Phase 1a Archaeological Impact Assessment

Proposed development of Joram Solar (Photovoltaic) Facility on a Portion of the Farm Vaal Koppies 40/ Remainder Portion 60, Including Potential Grid Connections Across Portions of the Farm Vaal Koppies 40/3, 9, 52 & 66; Farm 555/7; and Erven 73 & 19951, Kenhardt District, Northern Cape Province

prepared for

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by

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1. Executive Summary

This report provides archaeological input for the integrated Heritage Impact Assessment that forms part of the Environmental Impact Assessment process for the proposed development of the Joram Solar Facility to be situated some 13 km east-south-east of Upington in the Northern Cape. The solar facility with a 200 ha development footprint will be sited within a larger study area of about 450 ha. The study reported here covers the 450 ha study area as well as the proposed overhead power line options that will form the grid connection between the solar facility and the Gordonia Substation.

Previous archaeological studies in the area showed that the immediate surroundings do not contain significant archaeological sites. Although numerous Stone Age stone artefacts were recorded in the studied areas covered by this assessment, they occur as isolated finds or in very low density scatters that are temporally mixed, in derived and unstratified contexts and that lack organic remains and other cultural materials. No other tangible heritage resources were identified. Consequently, the archaeological record in the studied areas is considered to be of low significance, and therefore, it is recommended that no further archaeological studies are required prior to the development. Nevertheless, there are areas within the 450 ha study area that contain fewer stone artefacts, and it is suggested that the development activities associated with the solar facility be placed within these areas, as far as possible, in order to minimize the impact.

Overall, from an archaeological perspective there are no fatal flaws, and therefore, no objections to the authorization of the proposed development of the Joram Solar Facility and associated grid connection routes to the Gordonia Substation.

Recommended Mitigation Measures;

- *Archaeological resources identified during this study do not require further recording/studies, and because they are considered to be of low heritage value and have been adequately recorded through this assessment, it is suggested that they can be disturbed or damaged without a permit from SAHRA.*
- *Certain areas within the larger 450 ha study area for the Joram Solar Facility contain very few artefacts and it is suggested that the development footprint be placed in these areas as far as possible, though this is not considered to be a requirement (see Figure 5).*
- *The development may benefit from having an on-site display of the Stone Age archaeological record in the area, though this will require negotiation with and permission from SAHRA.*

Required Mitigation Measures;

- *In the event that excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately.*

- *If significant archaeological or heritage resources are exposed during construction activities, then they must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.*
- *In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency (Mrs Colette Scheermeyer) and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer.*

2. Name, Expertise and Declaration

I, Peter Nilssen (PhD in archaeology, University of Cape Town, 2000), herewith confirm that I am a Professional member - in good standing - of the Association of South African Professional Archaeologists (ASAPA), including the Cultural Resource Management section of the same association (ASAPA professional member # 097). I am an accredited Principal Investigator for archaeozoology (specialist analysis), coastal & shell midden and Stone Age; Field Director for Colonial Period; Field Supervisor for Iron Age and Rock Art.

As the appointed independent specialist (archaeologist) for this project hereby declare that I:

- act as an independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Peter Nilssen

Signature of the specialist:

Name of company: Dr Peter Nilssen

Date: **24 November 2014**

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3. Introduction

3.1. Background

The following provides background to the required assessment for the proposed development of the Joram Solar Facility, which is based in part on information supplied by Mr Dale Holder of Cape Environmental Assessment Practitioners (Pty) Ltd (Cape EAPrac). Cape EAPrac is facilitating the Environmental Impact Assessment (EIA) process while Perception Planning is undertaking the integrated Heritage Impact Assessment (HIA) of which the report presented here comprises the archaeological component. Contact details for Perception Planning are given on the title page of this report.

Joram Solar (Pty) Ltd. is proposing to establish a commercial solar energy facility - currently referred to as Joram Solar Facility (JSF) - on a Portion of the Farm Vaal Koppies 40/ Remainder Portion 60, Including Potential Grid Connections Across Portions of the Farm Vaal Koppies 40/3, 9, 52 & 66; Farm 555/7; and Erven 73 & 19951, Kenhardt District, Northern Cape Province. In total, the affected property is approximately 4696 ha in extent and is situated about 10 km ESE of Upington in the //Khara Hais Municipality, Northern Cape Province (Figures 1 & 2). An area of approximately 450 ha in extent makes up the larger study area that is earmarked for the JSF development. The 450 ha area was studied by various contributing specialists as part of the EIA process. The extent of the final development footprint for the JSF will be about 200 ha, and the latter footprint will be wholly restricted to the larger 450 ha study area.

The final layout for the JSF will avoid all constraints and buffers identified through various contributing specialist studies. The latter are not presently available and therefore Cape EAPrac cannot provide a final development layout at this time. Once the final layout is compiled, it will be circulated to participating specialists for their inspection and approval before it is submitted as part of the Final EIR to the Department of Environmental Affairs for decision making.

Although detailed specifications and development layouts for the proposed solar facility will be guided and determined by the EIA process, it is expected to include the following (see Figure 2):

- an approximate area of 200 ha development footprint for the installation of solar panels
- an onsite substation
- EITHER - a Loop-in power line option to link to existing Eskom 132kV power line that traverses the study area (the grid connection will be one of these options and not both)
- OR - Own built power line option to link to the Gordonia Substation (the grid connection will be one of these options and not both)
- Access road and internal service and maintenance roads
- Service and maintenance buildings (ablution, workshop & storage)
- Perimeter fencing

Activities associated with the proposed development trigger Sections 38(1)(a) - linear development exceeding 300m in length - and 38(1)(c)(i) - area development exceeding 5000m^2 - of the National Heritage Resources Act (Act 25 of 1999), and therefore, this author was appointed to provide archaeological input for the broader HIA in terms of Section 38(8) of the National Heritage Resources Act.

The first phase of the archaeological input involved a Scoping Archaeological Impact Assessment (SAIA) which showed that archaeological resources do occur in the surrounding environment and are therefore likely to occur on the properties being considered here (Nilssen 2014). It was deemed necessary, therefore, that a more detailed, ground truthing archaeological investigation be undertaken. The current phase of the HIA process involves a Phase 1a Archaeological Impact Assessment (AIA) of the larger 450 ha study area as well as the proposed alternative alignments for a 132kV overhead power line that will connect the JSF to the Eskom Gordonia substation. For the most part, the JSF and power line developments will be dealt with separately in this report.

3.2. Purpose and Scope of the Study

The overall purpose of the AIA is to assess the sensitivity of archaeological resources in the affected area, to determine the potential impacts on such resources, and to avoid and/or minimize such impacts by means of management and/or mitigation measures. This AIA report forms part of the Integrated HIA and meets standards required by the South African Heritage Resources Agency (SAHRA) in terms of the National Heritage Resources Act, No. 25 of 1999.

The objectives of the Archaeological Impact Assessment are:

- To assess the nature and sensitivity of archaeological resources in the affected environment;
- To identify the impact of the proposed development on such resources as well as options for mitigation in order to minimize potential negative impacts and to make recommendations for mitigation where necessary; and
- To identify archaeological resources and issues that may require further investigation.

Terms of Reference (ToR):
a) Locate boundaries and extents of the study areas.
b) Conduct a detailed foot survey of the study areas to identify and record all archaeological resources.
c) Assess the impact of the proposed development on such resources according to assessment criteria provided by Cape EAPrac.
d) Recommend mitigation measures and additional studies where necessary.
e) Prepare and submit a report that meets standards required by Heritage Authorities in terms of the National Heritage Resources Act, No. 25 of 1999

3.3. Study Areas

450 ha Study Area

The Joram Solar Facility with solar panel arrays and associated infrastructure will have a development footprint area of about 200 ha that will be contained entirely within the larger 450 ha study area as indicated by a red polygon in Figure 2. The study area is situated some 13 km ESE from the centre of Upington, and is accessible by vehicle via a gravel road leading south from the N10 national road (Figure 3). The E-W flowing Orange River and associated canal system is situated to the north of the N10 and the surrounding land use is rural and agricultural.

The study area is essentially flat and is situated in a slight depression with low ridges to the west and koppies or hills to the east and with small intervening drainage lines with a mainly northerly orientation, sloping down gently towards the Orange River in the north (Figures 3 & 4). Vegetation is open and sparse, and dominated by Karoo shrubs, some grasses and a few small/short trees of mostly *Acacia* species that occur along the main drainage line running through the study area. Consequently, there are large expanses of exposed ground surfaces and archaeological visibility is excellent. Surface sediments are mostly stony with quartz dominating over most of the affected area and these lie in and atop beige to brown to reddish sands that are variable in coarseness. These geological deposits appear to be alluvial gravels that are also exposed in stream cuttings. A few rocky outcrops of quartz, quartzite and calcrete also occur in the area. Examples of the affected environment are presented in Plates 1, 2 and 3.

Relatively recent human-related disturbances to the environment include single vehicle gravel tracks, a windmill with above surface concrete dam, feeding and watering troughs for cattle, cattle grazing, fencing, and a small quarry or borrow pit is situated immediately outside the south west corner of the 450 ha area (Plates 2 & 3). Apart from sheet wash as well as shallow erosion gullies associated with the drainage lines, there is considerable burrowing by smaller and larger mammals though no archaeological remains were found in association with animal burrows (Plates 2 & 3). Overall, the study area is relatively undisturbed with little negative impact on the existing archaeological record. As is expected, most impact occurs around the area containing the windmill, dam, feeding and watering troughs. The latter area is earmarked for the on-site substation.

Power Line Routes

The proposed alternatives for the power line route to link the JSF with the Gordonia Substation are shown in Figure 2. The black lines in Figure 2, as well as the most westerly line running to the Gordonia Substation are existing or approved 132kV overhead power lines. Plates 19 through 23 show the environment, surroundings and existing developments along the power line routes. The environment and existing developments can be seen by matching waypoint numbers along the power line route indicated in Figure 6 with photo numbers in Plates 19 through 23. From the on-site substation of the JSF the loop-in line runs NNW toward an approved / existing overhead power line where the ground surface is moderately undulating and consists of alluvial gravels and rocky outcrops.

The main, longer power line options run NW from the on-site substation and then in a WSW direction and cross the gravel road that joins the N10 to the north. Just before reaching the gravel road, the 2 optional routes diverge with one turning in a NW direction while the other continues on a WSW trajectory. The former rejoins the latter some 2km to the NW after the divergence. The latter option joins an existing 132kV power line route and follows it all the way to the Gordonia Substation in the north (Figures 2 & 6). A single vehicle gravel track runs along the existing overhead power line. Up to about 1km south of the Orange River, both routes run through an undeveloped area apart from single vehicle tracks, fencing and an existing overhead power line. Here the terrain, vegetation cover and surface sediments are similar to that described for the JSF area. The landscape is generally flat with some undulation and low ridges, and vegetation is sparse and open. Ground surfaces consist of alluvial gravels, orange to red sands and a few rocky outcrops. Archaeological visibility is excellent along the entire power line route (Plates 19 & 21).

From about 1km south of the Orange River and all the way to the Gordonia Substation in the north, the landscape has undergone considerable development and disturbance in the recent past. These include roads (gravel and the N10), agricultural

activities (e.g. vineyards, orchards), structures, fencing, earthmoving activities, canals and residential developments between the Gordonia Substation and the northern banks of the Orange River (Figure 6 and Plates 20, 21 & 22). A clear servitude for overhead power lines exists in this northern portion of the power line route. Gravels in this northern section are dominated by banded ironstone, but there is considerable disturbance to surface sediments even in the undeveloped areas along the existing power line servitude.

Table 1 below provides coordinates for the larger properties, excluding some of those traversed by the grid connection, as well as the 450 ha study area and power line route options.

Table 1. Coordinate data for the affected properties, study area for the JSF and alternative power line routes (see Figures 1 & 2).

Name	Description	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National
J1	property boundary - Figure, 1 red	S28.46733 E21.28893	21 Y-028296 X3150267
J2	property boundary - Figure, 1 red	S28.46559 E21.28895	21 Y-028298 X3150074
J3	property boundary - Figure, 1 red	S28.44927 E21.31503	21 Y-030858 X3148272
J4	property boundary - Figure, 1 red	S28.47337 E21.32750	21 Y-032072 X3150946
J5	property boundary - Figure, 1 red	S28.46670 E21.33978	21 Y-033277 X3150210
J6	property boundary - Figure, 1 red	S28.48765 E21.37094	21 Y-036321 X3152541
J7	property boundary - Figure, 1 red	S28.51070 E21.38789	21 Y-037972 X3155101
J8	property boundary - Figure, 1 red	S28.53058 E21.38398	21 Y-037582 X3157303
J9	property boundary - Figure, 1 red	S28.54074 E21.35398	21 Y-034643 X3158420
J10	property boundary - Figure, 1 red	S28.56993 E21.36187	21 Y-035405 X3161657
J11	property boundary - Figure, 1 red	S28.57376 E21.33802	21 Y-033071 X3162075
J12	property boundary - Figure, 1 red	S28.50408 E21.33064	21 Y-032370 X3154351
PVA	study area for JSF - Figure 2, red polygon	S28.48042 E21.35585	21 Y-034846 X3151735
PVB	study area for JSF - Figure 2, red polygon	S28.49715 E21.37186	21 Y-036407 X3153594
PVC	study area for JSF - Figure 2, red polygon	S28.50689 E21.35797	21 Y-035044 X3154669
PVD	study area for JSF - Figure 2, red polygon	S28.50578 E21.35520	21 Y-034774 X3154546
PVE	study area for JSF - Figure 2, red polygon	S28.50675 E21.35220	21 Y-034480 X3154653
PVF	study area for JSF - Figure 2, red polygon	S28.50185 E21.34747	21 Y-034018 X3154108
PVG	study area for JSF - Figure 2, red polygon	S28.48639 E21.34318	21 Y-033603 X3152393
PVH	study area for JSF - Figure 2, red polygon	S28.48552 E21.34740	21 Y-034016 X3152298
PVI	study area for JSF - Figure 2, red polygon	S28.48901 E21.35319	21 Y-034582 X3152687
PVJ	study area for JSF - Figure 2, red polygon	S28.48788 E21.35385	21 Y-034647 X3152562
PVK	study area for JSF - Figure 2, red polygon	S28.48309 E21.35193	21 Y-034461 X3152030
RDA	access road - Figure 2, dark green	S28.50934 E21.35502	21 Y-034755 X3154940
RDB	access road - Figure 2, dark green	S28.50402 E21.36215	21 Y-035455 X3154352
RDC	access road - Figure 2, dark green	S28.48903 E21.35321	21 Y-034585 X3152689
LPA	loop-in line option - Figure 2, pale blue	S28.48884 E21.35353	21 Y-034616 X3152667
LPB	loop-in line option - Figure 2, pale blue	S28.48009 E21.35016	21 Y-034289 X3151697
ONSITE	on site substation - Figure 2	S28.48887 E21.35378	21 Y-034640 X3152671
PL1A	own built power line to Gordonia substation	S28.48897 E21.35346	21 Y-034609 X3152682
PL1B	own built power line to Gordonia substation	S28.48159 E21.34395	21 Y-033680 X3151861
PL1C	own built power line to Gordonia substation	S28.48438 E21.33267	21 Y-032575 X3152167
PL1D	own built power line to Gordonia substation	S28.46437 E21.29930	21 Y-029312 X3149941
PL1E	own built power line to Gordonia substation	S28.45434 E21.30057	21 Y-029440 X3148830
PL1F	own built power line to Gordonia substation	S28.43800 E21.29652	21 Y-029048 X3147018
PL1G	own built power line to Gordonia substation	S28.43122 E21.29377	21 Y-028780 X3146266
PL2A	own built power line to Gordonia substation	S28.48445 E21.33269	21 Y-032577 X3152176
PL2B	own built power line to Gordonia substation	S28.48694 E21.32241	21 Y-031570 X3152449
PL2C	own built power line to Gordonia substation	S28.47145 E21.30192	21 Y-029567 X3150726
PL2D	own built power line to Gordonia substation	S28.46437 E21.29946	21 Y-029329 X3149941

3.4. Approach to the Study

This assessment was conducted with accepted best practice principles and in accordance with guidelines and minimum standards as set out by the Department of Environmental Affairs and Development Planning and the South African Heritage Resources Agency (DEA&DP 2005, SAHRA 2007).

A brief overview of the archaeological desktop study and literature review is presented below in the results section.

In order to assess the nature and significance of the archaeological record in the affected area, a comprehensive foot survey was performed. The extent of the area covered

by the foot survey was based on the provisional development layout plan including the footprint area for the JSF, own built power line routes and access road (Figure 2). Note that, in error, a large area to the east of the JSF - as indicated by the red polygon in Figures 2 and 4 - was included in the foot survey. The significance of archaeological resources were assessed in terms of their content and context. Attributes considered in determining significance include artefact and/or ecofact types, rarity of finds, exceptional items, organic preservation, aesthetic appeal, potential for future research, density of finds and the context in which archaeological traces occur.

On behalf of Joram Solar (Pty) Ltd., Mr Dale Holder of Cape EAPrac provided background information, terms of reference, locality maps and provisional development layout plans for the proposed activity. Initially, the land owner, Mr Sterling Strauss, was contacted for permission to access the study area and accompanied this author into the field for orientation and provided keys to access various parts of the property. Thereafter the entire archaeological survey was conducted independently and on foot.

Due to low, open vegetation and large expanses of exposed ground surfaces, access and archaeological visibility was excellent and allowed for a thorough assessment of the archaeological record in the JSF area and along the proposed power line options. Because of the large area covered on foot as well as excellent archaeological visibility, survey walk tracks were spaced from about 30m apart in the beginning of the survey to about 80m apart toward the end of the survey for the 450 ha JSF area. The relatively large spaces between the latter survey tracks is justified by this author's familiarization with the study area and its contents over several days as well as the low density and overall uniformity of the archaeological record.

Survey tracks were fixed with a hand held Garmin Camo GPS to record the search area (Figures 3, 4 and 6, gpx tracking file is available from author). The position of identified archaeological occurrences, observations and photo localities were fixed by GPS (Figures 4 & 6 and Plates 1 through 25). Due to their large number, all observations and archaeological occurrences are not presented in Figures 4 and 6 and a table with coordinate data is not provided. Figures 4 and 6 and the relevant Plates provide a representative sample of observations and the archaeological record in the studied areas. Data for all finds and observations are available from this author on request. Digital audio notes and a comprehensive, high quality digital photographic record were also made. In this report, localities of archaeological occurrences, observations and photographs are established by matching the numbers on photographs with those of waypoints in Figures 4 and 6. Directions of views are indicated with compass bearing names like E is east; WSW is west south west, and so on. Bearing names in panoramic views indicate the scope of those views (Plate 1). An image with a "N" at bottom left and a "S" at bottom right means that the view is approximately 180 degrees from the north to the south and that east is roughly at the centre of the image.

3.5. Assumptions, Limitations and Gaps in Knowledge

This assessment assumes that the proposed Joram Solar Facility will be contained within the 450 ha study area and that the proposed power line alignments as indicated in Figure 2 will not be rerouted. In the event that the impacted areas are moved, then a further archaeological investigation may be required. It is also assumed that all background information and layout plans provided by Cape EAPrac are correct and current. Once all participating specialists' input are considered and incorporated into the final development

layout plan, Cape EAPrac will circulate the final layout plan to participating specialists for their consideration and approval.

This assessment is specifically for the footprint of the JSF and corridors of the proposed power line routes and does not apply to, and may not be used for, any other future developments on the remainder of the affected properties.

High densities of alluvial gravels including a high proportion of quartz were very slow and difficult to assess since it is not feasible to individually inspect every stone. Nevertheless, and although some artefacts in quartz almost certainly went undetected, a careful assessment allowed for the identification of hundreds of artefacts and if present, higher density scatters would certainly have been readily visible to the trained eye.

There were no further limitations to the study since all relevant portions of the affected areas were accessible on foot and archaeological visibility is excellent, and therefore, it is considered that sufficient observations were made for the purpose of this assessment. Due to the fact that parts of the archaeological record may be covered by surface sediments, this study is limited to such resources exposed on the surface and in disturbed contexts. Consequently, it cannot be ruled out that more archaeological resources may be exposed during the construction phase of the development.

At present there are no gaps in knowledge regarding the proposed development.

