

**ARCHAEOLOGICAL MITIGATION FOR AN
EXTENSION OF DOLOMITIC LIMESTONE
MINE AND CONSTRUCTION OF LIME KILNS
ON FARM WELVERDIEND NEAR
VANRHYNSDORP, WESTERN CAPE
PROVINCE**

HWC Case No. 6103109AS1129M

Report for:

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1. EXECUTIVE SUMMARY

Item	Description
Proposed development and location	Extension of Dolomitic Limestone Mine and Construction of Lime Kilns on Farm Welverdiend No. 511, about 8kms south west of Vanrhynsdorp, off the N7 road.
Purpose of the study	Survey and mitigation for Stone Age sites located in the portion targeted for an Extension of Dolomitic Limestone Mine and Construction of Lime Kilns on Farm Welverdiend No. 511 near Vanrhynsdorp.
1:50 000 Topographic Map	3118DA
Coordinates	S31° 41' 16.098" E18 42' 46.702".
Municipalities	Matzikama Municipality, West Coast District Municipality
Predominant land use of surrounding area	Agriculture (crop and animal farming)

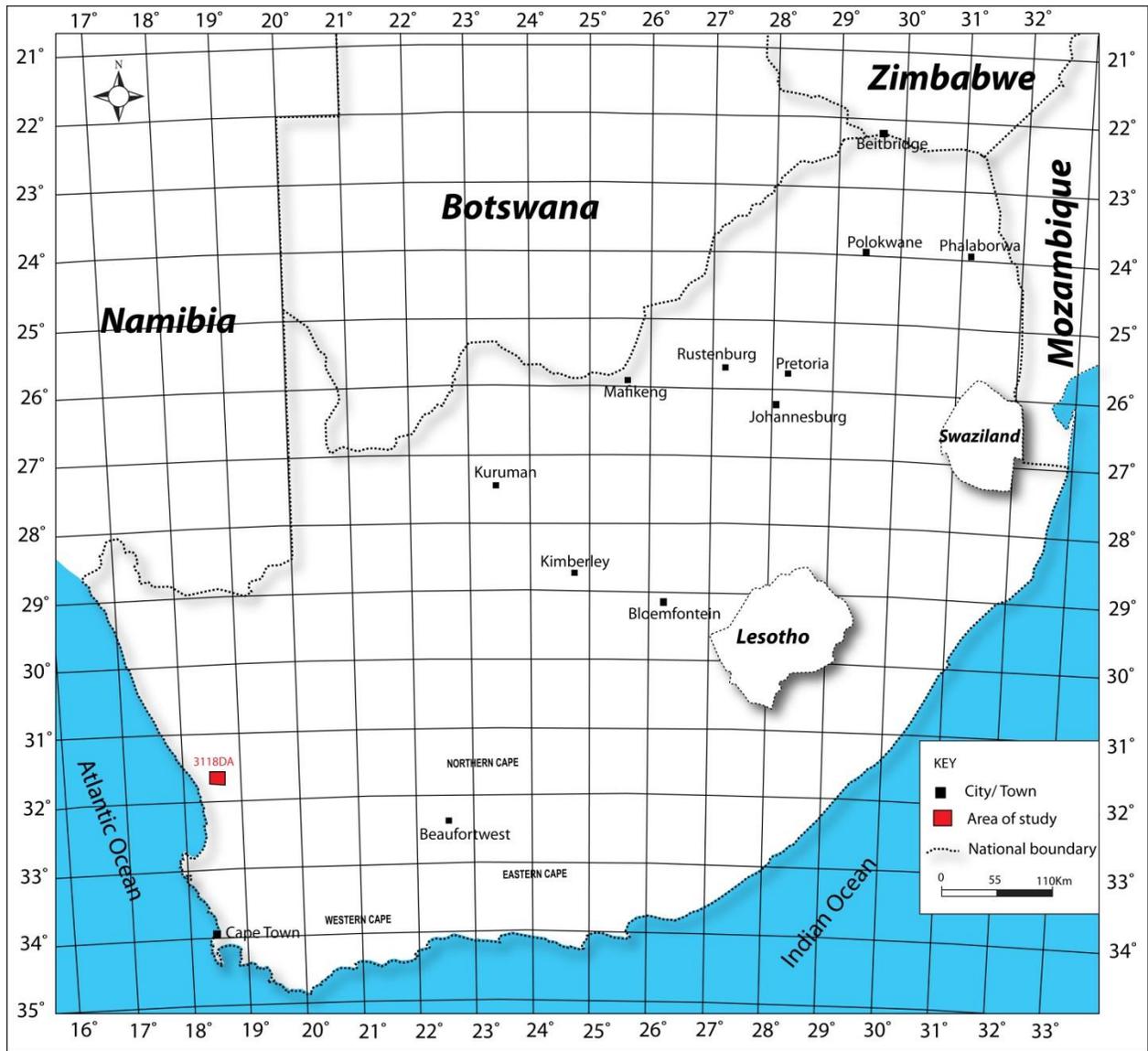


Figure 1: Location of the area of study in relation to national boundary.

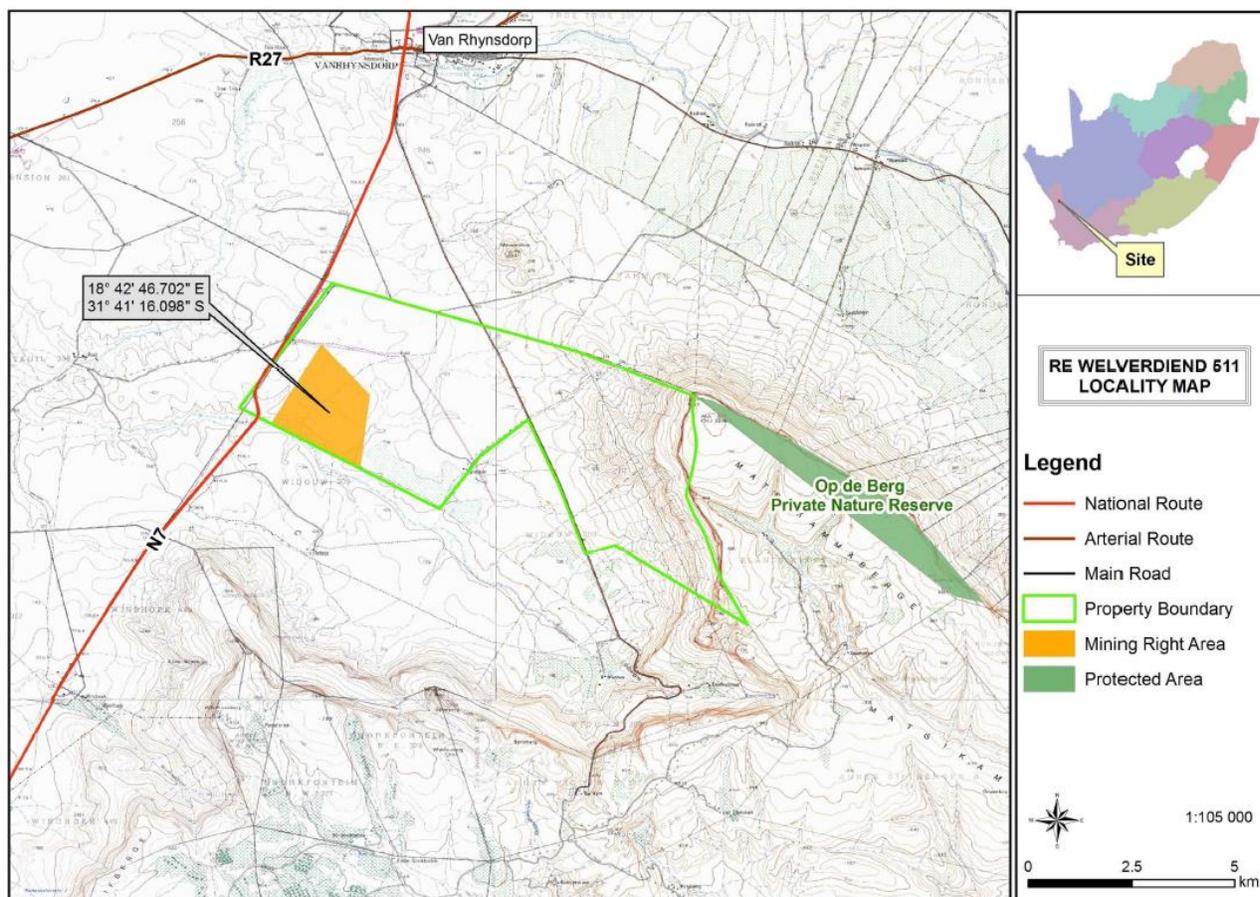


Figure 2: Locality map

The Scope

This archaeological mitigation project seeks to clearly identify, map and, where necessary, sample lithic material in order to clear the area for open cast mining of limestone deposits and the erection of a crushing plant with a total footprint of about ± 40 ha on the Remainder of Farm 511 (Wolverdiend) near Vanrhynsdorp. The Phase 1 AIA was conducted in May 2017 by Jonathan Kaplan who reported close to 200 MSA and ESA sites in the study area. The method chosen by Kaplan to record and depict these sites (mixing individual artefacts with lithic scatters) did not satisfy HWC which then requested that an archaeologist with appropriate expertise should re-visit the area and;

- a. Access the sites to establish which ones should be targeted for collection.
- b. Identify and adequately map the sites and significant scatters to enable meaningful interpretation and significance assessment.
- c. Assess and motivate for the significance/grading following HWC guidelines.
- d. Collect artefacts from some of the sites with IIIB significance/grading.
- e. Discuss the impact of the development on the areas between the two proposed localities, and place the analysis within regional context of Stone Age sites.

The present study addresses the above issues. Considering the difficult associated reading data from the first Phase 1 AIA, this researcher had to re-survey the area. 100m X 100m survey

quadrants covering both areas for proposed lime mine and crushing plant, as well as the immediate areas between them, were surveyed with a team of four people walking 25m wide transects.

The first significant observation was that the whole area for the two proposed developments occurs on previously farmed (ploughed) ground which has resulted in the admixture of artefacts. Historical Google Earth imagery clearly capture this through vegetation changes that were also visible to the naked eye on the ground during surveys. This is not inconceivable, considering that crop farming in the immediate areas adjacent to the proposed development is also depicted as orchards/vineyards in the 1:50 000 topographic map of this area (3118DA VANRHYNSDORP). The implications for this observation are far-reaching, and partly explains the difficult that the first Phase 1 researcher grappled with, because crop farming blurs site boundaries as artefacts are significantly moved (vertically and horizontally) on the landscape. Additionally, the loss of context through admixture also affects the grading for the sites and, in most cases, it relegates the value of the artefacts to teachings collections. This being said, there were still discernible scatters of the MSA/ESA lithics that were mapped for depiction purposes because all of them do not occur on pristine ground but in farmed contexts.

