Archaeological Impact Assessment

Proposed rezoning, subdivision and residential development: Erf 3122, Hartenbos, Mossel Bay, Western Cape Province

prepared for

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by

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VAT No. 4240230989

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Executive Summary

An Archaeological Impact Assessment (AIA) was conducted for the above-named project on 19 and 20 July 2010. The study area was previously cultivated and several disturbances were noted. Evidence for the dumping of building rubble and general waste occurs in certain areas. A large veld fire left most of the property denuded of vegetation. As a result, adequate ground surfaces are visible for archaeological inspection and assessment. Further disturbances by recent human activities include a reservoir and associated pipeline(s), vehicle tracks, what appears to be a miniature airfield and geological test holes.

All of the 136 identified archaeological occurrences originate in the Stone Age. These are dominated by Middle Stone Age specimens, followed by those of the Early Stone Age and Later Stone Age artefacts are rare. The contexts of these finds are mostly disturbed as a result of one or more of the above-mentioned activities. Two archaeological occurrences, one of Middle Stone Age implements and another of Early Stone Age material are considered of medium significance (field rating: Generally Protected B) and recommendations for mitigation are made. Due to the geological sequence and depth of disturbances – particularly that of ploughing – it is not expected that in situ archaeological materials will be encountered during earthmoving activities associated with the proposed development.

No tangible heritage resources of the historic period were identified, but see recommendations in the accompanying Scoping Heritage Impact Assessment and Notification of Intent to Develop (NID).

While no palaeontological remains were observed, a palaeontologist pointed out that the study area is situated on fossilliferous geological deposits. See the accompanying NID form for recommendations in this regard.

Provided that the recommended mitigation measures – if approved and required by Heritage Western Cape - are implemented, there are no objections to the approval of the proposed project.

It is recommended that;

- *Because the Early and Middle Stone Age artefact scatters at waypoints 127 and 34 are considered to be of medium significance, their extents and contents should be mapped (via GPS) and the materials recorded in more detail than presented here. Due to the disturbed context of these finds, it is not considered worthwhile collecting the artefacts under a permit from Heritage Western Cape.*

Note that;

- *If archaeological materials are exposed during vegetation clearing and/or earth moving 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 Heritage Western Cape (Ms Belinda Mutti) or the South African Heritage Resources Agency (Ms Mary Leslie or Ms Colette Scheermeyer) and will require a professional archaeologist to undertake mitigation if needed.

Table of Contents

ACRONYMS

AIA – Archaeological Impact Assessment

ESA – Early Stone Age

HWC – Heritage Western Cape

LSA – Later Stone Age

MSA – Middle Stone Age

NID – Notification of Intent to Develop

SHIA – Scoping Heritage Impact Assessment

1. Introduction

1.1 Background

Because the proposed development triggers Section 38 of the National Heritage Resources Act (Act 25 of 1999), Mr Schalk Cilliers - C/o Mr Werner Kock of ATKV-Hartenbos Strandoord - appointed CHARM to conduct an AIA, a SHIA, and to complete a NID. Results of the AIA are presented here and the SHIA and NID will accompany this document. The study area is approximately 59ha in extent and comprises Erf 3122, Hartenbos, which is situated some 8km NW of the coastal town of Mossel Bay on the Cape south coast (Figures 1 & 2).

Earlier archaeological work in the surrounding environment of the affected property has relevance (e.g., Hart 2005, Nilssen 2005, 2006, 2009a & b and Thompson 2006). These studies showed that the area is rich in Stone Age archaeology, and in the immediate surroundings, materials are dominated by artefacts originating in the Early and Middle Stone Age periods (ESA and MSA).

In addition to rezoning and subdivision, the proposed residential development includes the following:

- 173 units - single residential, units ranging from 600 to 880m^2 in extent
- 182 units - group housing, units ranging from 300 to 380m^2 in extent
- 162 units - retirement complex
- Business area - 4500m^2
- Community hall - 5276m^2
- Sports Field - 7436m^2
- Public open space
- Reservoir (existing)
- Roads
- Associated bulk services

Proposed development activities that can negatively impact on archaeological resources in the study area include large scale earthmoving activities.

The layout plan for the proposed development is shown in Figure 3, coordinate data for boundary points are presented in Table 1, and further details and specifications can be obtained from Mr Werner Kock – see contact details on title page of this report.

Table 1. Coordinate data for property boundary points and the trig beacon immediately WSW of the existing reservoir.

Name	Description	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National
A	Erf 3122 boundary point	S34.12258 E22.08597	23 Y0084322 X3777636
A1	Erf 3122 boundary point	S34.13200 E22.08132	23 Y0084742 X3778684
B	Erf 3122 boundary point	S34.12303 E22.08744	23 Y0084186 X3777684
B1	Erf 3122 boundary point	S34.13091 E22.07945	23 Y0084916 X3778565
C	Erf 3122 boundary point	S34.12406 E22.08694	23 Y0084231 X3777799
C1	Erf 3122 boundary point	S34.12987 E22.07957	23 Y0084906 X3778450
D	Erf 3122 boundary point	S34.12509 E22.08726	23 Y0084201 X3777913
D1	Erf 3122 boundary point	S34.12928 E22.08060	23 Y0084811 X3778383
E	Erf 3122 boundary point	S34.12606 E22.08719	23 Y0084206 X3778021
E1	Erf 3122 boundary point	S34.12900 E22.08145	23 Y0084733 X3778351
F	Erf 3122 boundary point	S34.12628 E22.08768	23 Y0084161 X3778045
F1	Erf 3122 boundary point	S34.12884 E22.08158	23 Y0084721 X3778333
G	Erf 3122 boundary point	S34.12765 E22.08975	23 Y0083969 X3778195
G1	Erf 3122 boundary point	S34.12729 E22.08103	23 Y0084773 X3778162
H	Erf 3122 boundary point	S34.12784 E22.09015	23 Y0083932 X3778215
H1	Erf 3122 boundary point	S34.12563 E22.08279	23 Y0084613 X3777976
J	Erf 3122 boundary point	S34.12811 E22.09260	23 Y0083705 X3778244
J1	Erf 3122 boundary point	S34.12564 E22.08454	23 Y0084451 X3777976
K	Erf 3122 boundary point	S34.12829 E22.09219	23 Y0083743 X3778264
K1	Erf 3122 boundary point	S34.12444 E22.08464	23 Y0084443 X3777843
L	Erf 3122 boundary point	S34.12824 E22.09179	23 Y0083780 X3778259
L1	Erf 3122 boundary point	S34.12330 E22.08474	23 Y0084435 X3777716
M	Erf 3122 boundary point	S34.12860 E22.09173	23 Y0083785 X3778299
N	Erf 3122 boundary point	S34.12838 E22.08973	23 Y0083970 X3778276
P	Erf 3122 boundary point	S34.12817 E22.08942	23 Y0083999 X3778253
Q	Erf 3122 boundary point	S34.12985 E22.08664	23 Y0084253 X3778441
R	Erf 3122 boundary point	S34.13097 E22.08826	23 Y0084103 X3778564
S	Erf 3122 boundary point	S34.13113 E22.08580	23 Y0084330 X3778584
T	Erf 3122 boundary point	S34.13286 E22.08662	23 Y0084252 X3778775
U	Erf 3122 boundary point	S34.13210 E22.08882	23 Y0084050 X3778689
V	Erf 3122 boundary point	S34.13260 E22.08906	23 Y0084027 X3778744
W	Erf 3122 boundary point	S34.13356 E22.08629	23 Y0084282 X3778853
X	Erf 3122 boundary point	S34.13301 E22.08602	23 Y0084307 X3778792
Y	Erf 3122 boundary point	S34.13317 E22.08551	23 Y0084354 X3778811
Z	Erf 3122 boundary point	S34.13325 E22.08525	23 Y0084378 X3778820
257 Mos 33	trig beacon 257 Mos 33	S34.12369 E22.08566	23 Y0084350 X3777759

1.2. Purpose and Scope of the Study

Objectives of the Archaeological Impact Assessment and heritage scoping study are:

- To assess the study area for traces of archaeological and tangible heritage related resources;
- To identify options for archaeological mitigation in order to minimize potential negative impacts; and
- To make recommendations for archaeological mitigation where necessary.

Terms of Reference (ToR):
a) Locate boundaries and extent of the study area.
b) Literature review of earlier archaeological work in and near study area
c) Conduct a survey of the study area to identify and record archaeological and heritage related resources.

d) Assess the impact of the proposed development on above-named resources.
e) Recommend mitigation measures where necessary.
f) Prepare and submit a report to the client that meets standards required by Heritage Western Cape in terms of the National Heritage Resources Act, No. 25 of 1999

1.3 Study Area

The middle of Erf 3122, Hartenbos, is situated some 3km directly W of Hartenbosstrand and approximately 8km NW of Mossel Bay (Figure 1). Coordinate data for the boundary points are given in Table 1 (see red flags in Figure 4). Boundary points are named alphabetically and clockwise from the most northerly flag. Some 59ha in extent, the property is situated on the high ground of a large, gently undulating hill that slopes down and away from the property boundaries. The trig beacon 257 Mos 33 is 136.9m above mean sea level (amsl), the average height along the higher ground is about 120m amsl and the lowest point recorded during the foot survey is 96m amsl. Four small valleys situated to the east of the study area originate along the middle of Erf 3122 (Figure 2). Surface sediments consist of a 20 to 50cm thick layer of humic, sandy topsoil that in places appears to contain iron oxides. It is this sediment that was ploughed and used for cultivation. Underlying this is a fluvial deposit of the Kirkwood Formation that in places is reminiscent of Enon. These fluvial sediments are fossilliferous (John Pether pers. comm. & see Plate 4 [23, 53 & 54]).

