

**ARCHAEOLOGICAL IMPACT ASSESSMENT: PROPOSED  
CONSTRUCTION OF HUMANSRUS SOLAR 4 ON A PORTION OF FARM  
HUMANSRUS 147 NEAR COPPERTON, NORTHERN CAPE**

(Assessment conducted under Section 38 (8) of the  
National Heritage Resources Act No 25 of 1999)

Prepared for:

Cape EAPrac  
Environmental Assessment Practitioners

On behalf of:  
Humansrus Solar 4 (Pty) Ltd

April 2016



Prepared by:

Lita Webley  
**ACO Associates cc**  
8 Jacobs Ladder  
St James

Email: [lita.webley@aco-associates.com](mailto:lita.webley@aco-associates.com)  
Tel: 0217064104  
Fax: 0866037195

## EXECUTIVE SUMMARY

ACO Associates cc was appointed by Perception Planning on behalf of Cape EAPrac Environmental Practitioners for Humansrus Solar 4 (Pty) Ltd to undertake an archaeological impact assessment for the construction of Humansrus Solar 4 (75 MW PV) facility on a portion of Farm Humansrus 147, near Copperton in the Siyathemba Municipality, Northern Cape.

Numerous renewable energy facilities are planned in the Copperton area around the substations of Cuprum and Kronos (Orton & Webley 2013a & b; Van der Walt 2013; Kaplan & Wiltshire 2011).

The study area for Humansrus Solar 3 and Humansrus Solar 4 was surveyed by Lita Webley and David Halkett on 22 and 23 October 2014. The property was accessed by the local farm roads and transects were walked across the study area.

The field assessment identified:

- A diffuse spread of ESA and MSA stone artefacts across the study area for Humansrus Solar 4;
- There are no buildings or graveyards on the property;

Indications are that in terms of archaeological heritage the proposed activity is viable; impacts are expected to be limited and controllable.

Construction of the proposed solar facility may proceed. Either layout (Alternative 1 and Alternative 2) is acceptable.

The following recommendations should be enforced:

- If during ground clearance or construction, any dense accumulations of stone tools, particularly if they are associated with ostrich eggshell fragments, are uncovered then the ECO should report this to SAHRA (Tel: 021 462 4502);
- The appropriate recommendations will need to be implemented during the EMPr should unmarked graves be encountered during construction. If any human remains are uncovered during construction, the ECO should have the area fenced off and contact SAHRA (Tel: 021 462 4502) immediately.

## GLOSSARY

**Archaeology:** Remains resulting from human activity which is in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

**Early Stone Age:** The archaeology of the Stone Age between 700 000 and 2500 000 years ago.

**Fossil:** Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

**Heritage:** That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

**Holocene:** The most recent geological time period which commenced 10 000 years ago.

**Late Stone Age:** The archaeology of the last 20 000 years associated with fully modern people.

**Middle Stone Age:** The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.

**National Estate:** The collective heritage assets of the Nation

**Palaeontology:** Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

**Pleistocene:** A geological time period (of 3 million – 20 000 years ago).

**SAHRA:** South African Heritage Resources Agency – the compliance authority which protects national heritage in the Northern Cape.

**Structure (historic:)** Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

## Acronyms

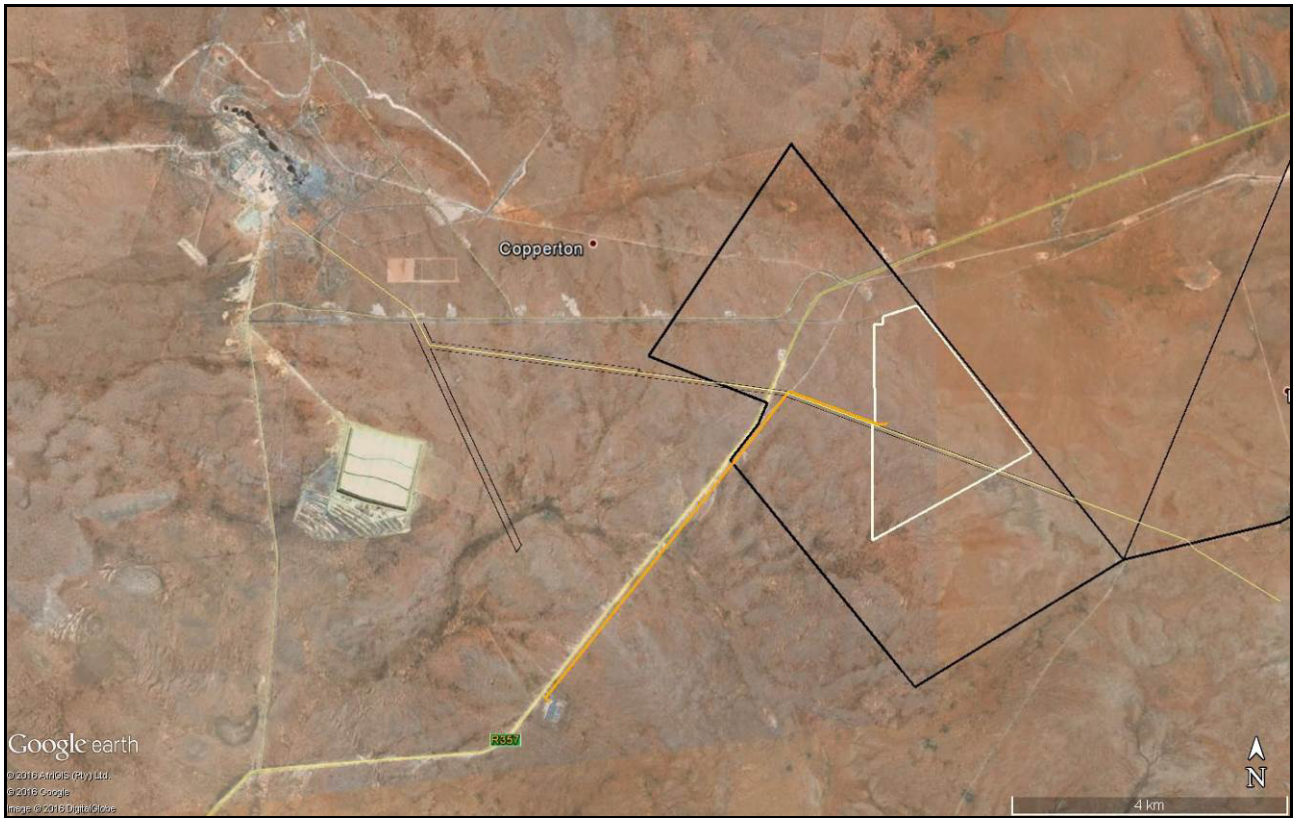
DEA	Department of Environmental Affairs
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency

