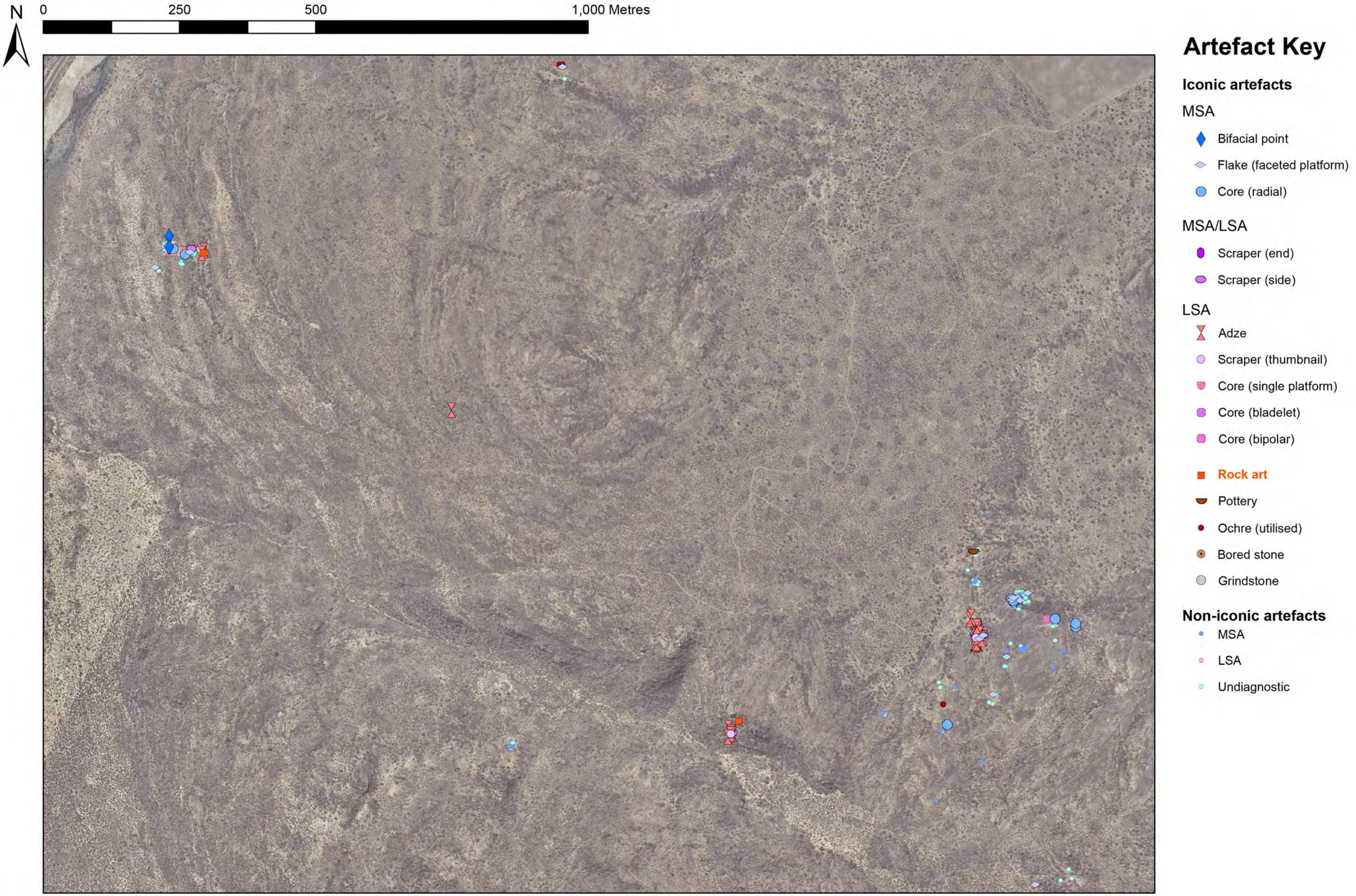
Map 17.1 Survey areas and site numbers in the Kransvleikloof area (KVK1 to KVK11)



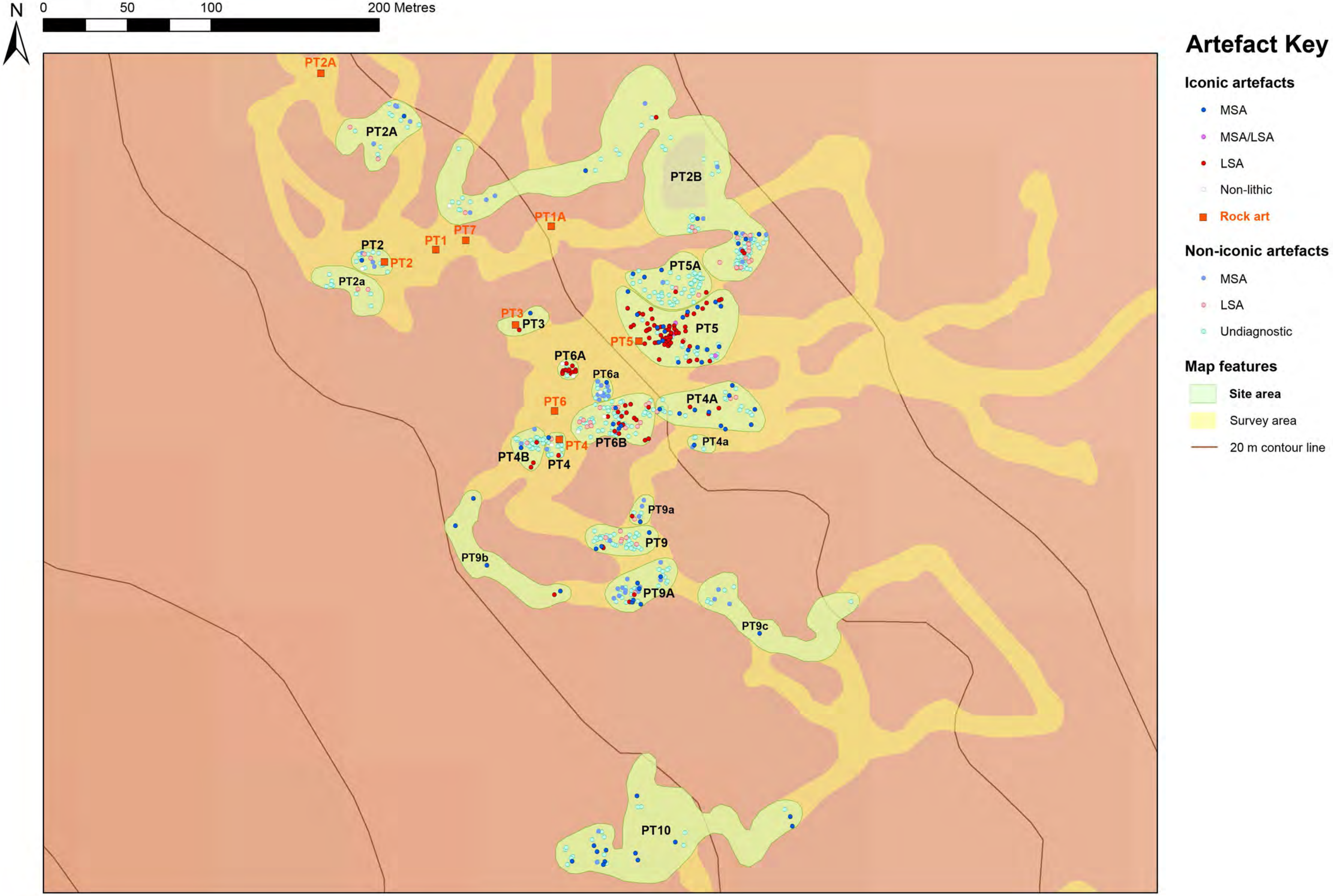
Map 17.2 Aerial photograph view of the Kransvleikloof area (KVK1 to KVK11), showing iconic artefacts



Map 18.1 Survey areas and site numbers in the Renbaan area (RB1 to RB5C and KVK2b to KVK3)

