

ARCHAEOLOGICAL IMPACT ASSESSMENT

THE PROPOSED DISSELFONTEIN KEREN ENERGY SOLAR PLANT NEAR HOPETOWN, NORTHERN CAPE PROVINCE

Portion 8 of the Farm Disselfontein No. 77

Assessment conducted under Section 38 (3) of the National Heritage
Resource Act (No. 25 of 1999)

Prepared for:

ENVIROAFRICA

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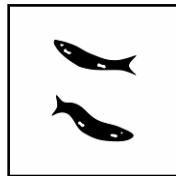
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Executive summary

Introduction

ACRM was appointed to conduct an Archaeological Impact Assessment (AIA) for the proposed construction of a 5MW Photovoltaic (PV) Energy Generation Facility on Portion 8 of the Farm Disselfontein No. 77, near Hopetown in the Northern Cape Province.

The study site is located \pm 21kms west of Hopetown, on the tar road to Douglas.

The site for the proposed development is covered in dense stands of Acacia, and virtually impenetrable Swarthak vegetation, although large swathes of grassland vegetation occur in places. Apart from existing infrastructure, including overhead powerlines/servitudes and the Eskom Disselfontein substation, the site is vacant. A few random pits have been excavated in the south, and there is a large open quarry alongside the tar road.

A specialist archaeological study on the Remainder of Farm 77 was undertaken in 2012 by the contracted archaeologist, but the footprint area for the proposed Disselfontein PV facility has now been moved, necessitating a new Heritage Impact Assessment (HIA).

The development proposal

The development entails the construction of solar panels/modules covering a footprint area of \pm 20ha. The PV panels will be raised above the ground, and mounted on pedestals drilled and set into the ground. Apart from trenches for underground cables, limited bedrock excavations are envisaged. The excavations for the footings are about 1.5m in diameter and so the actual ground disturbance is quite contained. Some vegetation will need to be cleared from the site. Associated infrastructure includes internal access roads, underground cables, transformer pads, a switching station, a maintenance shed, and a temporary construction campsite. The electricity generated from the project will be fed directly into the national grid via the Eskom Disselfontein substation which is located 250m north of the proposed PV facility.

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

Aim of the HIA

The overall purpose of the HIA is to assess the sensitivity of archaeological resources on the proposed development site, to determine the potential impacts on such resources, and to avoid and/or minimise such impacts by means of management and/or mitigation measures.

Findings

A site assessment took place on the 23rd February, in which the following observations were made:

Thirty-three archaeological occurrences, numbering more than 120 stone artefacts were recorded across the proposed development site. All of the occurrences were mapped

using a hand held GPS unit. Most of the remains comprise isolated finds spread thinly and unevenly over the surrounding landscape, but dispersed scatters of tools were also recorded on alongside the powerline servitude, and in the south, in the open grassland vegetation. An ephemeral scatter of Early Stone Age flakes, bifaces, cores and chunks alongside the eastern boundary of the study site, possibly indicates a low intensity activity area. However, no evidence of any human settlement was found and most of the remains most likely represent discarded flakes and flake debris.

The majority (more than 90%) of the archaeological remains are assigned to the Middle Stone Age (MSA), while small numbers of Later Stone Age (LSA), and Early Stone Age (ESA) lithics, including a handaxe and bifaces, were also recorded. Chunky, weathered retouched blade tools of the Fauresmith MSA were also encountered. The presence of different types of tools from all three periods of the South African Stone Age reflects the wide range and diversity of tools that are known to occur in the Northern Cape Province.

The majority of the Disselfontein stone implements are in quartzite and indurated shale, with the remainder in porphyry and chalcedony (0.5%). No tools in banded ironstone (a favoured raw material on Stone Age sites in the Northern Cape) were found.

Frequencies of formal retouched tools are also very low (less than 8%), and comprised a few MSA points, two scrapers and a LSA step-flaked adze. MSA points were most likely hafted onto shafts of wood and used as spears or stabbing tools, while adzes (woodworking tools) and scrapers (presumably skin cleaning tools) are reminiscent of the LSA. No pottery, ostrich eggshell or bone was found.

Grading of the archaeological resources

As archaeological sites are concerned, the occurrences are lacking in context, and the relatively small numbers and isolated context in which they were found, means that the remains have been rated as having low (Grade 3C) significance.

Conclusion

The results of the study indicate that the proposed construction and operation of the Disselfontein PV facility on Farm 77/8 near Hopetown will not have an impact of great significance on these, and potentially other archaeological remains that might be exposed or uncovered.

It is maintained that the study, including the results of the 2012 study, has captured a good record of the archaeological heritage across a large (\pm 40ha) portion of Farm 77.

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

The impact significance of the proposed construction of the Keren Energy Disselfontein PV facility on significant archaeological heritage, is therefore assessed as LOW.

Recommendations

1. No archaeological mitigation is required prior to development activities commencing.

2. If any unmarked human remains, or ostrich eggshell caches, for example, are exposed or uncovered during excavations these must immediately be reported to Heritage Western Cape (Ms Natasha Higgit 021 462 4509), or the contracted archaeologist (Jonathan Kaplan 082 321 0172).

