

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED KANGNAS WIND AND SOLAR ENERGY FACILITIES, NAMAKWA MAGISTERIAL DISTRICT, 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

ACO Associates cc was contracted by Aurecon South Africa (Pty) Ltd to assess the impact to heritage resources that might occur through construction of a wind energy facility (WEF) and a photo-voltaic solar energy facilities (PV) and/or concentrating photo-voltaic CPV on farms between Springbok and Aggeneys in the Northern Cape Province (Figure 1). The following farm portions are affected:

- Farm Areb 75/remainder;
- Farm Kangnas 77/remainder;
- Farm Kangnas 77/portion 3;
- Farm Koeris 78/portion 1; and
- Farm Smorgen Schaduwe 127/remainder.

No layouts were provided as the proponent wishes to design a layout that will have the least impacts to the environment based on specialist studies and, as such, only focus areas were provided for assessment. However, the solar facility would cover approximately 1000 ha and the wind facility would have between 185 and 500 turbines.

A literature survey set the heritage context for the development, while a six day field survey aimed to record as many heritage resources as possible so as to understand the heritage landscape well. Sites were photographed and their locations taken by means of a GPS.

The environment consists of two strongly contrasting landforms; flat open grasslands and rocky hills. Several pans also occur in the area.

A large number of heritage resources were found, some of which were deemed highly significant. These resources varied from background scatters of stone artefacts (very low significance) to rock art and graves (very high significance) to farm werfs and historical features (generally medium to high significance). The majority of resources occurred in clusters such that buffer zones could be proposed to ensure their protection. Five areas have buffer zones suggested, while one further site should be excluded from development but does not warrant a buffer around it. All of these lie within the wind focus area.

Overall it is found that the site is suitable for the proposed developments, so long as the suggested buffers are implemented. The solar energy facility will likely have very low impacts to archaeology and medium significance impacts to the landscape and scenic resources. The wind energy facility could result in archaeological impacts of high significance, but with the suggested buffers being implemented then these will be reduced to very low. Landscape and scenic impacts will be of medium significance. The grid connection power line from the wind focus area will need rerouting to avoid one of the sensitive archaeological areas.

It is recommended that the proposed developments should be allowed to proceed but subject to the following conditions:

- All buffers and no-go areas stipulated in this report must be adhered to for both the facilities and all roads and power lines;
- Should any human remains be uncovered during development they must be immediately protected *in situ* and reported to the heritage authorities or to an archaeologist. The remains will need to be exhumed at the cost of the developer;

- All construction and maintenance crew and vehicles (except small vehicles which may use existing farm tracks) should be kept out of the buffer zones.
- The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected.

21 August 2011

Declaration of independence:

I, Jayson Orton, am an independent specialist consultant who is in no way connected with the proponent, other than in terms of the delivery of consulting services.

I hold a Masters degree in archaeology and have been consulting since 2004 in the Northern, Eastern and Western Cape Provinces. I am an accredited Principal Investigator with the Association of Southern African Professional Archaeologists (ASAPA, member No. 233).



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1. INTRODUCTION

ACO Associates cc was contracted by Aurecon South Africa (Pty) Ltd to assess the impact to heritage resources that might occur through construction of a wind energy facility (WEF) and a photovoltaic (PV) and/or concentrating photovoltaic (CPV) solar energy facility (PV) on farms between Springbok and Aggeneys in the Northern Cape Province (Figure 1). The following farm portions are affected:

- Farm Areb 75/remainder;
- Farm Kangnas 77/remainder;
- Farm Kangnas 77/portion 3;
- Farm Koeris 78/portion 1; and
- Farm Smorgen Schaduwe 127/remainder (Figure 1).

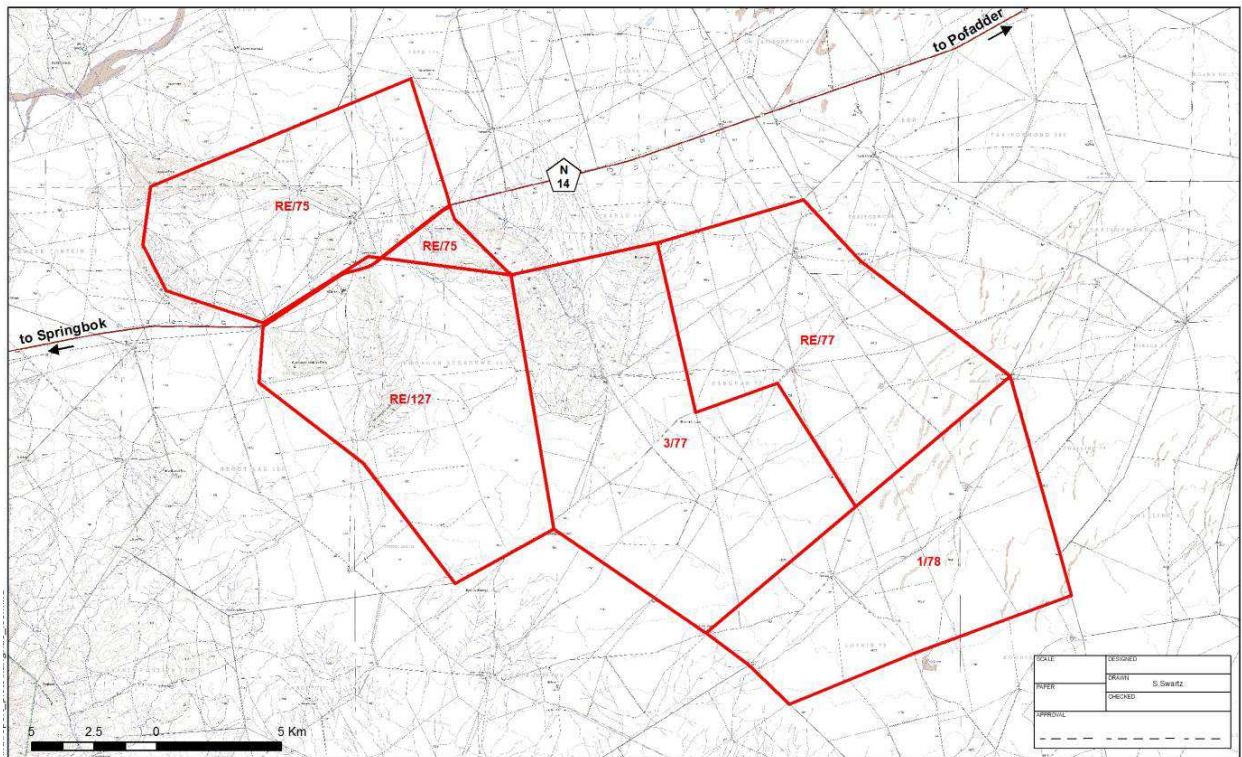


Figure 1: Map showing the location of the affected farm portions. Most lie just south of the N14 which runs from Springbok in the west to Aggeneys and Pofadder in the east.

No layout for either wind or solar energy generation was provided for assessment, since the proponent wishes to produce a realistic layout after receiving all the constraints from the specialist studies. However, we were provided with areas on which to focus for each of the proposed developments (Figure 2).

The project description is also still quite broad and only the following details are as yet available from the Draft Scoping Report (Aurecon 2012):

Wind:

- Between 185 and 500 turbines of between 1.5 and 4 MW each;
- Maximum total generating capacity of 750 MW; and

- Turbine foundations would be approximately 20 m by 20 m and 3 m deep.

Solar:

- Total generating capacity of 250 MW;
- Either PV or CPV technology will be used; and
- Total land area will be approximately 1000 ha.

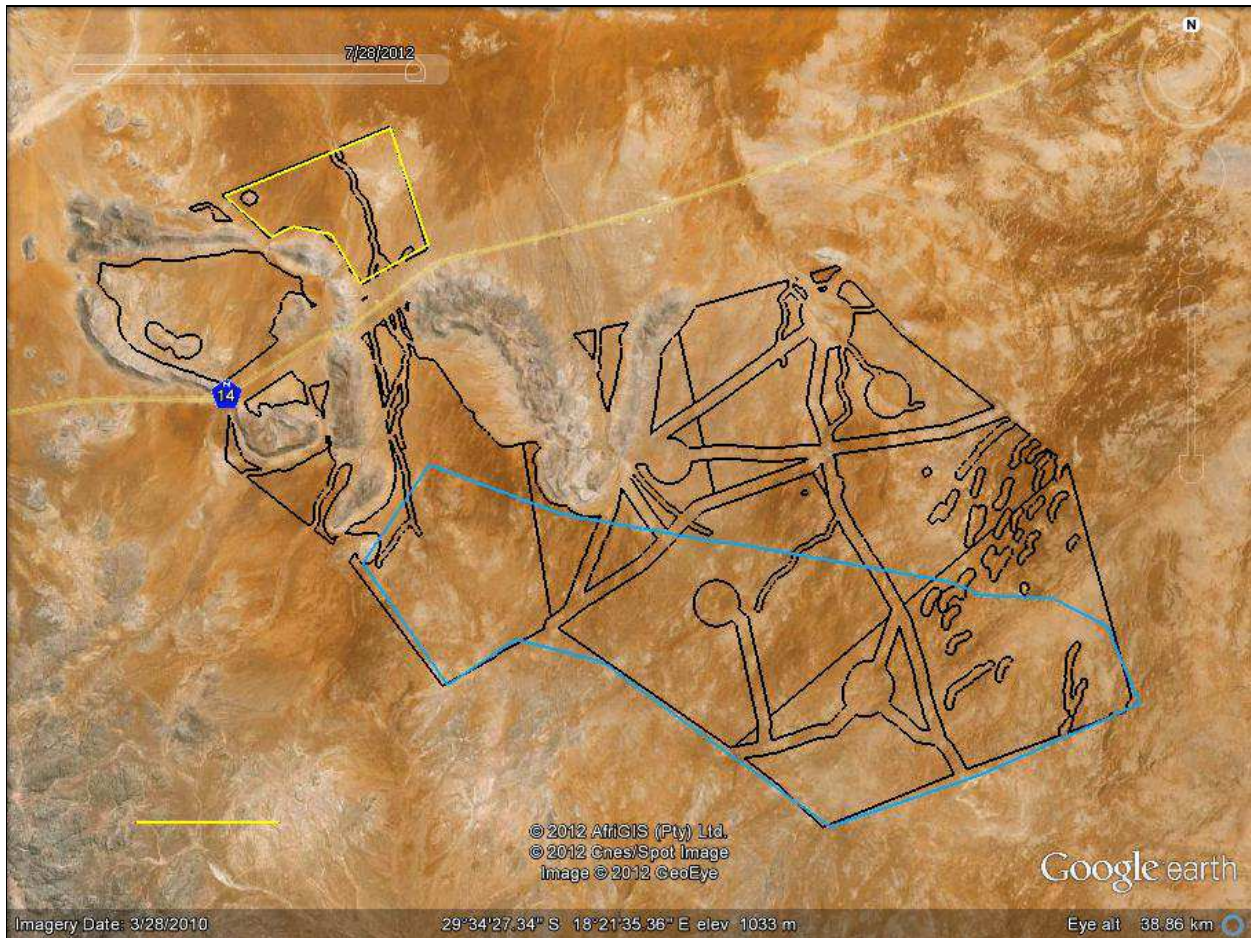


Figure 2: Aerial view of the study area showing the land available for development after the initial feasibility and scoping studies (black outlines) and the areas to be focused on for solar (yellow) and wind (blue).

1.1. Terms of reference

ACO Associates cc was asked to:

- Conduct a detailed desk-top level investigation to identify known archaeological, cultural and historic sites in the proposed development areas;
- Undertake field work to verify the results of the desktop investigation;
- Document (GPS coordinates and map) all sites, objects and structures identified;
- Compile a report which would include:
 - Identification of archaeological, cultural and historic sites within the proposed development areas;
 - Assess the sensitivity and significance of all heritage remains on the site;

- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on heritage 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));
- Recommend mitigation measures to ameliorate any negative impacts on areas of heritage importance;
- Prepare 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;
- Consider relevant guidelines; and
- Consider the Department of Environmental Affairs and Development Planning guideline: “Guideline for involving heritage specialists in EIA processes” (Winter & Baumann 2005).

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 (EIA), Heritage Northern Cape and the South African Heritage Resources Agency 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

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, a desktop fatal flaw analysis done by ACO and online material, and helped focus the field survey.

3.2. Field survey

The site was subjected to a combination of driving and walking surveys, during which 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. Due to the immense size of the study area, focus was placed on understanding the archaeological landscape so as to be able to effectively predict where archaeological resources would most

likely be found. The survey was carried out between 23rd July and 28th July 2012 inclusive. It should be noted that the use of binoculars at regular intervals was a key factor in locating parts of the landscape that were likely to be more sensitive and it is believed that no highly significant heritage resources would have been missed. Figure 3 shows the coverage of the survey.

Site names were allocated to all important heritage finds and these are based on three components: (1) a three letter acronym for the farm, a year to allow extension of the system into the future, and a consecutive number for the site for that year. So SMS2012/003 is the third site found in 2012 on Smorgen Schaduwe.

