HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES ON THE REMAINDER OF FARM KLIPGATS PAN 117, COPPERTON, NORTHERN CAPE

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

Prepared for

Aurecon South Africa (Pty) Ltd
Aurecon Centre, 1 Century City Drive, Waterford Precinct, Century City
Phone: 021 526 6022; Email: franci.gresse@aurecongroup.com

1st draft: 21st May 2013
Final report: 15th July 2013

Prepared by

Jayson Orton & Lita Webley

ACO Associates cc
8 Jacob's Ladder
St James
7945

Phone (021) 706 4104
Fax (086) 603 7195
Email: Jayson.Orton@aco-associates.com

EXECUTIVE SUMMARY

ACO Associates cc was appointed by Aurecon South Africa (Pty) Ltd) to assess the potential impacts to heritage resources that might be experienced through construction and operation of several solar energy facilities on the remainder of farm Klipgats Pan 117, near Copperton, Northern Cape. Alternative 1 would involve development of six solar energy facilities and related infrastructure, while Alternative 2 would see construction of three far larger facilities.

The site is generally flat, but with minor undulations in the topography. A low but prominent hill occurs in the far south. The vegetation is generally grassland with small shrubs. A few pans occur in the area, while more ephemeral pans were noted in a number of locations, particularly in the north.

Archaeological resources were found to be widespread across the site but the majority are of low value. A few sites, located predominantly around the pans and on the hill in the south, were of higher value and would require mitigation if they cannot be protected. One area, the northern part of Alternative 1 PV2, has extensive archaeological resources and is best avoided. No built environment will be impacted and no graves were found. The local landscape would be strongly impacted but due to the remoteness of the site and very few visitors to the area this impact would be of limited significance.

The proposed project could be allowed to proceed with either Alternative, although Alternative 1, omitting the northern part of PV2, is preferred. The following recommendations apply:

- Where archaeological sites cannot be avoided, mitigation in the form of excavation and collection of artefacts should be carried out;
- Test excavations should be conducted in areas close to pans to check for subsurface deposits;
- If Alternative 2 is selected then further survey will need to cover areas not already surveyed;
- If any human remains are encountered during the development, the area should be cordoned off and protected from further harm until the remains can be inspected and removed by an archaeologist under a permit issued for that purpose; and
- Once the exact alignments of the linear components of the project have been decided on they should be examined and possibly subjected to a walk-down survey.

Contents

1. INTRODUCTION 4
1.1. Terms of reference 5
2. HERITAGE LEGISLATION 6
3. METHODS 6
3.1. Literature survey 6
3.2. Field survey 6
3.3. Impact assessment 7
3.4. Limitations & assumptions 7
4. DESCRIPTION OF THE AFFECTED ENVIRONMENT 7
5. HERITAGE CONTEXT 8
6. FINDINGS 10
6.1. Archaeology 10
6.2. Built environment 12
6.3. Cultural landscapes 13
6.4. Scenic routes and sense of place 13
7. ASSESSMENT OF IMPACTS 13
8. CONCLUSIONS 17
9. RECOMMENDATIONS 17
10. REFERENCES 17
APPENDIX 1: Mapping 21
APPENDIX 2: List of heritage findings 25

1. INTRODUCTION

ACO Associates cc was appointed by Aurecon South Africa (Pty) Ltd (Aurecon)(to assess the potential impacts to heritage resources that might be experienced through construction and operation of several solar energy facilities on the remainder of farm Klipgats Pan 117, near Copperton, Northern Cape (Figure 1).

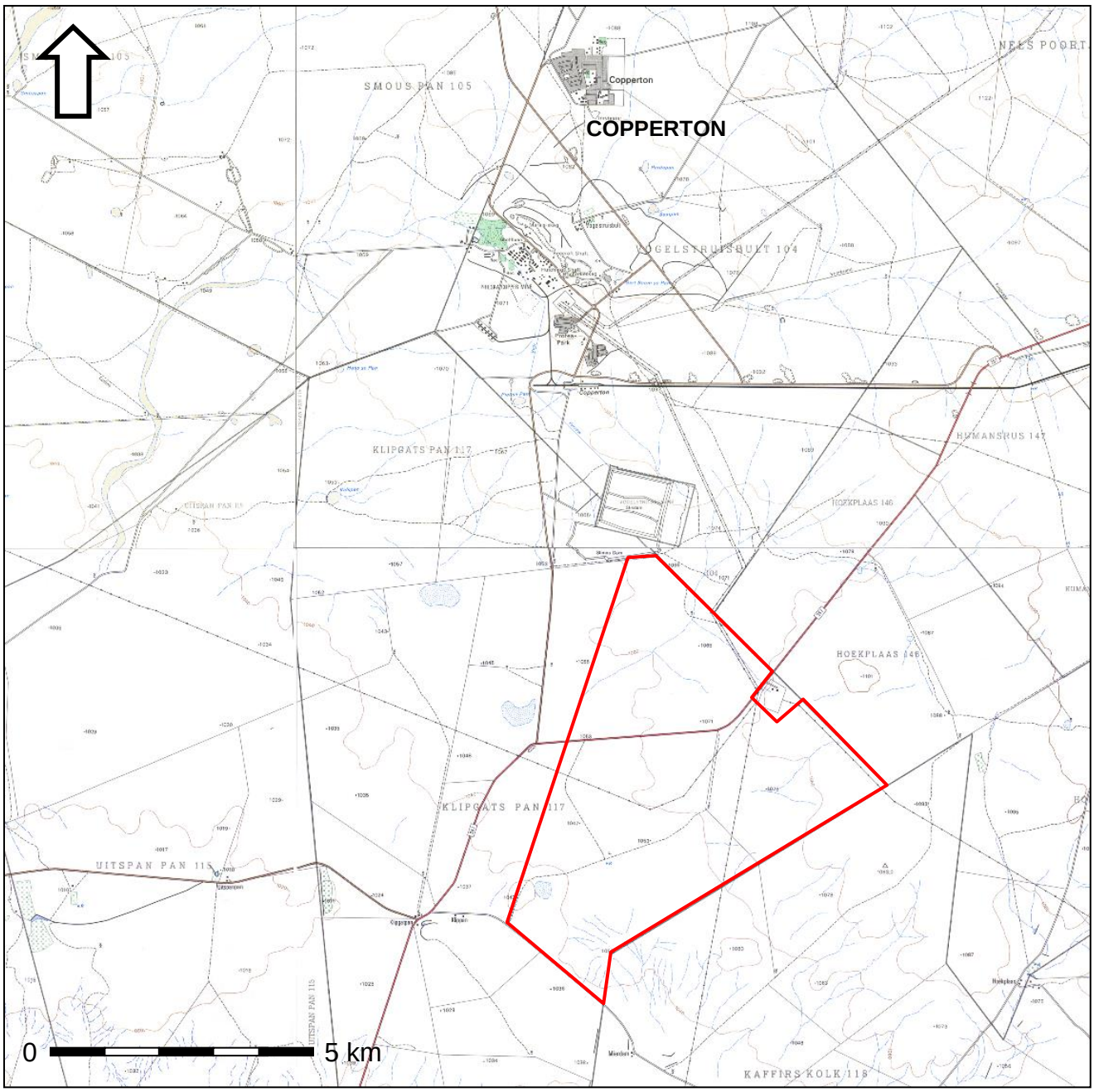


Figure 1: Map showing the location of the Klipgats Pan study area (red polygon) relative to Copperton.

Each of the proposed photovoltaic (PV) facilities[1] would consist of the following:

[1] Separate applications for each of the six proposed PV facilities have been submitted to the Department of Environmental Affairs for authorisation.

