

HERITAGE IMPACT ASSESSMENT FOR A PROPOSED PHOTOVOLTAIC ENERGY PLANT ON THE FARM KLIPGATS PAN NEAR COPPERTON, NORTHERN CAPE

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

Prepared for

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EXECUTIVE SUMMARY

The UCT Archaeology Contracts Office was requested by Aurecon South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might occur through construction of a solar energy facility on Portion 4 of farm Klipgats Pan 117. Mulilo Renewable Energy (Pty) Ltd proposes to establish a 100 MW photovoltaic solar energy facility with a footprint of 300 ha that will connect to the nearby Kronos Substation via a 0.71 km or 2.14 km (alternative) overhead transmission line. The chosen site lies about 10 km south of the town of Copperton and some 6 km south of the Prieska Copper Mine. Two alternative locations exist on the same farm.

The site lies on a relatively flat plain with low vegetation. A low hill occurs in the south and an elevated gravel terrace in the far north. The ground surface of the farm varies from dense gravel patches to fine silt.

A background scatter of Early Stone Age (ESA) and Middle Stone Age (MSA) artefacts was found across the site and is of very low archaeological significance. However, a large number of discrete Later Stone Age (LSA) sites were found focused around ephemeral pans and the hill. All these sites are of significance and would require mitigation should they be under threat – Only Alternative 1 would impact on pre-colonial sites. Within Alternative 2 are three built structures and some ruins forming an old farm complex likely dating to the early 20th century. This complex is best avoided. Visual impacts to scenic routes and sense of place will be limited for Alternative 2 due to the topography, but Alternative 1 to the north will result in more significant impacts due to its proximity to the road. This is somewhat offset by the existing abandoned mining infrastructure to the north and the substation to the south.

Archaeological impacts are assessed as being of Medium significance for Alternative 1 but Low with mitigation, while Alternative 2 has Low significance with no mitigation proposed. In terms of the built environment, only Alternative 2 is affected. Impacts would be of high significance there but, with avoidance, this would reduce to very low. Impacts of visual concern are rated as of Medium significance for Alternative 1 and Low for Alternative 2. No mitigation is suggested for either.

Overall, impacts to heritage resources are not considered to be highly significant for Alternative 1, but Alternative 2 is sensitive. It is thus concluded that the project may proceed on Alternative 1 but that a new site should be chosen if possible should Alternative 1 not be feasible. The following recommendations apply:

- Alternative 1 is favoured over Alternative 2;
- The structures on Alternative 2 should be avoided or, if required, the footprint should be relocated to the east;
- The suggested archaeological mitigation should be implemented as necessary; and
- If any human remains are uncovered during development then work in the immediate vicinity should be halted and the finds protected and reported to SAHRA (021 462 4502).

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1. INTRODUCTION

The UCT Archaeology Contracts Office (ACO) was requested by Aurecon South Africa (Pty) Ltd (Aurecon) to assess the potential impacts to heritage resources that might occur through construction of a solar energy facility on Portion 4 of farm Klipgats Pan 117 (Figure 1). Mulilo Renewable Energy (Pty) Ltd proposes to establish a 100 MW photovoltaic (PV) solar energy facility with a footprint of 300 ha that will connect to the nearby Kronos Substation via an overhead transmission line. The chosen site lies about 10 km south of the town of Copperton and some 6 km south of the Prieska Copper Mine.

The project components would include the following:

- Installation of arrays of panels comprised of photovoltaic cells;
- Construction of a 0.71 km or 2.14 km long 132 kV overhead transmission line to evacuate the power to the Kronos Substation which lies along the southwest edge of the farm;
- Upgrading of farm roads and construction of new roads to facilitate access to the site for construction and maintenance vehicles;
- Construction of small buildings to house an office, connection centre and guard; and
- Construction of an electric fence to protect the site from trespassers and livestock.

The plant is expected to be operational for approximately 20 years after which it would likely be decommissioned and the land rehabilitated.

Alternatives being assessed include the following:

- Two location alternatives each allowing generation of 100 MW;
- Technology alternatives include method of power generation (PV or CSP) as well as various ways of mounting the panels on various types of foundations (but note that CSP has been ruled out during scoping due to the high water requirements of this technology); and
- The only activity alternative to solar energy generation is the No-Go option in which the status quo would be maintained.

For the purposes of heritage assessment, the technology alternatives make little or no difference so this report therefore concentrates on assessing the layout alternatives. The ACO was asked to conduct a detailed assessment of the proposed site but to also consider the broader farm context so that should other specialist reports determine a need to shift the facility then some data would be available to further inform the relocation.

2. TERMS OF REFERENCE

Undertake a Heritage and Archaeological Impact assessment of the sites in accordance with the requirements of Section 38(3) of the NHRA which would include:

- Conducting a detailed desk-top level investigation to identify all archaeological, cultural and historic sites in the proposed development areas;
- Undertaking field work to verify results of desktop investigation;
- Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;
- Compile a report which would include:

- Identification of archaeological, cultural and historic sites within the proposed development areas;
- Assess the sensitivity and significance of archaeological remains in the site;
- Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction (medium term), more than 10 years after construction (long term));
- Recommendation of mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance;
- The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also guidelines on procedures to be implemented if previously unidentified cultural resources are uncovered during later developments in the area;
- Consideration of relevant guidelines; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: “Guideline for involving heritage specialists in EIA processes”.

3. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources including palaeontological, prehistoric and historical material (including ruins) more than 100 years old (Section 35), human remains older than 60 years and located outside of a formal cemetery administered by a local authority (Section 36) and non-ruined structures older than 60 years (Section 34). Landscapes with cultural significance are also protected under the definition of the National Estate (Section 3 (3.2d)). Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. This report fulfils that requirement.

Since the project is subject to an Environmental Impact Assessment, the heritage authorities are required to provide comments on the proposed project in order to facilitate final decision making by the Department of Environmental Affairs (DEA). The relevant heritage authorities are Ngwao Boswa Kapa Bokoni (Heritage Northern Cape) for built structures and the South African Heritage Resources Agency for archaeology.

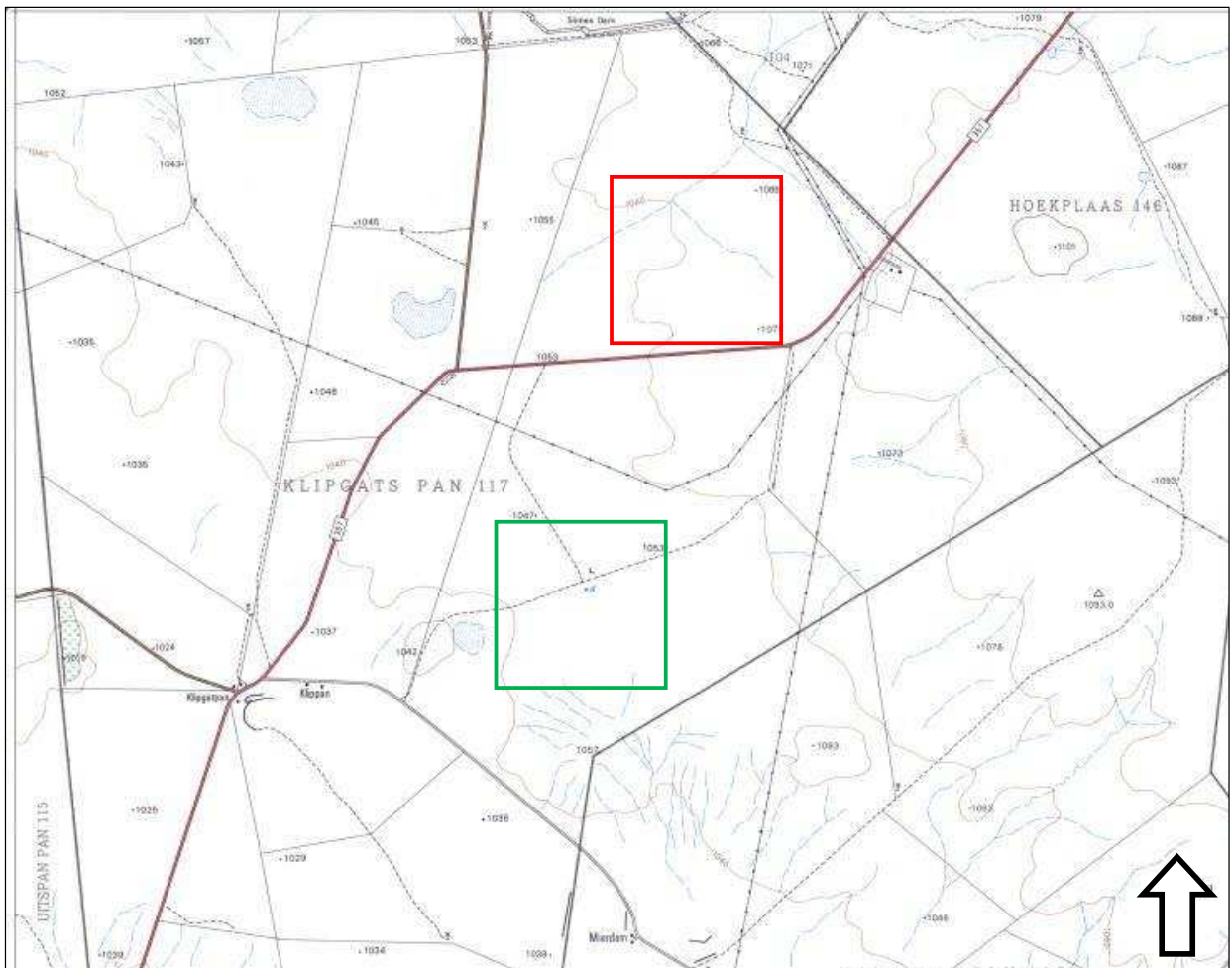


Figure 1: Map showing the two alternative locations of the proposed 100 MW solar energy facility on Klipgats Pan, to the south of Copperton and the Prieska Copper Mine (just out of view to the north) (Alternative 1: red rectangle north of the R357; Alternative 2: green rectangle south of the R357).