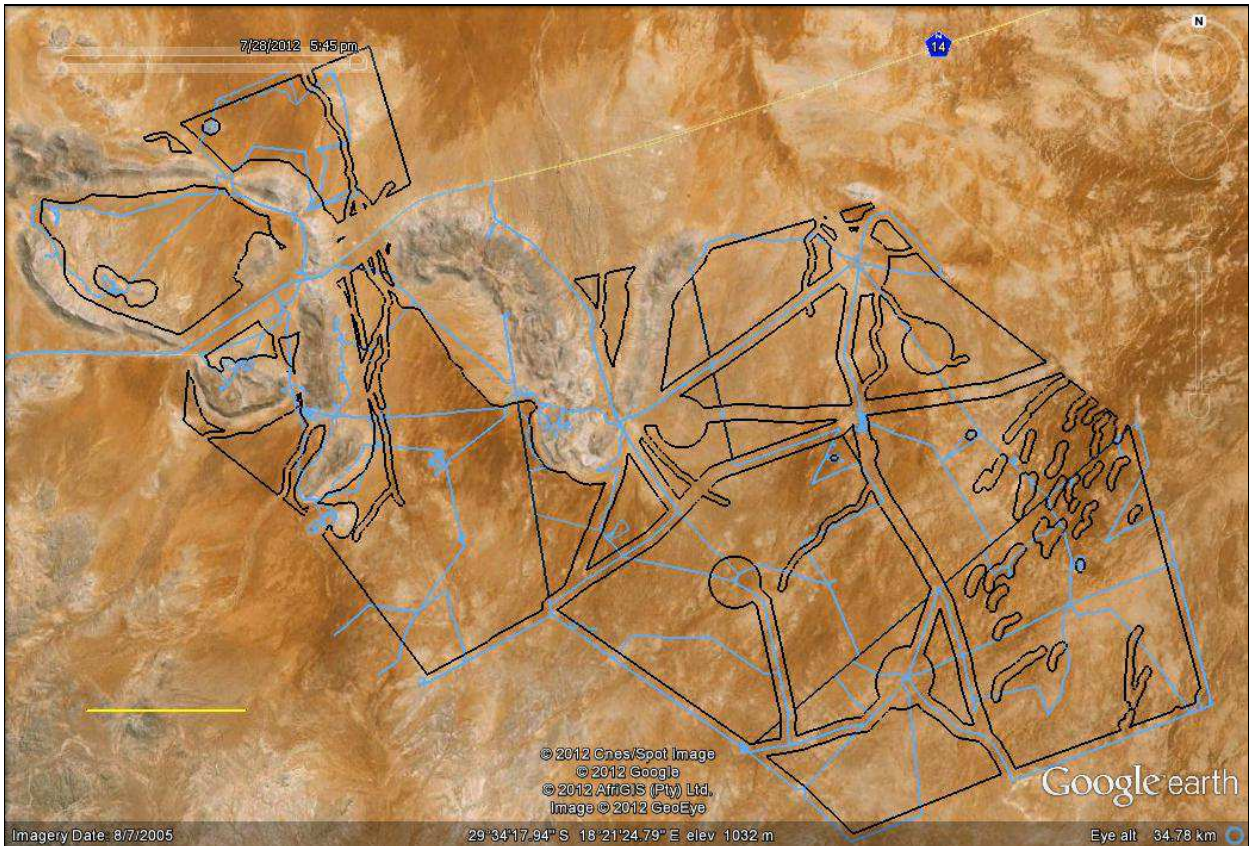


Figure 3: Aerial view of the study area showing the tracks (blue lines) created during the survey.

3.3. Impact assessment

The impact assessment ratings were estimated using a scale supplied by Aurecon as per their Draft Scoping Report. Criteria for each rating were described and the significance is worked out based on various combinations of the magnitude, extent and duration of impacts.

3.4. Limitations

The sheer immensity of the site precluded a detailed examination of the entire layout but it is anticipated that, through the survey methodology outlined above, we have gained a good understanding of the site and have located all the most important heritage resources.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The landscape on and around the study area is dominated by two strongly contrasting characters: low rocky inselbergs and ranges of hills dot the landscape, while in between them the land is very flat grassland (Figures 4 & 5). Within the latter, however, are several low rocky outcrops, sometimes heavily weathered and gravel-coated (Figures 6 & 7) and a number of pans (Figures 8 & 9), some of which also have exposed bedrock within them. The open areas are covered in grass and small shrubs and many farm tracks criss-cross the area (Figure 10).



Figure 4: View towards the southeast across the centre of Smorgen Schaduwe. Note the small orange-coloured hill (“Orange Hill” as referred to in Section 7.1) in the middle which is a very sensitive area for heritage. The rocky hills and open, very flat grasslands are obvious.

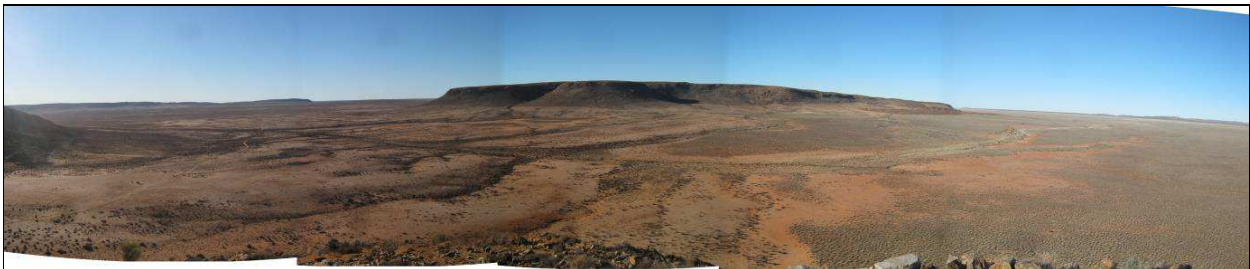


Figure 5: View towards the southeast across the centre of Smorgen Schaduwe and taken from the summit of the orange hill in Figure 3.



Figure 6: View towards the southwest near the south-western boundary of Kangnas showing a granite outcrop in the middle of the grassland. For scale, the white spot to the right of the hill is the vehicle.



Figure 7: View towards the southwest across Kangnas from a rocky hill in the far north of Kangnas. The extensive flat grasslands across the eastern part of the study area is evident.



Figure 8: One of the many small pans, this one in the southern part of Kangnas.



Figure 9: Exposed bedrock in the largest pan at Kangnas.



Figure 10: Open plains and farm tracks on Kangnas.

5. HERITAGE CONTEXT

5.1. Palaeontology

The farm Kangnas is believed to be the original discovery site of the dinosaur known as *Kangnasaurus coetzeei*. The fossil was named by Sidney Haughton in 1915, the generic name referring to the farm and the specific name to the farmer, Coetzee. It is based on holotype SAM 2732, a tooth found at a depth of 34 m in a well on the farm (Haughton 1915, cited in Wikipedia 2011). The age of the rocks, which are conglomerates in an ancient crater lake, is unclear but they are thought to be from the Early Cretaceous (Ruiz-Omeñaca et al. 2007, cited in Wikipedia 2011). Haughton considered the tooth an iguanodontid, but later reassessment considers it to be a more basal ornithomimid, such as a *Dryosaurus* (Cooper 1985). Haughton also described several other fossils possibly also belonging to *Kangnasaurus*, and these included several partial thigh bones, etc. Some of these bones came from other deposits and Haughton was not sure that they all belonged to the new genus. *Kangnasaurus* is regarded as a dubious specimen by some (Sues & Norman 1990, Norman 2004, both cited in Wikipedia 2011), Ruiz-Omeñaca et al. (2007, cited in Wikipedia 2011) still thought it potentially valid.

Another potentially significant palaeontological/geological feature relates to the unconfirmed reports that a meteorite impact crater exists near Kangnas, to the south of the present site. This was reported by the landowner, but consultation with various geologists has failed to yield any further information in this regard. None had heard of the possibility. Those consulted by us include:

- Dr John Rogers (retired, UCT);
- Associate Professor John Compton (UCT);
- Professor David Reid (UCT);
- Mr Greg Moseley (private geological consultant); and
- Dr Chris Hartnady (consultant, Umvoto).

In addition, Aurecon (2012) consulted with:

- Mr Hendrik Minnaar (Council for Geoscience in Upington); and
- Professor Chris Harris (UCT), who produced a report based on a site visit.

Harris (2012) suggested that the crater may have been the result of the eruption of an olivine melilitite pipe, of which several are known from an area some 10-30 km to the east. He considered it also possible, though less likely, that the crater was the result of a meteorite impact.

5.2. Archaeology

Although little archaeological research has been conducted in the general area around Kangnas, several impact assessment studies have been conducted in recent years. These form the basis of the present background review.

Early (ESA) and Middle Stone Age (MSA) material, including manufacturing sites, have been found on the northern slopes of the Gamsberg, probably positioned so as to gain easy access to a source of stone material on the mountain. Suitable flaking rock is apparently not easily available on the plains (D. Morris 2010). Pelsner (2011) reported MSA and Later Stone Age (LSA) material in an area around the Paulputs substation near Pofadder, although his

illustrations appear to be of LSA artefacts made on quartz. He also mentions the presence of ostrich eggshell. East of Aggeneys, Webley and Halkett (2012) found a background scatter of predominantly quartz, and some quartzite artefacts. The material is particularly prevalent in those areas where the soil surface is covered in quartz pebbles and cobbles. The size of the artefacts suggests that they pertain to the Middle Stone Age but diagnostic MSA features were absent. In general, the scatter of stone tools is very widely distributed and does not appear to be concentrated in any specific location.

According to D. Morris (2011a) LSA sites are the predominant archaeological trace noted in surveys in the Aggeneys-Pofadder region, although his survey of the northern slopes of the Gamsberg identified very few isolated LSA flakes (D. Morris 2010). However, on the plains below the mountain he did find three LSA settlements. To the northwest of the Gamsberg, he located two stone cairns which could represent graves, as well as a ceramic LSA site. These sites all lie at least 50 km away to the northwest and probably represent transient settlement by transhumant hunter-gatherers or herders that moved through the area. Beaumont *et al.* (1995:263) noted that most LSA sites then known in Bushmanland appeared to be ephemeral occupations by small groups of people in the hinterland both north and south of the Orange River. This was in sharp contrast to the substantial herder encampments along the Orange River floodplain itself. Away from the river, LSA material, mainly quartz flakes, appears to often be focused around the base of granite hills (D. Morris 2011a, b & c; Pelser 2011; Webley & Halkett 2011). Beaumont *et al.* (1995) agree and add that red dunes and the margins of seasonal pans also served as foci for LSA occupation.

Webley (pers. comm. 2012) visited Kangnas in 1987. The first cave with rock art (described below) had many grinding grooves in the bedrock nearby. The back of one cave had been used as a lair, but part of it contained a very shallow ashy deposit, with ostrich eggshell fragments and one bead, stone artefacts, and some black glass artefacts on the talus slope. The floor of the second shelter was covered in gravel brought in by the farmer who used to barbecue in the shelter. It too contained grinding grooves in the bedrock, some stone artefacts, ostrich eggshell and a trade bead. The stony ridges contained “klipbakke” which retained water in summer, making this an attractive location of prehistoric settlement. Webley observed fragments of ostrich eggshell, stone artefacts and bottle glass artefacts as well as a few potsherds around the ridges.

Despite the above observations, archaeological remains are likely to be patchy since, in a 15 km linear survey between Pofadder and Pella, Halkett (2010) failed to record any archaeological material. In general, D. Morris (2011c) notes that archaeological finds around Aggeneys and Pofadder are sparse.

Rock art is known from the region. Rudner and Rudner (1968) note the scarcity of suitable rock canvases and that art is sparsely distributed through the region. Engravings occur along the Orange River (D. Morris 1998) where suitable rock exists, while in the rocky areas away from the river there are rare rock paintings. Rudner and Rudner (1968:80-81) described the paintings on the farm Kangnas as follows:

“The paintings on this farm on the road to Pofadder are in a quartzite cave on the northern side of a ravine; on the sooty roof of the cave are crude black handprints and double-headed axe-like designs made in what appears to be black (burnt?) wax, which, when scratched, turned white. Where the pictures had weathered off, a greyish-white image remained. Grey designs are superimposed on red geometric designs.

“In a cave on the opposite side of the ravine are designs in white superimposed by red-brown ones. In this cave there is also an engraving of a wheel, which is probably of European origin as there are initials

engraved next to it. A few stone implements were found in these caves, including a crescent in clear quartz, a few potsherds of thin Hottentot ware and some flakes in glass. (SAM 6753.) These caves were mentioned by W. C. Scully (Wilman, 1933), who stated that Bushmen were known to have lived there”.

Further to the east, rock art occurs near the pan of Gobees. Rudner and Rudner (1968:81) described the art:

“In the southern corner of this farm near a small pan a large east-facing shelter contains paintings-crude gemsbok in faded red and some shield-like designs in maroon superimposed by white designs. The names of early visitors are pecked across the maroon pictures with the date 1879, providing us with an upper date for these paintings. Inside and outside this shelter we found a rich Wilton industry containing one large crescent and many small side-scrapers, some of them on reworked Middle Stone Age tools, two thumbnail scrapers, two small bead borers and a few potsherds of Hottentot-type, one with signs of an external lug (Namaqua pot?). (SAM 6751-2.) Some of this pottery has a coarse sand admixture (Rudner, in press)”.

