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

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

08 March, 2017

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

Dear Mr de Wit,

ARCHAEOLOGICAL IMPACT ASSESSMENT, KEREN ENERGY KAKAMAS SOLAR ENERGY FARM ON ERF 1654 KAKAMAS, NORTHERN CAPE

An Archaeological Impact Assessment (AIA) for the Keren Energy Kakamas Solar Energy Farm on Erf 1654 in Kakamas (Kai! Garib Municipality) in the Northern Cape, was undertaken by ACRM in 2012[1] (Figures 1 & 2).

The following heritage resources were recorded during the study:

➢ A highly dispersed scatter of Later Stone Age (LSA) and Middle Stone Age (MSA) implements were recorded during the study. The material was encountered on loose, degraded quartz gravels. The majority of the resources are in banded ironstone, with the remainder in quartz, quartzite and indurated shale. At least 10 cores/minimal cores were counted, indicating low level stone fabrication on the site. No activity areas or any evidence of human settlement was located. Two convex scrapers and one side scraper were found. No organic remains such as pottery or ostrich eggshell were found. Indications are that most of the remains represent discarded flakes and/or flake debris.

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

Grading of the archaeological remains

The small number, isolated and disturbed 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 (Natasha Higgit 021 462 4509).

[1] Kaplan, J. 2012. Archaeological Impact Assessment, proposed Keren Energy Kakamas Solar Energy Farm on Erf 1654 Kakamas, Northern Cape. Report prepared for EnviroAfrica. ACRM, Cape Town

