

ARCHAEOLOGICAL IMPACT ASSESSMENT THE PROPOSED DISSELFONTEIN KEREN ENERGY SOLAR PLANT NEAR HOPETOWN NORTHERN CAPE PROVINCE

Prepared for:

ENVIROAFRICA

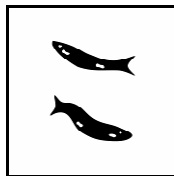
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Executive summary

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 the Remainder Farm 77 near Hopetown in the Northern Cape.

The study site for the proposed Disselfontein Solar Energy Plant is located alongside a gravel road, about 23 kms northwest of Hopetown. The Orange River is located about 1.5 kms to the east of the property. The site is fairly level. The western portion alongside the road is quite degraded and covered in dense stands of thorny acacia. The area across the eastern and northern portions, are literally infested with impenetrable Swarthok vegetation. There are several stream channels that intersect the site in the north and down the centre. Apart from existing Eskom infrastructure that includes several powerline servitudes, the Disselfontein substation, and gravel access road, there are no old buildings, structures or features within the proposed 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.

A 1-day, foot survey of the proposed 20 ha footprint area was undertaken by J. Kaplan on 5 March 2012, in which the following observations were made:

Thirty-two archaeological occurrences (numbering more than 100 stone implements) were recorded with a hand held GPS device. Most of the remains were found alongside the Eskom servitudes that cross the footprint area in several places. More than 95% of the tools are assigned to the Middle Stone Age (MSA), but a few Early Stone Age implements were also found that included several sub-bifaces and at least two handaxes. A range of different types of MSA flake and blade tools were counted, reflecting the range and variability of tools that occur in the Northern Cape Province. Most of the MSA lithics comprise triangular shaped flakes, chunks, retouched and utilised flakes and blades. Apart from a few chalcedony and chert flakes, more than 98% of the tools are in fine grained quartzite and weathered indurated shale. This is in stark contrast to several other proposed solar farms that were recently assessed by the archaeologist in the northern and western parts of the province, where the majority of the tools are almost exclusively in banded ironstone. Frequencies of formal retouched tools are low, and include only a few bifacial pointed flakes, and several retouched blades and points. No scrapers were found, but several side retouched flakes were counted, that could have been used as scraping tools. It is assumed that most of the pointed flakes were hafted onto shafts of wood and used as spears or stabbing tools.

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

The results of the study indicate that the proposed development of the Disselfontein Solar Energy Plant will not have an impact of great significance on these and potentially other archaeological remains. The study has captured a good record of the archaeological heritage that is representative of the site. Most of the archaeological remains were documented in/alongside the Eskom servitudes.

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

With regard to the proposed development of the Keren Energy Disselfontein Solar Energy Plant on Remainder Farm 77, the following recommendations are made:

1. No further archaeological mitigation is required.
2. Should any unmarked human burials/remains or 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

Keren Energy Disselfontein (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 Remainder Farm 77 near Hopetown in the Northern Cape (Figures 1 & 2).

The proposed development is situated within the Thembelihle Municipality. The subject property is zoned for Agriculture use and is owned by the J D Ferreira Family Trust.

The proposed development entails the construction of about 140 CPV solar panels covering a footprint area of 20 ha. The CPV panels will be mounted on pedestals drilled and set into the ground (Figure 3). 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 into the national grid at the Eskom Disselfontein 132/22 Kv sub station which is situated on the proposed site, alongside the minor gravel road.

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);

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- 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)).