4. Results

4.1. Archaeological Background - Desktop Study & Literature Review

A literature review of previous archaeological and heritage-related work in the surrounding area was conducted in part by using information from the Report Mapping Project of the SAHRA-APM Unit as well as SAHRIS. Most of the reports cited here were downloaded from the SAHRA web site.

Very little archaeological research has been conducted in this portion of South Africa and the bulk of information concerning the history and archaeology of the area was obtained through heritage and archaeological studies associated with environmental impact assessments for a variety of development activities. No previous archaeological or heritage related work has been done on the affected properties for the proposed Joram Solar Facility and power line options, but an archaeological study conducted by this author a few kilometres to the east gives an indication of the nature of the archaeological resources that occur in the immediate surroundings (Nilssen 2012).

It is evident from earlier studies that structures, graves as well as remnants of the Anglo-Boer War characterize the archaeological record of the historic period in the surroundings of Upington. The bulk of human occupation of the general surroundings, however, relates to the pre-historic period where Rock Art and herder sites as well as artefacts of the Early Stone Age, Middle Stone Age and Later Stone Ages are represented. No significant archaeological sites were identified in the immediate surroundings of the affected area and stone artefacts - made in a variety of raw materials - are most commonly found in low density scatters across the landscape. Overall, the Stone Age finds made in the area are considered to be of low archaeological significance because of the absence of

organic and other cultural remains, their low frequencies, temporally mixed nature as well as their disturbed, derived and unstratified contexts (Beaumont 2006a, b, c, d & e, Beaumont 2008, Dreyer 2006, Kaplan 2008, Morris 2006 & 2013, Nilssen 2012, Pelser 2012, Webley and Halkett 2010).

The nearest archaeological study, which consists of the same environmental setting, geological sediments and overall context as that of the current study areas, was undertaken a few kilometres to the east of the proposed JSF and power line routes (Nilssen 2012). The main findings of the latter investigation were that "Although numerous Stone Age artefacts were identified along most of the studied area, these are scattered on the surface in low densities and occur mostly as isolated finds. No faunal remains or other cultural materials were seen. The vast bulk of specimens are in quartz with only a few pieces made in banded ironstone. A few artefacts of potentially Middle Stone Age (MSA) origin were seen, but the overwhelming majority are of the Later Stone Age (LSA). No archaeological materials were identified in exposed profiles of geotechnical test holes or stream cuttings. Stone artefact types include cores (some microlithic and a few bladelet cores), flakes, chunks, and numerous retouched pieces were identified. The latter are dominated by a variety of scrapers and notched pieces/adzes. A bifacially retouched point or convergent flake was also noted. ... Because Stone Age artefacts identified in the study area occur as isolated finds or in low density artefact scatters that are in a temporally mixed and derived context, these materials are considered to be of low archaeological significance. The finds are designated a field rating of Generally Protected C, and because they were adequately documented during this study they do not require further recording before development commences. Apart from the above-mentioned archaeological materials, no other heritage related resources or issues were identified during the study" (Nilssen 2012, pg 8 & 9).

Since the bulk of the archaeological record in the immediate surroundings is that of the Stone Age period, a brief overview of the technology associated with the development of archaic and modern humans during this era is given below.

Early Stone Age (ESA) materials including Acheulian hand axes, cleavers and chopping tools that may date from as early as 2.7 million years ago and come to end about 300 000 years ago is the earliest evidence for the tool-making human ancestors occupying this area. Such artefacts are usually found among alluvial gravels. While present, ESA artefacts are fairly rare and are usually found in disturbed or derived contexts where they are mixed with artefacts of more recent Stone Age times.

The Middle Stone Age (MSA) starts about 300 000 years ago and the interface between the ESA and MSA is sometimes marked by a stone tool industry known as the Fauresmith, where small hand axes appear to indicate the transition from archaic humans to *Homo sapiens*. In the main, however, MSA stone artefacts are characterised by flake and blade industries where evidence for core preparation - also known as the Levallois technique - is seen on prepared or faceted platforms of flakes and blades. Convergent flakes or points are also one of the markers of the MSA period. Like the ESA specimens, though more numerous, stone artefacts of MSA origin also occur among alluvial gravels and are commonly mixed with artefacts of both ESA and Later Stone Age origin. Unfortunately, no other cultural materials or faunal remains are associated with these artefacts when found in exposed contexts.

The Later Stone Age (LSA) starts about 40 000 years ago and is characterised by substantial technological improvements over the MSA industries. Advancements on previous technologies and new technologies as well as cultural developments include the widespread occurrence of rock art (cave paintings and rock engravings), decorative objects

(ostrich egg shell beads, marine shell pendants and beads, ochre), human burials with grave goods including painted stones, an expanded stone tool kit, microlithic stone tool industries (often associated with composite tools such as bow and arrow hunting), bone tools, tortoise carapace bowls, ostrich egg shell containers, fire making sticks and so on. Due to the non-preservation of organic remains in exposed contexts such as the affected environment, the archaeological traces of the LSA occupants is limited to stone artefacts. While LSA stone artefacts are common in the landscape, they occur in low densities - often in isolation, are mixed with ESA and MSA specimens and lack organic and cultural remains. As a result, these materials are generally of low scientific value.

The bulk of archaic human (ESA) and human (MSA to recent) occupation of this area involves the Stone Age era, and therefore, the most significant cultural layer in this area involves the pre-colonial cultural landscape and its sense of place (see UNESCO 2008 for definitions, significance and preservation of cultural landscapes).

4.2. Archaeological Foot Survey - Joram Solar Facility

An archaeological foot survey was conducted over a five day period from 27 to 31 August 2014 on the proposed site for the Joram Solar Facility. As mentioned above, a larger area (nearly 540 ha) than the 450 ha study area demarcated by Cape EAPrac was investigated by mistake (Figures 3 & 4). Nevertheless, the entire demarcated study area was assessed. During the foot survey, a distance of 89.5 km was walked, which resulted in a comprehensive archaeological examination covering an area of about 130 ha. During the first three days, walk tracks were closely spaced (about 30 m apart) in order to become acquainted with the archaeological record on site and to ensure that no smaller high density scatters of stone artefacts were missed. Thereafter, having determined that visibility was good enough to detect cultural features (e.g., footings of stone kraals) up to a distance of about 50 m, and that high density artefact scatters do not seem to occur in the landscape, the walk tracks were spaced further apart (up to a maximum of about 100 m) during the last two days of survey.

Because no formal archaeological sites were identified and because the record consists entirely of isolated occurrences of stone artefacts, and in a few cases of very low density scatters of stone artefacts, each occurrence is not described separately here. Rather, the following is a summary description of the finds and their contexts, but a complete set of detailed records is available from this author. Similarly, Figure 4 only displays a representative sample of the archaeological occurrences recorded during the study as inclusion of every occurrence would fill most of the studied area with markers and render it illegible. Apart from a few small portions within the study area where no artefacts were recorded, the vast bulk of the study area is littered with isolated Stone Age specimens and a few very low density scatters of stone artefacts. Nevertheless, there are three larger areas where artefact densities are somewhat lower (Figure 5). A large number of Plates appear at the end of this report as it is considered to be important that a representative sample of the identified Stone Age specimens be included for the record, especially since it is highly improbable that further archaeological assessment will be undertaken on the affected properties.

Scattered thinly across the landscape and most commonly occurring among alluvial gravels, though also present less frequently on sandy surfaces, are isolated stone artefacts or very low density scatters of stone artefacts (at most 1 artefact per square meter) that span the entire Stone Age epoch. Overall frequencies of archaeological occurrences are somewhat lower in the yellow polygons shown in Figure 5. No organic or any other cultural

remains were identified or associated with the stone artefacts and in nearly all instances, specimens of ESA, MSA and LSA origin are mixed and thus out of primary context or unstratified. Artefacts have been washed or eroded onto the same surface and thus lack stratigraphic context. Examples of a representative sample of stone artefacts and their contexts are presented in Plates 4 through 18.

Materials of ESA origin are notably less common than those of the MSA and LSA and ESA specimens include flakes, cores and bifacially retouched hand axes and cleavers. No "chopper" tools were seen. It appears that most specimens of ESA origin are in quartzite and are usually heavily patinated. Some specimens cannot be attributed to either MSA or ESA since many of the MSA specimens are also patinated. Some hammer stones, cores and flakes, therefore, are likely of either ESA or MSA origin. It is estimated that the ESA fraction of the recorded stone artefact assemblage is about 5%.

MSA specimens are notably more common than those of the ESA, but also considerably less common than those of LSA origin. The MSA fraction of the overall stone artefact assemblage is estimated to be about 25%. MSA specimens include Fauresmith type hand axes, convergent flakes, blades, cores (including disc and blade cores), flakes, large scrapers, possible notched pieces/adzes and possible hammer stones. Prepared platforms are common, particularly on convergent flakes and blades and artefacts are in quartzite, quartz and banded ironstone. No raw material is notably more common than others. Due to their mixed context, some artefacts could not be assigned definitively to either MSA or LSA origins, and in particular, quartz does not appear to become as obviously patinated as quartzite.

Specimens of LSA origin are notably more frequent than those of the ESA or MSA and comprise about 70% of the total stone artefact assemblage. Specimens include adzes, notched pieces, scrapers, hammer stones, an upper grind stone, cores (including disc cores though no bladelet cores were identified), flakes and flaked pieces, and like the MSA materials, specimens are mostly in quartz, quartzite and banded ironstone. Quartz and banded ironstone appear to be the preferred raw materials. Adzes and notched pieces are by far the most common formal tools followed by scrapers.

No other tangible heritage related resources were identified in the study area.

Significance and Recommendation

Because Stone Age materials identified in the study area occur as isolated finds or in very low density stone artefact scatters, because organic and other cultural remains are entirely absent, and because artefacts are in a temporally mixed and derived context, these materials are considered to be of low archaeological significance. Consequently, the identified archaeological resources, because no formal archaeological sites were identified, are lumped and designated a "blanket" field rating of Generally Protected C, and because they were adequately documented during this study they do not require further investigation or recording before development commences. It is also recommended, that due to their low significance, a permit for their disturbance or destruction is not required form the heritage authorities. Because stone artefact densities are even lower in the areas indicated in Figure 5, and that these areas are less sensitive from an archaeological perspective, it is recommended that the JSF footprints be restricted to these areas, as far as possible, to reduce the overall negative and cumulative impact. This is a suggestion rather than a requirement since the entire archaeological record in the study area is considered to be of low significance.

4.3. Archaeological Foot Survey - 132kV Overhead Power Line

South of the Orange River

On 31 August and 1 September 2014 an archaeological foot survey was conducted along the proposed alternative 132kV power line routes that will link the JSF with the Gordonia Substation (Figures 2, 3 & 6). A distance of 23km was walked, covering an area of about 35 ha (Figures 3 & 6). Apart from the areas immediately adjacent to the Orange River, which are substantially disturbed by recent human related agricultural activities, all areas were accessible on foot and archaeological visibility was excellent. Sufficient observations were made to assess the archaeological sensitivity of the power line routes. Examples of the environment and developments along the power line routes are shown in Plates 19 through 23.

Along the stretch between the JSF study area and up to about 1 km south of the Orange River, the archaeological record is very similar to that recorded in the JSF though stone artefacts occurred in even lower frequencies. The bulk of archaeological occurrences consist of isolated stone artefacts and a few very low density stone artefact scatters. A typical example of the latter involves a temporally mixed scatter of eight MSA and LSA specimens that were collected over an area of about 30 square meters, meaning that the scatter consisted of less than 1 artefact per square meter. Artefacts include cores, chunks, flakes, blades, scrapers and adzes or notched pieces with milky quartz being the dominant raw material followed by notably fewer specimens in quartzite and banded ironstone (Plates 23 & 24). A bifacial ESA hand axe made in quartzite was found in a spoil heap adjacent to a test pit at waypoint 441 (Figure 6 and Plate 24). This specimen derived from red sands overlying a calcrete layer and inspection of the exposed profile revealed that no other artefacts or anthropogenic layers are present in the test pit. This find does indicate, however, that subsurface archaeological materials are present, but it is probable that they occur as isolated pieces or in very low density scatters.

Significance and recommendation: Due to the very low densities of Stone Age specimens, the lack of any other associated cultural or faunal remains and their derived and temporally mixed nature, the archaeological record along this stretch of the proposed power line routes is considered to be of low significance, and therefore, no further recording or mitigation is required. The finds are given a field rating of Generally Protected C and because an adequate recorded was made during this investigation, it is recommended that a permit from the heritage authorities is not required for their disturbance or destruction.

North of the Orange River

Surface sediments are notably disturbed along the proposed power line stretch between the northern banks of the Orange River and the Gordonia Substation. This portion of the power line route is also an existing power line servitude with existing pylons and overhead power lines. There is evidence for small scale earth moving activities, the dumping of building rubble and other garbage, as well as concentrations and low heaps of alluvial gravels that are clearly not in primary context. Consequently, the context of the archaeological record in this area is already substantially compromised. Unlike those seen south of the Orange River, alluvial gravels in this area are overwhelmingly dominated by banded ironstone and the vast bulk of identified stone artefacts are made in this raw material. A few isolated specimens were identified as well as very low density stone artefact scatters. Stone artefact types include hammer stones, cores (including disc cores), flakes, blades, scrapers and adzes or notched pieces (Plate 25). While no definitive ESA specimens were identified, the assemblage is a mix of artefacts of MSA and LSA origin. Other cultural or organic remains are entirely absent.

Significance and recommendation: As with the other areas covered during this investigation, and because of the already compromised context, the very low densities of Stone Age specimens, the lack of associated cultural or organic remains and their temporally mixed nature, the archaeological record along this stretch of the proposed power line route is considered to be of low significance, and therefore, no further studies or mitigation is necessary. The finds are given a field rating of Generally Protected C and because they were adequately recorded during this study, it is recommended that a permit from the heritage authorities is not needed for their disturbance or destruction.

5. Sources of Risk, Impact Identification and Assessment

Because archaeological resources are non-renewable and each archaeological occurrence is unique, it is important that areas affected by development are assessed for the presence and sensitivity of such resources prior to development. The Joram Solar Facility and associated power lines will involve area and linear developments respectively and these could have a permanent negative impact on archaeological resources. This study has shown that archaeological resources do occur in the affected environment, but that they are of low significance. The purpose of this AIA is to assess the sensitivity of archaeological resources in the affected areas, to determine the potential impacts on such resources, and to avoid and/or minimize such impacts on sensitive resources through management and/or mitigation measures.

Direct negative impacts on archaeological resources will occur during the construction and installation phase of the proposed development. Indirect and cumulative impacts will occur during the operational phase of the development.

While numerous artefacts of Stone Age origin were identified in the study areas, no significant archaeological sites were recorded and based on the surface finds, it is highly improbable that significant archaeological sites are currently buried beneath surface sediments.

The below criteria for assessment are drawn from the EIA Regulations that were published in April 1998 by the South African Department of Environmental Affairs and Tourism. The format of impact tables presented below were provided by Cape EAPrac.

5.1. Joram Solar Facility - 450 ha Study Area

The below focuses on the impact of the Joram Solar Facility and associated infrastructure on the recorded archaeological resources within the larger 450 ha study area and is summarized in Table 2 below.

Nature of Impact

The construction and installation phase of the development as detailed in Section 3.1 above will involve considerable disturbance to surface and sub-surface sediments. Such activities will have a significant and permanent negative impact on archaeological resources identified in the study area. The operational phase, long term and cumulative, will have a negligible impact on archaeological resources.

Extent of Impact

The impact will be local, confined to the 450 ha study area, and since the archaeological record is considered to be of low significance and because it has been adequately documented during this study, the impact will not change the heritage value of the immediate and surrounding environment (local, provincial or national).

Duration of Impact
Long term to permanent.

Intensity
High.

Probability of Occurrence
Definite

Legal Requirements
While archaeological resources identified during this assessment are protected by Section 35(4)(a) of the National Heritage Resources Act (Act 25 of 1999), which states that "No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite", it is suggested that, due their low significance, a permit is not required from the heritage authorities.

Status of the Impact
Negative for archaeological resources, but positive for the development.

Accumulative Impact
Because the archaeological record in the study area is considered to be of low significance and because it has been adequately recorded during this investigation it is considered that the cumulative impact on the archaeological record is negligible. By preserving areas that are richer in stone artefacts (as suggested above and indicated in Figure 5), the cumulative impact can be further reduced and therefore, this negative impact is graded as low.

Degree of Confidence in Prediction
High

5.2. 132kV Overhead Power Line Routes

Table 2 below presents a summary of impacts on archaeological resources that were recorded along the power line routes.

Nature of Impact
Although the assessment conducted here has shown that the bulk of the power line routes are not archaeologically sensitive, it cannot be ruled out that archaeological resources lie buried in sub-surface sediments (such as the isolated ESA hand axe unearthed in a test excavation). Nevertheless, based on surface observations, it is highly improbable that significant archaeological resources will be exposed during construction. The construction phase - installation of pylons - will involve approximately 2.5x2.5m excavations to a depth of up to 3m into mostly virgin sediments, sub-surface archaeological resources may be impacted negatively. Vegetation clearing for single vehicle service and access tracks may also disturb such resources. No further negative impact will occur during the operational phase.

Extent of Impact
Local

Duration of Impact
Permanent.

Intensity
Low.

Probability of Occurrence
Low to medium

Legal Requirements
Archaeological resources are protected by Section 35(4)(a) of the National Heritage Resources Act (Act 25 of 1999) and may not be damaged or disturbed without a permit from the heritage authorities. All identified archaeological resources, however, are of low significance and were adequately recorded during this study, and therefore, no further studies or mitigation is needed and it is suggested that a permit from the heritage authorities is not required for their disturbance or destruction.

Status of the Impact
The overhead power line will have a negligible negative impact on archaeological resources.

Accumulative Impact
Negligible negative impact.

Degree of Confidence in Prediction
High

5.3. No-Go Option

Table 2 summarizes the impacts of the no development option.

Nature of Impact
In the absence of development, the continued farming activities (cattle grazing) and natural erosion and disturbance by burrowing animals will have a slow negative impact on the archaeological record.

Extent of Impact
Local, existing and continued.

Duration of Impact
Continual.

Intensity
low.

Probability of Occurrence
low.

Legal Requirements
none.

Status of the Impact
Neutral.

Accumulative Impact
Low, existing and continual.

Degree of Confidence in Prediction
Medium.

As outlined in section 3.1 above, the proposed development will involve construction and installation activities that will have a permanent negative impact on archaeological resources identified in this study. However, the archaeological resources are considered to be of low significance and their destruction will not have a negative impact on the heritage value of the area.

Overall, from an archaeological perspective there are no fatal flaws, and therefore, no objections to the authorization of the proposed development of the Joram Solar Facility and associated grid connection routes to the Gordonia Substation.

Table 2. Summary of impacts on archaeological resources associated with the Joram Solar Facility (JSF), 132kV overhead power line routes (power lines) and the No-Go option (NO-GO).

Alternative	Nature of impact	Extent of impact	Duration of impact	Intensity	Probability of occurrence	Status of the impact	Degree of confidence	Level of significance	Significance after mitigation
JSF	Construction & Installation	Local	Long term to permanent	High	Definite	Negative for archaeological resources; positive for development	High	Low	Low
JSF	Operational	Local	Long term to permanent	Low	Low	Neutral	High	Low	Low
Power lines	Construction & Installation	Local	Long term to permanent	Low	Low to medium	Negligibly negative	High	Low	Low
Power lines	Operational	Local	Long term to permanent	Low	Low	Neutral	High	Low	Low
NO-GO	Farming activities	Local	Long term to permanent	Low	Low to medium	Neutral	Medium	Low	Low

6. Recommended and Required Mitigation Measures

Recommended Mitigation Measures;

- Archaeological resources identified during this study do not require further recording/studies, and because they are considered to be of low heritage value and have been adequately recorded through this assessment, it is suggested that they can be disturbed or damaged without a permit from SAHRA.
- Certain areas within the larger 450 ha study area for the Joram Solar Facility contain very few artefacts and it is suggested that the development footprint be placed in these areas as far as possible, though this is not considered to be a requirement (see Figure 5).
- The development may benefit from having an on-site display of the Stone Age archaeological record in the area, though this will require negotiation with and permission from SAHRA.

Required Mitigation Measures;

- In the event that excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately.
- If significant archaeological or heritage resources are exposed during construction activities, then they must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.
- In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency (Mrs Colette Scheermeyer) and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer.