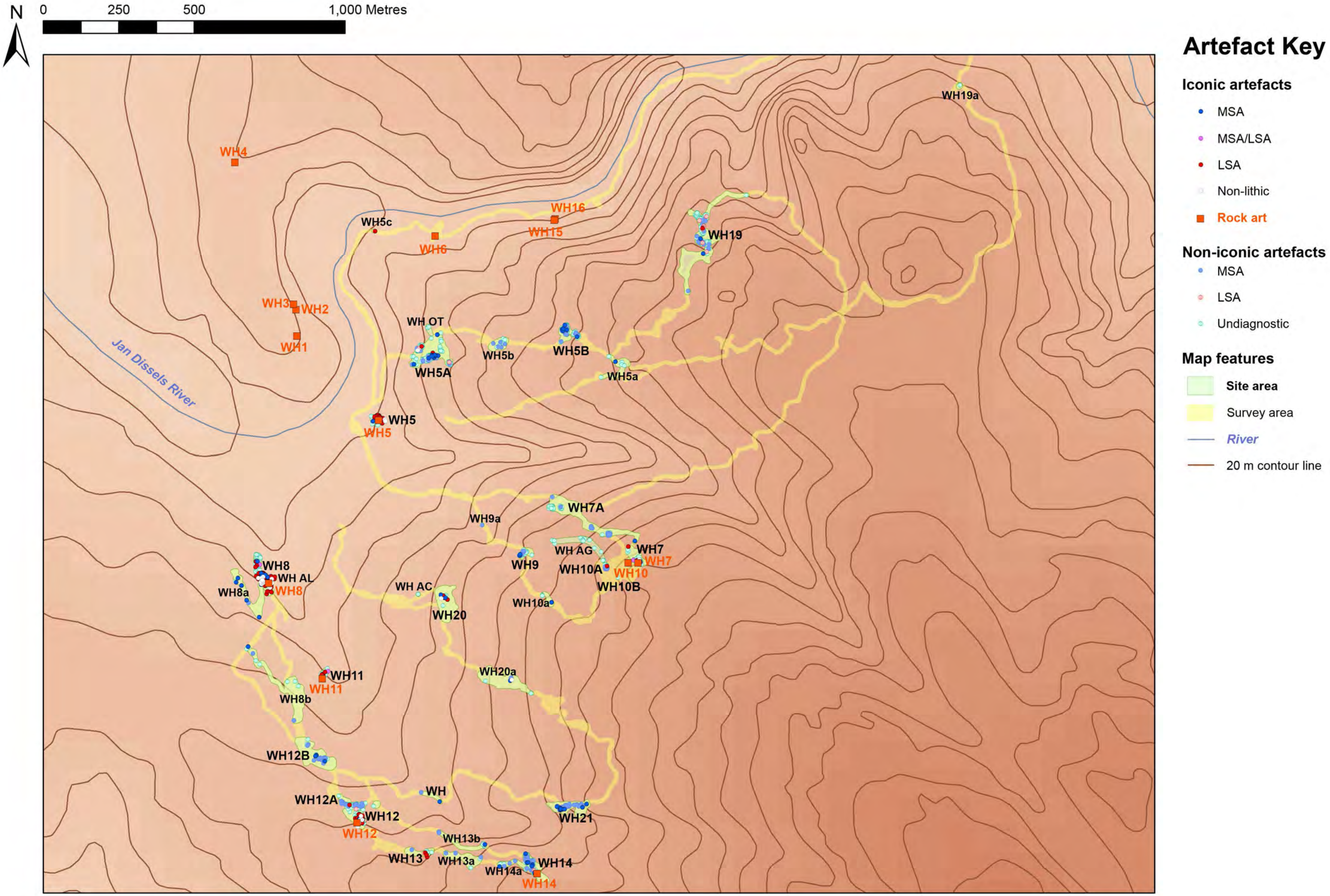


Map 18.2 Aerial photograph view of the Renbaan area (RB1 to RB5C and KVK 2b to KVK3), showing iconic artefacts

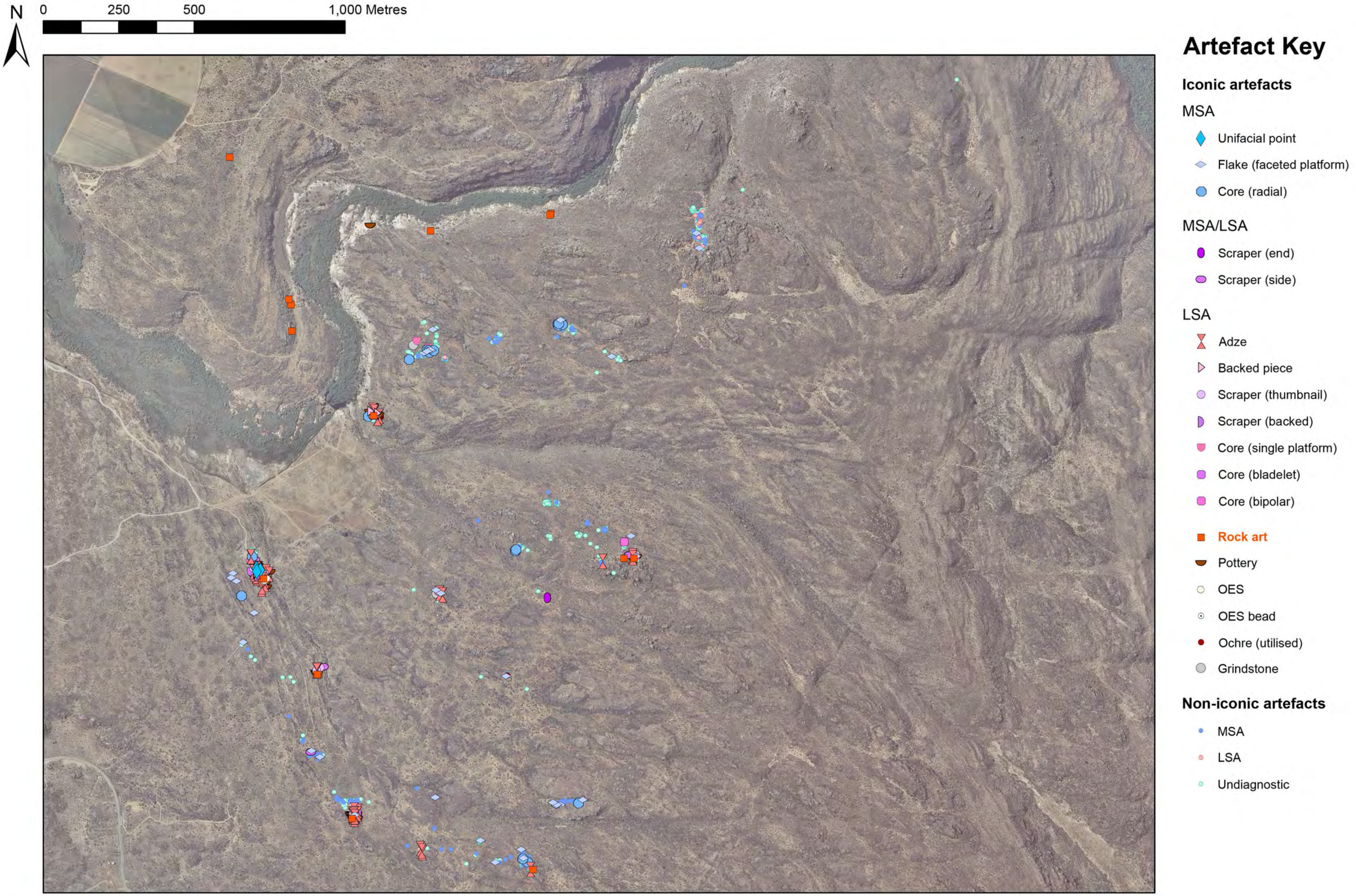


Map 19.1 Survey areas and site numbers in the Puts area (PT1 to PT10)

Map 19.2 Aerial photograph view of the Puts area (PT1 to PT10), showing iconic artefacts



Map 20.1 Survey areas and site numbers in the Warmhoek area (WH1 to WH21)

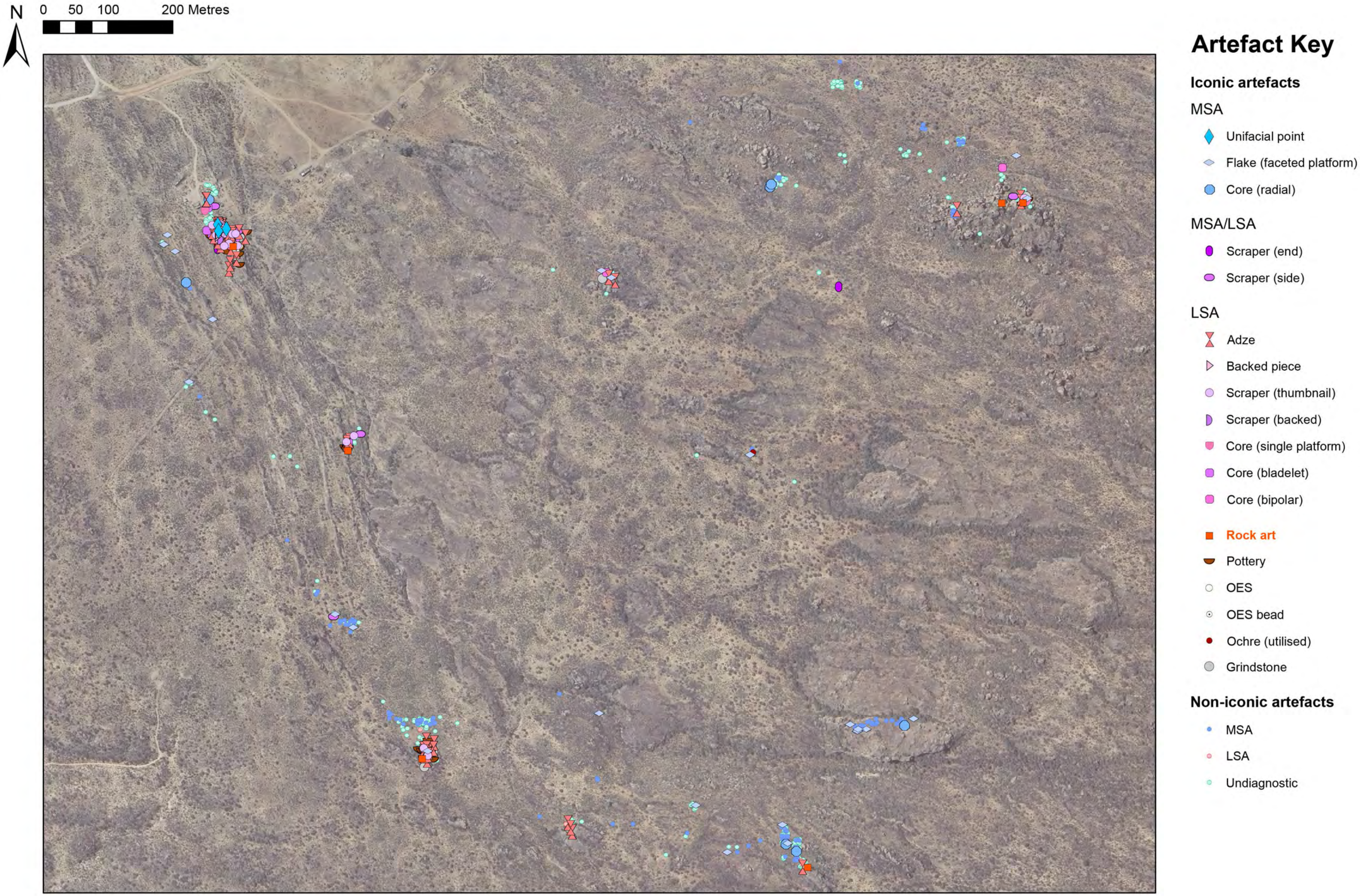


Map 20.2 Aerial photograph view of the Warmhoek area (WH1 to WH21), showing iconic artefacts