Historical accounts of travels through southern Africa frequently provide clues to the pre-colonial occupation of the land. In this case, two travellers, John Barrow and George Thompson, passed through this area leaving observations on the local population.

Barrow (1801:387) wrote of the plains between the Kamiesberg Mountains and the Orange River that:

“These plains are now desolate and uninhabited. All those numerous tribes of Namaquas, possessed of vast herds of cattle, are, in the course of less than half a century, dwindled away to four hordes, which are not very numerous, and in a great measure subservient to the Dutch peasantry, who dwell among them.”

Thompson (1824:288) noted the following:

"The extensive plains, lying between the Gariep and the Kamiesberg, are represented, by old writers, as occupied by a numerous race of people, possessed of large flocks and herds, and living in ease and abundance. Of these, the tribe now resident at Pella and its vicinity, is the only one remaining."

Both texts show that the area was well inhabited in the past but that colonial expansion was taking its toll on the indigenous inhabitants. Nevertheless, these observations suggest that archaeological remains, at least pertaining to the more recent prehistoric period, should be abundant on the landscape.

5.3. History

The nearest towns to the west of the study area are Springbok, O’Kiep, Concordia and Carolusberg. These owe their origins primarily to the 19th century copper mining industry and preserve extensive mining and Anglo-Boer War heritage. To the east Aggenys is a modern mining town and Pofadder and Pella are 19th century mission settlements (Northern Cape Tourism Board 2007).

A close examination of the 1906 map in Figure 11 shows how scarce water is on the landscape. This and the fact that the area is so remote probably led to the area being surveyed so late. The four adjoining farms of Areb 75, Kangnas 77, Karas 76 and Smorgen Schaduwe 127, were all surveyed in 1893. However, European graffiti (1879) is present at Kangnas testifying to the earlier use of the area by colonial settlers (Aurecon 2012). Interestingly Kangnas is labelled as Kannas near the centre of the map. This point marks Kangas Poort.

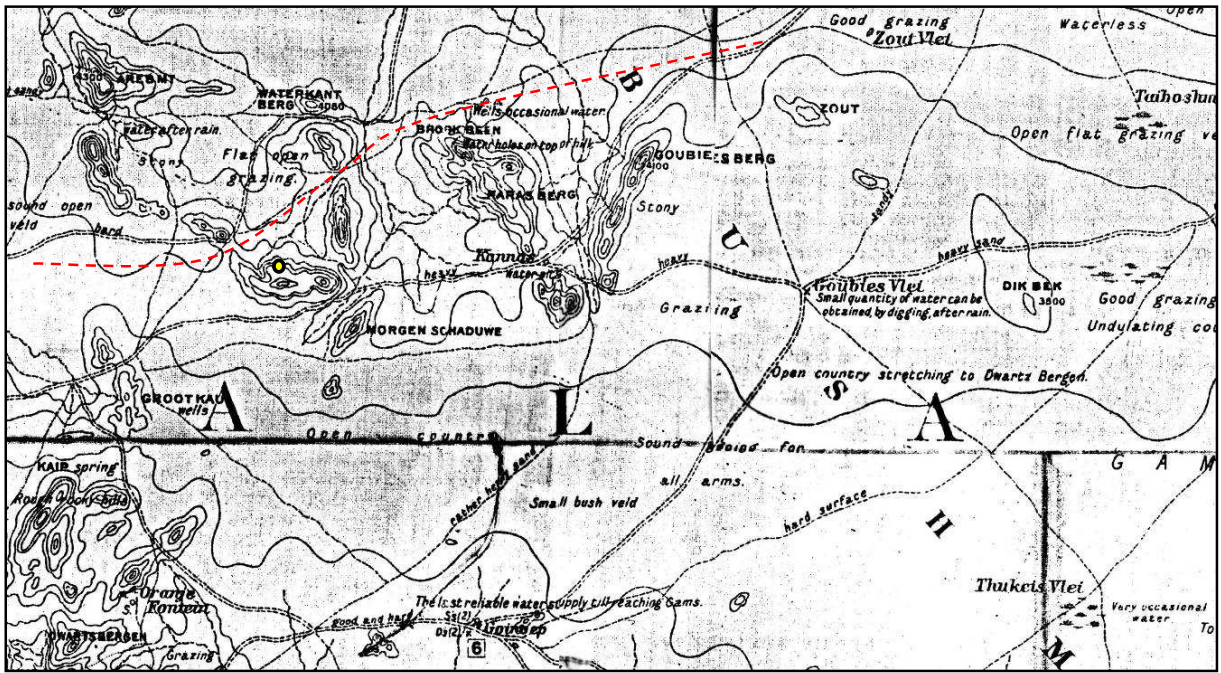


Figure 11: Military Map of 1906 showing the position of wagon tracks and sources of water around Kangnas and Smorgen Schaduwe. Note that there are water holes on the top of the Karas Berg. Goubies Vlei (Goebees) was reported to contain “small quantity of water obtained by digging, after rain”. There are also the icons for huts, positioned to the north of the Karas Berg, above the phrase “wells, occasional water”. The red dashed line shows the present position of the N14 and the small yellow dot the location of the Anglo-Boer War remains discussed in Section 6.3 below.

Very few records pertaining to Kangnas were available from the Cape Archives. A lease was held over the farm in 1987 by WC Dixon and it was owned by DJ Coetzee between 1914 and 1916. The road through Kangnas Poort, where Figure 11 shows water to have been available, was closed in 1918. According to Nienaber & Raper (1977) the name Kangnas is derived from the Nama word *!gai-!na* which means “string a bow”. This is in line with the explanation by a local farmer (1973) that Bushmen hunters used to ambush the game in the narrow passage between the mountains. The name of Goubies (or Goubies) is associated with Kangnas. The *-bie-* refers to a fountain or well. Together, the two names may be translated as “where with strung bow, game is shot”.

6. FINDINGS

A large number of occurrences were recorded. The sections below highlight examples of each of the different types of heritage resources, while the table in Appendix A lists every occurrence individually and Appendix B provides mapping. It should be noted that many of the occurrences were not worthy of being listed as archaeological or heritage sites. These were retained in the appendix but not allocated site numbers or rated for significance – they can all be assumed to be of very low significance.

6.1. Pre-colonial archaeology

The best pre-colonial sites are often found in caves. These are very rare in the Bushmanland landscape with only four being located in the study area. Two contain rock art and will be

discussed below and one had just two quartz artefacts in it and was not listed as a site (point 154). The last one, SMS2012/010, was located in a small rocky valley and seemed to contain only light traces of occupation (Figure 12). These consisted of fragments of burnt bone, some fragments of ostrich eggshell and pottery and a few quartz flaked stone artefacts. A lower grindstone was found on the talus slope. The dearth of occupation debris was surprising, especially given that the nearby river contained potholes that retained water.



Figure 12: Site SMS2012/010 (point 035).

The majority of archaeological sites recorded contained scatters of stone artefacts, predominantly in quartz (milky and clear) and cryptocrystalline silica (CCS) with silcrete, quartzite and other rocks more rarely represented. Several examples occurred near the base of a hill in the western part of the study area. SMS2012/034 is one such example (Figure 13). Many eroded/denuded areas revealed scatters of stone artefacts. Usually these were very ephemeral and were regarded as background scatter. However, in some areas there were denser concentrations that might well be representative of camp sites, such as at KNG2012/002 (Figure 14).



Figure 13: Stone artefacts from SMS2012/034 (point 073).



Figure 14: Stone artefacts from KNG2012/002 (point 157).

Around the few large pans, particularly those with bedrock exposures, many archaeological occurrences were recorded. No doubt the proximity to water, particularly after rains, served as the main attraction. The occurrences around the large 'Gobees se Pan' were grouped as one very large site, named KNG2012/011. More than 70 individual archaeological

occurrences of varying nature were located with point 180 being one of the most interesting because it included a large horizontally pierced and internally reinforced lug (Figure 15). Site KNG2012/010 is an artefact scatter located alongside a smaller pan very close to the large Gobees se Pan. This proximity no doubt resulted in the good artefact collection found there (Figure 16).



Figure 15: Stone artefacts, pottery and ostrich eggshell fragments from KNG2012/011 (point 180).



Figure 16: Stone artefacts from KNG2012/010 (point 179).

Sometimes European colonial artefacts can make their way into Stone Age contexts, either through reuse of the site by colonists, or perhaps through use of European artefacts by indigenous people. Several possible examples of either case were found with one example possibly suggested the latter, at point 089. Here a piece of the base of an old wine bottle appears to have been deliberately shaped for use as a tool (Figures 17 – 19). The sandy context and shape of artefact suggests it to have been flaked rather than trampled into shape.



Figures 17 – 19: The base of a wine bottle that appears to have been shaped for use (point 089).

Many sites contained pottery, but usually only a very few sherds. One small site was peculiar in that it contained only pottery and nothing else, in all ten sherds were located (Figure 20). Some of the sites in the study area contained pottery with fibre temper (Figure 21), although the vast majority of sherds were tempered with mineral grains. The significance of the temper lies in the fact that fibre (grass) tempered sherds have been directly associated with Bushmen groups rather than the Khoekhoen (Bollong *et al.* 1993). Such sherds are identified through the elongated spaces in the fabric where the grass has burned up during firing.



Figure 20: Pottery from ARB2012/003 (point 100).



Figure 21: Fibre tempered sherd from KOE2012/003 (point 143).

Large, heavy artefacts such as grindstones are usually not considered readily portable. However, we found isolated grindstones in a few locations. The large lower grindstone at point 044 is an example where it was entirely alone (Figure 22), while at ARB2012/010 there was a lower grindstone, two upper grindstones and several other rocks that may have functioned as weights for the ropes that are used to hold down a matjieshuis (Figure 23).

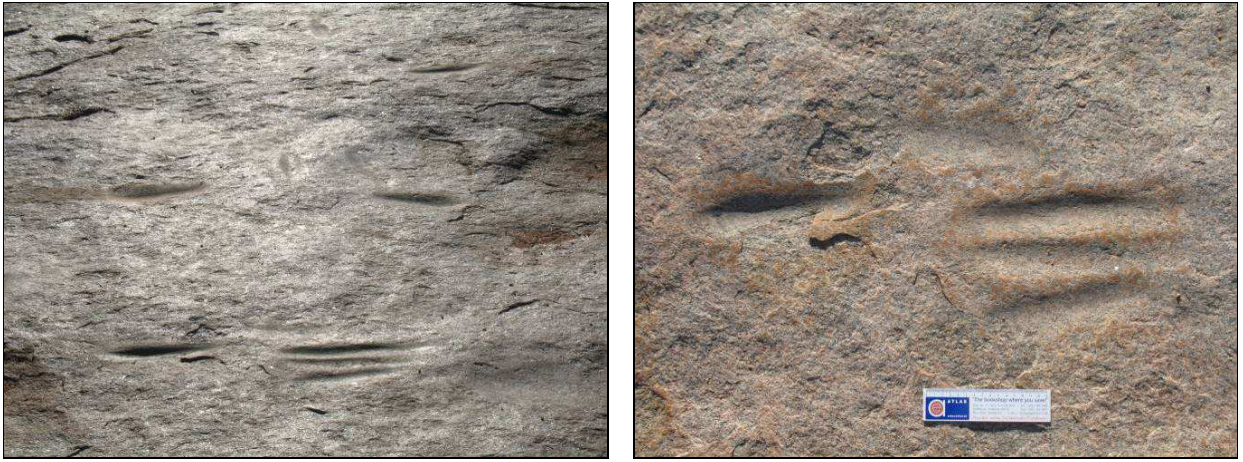


Figure 22: Isolated grooved lower grindstone from point 044.



Figure 23: Grindstones and other rocks at ARB2012/010 (point 109).

Particularly in/near pans, but also on a low hill in the middle of Smorgen Schaduwe, we found areas where people had used patches of exposed bedrock as lower grindstones. These areas manifested in two ways. Some were broad smooth areas, typical of many lower grindstones, while many others had formed clear grooves from repeated grinding in the same plane. The examples in Figures 24 and 25 come from KNG2012/011 at a point where 23 grinding hollows were found on the same rock (point 215). The photographs show a section where four grooves were placed one beside the other, reminiscent of a portable grindstone from coastal Namaqualand where the same was done. One groove at this same site (point 215) had a second and deeper groove placed over it at right angles.



Figures 24 & 25: Ground hollows and grooves in the bedrock at KNG2012/011 (point 215).

6.2. Pre-colonial rock art

Rock art in the study area took two forms. The first was painting which was located at four sites. The two painted rock shelters in Kangnas Poort were first described by Rudner and Rudner (1968) and are reasonably well known. The Rudners also described a third site from the same area, this one located at the junction of Kangnas, Koeris and Goinoep with the paintings actually on Koeris (Figure 26). The site is locally known as Kromneus and was incorrectly listed as Gobees se Pan by the Rudners. All three of these rock art sites contain paintings thought by their style and imagery to have been made by Khoekhoen herders rather than Bushmen hunter-gatherers (Eastwood & Smith 2005; Smith & Ouzman 2004). The imagery includes shapes listed as typical of 'herder art' such as circles, and grids (Figure 27). Two gemsbok (Figure 28) and a third unidentifiable animal are also present but importantly, all paintings are finger-painted.