Based on the concentration of surface artefacts, fourteen sites identified on the development footprint and its immediately surrounding areas. Only seven of these sites are located on the proposed extension area for lime mining, with just one occurring on the proposed kiln site and six on the area between the two proposed developments. The sites comprise mainly of flaked MSA artefacts with isolated occurrences of bifacial ESA cores and a few LSA microliths. Flaked cores also occur at some sites, supporting that some of the sites were production areas. No organic or other archaeological/historical artefacts were identifiable. Nonetheless, all of the fourteen sites are grade IIIC and none of them qualify as grade IIIB because the artefacts have lost their original context. The eight sites on the development footprint, and the six sites immediately adjacent to the development would be destroyed by the mining activities and surface collections were done to salvage the lithics that still remain useful as a teaching collection.

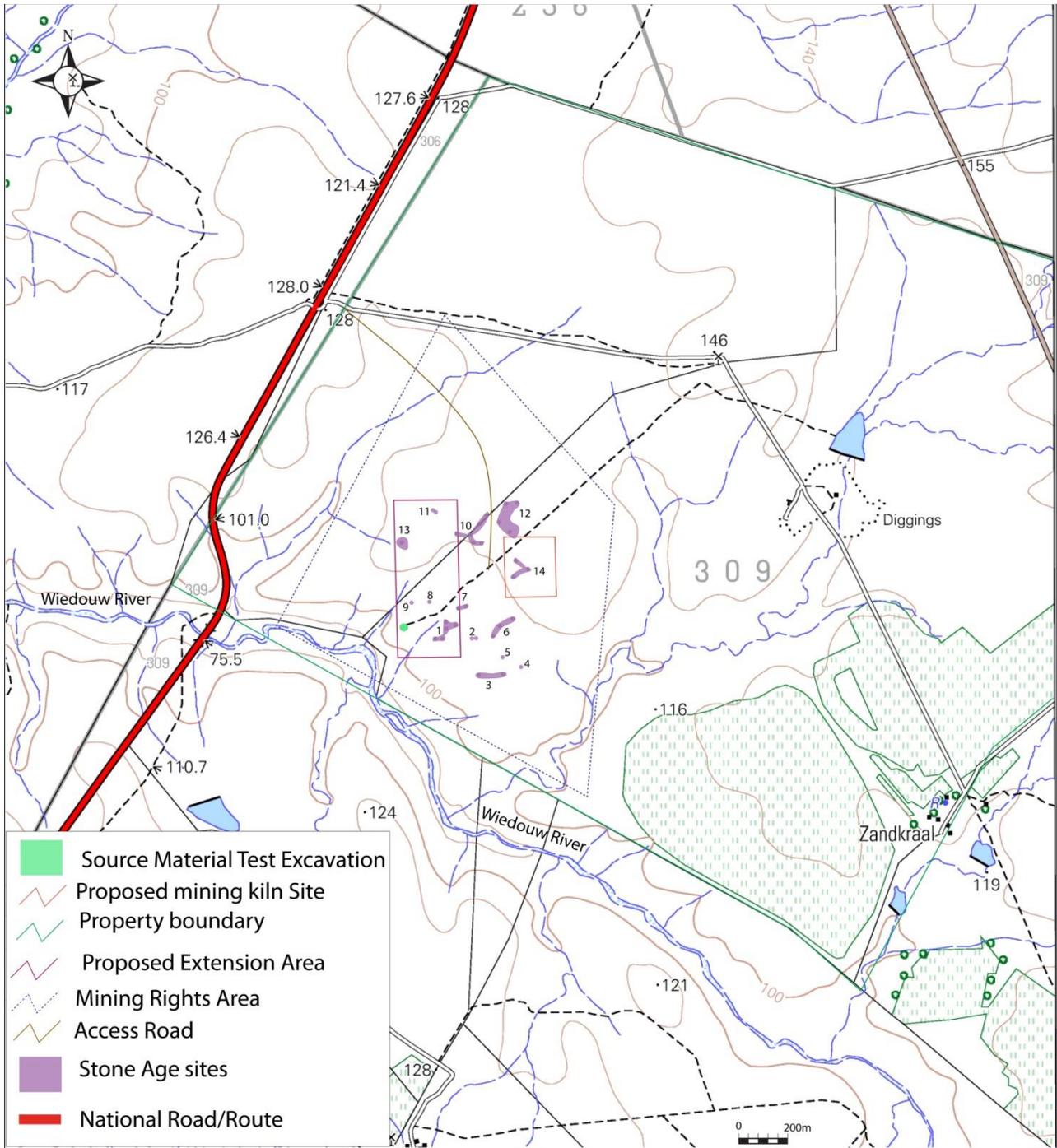


Figure 3: Identified sites in relation to the proposed development.

No excavations were necessary because of the disturbed nature of the sites and the shallowness of the stratigraphy. Stratigraphic information was easily readable from the Source Material Test Excavations conducted by Cape Lime, as well as the numerous animal burrows dotted across the proposed extension of the mining area. A thin (maximum of 25-40cm) soil layer with occasional artefacts, rests on decomposing sterile bedrock, making unnecessary to carryout test excavations, especially considering that the area was already disturbed by crop farming. All the sites on the development footprint would have been destroyed, but the surface collection program has meant

that no further significant impacts are expected at these sites. As with any other archaeological site, chance finds of buried archaeological or human remains are still possible, though highly unlikely.

Recommendations

This mitigation project has, according to the issues raised HWC for the first Phase 1 study, systematically re-surveyed the study area, identified the contextual landscape, identified and accessed the artefact distribution and site significance, mapped the identified resources and sampled the affected sites. This means that area is now deemed to be clear of significant archaeological resources to the satisfaction of the researcher. Accordingly, it is recommended that mining and the construction of the kiln facility can proceed, taking full cognisance of chance finding report procedures. If any human burials or significant archaeological material are discovered during mining or construction, work must stop immediately and the findings must be reported HWC so that appropriate action can be taken.

Author & Declaration of Independence

Dr Foreman Bandama, BA Hons. (UZ), PhD (UCT), ASAPA Professional Member (No.375). Foreman Bandama holds a BA Honours with a First Class Dissertation on the Stone Age of Zimbabwe (UZ) and a PhD. (UCT). He also has a book Chapter that has become standard reference on Zimbabwean Stone Age and has carried out several AIAs in the Western and Northern Cape. He is an independent researcher without financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

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3. ABBREVIATIONS

AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
EIA	Environmental Impact Assessment
EIA	Early Iron Age (<i>EIA refers to both Environmental Impact Assessment and the Early Iron Age but in both cases the acronym is internationally accepted. This means that it must be read and interpreted within the context in which it is used.</i>)
EIAR	Environmental Impact Assessment Report
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
ICOMOS	International Council of Monuments and Sites
LIA	Late Iron Age
LFC	Late Farming Community
LSA	Late Stone Age
MAA	Mineral Amendment Act, No 103 of 1993
MIA	Middle Iron Age
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MSA	Middle Stone Age
NEMA	National Environmental Management Act 107 of 1998
NHRA	National Heritage Resources Act 25 of 1999
NID	Notice of Intention to Develop
PHAR	Provincial Heritage Resource Agency
SAHRA	South African Heritage Resources Agency
ToR	Terms of Reference

4. DOCUMENT INFORMATION

4.1 Periodisation

Archaeologists divide the different cultural epochs according to the dominant material finds for the different time periods. This periodisation is usually region-specific, such that the same label can have different dates for different areas. This makes it important to clarify and declare the periodisation of the area one is studying. These periods are nothing a little more than convenient time brackets because their terminal and commencement are not absolute and there are several instances of overlap. In the present study, relevant archaeological periods are given below;

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

Early Iron Age (~ AD 200 to 1000)

Late Iron Age (~ AD1100-1840)

Historic (~ AD 1840 to 1950, but a Historic building is classified as over 60 years old)

6.2 Definitions

Just like periodisation, it is also critical to define key terms employed in this study. Most of these terms derive from South African

heritage legislation and its ancillary laws, as well as international regulations and norms of best-practice. The following aspects have a direct bearing on the investigation and the resulting report:

Cultural (heritage) resources are all non-physical and physical human-made occurrences, and natural features that are associated with human activity. These can be singular or in groups and include significant sites, structures, features, ecofacts and artefacts of importance associated with the history, architecture or archaeology of human development.

Cultural significance is determined means of aesthetic, historic, scientific, social or spiritual values for past, present or future generations.

Value is related to concepts such as worth, merit, attraction or appeal, concepts that are associated with the (current) usefulness and condition of a place or an object. Although significance and value are not mutually exclusive, in some cases the place may have a high level of significance but a lower level of value. Often, the evaluation of any feature is based on a combination or balance between the two.

Isolated finds are occurrences of artefacts or other remains that are not in-situ or are located apart from archaeological sites. Although these are noted and recorded, but do not usually constitute the core of an impact assessment, unless if they have intrinsic cultural significance and value.

In-situ refers to material culture and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

Archaeological site/materials are remains or traces of human activity that are in a state of disuse and are in, or on, land and which are older than 100 years, including artifacts, human and hominid remains, and artificial features and structures. According to the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), no archaeological artefact, assemblage or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorization from the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority.

Historic material are remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

Chance finds means archaeological artefacts, features, structures or historical remains accidentally found during development

A *grave* is a place of interment (variably referred to as burial) and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery (contemporary) or burial ground (historic).

A *site* is a distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

Heritage Impact Assessment (HIA) refers to the process of identifying, predicting and assessing the potential positive and negative cultural, social, economic and biophysical impacts of any proposed project which requires authorization of permission by law and which may significantly affect the cultural and natural heritage resources. Accordingly, a HIA must include recommendations for appropriate mitigation measures for minimizing or circumventing negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Impact is the positive or negative effects on human well-being and / or on the environment.

Mitigation is the implementation of practical measures to reduce and circumvent adverse impacts or enhance beneficial impacts of an action.

Mining heritage sites refer to old, abandoned mining activities, underground or on the surface, which may date from the prehistorical, historical or the relatively recent past.

Study area or 'project area' refers to the area where the developer wants to focus its development activities (refer to plan).

Phase I studies refer to surveys using various sources of data and limited field walking in order to establish the presence of all possible types of heritage resources in any given area.

5. INTRODUCTION

On behalf of Cape Lime, a subsidiary of Afrimat Aggregates (Pty) Ltd, Integrated Specialist Services (Pty) Ltd appointed Dr Foreman Bandama, an independent researcher to carry a Phase 2 mitigation as specified in the final comment by HWC (case number 6103109AS1129M) on the proposed extension of limestone mining and construction of kiln facilities in the Remainder of Farm 511 (Wolverdiend) near Vanrhynsdorp. Recommendations from HWC's final commenting requested that an archaeologist with appropriate expertise should re-visit the area and;

- a. Access the sites to establish which ones should be targeted for collection.
- b. Identify and adequately map the sites and significant scatters to enable meaningful interpretation and significance assessment.
- c. Assess and motivate for the significance/grading following HWC guidelines.
- d. Collect artefacts from some of the sites with IIIB significance/grading.
- e. Discuss the impact of the development on the areas between the two proposed localities, and place the analysis within regional context of Stone Age sites.

