9/2/025/0001

1 site might need mitigation

ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE

Prepared for:

DJ Environmental Consultants

Att: Mr Junaid Moosajee
Postnet Suite 66
Private Bag X15
Somerset West 7130
E-mail: Junaid@djec.co.za

On behalf of:

Mulilo Renewable Energy (Pty) Ltd

By

Jonathan Kaplan
Agency for Cultural Resource Management
No 5 Stuart Road
Rondebosch
P/F: 021 685 7589
M: 082 321 0172
Email: acrm@wcacces.co.za

APRIL 2010

EXECUTIVE SUMMARY

DJ Environmental Consultants, on behalf of Mulilo Renewable Energy, appointed the Agency for Cultural Resource Management to conduct an Archaeological Impact Assessment for a proposed photovoltaic (PV) power generation facility in De Aar in the Northern Cape Province. Two alternative options (North West and South East) have been identified. The proposed facility will generate an estimated 20 MW of energy in total. An overhead powerline will link to the national transmission grid via Hydra substation in De Aar. The footprint for each of the proposed power plants is 400 x 400 m (or about 16 ha in extent).

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

Dr Johann Almond of Nature viva cc has been appointed to conduct a Paleontological Impact Assessment (PIA) - desk top study of the proposed project.

Heritage consultant Ms Melanie Atwell has been commissioned to undertake a Heritage Scoping Study of the proposed facility.

The archaeological study entailed the following:

- A 1-day site visit that included a foot survey of each of the proposed alternative sites. The 1.6 km long overhead transmission line for the proposed North West site was also surveyed, but the ± 7 km long transmission line for the proposed South East option was not searched. It is maintained that the likelihood of locating significant archeological remains in the proposed 7 km route corridor is limited due to the highly transformed nature of the receiving environment as well as the findings of the archaeological study.

The following findings were made:

North West Option (the applicants preferred alternative)

The proposed site is located alongside the Brak River, north west of the town and quite close to the De Aar municipal substation. The receiving environment comprises old agricultural lands that have not been utilized for many years, and has reverted to range lands. Relatively large numbers of Later Stone Age tools, some possibly dating to the historic colonial period were documented on the proposed development site. These include mostly weathered hornfels flakes, chunks, cores and a few utilized and retouched flakes and blades. Some 19th Century annular ware and the utilized base of a 19th Century Case bottle were also found. A possible activity area, or evidence of human settlement has been identified, that comprises a range of tools including utilized and retouched flakes, blades, chunks, cores, manuports, an anvil and a lower grindstone. However, no pottery, or other cultural remains, or any stone features were found. Apart from the possible settlement site, the majority of artefactual remains over the site occur mostly in a disturbed context. Most of the finds have been recorded with a GPS waypoint and photographed, including the context in which the finds occur. It is maintained that

the archaeological study has captured good information on the archaeological heritage present on the site.

With regard to the proposed North West Option, the Archaeological Impact Assessment has shown that the proposed development will impact negatively on potentially important archaeological heritage remains, and that archaeological mitigation action will be required prior to any construction activities commencing.

South East Option

A relatively small number of Later Stone Age tools, including one Middle Stone Age flake were documented over the proposed development site, and these are spread very thinly and unevenly over the surrounding landscape. The tools comprise mostly very weathered hornfels flakes and a few utilized and retouched flakes and blades that occur in a disturbed and degraded context. No evidence of any factory or workshop site, or the result of any human settlement was identified, although several diffuse scatters of tools were documented. Most of the finds have been recorded with a GPS waypoint but only a few tools have been photographed. Overall, it is maintained that the proposed development of a 20 MW photovoltaic power generation facility will not have an impact of great significance on these and potentially other archaeological remains.

With regard to the South East Option, the Archaeological Impact Assessment has identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to proposed development activities.

The following recommendations and mitigation actions are made:

1. Mapping and sampling of archaeological remains in the North West Option is required, prior to any construction activities commencing. This will entail fairly extensive horizontal excavation of the identified settlement site, including the mapping, recovery, analysis, reporting and storage of archaeological finds. Mitigation is at the cost of the developer.

Indications are that in terms of archaeological heritage, the proposed activity is viable. While impacts in the North West Option are expected to be negative, these can be effectively mitigated.

In archaeological terms, no fatal flaws have therefore been identified.

Table of Contents

1. INTRODUCTION

DJ Environmental Consultants, on behalf of Mulilo Renewable Energy, appointed the Agency for Cultural Resource Management to conduct an Archaeological Impact Assessment for a proposed photovoltaic (or PV) power generation facility on Farms 180/1 and 145/2 in De Aar in the Northern Cape Province. De Aar is located about 755 kms north east of Cape Town on the N1. The proposed development is situated within the Emathanjeni Local Municipality.

Two alternative sites (North West Option and South East Option) have been identified. The proposed facility will generate an estimated 20 MW of energy in total. An overhead powerline will link to the national transmission grid via Hydra substation in De Aar. The footprint for each of the proposed power plants is 400 x 400 m (or about 16 ha in extent).

The North West Option is the applicants preferred alternative.

South Africa is on the verge of adding renewable power generation to the existing coal fired and nuclear energy power stations. In April 2009, The National Energy Regulator of South Africa (NERSA) published a favourable feed-tariff structure for various forms of renewable energy that allows for independent clean energy producers to invest in renewable energy resources. Although PV was not included at that stage this has been addressed in an amendment which is currently drawing public comment.

It is in this context that the applicant proposes to construct a 20 MW photovoltaic power generation facility in De Aar, and an overhead powerline linking to the national transmission grid via the Hydra substation. The substation provides good grid connectivity, with major transmission lines to all parts of the country. The region has an excellent solar radiation resource, where large areas of unutilised level land are located.

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

Dr John Almond of Nature viva cc has been appointed to conduct a Paleontological Impact Assessment (PIA) - desk top study of the proposed project (Almond 2010).

Heritage consultant Ms Melanie Atwell has been commissioned to undertake a Heritage Scoping Study of the proposed power generation facility.

The Archaeological Impact Assessment forms part of the Environmental Impact Assessment (EIA) process that is being conducted by independent environmental consultants DJ Environmental Consultants.

The archaeological study entailed the following:

2. A 1-day site visit that included a foot survey of each of the proposed alternative sites. The 1.6 km long transmission line for the proposed North West Option was also surveyed, but the ± 7 km long transmission line for De Aar South East Option was not searched. It is maintained that the likelihood of locating significant archeological remains in the proposed South East route corridor is limited due to

the highly transformed nature of the receiving environment and the findings of the archaeological study.

2. TERMS OF REFERENCE

The terms of reference for the archeological study are to:

- Determine whether there are likely to be any archaeological resources that may potentially be impacted by the proposed development;
- To identify and map archaeological resources that may potentially be impacted by the proposed development;
- To assess the sensitivity and conservation significance of archaeological resources potentially affected by the proposed development;
- To assess the significance of any impacts resulting from the proposed development, and
- To identify measures to protect and maintain any valuable archaeological sites that may impacted by the proposed development

3. THE STUDY SITE

The proposed development is situated in De Aar in the Northern Cape (Figure 1 and refer to Figures in Appendix). A, Google aerial photograph of the study area is illustrated in Figures 2-4. The current zoning of the affected properties is Agriculture.