- Numerous arrays of PV panels and associated support infrastructure to generate up to 75 MW alternative current (AC) per facility through the photovoltaic effect;
- 132kV overhead transmission lines to connect each facility to the central onsite substation or an existing Eskom substation;
- An onsite 132kV, three bay substation per facility and one central multi-bay substation; and
- A boundary fence for health, safety and security reasons (Aurecon 2013).

Furthermore, the project as a whole would require the following components which, it is envisaged, could be shared by all six facilities (Alternative 1):

- One central 132kV substation and connection to Eskom grid. This central substation will connect the PV facilities with Eskom's Kronos or Cuprum substations via a new 132kV transmission line;
- An access road and internal access roads for servicing and maintenance of the site;
- Stormwater infrastructure including drainage channels, berms, detention areas and kinetic energy dissipaters; and
- Buildings that would likely include onsite substations, a connection building, control building, guard cabin, an electrical fence and solar resource measuring substation (Aurecon 2013).

A single 75 MW facility (PV1; see Orton 2011) has already been approved for the farm and the present study considers a further six such facilities with a total area of 1095 ha. These are known as PV2 to PV7. Several alternatives are being considered for the project as follows:

- Layout: At present legislation only permits development of 75 MW solar energy facilities but should this change then alternative layouts would see three facilities with capacities of up to 300 MW being considered across the entire farm (this is Alternative 2);
- Technology: different types of solar panels and mounting alternatives are being considered, but, since these do not variably affect the impacts to heritage resources, they are not described further;
- Transmission lines and substations: two corridors have been identified for assessment; and
- The No-Go alternative assesses the status quo of the property (including the already authorised PV1; Aurecon 2013).

1.1. Terms of reference

The following terms of reference is modified from the Draft Scoping Report for the project (Aurecon 2013):

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.

Note that palaeontological impacts will be assessed by an independent specialist.

2. 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, Heritage Northern Cape (for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the Department of Environmental Affairs (DEA).

3. METHODS

3.1. Literature survey

For the original report (Orton 2011), a survey of available literature was carried out to assess the general heritage context into which the development was to be set. This literature included published material, unpublished commercial reports and online material. In the present report this same information has been used and updated as necessary.

3.2. Field survey

The site was examined through a combination of driving and walking. Through driving across the site we were able to identify landscape features where heritage remains were more likely to be present. These included high ground, areas around pans and areas along water courses. Walking was then employed to examine specific locations considered to be of heritage interest and also to conduct random examination of other areas. The survey was carried out on 3rd May 2013. During the survey the positions of finds were recorded on a hand-held GPS receiver set to the WGS84 datum. Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape settings of the proposed developments.

3.3. Impact assessment

For consistency among specialists, the impact assessment ratings were done using a scale supplied by Aurecon. Each individual solar energy facility is given an assessment, while a cumulative assessment for all facilities proposed on the farm is also included.

It is also relevant to note that the mitigation requirements from the original 2011 report have been revised in view of the fact that far larger areas of the landscape will be developed with the current proposal.

3.4. Limitations & assumptions

Due to the large size of the study area and, in places, dense vegetation, it was not possible to cover all the ground via a detailed foot survey. However, given the nature of the site and the heritage resources located thereon, it is believed that the survey has captured a sufficient sample of all heritage resources to enable accurate prediction of impacts. Heritage resources (in particular archaeological ones) were found to be tied to landscape features that are easily located by vehicle. Assuming this pattern to hold true, this suggests that relatively few such resources will have been missed during the survey.

4. 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 5). 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.

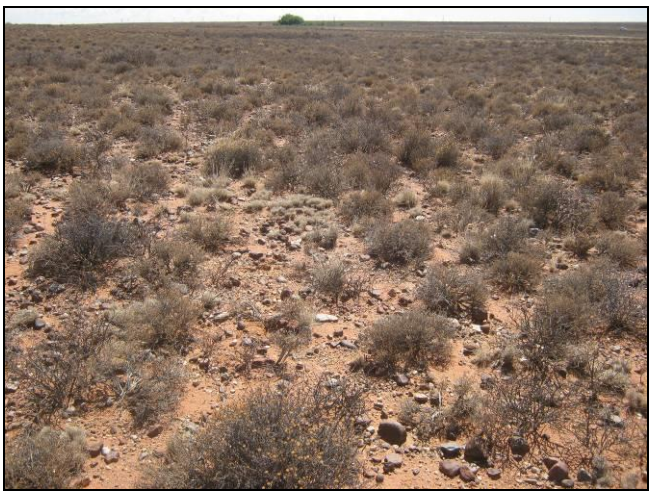


Figure 3: View across part of the Klipgats Pan study area showing vegetation in a gravel area.

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.

5. 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. According to Beaumont *et al* (1995) 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 include 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 identified through 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 and found to have greater densities of archaeological material surrounding them (Kaplan & Wiltshire 2011).

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 contain 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 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/on 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 descendants of indigenous groups 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. Since it is 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).

6. FINDINGS

The initial survey presented a set of findings from the farm and, while those findings are also directly relevant here, this section illustrates further examples. All finds from both surveys are tabulated together in Appendix 1.

6.1. Archaeology

Archaeological resources were found to be widespread across the study area, although certain landscape features obviously attracted settlement with the result that these areas had higher densities of finds. These latter areas include the margins of pans and hills with much gravel that presumably was used as a stone material source for manufacturing artefacts.

The Stone Age material dates to all three ages, ESA, MSA and LSA with the first two being represented more by the so-called “background scatter” of artefacts commonly found in the gravel areas of the Karoo and Bushmanland region. Although larger artefacts, in general, are

not readily assigned to one or other Age, some are highly weathered signifying great age while others are diagnostic. Relevant here are a number of hand-axes that were found across the study area, but usually associated with gravel areas. Figures 6 and 7 show two of these artefacts from the 2013 survey. Most were quite small, often around 12 cm in length. The smaller hand-axes are generally acknowledged to come from a period of the ESA referred to as Fauresmith (Goodwin 1926; Goodwin & Van Riet Lowe 1929; Van Riet Lowe 1927). Fauresmith artefacts from Kathu Pan to the north of the Orange River have recently been dated to about 500 000 years old (Porat *et al.* 2010). Much of the remaining background scatter is likely to be MSA in origin, with occasionally distinctive MSA artefacts noticeable (Figures 9 & 10). No proper MSA sites were recorded. It is quite possible that MSA material would be present beneath the surface close to pans though.

Figure 6: Hand-axe from Klipgats Pan. Scale in cm.

Figure 7: Hand-axe from Klipgats Pan. Scale in cm.

Figure 8: Hand-axe from Klipgats Pan. Scale in cm.

Figure 9: Artefacts from point J138. Note MSA blades. Scale in cm.

Figure 10: Ventral and dorsal surfaces of MSA blade. Scale in cm.

It was noticeable that LSA artefacts were often found in clusters suggestive of actual occupation sites. These artefacts are recognisable by their small size, their relatively unweathered surface appearance and the inclusion of quartz in the assemblages (Figures 7 & 8). Most LSA scatters were found to be on the hill in the south and around pans, either proper pans or the ephemeral ones that occur on flat ground from time to time. Details of these were included in the original report (Orton 2011). Few LSA traces were located during the present survey, since the obvious landscape features were all searched in 2011.

Aside from the historical farm complex reported on in the earlier survey (Orton 2011), historical material was extremely rare. One notable find was an isolated Westley Richards rifle cartridge that must have been dropped during the last few decades of the 19th century.

Figures 11 & 12: Isolated cartridge of a Westley Richards No 1 Carbine rifle, probably dating from around 1870.

6.2. Built environment

The original survey described the historical ruin complex. This was located in the centre of the farm and has been excluded from the development area. It is not expected to be impacted at all. No other structures occur on the land assessed and farm buildings in the general surroundings are few and far between.