The purpose of the mitigation was to also clear sites graded as IIIB prior to mining and construction activities. The fieldwork component was carried out on 1 and 2 November 2017 by a team of four people, including students from the University of Cape Town. The proposed areas lie on previously farmed ground whose tilling activities had resulted in significant admixture of archaeological artefacts. Historical satellite imagery also shows these farming activities. This makes it difficult to clearly establish the distribution of artefacts and artefact scatters. Based on the concentration of surface artefacts, fourteen sites were reported on this disturbed ground that covered both proposed developments and the area in between them. Some of the sites had more than two lithic scatters. For the purposes of this study, a lithic scatter was considered to be any area with a density of five or more artefacts per square metre. Any area with an artefact density less than this did not qualify an individual site or scatter, unless when it was associated with (within 20m of) a lithic scatter.

5.1. Terms of reference

On behalf of Cape Lime, a subsidiary of Afrimat Aggregates (Pty) Ltd, Integrated Specialist Services (Pty) Ltd appointed Dr Foreman Bandama, an independent researcher to carry a Phase 2 mitigation as specified in the final comment by HWC (case number 6103109AS1129M), dated 17 August 2017 on the proposed extension of limestone mining and construction of kiln facilities in the Remainder of Farm 511 (Wolverdiend) near Vanrhynsdorp:

5.2. Scope and purpose of the report

The present report describes the new archaeological surveys, mapping and collections on MSA/ESA sites in the Remainder of Farm 511 (Wolverdiend) near Vanrhynsdorp that is being proposed for an extension of limestone mining and construction of kiln facilities. For these developments to take place, a positive comment from HWC is required, following earlier commenting and recommendations by committee (see below).

The Committee noted that:

- The HIA does not adequately address the historical heritage context of the area such as landscape elements (in particular pre-colonial occupation) and current land use/settlement patterns. This should form the general introduction to the HIA, the body of which is a summary of the findings and implications of the palaeontological and archaeological impact assessments (which are attached as specific detailed reports).
- The site comprises a widespread scatter of a Middle and some Early Stone Age artefacts. However, the archaeological methodology of plotting individual artefacts, in addition to artefact scatters, makes it difficult to identify the distribution of significant scatters (or sites) or allow for meaningful interpretation and assessment of significance.
- The HIA does not motivate or explain why certain stone artefact scatters are assigned III B significance and others III C. The HWC grading guide must be followed.
- It may not be necessary to sample all the scatters listed in the HIA as being of III B significance.
- The proposed buffer zones would not protect this type of widespread archaeology. There is no discussion of the impact of the development on areas between and around the two plotted areas. The collection of artefacts is therefore supported, but an archaeologist with the necessary Stone Age expertise must first assess the site and select those assemblages which should be targeted for collection.

FINAL COMMENT

The mitigation of selected sites is supported. A detailed work plan to be submitted with the following conditions:

- An archaeologist with the recognised expertise in Early and Middle Stone Age must assess and select those scatters which must be collected in order to retain a representative sample of the most significant ones.
- The workplan report must include a contextual and comparative analysis of the regional stone-age sites.

6. HERITAGE LEGISLATION

Heritage management and conservation in South Africa is governed by the NHRA and falls under the overall jurisdiction of the SAHRA and its PHRAs. The relevant PHRA for this study is HWC. There are different sections of the NHRA that are relevant to this study. The present proposed development is a listed activity in terms of Section 38 of the NHRA which stipulates that the following development categories require a HIA to be conducted by an independent heritage management consultant:

- Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length
- Construction of bridge or similar structure exceeding 50m in length
- Development or other activity that will change the character of a site -
 - Exceeding 5000 sq. m
 - Involving three or more existing erven or subdivisions
 - Involving three or more erven or divisions that have been consolidated within past five years
 - Rezoning of site exceeding 10 000 sq. m
 - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- Any other development category, public open space, squares, parks, recreation grounds

Thus any person undertaking any development in the above categories, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. Section 38 (2) (a) of the NHRA also requires the submission of a heritage impact assessment report for authorisation

purposes to the responsible heritage resources agencies (SAHRA/PHRAs). This report was submitted by Jonathan Kaplan in May 2017 and the commenting process triggered the Section 35 of the National Heritage Resources Act (NHRA) No. 25 of 1999 which covers palaeontological, prehistoric and historical material (including ruins) more than 100 years old. Section 35 (4) of the NHRA stipulates that no person may, without a permit issued by SAHRA, destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object. This section may apply to any significant archaeological sites that may be discovered before or during construction. This means that any chance find must be reported to SAHRA or HWC (the relevant PHRA), who will assist in investigating the extent and significance of the finds and inform about further actions. Such actions may entail the removal of material after documenting the find site or mapping of larger sections before destruction.

Related to Section 35 and 38 of the NHRA are Sections 34, 36 and 37 that do not apply to the present study. Section 34 stipulates that no person may alter, damage, destroy, relocate etc any building or structure older than 60 years, without a permit issued by SAHRA or a provincial heritage resources authority. This section may not apply to present study since none were identified. Section 36 (3) of the NHRA also stipulates that no person may, without a permit issued by the SAHRA, destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority. This section may apply in case of the discovery of chance burials, which is unlikely. The procedure for reporting chance finds also applies to the unlikely discovery of burials or graves by the developer or his contractors. Section 37 of the NHRA deals with public monuments and memorials but this does not apply to this study because none exist.

Table 1: Evaluation of the proposed development as guided by the criteria in NHRA

ACT	Stipulation for developments	Requirement details
NHRA Section 38	Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
	Construction of bridge or similar structure exceeding 50m in length	No
	Development exceeding 5000 sq. m	Yes
	Development involving three or more existing erven or subdivisions	No
	Development involving three or more erven or divisions that have been consolidated within past five years	No
	Rezoning of site exceeding 10 000 sq. m	Not available
	Any other development category, public open space, squares, parks, recreation grounds	No
NHRA Section 34	Impacts on buildings and structures older than 60 years	No
NHRA Section 35	Impacts on archaeological and paleontological heritage resources	Yes
NHRA Section 36	Impacts on graves	None identified during Phase 1
NHRA Section 37	Impacts on public monuments	No

7. METHODS

The screening and basic assessment phase of the project was undertaken as part of the Phase 1 study conducted by Jonathan Kaplan but it was felt prudent to carry out literature survey in order to describe the archaeological context of Vanrhynsdorp area. This aids our understanding of the sites targeted for mitigation. As part of the desktop study, published literature and cartographic data, as well as archival data on heritage laws, the history and archaeology of the area were studied.

The desktop study was followed by field work conducted on 1 and second of December 2017. This field component aimed at:

- a. Documenting the geo-physical setting and land use information about the proposed development because desktop studies had intimated historical crop farming on the development footprint.
- b. Locating all possible objects, sites, artefact scatters and features of archaeological significance on the development footprint.
- c. Mapping the distribution of artefact scatters and sites on the development footprint in order to enable significance assessment.
- d. Collecting lithic artefacts associated with grade IIIB sites as requested by HWC.

To document the general physiographic setting, detailed photographs were undertaken (Figure 4A and B).

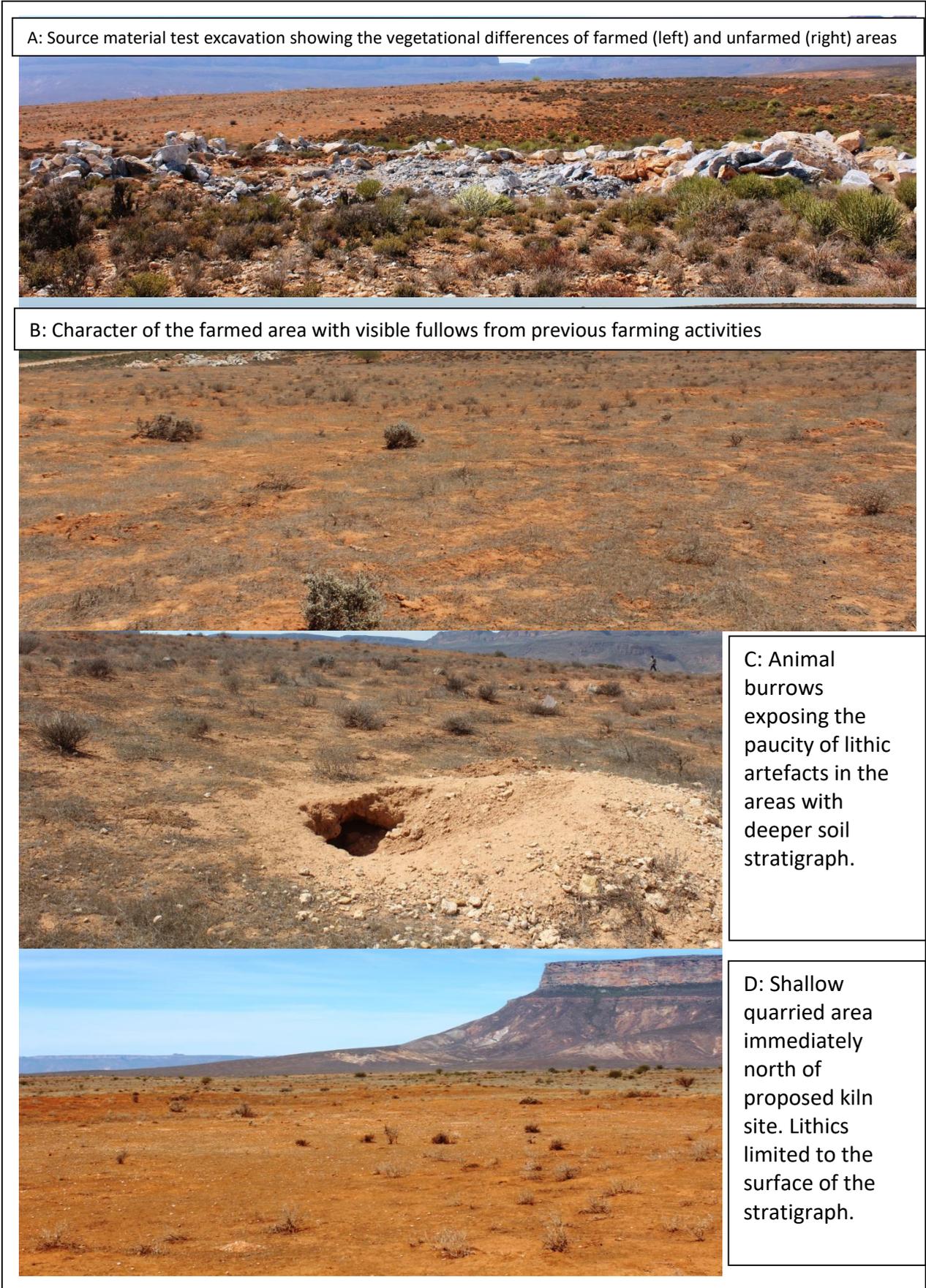


Figure 4A-D: Physiographic setting of the proposed development.

Systematic field surveys then followed. The survey quadrants were 100m X 100m and field walking was done in 25m wide transects by a team of four people (Figure 5).