## CONTENTS

1. INTRODUCTION .....	5
1.1 Introduction .....	<b>Error! Bookmark not defined.</b>
2. DEVELOPMENT DETAILS.....	5
3. HERITAGE: POLICY AND LEGISLATIVE FRAMEWORK .....	7
3.1 Archaeology & Palaeontology (Section 35(4)).....	8
3.2 Burial grounds and graves (Section 36(3)).....	8
3.3 Grading .....	8
4. METHODOLOGY.....	8
4.1 Literature Survey .....	8
4.2 Field Survey .....	9
4.3 Assumptions and Limitations.....	10
5. RECEIVING ENVIRONMENT.....	10
5.1 Archaeological Background.....	11
5.2 Historical Background .....	12
6. IMPACT ASSESSMENT .....	12
6.1 Impacts to Pre-Colonial Archaeology .....	13
6.2 Impacts on Colonial Period Archaeology.....	13
6.3 Impacts on Cemeteries and Graves .....	14
6.4 Impacts of Powerlines and Access Roads .....	14
7. CUMULATIVE IMPACTS.....	14
8. CONCLUSIONS .....	15
9. RECOMMENDATIONS.....	15
10. REFERENCES .....	15

## 1. INTRODUCTION

ACO Associates cc was appointed by Perception Planning on behalf of Cape EAPrac Environmental Practitioners for Humansrus Solar 4 (Pty) Ltd to undertake an archaeological impact assessment for the construction of a 75 MW PV facility on a portion of the Farm 147, Humansrus near Copperton in the Siyathemba Municipality, Northern Cape (Figure 1).