3. The above recommendations must be incorporated into the Environmental Management Plan (EMP) for the proposed development.

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1. INTRODUCTION

ACRM was appointed by EnviroAfrica on behalf of Keren Energy Disselfontein (Pty) Ltd to conduct an Archaeological Impact Assessment (AIA) for the proposed construction and operation of a 5MW Photovoltaic (PV) Energy Generation Facility on Portion 8 of the Farm Disselfontein No. 77 near Hopetown (Thembelihle Municipality) in the Northern Cape (Figures 1 & 2).

The site for the proposed development is located 21kms northwest of Hopetown, on the tar road to Douglas.

EnviroAfrica is the appointed independent Environmental Assessment Practitioner (EAP) responsible for facilitating the Environmental Basic Assessment process.

2. THE DEVELOPMENT PROPOSAL

The development entails the construction of solar panels/modules covering an estimated footprint area of about 20ha (Figure 3). The PV panels will be raised about 2m above the ground, mounted on pedestals drilled and set into the ground. Apart from trenches for underground cabling, limited bedrock excavations are envisaged. The excavations for the footings are about 1.5m in diameter and so the actual ground disturbance is quite limited. Some vegetation will need to be cleared from the site. Associated infrastructure includes internal access roads, trenches for cables, transformer pads, switching stations, a maintenance shed, and a temporary construction campsite. The electricity generated from the project will be fed directly into the national grid at the Eskom Disselfontein which is located 250m north of the proposed PV facility.