4. METHODS

The site was surveyed on the 10th and 13th December 2011 by a Principal Investigator (Jayson Orton) and a student assistant (Ross Lyall) through a combination of driving and walking. The driving aimed to locate areas that, through experience, would be more likely to contain archaeological and/or other heritage remains. These typically consisted of hills, dense gravel patches and pan and stream margins. Such areas were searched most intensively, but many other areas were walked in order to confirm expectations in those areas. All heritage resources were recorded photographically and GPS co-ordinates were taken and walk and drive paths were recorded using a hand-held GPS receiver set to the WGS84 datum (blue lines on Figure 6 below).

Field numbers were allocated on the GPS during the survey and these points are indicated by a '#' in the text. All occurrences of heritage were recorded thus and only those deemed to have good integrity were actually given site numbers. These numbers are constructed through combination of a three-letter acronym for the farm name, the year of discovery (2011) and a sequential site number. The sites and other occurrences are listed in

Appendix 1 and gradings, following the grading system proposed by Baumann and Winter (2005: box 5), are assigned to indicate overall heritage conservation-worthiness where appropriate. Note that this system makes no provision for sites not worthy of conservation and these are thus left ungraded. The definitions of the various grades are provided in Table 1.

Table 1: Grading of heritage resources (Source: Baumann & Winter 2005: Box 5).

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

In assessing the significance of impacts standard criteria provided by Aurecon were employed. These use the combination of magnitude, extent and duration in the determination of significance.

4.1. Limitations and assumptions

The site was relatively flat and but generally coated in knee-high bushes and grass. This made ground visibility difficult in many areas, but some gravel patches and open, pan-type localities provided opportunities to examine the substrates in these areas. Aside from this, it is acknowledged that the survey density did not allow comprehensive coverage of every part of the site but it is believed that the outcome of this report would not be significantly altered by any further detailed coverage.

The survey could not practically cover the entire project areas and, in terms of pre-colonial archaeology, it is assumed that, through focusing on finding and examining landscape features that seemed most likely to yield finds, an understanding of the overall archaeological and historical landscape has been attained.

Due to the difficulties associated with accessing linear routes crossing many camps and fences, the power line routes were not specifically searched. The footprints of the pylons are small and it is assumed that they will not have impacts of any magnitude.

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The site is very flat with very low vegetation dominating but occasional plants do exceed knee height (Figures 2 to 6). Ground visibility was generally good owing largely to the many gravel areas where vegetation was often very sparse (Figures 3 to 5). Major landscape

features present are the large pan and a slightly hilly area in the southern part of the site. The substrate varies from fine silt (Figure 2) to gravel (Figure 3).



Figure 2: View across part of the Klipgats Pan study area showing vegetation in a silty, pan-like area.



Figure 3: View across part of the Klipgats Pan study area showing vegetation in a gravel area.



Figure 4: Part of the Klipgats Pan study area with sand and gravel and light vegetation cover.



Figure 5: Sparse vegetation cover on a dolerite hill in the Klipgats Pan study area.

6. HERITAGE CONTEXT

Much of the Karoo is covered by gravels that contain abundant stone artefacts in varying densities (personal observation). Of the Bushmanland area, Beaumont *et al.* (1995: 240) declared that “thousands of square kilometres of Bushmanland are covered by a low density lithic scatter”. These artefacts are generally very well weathered and mostly pertain to the Early (ESA) and Middle Stone Age (MSA). They can be considered as background scatter in that their fine-scale distribution is conditioned more by geological actions than human actions. Occasional Later Stone Age (LSA) artefacts are also present within this scatter and these were no doubt dropped there during recent millennia. These kinds of finds were made by Kaplan (2010) and Wiltshire (Kaplan & Wiltshire 2011) on proposed PV and wind energy sites nearby. The ESA is said to be characterised by the presence of long blades, Victoria West cores and relatively few hand-axes and cleavers. Substantial MSA sites are rare with

only a few isolated examples known (Beaumont *et al.* 1995). The open landscape holds few cave sites but one called Zoovoorbij Cave close to the Orange River near Upington did reveal an early MSA occupation (Smith 1995a).

A significant aspect of the Northern Cape archaeological record is the presence of pans which frequently display associated archaeological material. The only detailed work in this regard is that of Kiberd (2001, 2005, 2006) who excavated a site known as Bundu Pan, some 25 to 30 km northwest of Copperton. The site had initially been revealed by excavations to obtain gravel for surfacing local roads with early observations noting MSA artefacts on quartzite eroding from the sections. The artefacts were accompanied by warthog and equid teeth (Beaumont *et al.* 1995). The site was subsequently excavated between 1998 and 2003 and, importantly, found to actually contain stratified deposits ascribable to the ESA, MSA and LSA. The preserved Pleistocene faunal material was confirmed and found to include, in decreasing order of abundance, the bones of wildebeest, warthog, extinct giant hartebeest, two species of equid (horse/zebra), baboon, springbok and blesbok (Kiberd 2006). The only other site in the Northern Cape Province to contain all three Stone Ages is Wonderwerk Cave near Kuruman with its deep stratified deposits (Humphreys & Thackeray 1983). Such sites are generally rare in South Africa. Local pans were also examined by Wiltshire (Kaplan & Wiltshire 2011) and found to have greater densities of archaeological material surrounding them.

Several Later Stone Age sites in the Bushmanland area to the northwest, west and southwest of Copperton have been investigated by Beaumont and colleagues (1995), Smith (1995a) and Parsons (2003, 2004, 2007, 2008). Work on these sites led to a distinction between hunter-gatherer and herder sites, based on stone artefact assemblages (Beaumont *et al.* 1995; Beaumont & Vogel 1984, 1989; Parsons 2003), which has recently been called into question (Parsons 2007). Briefly, the hunter-gatherer assemblages, termed 'Swartkop', were said to be dominated by hornfels, but with some quartz, and to have many blades with backed blades a common retouched type (Morris 1990; Orton 2002/3). Earlier assemblages have proportionally more blades and fewer potsherds with later sites the reverse. Ceramics are usually grass-tempered (Beaumont & Vogel 1989). The herder sites, termed 'Doornfontein', were said to be mostly irregular flakes usually made on quartz and to have many potsherds, including lugs and spouts, associated with them, but with lugs absent on sites older than about AD 700 (Beaumont *et al.* 1995). Smith (1995a) notes that Doornfontein sites tend to occur along the river, while Swartkop sites are usually found further from the river. Sites dating more than about 2000 years ago belong to a group that Beaumont *et al.* (1995) refer to as Springbokoog. Such sites are likely the predecessors of the Swartkop sites and also have high frequencies of backed blades though to the east backed blades and scrapers may be more equal in proportion as shown by a sample from Prieska. All these Later Stone Age sites have very few, if any, organic items on them. The only organic find usually present is fragments of ostrich eggshell which originated either from eggs eaten or else whole shells used as flasks. Many such flasks have been found across the Northern Cape (Morris 1994; Morris & Von Bezing 1996). One of the farmers during the present study mentioned that his family had found several ostrich eggshell flasks with three holes in them. One end had one hole which was used for drinking and otherwise lugged. The other two holes were placed at the opposite end and were threaded for the purposes of carrying the suspended flask.

Rock art, in the form of engravings, is widely known from Bushmanland and the Northern Cape in general (Beaumont *et al.* 1995; Beaumont & Vogel 1989; Rudner & Rudner 1968; Rusch & Parkington 2010; Wilman 1933) where sites such as Wildebeest Kuil,

Driekopseiland are well known. Various styles occur and are attributed to different time periods; incised finelines extend back the furthest in time, while pecked and scraped engravings occur within the last 2000 years. The latter have the smallest distribution between Kenhardt, Beaufort West and De Aar (Beaumont & Vogel 1989). During our time in the field one of the farmers pointed out an engraving site along the road between Copperton and Vanwyksvlei. At this site we found scraped engravings of eland and ostrich as well as very recent (historical) incised (perhaps better termed scratched) engravings including horses with riders, one chariot and some writing. This site is known to researchers and is probably the nearest engraving site to Copperton (David Morris, pers. comm. 2012).

The last Stone Age (LSA) archaeological concern is stone circles. These low structures are not well studied but work further east along the Orange River (Sampson 1968), in the Seacow Valley in the eastern Karoo (Sampson 1986) and also at Bloubos northwest of Upington (Parsons 2004) suggests they may well have been the bases in which huts or windbreaks were constructed. Similar stone circles have recently also been discovered at De Aar in the central Karoo (Orton 2011). Such stone circles are very different to the far more substantial piled stone kraals commonly encountered in the central and eastern Karoo regions (Hart 1989, 2005; Orton & Halkett 2010; Sampson 1984, 1985, 1986, 2010).

Indigenous people were present in this area until quite recently with one of the farmers, Frans Ekkert, informing us that when his grandfather began farming in the area in 1864 there were still many Bushman living there. Smith (1995b) notes that around that time white farmers were making extensive use of Bushmanland for summer grazing and that this led to the extermination of the massive springbok herds on which the indigenous population subsisted. This in turn led to the locals turning to the farmers for food (and employment), effectively ending the span of prehistory in the region.

More recent heritage relevant to the study area includes the typical flat-roofed Karoo-style houses commonly found in the small towns. None were noted to occur close to Copperton with the town itself being quite recent and related to the start of copper and zinc mining there during the 1970s. Mining ceased during the 1990s. Much of the town was demolished after this. Being so arid, the farms in the area are large and used only for livestock grazing. Farm complexes are rarely seen on the landscape and tend to be relatively recent.