NWOp

The proposed North West Option is situated alongside and in the floodplain of the Brak River and about 1.5 kms north of the Municipal Show grounds and quite close to the De Aar municipal substation. The receiving environment comprises old agricultural lands that have not been utilized for some years, and has reverted back to range lands. Several sandy and gravel tracks intersect the property. Overgrazing and sheet erosion are also evident. The proposed site is covered in thick grass, bush and scrub with a few sporadic trees occurring in places. Animal burrowing is extensive. Surrounding land use comprises large tracts of vacant land and the railway line to the south. Apart from the Brak River there are no significant landscape features on the property (Figures 5-13).

SEOp

The proposed South East Option is situated about 3 kms north of the N10 and the Hydra substation, about 1.5 km east of Nonzwakazi Township and directly alongside a major 450 KV transmission line corridor. Access to the proposed development site is via an existing farm and Eskom service road that will be upgraded. No new access road to the site is envisaged. The proposed site is level and the receiving environment comprises old agricultural lands that have not been utilized for some years. Overgrazing in very evident and there are large patches of compact red sand and gravel in the south (Figures 14-20). The ground cover comprises extensive grass, low bush and some scrub. There are no significant landscape features on the property. Some dolerite covered hills occur immediately to the east and south of the proposed site.

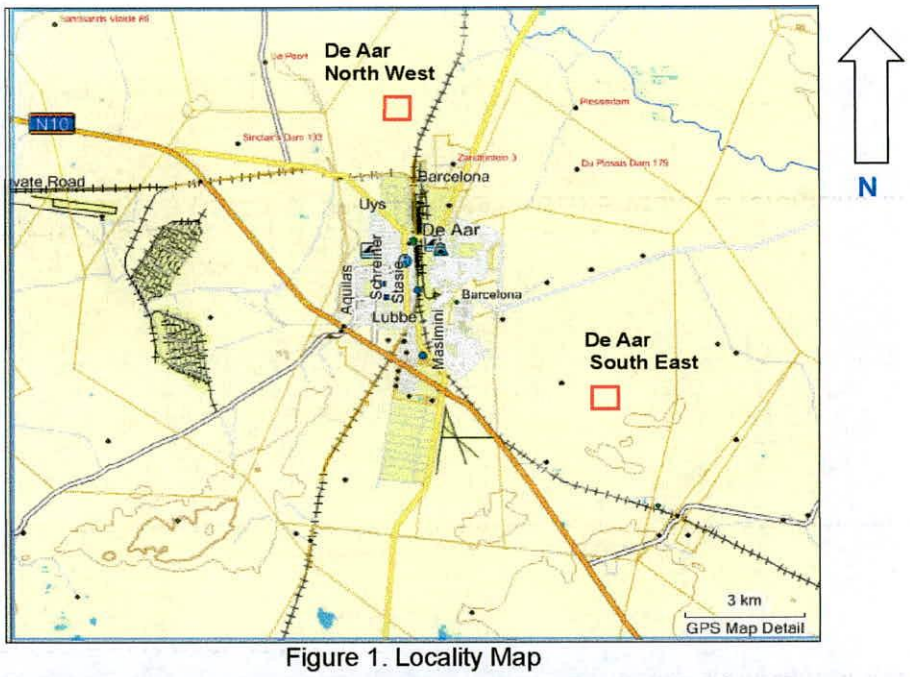


Figure 1. Locality Map

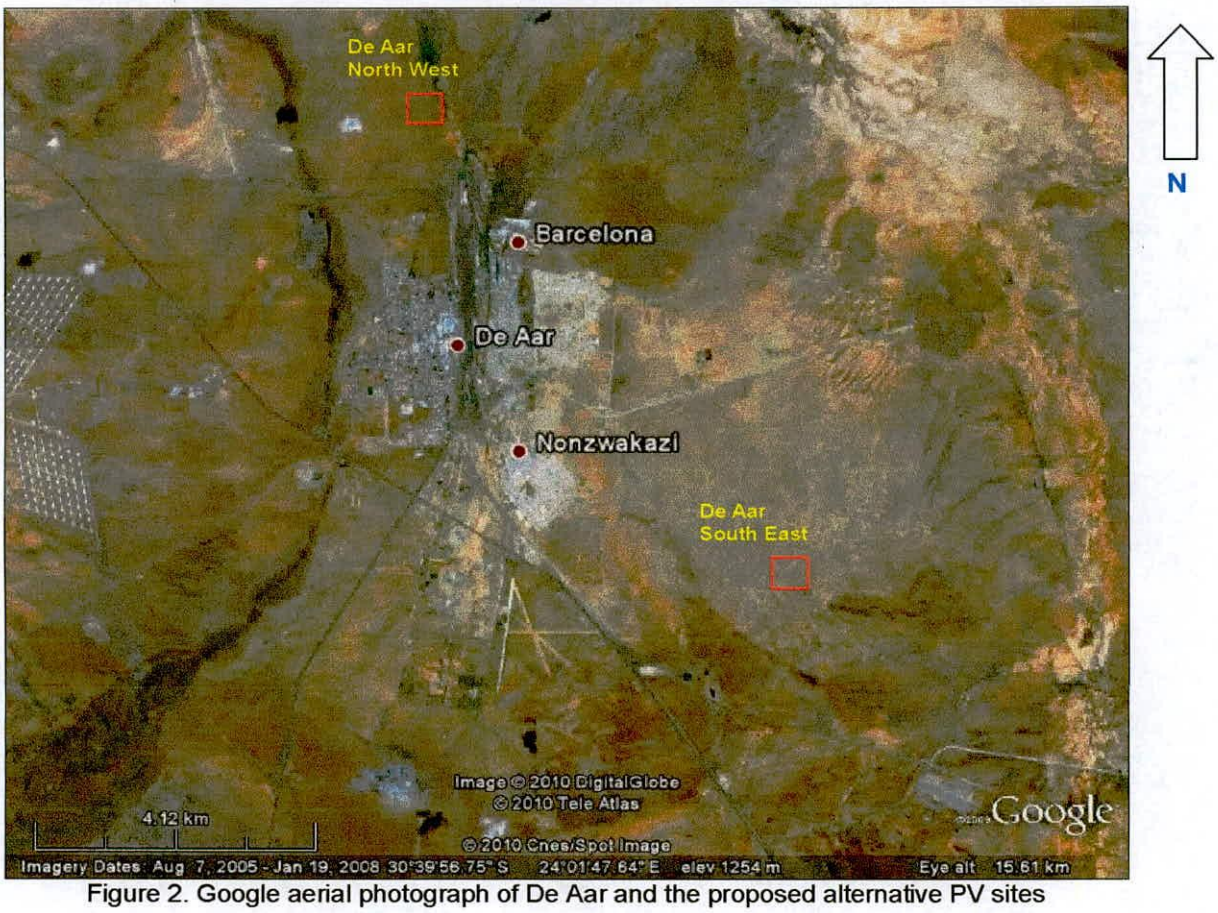


Figure 2. Google aerial photograph of De Aar and the proposed alternative PV sites