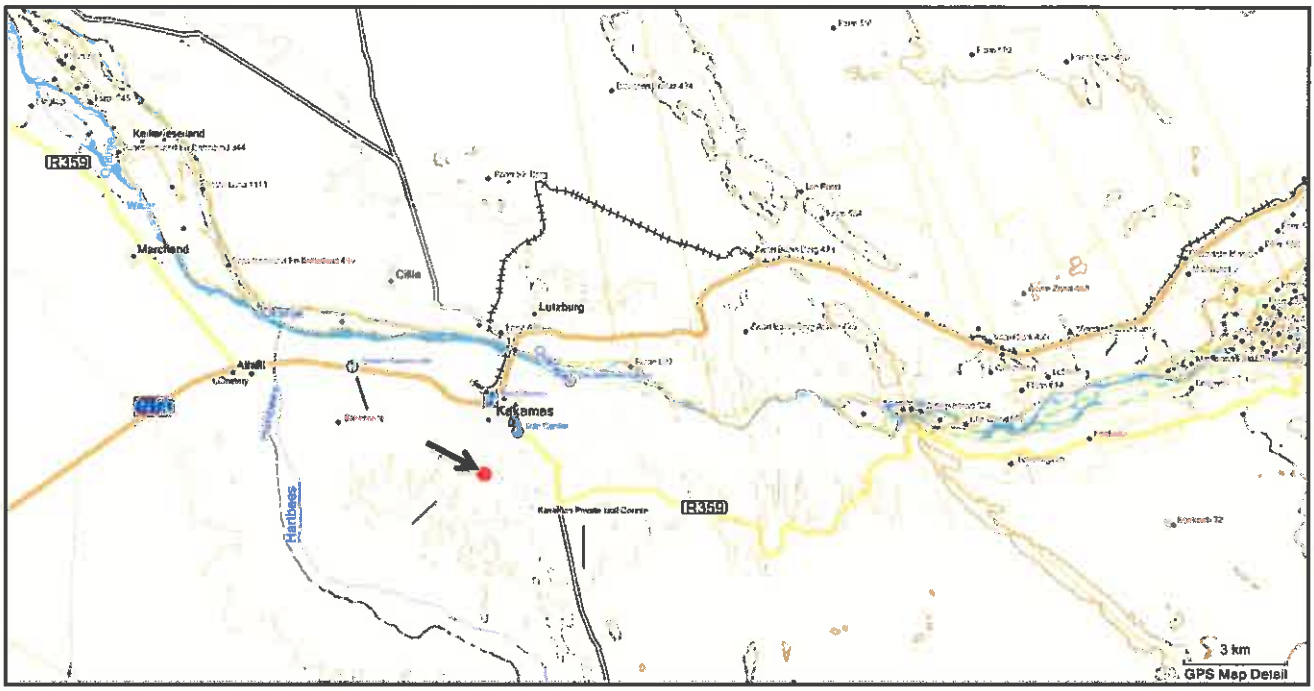

Figure 1. Locality Map. Arrow indicates the study site

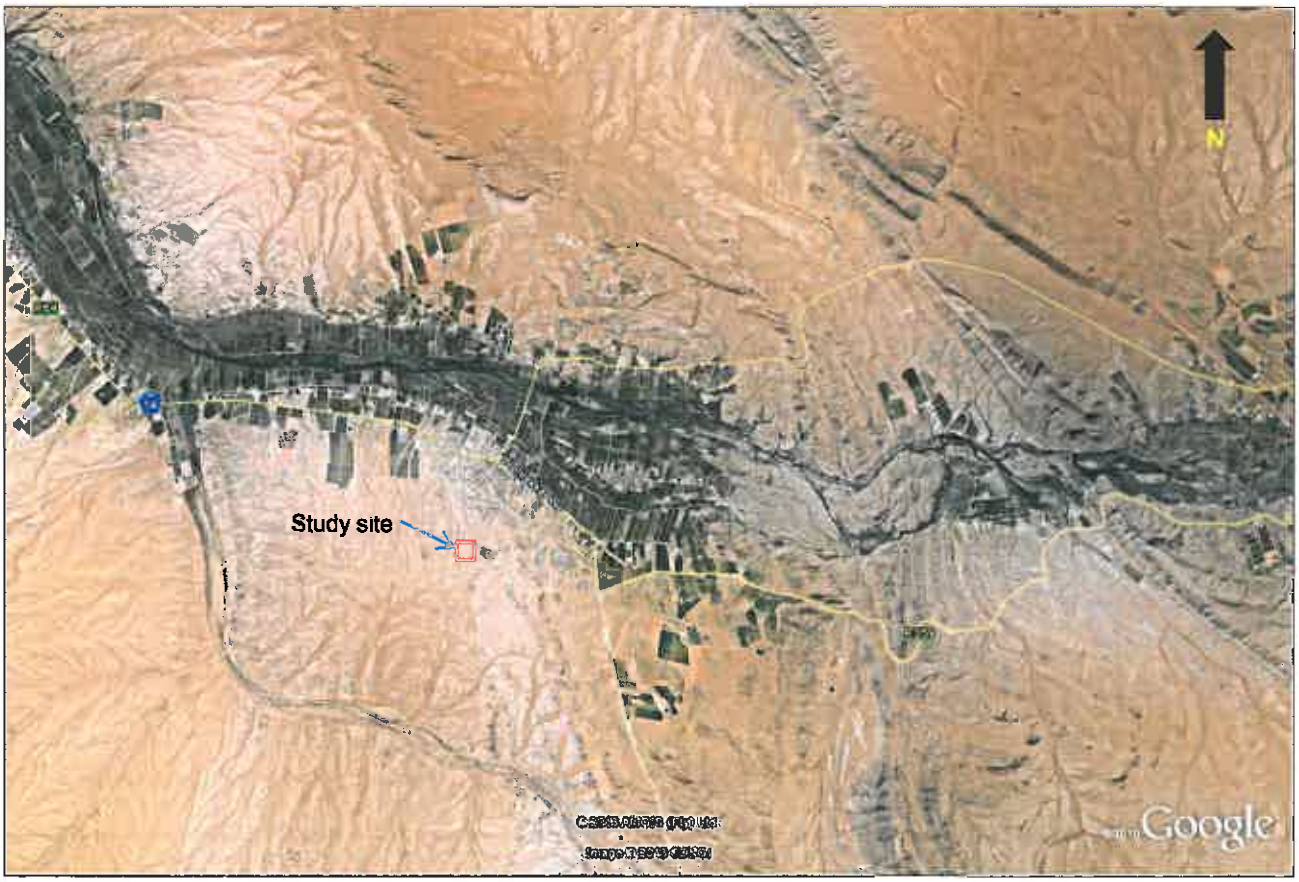

Figure 2. Google satellite map indicating the location of the proposed development site (red polygon) alongside the Waste Water Treatment Works

SAHRA reviewed the report (File No. 9/2/008/0001) on 28 June, 2012 and supported the recommendations made by the heritage practitioner.

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 proposed 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 3-6).

2.5 hrs was spent walking the site. The proposed powerline route to the Eskom Taaipit Kakamas substation was also assessed. The route follows an existing gravel road (Figure 6).

A track path of the assessment was also created (Figure 7).

A spreadsheet of waypoints and a description of the archaeological resources are presented in Table 1.

A collection of archaeological finds recorded during the field assessment is illustrated in Figures 8-10.


Figure 3. View of the proposed site facing south


Figure 4. View of the proposed site facing south

Figure 5. View of the proposed site facing north

Figure 6. Gravel road/powerline route to the Eskom Taaipit substation

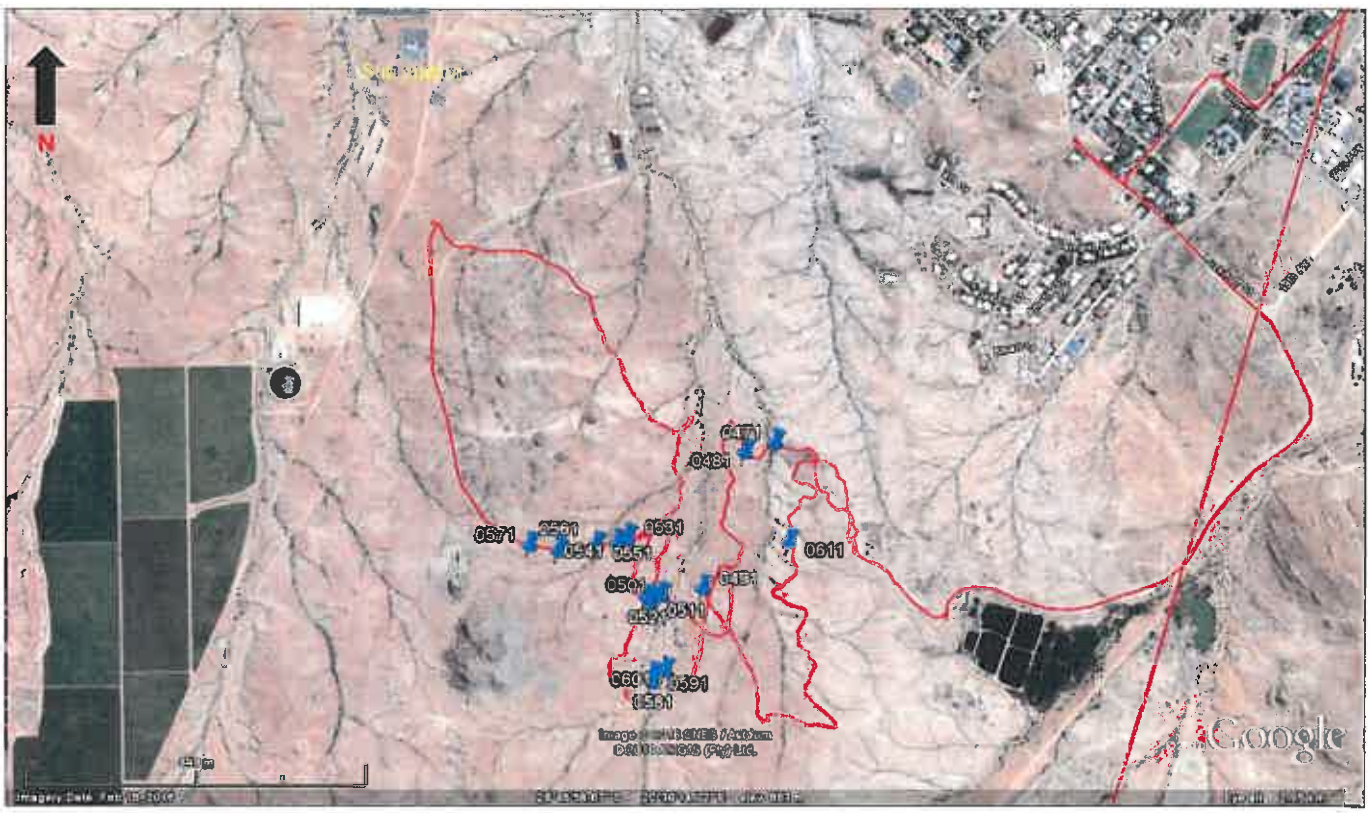

Figure 7. Track paths in red and waypoints of archaeological finds (refer to Table 1). Note the location of the Eskom Taaipit substation