The Anglo-Boer War included action in Bushmanland with the British fort at Prieska being a fine example. War graves are also present there (Southerncape 2010).

7. FINDINGS

Figure 6 shows the distribution of archaeological resources recorded during the survey as well as the walk- and drive-paths taken. It can be seen that one large cluster of occurrences is situated in the southern area and it is these that lie on the elevated ground overlooking the pan to the west. Interestingly, although not searched very carefully, LSA material was not noted around this pan. It is assumed that the proximity of the hill made it a more attractive settlement option owing to the view of the surrounding plains that was afforded. Other concentrations of LSA material were associated with ephemeral pans: one just north of the R357 and another even further north on slightly elevated and gravel-strewn ground. Over the remainder of the study area, most finds were examples of background scatter with all the discrete sites related to LSA occupations and the background scatter being almost all ESA and MSA. The fourth, and smallest, concentration in the centre of the southern area is a set

of historical farm ruins and associated artefacts. These various types of archaeological occurrences and the historical ruins will be addressed separately.

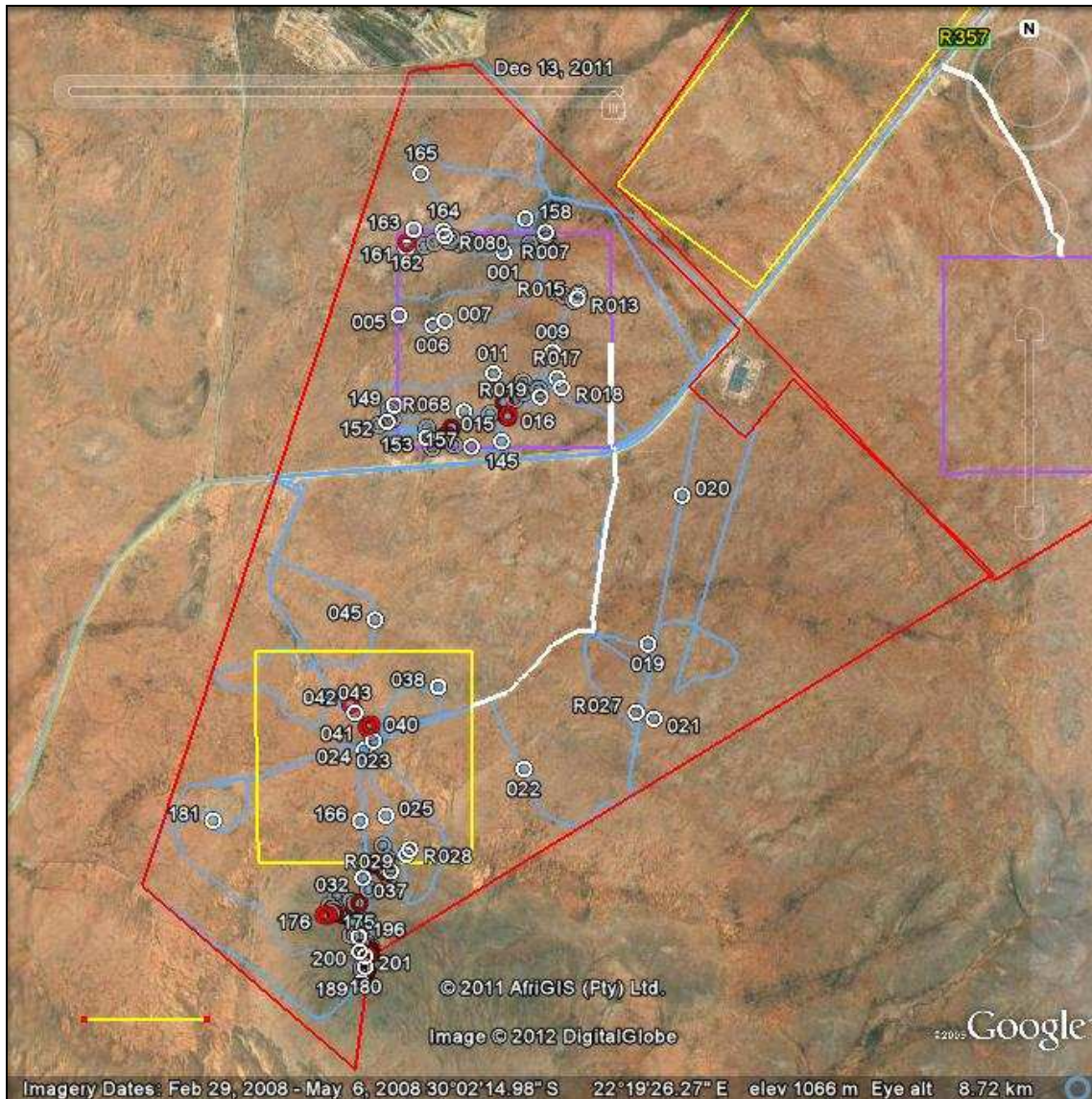


Figure 6: Aerial view of the study area taken from Google Earth and showing the distribution of recorded archaeological occurrences by their field numbers. The purple block is the location of Alternative 1 and the yellow one Alternative 2. The yellow bar for scale at lower left is 1 km. The site with red symbols require mitigation, the white ones do not.

7.1. Background Stone Age artefact scatter

Artefacts were observed in low densities over much of the study area and Figure 7 shows a selection of these. Quartzite strongly dominates the background scatter but some CCS and quartz is present. Hornfels is absent. Weathering states vary indicating a vast span of time over which the artefacts have accumulated. Such finds have no discernible original context and have little to no archaeological value. Some places revealed slightly elevated frequencies of artefacts, but this is generally unrelated to human factors. GPS points were taken at such places and selections of artefacts were photographed. These appear in Figures 8 to 13. At #159 (Figure 11) there were also two small fragments of ostrich eggshell. While

the stone artefacts are probably all MSA, the eggshell would belong to the LSA. Occasional LSA artefacts were noted among the background scatter, and, in the area with many LSA sites in the far south, most background scatter was in fact comprised of LSA artefacts. Although at times, for example at #161, these artefacts were quite densely concentrated (Figure 12 & 13), the nature of the scatter suggested it to be background and not a discrete occupation site.



Figure 7: Selection of isolated artefacts from the background scatter on Klipgats Pan showing the variability in materials and weathering states.

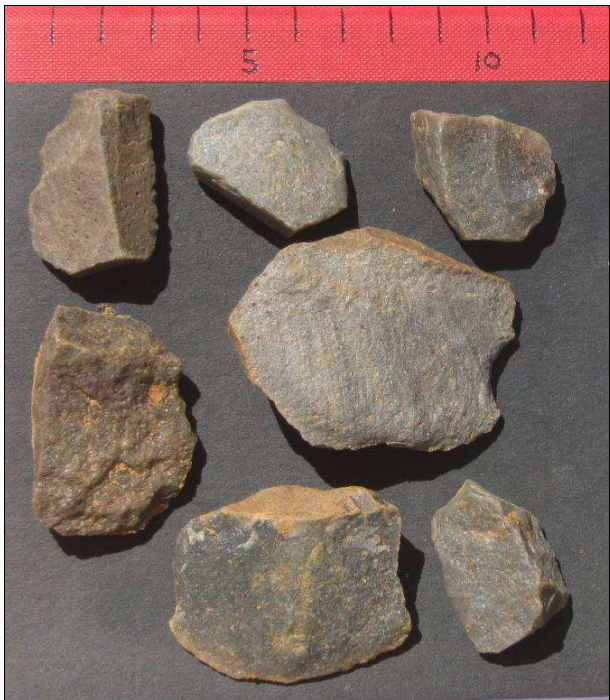


Figure 8: Artefacts from #001.



Figure 9: Artefacts from #005.



Figure 10: Artefacts from #010.



Figure 11: Artefacts from #159.



Figure 12: Artefacts from #161.



Figure 13: Environment at point #161.

Among the background scatter were occasional hand-axes pertaining to the ESA. These were usually heavily weathered testifying to their great age (Figures 14 to 22). One hand-axe was particularly interesting in that it appears to have been reused during a more recent period of the Stone Age as a core (Figure 20). One sometimes finds hand-axes in unexpected places, or associated with younger archaeology, and the assumption is generally that they were collected for some purpose. But this example was clearly collected as stone material for flaking.



Figure 14: Hand-axe from #004.



Figure 15: Hand-axe from #019.



Figure 16: Hand-axe from #021.



Figure 17: Hand-axe from #145.



Figure 18: Hand-axe from background scatter.



Figure 19: Hand-axe from #149.

Something sometimes seen in areas with lots of rock exposed is quarrying of the exposures. One instance of this was recorded on Klipgats Pan at #153. Here a quartzite outcrop has been flaked (Figure 23). This probably dates to the MSA since the flaked edge is somewhat weathered and it is quite clear that quartzite use is infrequent on the LSA sites in the area.



Figure 20: Hand-axe from #150. **Figure 21:** Hand-axe from #157 . **Figure 22:** Hand-axe from #163.



Figure 23: Flaked quartzite exposure at #153. It was flaked with the surface at the top of the picture acting as the striking platform.

7.2. Discrete Stone Age sites

A large number of discrete LSA archaeological sites were found on Klipgats Pan. As already indicated, these were clustered in three main areas, all associated with landscape features. These are described from north to south with examples to illustrate the typical characteristics.

The first cluster is located atop the elevated terrace at the far north end of the study area among dense gravel but with silty pan-like areas in places. It was no doubt the co-occurrence of elevation (good view for hunting), temporary water and a stone material source that resulted in this spot being selected for LSA occupation. The cluster is fairly minor, but it is likely that more scatters would be revealed through further survey of this area. It is interesting to note that although quartz, which usually is present on LSA sites but not MSA ones, is present, quartzite dominates. This is no doubt due to the presence of plenty of quartz in the immediate vicinity. The quartzite flakes, in this case, are all unweathered (Figures 24 & 25; compare those in Figures 7 to 11 for example) signifying a recent temporal origin. Another very small scatter was comprised of just one type of stone, likely all from the same original rock – a green-coloured CCS (Figure 26). While most of the flakes in Figure 12 are probably also LSA, they lacked a focal point on the landscape and were far more widely dispersed. Nevertheless, these artefacts together indicate LSA occupation of this terrace.

