

**Appendix D3a: Updated Archaeological Assessment/Addendum
(2017 revision)**



Agency for Cultural Resource Management
Specialists in Archaeological Studies and Heritage Resource Management

09 March, 2017

Att: Mr Bernard de Wit
EnviroAfrica cc
PO Box 5367
Somerset West
7135

Dear Mr de Wit,

ARCHAEOLOGICAL IMPACT ASSESSMENT, KEREN ENERGY KEIMOES SOLAR ENERGY FARM ON ERF 666 KEIMOES, NORTHERN CAPE

An Archaeological Impact Assessment (AIA) for the Keren Energy Keimoes Solar Energy Farm (SEF) on Erf 666 Keimoes (Kai! Garib Municipality) in the Northern Cape was undertaken by ACRM in 2012¹ (Figures 1 & 2).

The following heritage resources were recorded:

➤ More than 100 mostly single, isolated stone artefacts were recorded during the study. The majority of the remains are assigned to the Later Stone Age (LSA), but tools belonging to the Middle Stone Age (MSA) were also recorded. An Early Stone Age (ESA) biface and handaxe was found. More than 90% of the implements are in locally available banded ironstone, with the remainder in indurated shale, quartzite, silcrete and quartz. Most of the tools are spread thinly and unevenly over the surrounding landscape, but a dispersed scatter of LSA, ESA and MSA implements was recorded on eroded gravels (i. e. below the topsoils) close to the Eskom Oasis substation. Eighteen cores/minimal cores were counted over the footprint area, indicating some level of stone fabrication on the site. The ratio of cores to flakes indicated that many of the final retouched or flaked tools were removed from the site by the ancient toolmakers. Frequencies of formal retouched tools are very low, and only three scrapers were found.

No graves or typical grave markers were found during the 2012 field assessment.

Grading of the archaeological remains

Overall, the relatively small numbers and isolated context in which they were found, means that the archaeological remains were graded as having *low* (3C) significance.

The following recommendations were made:

1. No mitigation is required.
2. Should any unmarked human burials/remains or ostrich eggshell water flask caches be uncovered, or exposed during construction activities, these must immediately be reported to the contracted archaeologist (Jonathan Kaplan 082 321 0172), or the South African Heritage Resources Agency (Ms Natasha Higgitt (021 462 4509).

¹ Kaplan, J. 2012. Archaeological Impact Assessment, proposed Keren Energy Keimoes Solar Energy Farm on Erf 666 Keimoes, Northern Cape. Report prepared for EnviroAfrica. ACRM, Cape Town

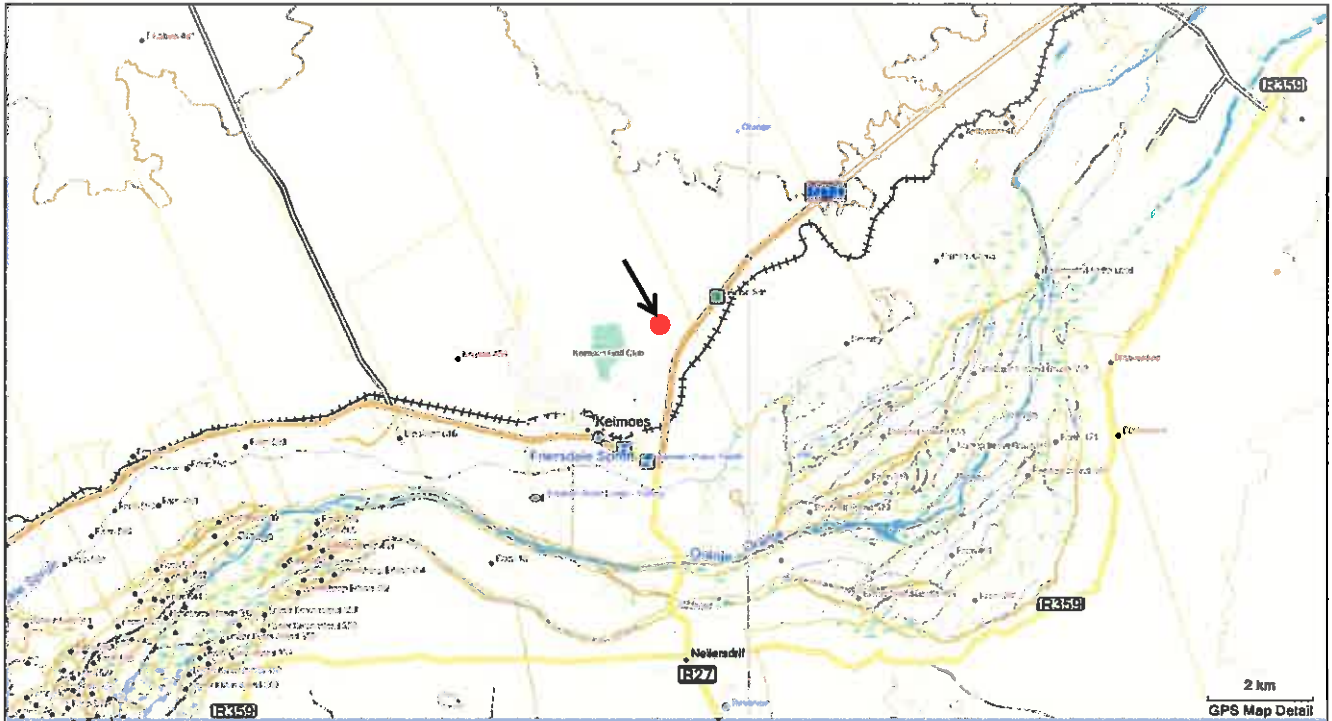


Figure 1. Locality Map. Arrow indicates the location of the study site (red polygon)



Figure 2. Google satellite map indicating the location of the proposed Keimoes PV facility (red polygon)



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SAHRA reviewed the archaeologists report (File No. 9/2/032/0004) on the 28 June, 2012 and supported the recommendations made by the contracted archaeologist.

The AIA report was submitted to the Department of Environment Affairs as part of the Environmental Impact Assessment process undertaken by EnviroAfrica cc.

However, the project did not proceed and the environmental authorization lapsed, necessitating a new Basic Assessment process, and re-submission of the specialist archaeological report.

2. TERMS OF REFERENCE

ACRM has been instructed to:

1. Undertake a field assessment;
2. Confirm or re-evaluate the findings of the original study, and
3. Address cumulative impacts

3. FINDINGS

The proposed development site was visited on 21st February 2017 (Figures 3 & 4), where three hours was spent walking the identified footprint area.

A track path of the survey was created (Figure 5).

A spreadsheet of waypoints and description of archaeological finds is presented in Table 1.

A collection of heritage resources recorded during the 2017 field assessment is illustrated in Figures 6-14.



Figure 3. View of the proposed site facing west. The white building is the Sun Food dried fruit and nut packing factory



Figure 4. View of the site facing north east, with the Eskom powerline servitude to the right of the plate.