The vast bulk of the study area was previously cultivated and several events of recent disturbances to geological sediments were noted (Plate 1 [18 & 21], Plate 2 [71] and Plate 5 [58]). Parts of the study area were used for the dumping of building rubble, and general waste is also common in those areas (Plate 4 [12 & 42]). This is particularly evident to the north and east of the main vehicle track in the NE part of the property and in the vicinity of the existing reservoir. A large veld fire swept through the area in recent times and left most of the property denuded of vegetation (Plates 1 &2). The exception to this is the area not covered by survey tracks and that is roughly in the middle of the property (Figure 4 and Plate 3, Plate 4 [31] and Plate 5 [59]). As a result, visibility of ground surfaces is very good and therefore, allowed for archaeological inspection and assessment. Further disturbances by recent human activities include a reservoir and associated pipeline(s), vehicle tracks and what appears to be a small airfield – and associated structure – that was probably used for radio controlled aircraft (Figure 2 and Plate 5 [83 & 106]). Geological test holes were also seen (Plate 4 [23]). For more examples of the above see Figures 2 & 4 and Plates 1 through 5. Examples of the environment – development, disturbances, vegetation, topography and so on are shown in Plates 1 through 5. No undisturbed indigenous vegetation was seen during the survey.

The study area is most readily accessible by vehicle at its SE extent. After taking the Mossel Bay exit from the N2, a turn to the east leads to the intersection with the R328. After following the R328 to the north for some 1.8km, the following directions were used; left onto Boekenhout Laan, first left onto Kameeldoring Laan, first left onto Bernard Street and then the first gravel/dirt track to the right after some 400m on Bernard Street (see Figure 1 and black directional arrows in inset). The gravel/dirt track can only be negotiated with a “bakkie” and preferably with differential lock or 4x4.

1.4 Approach to the Study

Earlier archaeological work conducted in the surrounding environment and in the immediate vicinity of the study area found that most archaeological remains originate in the Early and Middle Stone Age periods (Hart 2005, Nilssen 2005, 2006, 2009a & b and Thompson 2006). Most archaeological occurrences occur in previously disturbed contexts. Most Stone Age implements occur in low density scatters though medium and higher density scatters do occur. No tangible heritage related resources of the colonial period were expected to occur in the study area. Other heritage related resources will likely be affected by the proposed development and recommendations in this regard are made in the accompanying SHIA and NID.

Mr Werner Kock of ATKV-Hartenbos Strandoord provided background information, coordinate data for the study area as well as a layout plan for the proposed development (Figure 3). The study was conducted independently. Almost the entire study area was accessible and adequate ground surfaces were exposed for archaeological inspection and assessment. The survey was conducted on foot.

Survey tracks were fixed with a hand held Garmin Camo GPS to record the search area (Figure 4, gpx tracking file submitted to HWC and is available from author). Observations and photo localities were also fixed by GPS (Figure 4, Plates 1 through 9, Table 2 and Appendix A). Digital audio notes and a high quality, comprehensive digital photographic record were also made (full data set available from author). Due to the high numbers of identified stone artefacts, all were mapped, but only representative samples were photographed. Localities of photographs are established by matching the numbers on photographs with those of waypoints in Figure 4 and coordinate data are given in Table 2. Directions of views are indicated with compass bearing names like E is east; WSW is west south west, and so on. Bearing names on panoramic views are approximate and indicate the bearing at the position of the label on the photograph.

2. Results

On 19 and 20 July 2010, in 2 days of survey, a distance of 24.7km was walked, covering an area of about 25ha, of which an average of at least 80% provided good archaeological visibility (Plates 1 through 9). The vast bulk of the study area comprises disturbed sediments and the most common disturbance results from ploughing for cultivation (see section 1.3 above).

2.1

All of the 136 identified archaeological occurrences originate in the Stone Age and these include isolated stone artefacts as well as low density scatters of stone artefacts (Appendix A). The materials are dominated by Middle Stone Age (MSA) specimens, followed by those of the Early Stone Age (ESA) and Later Stone Age (LSA) artefacts are rare. The contexts of these finds are mostly disturbed as a result of one or more of the above-mentioned activities (section 1.3).

Stone artefacts at **waypoints 6, 61, 95 and 112** may be of either MSA or LSA origin while those at **waypoints 2, 3, 10, 14, 22, 24, 29, 52, 70, 122, 126 and138** are of MSA age and include;

- hammer stones,
- a variety of single and multi platform cores including “tortoise” and disc cores,

- flaked quartzite and flaked quartzite cobbles,
- flakes & chunks and
- a large scraper

All but one of these specimens are in quartzite. Examples of the above are shown in Plates 6 and 7 (also see Figure 4 and Table 2).

Waypoints 75, 114, 118 and 120 represent localities where ESA stone artefacts were identified including;

- large cores,
- bifacial hand axes and
- large flakes

All ESA pieces are in quartzite and examples are shown in Plates 8 and 9 (also see Figure 4 and Table 2).

The only definitively LSA stone artefact was identified at **waypoint 136** and is a multi platform core in chalcedony (Plate 9, Figure 4 and Table 2). While this is the only piece of chalcedony I have seen in this area, geologist and palaeontologist, John Pether, says that the stone occurs in the Kirkwood Formation on which Erf 3122 is situated.

Significance and recommendations:

Due to the fact that the context of all the above finds is compromised and because materials occur in isolation or in low densities, the above materials are considered to be of low significance (Generally Protected C). It is recommended that no further archaeological mitigation of these occurrences is required.

2.2

A MSA scatter of stone artefacts was recorded at **waypoint 34**, which is in close proximity to an existing reservoir (Plate 7, Figure 4 and Table 2). This is a medium density scatter of materials roughly 250m^2 in extent and some artefacts are still imbedded in sediment. Specimens include hammer stones, a hammer stone/grind stone, various cores, blades, flakes and chunks, and all these are in medium to fine grained quartzites of differing colour. Retouched pieces occur, but are rare.

Significance and recommendations:

The context of this occurrence is disturbed, but due to the higher density and wider variety of stone artefacts than seen at other occurrences, it is considered to be of medium significance (field rating: Generally Protected B). Although the site does not require archaeological excavation or the collection of specimens under a permit from HWC, it is recommended that the extent of the occurrence should be mapped via GPS and that individual artefacts be recorded in greater detail than presented here.

2.3

At **waypoint 127**, a medium to low density stone artefact scatter of ESA implements was identified (Plate 9, Figure 4 and Table 2). The occurrence is about 300m^2 in extent and is situated in formerly ploughed and cultivated fields. Artefacts include large cores, crude and finer bifacial hand axes, “chopper” tools (probably worn out hammer stones and/or cores) and flakes. All specimens are in quartzite that is patinated.

Significance and recommendations:

Although these artefacts occur in a disturbed context, they occur in higher frequencies than seen elsewhere in the study area and are exclusively of ESA origin. A variety of artefacts were identified, representing a range of ESA tools that are indicative of the stone tool technology used at that time. As such, the site is considered to be of medium significance (field rating: Generally Protected B) and as described above for waypoint 34, it is

recommended that the extent of the occurrence should be mapped via GPS and that individual artefacts be recorded in greater detail than presented here.

While no palaeontological remains or other tangible heritage related resources were observed, Mr John Pether - a palaeontologist - noted that the study area is situated on fossilliferous geological deposits. See the accompanying NID for further recommendations.

Table 2. Coordinate and descriptive data for photographs & selected observations.