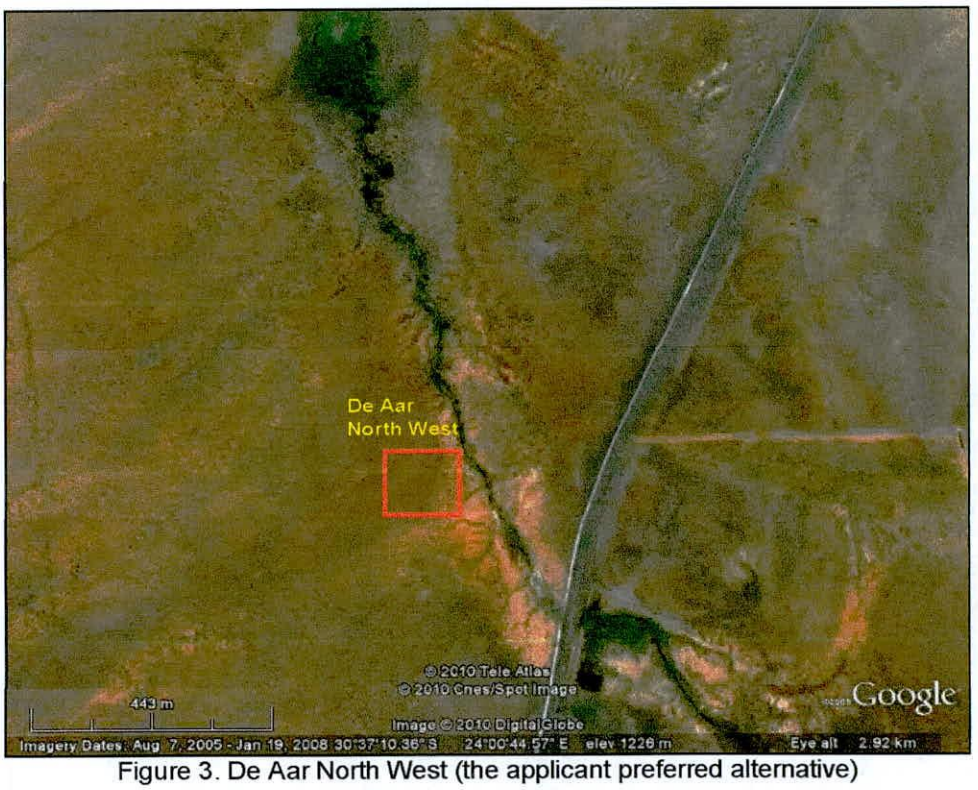


Figure 3. De Aar North West (the applicant preferred alternative)

