

**ARCHAEOLOGICAL IMPACT ASSESSMENT
THE PROPOSED MOUNT ROPER ROMA ENERGY
SOLAR PLANT ON FARM 321 NEAR KURUMAN
NORTHERN CAPE PROVINCE**

Prepared for:

ENVIROAFRICA

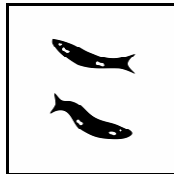
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Executive summary

The Agency for Cultural Resource Management was appointed to conduct an Archaeological Impact Assessment (AIA) for the proposed construction of a 10 MW Concentrated Photovoltaic (CPV) Energy Generation Facility on Farm 321 Mount Roper, northwest of Kuruman in the Northern Cape.

The proposed activity entails the construction of 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 much of the vegetation on the site will need to be cleared. Associated infrastructure includes 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 into the national grid at the Eskom Riries substation which is situated about 600 m north of the site.

The proposed site for the solar farm is located about 31 kms northwest of Kuruman alongside the R31. A large portion of the site is covered in dense thornveld vegetation, resulting in very poor archaeological visibility. This is particularly so across most of the northern portion of the footprint area, where access was severely constrained. There are, however, a number of gravel farm roads and game tracks that intersect the site, allowing for some movement across the landscape.

In terms of Section 38 (1) (c) (iii) of the National Heritage Resources Act 1999 (Act 25 of 1999), a Heritage 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 any impacts.

A 1 day survey of the proposed site was undertaken by J. Kaplan on 3 March 2012, in which the following observations were made:

Thirty-one archaeological occurrences (numbering more than 50 stone artefacts) were mapped with a hand held GPS device. Most of the tools recorded during the survey are assigned to the Middle and Later Stone Age. Only one Early Stone Age biface (a possible handaxe) was recovered. The tools are spread fairly thinly and unevenly over the landscape, but tend to cluster across the northern portion of the property which is overlain by extensive sheets of ironstone gravels. The southern portion of the farm is covered in red sands where surface stone is virtually absent.

Most of the lithics recorded comprise modified (i. e. retouched and utilized) flakes and pieces of stone, but several retouched blade tools, and two pointed flakes were also found. Four scrapers were recovered, including one end scraper on a long blade, and three convex scrapers. Some of the tools are burnished, while others are also abraded (having been rolled around by natural processes).

Several low density scatters of tools were documented on the gravels across the northern portion, while a very thin scatter of MSA flake tools (in indurated shale and ironstone) was recovered from alongside small, dry pan.

The western portion of the site is very degraded due to extensive grazing, trampling and infrastructure and a few dispersed flake tools were also found in this area. However, no evidence of any factory or workshop site, or the result of any human settlement was identified.

More than 90% of the tools found are made on banded ironstone with the remainder in indurated shale, chalcedony and quartzite. Sheets of ironstone gravels are prolific across the vegetated northern portion of the footprint area. Banded ironstone is known to have been a desirable raw material for making stone artefacts and occurs on a number of sites throughout the Northern Cape.

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 collection recovered, however, most likely represents only a very small sample of what is expected to be present on the site, with many more tools hidden among the ironstone gravels under the vegetation cover across the northern footprint area.

Despite the relatively small number of tools counted, and the disturbed context in which many of them were found (gravel roads), the archaeological remains on Farm 321 Mount Roper have been provisionally rated as having medium-low (Grade 3B-3C) local significance, subject to further investigation of the site.

There are no visible graves with headstones, stone cairns, or any other burial ground, or cemetery on the affected property.

In terms of the built environment, the proposed site has no significance, as there are no old buildings, ruins, structures, public memorials or monuments in the footprint area.

Indications are that in terms of archaeological heritage, the proposed activity (i. e. the construction of a solar energy farm) is viable, subject to further archaeological mitigation.

With regard to the proposed development of the Roma Energy Mount Roper Solar Energy Plant on Farm 321, the following recommendations are made:

1. The footprint area across the northern portion of the site should be re-surveyed once the vegetation has been cleared from the site. Archaeological visibility will be much higher and many more stone tools are likely to be encountered on the ironstone gravels which overlie this portion of the farm. These should be documented before any physical construction takes place on the site, so as to record a more representative sample of the archaeological remains.
2. Should any unmarked human burials/remains or buried ostrich eggshell 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

Roma Energy Mount Roper (Pty) Ltd, appointed the Agency for Cultural Resource Management to conduct an Archaeological Impact Assessment (AIA) for the proposed construction of a 10 MW Concentrated Photovoltaic (CPV) Energy Generation Facility on Farm 321 Mount Roper northwest of Kuruman in the Northern Cape Province (Figures 1 & 2). The proposed development is situated within the Ga-Segonyana Local Municipality.