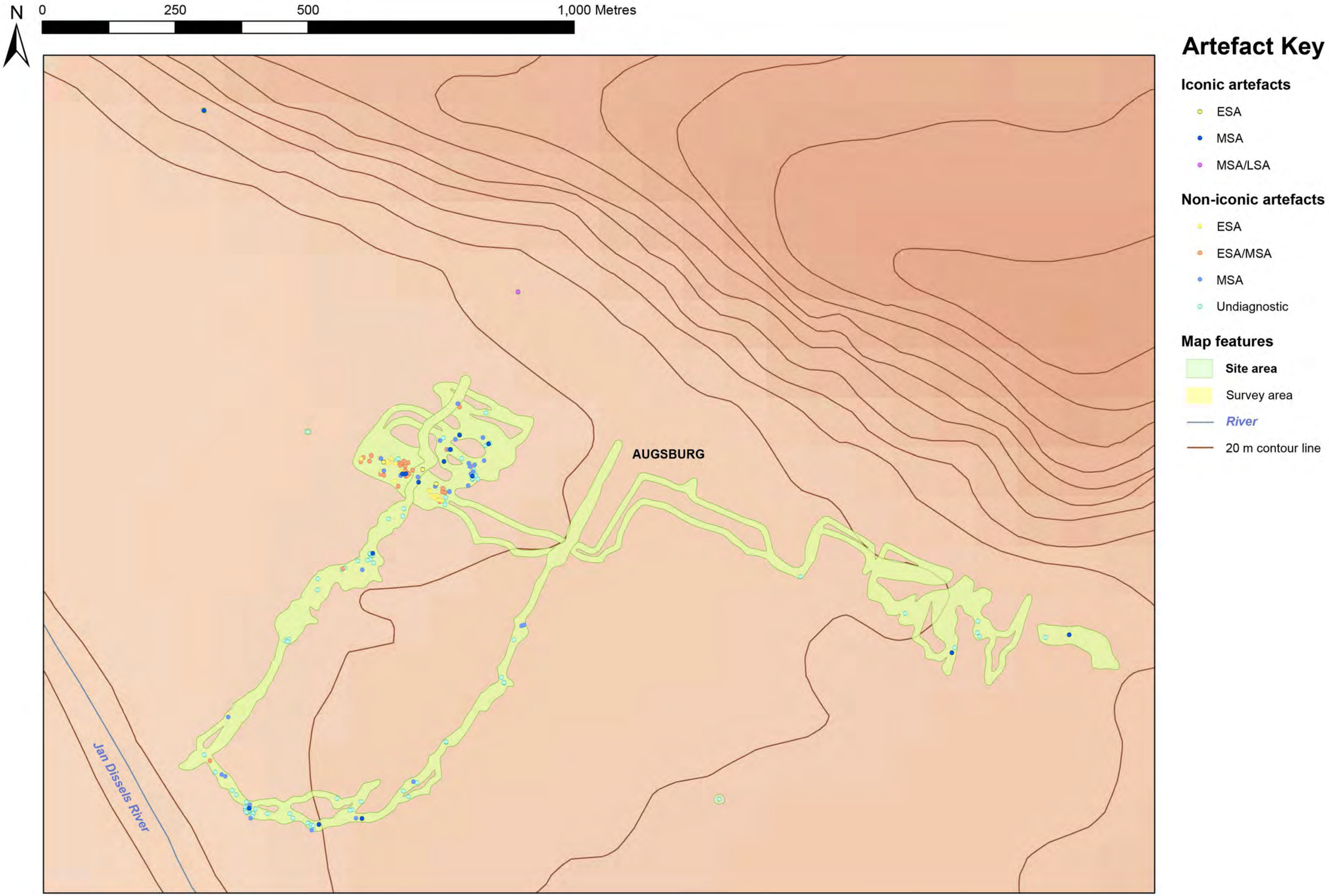
Map 20.3 Survey areas and site numbers in the northern Warmhoek area, enlarged (WH5 to WH19)

Map 20.4 Aerial photograph view of the northern Warmhoek area, enlarged (WH5 to WH19), showing iconic artefacts

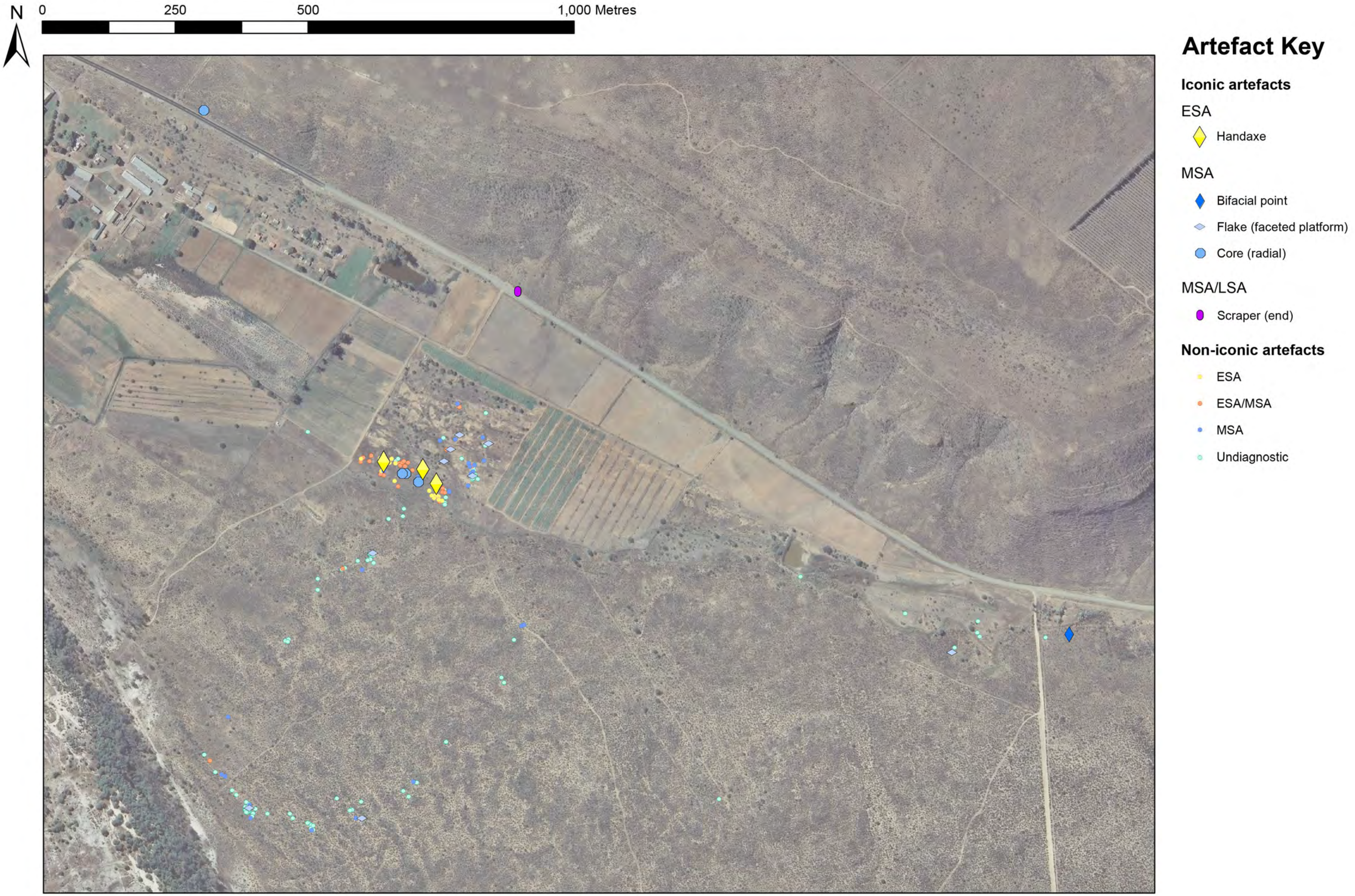
Map 20.5 Survey areas and site numbers in the southern Warmhoek area, enlarged (WH7 to WH21)



