# HERITAGE IMPACT ASSESSMENT

# SPECIALIST ARCHAEOLOGICAL STUDY

# PROPOSED LOW COST HOUSING PROJECT ERF 666 (SITE B), KEIMOES NORTHERN CAPE

Prepared for:

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## Executive summary

ACRM was appointed to conduct a Heritage Impact Assessment (HIA) – specialist archaeological study - for a proposed low cost housing development on Erf 666 (Site B) in Keimoes in the Northern Cape.

About 1200 houses are planned, including associated infrastructure. Two sites (Site 1 & Site 2) have been identified for the construction of low cost housing. Both sites are situated inside the urban edge, adjacent existing formal and shack housing. The combined footprint area is about 146ha, but it is important to note that the layout of the proposed development will not cover the entire site, but will be determined by archaeological and biophysical constraints.

In terms of Section 38 (1) (c) (iii) of the National Heritage Resources Act (NHRA) 1999 (Act 25 of 1999), a HIA of the proposed project is required if the footprint area of the development is more than 5000m².

The HIA forms part of the Basic Assessment process that is being conducted by EnviroAfrica cc.

Much of the top soil has been removed from Site 1, and there are extensive diggings and spoil dumps covering the proposed site. A large rubbish dump occurs on the property and there is a large cemetery situated in the north east. Gravel roads and pedestrian footpaths also intersect the proposed development site. The eastern portion is quite hilly and rocky and according to the biophysical specialist, is not suitable for a housing development.

Site 2 is also quite severely degraded. It is estimated that about 30-40% of the proposed development site is already covered by shacks and the receiving environment has been heavily impacted. Dumping of domestic debris is quite extensive, and there are several drainage channels that intersect the property in the east and west.

A fairly detailed survey of the proposed development site (i. e. Site 1 and Site 2) was undertaken on the 30th and 31st January 2013, in which the following observations were made:

160 archaeological occurrences (numbering more than 250 stone artefacts) were counted and mapped with a hand held GPS device. Most of the implements are spread very thinly and unevenly over the surrounding landscape and are characterised as low density scatters with no spatial coherence.

The majority of the tools are assigned to the Later Stone Age, but a relatively large number of Middle Stone Age lithics are also represented. Only four Early Stone Age tools were encountered. No pottery, bone or ostrich eggshell was found.

Most of the tools comprise flakes and chunks, while many of these pieces are utilized and retouched. Seventeen cores were found, including two flat disc cores, and one large MSA core.

The frequency of formal retouched tools is very low and include, a few end and side scrapers, one boat shaped scraper, two backed pieces and one awl.

More than 90% of the tools are in banded ironstone and was a favoured raw material among hunter gatherer groups for its superior flaking qualities. Banded iron stone dominates many assemblages in the Northern Cape.

Indurated shale is also represented on the site, but in much lower frequencies, while a few tools in quartz, quartzite and opaline were found.

As archaeological sites are concerned, however, the occurrences are lacking in context, as no pottery, ostrich eggshell, bone, or activity areas were identified. Most of the remains occur in a severely disturbed and transformed context.

While the scatters of tools are relatively rich in quantity, they are poor in terms of information that can be constructed from them. As a result the remains have been rated as having low (Grade 3C) archaeological significance.

No colonial heritage resources were noted.

Apart from the formal cemetery in Site 1, no other visible graves were found.

In terms of the built environment, the area has no significance.

It is maintained that the HIA has captured good information on the archaeological heritage and that the study has identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to proposed development activities

The results of the study indicate that a proposed low cost housing development on Erf 666 (Site B) in Keimoes will not impact on any important archaeological heritage.

Indications are that in terms of the archaeological heritage, the proposed activity is viable and no fatal flaws have been identified.

The following recommendations are made:

1. No archaeological mitigation is required.

2. Should any unmarked human burials, or ostrich eggshell water flask caches be uncovered during construction activities, these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or Ms Katie Smuts at the South African Heritage Resources Agency (021 462 4502).

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## 1. INTRODUCTION

ACRM was appointed to conduct a Heritage Impact Assessment (HIA) – specialist archaeological study - for a proposed low cost housing development on Erf 666 (Site B) in Keimoes (Kai Garib Municipality), in the Northern Cape (Figures 1 & 2).

Erf 666 is owned by the Kai Garib local municipality and has an Undetermined, zoning.

About 1200 houses are planned, including associated infrastructure such as internal streets and services.

Two sites (Site 1 & Site 2) have been identified for the construction of low cost housing. Both sites are situated inside the urban edge. The combined footprint area is about 146ha, but it is important to note that the layout of the proposed development will not cover the entire site, but will be determined by archaeological and biophysical constraints.

In terms of Section 38 (1) (c) (iii) of the National Heritage Resources Act 1999 (Act 25 of 1999), a HIA of the proposed project is required if the footprint area of the development is more than 5000m².

The aim of the study is to locate and map any archaeological heritage that may be impacted by the proposed project, to assess the significance of the potential impacts and to propose measures to mitigate the impacts.

The HIA forms part of the Basic Assessment process that is being conducted by EnviroAfrica cc.