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 north west of Kuruman. The proposed activity entails the construction of about 140 CPV solar panels covering a footprint area of about 20 ha (Figure 3). The CPV panels will be mounted on pedestals drilled and set into the ground. Extensive bedrock excavations are not envisaged, but much of the vegetation on the site will need to be cleared. 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 Riries 66/11 kV substation which is situated about 600 m further to the north, alongside the R31. An existing powerline is located alongside the northern boundary of the footprint area, so no new transmission line is required for the project.

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:

Archaeological study proposed solar energy plant on Farm 321 near Kuruman

- 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)).

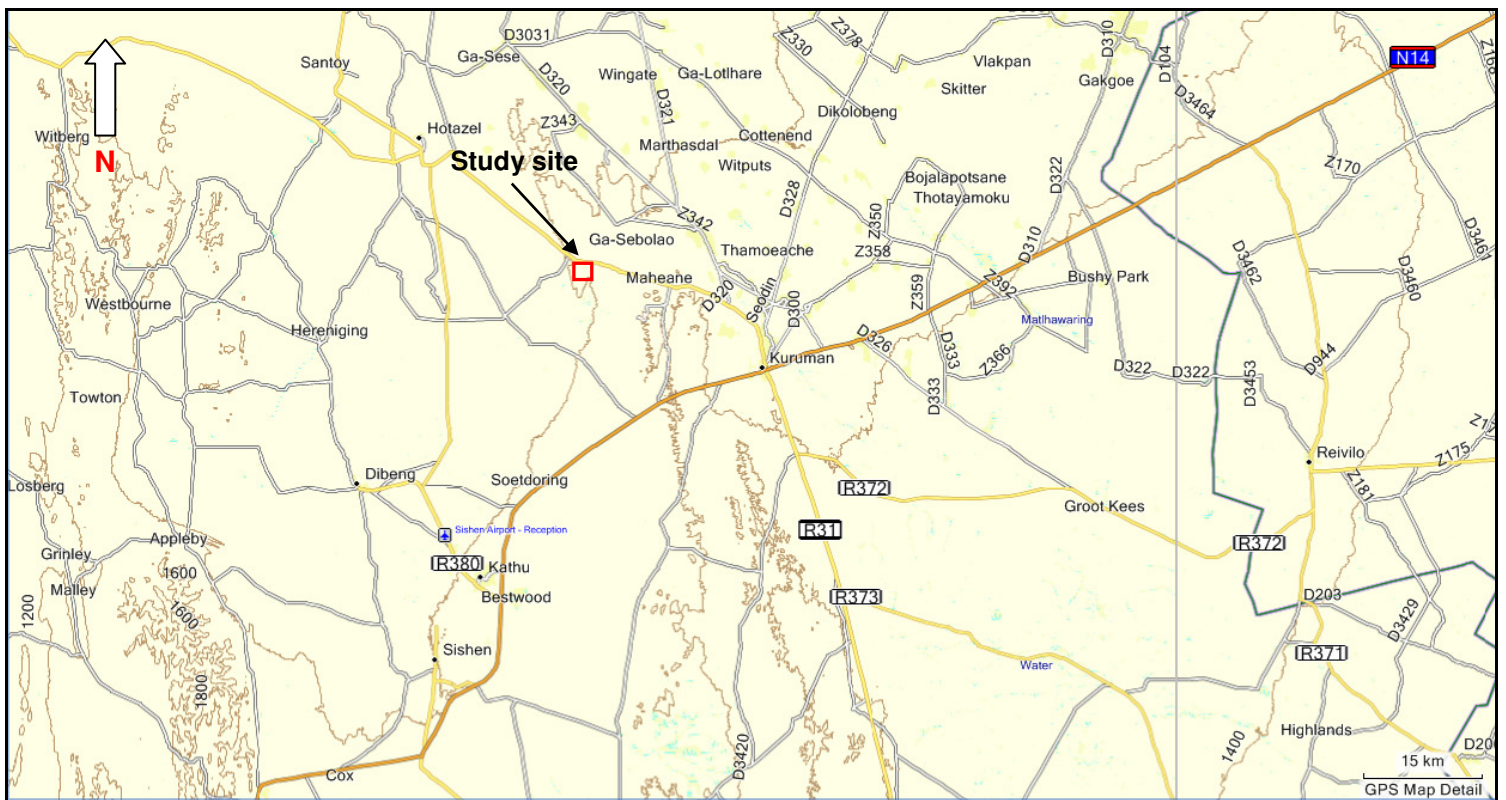


Figure 1. Locality Map.