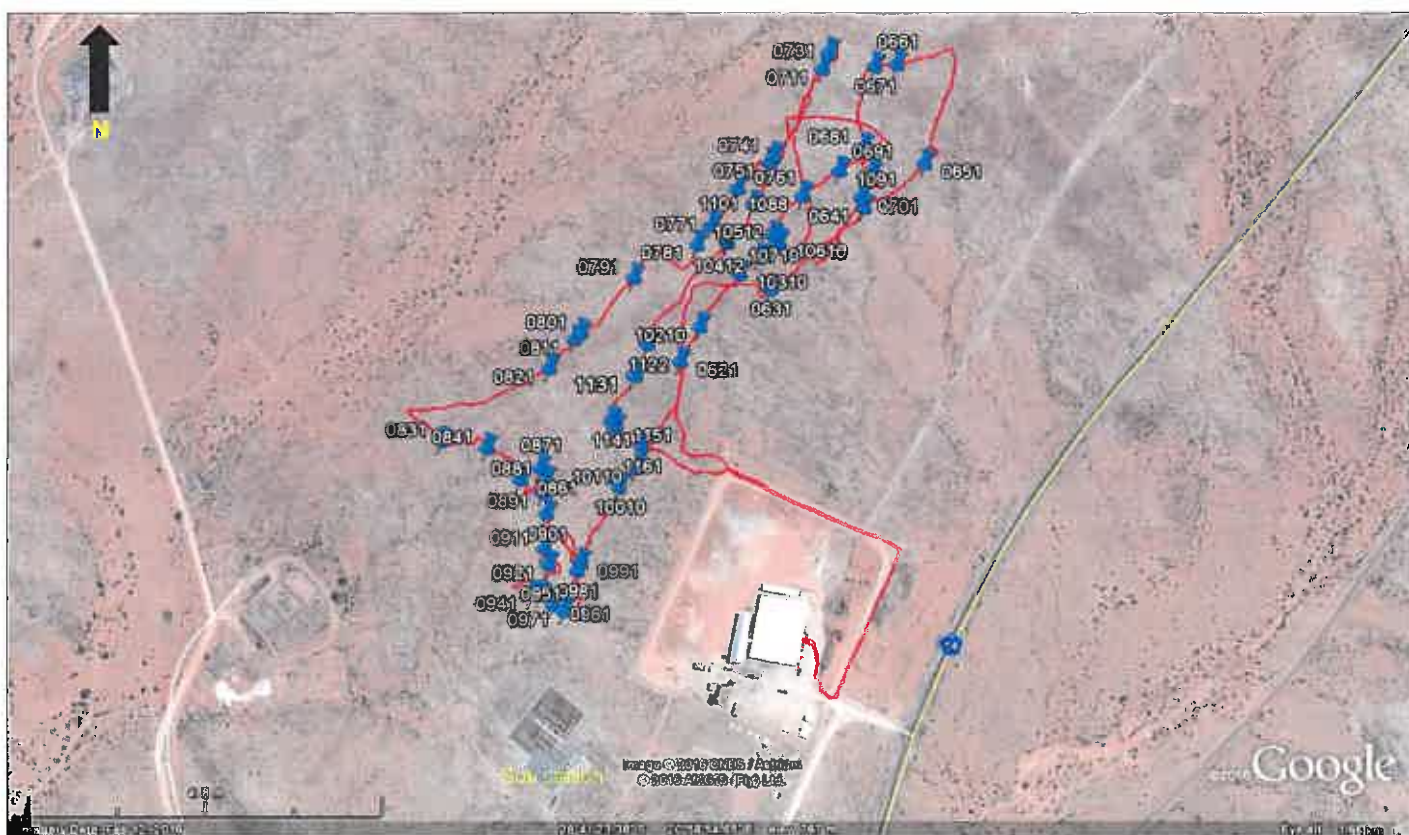


Figure 5. Track paths in red and waypoints of archaeological finds (refer to Table 1). Note the location of the Eskom Oasis substation. The white building is the Oasis dried fruit and nut packaging facility.



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Site	Name of farm	Lat/long	Description of finds	Grading	Suggested mitigation
	Erf 666 Keimoos				
0621		S28° 41.342' E20° 58.884'	MSA quartzite core	3C (low)	None required
0631		S28° 41.289' E20° 58.959'	Vein quartz chunk	3C (low)	None required
0641		S28° 41.229' E20° 59.037'	ESA handaxe	3C (low)	None required
0651		S28° 41.196' E20° 59.087'	Small banded ironstone flake/chunk	3C (low)	None required
0661		S28° 41.124' E20° 59.063'	MSA banded ironstone retouched/utilized flake	3C (low)	None required
0671		S28° 41.126' E20° 59.045'	Large indurated shale cortex cobble chunk	3C (low)	None required
0681		S28° 41.185' E20° 59.036'	Large banded ironstone irregular core	3C (low)	None required
0691		S28° 41.205' E20° 59.043'	Banded ironstone chunk	3C (low)	None required
0701		S28° 41.222' E20° 59.034'S	Snapped, retouched banded ironstone flake	3C (low)	None required
0711		S28° 41.128' E20° 59.002	Chunky banded ironstone MSA misc. retouched flake	3C (low)	None required
0721		S28° 41.122' E20° 59.009'	Minimal retouched banded ironstone flake	3C (low)	None required
0731		S28° 41.115' E20° 59.007'	Banded ironstone ?MSA weathered flake	3C (low)	None required
0741		S28° 41.192' E20° 58.962'	Large quartzite ESA flake	3C (low)	None required
0751		S28° 41.196' E20° 58.958'	Irregular quartzite core & banded ironstone flake/MRP	3C (low)	None required
0761		S28° 41.215' E20° 58.931'	Small quart flake	3C (low)	None required
0771		S28° 41.243' E20° 58.910'	Misc. retouched banded ironstone flake		
0781		S28° 41.256' E20° 58.898'	Chunky banded ironstone MRP ?MSA	3C (low)	None required
0791		S28° 41.281' E20° 58.846'	Small, retouched banded ironstone flake	3C (low)	None required
0801		S28° 41.322' E20° 58.802'	Banded ironstone chunk	3C (low)	None required
0811		S28° 41.326' E20° 58.796'	Indurated shale unifacial point (tip)	3C (low)	None required
0821		S28° 41.348' E20° 58.775'	Weathered banded ironstone flake	3C (low)	None required
0831		S28° 41.401' E20° 58.686'	Banded ironstone chunk	3C (low)	None required
0841		S28° 41.406' E20° 58.724'	Retouched banded ironstone chunk	3C (low)	None required
0861		S28° 41.429' E20° 58.752'	Vein quartz flake	3C (low)	None required
0871		S28° 41.420' E20° 58.768'	Low level activity area. Extensive eroded gravels, with dispersed tools including incomplete ESA biface, large flake; banded ironstone modified and unmodified flakes, chunks, indurated shale.	3C (low)	None required
0881		S28° 41.429' E20° 58.773'	Banded ironstone core on exposed gravel	3C (low)	None required
0891		S28° 41.439' E20° 58.771'	Banded ironstone chunk	3C (low)	None required
0901		S28° 41.454' E20° 58.774'	MSA pointed flake	3C (low)	None required



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0911		S28° 41.479' E20° 58.772'	MRP/?convex scraper in exposed gravels alongside Oasis substation	3C (low)	None required
0921		S28° 41.491' E20° 58.776'	Banded ironstone flake & chunk	3C (low)	None required
0941		S28° 41.513' E20° 58.761'	Banded ironstone MRP – large eroded gravels alongside substation	3C (low)	None required
0951		S28° 41.513' E20° 58.768'	Retouched flake/blade	3C (low)	None required
0961		S28° 41.521' E20° 58.780'	Utilized/retouched flake	3C (low)	None required
0971		S28° 41.525' E20° 58.788'	MSA flake	3C (low)	None required
0981		S28° 41.496' E20° 58.799'	Several banded ironstone flakes on large patch of ground – same as above	3C (low)	None required
10010		S28° 41.434' E20° 58.834'	Banded ironstone cortex core, flake & chunk alongside powerline servitude	3C (low)	None required
10110		S28° 41.420' E20° 58.848'	Round quartzite MSA core	3C (low)	None required
10210		S28° 41.317' E20° 58.901'	Weathered banded ironstone MSA flake	3C (low)	None required
10310		S28° 41.278' E20° 58.934'	Round banded ironstone core	3C (low)	None required
10410		S28° 41.266' E20° 58.950'	Quartzite hammerstone cobble, 2 banded ironstone flakes & chunk	3C (low)	None required
10510		S28° 41.255' E20° 58.966'	ESA core	3C (low)	None required
10610		S28° 41.255' E20° 58.966'	Thin, weathered banded ironstone flake	3C (low)	None required
10710		S28° 41.249' E20° 58.961'	Banded ironstone chunk	3C (low)	None required
1088		S28° 41.220' E20° 58.986'	Banded ironstone flake	3C (low)	None required
1091		S28° 41.202' E20° 59.016'	Large quartzite ESA flake	3C (low)	None required
1011		S28° 41.227' E20° 58.945'	Round, banded ironstone cobble/chunk	3C (low)	None required
1112		S28° 41.255' E20° 58.923'	Retouched banded ironstone flake, quartzite core/cobble	3C (low)	None required
1122		S28° 41.330' E20° 58.857'	Banded ironstone core, retouched flake & chunk	3C (low)	None required
1131		S28° 41.352' E20° 58.847'	Banded ironstone flake	3C (low)	None required
1141		S28° 41.385' E20° 58.827'	Banded ironstone flake	3C (low)	None required
1161		S28° 41.404' E20° 58.853'	2 banded ironstone utilized/retouched flake	3C (low)	None required