Site	Name of farm	Lat/long	Description of finds	Grading	Suggested mitigation
	Erf 1654, Kakamas				
0471		S28° 46.990' E20° 36.384'	Large, rose quartz retouched flake alongside small track in dry stream channel	3C (low)	None required
0481		S28° 47.003' E20° 36.337'	2 banded ironstone flakes & 1 chunk on extensive sheet of eroded gravels	3C (low)	None required
0491		S28° 47.187' E20° 36.273'	Banded ironstone MRP on extensive sheet of eroded gravels	3C (low)	None required
0501		S28° 47.196' E20° 36.209'	MRP/chunk on eroded gravels	3C (low)	None required
0511		S28° 47.205' E20° 36.193'	Weathered banded ironstone MRP and broken flake on extensive gravels	3C (low)	None required
0521		S28° 47.199' E20° 36.188'	Banded ironstone cortex core on gravels	3C (low)	None required
0531		S28° 47.118' E20° 36.159'	Weathered banded iron-stone miscellaneous retouched flake in road/powerline servitude to Taaipit substation	3C (low)	None required
0541		S28° 47.125' E20° 36.143'	Banded ironstone flake in road/powerline servitude to substation	3C (low)	None required
0551		S28° 47.128' E20° 36.111'	Banded ironstone flake in road/powerline servitude to substation	3C (low)	None required
0561		S28° 47.136' E20° 36.052'	Banded ironstone chunk in road/powerline servitude to substation	3C (low)	None required
0571		S28° 47.129' E20° 36.008'	Banded ironstone cortex flake in road/powerline servitude to substation	3C (low)	None required
0581		S28° 47.313' E20° 36.196	Thin, indurated shale utilized cortex flake on gravels alongside dry stream channel	3C (low)	None required
0591		S28° 47.303' E20° 36.196'	Banded ironstone chunk on extensive gravels	3C (low)	None required
0601		S28° 47.298' E20° 36.216'	Small collection of late 19th /early 20th Century cheap, household ware	3C (low)	None required
0611		S28° 47.124' E20° 36.405'	Large quartzite cortex cobble/chunk	3C (low)	None required

Table 1. Spreadsheet of waypoints and description of archaeological finds

No. 5 Stuart Road Rondebosch, 7700 Phone/Fax 021-6857589
E-mail: acrm@wcaccess.co.za Mobile: 082 321 0172

Figure 8. Collection of tools. Scale is in cm

Figure 9. Site 0471 & Site 0521. Scale is in cm

Figure 10. Collection of tools and Site 0601. 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 is only one other renewable energy (RE) project planned within a 30km radius of Kakamas. Despite the presence of this site, it will not impact on archaeological resources in the proposed Kakamas PV site. It is also noted that the existing Kakamas Waste Water Treatment Plant is located about 500m south west of the proposed development site. An AIA for the proposed upgrading of the WWTW was undertaken by Kaplan[3], where a small number of stone tools in banded ironstone were recorded. Studies of several housing developments in Kakamas located dispersed scatters of archaeological heritage[4]. There is an old quarry located about 200m south of the proposed development site, while the Kakamas waste disposal site is located about 1.3kms to the south east.

Indications are that cumulative impacts will not need to be managed, since the surrounding area is not a sensitive archaeological landscape.

5. CONCLUSION

A reassessment of the Keren Energy Kakamas Solar Energy Farm on Erf 1654 confirms the results captured during the original study (Kaplan 2012), which found a small number of tools spread unevenly over the surrounding landscape.

The site assessment has shown that the development site is not a sensitive, threatened or vulnerable archaeological landscape.

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

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[2] https://dea.maps.arcgis.com/apps/webappviewer/index.html?id=b8452ef22aeb4522953f1fb10e6dc79e

[3] Kaplan, J. 2013. Heritage Impact Assessment, proposed new Waste Water Treatment Works on Erf 1181 Kakamas. Report prepared for EnviroAfrica. ACRM, Cape Town

[4] Kaplan, J. 2016. Archaeological Impact Assessment, proposed housing development on Erf 1612 Kakamas. Report prepared for EnviroAfrica. ACRM, Cape Town

Kaplan, J. 2013. Archaeological Impact Assessment proposed low cost housing development in Kakamas, Northern Cape. Report prepared for EnviroAfrica. ACRM, Cape Town.

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

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Marital status: Married with two children

Languages:
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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 Assessment
(Original report)

ARCHAEOLOGICAL IMPACT ASSESSMENT THE PROPOSED KEREN ENERGY KAKAMAS SOLAR FARM ON ERF 1654 KAKAMAS NORTHERN CAPE PROVINCE

Prepared for:

ENVIROAFRICA
Att: Mr Bernard de Wit
PO Box 5367
Helderberg
7135
E-mail: Bernard@enviroafrica.co.za

On behalf of:

KEREN ENERGY KAKAMAS (PTY) LTD

By

Jonathan Kaplan
Agency for Cultural Resource Management
5 Stuart Road
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7700
Ph/Fax: 021 685 7589
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MARCH
2012

Executive summary

The Agency for Cultural Resource Management was commissioned 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 1654 in Kakamas in the Northern Cape.

Kakamas is situated alongside the Orange River, about 80 kms west of Upington. The site for the proposed solar farm is located south of the town and just to the west of the Waste Water Treatment Works. The land is owned by the Kai Garib local municipality and is currently zoned for Agriculture use. The proposed 20 ha footprint area is fairly flat and slopes gently north toward the town. It is surrounded by hill slopes in the east. Several drainage channels intersect the site, draining south toward the town. The proposed footprint area is quite severely degraded. There is very little natural vegetation on the site. It is overgrazed, heavily sheet washed and covered in quartz gravel.

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 20 ha footprint area, and a proposed ± 1 km long overhead powerline was undertaken by the archaeologist on 1 March 2012.

