

**ARCHAEOLOGICAL SCOPING STUDY AND
IMPACT ASSESSMENT OF A PROPOSED
PHOTOVOLTAIC POWER GENERATION FACILITY
IN COPPERTON
NORTHERN CAPE**

Prepared for:

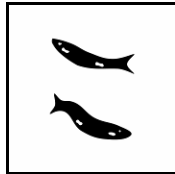
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EXECUTIVE SUMMARY

DJ Environmental Consultants, on behalf of Mulilo Renewable Energy, appointed the Agency for Cultural Resource Management to conduct an Archaeological Scoping Study and Impact Assessment for a proposed photovoltaic power generation facility on the Farm Vogelstruisbult 104 in Copperton in the Bushmanland region of the Upper Karoo in the Northern Cape Province. Copperton is a small mining town situated about 60 kms south west of Prieska.

Mulilo Renewable Energy proposes to construct a 20 MW photovoltaic power generation facility and an overhead powerline linking to the national transmission grid via Cuprum and Kronos substations. The development footprint for a 20 MW power generation facility is quite small, measuring about 16 ha in extent, but larger arrays (up to 50 MW) may be constructed in the future. A new gravel road will also be required to provide access to the site from a nearby tar road.

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 Johan 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 power generation facility.

The archaeological study entailed the following:

- A 1-day site visit that included a foot survey and scoping study of the proposed development site. A much larger, area covering about 50 ha was, surveyed and assessed by the archaeologist.

The proposed transmission line was not surveyed as the proposed powerline will be located within an existing, servitude and constitutes an already disturbed and transformed landscape.

The following archaeological findings were made:

Relatively large numbers of mainly Later Stone Age tools were documented over the proposed development site. However, most of the tools were found outside the proposed 16 ha development site which is already quite severely degraded, consisting of mainly demolished mine works and some old farm infrastructure. These include mainly large flakes, cores, chunks, end scrapers, large utilized and retouched blade tools, and utilized and retouched flakes in fine grained quartzite, highly weathered hornfels and indurated shale. A number of tools in weathered chalcedony, including adzes, scrapers, retouched and utilized flakes, bladelets, small round cores, and unmodified flakes and chunks, were also found.

While many of the tools are isolated finds, mostly small, low-density and diffuse, scatters of tools were documented. No evidence of any factory or workshop site, or the result of any human settlement was identified. Most of the finds have been recorded with a GPS waypoint and photographed. It is maintained that the archaeological study has captured good information and a representative sample on the archaeological heritage present.

Overall, it is argued that the proposed development of a 20 MW photovoltaic power generation facility on the Farm Vogelstruisbult 104 in Copperton will not have an impact of great significance on these and potentially other archaeological remains. The small, 16 ha development footprint is already quite severely degraded and extensive bedrock excavations are not envisaged either, so the impact on even older Early and Middle Stone Age material is also likely to be minimal.

The Phase 1 Archaeological Impact Assessment has therefore identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to proposed development activities.

Indications are that in terms of archaeological heritage, the proposed activity (i.e. the construction of a 20 MW photovoltaic power generation facility) is viable, and impacts are expected to be limited. In archaeological terms, no fatal flaws have been identified.

The following recommendations are however made:

1. Should the proposed development proceed to construction of a 30 or 50 MW facility, further fieldwork will be required in order to document archaeological heritage remains.

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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 the Farm Vogelstruisbult 104 in Copperton near Prieska in the Bushmanland region of the Upper Karoo, Northern Cape Province. Copperton is situated about 900 kms from Cape Town on the N1. The proposed development is situated within the Pixley Ka Seme District Municipality.

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 photovoltaic power generation 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 Copperton, and an overhead powerline linking to the national transmission grid via Cuprum and the nearby Kronos substations. 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 proposed development footprint for a 20 MW PV power generation facility is quite small, measuring about 16 ha in extent, but larger arrays (up to 30 and even 50 MW, or 100 ha) may be constructed in the future. A new gravel road will also be required to provide access to the site from a nearby tar road.

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 Johan 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:

- A 1-day site visit that included a foot survey and scoping assessment of the proposed development site.
- A survey of the proposed gravel access road.

- The proposed transmission line was not surveyed by the archaeologist as the line will be located within an existing, servitude.