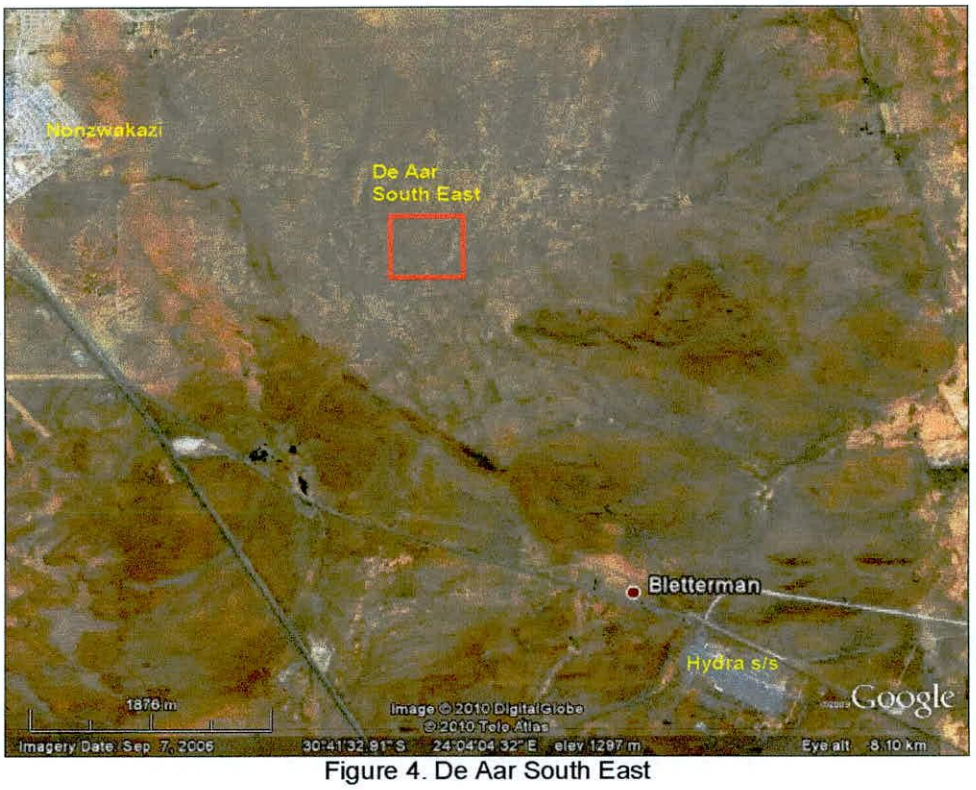


Figure 4. De Aar South East

OP 1

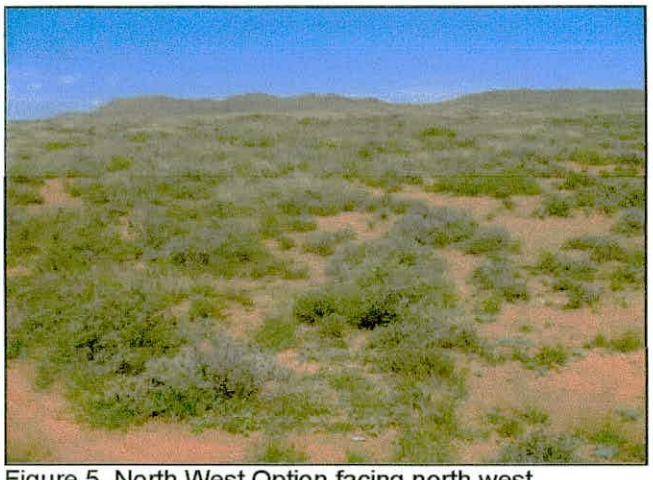


Figure 5. North West Option facing north west

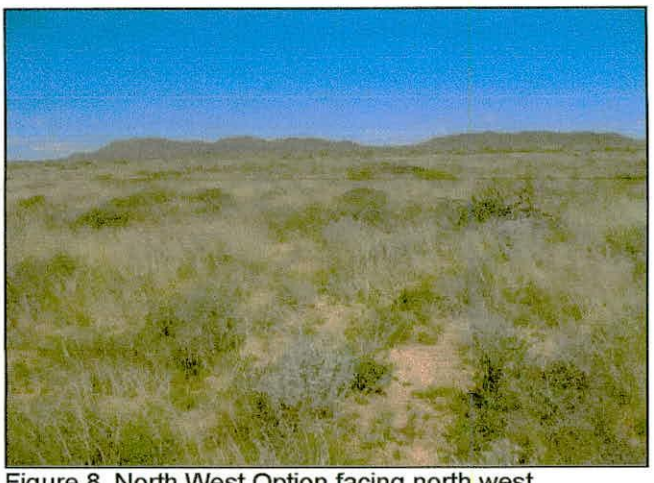


Figure 8. North West Option facing north west

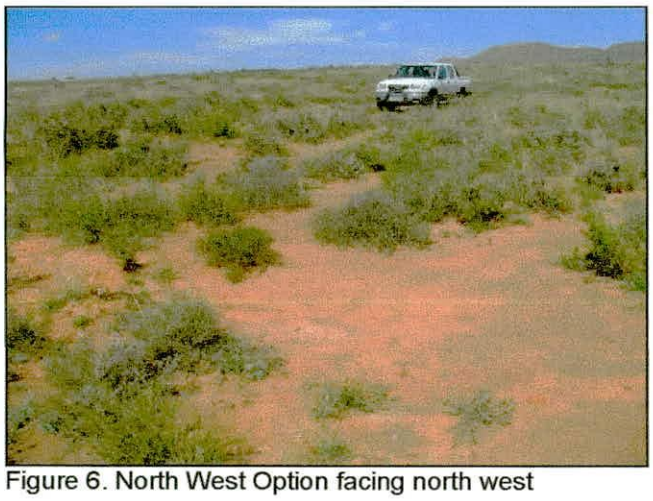


Figure 6. North West Option facing north west

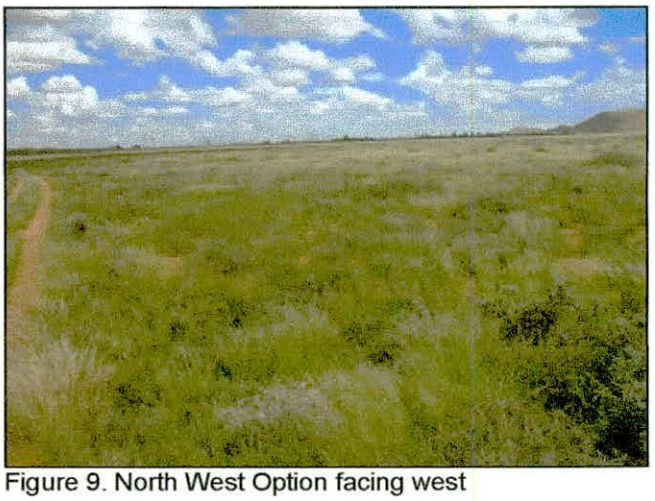


Figure 9. North West Option facing west

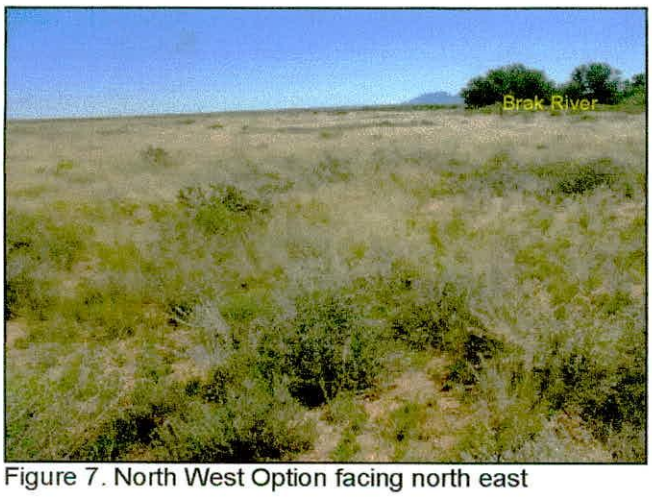


Figure 7. North West Option facing north east

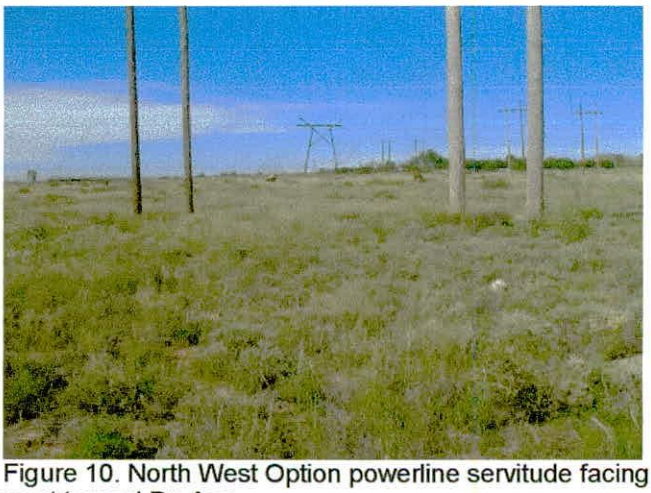


Figure 10. North West Option powerline servitude facing west toward De Aar

OP 1

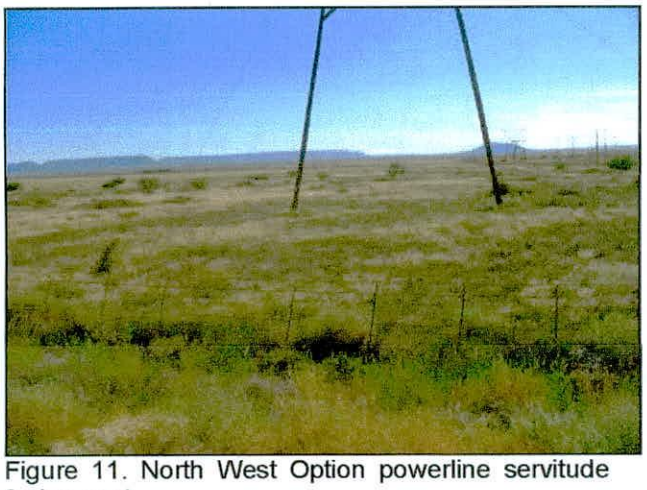


Figure 11. North West Option powerline servitude facing east

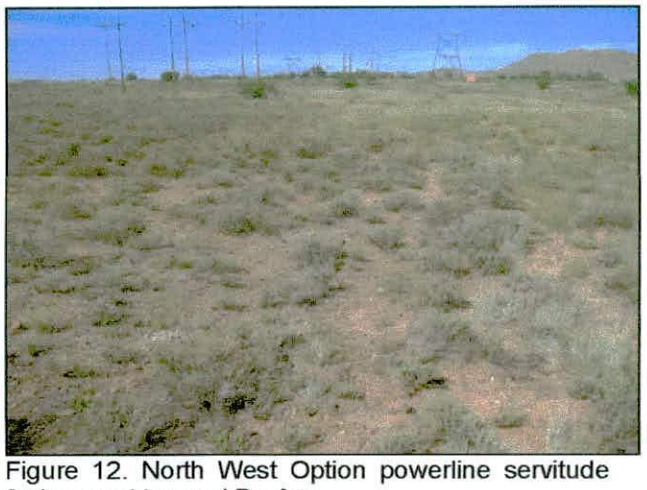


Figure 12. North West Option powerline servitude facing west to ward De Aar

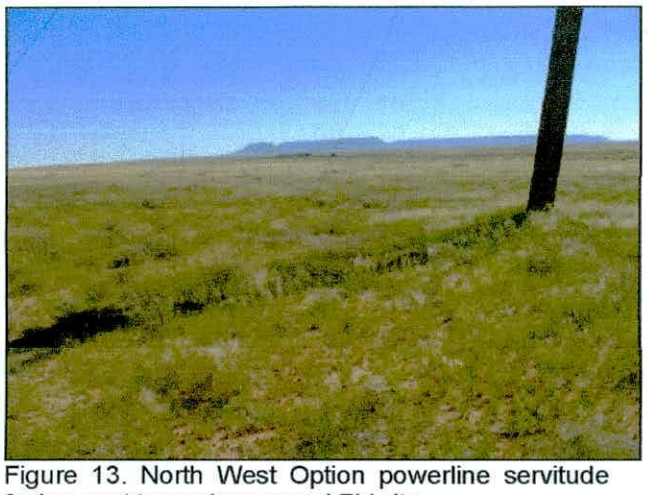


Figure 13. North West Option powerline servitude facing east toward proposed PV site