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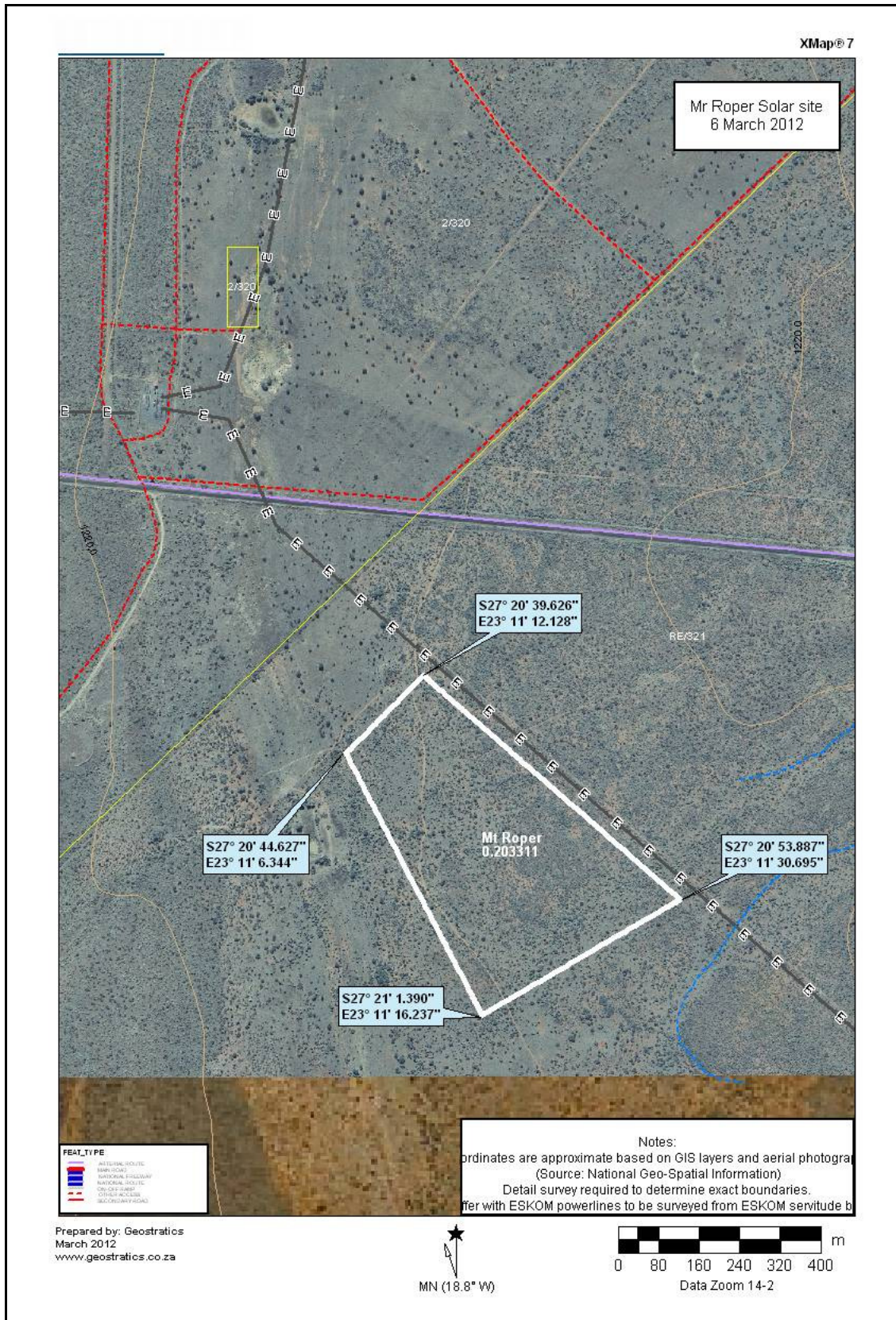


Figure 2. Satellite image showing the footprint area of the proposed Mount Roper Solar Energy Plant

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Figure 3. Aerial photographing illustrating the proposed layout of the CPV panels for the Mount Roper Solar Energy Plant

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 Mount Roper Solar Energy Plant is illustrated in Figure 4.

