ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED ROMANO PV FACILITY ON THE FARM NUWEDRIFT 292, NEAR VREDENDAL, WESTERN CAPE

CASE: 131030GT04

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act (No. 25 of 1999) as part of A Basic Assessment)

Prepared for

Terramanzi Environmental Consulting

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EXECUTIVE SUMMARY

Introduction

ACO Associates cc was requested by Terramanzi Environmental Consulting to assess the potential impacts to heritage resources that might occur through construction of the proposed 10 Mw Romano PV Facility (2 x 5 Mw Phases) on the farm Nuwedrift, just outside Vredendal (Figure 1). A Notification of Intent to Develop application was submitted to Heritage Western Cape (HWC) and the interim comment requested an integrated heritage impact assessment (HIA) that included specialist Archaeological and Visual studies.

The Project

The Applicant wishes to establish a 10 Mw Photovoltaic (PV) facility and associated infrastructure on the farm Nuwedrift 292, Vredendal. The project proposal broadly consists of the following:

- The development of up to 10 Mw of PV solar arrays to be constructed in two phases of up to 5 Mw each. It is anticipated that there will be approximately 16700 panels per phase, supported on fixed mounts. The initial two sites were towards the R27 but two alternatives have now been proposed in uppermost northern corner of the property to reduce the length of the powerline;
- Associated underground electrical wiring/cabling infrastructure to connect the PV arrays to the proposed powerline;
- The establishment/construction of a 6km 66 kV powerline to the existing Bulte substation to the north west of Vredendal partly in parallel to an existing 22 kV line;
- Water collection facilities to enable the harvesting of condensate (dew) on the PV panels to assist with reduction of borehole water for cleaning of the panels (which must take place on a regular basis);
- The construction of administrative facilities, a workshop area for maintenance and storage, and internal access roads for the PV facility; and
- The use of existing, gravelled roads for access to the PV facility by the applicant, the construction crew and maintenance teams.

Alternatives

Two PV sites were initially proposed on the eastern part of the property close to the R27. As ESKOM has now agreed to a powerline route to the Bulte sub-station, two alternative PV sites have been proposed in the northern part of the property. The placement of the PV sites there would reduce the length of powerline as well as reduce Visual Impact.

Archaeological observations

Alternative 1 is situated approximately 1.5 km to the north of Alternative 2. While they are not hugely distant from each other and lie in the formerly “ploughed” land, there appear to be differences in the overall underlying remnant landforms at the two sites. The archaeology in the southern area is concentrated on and around remnant heuweltjies, while in the north, the archaeology is focused on blowouts and pans, most often with calcretised bases. It is not clear if the stone artefacts are ubiquitous across the calcretised surface below the sands, or if they are only located in the blowouts and pans. It seems likely that the former may be true. The overall size of flaked material and distinctive bifaces suggest that most of the material dates to the Early Stone Age (in excess of 300 Ka), while some possible Middle Stone Age is present in the form of convergent flakes and occasional denticulates. No Late Stone Age artefacts were identified at any of the sites.

No non lithic artefacts or bone was observed, possibly due to the age of the material and to long exposure and deflation since deposition. Lack of such items and absence of stratification greatly diminishes the heritage significance of the sites, although the presence of several bifaces distributed across the pans raises the significance of the archaeology marginally in some places, particularly in the pan between the two northern PV sites.

Recommendations

- No mitigation of archaeology at the Alternative 1 sites would be required if those are chosen;
- Although of generally of low significance, a few of the stone scatters in and around the Alternative 2 sites are rated as having medium - high significance due to the numbers of bifaces and associated debitage on them. In addition, the stone artefact scatters pose some questions as to whether the artefacts are widespread below the sand beyond the pans and blowouts, and if so, will they contain additional Early Stone Age bifaces. In order to answer the first question, we believe that the clearing of the PV sites (if the northern sites are selected for use) should be monitored to determine the extent of the stone artefacts. If it is evident that stone is clustered in the pans only, then monitoring can be curtailed;
- The extensive stone artefact scatter on the pan areas between the two Alt 2 PV sites is of concern. Although no direct impacts are anticipated, secondary construction (and possibly operational) period impacts are likely. We believe that the extensive pan should be comprehensively assessed and samples be made of the material. All bifaces should be collected.
- While the Alternative 1 site contains less significant archaeological sites, it is likely that Visual impact there will be greater. While the Alternative 2 PV site contains more archaeology, we do not believe that this fact prevents their use as in our opinion, the material can be adequately mitigated;
- The positions of all administrative facilities, construction and lay down areas and access roads (not yet identified) must be assessed as part of the EMP once they are identified;
- No further mitigation of the powerline route is required.