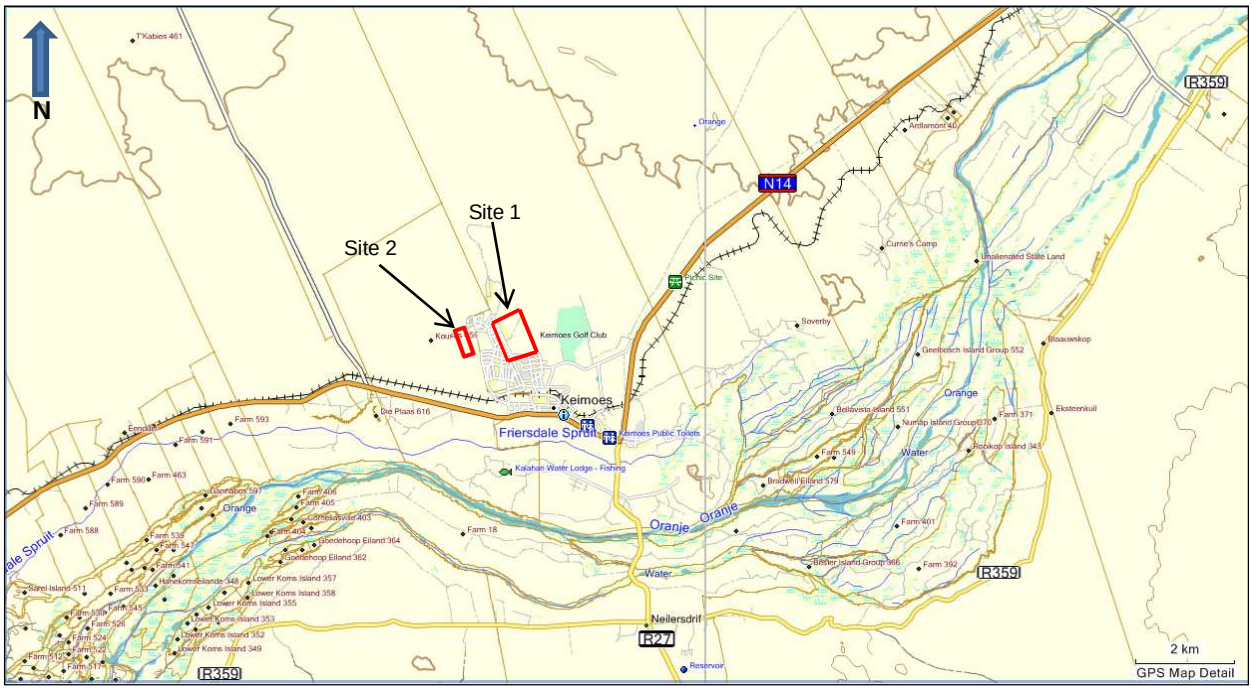


Figure 1. Locality map indicating the location site for the proposed housing development on Erf 666 (Site B), in Keimoes, in the Northern Cape. The proposed development is on two sites.

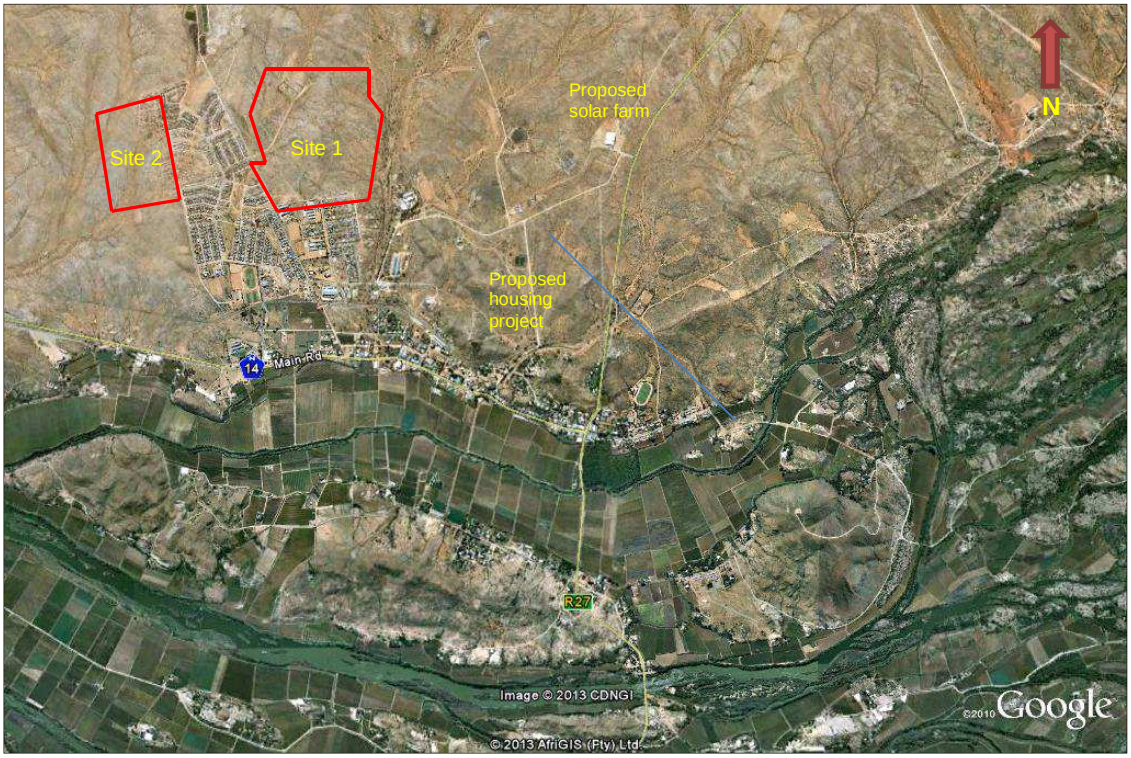


Figure 2. Google aerial map illustrating the location sites (red polygons) of the proposed development on Erf 666 (Site B).

## 2. HERITAGE LEGISLATION

The National Heritage Resources Act (Act No. 25 of 1999) makes provision for a compulsory Heritage Impact Assessment (or HIA) when an area exceeding 5000m² is being developed. This is to determine if the area contains heritage sites and to take the necessary steps to ensure that they are not damaged or destroyed during development.

The NHRA provides protection for the following categories of heritage resources:

- Landscapes, cultural or natural (Section 3 (3))
- Buildings or structures older than 60 years (Section 34);
- Archaeological sites, palaeontological material and meteorites (Section 35);
- Burial grounds and graves (Section 36);
- Public monuments and memorials (Section 37);
- Living heritage (defined in the Act as including cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems and the holistic approach to nature, society and social relationships) (Section 2 (d) (xxi)).

## 3. TERMS OF REFERENCE

The terms of reference for the study were to:

- Determine whether there are likely to be any important archaeological heritage that may be impacted by the proposed housing development;
- Indicate any constraints that would need to be taken into account in considering the development proposal;
- Identify potentially sensitive archaeological areas, and
- Recommend any further mitigation action.

## 4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

Keimoes is located about 40 kms west of Upington on the N14. Erf 666 (Site B) is located north of the main road/N14. Two sites (Site 1 & Site 2) have been identified for construction of low cost housing (Figure 3).

Figure 3. Google Earth aerial photograph illustrating Site 1 & Site 2 and surrounding land use.

### 4.1 Site 1

Site 1 is located east of Protea Avenue and north of Blesbok Avenue. The proposed development site is fairly flat and slopes gently to the south. The western portion has been heavily scraped and most of the site is severely degraded (Figures 4-8). There are large diggings, pits and spoil dumps alongside Blesbok Avenue. There are a number of gravel roads and informal footpaths that intersect the property and pedestrian traffic is extensive. There is a large (illegal) dump site alongside Protea Avenue and a large formal cemetery in the north east which is currently being expanded. Several drainage channels intersect the site in the northwest. Where Site 1 slopes south east toward the river and the eastern boundary, the lands are hilly and very rocky, and not suitable for a housing development (refer to Figure 9). According to the biophysical report, the eastern portion of Site 1 is also botanically sensitive (Peet Botes pers. comm.). Surrounding land use is cemetery, residential, schools, church, light industry, oxidation ponds, and vacant land.

Figure 4. Site 1, view facing north from Blesbok Avenue.