The proposed site is situated about 31 kms northwest of Kuruman on the R31 between Kuruman and Hotazel. The site is located on the south side of the road, alongside the Eskom servitude. The Kuruman hills are located north and west of the proposed site. The proposed site is on fairly flat terrain. The northern portion is very heavily vegetated, and overlain by extensive sheets of ironstone gravels (Figures 5-13). The eastern portion is less vegetated, and covered in mostly soft red sands with little visible surface stone. The northern portion of the farm is severely degraded, overgrazed and heavily trampled by game (mainly antelope). Existing infrastructure comprises several dams/water holes, concrete drinking troughs, feeding bins, and dry pans. Gravel farm roads cross the property in the west and through the centre, and there are also numerous small game tracks that intersect the site. There are no significant landscape features in the footprint area. There are no streams, or water courses and surrounding land use is agriculture, game farms and vast tracts of vacant agriculture land.

There is some existing infrastructure related to game farming, but there are no old buildings, stone ruins, old structures or features on the proposed site.

There are no visible graves, burials sites or stone cairns in the footprint area

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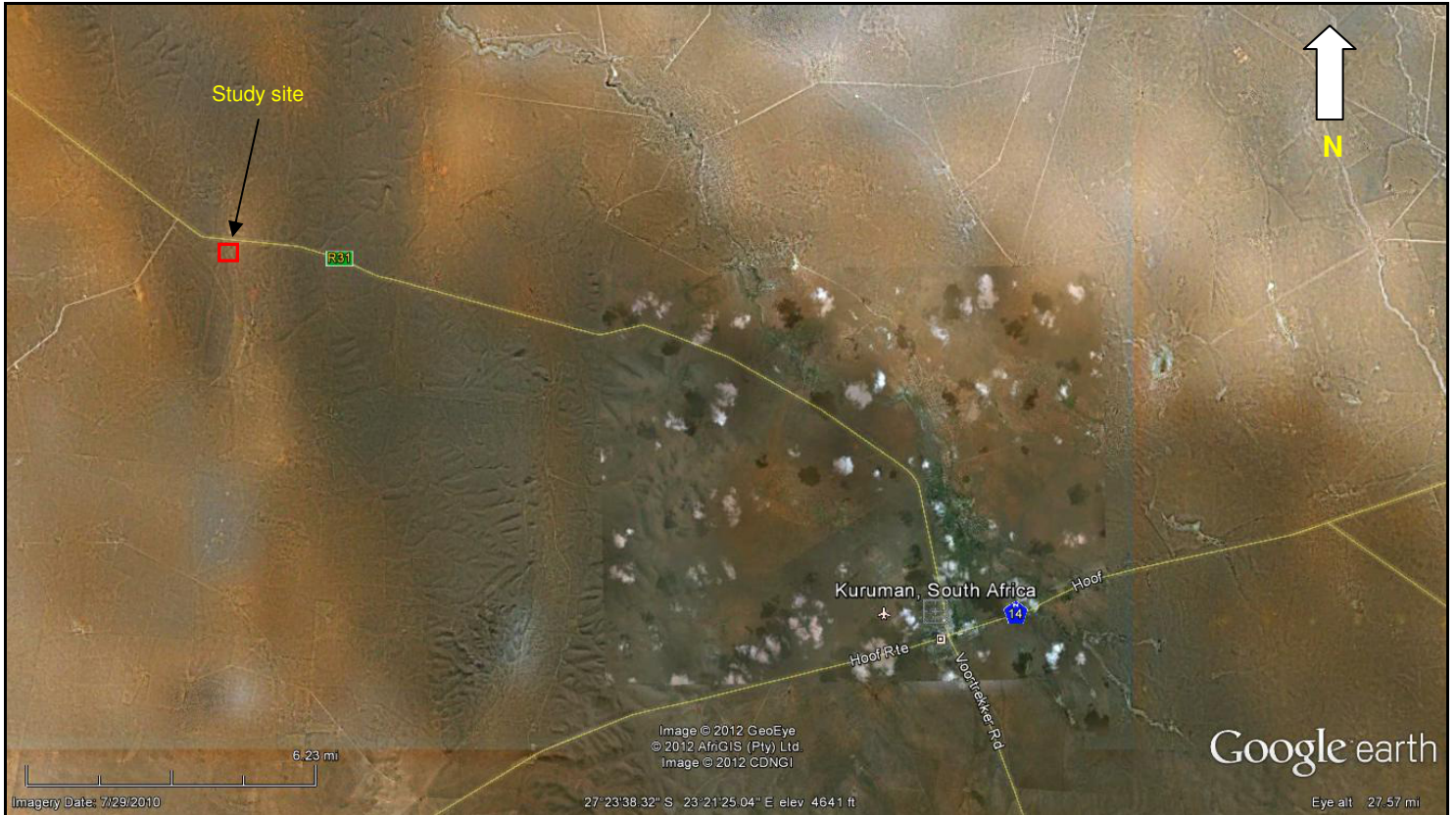


Figure 4. Aerial photograph of the proposed site in relation to Kuruman



Figure 5. View of the site facing east. Photograph taken from the hills in the west.