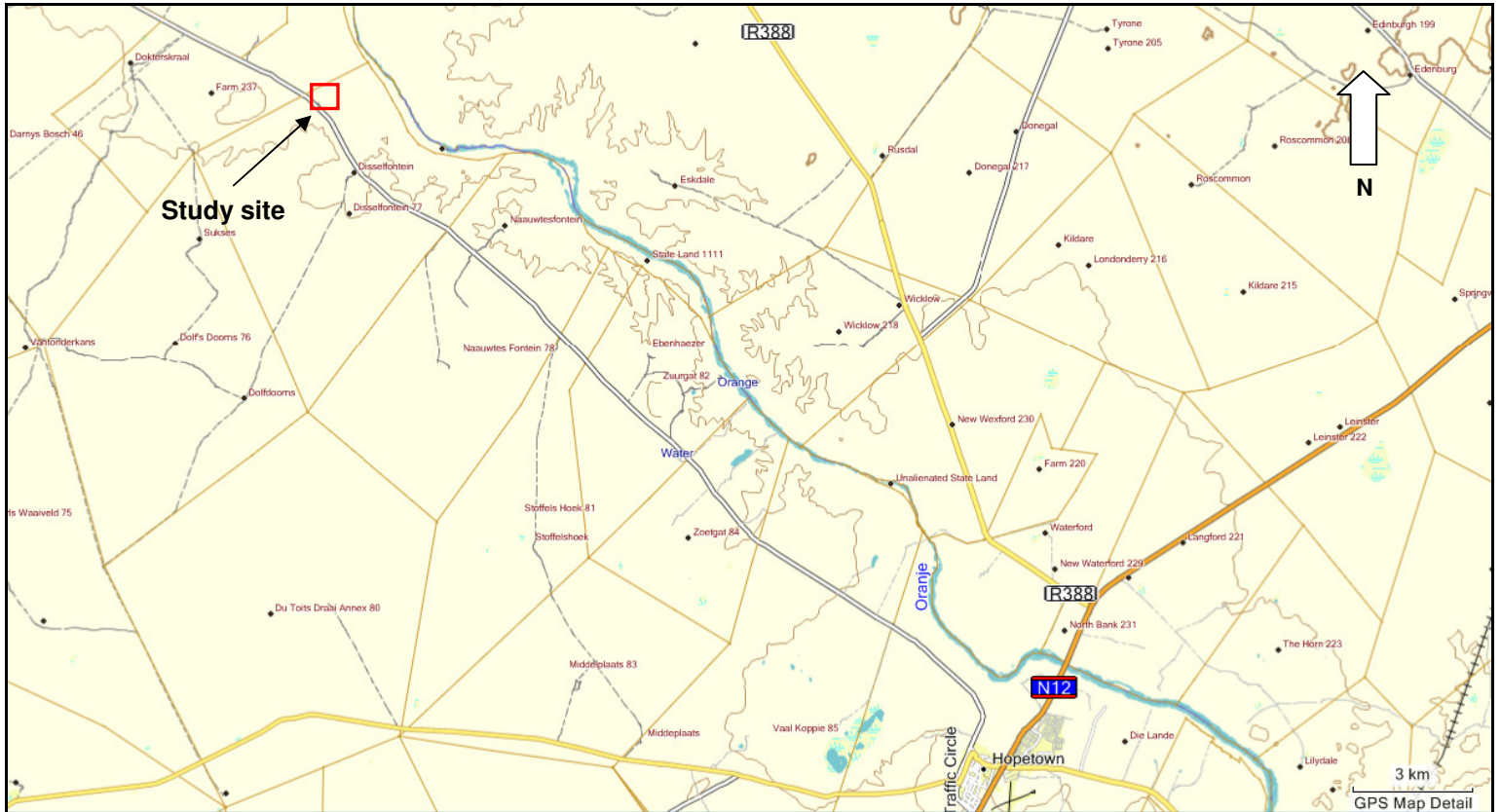


Figure 1. Locality Map

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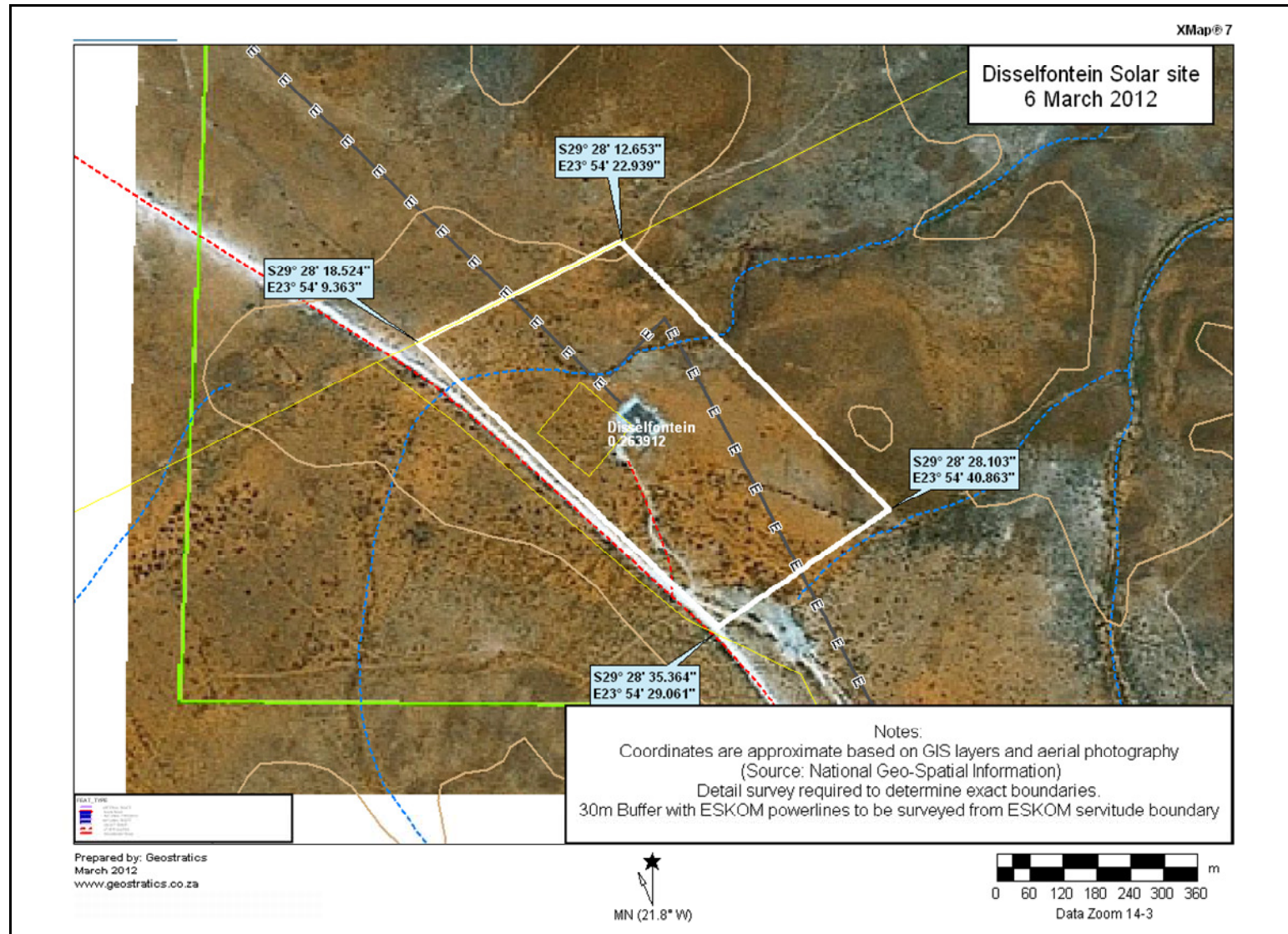


Figure 2. Aerial photograph of the footprint area for the proposed Disselfontein Solar Energy Plant



Figure 3. Aerial photograph illustrating the layout of the PV modules for the proposed Disselfontein 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 Disselfontein Solar Energy Plant is illustrated in Figure 4.

The proposed site is located about 23 kms northwest of Hopetown. Hopetown is about 150 kms southwest of Kimberly on the N12. The subject property is located alongside a minor gravel road, directly adjacent the Disselfontein substation. The Orange River is located about 1.5 kms to the east of the property. The proposed site is fairly level. A large swathe of grassland vegetation on red sands covers the central portion of the site (Figures 5 & 6), while the western portion alongside the gravel road is fairly degraded and covered in dense stands of thorny acacia with open spaces of red sands occurring in the north (Figure 7). There is also a large quarry in the south, alongside the entrance to the property. The northern and eastern portions are overlain by shallow soils and extensive surface exposures of angular blocky surface gravels, and jointed lavas of the Allanridge Formation (John Almond pers. comm.). The north eastern portion of the proposed site is also infested with extremely thick, thorny Swarthok vegetation (Figures 8 & 9). There are several non-perennial streams that intersect the site; in the north and one through the centre of the property alongside the Eskom servitude. There are no significant landscape features on or within the proposed footprint area. The land is currently zoned for agriculture. Surrounding land use is agriculture and vast tracks of vacant land. Centre pivots vegetation is extensive further south toward Hopetown. Apart from the Eskom infrastructure, there are no old buildings, structures, features, public memorials or monuments on or close to the proposed site.

There are no visible graves on the proposed site.

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Figure 4. Location of the proposed Disselfontein Solar Energy Plant



Figure 5. View of the site facing north west. Note the strip of grassland vegetation. Note the angular surface gravels in the foreground of the plate.