OP 2

Figure 14. South East Option facing north

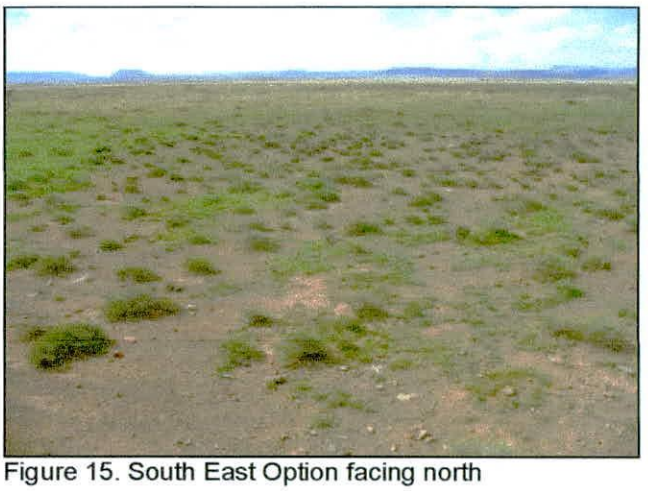


Figure 15. South East Option facing north

Figure 16. South East Option facing east

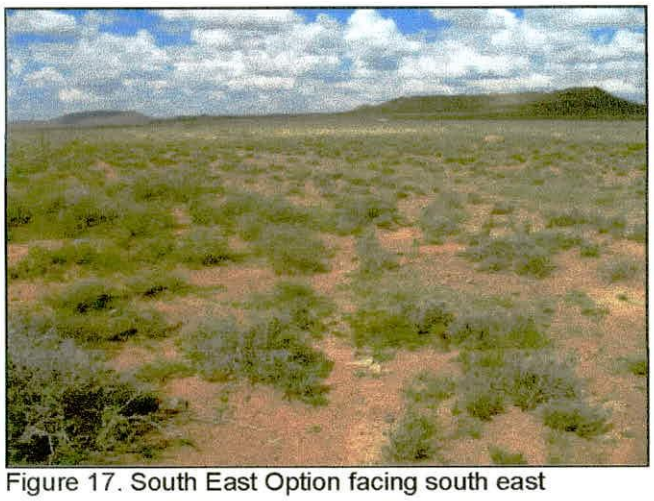


Figure 17. South East Option facing south east

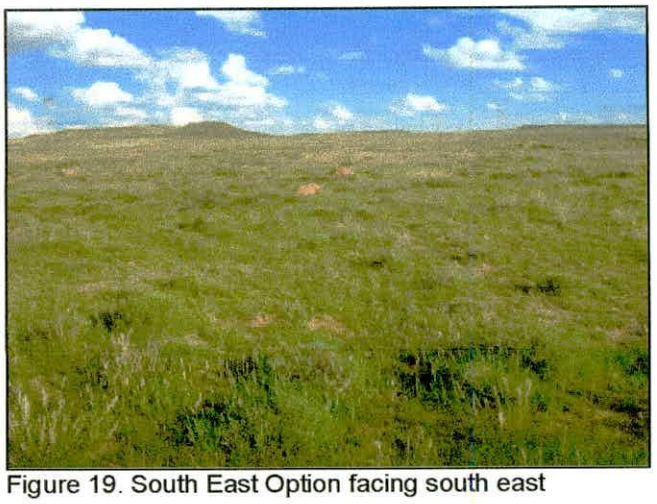


Figure 19. South East Option facing south east

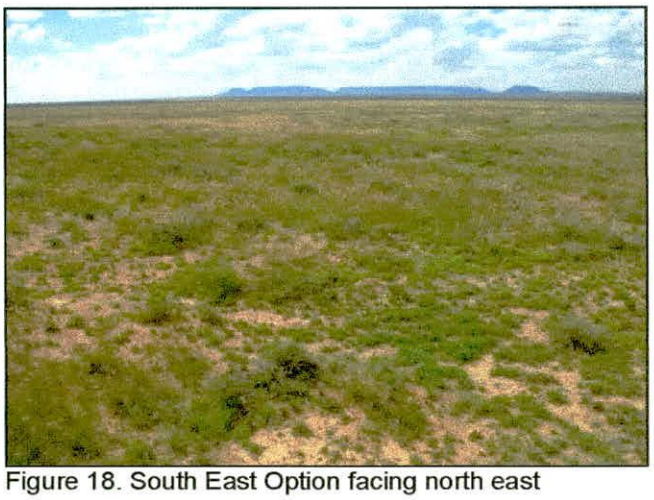


Figure 18. South East Option facing north east

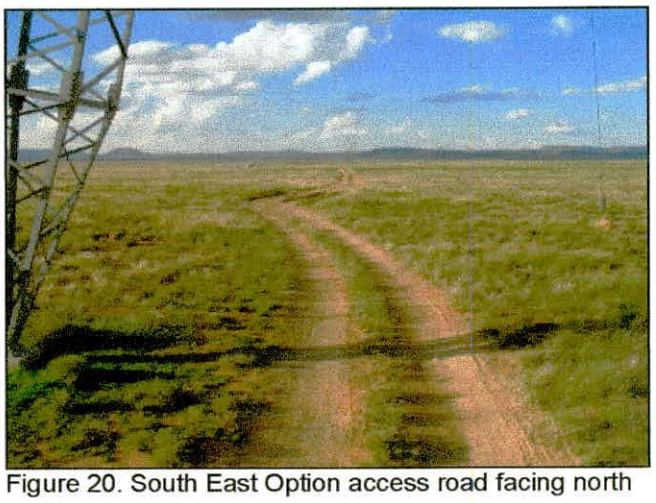


Figure 20. South East Option access road facing north

4. METHODOLOGY FOR THE STUDY

4.1 Method of survey

A one day site visit and ground survey was completed and a number of archaeological observations were made. A 16 ha footprint is required for the development of a 20 MW power plant, but a significantly larger footprint for the South East Option was searched (refer to GPS track path). Initially, the South East Option was the applicants preferred alternative, which is why a larger area was searched. The proposed 1.6 km long North West transmission line was also surveyed, but the proposed 7 km long, South East Option transmission line was not searched for archaeological remains. The findings from the survey suggest that while Stone Age material may be located in the South East powerline corridor, these will likely be spread very thinly over the surrounding landscape.