6.3. Cultural landscapes

Aside from fences and farm roads, the site is in almost natural condition with very little sign of human intervention. The main cultural landscape element is the historic farm werf, waterhole and associated trees. However, this is of only very minor local significance.

6.4. Scenic routes and sense of place

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 proposed PV2 and PV3 being to the north of it and the other proposed facilities all being to the south. However, it should be borne in mind that very few people use the road making any visual impacts to it of reduced concern. The general landscape is very typical of the area and retains a strong sense of place which could easily be impacted through construction of industrial facilities in the area.

7. ASSESSMENT OF IMPACTS

Archaeological resources were found to be widespread but clearly focused in certain areas. The majority of resources of value lie on the hill in the south and around the various pans on the farm, all of which are protected from development. Because the most important landscape features were searched during the initial assessment, most of the important archaeological sites have been protected from harm through the design of the proposed facilities. However, the new survey has revealed several further mitigation-worthy occurrences in the northern part of the site.

A primary concern here is the northern-most part of the site proposed for inclusion within PV2 (Figure 13). There is a low calcrete ridge running northeast to southwest across this area and on it are a large number of archaeological occurrences. While each individual occurrence is of generally low significance, the fact that such a high density of archaeological remains is present suggests that this area is best avoided. It contains a good representative sample of all the types of archaeological heritage in the area. However, having said that, the low significance of the individual finds does mean that mitigation is an acceptable alternative to avoidance but in this area such work would be time consuming. Despite the few sites where mitigation has been suggested in Appendix 2, it is maintained that sampling of the background scatter should occur at several places should this area be developed. In total, perhaps, about 5 days should be spent working in this area alone.

It is also suggested that once the linear alignments have been decided upon, a pre-construction survey should be conducted to check transmission line routes and certain other areas that were not accessed during the 2013 survey, either due to time constraints or because of dense vegetation cover. Included here would be better coverage of the northern area along the calcrete ridge if this area is to be developed, as well as examination of a few ephemeral water courses and landscape features in the PV1, PV5 and PV7 areas. (Note that PV1 is not specifically assessed here but that its finalised location is different to that assessed before. The mitigation measures described here should thus apply to this site too when the development proceeds.) Follow-up surveys will be particularly necessary should

Alternative 2 be developed since this will result in large scale destruction of heritage in areas known to have many site (e.g. the hill and pan areas).

The following mitigation requirements apply to Klipgats Pan (indexed to Table 1):

1. A follow-up survey must be undertaken to deal with linear developments and any areas still considered sensitive prior to development;
2. All sites requiring mitigation and that cannot be protected from development should be mitigated via excavation, sampling and analysis. Development of Alternative 1 will result in most mitigation occurring in the far north of the study area, while Alternative 2 would require extensive mitigation across the property; and
3. In the part of PV7 closest to the pan it is suggested that test excavations be conducted to check for subsurface archaeological heritage remains.

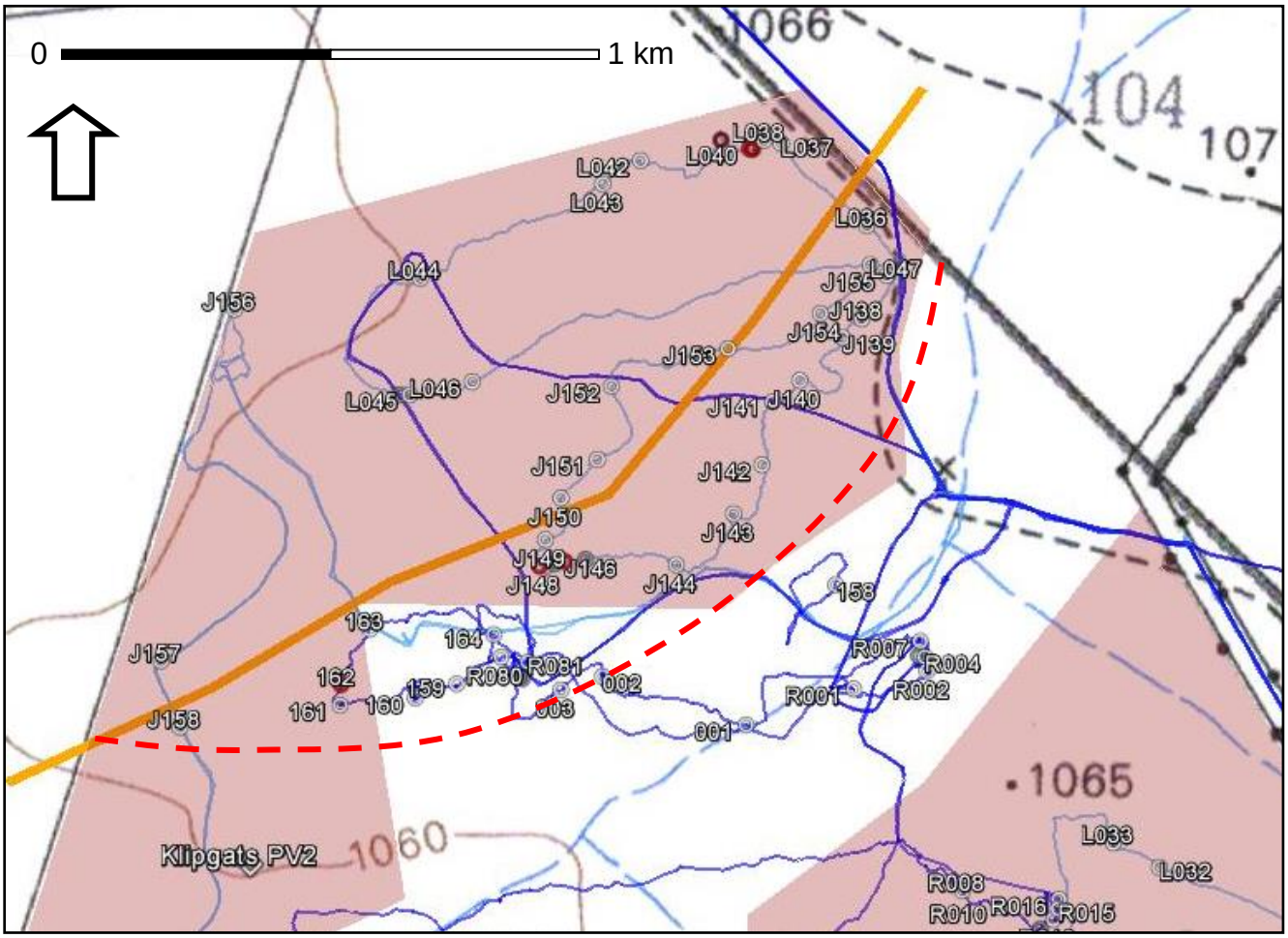


Figure 13: Map showing the northern-most part of the study area and all recorded archaeological heritage sites along the calcrete ridge (orange line). The area north of the red dashed line is best avoided during development.

Table 1: Assessment of heritage impacts for all Alternatives.