Figure 5. Site 1, view facing north

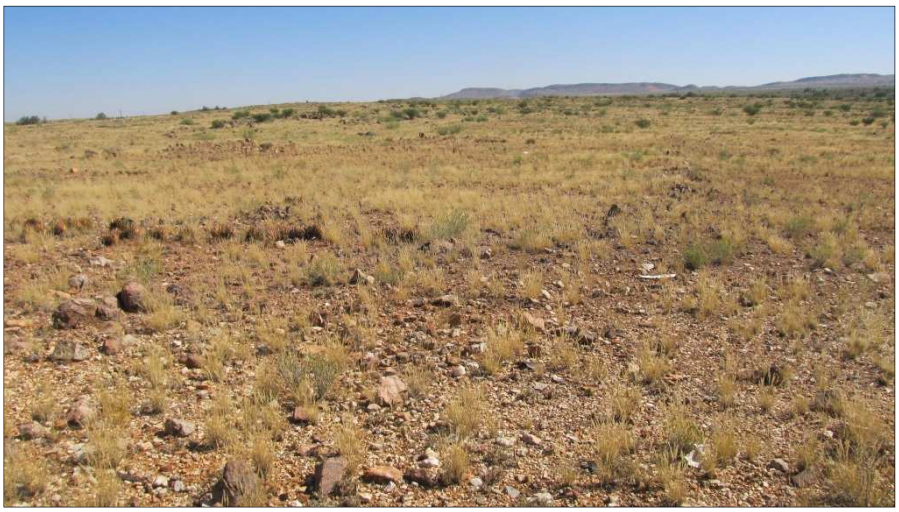

Figure 6. Site 1, view facing north east. Note the rocky hills in the background.

Figure 7. Site 1, view facing south toward Keimoes.

Figure 8. Site 1, view facing north. The cemetery is by the line of trees.

Figure 9. Site 1, view facing south west toward Keimoes

### 4.2 Site 2

Site 2 is located alongside rows of informal housing off, Alwyn Street, and to the west of Site 1. It is estimated that about 30-40% of the footprint area is already covered by shacks (Figures 10-14). Most of the top soil in the northern portion of the site has been removed and there is very little natural vegetation covering this area. The area west of the drainage channels that cut through the site is covered in dry grass and shrubs, and there are sporadic Acacia trees occurring in places. The western portion of the proposed site is not suitable for housing as it is situated between several drainage channels and is located on an uneven, rocky platform. A wide strip of land east of another drainage channel is surrounded by shack housing, small scale farming, and open space. Much of this portion of the proposed site is severely degraded, while the strip alongside the channel is covered in thick dry grass and underlain by red sands. Surrounding land use is formal and informal housing, and vast tracts of vacant land to the north and west.

Figure 10. Site 2, view facing south. Note the heavily scraped areas.

Figure 11. Site 2, view facing south. This portion of the site (in the west) is covered in dry grass, thorn bush and underlain by red sands

Figure 12. Site 2, view facing south

Figure 13. Site 2, view facing south. Degraded land east of the drainage channel.

Figure 14. Site 2, view facing south. Degraded land east of the drainage channel.

## 5. STUDY APPROACH

### 5.1 Method of survey

A foot survey of the proposed development site was undertaken by J. Kaplan on the 30th and 31st January, 2013. A track path of the survey is illustrated in Figures 31-33 (refer to Appendix II). All archaeological remains were mapped and documented in-situ using a Garmin Oregon 300, hand held GPS device set on the map datum WGS 84. A desk top study was also done.

### 5.2 Constraints and limitations

There were no constraints or limitations associated with the study. Archaeological visibility was very good over both Sites 1 and 2.

### 5.3 Identification of potential risks

Based on the results of the study, there are no archaeological risks associated with the proposed housing development. The fairly detailed foot survey has captured most of the archaeological heritage that is present over the proposed development site.

### 5.4 Results of the desk top study

Up until about a year ago, very little archaeological work had been done in Keimoes. The first known study undertaken, as part of the EIA process, was for a bulk water supply pipeline between Keimoes and Kenhardt (Kaplan 2008) where both MSA and LSA implements were documented in the road reserve. An AIA for a planned 10MW solar energy facility, situated about 1.5kms north east of Erf 666 (Site B) encountered more than 100 Middle and Later Stone Age (MSA & LSA) implements in banded ironstone (Kaplan 2012). A few ESA tools were also recorded during the study. Only seven MSA and LSA implements were documented during a study for a parallel, low cost housing development on Erf 666 (Site A), about 1 km east of Site 1 (Kaplan 2013). It is not surprising that Stone Age remains are encountered in Keimoes, even inside the urban

edge of the town, considering that “thousands of square kilometres of Bushmanland are covered by a low density lithic scatter” (Beaumont et al 1995:240).

## 6. FINDINGS

### 6.1 Site 1

Ninety-one archaeological occurrences numbering about 154 stone tools were mapped and counted on Site 1 (refer to Table 2 in Appendix I). The majority of the tools belong to the LSA, but a well-represented number of MSA flakes and a few blades were also found, including a double-sided retouched pointed flake (697). No MSA formal tools such as unifacial or bifacial points were found, however. Five ESA flakes were found, including two bifaces (634 & 702). This pattern of distribution and frequency of type, mirrors that which was encountered during the study for a proposed solar energy facility, located about 2 kms north east of the affected property (Kaplan 2012 & refer to Figure 2).

The majority of the LSA remains comprise flakes and chunks, many of them utilized and/or retouched. Several bladelets were also found. No pottery, bone or ostrich eggshell was found. No evidence of any factory or workshop site, or the result of any human settlement was identified.

Thirteen cores were counted, indicating a relatively high incidence of flaking on the property These comprised mostly round cores (in banded ironstone), but one disc core (619), one irregular opaline core (630), and one large round MSA core (642) in indurated shale was also counted.

Most of the tools are spread very thinly and unevenly over the surrounding area, and occur in a severely disturbed and degraded context.

The frequency of formal retouched LSA tools is very low, but one possible boat-shaped scraper (641), one end scraper (653), and one possible side scraper (694) was found. One snapped backed flake (641) and one hammerstone (682) was also found.

In terms of raw material frequencies, more than 95% of the tools are in banded ironstone, while the remainder is in indurated shale, quartz and opaline. Banded ironstone is known to have been a favoured raw material among hunter-gatherer groups for making stone artefacts, and occurs on a number of sites that have been documented by the archaeologist. It occurs widely in the region and was clearly a desirable raw material for its superior flaking qualities.

The ruins of, a house/foundations were encountered on a rocky hillock in the north eastern portion of Site 1. An engraved piece of asbestos (dated 21-08-85), two concrete filled metal drums, some domestic debris (glass, rusted metal, asbestos), and rubble were also found (Figures 22 & 23). No other structures were found in the surrounding area. The ruin does not have any heritage value.

A collection of tools encountered during the study are illustrated in Figures 15-26.