The following observations were made:

- 41 single, isolated archaeological occurrences were documented and mapped with a hand held GPS unit. The tools are spread very thinly and unevenly over the surrounding landscape. Most of the lithics (about 70%) are assigned to the Later Stone Age and the remainder to the Middle Stone Age. No Early Stone Age implements were found. The majority (78%) of the tools are in banded ironstone, with the remainder in indurated shale, quartzite, silcrete and quartz. Quartz gravel is prolific over the site making it difficult to detect such tools. 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.

  Most of the tools comprise flakes and chunks which are utilised and/or retouched. Several flake blades in banded ironstone and indurated shale were also found. At least 10 cores/minimal cores and chunks (with one or more flake scars) were counted. This amounts to 24% of the stone artefact assemblage, indicating a relatively high level of stone fabrication on the site. One large quartzite hammerstone was also found.

Frequencies of formal retouched tools are very low; one MRP/convex scraper, one flat convex quartz scraper and one side scraper were found. Six miscellaneous retouched pieces were found, including one MSA pointed flake with a retouched tip.

There are no graves on the affected property.

In terms of the built environment, no old buildings, structures, or features, old equipment, public memorial or monuments occur in or beyond the footprint area.

As archaeological sites are concerned, the occurrences are lacking in context and no organic remains such as bone, pottery or ostrich eggshell was found. There is no spatial patterning to the distribution of finds. The fairly small numbers and isolated and disturbed context in which they were found means that the archaeological remains on Erf 1654 have been rated as having low archaeological (Grade 3C) significance.

The results of the study indicate that the proposed development of the Keren Energy Kakamas Solar Farm 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 Kakamas Solar Farm on Erf 1654, 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.

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1. INTRODUCTION

1.1 Background and brief

Keren Energy Kakamas (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 1654 in Kakamas in the Northern Cape (Figures 1 & 2). The proposed development is situated within the Kai Garib municipality. Erf 1654 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 and operate a commercial solar energy facility in Kakamas. The proposed activity entails the construction of about 140 CPV solar panels covering a footprint 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 may 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 via a proposed ± 1 km overhead powerline linking to the Eskom Kakamas substation which is situated northwest of the proposed facility.

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))

- 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)).