Figure 6. View of the site facing south. Note the grassland vegetation and red sands alongside (i. e. east of) the drainage channel. The Disselfontein substation is also visible in the plate

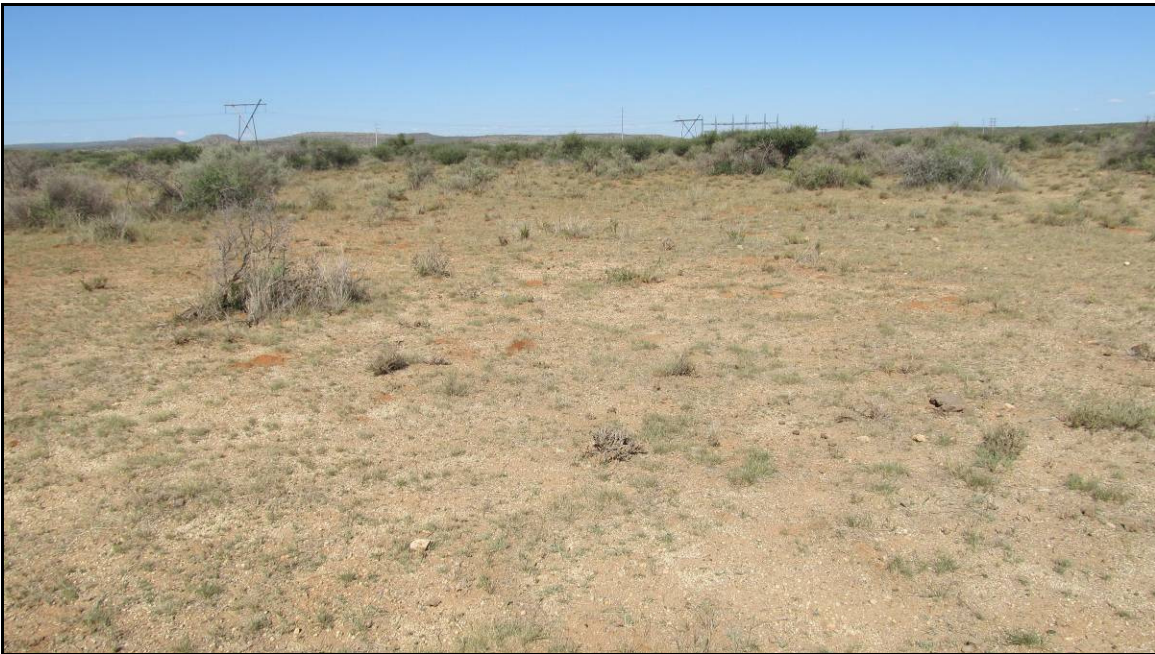


Figure 7. View of the site facing south. photograph taken from alongside the Disselfontein road in the far north western corner of the footprint area.



Figure 8. View of the site facing south. Note the Disselfontein substation to the right of the plate



Figure 9. View of the site facing south. Note the dense Swarthok vegetation which covers a large portion of the footprint area. Arrow indicated the Disselfontein substation. Note the angular surface gravels in the foreground of the plate

5. STUDY APPROACH

5.1 Method of survey

A ground survey of the proposed site was undertaken by J. Kaplan on 5 March, 2012. Archaeological occurrences were documented and mapped using a hand-held Garmin Oregon 300 GPS unit set on the map datum WGS 84.

A track path of the archaeological survey was also created (refer to Figure 10).

A desk top study was done.

5.2 Constraints and limitations

A large portion of the proposed site in the north and east is covered in extremely thorny and virtually impenetrable Swarthok vegetation, resulting in very poor archaeological visibility. Visibility alongside the western half was much better, even though portions of the site in the south are also covered in dense stands of thorny acacia. Visibility was very good in the central portion, which is covered in grassland vegetation, where most of the archaeological remains were documented.

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 relatively small and occur mostly within the Eskom servitude. 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”. As far as can be established, no archaeological work has been done in Hopetown, but it is interesting to note that rock engravings have been recorded on Thomas’ Farm about 30 kms from Hopetown on Kimberly-Hopetown road where a cache of buried ostrich eggshells, dating to possibly the late 19th or early 20th Century, were also excavated by Henderson (2001, 2002). According to Henderson, a late 19th Century date would be consistent with the presence of San (Bushman) recorded by 19th Century travellers to the interior.

Buried ostrich eggshell containers have also been uncovered on several farms in the Douglas area, about 70 kms north of Hopetown (Morris 2005). Such containers, some of them with mastic spouts were used to store water, as well as specularite which is a mineral pigment applied in cosmetic and ritual contexts (Morris 1992).