Table 1. Spreadsheet of waypoints and description of archaeological finds (2017 study)



Figure 6. Collection of tools. Scale is in cm



Figure 9. Site 0871. Arrow indicates some of the tools.



Figure 7. Collection of tools. Scale is in cm



Figure 10. Close up of Site 0871



Figure 8. Collection of tools. Scale is in cm



Figure 11. Site 0981. The Oasis substation is in the background



Figure 11. Collection of tools. Scale is in cm



Figure 12. Collection of tools). Scale is in cm

4. CUMULATIVE IMPACTS ON ARCHAEOLOGICAL HERITAGE

According to the Department of Environmental Affairs (DEA) Renewable Energy EIA Application Database for renewable projects (new builds)², there are four other renewable energy (RE) projects planned within a 30km radius of Keimoes. However, despite the presence of these RE sites in the region, it will not impact on archaeological resources in the proposed Keren Energy PV facility.

It is also worth noting that since the contracted archaeologist last visited the proposed development site in 2012, light industrial development has mushroomed in rezoned land alongside the Eskom Oasis substation. The construction of the Keimoes PV facility will therefore not fundamentally change the character of the site, as it is keeping with the current land use of the surrounding area (i.e. an increasingly industrial landscape).

5. CONCLUSION

A re-assessment of the Keren Energy Keimoes Solar Energy Farm on Erf 666, confirms the observations made during the original study (Kaplan 2012), which found mostly isolated stone implements spread thinly and unevenly over the surrounding landscape.

Indications are that the study has captured good information on the archaeological heritage. Some of the resources recorded during 2017 field assessment were captured during the 2012 study; for example the low level activity area on eroded gravels close to the Eskom Oasis substation (Sites 0871-0981).

Apart from trenches for underground cabling, limited bedrock excavations are envisaged. The solar panels will be raised about 2m above ground and mounted on small footings drilled and set into the ground. The excavations for the footings are about 1.5m in diameter and so the actual ground disturbance will be quite limited.

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<https://dea.maps.arcgis.com/apps/webappviewer/index.html?id=b8452ef22aeb4522953f1fb10e6dc79e>



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As long as the recommendations made in the 2012 study are adhered too, there are no objections to the development, proceeding.

The recommendations must be included in the Environmental Management Plan (EMP) for the proposed project.

Yours sincerely

Jonathan Kaplan

CURRICULUM VITAE

Name: Jonathan Michael Kaplan
Profession: Archaeologist/Heritage Practitioner
Date of Birth: 23-09-1961
Name of Company: Agency for Cultural Resource Management (ACRM)
Position: Director
Nationality: South African
ID Number: 6109235177089
Marital status: Married with two children
Languages:
First language: English
Other: Afrikaans
Contact details: 5 Stuart Road
Rondebosch
7700
Phone/Fax (021) 685 7589
Mobile 082 321 0172
E-mail acrm@wcaccess.co.za

Qualifications:

- MA (Archaeology) University of Cape Town, 1989.

Professional registration:

- Association of Southern African Professional Archaeologists (ASAPA) Membership No. 253
- Registered with the South African Heritage Resources Agency (SAHRA)
- Association of Professional Heritage Practitioners (APHP)

Publications:

- Jerardino, A., Halkett, D., Hart, T., Kaplan, J., Navarro, R., & Nilssen, P. 2016 (in press). Filling-in the gaps and testing past scenarios on the central West Coast: hunter-gatherer subsistence and mobility at 'Deurspring 16' shell midden, Lamberts Bay, South Africa. *South African Archaeological Bulletin*
- Kaplan, J. & Mitchell, P. 2012. The archaeology of the Lesotho Highlands Water Project Phases 1A and 1 B. *South African Humanities* 24:1-32. KwaZulu Natal Museum.
- Sealy, J., Maggs, T., Jerardino, A. & Kaplan, J. 2004. Excavations at three shell middens at Melkbosstrand: variability among herder sites on Table Bay. *South African Archaeological Bulletin* 59:17-28.
- Kaplan, J. 1993. The state of archaeological information in the coastal zone from the Orange River to Ponta do Ouro. Report prepared for the Department of Environmental Affairs and Tourism. Agency for Cultural Resource Management.
- Kaplan, J. 1990. The Umhlatuzana Rock Shelter sequence: 100 000 years of Stone Age history. *Natal Museum Journal of Humanities* 2:1-94.

- Kaplan, J. 1989. 45 000 years of hunter-gatherer history at Umhlatuzana Rock Shelter: South African Archaeological Society Goodwin Series 6:7-16
- Kaplan, J. 1987. Settlement and Subsistence at Renbaan Cave. In Parkington, J. & Hall, M (Eds). Papers in the Prehistory of the Western Cape, South Africa. British Archaeological Reports International Series 332:237-261

Countries of work experience:

South Africa, Lesotho, Swaziland, Namibia, Botswana, Mozambique

Services offered:

- Archaeological Impact Assessments
- Heritage Impact Assessments
- Heritage Management Plans
- Heritage tourism
- Rock art recording
- Excavation and data analysis
- Monitoring of construction activities

Company profile:

ACRM was founded by Jonathan Kaplan in 1992 and is one of the oldest heritage consultancies in the country. Jonathan has completed more than 1500 Archaeological and Heritage Impact Assessments (HIA & AIAs), specialising in Stone Age, rock art and herder studies. He has undertaken baseline studies on large infrastructure projects, including the Lesotho Highlands Water Project, Maguga Dam (Swaziland), Namibia/Botswana Water Transfer Project, Sasol/ACO Gas Pipeline (South Africa & Mozambique), Corridor Sands (Mozambique) and numerous utility projects for Eskom, the Department of Transport and Public Works, local and provincial authorities, as well as private developers. Since 2010, ACRM has conducted baseline studies (Scoping and full EIA) on a large number of alternative energy (wind and photo-voltaic) projects in the Western and Northern Cape Provinces.

Jonathan has a MA degree in Archaeology (UCT 1989) and is an Association of Southern African Professional Archaeologists (ASAPA) accredited Cultural Resources Management (CRM) practitioner (Membership No 253).

ACRM has been registered since 1992.

Declaration:

I confirm that the above CV is an accurate description of my experience and qualifications.