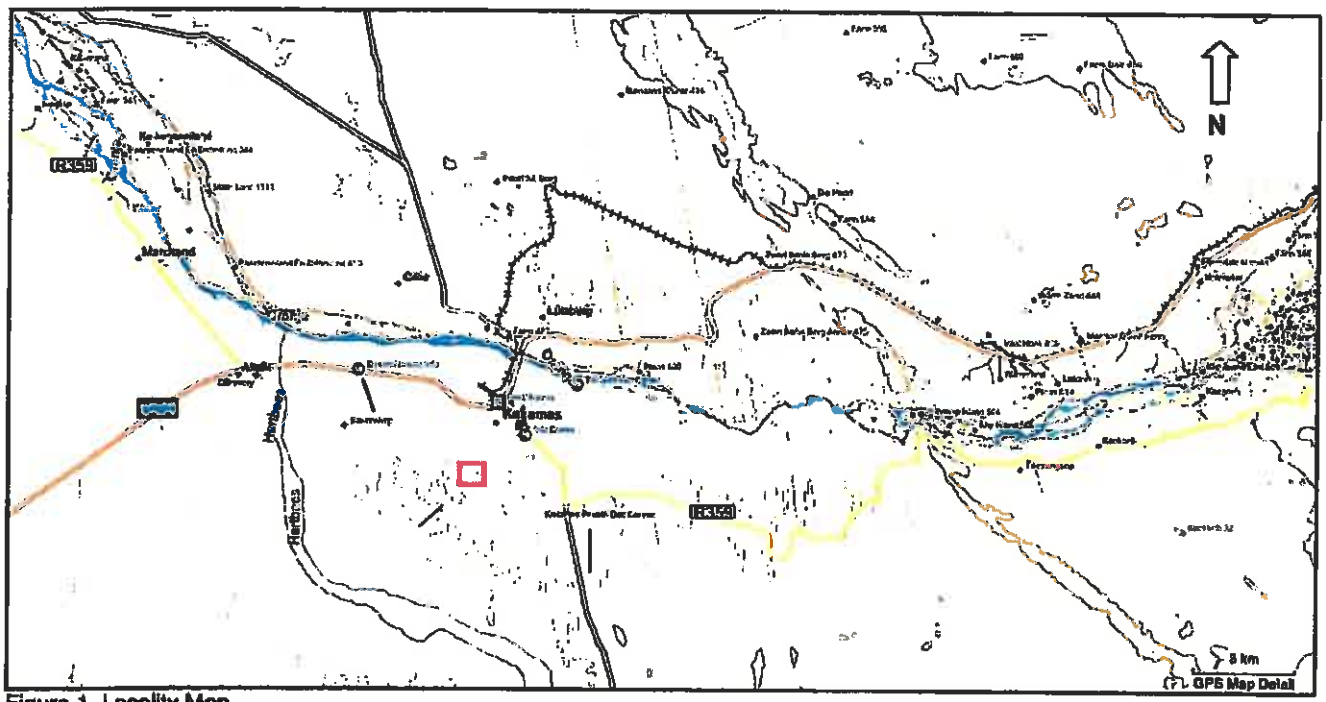

Figure 1. Locality Map

Study site

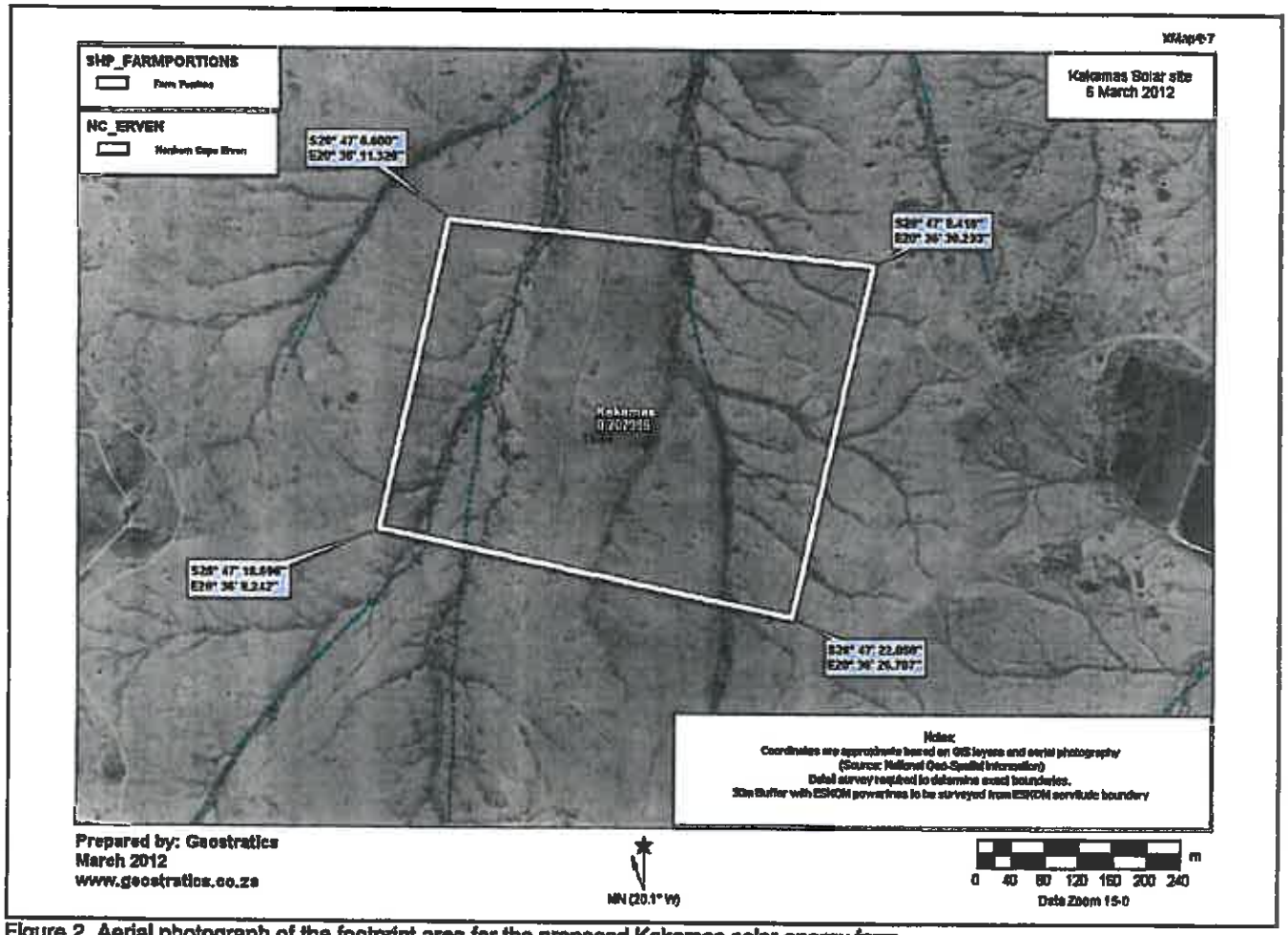

Figure 2. Aerial photograph of the footprint area for the proposed Kakamas solar energy farm

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 Kakamas Solar Energy Farm is illustrated in Figure 3.

Kakamas is located alongside the Orange River, about 80 kms west of Upington on the N14. The site (Erf 1654) for the proposed solar farm is located south of the town and just to the west of the Waste Water Treatment Works. The proposed 20 ha footprint area is fairly flat and slopes gently north toward the town. It is surrounded by hill slopes in the east. Several drainage channels intersect the site, draining south toward the town. The proposed footprint area is quite severely degraded. Apart from fairly dense vegetation alongside the drainage channels, there is very little natural vegetation occurring on the proposed site. It is overgrazed, heavily sheet washed and covered in quartz gravel (Figures 4-7).

The route for the proposed ± 1 km long overhead powerline has not yet been established but it would cross several drainage channels and an undulating landscape, and could be aligned alongside a gravel road that leads all the way to the existing Kakamas sub station. The receiving environment is fairly severely degraded.

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.

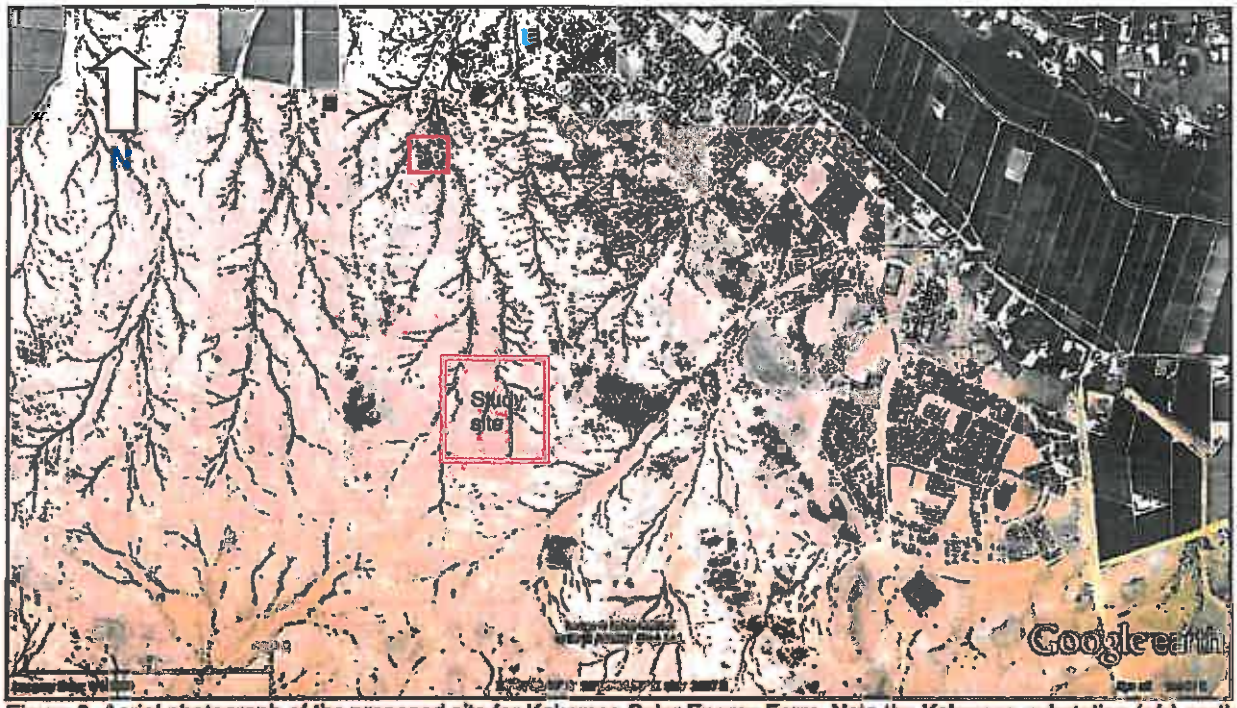

Figure 3. Aerial photograph of the proposed site for Kakamas Solar Energy Farm. Note the Kakamas substation (s/s) north west of the study site.