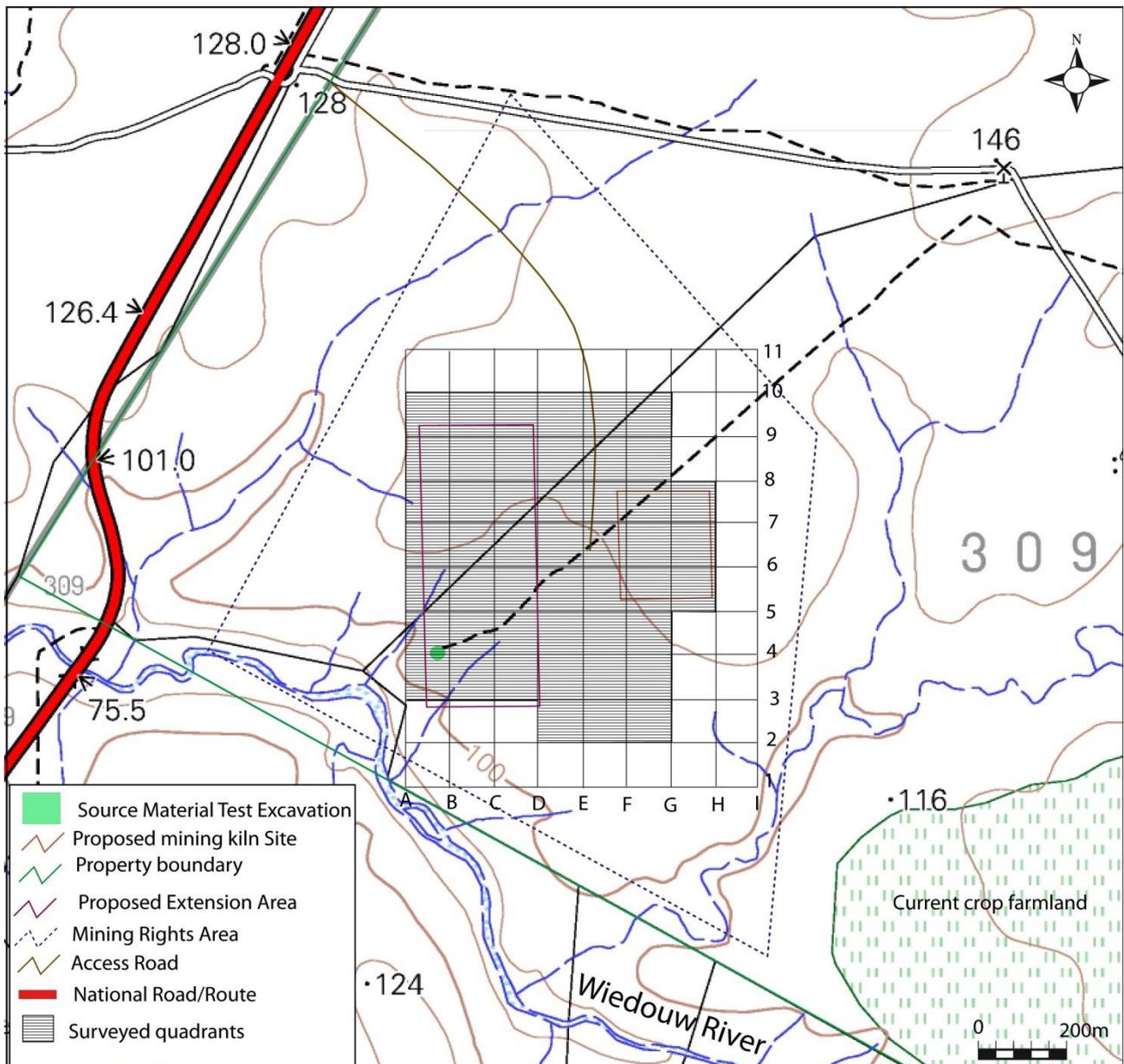


Figure 5: Surveyed quadrants in relation to the proposed developments.

The identified sites and artefact scatters were then mapped using triangulation and a handheld GPS. Site consisted of an artefact scatter or groups of associated (generally within 20m of each other). An artefact scatter was considered to be an area with a density of five or more lithics per square metre. Ground visibility was very good because vegetation was sparse, with short and dry grass interrupted by isolated shrubs. Considering the very sparse vegetation, as well as the shallow and disturbed soil profiles, it was assumed that some sense of the archaeological traces to be found in the area of proposed development would be readily identifiable from surface observations. Accordingly, it was not considered necessary to conduct excavations. Stratigraphic profiles were however captured from the animal burrows, the gravel quarry site (north of the proposed kiln site) and on the Source Material Test Excavation site (Figure 6).

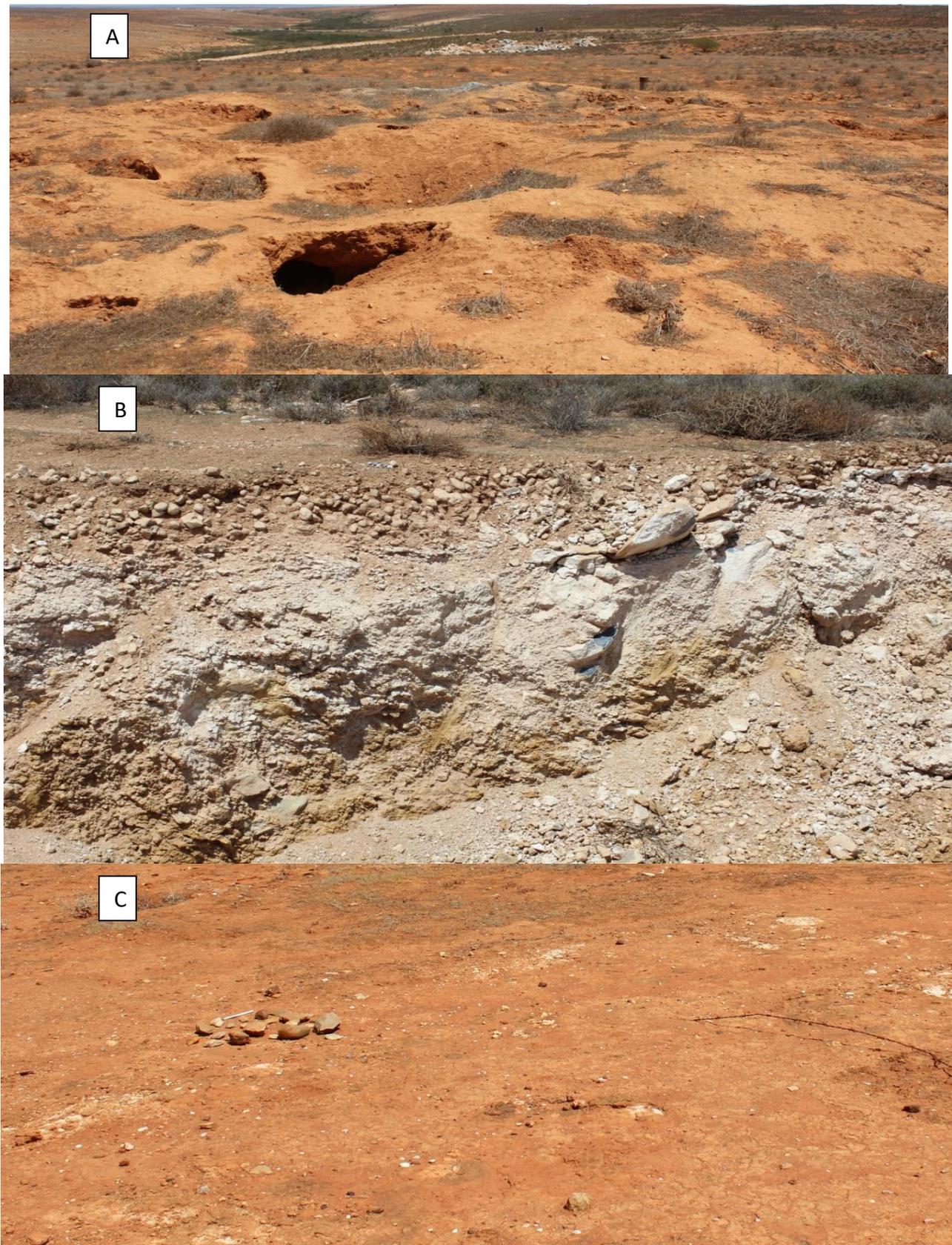


Figure 7: Burrow 5 (A), Source Material Test Excavation (B) and very shallow ground (C) with decomposing sterile rock appearing as white patches.

Mapping and systematic surface collections were guided by 10m X 10m grid units laid out using tape measures. Sorting was carried out on site and where feasible, illustrations were also done on the site before being placed into plastic bags labelled according to their grid squares. Non-artefactual rock fragments were generally discarded but all flaked cores were also collected.

Lithic typological analysis of stone artefacts followed a system compiled by Deacon (1984) and then adopted by several researchers in the region (e.g Orton 2009, 2012, 2014; Orton and Halkett 2010). The method involves separating lithics by raw material, size and modification pattern.

7.1. Assumptions and limitations

Archaeological materials reported in this project were located on the surface of very shallow sites that had been disturbed by farming. As such, there is still a chance that some material may still lay buried in the ground even though it is assumed that the majority of the representative samples were collected.

8. ARCHAEOLOGICAL CONTEXT

This Vanrhynsdorp section of the Namaqualand is replete with open-air Stone Age sites of the EIA and MSA, with LSA dominating along the coastline. MSA and ESA remains are strongly concentrated along the floodplains, suggesting their secondary context but being revealed by erosion on deflated areas (Orton et al. 2011). Typical open-air MSA sites in this area belong to the Still Bay period about 70000 years ago (Mackay *et al.* 2010). Dispersed LSA sites are also not uncommon in this area (Orton et al. 2011).

9. FINDINGS

A total of 14 sites with 34 scatters were recorded but it should be noted that because of the significant admixture, the site boundaries are mere estimates and the significance of the sites is diminished from possible grade IIIB to IIIC. These 14 sites produced 823 lithics, 44 (5%) of which are informal tools (cores and flake cores). Six of these (Site 1, 7-11 and 13) are located on the development footprint for the proposed extension of the limestone mine, while only 1 (Site 14) is located within the proposed area for kiln site. The other six are outside the proposed development footprint, but will nonetheless be affected by the mining and construction operation due to their proximity.