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 site is situated on the Farm Vogelstruisbult about 5 kms south east of the abandoned mining town of Copperton, adjacent to the Cuprum substation and about 2 north of the Kronos substation (Figures 1-3). Copperton is situated about 60 kms south west of Prieska. The proposed site is currently zoned Agriculture, although no agricultural activity has taken place on the farm for some time.

It is important to note that the 16 ha development footprint for the proposed 20 MW power generation facility is already quite severely degraded, consisting of demolished mine works and tailings and some old farm infrastructure (refer to Figure 3). It is envisaged that the proposed power plant will be situated on these disturbed lands, which is situated alongside the existing transmission line and close to the Cuprum substation. The remainder of the farm is relatively undisturbed but has been quite heavily grazed in the past. The site is typical flat Karoo scrub, overlain by red Kalahari wind blown sands. The site is level and there are no significant landscape features such as rocky outcrops, or large dolerite boulders occurring (Figures 4-15). There are no rivers or streams on, or close to the property, either.

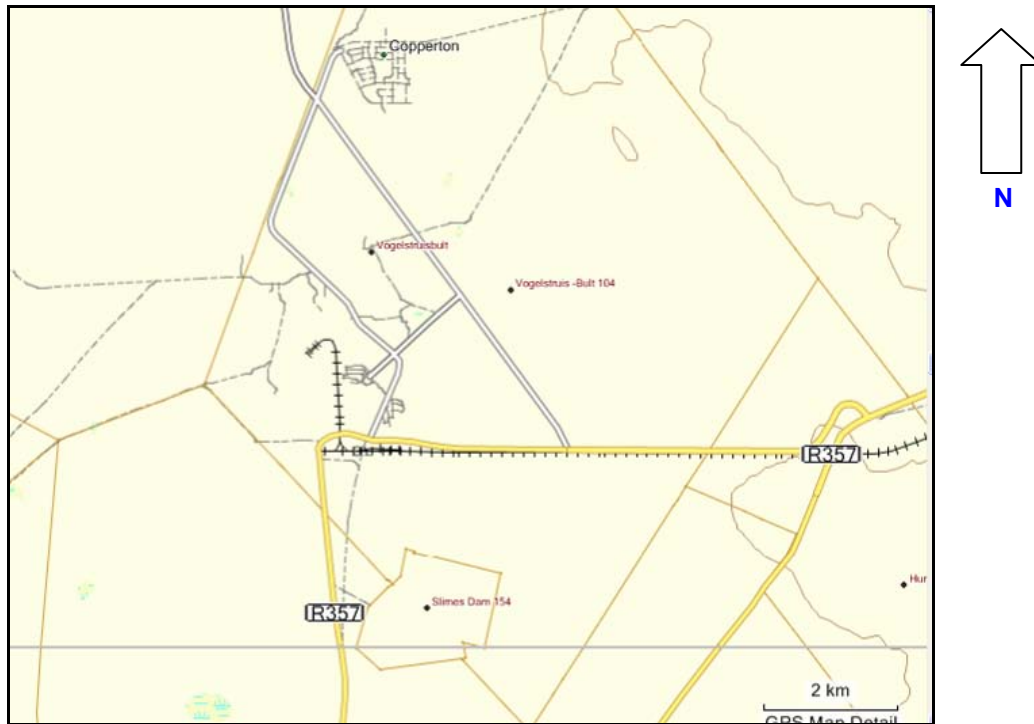


Figure 1. Locality Map

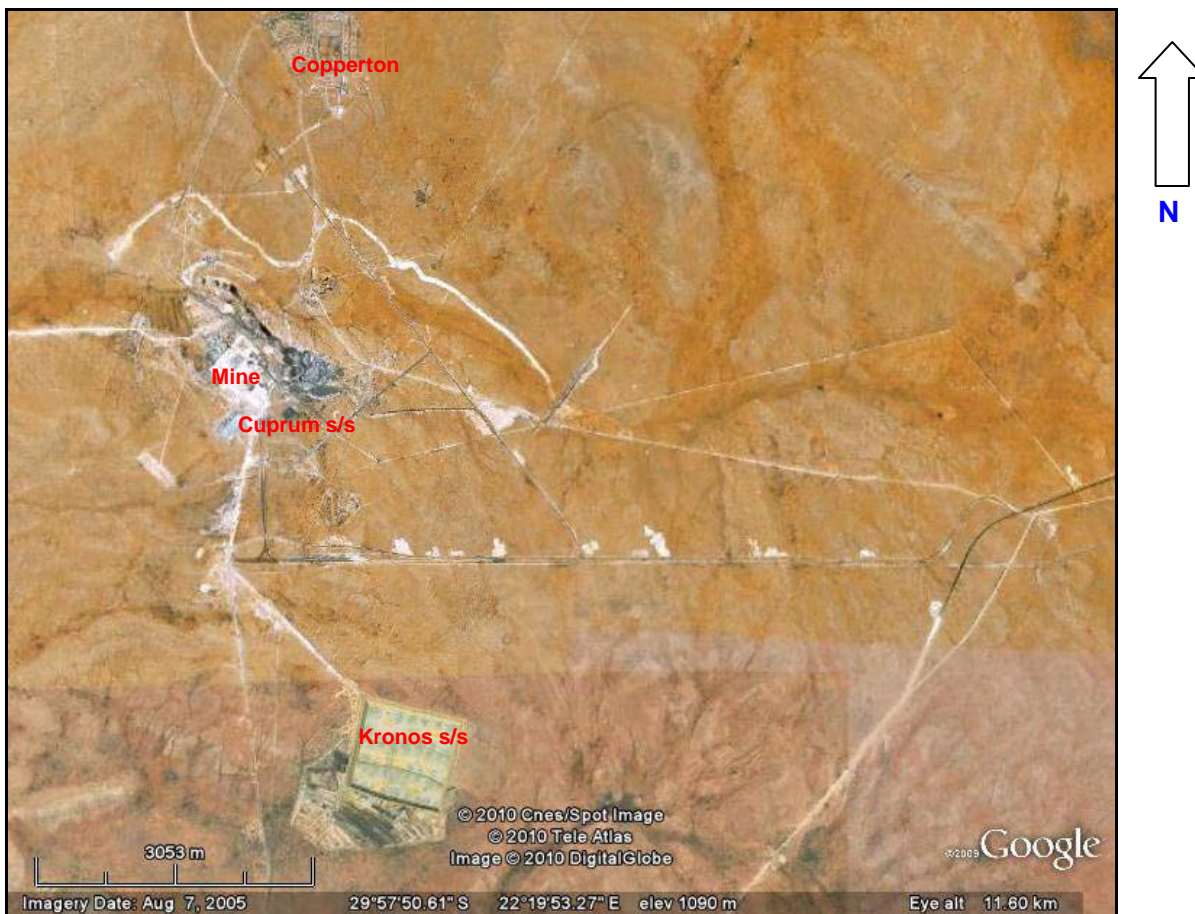


Figure 2. Google aerial photograph of the proposed study site



Figure 3. Google photograph indicating approximately the area covered during the foot survey



Figure 4. Copperton PV site view facing west



Figure 5. Copperton PV site view facing west



Figure 6. Copperton PV site view facing south