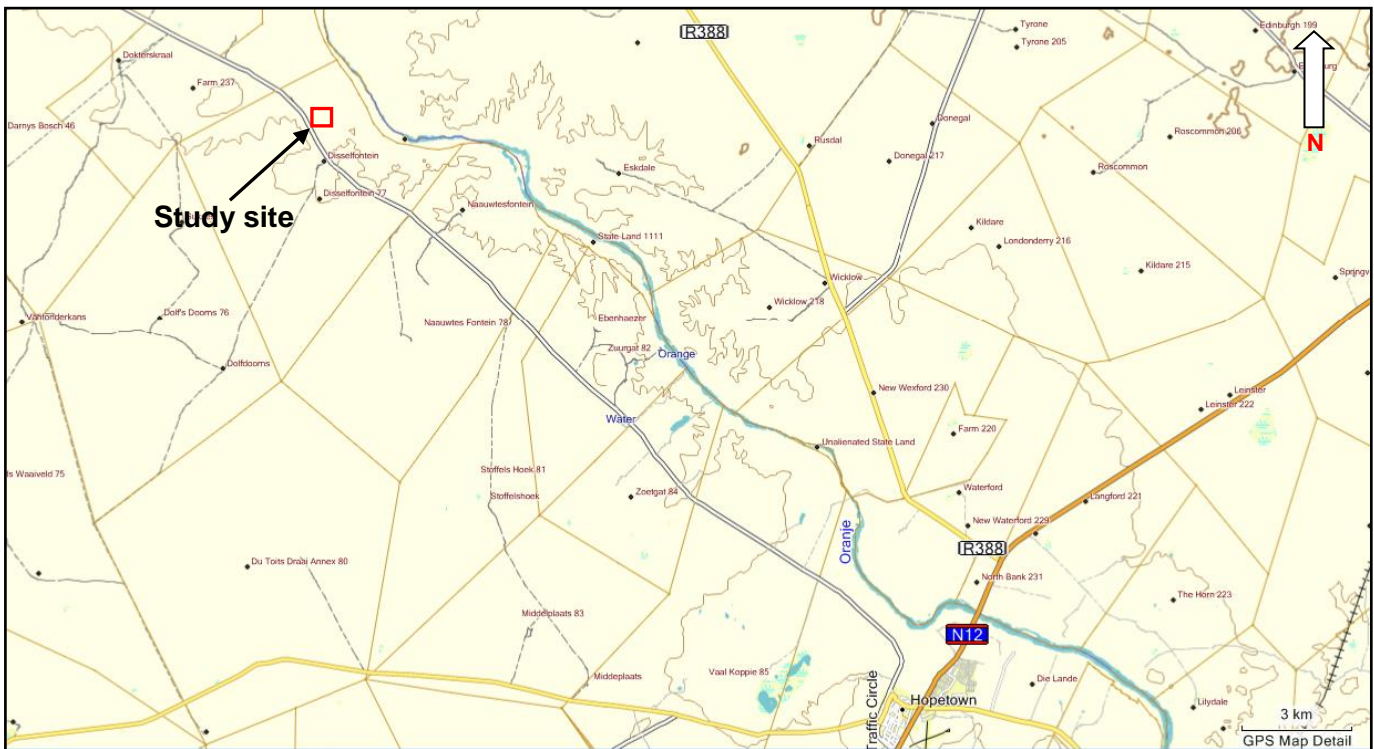


Figure 1. Locality Map

Archaeological study proposed solar energy farm near Hopetown

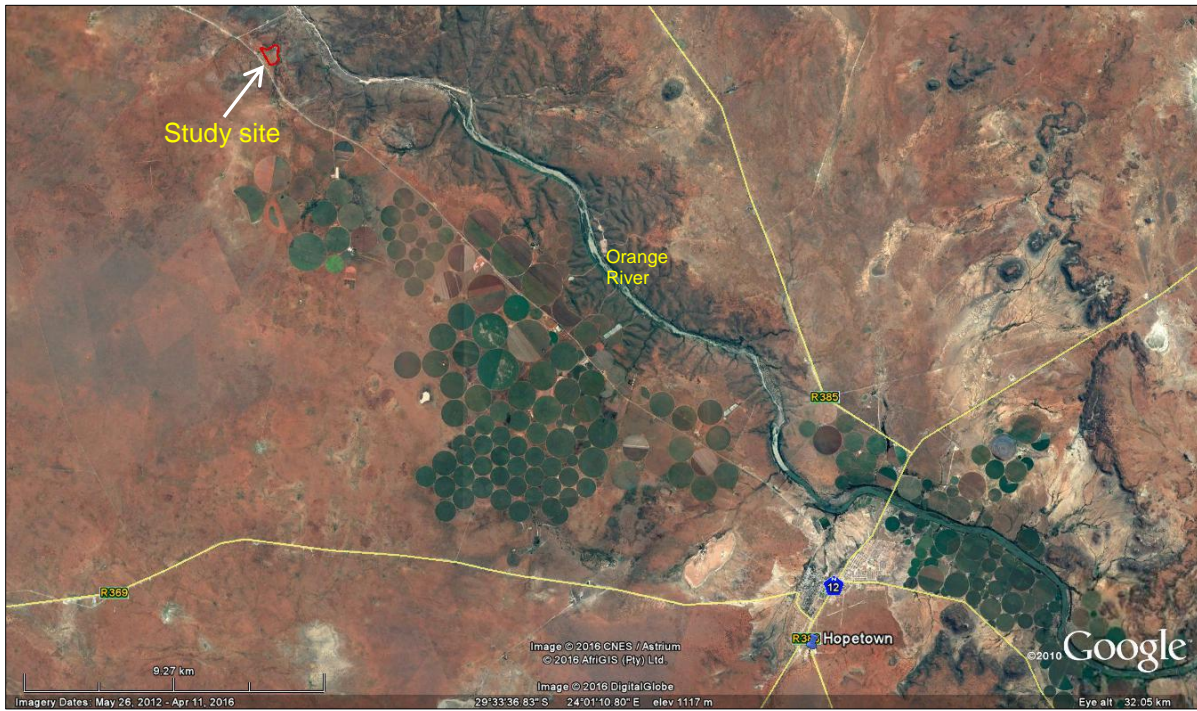


Figure 2. Google satellite map indicating the location of the proposed PV facility (red polygon) in relation to Hopetown