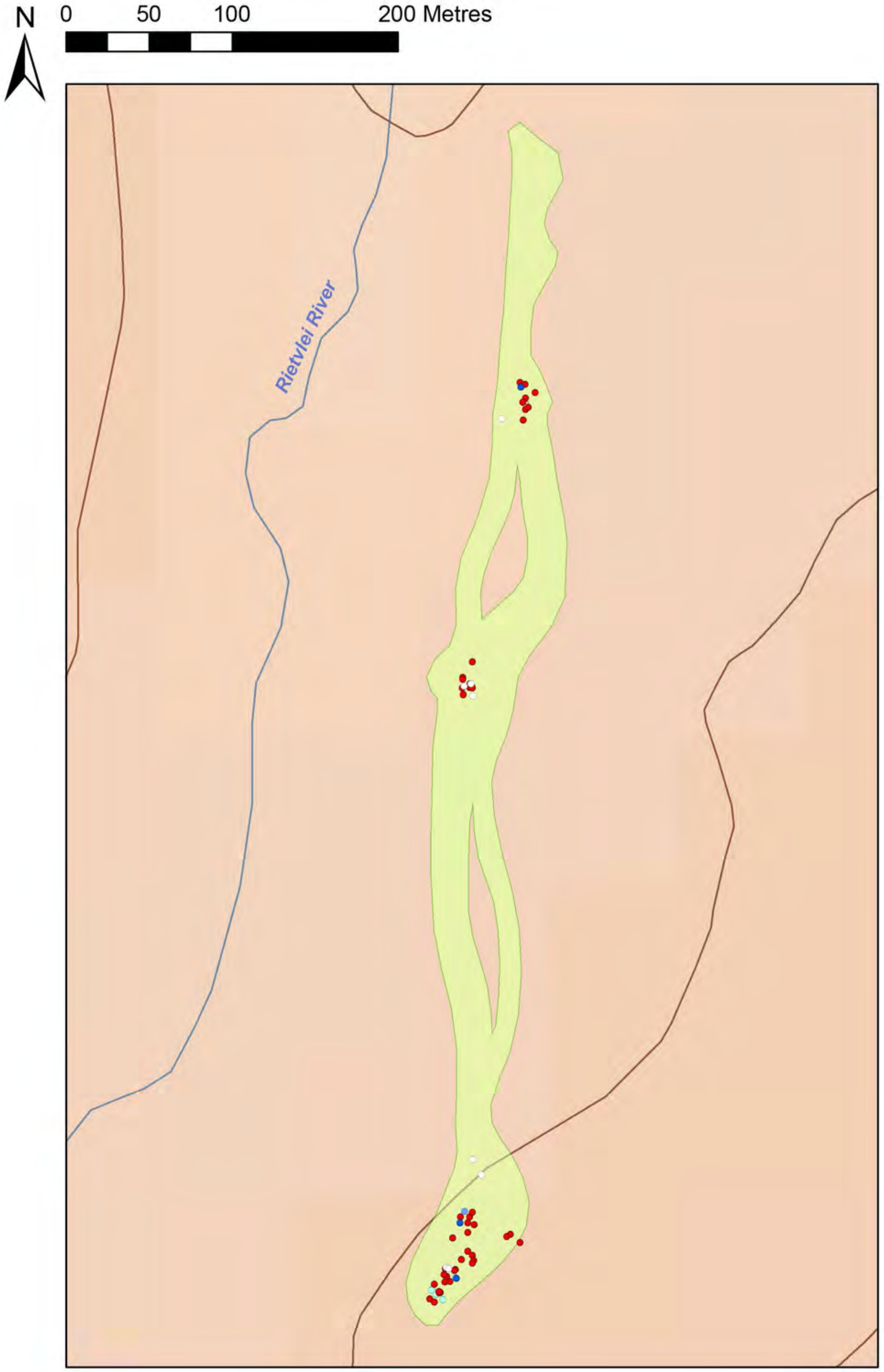
Map 20.6 Aerial photograph view of the southern Warmhoek area, enlarged (WH7 to WH21), showing iconic artefacts



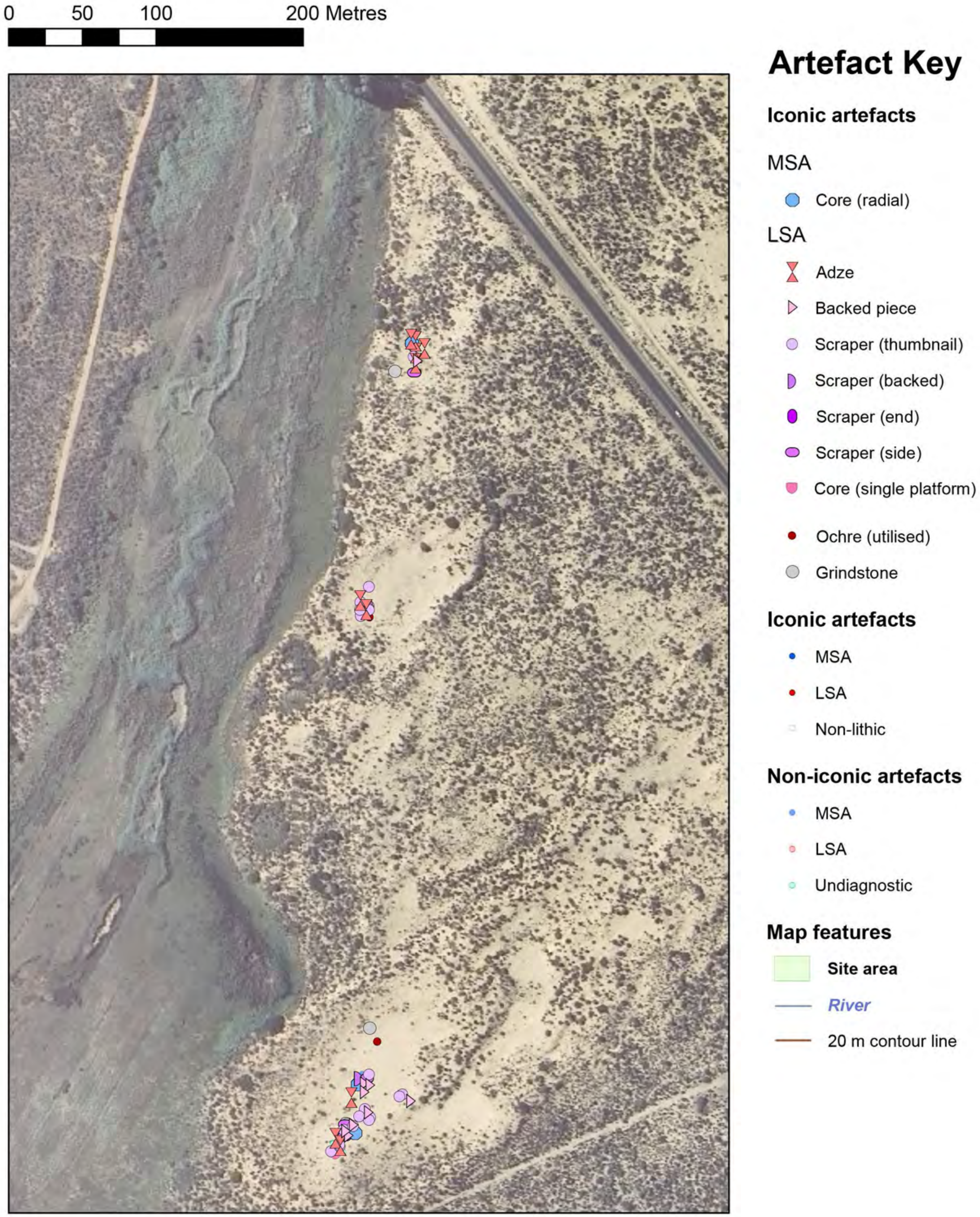
Map 21.1 Survey area at Augsburg



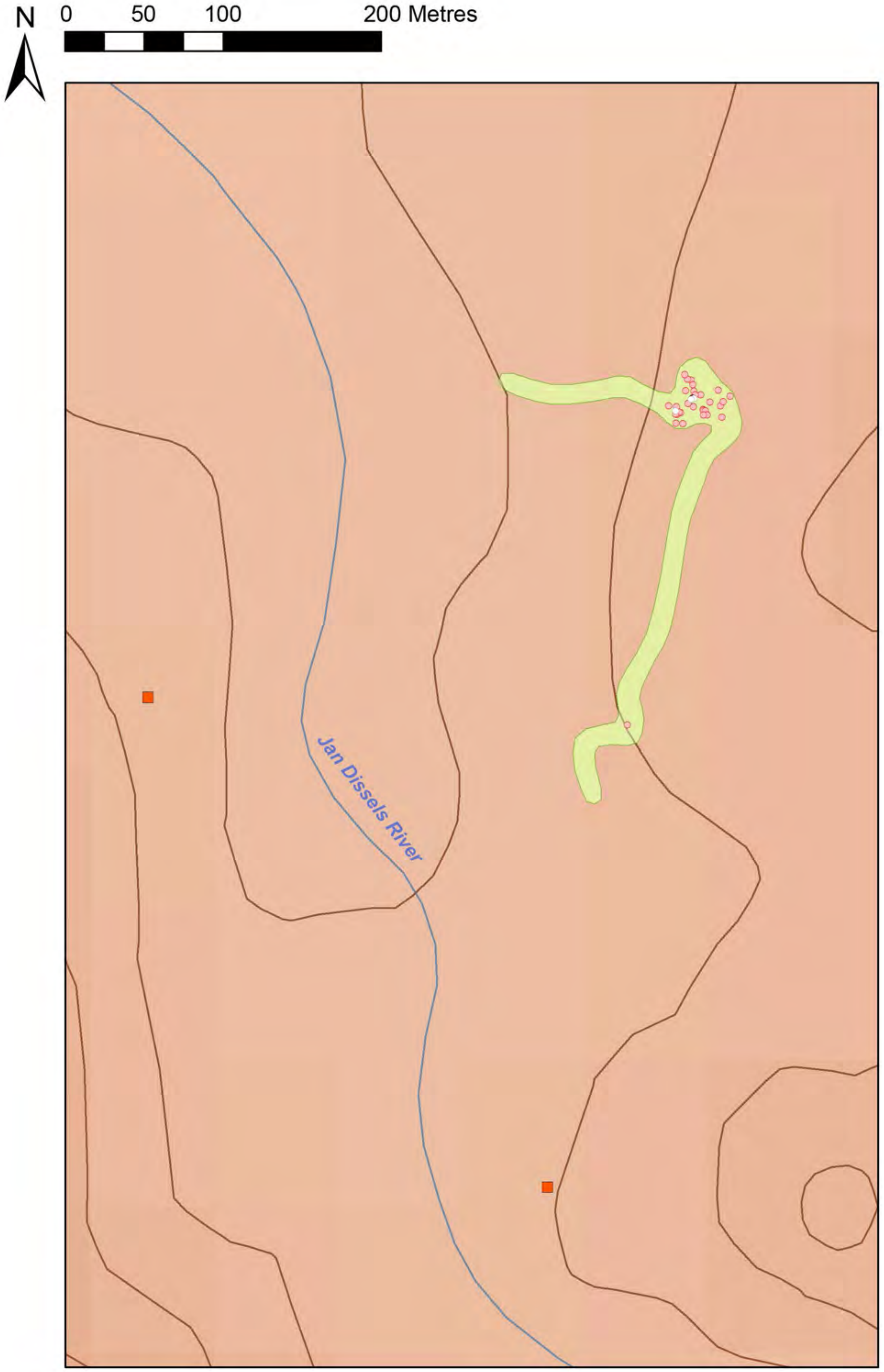
Map 21.2 Aerial photograph view of Augsburg, showing iconic artefacts