Impact on Heritage Resources:

project	Key impacts	No mitigation /Mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Mitigation measures
Alt. 1, PV2	Archaeology	No mitigation	Site specific	Medium	Long term	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	1, 2
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV3	Archaeology	No mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Long term	Very low (negative)	Definite	Sure	Irreversible	2
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV4	Archaeology	No mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV5	Archaeology	No mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Long term	Low (negative)	Definite	Sure	Irreversible	1
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV6	Archaeology	No mitigation	Site specific	Low	Long term	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low	Long term	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV7	Archaeology	No mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	1
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 2, PV2	Archaeology	No mitigation	Site specific	High	Long term	High (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low-medium	Long term	Low-medium (negative)	Definite	Sure	Irreversible	1, 2
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 2, PV3	Archaeology	No mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low	Long term	Low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	

project	Key impacts	No mitigation /Mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Mitigation measures
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 2, PV4	Archaeology	No mitigation	Site specific	High	Long term	High (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Low-medium	Long term	Low-medium (negative)	Definite	Sure	Irreversible	1, 2, 3
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
No-Go	Archaeology	No mitigation	Site specific	Very low	Long term	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Long term	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Very low	Long term	Low (neutral)	Definite	Sure	Reversible	
		Mitigation	Local	Very low	Long term	Low (neutral)	Definite	Sure	Reversible	None

Table 2: Cumulative assessment of heritage impacts for all Alternatives.

Cumulative impact on Heritage Resources:

	Key impacts	No mitigation /Mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Mitigation measures
Klipgats Pan	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1, 2, 3
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
Local extent	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1, 2, 3
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
Regional extent	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1, 2, 3
	Cultural landscape	No mitigation	Regional	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Regional	Low	Long term	Low (negative)	Definite	Sure	Reversible	

8. CONCLUSIONS

This heritage impact assessment has found that there will be impacts to heritage resources if the proposed solar energy facilities are constructed. Two major types of heritage resources will be impacted: archaeological sites and the landscape. No built environment resources will be directly impacted by the proposed developments. The most important archaeological sites are located in and around the various pans on the farm and on the hill in the far south. Many of these sites are avoided by Alternative 1, but would be impacted by Alternative 2. Although protection of archaeological sites is desirable, mitigation can be conducted for all. Alternative 2 would have generally widespread archaeological impacts, particularly around the pans and on the hill. For this reason, Alternative 1 is favoured, although it is noted that it would be desirable to avoid development of the northern part of PV2 due to the extensive archaeological material located there. It should also be noted that any buried MSA deposits at and around the pans could potentially have very high significance that can only be quantified through test excavations. Again, Alternative 2 is likely to be far more problematic in this regard. The landscape impacts will be substantial and cannot easily (if at all) be mitigated. Given the scale of solar and wind energy development planned for the region, there is little sense in attempting to shield the presently proposed developments from view.

In conclusion, Alternative 1 omitting the northern part of PV2 would be favoured, followed by Alternative 1 with all PVs. Alternative 2 is least favoured and would result in extensive destruction of archaeological heritage.

9. RECOMMENDATIONS

The proposed projects could be allowed to proceed with either Alternative, although Alternative 1, omitting the northern part of PV2, is preferred. The following recommendations apply:

- Where archaeological sites cannot be avoided, mitigation in the form of excavation and collection of artefacts should be carried out;
- Test excavations should be conducted in areas close to pans to check for subsurface deposits;
- If Alternative 2 is selected then further survey will need to cover areas not already surveyed;
- If any human remains are encountered during the development they should be cordoned off and protected from further harm until they can be inspected and removed by an archaeologist under a permit issued for that purpose; and
- Once the exact alignments of the linear components of the project have been decided on they should be examined and possibly subjected to a walk-down survey.

10. REFERENCES

Aurecon. 2013. Proposed PV2-PV7 photo-voltaic energy plant on farm Klipgatspan near Copperton, Northern Cape: Draft Scoping Report. Report No 7580/109378.

Beaumont, P.B., Smith, A.B. & Vogel, J.C. 1995. Before the Einiqua: the archaeology of the frontier zone. In: Smith, A.B. (ed.) Einiqualand: studies of the Orange River frontier: 236-264. Cape Town: University of Cape Town Press.

Beaumont, P.B. & Vogel, J.C. 1984. Spatial patterning of the ceramic Later Stone Age in the northern Cape, South Africa. In: Hall, M., Avery, G., Avery, D.M., Wilson, M.L. & Humphreys, A.J.B. (eds) Frontiers: southern African archaeology today: 80-95. Oxford: British Archaeological Reports International Series 207.

Beaumont, P.B. & Vogel, J.C. 1989. Patterns in the age and context of rock art in the northern Cape. South African Archaeological Bulletin 44: 73-81.

Goodwin, A.J.H., 1926. South African stone implement industries. South African Journal of Science 23: 784–788.

Goodwin, A.J.H., Van Reit Lowe, C., 1929. The stone age cultures of South Africa. Annals of the South African Museum 27: 1–289.

Hart, T.J.G. 1989. Haaskraal and Volstruisfontein: Later Stone Age events at two rockshelters in the Zeekoe Valley, Great Karoo, South Africa. Unpublished M.A. dissertation, University of Cape Town.

Hart, T. 2005. Heritage impact assessment of a proposed Sutherland golf estate, Sutherland, Northern Cape Province. Unpublished report prepared for DJ Environmental. Archaeology Contracts Office, University of Cape Town.

Kaplan, J. 2010. Archaeological scoping study and impact assessment of a proposed photovoltaic power generation facility in Copperton Northern Cape. Unpublished report prepared for DJ Environmental Consultants.

Kaplan, J. & Wiltshire, N. 2011. Archaeological impact assessment of a proposed wind energy facility, power line and landing strip in Copperton, Siyathemba Municipality, Northern Cape. Unpublished report prepared for Aurecon (Pty) Ltd. Rondebosch: Agency for Cultural Resource Management.

Kiberd, P. 2001. Bundu Farm: a Middle and Later Stone Age pan site, Northern Cape, South Africa: preliminary results of fieldwork. Nyame Akuma 55: 51-55.

Kiberd, P. 2005. Bundu Farm and the transition from Earlier to Middle Stone Age in the Northern Cape, South Africa. Unpublished M.Phil dissertation. Southampton: University of Southampton.

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

Humphreys, A.J.B. & Thackeray, A.I. 1983. Ghaap and Gariep: Later Stone Age studies in the northern Cape. Cape Town: South African Archaeological Society Monograph Series No. 2.

Morris, D. 1990. “Etchings” and “intaglios” in the Upper Karoo. In: Beaumont, P & Morris, D. (eds) Guide to archaeological sites in the Northern Cape: 232-258. Kimberley: McGregor Museum.

Morris, D. 1994. An ostrich eggshell cache from the Vaalbos National Park, Northern Cape, South Africa. Southern African Field Archaeology 3: 55-58.

Morris, D. & Von Bezing, I. 1996. The salvage of a cache of ostrich eggshell flasks near Kenhardt, Northern Cape. McGregor Miscellany 6(2): 3-4.

Orton, J. 2002/2003. Superficial comparisons and reality: a reassessment of Dunefield Midden and the Swartkop Industry. Southern African Field Archaeology 11 & 12: 63-67.

Orton, J. 2011. Heritage impact assessment for a proposed photovoltaic energy plant on the farm Klipgats Pan near Copperton, Northern Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. University of Cape Town: Archaeology Contracts Office.

Orton & Halkett 2011. Heritage impact assessment for the proposed photovoltaic solar energy facility on the remainder of farm Jakhalsvalley 99, Sutherland Magisterial District, Northern Cape.

Parsons, I. 2003. Lithic expressions of Later Stone Age lifeways in the Northern Cape. South African Archaeological Bulletin 58: 33-37.

Parsons, I. 2004. Stone circles in the Bloubos landscape, Northern Cape. Southern African Humanities 16: 59-69.

Parsons, I. 2007. Hunter-gatherers or herders? Reconsidering the Swartkop and Doornfontein Industries, Northern Cape Province, South Africa. Before Farming 2007/4: Article 3.

Parsons, I. 2008. Five Later Stone Age artefact assemblages from the interior Northern Cape Province. South African Archaeological Bulletin 63: 51-60.