Name	Description img=image snd=sound	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National	Elevation masl
2	MSA img8164-6 snd8166	S34.13324 E22.08624	23 Y0084287 X3778818	123 m
3	MSA img8167-9 snd8169	S34.13284 E22.08425	23 Y0084471 X3778775	125 m
6	MSA/LSA img8170-2 snd8172	S34.13245 E22.08300	23 Y0084587 X3778733	127 m
10	MSA img8173-6 snd8176	S34.13221 E22.08249	23 Y0084634 X3778706	126 m
14	MSA img8178-80 snd8180	S34.13144 E22.08054	23 Y0084815 X3778623	129 m
22	MSA img8190-1 snd8191	S34.12701 E22.08133	23 Y0084746 X3778132	131 m
24	MSA img8194-6 snd8196	S34.12604 E22.08231	23 Y0084657 X3778023	129 m
29	MSA img8198-8200 snd8200	S34.12526 E22.08460	23 Y0084446 X3777934	134 m
34	MSA img8202-5 snd8205	S34.12311 E22.08733	23 Y0084197 X3777693	123 m
52	MSA img8215-20 snd8220	S34.13049 E22.08538	23 Y0084369 X3778513	106 m
61	MSA/LSA img8227-30 snd8230	S34.12871 E22.08767	23 Y0084160 X3778314	122 m
70	MSA img8231-4 snd8234	S34.13340 E22.08640	23 Y0084272 X3778835	123 m
75	ESA img8240-4 snd8244	S34.13292 E22.08524	23 Y0084379 X3778783	120 m
95	MSA/LSA img8246-50 snd8250	S34.12371 E22.08667	23 Y0084256 X3777761	132 m
112	MSA/LSA img8257-62 snd8262	S34.13207 E22.08430	23 Y0084467 X3778690	123 m
114	ESA img8263-7 snd8267	S34.13254 E22.08539	23 Y0084366 X3778741	122 m
118	ESA img8274-80 snd8280	S34.12854 E22.08608	23 Y0084306 X3778297	121 m
120	ESA img8281-6 snd8286	S34.12675 E22.08466	23 Y0084439 X3778100	126 m
122	MSA img8287-92 snd8292	S34.12810 E22.08283	23 Y0084606 X3778251	127 m
126	MSA img8293-5 snd8295	S34.13049 E22.08173	23 Y0084705 X3778517	127 m
127	ESA img8296-8301 snd8301	S34.13060 E22.08164	23 Y0084713 X3778529	126 m
136	LSA img8302-8 snd8308	S34.13085 E22.08226	23 Y0084656 X3778556	125 m
138	MSA img8309-12 snd8312	S34.13063 E22.08241	23 Y0084642 X3778532	122 m
1	img8160-3 snd8163	S34.13355 E22.08631	23 Y0084280 X3778853	122 m
12	img8177 snd8177	S34.13194 E22.08142	23 Y0084733 X3778678	127 m
18	img8181-5 snd8185	S34.13006 E22.07965	23 Y0084898 X3778471	129 m
21	img8186-9 snd8189	S34.12702 E22.08132	23 Y0084747 X3778132	130 m
23	GEO test hole img8192-3 snd8193	S34.12669 E22.08188	23 Y0084696 X3778095	127 m
31	img8201 snd8201	S34.12276 E22.08631	23 Y0084291 X3777656	126 m
40	img8206-7 snd8207	S34.12674 E22.08838	23 Y0084096 X3778095	121 m
42	img8208 snd8208	S34.12788 E22.09082	23 Y0083870 X3778220	104 m
43	img8209 snd8209	S34.12819 E22.09174	23 Y0083785 X3778253	104 m
44	img8210 snd8210	S34.12789 E22.08905	23 Y0084033 X3778223	113 m
47	img8211 snd8211	S34.12855 E22.08820	23 Y0084110 X3778296	117 m
49	img8212-3 snd8213	S34.13031 E22.08567	23 Y0084342 X3778493	111 m
51	img8214 snd8214	S34.13062 E22.08424	23 Y0084474 X3778529	112 m
53	GEO profile img8221-2 snd8222	S34.13070 E22.08589	23 Y0084322 X3778537	101 m
54	GEO profile img8223 snd8223	S34.13044 E22.08719	23 Y0084202 X3778507	96 m
56	img8224 snd8224	S34.13098 E22.08807	23 Y0084120 X3778565	113 m
58	img8225 snd8225	S34.13124 E22.08495	23 Y0084408 X3778598	120 m
59	img8226 snd8226	S34.12860 E22.08429	23 Y0084472 X3778305	121 m
71	img8235-7 snd8237	S34.13279 E22.08939	23 Y0083996 X3778765	97 m
72	img8238-9 snd8239	S34.13295 E22.08794	23 Y0084131 X3778784	114 m
83	img8245 snd8245	S34.13099 E22.08009	23 Y0084856 X3778574	128 m
98	img8251-3 snd8253	S34.12552 E22.08696	23 Y0084228 X3777961	127 m
99	img8254-5 snd8255	S34.12760 E22.08929	23 Y0084011 X3778190	111 m
106	img8256 snd8256	S34.12994 E22.08093	23 Y0084780 X3778457	128 m
115	img8268-73 snd8273	S34.12838 E22.08296	23 Y0084594 X3778282	126 m
144	img8313-5 snd8315	S34.12854 E22.08316	23 Y0084576 X3778299	121 m

3. Sources of Risk, Impact Identification and Assessment

The proposed development will involve large scale earthmoving activities that may have a permanent negative impact on archaeological resources in the study area. Due to the geological sequence and depth of disturbances – particularly that of ploughing – it is not expected that *in situ* archaeological materials will be encountered during earthmoving activities associated with the proposed development. It is possible, however, that palaeontological materials occur subsurface. Apart from archaeological materials recorded at waypoints 34 and 127, the study area is not archaeologically sensitive, and provided that the above-named sites are mitigated, the proposed development will not have a negative impact on significant archaeological resources.

Table 3 summarizes the potential impact of the proposed development on archaeological resources with and without mitigation.

Table 3. Potential impact on and loss of archaeological resources

	With Mitigation	Without Mitigation
Extent	Local	Local
Duration	Permanent	Permanent
Intensity	Low	Medium to High
Probability	Low	High
Significance	Low	Medium
Status	Low	Medium
Confidence	High	High

Provided that the recommended mitigation measures – if approved and required by Heritage Western Cape - are implemented, there are no objections to the approval of the proposed project.

4. Required and Recommended Mitigation Measures

Recommended mitigation;

- Because the Early and Middle Stone Age artefact scatters at waypoints 127 and 34 are considered to be of medium significance, their extents and contents should be mapped (via GPS) and the materials recorded in more detail than presented here. Due to the disturbed context of these finds, it is not considered worthwhile collecting the artefacts under a permit from Heritage Western Cape.

Required mitigation;

- If archaeological materials are exposed during vegetation clearing and/or earth moving 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 Heritage Western Cape (Ms Belinda Mutti) or the South African Heritage Resources Agency (Ms Mary Leslie or Ms Colette Scheermeyer) and will require a professional archaeologist to undertake mitigation if needed.

References

Hart, T. 2005. Initial Heritage Statement: Proposed Open Cycle Gas Turbine Site and Transmission Lines at Mossel Bay, South Western Cape. Prepared for Ninham Shand Consulting by Archaeology Contracts Office, Department of Archaeology, University of Cape Town

Nilssen, P.J. 2005. Archaeological Heritage Impact Assessment: Proposed rezoning and development of Remainder Portion Vyf Brakkefontein 220, Hartenbos Heuwels, Mossel Bay. Final report prepared For: SRK Consulting Engineers & Scientists, PO Box 6824, Roggebaai, 8012

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Nilssen, P.J. 2009b. Archaeological Impact Assessment: Asazani Zinyoka Bulk Water Pipeline Route, Mossel Bay Municipality, Mossel Bay, Western Cape Province. Prepared for MVD Raadgewende Ingenieurs (Suid-Kaap) (Edms.) Bpk. – Mr Danie Wessels 34 Upper Cross Street, Mossel Bay | P.O. Box 730, Mossel Bay, 6500

Thompson, Erin. 2006. Artifact Accumulation Formation Processes and their Affect on Studies of Early Hominin Land Use as Reflected in an Acheulean Assemblage near Mossel Bay, South Africa. Unpublished Masters Dissertation.

Figures and Plates (on following pages)

Figure 1. Locality map - study area west of Hartenbos (red), Western Province. Maps courtesy of Chief Directorate Surveys and Mapping (CDSM).

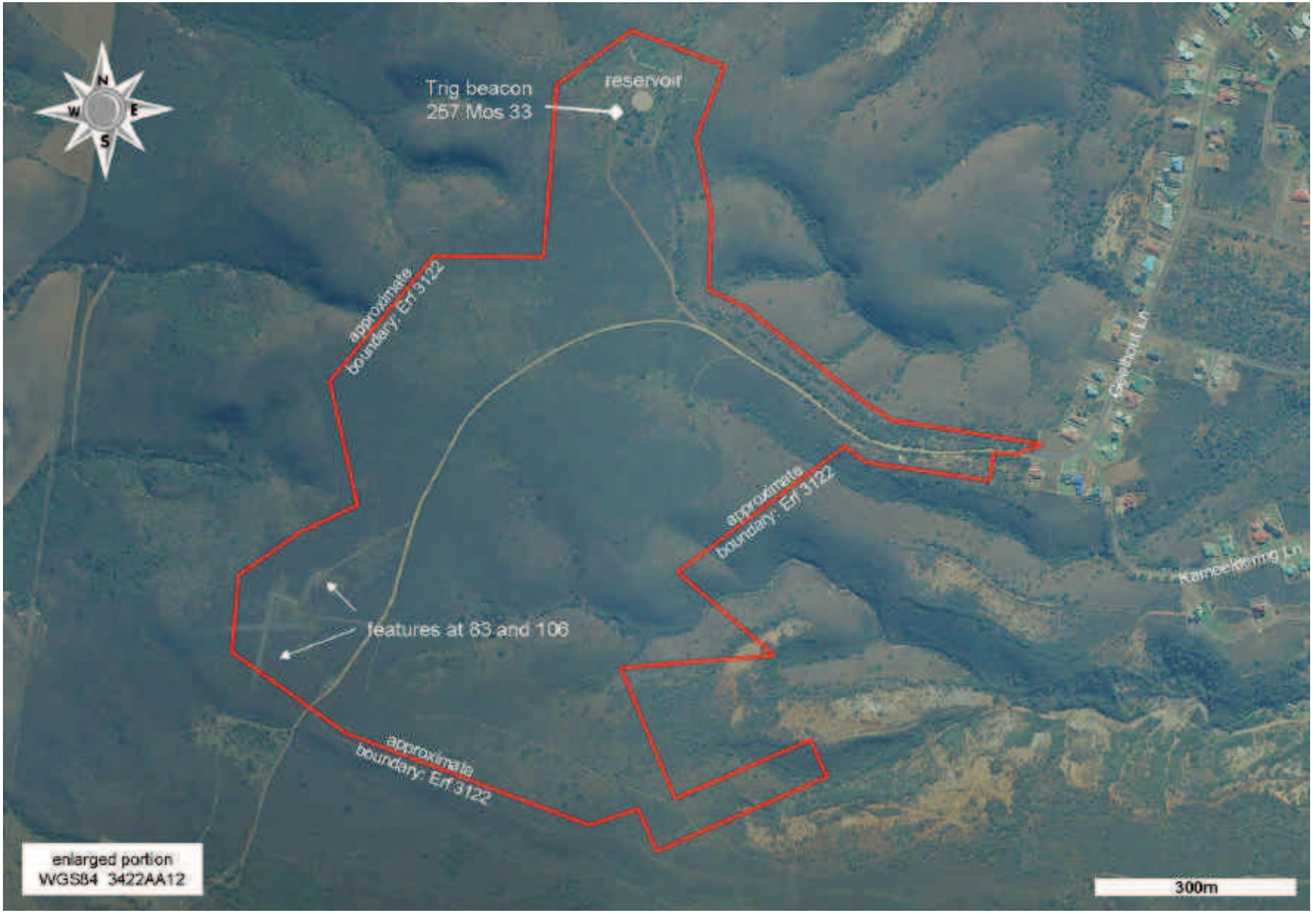

Figure 2. Enlarged area as indicated in Figure 1 showing property boundary & features. Courtesy of CDSM.