Map 22.1 Survey area at Rietvlei



Map 22.2 Aerial photograph view of Rietvlei, showing iconic artefacts



Map 23.1 Survey area at Dwarsrivier (DWR7)

Artefact Key

Iconic artefacts

LSA

- Rock art
- Grindstone
- Non-lithic

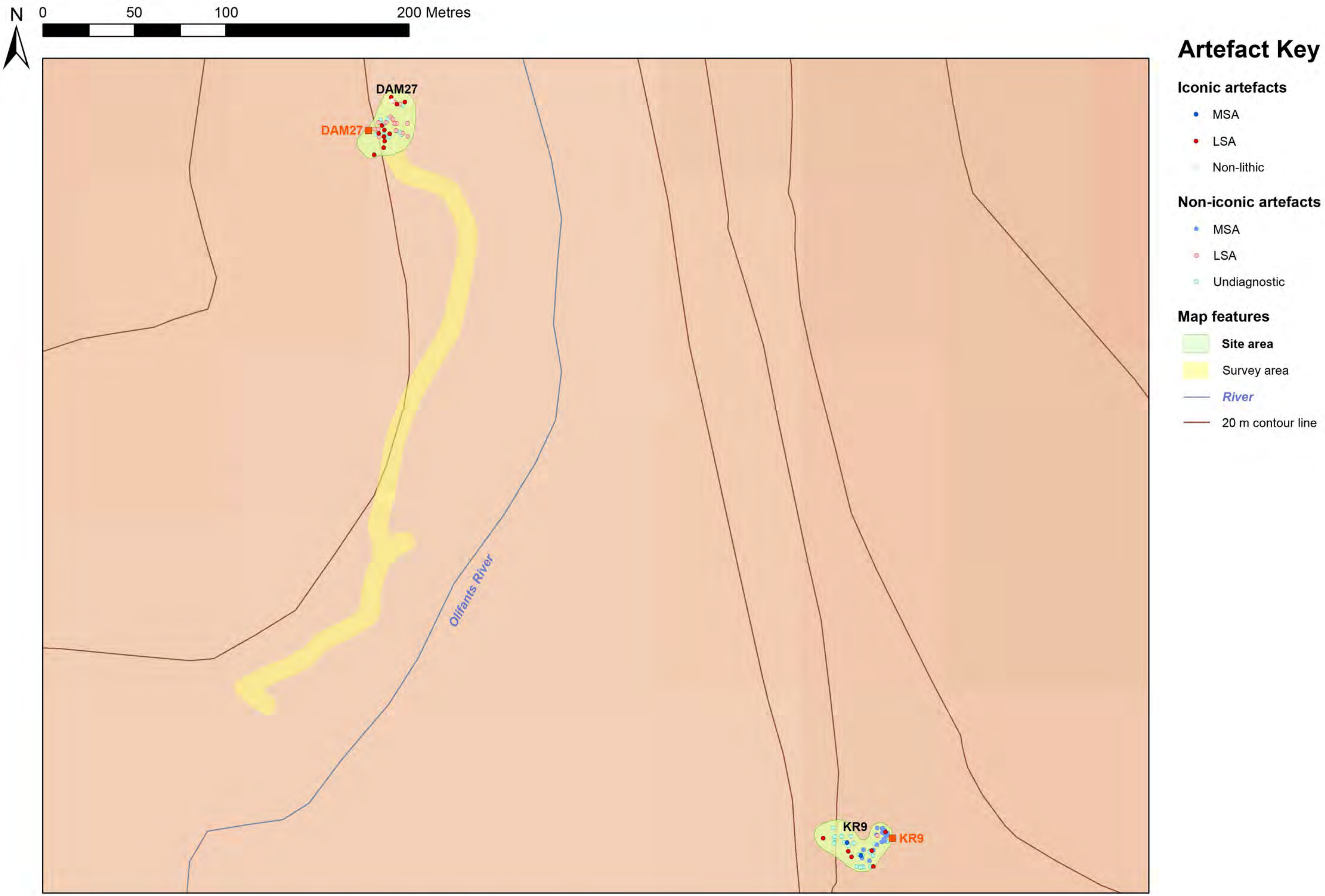
Non-iconic artefacts

- LSA

Map features

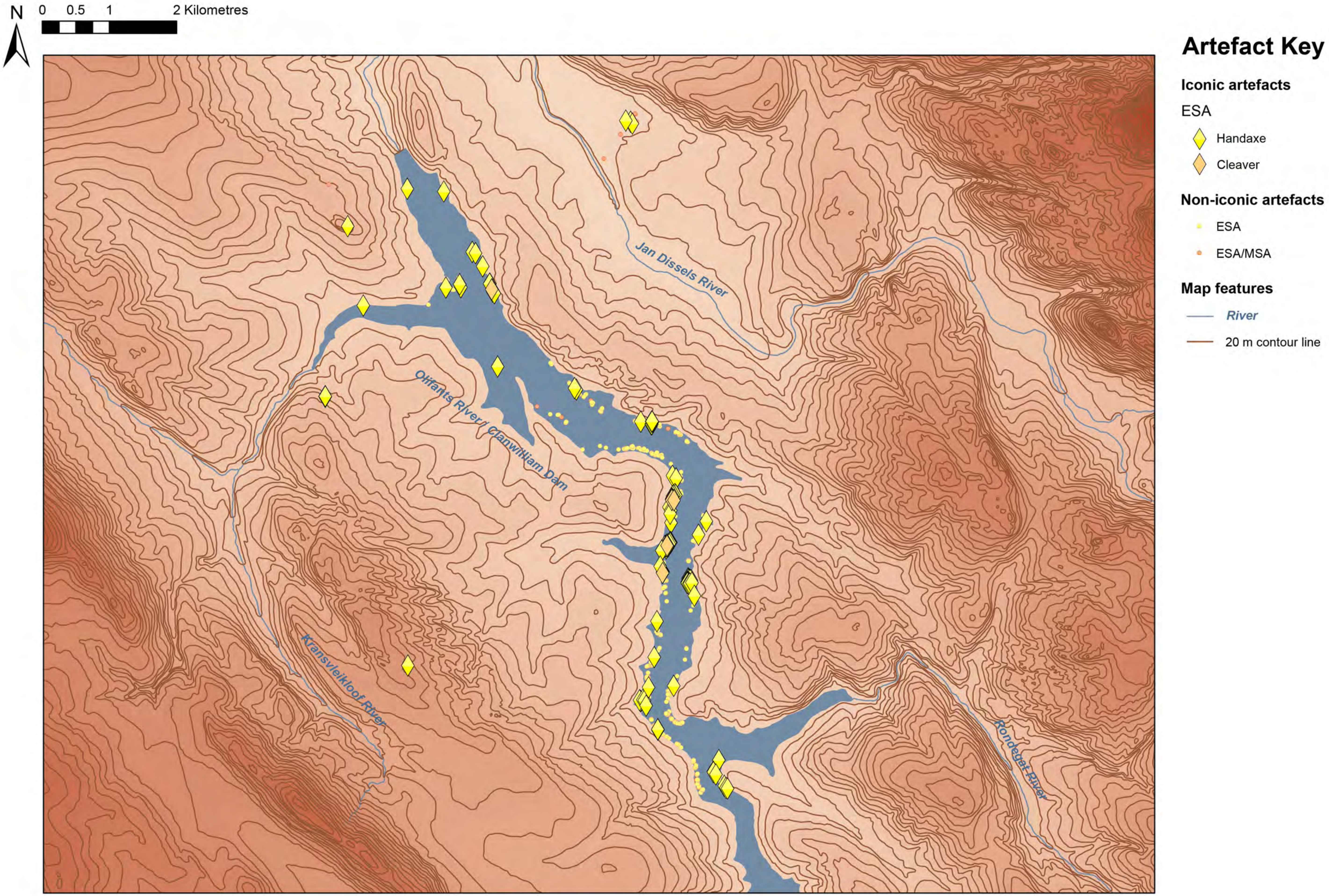
- Site area
- River
- 20 m contour line