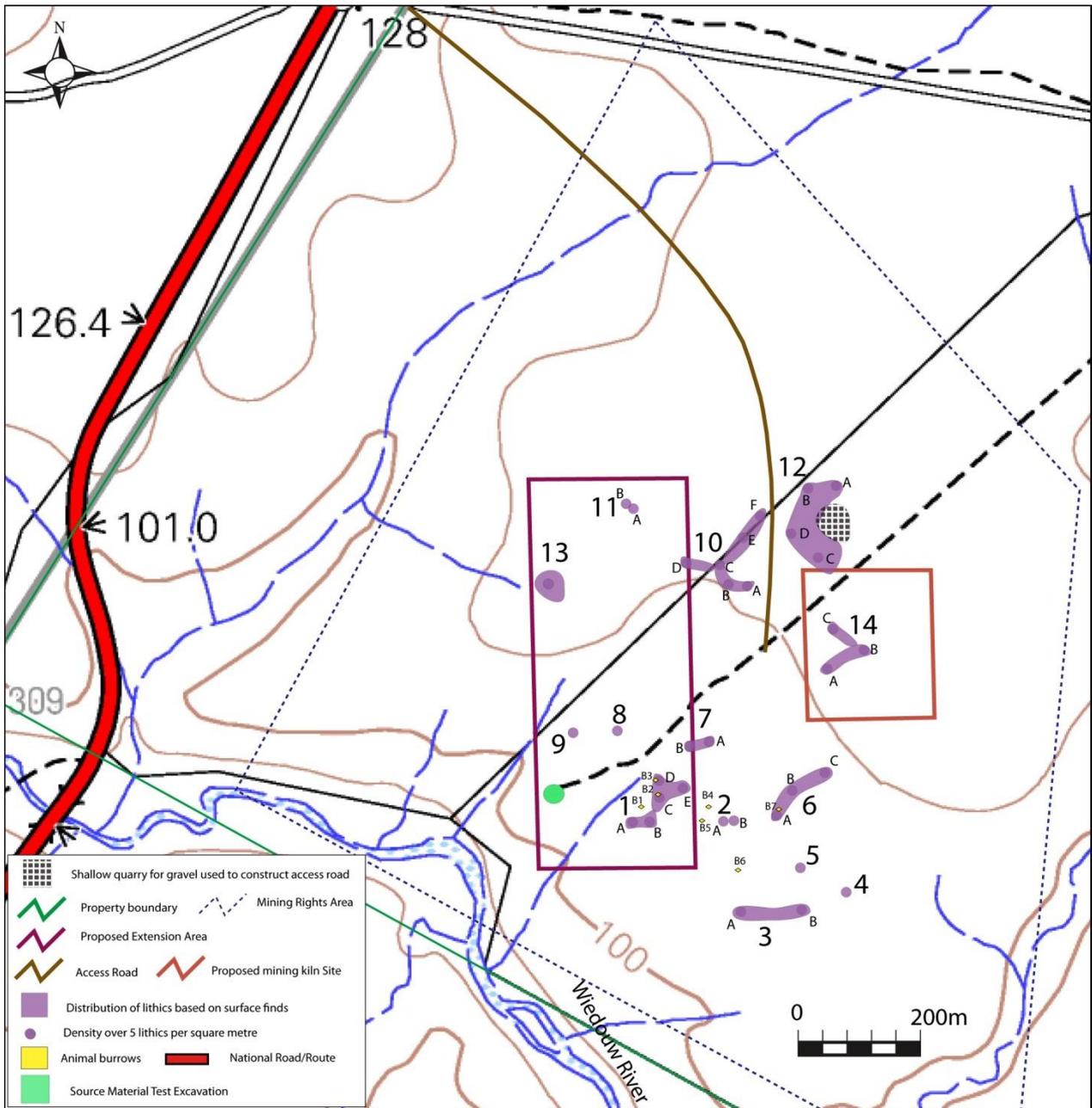


Figure 8: Stone Age sites in relation to the proposed developments.

Table 3: Documented Stone Age sites on the development footprint.

Site	Scatter	Coordinates	Period	Description
1	Scatter 1	S31° 41' 26.3" E018° 42' 35.3"	ESA-MSA	45 lithics (37 end and side scrapers, 4 cores, 1 handaxe, 3 blade)
	Scatter 2	S31° 41' 26.5" E018° 42' 36.8"	MSA	38 lithics (26 end and side scrapers, 12 blades)
	Scatter 3	S31° 41' 24.7" E018° 42' 37.4"	MSA	27 lithics (6 blades, 2 cores, 19 end and side scrapers)
	Scatter 4	S31° 41' 23.9" E018° 42' 37.6"	MSA	13 lithics (9 cores, 9 blades, 13 end and side scrapers, 1 point)
	Scatter 5	S31° 41' 24.2" E018° 42' 39.0"	MSA	16 lithics (2 blades, 14 end and side scrapers)
	Scatter 1	S31° 41' 26.5" E018° 42' 41.6"	MSA	37 lithics (29 end and side scrapers, 8 blades)

2	Scatter 2	S31° 41' 26.6" E018° 42' 42.3"	MSA	6 lithics (6 end and side scrapers)
3	Scatter 1	S31° 41' 33.0" E018° 42' 43.1"	ESA-MSA	16 lithics (12 end and side scrapers, 2 blades, 1 cleaver, 1 core)
	Scatter 2	S31° 41' 33.1" E018° 42' 47.1"	MSA	13 lithics (3 blades, 10 end and side scrapers)
4		S31° 41' 31.8" E018° 42' 50.2"	ESA-MSA	21 lithics (1 small Acheulean hand axe, 17 end and side scrapers, 1 blade, 2 cores)
5		S31° 41' 30.1" E018° 42' 47.3"	ESA-MSA	10 lithics (1 handaxe, 2 cores, 7 end and side scraper)
6	Scatter 1	S31° 41' 26.6" E018° 42' 45.8"	MSA	13 lithics (10 end and side scrapers, 1 core, 2 blades)
	Scatter 2	S31° 41' 24.8" E018° 42' 47.0"	MSA	20 lithics (5 blades, 13 end and side scrapers, 2 cores)
	Scatter 3	S31° 41' 23.6" E018° 42' 49.5"	ESA-LSA	43 lithics (6 blades, 1 bladelet, 28 end and side scrapers, 2 crude cleavers, 1 crude point, 5 cores)
7	Scatter 1	S31° 41' 20.4" E018° 42' 41.5"	MSA-LSA	13 lithics (4 blades, 7 end and side scrapers, 1 core, 1 crescent)
	Scatter 2	S31° 41' 20.8" E018° 42' 40.0"	MSA-LSA	20 lithics (19 end and side scrapers, 1 point)
8		S31° 41' 18.1" E018° 42' 35.0"	MSA	11 lithics (2 end scrapers and 9 end and side scrapers)
9		S31° 41' 18.2" E018° 42' 31.5"	MSA-LSA	5 lithics (4 end and side scrapers, 1 flake core)
10	Scatter 1	S31° 41' 09.1" E018° 42' 45.7"	ESA-MSA	32 lithics (5 cores, 1 cleaver, 4 blades, 22 end and side scraper)
	Scatter 2	S31° 41' 09.0" E018° 42' 44.0"	ESA-MSA	34 lithics (26 end and side scrapers, 1 point, 7 blades)
	Scatter 3	S31° 41' 08.0" E018° 42' 43.6"	ESA-MSA	31 lithics (26 end side scrapers, 3 blades, 2 points)
	Scatter 4	S31° 41' 07.6" E018° 42' 41.1"	ESA-MSA	21 lithics (1 hammer stone, 3 blades, 3 hand axes, 14 end and side scrapers)
	Scatter 5	S31° 41' 06.1" E018° 42' 45.4"	ESA-MSA	16 lithics (2 cores, 1 handaxe, 7 end and side scrapers, 6 blades)
	Scatter 6	S31° 41' 04.6" E018° 42' 47.1"	MSA-LSA	11 lithics (1 hammer stone, 3 blades, 1 bladelet, 6 end and side scrapers)
11	Scatter 1	S31° 41' 04.2" E018° 42' 50.8"	ESA-LSA	14 lithics (2 cores, 8 large scrapers, 1 blade, 1 point, 2 cleavers)
	Scatter 2	S31° 41' 03.8" E018° 42' 35.6"	ESA-LSA	90 lithics (7 Cores, 18 blades, 64 end and side scraper, 1 cleaver)
12	Scatter 1	S31° 41' 02.9" E018° 42' 48.8"	ESA-MSA	60 lithics (53 end and side scrapers, 2 blades, 5 choppers)
	Scatter 2	S31° 41' 02.5" E018° 42' 53.5"	ESA-MSA	28 lithics (24 end and side scrapers, 1 core, 1 adze, 2 handaxes)
	Scatter 3	S31° 41' 07.3" E018° 42' 51.6"	MSA	16 lithics (8 end and side scrapers, 7 blades, 1 hammer stone)
	Scatter 4	S31° 41' 05.9" E018° 42' 48.3"	ESA-MSA	14 lithics (2 cores, 8 large scrapers, 1 blade, 1 point, 2 cleavers)

13		S31° 41' 8.9" E018° 42' 28.8"	MSA	17 lithics (17 end and side scrapers)
14	Scatter 1	S31° 41' 56.1" E018° 42' 32.2"	MSA	16 lithics (8 end and side scrapers, 6 blades, 2 cores)
	Scatter 2	S31° 41' 54.7" E018° 42' 33.7"	MSA	24 lithics (19 end and side scrapers, 2 blades, 3 hammer stone)
	Scatter 3	S31° 41' 55.0" E018° 42' 37.5"	MSA	12 lithics (4 blades, 8 end and side scrapers)

9.1. Site 1

This site is located to the southwest of the proposed extension of limestone mining area. The site produced 139 lithics, 11% (15) of which were non-formal tools. It forms one of the significant artefact densities in this study, and has 5 lithic scatters of MSA artefacts associated with a few ESA materials (Figure 9A-C).