1. INTRODUCTION

ACO Associates cc was requested by Terramanzi Environmental Consulting to assess the potential impacts to heritage resources that might occur through construction of the proposed 10 Mw Romano PV Facility (2 x 5 Mw Phases) on the farm Nuwedrift, just outside Vredendal (Figure 1). A Notification of Intent to Develop application was submitted to Heritage Western Cape (HWC) and the interim comment requested an integrated heritage impact assessment (HIA) that included specialist Archaeological and Visual studies. This report constitutes the archaeological specialist study, while the project's VIA, conducted independently by Bruce Eitzen (2014) is included as an appendix to the HIA.

The position of the affected property is shown in Figure 1.

Figure 1: Extract from Mapsheet 3118DA showing the property (green polygon) and the two originally proposed development footprints – Alternative 1 (red rectangles). The latest revised PV sites referred to as Alternative 2, are shown by the blue polygons. The proposed overhead powerline is represented by the orange line.

1.1 Project details

The Applicant wishes to establish a 10 Mw Photovoltaic (PV) facility and associated infrastructure on the farm Nuwedrift 292, Vredendal. The project proposal broadly consists of the following:

- The development of up to 10 Mw of PV solar arrays to be constructed in two phases of up to 5 Mw each. It is anticipated that there will be approximately 16700 panels per phase, supported on fixed mounts. The initial two sites were towards the R27 but two alternatives have now been proposed in uppermost northern corner of the property to reduce the length of the powerline;
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- The construction of administrative facilities, a workshop area for maintenance and storage, and internal access roads for the PV facility; and
- The use of existing, gravelled roads for access to the PV facility by the applicant, the construction crew and maintenance teams.

2. METHOD

The site was initially visited by Mr J Orton of ACO Associates on the 18th December 2013 in order to evaluate the initial two PV sites. He prepared an integrated HIA document (Orton 2014) that included an Archaeological Impact Assessment and a Visual Impact Assessment (Eitzen 2014). No powerline was inspected at that time. The site was subsequently visited again by Mr D. Halkett and Mr R Lyall-Jennings of ACO Associates on the 12th September 2014 to assess the two newly proposed alternative PV sites and a 66kV powerline route that has finally been agreed to by ESKOM.

We have inspected on foot all the proposed PV sites as well as areas immediately outside and more distant for the presence of archaeological material, or to determine areas with archaeological potential. The powerline route was inspected via a combination of walking and driving since some areas are degraded and the 66kV powerline has a very small overall footprint.

A number of photographs of the site and ground surface were captured. The PV areas and powerline areas were loaded to GPS in order to easily locate the areas during fieldwork. During the survey, all search racks and the positions of archaeological sites were recorded on a hand-held GPS receivers set to the WGS84 datum.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The study area lies immediately north of the R27 road about 6 to 7 km east of Vredendal in the direction of Van Rhynsdorp. (Figure 1). We have noted from the photographs on Google Earth that there is evidence of virtually the entire area proposed for all the PV sites having been transformed by some form of agriculture in the past, and this can be seen as remnant straight vegetation lines. It is however not very obvious on the actual landscape which is now used exclusively for grazing. According to Macdonald (2012: 8) the vegetation on the red sands was virtually all removed historically. This has meant that the shrubby component of the vegetation was mostly destroyed and as a result, the tough, wiry and thorny (spinescent) grass species, *Cladoraphis spinosa* (Volstruisdoring) which is a naturally occurring species, has been strongly favoured and it has aggressively dominated the vegetation.