Figure 6. View of the site facing east. Notice the overgrazing in the foreground of the plate

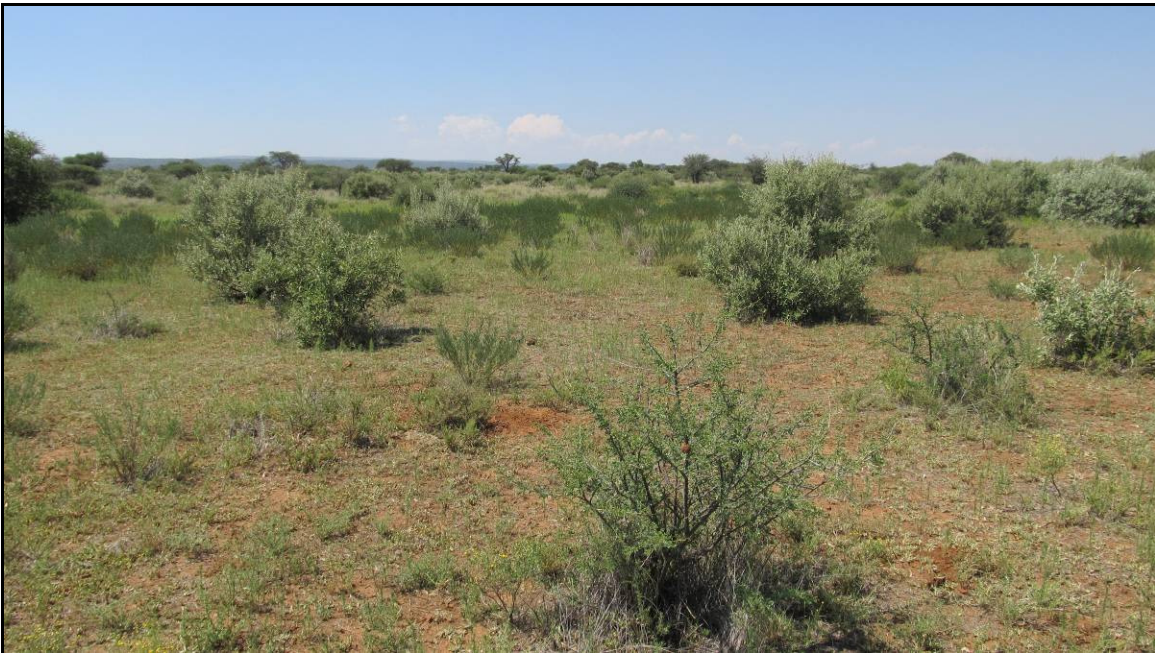


Figure 7. View of the site facing east



Figure 8. View of the site facing east. Note the powerline servitude (the northern boundary of the site) to the left of the plate



Figure 9. View of the site facing south west



Figure 10. Ironstone gravels in the powerline servitude



Figure 12. Ironstone gravels on edge of dam/waterhole



Figure 11. Ironstone gravels in road

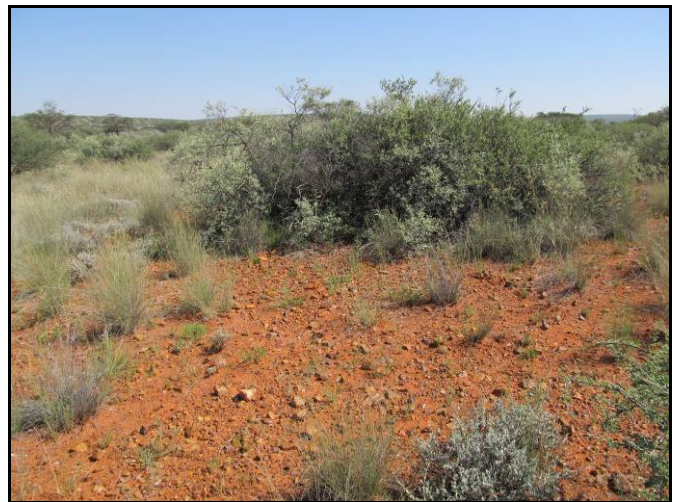


Figure 13. Ironstone gravels in northern portion of the site

5. STUDY APPROACH

5.1 Method of survey

A survey of the proposed footprint area was undertaken by J Kaplan on 3 March, 2012.