Map 23.2 Aerial photograph view of Dwarsrivier (DWR7), showing iconic artefacts

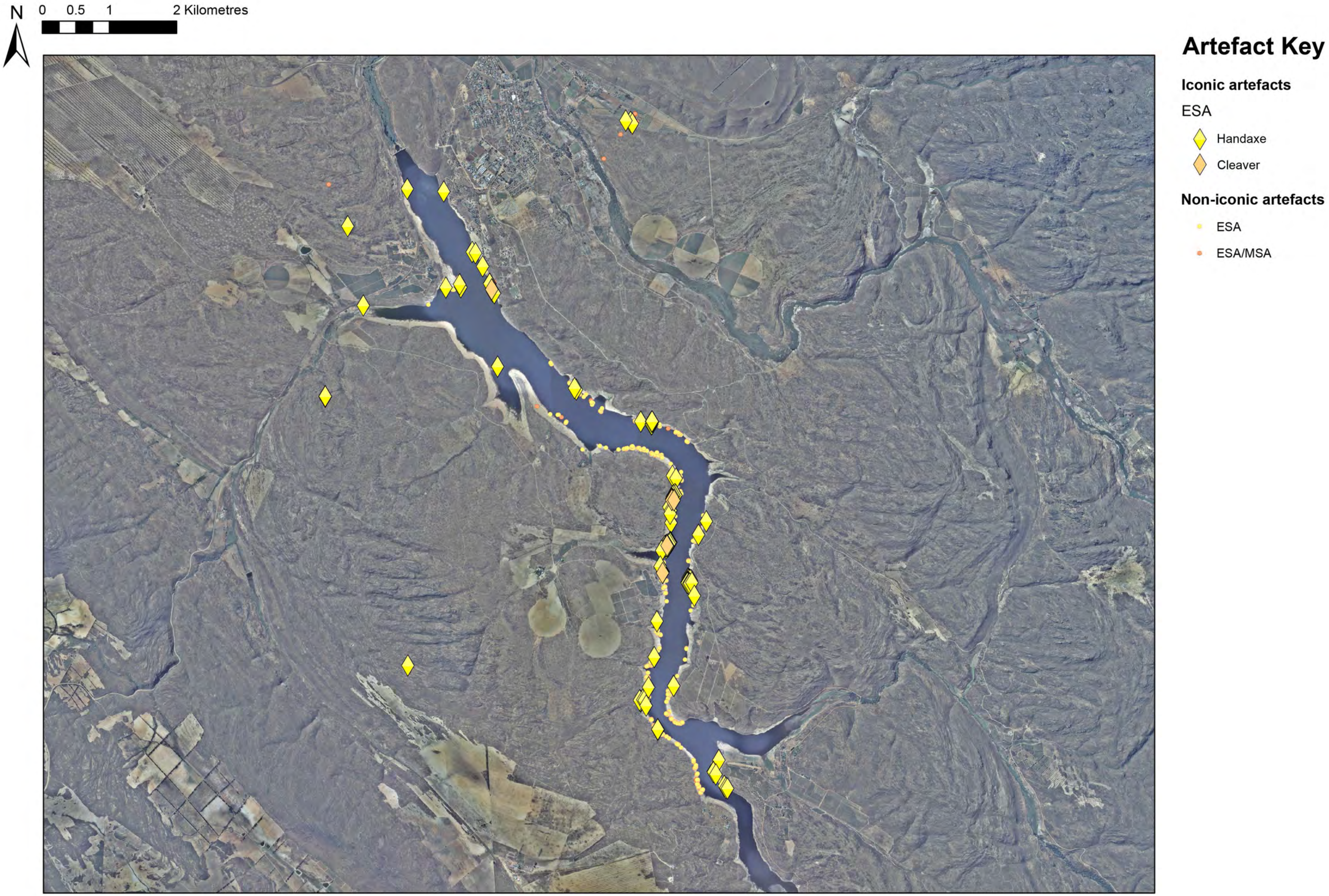


Map 24.1 Survey areas and site numbers in the Kriedouwkrantz area (DAME27 and KR9)

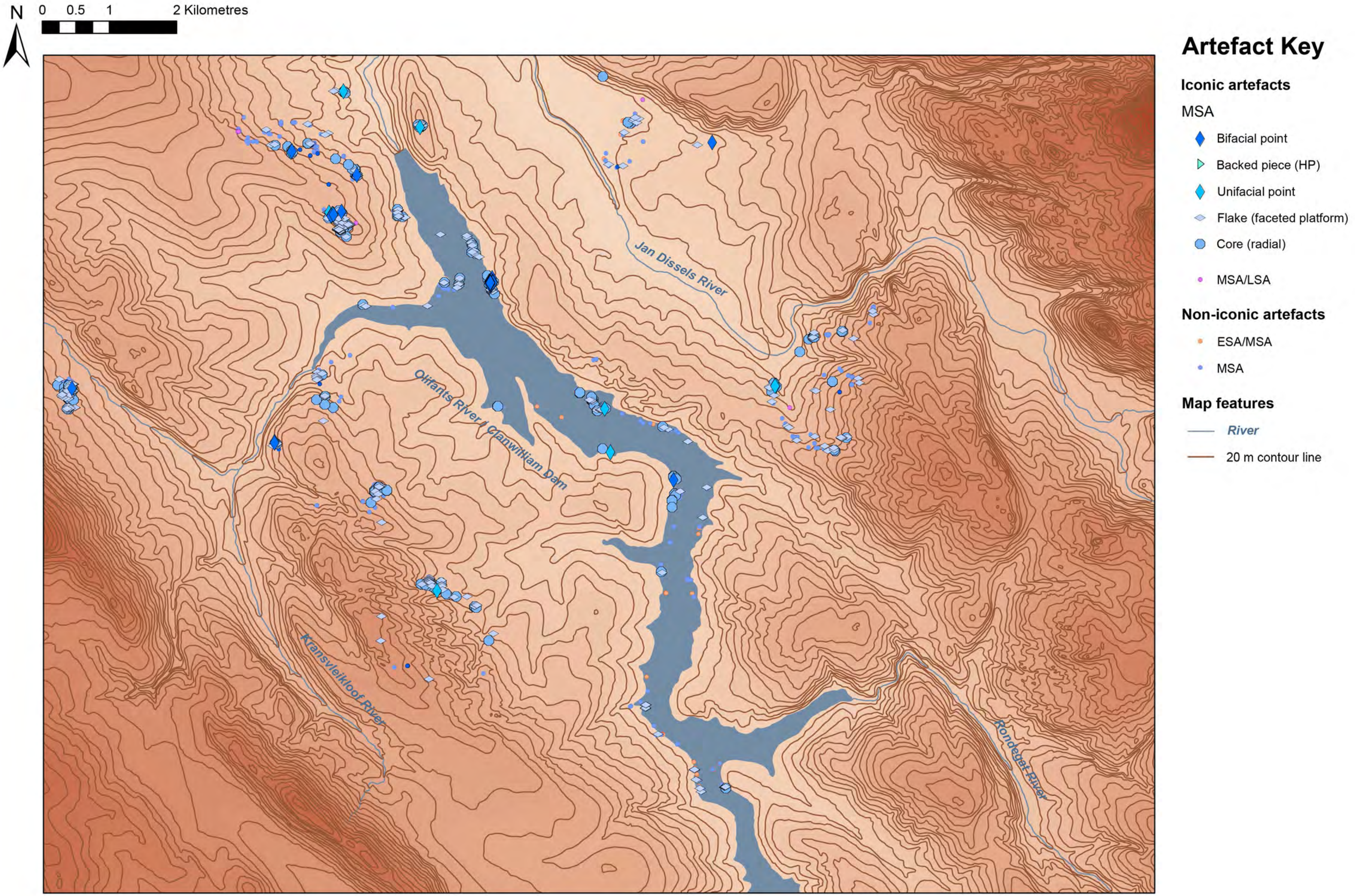
Map 24.2 Aerial photograph view of the Kriedouwkrantz area (DAME27 and KR9), showing iconic artefacts



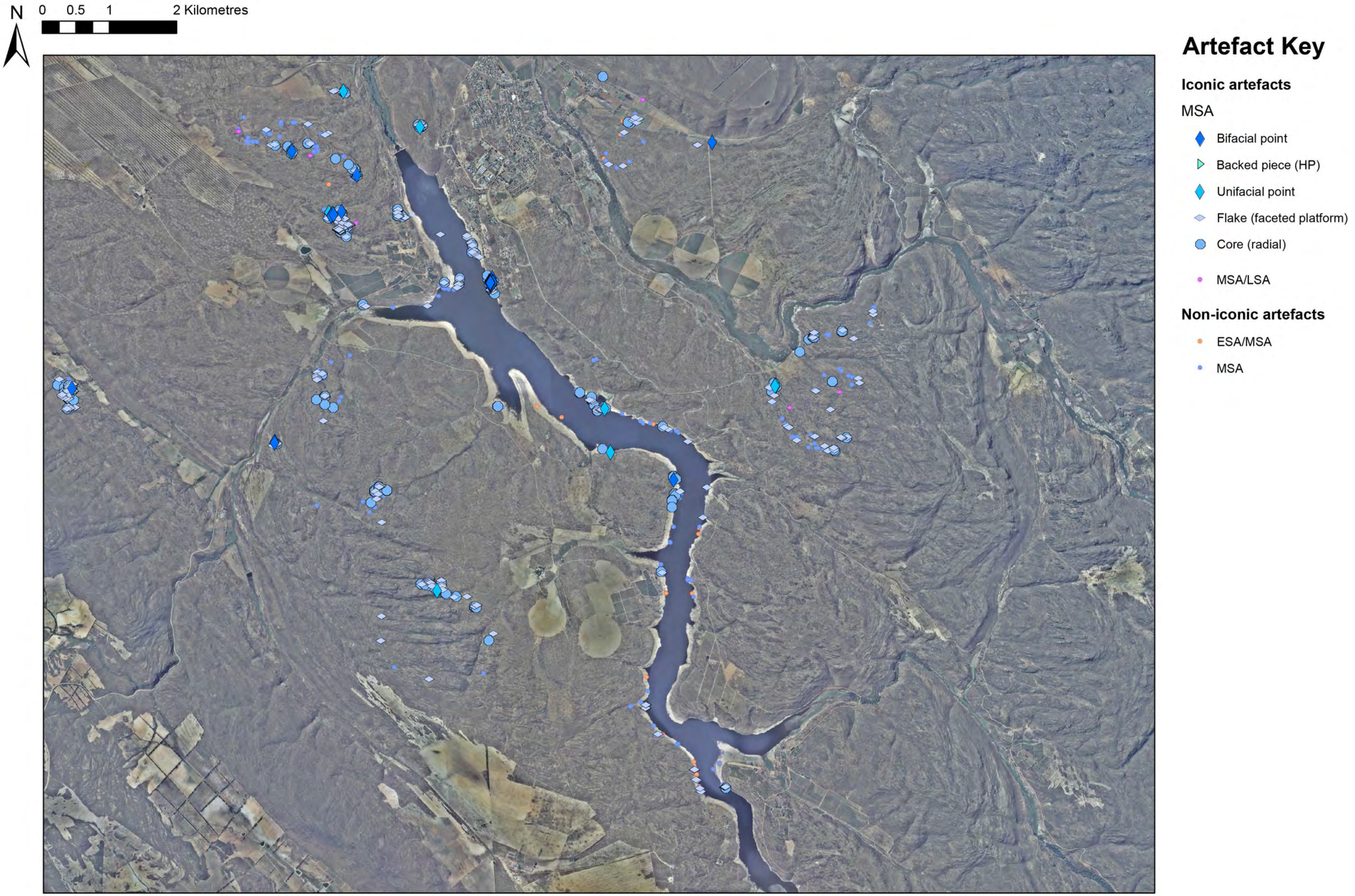
Map 25.1 ESA artefact distribution in the study area