Signature

Date: 15 January, 2016

**Appendix D3a: Archaeological Impact Assessment
(Original report)**

**ARCHAEOLOGICAL IMPACT ASSESSMENT
THE PROPOSED KEREN ENERGY KEIMOOES
SOLAR FARM ON ERF 666
KEIMOOES
NORTHERN CAPE PROVINCE**

Prepared for:

ENVIROAFRICA

Att: Mr Bernard de Wit

PO Box 5367

Helderberg

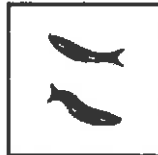
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E-mail: Bernard@enviroafrica.co.za

On behalf of:

KEREN ENERGY KEIMOOES (PTY) LTD

By



Jonathan Kaplan

Agency for Cultural Resource Management

5 Stuart Road

Rondebosch

7700

Ph/Fax: 021 685 7589

Mobile: 082 321 0172

E-mail: acrm@wcaccess.co.za

**MARCH
2012**

Archaeological study proposed solar energy farm near Keimoes

Executive summary

The Agency for Cultural Resource Management was requested to conduct an Archaeological Impact Assessment (AIA) for the proposed construction and operation of a 10 Mega Watt (MW) commercial Concentrated Photovoltaic (CPV) Energy Generation Facility on Erf 666 in Keimoes in the Northern Cape Province.

Keimoes is situated alongside the Orange River, about 40 kms west of Upington. The site for the proposed solar farm is located north of the N14 and just to the east of the Keimoes Golf Course. The land is owned by the Kai Garib local municipality and is currently zoned for Agriculture use. The proposed site is fairly flat, but does slope gently toward the N14 and is very exposed and covered in rocks and stone with sparse natural vegetation covering the 20 ha footprint area.

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

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

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

A 1 day, foot survey of the proposed footprint area was undertaken by the archaeologist on 2 March 2012, in which the following observations were made:

- More than 100 stone artefacts were mapped with a hand held GPS unit. Most of the tools are assigned to the Later Stone Age, but tools belonging to the Middle Stone Age were also counted. Only two Early Stone Age implements were found, including a large biface and one handaxe. More than 90% of the tools are in banded ironstone, with the remainder in indurated shale, quartzite, silcrete and quartz. Banded ironstone is fairly prolific on the site and was clearly the preferred raw material for making tools. Banded ironstone is known to have been a favoured and desirable raw material for making stone artefacts and occurs on a number of sites that have been documented by the archaeologist and others throughout the Northern Cape. Most of the tools are spread very thinly and unevenly over the surrounding landscape, but a low density scatter of tools was documented near the Eskom servitude. However, no evidence of any factory or workshop site, or the result of any human settlement was identified. No organic remains such as bone, pottery, or ostrich eggshell were found.

The majority of the lithics comprise flakes, flake blades and chunks most of which are utilised and/or retouched, testament to the flaking qualities and sharp cutting edges of the preferred raw material. At least 18 cores or minimal cores/flaked chunks were also counted, indicating a fairly high level of stone fabrication on the site. The ratio of cores to flakes suggests that many of the final retouched or flaked artefacts were removed from the site by the toolmakers. Frequencies of formal retouched tools are very low, but the numbers of miscellaneous retouched tools (nearly 50%) is quite high. Of the formal retouched tools; only one convex

Archaeological study proposed solar energy farm near Keimoes

scraper, one side scraper, one possible end scraper, and two step retouched flakes (possible utilitarian adzes) were counted. No hammerstones were found and only one manuport was counted.

As archaeological sites are concerned, the occurrences are lacking in context as no organic remains such as bone, pottery or ostrich eggshell was found. There is no spatial patterning to the distribution of finds, but it was noted that some of the lithics tended to cluster around the south western portion of the proposed site near the Eskom servitude. Overall, however, the fairly small numbers and isolated context in which they were found means that the archaeological remains on Erf 666 have been rated as having low archaeological (Grade 3C) significance.

There are no graves on the affected property.

In terms of the built environment, the area has no significance, as there are no old buildings, structures, or features, old equipment, public memorial or monuments in the footprint area.

It is maintained that the study has captured good information on the archaeological heritage present 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 the proposed development of the Keren Energy Keimoes Solar Farm on Erf 666 will not have an impact of great significance on these and potentially other archaeological remains.

Indications are that in terms of archaeological heritage, the proposed activity (i. e. the construction of a solar energy farm) is viable and no fatal flaws have been identified.

With regard to the proposed development of the Keren Energy Keimoes Solar Farm on Erf 666 in Keimoes, the following recommendations are made:

1. No further archaeological mitigation is required.
2. Should any unmarked human burials/remains 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 the South African Heritage Resources Agency (SAHRA) (Att Ms Mariagrazia Galimberti 021 462 4502). Burials, etc must not be removed or disturbed until inspected by the archaeologist.

Archaeological study proposed solar energy farm near Keimoes

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1. INTRODUCTION

1.1 Background and brief

Keren Energy Keimoes (Pty) Ltd, commissioned the Agency for Cultural Resource Management to conduct an Archaeological Impact Assessment (AIA) for the proposed construction and operation of a 10 MW Concentrated Photovoltaic (CPV) Energy Generation Facility on Erf 666 near Keimoes in the Northern Cape (Figures 1 & 2). The proposed development is situated within the Kai Garib municipality. Erf 666 is zoned for Agriculture and is owned by the local authority.

The Northern Cape has the highest levels of Solar Irradiance in South Africa, which makes the location of the proposed development ideal for solar energy generation. The renewable energy industry is currently experiencing an explosive growth worldwide. In South Africa, while such energy sources are not expected to replace the country's traditional reliance and dependency on coal-generated power, the National Energy Regulator of South Africa (NERSA) has published a favourable feed-in tariff structure for renewable energy that allows for independent clean energy producers to invest in renewable energy resources. The growing alternative energy industry is considered to be of national importance in anticipation of its contribution to electricity supply and reduced reliance of non-renewable energy sources.

It is in this context that the applicant proposes to construct a solar energy facility in Keimoes. The proposed activity entails the construction of about 140 CPV solar panels covering an area of about 20 ha. The CPV panels will be mounted on pedestals drilled and set into the ground. Extensive bedrock excavations are not envisaged, but some vegetation will need to be cleared from the site. Associated infrastructure includes single track internal access roads, trenches for underground cables, transformer pads, a switching station, a maintenance shed, and a temporary construction camp. The electricity generated from the project will be fed directly into the national grid at the Eskom Oasis substation which is situated alongside the subject property.

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

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

2. HERITAGE LEGISLATION

The National Heritage Resources Act (Act No. 25 of 1999) makes provision for a compulsory Heritage Impact Assessment (HIA) when an area exceeding 5000 m² 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))

Archaeological study proposed solar energy farm near Keimoes

- 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)).