A trackpath of the survey was created (refer to Figure 10).

All archaeological occurrences documented during the study were mapped in-situ using a hand-held Garmin Oregon 300 GPS device set on the map datum WGS 84.

A collection of tools were photographed, including the context in which some of the artefacts were found.

A desk top study was also done.

5.2 Constraints and limitations

The northern portion of the footprint area is covered in dense Kuruman Thornveld vegetation resulting in very low archaeological visibility. Access to this area was therefore severely restricted, and this was a major constraint when approaching the study. While the southern portion of the site is also covered in vegetation, this is not so dense, and access was therefore easier in places and archaeological visibility consequently much better. As a result of grazing, open grassland vegetation also covers portions of the farm in the south.

5.3 Identification of potential risks

Potentially important archaeological heritage (i. e. stone implements) may be impacted by the proposed development. Vegetation clearing operations in the northern portion of the site, in preparation of the site for development, will very likely expose scatters of stone implements on the surface which is overlain by gravels of banded ironstone, where stone implements are likely to be found.

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”. Webley & Halkett (2008) have noted that there has been very little archaeological work undertaken north of Kuruman, but there are reports of rock engravings to the north of the town. Most of our knowledge of the archaeology of the region is largely dependent on the work undertaken by Humphreys & Thackeray (1983) to the south of Kuruman, and on the Ghaap escarpment, as well as that of Beaumont (1990). J. Kaplan (2012) has recently undertaken an AIA for a proposed solar power farm about 13 kms northwest of Kuruman. While the footprint area for the proposed solar facility is covered in extremely dense Thornveld vegetation dispersed scatters of Middle and some Early Stone Age implements were encountered.

6. FINDINGS

A description of the archaeological finds located during the study is presented in Table 2 in Appendix I.

Thirty-one archaeological occurrences (numbering more than 50 stone implements) were mapped with a hand held GPS device (refer to Figure 10). Most of the tools recorded during the survey are assigned to the Middle and Later Stone Age and only one Early Stone Age biface, a possible handaxe (154), was recovered. The majority of the tools are spread fairly thinly and unevenly over the surrounding landscape but tend to cluster across the northern portion of the property among deposits of ironstone gravels. By far the largest collection of tools (164-166) was recorded in a gravel road that cuts through northern portion of the farm which has exposed gravels below a thin sandy overburden.

Most of the lithics comprise modified (i. e. retouched and utilized) flakes and pieces of stone, but several retouched blade tools, and two pointed flakes (159 & 168) were also found. Four scrapers were recovered, including one end scraper on a long blade (144) and three convex scrapers (157, 160 & 167). A few round cores were found.

Several very low density scatters of a few flake tools were documented on the gravels across the northern portion while a thin scatter of weathered and burnished indurated shale and ironstone flakes (172) were recovered from alongside a small dry pan. As indicated the western portion of the site is severely degraded due to extensive grazing, trampling and infrastructure and a few dispersed flakes and chunks were also found near the dam (150) and alongside the road. However, no evidence of any factory or workshop site, or the result of any human settlement was identified in the footprint area.

More than 90% of the tools found are made on banded ironstone with the remainder in indurated shale, chalcedony and quartzite. Some of the tools are also burnished and weathered (indurated shale), while others are abraded (rolled around by natural processes). Extensive gravels of ironstone occur across the vegetated northern portion of the footprint area and banded ironstone is known to have been a desirable raw material for making stone artefacts (refer to Kaplan 2012).

As archaeological sites are concerned, however, the occurrences are lacking in context as no organic remains such as bone, pottery or ostrich eggshell was found. The collection recovered most likely represents only a very small sample of what is expected to be present on the site, with many more tools hidden under the vegetation cover across the northern portion of the footprint area.

A collection of tools documented during the study and the context in which some of them were found are illustrated in Figures 11-16.

6.1 Significance of the archaeological remains

Despite the fairly small numbers counted, and the disturbed context in which many of the tools were found (such as gravel roads), the archaeological remains on Farm 321 Mount Roper have been provisionally rated as having medium-low (Grade 3B-3C) local significance, subject to further investigation of the site.

6.2 The built environment

In terms of the built environment, the area has no significance, as there are no old buildings, structures, stone ruins, or features in the footprint area.

There are several structures such as concrete drinking troughs but these modern structures do not constitute heritage resources.