Porat, N., Chazan, M., Grün, R., Aubert, M., Eisenmann, V., Horwitz, L.K. 2010. New radiometric ages for the Fauresmith industry from Kathu Pan, southern Africa: Implications for the Earlier to Middle Stone Age transition. Journal of Archaeological Science 37: 269-283.

Rudner, J. & Rudner, I. 1968. Rock-art in the thirstland areas. South African Archaeological Bulletin 23: 75-89.

Rusch, N. & Parkington, J. 2010. San rock engravings marking the Karoo landscape. Cape Town: Struik Travel & Heritage.

Sampson, C.G. 1968. The Middle Stone Age industries of the Orange River scheme area. National Museum Bloemfontein Memoir 4: 1–111.

Sampson, C.G. 1984. A prehistoric pastoralist frontier in the Upper Zeekoe Valley, South Africa. In: Hall, M., Avery, G., Avery, D.M., Wilson, M.L. & Humphreys, A.J.B (eds) Frontiers: southern African archaeology today: 96 – 110. Oxford: British Archaeological Reports International series 207.

Sampson, C.G. 1985. Atlas of Stone Age settlement in the central and upper Seacow Valley. Memoirs of the National Museum (Bloemfontein) 20: 1-116.

Sampson, C.G. 1986. Model of a prehistoric herder-hunter contact zone: a first approximation. South African Archaeological Society Goodwin Series 5: 50-56.

Sampson, C.G. 2010. Chronology and dynamics of Later Stone Age herders in the Seacow River valley, South Africa. Journal of Arid Environments 74:848-848.

Smith, A.B. 1995. Archaeological observations along the Orange River and its hinterland. In: Smith, A.B. (ed.) Einiqualand: studies of the Orange River frontier: 236-264. Rondebosch: UCT Press.

Smith, A.B. 1995b. Introduction. In: Smith, A.B. (ed.) Einiqualand: studies of the Orange River frontier: xvii-xx. Rondebosch: UCT Press.

Southern Cape. 2010. http://www.southerncape.co.za/towns/prieska/welcome.php. Accessed 2nd January 2012.

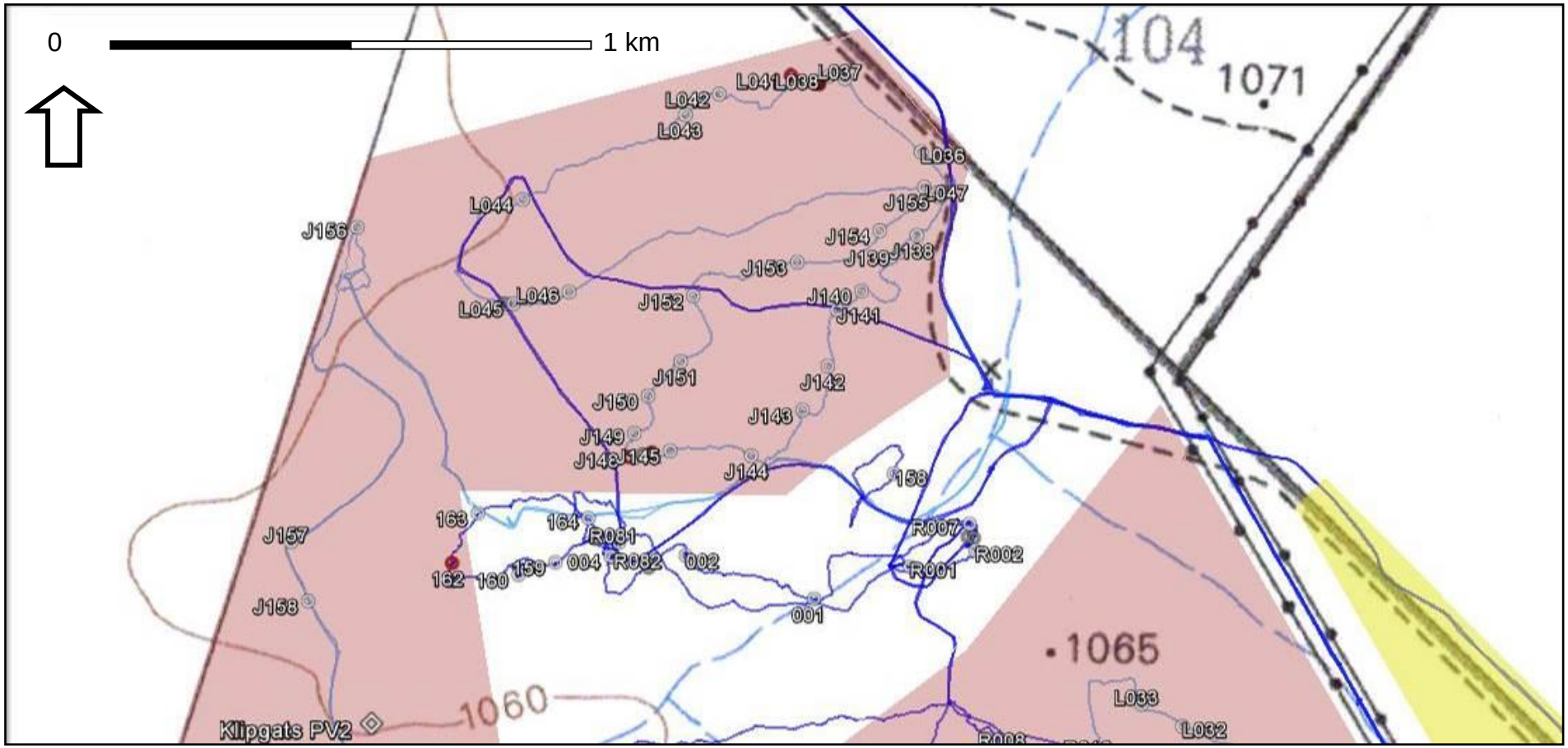
Underhill, D. 2011. The study of the Fauresmith: A review. South African Archaeological Bulletin 66 (193): 15-26.

Van Riet Lowe, C., 1927. The Fauresmith coup de poing. South African Journal of Science 24: 502–505.