Figure 15. Site 1. Collection of tools. Scale is in cm

Figure 16. Site 1. Collection of tools. Scale is in cm

Figure 17. Site 1. Collection of tools. Scale is in cm

Figure 18. Site 1. Collection of tools. Scale is in cm


Figure 19. Site 1. Collection of tools. Scale is in cm

Figure 20. Site 1. Collection of tools 1. Scale is in cm


Figure 21, Collection of tools. Site 1, Scale is in cm

Figure 22. Site 1. 675. Old foundations & debris


Figure 23. Site 1. Asbestos sheet with date


Figure 24. Site 1. Collection of tools. Scale is in cm


Figure 25. Site 1. ESA tools. Scale is in cm

Figure 26. Site 1. Collection of tools. Scale is in cm

### 6.2 Site 2

Sixty-nine archaeological occurrences, numbering at least 102 stone artefacts were documented in Site 2 (refer to Table 2 in Appendix I). Like Site 1, the majority of the finds are assigned to the LSA, followed by artefacts characterised as MSA. No ESA tools were found. No organic remains such as pottery, bone or ostrich eggshell was found either.

Most of the tools are spread very thinly over the surrounding landscape, but very few tools were located east of the main drainage channel (refer to Figure 31), where the receiving environment is underlain by red sands, and is also heavily degraded (refer to Figures 13 & 14). A number of implements were encountered west of the drainage channel but these occur within the 30 m buffer zone. It can be said therefore, that most of the implements were documented in the western portion of the proposed development site, but that no evidence of any factory or workshop site, or the result of any human settlement was identified. One small scatter (725) numbering about nine implements, including a double-sided retouched flake, several modified flakes and chunks, and a minimal core was recorded on rocky gravels alongside the drainage channel in the south west. A small pile of tools (762), that included chunks and retouched/utilized pieces, possibly collected by kids playing in the area, was also encountered on the rocky gravelly ridge in the elevated western portion of the site.

Overall, however the majority of the remains (mainly single, isolated occurrences) comprise modified flakes, chunks, and a few blade-like tools. One step-retouched flake (748) and one backed piece (753) was also found. Only four cores were counted, including one disc core (776).

The frequency of formal retouched tools is very low, and comprised one LSA end scraper (715) made on an older MSA flake, one side scraper (717), one backed blade (718), one beautifully made MSA retouched point, and one awl (759).

In terms of raw material frequencies, more than 95% of the tools are made on banded ironstone, while the remainder is in indurated shale, quartzite (757), opaline and quartz.

A collection of tools documented during the study is illustrated in Figures 27-30.

### 6.3 Significance of the archaeological remains

As archaeological sites are concerned, the occurrences are lacking in context. While the random scatters of tools are relatively rich in quantity, they are poor in terms of information that can be constructed from them. No organic remains such as bone, pottery or ostrich eggshell was found. As a result the remains have been rated as having low (Grade 3C) archaeological significance.

The tools described and documented above are identical to those which were encountered on the proposed solar energy site, which are also dominated by LSA elements (Kaplan 2012 & refer to Figure 2).

Figure 27. Site 2. Collection of tools. Scale is in cm

Figure 28. Site 2. Collection of tools. Scale is in cm

Figure 29. Site 2. Collection of tools. Scale is in cm

Figure 30. Site Collection of tools. Scale is in cm

## 7. ASSESSMENT OF IMPACTS

The overall impact of the proposed development on the archaeological heritage is rated as being Low (Table 1).

| **Potential impacts on archaeological heritage** | |
|---|---|
| Extent of impact: | Site specific |
| Duration of impact; | Permanent |
| Intensity | Low |
| Probability of occurrence: | Improbable |
| Significance without mitigation | Low |
| Significance with mitigation | Low |
| Confidence: | High |

Table 1. Assessment of archaeological impacts, Site 1 and Site 2 Erf 666 (Site B).

## 8. CONCLUSION

The HIA has captured good information on the archaeological heritage present. The study has, however, identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to proposed development activities.

The majority of the tools comprise single, isolated occurrences that occur in a disturbed or degraded context. Very few formal tools were found.

While a relatively large number of stone implements were encountered, the receiving environment is not considered to be a sensitive archaeological landscape.

Indications are that in terms of the archaeological heritage, the proposed activity is viable.

## 9. RECOMMENDATIONS

With regard to the proposed construction of low cost housing units on Erf 666 (Site B) in Keimoes, the following recommendations are made:

1. No archaeological mitigation is required.

2. Should any unmarked human burials or ostrich eggshell water flask caches be uncovered, or exposed during construction activities, these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or Katie Smuts at SAHRA (021 462 4502). Burials must not be removed or disturbed until inspected by the archaeologist.

## 10. REFERENCES

Beaumont, P.B. & Vogel, J.C. 1984. Spatial patterning of the ceramic Later Stone Age in the northern Cape Province, South Africa. In: Hall, M., Avery, G., Avery, D.M., Wilson, M.L. & Humphreys, A.J.B. (eds) Frontiers: southern African archaeology today: 80-95. Oxford: British Archaeological Reports International Series 207.

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Kaplan, J. 2012. Archaeological Impact Assessment the proposed Keren Energy Keimoes Solar Plant on Erf 666, Keimoes. Report prepared for EnviroAfrica. ACRM Cape Town.

Kaplan, J. 2008. Phase 1 Archaeological Impact Assessment proposed construction of a water treatment plant and supply pipeline from Keimoes to Kenhardt, Western Cape Province. Report prepared for EnviroAfrica. Agency for Cultural Resource Management.