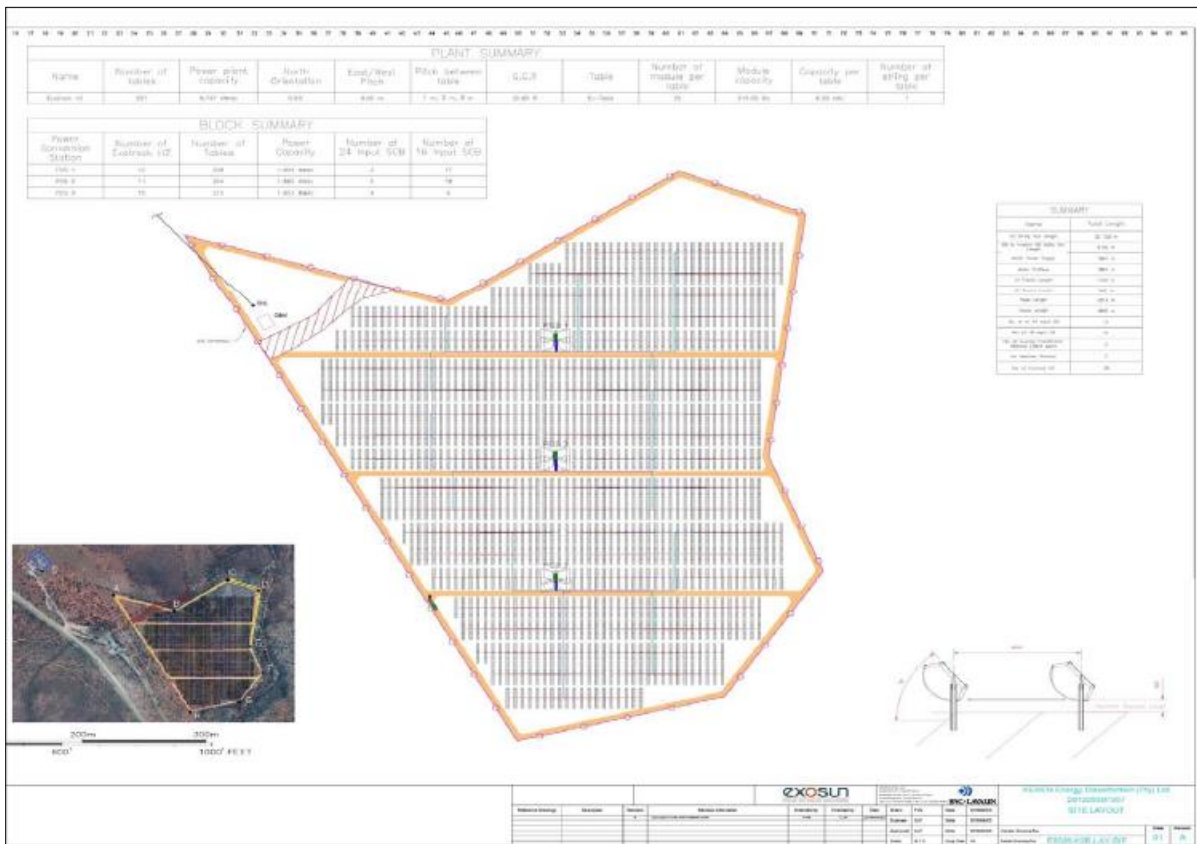


Figure 3. Disselfontein Solar Energy Farm: Proposed layout plan

3. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA No. 25 of 1999) protects archaeological and palaeontological sites and materials, as well as graves/cemeteries, battlefield sites and buildings, structures and features over 60 years old.

The South African Heritage Resources Agency (SAHRA) administers this legislation nationally, with Heritage Resources Agencies acting at provincial level. According to the Act (Sect. 35), it is an offence to destroy, damage, excavate, alter or remove from its original place, or collect, any archaeological, palaeontological and historical material or object, without a permit issued by the SAHRA or applicable Provincial Heritage Resources Agency, viz. Heritage Western Cape (HWC).

Notification of SAHRA is required for proposed developments exceeding certain dimensions (Sect. 38), upon which they will decide whether or not the development must be assessed for heritage impacts (an HIA) that may include an assessment of archaeological (a AIA) or palaeontological heritage (a PIA).

4. 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 be impacted by the proposed development;
- Indicate any constraints that would need to be taken into account in considering the development proposal;
- Identify any `No-Go` areas;
- Address Cumulative Impacts, and
- Recommend mitigation/management action

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The proposed Disselfontein PV site is located 21kms west of Hopetown on the tar road to Douglas. Hopetown is ±150kms southwest of Kimberly on the N12. The site is located ± 250m south of the Eskom Disselfontein substation (Figures 4-8). The Orange River is located 1.5kms to the east. The western portion of the property, alongside the tar road, is severely degraded (powerline, servitude & gravel road), and covered in dense stands of thorny Acacia. There is a large quarry near the entrance to the property. Some random pits have been excavated in the south. The remainder of the study site is infested with thorny Swarthaak and Acacia vegetation, although large swathes of grassland vegetation occur in the south. The substrate comprises mostly shallow red sands, with occasional patches of quartz and calcrete gravels. Small outcroppings of dolerite occur sporadically across the eastern portion of the site. The site is mostly level, but slopes to

the east alongside a non-perennial stream. There are no significant landscape features on or within the proposed footprint area. Farm No. 77 is currently zoned for agriculture.

Surrounding land use is agriculture. Large centre pivots dominate the agricultural landscape further south toward Hopetown. Apart from the Eskom infrastructure, there are no other buildings, structures or features on or close to the proposed development site.