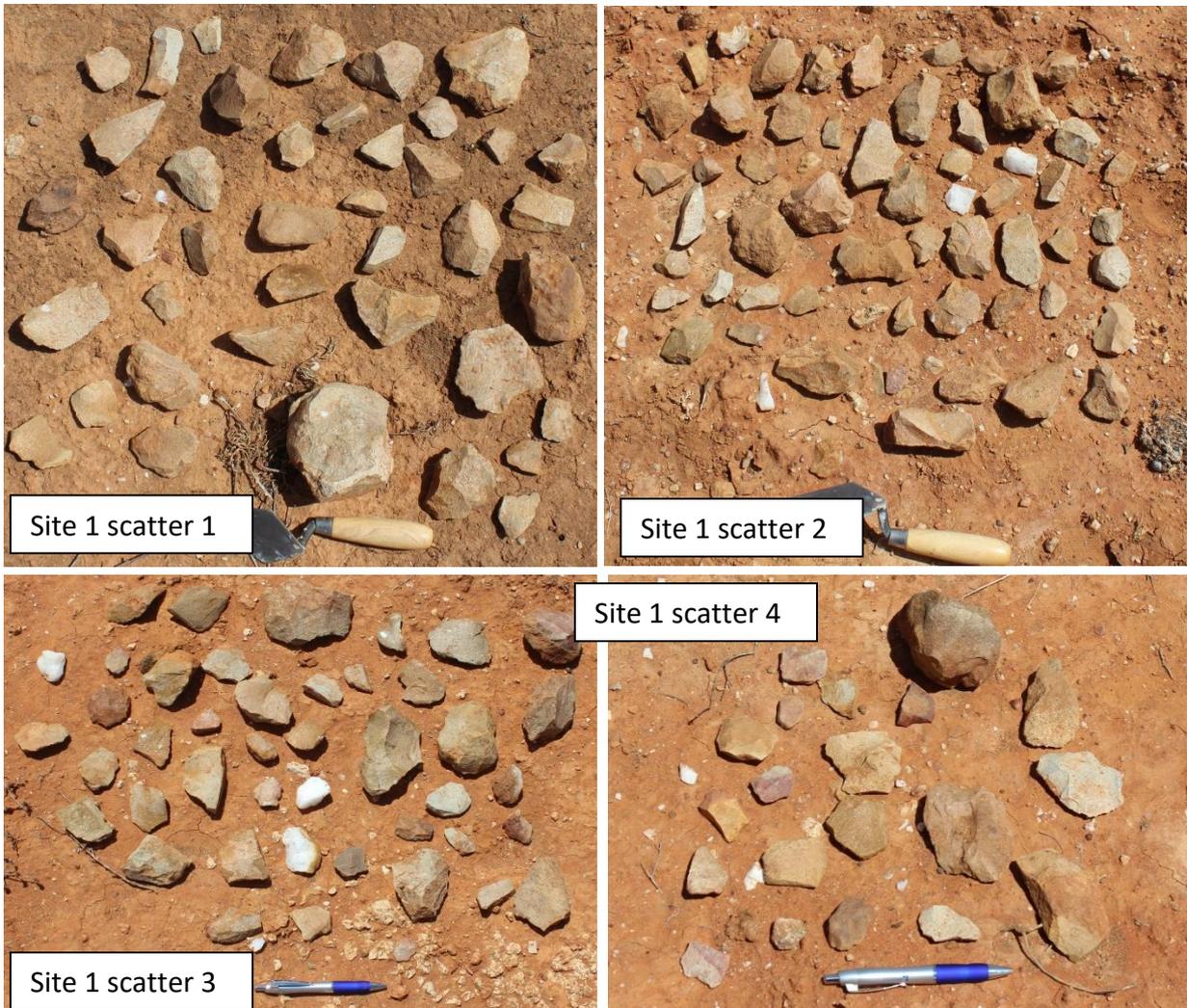


Figure 9A: Photographs of lithics from Site 1 Scatters 1-4

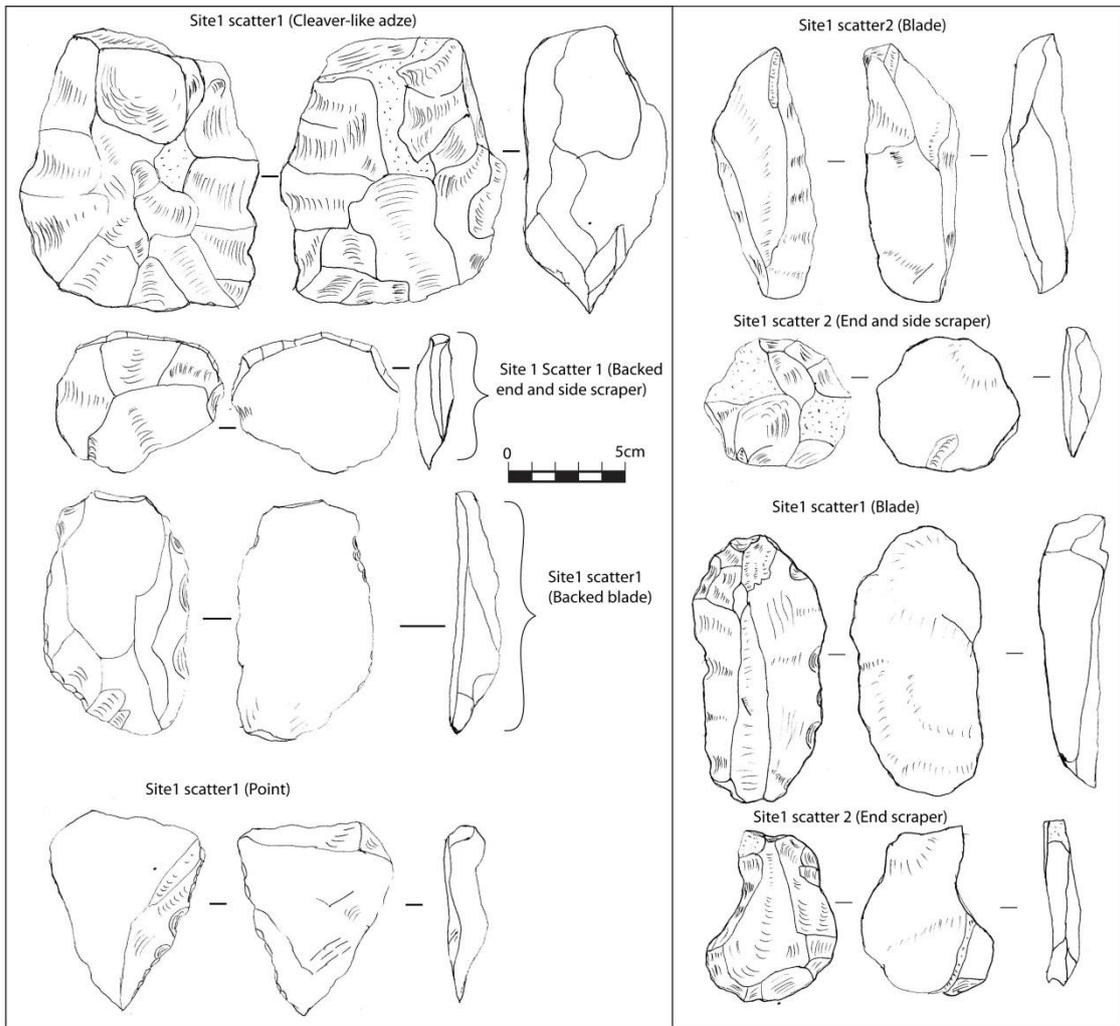


Figure 9B: Illustrations of some lithics from Site 1 Scatters 1 and 2.

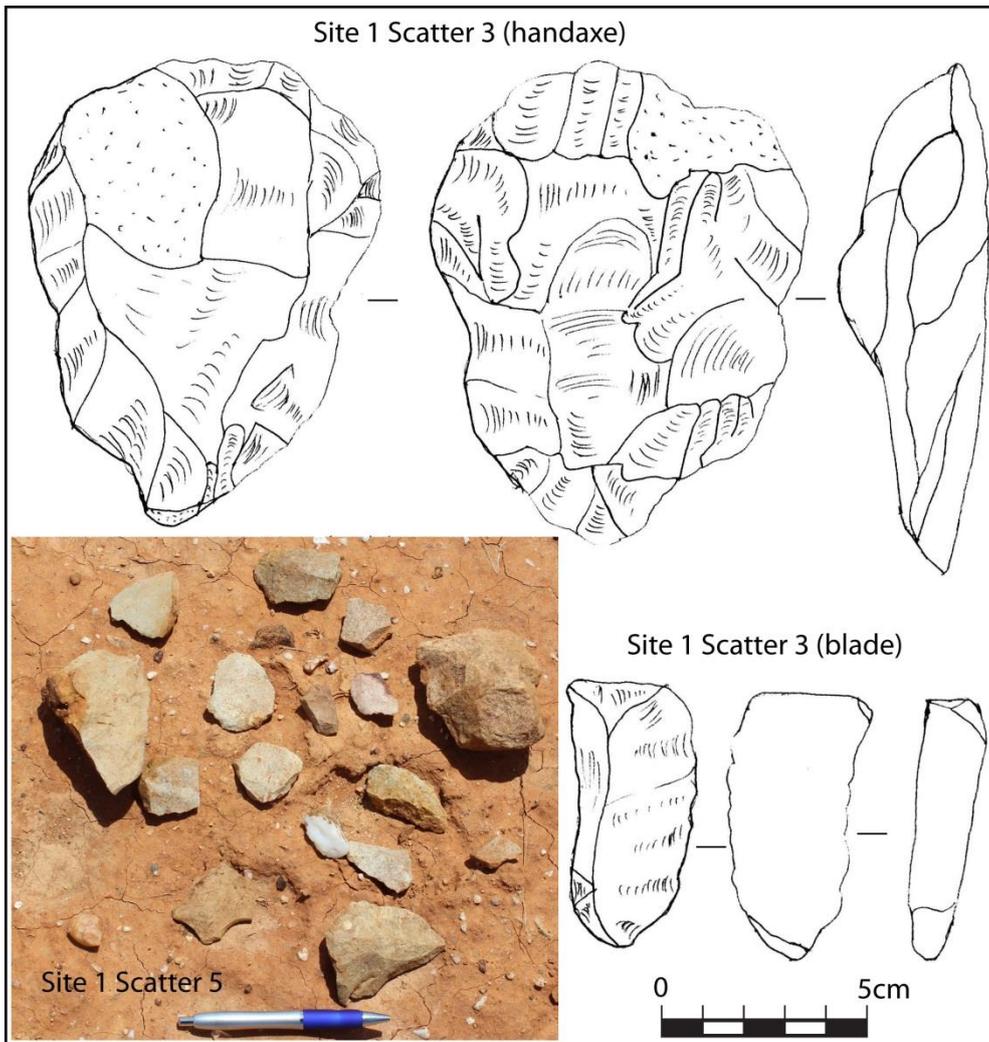


Figure 9C: Photograph of lithics from Site 1 Scatter 5 and illustrations of some stone artefacts from Site 1 Scatter 3.

There are animal burrows (B1-3) that occur on Site 1 but the spoil heap from the animal diggings do not reveal any lithic material, suggesting that none of the stone tools occurs in the deeper stratigraphy. This observation made unfruitful to consider excavations at this site, especially because the burrowing animal seem to have targeted the areas with deeper soil stratigraphy.

9.2. Site 2

This site lies immediately outside the proposed extension area for the limestone mining to the southeast. It also has two animal burrows whose spoil heaps do not have artefacts. 43 formal tools were recovered from this site (Figure 10).