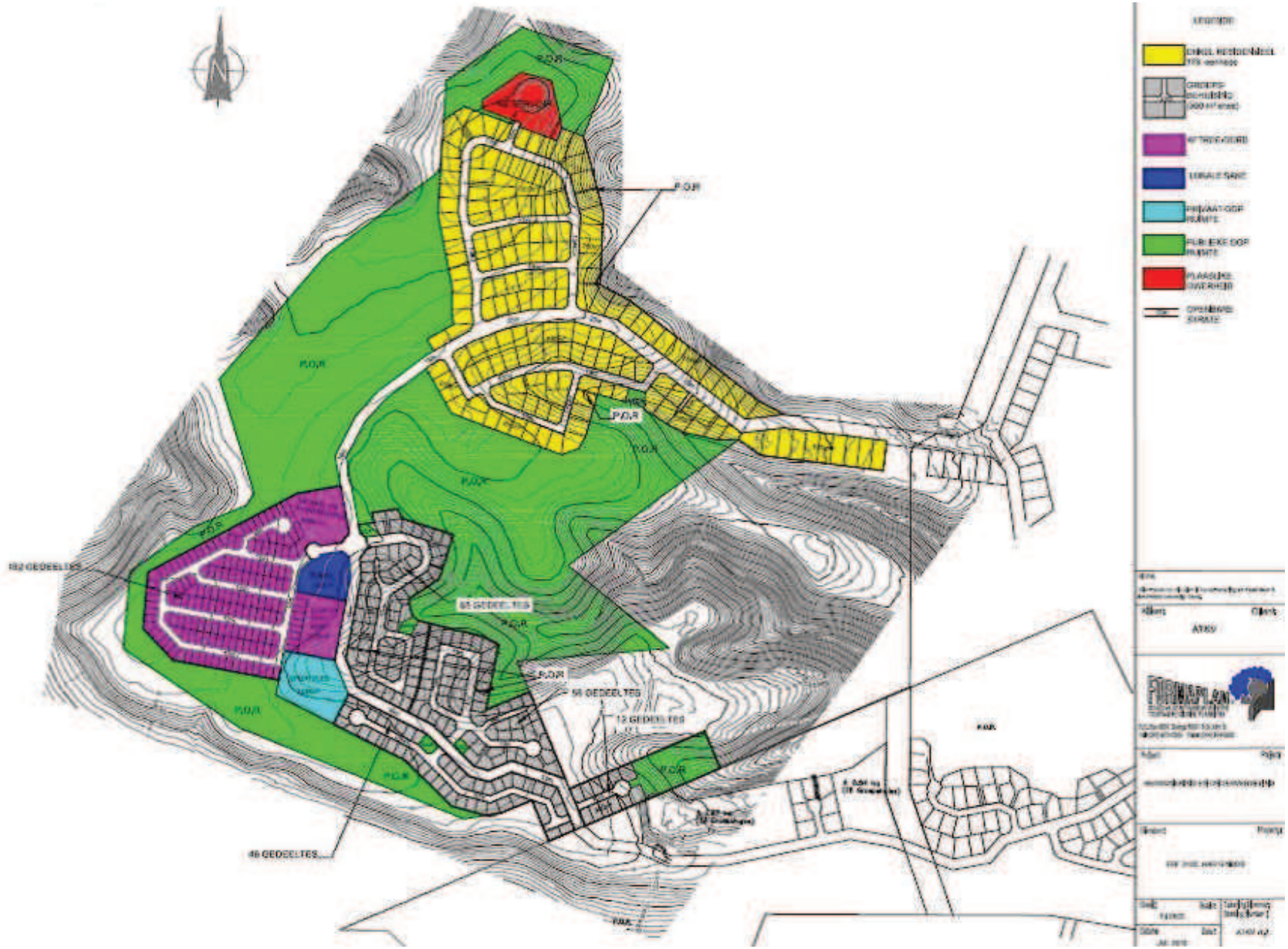

Figure 3. Layout plan of proposed development as supplied by Mr Garth Flores of Formaplan Town and Regional Planners.

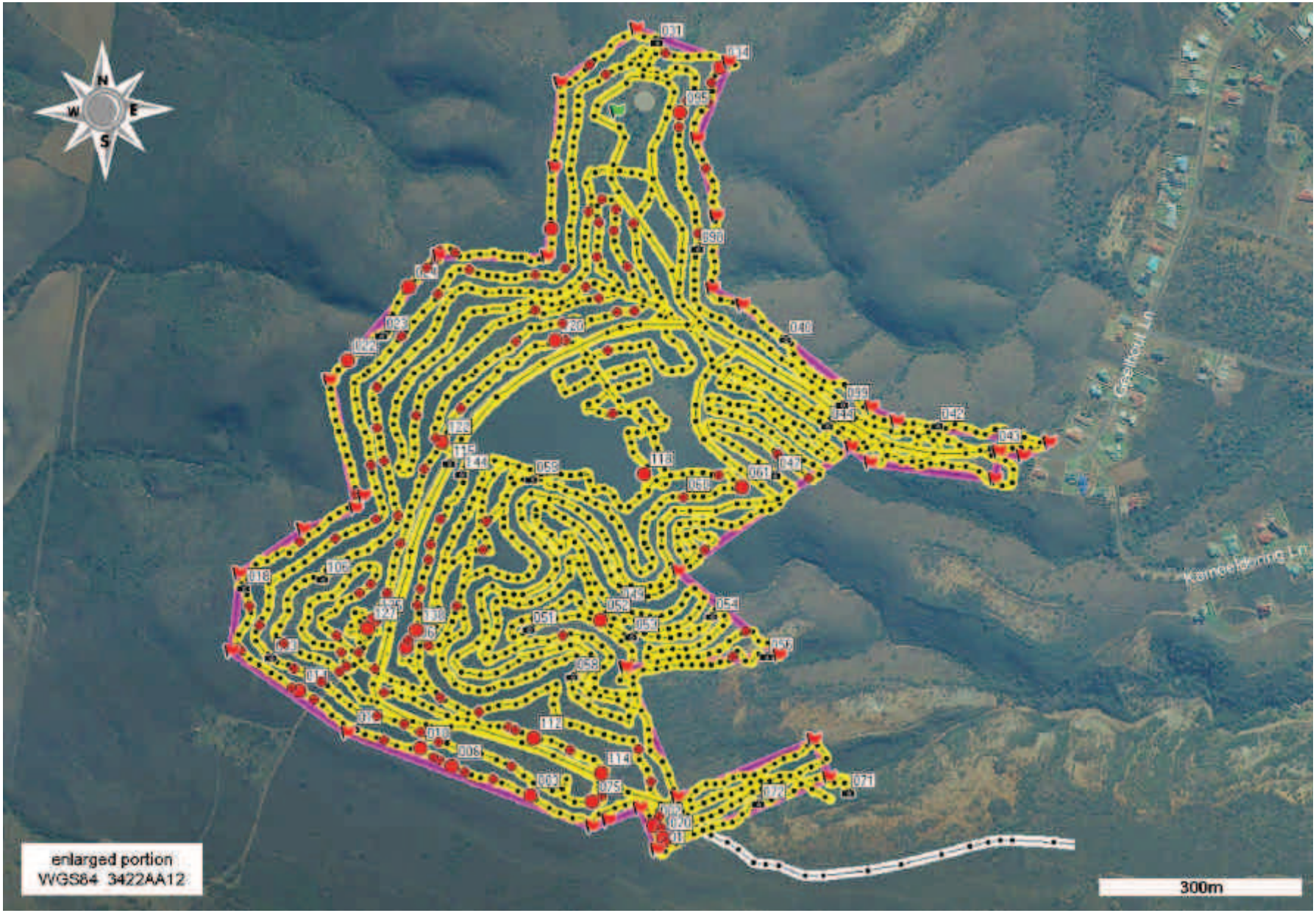

Figure 4. Survey tracks (yellow), photo and observation localities. See Table 2 & Appendix A for descriptive and coordinate data.

Plate 1. Examples of the environment and surrounds (see Figure 4 for locality information). Note evidence for ploughing (121) and result of veld fire.

Plate 2. Site and surrounds – note disturbances and burnt vegetation (see Figure 4 for locality information).

Plate 3. Areas unaffected by the recent veld fire (see Figure 4 for locality information).