Figure 9. Copperton PV site view facing north west



Figure 7. Copperton PV site view facing south west



Figure 10. Copperton PV site view facing east



Figure 8. Copperton PV site view facing north west



Figure 11. Copperton PV site view facing north west



Figure 12. Copperton PV site view facing north east



Figure 14. Copperton PV site. Proposed access road



Figure 13. Copperton PV site view facing south



Figure 15. Copperton PV site proposed access road

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 the archaeological survey and scoping study focused on a much larger development footprint accommodating a possible 30-50 MW power plant, or an area measuring about 100 in extent. The large area (estimated to be about 50 ha in extent) covered by the archaeologist, meant that fairly accurate predictions regarding overall site distribution could also be made.

The proposed access road was also searched (refer to Figure 3).

The AIA was conducted on the 23rd of March, 2010. Considering the relatively large area of the farm covered on foot by the archaeologist, it is maintained that the survey has captured good information on the archaeological heritage present.

The proposed overhead transmission line was not searched for archaeological remains, as the proposed line is located within an already, existing powerline servitude. The servitude therefore comprises an already disturbed and transformed landscape.

Archaeologist, Mr David Morris of the McGregor Museum in Kimberly was consulted. Of interest also are several reports on archaeological assemblages from a pan site on Bundu Farm, about 28 kms north of Copperton (Kiberd 2002, 2006).