In the south-eastern most corner of the study area is a small area of Gannabosveld with exposed heuweltjies (Figure 2). Heuwltjies are the remnants of ancient termiteria that occur as harder soil in the form of low mounds; they are typical of South Africa's drier, western parts. They are generally lightly calcretised through interaction of groundwater with the more alkaline soil of the mound (Moore & Picker 1991). The rest of the site is covered with spiny grassland with much exposed sand.

Occasional isolated Acacia trees occur on the site while clusters of larger Blue Gums and other trees occurs at water points.

4. HERITAGE CONTEXT

Several commercial surveys and two research projects in the southern Knersvlakte vicinity have shown that archaeological resources are widespread on the Knersvlakte. Just north west of Vredendal, on the edge of the town, Orton (2010) found that archaeological resources were located primarily in areas of Vanrhynsdorp Gannabosveld and were associated with old heuweltjies. Artefacts were found to be sparse in the sandy Namaqualand Spinescent Grassland. Several other studies have documented a similar pattern (Orton 2011a, 2011b, 2012; Patrick et al. 2011). In the Gannabosveld areas the artefacts are mostly of quartz and are exposed on the surface through erosion of the soils. Their age is probably mostly Middle Stone Age (MSA), but with some Early (ESA) and Later Stone Age (LSA) artefacts almost certainly included. The observations made during examination of the Romano PV (north sites) suggest that ESA predominates there. In the Spinescent Grassland, quartz artefacts are found in places but are usually concentrated within sandy deflations and around occasional pans located there. On one property, artefacts were found to be most dense on a sandy ridgeline not far from the edge of the Gannabosveld (Orton 2011a). These latter finds are likely to be mostly LSA.

Some 13km north of the site, extensive surveys along the banks of the Varsche River have resulted in the recording of vast quantities of Stone Age archaeological remains both in the open and in a series of limestone rock shelters (Orton et al. 2011a, 2011b; Steele et al. 2012). Material pertaining to the ESA, MSA and LSA has been documented in areas devoid of recent sand cover. While LSA material occurs close to the river, the older artefacts are focused along the margins of the floodplain and on the palaeo-river terraces. Particularly significant are an LSA site (VR048) on an ‘island’ between the braided streams of the Varsche River (Orton 2012) and an MSA site (SFT001) eroding out of the cover sands and dating to a period known as the ‘Still Bay’ (Mackay et al. 2010).

Many artefacts in deflated contexts have also been found on the hill to the west of the Sout River (Kaplan 2010) and also on the floodplain of its lower reaches where it is referred to as the Hol River (Orton et al. 2011). South of the present study area and closer to Klawer, areas of Gannabosveld with heuweltjies have also been found to be coated in stone artefacts (Orton 2011c). These various studies show that Stone Age archaeological resources are widely distributed on the local landscape.

The town of Vredendal is not very old, having only been established in 1933 (Fransen 2004) and although older farm buildings are found in the broader region, none are present on the proposed PV site.

5. OBSERVATIONS

We list below the observations made in each of the PV site areas. We discuss the material briefly and summarise the site by site observations in Table 1.

5.1 Archaeology

5.1.1 Alternative 1 - Initial PV sites (south)

Stone Age artefacts were found throughout the study area in varying densities. The majority were found towards the south-east where a number of heuweltjies were exposed (Figure 2) though few scatters were found within the PV areas. In other areas a number of isolated artefacts or ephemeral, widespread scatters were noted but not recorded. None of the exposures of artefacts can be classified as archaeological sites and they are thus deemed to be of low heritage significance. Plates 1 to 4 show typical artefacts from four of the heuweltjie sites, while Plates 5 to 8 show some larger artefacts from a third heuweltjie site where the scatter was characterised by such pieces. The sandy plains had artefacts present on them in several areas. Examination of aerial photography shows that there are ‘uneven’ areas in terms of colour and these appear to relate to variable thickness sand cover. In these areas the underlying heuweltjies are no doubt closer to the surface with some artefacts having moved upwards onto the present surface, perhaps through the action of burrowing animals (Orton 2014: 8-10).