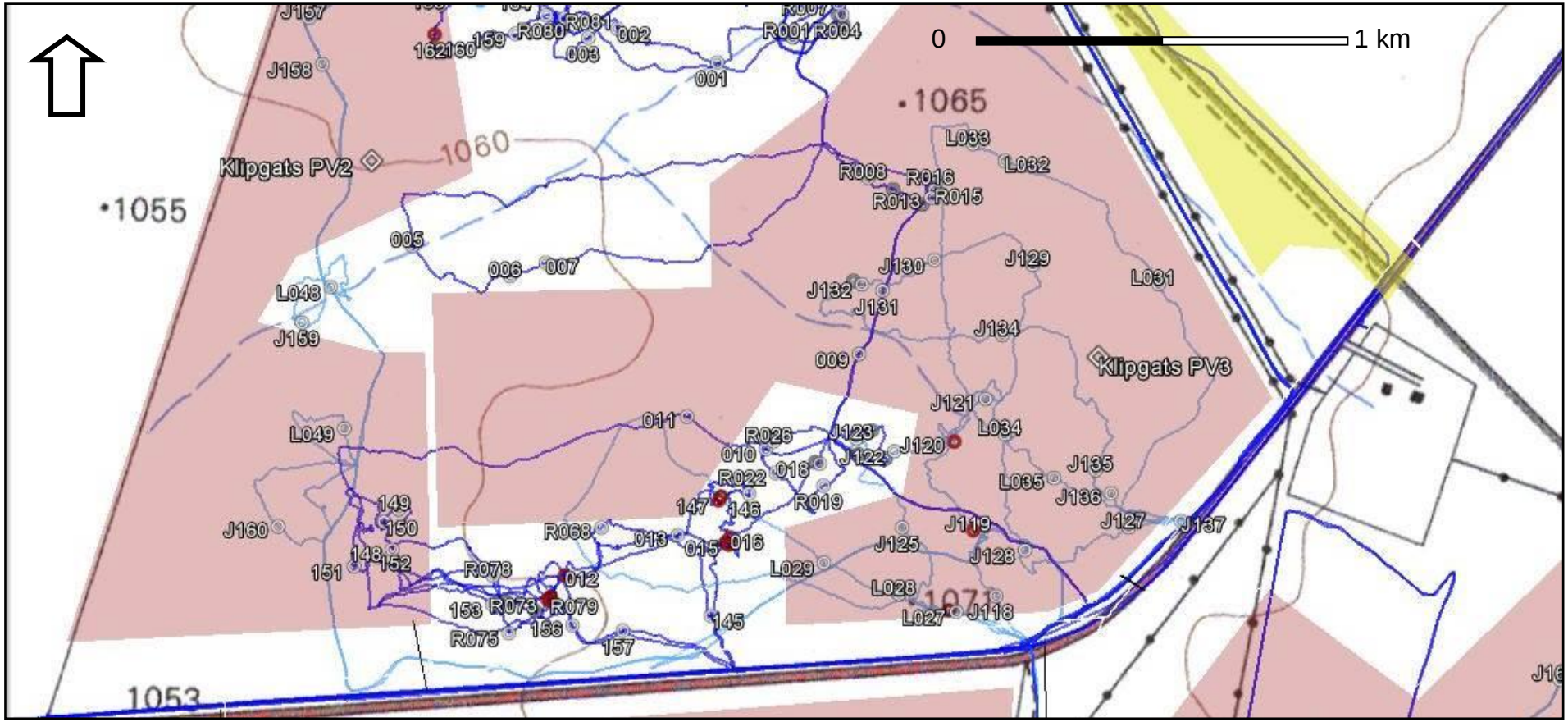
Vogel, J.C., Visser, E. & Fuls, A 2001. Suitability of ostrich eggshell for radiocarbon dating. Radiocarbon 43:133-137.

Wilman, M. 1933. The rock engravings of Griqualand West and Bechuanaland, South Africa. Cambridge: Bell.