6. FINDINGS

Thirty-two archaeological occurrences (numbering more than 100 stone implements) were recorded with a hand held GPS device (Figure 10).

A spreadsheet and a description of the archaeological finds located during the study are also presented in Table 2 in the Appendix.

The majority of the remains occur in, and alongside the Eskom servitudes that cross the footprint area of the property in a number of places. These include a low density scatter of flakes and chunks west of the small non-perennial stream (209 & 210), and several low density scatters to the east of the stream that cuts through the central portion of the proposed site (211-22 & 222). Most of the archaeological remains were documented in this central area, on patches of stony ground and red sands, covered in grassland vegetation either side of a large Eskom servitude (refer to Figures 5 & 6).

A range of different types of implements were found on the site, reflecting the variability and range of tools that occur in the Northern Cape Province. Most of the tools are assigned to the Middle Stone Age (MSA), but a few ESA elements were also found, including two handaxes and several sub-biface tools (212, 216 & 221). Most of the MSA lithics comprise unmodified triangular shaped flakes, including chunks, retouched and utilised flakes, and a number of blades. At least seven round quartzite cores and two flat (prepared) quartzite cores were also found.

Apart from a few chalcedony/chert flakes, that included a very low density scatter of tools on a patch of orange sand in the eastern portion of the footprint area (238), more than 98% of the tools are in fine grained quartzite and weathered indurated shale. This is in stark contrast to several other proposed solar farms that were recently assessed by the archaeologist in the northern and western parts of the province, where the majority of the tools were almost exclusively in banded ironstone.

Frequencies of formal tools are low, and include a few bifacial pointed flakes, and partially retouched blades and points, including a large blade with step/adze retouch. It is assumed that most of the pointed flakes were hafted onto shafts of wood and used as spears or stabbing tools. No scrapers were found, but several side retouched flakes were noted, that could have been used as scraping tools. .

No organic remains such as pottery, bone or ostrich eggshell was found.

A collection of tools and the context in which some of them were found are illustrated in Figures 11-21.

No visible graves were found on the proposed site.

No rock engravings were found among numerous small outcroppings of dolerite that were searched alongside the northern boundary of the proposed site.

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

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Figure 10. The proposed Keren Energy Disselfontein Solar Energy Park: Waypoints of archaeological finds



Figure 11. 209-210. Scale is in cm

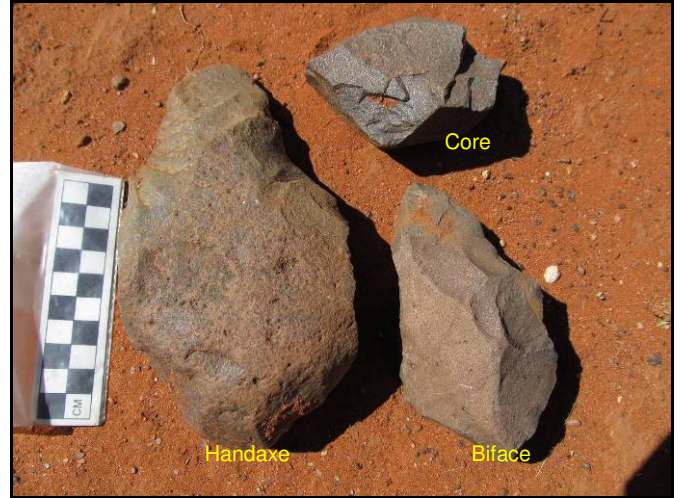


Figure 14. 216. Scale is in cm



Figure 12. 210. Context in which the remains were found



Figure 15. 217. Scale is in cm



Figure 13. 212. Scale is in cm



Figure 16. 216. Context in which the tools were found



Figure 17. 220 Context in which the tools were found



Figure 20. 238. Scale is in cm



Figure 18. 211-220 & 222. Scale in cm



Figure 21. 238 context in which the tools were found



Figure 19. 211-220, & 222. Scale is in cm

6.1 Significance of the archaeological remains

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

7. ASSESSMENT OF IMPACTS

In the case of the proposed Disselfontein Solar Energy Plant near Hopetown it is expected that the overall impact on important archaeological remains will be low (Table 1). The majority of the lithics were recorded in the Eskom servitudes and alongside the non-perennial stream, which will not be directly impacted by the proposed project.

Apart from trenches for underground cables, 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 1.5 m in diameter and so the actual ground disturbance will be quite limited and contained

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

It is maintained that development of the proposed Keren Energy Disselfontein Solar Energy Plant on Remainder Farm 77 will have a limited impact on archaeological heritage resources.