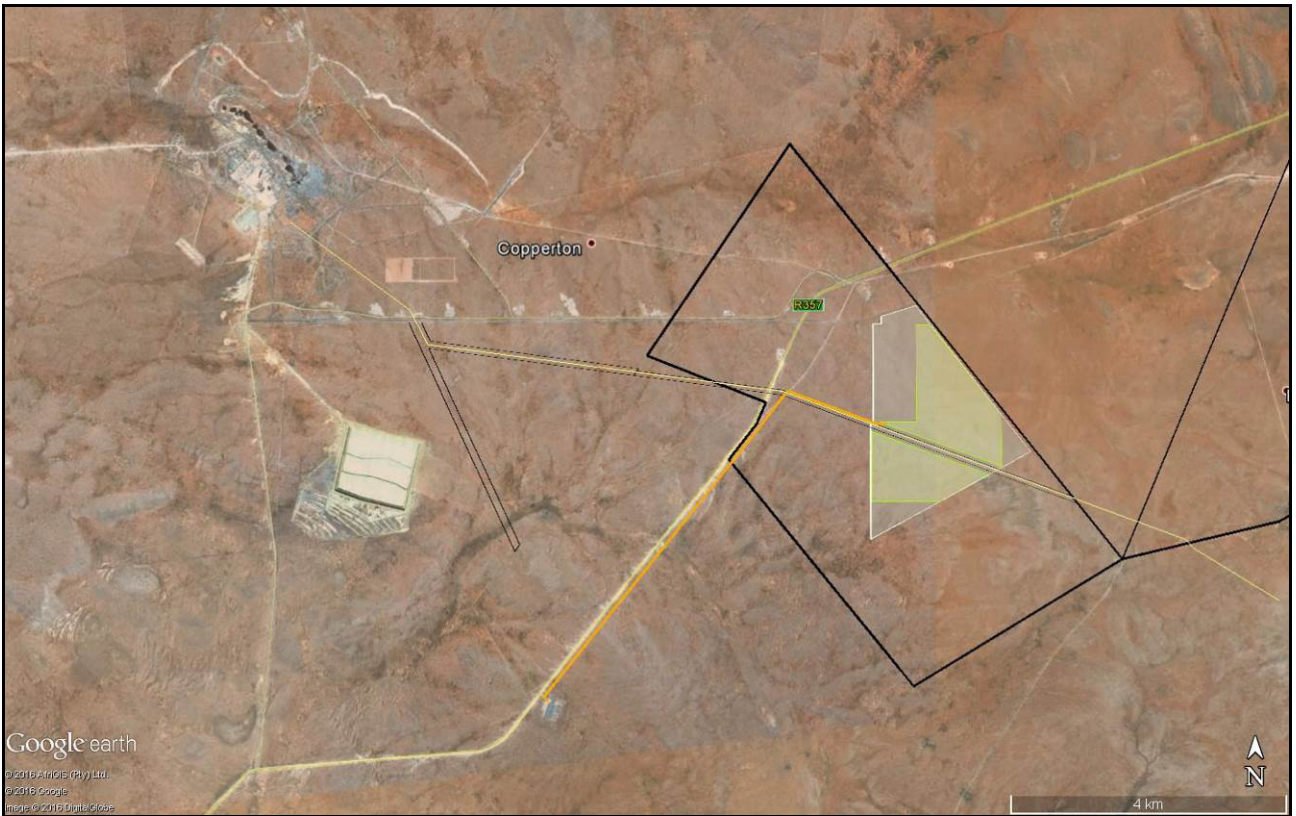


**Figure 1:** Humansrus Solar 4, the study area indicated in the white polygon.

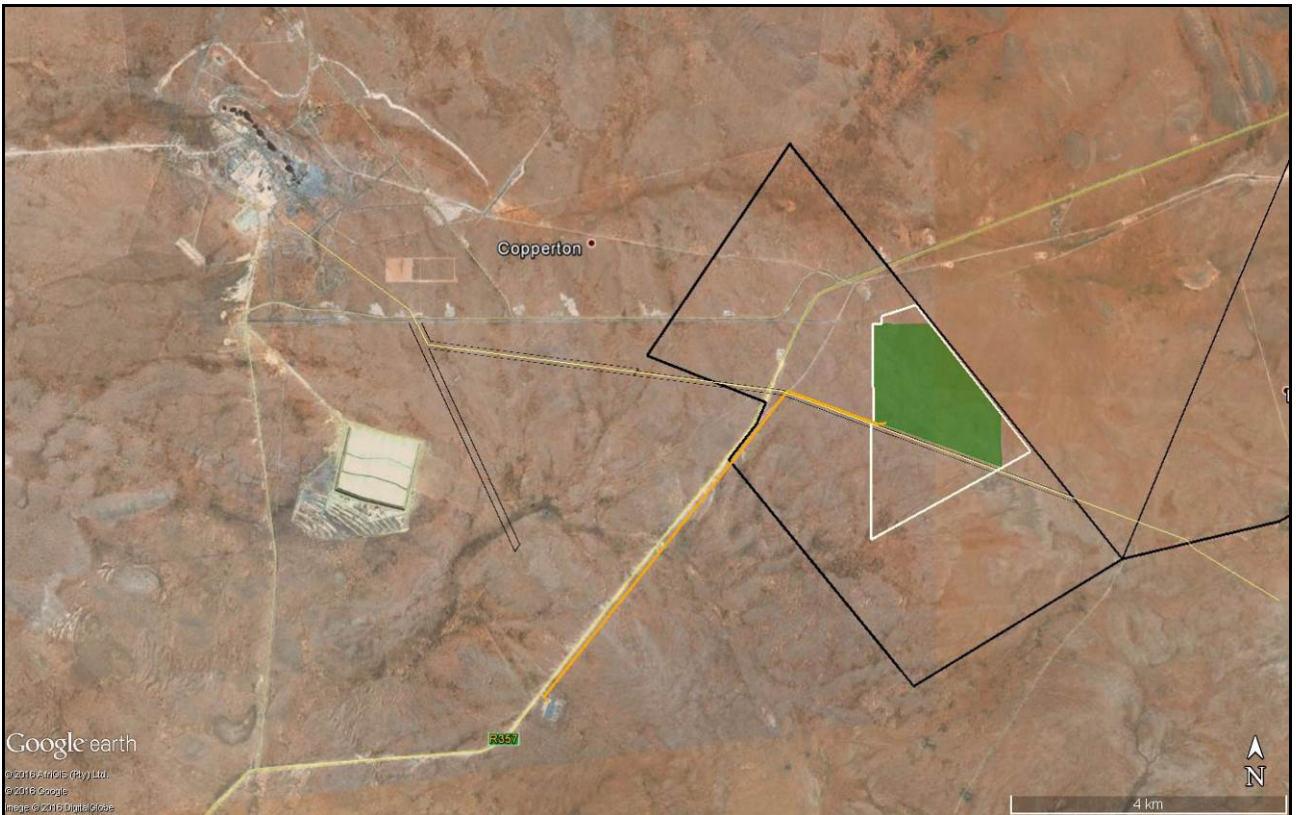
## 2. DEVELOPMENT DETAILS

Two alternatives have been proposed. A preferred layout (Figure 2) and an alternative layout (Figure 3):

- The preferred layout (Figure 2) will be 75MW;
- The alternative layout (Figure 3) will be 75MW.



**Figure 2:** The preferred location for Humansrus Solar 4 is shown as a pale green polygon.



**Figure 3:** The alternative location for Humansrus Solar 4 is shown as a dark green polygon.

Humansrus Solar 4 (Pty) Ltd proposes to construct a 75 MW on an estimated site layout of 220ha. The solar technology will comprise PV and/or concentrated PV with fixed, single or double axis tracking technology. The height of the facility will be less than 10m, it will be north-facing and approximately 2-5ha will be required for the laydown area.

Grid Connections:

There are two substations within the surrounding area, namely Kronos and Cuprum.

- The facility plans to connect to the Kronos substation via a self-built 132kV line;
- The 132 kV powerlines will require a servitude of less than 32m;
- The pylons will be monopole steel structures with a height of less than 25m.

Other Infrastructure:

- Auxiliary buildings of approximately 2ha in size for ablutions, workshops, storage areas and site offices, etc. Fencing height will not exceed 3m;
- Laydown areas of approximately 2-5ha will be required.

Access Roads:

- Access Road\_01 is opposite the preferred Humansrus SEF 1 access road, same road access as Humansrus Solar 3.
- Access road entrance\_02 from R357 same as for Humansrus Solar 3 (parallel to the Cuprum - Hydra line).
- The access roads which are not used during operation of the facility to be closed and rehabilitated;
- Access roads expected to be 6m widen but less than 8m in width.

### **3. HERITAGE: POLICY AND LEGISLATIVE FRAMEWORK**

While the National Department of Environmental Affairs is the decision making authority acting in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and Regulations (2014), they must ensure that the evaluation of the statutorily defined broad range of heritage resources fulfils the requirements of the relevant heritage resources authority in terms of Section 38 (3) of the National Heritage Resources Act (Act 25 of 1999) (NHRA) and that any comments and recommendations of the relevant heritage resources authority with regard to proposed development have been taken into account prior to the granting of the consent.

This report is conducted in terms of Section 38 (8) of the National Heritage Resources Act, No 25 of 1999.

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)).

### 3.1 Archaeology & Palaeontology (Section 35(4))

No person may, without a permit issued by HWC, destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite.

Archaeological is defined as: “material remains resulting from human activity which is in a state of disuse and is in or on land and which is older than 100 years, including artefacts, human and hominid remains and artificial features and structures”.

Palaeontological is defined as: “any fossilised remains or fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace”.

### 3.2 Burial grounds and graves (Section 36(3))

No person may, without a permit issued by the South African Heritage Resources Authority (SAHRA), destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority.

### 3.3 Grading

The South African heritage resources management system is based on grading, which provides for assigning the appropriate level of management responsibility to a heritage resource.

**Table 1:** Grading of Heritage Resources

Grade	Level of significance	Description
I	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
II	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
IIIa	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3a heritage resources.
IIIb	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3b heritage resources.
IIIc	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3c heritage resources.