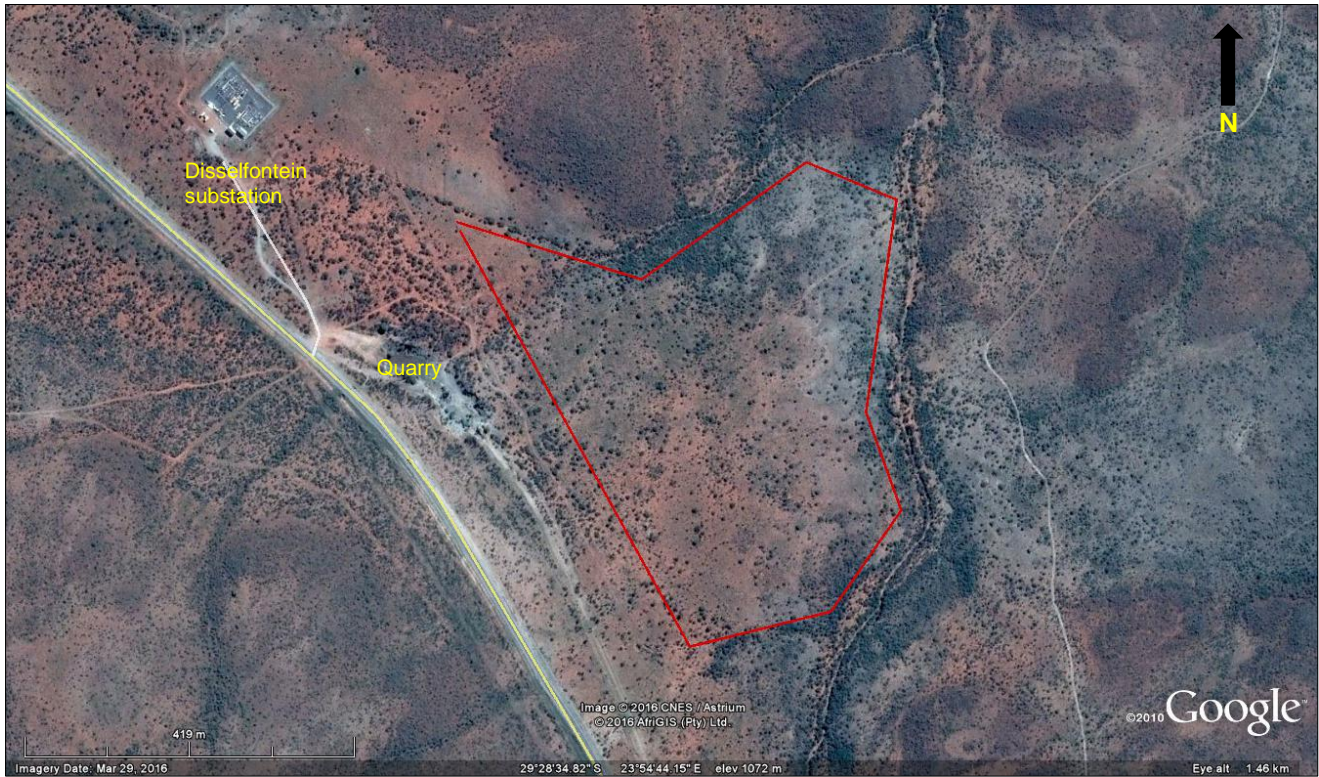


Figure 4. Google Earth satellite map illustrating the proposed footprint area for the Disselfontein PV facility



Figure 5. View of the site facing north. Arrow indicates the Eskom Disselfontein sub-station



Figure 6. View of the site facing north west



Figure 7. View of the site facing north



Figure 8. View of the site facing north

6. STUDY APPROACH

6.1 Method of survey

The purpose of the HIA is to assess the sensitivity of archaeological resources in the study area, to determine the potential impacts on such resources, and to avoid and/or minimize such impacts by means of management and/or mitigation measures

A field assessment of the proposed development site was undertaken on February 24th 2017. A track path of the survey was captured (Figure 9). Archaeological remains documented were mapped using a hand-held GPS unit set on the map datum WGS84.

A literature survey was carried out to assess the heritage context surrounding the proposed development site.

6.2 Constraints and limitations

Most of the proposed development site is covered in very thorny and virtually impenetrable Swarthaak, and thorny acacia vegetation, resulting in very poor archaeological visibility. Large swathes of grassland vegetation occur in the centre of the site and in the south, where archaeological visibility is good.

6.3 Identification of potential risks

Archaeological resources (i. e. stone tools) will be impacted by the proposed development, but the overall numbers are relatively small and widely dispersed over the landscape. Apart from trenches for underground cables, limited bedrock excavations are envisaged. The solar panels will be raised above the 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.

6.4 Results of the desk top study

According to the SAHRIS website, several archaeological studies have been undertaken in the Hopetown area. A single, MSA flake/blade was found near the Hopetown Sewerage Works (Rossouw & Groenewald 2003), while sporadic finds of patinated MSA blades, flakes, pointed flakes, retouched and utilized flakes were recorded on the Farm Vluytjeskraal east of Hopetown, alongside the R369 (Opperman 2012). Van Ryneveld (2005) also recorded MSA flakes, blades, cores and formal tools during an assessment for a proposed mining right permit of the Farm Ettrick alongside the Orange River north east of Hopetown. And Morris (2011) recorded low density scatters of MSA implements and fine line rock engravings on the Farm Gannahoek N12 near Hopetown.

Rock engravings have been also recorded on Thomas's Farm about 30kms north east of Hopetown on the N12/Hopetown-Kimberley road, where a cache of buried ostrich eggshells, dating to the late 19th/early 20th Century, was excavated by Henderson (2001, 2002). According to Henderson (2001), 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 70kms 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).

A baseline study of the (then) proposed Disselfontein solar energy farm in 2012 mapped 30 archaeological occurrences, numbering more than 150 stone implements. The majority of the remains were dominated by MSA implement, with much smaller numbers of LSA and ESA lithics occurring (Kaplan 2012). The remains were spread thinly and unevenly over the surrounding landscape. No activity areas were identified, and few formal tools were found, suggesting that most the finds comprised flakes and flake debris. No pottery, bone or ostrich eggshell was found either. It was maintained that the study captured a good record of the archaeological heritage present on the site.

7. FINDINGS

Thirty-three archaeological occurrences, numbering more than 180 stone implements, were recorded during the 2017 field assessment (Figure 9).