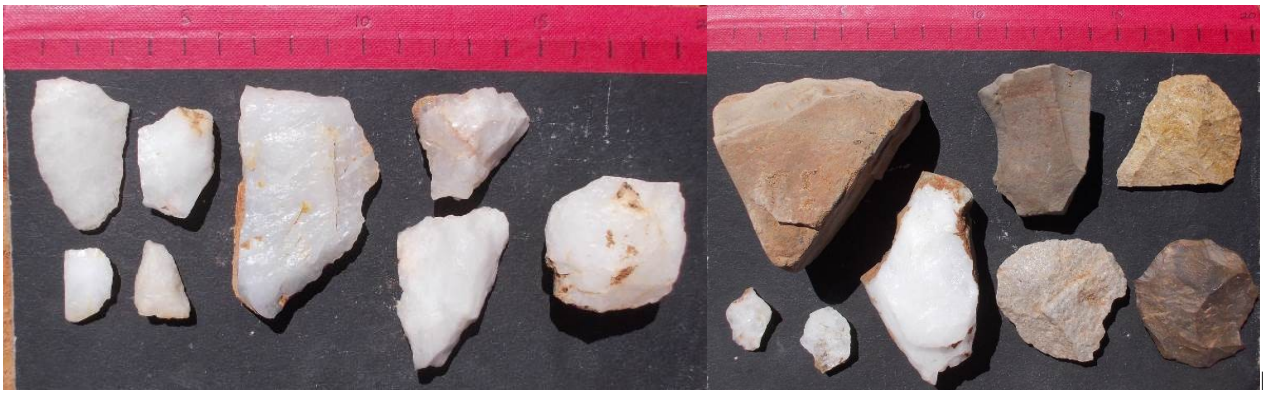

Plate 1: Artefacts from the heuweltjie at 001. Scale in cm. **Plate 2:** Artefacts from the heuweltjie at 002.

Plate 3: Artefacts from the scatter at 003. **Plate 4:** Artefacts from the scatter at 004.

Figure 2: The southern PV sites (red rectangles) with walk-paths (light blue) superimposed. The small blue diamond symbols show the positions of archaeological observations referred to in Table 1. These sites are prefaced with a “j” in the table.

Plates 5 – 8: Artefacts from the heuweltjie at 009. Scales in cm.

5.2 Alternative 2 - PV sites (north)

The PV sites lie in the formerly ploughed areas that we have described earlier. The landscape here is however now devoid of obvious signs of the ploughing and is instead characterised by small vegetated hummock dunes of orange sand interspersed by depressions or blowouts frequently exposing hard calcretised level surfaces (Plates 9 and 10). These have the appearance of seasonal pans. Almost without exception, these “pans” contain scatters of stone debris and artefacts. Quartz is the predominant raw material although numerous quartzite pieces are also noted. Finer grained rocks such as silcrete are present in smaller amounts and a few pieces of crypto crystalline rock was observed. Cobbles (modified and unmodified) are found in some pans and have been used in some instances as hammerstones or anvils. The flaked debris and cores are generally on the large side and it was difficult at first to characterise the material. There are occasional (Middle Stone Age) MSA-like convergent flakes, as well as a few denticulate pieces, but we now believe that the majority of the material can be ascribed to the Early Stone Age (ESA), based on the number of bifaces (handaxes) that have been recorded. No Late Stone Age material was observed. A number of significant scatters are found on a large elongated pan between the two PV areas. Most material is found there and in the southernmost of the two. There are no pans in the northern site though are again found beyond near the proposed on site sub-station. Positions of sites are shown in Figure 4, while artefacts are shown in Plates 11 – 20 and sites described in Table 1.