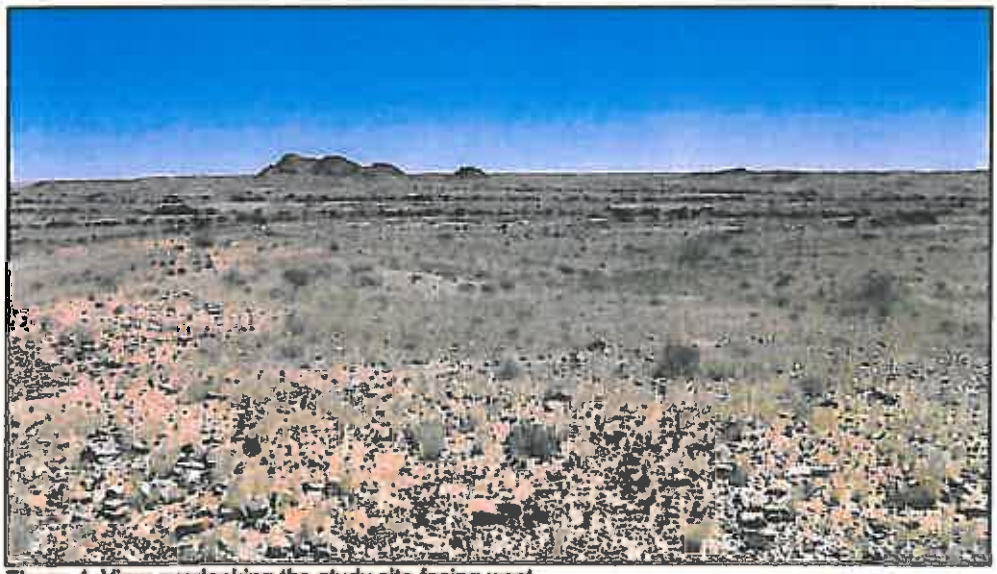

Figure 4. View overlooking the study site facing west

Figure 5. View of the proposed site facing north west

Figure 6. View of the proposed site facing north west. Not the heavy sheet wash and quartz stone

Figure 7. View of the proposed site facing north. Note the heavy sheet wash

5. STUDY APPROACH

5.1 Method of survey

A detailed and controlled survey of the proposed footprint area, and the proposed ± 1 km long overhead powerline was undertaken by J Kaplan on 1 March, 2012. The survey was undertaken on foot. Unfortunately, a GPS track path was not logged. 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 (refer to Figure 11 & 12 in Appendix I). A collection of tools were also photographed. A desk top study was done.

5.2 Constraints and limitations

There were no constraints or limitations associated with the study. Overall, 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 the numbers are very small and they occur in a severely disturbed and degraded context.

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. Much of the top soils have already been washed away due to heavy sheet wash and erosion.

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". Very little archaeological work has been done in Kakamas. Stone artefacts in banded ironstone and indurated shale were documented in the road reserve during a survey for a water pipeline between Kakamas and Kenhardt (Kaplan 2008). Orton (2012) recently recorded very low density scatters of LSA and MSA tools in quartz, indurated shale and banded ironstone during a survey for a proposed solar farm near the Augrabies Falls National Park. Orton (2012) also describes an archaeological sequence in the Augrabies Falls region based on the work of others which spans the Early, Middle and Later Stone Age pre-colonial history in the region. Much of the information has been generated by excavations of open scatters of stone artefacts, pottery and ostrich eggshell, as well as excavations of several small shelters near the Augrabies Falls and the town of Augrabies.

Orton (2012) also notes that many skeletons, most dating to the 18th and 19th Centuries have been exhumed from the area between Augrabies and Upington in the late 1930s. Historical sites and remains (such as forts) relating to events such as the Anglo Boer War are also well preserved in the region, including the presence of war graves in Kakamas, Pofadder and Keimoes. Orton (2012) also notes that the water related infrastructure in the Kakamas area was important for agricultural development and several water wheels and excavated tunnels and leiwaters/furrows in Kakamas have been declared Provincial Heritage Sites.

6. FINDINGS

Forty-one single, isolated archaeological occurrences were documented and mapped with a hand held GPS unit. A description of the archaeological finds located during the study is presented in Table A in Appendix I.

All the tools documented are spread very thinly and unevenly over the surrounding landscape. There is no spatial integrity to any of the finds. Most of the lithics (about 70%) are assigned to the Later Stone Age and the remainder to the Middle Stone Age. No Early Stone Age implements were found. The majority (78%) of the tools are in banded ironstone, with the remainder in indurated shale, quartzite, silcrete and quartz. 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. Quartz gravel is prolific over the site making it difficult to detect such tools. 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.

Most of the tools comprise flakes and chunks which are utilised and/or retouched. Several flake blades in banded ironstone and indurated shale were also counted. At least 10 cores/minimal cores and flaked chunks (with one or more flake scars) were counted. This amounts to 24% of the stone artefact assemblage, indicating a relatively high level of stone fabrication on the site. One quartzite hammerstone (005) was found.

Frequencies of formal retouched tools are very low; one MRP/convex scraper (008), one flat convex quartz scraper (012) and one side scraper (026) were found. Six miscellaneous retouched pieces were found, including one MSA pointed flake with a retouched tip (040).

There are no graves on the affected property.

No old buildings, structures, or features, old equipment, public memorial or monuments occur in the footprint area.

No other colonial heritage resources were noted during the study.

A collection of tools documented during the study are illustrated in Figures 8-10.