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8. **Figures and Plates** (on following pages)

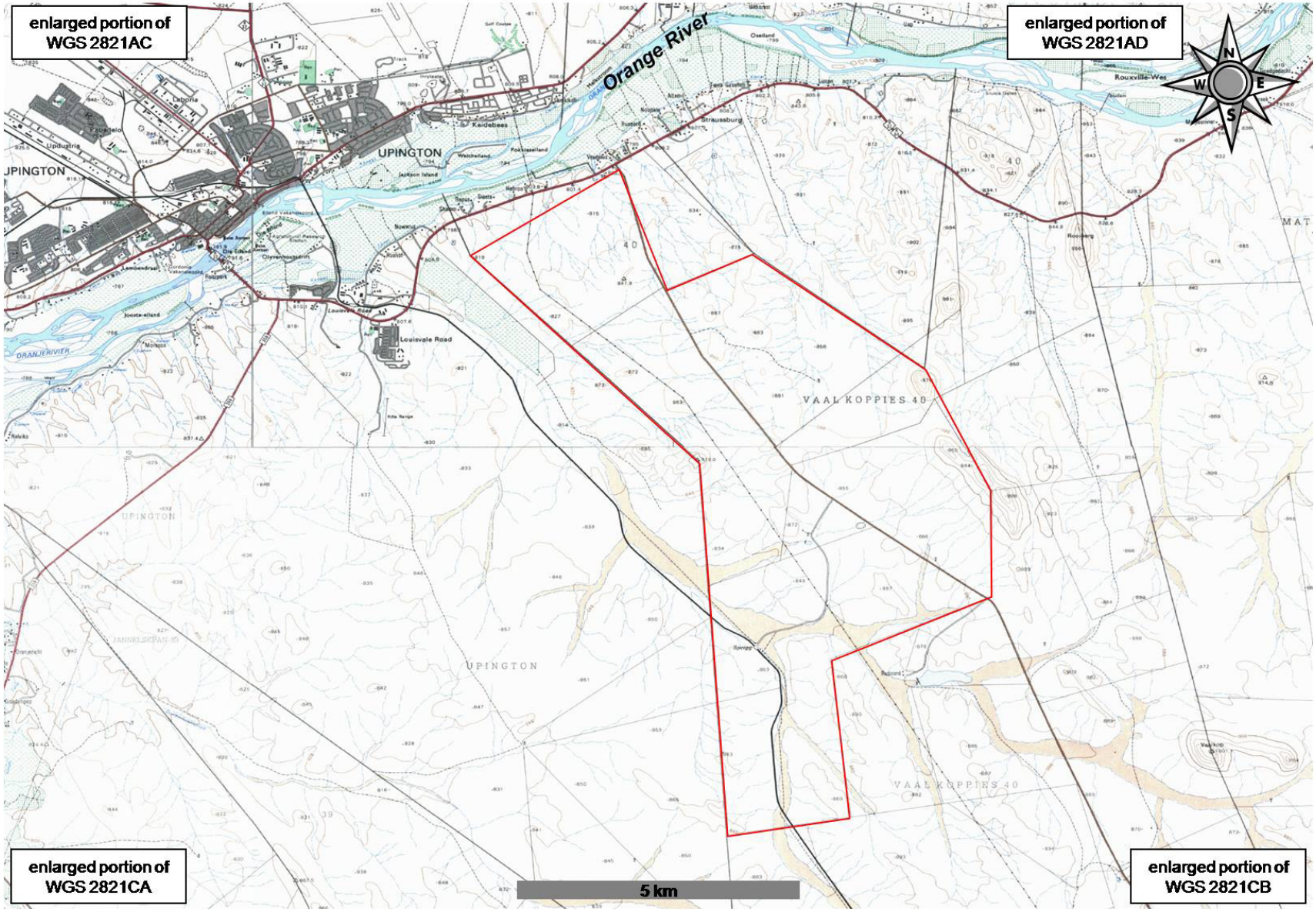

Figure 1. Location of affected properties (red polygon) relative to Upington, Northern Cape Province. (Map - The Chief Directorate, Surveys & Mapping, Mowbray).

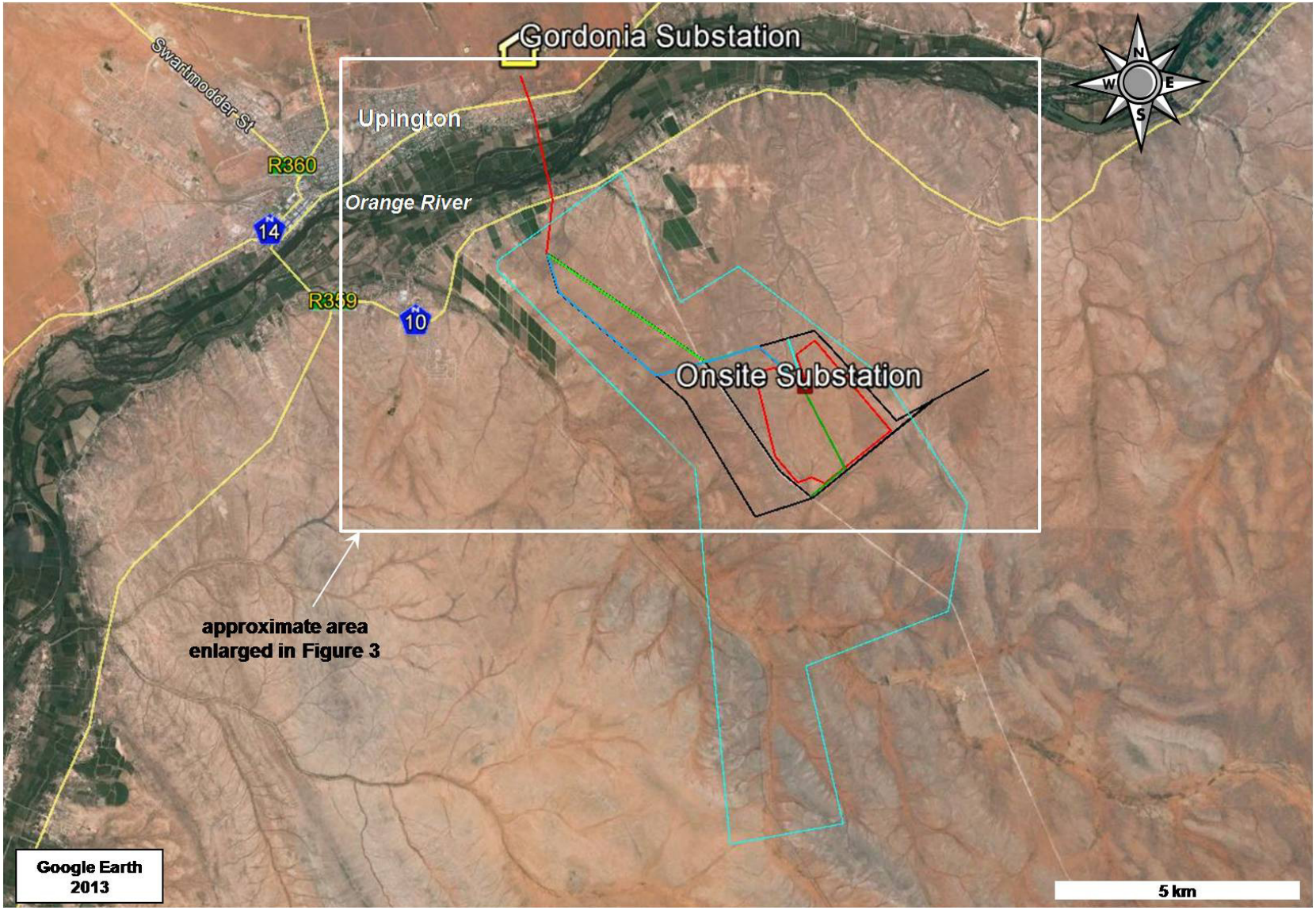

Figure 2. Provisional development layout on affected properties (pale blue polygon); 450 ha study area for Joram Solar Facility (red polygon), existing Eskom 132kV line (black-blue-red lines on left linking to Gordonia Substation), own built 132kV power line (black-green line), access road (dark green line) and onsite substation. Courtesy of Cape EAPrac.

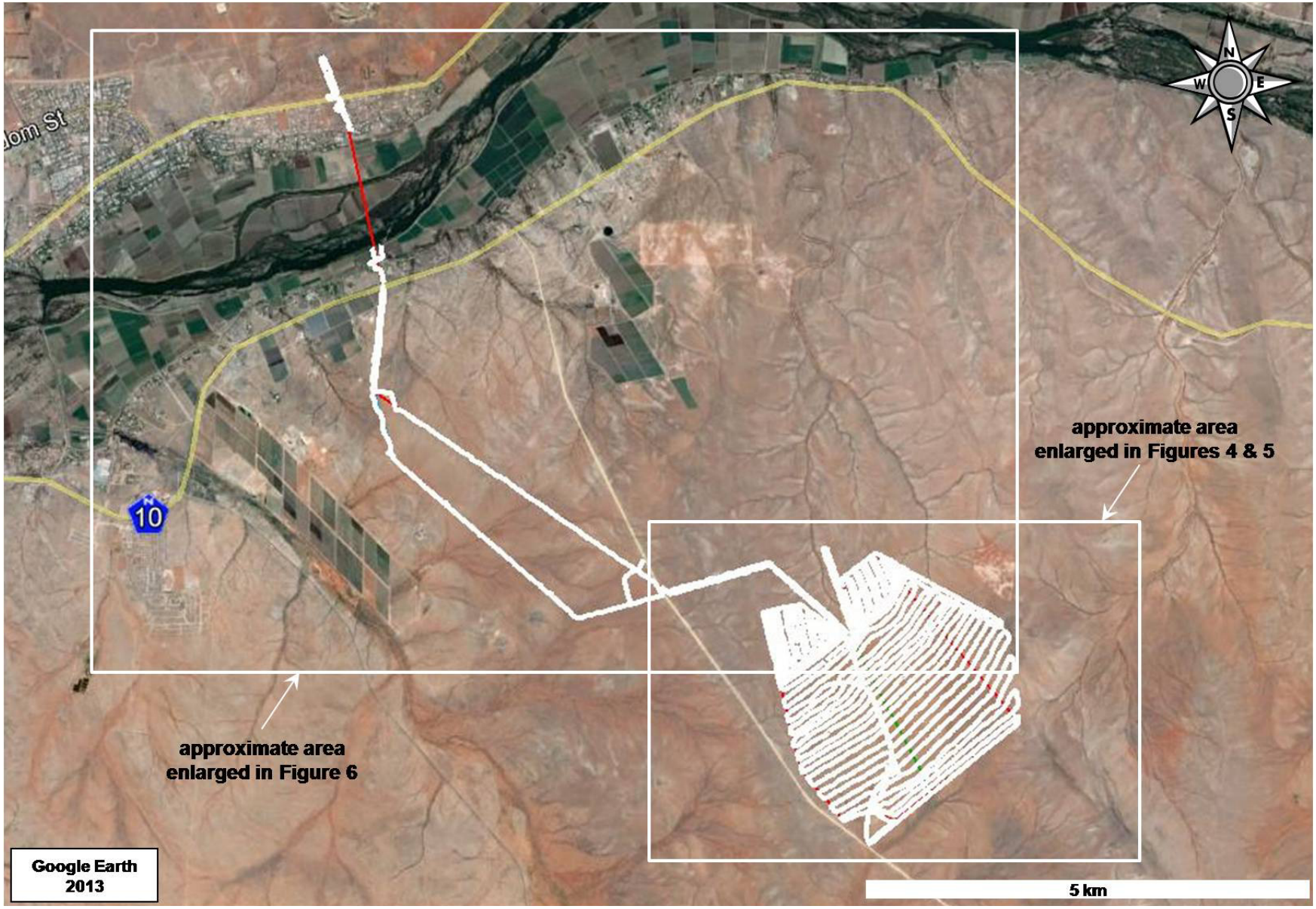

Figure 3. Area enlarged from Figure 2 showing larger study area for solar facility and power line routes with survey walk tracks indicated in white.

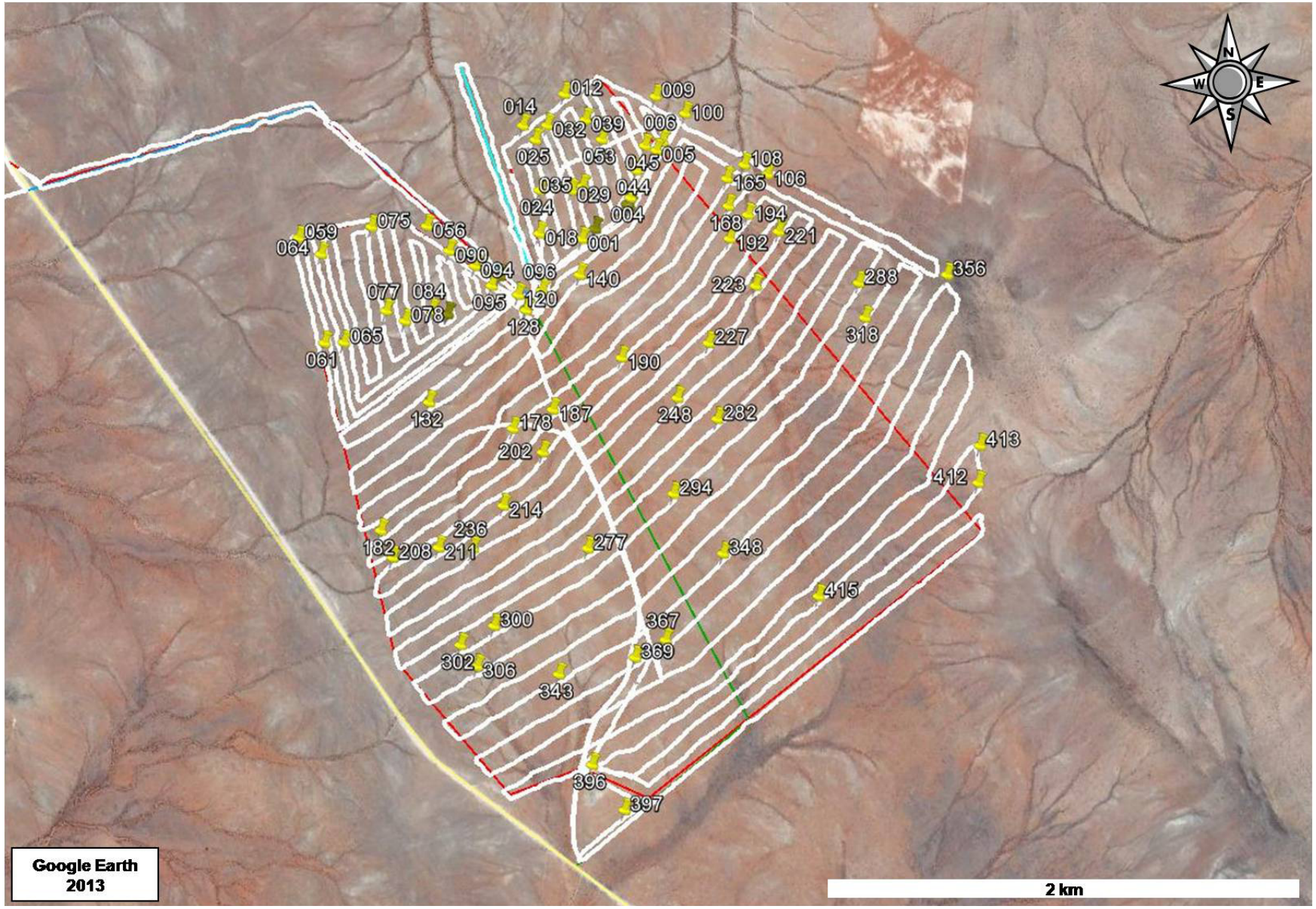

Figure 4. Area enlarged from Figure 3 showing 450 ha study area for solar facility (red polygon), access road (green line), survey walk tracks (white lines) and a representative sample of archaeological occurrences and photo localities (labelled yellow markers). See Plates 1 through 18.

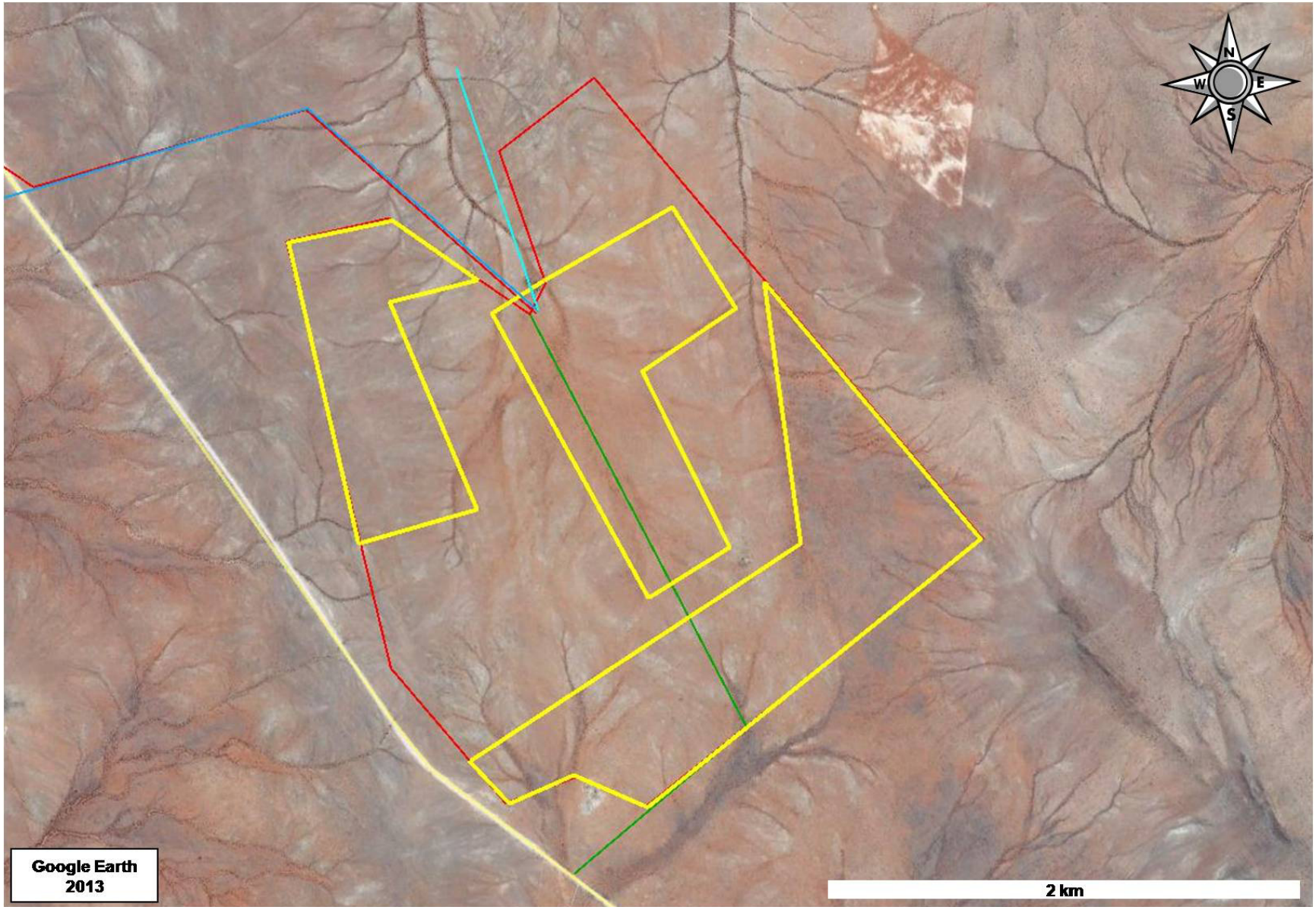

Figure 5. Area enlarged from Figure 3 with yellow polygons demarcating areas that contain fewer Stone Age stone artefacts. While not a requirement, it is suggested that the solar facility footprint be placed within these polygons that have a collective extent of some 250 ha.