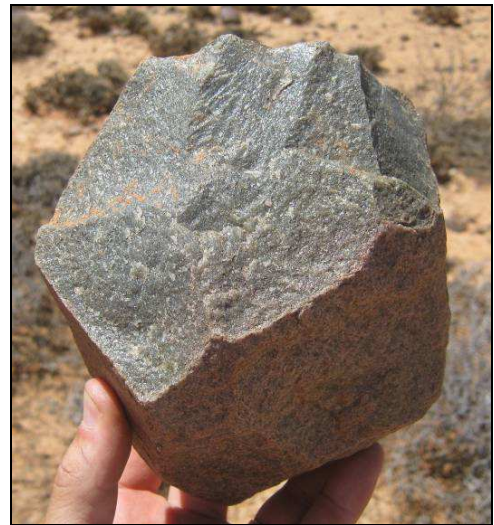


Figure 24: Artefacts from site KGP2011/033 (#160).

Figure 25: Core from KGP2011/033 (#160).



Figure 26: Artefacts from site KGP2011/066 (#R082).

The second cluster of LSA sites is located just north of the R357 road in an area with many gravel patches, sandy patches (Figure 26) and silt-covered ephemeral pans (Figure 27). The sites in this area were frequently characterised by the presence of ostrich eggshell fragments and one site, KGP2011/030 (#154), in fact had only ostrich eggshell on it with no stone artefacts at all. Also, typical of LSA sites, quartz and CCS dominated the stone materials, though one site KGP2011/065 (#R071, #R073, #R079), had quartzite as the most common material. It was all the same very pale grey quartzite and occurred in conjunction with quartz artefacts and a good scatter of ostrich eggshell. Figures 27 and 28 show the environment in which these sites were located. These sites were generally quite ephemeral but two had decent enough artefact concentrations to suggest mitigation should be carried out. Significantly, the ostrich eggshell can be used for radiocarbon dating to get an approximate age for the sites.

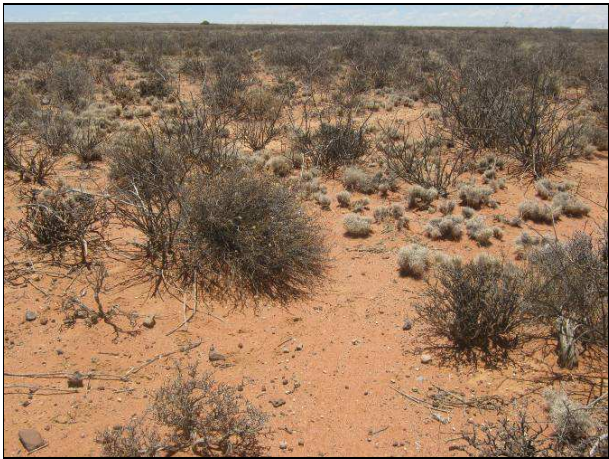


Figure 27: The environment of KGP2011/027 (#150).

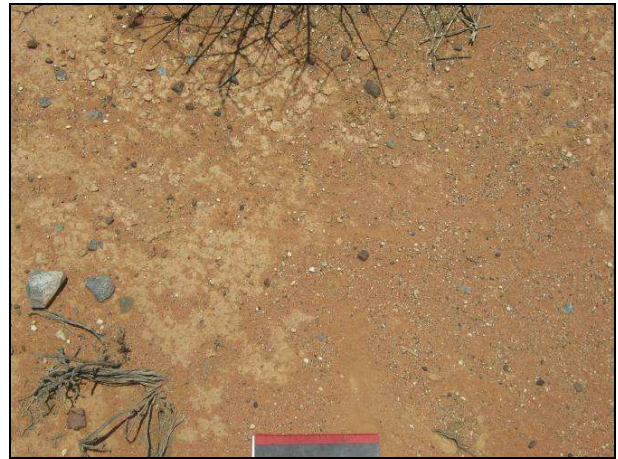


Figure 28: The ground surface at KGP2011/029 (#152). The dry mud is evident on the surface.

The last cluster is the most significant and can be loosely divided into two smaller clusters, but based purely on our survey paths. No doubt further survey would have revealed more sites in the intervening areas. This cluster lies on elevated ground in the southern part of the study area. To the north is an old dam suggesting that water may have been present in that area after rains and to the west is a pan – the one that has almost no visible archaeology around it. Figure 29 shows the typical microlithic nature of the artefacts on the LSA sites from this area. These are from KGP2011/012 (#032). Figure 4 above shows the location in which these artefacts were found on the crest of a low hill. Site KGP2011/010 (#028) was comprised of a dense scatter of stone artefacts in quartz, quartzite and CCS in a sandy area. One CCS scraper was noted, as were some bone fragments. Site KGP2011/011, was a larger site, also in a sandy area and also revealing one CCS scraper. Two areas were examined and one found to be dominated by quartz (#030) and the other by CCS (#031). The last site discussed here (KGP2011/014; #035) was unique in that it had evidence of stone construction. A small semi-circular shape was made from small cobbles (Figure 30) and artefacts of quartz, quartzite and CCS and some ostrich eggshell were found nearby. There was also some burnt bone, glass and ceramics. The stone circle and bone could belong with either the historical or the LSA material.



Figure 29: Artefacts from KGP2011/012 (#032). All are in quartz and CCS.

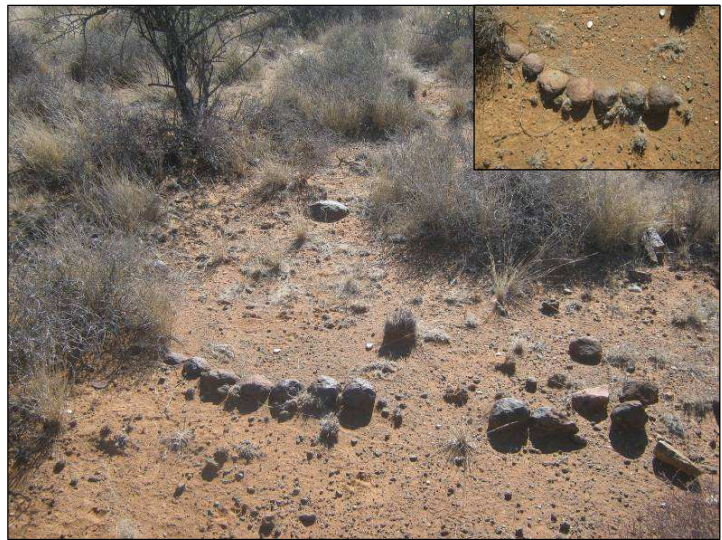


Figure 30: The stone semi-circle found at KGP2011/014 (#035).

The bulk of the LSA sites recorded in this area were on a plateau overlooking the pan to the west. Some of these sites were spatially extensive, either through simply being large or through having multiple smaller scatters associated with one another. CCS was very common as a flaked stone material (Figure 31) and on some of these sites stone artefacts were quite dense, perhaps of the order of 15 to 20 artefacts per square meter in places (Figure 32). The largest and certainly most significant site was KGP2011/048 (#182 - #185). This site was very extensive and had particularly high densities of artefacts. Among them were several fragments of decorated ostrich eggshell, usually assumed to have originated from a flask and, seemingly in confirmation, a flask mouth fragment was found with them (Figure 33). These pieces were found among a dense scatter of ostrich eggshell fragments, perhaps indicating that the flask was dropped and broken right there (Figure 34). The site included bone fragments as well. Among the stone artefacts were an adze and a fragment of a very small bored stone (Figures 35 & 36). Another site that was dominated by quartz also had a CCS thumbnail scraper and a unifacially flaked quartzite artefact (Figure 37). One further artefact worth noting comes from site KGP2011/050 (#187). Here an upper grindstone / hammerstone shows extensive wear indicative of long term use. This may support long term occupation of the site – whether this was in one go or as frequent visits over a longer period cannot be said. If the latter, then the grindstone may have been left behind and reused each time.



Figure 31: Artefacts from KGP2011/038 (#170). The upper row are all CCS artefacts.



Figure 32: The surface of site KGP2011/041 (#173). Flaked artefacts litter the surface.



Figure 33: Decorated ostrich eggshell from KGP2011/048 (#182).



Figure 34: Ostrich eggshell fragments abound on this part of KGP2011/048 (#182).



Figure 35: The outside of the bored stone fragment from KGP2011/048 (#183).



Figure 36: The inside of the bored stone fragment from KGP2011/048 (#183).



Figure 37: Unifacially flaked quartzite artefact from KGP2011/053 (#190).



Figure 38: Upper grindstone / hammerstone from KGP2011/050 (#187).

One LSA site was found in a flat, open area away from any significant landscape features but close to an ephemeral pan (Figure 39). This site, KGP2011/034 (#162), had a collection of microlithic artefacts, primarily in quartz, which included a backed triangle – an artefact type rarely found in South Africa (Figure 40).



Figure 39: Ground surface at KGP2011/034 (#162).



Figure 40: Artefacts from KGP2011/034 (#162). The backed triangle is at the top left hand corner.

7.3. Historical archaeology

Within this category are ruined structures and artefact scatters. The ruined structures are associated with the standing structures reported below and form one large complex, which, according to the present tenant (whose father once owned the farm), probably dates just after 1914. The first is the remains of a small rectangular stone structure with what appears to be a pillar nearby (KGP2011/006; #023). This latter was not physically connected to the rectangular ruin (Figure 41). Some clear glass, probably 20th century and including a small bottle base bearing "Pretoria 3 oz", was found at this site (Figure 42).