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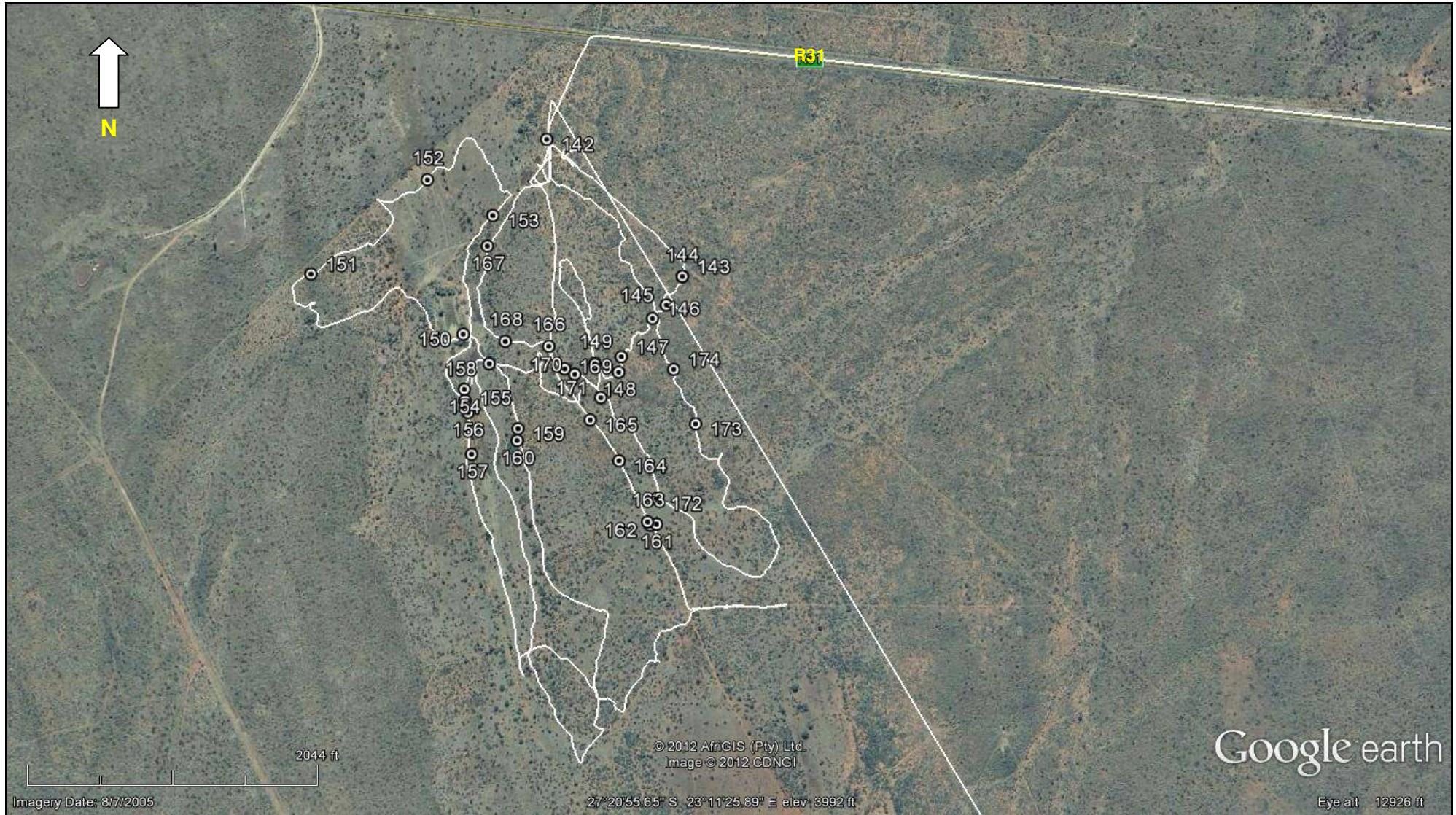


Figure 10. Track paths and waypoints of archaeological finds (refer to Table 2 in Appendix I)

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Figure 11. 154. Context in which tools were found



Figure 14. 132 Context in which tools were found



Figure 12. 155. ESA biface & MSA flakes. Scale is in cm



Figure 15. 144. Collection of tools. Scale is in cm



Figure 13. 172. MSA burnished flakes. Scale is in cm



Figure 16. Collection of tools. Scale is in cm

7. ASSESSMENT OF IMPACTS

The proposed Roma Energy Mount Roper Solar Energy Plant may potentially impact on important archaeological remains across the northern portion of the footprint area, which is overlain by deposits of ironstone gravels (Table 1). It is known that banded ironstone was a desirable raw material for making stone artefacts, by Stone Age people. Quarry/workshop sites and activity areas may possibly be identified as well.