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

As indicated above, archaeological visibility was low, as much of the study site is infested with thorny Swarthaak and Acacia vegetation. However, low density scatters of tools (Sites 1401, 1421 & 1431) were recorded on the red cover sands alongside the powerline servitude in the north, and in the south among the grassland vegetation. The overall pattern of distribution however, is that of mostly isolated tools spread very thinly and unevenly over the surrounding landscape, with a few, sporadic finds of tools occurring in places (e.g. Site 1451-1471, 1481, 1531, 1541, 1611 & 1651).

Clusters of small dolerite boulders are scattered across the eastern portion of the site, but no rock engravings or scratchings were found. A few isolated hornfels flakes and

chunks were counted among boulders and there is also evidence that some of the stone has also been heavily flaked.

More than 90% of the archaeological remains are assigned to the Middle Stone Age (MSA), while small numbers of Later Stone Age (LSA) and Early Stone Age (ESA) remains, including several bifaces (Sites 1521 & 1641) and a handaxe (Site 1501), was also recorded. Chunky, weathered retouched blade tools of the Fauresmith MSA were also noted. The presence of different types of tools from all three periods of the South African Stone Age reflects the wide range, diversity and variability of tools that are known to occur in the Northern Cape Province.

The majority of the remains are in quartzite and indurated shale, with the remainder in chalcedony (less than 0.5%) and porphyry, while most of the large ESA tools are weathered and abraded indurated shale. Interestingly, no tools in banded ironstone were found suggesting such sources were located some distance away. Banded ironstone is common on many sites in the Northern Cape, close to Orange River, and was a favoured raw material of Stone Age hunter-gatherers.

A possible low-intensity, ESA knapping area (Sites 1561, 1571 & 1581) was recorded on the rocky slopes alongside the non-perennial stream which defines the eastern boundary of the proposed footprint area. This dispersed scatter comprised a few isolated weathered and abraded flakes, flaked boulders, chunks, and several bifaces. No handaxes or cleavers were found.

Frequencies of formal retouched tools are very low (less than 8%), and comprised a few pointed MSA flakes (Site 1571 & 1581), one scraper (Site 1571), and a LSA indurated shale step-flaked adze (Site 1531). MSA points were hafted onto shafts of wood and used as spears or stabbing tools, while adzes (woodworking tools) and scrapers (presumably skin cleaning tools) are reminiscent of the LSA.

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

No graves or typical grave markers were found in the proposed footprint area.

A collection of tools and the context in which some of the remains were found are illustrated in Figures 10-23.

7.1 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, dispersed and sporadic context in which they were found mean that the remains have been rated as having low (Grade 3C) significance.

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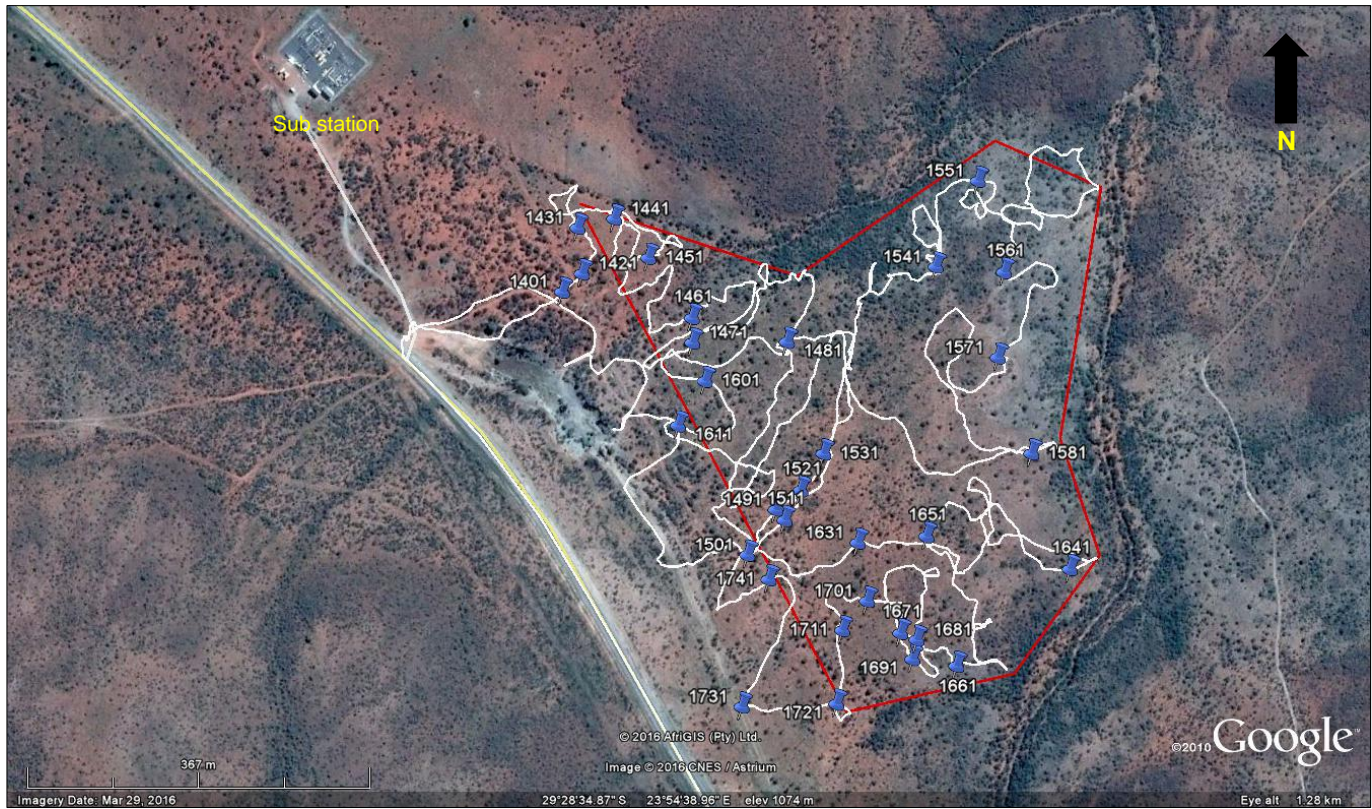