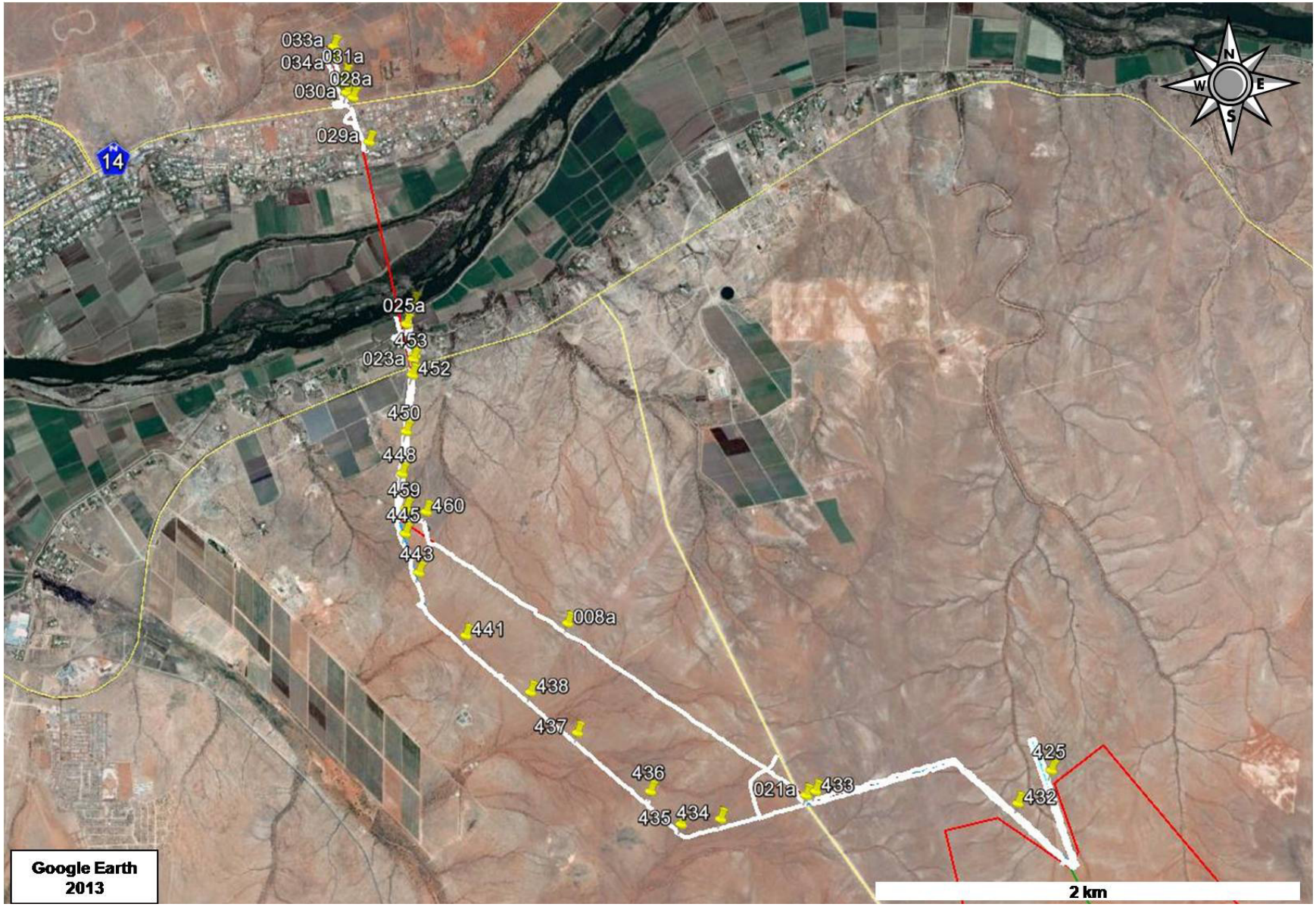

Figure 6. Area enlarged from Figure 3 showing survey walk tracks (white lines) and a representative sample of archaeological occurrences and photo localities (labelled yellow markers). See Plates 19 through 25.

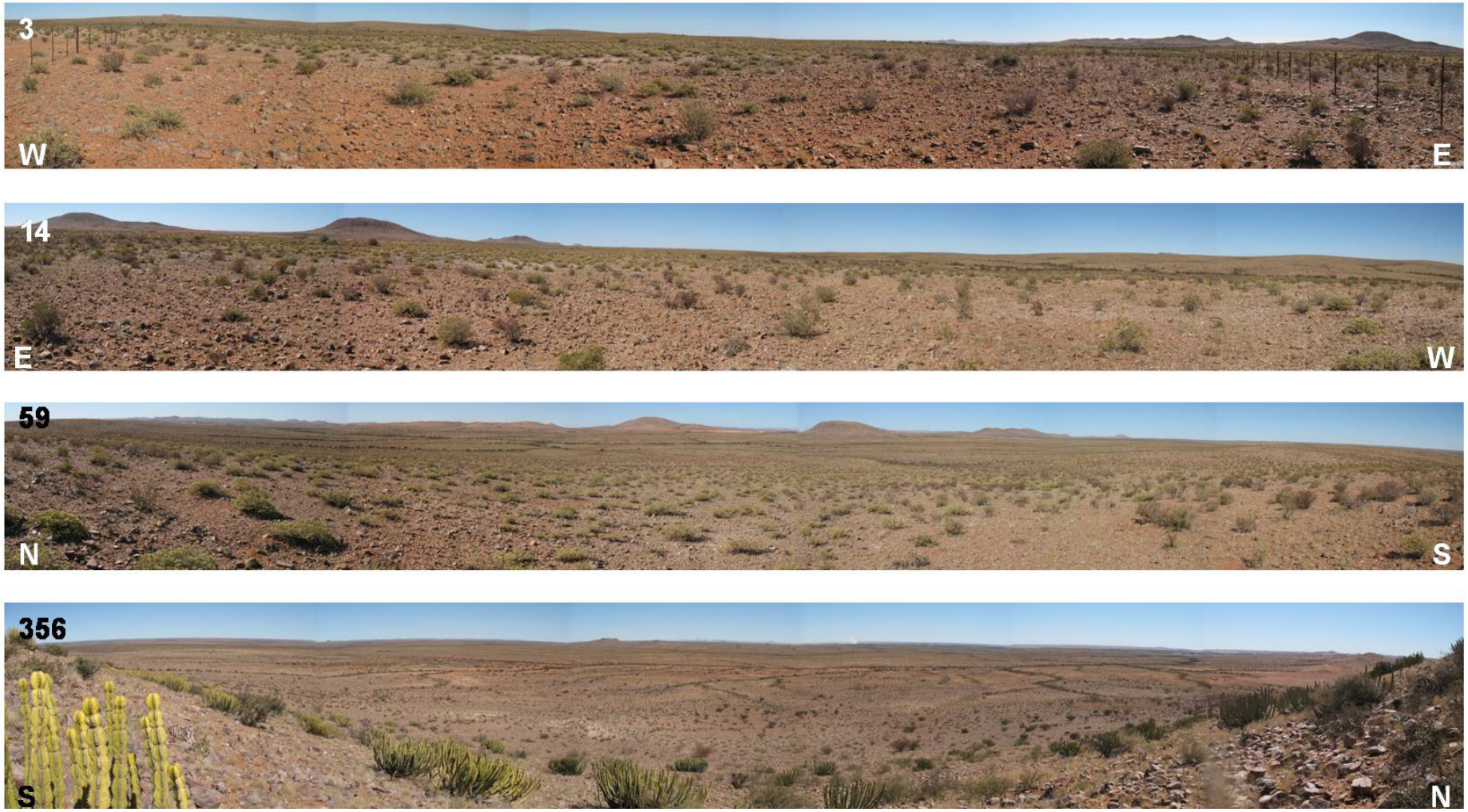

Plate 1. Example of the affected environment at the 450 ha site for the Joram Solar Facility. See Figure 4.

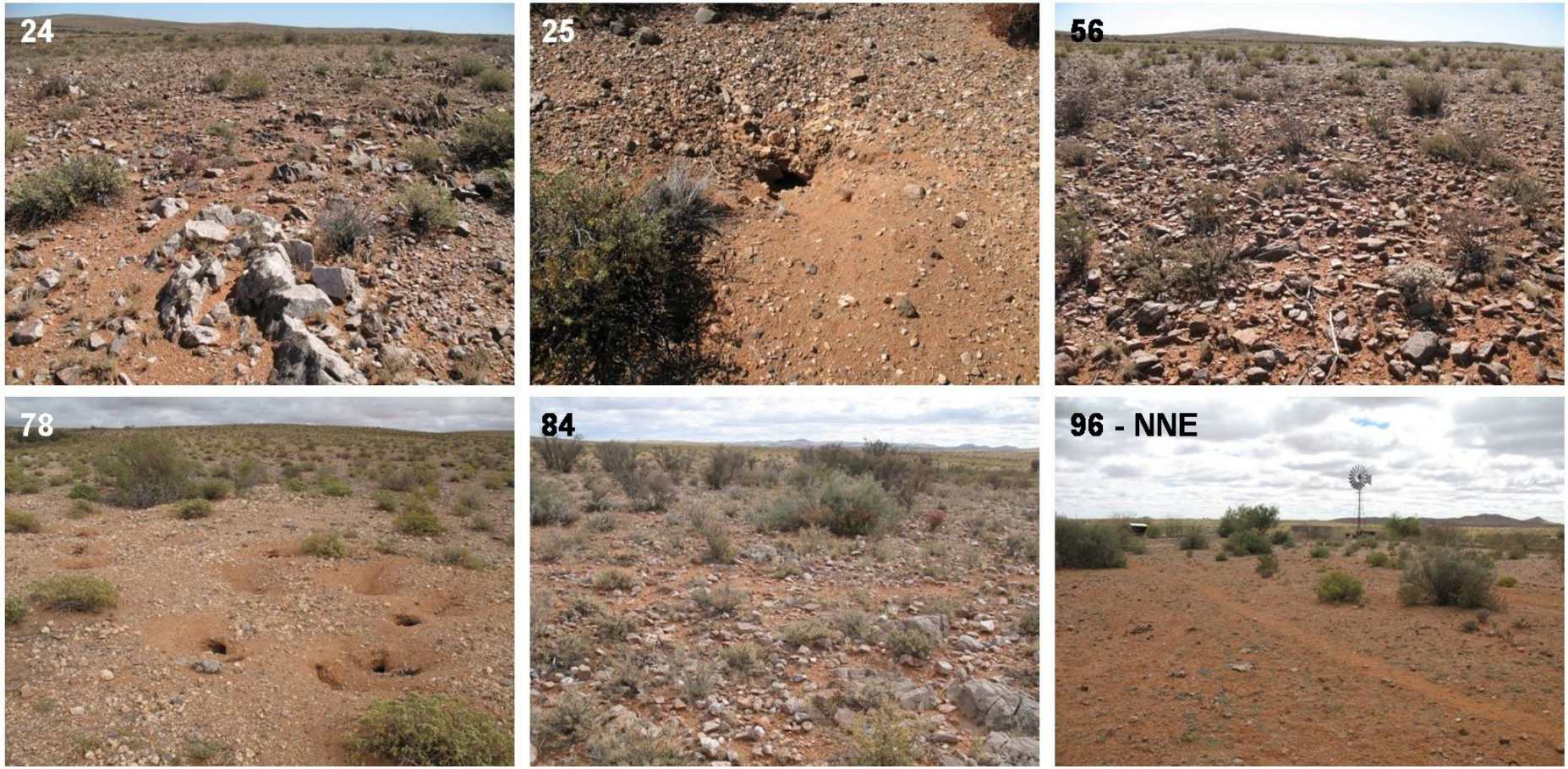

Plate 2. Examples of the affected environment showing topography, vegetation cover, rocky outcrop (quartz [24]), small mammal burrows (meerkat [78]), exposed surfaces and alluvial gravels and developments (windmill, dam, troughs [96]) (see Figure 4).

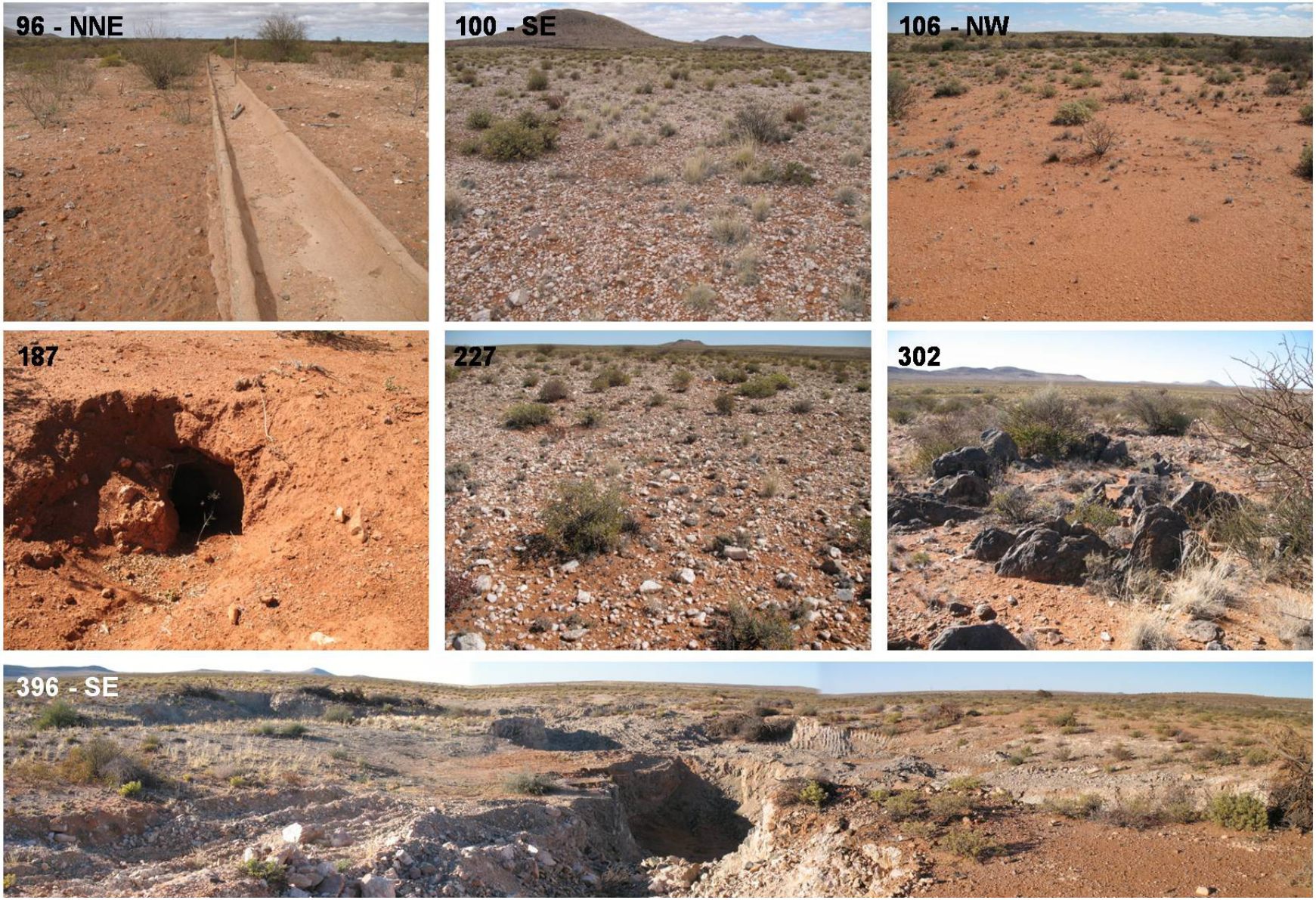

Plate 3. Examples of the affected environment showing cattle feeding troughs, quartz dominated gravels, topography, vegetation cover, exposed surfaces, large mammal burrow, rocky outcrops and quarry / borrow pit outside SW corner of study area (see Figure 4).

Plate 4. Examples of contexts and archaeological occurrences; LSA adze (1), ESA / MSA flake (2) and core (4) (see Figure 4).

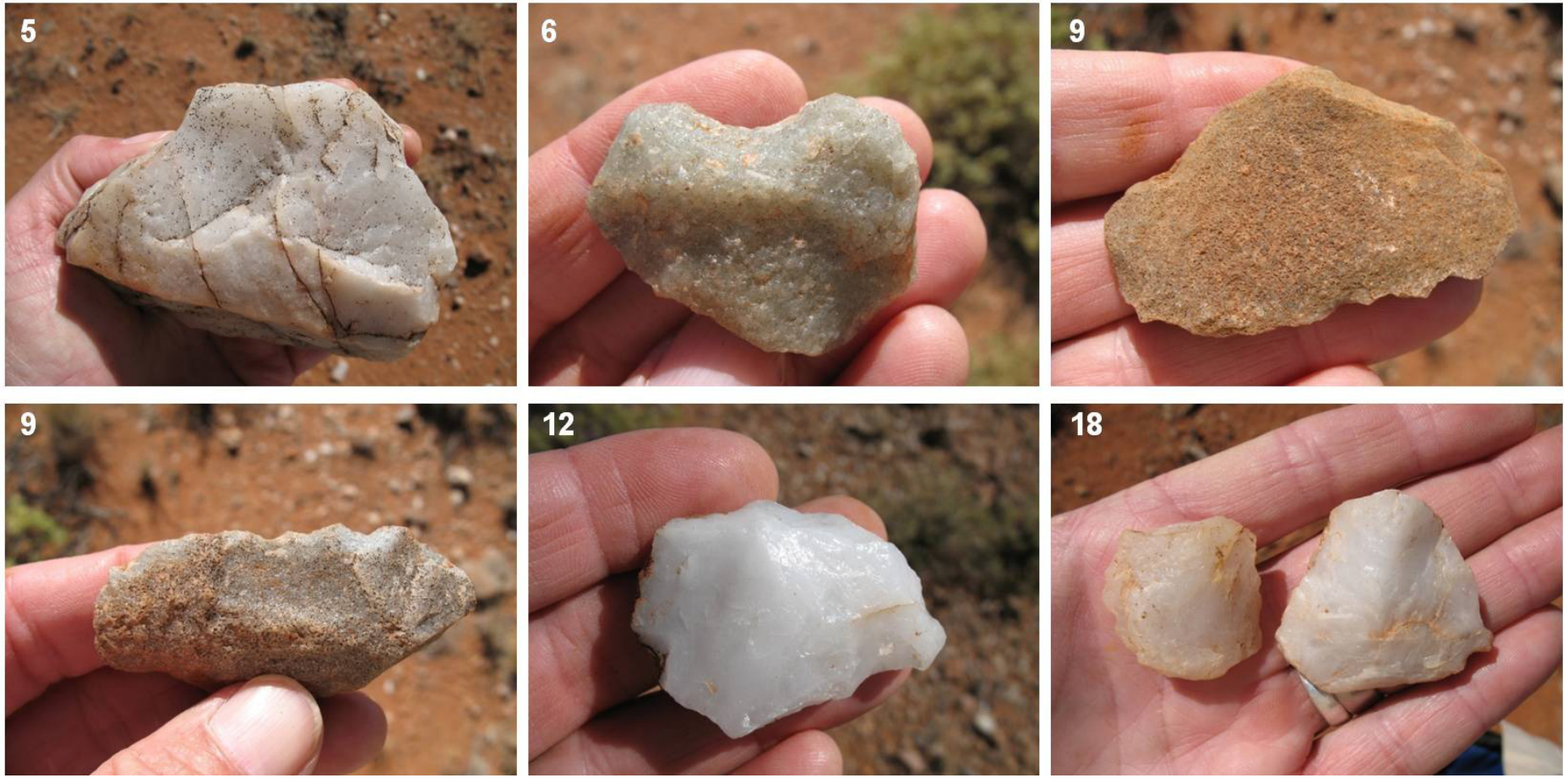

Plate 5. Examples of archaeological occurrences; LSA / MSA quartz core (5), LSA adze or notched piece, LSA / MSA side scraper (9) and quartz flakes (12, 18) (see Figure 4).