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

Table 1. Assessment of archaeological impacts.

8. CONCLUSION

Development of the proposed Roma Energy Mount Roper Solar Energy Plant will possibly impact on potentially important pre-colonial archaeological heritage. Stone implements will likely be exposed during vegetation clearing operations in the northern portion of the site. Such tools are likely to occur in-situ as very little disturbance has taken place in this area. Evidence for workshop sites, activity areas, or human settlement may also be identified.

Indications are, however, that in terms of the archaeological heritage the proposed activity is viable, subject to further archaeological investigation.

9. RECOMMENDATIONS

With regard to the proposed development of the Roma Energy Mount Roper Solar Energy Plant on Farm 321, near Kuruman, the following recommendations are made:

1. The footprint area across the northern portion of the site should be re-surveyed once the vegetation has been cleared from the site. Archaeological visibility will be much higher and many more stone tools are likely to be encountered on the ironstone gravels which overlie this portion of the farm. These should be documented before any physical construction takes place on the site, so as to record a more representative sample of the archaeological remains.
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

Archaeological study proposed solar energy plant on Farm 321 near Kuruman

Name of Site	Name of Farm	Lat/Long	Finds
	Remainder Farm 321 Mount Roper		
142		S27 20.613 E23 11.185	MSA flake
144		S27 20.771 E23 11.366	Low density scatter of a few flakes, including retouched and utilized pieces and end scraper on long blade, on patch of ironstone gravels
145		S27 20.805 E23 11.346	2-3 flakes on patch of ironstone gravels
146		S27 20.821 E23 11.328	Retouched flake
147		S27 20.866 E23 11.287	Flaked chunk, retouched triangular shaped flake
148		S27 20.884 E23 11.284	1-2 flakes, retouched MSA blade, on patch of ironstone gravels
149		S27 20.874 E23 11.253	Chunk and flake on patch of ironstone gravel
150		S27 20.843 E23 11.078	A few flakes and chunks on gravels alongside dam. 1 weathered MSA flake in indurated shale
151		S27 20.775 E23 10.878	Flake and chunk on slopes covered in banded ironstone
152		S27 20.662 E23 11.028	Indurated shale MSA flake in road
153		S27 20.703 E23 11.115	Utilized and retouched flake
154		S27 20.907 E23 11.081	ESA handaxe/biface, 2 MSA flakes in ironstone and indurated shale on thin patch of ironstone and red sands
155		S27 20.920 E23 11.082	Retouched and utilized MSA flake
156		S27 20.934 E23 11.086	MSA flake blade in indurated shale
157		S27 20.983 E23 11.092	Flake and convex and utilized scraper
158		S27 20.877 E23 11.113	Blade flake retouched on both ends/scraper retouch
159		S27 20.952 E23 11.152	Snapped MRP flake, broken point, quartzite flake
160		S27 20.966 E23 11.152	Convex scraper
161		S27 21.062 E23 11.337	Chunk and flake next to Aardvark hole
162		S27 21.063 E23 11.329	Broken utilized flake in gravel roads
163		S27 21.059 E23 11.325	Thick chunky blade and flake in gravel road
164-165		S27 20.988 E23 11.287 S27 20.941 E23 11.248	Gravel road – broken utilized flake, chunk, MRP, thick weathered end retouched blade, large side retouched flake, flake, blade, large cobble side retouched flake, retouched flake
166		S27 20.855 E23 11.191	Large, thick double sided blade with adze-like step retouch in indurated shale in road, 1 x small round core , utilized flake, weathered retouched flake
167		S27 20.739 E23 11.108	Convex scraper
168		S27 20.850 E23 11.134	Retouched and utilized pointed flake
169		S27 20.881 E23 11.213	Large chunk/minimal core
170		S27 20.887 E23 11.226	Gravel patch – 1 large chunky step retouched blade, 1 utilized flake, 1 retouched flake
171		S27 20.914 E23 11.261	Weathered indurated shale core
172		S27 21.032 E23 11.336	MSA burnished flakes (x 2), chunk, blade misc retouched flake, large chunk, retouched blade – in dry pan
173		S27 20.943 E23 11.387	Small chunk
174		S27 20.880 E23 11.357	Patch of ironstone gravel – chunk, x 2 flakes,

Table 2. Spreadsheet of waypoints and description of archaeological finds. Unless otherwise stated, all implements are in banded iron stone