Figure 41: Ruin and 'pillar' at KGP2011/006 (#023). The ruined rectangular structure is the pile of rocks in the middle ground and the pillar is at front left.



Figure 42: Bottle base at KGP2011/006 (#023). "Pretoria 3 oz" appears embossed on it.

Another ruined structure was located at KGP2011/018 (#039). Here there was stone walling, a stone foundation, a collapsed brick wall, two brick 'towers' and a small structure of unknown function but bearing double walls suggesting some sort of insulation (Figures 43 to 46). The cement on all these structures was not very old and likely early 20th century in age.

According to the tenant, this structure was a house. A pile of stones was also present close by. At #041, where a standing structure lies, there were two more similar piles of stones. The last ruin feature, KGP2011/022 (#043) was a stone foundation of a small structure some 3.5 m by 2.5 m in size (Figure 47).



Figure 43: Brick tower and stone ruin at KGP2011/018 (039).



Figure 44: The same ruin as Figure 43 but viewed from the other side showing a white-washed wall.



Figure 45: Small structure alongside the ruin at KGP2011/018.

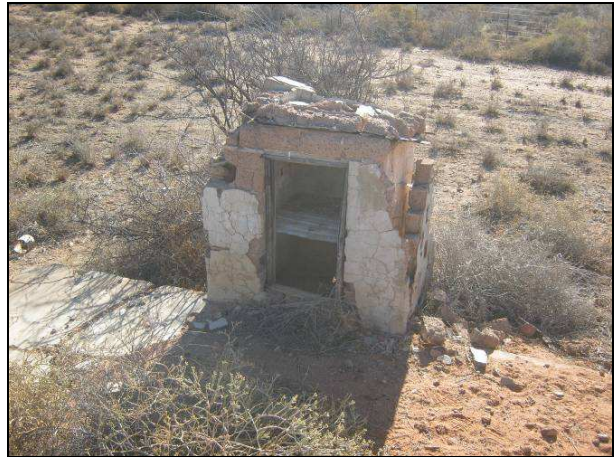


Figure 46: Small structure alongside the ruin at KGP2011/018.



Figure 47: The small stone foundation at KGP2011/022 (#043).

Approximately 1 km south of the complex of ruins and structures we noted a widespread, and quite dispersed, scatter of historical glass and ceramics. The GPS points taken refer to places where slight concentrations were evident and finds were photographed. Finds from both this area and around the ruins and structures include some clear (possibly solarised) glass fragments at #029, some pink glass fragments at #032, some pink glass and a square iron nut at #033, a fragment of a harmonica at #036, some glass, ceramics and a ground stone fragment at #034 (Figure 48), some glass and ceramic fragments at #035, including a glass stopper (Figure 49), some glass and ceramics at R032, and, as expected, glass, ceramics and metal items around the structures at #040 (Figure 50), #041, #042 and #043. The majority of these items are either late 19th or early 20th century and hence only just count (legally) as archaeology. At #042, the stone kraal site, there was also a rifle cartridge with “K36” and “VII” on the end. The map in Figure 51 shows the distribution of GPS points that recorded historical artefacts. It can be seen that they all broadly cluster in two areas: around the farm complex and on the north edge of the low hill to the south of the complex. All of the latter are artefacts only and it may be that some sort of temporary shelter was erected here and occupied for a time with no trace of the shelter remaining today.



Figure 48: Glass, ceramics and the ground stone from #034.



Figure 49: Glass stopper from #035.



Figure 50: Glass and ceramics from #040.

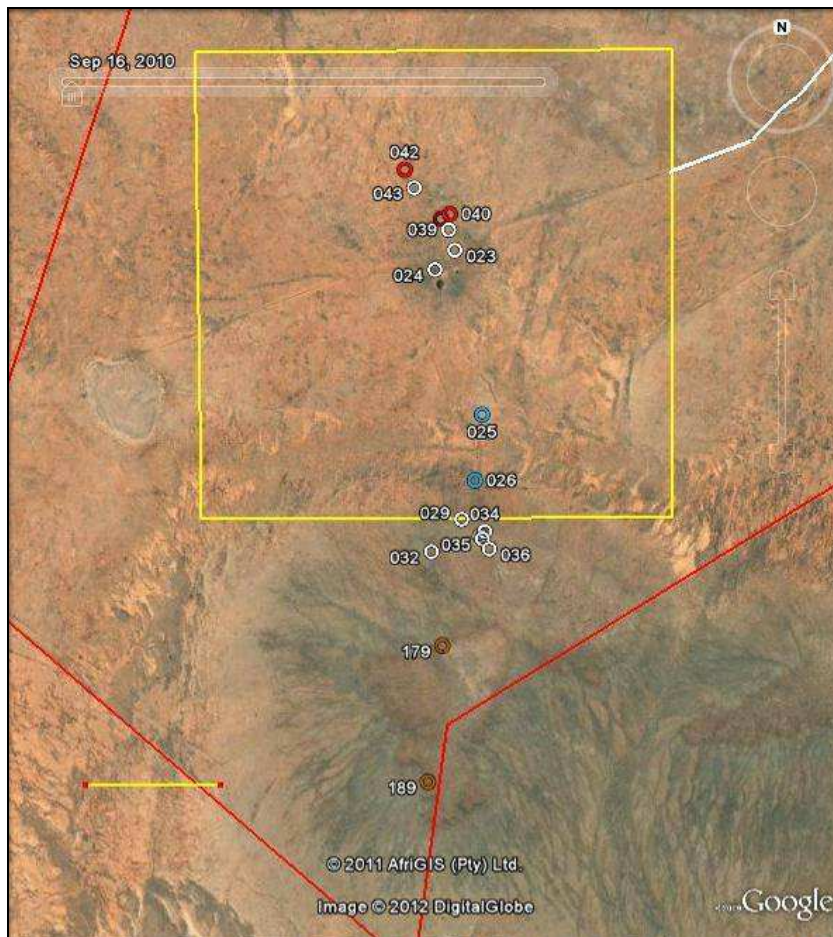


Figure 51: Map showing the distribution of historical material on Klipgats Pan. Red symbols are standing structures, white symbols are ruins and artefact scatters, blue symbols mark the ends of the dam wall and brown are the two shale quarries. The yellow bar for scale at lower left is 500 m and the yellow block represents Alternative 2.

7.4. Built environment

This category includes only standing structures, of which three were located on Klipgats Pan. They are part of a complex thought by the present tenant (whose father once owned the farm) to date to just after 1914. The structures include a cow shed, a toilet, a kraal and the ruins described above and, together, represent a wonderful example of craftsmanship. Of the latter, that at KGP2011/018 (#039) was said to be the house. The first standing structure, the cow shed (KGP2011/020; #041), is built from shale blocks, has concrete lintels and corrugated iron door and roof. A small window has a wooden shutter (Figures 52 to 55). The interior floor is paved and walling and stone alignments denote enclosures at the rear (north side) of the shed. A very low gable appears above the front door.



Figure 52: View of the front of the cow shed at KGP2011/020 (#041).

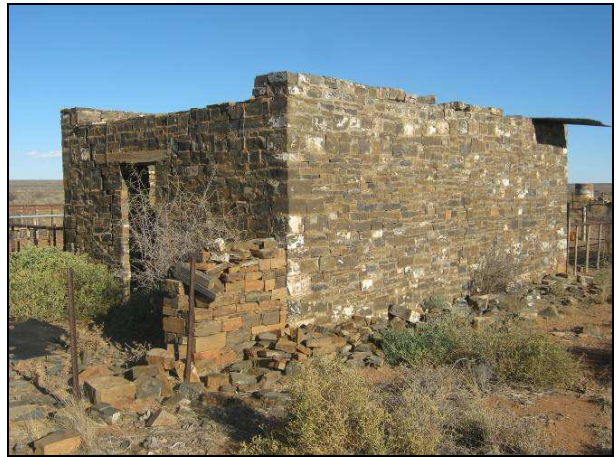


Figure 53: The rear of the cow shed with adjoining walling.

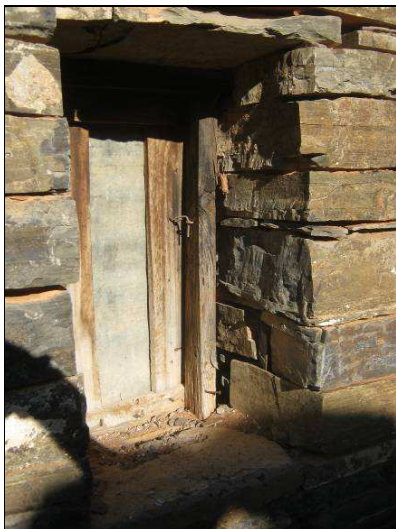


Figure 54: The small window and shutter in the cow shed at KGP2011/020.



Figure 55: The inside of the large door to the cow shed. Note the concrete lintel.

The second structure is an old toilet house (KGP2011/019; #040). According to the present tenant, it was a long drop and the pit has now been backfilled. The structure is again built from shale blocks (Figure 56) but, although the roof of the shed is poorly preserved, there

seems to be a difference in construction. The toilet house has a 'modern' form of what is termed a "brak dak". In traditional form, a brak dak has wooden beams covered by small sticks which are in turn covered by mud. In this structure a corrugated iron roof is supported by a single cross beam and covered by shale slabs and cement (Figure 57 & 58). Part of a wooden door frame is still present (Figure 56), a large flagstone lies at the entrance (Figure 57) and an iron bar and stone lip provide the support for the planks that would have formed the seat (Figure 58).



Figure 55: The rear of the toilet house at KGP2011/019 (#040).

Figure 56: (top) Inside of the toilet roof.
Figure 57: (bottom) Outside of the toilet roof.



Figure 57: The doorway of the toilet house at KGP2011/019 (#040).