Figure 26: Panoramic view of the entire painted rock face at Kromneus (KOE2012/001; point L056). The fence separating Koeris from Kangnas can be seen at the far right hand side.



Figure 27: Geometric imagery at Kromneus (KOE2012/001; point L056).



Figure 28: A gemsbok at Kromneus (KOE2012/001; Point L056).

One new painted site was discovered. It was found in a small crevice between two boulders on the farm Areb (Figure 29). It consists of just two semi-circular shapes with their straight sides adjacent to one another (Figure 30). It is unclear what the images represent but they are probably also part of the herder art tradition. A few ostrich eggshell fragments and quartz artefacts were found in front of the boulders.



Figure 29: The crevice containing the painting at ARB2012/004 (point 102). The art is above the two vertical plant stems.



Figure 30: Close-up of the paintings at ARB2012/004 (point 102).

The second type of rock art takes the form of small hollows or ‘cupules’ pecked and ground into the surface of the rock face. In total eight such localities were found, all on Smorgen Schaduwe. This form of art is very rare outside of the Iron Age and David Morris, an expert on Northern Cape rock art, knows of only a handful of similar occurrences stretching from Nieuwhoudtville in the south to north of the Orange River (D. Morris, pers. comm. 2012). Most of the new examples were on vertical rock faces with a small overhanging roof, but not all. They were all at or very close to ground level with just one example being about 3 m above the sandy plains (Figures 31 – 32). Five were on one small and slightly orange-coloured hill (SMS2012/054 to SMS2012/058 inclusive; see Figure 4 for a distant view of the hill) and a sixth was immediately north of this hill (SMS2012/036). All of these faced either

south or south-east. Two more were located on low rock outcrops on the low hill 4 km ESE of the one just mentioned (SMS2012/027 and SMS2012/019). Both face southeast and are different to the other six sites for different reasons. SMS2012/019 was the only site to have 'cupules' deeper than about 3 mm. Here three were deeper than 20 mm with the deepest being ground about 35 mm into the rock surface (Figures 33 & 34). The second 'cupule' site on the hill was distinguished by having just a single hollow ground into a low, overhanging boulder at about knee-height.



Figures 31 & 32: View of the 'cupule' site at SMS2012/058 (point L017), the only one to be a few metres above natural ground level.



Figure 33: The ground 'cupule' site at SMS2012/019 (point 048).



Figure 34: Close-up of some of the deep 'cupules' at SMS2012/109 (point 048).

That the hollows were started by chipping the surface of the rock is exemplified at SMS2012/036 where about 27 'cupules' were found (Figures 35 & 36). Two, on a separate face just to the right of the main panel were not ground at all and presented only a rough concavity (Figure 37).

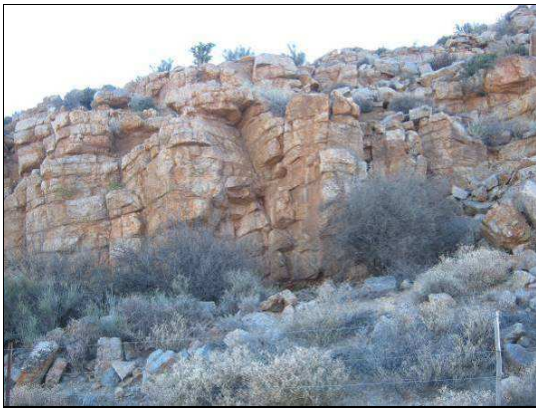


Figure 35: The rock face at SMS2012/036 (point 075) where c. 27 'cupules' were located.



Figure 36: Smooth 'cupules' at SMS2012/036 (point 075).



Figure 37: Rough 'cupule' at SMS2012/036 (point 075).

Archaeological associations at rock art sites are notoriously difficult to make and these sites were varied in that regard. Some had large scatters of Stone Age material, others had very little or none at all, while one had some European ceramic and glass fragments at its base (Figures 38 – 40). We are certain of the Stone Age antiquity of the art and the European artefacts may indicate use of the area by settlers, or perhaps that the archaeology was quite recent.



Figure 38: 'Cupule' site at SMS2012/056 (point L015) with limited archaeological material around its base.



Figure 39 & 40: Glass and ceramic from SMS2012/056 (point L015).

6.3. Historical archaeology (Anglo-Boer War)

Informal and formal Anglo-Boer War fortifications and related structures are common throughout north-western South Africa. In the present study area several examples of informal type structures pertaining to the war (according to the Kennedys who own the farm)

were located. None of the structures on Smorgen Schaduwe were fortifications in the traditional sense and there were no gun ports in the walls, which, in turn, were all relatively low and made of roughly packed rocks collected from the immediate vicinity (Figures 41 & 42). Most of the structures were perched on the northern edge of a hill with a commanding view across the plains to the north (Figure 43). What the function of these structures were is unknown, especially since the main road through the area in fact passed to the south of this hill and could not have been seen from this location (Figure 11). Two larger structures were located further back, more on top of the hill, and must have served different functions given their restricted views (Figures 44 & 45). The presence of a number of old tin cans and other similar metal items supports this claim, since such items are frequently found on known Anglo-Boer War sites (Figures 46 – 48).



Figure 41: Stone enclosure at SMS2012/002 (point 027).



Figure 42: Close-up of the packed stone wall at SMS2012/002 (point 027).



Figure 43: View of SMS2012/005 (point 030) showing its location on the edge of the mountain overlooking the plains.

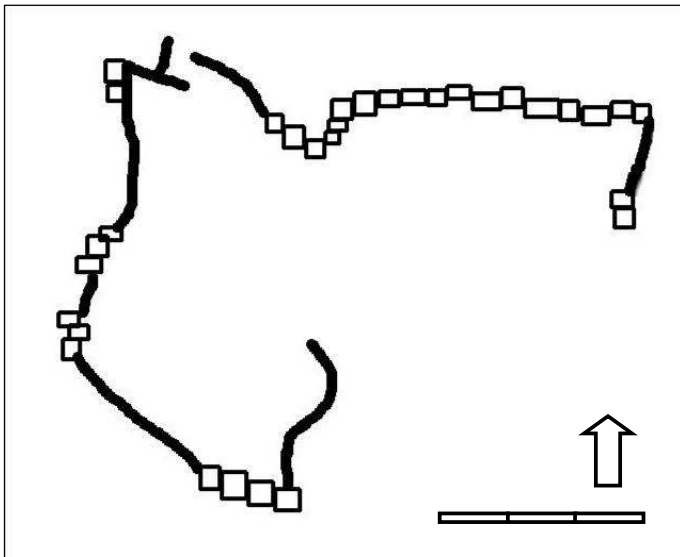


Figure 44: Floor plan of the large stone walled Structure at SMS2012/004 (point 029). Scale bar in 10 m intervals. The blocks represent natural rock outcrops and the lines built walls. Downhill is to the north.

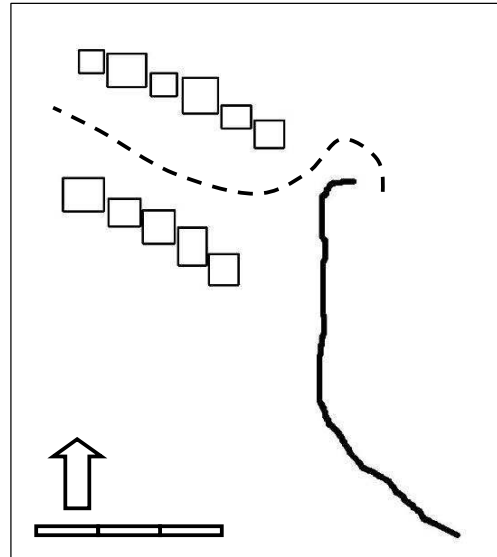


Figure 45: Floor plan of the stone-walled structure at SMS2012/004 (point 032). Scale bar in 2 m intervals. The blocks represent natural rock outcrops and the lines built walls. Downhill is to the west.



Figures 46 – 48: Tin cans found at Anglo-Boer War sites. Figure 45 is from SMS2012/003 (point 028), while the other two are from SMS2012/004 (point 029).

6.4. Historical archaeology (other)

Several other informally built, piled stone structures were also present on the landscape and these likely all pertain to the historical use of the landscape for livestock grazing. It should be emphasised that with the very late granting of farms in this area and its great remoteness from the Cape Colony, practices that seem very antiquated would likely have continued on into the 20th century and all the features described here likely date to the very late 19th century or early 20th century. The structures consist of small circular features and kraals with walls up to one metre high and single stone high alignments of rocks. The first example highlighted here is a set of low features of stones and earth that have been packed into the low points on a granite outcrop to increase the volume of the natural 'klipbakke' that occur there (Figure 49). Small informal kraals were also noted in a number of areas. That at SMS2012/026 was a fine example of about 7 m diameter and 0.3 m to 0.8 m height and contained a small (c. 140 mm long) early-mid 20th century clear glass bottle (Figure 50).



Figure 49: Stone and earth feature that traps water
On the granite in the lower left corner of the picture
at SMS2012/031 (point 069).



Figure 50: Small stone kraal with informally-packed
walls at SMS2012/026 (point 063). It is about 7 m
by 7 m in size with its entrance facing south.

Even less formal structures also occur. At SMS2012/045 we found a low semi-circular stone alignment some 23 m long running along the base of a hill with a rectangular enclosure of 5.5 m by 7.0 m sticking out from it (Figure 51). Nearby was a small semi-circular feature, perhaps for anchoring the base of a wind break structure made from matting. These no doubt relate to a historical stock post.



Figure 51: SMS2012/045 (point 092) had informally built stone features suggesting a historical stock post.

A large kraal at ARB2012/007 may have been in use until fairly recently but still no doubt dates back to at least the early 20th century. It is well built of packed stone and approximately 10 m by 31 m in size (Figures 52 & 53). The walls were about 1 m high. A small (c. 3 m diameter) circular structure was found some 60 m to the northwest. This too may have served as shelter for a shepherd. A large area in front of the kraal was heavily overgrazed and, despite not having been used in very recent decades, the ground has not recovered (Figure 54). Many historical artefacts typical of the late 19th and early 20th centuries (Figures 55 & 56) and even a probable grave are associated with this site (see below).



Figure 52: Large historical kraal built against the side of a rocky ridge at ARB2012/007 (point 105).

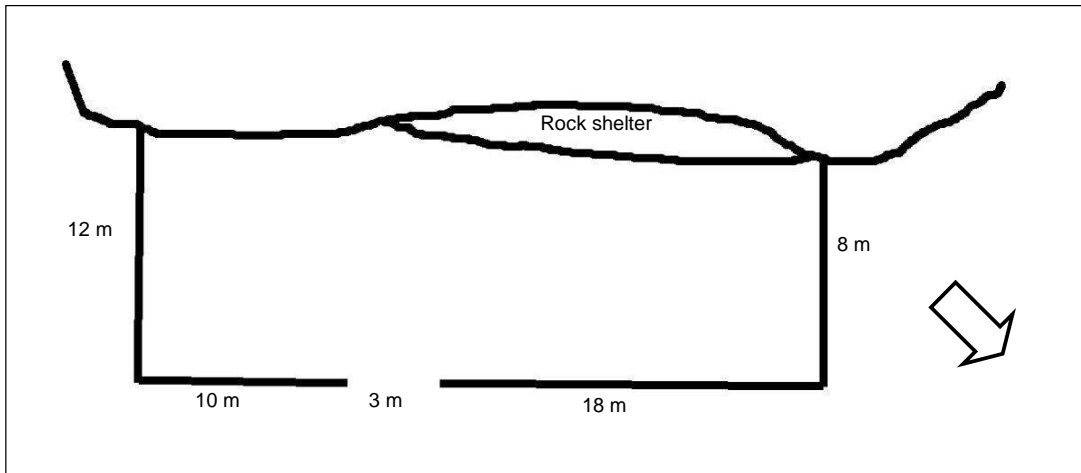


Figure 53: Floor plan of the kraal at ARB2012/007 (point 105).



Figure 54: The degraded area in front of the kraal at ARB2012/007 (point 105).



Figures 55 & 56: Historical artefacts from the stockpost at ARB2012/007 (point 105).

One outcrop of granite boulders seems to have been used both in pre-colonial and historical times. Pre-colonial artefacts were rather less frequent than might have been expected. It is thus unlikely that the site was the result of contact between indigenous and colonial people. Artefacts of glass, ceramic and metal were noted, and a number of bones were also present (Figures 57 – 59).



Figures 57 – 59: Stone Age and historical artefacts found at SMS2012/038 (point 082).