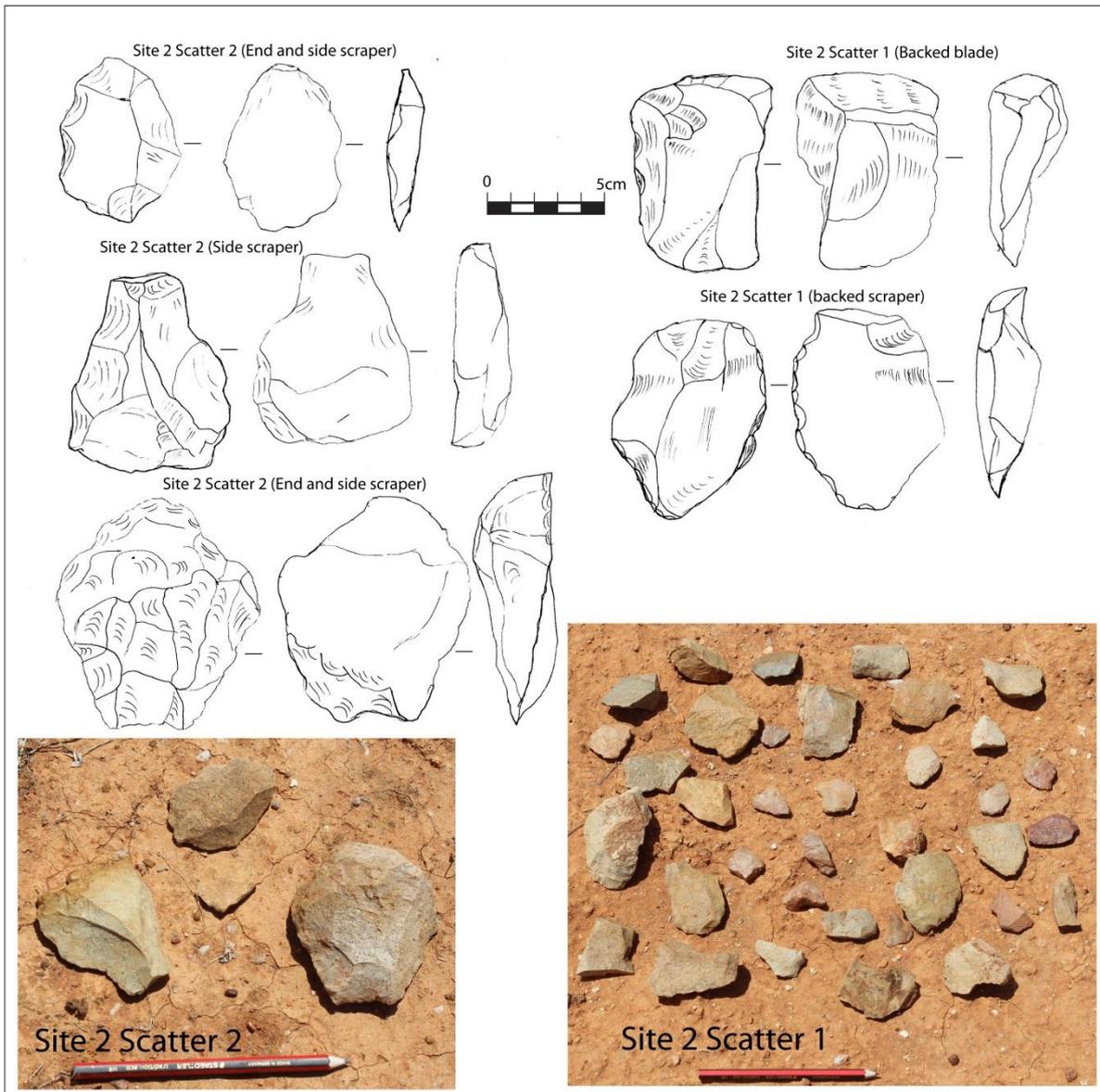


Figure 10: Lithics from Site 2 Scatters 1 and 2.

9.3. Site 3

Site 3 is also outside the development footprint, south of Site 2. The two clusters at this site produced a total of 30 lithics, with only one of these being a non-formal tool (core) (Figure 11).

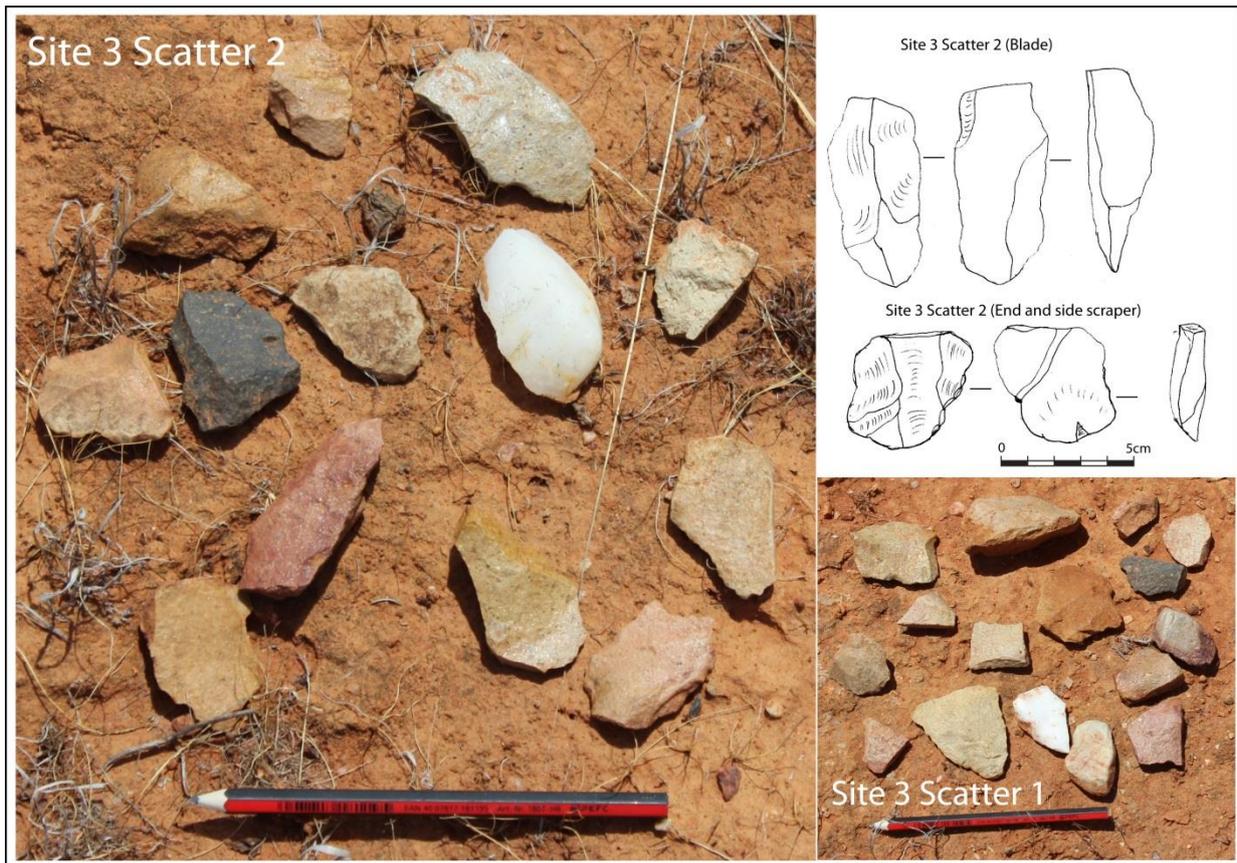


Figure 11: Lithics from Site 3 Scatters 1 and 2.

9.4. Site 4 & 5

Site 4 is located east of Site 3, while Site 5 is north of the same site, all of which are outside the proposed development. Site 4 consists of a small cluster of lithics totalling 19 formal tools and 2 cores, Site 5 has a much smaller assemblage of 8 formal tools and 2 cores (Figure 12).



Figure 12: Lithics from Site 4 (left) and Site 5 (right).

9.5. Site 6

This site is directly north of Site 5 and has 68 formal tools and 8 cores spread around three lithic scatters (Figure 13).

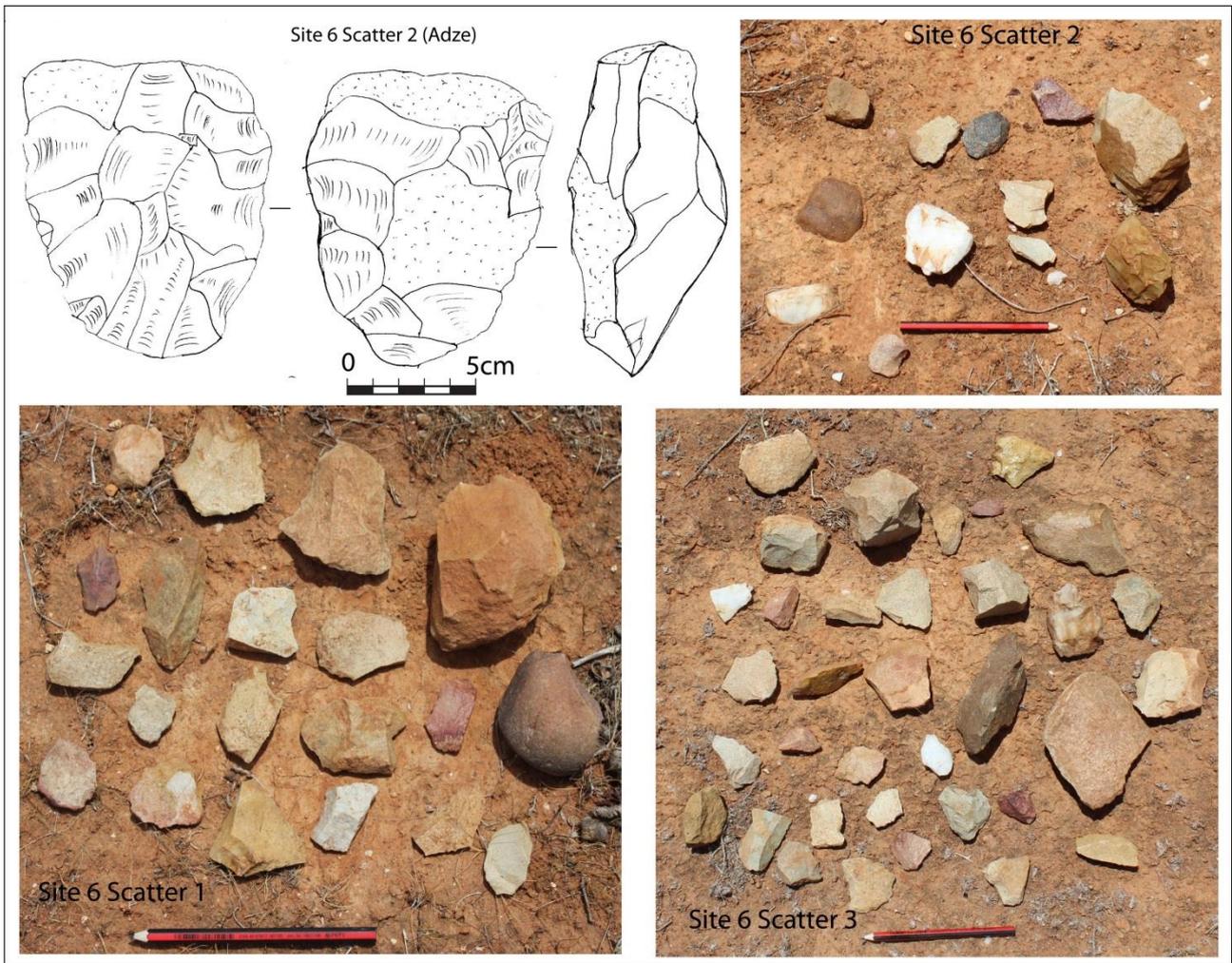


Figure 13: Lithics from Site 6.

9.6. Site 7

Site 7 has two scatters, one of which lies within the proposed extension for limestone mining. The two scatters produced 32 formal tools and 1 core (Figure 14).