## 4. METHODOLOGY

### 4.1 Literature Survey

A survey of available literature was carried out during the Scoping process to assess the general heritage context of the area. A background search of other Cultural Resource Management (CRM) projects in the area was made via the South African Heritage Resources Information Systems (SAHRIS) database. Numerous impact assessments have been conducted in proximity to the proposed facility as reflected on the SAHRIS database. The following CRM reports provide valuable information on the heritage resources of the area and were consulted:



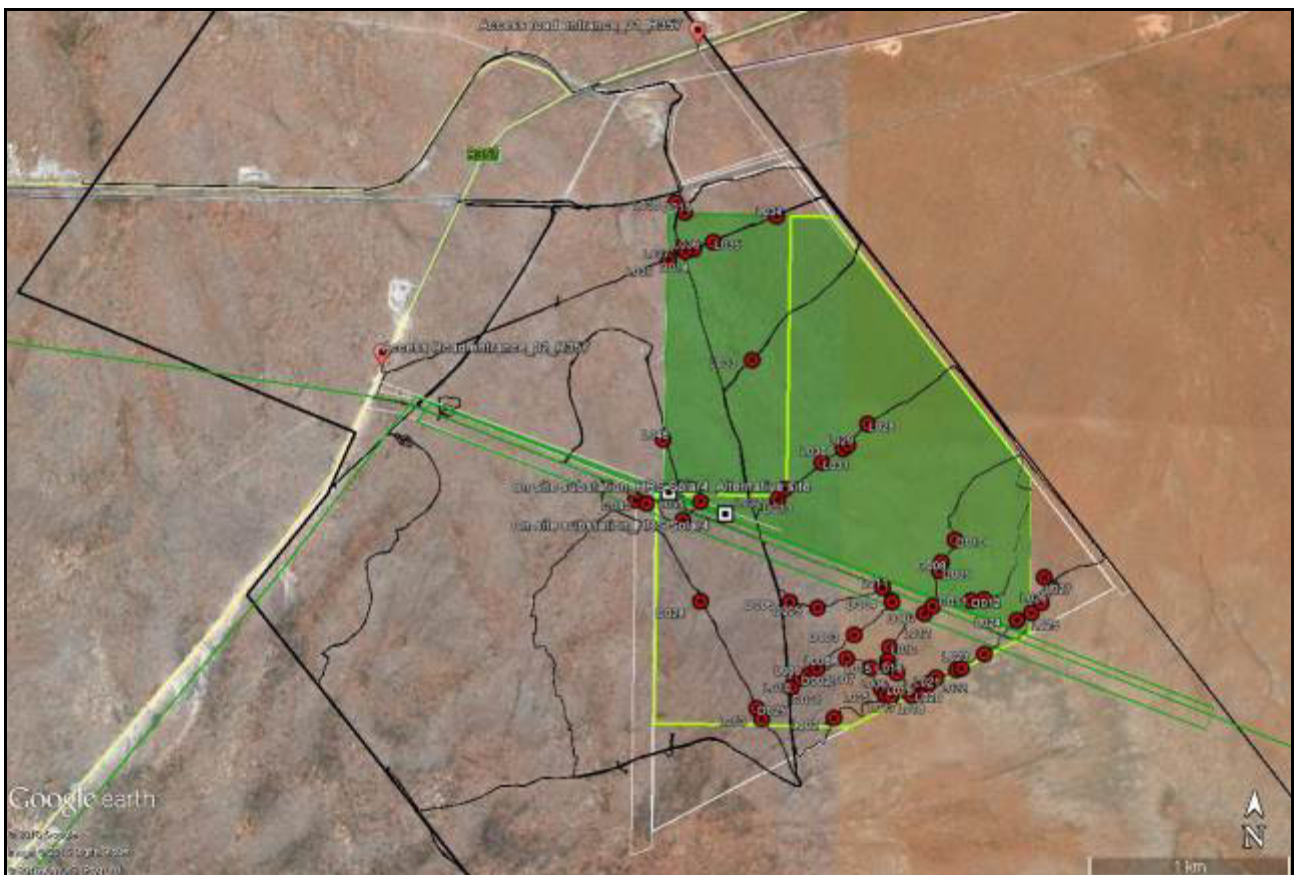
- Orton & Webley (2013a & b) have undertaken impact assessments on the farm Hoekplaas 146 and the farm Klipgats Pan 117 to the south-west of the farm Humansrus 147;
- Van der Walt (2013) has assessed the farm Bosjesmansberg to the north-east of the study area;
- Kaplan & Wiltshire (2011) assessed the farm Vogelstruisbult to the west of the study area;
- Van Ryneveld (2006) conducted an assessment on the farm Vogelstruis Bult 104 for Amber Mountain Investments interested in re-working the old mine dump and, pending the results of this activity, the re-opening of the old Copperton Mine. The mine is located to the north-west of the farm Humansrus 147.

Webley & Halkett (2014a&b) have conducted an assessment of Humansrus Solar PV 1 and Humansrus Solar PV 2 on the farm Humansrus 147 and these reports form the basis of this archaeological impact assessment. These two solar facilities have both been authorised in terms of NEMA.

The location of the other renewable (solar and wind) facilities are shown in Figure 7.

#### 4.2 Field Survey

Lita Webley and David Halkett (2014) undertook an archaeological survey of Humansrus Solar PV 1 and Humansrus Solar PV 2 in October 2014 and recorded their tracks and sites by means of a Garmin GPS. All archaeological sites were recorded, described and photographed. The area was accessed by local farm roads but transects of the study area were also undertaken on foot. These tracks are shown on Figure 4. Webley and Halkett also drove along sections of the proposed access roads and powerline options where this was possible.



**Figure 4:** Tracks (indicated with black lines) and “sites” shown as red circles during the 2014 survey of the property. Many of the spot locations are merely a mid-point in a large scatter of stone tools. The preferred location is shown as the light green polygon; the alternative location is shown as the dark green polygon.

### 4.3 Assumptions and Limitations

There are only a few farm roads and tracks which cross the facility and this makes a detailed survey difficult. We are of the opinion that our coverage of the area was sufficiently broad to identify the distribution of archaeological resources.

### 5. RECEIVING ENVIRONMENT

The farm Humansrus 147 comprises a generally flat landscape, with knee-high vegetation (Figure 5) and a substrate which varies between thick red soils, calcretes surfaces and gravel patches. There are two powerlines which cross the property (Figure 6).



**Figure 5:** The landscape is generally flat and ground visibility is good.



**Figure 6:** There are two sets of powerlines (and servitudes) which cross the property.

## 5.1 Archaeological Background

The archaeological review below includes the results of the survey of the property undertaken by Webley & Halkett (2014) but also draws on the conclusions of archaeologists who have surveyed adjoining properties. Our survey tracks are reflected in Figure 4 and the list of sites within the two alternatives are provided in Table 3 at the end of the report.