At ARB2012/002 (point 097A & 097B) there were crude stone walls between boulders of a granite outcrop. Their function is not evident but they are almost certainly historical and have a number of glass, ceramic and metal objects in their vicinity (point 096; Figures 60 & 61). Another area with suggestions of historical use was at SMS2012/065 where a denuded area suggested an old stock post and several historical ceramic fragments (Figure 62) and some loose rocks were found. The rocks may have been anchors for a Matjieshuis. These traditional houses were still in use until quite recently and were also used by European settlers for their versatility and convenience. The ceramics included Chinese coarse porcelain

(ginger jars), lusterware, white refined earthenware and transfer ware. Other evidence of historical use of the area is found in the occasional isolated fragments of glass and ceramics like the pink glass found very far from any other heritage or landscape features in the northern part of Areb at point 110 (Figure 63).



Figures 60 & 61: Historical artefacts from in and around the crude stone walling at ARB2012/002 (point 096).



Figure 62: Historical ceramic fragments from SMS2012/065 (point L038).

Figure 63: Isolated find of glass on Areb (point 110).

The last type of historical archaeological resource we noted were ‘putse’ excavated by hand during the late 19th and early 20th centuries. These are essentially wells but only had the uppermost parts lined with stones. They can be very deep with three dry ‘putse’ on Areb being as much as 20 m to 25 m deep and only about 2.5 m to 3.0 m in diameter. The Areb ‘putse’ now have windmills built over the top of them. One was located on Karas, just outside the study area while two more were on Kangnas (in Gobees se Pan) and Koeris (in Springbokvlei) respectively. These two were obviously excavated in pans where water frequently collects so as to maximise their yield. During our visit both had water in them almost to the land surface (Figures 64 & 65).



Figure 64: The 'putse' at KNG2012/011 (point L129) located in Gobees se Pan.

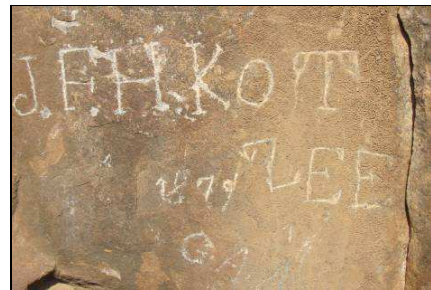
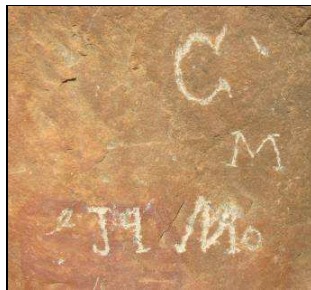


Figure 65: The 'putse' at KOE2012/003 (L086) located in Springbokvlei. Note the rock through which the well has been excavated.

At the Kromneus rock art site we also found several examples of historical graffiti. That the pan was important for water in pre-colonial and historical times is shown by the fact that an early 19th century track ran past this place (Figure 11), likely the reason for the graffiti (Figures 66 – 70). Names, initials and dates visible include:

- J.F.H. Kotzee 1879;
- C.W. Meyer 1879;
- J. v. Niekerk;
- D.J. Coetzee;
- 1900 (possibly associated with D.J. Coetzee and maybe J. v. Niekerk);
- A J v Zyl
- G.A.;
- EM;
- CM
- H;
- AE;
- ARM;
- J; and
- J9 Mo.

There was also one name engraved on the floor of the shelter but this has become to worn down to read.



Figures 66 – 68: Historical graffiti scratched on the rocks at Kromneus, often over pre-colonial rock art.



Figures 69 – 70: Historical graffiti scratched on the rocks at Kromneus, often over pre-colonial rock art.

6.5. Built environment

The built environment, in general, is not very old in this area. Most farm buildings appear to date to the 1930s to 1960s but some on Smorgen Schaduwe appear to be older, perhaps dating to the late 9th century. They are vernacular Karoo-style buildings, now serving as farm outbuildings, although we were told that one was originally a house and the other a barn (Figures 71 & 72). The walls of these structures are very thick and they are flat-roofed.



Figure 71: The outbuilding at SMS2012/001 (point 026).



Figure 72: Second outbuilding at SMS2012/001 (point 026).

The oldest ‘modern’ house is likely that at Areb. The present owner (who acquired the farm in 1988) claims it to have been built in about 1912/1913. It is early 20th century, built of dressed stone and the walls are thick. However, the joinery (windows and doors) appears more like joinery typical of the 1930s. The porch was enclosed during the 1950s or 1960s, judging by the bricks used (Figure 73). A ruined outbuilding shows evidence of at least early 20th century construction with more modern alteration (Figure 74). The water ‘putse’ mentioned above are located behind this building, beneath the windmills.



Figure 73: The main house at Areb (ARB2012/004; point 102).



Figure 74: Ruined outbuilding at ARB2012/018 (point L054).

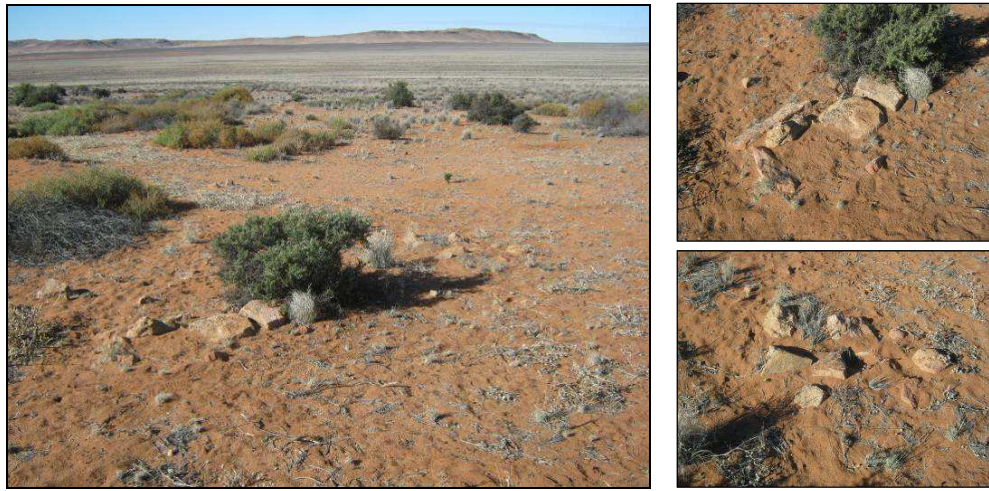
The Koeris farmstead has a historical component but this is only early 20th century. While the main house (now in ruin) seems to have been built in the 1960s, the single outbuilding, which is still in usable condition, is likely a bit older (Figure 75). An interesting item at this werf was an old water pump that may have predated the windmills (Figure 76). It too is regarded as a heritage object.



Figures 75 & 76: The shed/outbuilding, dams, windmills and old pump at KOE2012/005 (point 126).

6.6. Graves and graveyards

Most farms have family graveyards and those under study here were no exception. With one exception (Areb), they were not visited. Of greater concern is the possibility of isolated graves occurring away from the houses. A few potential examples were encountered. At SMS2012/020 there were two small neighbouring mounds of stones that seemed like possible graves (Figures 77 – 79). At ARB2012/005 there was a pile of rocks placed in a small gully between two bulges of bedrock (Figure 80). This seemed suspiciously similar to the stone-piled graves commonly found along the Orange River, close to Augrabies Falls (Dreyer & Meiring 1937; A. Morris 1995), although the latter are generally far larger.



Figures 77 - 79: Possible graves at SMS2012/020 (point 054).



Figure 80: Possible pre-colonial grave site at ARB2012/005 (point 103).

Perhaps the clearest example of a grave is that mentioned earlier from alongside the stockpost at ARB2012/007 (point 106). It was a stone mound with one stone that was probably a headstone (Figure 81). The grave also had a small blue bottle on top of it, perhaps left in memory of the deceased (Figure 82). Unmarked pre-colonial graves can be found anywhere on the landscape where substrate suitable for burial exists. There is, however, no way of predicting the locations of such graves.



Figure 81: Grave alongside the stockpost at ARB2012/007.

Figure 82: Bottle found on the grave.

6.7. Cultural landscapes

The study area was developed for farming relatively recently when compared to, for example, the south-western Cape. As a result the cultural landscape has few layers. The landscape is dominated by vast undeveloped spaces with occasional livestock enclosures, watering points, cement dams and windmills (Figure 83). Trees are very rare. Otherwise the only other elements of cultural landscape pertain to the farm werfs which are generally 20th century. These manifest as clusters of low buildings with windmills, water tanks, bushes and fences (Figures 84 & 85).



Figure 83: The windmills, dams, livestock watering point and stock enclosures at point152.



Figure 84: The Kangnas farm werf at KNG2012/001 (point 153).



Figure 85: Water infrastructure at the Kangnas farm werf at KNG2012/001 (point 153).

Although the farms were surveyed relatively late, in 1893, we know that colonists were using the area earlier than this because of both the graffiti and the European and Asian ceramic fragments found from time to time. The pans were as important to the colonists as they were in pre-colonial times and each pan, mountain and hill would have been well known to those passing through the area.

7. IMPORTANT HERITAGE

Due to the large number of sites and occurrences placed on record, this section was deemed necessary so as to briefly sum up the most important heritage resources that require further action before development and during operation of the proposed facilities.

Many of the important heritage resources have already been protected through institution of buffers around farm werfs, pans and mountains. There are, however, still five areas of primary heritage concern.

7.1. 'Orange Hill'

The first area of concern is a small hill that we have dubbed 'Orange Hill' (Figure 4). From a distance it appears geologically different and has a clearly orange hue. There are a large number of archaeological sites on and around this hill, including six of the eight ground 'cupule' sites described above. There are many scatters of stone artefacts, including one with a preserved hearth that appears that it may be a recent Khoekhoen stockpost. There are other areas with artefacts clearly dating to 2000 to 5000 years ago as well. This entire hill and its surrounds should be considered a no-go area and a buffer as shown in Figure 86 should be implemented. The buffer is approximately 1.5 km in diameter (approximately 700 m from all recorded heritage on the side that the rock art faces and 400 m elsewhere). This whole hill currently falls outside of both development focus areas.

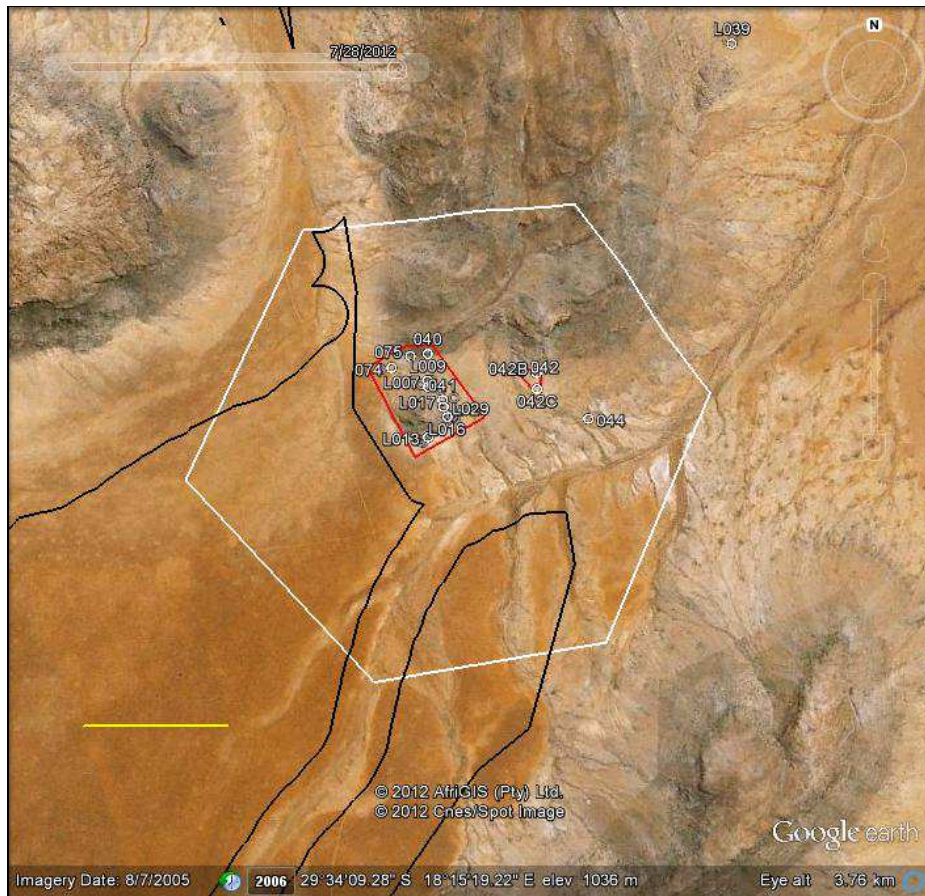


Figure 86: Aerial view of 'Orange Hill' showing the proposed heritage buffer. The yellow bar for scale at lower left is 500 m long.

7.2. 'SMS Hill'

This low rise on Smorgen Schaduwe (hence 'SMS') protrudes from the grasslands and has multiple low rocky outcrops on it. A large number of archaeological occurrences are present on the hill and, although none are of very high significance, the sheer number of occurrences shows the importance ascribed to this hill in both pre-colonial and historical times. This entire hill and its surrounds should be considered a no-go area and a buffer as shown in Figure 87 should be implemented. The proposed grid connection power line will need to be shifted outside of this buffer zone. The buffer is approximately 1.5 km east/west and 1.9 km north/south (approximately 450 m from all recorded heritage). This entire hill currently falls just inside the wind focus area.