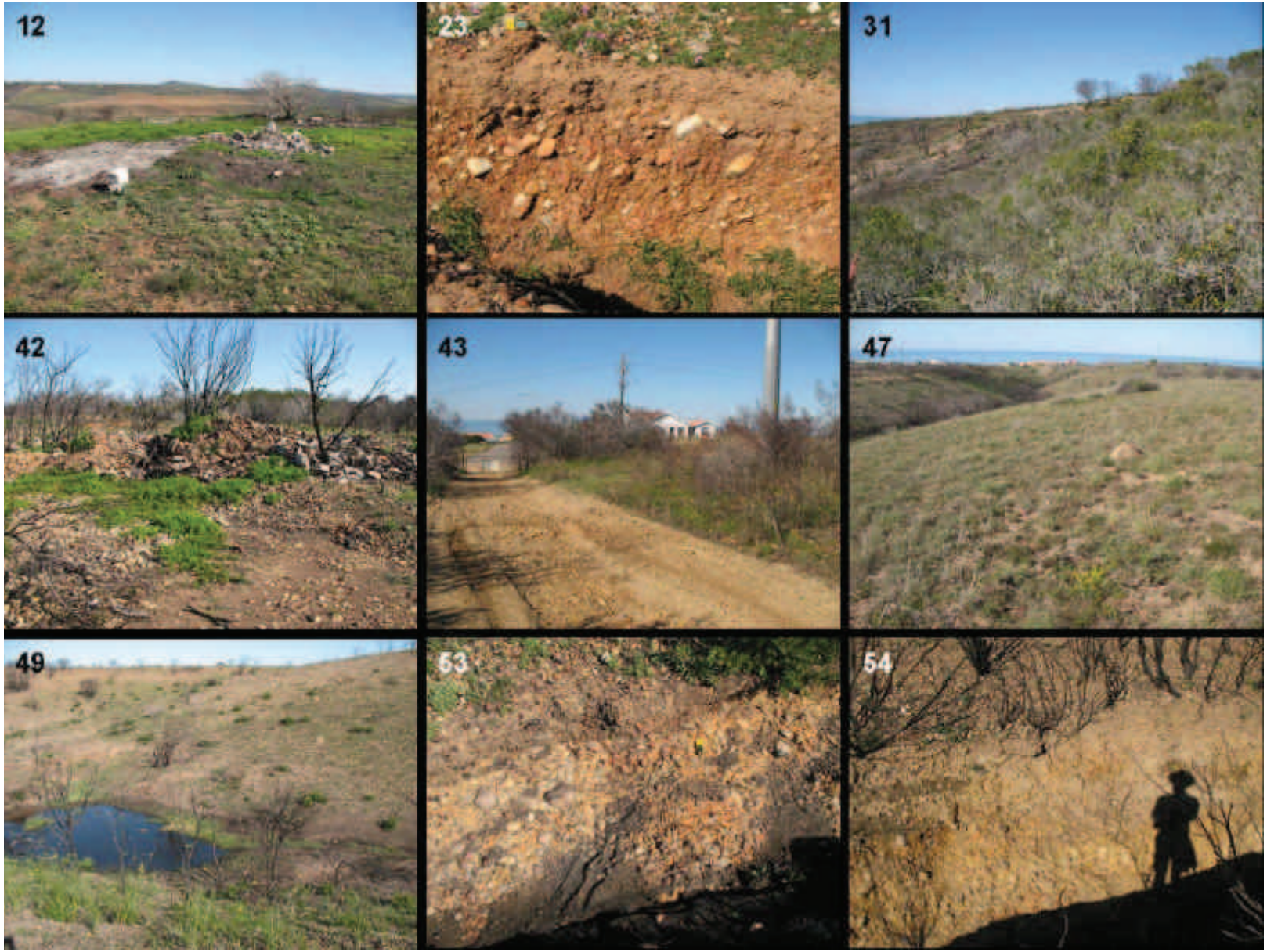

Plate 4. Examples of rubble dumps, geological test hole, vegetation cover, vehicle tracks and profiles exposed in erosion gullies (see Figure 4 for locality information).

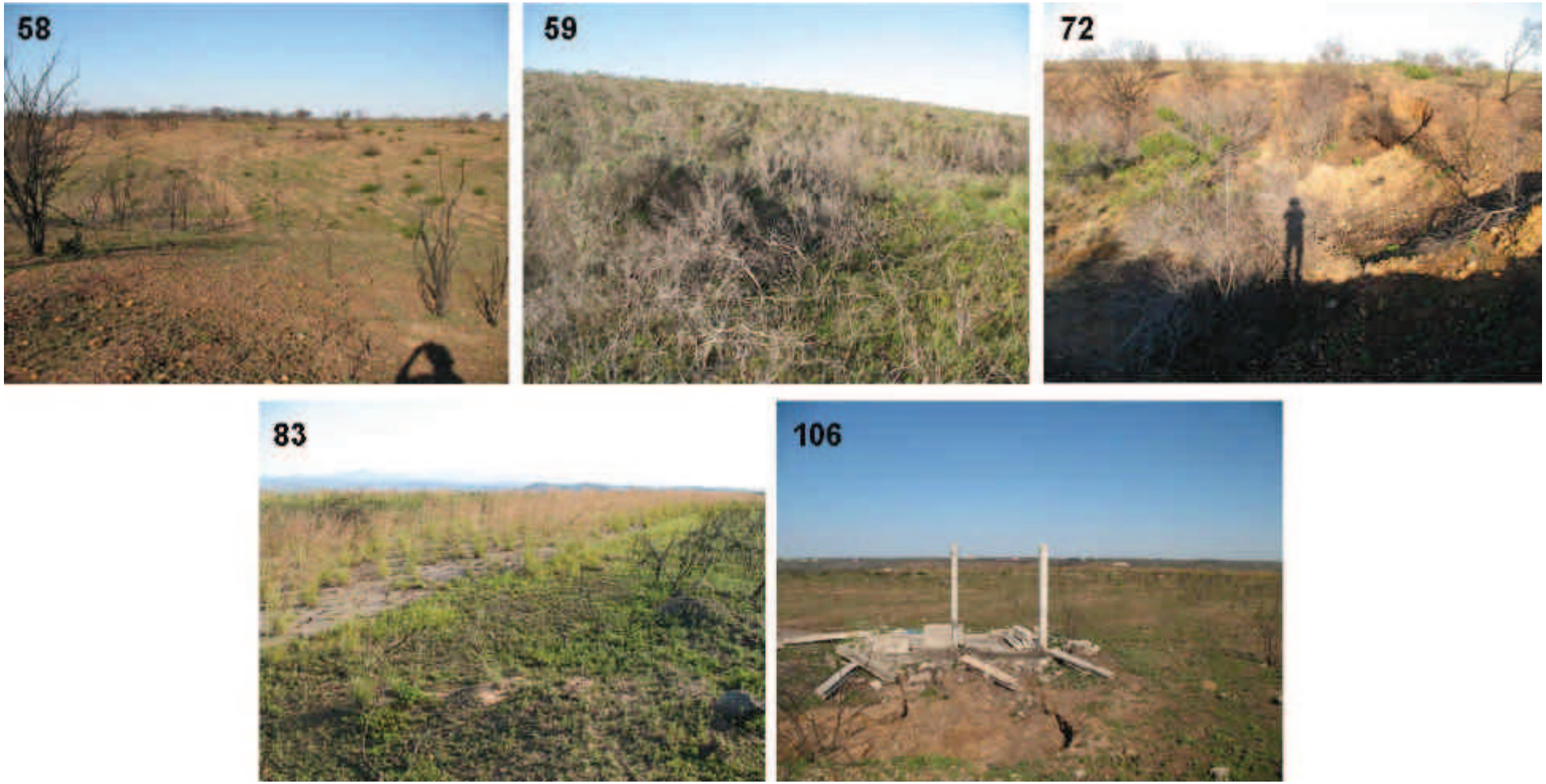

Plate 5. Examples of ploughed area (58), vegetation, disturbances and miniature airfield and ruins of associated structure (83 & 106). See Figure 4 for locality information.