It is maintained that the survey of the proposed PV sites has captured good information on the archaeological heritage present. The AIA was conducted on the 24th of March, 2010.

Archaeologist, Mr David Morris of the McGregor Museum in Kimberly was consulted. An Archaeologist Impact Assessment of the proposed extension of the Hydra Substation in De Aar found `no significant archaeological traces' (Morris 2007:4), apart from a low-density scatter of Middle Stone Age tools, and some Later Stone Age tools on a nearby ridge. According to Morris (1988 and pers. comm.) rock engravings occur in the hills north and especially south west of De Aar. Tourist brochures also report the presence of rock engravings on several farms in De Aar, but these are located north of the town on the R48 to Philipstown.

A GPS track path of the archaeological survey was also created. The track path has been saved to a DVD and submitted with a digital copy of the report. Most of the archaeological occurrences were plotted using a Garmin Oregon 300 GPS unit, set on map datum wgs 84, and photographed. A spreadsheet of the waypoints and a description of the archaeological occurrences are presented in Tables 1 and 2.

4.2 Constraints and limitations

There were no constraints or limitations associated with the study, although much of the proposed North West Option is covered in thick grass resulting in low archaeological visibility.

5. FINDINGS

5.1 North West Option covered in thick grass

Mostly diffuse scatters of Later Stone Age artefacts were documented over the proposed development site, some of which may possibly date to the historic colonial period. Most of the tools comprise unmodified flakes and chunks, but a few round cores, bladelets, utilized and retouched flakes and blades were also documented (Table 1). All the tools are in heavily weathered and patinated hornfels. The tools were found on patches of compact red sands below a sandy overburden. One such patch (DANW 7) also contained several pieces of 19th Century Annular ware and a possible utilized flake made from a broken 19th Century, Case bottle (DANW 13).

A larger (albeit diffuse) scatter of tools was also found on open patches of compact red sounds, about 75 m from the bank of the Brak River (DANW 10 and 11). These included a range of tools, such as flakes, chunks, chips, utilized and retouched flakes and blades, an anvil, a large lower grindstone (in dolerite) and at least two large convex scrapers. A relatively large number of manuports (rounded hornfels cobbles) were also found on a patch of ground alongside a sandy track. Given the range of tools present on the site, the scatter of artefacts might be compelling evidence for a settlement site, the manuports being raw materials for the manufacture of tools, or possible other uses. No other cultural remains such as pottery, or ceramics or evidence of any stone walling was, however found, despite a careful search of the surrounding area.

A few isolated tools and several very diffuse scatters of tools (DANW 1-5) were also documented in the existing powerline servitude (refer to Figure 10-12). These finds comprise mainly very weathered hornfels flakes and chunks, and a few utilized and retouched flakes and blades. Most of these finds occur in a disturbed context, on patches of gravel and in the powerline corridor.

A collection of artefacts and the context in which they occur are illustrated in Figures 21-28.

Figure 21: DANW 5. Scale in cm

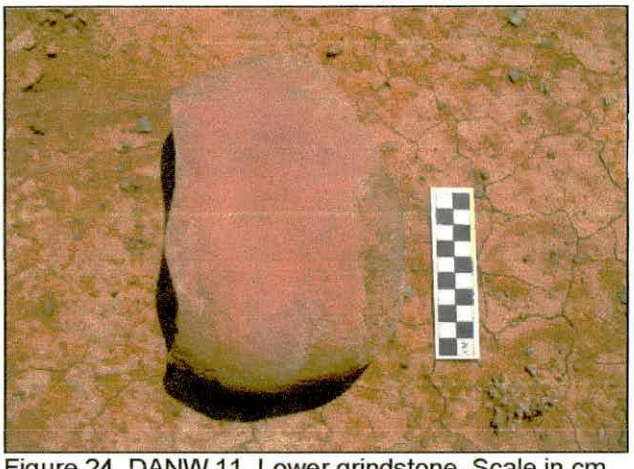


Figure 24. DANW 11. Lower grindstone. Scale in cm

mitigation

Figure 22. DANW 7. Scale in cm

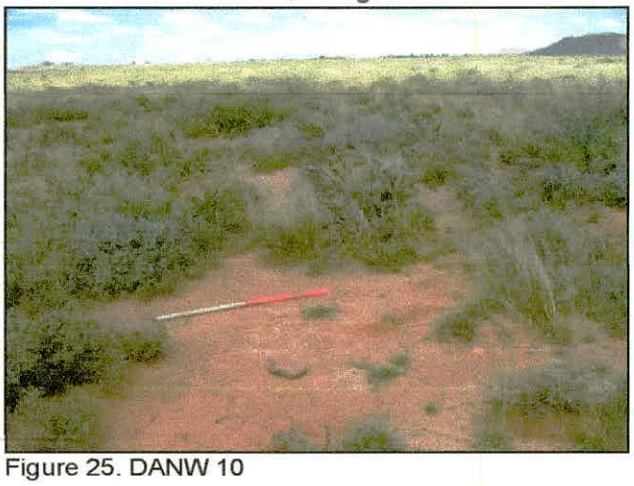


Figure 25. DANW 10

Figure 23. DANW 10. Scale in cm

mitigation

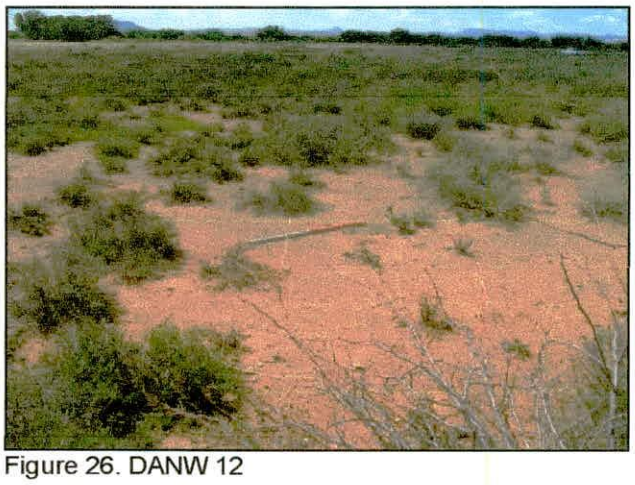


Figure 26. DANW 12

Figure 27 DANW 1. Scale in cm

Figure 28. DANW 4. Scale in cm

5.2 South East Option

not the preferred for the client

Mostly isolated, Later Stone Age tools, ~~including one~~ and Middle Stone Age flake (DASE 4) were documented over the proposed development site, but these are spread very thinly and unevenly over the surrounding landscape (Table 2). The tools comprise heavily weathered hornfels flakes, including a few retouched and/or partially retouched flakes and blade tools, and chunks that occur in a disturbed and degraded context. No evidence of any factory or workshop site, or the result of any human settlement was identified, but several diffuse scatters of hornfels flakes, including utilized and retouched flakes and a small convex scraper, were recorded (DASE 11, 21 and 25) outside the proposed development footprint. All the tools were assigned GPS waypoints, ~~but~~ only several were photographed. A collection of some of the artefacts is illustrated in Figures 29 and 30.