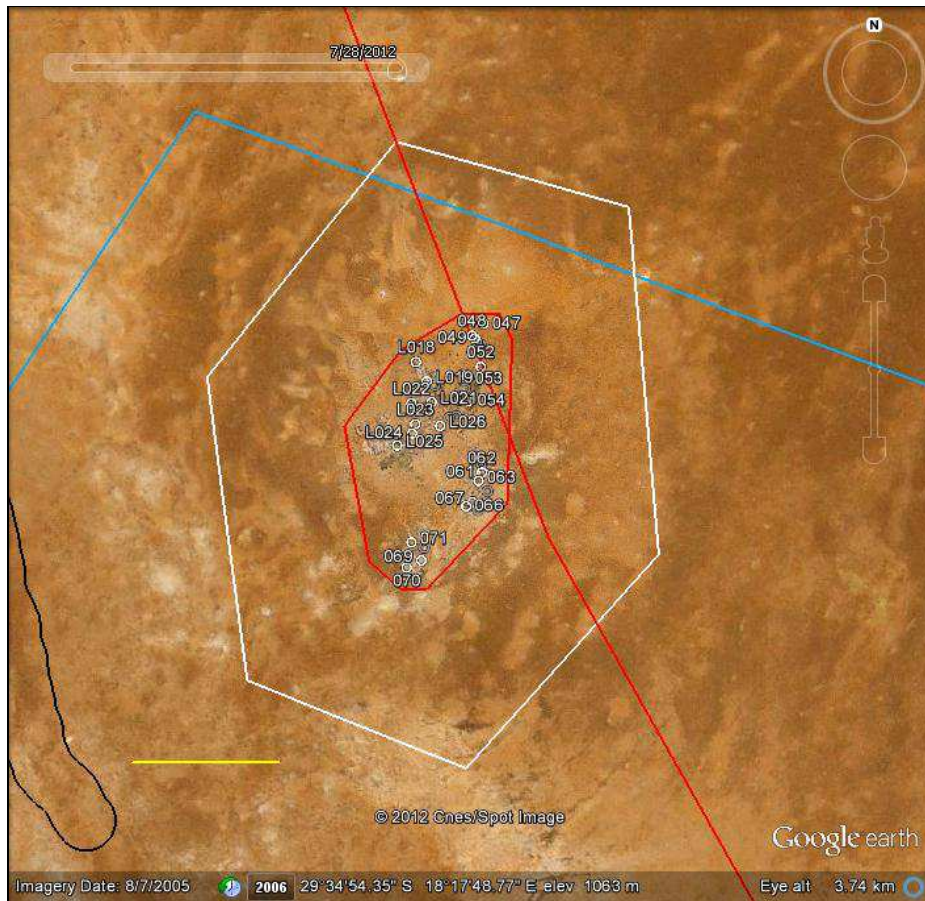


Figure 87: Aerial view of 'SMS Hill' showing the proposed heritage buffer. The red outline denotes the edge of the archaeological site, while the straight red line is the proposed grid connection routing. The blue line represents the wind focus area (south of the line). The yellow bar for scale at lower left is 500 m long.

7.3. Gobees se Pan

This large pan with extensive granite bedrock outcrops is home to a plethora of archaeological sites and occurrences and more may well be preserved beneath the surface of the ground. The entire pan and its immediate surroundings should be considered a no-go area and a buffer as shown in Figure 88 should be implemented. The buffer is approximately 1.2 km east/west and 1.3 km north/south (approximately 350 m from all recorded heritage). This site currently falls outside of both development focus areas.

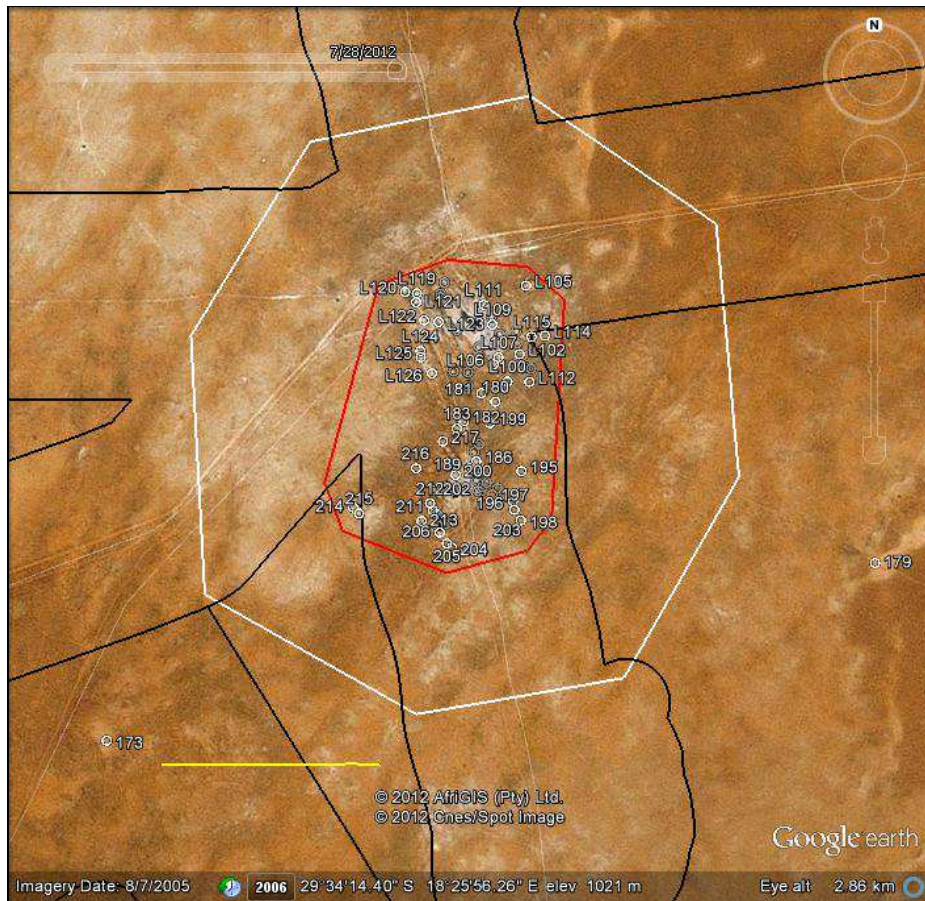


Figure 88: Aerial view of Gobees se Pan showing the proposed heritage buffer. The red outline denotes the edge of the archaeological site. The yellow bar for scale at lower left is 500 m long.

7.4. Springbokvlei

This is another large pan with some exposed bedrock. Many archaeological sites were located on the surface and some may have depth. Further sites may be fully preserved beneath the ground. The entire pan and its immediate surroundings should be considered a no-go area and a buffer as shown in Figure 89 should be implemented. The buffer is approximately 0.9 km east/west and 1.0 km north/south (approximately 200 m from all recorded heritage). The site presently falls just on the northern edge of the wind focus area.

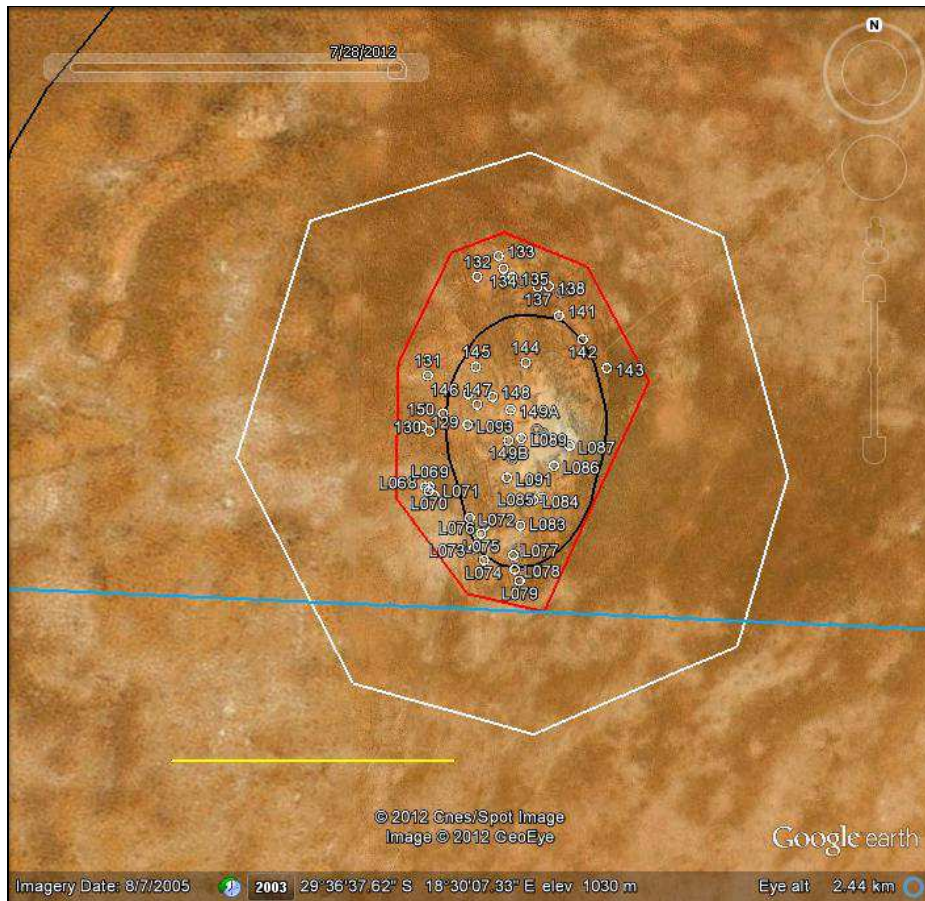


Figure 89: Aerial view of Springbokvlei showing the proposed heritage buffer. The red outline denotes the edge of the archaeological site. The blue line denotes the wind focus area (to the south of the line). The yellow bar for scale at lower left is 500 m long.

7.5. Site KNG2012/007

This site is not of very high significance but nonetheless has value and should not be developed. Being a pan, the chances of subsurface deposits occurring around it are still relatively high. No buffer is proposed but the area within the red line should be considered off limits for development (Figure 90). The site is approximately 250 m across.

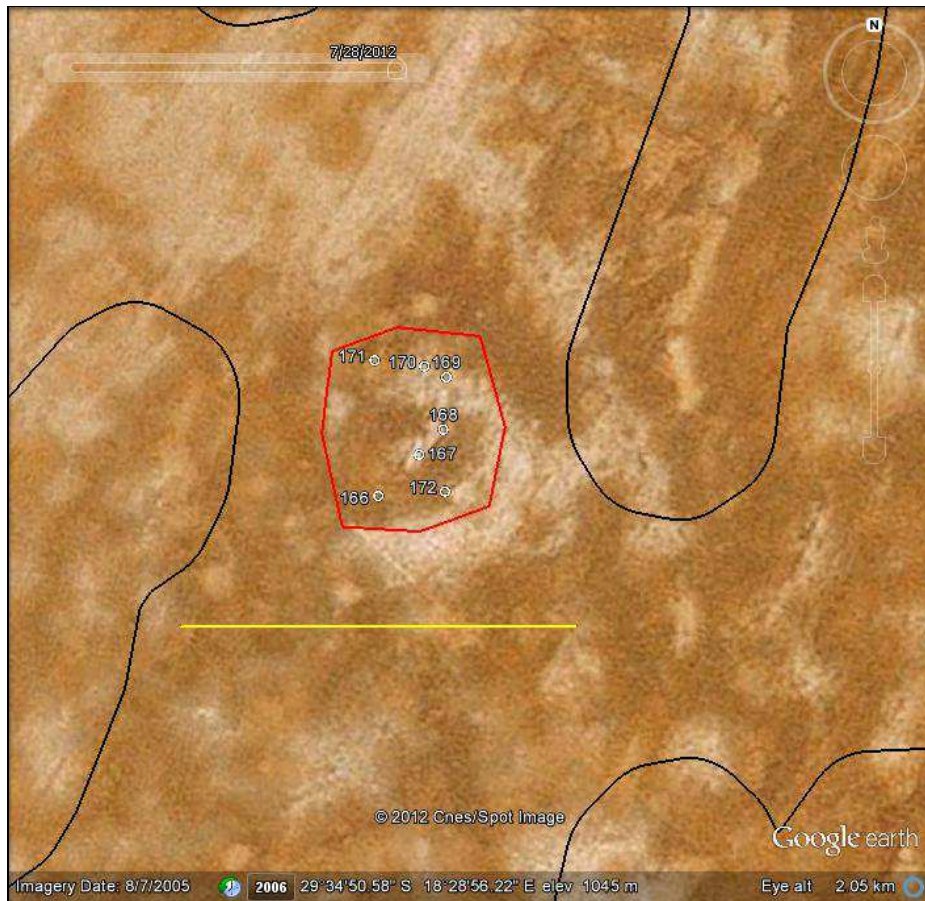


Figure 90: Aerial view of site KNG2012/007 showing the edge of the archaeological site (red outline). The yellow bar for scale is 500 m long.