Low density scatters of stone artefacts were found widely distributed across the study area. They tended to be concentrated on slightly deflated areas covered in fine gravel. Often these stone scatters occurred on surfaces underlain by calcretes exposures – i.e. north-eastern corner of the property.

Those parts of the study area under dense knee-high bush and thick sands, had much lower concentrations of artefacts. We did not record individual stone artefacts during the survey (with the exception of type artefacts such as handaxes), but denser concentrations exceeding three stone artefacts or more in a limited area were recorded as “sites”.

In general the 2014 survey of the property recorded that the artefact distributions on Humansrus Solar 4 resemble those on Humansrus Solar 3 but the densities appear to be slightly higher, especially along the southern boundaries of the site (Figure 4).

### *Early and Middle Stone Age*

Orton & Webley (2013a&b) have reviewed the archaeology of the general area.

Much of the Karoo is covered by gravels that contain abundant stone artefacts in varying densities. Beaumont *et al.* (1995: 240) has declared with regard the Bushmanland area that “thousands of square kilometres of Bushmanland are covered by a low density lithic scatter”. These artefacts are generally very well weathered and mostly belong to the Early (ESA) and Middle Stone Age (MSA). Occasional Later Stone Age (LSA) artefacts are also present within this scatter. These kinds of finds were made by Kaplan (2010) and Wiltshire (Kaplan & Wiltshire 2011) on proposed PV and wind energy sites of Vogelstruis Bult to the east. According to Beaumont *et al.* (1995) the ESA in this area is said to be characterised by the presence of long blades, Victoria West cores and relatively few hand-axes and cleavers. Orton & Webley (2013) recorded a number of handaxes across the study area. While a few were large, the majority were smaller. These smaller handaxes were, prior to 1965, considered to signify a transitional stone tool industry between the ESA and the MSA called the Fauresmith. However, in a recent review, Underhill (2011) has highlighted the need to determine the validity of this industry. Van der Walt (2013) identified isolated scatters of ESA tools including bifaces made on quartzite to the north of the study area.

Orton & Webley (2013a & b) recorded large scatters of MSA material across Hoekplaas and Klipgats pan to the south-east of the study area. A highly significant MSA site, associated with a fossilised equid tooth, was recorded in a borrow pit at the side of the road. Substantial MSA sites are rare with only a few isolated examples known (Beaumont *et al.* 1995). Van der Walt (2013) concurs about the presence localised MSA quarries utilising quartz and quartzite outcrops. He describes the MSA as including large flakes, radial and bipolar cores, end scrapers, large utilised and retouched blade tools, and utilised and retouched flakes.

The 2014 survey identified both ESA and MSA artefacts but no distinctly LSA material was recorded. The ESA included some very weathered handaxes on indurated shales. The MSA artefacts included blades, cores, flakes and chunks on a variety of raw materials including quartzite and banded ironstone. There is some evidence that the quartzite bedrock was quarried as a source of raw material.

## Later Stone Age

Several LSA sites in the Bushmanland area to the northwest, west and southwest of Copperton have been investigated by Beaumont and colleagues (1995), Smith (1995a) and Parsons (2003, 2008). Work on these sites led to a distinction between hunter-gatherer and herder sites (Beaumont *et al.* 1995; Beaumont & Vogel 1984, 1989; Parsons 2003), which has recently been called into question (Parsons 2007). Briefly, it is asserted that hunter-gatherer assemblages, termed 'Swartkop' may be distinguished from herder sites, termed 'Doornfontein' based on stone artefact assemblages. All these LSA sites have very few, if any, organic items on them. The only organic material generally present is fragments of ostrich eggshell which originated either from eggs eaten or else whole shells used as flasks.

Orton & Webley (2013a & b) observed that LSA artefacts were often found in clusters, suggesting that they represented occupation sites. These artefacts are recognised by their small size, their relatively un-weathered surface appearance and the inclusion of quartz in the assemblages. Most LSA scatters were found located around pans. There is also some evidence for the quarrying of quartzite outcrops. Van der Walt (2013) described fewer concentrations of LSA material, including scraper, retouched and utilised flakes, blades and small round cores predominantly made on crypto-crystalline silica (CCS) material.

Most recently, Orton (2014) has undertaken archaeological mitigation of seven Later Stone Age sites on the farm Klipgats Pan 117. He recorded that they were found in dry river courses. The sites included pottery, ostrich eggshell (including decorated fragments), stone artefacts (including many retouched pieces) made on quartz, quartzite, crypto-crystalline silica and hornfels. Some sites also included hammer stones, grindstones and anvils. He concluded that these sites provided a valuable sample of late Holocene settlement from northern Bushmanland.

## 5.2 Historical Background

Smith (1995b) notes that around that time white farmers were making extensive use of Bushmanland for summer grazing and that this led to the extermination of the massive springbok herds on which the indigenous population subsisted. This in turn led to the descendants of indigenous groups turning to the farmers for food (and employment), effectively ending the span of prehistory in the region.

The farm complex of Humansrus and Platsambok lie outside the study area. The farms of Humansrus and Hoekplaas were surveyed in 1977 and appear to comprise portions of the farms Plat Sjambok 102 and Vogelstruis Bult 104 both of which date to the 1880s and appear to be some of the older farms in this district.

The town of Copperton was established in 1972 to provide housing for the nearby copper mine, but after the mine closed down in 1992 the town was sold and some of the housing has been demolished.

## 6. IMPACT ASSESSMENT

The levelling and clearing of the ground to install the PV units will result in the relocation or destruction of all surface heritage material. Similarly, the clearing of vegetation for the on-site substation and control room, as well as access roads will impact material that lies buried in the surface sand. Since heritage sites, including archaeological sites, are non-renewable, it is important that they are identified and their significance assessed prior to construction.

Potential impacts caused by a 132 kV power line and the power line access roads are likely to be limited and local. The access road required for a 132 kV powerline is likely to be a 'two-track' which generally only requires limited physical disturbance of the ground surface.

## 6.1 Impacts to Pre-Colonial Archaeology

The main cause of impacts to archaeological sites is direct, physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose buried archaeological sites and artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. The impacts are likely to be most severe during the construction period although indirect impacts may occur during the operational phase of the project.

Surveys on adjoining farms have recorded high concentrations of MSA and LSA material on the farm Hoeklaas (Orton & Webley 2013a), on the farm Klippgats Pan (Orton & Webley 2013b), Vogelstruis Bult (Kaplan & Wiltshire 2013) and Bosjesmansberg (Van der Walt 2013) and they have been graded as potentially of very high research value and the “No-Go” option has been recommended. However, these artefact concentrations are found on small hills with outcrops of quartzite/quartz as well as and around pans. In general these areas need to be avoided.