# Appendix I

## Spreadsheet of waypoints and description of archaeological finds

| Site | Farm Name | Lat/Long | Description of archaeological finds |
|---|---|---|---|
| | Erf 666 Keimoes | | |
| **Site 1** | | | |
| 616 | | S28 41.604 E20 57.475 | Weathered, indurated shale retouched MSA flake. Large banded ironstone flake & MRP, chunk & **core** near dump alongside pit – Blesbok Avenue |
| 617 | | S28 41.737 E20 57.551 | Large, chunky banded ironstone flake, slightly weathered nicked and retouched - alongside pit – Blesbok Ave |
| 618 | | S28 41.661 E20 57.508 | Large, round banded ironstone core & indurated shale cobble/cortex flake near diggings and rubbish |
| 619 | | S28 41.640 E20 57.496 | Weathered indurated shale partial **disc core** |
| 620 | | S28 41.623 E20 57.486 | Small, flat utilised banded ironstone flake, and chunky cobble/cortex retouched banded ironstone flake |
| 621 | | S28 41.548 E20 57.473 | Step retouched banded ironstone flake, chunky retouched blade/flake, weathered MSA indurated shale flake |
| 622 | | S28 41.556 E20 57.491 | Weathered MSA indurated shale partially retouched flake on quartz gravels. |
| 623 | | S28 41.653 E20 57.530 | Cortex cobble banded iron stone **core** on quartz gravels, inc. chunk and utilized/retouched flake, retouched/utilized snapped MSA flake |
| 624 | | S28 41.659 E20 57.544 | Thin, flat, utilized MSA flake. and chunk on quartz gravels. |
| 625 | | S28 41.734 E20 57.586 | Chunk/broken banded ironstone **core** |
| 626 | | S28 41.691 E20 57.598 | X 2 small retouched banded ironstone chunks, thin indurated shale utilized flake, large chunk, weathered retouched broken indurated shale cortex chunk |
| 627 | | S28 41.670 E20 57.587 | Weathered indurated shale chunk, slightly weathered/burnished utilized/retouched ironstone chunk, small indurated shale flake, small retouched and utilized banded ironstone flake – quartz gravels |
| 628 | | S28 41.640 E20 57.571 | X 2 utilized and retouched banded ironstone flakes, and small ironstone chunk – quartz gravels |
| 629 | | S28 41.627 E20 57.566 | X 2 small iron stone flakes, and utilized/misc. retouched ironstone flake – quartz gravels |
| 630 | | S28 41.604 E20 57.556 | Red opaline chunk/**core** |
| 631 | | S28 41.569 E20 57.525 | Small indurated shale chunk |
| 632 | | S28 41.564 E20 57.522 | Broken indurated shale cobble/cortex chunk |
| 633 | | S28 41.549 E20 57.511 | Indurated shale chunk and small ironstone chunk |
| 634 | | S28 41.542 E20 57.509 | **ESA** biface |
| 635 | | S28 41.534 E20 57.508 | Small indurated shale utilized/retouched flake, small side struck utilized bladelet, x 2 ironstone chunks, larger utilized/retouched ironstone flake |
| 636 | | S28 41.513 E20 57.494 | Ironstone chunk |
| 637 | | S28 41.517 E20 57.516 | Retouched ironstone chunk |
| 638 | | S28 41.534 E20 57.523 | Ironstone chunk |
| 639 | | S28 41.568 E20 57.532 | **ESA** flake |
| 640 | | S28 41.593 E20 57.544 | Indurated shale cobble/chunk, ironstone utilized/retouched flake |
| 641 | | S28 41.754 E20 57.595 | Small retouched flake (**?boat shaped scraper**), snapped **backed blade** |
| 642 | | S28 41.763 E20 57.595 | Large round weathered indurated shale MSA **core** |

| | | | |
|---|---|---|---|
| | | | and quartz chunk |
| 643 | | S28 41.700 E20 57.608 | Small, flat, double sided **retouched** chunky **pointed** flake, x 2 ironstone flakes, 1 small chunk – outcropping of rock alongside Blesbok Av. |
| 644 | | S28 41.699 E20 57.620 | 4 flakes and chunk |
| 645 | | S28 41.682 E20 57.618 | Weathered split, slightly retouched indurated shale cobble, ironstone chunk, **quartz chunky MSA** flake |
| 646 | | S28 41.661 E20 57.616 | Ironstone chunk |
| 647 | | S28 41.653 E20 57.613 | Broken/snapped ironstone utilized cortex flake |
| 648 | | S28 41.645 E20 57.608 | Ironstone chunk |
| 649 | | S28 41.589 E20 57.583 | Utilized/retouched ironstone flake |
| 650 | | S28 41.562 E20 57.563 | Large **ESA** flake |
| 651 | | S28 41.650 E20 57.618 | Ironstone chunk |
| 652 | | S28 41.642 E20 57.643 | MSA utilized/misc. retouched ironstone flake |
| 653 | | S28 41.621 E20 57.639 | **End retouched ?scraper**, chunky flake, retouched flake, chunk/minimal **core** – all banded ironstone |
| 654 | | S28 41.611 E20 57.623 | Retouched/utilized chunky ironstone flake |
| 655 | | S28 41.498 E20 57.544 | Misc. retouched chunky ironstone flake |
| 656 | | S28 41.561 E20 57.617 | Large flat indurated shale MSA cortex flake, utilized/retouched ironstone flake, chunk |
| 657 | | S28 41.544 E20 57.618 | X 2 ironstone chunks |
| 658 | | S28 41.532 E20 57.602 | Chunky ironstone flake |
| 659 | | S28 41.521 E20 57.591 | Ironstone chunk |
| 660 | | S28 41.487 E20 57.550 | Ironstone flake |
| 661 | | S28 41.483 E20 57.585 | Banded ironstone chunk/minimal **core** |
| 662 | | S28 41.505 E20 57.610 | Large, round indurated shale cobble chunk/**core** |
| 663 | | S28 41.504 E20 57.610 | Misc. retouched ironstone chunk |
| 664 | | S28 41.491 E20 57.602 | Ironstone flake |
| 665 | | S28 41.472 E20 57.611 | Small ironstone irregular **core** |
| 666 | | S28 41.593 E20 57.665 | Utilized/retouched chunk |
| 667 | | S28 41.631 E20 57.656 | Flake |
| 668 | | S28 41.648 E20 57.660 | X 3 chunks, 1 flake – banded ironstone |
| 669 | | S28 41.696 E20 57.714 | Sharp edged pointed indurated shale flake |
| 670 | | S28 41.606 E20 57.674 | Chunk |
| 671 | | S28 41.559 E20 57.657 | Ironstone chunk and **core** |
| 672 | | S28 41.476 E20 57.663 | Edge retouched indurated shale weathered cortex chunk |
| 673 | | S28 41.420 E20 57.668 | Chunk |
| 674 | | S28 41.503 E20 57.765 | Ironstone **core** |
| **675** | | S28 41.493 E20 57.784 | Ruins/foundations and debris from home |
| 676 | | S28 41.461 E20 57.742 | Ironstone chunk |
| 677 | | S28 41.404 E20 57.664 | Ironstone chunk |
| 678 | | S28 41.449 E20 57.661 | Ironstone chunk |
| 679 | | S28 41.457 E20 57.665 | Thin, utilized banded ironstone flake |
| 680 | | S28 41.457 E20 57.648 | Large banded ironstone broken, chunky flake |
| 681 | | S28 41.433 E20 57.627 | Large chunk |
| 682 | | S28 41.389 E20 57.601 | ?hammerstone |
| 683 | | S28 41.356 E20 57.652 | Ironstone chunk |
| 684 | | S28 41.353 E20 57.675 | Ironstone chunk and flake |
| 685 | | S28 41.319 E20 57.669 | Broken MSA utilized ironstone flake |
| 686 | | S28 41.284 E20 57.680 | X 2 ironstone chunk with min. retouch |
| 687 | | S28 41.244 E20 57.646 | Double sided retouched ironstone bladelet/flake |
| 688 | | S28 41.196 E20 57.563 | Banded iron stone **core** |
| 689 | | S28 41.200 E20 57.479 | Ironstone chunk |