Figure 8. Quartzite hammerstone (005). Note the pecking on the tip of the cobble

Figure 9. Collection of tools from Erf 1654. Scale is in cm

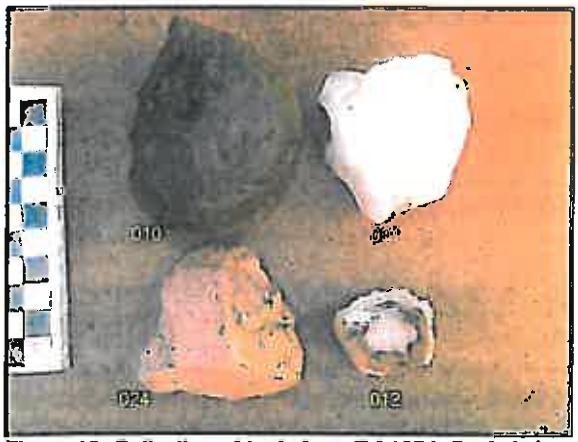

Figure 10. Collection of tools from Erf 1654. Scale is in cm

6.1 Significance of the archaeological remains

All of the lithics documented during the study comprise isolated occurrences that are spread thinly and unevenly over the surrounding landscape, 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. The receiving environment is also degraded.

The relatively small numbers isolated and disturbed context in which they were found means that the archaeological remains have been rated as having low archaeological (Grade 3C) significance.

7. ASSESSMENT OF IMPACTS

In the case of the proposed Keren Energy Kakamas Solar Energy Farm it is expected 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 Kakamas solar energy facility on Erf 1654 will have a very limited impact on archaeological heritage resources.

The study has identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to development activities commencing.

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 1654 in Kakamas, 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

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Appendix I

Name of Site	Name of Farm	Lat/Long	Finds
	Erf 1654 Kakamas		
001		S28 47.127 E20 36.484	Round quartz **core**
002		S28 47.094 E20 36.437	Indurated shale blade (**MSA**)
003		S28 47.025 E20 36.437	Pink quartz chunk
004		S28 47.095 E20 36.428	Snapped/broken utilized chunk, & weathered flake
005		S28 47.101 E20 36.438	Large round quartzite **hammerstone**
006		S28 47.123 E20 36.436	Weathered retouched and utilized **MSA** flake blade
007		S28 47.131 E20 36.423	Utilized, retouched cortex chunk/**min core**
008		S28 47.159 E20 36.430	MRP/**?scraper**
009		S28 47.172 E20 36.426	Quartz chunk
010		S28 47.160 E20 36.436	Weathered indurated shale chunk
011		S28 47.397 E20 36.425	Round **core**
012		S28 47.240 E20 36.431	Flat pink quartz **?convex scraper**
013		S28 47.311 E20 36.424	Butt end of broken flake
014		S28 47.314 E20 36.426	Weathered flaked chunk
015		S28 47.404 E20 36.426	Weathered cobble chunk/cortex
016		S28 47.441 E20 36.427	Cobble **core**
017		S28 47.251 E20 36.402	Large flake & weathered indurated shale **core**
018		S28 47.179 E20 36.371	Utilised & misc retouched flake
019		S28 47.233 E20 36.388	**MSA** flake
020		S28 47.295 E20 36.411	Snapped quartzite flake blade (**?MSA**)
021		S28 47.300 E20 36.419	Parallel flaked chunk/**core**
022		S28 47.318 E20 36.410	Pink quartz **?core**
023		S28 47.360 E20 36.405	Chunk
024		S28 47.405 E20 36.413	Chunky **silcrete MSA** flake
025		S28 47.383 E20 36.360	Weathered cobble/chunk
026		S28 47.335 E20 36.346	Burnished **side scraper**
027		S28 47.334 E20 36.342	Large quartz chunk
028		S28 47.333 E20 36.318	Weathered cobble
029		S28 47.348 E20 36.312	Pointed side retouched **MSA** flake
030		S28 47.427 E20 36.336	Flat retouched/utilized flake
031		S28 47.404 E20 36.304	Retouched flake & chunk/**min core**
032		S28 47.324 E20 36.316	Snapped **MSA** double sided retouched quartzite flake
033		S28 47.242 E20 36.364	Chunky **silcrete MSA** flake
034		S28 47.307 E20 36.361	Large round quartz **core**
035		S28 47.326 E20 36.298	Large chunky **MSA** quartzite flake/blade
036		S28 47.385 E20 36.292	Large **silcrete** chunk
037		S28 47.327 E20 36.290	Weathered and chunky quartzite **MSA** flake
038		S28 47.318 E20 36.270	**?MSA** flake
039		S28 47.344 E20 36.218	Split quartzite cobble flake
040		S28 47.283 E20 36.251	Triangular shaped **MSA** pointed flake with retouched tip
041		S28 47.232 E20 36.425	Cobble **core**

Table A. Spreadsheet of waypoints and description of archaeological finds. Unless otherwise stated, all implements are in locally available banded iron stone