7.6. Kromneus

Aside from graves, this painted rock art site and its surrounding archaeology are perhaps the most important heritage resources under threat from the proposed development, given that the other rock art sites are already protected. The entire outcrop and its immediate surroundings should be considered a no-go area and a buffer as shown in Figure 91 should be implemented. The buffer is approximately 1.0 km in radius from the rock art site.

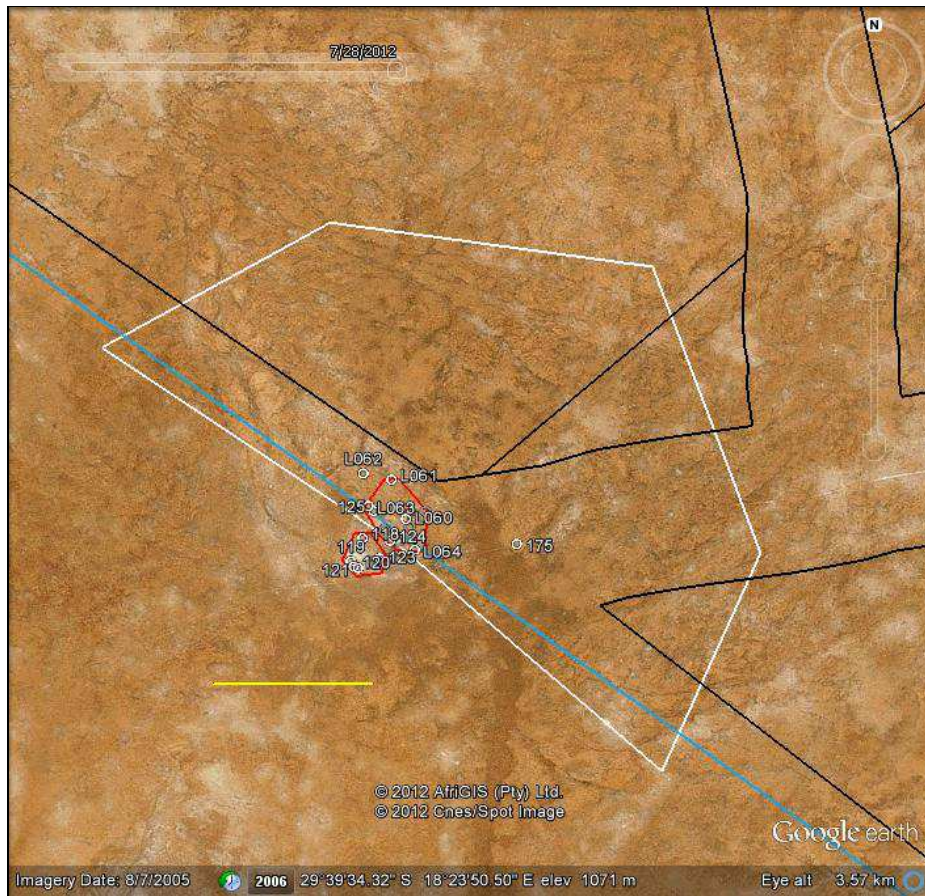


Figure 91: Aerial view of Springbokvlei showing the proposed heritage buffer. The red outline denotes the edge of the archaeological site. The yellow bar for scale at lower left is 500 m long.

8. ASSESSMENT OF IMPACTS

In this section the impacts are rated according to the standard criteria provided by Aurecon in their DSR. It should be noted that impacts to the majority of heritage resources occur during construction as they relate to destruction of the resource and/or degradation of its context. The latter impacts would be reversible after decommissioning but any destroyed heritage is non-recoverable. Note also that significance ratings for heritage are sometimes inflated due to the permanent nature of the impacts and the rating reflected in the table below have at times been moderated to more accurately reflect the archaeological significance. No ratings for decommissioning are provided since all impacts would revert back to the status quo.

8.1. Solar energy facility

Direct impacts to heritage resources are primarily expected to occur during the construction phase of the solar development, although indirect visual impacts will persist for the life of the project. Table 1 shows the expected impacts to archaeological resources. No mitigation is required within the present solar focus area. Table 2 shows the expected impacts to the cultural landscape and scenic value as seen from the N14. The only mitigation that can be suggested is to keep the facility as far to the northwest within the focus area as possible, but

without knowing the full extent of the layout, specific alterations to it cannot be suggested. As such, no post-mitigation ratings can be provided. Impacts to graves and built environment resources will not occur in the current solar focus area.

Table 1: Assessment of construction phase archaeological impacts for the solar energy facility.

	Before mitigation	After mitigation
Extent	Site specific	-
Magnitude	Very low	-
Duration	Long term	-
Probability	Definite	-
Significance	Very low	-
Confidence	Sure	
Status	Negative	Negative
Reversible	No	
Cumulative impacts	No similar facilities are planned within reasonable proximity of the Kangnas site and cumulative impacts cannot thus be rated. However, the archaeological material present in the immediate vicinity is of very low significance and the loss of larger areas containing such material is not significant.	

Table 2: Assessment of construction and operational phase cultural landscape and visual impacts for the solar energy facility.

	Before mitigation	After mitigation
Extent	Local	-
Magnitude	Low - Medium*	-
Duration	Long term	-
Probability	Definite	-
Significance	Medium**	-
Confidence	Certain	-
Status	Negative	Negative
Reversible	Yes	
Cumulative impacts	No similar facilities are planned within reasonable proximity of the Kangnas site and cumulative impacts cannot thus be rated. However, the more such facilities that are built along the N14 the more its scenic value would be degraded.	
* This would vary depending on the height of the facility.		
** Most likely overall significance.		

8.2. Wind energy facility

Direct impacts to heritage resources are primarily expected to occur during the construction phase of the wind development, although indirect visual impacts will persist for the life of the project. Table 3 shows the expected impacts to archaeological resources. No conventional archaeological mitigation work (i.e. excavation, recording) is required so long as the suggested buffers and no-go areas are implemented. These buffers will serve to protect all important heritage resources. The post-mitigation ratings are effectively rating the impacts that would occur to the general background scatter of archaeological artefacts that litter the landscape. Table 4 shows the expected impacts to the cultural landscape and scenic value as seen from the N14, as well as visual impacts to the contexts of the important archaeological resources. Although the facility would be further from the N14 if the present wind focus area is retained, the turbine structures are far taller than solar development so the

same magnitude has been assigned as for the solar development. Impacts to graves and built environment resources will not occur in the current wind focus area so long as the proposed buffers are implemented.

Table 3: Assessment of construction phase archaeological impacts for the wind energy facility.

	Before mitigation	After mitigation
Extent	Regional	Site specific
Magnitude	High	Very low
Duration	Long term	Long term
Probability	Certain	Definite
Significance	High	Very low
Confidence	Certain	Sure
Status	Negative	Negative
Reversible	No	
Cumulative impacts	No similar facilities are planned within reasonable proximity of the Kangnas site and cumulative impacts cannot thus be rated. However, the archaeological material present within the no-go areas is of high significance and any impacts caused by further similar facilities would be considerable.	

Table 4: Assessment of construction and operational phase cultural landscape and visual impacts for the wind energy facility.

	Before mitigation	After mitigation
Extent	Local	-
Magnitude	Low - Medium*	-
Duration	Long term	-
Probability	Definite	-
Significance	Medium**	-
Confidence	Certain	-
Status	Negative	Negative
Reversible	No	
Cumulative impacts	No similar facilities are planned within reasonable proximity of the Kangnas site and cumulative impacts cannot thus be rated. However, the more such facilities that are built along the N14 the more its scenic value would be degraded.	
* This would vary depending on the height of the facility.		
** Most likely overall significance.		

9. CONCLUSIONS

This heritage impact assessment has found a wide variety of heritage resources to be present on the landscape of the study area. However, these resources are very tightly clustered around water sources and hills and, as such are often protected by the buffers already required by natural scientists. However, certain of these buffers require extending to ensure adequate protection of heritage resources. Should such buffers be successfully implemented then the site is deemed suitable from a heritage point of view for the proposed developments. The grid connection power line will need to be shifted so as to stay out of one of the no-go areas.

It should be noted that the management plan must stipulate that construction crew and vehicles should not enter the buffer areas so as to ensure their protection at all times. Small vehicles may, however, continue to use farm roads that pass through the buffer zones. The primary concern here is with people seeing the existing historical graffiti at the rock art sites and adding their own modern graffiti.

Although Harris (2012) has concluded that the Kalkkom crater could be a meteorite impact site, he feels this to be unlikely. In any event, the crater is outside of the area to be impacted and requires no further consideration.

10. RECOMMENDATIONS

It is recommended that the proposed developments should be allowed to proceed but subject to the following conditions:

- All buffers and no-go areas stipulated in this report must be adhered to for both the facilities and all roads and power lines;
- Should any human remains be uncovered during development they must be immediately protected *in situ* and reported to the heritage authorities or to an archaeologist. The remains will need to be exhumed at the cost of the developer;
- All construction and maintenance crew and vehicles (except small vehicles which may use existing farm tracks) should be kept out of the buffer zones; and
- The final layout should be shown to the appointed archaeologist before implementation to confirm that all significant heritage resources have been adequately protected.

11. REFERENCES

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APPENDIX A : List of heritage sites and other occurrences.

Site Name	GPS point	Co-ordinates	Description	Significance
Areb 75				
---	094	S29 30 37.0 E18 10 42.0	One shallow ground area in bedrock.	---
ARB2012/001	095	S29 30 37.9 E18 10 16.6	Tiny stone structure 1.0 x 1.0 x 0.4 m high.	
ARB2012/002	096	S29 30 40.9 E18 10 17.9	Light scatter of pink and pale green glass, hand-painted ceramics, tin lid, quartz, OES.	Low
	097A	S29 30 40.7 E18 10 18.3	Crude walling on granite platform. A & B at two bits of walling. Tin can close to 097A.	
	097B	S29 30 41.4 E18 10 18.0		
---	098	S29 30 41.1 E18 10 18.0	One shallow ground area in bedrock.	---
---	099	S29 30 41.3 E18 10 19.4	Ephemeral quartz, OES and refined earthenware scatter and one granite upper grindstone on granite platform. Fragments of ?early 20 th century wine bottle nearby.	---
ARB2012/003	100	S29 31 58.0 E18 11 20.9	Scatter of pottery, with one having an ochred external surface. Nothing else associated.	Low
---	101	S29 31 44.7 E18 11 17.3	A few green bottle fragments. One has a square edge suggesting case bottle.	---
ARB2012/004	102	S29 31 48.9 E18 11 17.6	Likely rock painting in white. Two semi-circular motifs with straight sides facing one another a few cm apart. OES and quartz scatter in front of the shelter and one tin lid. The shelter is not inhabitable and is really a gap between two boulders.	High-Medium
ARB2012/005	103	S29 31 49.0 E18 11 18.9	Suspicious pile of rocks filling a crevice between granite bedrock outcrops. Looks like it may be a burial.	High (potentially)
ARB2012/006	104	S29 31 49.9 E18 11 20.3	Small round stone enclosure of 3.0 x 3.0 x 0.8 m high at the base of the hill. A refined earthenware fragment was found in front of it. Probably related to point 105.	Low
ARB2012/007	105	S29 31 51.2 E18 11 22.1	Large rectangular kraal up against a steep granite wall. Plenty of quartz and OES in front of the part that would be called a rock shelter. Near the entrance was quartz, CCS, pottery, a HS/UG fragment (quartzite cobble), and ceramic and glass fragments.	Medium (stock post)
	L052	S29 31 54.4 E18 11 25.6	A 20 th century stockpost location? The veld is degraded and covered with invasive plants (dried Mesembryanthemum?) Some glass and a widespread distribution of European ceramics that extends all the way to the front of the stone kraal (recorded by J)	High (grave)
	106	S29 31 50.9	Likely stone covered grave with informal	