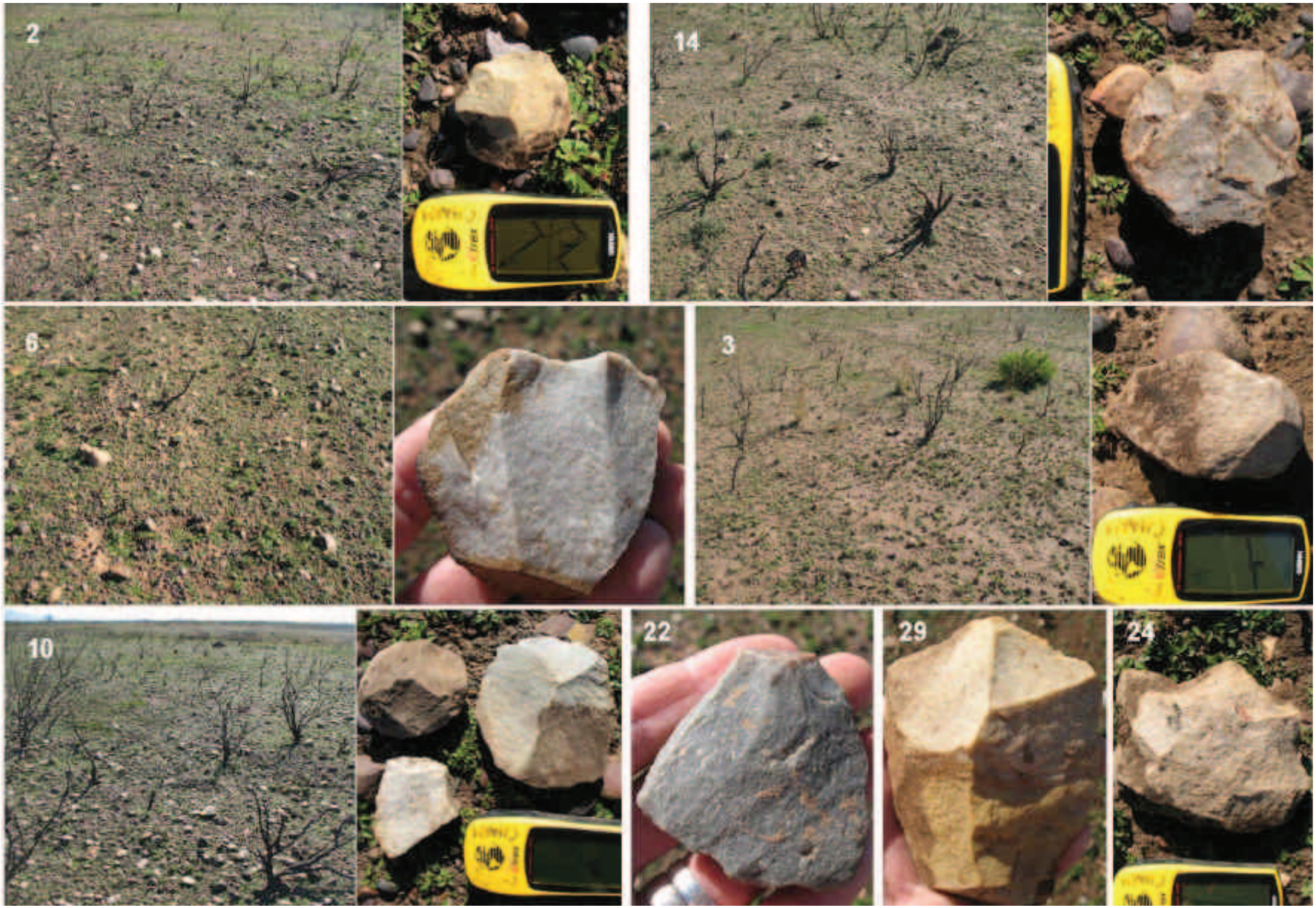

Plate 6. Archaeological finds and contexts. Numbers denote waypoint names – see Figure 4 and Table 2 for further information.

Plate 7. Archaeological finds and contexts. Numbers denote waypoint names – see Figure 4 and Table 2 for further information.

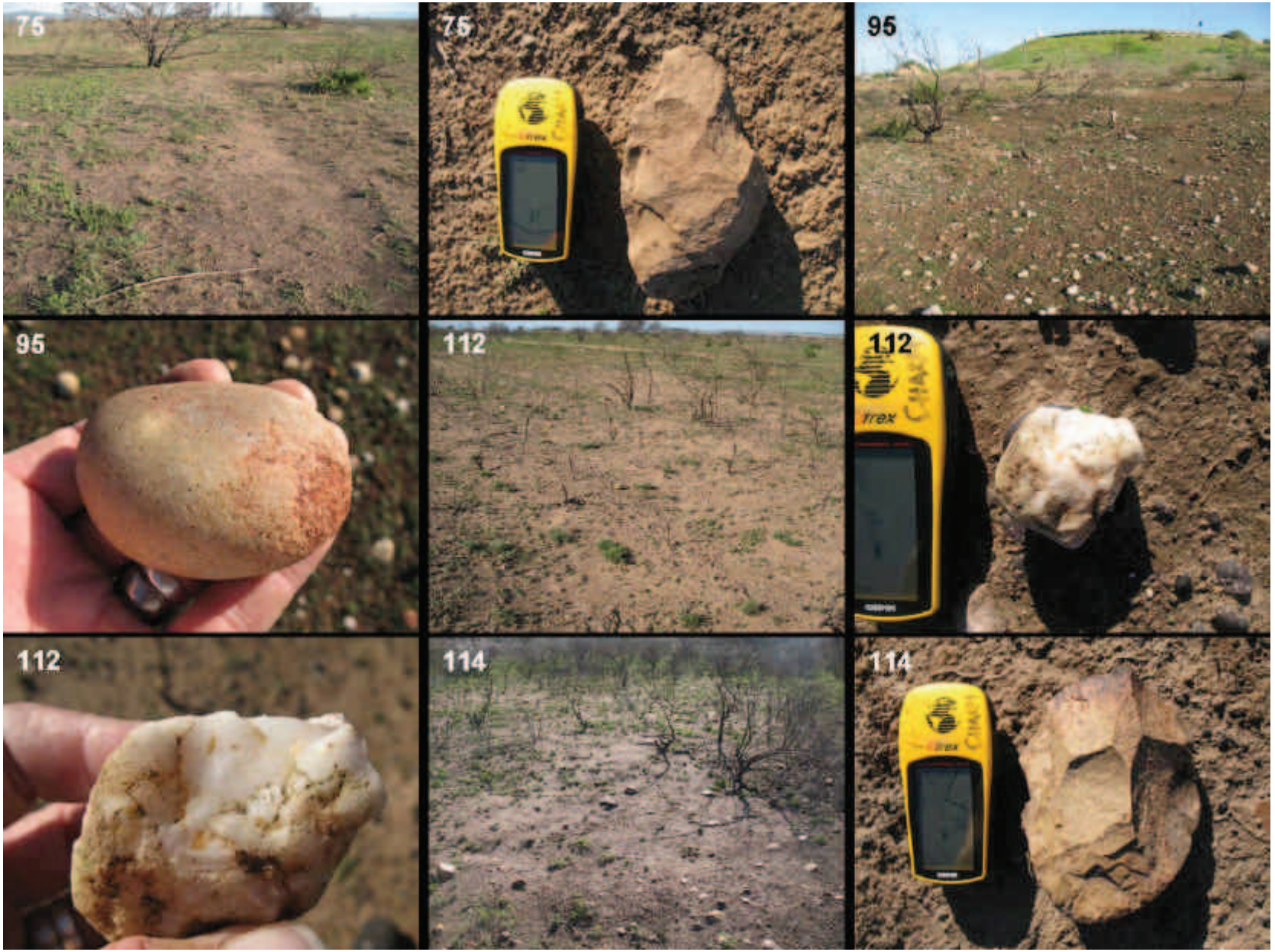

Plate 8. Archaeological finds and contexts. Numbers denote waypoint names – see Figure 4 and Table 2 for further information.

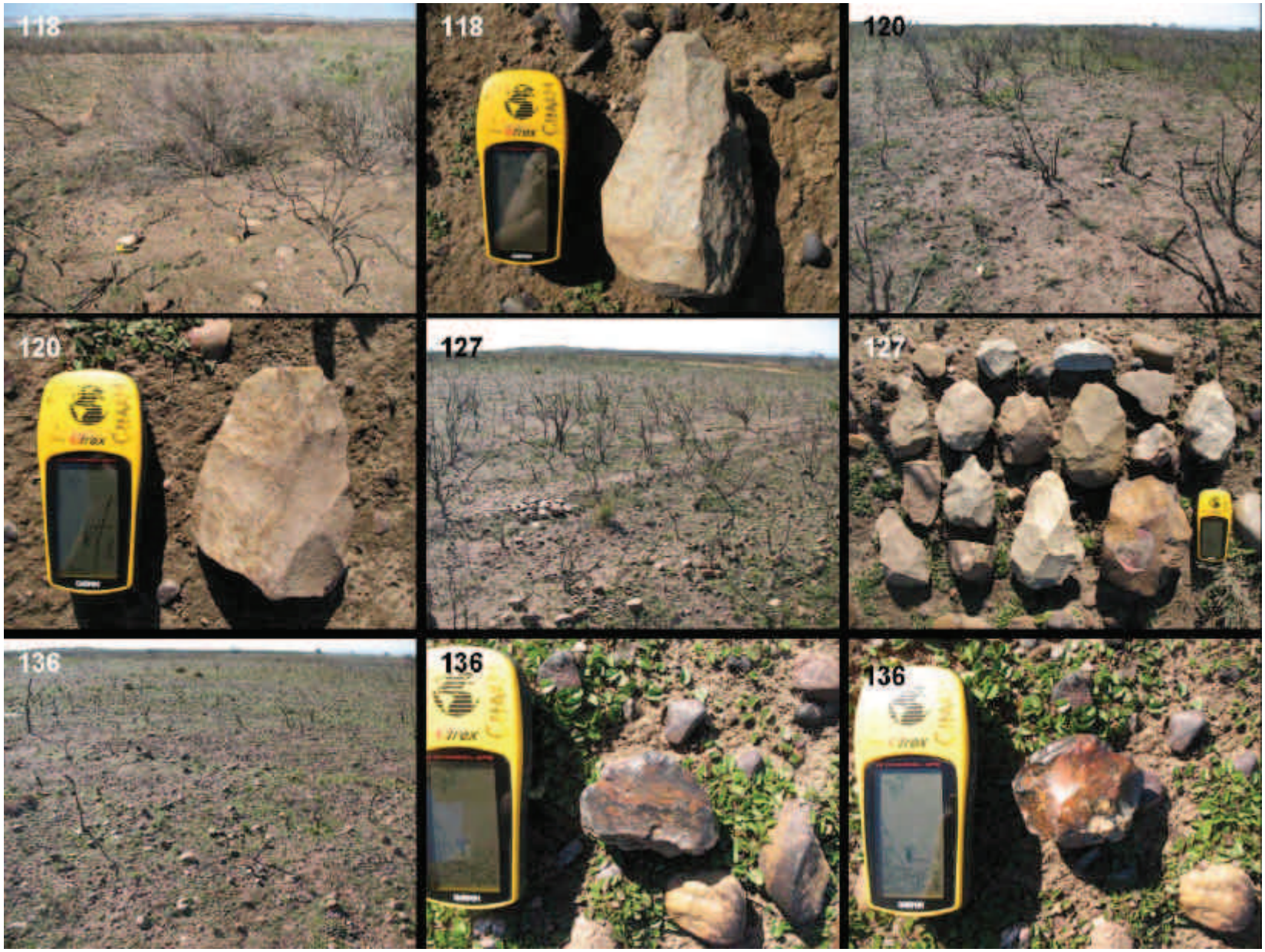

Plate 9. Archaeological finds and contexts. Numbers denote waypoint names – see Figure 4 and Table 2 for further information.