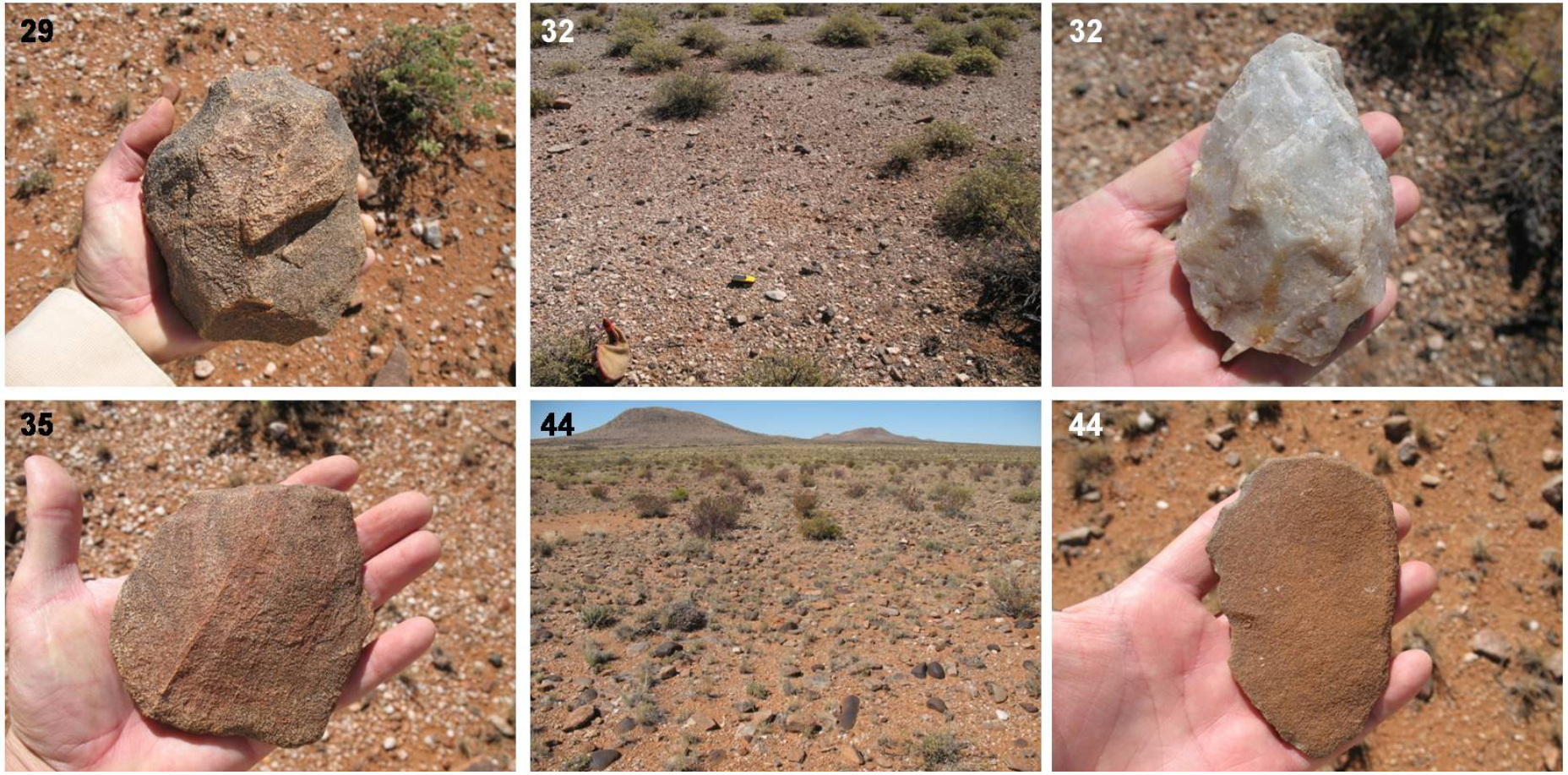

Plate 6. Examples of contexts and archaeological occurrences; ESA core or flaked piece (29), MSA / Fauresmith hand axe (32), ESA flakes (35, 44) (see Figure 4).

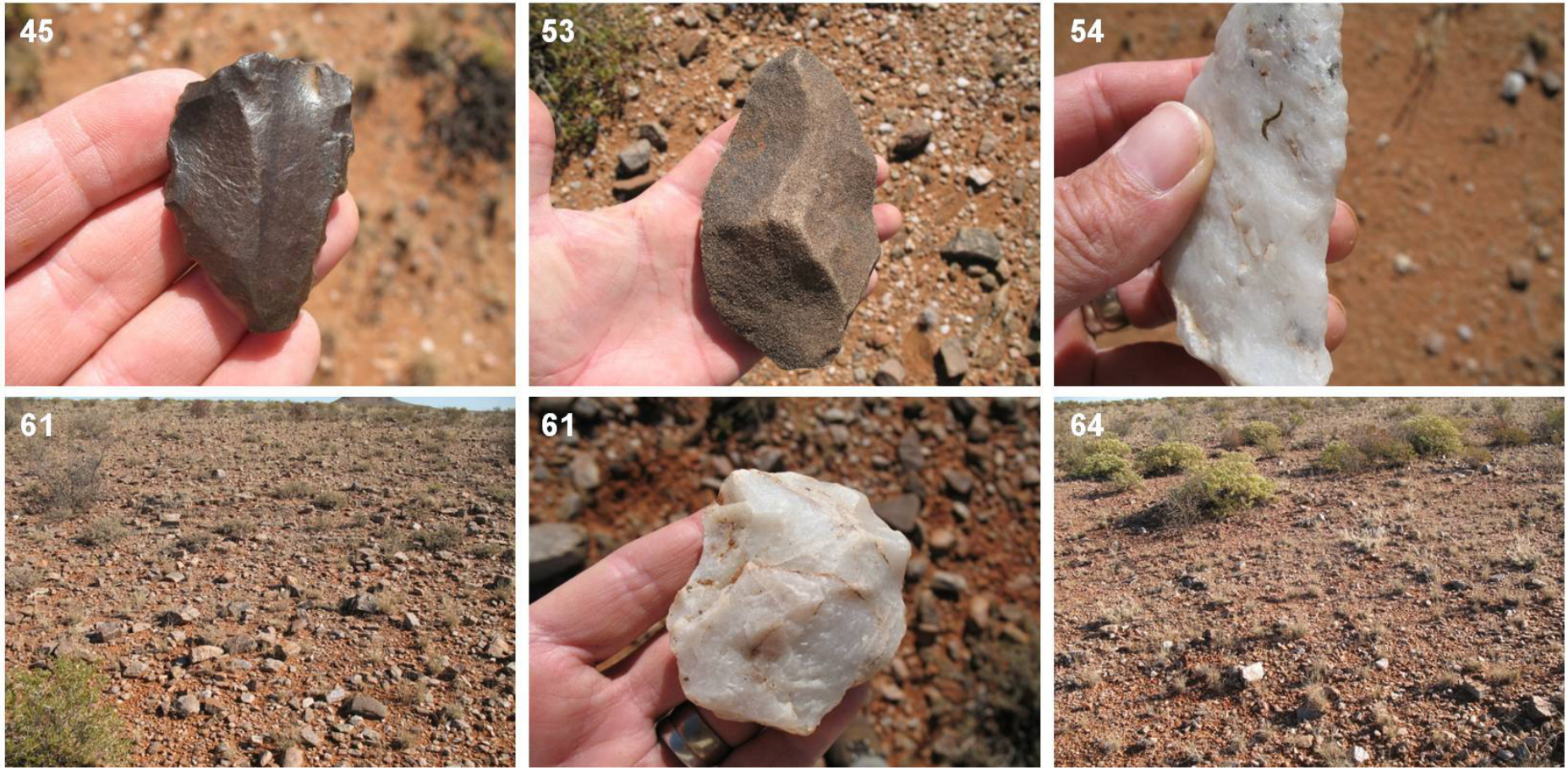

Plate 7. Examples of contexts and archaeological occurrences; MSA convergent flake or point (45), ESA / MSA core or flaked piece (53), MSA / LSA side scraper (54), quartz core (61) (see Figure 4).

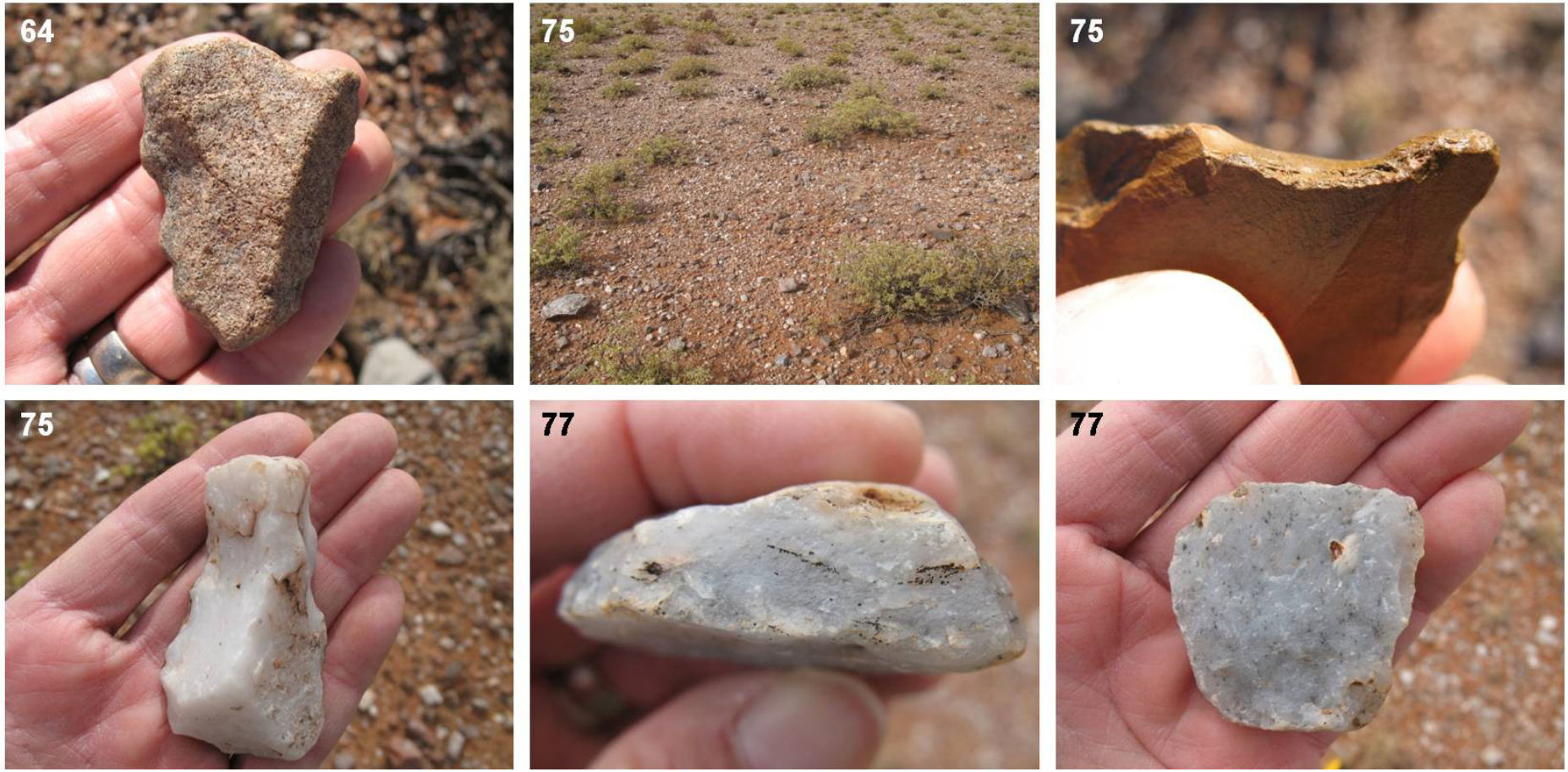

Plate 8. Examples of contexts and archaeological occurrences; MSA convergent flake (64), LSA adze (75), LSA / MSA notched piece or adze and side scraper (75), LSA end and side scraper (77) (see Figure 4).

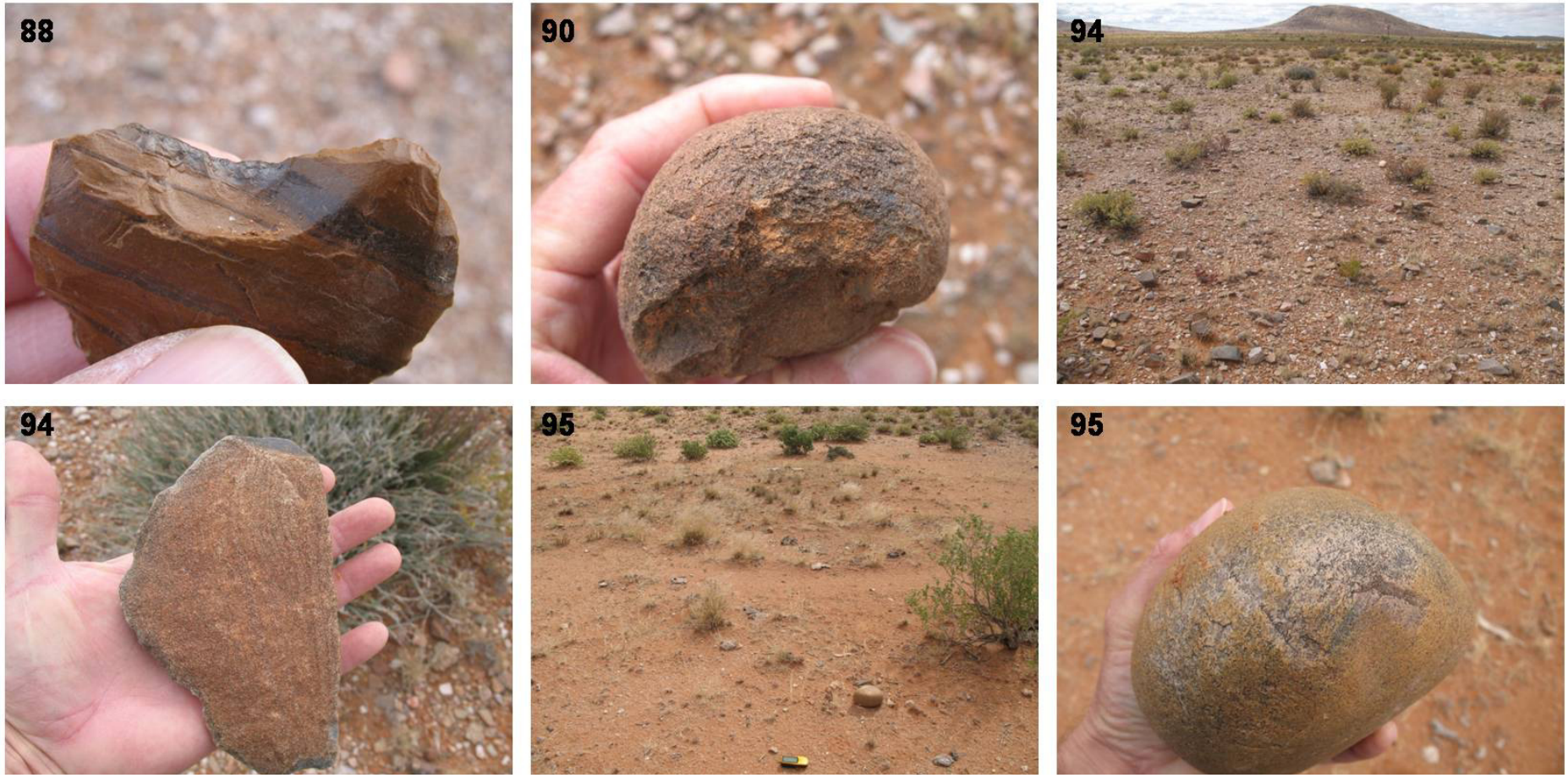

Plate 9. Examples of contexts and archaeological occurrences; LSA adze or notched piece (88), MSA / ESA hammer stone (90), ESA flake (94), hammer stone (95) (see Figure 4).

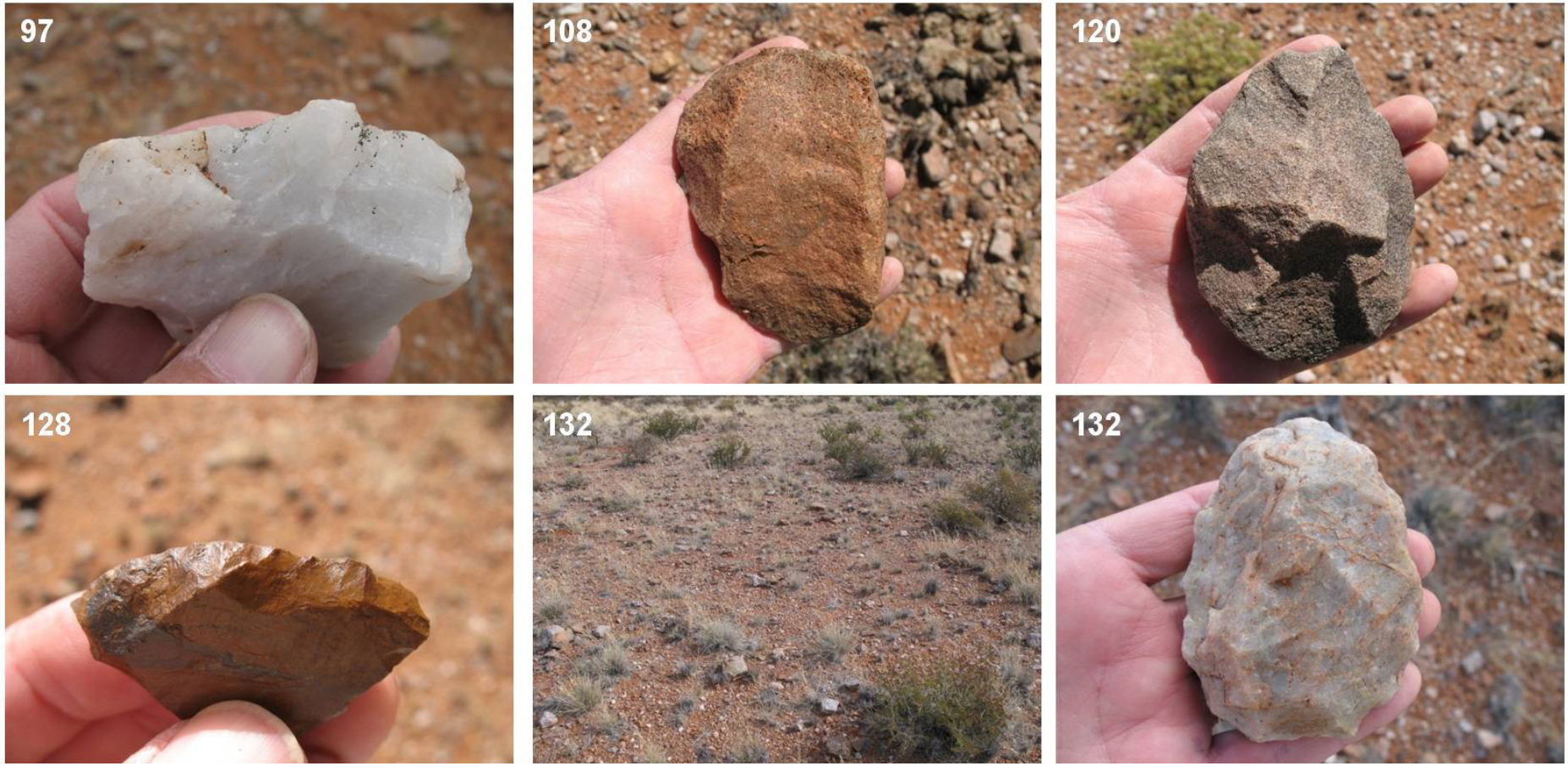

Plate 10. Examples of contexts and archaeological occurrences; LSA / MSA notched piece (97), ESA / MSA flaked piece (108), MSA / ESA flaked piece or core (120), LSA scraper (128), LSA / MSA disc core (132) (see Figure 4).