A large number of digital photographs of the site was taken, which have been saved to DVD. A GPS track path of the archaeological survey was created. This track path has been saved to a DVD and submitted with a digital copy of the report.

Most of the archaeological occurrences and observations were plotted using a Garmin Oregon 300 GPS unit, set on map datum wgs 84 and photographed. Individual occurrences were not point plotted. A spreadsheet of the waypoints and a description of the archaeological occurrences are presented in Table 1.

4.2 Constraints and limitations

There were no constraints associated with the proposed study, although there are large portions of the proposed site (outside of the disturbed areas to the north) that are covered in thick bush and ground cover, resulting in low archaeological visibility.

5. FINDINGS

Relatively large numbers of Later Stone Age tools were documented over the proposed development site. However, the vast majority of tools were found outside the proposed 16 ha (20 MW) development site, which is already quite severely degraded, consisting of demolished mine works, tailings and old farm infrastructure. These include tools in weathered chalcedony, including adzes, convex and side/end scrapers, retouched flakes, small round cores, bladelets, unmodified and utilized flakes and chunks. Most of the lithics, however, comprise much larger flake tools, larger rounded cores, large end scrapers and utilized and retouched blade tools in quartzite, very weathered hornfels and indurated shale (refer to Table 1 in Appendix). At least twelve MSA flakes, including two LSA retouched flakes on older MSA flakes, and one retouched point, were also found. Almost all the tools occur on a hard, compact red/brown surface, below the red sandy overburden.

While many of the tools are isolated finds, mostly low-density, diffuse scatters of tools were, documented. No evidence of any factory or workshop site, or the result of any human settlement was identified. Apart from the lithics, no pottery, ostrich eggshell, or any other cultural remains were noted. All of the occurrences have been recorded with a GPS waypoint and photographed, but not all the finds have been point plotted. It is maintained that the archaeological study has captured good information on the archaeological heritage present.

A collection of tools and the context in which they occur is illustrated in Figures 16-32.

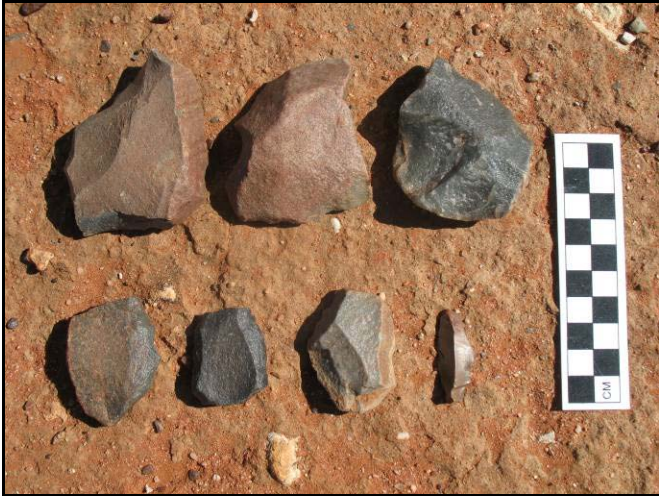


Figure 16. CP8. Scale in cm



Figure 19. CP8-10. Context in which find were made



Figure 17. CP9. Scale in cm



Figure 20. CP11. Scale in cm



Figure 18. CP10. Scale in cm



Figure 21. CP13. Scale in cm



Figure 22. CP19. Scale in cm



Figure 25. CP28. Scale in cm



Figure 23. CP16-19. Context in which finds were made



Figure 26. CP30. Scale in cm



Figure 24. CP28 Context in which finds were made



Figure 27. CP30. Context in which finds were made



Figure 28. CP33. Scale in cm



Figure 31. CP44 retouched/utilized blade found in proposed access road. Scale in cm



Figure 29. CP35 hornfels side/end scraper. Scale in cm



Figure 32. CP45 large hornfels end scraper found in proposed access road. Scale in cm



Figure 30. CP40 retouched/utilized blade found in proposed access road. Scale in cm

It is important to refer to the work done by Kiberd (2002, 2006) on Bundu Farm, situated about 28 kms north of Copperton. Unlike the Copperton surface finds, at Bundu, a series of dried up deflated pans have been excavated. Pans would have acted as focal points for grazing animals, but also a source of water. A complex series of sedimentary features and horizons in these pans may be broadly coeval with periods of climatic change in the region (Kiberd 2006). Archaeological material was recovered from throughout the sedimentary sequence. Large numbers of Later Stone Age tools occur on the surface of the pan and within the upper red sands and include micro-lithic tools, while below the red sands, Middle Stone Age lithics mainly in quartzite, and preserved fauna were found. Early Stone Age (ESA) tools, preserved fauna and even the possible discovery of an ESA hearth, which may be older than 300 000 years, was also excavated.