Plates 9 – 10: Artefact scatters are found in pans and blowouts with calcretised bases

Plate 11: A selection of typical artefacts found in the pans. These are from d007 **Plate 12:** A number of large cores and other artefacts at r007 (radio 15 cm)

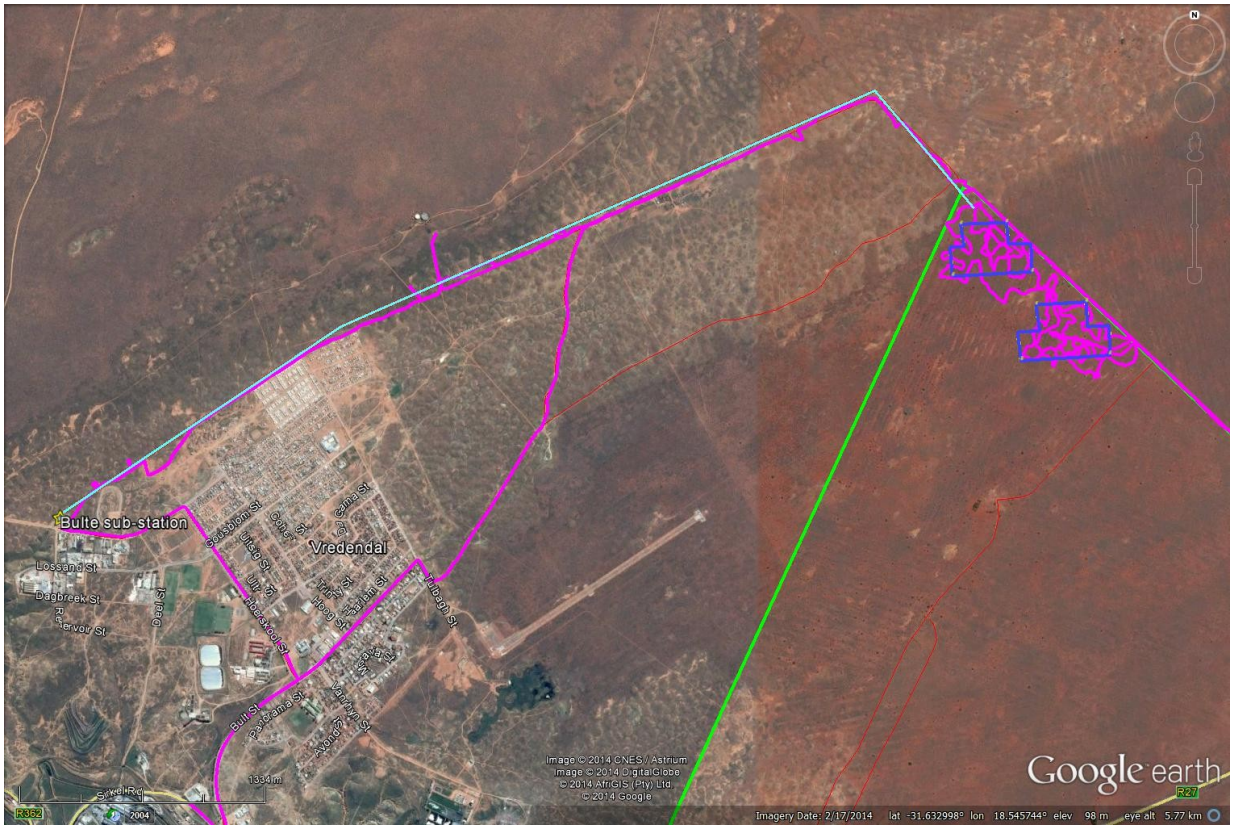

Figure 3: The northern tip of the affected property (green polygon) with the two PV sites in dark blue showing the largely transformed landscape. The proposed powerline is shown in light blue. Walk and drive paths are shown (purple).