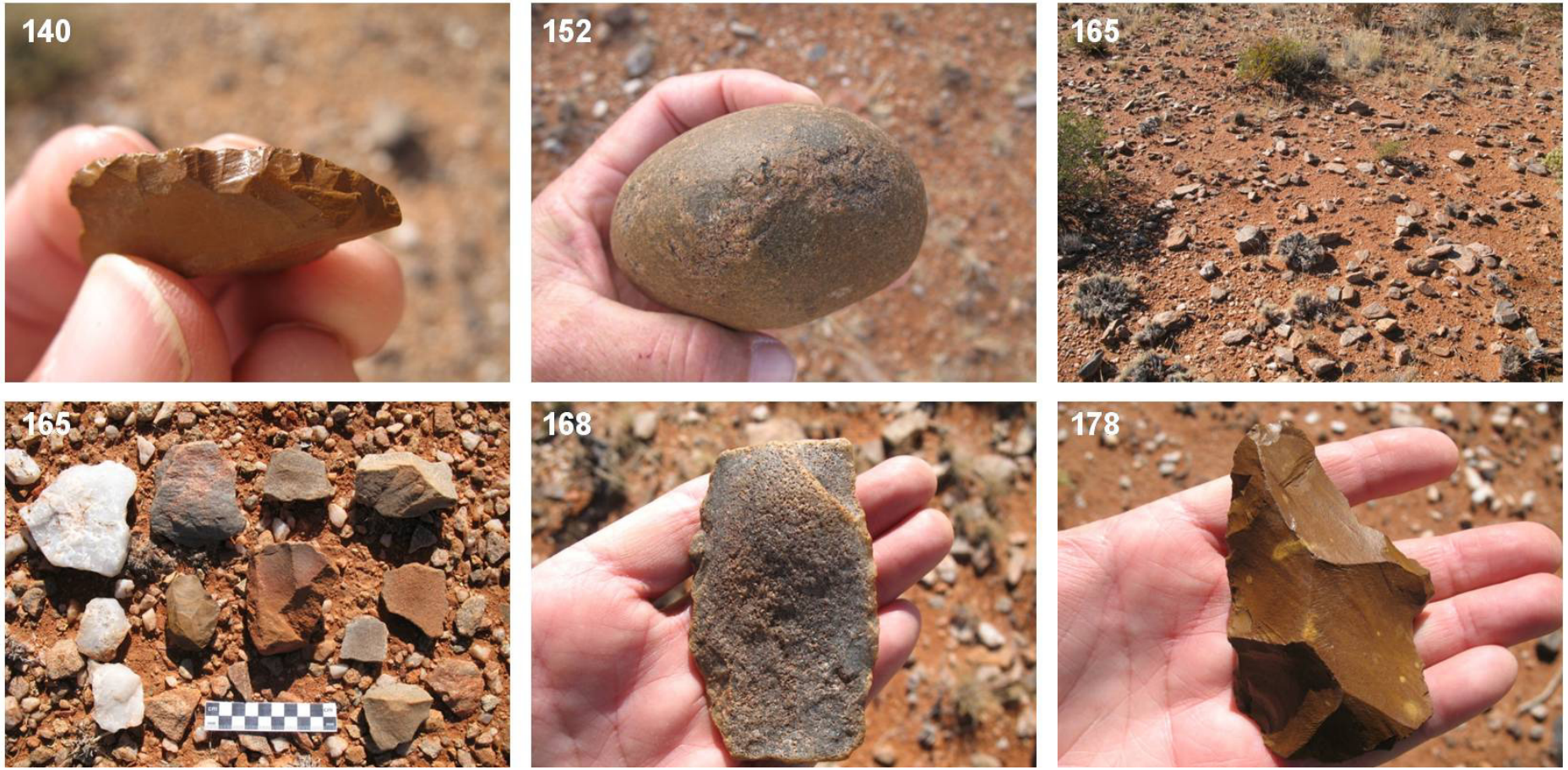

Plate 11. Examples of contexts and archaeological occurrences; LSA scraper (140), hammer stone (152), temporally mixed pieces of MSA & LSA origtin (165), MSA blade (168) and flaked banded ironstone (178) (see Figure 4).

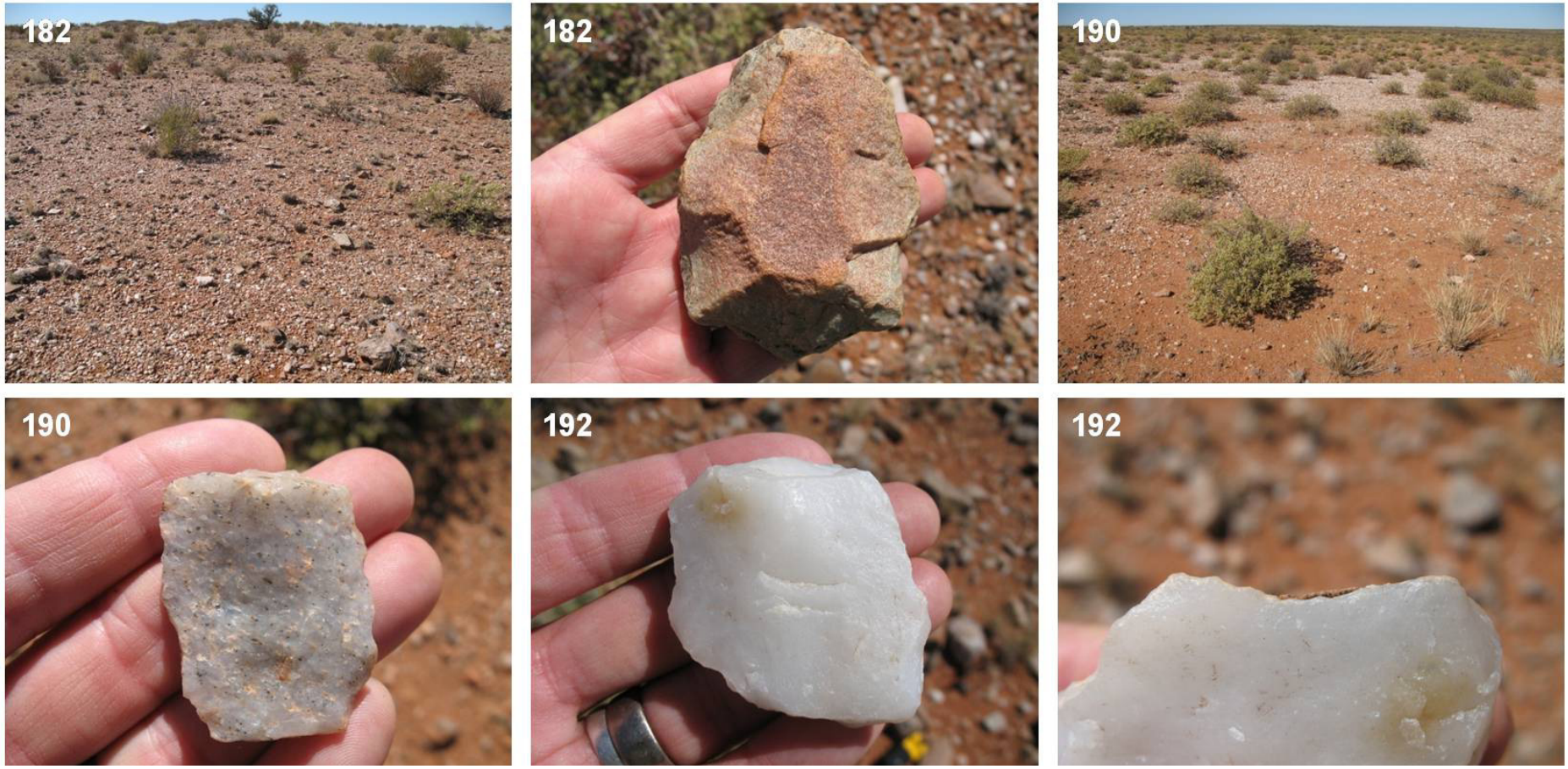

Plate 12. Examples of contexts and archaeological occurrences; MSA core or flaked piece (182), flakes (190, 192), LSA adze or notched piece (192) (see Figure 4).

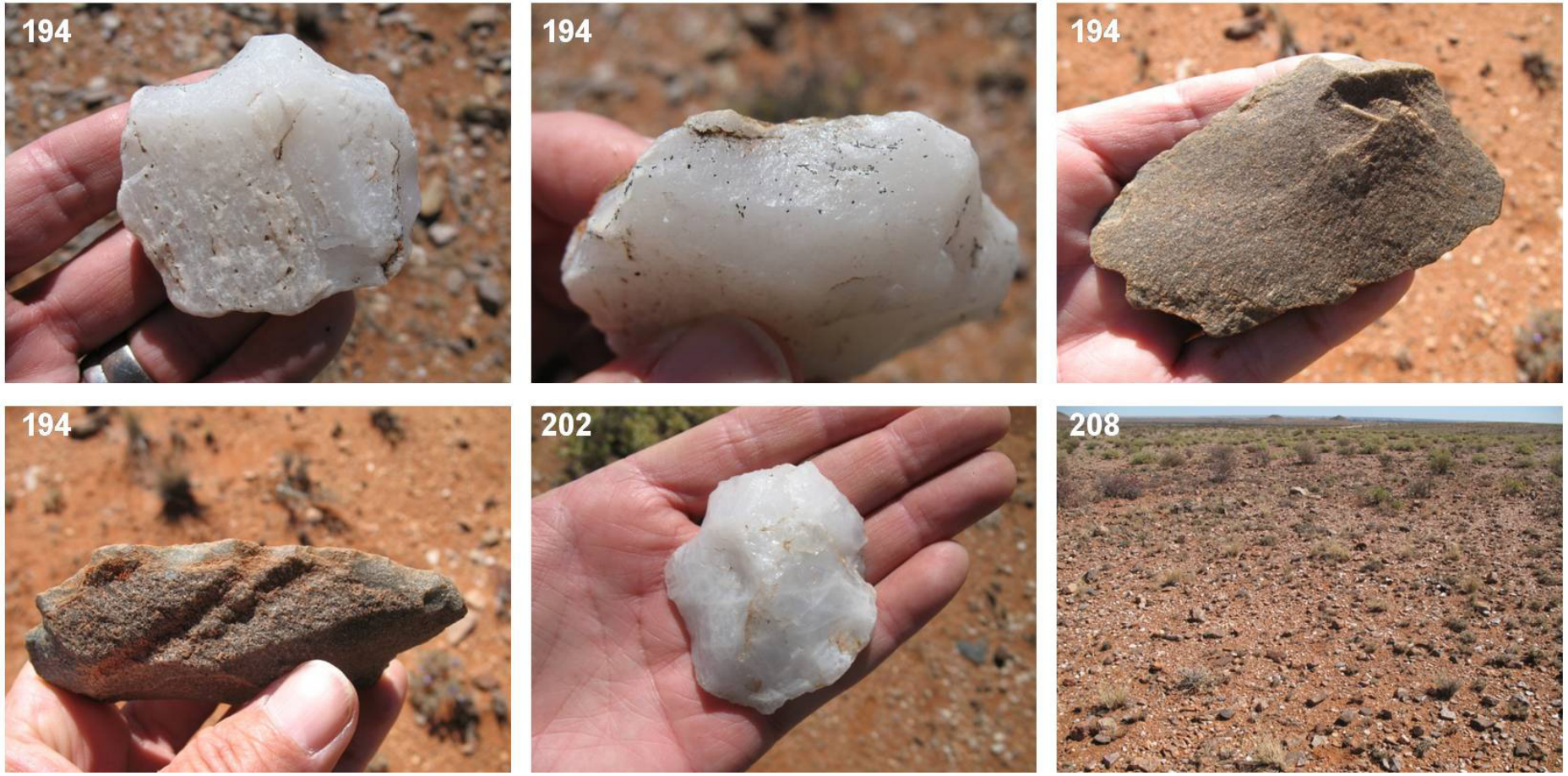

Plate 13. Examples of contexts and archaeological occurrences; notched piece (194), reworked MSA side struck flake - scraper (194) and disc core / notched piece (202) (see Figure 4).

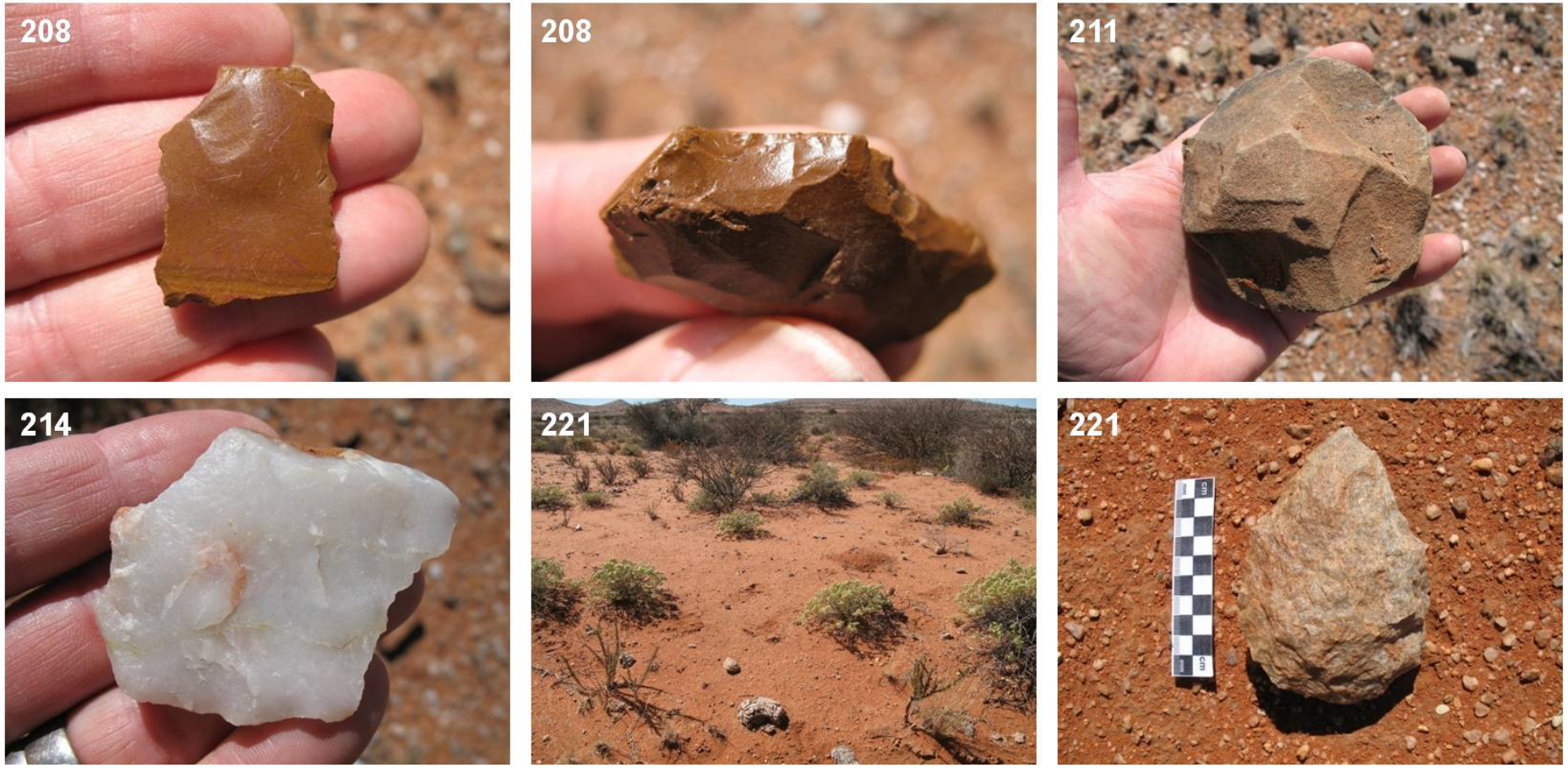

Plate 14. Examples of contexts and archaeological occurrences; LSA scraper / adze (208), MSA disc core (211), adze / notched piece - scraper (214), MSA / Fauresmith hand axe (221) (see Figure 4).

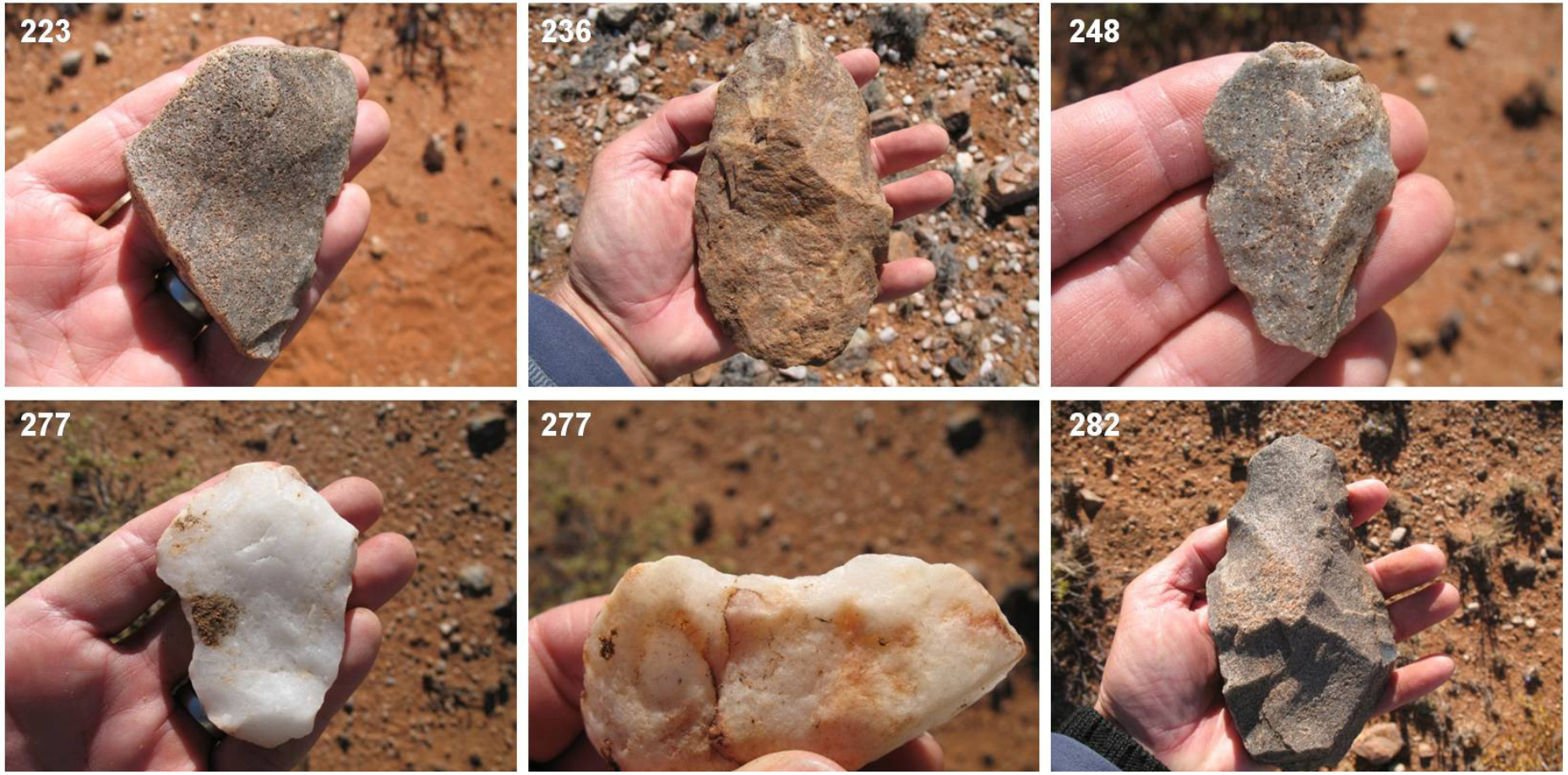

Plate 15. Examples of contexts and archaeological occurrences; ESA / MSA flake (223), ESA / MSA core or hand axe (236), MSA convergent flake or broken point (248), adze or notched piece (277) and ESA / MSA core or cleaver (see Figure 4).