Figure 58: (top) The flagstone at the doorway.
Figure 59: (bottom) Seat detail in the toilet house.

The third structure is a small kraal complex at KGP2011/021 (#042). The kraal has two enclosures built of rough sandstone blocks (Figure 60 to 61); the larger is 16 m by c. 10 m and the smaller is 4 m by 7 m. An iron fitting was fastened into the wall in one place (Figure 62). The larger enclosure is not perfectly symmetrical with the width varying between about 11 m on the western end and about 9 m on the eastern end (Figure 63).



Figure 60: (top) The inside of the large enclosure of the kraal at KGP2011/021 (#042).

Figure 61: (bottom) The smaller enclosure with damaged section. **Figure 62:** (right) Iron fitting in the kraal wall.



Figure 63: Plan view of the kraal (KGP2011/021; #042). The white bar for scale at lower left is 5 m.

7.5. Cultural landscapes

Immediately south of the farm complex was an area with a windmill, some feeding/watering troughs and a stone-lined dam. Although constructed in the strict sense, the dam is more of a landscape modification and, together with the smaller features listed above, comprise a cultural landscape (KGP2011/007; #024). These features may not be all that old, but some are likely more than 60 years of age. The rocks of the dam have been white-washed. One other landscape modification is an old, now breached, dam wall that has been built up from earth and then had stone laid on it. This feature was located some 650 m south of the main complex of historical structures and ruins and is about 240 m in length (between points #025 and #026; see Figure 51).



Figure 64: Stone-lined dam at KGP2011/007 (#024).



Figure 65: Other features at KGP2011/007.

Located some distance south of the farm complex, and on a hill, were two shale quarries. They are represented by shallow pits, now partly infilled through nearly a century of natural erosion (Figure 66). Many broken shale slabs were lying about and the quarries were undoubtedly used for sourcing the stone with which the farm buildings were constructed.



Figure 66: One of the small shale quarries. The quarried rock face is visible on the left, though it is obscured by broken and abandoned shale slabs.

7.6. Scenic routes, sense of place and visual concerns

The R357, which connects Prieska with Vanwyksvlei via Copperton, is generally scenic in that one experiences the typical vast, undeveloped open space of the Karoo while driving along it. The study area straddles this road with Alternative 1 being immediately north of and adjoining the road and Alternative 2 some 2 km to its south and east. While Alternative 2 may not be fully visible from the R357, Alternative 1 will result in a significant detractor from the sense of place and scenic value along the road. However, it should be borne in mind that very few people use the road making any visual impacts to it of reduced concern. The solar energy facility would not exceed 4.5 m in height.

8. ASSESSMENT OF IMPACTS

Impacts to archaeological resources, the built environment and scenic routes/sense of place are assessed. It should be noted that the visual impact assessment (being conducted by Karen Hansen) will further inform on the visual impacts.

8.1. Archaeology

Most archaeology present on the site is background scatter of low significance but important LSA archaeological sites do occur. These are focused around ephemeral pans and on a low hill with the exception of isolated camps that occur away from landscape features. The two alternative sites will affect different types of archaeology with the ruins not readily mitigatable. Alternative 1 will result in a greater cumulative impact to pre-colonial archaeology, while Alternative 2 would negatively impact on historical archaeological resources. However, the latter are likely all less than 100 years of age and thus not technically protected. The assessment takes this legal definition into account assuming the age of 1914 indicated by the tenant (and supported by the construction materials) to be

correct. Pre-colonial sites falling within Alternative 1 would require some excavation as a mitigation measure.

Table 2: Assessment of archaeological impacts for PV4 Alternative 1.

	Before mitigation	After mitigation
Magnitude	Medium	Low
Extent	Site specific	Site specific
Duration	Long term	Long term
Significance	Medium	Low
Probability	Probable	Probable
Status	Negative	Negative
Reversible	No	
Cumulative impacts	Considering the scale of archaeological research in other parts of South Africa, relatively little is known of Bushmanland with no excavated sites known from close to Copperton. It is considered that the loss of any significant LSA sites will impact on our knowledge of the wider region. With many energy generation facilities planned in the region, the potential to lose many sites exists.	

Table 3: Assessment of archaeological impacts for PV4 Alternative 2.

	Before mitigation	After mitigation
Magnitude	Low	-
Extent	Site specific	-
Duration	Long term	-
Significance	Low	-
Probability	Probable	-
Status	Negative	-
Reversible	No	
Cumulative impacts	The historical archaeological resources falling within the alternative are not yet legally protected, while no significant pre-colonial resources occur. Cumulative impacts are thus not of concern here.	

8.2. Built environment

Only three structures are present, all within the footprint of Alternative 2. No suitable mitigation measure is possible for these structures besides avoidance and this option is considered here as the mitigation. Although the buildings would not receive direct impacts through this course of action, a significance rating is still applied and represents destruction of the landscape context of the structures. Alternative 2 would result in the loss of some of the very few historical buildings that seem to be present in the local landscape and this may represent a cumulative impact. On the basis of the structures present, if Alternative 1 proves unsuitable it is strongly recommended that a site on the eastern part of the farm be considered.

Table 3: Assessment of built environment impacts for PV4 Alternative 2.

	Before mitigation	After mitigation
Magnitude	High	Very low
Extent	Local	Site specific
Duration	Long term	Long term
Significance	High	Very low
Probability	Probable	Probable
Status	Negative	Negative
Reversible	No	
Cumulative impacts	Few historical structures appear to be present in the local landscape and the loss of any that do occur is considered significant in that they might represent quite a high proportion of similar structures in the region.	

8.3. Scenic routes and sense of place

The R357 that bisects the site is little used aside from a few local farmers and, although scenic, is not considered an important scenic route. This makes the significance of visual impacts to it very low. The landscape setting is typical of the Karoo region, however it is not unique and has been compromised by the presence of the now abandoned Prieska Copper Mine to the north and the substation to the south. Given the general topography, no mitigation is proposed for this set of impacts. Imposition of a berm alongside Alternative 1, for example, would create an impact of its own through alteration of the natural landform and, given that the facility would be dismantled and the site rehabilitated, it is considered better to avoid such artificial landforms. Similarly, planting of trees is impractical and unnatural in this landscape.

Table 4: Assessment of impacts to scenic routes and sense of place for PV4 Alternative 1.

	Before mitigation	After mitigation
Magnitude	Medium	-
Extent	Local	-
Duration	Long term	-
Significance	Medium	-
Probability	Definite	-
Status	Negative	-
Reversible	Yes (with rehabilitation)	
Cumulative impacts	A number of PV and wind energy facilities are planned for the area (with one PV already approved on the same farm) and if all are constructed then cumulative visual impacts to the landscape will be of concern and will detract from peoples' experience of the place.	

Table 5: Assessment of impacts to scenic routes and sense of place for PV4 Alternative 2.

	Before mitigation	After mitigation
Magnitude	Low	-
Extent	Local	-
Duration	Long term	-
Significance	Low	-
Probability	Definite	-
Status	Negative	-
Reversible	Yes (with rehabilitation)	
Cumulative impacts	A number of PV and wind energy facilities are planned for the area (with one PV already approved on the same farm) and if all are constructed then cumulative visual impacts to the landscape will be of concern and will detract from peoples' experience of the place.	

9. CONCLUSIONS & RECOMMENDATIONS

The impacts to heritage resources for Alternative 1 are not considered to be highly significant and archaeological sites can very easily be mitigated. This mitigation would consist of excavation and sampling of sites.

All sites on the farm deemed to require mitigation are (those within the two potential footprints are underlined – the rest will not be affected):

- KGP2011/002;
- KGP2011/003;
- KGP2011/010;
- KGP2011/011;
- KGP2011/014;
- KGP2011/019;
- KGP2011/020;
- KGP2011/021;
- KGP2011/025;
- KGP2011/034;
- KGP2011/036;
- KGP2011/041;
- KGP2011/043;
- KGP2011/045;
- KGP2011/048;
- KGP2011/049;
- KGP2011/053;
- KGP2011/063;
- KGP2011/064; and
- KGP2011/065.

Although only one site in the far north of Alternative 1 was deemed mitigation worthy (KGP2011/034), it is recommended that the proposed development completely avoid the low plateau that occurs there, since a very high density background scatter was found in this area. It serves as a good example of the range of ESA and MSA artefacts present on the overall landscape. Several mitigation-worthy LSA scatters lie within the southern edge of Alternative 1 and will require excavation before the start of construction. This could be effected with a few days work on site. These are KGP2011/002, KGP2011/003, KGP2011/025, KGP2011/065. Alternative 2 affects no pre-colonial sites but has some built structures in the middle of it. Due to the very tangible nature of this heritage, it is strongly recommended that these structures be avoided and, furthermore, that if Alternative 1 is not selected a new alternative to the east of Alternative 2 be considered for assessment. However, should destruction of these structures eventually be required then a detailed survey and recording of the entire complex needs to be undertaken. This may require some excavation, particularly if the development only gets constructed during or after 2014, by which time the archaeological resources would become protected. A destruction permit would then be required for the structures. The complex of LSA sites on the hill to the south of Alternative 2 should be entirely off limits during construction.

The addition of new power lines to the area will not have a significant impact on the general character of the area due to the electrical and mining infrastructure already in place.

It is recommended that the proposed project be allowed to proceed, but subject to the following:

- Alternative 1 is favoured over Alternative 2;
- The structures on Alternative 2 should be avoided or, if required, the footprint should be relocated to the east;
- The suggested archaeological mitigation should be implemented as necessary. Any sites to be impacted by the final chosen layout will need to be excavated prior to construction; and
- If any human remains are uncovered during development then work in the immediate vicinity should be halted and the finds protected and reported to SAHRA (021 462 4502).