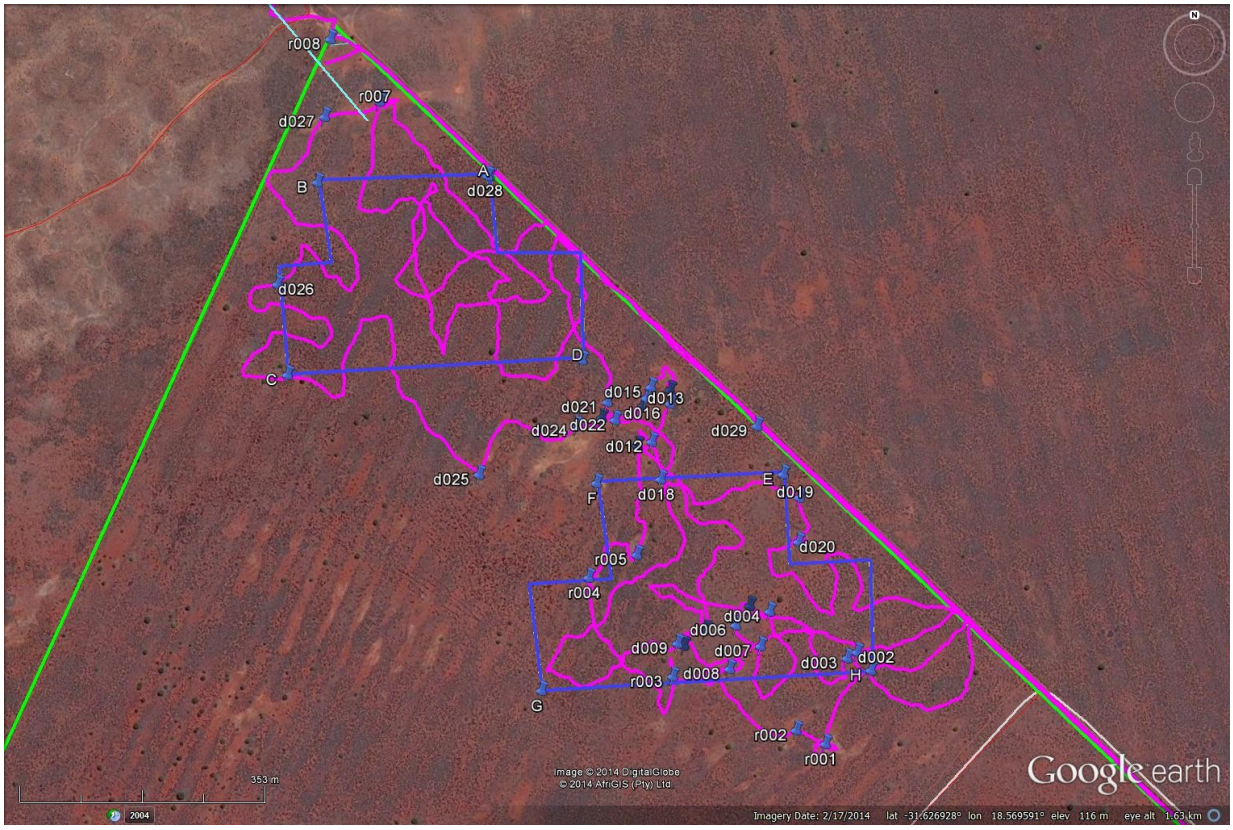

Figure 4: A detail of the northern PV sites (dark blue), walk paths (magenta) and blue pins showing the positions of observations referred to in Table 1. A small on site substation may be sites where the powerline (light blue) originates on the site. The old strip ploughing is obvious on this image. The association between artefacts and calcretised pans can be seen.

Plates 13 - 20: A selection of bifaces in quartzite, silcrete and quartz (13) d002/d003 quartz (2)d011/d012 quartzite (3) d015 quartzite (4) d016/d017 silcrete (5) d022 quartzite (6) d023 quartzite (7) d024 quartzite (8) r001 quartzite

5.3 Proposed 66kV overhead powerline

The powerline will run north west from a small on site sub-station in the very north of the farm to a point where it meets with an existing ESKOM line and servitude heading south west towards the Bulte sub-station just outside Vredendal. The route of the line was covered via a combination of walking and driving as can be seen on Figure 3. The landscape covered by the line appears to be a remnant dune field that is now vegetated, though the topography is low. There is moderate disturbance along the route and although occasional artefactual material was noted, none of the material could be defined as an archaeological site. The powerline has a small footprint and is expected to have little if any impact.