Our survey for Humansrus Solar 4 (Webley & Halkett 2014) recorded scatters of ESA and MSA artefacts across the study area but particularly concentrated along the southern boundary. We did not record any LSA artefacts in the study area. While impacts to the stone tool scatters will be permanent, assigning significance to these surface scatters of ESA and MSA material is difficult. The stone artefacts are no longer in their original location or *in situ*. They can provide only limited information with respect to activity areas.

**Table 2:** Potential impact to pre-colonial Archaeology

<b>Impact Phase: Construction of PV Facility and infrastructure - Archaeology</b>							
<b>Nature of Impact:</b> Clearing and levelling the ground for solar panels, access roads, cabling, substation and powerlines may impact archaeological resources.							
<b>ANTICIPATED SCOPING IMPACTS TO BE SCOPED OUT OR INVESTIGATED FURTHER</b>							
	<b>Extent</b>	<b>Duration</b>	<b>Intensity</b>	<b>Status</b>	<b>Significance</b>	<b>Probability</b>	<b>Confidence</b>
<b>Without Mitigation</b>	<b>L</b>	<b>H</b>	<b>L-</b>	<b>Negative</b>	<b>Medium -</b>	<b>M</b>	<b>H</b>
<b>With Mitigation</b>	<b>L</b>	<b>M</b>	<b>L-</b>	<b>Positive</b>	<b>Low -</b>	<b>M</b>	<b>H</b>
Can the impact be reversed?						NO – physical heritage resources are generally non-renewable	
Will impact cause irreplaceable loss or resources?		No – the field assessment indicates that archaeological resources are of low significance					
Can impact be avoided, managed or mitigated?		Yes					
Mitigation: If during ground clearance or construction, any dense accumulations of stone tools, particularly if they are associated with ostrich eggshell fragments, are uncovered then the ECO should report this to SAHRA (Tel: 021 462 4502)							

Further impacts are not expected during the operational or decommissioning phase of the project.

## 6.2 Impacts on Colonial Period Archaeology

The 1:50 000 maps and Google imagery confirm that there are no farm buildings or structures on the land identified for the solar facility. No historical archaeological material was identified during the survey. It is not anticipated that there will be any impacts to the Built Environment.

### 6.3 Impacts on Cemeteries and Graves

In the absence of any residential structures, it seems unlikely that any farm graveyards will be present. However, the possibility of unmarked archaeological and/or historical graves cannot be excluded. The landowner was interviewed with respect to graveyards on the property and confirmed that none were present.

### 6.4 Impacts of Powerlines and Access Roads

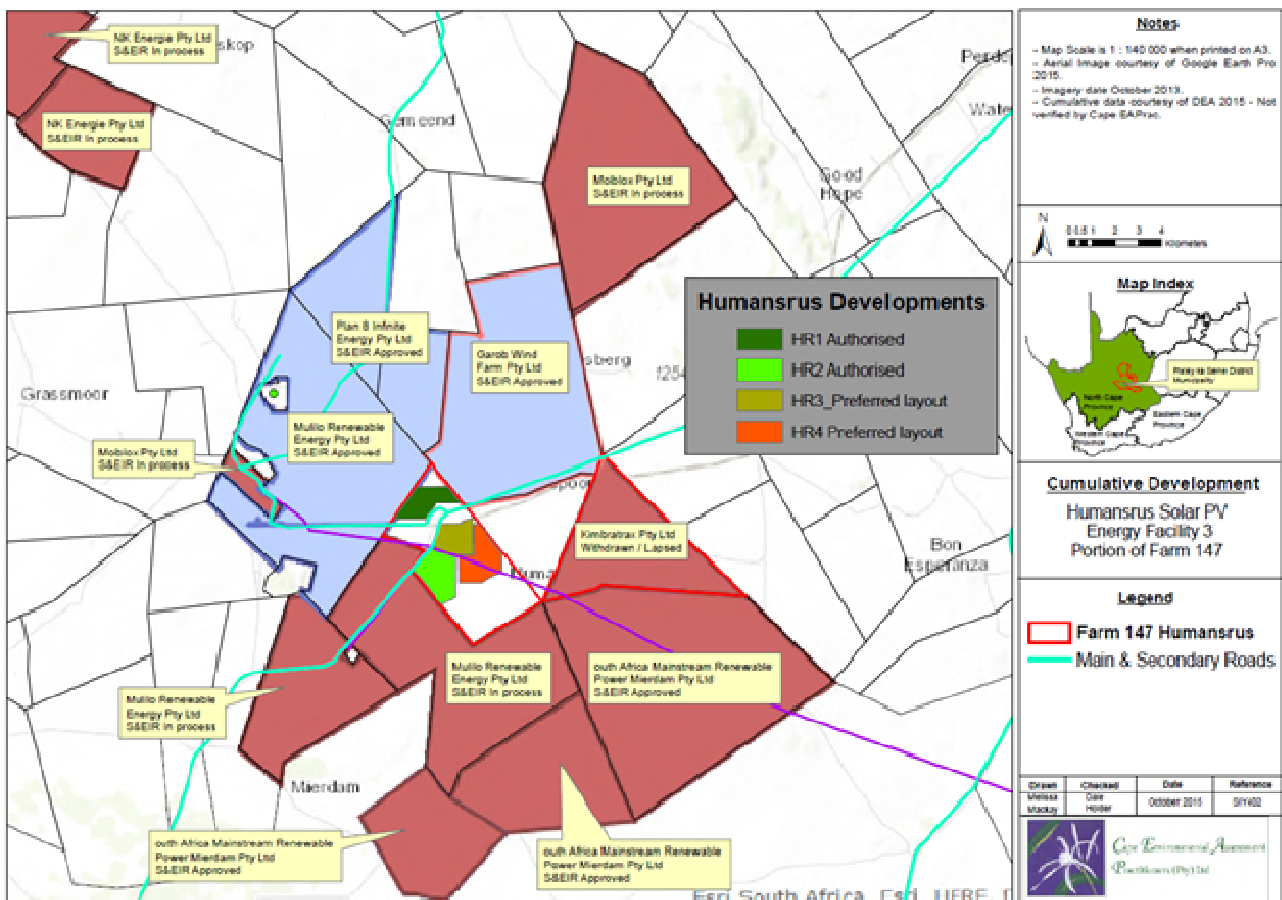
Potential impacts caused by a 132 kV power line and the power line access roads are likely to be limited and local.