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11. INVESTIGATION TEAM

- Fieldwork: J. Orton (Principal Investigator)
R. Lyall (Student assistant)
- Report: J. Orton

APPENDIX 1: LIST OF ARCHAEOLOGICAL OCCURRENCES

Note that in this table the columns are interpreted as follows:

Field No.: number allocated by the GPS in the field for each occurrence (numbers with '∞' alongside them denote occurrences illustrated and/or described in the text);

Site No.: number allocated afterwards for those occurrences deemed suitable to be called archaeological sites (they have spatial integrity and are not 'background scatter');

Description: short description of the occurrence; and

Significance, grade & mitigation requirements: how important the occurrence is in archaeological terms, the assigned heritage conservation grading (where applicable) and the estimated time requirement for appropriate mitigation (where applicable and excluding any new sites discovered through test excavations).

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
001 [∞]		S30 00 56.2 E22 19 11.3	Low density background scatter	Very low
002	KGP2011/001	S30 00 53.2 E22 19 00.9	Dense background scatter among cobbles and gravel.	Low
003		S30 00 54.0 E22 18 57.9	Dense background scatter among cobbles and gravel.	Low
004 [∞]		S30 00 53.2 E22 18 54.9	Dense background scatter among cobbles and gravel but including a scatter of MSA material in one stone type. Some LSA around too. One ESA hand-axe. Materials include quartzite, CCS, silcrete, quartz and others.	Low-medium
005 [∞]		S30 01 12.6 E22 18 39.7	Moderate density background scatter in gravel area.	Low
006		S30 01 15.3 E22 18 49.8	Low density background scatter in gravel area.	Very low
007		S30 01 14.1 E22 18 53.5	Low density background scatter in gravel area.	Very low
008		S30 01 08.9 E22 19 32.5	Low density background scatter in gravel area.	Very low
009		S30 01 22.2 E22 19 26.0	Low density background scatter in gravel area.	Very low
010 [∞]		S30 01 30.7 E22 19 16.4	Low density background scatter in gravel area.	Very low
011		S30 01 27.8 E22 19 08.2	Low density background scatter in gravel area.	Very low
012	KGP2011/002	S30 01 42.0 E22 18 55.5	Discrete LSA quartz scatter with some quartzite and some ostrich eggshell. Approximately 9 m diameter. Quartz and ostrich eggshell both fresh.	Low-medium (0.5 day)
013		S30 01 38.4 E22 19 07.2	Low density background scatter in gravel area.	Very low
014	KGP2011/003	S30 01 39.1	LSA quartz, quartzite and CCS	Medium (1 day)

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
		E22 19 12.2	scatter with lots of ostrich eggshell. One upper grindstone.	
015		S30 01 39.3 E22 19 12.5	More of the same but higher density quartzite. Ostrich eggshell continues. One bone fragment.	
016		S30 01 38.6 E22 19 12.7	More of the same.	
017	KGP2011/004	S30 01 31.9 E22 19 21.5	Scatter of ostrich eggshell. LSA. Some quartzite but this may be background scatter.	Very low
018		S30 01 32.0 E22 19 21.9	More of the same.	
019 [∞]		S30 02 38.5 E22 19 54.8	Low density background scatter in gravel area including a hand-axe.	Very low
020		S30 01 59.7 E22 20 05.0	Low density background scatter in gravel area.	Very low
021 [∞]		S30 02 58.0 E22 19 56.6	Low density background scatter in gravel area including a hand-axe.	Very low
022	KGP2011/005	S30 03 11.3 E22 19 17.4	Scatter of ostrich eggshell and one possible backed quartz flake. LSA.	Low
023 [∞]	KGP2011/006	S30 03 04.0 E22 18 31.9	Small rectangular ruined structure and a possible stone pillar. Some 20 th century glass including one small bottle base with "Pretoria 3 oz" embossed on it.	Low
024 [∞]	KGP2011/007	S30 03 06.3 E22 18 29.1	Stone-packed and white-washed dam, various small reservoirs, etc. Windmill here. Also some brown and green glass but quite recent.	Low
025 [∞]	KGP2011/008	S30 03 23.5 E22 18 35.6	NE end of old dam wall.	Very low
026 [∞]		S30 03 31.3 E22 18 34.6	Other end.	
027	KGP2011/009	S30 03 34.5 E22 18 35.8	Ephemeral LSA quartz scatter on sand.	
028 [∞]	KGP2011/010	S30 03 35.2 E22 18 34.6	Dense LSA quartz, quartzite and CCS scatter on sand. One CCS scraper. Bone fragments, one mandible.	Medium (1 day)
029 [∞]		S30 03 36.0 E22 18 32.8	Glass fragments, clear (? Solarised)	Very low
030 [∞]	KGP2011/011	S30 03 35.9 E22 18 32.2	LSA quartz and CCS scatter in sandy area. One CCS scraper.	Medium (1 day)
031 [∞]		S30 03 36.5 E22 18 32.1	As above but high density of CCS here.	
032 [∞]	KGP2011/012	S30 03 39.8 E22 18 28.6	LSA quartz, quartzite, hornfels and CCS scatter on top of hill among gravel. Also some pink glass in this area.	Low
033 [∞]	KGP2011/013	S30 03 38.0	Ephemeral LSA scatter of quartz,	Low

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
		E22 18 35.3	CCS, pink glass and a square iron nut.	
034 [∞]		S30 03 37.4 E22 18 36.0	Low density scatter of glass and ceramics in this general wider area.	Very low
035 [∞]	KGP2011/014	S30 03 38.3 E22 18 35.7	Small stone circle. Nearby are LSA quartz and CCS artefacts, OES, burnt bone fragments, glass and ceramics including a stopper.	Low-medium (0.5 day)
036 [∞]	KGP2011/015	S30 03 39.5 E22 18 36.6	LSA quartz, quartzite and CCS scatter and small metal fragment of an old harmonica.	Low
037	KGP2011/016	S30 03 38.1 E22 18 37.1	Small quartz scatter in open area.	Low
038	KGP2011/017	S30 02 49.7 E22 18 51.5	Rocky area with much quartz and a few flaked pieces. Probable source of local quartz.	Very low
039 [∞]	KGP2011/018	S30 03 01.5 E22 18 31.0	Stone walling, stone foundation, brick walling (collapsed), stone pile, two brick 'towers', ?fridge structure.	Low
040 [∞]	KGP2011/019	S30 02 59.7 E22 18 31.2	Square stone hut. Roof has corrugated iron with stones and cement on top (version of brak dak). Ceramics and glass around about.	Medium
041 [∞]	KGP2011/020	S30 03 00.2 E22 18 30.0	Stone alignment, two stone piles, stone shed with garage door (with corrugated iron on wooden frame doors), small door and window (with working shutter), small corner shelf. Also a small yard wall / foundation and fence on north side. Main structure is 7.5 m by 4.5 m. Historical artefacts around the area.	Medium
042 [∞]	KGP2011/021	S30 02 54.4 E22 18 25.0	Stone kraal complex. Main enclosure 11 x 16 m and smaller one 4 x 7 m. Ceramics and metal lying about including a rifle cartridge with "K36" and "VII" on the end.	Medium
043 [∞]	KGP2011/022	S30 02 56.5 E22 18 26.3	Small rectangular ruined structure with door to the east. 3.5 x 2.5 m. Plain white ceramics, pink glass, metal and a tin outside.	Low
044	KGP2011/023	S30 02 52.6 E22 18 18.1	Short stone alignment.	Low
045		S30 02 32.2 E22 18 32.4	Low density background scatter in gravel area.	Very low
R001		S30 00 54.0 E22 19 19.1	Low density background scatter in gravel area.	Very low

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
R002		S30 00 52.8 E22 19 24.4	Low density background scatter in gravel area.	Very low
R004		S30 00 51.9 E22 19 24.3	Low density background scatter in gravel area.	Very low
R006		S30 00 51.9 E22 19 23.8	Low density background scatter in gravel area.	Very low
R007		S30 00 51.0 E22 19 23.9	Low density background scatter in gravel area.	Very low
R008		S30 01 06.5 E22 19 26.9	Low density background scatter in gravel area including a hand-axe.	Very low
R010		S30 01 07.6 E22 19 29.5	Low density background scatter in gravel area.	Very low
R013		S30 01 08.3 E22 19 33.5	Low density background scatter in gravel area.	Very low
R015		S30 01 07.6 E22 19 33.8	Low density background scatter in gravel area.	Very low
R016		S30 01 07.1 E22 19 33.9	Low density background scatter in gravel area.	Very low
R017		S30 01 29.1 E22 19 27.4	Low density background scatter in gravel area.	Very low
R018		S30 01 31.6 E22 19 28.8	Low density background scatter in gravel area.	Very low
R019		S30 01 34.0 E22 19 22.3	Low density background scatter in gravel area.	Very low
R022		S30 01 32.9 E22 19 17.4	Low density background scatter in gravel area.	Very low
R026		S30 01 30.1 E22 19 17.2	Low density background scatter in gravel area.	Very low
R027		S30 02 56.4 E22 19 51.2	Low density background scatter in gravel area.	Very low
R028		S30 03 32.3 E22 18 42.8	Low density background scatter in gravel area.	Very low
R029		S30 03 33.7 E22 18 41.8	Low density background scatter in gravel area.	Very low
R032 [∞]		S30 03 36.3 E22 18 37.0	Background scatter in sandy area with some glass and ceramics.	Very low
145 [∞]		S30 01 45.6 E22 19 10.7	Background scatter in gravel area and including one hand-axe.	Very low
146	KGP2011/024	S30 01 34.7 E22 19 14.6	Ephemeral LSA quartz and CCS scatter.	Very low
147	KGP2011/025	S30 01 35.3 E22 19 11.5	Low density LSA quartz, CCS, quartzite scatter of 20 m diameter.	Low (0.5 day)
148	KGP2011/026	S30 01 39.7 E22 18 37.6	Ephemeral LSA quartz, CCS, quartzite and ostrich eggshell scatter of 20 m diameter alongside ephemeral pan.	
149 [∞]		S30 01 36.1 E22 18 38.2	Background scatter in gravel area and including one hand-axe.	Very low
150 [∞]	KGP2011/027	S30 01 37.3 E22 18 36.7	Ephemeral LSA scatter of Quartzite, CCS and ostrich eggshell. Includes a distal tip of a	Very low