| | | | |
|---|---|---|---|
| 690 | | S28 41.232 E20 57.459 | Large chunk, and flake – banded ironstone |
| 691 | | S28 41.215 E20 57.433 | X 2 retouched flakes, weathered indurated shale chunk |
| 692 | | S28 41.230 E20 57.433 | Ironstone chunk and retouched chunk |
| 693 | | S28 41.260 E20 57.429 | **ESA** flake indurated shale, x 2 ironstone chunks |
| 694 | | S28 41.241 E20 57.410 | Retouched chunk/**?side scraper on cobble flake**, chunk – all in banded ironstone |
| 695 | | S28 41.252 E20 57.395 | Retouched cortex chunk |
| 696 | | S28 41.305 E20 57.420 | Utilized/retouched ironstone flake |
| 697 | | S28 41.293 E20 57.395 | **Double sided retouched** ironstone flake |
| 698 | | S28 41.280 E20 57.382 | Retouched ironstone flake |
| 699 | | S28 41.297 E20 57.360 | Chunk |
| 700 | | S28 41.307 E20 57.375 | Chunk |
| 701 | | S28 41.314 E20 57.382 | Ironstone flake |
| 702 | | S28 41.350 E20 57.433 | **ESA biface** |
| 703 | | S28 41.368 E20 57.352 | Round **core** |
| 704 | | S28 41.346 E20 57.331 | Retouched MSA ironstone flake |
| 705 | | S28 41.308 E20 57.314 | X 3 chunk, 1 flake – banded ironstone |
| 706 | | S28 41.308 E20 57.314 | Chunk and flake – banded ironstone |
| **Site 2** | | | |
| 707 | | S28 41.385 E20 56.825 | Banded ironstone **core** |
| 708 | | S28 41.400 E20 56.817 | Ironstone chunk |
| 709 | | S28 41.450 E20 56.809 | Snapped ironstone retouched/utilized blade |
| 710 | | S28 41.464 E20 56.807 | Snapped/broken retouched ironstone flake |
| 711 | | S28 41.554 E20 56.822 | Chunky, retouched ironstone flake |
| 712 | | S28 41.591 E20 56.891 | Chunk |
| 713 | | S28 41.591 E20 56.899 | Weathered, retouched ironstone flake |
| 714 | | S28 41.590 E20 56.903 | **End retouched w**eathered ironstone MSA flake |
| 715 | | S28 41.595 E20 56.903 | Chunk and flake – banded ironstone |
| 716 | | S28 41.571 E20 56.806 | Utilized and retouched banded ironstone flake |
| 717 | | S28 41.599 E20 56.795 | Retouched flake/**?side scraper** on chunky rounded flake |
| 718 | | S28 41.687 E20 56.772 | Retouched/**backed** ironstone bladey flake |
| 719 | | S28 41.722 E20 56.759 | Ironstone chunk |
| 720 | | S28 41.731 E20 56.753 | Snapped, retouched ?MSA chunky ironstone flake |
| 721 | | S28 41.738 E20 56.753 | Chunk |
| 722 | | S28 41.762 E20 56.744 | Ironstone cortex cobble **core** |
| 723 | | S28 41.770 E20 56.740 | Chunk – cortex cobble |
| 724 | | S28 41.796 E20 56.722 | Small chunk |
| 725 | | S28 41.818 E20 56.692 | **Low density scatter** – including double sided retouched flake, indurated shale cortex chunk, large indurated shale chunk, x 2 ironstone flakes, chunk/minimal **core**, chunk, larger indurated shale chunk, retouched/utilized ironstone flake on rocky gravels above drainage channel. |
| 726 | | S28 41.808 E20 56.694 | Ironstone flake |
| 727 | | S28 41.801 E20 56.696 | X 2 chunks, x 2 flakes – banded ironstone |
| 728 | | S28 41.796 E20 56.697 | Large chunk/core, and chunk – banded ironstone |
| 729 | | S28 41.790 E20 56.700 | X 2 chunks, and flake – banded ironstone |
| 730 | | S28 41.771 E20 56.710 | Chunk |
| 731 | | S28 41.747 E20 56.719 | Retouched flake – ironstone |
| 732 | | S28 41.715 E20 56.733 | MSA flake – banded ironstone |
| 733 | | S28 41.708 E20 56.735 | Broken retouched flake – ironstone |
| 734 | | S28 41.703 E20 56.736 | Flake – ironstone |

| | | | |
|---|---|---|---|
| 735 | | S28 41.697 E20 56.739 | Banded ironstone utilized flake |
| 736 | | S28 41.661 E20 56.746 | Banded ironstone partially utilized/nicked flake |
| 737 | | S28 41.646 E20 56.748 | Banded ironstone flake |
| 738 | | S28 41.643 E20 56.750 | Retouched ironstone chunk |
| 739 | | S28 41.635 E20 56.752 | Snapped, retouched MSA ironstone flake, & flake |
| 740 | | S28 41.598 E20 56.758 | Chunk/**core**, & retouched ironstone flake |
| 741 | | S28 41.593 E20 56.760 | Retouched cobble/cortex chunk – ironstone |
| 742 | | S28 41.587 E20 56.762 | Large indurated shale chunk and utilized/retouched ironstone flake |
| 743 | | S28 41.581 E20 56.764 | Retouched ironstone flake |
| 744 | | S28 41.524 E20 56.781 | Utilized flake/chunk - ironstone |
| 745 | | S28 41.493 E20 56.787 | Ironstone flake |
| 746 | | S28 41.477 E20 56.789 | Ironstone utilized flake |
| 747 | | S28 41.443 E20 56.780 | Chunk |
| 748 | | S28 41.544 E20 56.740 | Chunk, and **step flaked** flake – banded ironstone |
| 749 | | S28 41.572 E20 56.734 | Lovely MSA retouched ironstone flake |
| 750 | | S28 41.574 E20 56.733 | Flake and chunk |
| 751 | | S28 41.579 E20 56.730 | Chunk |
| 752 | | S28 41.607 E20 56.723 | Chunk and indurated shale retouched cobble flake |
| 753 | | S28 41.632 E20 56.719 | Ironstone chunk with **backed retouch** |
| 754 | | S28 41.644 E20 56.719 | Weathered, retouched/nicked indurated shale flake |
| 755 | | S28 41.648 E20 56.719 | Retouched/utilized ironstone flake |
| 756 | | S28 41.685 E20 56.702 | Chunk |
| 757 | | S28 41.692 E20 56.699 | Chunky **quartzite** MSA blade |
| 759 | | S28 41.700 E20 56.698 | Weathered indurated shale retouched/nicked flake, banded ironstone retouched/utilized flake (**?awl**) |
| 760 | | S28 41.723 E20 56.696 | Flake |
| 761 | | S28 41.729 E20 56.698 | Partially retouched ironstone flake |
| **762** | | S28 41.730 E20 56.699 | Small pile of stacked tools, including chunks, flaked chunk, retouched/utilized flake, indurated shale flake, quartz chunk – possibly collected by kids. |
| 763 | | S28 41.745 E20 56.700 | Chunk |
| 764 | | S28 41.750 E20 56.701 | Flake |
| 765 | | S28 41.768 E20 56.706 | Flake |
| 766 | | S28 41.756 E20 56.709 | Retouched chunky ironstone flake |
| 767 | | S28 41.713 E20 56.705 | Flake |
| 768 | | S28 41.677 E20 56.701 | Core reduced flake and flat flake – banded ironstone |
| 770 | | S28 41.657 E20 56.702 | MSA banded ironstone flake |
| 771 | | S28 41.634 E20 56.702 | Chunk and flake |
| 772 | | S28 41.605 E20 56.705 | Red opaline chunk |
| 773 | | S28 41.576 E20 56.712 | Chunk |
| 774 | | S28 41.569 E20 56.714 | Chunky MSA retouched ironstone flake |
| 775 | | S28 41.469 E20 56.777 | Small ironstone flake and chunk |
| 776 | | S28 41.447 E20 56.787 | Flat indurated shale **disc/prepared core** |
| 777 | | S28 41.430 E20 56.793 | Ironstone flake |
| 778 | | S28 41.371 E20 56.822 | Banded ironstone flake |