The AIA has captured a good record of the archaeological heritage that is present on the site, although it should be remembered that a large portion of the footprint area is covered in dense Swarthok vegetation.

Indications are, however, that in terms of the 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 the Keren Energy Disselfontein Solar Energy Plant on Remainder Farm 77 near Hopetown, the following recommendations are made:

1. No further archaeological mitigation is required.
2. Should any unmarked human burials/remains or 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 must not be removed or disturbed until inspected by the archaeologist.

10. REFERENCES

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

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Morris, D. 2005. Further evidence of spouts on ostrich eggshell containers from the Northern Cape, with a note on the history of anthropology and archaeology at the McGregor Museum, Kimberley. *South Africa Archaeological Bulletin* 60:112-114

Morris, D. 2002. Another spouted ostrich eggshell container from the Northern Cape, *South African Archaeological Bulletin* 57:41

Appendix I

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Name of Site	Name of Farm	Lat/Long	Finds
	Rem Farm 777 Hopetown		
208		S29 28.528 E23 54.492	X 2 broken quartzite MSA flakes on red sands
209		S29 28.470 E23 54.516	MSA quartzite blade and several quartzite chunks on red sands
210		S29 28.447 E23 54.513	Dispersed scatter of MSA quartzite tools, including flakes, flake blades, and chunks. A few very weathered Indurated shale flakes on patches of red sands south west of Eskom servitude and small drainage channel
211		S29 28.426 E23 54.522	Low density scatter of MSA tools in quartzite, including flakes, retouched flakes, x 3 cores, and pointed flake, in Eskom servitude
212		S29 28.419 E23 54.528	A quartzite ESA biface
213-214		S29 28.410 E23 54.602 S29 28.410 E23 54.602 S29 28.404 E23 54.568	Low density scatter of MSA tools n quartzite and indurated shale, including, flakes (some broken), retouched and utilized flakes pieces, two round and one flat core, among grass in Eskom servitude
216		S29 28.405 E23 54.568	ESA handaxe, core and smaller biface, as well as a low density of scatter of small and larger, MSA triangular-shaped and chunky flakes in (weathered) indurated shale and quartzite on stony patch/grass alongside Eskom servitude.
217		S29 28.369 E23 54.525	Dispersed quartzite flakes in Eskom servitude
218		S29 28.360 E23 54.511	Pointed tip of a broken MSA flake blade – indurated shale.
219		S29 28.364 E23 54.478	Quartzite flake
220		S29 28.355 E23 54.476	Low density scatter of tools, including MSA quartzite flakes, large indurated shale flake, flake blade, several round quartzite cores, on stony rocky ground in and alongside Eskom servitude. Surrounded by dense Swarthok vegetation
221		S29 28.344 E23 54.456	Weathered ESA biface
222		S29 28.286 E23 54.439	Low density scatter of few quartzite flakes, on thick indurated shale blade, at Eskom line T-in. Impenetrable Swarthok
223		S29 28.350 E23 54.294	MSA quartzite flake
224		S29 28.360 E23 54.333	MSA quartzite flake
225		S29 28.379 E23 54.336	MSA quartzite flake
226		S29 28.395 E23 54.317	X 3 MSA quartzite flakes
227		S29 28.387 E23 54.265	X 2 MSA quartzite flakes
228		S29 28.372 E23 54.244	MSA quartzite flake
229		S29 28.316 E23 54.147	MSA quartzite flake
230		S29 28.337 E23 54.229	MSA quartzite flake
231		S29 28.319 E23 54.247	MSA quartzite flake
232		S29 28.307 E23 54.243	Chert flake (? LSA)
233		S29 28.302 E23 54.239	MSA quartzite flake
234		S29 28.272 E23 54.242	MSA quartzite flake
235		S29 28.259 E23 54.255	MSA quartzite flake
236		S29 28.249 E23 54.301	MSA quartzite flake
237		S29 28.216 E23 54.391	MSA quartzite flake

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238		S29 28.328 E23 54.565	3-4 chert flakes and 2-3 MSA quartzite flakes on small patch of gravel/sand surrounded by dolerite outcropping
239		S29 28.356 E23 54.612	X 2 MSA quartzite flakes in small footpath
240		S29 28.391 E23 54.603	MSA quartzite flake

Table 2. The proposed Disselfontein Solar Energy Plant: spreadsheet of waypoints and description of archaeological finds