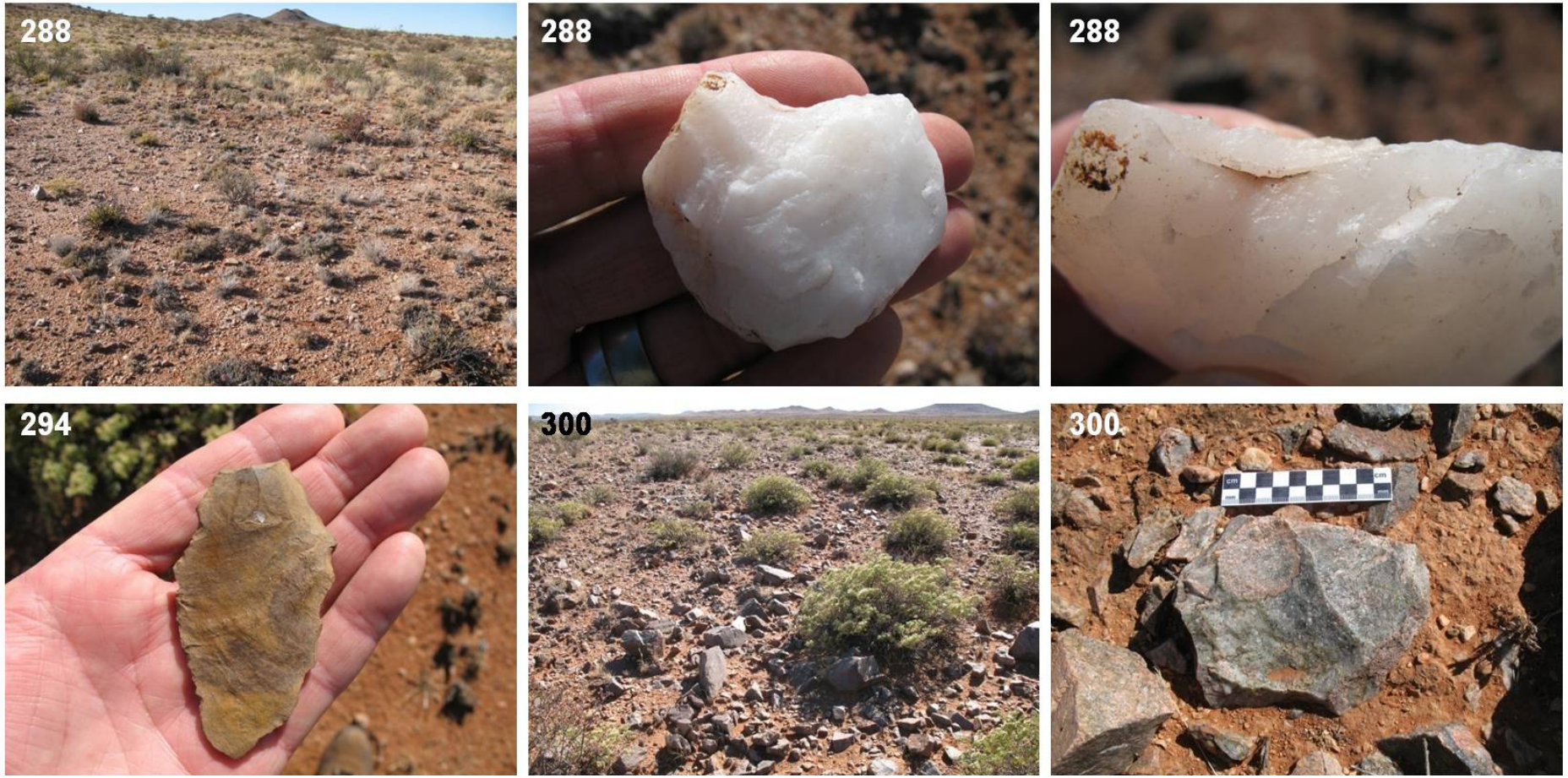

Plate 16. Examples of contexts and archaeological occurrences; LSA adze or notched piece (288), MSA convergent flake / blade (294), large core (300) (see Figure 4).

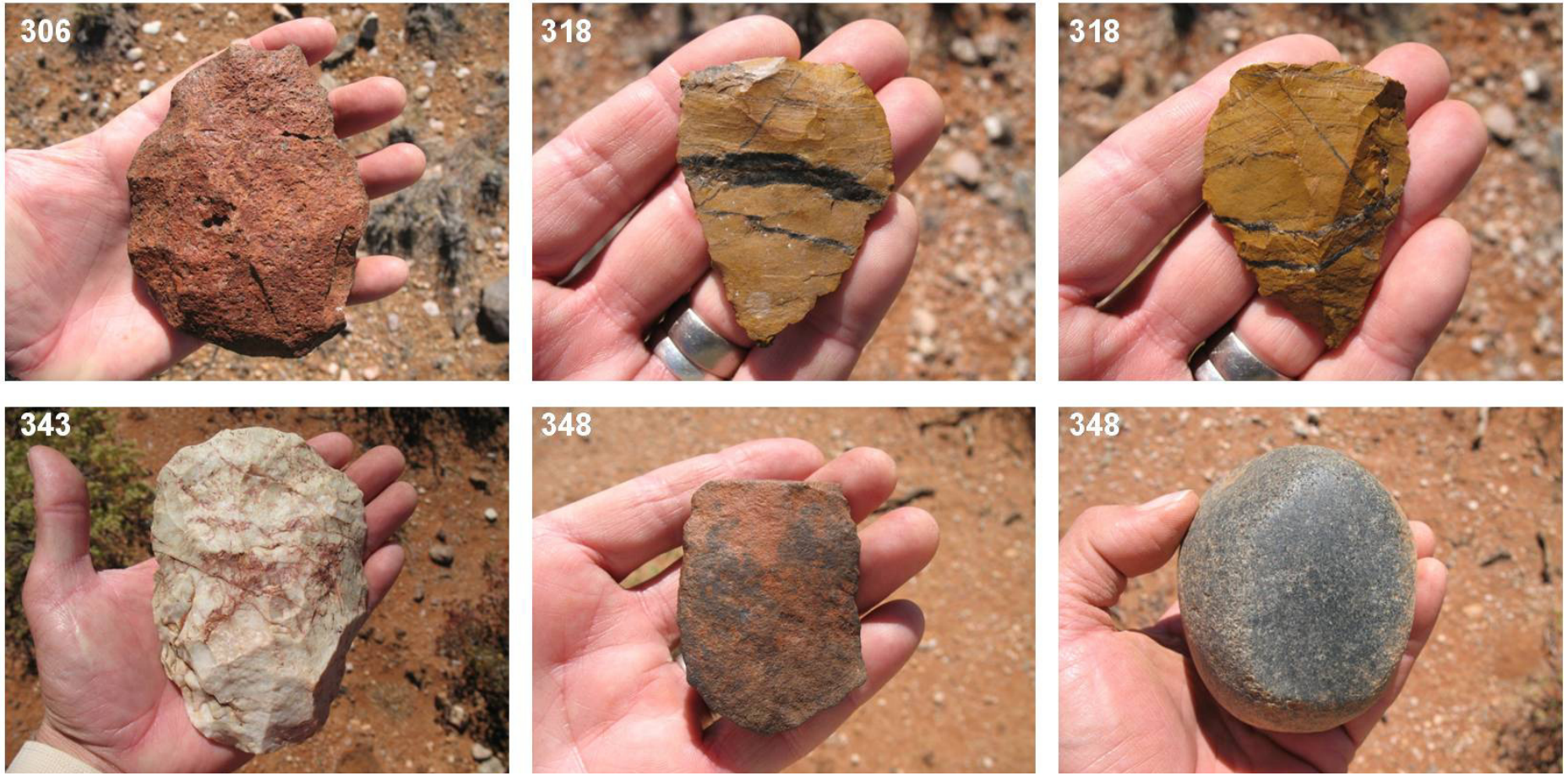

Plate 17. Examples of contexts and archaeological occurrences; ESA / MSA core or flaked piece (306), MSA convergent flake / point (318), large end - side scraper (343), ESA / MSA flake and combination upper grind stone & hammer stone (348) (see Figure 4).

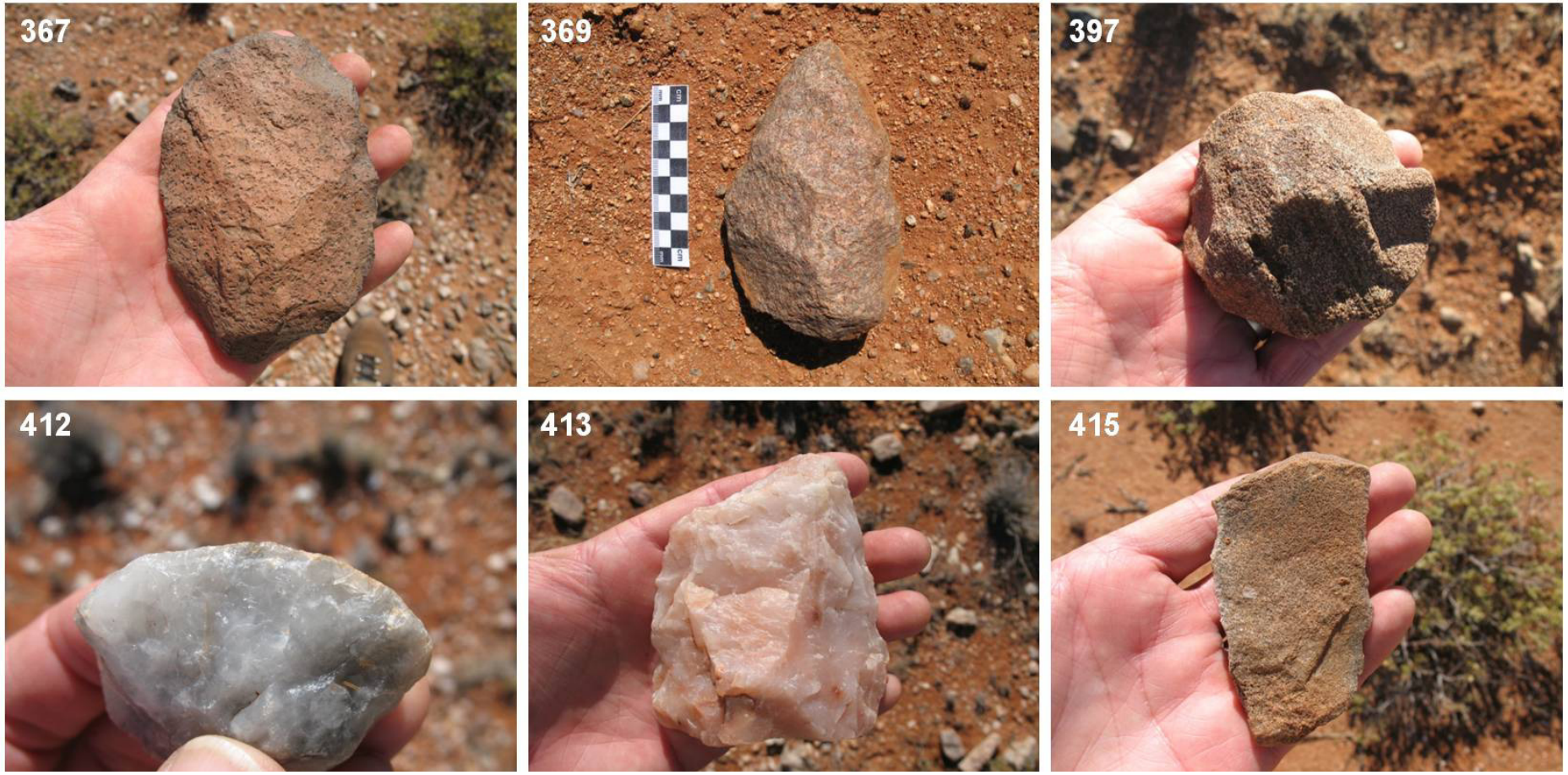

Plate 18. Examples of contexts and archaeological occurrences; ESA / MSA core or flaked piece (367), ESA bifacial hand axe (369), ESA / MSA core (397), LSA end scraper (412), bifacially retouched piece (413), MSA blade (415) (see Figure 4).

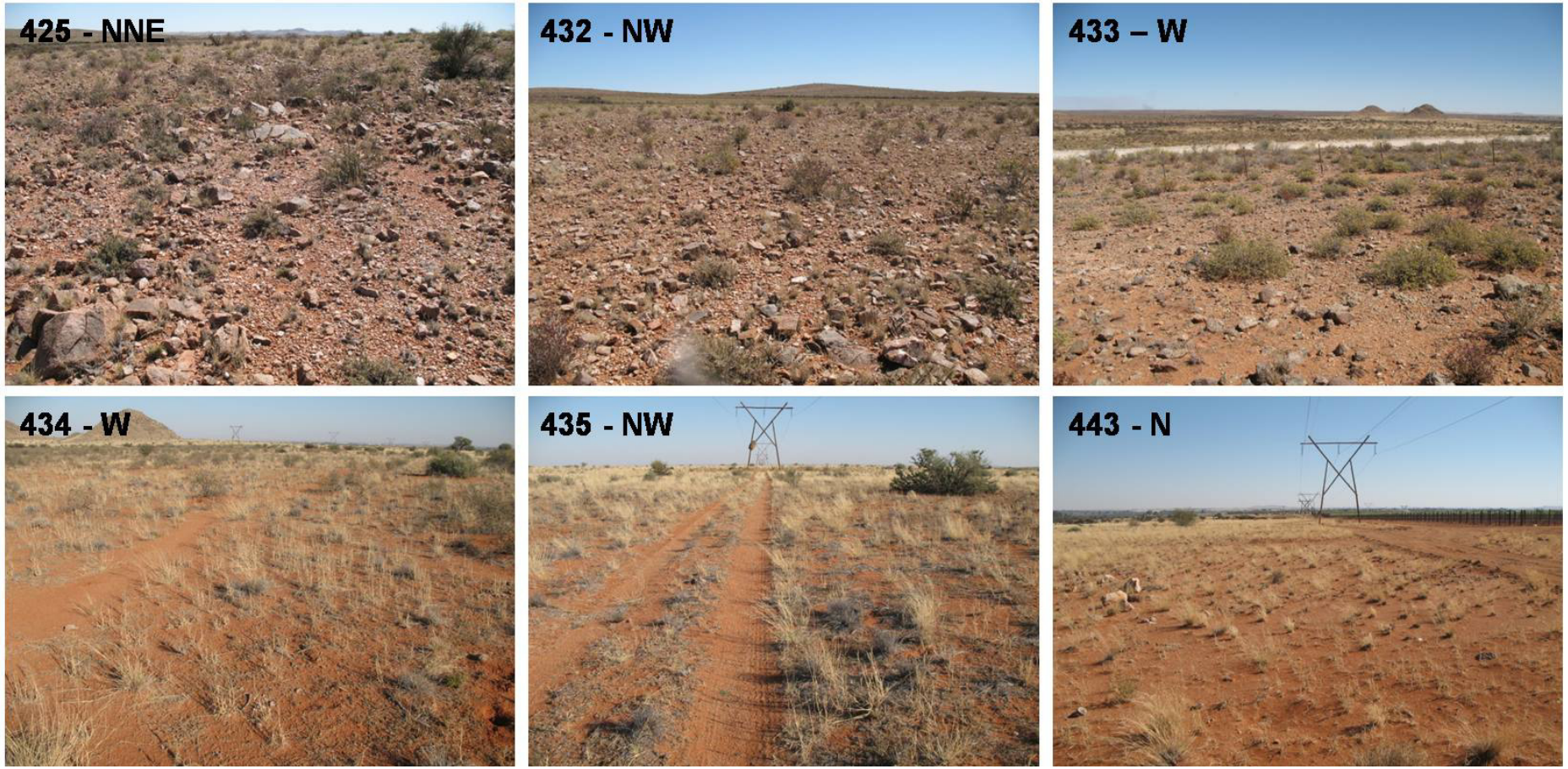

Plate 19. Examples of the receiving environment along various stretches of the proposed loop-in line and alternative power line routes showing topography, vegetation cover, exposed surfaces, rocky outcrops, alluvial gravels and existing developments (see Figure 6).

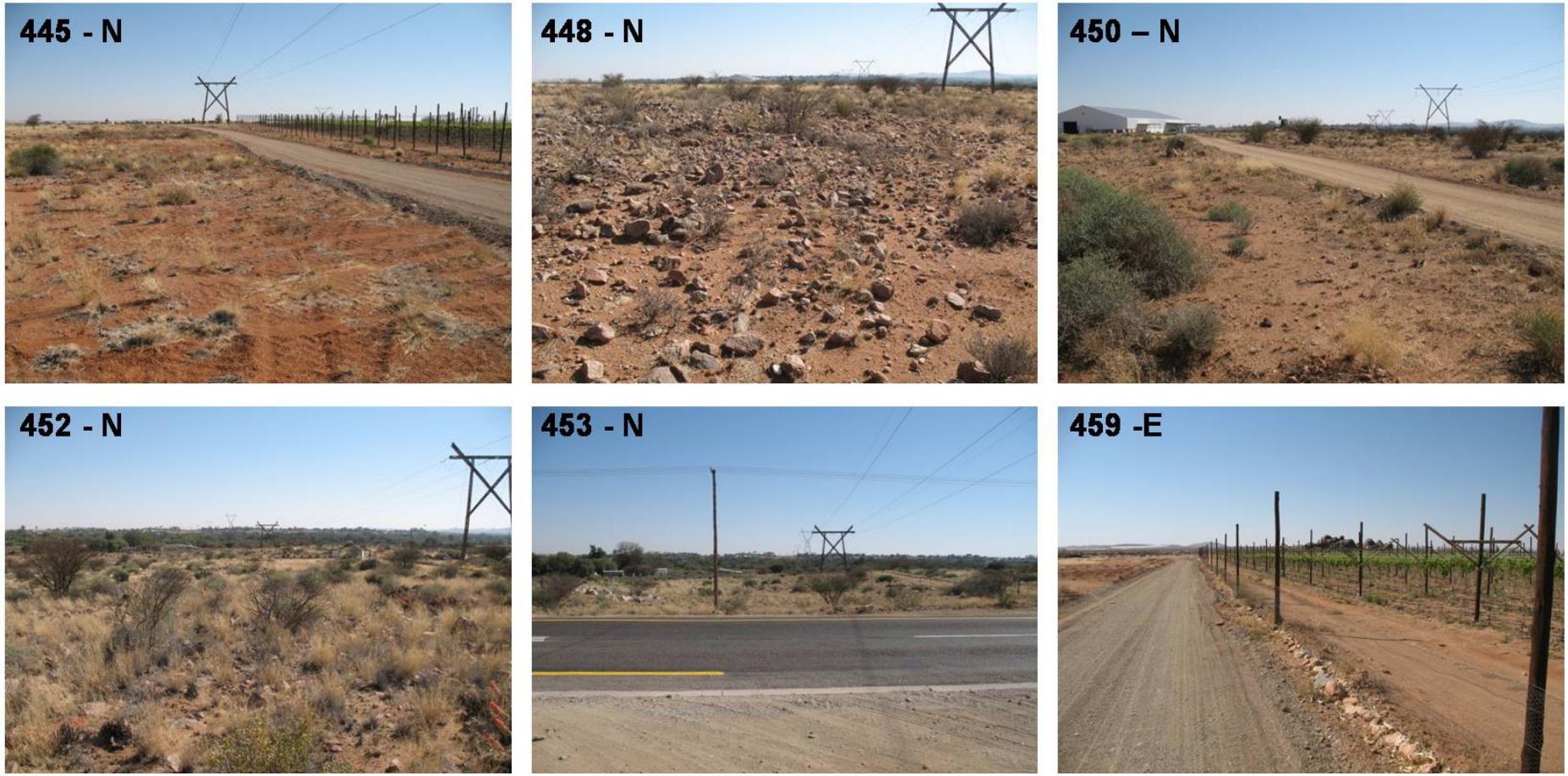

Plate 20. Examples of the receiving environment along various stretches of the proposed alternative power line routes showing topography, vegetation cover, exposed surfaces, alluvial gravels and existing developments (see Figure 6).