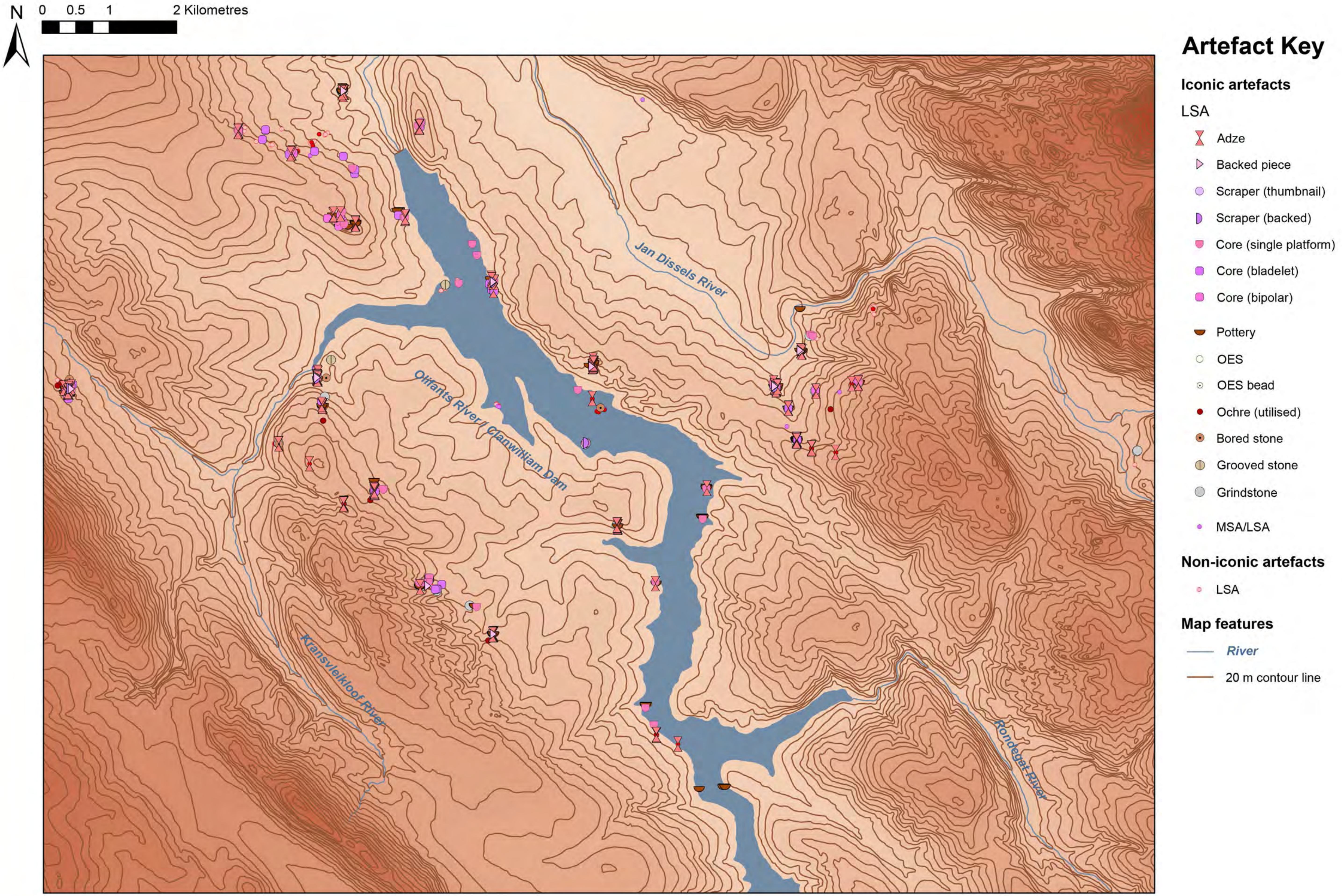
Map 25.2 Aerial photograph view of ESA artefact distribution in the study area



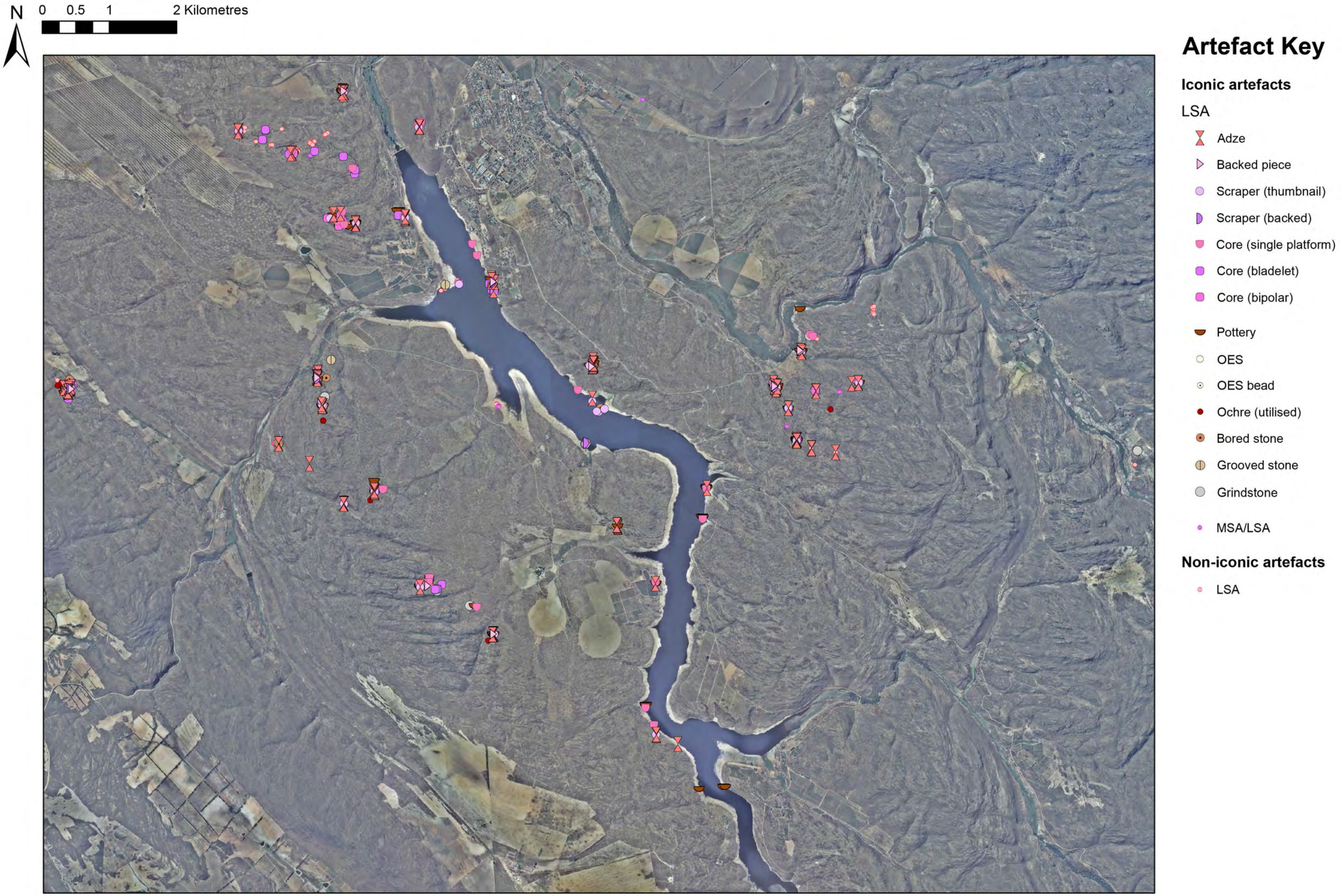
Map 26.1 MSA artefact distribution in the study area