Figure 9. Waypoints of archaeological finds and track paths (in white). Red polygon is the proposed footprint area

Site	Name of farm	Let/long	Description of finds	Grading	Suggested mitigation
	Disselfontein No. 77/8				
1401		S29° 28.516' E23° 54.563'	Dispersed scatter of retouched and modified/utilized flakes, blade tools, chunks on soft red sands in powerline servitude. Fairly widespread. Mostly in indurated shale, porphyry	3C (low)	None required
1421		S29° 28.505' E23° 54.576'	Dispersed scatter of tools, same as above, on red sands in servitude. Flakes, chunks in porphyry, indurated shale, also weathered flakes, cortex flake and chunks	3C (low)	None required
1431		S29° 28.478' E23° 54.573'	Dispersed scatter, same as above, in servitude, on red sands, large quartzite MSA flake, MSA porphyry flakes, smaller flakes and chunks, weathered indurated shale flakes,	3C (low)	None required
1441		S29° 28.473' E23° 54.597'	Low density, dispersed scatter on red sands, between powerline servitude and small drainage channel/stream, occasional flake, chunk, blade mainly in quartzite. Possible quartzite anvil.	3C (low)	None required
1451		S29° 28.495' E23° 54.620'	Dispersed scatter of a few tools on	3C (low)	None required

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			patch of small pebbles, mainly indurated shale, including weathered indurated shale, and chunks/flaked chunk. Scatter of dolerite cobbles on thin gravels among dense acacia. A few isolated tools, but no engravings.		
1461		S29° 28.529' E23° 54.650'	Patch of quartz pebbles, a few isolated tools, weathered MSA in indurated shale, possibly ESA as well. Lots of dolerite cobbles, but no engravings. Dense acacia bush	3C (low)	None required
1471		S29° 28.544' E23° 54.650'	Dispersed scatter of a few isolated tools on pebble gravels and red sands dense acacia bush	3C (low)	None required
1481		S29° 28.542' E23° 54.713'	A few weathered MSA indurated shale and quartzite flake on stony gravel surface and dolerite cobbles surrounded by thick acacia bush. No engravings were found	3C (low)	None required
1491		S29° 28.639' E23° 54.708'	2 large weathered MSA indurated shale flake.	3C (low)	None required
1501		S29° 28.666' E23° 54.690'	ESA handaxe	3C (low)	None required
1511		S29° 28.645' E23° 54.714'	Several weathered indurated shale MSA flakes, retouched point and core, a few quartzite MSA fakes, on red sands surrounded by acacia bush	3C (low)	None required
1521		S29° 28.628' E23° 54.724'	ESA biface	3C (low)	None required
1531		S29° 28.606' E23° 54.739'	Dispersed scatter of LSA indurated shale flakes, on pebble surface. Long thin indurated shale bladelet, surrounded by thick impenetrable acacia bush	3C (low)	None required
1541		S29° 28.497' E23° 54.811'	Dispersed scatter of a few large quartzite flakes, bifacial weathered flake/point, large weathered ESA indurated shale flake, on open patch of sand and surface stone, small pieces of limestone, and dolerite boulders surrounded by dense bushes and trees. Large ESA weathered core/boulder	3C (low)	None required
1551		S29° 28.447' E23° 54.838'	Chunk, flake, weathered indurated shale flake, large chunk/core (?ESA) on red sands surrounded by very dense acacia bush	3C (low)	None required
1561		S29° 28.499' E23° 54.857'	Large ESA flake, large core/chunk, chunk on rocky stony slopes alongside dry stream bed – dense acacia directly alongside stream	3C (low)	None required
1571		S29° 28.549' E23° 54.854'	Large, weathered ESA core, flaked boulders, large flake in weathered indurated shale, 2-3 MSA quartzite flakes, indurated shale scraper ,	3C (low)	None required