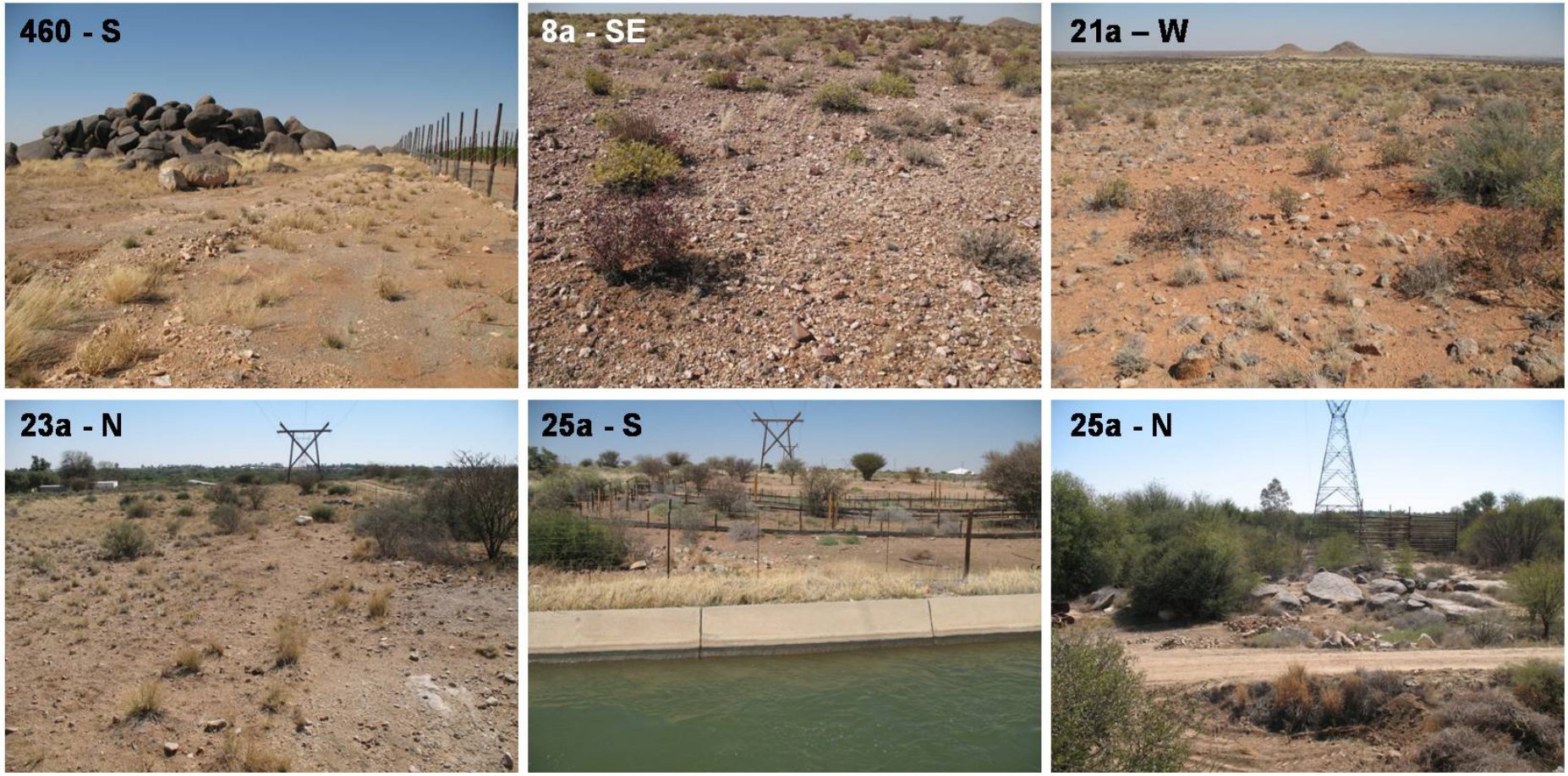

Plate 21. Examples of the receiving environment along various stretches of the proposed alternative power line routes showing topography, vegetation cover, exposed surfaces, alluvial gravels and existing developments south of, and adjacent to the Orange River(see Figure 6).

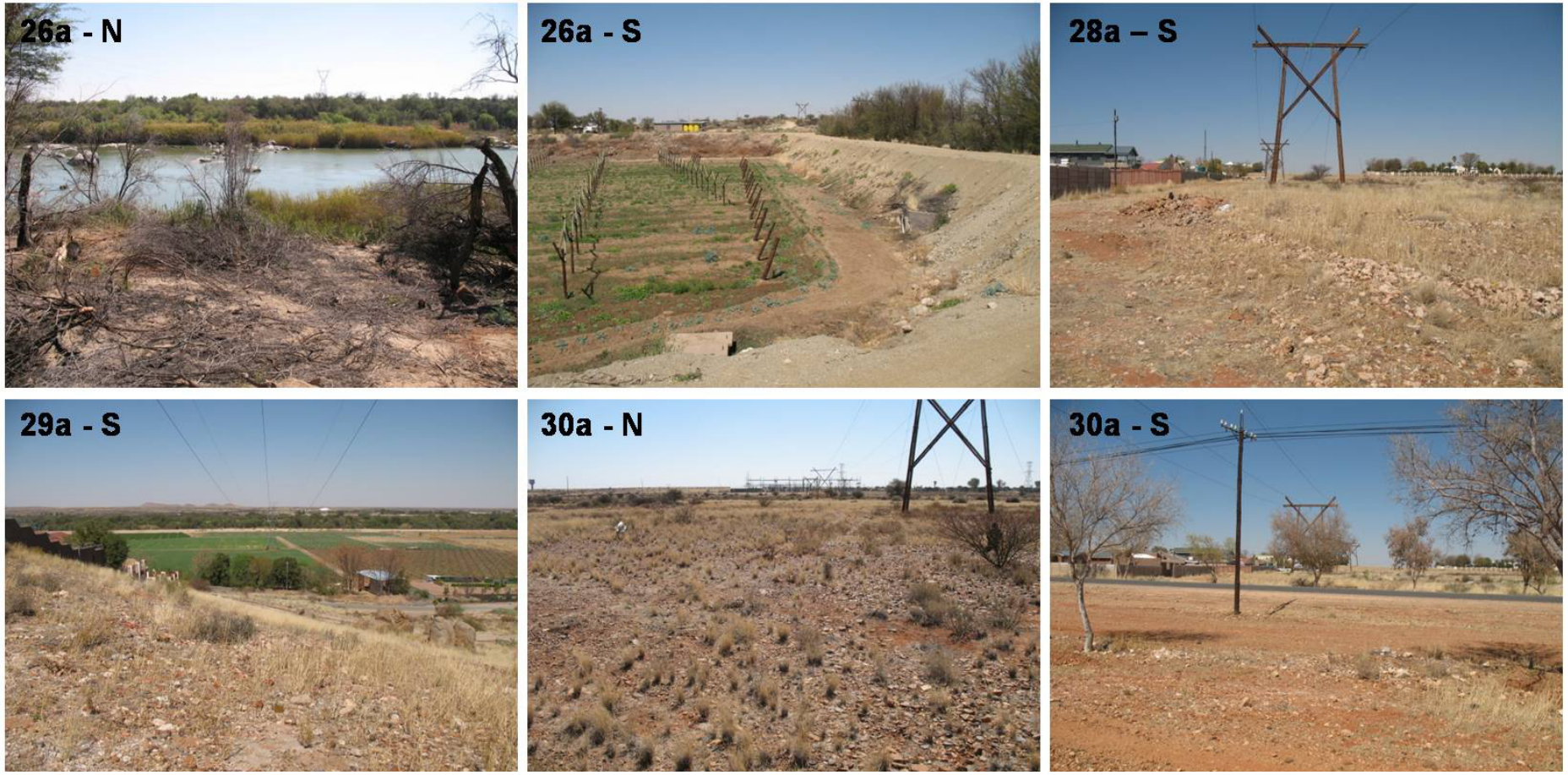

Plate 22. Examples of the receiving environment along various stretches of the proposed power line route that runs along the existing overhead power line connecting with the Gordonia Substation; showing the Orange River and adjacent agricultural developments and the area north of the Orange River with existing residential developments and disturbed surface sediments and gravels (see Figure 6).

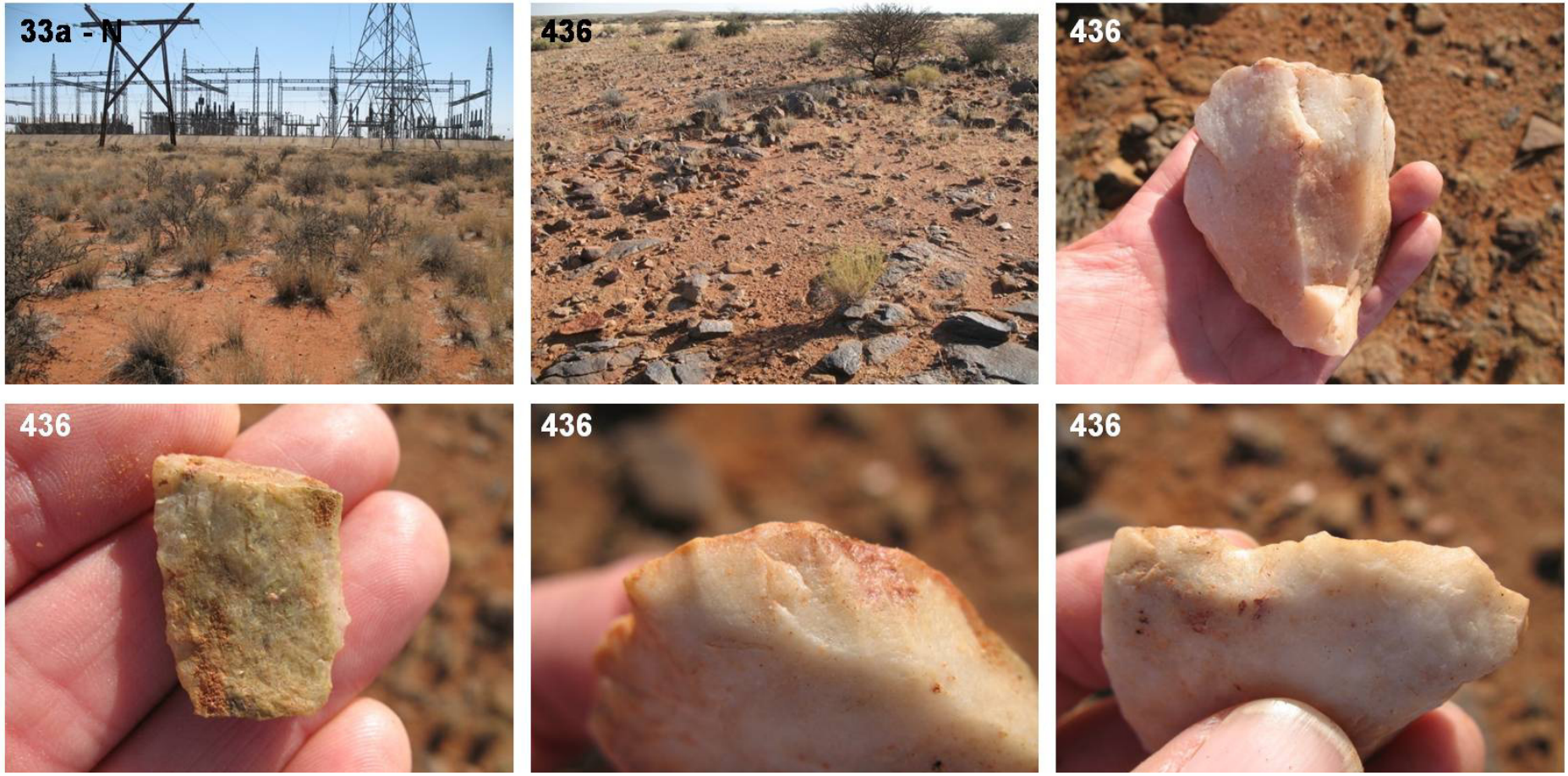

Plate 23. View towards the Gordonia Substation (33a). Examples of contexts and archaeological occurrences; core, flake, end scraper and notched piece (436) (see Figure 6).

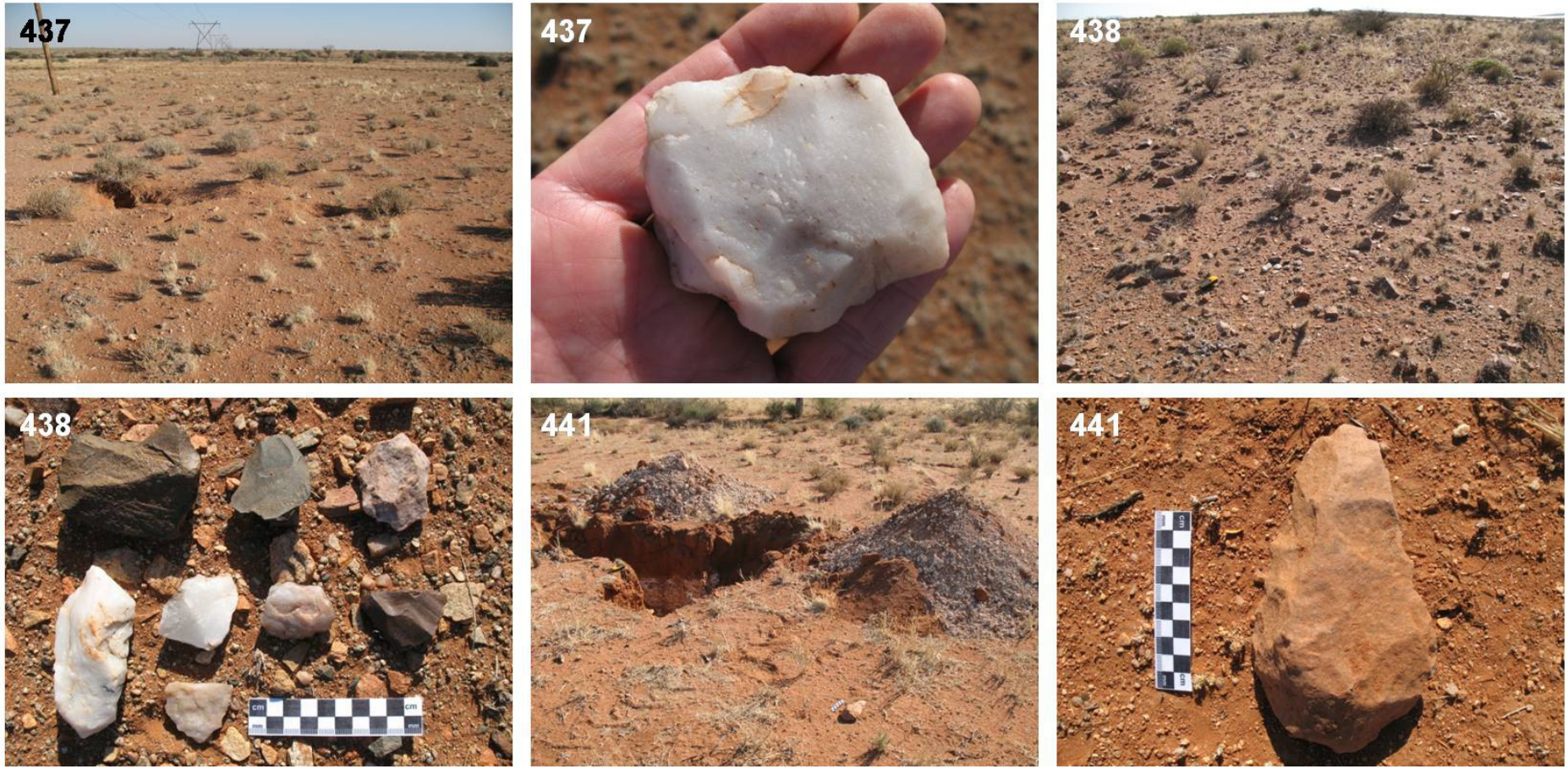

Plate 24. Examples of contexts and archaeological occurrences; quartz core (437), mixed MSA / LSA specimens from very low density surface scatter (438) and ESA bifacial hand axe unearthed from existing test hole (441) (see Figure 6).

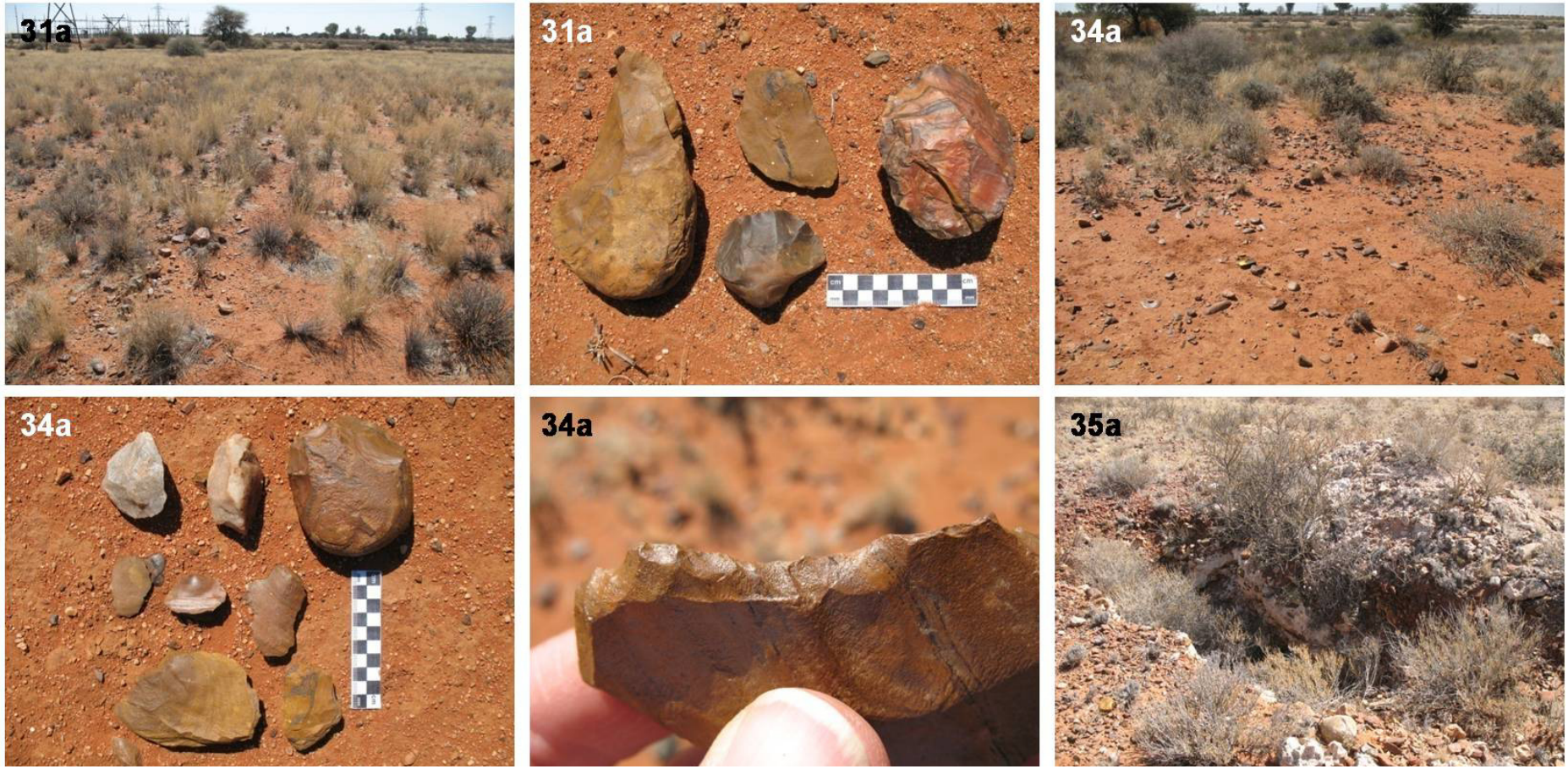

Plate 25. Examples of contexts and archaeological occurrences; temporally mixed, very low density surface scatter of stone artefacts mainly in banded ironstone (31a & 34a), LSA adze (34a) and an existing test hole showing a sub surface calcrete layer (35a) (see Figure 6).

Appendix A

Legislation relevant to archaeology and palaeontology taken from the National Heritage Resources Act (Act 25 of 1999)

Archaeology, palaeontology and meteorites

35. (1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

(6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or a meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

(7) (a) Within a period of two years from the commencement of this Act, any person in possession of any archaeological or palaeontological material or object or any meteorite which was acquired other than in terms of a permit issued in terms of this Act, equivalent provincial legislation or the National Monuments Act, 1969 (Act No. 28 of 1969), must lodge with the responsible heritage resources authority lists of such objects and other information prescribed by that authority. Any such object which is not listed within the prescribed period shall be deemed to have been recovered after the date on which this Act came into effect.

(b) Paragraph (a) does not apply to any public museum or university.

(c) The responsible authority may at its discretion, by notice in the Gazette or the Provincial Gazette, as the case may be, exempt any institution from the requirements of paragraph (a) subject to such conditions as may be specified in the notice, and may by similar notice withdraw or amend such exemption.

(8) An object or collection listed under subsection (7)—

(a) remains in the ownership of the possessor for the duration of his or her lifetime, and SAHRA must be notified who the successor is; and

(b) must be regularly monitored in accordance with regulations by the responsible heritage authority.

Legislation relevant to the proposed activity under consideration taken from the National Heritage Resources Act (Act 25 of 1999)

Heritage resources management

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50 m in length;

(c) any development or other activity which will change the character of a site—

(i) exceeding 5 000 m^2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, 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.