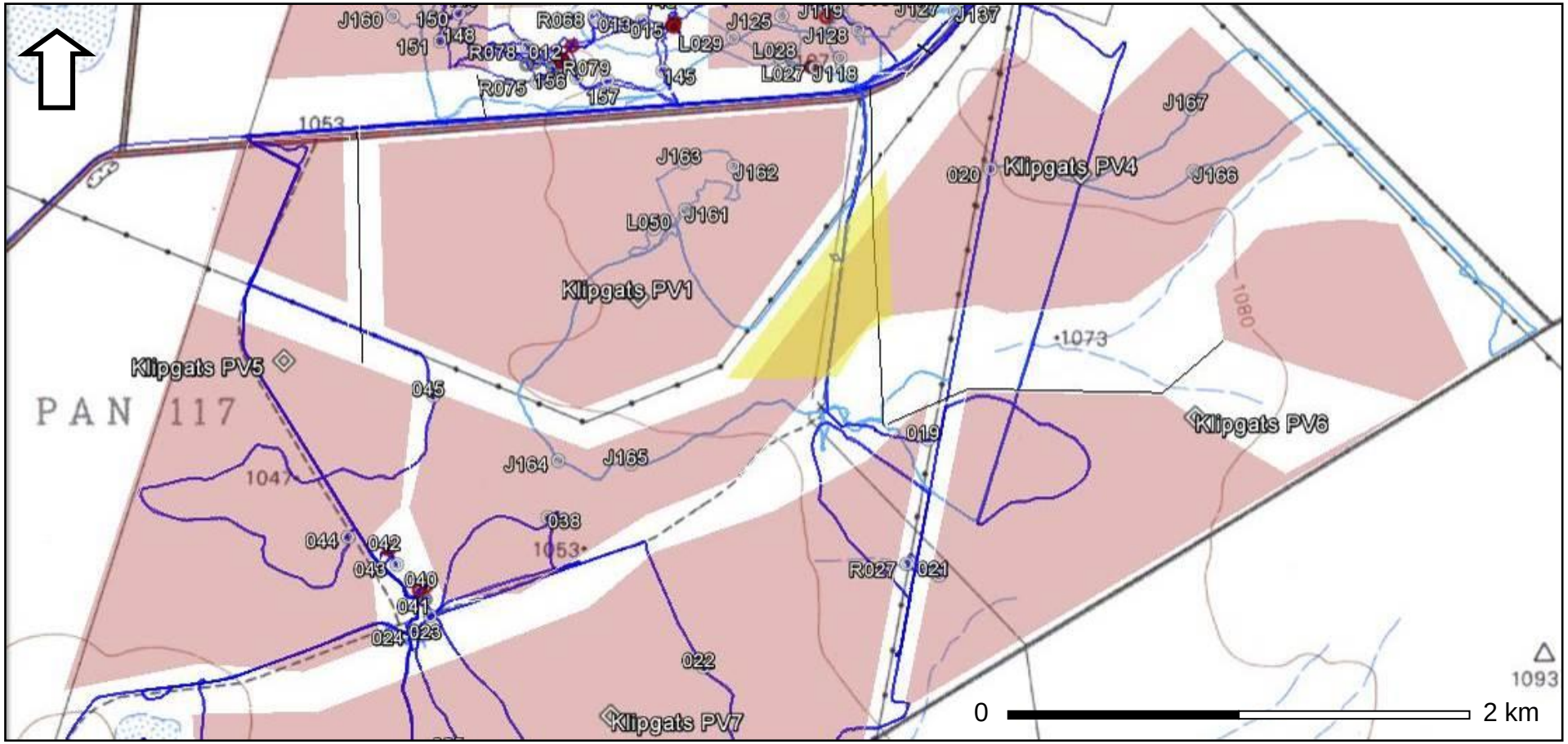
APPENDIX 1: Mapping



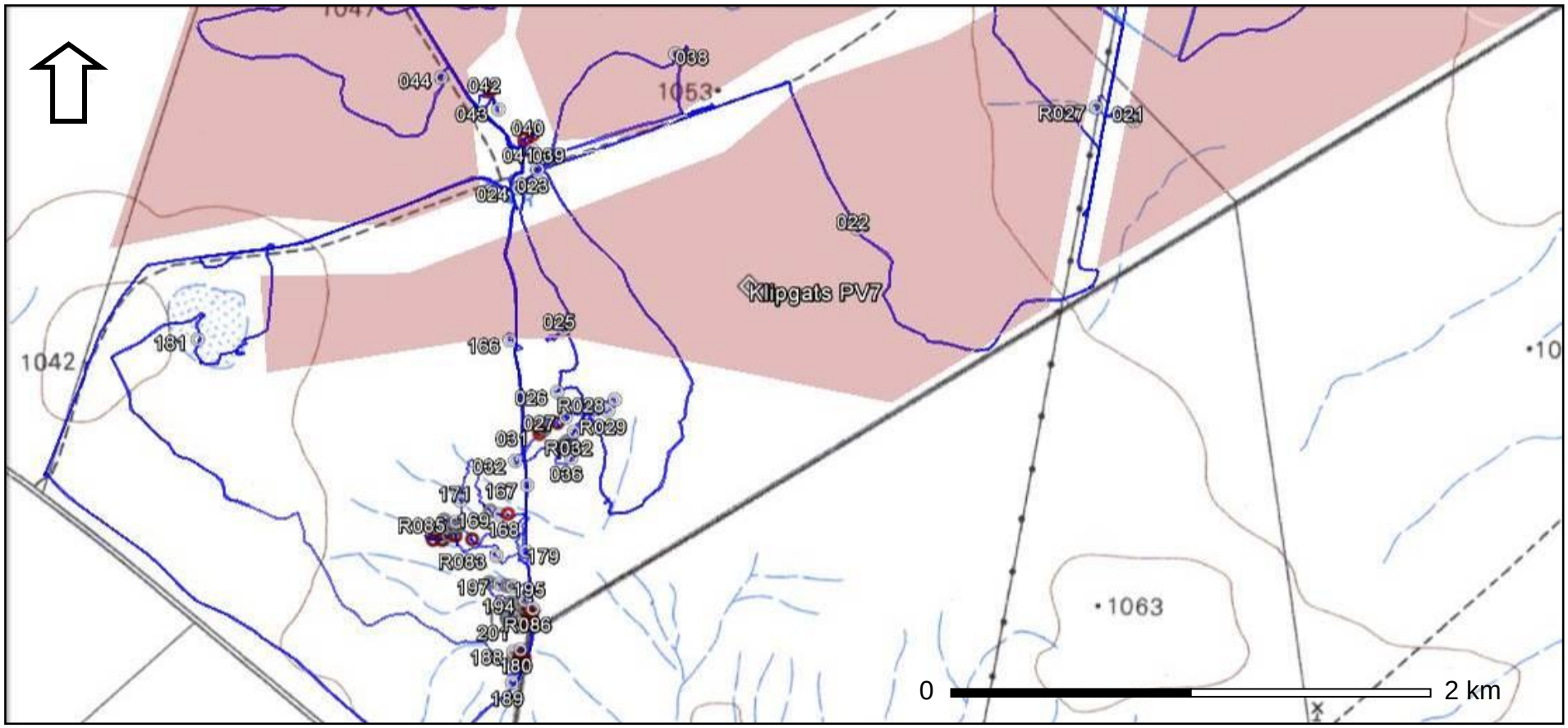
Map showing the walk and drive paths from 2011 (dark blue) and 2013 (light blue) and all plotted heritage finds (northern part of study area - 1).



Map showing the walk and drive paths from 2011 (dark blue) and 2013 (light blue) and all plotted heritage finds (northern part of study area - 2).



Map showing the walk and drive paths from 2011(dark blue) and 2013 (light blue) and all plotted heritage finds (central part of study area).



Map showing the walk and drive paths from 2011 (dark blue) and 2013 (light blue) and all plotted heritage finds (southern part of study area).

APPENDIX 2: List of heritage findings

Field No	Site No	Co-ords	Description	Significance/ Mitigation
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 **(4 hours)**
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 E22 19 12.2	LSA quartz, quartzite and CCS scatter with lots of ostrich eggshell. One upper grindstone.	Medium **(8 hours)**
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 20th century glass including one small bottle base with “Pretoria 3 oz” embossed on it.	Low
024	KGP2011/007	S30 03 06.3	Stone-packed and white-washed dam, various	Low

		E22 18 29.1	small reservoirs, etc. Windmill here. Also some brown and green glass but quite recent.	
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 **(8 hours)**
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 E22 18 35.3	Ephemeral LSA scatter of quartz, CCS, pink glass and a square iron nut.	Low
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 **(4 hours)**
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 **Avoid**
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 **Avoid**
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 **Avoid**
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 **Avoid**
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 **Avoid**
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
R002		S30 00 52.8	Low density background scatter in gravel area.	Very low

		E22 19 24.4		
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. Background scatter in sandy area with some glass and ceramics.	Very low Very low
R032		S30 03 36.3 E22 18 37.0		
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 **(4 hours)**
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 hand-axe which is all that is left after using the hand-axe as a core.	Very low
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	Ephemeral scatter of ostrich eggshell. LSA.	Very low

		E22 18 49.4		
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 **(4 hours)**
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 **(4 hours)**
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 sandy area.	Low
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 **(24 hours)**
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 **(4 hours)**
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 **(4 hours)**
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 **(32 hours)**
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 **(4 hours)**
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 artefact.	Medium **(8 hours)**
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 **(4 hours)**
203	KGP2011/064	S30 03 59.8 E22 18 30.9	Dense LSA scatter of quartz, CCS, quartzite and ostrich eggshell.	Medium **(8 hours)**
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 **(4 hours)**
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
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
J118		S30 01 43.8 E22 19 40.1	Background scatter in sandy area with gravel.	Very low
J119	KGP2013/001	S30 01 38.0 E22 19 37.8	Background scatter in gravel area just north of shallow pan. Quartzite and CCS. Quite a lot here and the scatter could be sampled. 1 large thumbnail scraper	Low **(2 hours)**
J120	KGP2013/002	S30 01 30.1 E22 19 35.9	LSA scatter with good spatial integrity. Includes quartz, quartzite, CCS and OES. 15 m diameter in a sandy area alongside a shallow pan.	Medium **(4 hours)**
J121	KGP2013/003	S30 01 26.2 E22 19 39.1	Light scatter of OES fragments about 20 m in diameter. No artefacts associated. Alongside ephemeral pan.	Very low
J122		S30 01 30.9 E22 19 29.6	Background scatter of quartzite and CCS in gravel area.	Very low
J123		S30 01 29.8 E22 19 25.7	Biface in pan.	Very low
J124	KGP2013/004	S30 01 31.2 E22 19 26.0	Ephemeral LSA scatter of CCS, quartzite and quartz around southern edge of pan.	Low
J125		S30 01 37.7 E22 19 30.5	Background scatter in gravel area with quartzite, CCS, quartz and hornfels.	Very low
J126	KGP2013/005	S30 01 45.1 E22 19 35.3	*In situ* scatter of grey quartzite covering about 15 to 20 m diameter. Also background scatter here.	Low **(2 hours)**
J127		S30 01 37.7 E22 19 53.8	Quartzite background scatter in gravel area.	Very low
J128		S30 01 39.7 E22 19 43.1	Quartzite and CCS background scatter in gravel area.	Very low
J129		S30 01 14.3 E22 19 43.9	Low density but widespread background scatter on gravel and calcrete substrate.	Very low
J130		S30 01 13.9 E22 19 33.8	Quartzite background scatter that includes an 11 cm long bifaces made on a big flake. In gravel area.	Very low
J131	KGP2013/006	S30 01 16.6 E22 19 28.4	Light OES scatter among bushes in a sandy area alongside a shallow pan.	Very low
J132	KGP2013/007	S30 01 16.0 E22 19 26.3	Ephemeral LSA scatter of quartz and quartzite alongside shallow pan. Some OES nearby as well.	Very low
J133		S30 01 15.7 E22 19 25.4	Background scatter in shallow pan including an MSA blade and a unifacial point fragment.	Very low
J134		S30 01 20.5 E22 19 40.8	Quartzite, CCS and quartz background scatter in gravel area.	Very low
J135		S30 01 32.6 E22 19 50.4	Quartzite and CCS background scatter in gravel area.	Very low
J136		S30 01 34.6 E22 19 52.0	Quartzite background scatter in gravel area.	Very low
J137		S30 01 37.1 E22 19 59.2	Quartzite and CCS background scatter in gravel area.	Very low
J138		S30 00 30.8 E22 19 19.7	Quartzite background scatter in gravel area at the foot of the slope leading onto the calcrete	Very low