6. IMPACT STATEMENT

The proposed development of a 20 MW photovoltaic power generation facility will not have an impact of great significance on important archaeological remains. The small, 16 ha development footprint is already quite severely degraded, consisting of mainly demolished mine works and old farm infrastructure. Extensive bedrock excavations are not envisaged either, so the impact on older MSA and ESA material is also likely to be minimal. Apart from CP30 the majority of archaeological finds were documented outside the proposed development footprint. While archaeological impacts will obviously be greater over a larger development footprint, it is maintained that the archaeological impact assessment and scoping study has captured good information, and a representative sample, on the archaeological heritage present.

The Phase 1 Archaeological Impact Assessment has therefore identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to proposed construction activities.

7. RECOMMENDATIONS AND MITIGATION ACTION

The following recommendations are made:

1. It is maintained that the proposed development of a 20 MW photovoltaic power generation facility on a 16 ha development footprint will not have an impact of great significance on archaeological remains, as the numbers are quite small and the proposed development site is already quite severely degraded. Recording of archaeological occurrences, including GPS waypoints and photography over a large part of the remainder of the site has also been undertaken and forms a reasonably good record of the archaeological heritage present.

However, should the proposed development proceed to construction of a 30, or 50 MW facility, further fieldwork will be required in order to document additional archaeological remains heritage that may be present on the property.

8. CONCLUSION

Indications are that in terms of archaeological heritage, the proposed activity (i.e. the construction of a 20 MW photovoltaic power generation facility) is viable, and impacts are expected to be limited.

In archaeological terms, no fatal flaws have been identified.

9. REFERENCES

Almond, J. 2010. Palaeontological Impact Assessment Desk Top Study. Proposed photovoltaic power generation facility: Prieska PV Site 1, Copperton, Northern Cape Province. Report prepared for DJEC Consultants. Nature Viva cc. Cape Town

Kiberd, P. 2002. Bundu Farm Pan, Northern Cape. *The Digging Stick* 19 (3):5-8. South African Archaeological Society.

Kiberd, P. 2006. Bundu Farm: A report on archaeological and palaeoenvironmental assemblages from a pan site in Bushmanland, Northern Cape, South Africa. *South African Archaeological Bulletin* 61 (184):189-201.

Appendix

Site	Name	Long	Lat	Findings
CP (Copperton)	Vogelstruisbult 105			
CP1		S29 57.677	E22 19.420	Chalcedony adze, convex scraper & chunk
CP2		S29 57.673	E22 19.422	Chalcedony chunk
CP3	GPS reading not captured			Chalcedony MRP
CP4		S29 57.665	E22 19.409	Chalcedony chunk & adze/MRP
CP5		S29 57.664	E22 19.409	Quartzite flake
CP6		S29 57.660	E22 19.408	Chalcedony core and small round scraper, including diffuse scatter of chalcedony flakes, chunks, MRPs, larger quartzite flakes, on compact brown soils alongside fence line
CP7		S29 57.672	E22 19.420	Chalcedony utilized bladelet
CP8		S29 57.682	E22 19.396	Low density scatter of hornfels flakes, including large blade, on compact red sands alongside gravel road and mine tailings and many pieces of calcrete
CP9		S29 57.692	E22 19.355	Diffuse scatter of tools on compact red sands, alongside gravel road, including large hornfels flakes, large cores, chunks, a few pieces of chalcedony and some larger quartzite flakes
CP10		S29 57.721	E22 19.213	Thin scatter of large quartzite and hornfels flakes, utilized flakes, crude end scraper, and a large core on compact red sands, alongside gravel road. 1 MSA quartzite flake.
CP11		S29 57.775	E22 19.081	Diffuse scatter of tools inc. 2 MSA flakes. Quartzite flakes, chunks, large scraper, small side/end scraper, utilized/retouched blade.
CP12		S29 57.814	E22 19.060	Diffuse scatter comprising mostly larger quartzite flakes, chunks, core, quartz core/chunk and 2 MSA flakes