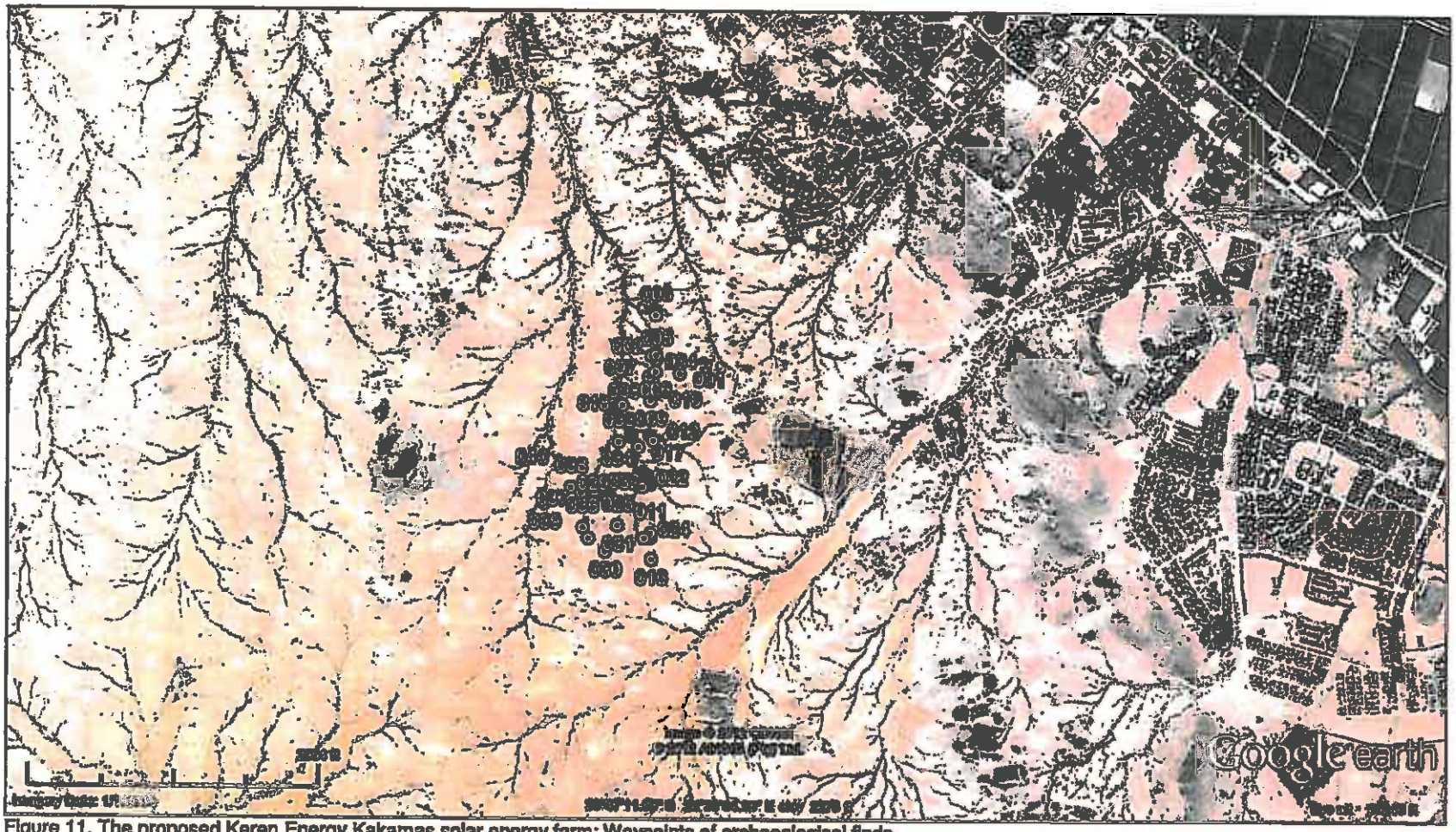

Figure 11. The proposed Keren Energy Kakamas solar energy farm: Waypoints of archaeological finds

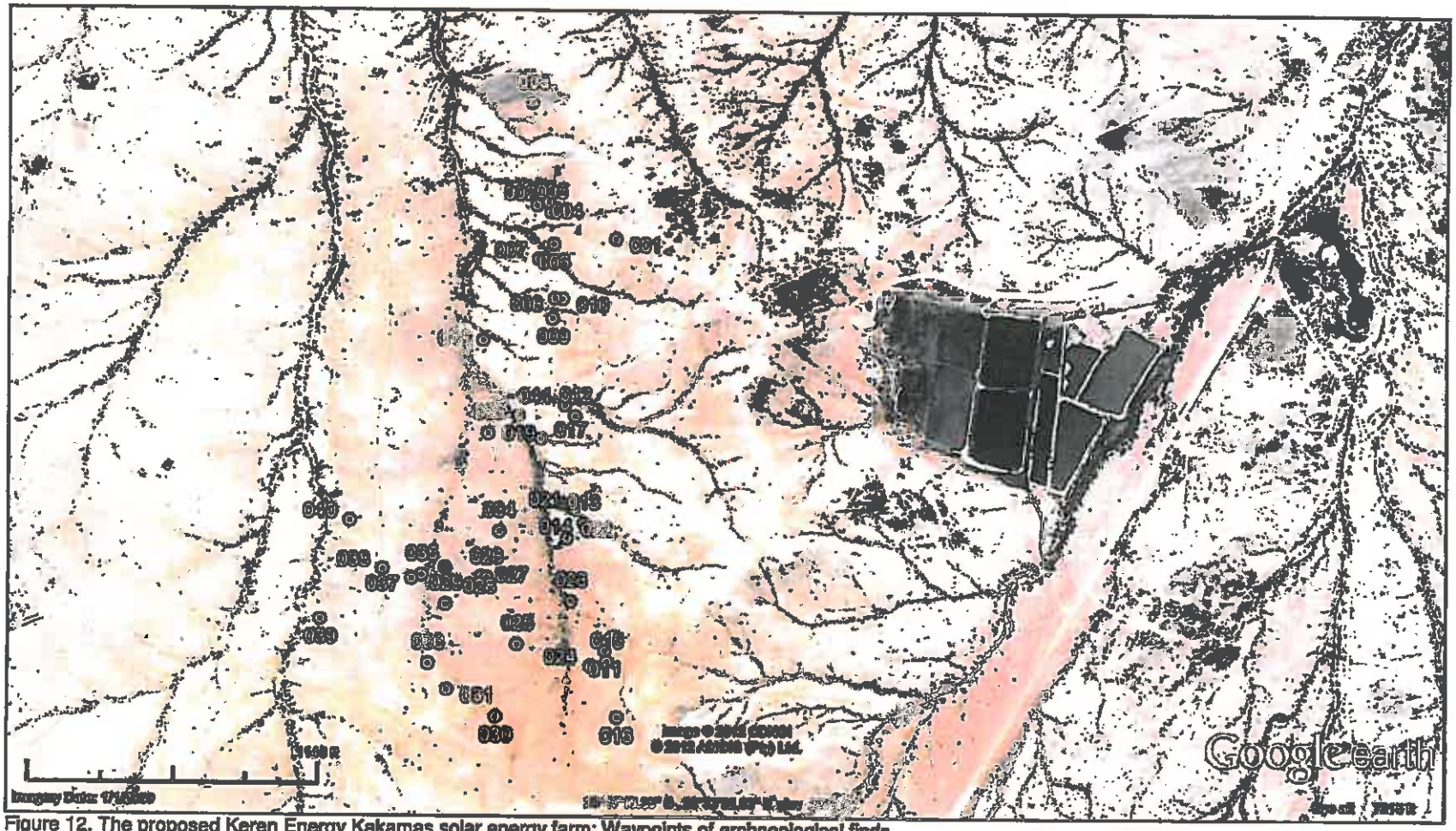

Figure 12. The proposed Keren Energy Kakamas solar energy farm: Waypoints of archaeological finds