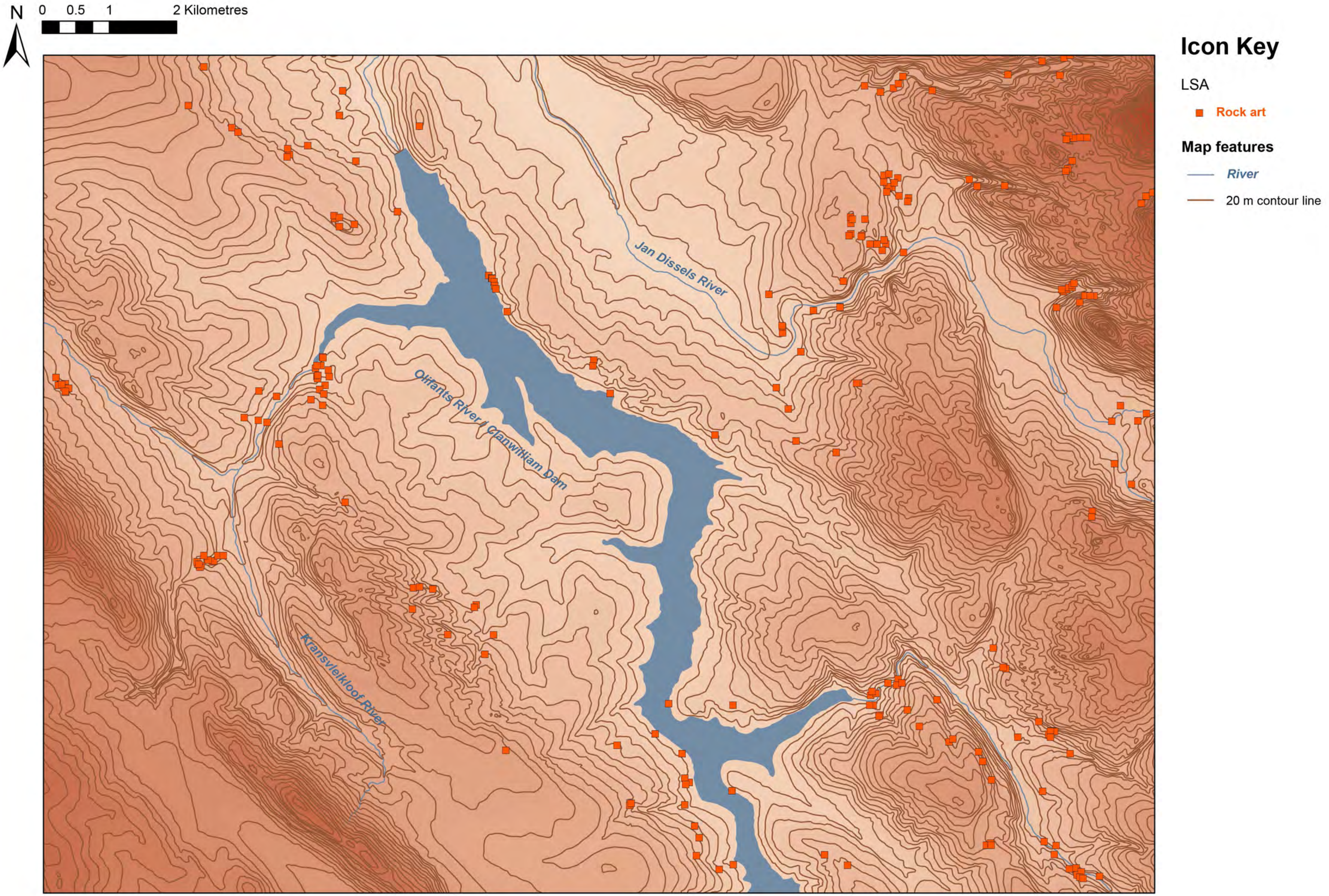
Map 26.2 Aerial photograph view of MSA artefact distribution in the study area



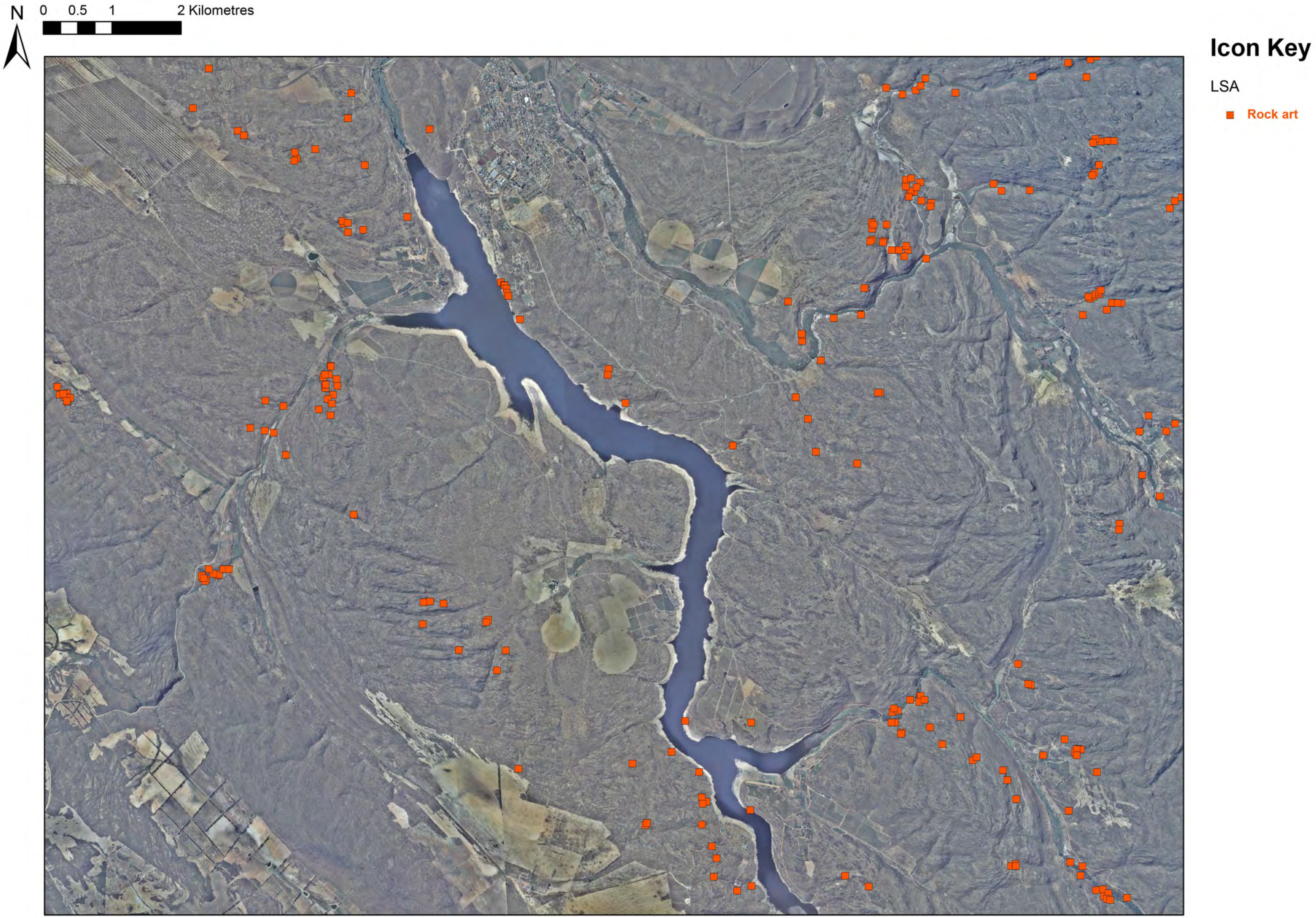
Map 27.1 LSA artefact distribution in the study area



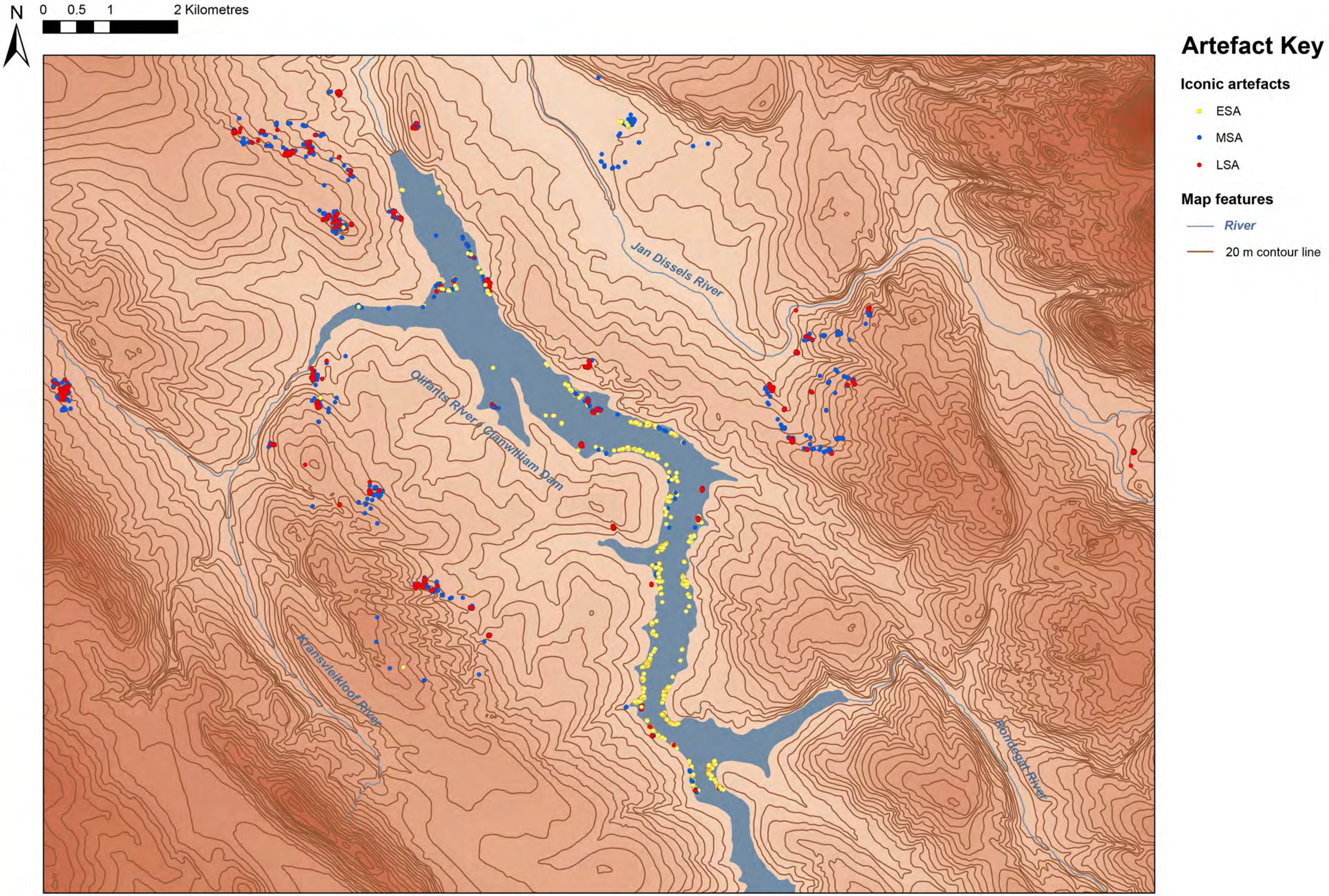
Map 27.2 Aerial photograph view of LSA artefact distribution in the study area



Map 28.1 Rock art distribution in the study area



Map 28.2 Aerial photograph view of rock art distribution in the study area



Map 29 ESA, MSA and LSA artefact distribution in the study area