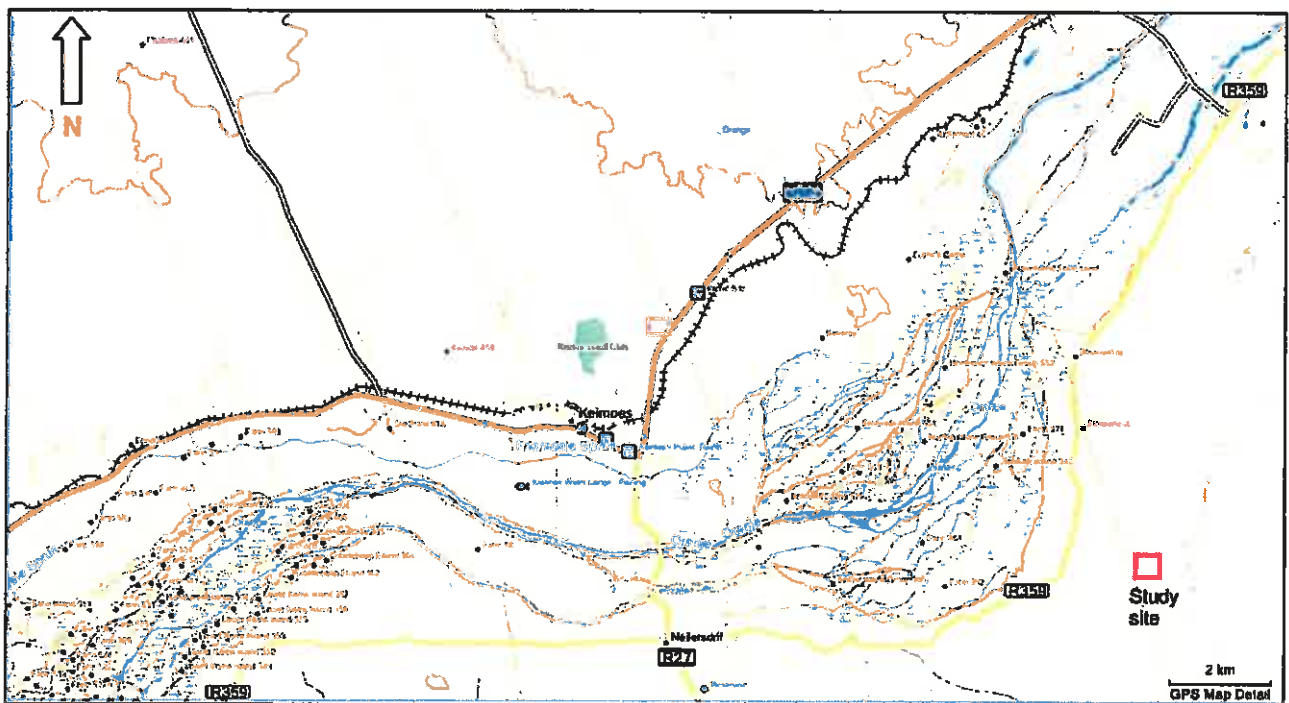


Figure 1. Locality Map

Archaeological study proposed solar energy farm near Keimoes

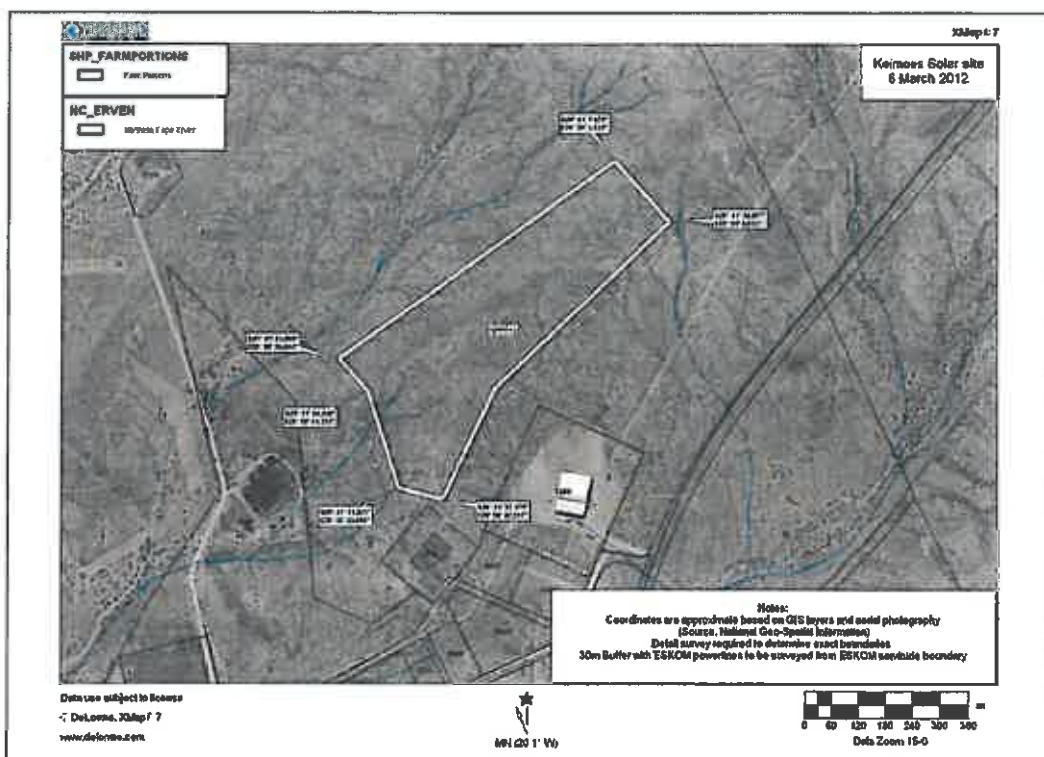


Figure 2. Aerial photograph of the proposed study site and the footprint area of the proposed solar farm

3. TERMS OF REFERENCE

The terms of reference for the study were to.

- Determine whether there are likely to be any important archaeological resources that may potentially be impacted by the proposed project, including the erection of the solar panels, internal access roads, trenches for underground cables, and any other associated infrastructure;
- 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 AFFECTED ENVIRONMENT

An aerial photograph indicating the location site of the proposed Keren Energy Keimoes Solar Farm is illustrated in Figure 3.

The proposed site (Erf 666) is located just north of the N14 and about 2 kms before entering the town of Keimoes on the right hand side of the road. Keimoes is located about 40 kms west of Upington. The proposed site, which is to the east of the Keimoes Golf Course, is fairly flat, but slopes gently toward the N14. The site is very rocky and stony with sparse vegetation covering the \pm 20 ha footprint area (Figure 4). A few sporadic trees occur in places. Several drainage channels (non-perennial streams) intersect the site while there are several small hillocks located alongside an Eskom powerline servitude. The vegetation alongside the drainage channels is quite dense. The Eskom Oasis sub-station is located directly west of the proposed solar energy farm. There is no other infrastructure on the proposed site. A large food packaging factory (Sun Foods) is located directly alongside the proposed site and the N14. Immediate surrounding land use is the Sun Food processing factory, the Keimoes Golf Course, Waste Water Treatment Works, the N14, and large tracts of vacant, communal grazing land.

There are no old buildings, structures or features or any old equipment on the proposed site.

There are no public memorials or monuments on the site.

There are no visible graves on the proposed site, or within the proposed footprint area of the proposed solar farm.