			ridge. Some nice MSA blades.	
J139		S30 00 32.0 E22 19 18.3	Quartzite, CCS and quartz background scatter mid-way up the slope leading onto the calcrete ridge.	Very low
J140		S30 00 34.7 E22 19 15.2	Extensive background scatter in gravel area on crest of calcrete ridge slope.	Very low
J141		S30 00 36.0 E22 19 13.2	Quartzite, CCS and quartz background scatter in gravel area on crest of calcrete ridge slope.	Very low
J142		S30 00 39.9 E22 19 12.4	Quartzite background scatter in gravel area on crest of calcrete ridge slope. Includes blades.	Very low
J143	KGP2013/008	S30 00 43.0 E22 19 10.4	Quartzite and CCS background scatter in gravel area on crest of calcrete ridge slope. Also an ephemeral LSA quartz and OES scatter in a proximate sandy patch.	Very low
J144		S30 00 46.2 E22 19 06.3	Quartzite background scatter in gravel area on crest of calcrete ridge slope.	Very low
J145	KGP2013/009	S30 00 45.9 E22 18 59.7	Mixed LSA (CCS and OES) and background (quartzite and CCS) scatter in sandy area with gravel near shallow pan.	Very low
J146	KGP2013/010	S30 00 46.0 E22 18 58.2	Light LSA scatter of CCS, quartz and OES plus a scatter of grey quartzite which is probably mostly background scatter in pan. Bone frag.	Low **(2 hours)**
J147	KGP2013/011	S30 00 46.1 E22 18 57.4	LSA scatter of quartz, quartzite, CCS and OES in shallow pan with gravel. Quite diffuse and 15 – 20 m in diameter.	Low
J148	KGP2013/012	S30 00 46.3 E22 18 56.4	LSA scatter of quartz, quartzite and CCS in sandy area in shallow pan. Quite widespread and about 20 m diameter.	Low-medium **(6 hours)**
J149	KGP2013/013	S30 00 44.6 E22 18 56.8	LSA scatter of quartz and quartzite in sandy area with gravel near edge of shallow pan. Diffuse scatter.	Low
J150		S30 00 42.0 E22 18 57.9	Quartzite and CCS background scatter on crest of calcrete ridge.	Very low
J151		S30 00 39.6 E22 19 00.6	Quartzite and CCS background scatter on crest of calcrete ridge.	Very low
J152		S30 00 35.0 E22 19 01.6	Mixed age scatter of quartzite and CCS in shallow pan.	Very low
J153		S30 00 32.7 E22 19 10.0	Extensive quartzite and CCS background scatter on crest of calcrete ridge.	Very low
J154		S30 00 30.5 E22 19 16.7	Quartzite and CCS background scatter on crest of calcrete ridge.	Very low
J155	KGP2013/014	S30 00 28.1 E22 19 21.5	Large OES scatter in sandy area with bushes at base of slope. No associated artefacts.	Very low.
J156		S30 00 30.2 E22 18 34.3	Quartzite scatter in shallow pan area.	Very low
J157		S30 00 52.2 E22 18 29.0	Quartzite background scatter on calcrete ridge.	Very low
J158		S30 00 56.4 E22 18 30.4	Quartzite background scatter on calcrete ridge.	Very low
J159		S30 01 19.4 E22 18 28.2	Mixed age scatter in shallow pan. Mostly quartzite but one quartz and one OES.	Very low
J160		S30 01 37.7 E22 18 25.7	Widespread but generally low density background scatter in gravel area.	Very low
J161		S30 02 05.6 E22 19 14.4	Mixed age scatter of quartz and quartzite in shallow pan.	Very low
J162		S30 01 59.3 E22 19 22.5	Background scatter of quartzite and CCS in sandy area. Generally very light background scatter in this area.	Very low
J163		S30 01 58.8	Quartzite background scatter in gravel area.	Very low

		E22 19 14.3		
J164		S30 02 41.6 E22 18 53.2	Quartzite background scatter in gravel area.	Very low
J165		S30 02 42.0 E22 19 05.3	Quartzite background scatter in gravel area.	Very low
J166		S30 02 00.1 E22 20 38.7	Quartzite background scatter in gravel area.	Very low
J167		S30 01 51.1 E22 20 38.2	Quartzite background scatter in gravel area.	Very low
L027		S30 01 45.2 E22 19 36.0	Background scatter including a small hand-axe.	Very low
L028		S30 01 43.6 E22 19 30.1	Scatter includes three 'recently' flaked grey quartzite flakes on a rocky surface.	Very low
L029		S30 01 40.8 E22 19 22.4	Background scatter of large chunks, cores and flakes of grey quartzite on a rocky plain.	Very low
L030	KGP2013/015	S30 01 34.9 E22 19 11.7	Dense distribution of artefacts on a sandy plain. Grey and black quartzite flakes, flaked quartz cobbles. Although some flakes look recently flaked, there is some MSA present. Extends over an area 5m x 5m.	Medium **(2 hours)**
L031		S30 01 16.0 E22 19 56.9	Sandy hollow near the substation, contains a single small hand-axe and one 'recently' flaked quartzite flake.	Very low
L032	KGP2013/016	S30 01 05.0 E22 19 41.1	One small knapping site – including a 'hornfels' cobble and at least 8 flakes nearby. In an area of 1m².	Low-medium
L033		S30 01 03.5 E22 19 37.8	'Recently' flaked quartzite flakes on a calcrete cobble floor	Very low
L034		S30 01 29.4 E22 19 41.1	Quartzite flakes and chips on a loose sandy soil near a large bush.	Very low
L035	KGP2013/018	S30 01 33.3 E22 19 46.1	Site with about 8 large quartzite flakes and cores in a small area (2m²). Single knapping episode? In sandy area near bushes.	Low
L036		S30 00 25.0 E22 19 20.0	Background scatter on calcrete slope, some 'recently' flaked quartzite flakes and some weathered MSA.	Very low
L037		S30 00 19.9 E22 19 13.8	Background scatter on slopes leading to the top of the ridge on the edge of the farm Kipgatspan, closest to the slimes dam (tailings). Chunky grey quartzite hand-axe in sandy soil.	Low
L038		S30 00 19.7 E22 19 12.6	Scatter of quartzite cores and flakes nearby in loose sandy soil.	Low
L039	KGP2013/019	S30 00 20.2 E22 19 11.8	Background scatter on a smooth, sandy surface between tall thorny bushes. This area, on the top of the hill, appears to represent a drainage area below the slimes dam. The soil is silty, rather than rocky. L039: Collection of grey quartzite flakes and cores. L040: Small hand-axe on 'hornfels' surrounded by dense distribution of cores and flakes.	Low-medium **(5 hours)**
L040		S30 00 20.2 E22 19 11.5		
L041	KGP2013/020	S30 00 19.7 E22 19 09.5	Same area as above. Grey quartzite artefacts lying on sandy area with older MSA and ESA implements.	Low-medium **(3 hours)**
L042		S30 00 20.9 E22 19 03.7	Same area as above. Chert and Quartzite cores and flakes. Dense distribution which extends along the drainage basin.	Low
L043		S30 00 22.4 E22 19 00.9	Same area as above. Dense distribution which extends along the drainage basin. Quartzite core, chert core, quartzite flakes.	Low
L044		S30 00 28.3	Background surface scatter	Very low

		E22 18 47.8		
L045	KGP2013/021	S30 00 35.6 E22 18 47.0	Background scatter with some ‘recently’ flaked grey quartzite	Low
L046		S30 00 34.8 E22 18 51.5	Background scatter with a hand-axe	Very low
L047		S30 00 27.5 E22 19 20.3	Background scatter	Very low
L048		S30 01 16.2 E22 18 31.2	Ephemeral scatter of ostrich eggshell pieces but not associated with any stone artefacts	Very low
L049		S30 01 28.9 E22 18 32.6	Two large quartzite cores and a single weathered MSA blade nearby. 2m distance, another large quartzite core and 2 flakes.	Very low
L050		S30 02 08.2 E22 19 09.2	Large quartzite core and some smaller fresher quartzite cores nearby on a calcrete ridge.	Very low