CP13		S29 57.907	E22 18.995	Diffuse scatter of a few quartzite flakes, chunks, core, weathered hornfels blade and several cortex flakes
CP14		S29 57.950	E22 18.915	Diffuse scatter including 2 quartzite flakes, 1 chunk, hornfels scraper, MRP, chunks.
CP15		S29 57.980	E22 18.819	Diffuse scatter of a few chalcedony flakes, chunks, 1 MRP, and weathered hornfels
CP16		S29 58.014	E22 18.872	Diffuse scatter of chalcedony flakes and chunks, 2 MRPs, utilized flake, quartzite flakes and chunk, 1 MSA
CP17		S29 57.986	E22 18.809	Quartzite chunks, MRP blade/side scraper, quartzite flakes and chunks and quartz flake.
CP18		S29 58.011	E22 18.764	Chalcedony chunk, weathered hornfels retouched flake, quartz chunk, MSA flake, quartzite chunk.
CP19		S29 58.020	E22 18.717	Diffuse scatter of weathered hornfels flakes and chunks inc. 1 very large flake, 2 LSA retouched flakes on older MSA flakes, and several quartzite flakes and chunks and cores
CP20		S29 58.034	E22 18.739	Thin scatter of hornfels flakes and chunks, 1 blade, and MSA retouched flake
CP21		S29 57.935	E22 18.634	Chalcedony flake and chunk
CP22		S29 57.810	E22 18.619	Retouched MSA point
CP23		S29 57.777	E22 18.610	Hornfels chunk
CP24		S29 57.698	E22 18.599	Large hornfels core, two hornfels flakes and 1 chunk
CP25		S29 57.673	E22 18.590	Diffuse scatter of chalcedony flakes, chunk, large retouched hornfels flake, hornfels end/retouched scraper
CP26		S29 57.593	E22 18.590	Hornfels flakes, chunks, retouched chalcedony flake, retouched MSA flake, large chalcedony

				MRP/end scraper near tailings dump
CP27		S29 57.573	E22 18.913	Thin scatter of tools inc. weathered chalcedony convex scraper, retouched chalcedony flake, utilized hornfels flake hornfels chunks & flakes, hornfels core, quartzite flakes, core & quartz chunk
CP28		S29 57.566	E22 18.960	Diffuse scatter of quartzite core, flakes, quartz end scraper, weathered hornfels utilized/MRP blade, chalcedony flake
CP29		S29 57.556	E22 19.015	Large weathered hornfels flakes, chalcedony chunk, retouched quartzite flake, quartzite MSA flake
CP30		S29 57.514	E22 19.160	Diffuse scatter of mainly quartzite & hornfels flakes, large hornfels flake, several round cores, smaller quartzite flakes and chunks on wind-swept patch of red sands alongside powerline servitude.
CP31		S29 57.697	E22 19.427	Diffuse scatter of chalcedony chunks, chips, flakes, retouched chunk, quartzite and hornfels chunks & flakes, hornfels core & retouched hornfels flake (no photo)
CP32		S29 57.747	E22 19.413	Chalcedony flake, chunk, large hornfels flake, quartzite core, large quartzite flake and smaller flakes (no photo)
CP33		S29 57.848	E22 19.393	Scatter of chalcedony flakes, quartzite blade tools, chalcedony convex scraper, small round core.
CP34		S29 57.967	E22 19.324	Hornfels blade, hornfels flakes, 1 quartz flake, chalcedony chunk, chalcedony core, bladelet, flakes, hornfels

				flakes
CP35		S29 58.074	E22 19.306	Hornfels side end scraper
CP36		S29 58.035	E22 19.310	Chalcedony core, bladelet, flake, hornfels flake
CP37		S29 58.013	E22 19.316	Part of above
CP38		S29 58.337	E22 19.350	Quartzite and hornfels flakes, chunk, utilized chunk, chalcedony core
CP39		S29 58.306	E22 19.337	Hornfels chunk
CP40		S29 58.264	E22 19.316	Large hornfels utilizes/retouched blade
CP41		S29 58.215	E22 19.302	Hornfels flake
CP42		S29 58.282	E22 19.293	Quartzite flake
CP43		S29 58.324	E22 19.306	Quartzite flake
CP44		S29 58.354	E22 19.319	Large hornfels utilized/retouched blade
CP45		S29 58.378	E22 19.335	Large hornfels end scraper