Archaeological study proposed solar energy farm near Keimoes

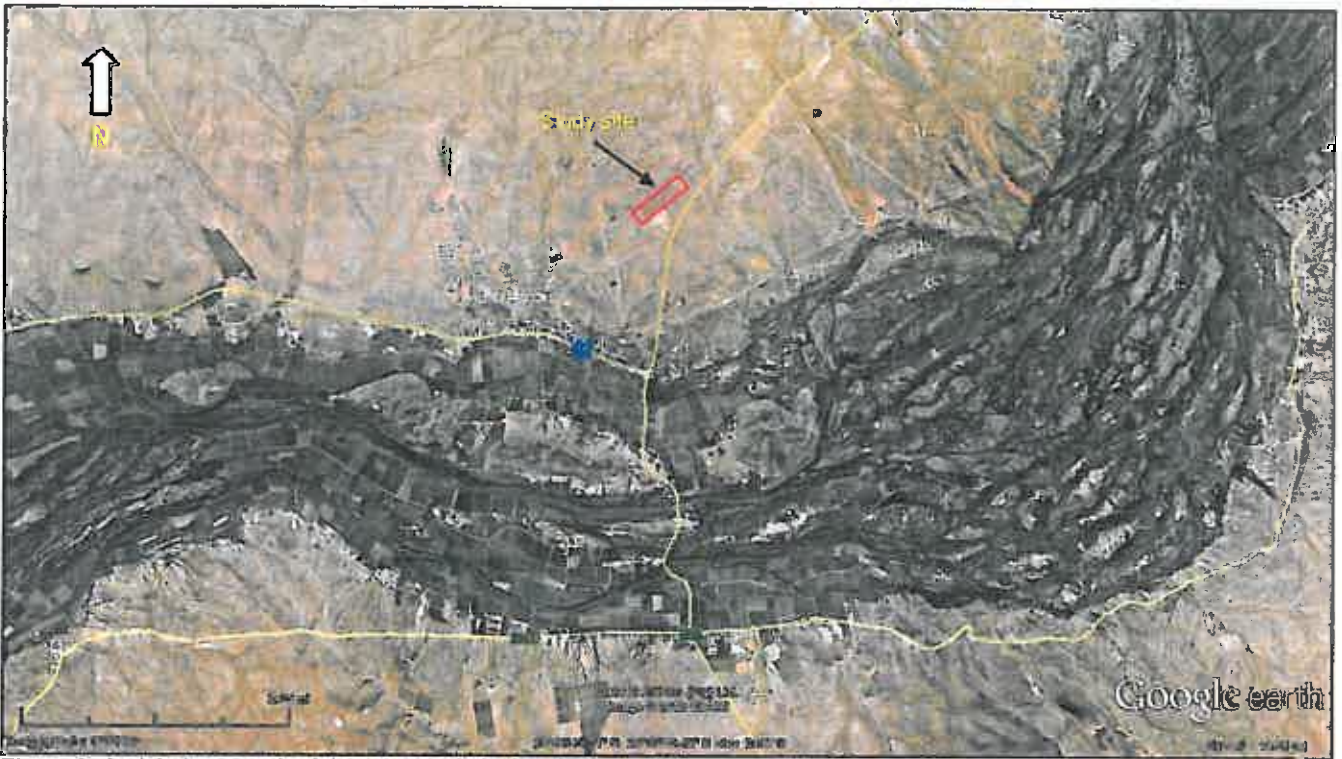


Figure 3. Aerial photograph of the proposed site in relation to Keimoes and the Orange River

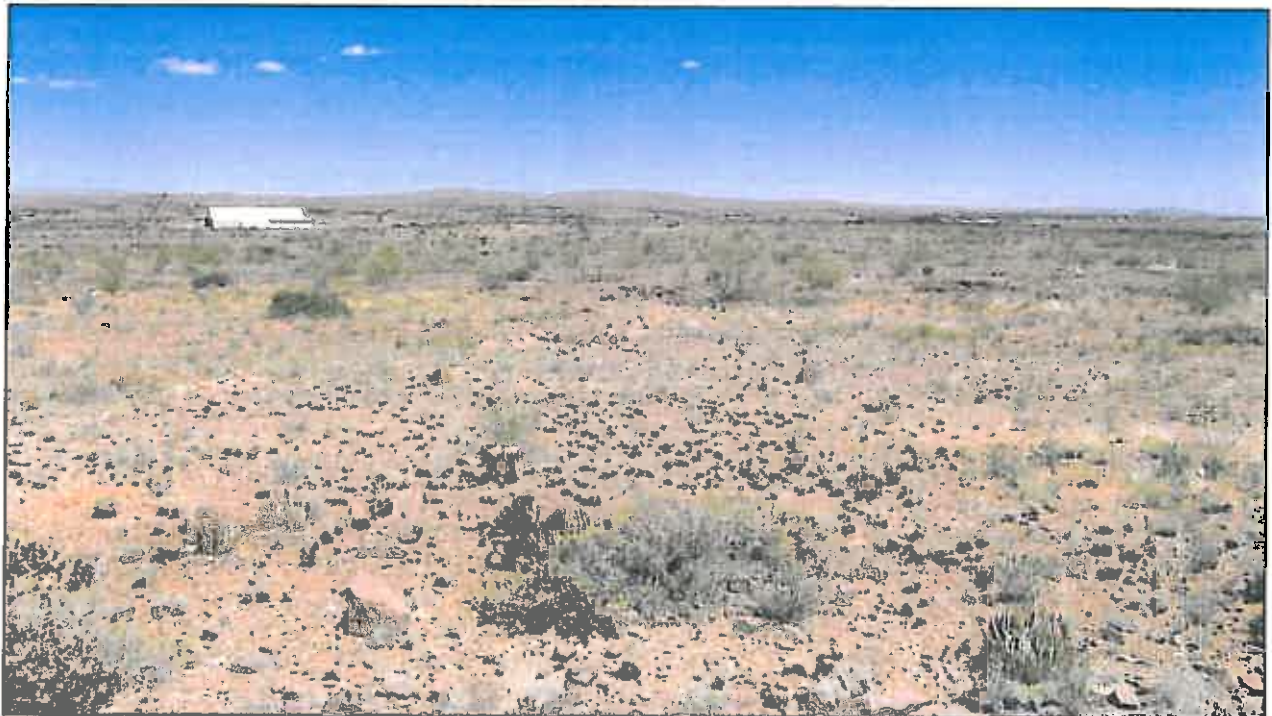


Figure 4. View of the proposed site facing west. The Sun Foods factory can be seen in the left of the plate

5. STUDY APPROACH

5.1 Method of survey

A survey of the proposed footprint area was undertaken by J Kaplan on 02 March, 2012. This survey was undertaken on foot and most of the footprint area was covered in a series of transects. The ± 20 m wide, Eskom powerline servitude was not searched. A GPS track path of the survey was created (refer to Figure 13 in Appendix I). All archaeological occurrences documented during the study were mapped *in-situ* using a hand-held Garmin Oregon 300 GPS unit set on the map datum WGS 84. A collection of tools were also photographed, including the context in which some of the artefacts were found. A desk top study was also done and archaeologist David Morris of the McGregor Museum was consulted.

5.2 Constraints and limitations

There were no constraints or limitations associated with the study. Apart from the drainage channels which have some vegetation growing alongside its banks, there is very little natural vegetation covering the site, and only a few sporadic trees occurring in places. As a result, archaeological visibility was very good.

5.3 Identification of potential risks

Pre-colonial archaeological heritage (i. e. stone implements) will be impacted by the proposed development, but it is maintained that the study has captured a good record of the archaeological heritage present in the proposed footprint area. Apart from trenches for underground cabling, limited bedrock excavations are envisaged. The solar panels will be raised about 2 m above ground and mounted on small footings drilled and set into the ground. The excavations for the footings are about 1-1.5 m in diameter and so the actual ground disturbance will be quite limited and contained.

5.4 Results of the desk top study

The archaeology of the Northern Cape is rich and varied covering long spans of human history. According to Beaumont *et al* (1995:240) "thousands of square kilometres of Bushmanland are covered by a low density lithic scatter". No previous archaeological work has been done in Keimoes, but an AIA for a proposed solar farm in Kakamas, about 40 kms west of Keimoes documented small numbers of LSA lithics in banded ironstone (Kaplan 2012). Banded ironstone implements were also documented during a survey for a water pipeline between Kakamas and Kenhardt (Kaplan 2008) while Orton (2012) recently recorded very low density scatters of LSA and MSA tools in quartz, indurated shale and banded ironstone for a proposed solar farm near the Augrabies Falls National Park. A number of sites (including open scatters and shelters) are also described by Orton (2012) in the Augrabies area, but these are located many kilometres away from Keimoes. The archaeologist also consulted with David Morris of the McGregor Museum in Kimberly with regard to the presence of archaeological sites in Keimoes, but at the time of writing up this report, Mr Morris had not yet communicated to the archaeologist.

6. FINDINGS

More than 100 stone artefacts were mapped and counted with a hand held GPS unit.

A description of the archaeological finds located during the study is presented in Table A in Appendix I.

The majority of finds located during the study are assigned to the Later Stone Age (LSA), but at least 16 Middle Stone Age artefacts were also counted. Only two Early Stone Age implements were found, including a large biface (113) and one handaxe (060). More than 90% of the tools are in banded ironstone, with the remainder in indurated shale and quartzite. Only two 'silcrete' flakes, one limestone flake and one quartz core, were found. Banded ironstone is known to have been a favoured raw material for making stone artefacts and occurs on a number of sites that have been documented by the archaeologist and others throughout the Northern Cape. It occurs fairly widely over the site and was clearly a desirable raw material which was targeted by LSA people for its superior flaking qualities.