Figure 29 DASE 5. Scale in cm

Figure 30. DASE 11 – convex scraper. Scale in cm

6. IMPACT STATEMENT

6.1 North West Option

With regard to the North West Option, the Archaeological Impact Assessment has shown that the proposed development of a 20 MW photovoltaic power generation facility will impact negatively on potentially important archaeological heritage remains, and that archaeological mitigation action will be required prior to any construction activities commencing. Evidence of human settlement and activity has been identified on the proposed site (DANW 10 and 11), and will require further contextual archaeological investigation.

6.2 South East Option

With regard to the South East Option, the Archaeological Impact Assessment has identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to proposed development activities.

7. RECOMMENDATIONS AND MITIGATION ACTION

The following recommendations are made:

1. Mapping and sampling of archaeological remains (specifically DANW 10 and 11) in the North West Option is required, prior to any construction activities commencing. This will entail fairly extensive horizontal excavation of the site, including the mapping, recovery, analysis, reporting and storage of archaeological finds. Mitigation is at the cost of the developer.

8. CONCLUSION

Indications are that in terms of archaeological heritage, the proposed activity is viable. While impacts are expected to be negative on the North West Option, these can be effectively mitigated.

In archaeological terms, no fatal flaws have therefore been identified.

9. REFERENCES

Almond, J. 2010. Palaeontological Impact Assessment Desk Top Study. Proposed Photovoltaic Power Generation Facility at De Aar, Northern Cape. Report prepared for DJ Environmental Consultants. Nature viva. Cape Town

Morris, D. 2007. Archaeological Impact Assessment of the proposed extension of the Hydra Substation in De Aar, Northern Cape Province. Report prepared for Bohlweki Environmental. McGregor Museum, Kimberly

Morris, D. 1988. Engraved in place and time: a review of variability in the rock art of the Northern Cape and Karoo. South African Archaeological Bulletin 43:109-121.

Site	Name	Long	Lat	Finds
De Aar North West (DANW)	180/1			
DANW 1		S30 37.777	E24 00.668	A few very weathered hornfels flakes on patch of gravel in powerline servitude
DANW 2		S30 37.737	E24 00.685	A few weathered hornfels lakes, and utilized flake in powerline servitude
DANW 3		S30 37.691	E24 00.718	2-3 weathered hornfels flakes in powerline servitude
DANW 4		S30 37.638	E24 00.744	Diffuse scatter of weathered hornfels flakes and chunks and blade in powerline servitude
DANW 5		S30 36.982	E24 00.582	Diffuse scatter of a few very weathered hornfels flakes, chips, 1 utilized flake, 1 MRP, 1 core, on a compact patch of red sands ±40m from Brak River
DANW 6		S30 36.948	E24 00.539	Diffuse scatter of weathered hornfels flakes, round core, MRP, chunks, on compact red sands
DANW 7		S30 36.973	E24 00.540	Weathered hornfels flakes, 1 retouched blade, indurated shale bladelet and flakes on compact red sand, including 4 pieces of Annular ware ceramics
DANW 8		S30 37.024	E24 00.603	Diffuse scatter of weathered and fresh hornfels flakes, utilized flake/blade, utilized bladelet, 1-2 chunks, on small patches of compact red sands
DANW 9		S30 36.997	E24 00.516	A few weathered hornfels flakes, inc. 2 utilized flakes
DANW 10 mitigation required		S30 36.995	E24 00.502	Relative large number of weathered hornfels flakes, chunks, chips, manuport on larger patch of compact red sands. 1 anvil and large

				scraper. Possible settlement site
DANW 11 mitigation required		S30 37.026	E24 00.617	Lower grindstone fragment, diffuse scatter of hornfels flakes, large convex scraper, utilized and retouched flakes, and blades. Possible settlement site – part of DANW 10
DANW 12		S30 37.055	E24 00.520	Very diffuse scatter of flake tools in weathered hornfels
DANW 13		S30 37.066	E24 00.582	Possible utilized fragment of glass Case bottle

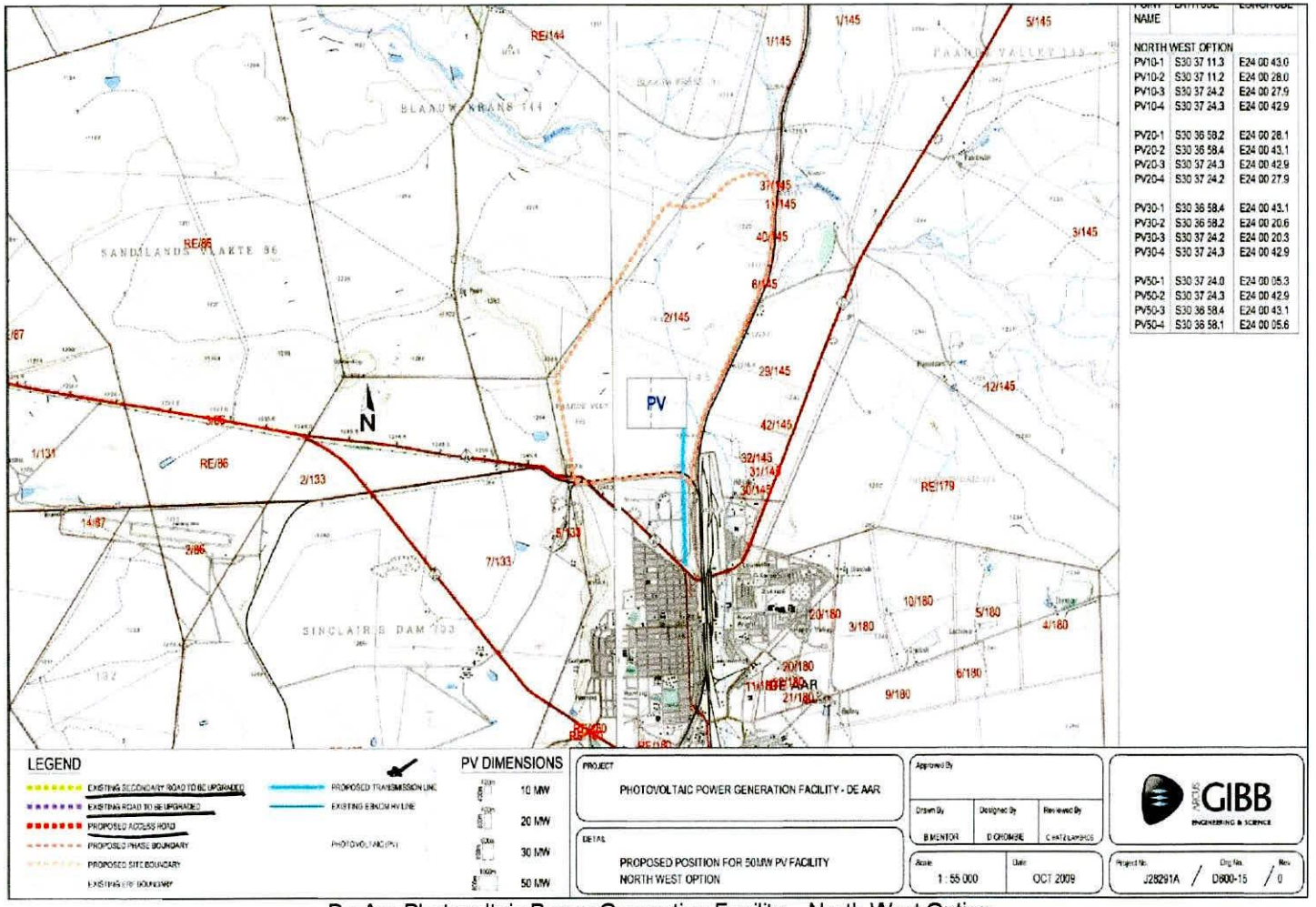
Table 1. De Aar North West Option. Spreadsheet of site observations