Table 1. Spreadsheet of site observations

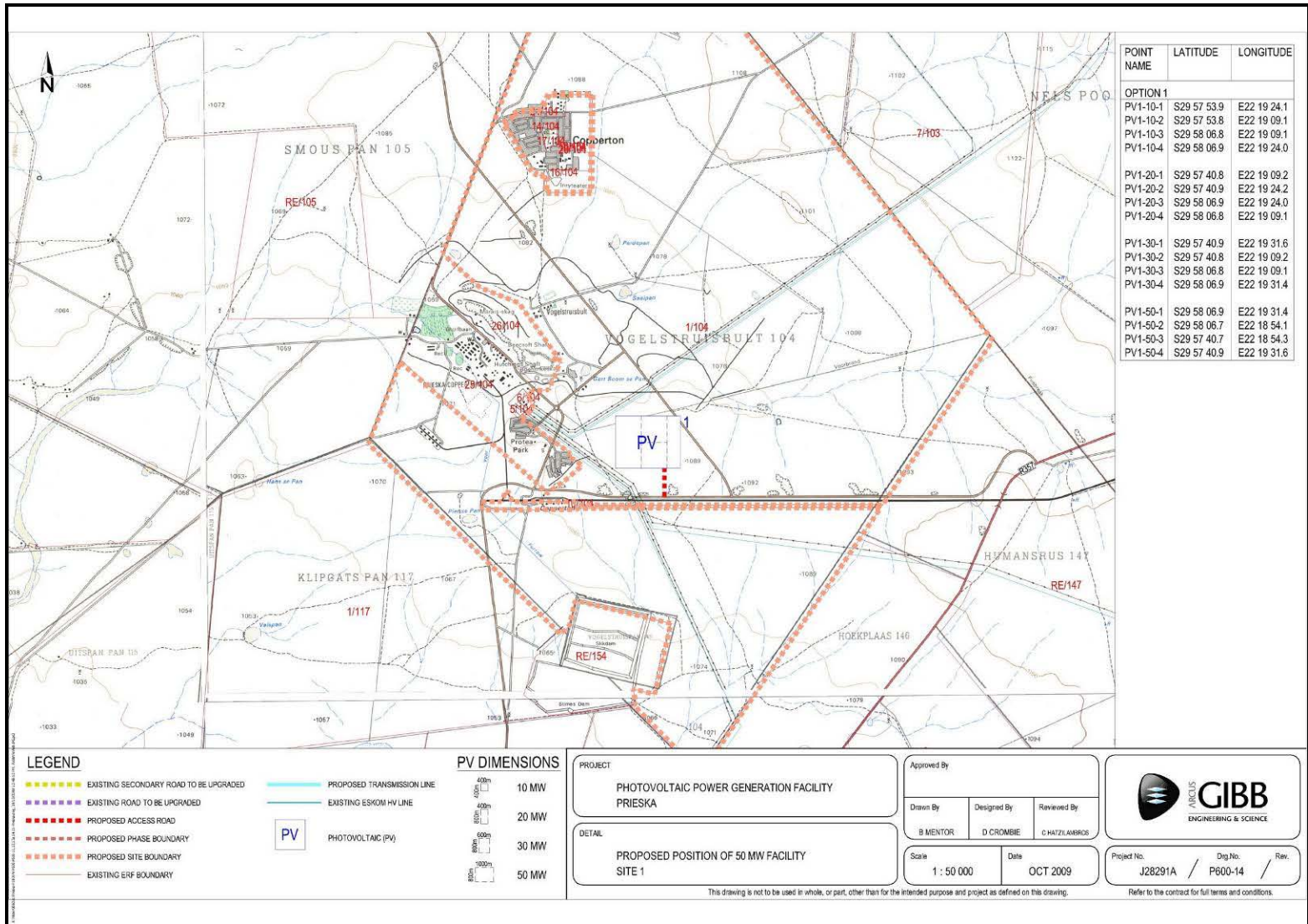


Figure. Photovoltaic Power Generation Facility Prieska. Proposed position of a 50 MW facility