Appendix A

Coordinate & Descriptive data for all observations and photographs

Name	Description img=image snd=sound	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National	Elevation masl
1	img8160-3 snd8163	S34.13355 E22.08631	23 Y0084280 X3778853	122 m
2	MSA img8164-6 snd8166	S34.13324 E22.08624	23 Y0084287 X3778818	123 m
3	MSA img8167-9 snd8169	S34.13284 E22.08425	23 Y0084471 X3778775	125 m
4	stone artefact	S34.13261 E22.08366	23 Y0084526 X3778751	125 m
5	stone artefact	S34.13252 E22.08320	23 Y0084568 X3778741	127 m
6	MSA/LSA img8170-2 snd8172	S34.13245 E22.08300	23 Y0084587 X3778733	127 m
7	stone artefact	S34.13236 E22.08280	23 Y0084605 X3778724	128 m
8	stone artefact	S34.13232 E22.08269	23 Y0084615 X3778719	127 m
9	stone artefact	S34.13225 E22.08249	23 Y0084633 X3778711	127 m
10	MSA img8173-6 snd8176	S34.13221 E22.08249	23 Y0084634 X3778706	126 m
11	stone artefact	S34.13209 E22.08190	23 Y0084689 X3778694	125 m
12	img8177 snd8177	S34.13194 E22.08142	23 Y0084733 X3778678	127 m
13	stone artefact	S34.13155 E22.08078	23 Y0084792 X3778636	128 m
14	MSA img8178-80 snd8180	S34.13144 E22.08054	23 Y0084815 X3778623	129 m
15	stone artefact	S34.13140 E22.08043	23 Y0084825 X3778618	127 m
16	stone artefact	S34.13089 E22.07960	23 Y0084901 X3778563	129 m
17	stone artefact	S34.13030 E22.07974	23 Y0084890 X3778498	129 m
18	img8181-5 snd8185	S34.13006 E22.07965	23 Y0084898 X3778471	129 m
19	stone artefact	S34.12943 E22.08055	23 Y0084816 X3778401	127 m
20	stone artefact	S34.12881 E22.08145	23 Y0084733 X3778330	129 m
21	img8186-9 snd8189	S34.12702 E22.08132	23 Y0084747 X3778132	130 m
22	MSA img8190-1 snd8191	S34.12701 E22.08133	23 Y0084746 X3778132	131 m
23	GEO test hole img8192-3 snd8193	S34.12669 E22.08188	23 Y0084696 X3778095	127 m
24	MSA img8194-6 snd8196	S34.12604 E22.08231	23 Y0084657 X3778023	129 m
25	stone artefact	S34.12579 E22.08260	23 Y0084630 X3777994	130 m
26	stone artefact	S34.12566 E22.08275	23 Y0084616 X3777981	130 m
27	stone artefact	S34.12555 E22.08281	23 Y0084611 X3777968	131 m
28	stone artefact	S34.12559 E22.08305	23 Y0084589 X3777972	132 m
29	MSA img8198-8200 snd8200	S34.12526 E22.08460	23 Y0084446 X3777934	134 m
30	stone artefact	S34.12306 E22.08521	23 Y0084391 X3777690	124 m
31	img8201 snd8201	S34.12276 E22.08631	23 Y0084291 X3777656	126 m
32	stone artefact	S34.12291 E22.08643	23 Y0084279 X3777672	124 m
33	stone artefact	S34.12311 E22.08738	23 Y0084192 X3777693	124 m
34	MSA img8202-5 snd8205	S34.12311 E22.08733	23 Y0084197 X3777693	123 m
35	stone artefact	S34.12331 E22.08717	23 Y0084210 X3777716	128 m
36	stone artefact	S34.12357 E22.08713	23 Y0084214 X3777745	129 m
37	stone artefact	S34.12445 E22.08710	23 Y0084216 X3777842	117 m
38	stone artefact	S34.12507 E22.08728	23 Y0084199 X3777911	124 m
39	stone artefact	S34.12534 E22.08722	23 Y0084204 X3777941	128 m
40	img8206-7 snd8207	S34.12674 E22.08838	23 Y0084096 X3778095	121 m
41	stone artefact	S34.12748 E22.08946	23 Y0083996 X3778177	107 m
42	img8208 snd8208	S34.12788 E22.09082	23 Y0083870 X3778220	104 m
43	img8209 snd8209	S34.12819 E22.09174	23 Y0083785 X3778253	104 m
44	img8210 snd8210	S34.12789 E22.08905	23 Y0084033 X3778223	113 m
45	stone artefact	S34.12858 E22.08874	23 Y0084061 X3778300	110 m
46	stone artefact	S34.12827 E22.08823	23 Y0084108 X3778265	113 m
47	img8211 snd8211	S34.12855 E22.08820	23 Y0084110 X3778296	117 m
48	stone artefact	S34.12955 E22.08705	23 Y0084215 X3778408	110 m
49	img8212-3 snd8213	S34.13031 E22.08567	23 Y0084342 X3778493	111 m
50	stone artefact	S34.13069 E22.08479	23 Y0084424 X3778536	115 m
51	img8214 snd8214	S34.13062 E22.08424	23 Y0084474 X3778529	112 m
52	MSA img8215-20 snd8220	S34.13049 E22.08538	23 Y0084369 X3778513	106 m
53	GEO profile img8221-2 snd8222	S34.13070 E22.08589	23 Y0084322 X3778537	101 m
54	GEO profile img8223 snd8223	S34.13044 E22.08719	23 Y0084202 X3778507	96 m
55	stone artefact	S34.13063 E22.08773	23 Y0084152 X3778528	108 m
56	img8224 snd8224	S34.13098 E22.08807	23 Y0084120 X3778565	113 m
57	stone artefact	S34.13097 E22.08751	23 Y0084172 X3778566	116 m
58	img8225 snd8225	S34.13124 E22.08495	23 Y0084408 X3778598	120 m
59	img8226 snd8226	S34.12860 E22.08429	23 Y0084472 X3778305	121 m
60	stone artefact	S34.12884 E22.08672	23 Y0084247 X3778330	123 m
61	MSA/LSA img8227-30 snd8230	S34.12871 E22.08767	23 Y0084160 X3778314	122 m

Name	Description img=image snd=sound	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National	Elevation masl
62	stone artefact	S34.12855 E22.08728	23 Y0084195 X3778297	123 m
63	stone artefact	S34.12955 E22.08349	23 Y0084544 X3778411	125 m
64	stone artefact	S34.13152 E22.08281	23 Y0084605 X3778630	123 m
65	stone artefact	S34.13171 E22.08344	23 Y0084547 X3778651	125 m
66	stone artefact	S34.13221 E22.08600	23 Y0084310 X3778704	123 m
67	stone artefact	S34.13265 E22.08620	23 Y0084292 X3778753	123 m
68	stone artefact	S34.13312 E22.08633	23 Y0084278 X3778804	124 m
69	stone artefact	S34.13326 E22.08636	23 Y0084276 X3778820	123 m
70	MSA img8231-4 snd8234	S34.13340 E22.08640	23 Y0084272 X3778835	123 m
71	img8235-7 snd8237	S34.13279 E22.08939	23 Y0083996 X3778765	97 m
72	img8238-9 snd8239	S34.13295 E22.08794	23 Y0084131 X3778784	114 m
73	stone artefact	S34.13345 E22.08644	23 Y0084268 X3778842	120 m
74	stone artefact	S34.13284 E22.08539	23 Y0084365 X3778775	123 m
75	ESA img8240-4 snd8244	S34.13292 E22.08524	23 Y0084379 X3778783	120 m
76	stone artefact	S34.13244 E22.08394	23 Y0084500 X3778732	123 m
77	stone artefact	S34.13212 E22.08278	23 Y0084607 X3778697	125 m
78	stone artefact	S34.13199 E22.08249	23 Y0084634 X3778683	125 m
79	stone artefact	S34.13188 E22.08222	23 Y0084659 X3778670	126 m
80	stone artefact	S34.13176 E22.08179	23 Y0084699 X3778658	126 m
81	stone artefact	S34.13131 E22.08088	23 Y0084783 X3778608	127 m
82	stone artefact	S34.13113 E22.08045	23 Y0084823 X3778589	128 m
83	img8245 snd8245	S34.13099 E22.08009	23 Y0084856 X3778574	128 m
84	stone artefact	S34.13056 E22.07990	23 Y0084874 X3778526	129 m
85	stone artefact	S34.12940 E22.08112	23 Y0084762 X3778397	128 m
86	stone artefact	S34.12914 E22.08178	23 Y0084703 X3778367	127 m
87	stone artefact	S34.12842 E22.08168	23 Y0084712 X3778287	129 m
88	stone artefact	S34.12670 E22.08220	23 Y0084666 X3778096	130 m
89	stone artefact	S34.12613 E22.08277	23 Y0084614 X3778032	131 m
90	stone artefact	S34.12581 E22.08329	23 Y0084567 X3777996	131 m
91	stone artefact	S34.12587 E22.08434	23 Y0084470 X3778002	130 m
92	stone artefact	S34.12580 E22.08482	23 Y0084425 X3777994	129 m
93	stone artefact	S34.12320 E22.08548	23 Y0084367 X3777705	130 m
94	stone artefact	S34.12355 E22.08678	23 Y0084246 X3777743	132 m
95	MSA/LSA img8246-50 snd8250	S34.12371 E22.08667	23 Y0084256 X3777761	132 m
96	stone artefact	S34.12390 E22.08666	23 Y0084258 X3777781	129 m
97	stone artefact	S34.12532 E22.08696	23 Y0084228 X3777939	127 m
98	img8251-3 snd8253	S34.12552 E22.08696	23 Y0084228 X3777961	127 m
99	img8254-5 snd8255	S34.12760 E22.08929	23 Y0084011 X3778190	111 m
100	stone artefact	S34.12519 E22.08592	23 Y0084324 X3777925	132 m
101	stone artefact	S34.12503 E22.08521	23 Y0084390 X3777908	134 m
102	stone artefact	S34.12737 E22.08179	23 Y0084703 X3778171	128 m
103	stone artefact	S34.12791 E22.08179	23 Y0084702 X3778231	128 m
104	stone artefact	S34.12836 E22.08190	23 Y0084692 X3778280	127 m
105	stone artefact	S34.12909 E22.08212	23 Y0084671 X3778361	127 m
106	img8256 snd8256	S34.12994 E22.08093	23 Y0084780 X3778457	128 m
107	stone artefact	S34.13080 E22.08029	23 Y0084838 X3778552	128 m
108	stone artefact	S34.13118 E22.08118	23 Y0084756 X3778594	127 m
109	stone artefact	S34.13147 E22.08190	23 Y0084689 X3778625	126 m
110	stone artefact	S34.13191 E22.08390	23 Y0084504 X3778673	123 m
111	stone artefact	S34.13196 E22.08401	23 Y0084493 X3778678	123 m
112	MSA/LSA img8257-62 snd8262	S34.13207 E22.08430	23 Y0084467 X3778690	123 m
113	stone artefact	S34.13223 E22.08489	23 Y0084412 X3778707	121 m
114	ESA img8263-7 snd8267	S34.13254 E22.08539	23 Y0084366 X3778741	122 m
115	img8268-73 snd8273	S34.12838 E22.08296	23 Y0084594 X3778282	126 m
116	stone artefact	S34.12689 E22.08552	23 Y0084360 X3778114	123 m
117	stone artefact	S34.12772 E22.08558	23 Y0084353 X3778207	122 m
118	ESA img8274-80 snd8280	S34.12854 E22.08608	23 Y0084306 X3778297	121 m
119	stone artefact	S34.12675 E22.08483	23 Y0084423 X3778100	126 m
120	ESA img8281-6 snd8286	S34.12675 E22.08466	23 Y0084439 X3778100	126 m
121	stone artefact	S34.12766 E22.08314	23 Y0084578 X3778202	126 m
122	MSA img8287-92 snd8292	S34.12810 E22.08283	23 Y0084606 X3778251	127 m