Morris (2013) points out that the access road required for a 132 kV powerline is likely to be a ‘two-track’ which generally only requires limited physical disturbance of the ground surface.

It was not possible to drive down all the alternative routes as they cross other properties. However, inferences may be drawn from the other CRM projects undertaken in proximity to the site. It is concluded that the impacts will be limited.

## 7. CUMULATIVE IMPACTS

Of concern, however, is the increasing number of solar facilities increase in this area (Figure 7). The cumulative impacts of the developments will result in widespread destruction of pre-colonial sites. Although many of these sites have, individually, been rated as having low significance, the cumulative impact of the removal of all archaeological material will result in the destruction of large areas of archaeology and could be considered significant.



**Figure 7:** The location of renewable energy facilities (both approved and proposed) in proximity to Humansrus 4.

Limited mitigation, particularly of Later Stone Age sites, has been undertaken by Orton (2014) on the farm Klipgats Pan 117 and this addresses some of the concerns about the destruction of archaeological heritage. The mitigation of additional archaeological sites will need to be considered based on the merits of each site. Mitigation of archaeological sites on a portion of Humansrus 147 is not warranted based on the low significance of the archaeological resources on the property.

## **8. CONCLUSION**

The archaeological survey identified an amorphous distribution of Early and Middle Stone Age artefacts randomly scattered across the landscape. No Later Stone Age sites, such as those mitigated by Orton (2014) on the adjoining farm of Klipgats Pan 117, were observed. It is concluded that the artefacts distributions are of low significance and that no further mitigation is required.

## **9. RECOMMENDATIONS**

Indications are that in terms of archaeological heritage the proposed activity is viable; impacts are expected to be limited and controllable.

Construction of the proposed solar facility may proceed. Either layout (Alternative 1 and Alternative 2) is acceptable.

The following recommendations should be enforced:

- If during ground clearance or construction, any dense accumulations of stone tools, particularly if they are associated with ostrich eggshell fragments, are uncovered then the ECO should report this to SAHRA (Tel: 021 462 4502);
- If any human remains are uncovered during construction, the ECO should have the area fenced off and contact SAHRA (Tel: 021 462 4502) immediately.

## **10. REFERENCES**

Beaumont, P.B., Smith, A.B. & Vogel, J.C. 1995. Before the Einiqua: the archaeology of the frontier zone. In: Smith, A.B. (ed.) Einiqualand: studies of the Orange River frontier: 236-264. Cape Town: University of Cape Town Press.

Beaumont, P.B. & Vogel, J.C. 1984. Spatial patterning of the ceramic Later Stone Age in the northern Cape, 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.

Beaumont, P.B. & Vogel, J.C. 1989. Patterns in the age and context of rock art in the northern Cape. South African Archaeological Bulletin 44: 73-81.

Kaplan, J. 2010. Archaeological scoping study and impact assessment of a proposed photovoltaic power generation facility in Copperton Northern Cape. Unpublished report prepared for DJ Environmental Consultants.

Kaplan, J. & Wiltshire, N. 2011. Archaeological impact assessment of a proposed wind energy facility, power line and landing strip in Copperton, Siyathemba Municipality, Northern Cape. Unpublished report prepared for Aurecon (Pty) Ltd. Rondebosch: Agency for Cultural Resource Management.

- Kiberd, P. 2006. Bundu Farm: a report on archaeological and palaeoenvironmental assemblages from a pan site in Bushmanland, Northern Cape, South Africa. *South African Archaeological Bulletin* 61: 189-201.
- Humphreys, A.J.B. & Thackeray, A.I. 1983. Ghaap and Gariep: Later Stone Age studies in the northern Cape. Cape Town: South African Archaeological Society Monograph Series No. 2.
- Morris, D. 1990. "Etchings" and "intaglios" in the Upper Karoo. In: Beaumont, P & Morris, D. (eds) *Guide to archaeological sites in the Northern Cape*: 232-258. Kimberley: McGregor Museum.
- Orton, J. 2011. Heritage impact assessment for a proposed photovoltaic energy plant on the farm Hoekplaas near Copperton, Northern Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. University of Cape Town: Archaeology Contracts Office.
- Orton & Halkett 2011. Heritage impact assessment for the proposed photovoltaic solar energy facility on the remainder of farm Jakhalsvalley 99, Sutherland Magisterial District, Northern Cape.
- Orton, J. & Webley, L. 2013a. Heritage Impact Assessment for multiple proposed solar energy facilities on Farm Hoekplaas 146, Copperton, Northern Cape. Unpublished report for Aurecon South Africa (Pty) Ltd.
- Orton, J & Webley, L. 2013b. Heritage Impact Assessment for multiple solar energy facilities on the Remainder of Farm Klipgats Pan 117, Copperton, Northern Cape. Unpublished report for Aurecon South Africa (Pty) Ltd.
- Orton, J. 2014. Final archaeological 'walk through' for the approved PV facility on the remainder of Portion 4 of Klipgats Pan 117, Prieska Magisterial District, Northern Cape. Unpublished report for Mulilo Prieska PV (Pty) Ltd.
- Orton, J. 2014b. Archaeological mitigation of Later Stone Age sites on the remainder of Portion 4 of Klipgats Pan 117, Prieska Magisterial District, Northern Cape. Unpublished report for Mulilo Prieska PV (Pty) Ltd.
- Parsons, I. 2003. Lithic expressions of Later Stone Age lifeways in the Northern Cape. *South African Archaeological Bulletin* 58: 33-37.
- Parsons, I. 2007. Hunter-gatherers or herders? Reconsidering the Swartkop and Doornfontein Industries, Northern Cape Province, South Africa. *Before Farming* 2007/4: Article 3.
- Rudner, J. & Rudner, I. 1968. Rock-art in the thirstland areas. *South African Archaeological Bulletin* 23: 75-89.
- Rusch, N. & Parkington, J. 2010. San rock engravings marking the Karoo landscape. Cape Town: Struik Travel & Heritage.
- Smith, A.B. 1995. Archaeological observations along the Orange River and its hinterland. In: Smith, A.B. (ed.) *Einiqualand: studies of the Orange River frontier*: 236-264. Rondebosch: UCT Press.
- Smith, A.B. 1995b. Introduction. In: Smith, A.B. (ed.) *Einiqualand: studies of the Orange River frontier*: xvii-xx. Rondebosch: UCT Press.
- Underhill, D. 2011. The study of the Fauresmith: A review. *South African Archaeological Bulletin* 66 (193): 15-26.