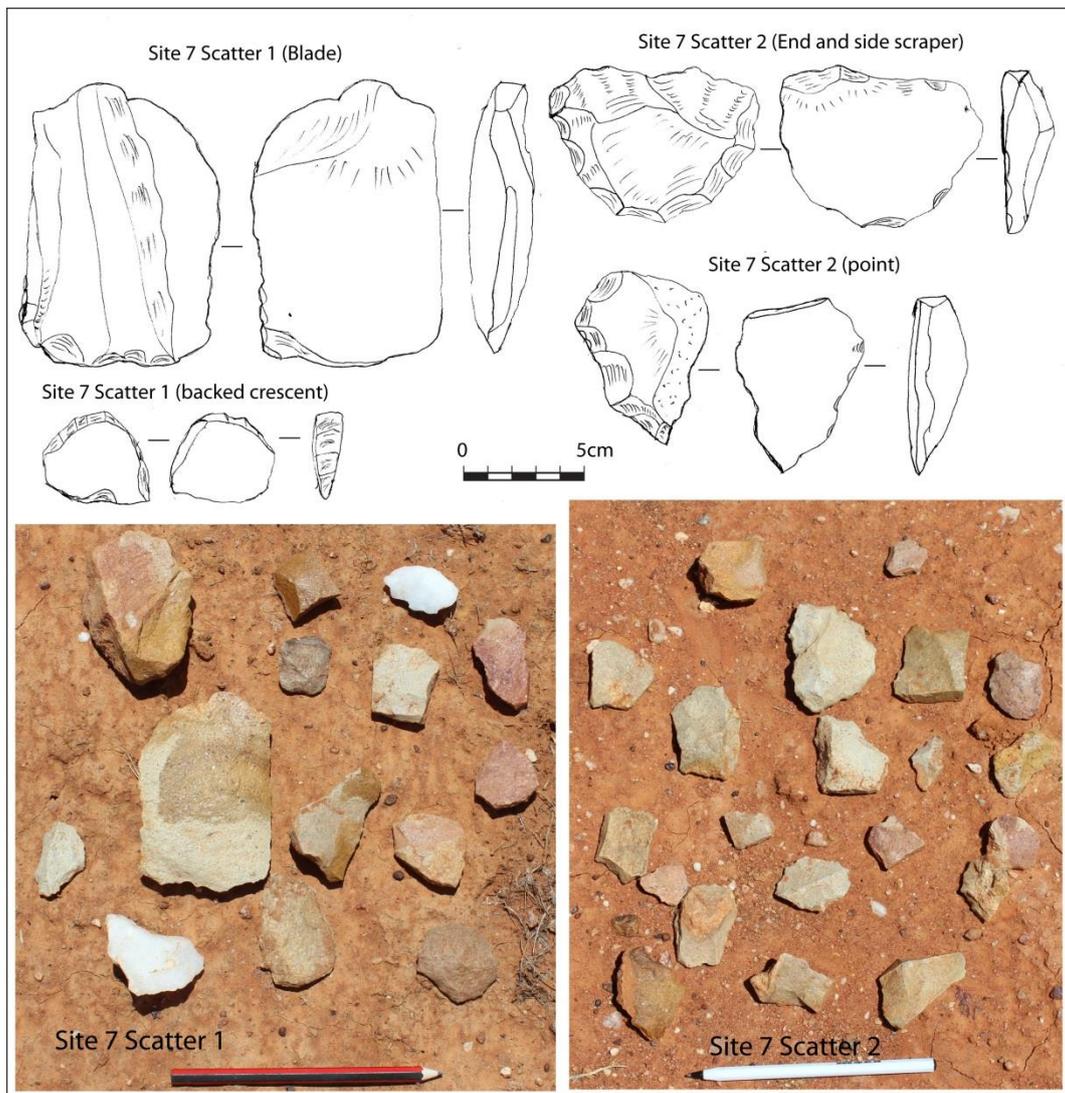


Figure 14: Lithics from Site 7 Scatters 1 and 2.

9.7. Site 8 & 9

Site 8 and 9 are the only sites that did not satisfy our criterion for a site or lithic scatter but were recorded as such because the distribution of their artefacts could not be associated with any other cluster. Both sites occur within the boundary of the proposed extension of the limestone mining area. Site 8 had 11 formal tools only, while Site 9 had 5 formal lithics and 1 core (Figure 15).



Figure 15: Lithics from Site 8 (right) and 9 (left).

9.8. Site 10

Site 10 has six extensive surface scatters that occur between the two proposed developments. Only one scatter (4) is within the proposed boundary for the extension of limestone mining area. This scatter has 21 formal tools most of which are comparable to those reported in the previous sites. Of the 154 lithics from the six scatters at this site, only 7 were cores (Figure 16). It is important to note that this area has very shallow soil stratigraphy and in most cases, erosion has exposed the parent rock (see background surface for images in Figure 16).



Figure 16: Lithics from Site 10 Scatters 1 (top left), 2 (top right), 3 (middle left), 4 (middle right), 5 (bottom left) and 6 (bottom right).

9.9. Site 11 & 13

Sites 11 and 13 are located on the north western corner of the proposed extension of the mining activities. Like Site 10, they both have very shallow soil depth and parent rock is visible on most areas. Site 11 produced 25 lithics (two of which are cores) and Site 13 produced 12 formal tools and 2 cores (Figure 17).



Figure 17: Lithics from Site 11 (top) and Site 13 (bottom).

9.10. Site 12

Site 12 does not occur on the development footprint is one of extensive sites under study. A big portion of the site was destroyed during quarrying (probably for the construction of the access road). The stratigraphy of the site shows that it is not excavation worthy because bedrock is exposed in some areas. The largest number of lithics (193 formal tools and 1 core) came from the four scatters at this site (Figure 18).



Figure 18: Lithics from site 12

9.11. Site 14

The last site reported in this study is Site 14. This is also the only site that occurs in the boundaries of the proposed kiln site. It has three scatters that produced 67 formal tools and 2 cores (Figure 19).

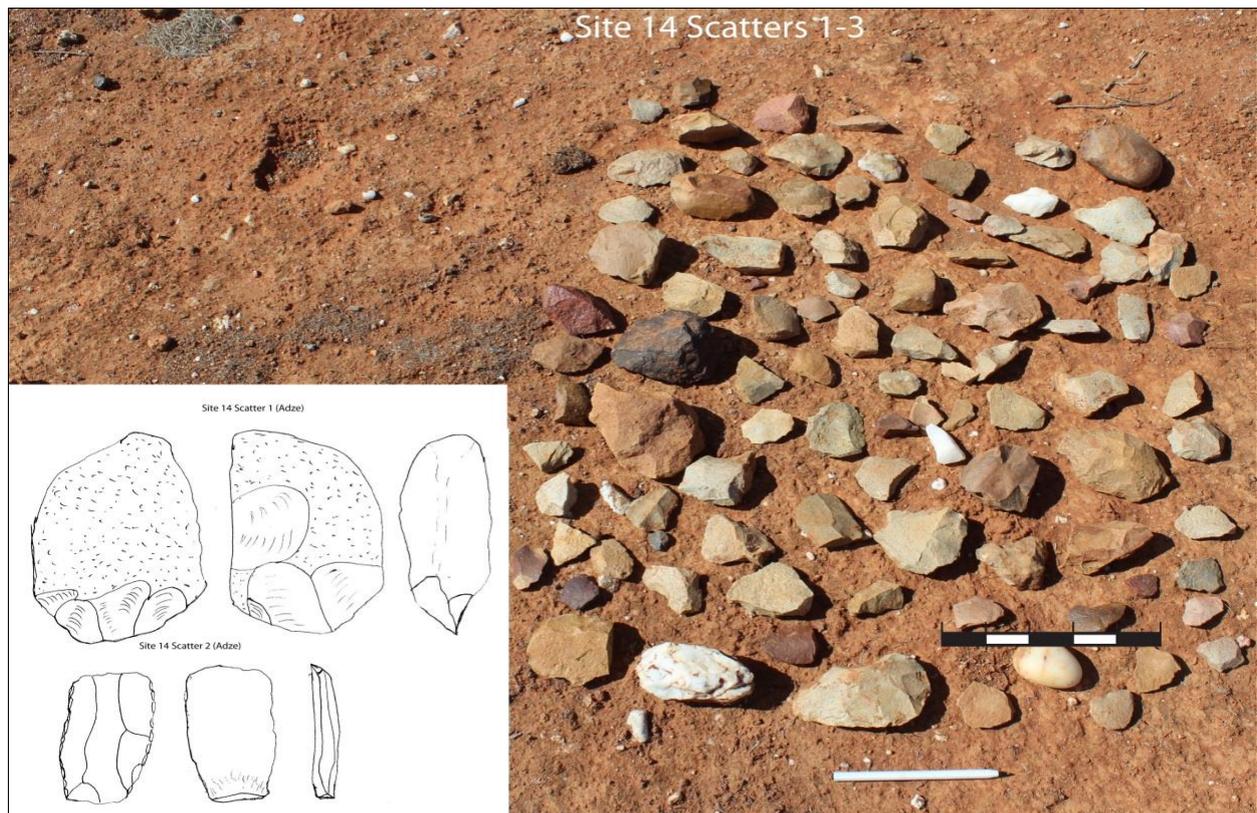


Figure 19: Lithics from Site 14.

The distinction between some rock types was not always easy but quartz, quartzite, silcrete and chert were represented at most sites.

10. DISCUSSION

This mitigation project has clarified the challenges encountered by the first researcher during Phase 1. The observation that the sites and lithic scatters were mixed up during tillage is very significant in terms of the subsequent approach to the study, as well as the significant assessment. The majority of the studied are predominantly MSA in character but ESA and LSA material are also represented. The presence of chunks (cores) at several sites intimates that some of the sites were production centres but the subsequent farming activities have robbed these potential IIIB sites of their significance. In their current state, none of the studied sites are particularly special, even though the material still has some teaching value.

11. CONCLUSION & RECOMMENDATIONS

As requested by HWC, this mitigation project has re-visited the proposed development area, re-surveyed and re-mapped the sites based on informed observations, and sampled surface collections from the sites in order to clear the area for the proposed limestone mining and kiln construction. While the area is now deemed to be clear of significant archaeological resources, and it is recommended that mining can proceed, if any human remains or accumulations of archaeological material are discovered during construction or mining activities, work should stop immediately and the finds must be reported to HWC. The procedure for reporting chance finding must be clearly followed.

12. CHANCE FINDINGS PROCEDURES

It has already been highlighted that sub-surface materials may still be lying hidden from surface surveys. The following monitoring and reporting procedures must be followed in the event of a

chance find, in order to ensure compliance with heritage laws and policies for best-practice. This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. Accordingly, all construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds.

- If during the construction/mining, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- The senior on-site Manager must then make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area before informing SAHRA/PHRA.
- If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and SAHRA or HWC are informed. If the burial is deemed to be over 60 years old and no foul play is suspected, an emergency exhumation permit may be issued by SAHRA for an archaeologist to exhume the remains.

13. REFERENCES

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