Table 1. Spreadsheet of waypoints and description of archaeological finds

# Appendix II

## Track paths and waypoints of archaeological finds

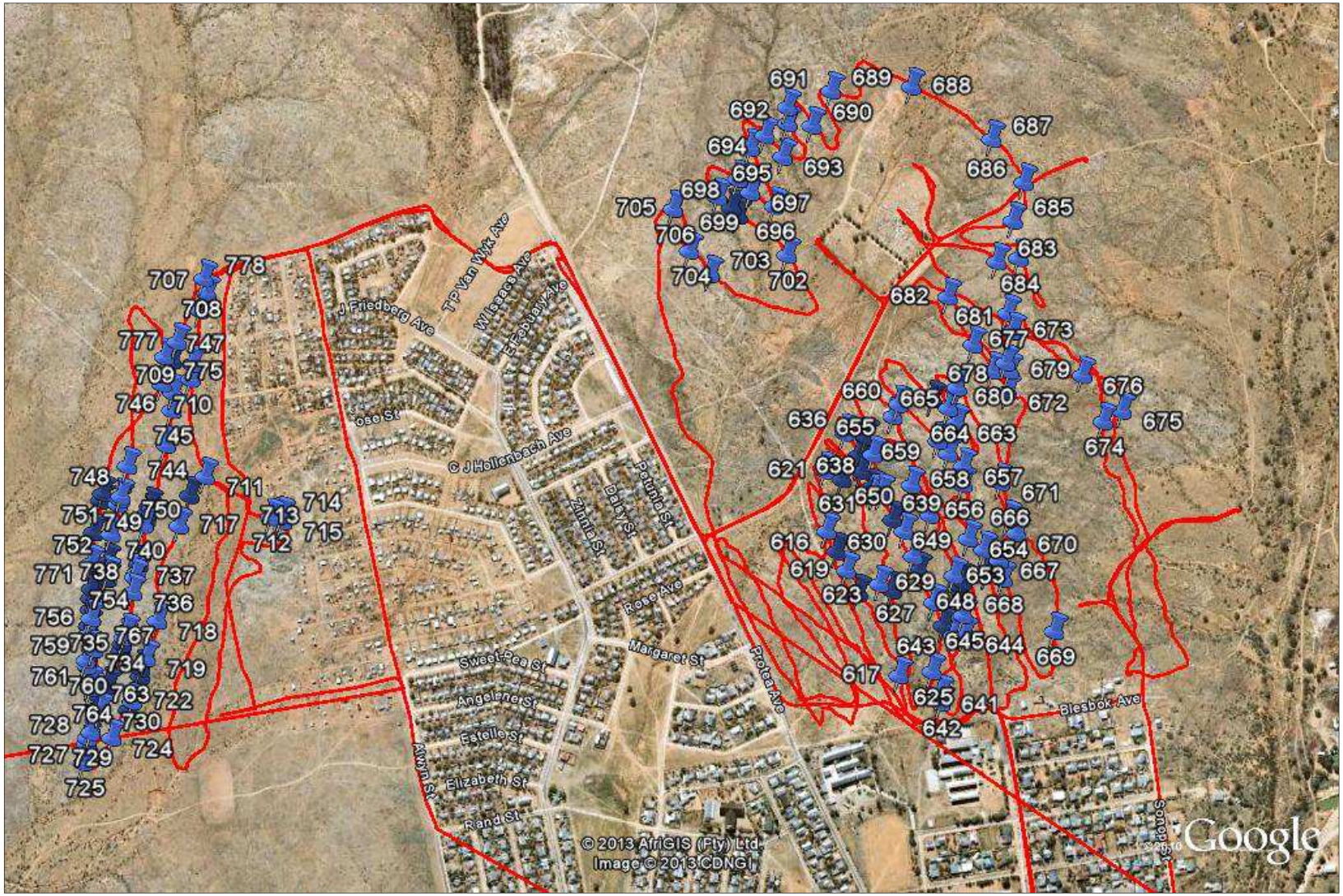


Figure 31. Track paths and waypoints of archaeological finds (Site 1 & Site 2).