De Aar South East Option

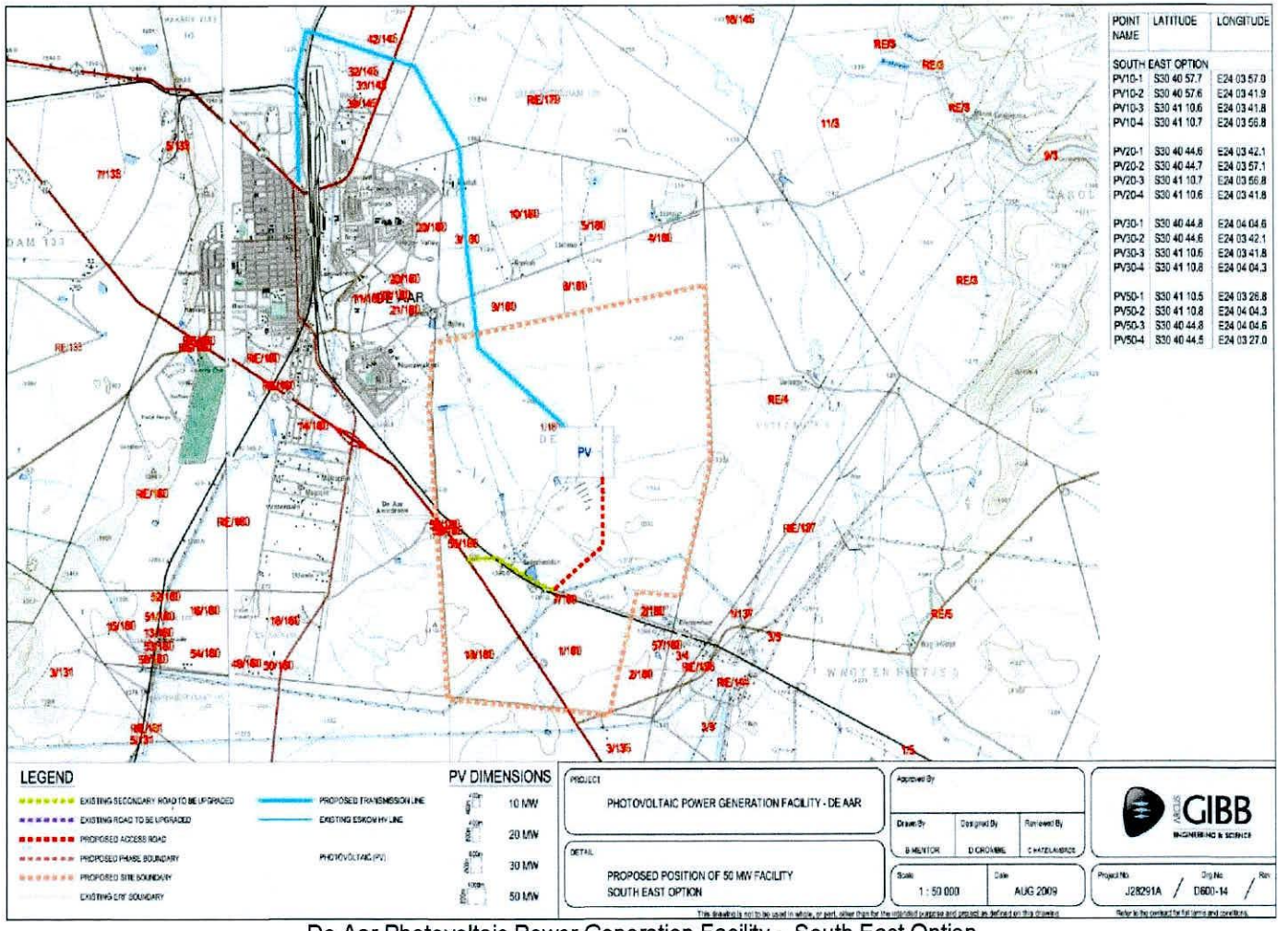
Site	Name	Long	Lat	Finds
De Aar South East (DASE)	145/2			
DASE 1		S30 41.139	E24 04.063	Weathered hornfels flake
DASE 2		S30 41.124	E24 03.952	Indurate shale utilized flake
DASE 3	GPS reading not captured			Weathered hornfels MRP
DASE 4		S30 41.106	E24 03.942	Weathered hornfels MSA flake
DASE 5		S30 41.110	E24 03.919	Weathered hornfels blade
DASE 6		S30 41.104	E24 04.074	Weathered hornfels flake
DASE 7		S30 41.091	E24 04.041	Weathered hornfels partially retouched flake
DASE 8		S30 41.089	E24 04.036	Weathered hornfels blade
DASE 9		S30 41.087	E24 04.048	Thick flake (MSA) weathered hornfels
DASE 10		S30 41.087	E24 04.016	Broken hornfels flake
DASE 11	GPS reading not captured			Very diffuse scatter of weathered hornfels flakes, including 1 convex scraper, on exposed patch of gravel alongside fence line, outside of development site.
DASE 12		S30 41.094	E24 03.918	Weathered utilized hornfels flake
DASE 13		S30 41.068	E24 03.968	Utilized hornfels flake
DASE 14		S30 41.063	E24 04.023	Partially retouched weathered hornfels flake

DASE 15		S30 41.051	E24 03.962	Weathered hornfels blade
DASE 16		S30 41.050	E24 04.027	Partially retouched weathered flake
DASE 17		S30 41.036	E24 03.921	Partially retouched weathered flake
DASE 18		S30 40.990	E24 03.982	Weathered hornfels bladelet
DASE 19		S30 40.989	E24 03.888	Weathered hornfels retouched and utilized flake
DASE 20		S30 40.979	E24 03.977	Weathered hornfels flake
DASE 21		S30 40.946	E24 03.893	Very diffuse scatter of about 16 weathered hornfels flakes, inc. 1 utilized flake and 1 partially retouched flake, on a large patch of light brown sand, outside the development site.
DASE 22		S30 40.949	E24 03.931	Weathered hornfels flake
DASE 23				Weathered hornfels flake
DASE 25		S30 40.811	E24 03.874	Diffuse scatter of 11 weathered hornfels flakes, inc. 2 retouched flakes and 2 utilized flakes, on large patch of compact red sands outside the development site
DASE 26		S30 40.842	E24 03.920	Weathered retouched flake/blade
DASE 27		S30 40.857	E24 03.990	2 Weathered hornfels flakes

Table 2. De Aar South East Option. Spreadsheet of site observations



De Aar Photovoltaic Power Generation Facility – North West Option



De Aar Photovoltaic Power Generation Facility – South East Option