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			and point, LSA flake on rocky, hilly slopes, dolerite cobbles. No engravings found		
1581		S29° 28.542' E23° 54.709'	Low level scatter – quartzite MSA flakes, chunk, core, large weathered indurated shale ESA flake/flaked cobble,	3C (low)	None required
1601		S29° 28.566' E23° 54.659'	Low level scatter of a few large weathered ESA and MSA flakes & chunks on gravel patch surrounded by thorny Swarthaak vegetation	3C (low)	None required
1611		S29° 28.592' E23° 54.642'	Chunk, possible indurated shale LSA adze, hammer-stone, several MSA quartzite flakes, large weathered ESA flake on stony patch of ground/red sands surrounded by thorny Swarthaak vegetation.	3C (low)	None required
1631		S29° 28.657' E23° 54.763'	Occasional quartzite MSA flake in twee-spoor track and dispersed scatter in grassland vegetation	3C (low)	None required
1641		S29° 28.670' E23° 54.904'	ESA biface	3C (low)	None required
1651		S29° 28.653' E23° 54.809'	Small scatter comprising a few quartzite MSA flakes, weathered indurated shale flakes on small stony patch of gravel. Snapped chalcedony retouched flaked, retouched quartzite flake, large indurated shale retouched blade/flake. Scatter of dolerite but no engravings found	3C (low)	None required
1661		S29° 28.728' E23° 54.830'	Thin scatter of tools on stony slope alongside stream, dense Swarthaak vegetation, ESA flake, retouched indurated shale flake, quartzite flake and chunk	3C (low)	None required
1671		S29° 28.709' E23° 54.792'	A few isolated quartzite & indurated shale flakes on red sands	3C (low)	None required
1681		S29° 28.713' E23° 54.803'	Quartzite flake on red sands	3C (low)	None required
1691		S29° 28.724' E23° 54.801'	Quartzite flake on red sands	3C (low)	None required
1701		S29° 28.691' E23° 54.770'	Dispersed scatter of quartzite MSA flakes and chunks on patch of red sands surrounded by grassland vegetation	3c (low)	None required
1711		S29° 28.708' E23° 54.754'	Dispersed scatter of quartzite MSA flakes, incomplete quartzite MSA point, hammer-stone, weathered indurated shale flake surrounded by thick grassland vegetation	3C (low)	None required
1721		S29° 28.751' E23° 54.751'	Dispersed scatter of a few quartzite MSA flakes, weathered indurated shale chunky MSA flakes on larger patch of red sand surrounded by thick grassland vegetation	3C (low)	None required
1731		S29° 28.754' E23° 54.688'	MSA quartzite flakes and chunk on	3C (low)	None required

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			stony rock ground in powerline servitude		
1741		S29° 28.680' E23° 54.704'	Quartzite MSA flake chunk on stony compact ground alongside powerline servitude	3C (low)	None required

Table 1. Spreadsheet of waypoints and description of archaeological finds



Figure 10. Sites 1401 & 1421. Scale is in cm



Figure 11. Site 1401. Context in which the remains were found



Figure 12. Site 1431. Scale is in cm



Figure 13. Site 1611

Archaeological study proposed solar energy farm near Hopetown



Figure 14. Collection of tools. Scale is in cm



Figure 17. Site 1641. Scale is in cm



Figure 15. Site 1521. Scale is in cm



Figure 18. Site 1561.



Figure 16. Site 1501. Scale is in cm



Figure 19. Site 1571

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Figure 20. Site 1571. Scale is in cm



Figure 23. Site 1651



Figure 21. Site 1651



Figure 24. Site 1651 Scale is in cm



Figure 22. Site 1611. Scale is in cm



Figure 25. Site 1701



Figure 26. Site 1701



Figure 27. Site 1711

8. CUMULATIVE IMPACTS ON ARCHAEOLOGICAL HERITAGE

According to the Department of Environmental Affairs (DEA) Renewable Energy EIA Application Database for renewable projects (new builds)¹, there are four more renewable energy (RE) projects planned within a 30km radius of Disselfontein. However, despite the presence of the other RE sites in the region, it will not impact on archaeological resources in the proposed Disselfontein PV facility.

9. CONCLUSION

Construction and operation of the proposed Keren Energy Disselfontein Solar Energy Plant on Farm 77/8 will have a limited impact on archaeological heritage. However, it is maintained that the study, including the results of the 2012 study done by the contracted archaeologist, has captured a good record of the archaeological heritage across a large (40ha) portion of the farm.

The impact significance of the proposed construction of the Keren Energy Disselfontein PV facility on significant archaeological heritage is therefore assessed as LOW.

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

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

10. RECOMMENDATIONS

With regard to the proposed construction and operation of the Keren Energy Disselfontein Solar Energy Plant on Portion 8 of Farm No. 77, the following recommendations are made:

1. No archaeological mitigation is required prior to development activities commencing.
2. If any unmarked human remains, or ostrich eggshell caches, for example, are exposed or uncovered during excavations these must immediately be reported to Heritage Western Cape (Ms Natasha Higgit 021 462 4509), or the contracted archaeologist (Jonathan Kaplan 082 321 0172).
3. The above recommendations must be incorporated into the Environmental Management Plan (EMP) for the proposed development.

11. REFERENCES

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