Van der Walt, J . 2013. Archaeological Impact Assessment for the proposed Bosjesmansberg Solar Facility and associated power line options, located close to Copperton in the Northern Cape. Unpublished report for Savannah Environmental Pty Ltd.

Van Ryneveld, K. 2006. Phase 1 Archaeological Impact Assessment: Vogelstruisbult 104, Prieska District, Northern Cape, South Africa. Unpublished report for Amber Mountain Investments.

Webley, L. & Halkett, D. 2014a. Archaeological Impact Assessment: Proposed construction of RE Capital 13 PV on the remainder of the farm Humansrus 147 near Copperton, Northern Cape. Unpublished report for RE Capital 13 (Pty) Ltd

Webley, L. & Halkett, D. 2014b. Archaeological Impact Assessment: Proposed construction of RE Capital 14 PV on the remainder of the farm Humansrus 147 near Copperton, Northern Cape. Unpublished report for RE Capital 14 (Pty) Ltd.

**Table 3:** List of archaeological sites recorded during the survey.

Site Name	GPS Co-ordinates Longitude	Latitude	Site description	Significance
L001	22.39522688	-29.99893597	General background spread of Qzte core, hornfels MSA flake, an adze like heavily patinated flake. Some small quartz cores. 1 silcrete (fine grained quartzite?) handaxe with the tip missing	Low
L002	22.39707048	-29.99720067	Large quartzite cores. Many are irregular.	Low
L003	22.39930786	-29.99647102	Ditto	Low
L004	22.40003700	-29.99616131	Ditto	Low
L005	22.39971480	-29.99611328	A weathered hornfels biface. 2 quartzite cores. 1 black quartzite?	Low
L006	22.39949754	-29.99584699	A triangular (convergent) MSA flake	Low
L007	22.39892313	-29.99490512	Ditto	Low
L008	22.39766392	-29.99450136	Ditto. A few banded ironstone flakes.	Low
L009	22.39614780	-29.99496396	Ditto. Quartzite core	Low
L010	22.39561253	-29.99531315	Ditto. 1 white chert flake with retouch	Low
L011	22.39948137	-29.99127030	Next to the powerline servitude – several bedrock boulders with dense distribution of stone artefacts. Concentration of weathered ESA on hornfels. Crude handaxe. Smaller quartzite flakes – probably MSA. Some banded ironstone cores, 1 blade in hornfels, etc. Some quartzite which appears fresh – LSA? At least 5-7 artefacts per square metre.	Low-Medium
L012	22.40167181	-29.99240982	Stone artefacts scatter	Low
L013	22.39989275	-29.99395369	Ditto	Low
L014	22.39981622	-29.99455886	Ditto	Low
L015	22.39979653	-29.99482390	Ditto. Quartzite radial core, quartzite blade, 1 banded ironstone core	Low
L016	22.40030103	-29.99511559	Possible bedrock factory site. Rock flaked.	Low
L017	22.40109254	-29.99610457	Stone artefacts scatter	Low
L018	22.40144055	-29.99584196	Ditto	Low
L019	22.40197934	-29.99555119	Ditto	Low
L020	22.40233256	-29.99529630	Ditto. Plus one large cartridge case	Low
L021	22.40338574	-29.99492129	Artefact scatter	Low
L022	22.40363133	-29.99484753	Ditto	Low
L023	22.40482005	-29.99418193	Black quartzite debitage	Low
L024	22.40647858	-29.99263220	Artefact scatter	Low
L025	22.40722507	-29.99229717	Higher distribution of quartz chunks, some of them flaked	Low
L026	22.40773872	-29.99183256	Artefact scatter	Low
L027	22.40788674	-29.99068919	Soft red soil amongst the knee-high bushes. A red jasper core. Quartzite core	Low
L028	22.39858719	-29.98388744	Artefact scatter	Low
L029	22.39756451	-29.98485044	Artefact scatter	Low
L030	22.39731381	-29.98503258	Ditto. Bipolar core and one weathered blade	Low

L031	22.39622324	-29.98566390	Artefact scatter	Low
L032	22.39395493	-29.98736677	Outcrop of grey quartzite. Debitage of this coarse grey quartzite around as well as more finer grained quartzite. Possibly a knapping site.	Low
L033	22.39252305	-29.98107489	Artefact scatters. They appear to lie on calcretes pavements where the red soils have been deflated.	Low
L034	22.39369048	-29.97454279	Ditto	Low
L035	22.39040343	-29.97575230	Ditto	Low
L036	22.38938830	-29.97607986	Ditto. A handaxe with a very thick butt.	Low
L037	22.38895445	-29.97620207	Ditto. Near the railway line and quite disturbed	Low
L038	22.38841315	-29.97398724	Artefact scatter	Low
L039	22.38808936	-29.97657540	Ditto	Low
L048	22.38793437	-29.98472974	Artefact scatter	Low
D001	22.39482002	-29.99585797	General background. Grey quartzite and hornfels	Low
D002	22.39528899	-29.99543100	Scatter of ESA? Quartzite, hornfels. Possibly small biface on a cobble.	Low
D003	22.39804404	-29.99341498	General scatter	Low
D004	22.39997598	-29.99190699	Isolated artefacts. ESA? Biface?	Low
D005	22.39611000	-29.99223003	Ditto	Low
D006	22.39465498	-29.99199400	Fine-grained rock. MSA. An artefact which looks like a large adze	Low
D007	22.40209401	-29.99206801	Typically rocky platform with general scatter	Low
D008	22.40241302	-29.99046396	General scatter	Low
D009	22.40251897	-29.99007898	Big weathered handaxe	Low
D010	22.40321299	-29.98905899	General	Low
D011	22.40475903	-29.99172402	Classic handaxe on patinated quartzite	Low
D012	22.40407004	-29.99178898	Handaxe on grey quartzite	Low
D013	22.39432398	-29.98687802	Grey quartzite outcrop scatter - quarried	Low
D014	22.38875102	-29.97605396	Big pavement with weathered artefacts	Low
D015	22.38888798	-29.97442796	General scatter around stockpost at dam	Low