Plate 21: The existing powerline and Bulte sub-station on the edge of Vredenburg north. **Plate 22:** The existing PV facility to the north of Vredendal wich lies ~600 m to the nw of the Bulte sub-station

Table 1: List of archaeological observations for all PV and infrastructure alternatives (excl roads construction lay down areas and administration buildings

SITE	LAT S dec deg	LON E dec deg	DESCRIPTION	SIGNIFICANCE
d001	31.64828103	18.58303104	Low density scatter of quartz artefactual material on a remnant heuweltjie immediately adjacent to access road near the R27. ~ 2 m diam.	low
d002	31.62995903	18.57320602	Low density scatter of quartz and ccs artefactual material on an exposed “dorbank” pan between low hummock dunes. Large flakes, chunks and some cores. 1x small quartz biface. Overall not obviously MSA but occasional flakes have MSA-like qualities. ~ 15 m diameter is exposed.	low
d003	31.63003597	18.57305900	Quartz biface on d002	low
d004	31.62944002	18.57189702	Low density scatter of predominantly quartz artefactual material with a few ccs pieces on an exposed “dorbank” pan between low hummock dunes. Big flakes and 1 quartz core. ~20 m diameter is exposed.	low
d005	31.62936701	18.57159703	Sandy blowout with a low density scatter of quartz and silcrete artefacts	low
d006	31.62961797	18.57138899	Sandy blowout with a low density scatter of quartz and silcrete artefacts. I MSA-like denticulated flake	low
d007	31.62988300	18.57175997	Low density scatter of quartz, quartzite and silcrete artefactual material on an exposed “dorbank” pan between low hummock dunes. Large flakes, chunks and some cores. !x sandstone/quartzite hammesrstone/anvil with concave pecking on one surface. Overall not obviously MSA but occasional flakes have MSA-like qualities. ~ 20 m diameter is exposed.	low
d008	31.63017604	18.57129503	Big “dorbank” pan (~40x20 m) with a low density scatter of quartz, quartzite, ccs and silcrete artefactual material. Big pieces. Some fragments of unmodified dolomite noted. ! MSA-like flake in silcrete observed.	low
d009	31.62984998	18.57051400	Low density scatter of quartz and silcrete artefactual material on an exposed “dorbank” pan (~30x15 m)	low
d010	31.62967597	18.57093704	Small dorbank pan with few artefacts	low
d011	31.62732300	18.56991202	Small sandy dorbank pan with low density artefact scatter including quartz, quartzite and silcrete (including some red). 1 x MSA? Denticulate flake. 2x qzite hammesrstones, 1x fine qzit biface.	medium
d012	31.62727498	18.57013003	Quartzite biface on d011	medium - high
d013	31.62678698	18.57040504	Long narrow dorbank pan ~40x10 with low density scatter of quartz, quartzite and silcrete. Cores, flakes, chunks.	medium - high
d014	31.62661498	18.57040303	Fairly dense localised artefact scatter in larger dorbank pan. Quartz, quartzite and silcrete. Some manuports and a relatively large number of flaked quartzite cobbles, Cores, flakes, blades. 1x quartzite biface	medium - high
d015	31.62657601	18.57011603	Quartzite biface on d011	medium - high
d016	31.62671699	18.57004898	Long narrow dorbank pan ~40x10 with moderately dense scatter of quartz, quartzite, ccs and silcrete. Cores, flakes, chunks. Lots of cobbles. Some cores, flakes. !x qzite hammerstone. 1 x silcrete biface . This pan continues to the west and was not fully examined.	medium - high
d017	31.62682202	18.56998603	Silcrete biface on 017	medium - high
d018	31.62775501	18.57026297	Elongated pan ~20x15 with low density artefact scatter of quartz, quartzite and some silcrete.	low
d019	31.62798501	18.57234302	Sandy dorbank pan with few quartz flakes and 1x large core.	low
d020	31.62855196	18.57232600	Round diorbank pan with low density scatter of quartz, quartzite and ccs	low
d021	31.62676896	18.56946199	Dorbank pan with low density scatter	low
d022	31.62699703	18.56957599	Small quartzite biface on d023	low
d023	31.62697298	18.56937298	Artefact scatter in large dorbank pan. 1 x small quartzite biface	low
d024	31.62706903	18.56899998	Small biface in d024	low
d025	31.62769801	18.56752904	Low density quartz scatter in dorbank pan	low
d026	31.62525602	18.564480962	White metal angle iron marker	low
d027	31.62311504	18.56520399	Large dorbank pan area with low density artefact scatter. R007 is found to east of this area	low
d028	31.62386395	18.56768301	White metal angle iron marker	n/a
d02	31.62707398	18.57170801	White metal angle iron marker	n/a