Name	Description img=image snd=sound	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National	Elevation masl
123	stone artefact	S34.12846 E22.08256	23 Y0084631 X3778291	127 m
124	stone artefact	S34.12947 E22.08217	23 Y0084666 X3778403	126 m
125	stone artefact	S34.13012 E22.08194	23 Y0084686 X3778476	127 m
126	MSA img8293-5 snd8295	S34.13049 E22.08173	23 Y0084705 X3778517	127 m
127	ESA img8296-8301 snd8301	S34.13060 E22.08164	23 Y0084713 X3778529	126 m
128	stone artefact	S34.13092 E22.08150	23 Y0084727 X3778564	128 m
129	stone artefact	S34.13111 E22.08130	23 Y0084744 X3778585	128 m
130	stone artefact	S34.13092 E22.08121	23 Y0084753 X3778564	129 m
131	stone artefact	S34.13000 E22.08169	23 Y0084710 X3778463	129 m
132	stone artefact	S34.13013 E22.08151	23 Y0084726 X3778477	129 m
133	stone artefact	S34.13069 E22.08113	23 Y0084761 X3778539	130 m
134	stone artefact	S34.13114 E22.08175	23 Y0084703 X3778589	128 m
135	stone artefact	S34.13091 E22.08222	23 Y0084660 X3778563	125 m
136	LSA img8302-8 snd8308	S34.13085 E22.08226	23 Y0084656 X3778556	125 m
137	stone artefact	S34.13077 E22.08229	23 Y0084653 X3778547	124 m
138	MSA img8309-12 snd8312	S34.13063 E22.08241	23 Y0084642 X3778532	122 m
139	stone artefact	S34.13029 E22.08244	23 Y0084640 X3778494	124 m
140	stone artefact	S34.13008 E22.08249	23 Y0084636 X3778470	123 m
141	stone artefact	S34.12968 E22.08261	23 Y0084625 X3778426	122 m
142	stone artefact	S34.12948 E22.08265	23 Y0084621 X3778404	123 m
143	stone artefact	S34.12914 E22.08281	23 Y0084607 X3778366	123 m
144	img8313-5 snd8315	S34.12854 E22.08316	23 Y0084576 X3778299	121 m
145	stone artefact	S34.13082 E22.08262	23 Y0084623 X3778553	123 m
146	stone artefact	S34.13030 E22.08307	23 Y0084582 X3778494	122 m
147	stone artefact	S34.12917 E22.08354	23 Y0084540 X3778369	123 m
148	stone artefact	S34.12805 E22.08272	23 Y0084617 X3778245	126 m
149	stone artefact	S34.12677 E22.08403	23 Y0084497 X3778102	128 m
150	stone artefact	S34.12652 E22.08477	23 Y0084429 X3778074	126 m
151	stone artefact	S34.12637 E22.08567	23 Y0084346 X3778057	126 m
152	stone artefact	S34.12636 E22.08594	23 Y0084322 X3778055	126 m
153	stone artefact	S34.12576 E22.08582	23 Y0084333 X3777989	129 m
154	stone artefact	S34.12529 E22.08561	23 Y0084353 X3777936	131 m
155	stone artefact	S34.12500 E22.08564	23 Y0084350 X3777904	130 m
156	stone artefact	S34.12487 E22.08542	23 Y0084370 X3777890	132 m
157	stone artefact	S34.12517 E22.08536	23 Y0084376 X3777924	131 m
158	stone artefact	S34.12563 E22.08534	23 Y0084378 X3777975	129 m
159	stone artefact	S34.12618 E22.08536	23 Y0084375 X3778036	127 m
160	stone artefact	S34.12635 E22.08434	23 Y0084469 X3778055	128 m
161	stone artefact	S34.12775 E22.08242	23 Y0084645 X3778212	126 m
162	stone artefact	S34.12603 E22.08515	23 Y0084394 X3778019	127 m
257 Mos 33	trig beacon 257 Mos 33	S34.12369 E22.08566	23 Y0084350 X3777759	
A	Erf 3122 boundary point	S34.12258 E22.08597	23 Y0084322 X3777636	
A1	Erf 3122 boundary point	S34.13200 E22.08132	23 Y0084742 X3778684	
B	Erf 3122 boundary point	S34.12303 E22.08744	23 Y0084186 X3777684	
B1	Erf 3122 boundary point	S34.13091 E22.07945	23 Y0084916 X3778565	
C	Erf 3122 boundary point	S34.12406 E22.08694	23 Y0084231 X3777799	
C1	Erf 3122 boundary point	S34.12987 E22.07957	23 Y0084906 X3778450	
D	Erf 3122 boundary point	S34.12509 E22.08726	23 Y0084201 X3777913	
D1	Erf 3122 boundary point	S34.12928 E22.08060	23 Y0084811 X3778383	
E	Erf 3122 boundary point	S34.12606 E22.08719	23 Y0084206 X3778021	
E1	Erf 3122 boundary point	S34.12900 E22.08145	23 Y0084733 X3778351	
F	Erf 3122 boundary point	S34.12628 E22.08768	23 Y0084161 X3778045	
F1	Erf 3122 boundary point	S34.12884 E22.08158	23 Y0084721 X3778333	
G	Erf 3122 boundary point	S34.12765 E22.08975	23 Y0083969 X3778195	
G1	Erf 3122 boundary point	S34.12729 E22.08103	23 Y0084773 X3778162	
H	Erf 3122 boundary point	S34.12784 E22.09015	23 Y0083932 X3778215	
H1	Erf 3122 boundary point	S34.12563 E22.08279	23 Y0084613 X3777976	
J	Erf 3122 boundary point	S34.12811 E22.09260	23 Y0083705 X3778244	
J1	Erf 3122 boundary point	S34.12564 E22.08454	23 Y0084451 X3777976	
K	Erf 3122 boundary point	S34.12829 E22.09219	23 Y0083743 X3778264	
K1	Erf 3122 boundary point	S34.12444 E22.08464	23 Y0084443 X3777843	

Name	Description img=image snd=sound	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National	Elevation masl
L	Erf 3122 boundary point	S34.12824 E22.09179	23 Y0083780 X3778259	
L1	Erf 3122 boundary point	S34.12330 E22.08474	23 Y0084435 X3777716	
M	Erf 3122 boundary point	S34.12860 E22.09173	23 Y0083785 X3778299	
N	Erf 3122 boundary point	S34.12838 E22.08973	23 Y0083970 X3778276	
P	Erf 3122 boundary point	S34.12817 E22.08942	23 Y0083999 X3778253	
Q	Erf 3122 boundary point	S34.12985 E22.08664	23 Y0084253 X3778441	
R	Erf 3122 boundary point	S34.13097 E22.08826	23 Y0084103 X3778564	
S	Erf 3122 boundary point	S34.13113 E22.08580	23 Y0084330 X3778584	
T	Erf 3122 boundary point	S34.13286 E22.08662	23 Y0084252 X3778775	
U	Erf 3122 boundary point	S34.13210 E22.08882	23 Y0084050 X3778689	
V	Erf 3122 boundary point	S34.13260 E22.08906	23 Y0084027 X3778744	
W	Erf 3122 boundary point	S34.13356 E22.08629	23 Y0084282 X3778853	
X	Erf 3122 boundary point	S34.13301 E22.08602	23 Y0084307 X3778792	
Y	Erf 3122 boundary point	S34.13317 E22.08551	23 Y0084354 X3778811	
Z	Erf 3122 boundary point	S34.13325 E22.08525	23 Y0084378 X3778820	