Most of the archaeological remains are spread very thinly and unevenly over the surrounding landscape, but one small, low density scatter of tools (105) was documented not far from the Eskom servitude. This included a mix of LSA and MSA tools including several chunks, a weathered broken limestone flake, several burnished retouched and utilised flakes, a burnished core, and an unworked quartzite cobble/manuport on a large patch of stony ground. However, no evidence of any factory or workshop site, or the result of any human settlement was identified. Spatially, a number of the occurrences tend to cluster around the south western portion of the proposed footprint area near the Eskom servitude but no organic remains such as bone, pottery, or ostrich eggshell were found.

Most of the lithics comprise flakes, flake blades and chunks of which many are utilised and/or retouched, testament to the superior flaking qualities and sharp cutting edges of the banded iron stone. A number of the tools are also abraded or weathered suggesting that they have lain on the surface for many years. At least 18 cores/ minimal cores/flaked chunks (or about 20 % of the stone artefact assemblage) were also counted, indicating a fairly high level of stone fabrication. Five of the cores are made on cobbles of indurated shale. The ratio of cores to flakes on the ground may indicate that many of the formal tools/artefacts were removed from the site by the toolmakers.

Frequencies of formal retouched tools are very low, but the numbers of miscellaneous retouched tools (almost 50%) is quite high. Of the formal retouched tools; one convex scraper, one side scraper, one possible end scraper, two step retouched flakes (possible adzes) were counted. No hammerstone were found and only one manuport was counted.

No colonial heritage resources were noted during the study.

A collection of tools documented during the study and the context in which some of them were found are illustrated in Figures 5-12.

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Figure 5. Core and flakes. Scale is in cm



Figure 8. Site 105. Low density scatter of tools



Figure 6. Core and pointed retouched flakes (MSA). Scale is in cm



Figure 9. Collection of tools. Scale is in cm



Figure 7. Collection of stone tools. Scale is in cm



Figure 10. Collection of tools. Scale is in cm

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Figure 11. ESA Handaxe (060) scale is in cm



Figure 12. ESA biface (060) scale is in cm

6.1 Significance of the archaeological remains

Most of the stone implements documented during the study comprise isolated occurrences that are spread thinly and unevenly over the surrounding landscape, although one low density scatter of tools (105) was recorded in the western portion of the proposed footprint area. However, no evidence of any factory or workshop site, or the result of any human settlement was identified.

As archaeological sites are concerned, the occurrences are lacking in context as no organic remains such as bone, pottery or ostrich eggshell was found. There is no spatial patterning to the distribution of finds, but it was noted that some of the lithics tended to cluster around the south western portion of the proposed site near the Eskom servitude (refer to Figure 13). Overall, however, the fairly small numbers and isolated context in which they were found means that the archaeological remains on Erf 666 have been rated as having low archaeological (Grade 3C) significance.

7. ASSESSMENT OF IMPACTS

In the case of the proposed Keren Energy Keimoes Solar Energy Farm it is expected that some archaeological impacts will occur during the construction phase of the proposed project, but that the overall impact on important archaeological resources will be low (Table 1).

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

Table 1. Assessment of archaeological impacts.

8. CONCLUSION

Development of the proposed Keren Energy Keimoes solar energy facility will have a very limited impact on archaeological heritage resources.

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

The project should be allowed to proceed with no further archaeological input required.

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

9. RECOMMENDATIONS

With regard to the proposed construction and operation of a 10 MW solar energy facility on Erf 666 near Keimoes in the Northern Cape, the following recommendations are made:

1. No further archaeological mitigation is required.
2. Should any unmarked human burials/remains 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 the South African Heritage Resources Agency (SAHRA) (Att Ms Mariagrazia Galimberti 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.

Kaplan, J. 2012. Agency for Cultural Resource Management, the proposed Keren Energy Kakamas Solar Plant on Erf 1654, Kakamas. Report prepared for EnviroAfrica. Agency for Cultural Resource Management.

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.

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Appendix I

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Name of Site	Name of Farm	Lat/Long	Findings
	Erf 666 Keimoes		
042		S28 41.502 E20 59.038	Crude quartzite misc retouched flake ?MSA
043		S28 41.495 E20 59.051	Thick pointed flake blade & small chunk -- misc retouch
044		S28 41.489 E20 59.041	Cobble chunk; green chert flake (MSA), and misc retouched flake & chunk
045		S28 41.290 E20 59.143	Small nicked chunk and misc retouch
046		S28 41.289 E20 59.144	Indurated shale cobble core
047		S28 41.258 E20 59.168	Large weathered pointed MSA flake, with some retouch along dorsal edge
048		S28 41.192 E20 59.201	Indurated shale cobble core
049		S28 41.103 E20 59.139	Core reduced flake with utilization damage and misc retouch; chunk/pebble; small misc retouch chunk
050		S28 41.058 E20 59.106	Possible side scraper & chunk
051		S28 41.129 E20 59.131	Chunk/core on cobble; round quartz chunk/minimal core
052		S28 41.205 E20 59.176	Flake & flake with step flaking (? Adze)
053		S28 41.229 E20 59.193	Misc retouch flake
054		S28 41.288 E20 59.193	Large flake, side retouched
055		S28 41.312 E20 59.183	Round cobble core, with cortex
056		S28 41.412 E20 59.094	Large indurated shale cobble core
057		S28 41.426 E20 59.083	Large burnished flake (?MSA) retouched and utilized
058		S28 41.430 E20 59.079	Burnished chunk with 1-2 retouch
059		S28 41.471 E20 59.050	Burnished chunk/pebble
060		S28 41.438 E20 59.024	Large quartzite biface (ESA)
061		S28 41.415 E20 59.044	Chunk with misc retouch
062		S28 41.227 E20 59.174	Burnished chunk
063		S28 41.223 E20 59.175	Burnished pebble chunk; small pointed retouched flake
064		S28 41.227 E20 59.145	Double sided retouched flake
065		S28 41.229 E20 59.143	Chunk with 1-2 retouch
066		S28 41.239 E20 59.136	Retouched chunk
067		S28 41.243 E20 59.131	Broken retouched flake & a retouched (high edge) possible end scraper
068		S28 41.246 E20 59.128	Burnished chunk
069		S28 41.262 E20 59.112	Indurated shale cobble -- manuport
070		S28 41.345 E20 59.023	Miscellaneous retouched flake
071		S28 41.347 E20 59.020	Miscellaneous retouched flake
072		S28 41.375 E20 58.997	Round core and 2 flakes
073		S28 41.380 E20 58.995	Cortex chunk/core
074		S28 41.242 E20 59.108	Burnished broken flake in servitude
075		S28 41.207 E20 59.119	Flake
076		S28 41.346 E20 58.943	Indurated shale flake (weathered) ?MSA
077		S28 41.407 E20 58.882	Burnished retouched flake ?MSA
078		S28 41.450 E20 58.864	Burnished flake
079		S28 41.465 E20 58.856	Chunk; end retouched & utilised flake & burnished retouched flake
080		S28 41.483 E20 58.848	Chunk
081		S28 41.510 E20 58.832	Misc utilized chunk; misc retouched flake
082		S28 41.514 E20 58.831	Misc retouched flake
083		S28 41.519 E20 58.826	Core and flake