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
			hand-axe which is all that is left after using the hand-axe as a core.	
151	KGP2011/028	S30 01 41.2 E22 18 33.6	Ephemeral LSA scatter of quartzite, quartz and ostrich eggshell.	Very low
152 [∞]	KGP2011/029	S30 01 40.4 E22 18 36.0	Small, discrete LSA quartz scatter of 3 m diameter.	Very low
153 [∞]		S30 01 44.6 E22 18 48.0	Flaked bedrock exposure, quartzite.	Very low
154 [∞]	KGP2011/030	S30 01 44.4 E22 18 49.4	Ephemeral scatter of ostrich eggshell. LSA.	Very low
155	KGP2011/031	S30 01 45.2 E22 18 52.4	Ephemeral LSA scatter of quartz, quartzite and CCS.	Very low
156	KGP2011/032	S30 01 46.5 E22 18 56.3	Ephemeral LSA scatter of quartzite, quartz and ostrich eggshell.	Very low
157 [∞]		S30 01 47.0 E22 19 01.5	Background scatter in gravel area and including one hand-axe.	Very low
158		S30 00 47.4 E22 19 17.8	Dense background scatter in vicinity of ephemeral pan and including some LSA.	Very low
159 [∞]		S30 00 53.6 E22 18 50.4	Dense background scatter plus two ostrich eggshell fragments. Some large blades here.	Very low
160 [∞]	KGP2011/033	S30 00 54.5 E22 18 47.4	LSA scatter of quartz, quartzite and CCS in ephemeral pan area.	Low
161 [∞]		S30 00 55.0 E22 18 42.0	Extensive background scatter in gravel area with much quartzite.	Very low
162 [∞]	KGP2011/034	S30 00 53.7 E22 18 42.0	Scatter of LSA quartz, quartzite, CCS and ostrich eggshell in ephemeral pan area. Also includes a crystal quartz backed triangle.	Low (0.5 day)
163 [∞]		S30 00 50.2 E22 18 44.1	Background scatter in gravel area and including one hand-axe.	Very low
164		S30 00 50.6 E22 18 53.1	Background scatter in gravel area with much quartzite.	Very low
165		S30 00 35.6 E22 18 46.3	Background scatter in gravel area with much quartzite.	Very low
166		S30 03 25.0 E22 18 27.8	Background scatter in sandy / ephemeral pan area.	Very low
167	KGP2011/035	S30 03 42.8 E22 18 30.3	Ephemeral LSA quartz scatter.	Very low
168	KGP2011/036	S30 03 46.4 E22 18 27.6	LSA scatter of quartz, CCS, quartzite and ostrich eggshell in sandy area. One CCS thumbnail scraper.	Low (0.5 day)
169	KGP2011/037	S30 03 46.5 E22 18 26.4	LSA scatter of CCS, quartz and quartzite in sandy area.	Low
170 [∞]	KGP2011/038	S30 03 46.0 E22 18 25.0	LSA scatter of CCS, quartz, quartzite and ostrich eggshell in	Low

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
			sandy area.	
171	KGP2011/039	S30 03 44.7 E22 18 20.8	Ephemeral scatter of LSA quartz and CCS.	Very low
172	KGP2011/040	S30 03 48.0 E22 18 20.3	Ephemeral CCS, quartz, quartzite, hornfels and bone scatter in sandy area.	Low
173	KGP2011/041	S30 03 49.1 E22 18 20.1	Large LSA scatter of quartz, quartzite, CCS and hornfels with bone and ostrich eggshell. Large number of stone artefacts.	Medium-high (3 days)
174	KGP2011/042	S30 03 49.1 E22 18 19.0	Scatter of ostrich eggshell with few artefacts. LSA.	Very low
175	KGP2011/043	S30 03 49.6 E22 18 18.2	LSA scatter of quartz, quartzite and hornfels on crest of hill. Also ostrich eggshell and a possible glass flake.	Low-medium (0.5 day)
176		S30 03 49.6 E22 18 16.9	Odd stone mound here. Looks like a fractured bedrock outcrop but other rocks have been pushed into the gaps.	
177	KGP2011/044	S30 03 47.1 E22 18 18.5	Extensive, low density scatter of LSA quartz, quartzite, CCS and hornfels.	Low
178	KGP2011/045	S30 03 49.5 E22 18 22.5	LSA quartz and ostrich eggshell scatter on river bank.	Low-medium (0.5 day)
179	KGP2011/046	S30 03 51.0 E22 18 30.1	Shale quarry no doubt used in the building of the nearby structures.	Low
180		S30 04 03.1 E22 18 29.4	Very low density LSA is widespread around this area.	Very low
181	KGP2011/047	S30 03 24.9 E22 17 43.3	Ephemeral LSA scatter of quartz, quartzite and CCS.	Very low
182	KGP2011/048	S30 04 04.1 E22 18 29.9	Very high density and extensive LSA scatter of quartz, quartzite, CCS and ostrich eggshell. Also bone frags. Ostrich eggshell flask mouth and some decorated fragments on one patch, more decorated fragments on another patch. Points around the edges but bored stone fragment at 183.	High (4 days)
183		S30 04 04.1 E22 18 29.2		
184		S30 04 03.8 E22 18 29.4		
185		S30 04 04.4 E22 18 29.3		
186	KGP2011/049	S30 04 04.8 E22 18 29.4	Another small patch with quartz, quartzite, CCS and ostrich eggshell.	Medium (0.5 day)
187 [∞]	KGP2011/050	S30 04 04.1 E22 18 28.4	LSA quartz scatter with a lower grindstone / hammer stone. Also ostrich eggshell.	Low
188	KGP2011/051	S30 04 03.3 E22 18 28.3	LSA quartz and quartzite scatter.	Very low
189	KGP2011/052	S30 04 07.2 E22 18 28.1	Shale quarry no doubt used in the building of the nearby structures.	Low
190 [∞]	KGP2011/053	S30 03 59.2 E22 18 30.9	LSA scatter of quartz, quartzite and CCS. Quartzite unifacial	Medium (1 day)

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
			artefact.	
191 [∞]		S30 03 58.4 E22 18 30.7	Lots of quartz here, some ostrich eggshell and a CCS thumbnail scraper.	
192 [∞]		S30 03 58.5 E22 18 30.2	Quartz scatter and an igneous upper grindstone.	
193	KGP2011/054	S30 03 57.9 E22 18 29.9	Small scatter of LSA quartz, CCS and quartzite.	Low
194	KGP2011/055	S30 03 57.0 E22 18 30.0	Ephemeral quartz and quartzite scatter.	Very low
195	KGP2011/056	S30 03 55.3 E22 18 28.1	LSA scatter of quartz and CCS with some bone.	Low
196	KGP2011/057	S30 03 55.2 E22 18 27.4	LSA scatter of quartz, CCS, quartzite and ostrich eggshell.	Low
197	KGP2011/058	S30 03 55.0 E22 18 26.4	Ephemeral quartz and CCS scatter.	Very low
198	KGP2011/059	S30 03 54.8 E22 18 24.9	Ephemeral quartz and CCS scatter.	Very low
199	KGP2011/060	S30 03 57.3 E22 18 28.0	Ephemeral quartz, quartzite and hornfels scatter.	Very low
200	KGP2011/061	S30 03 59.2 E22 18 27.6	Ephemeral quartz, quartzite and CCS scatter.	Very low
201	KGP2011/062	S30 04 00.3 E22 18 29.3	Ephemeral quartz and quartzite scatter.	Very low
202	KGP2011/063	S30 04 00.1 E22 18 30.6	LSA scatter of quartz, quartzite, CCS and ostrich eggshell. One CCS thumbnail scraper.	Low-medium (0.5 day)
203	KGP2011/064	S30 03 59.8 E22 18 30.9	Dense LSA scatter of quartz, CCS, quartzite and ostrich eggshell.	Medium (1 day)
R068		S30 01 37.8 E22 18 59.3	Background scatter in gravel area.	Very low
R075		S30 01 47.2 E22 18 49.7	Background scatter in gravel area.	Very low
R078		S30 01 42.1 E22 18 48.0	Background scatter in gravel area.	Very low
R071 [∞]	KGP2011/065	S30 01 43.9 E22 18 54.0	LSA quartzite, quartz and ostrich eggshell scatter. All same pale grey quartzite and there is lots of ostrich eggshell. Also a CCS hammer stone. Site about 10 m diameter	Low-medium (0.5 day)
R073 [∞]		S30 01 44.2 E22 18 53.7		
R079 [∞]		S30 01 44.3 E22 18 54.0		
R080		S30 00 52.0 E22 18 53.6	Background scatter in gravel area.	Very low
R081		S30 00 52.3 E22 18 55.5	Background scatter in gravel area. One hand-axe included.	Very low
R082 [∞]	KGP2011/066	S30 00 53.3 E22 18 55.1	Small, discrete scatter of green CCS in a 1 m diameter area. LSA.	Low
R083		S30 03 51.5 E22 18 25.9	Low density LSA scatter.	Low
R084		S30 03 48.0 E22 18 19.6	Low density LSA scatter.	Low

Field No.	Site No.	Co-ordinate location	Description	Significance, grade & mitigation requirements
R085		S30 03 47.4 E22 18 20.1	Low density LSA scatter.	Low
R086	KGP2011/067	S30 03 58.1 E22 18 31.1	Ostrich eggshell scatter with some quartz.	Low