9				
r001	31.63113300	18.57273554	Dorbank pan ~20 x 20 m with low density stone scatter. 1x large, 1 small biface. Quartz and quartzite. Grindstone? (Probably smoothed naturally as no LSA material has been observed)	medium - high
r002	31.63095907	18.57229700	Small dorbank pan ~10 x10 m with a number of cobbles	low
r003	31.63027276	18.57044117	Small dorbank pan ~10 x10 m. 2x silcrete flakes	low
r004	31.62901254	18.56917919	Scatter of flakes with some edge damaged cobbles.	low
r005	31.62871851	18.56990347	Small dorbank pan 10 x 5 m with few quartz and silcrete pieces	low
r006	31.62987638	18.57061132	Large dorbank pan ~30 x 10 m with low density quartz scatter	low
r007	31.62292024	18.56602918	Large pan area 30 x 40 m with a moderate scatter of quartz, quartzite and silcrete.	low
r008	31.62213117	18.56529887	Single large silcrete chunk	low
j001	31.64829900	18.58300400	Quartz flakes and cores on heuweltjie among gravel. 1 diagnostic MSA flake.	low
j002	31.64786700	18.58309300	Silcrete, quartz, quartzite, other flakes and cores on heuweltjie. 1 diagnostic MSA flake.	low
j003	31.64093200	18.57839100	Quartz scatter on sand on slope leading to the top of the hill.	low
j004	31.64167400	18.57831100	Very ephemeral and widespread artefact scatter. quartz and silcrete.	low
j005	31.65096800	18.57360900	Very ephemeral and widespread quartz scatter	low
j006	31.64953300	18.57767900	Very ephemeral and widespread quartz scatter. Some fresh quartz artefacts as well	low
j007	31.64945100	18.58065700	Very ephemeral and widespread quartz scatter	low
j008	31.64869200	18.58261900	Quartz and silcrete artefact scatter on a heuweltjie.	low
j009	31.64743200	18.58271400	Quartz, quartzite and silcrete artefact scatter on a heuweltjie. Cores and flakes. 1 large quartzite ESA flake. 1 large silcrete ESA flake	low

6. CONCLUSIONS

The two north alternative PV sites lie approximately 1.5 km to the north of the two southern alternatives originally examined by Jayson Orton in 2013. While they are not hugely distant from each other and lie in the formerly “ploughed” land, there appear to be differences in the overall landforms at the two sites. The archaeology in the southern area is concentrated on and around remnant heuweltjies, while in the north, the archaeology is focused on blowouts and pans. It is not clear if the stone artefacts are ubiquitous across the calcretised surface below the sands, or if they are only located in the blowouts and pans. It seems likely that the former may be true. The overall size of flaked material and distinctive bifaces suggest that most of the material dates to the Early Stone Age (in excess of 300 Ka). Some possible Middle Stone Age is present in the form of convergent flakes and occasional denticulates. No Late Stone Age forms were identified amongst the observations.

No non lithic artefacts or bone was observed as a likely result to long exposure and deflation since deposition. Lack of such items and absence of stratification greatly diminishes the heritage significance of the sites, although the presence of several bifaces distributed across the pans raises the significance marginally in some places, particularly in the pan between the two northern PV sites.

7. RECOMMENDATIONS

- No mitigation of archaeology at the Alternative 1 sites would be required if those are chosen;
- Although of generally of low significance, a few of the stone scatters in and around the Alternative 2 sites are rated as having medium - high significance due to the numbers of bifaces and associated debitage on them. In addition, the stone artefact scatters pose some questions as to whether the artefacts are widespread below the sand beyond the pans and blowouts, and if so, will they contain additional Early Stone Age bifaces. In order to answer the first question, we believe that the clearing of the PV sites (if the northern sites are selected for use) should be monitored to determine the extent of the stone artefacts. If it is evident that stone is clustered in the pans only, then monitoring can be curtailed;
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- No further mitigation of the powerline route is required.

8. REFERENCES

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