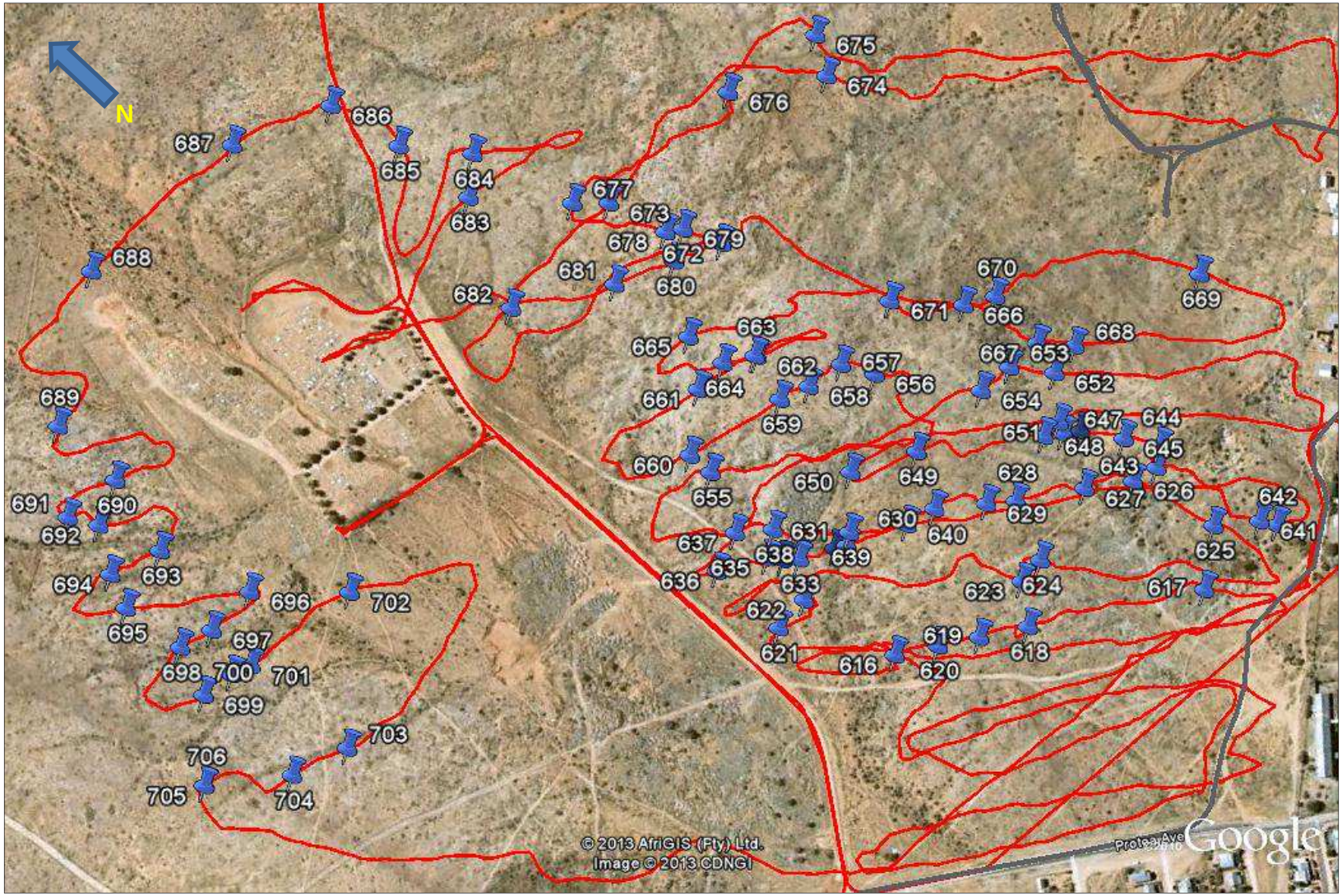


Figure 32.Track path and waypoints of archaeological finds (Site 1).

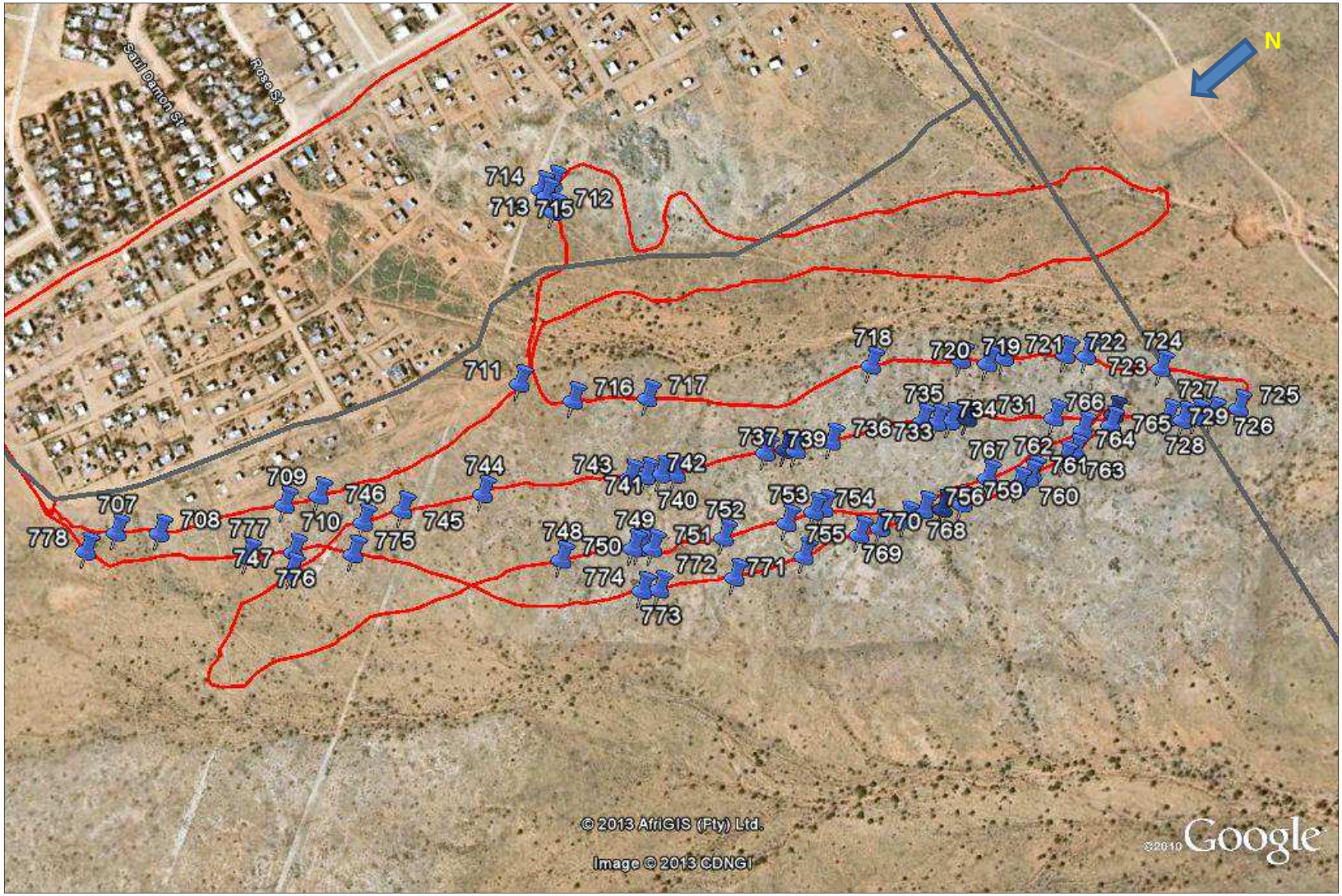


Figure 33. Track path and waypoints of archaeological finds (Site 2).