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084		S28 41.531 E20 58.815	Misc. retouched flake; cobble flake (cortex)
085		S28 41.492 E20 58.808	Indurated shale core/chunk (cortex)
086		S28 41.466 E20 58.819	Single flake with step flake retouch & end scraper retouch
087		S28 41.457 E20 58.821	Burnished flake with retouch on ventral surface
088		S28 41.424 E20 58.838	Quartzite MSA flake
089		S28 41.421 E20 58.842	Large retouched flake (broken); core/chunk
090		S28 41.336 E20 58.903	Retouched chunky flake
091		S28 41.236 E20 59.032	Broken quartzite flake
092		S28 41.220 E20 59.053	Chunk/core and broken retouched MSA flake
093		S28 41.147 E20 59.138	Round core
094		S28 41.149 E20 59.128	Misc retouched chunky MSA flake
095		S28 41.188 E20 59.062	Red banded agate lump/chunk
096		S28 41.214 E20 59.018	Burnished chunky, retouched MSA flake; burnished chunk with misc retouch; burnished chunk with utilization damage and misc retouch
097		S28 41.230 E20 58.995	Chunk
098		S28 41.311 E20 58.916	Large burnished Indurated shale core ?MSA
099		S28 41.338 E20 58.900	Double sided retouched chunky flake ?MSA
100		S28 41.354 E20 58.886	Chunk
101		S28 41.387 E20 58.860	Small chunk with misc retouch
102		S28 41.398 E20 58.851	Pebble core; pointed triangular shaped flake with retouch on 1 end; flake with retouch on ventral surface
103		S28 41.430 E20 58.827	Chunk with misc retouch
104		S28 41.439 E20 58.820	Chunk; large wide burnished blade; large round burnished Indurated shale chunk/min core – large flake scars ?MSA
105		S28 41.446 E20 58.809	Low density scatter – x 4 chunks, 1 weathered broken limestone flake, burnished retouched flake, burnished core, MSA retouched flake, quartzite cobble manuport, on large patch stony ground
106		S28 41.479 E20 58.791	Chunk and misc retouched flake
107		S28 41.487 E20 58.777	Chunk and retouched cortex flake with some end retouch and utilized damage on ventral surface
108		S28 41.487 E20 58.777	Chunky burnished indurated shale flake blade ?MSA
109		S28 41.434 E20 58.783	Multiple retouched flake
110		S28 41.433 E20 58.788	Chunky side retouched flake
111		S28 41.427 E20 58.792	Round quartzite cobble core/chunk
112		S28 41.428 E20 58.767	Broken chunk/cobble cortex with scraper retouch
113		S28 41.439 E20 58.756	ESA quartzite biface
114		S28 41.505 E20 58.698	Large green silcrete side struck flake ?MSA
115		S28 41.437 E20 58.753	Cortex flake misc retouch and utilized
116		S28 41.421 E20 58.758	Weathered/burnished chunk
117		S28 41.398 E20 58.788	Flat quartzite utilised flake; several flakes and chunk
118		S28 41.358 E20 58.811	Snapped quartzite MSA flake
119		S28 41.176 E20 58.968	? adze and 1 min retouched convex shaped

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			flake ?scraper blank
120		S28 41.167 E20 58.970	Cortex cobble chunk/min core
121		S28 41.138 E20 59.000	Burnished chunk
122		S28 41.105 E20 59.034	MSA utilised flake blade broken tip
123		S28 41.068 E20 59.089	Chunk
124		S28 41.091 E20 59.104	Small chunky side scraper
125		S28 41.097 E20 59.120	Burnished flake
126		S28 41.089 E20 59.059	Burnished flake
127		S28 41.138 E20 58.988	Green silcrete flake
128		S28 41.150 E20 58.974	Small snapped retouched flake
129		S28 41.346 E20 58.772	Large chunk
130		S28 41.333 E20 58.789	X 2 step retouch chunks
131		S28 41.322 E20 58.804	Flake
132		S28 41.201 E20 58.973	Utilised and retouched flake blade
133		S28 41.201 E20 58.975	MSA quartzite flake
134		S28 41.086 E20 59.069	Flake
135		S28 41.130 E20 59.143	Double sided retouched flake & chunk
136		S28 41.197 E20 59.152	Large flat core in road
137		S28 41.262 E20 59.216	Weathered MSA Indurated shale flake
138		S28 41.315 E20 59.219	Snapped retouched and double sided utilised pointed flake
139		S28 41.320 E20 59.217	Chunk
140		S28 41.442 E20 59.101	Utilised cobble cortex flake
141		S28 41.462 E20 59.088	Small chunky weathered utilised flake

Table A. Spreadsheet of waypoints and description of archaeological finds. Unless otherwise stated, all implements are in locally available banded iron stone which is prolific over the study area and surrounding farms

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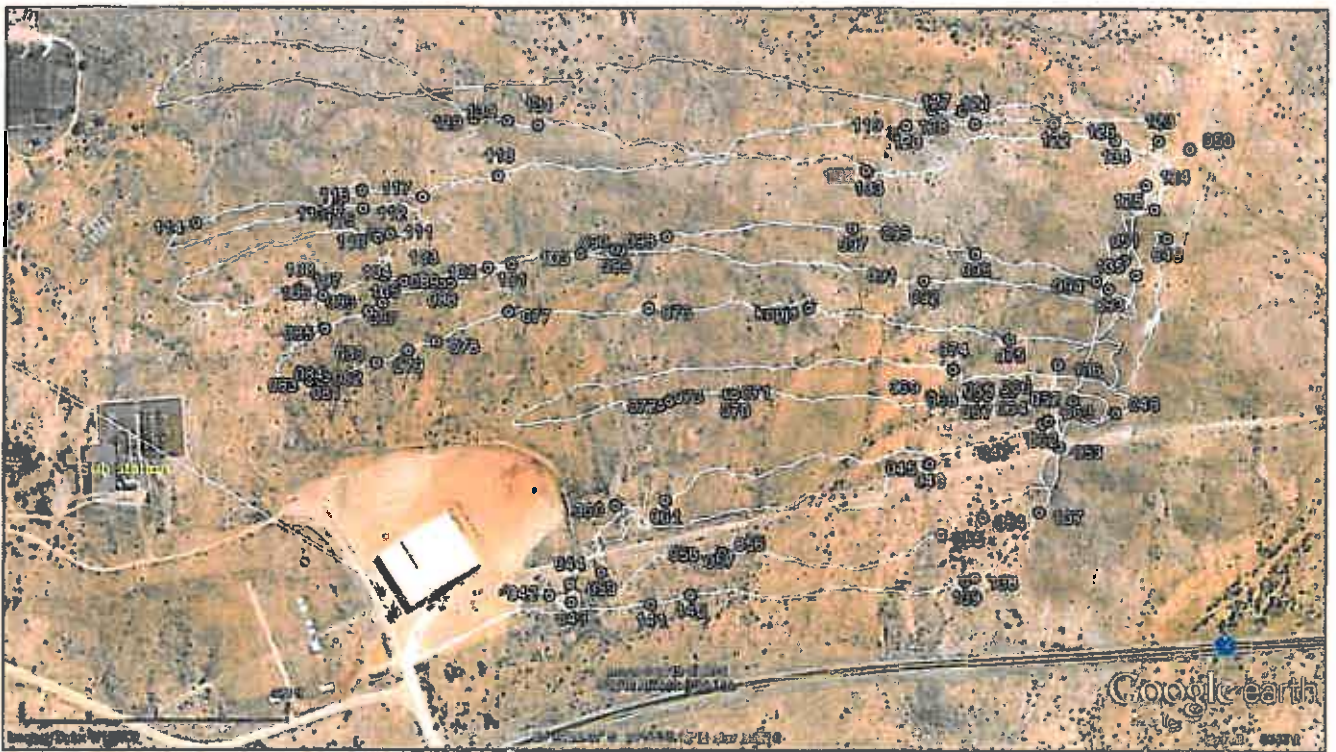


Figure 13. GPS trackpath and waypoints of archaeological finds