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 11 23.4	headstone. Several other clusters and alignments of stones and isolated stones lie very close by so perhaps there are more graves? Also some glass and ceramics. Small blue bottle on the main grave.	
ARB2012/008	107	S29 29 15.2 E18 13 22.3	Quartz artefact scatter in an eroding area at the base of the granite hill.	Low
ARB2012/009	108	S29 28 48.5 E18 13 49.8	Ephemeral pan with six potsherds in it and nothing else. Next small pan to the east had one clear quartz flake in it.	Low
ARB2012/010	109	S29 28 35.8 E18 14 36.5	Large ephemeral pan with two upper grindstones right alongside a lower grindstone. Also a few other rocks together here. One quartz flake and one quartz core were seen elsewhere in the same pan.	Low
---	110	S29 28 18.7 E18 15 37.0	Three purple glass fragments.	---
ARB2012/011	111	S29 29 32.2 E18 15 47.4	Quartzite block with a flaked edge in a deflated area. Also occasional quartz flakes in the area.	Low
ARB2012/012	112	S29 30 41.0 E18 14 56.2	Areb farm werf. Main house built 1912 (according to farmer) although the joinery and steel windows look a bit later. The porch was enclosed and an addition made probably in the 1950s/1960s. Also a small vernacular Karoo-style cottage out the back in decorative breeze blocks.	High
ARB2012/013	113	S29 30 51.4 E18 14 55.6	Two open wells with stone walling around the top meter or so then just cut through layers of calcrete. Apparently some French palaeontologists found and published a fossil from the calcrete in one of these holes. Windmills are built over the top of the wells and one has an old iron bucket next to it from the days when there was water in the wells.	High
ARB2012/014	114	S29 30 50.6 E18 15 03.1	Farm graveyard with three graves. Van den Heever (1940), Van den Heever (1947) & Dauth (1944).	High
---	L046	S29 30 51.2 E18 10 19.9	An ephemeral scatter of quartz artefacts next to a granite koppie; about 5 stone artefacts, some OES and a Chinese cracker	---
---	L047	S29 30 50.0 E18 10 19.6	A scatter of quartz artefacts (about 5) between some granite boulders at the base of a koppie	---
---	L048	S29 30 46.8 E18 10 21.8	An ephemeral scatter of quartz artefacts near the koppies	---
---	L049	S29 32 01.7 E18 11 26.5	Tin cans, wire and some OES in front of a koppie	---
ARB2012/015	L050	S29 32 00.5 E18 11 31.9	A Lower Grindstone of quartzite lying in a sheltered kloof between two koppies. Associated with an ephemeral quartz scatter	Low
ARB2012/016	L051	S29 31 59.0 E18 11 31.0	Stone walling in front of a small cave formed by two large granite boulders.	Low

Site Name	GPS point	Co-ordinates	Description	Significance
			The floor of the kraal is of stone. The wall is roughly packed and about 1m high. There is no associated material.	
ARB2012/017	L053	S29 28 34.5 E18 15 12.0	A scatter of 9 potsherds and one quartz flake on the banks of a dried river bed. The potsherds are all very small, about 5mm thick, fine-grained temper and brown in colour.	Low
ARB2012/018	L054	S29 30 51.1 E18 14 55.7	A stone structure at the "putse". It is located immediately next to the putse, and adjoining the reservoir. It is square (about 20m ²), minus a roof, with a large doorway, supported by a more recently inserted concrete lintel and evidence of a modern sliding door. Presumably a shed. The inside stone walls have been plastered halfway up the walls. Running in front of the door, from the reservoir to the little vineyard at the putse, is a small stone-lined furrow.	Medium-Low
Goioep 126				
GNP2012/001	118	S29 39 43.1 E18 23 38.1	Two shallow grinding grooves in bedrock on edge of pan.	Medium-Low
	119	S29 39 45.4 E18 23 36.7	Three shallow grinding grooves in bedrock on edge of pan.	
	120	S29 39 45.9 E18 23 37.0	Three shallow grinding grooves in bedrock on edge of pan.	
	121	S29 39 46.1 E18 23 37.5	At least nine shallow grinding grooves in bedrock on edge of pan.	
	122	S29 39 45.7 E18 23 39.6	At least seven shallow grinding grooves in bedrock on edge of pan.	
	123	S29 39 45.1 E18 23 40.0	At least seven shallow grinding grooves in bedrock on edge of pan.	
Kangnas 77				
---	115	S29 37 42.0 E18 20 36.4	Extensive area of pans with rare quartz artefacts.	---
---	116	S29 37 57.1 E18 20 44.9	Pan with quartz scatter among quartz gravel.	---
---	127	S29 40 13.4 E18 28 54.7	North edge of so-called crater. Looks just like a very large pan and lies on the south side of the fence line. With cadastral buffer it should be protected.	---
KNG2012/001	153	S29 34 06.3 E18 21 11.2	Kangnas farm werf. Probably all mid-20 th century structures.	Medium
---	156	S29 33 45.9 E18 19 22.6	Isolated granite lower grindstone and a few quartz flakes.	---
KNG2012/002	157	S29 33 39.4 E18 19 20.9	Artefact scatter of quartz in a denuded area.	Low
---	158	S29 33 42.4 E18 19 27.3	Quartzite pebble hammerstone/upper grindstone and a large piece of very nice ochre – nothing else.	---
KNG2012/003	159	S29 34 01.4 E18 20 19.6	Kangnas rock art cave on the north side of the valley. Three shelters with central one largest. Left one (about 5 m wide, 1 m high and 2 m deep) is up on a ledge and has just one white image. Central shelter (width hard to estimate due to	High

Site Name	GPS point	Co-ordinates	Description	Significance
			shape, about 4 m deep and 2 m height) has several geometric images including circular and grid designs. All art is on the steep roof. Some grinding hollows are present on the floor. Graffiti on walls and floor including a 'wagon wheel' that may be imitating the rock art. No dates. Tiny, low shelter on the right (4m wide, 2 m deep, 0.7 m high) has one large 'sunburst-type' image on the roof on the left side where roof is very low. Graffiti on the floor including another 'wagon wheel but with two concentric circles, spokes between circles and cross in central circle. Several grinding hollows and some graffiti over-writes hollows. No associated archaeology – unclear if deposit may have been present beneath gravel floor or if gravel is natural river gravel.	
KNG2012/004	160	S29 34 01.3 E18 20 15.5	Stone-lined dam with the rocks probably having been raided from a kraal that used to stand in this valley. Only the 'foundation' remains. Dam of uncertain age but spillway was made of 'slasto' and probably dates to about the 1970s.	Low
KNG2012/005	161	S29 34 03.0 E18 20 20.5	Kangnas rock art cave on the south side of the valley. Dome shaped shelter of about 9 m width at the mouth tapering to form two alcoves at the back (right one is a lair). Roof about 2.5 m at mouth and about 1 m at the back, depth about 10 m. Lots of geometric art, some of which may be 'modern art'. Lots of red geometrics are clearly the oldest with white and black being over the top.	High
---	162	S29 35 37.9 E18 21 02.3	System of ephemeral pans with quartz background scatter.	---
---	163	S29 36 00.1 E18 21 10.1	System of ephemeral pans with quartz background scatter.	---
---	164	S29 35 22.6 E18 29 12.7	System of ephemeral pans with quartz background scatter but there is a proper pan at this point.	---
KNG2012/006	165	S29 35 15.3 E18 29 13.4	Part of above system but with more artefacts. Quartz, quartzite, CCS. One ?unifacial point in CCS. Probably MSA and LSA mixed.	Low
KNG2012/007	166	S29 34 52.3 E18 28 51.9	OES scatter with massive number of fragments over a wide area. Also 2 CCS flakes. On edge of pan.	Medium
	167	S29 34 50.6 E18 28 53.8	Pan with granite bedrock exposure. 10 grinding hollows.	
	168	S29 34 49.6 E18 28 55.0	Granite bedrock with 7 grinding hollows on one rock and 1 more on a second area of bedrock. One broken backed piece in CCS, looks large and weathered, ?MSA.	
	169	S29 34 47.4	Artefact scatter in calcrete gravel, quartz and CCS.	

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 28 55.1		
	170	S29 34 47.0 E18 28 54.1	Artefact scatter in calcrete gravel, quartz and quartzite.	
	171	S29 34 46.8 E18 28 51.8	Artefact scatter in ephemeral pan, quartz and CCS.	
	172	S29 34 52.1 E18 28 55.1	Artefact scatter, 8 potsherds (7 fibre temper, 1 mineral temper) – 1 rim, flattened and ?everted – quartz, CCS, lots of OES. Fragment of blue and white annular ware found 50 m to the southwest.	
KNG2012/008	173	S29 34 35.5 E18 25 25.4	Pan with artefact scatter. Quartz and CCS. MSA.	Low
KNG2012/009	174	S29 34 47.9 E18 25 25.4	Pan with granite outcrop. Artefact scatter of quartz, CCS, Silcrete. MSA.	Low
KNG2012/010	179	S29 34 22.3 E18 26 30.8	Pan with artefact scatter. Quartz and CCS, many artefacts.	Low
KNG2012/011	180	S29 34 10.5 E18 25 58.4	Artefact scatter. Quartz, CCS, OES, Pottery. Internally reinforced and horizontally-pierced lug in light brown clay.	High (Avoid)
	181	S29 34 09.8 E18 25 57.2	Granite bedrock outcrop away from pan with 7 grinding hollows. Artefact scatter. Quartz, quartzite, CCS, OES, pottery.	
	182	S29 34 11.9 E18 25 55.7	Subsidiary pan with granite bedrock patches. 8 grinding hollows. Extensive, low density artefact scatter of quartz, CCS, OES to the east.	
	183	S29 34 12.4 E18 25 55.1	Granite bedrock outcrop away from pan with 4 grinding hollows.	
	184	S29 34 13.6 E18 25 57.0	OES scatter with some quartz.	
	185	S29 34 14.2 E18 25 56.6	Granite bedrock outcrop in pan with 3 grinding hollows.	
	186	S29 34 14.9 E18 25 56.8	Granite bedrock outcrop in pan with 2 grinding hollows.	
	187	S29 34 15.7 E18 25 57.0	Granite bedrock outcrop in pan with 1 grinding hollow. Big waterbakke near this point and 188.	
	188	S29 34 16.3 E18 25 56.8	Granite bedrock outcrop in pan with 2 grinding hollows.	
	189	S29 34 15.4 E18 25 56.2	Granite bedrock outcrop in pan with 3 grinding hollows.	
	190	S29 34 16.5 E18 25 57.7	Granite bedrock outcrop in pan with 3 grinding hollows.	
	191	S29 34 16.8 E18 25 57.3	Granite bedrock outcrop in pan with 4 grinding hollows.	
	192	S29 34 17.1 E18 25 56.9	Granite bedrock outcrop in pan with 17 grinding hollows. Two hollows have some granite flaking off from within them. Presumably people would not have worked in obviously loose areas so this may indicate some antiquity? Artefact scatter of quartz, pottery and glass.	
	193	S29 34 17.3 E18 25 58.2	OES and quartz scatter.	
194	S29 34 16.9	OES and quartz scatter.		

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 25 58.6		
	195	S29 34 15.6 E18 26 00.6	Artefact scatter. Quartz, CCS, other, OES, pottery, glass, ceramic, metal musical instrument fragment. Also a few small granite and calcrete rocks on the site.	
	196	S29 34 17.8 E18 25 59.9	OES and quartz scatter.	
	197	S29 34 18.5 E18 26 00.1	OES and quartz scatter and 1 fragment of burnt calcrete. Also a very solid metal lid of a round container of sorts.	
	198	S29 34 19.2 E18 26 00.6	Artefact scatter. Quartz, CCS, OES.	
	199	S29 34 12.1 E18 25 58.0	Light artefact scatter. Quartz, CCS, OES.	
	200	S29 34 15.9 E18 25 55.0	Granite bedrock outcrop on edge of pan with 4 grinding hollows.	
	201	S29 34 16.7 E18 25 54.3	Granite bedrock outcrop on edge of pan with 3 grinding hollows. Artefact scatter. Quartz, CCS, OES, green glass.	
	202	S29 34 17.0 E18 25 53.3	Granite bedrock outcrop on edge of pan with 8 grinding hollows.	
	203	S29 34 20.0 E18 25 59.4	Ephemeral artefact scatter. Granite lower grindstone fragment, quartz, quartzite, OES, clear glass.	
	204	S29 34 21.3 E18 25 54.7	Artefact scatter. OES, quartz, fibre-tempered pottery.	
	205	S29 34 20.9 E18 25 54.3	OES scatter on the edge of the pan.	
	206	S29 34 20.1 E18 25 53.7	Granite bedrock outcrop in pan with 1 grinding hollow.	
	207	S29 34 19.6 E18 25 53.5	Granite bedrock outcrop in pan with 4 grinding hollows.	
	208	S29 34 19.5 E18 25 54.2	Granite bedrock outcrop in pan with 5 grinding hollows.	
	209	S29 34 19.1 E18 25 53.9	Granite bedrock outcrop in pan with 1 grinding hollow.	
	210	S29 34 18.8 E18 25 53.5	Granite bedrock outcrop in pan with 7 grinding hollows.	
	211	S29 34 18.5 E18 25 53.1	Granite bedrock outcrop in pan with 2 grinding hollows.	
	212	S29 34 18.0 E18 25 52.9	Granite bedrock outcrop in pan with 6 grinding hollows.	
	213	S29 34 19.3 E18 25 52.2	Granite bedrock outcrop on edge of pan with 4 grinding hollows.	
	214	S29 34 18.3 E18 25 46.3	Granite bedrock outcrop in pan with 3 grinding hollows.	
	215	S29 34 18.7 E18 25 46.8	Granite bedrock outcrop in pan with 23 grinding hollows. Some hollows placed very close together with a set of 3 and 2 at 90 degrees to one another being noteworthy. Many grooves are very deep. Artefact scatter. Quartz, CCS.	
	216	S29 34 15.4 E18 25 51.7	Light artefact scatter. OES, quartz, CCS, quartzite.	
	217	S29 34 13.4	Granite bedrock outcrop away from pan	

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 25 54.0	with 4 grinding hollows.	
	218	S29 34 09.3 E18 25 56.1	Granite bedrock outcrop away from pan with 1 grinding hollow.	
	219	S29 34 08.3 E18 25 56.1	Granite bedrock outcrop away from pan with 4 grinding hollows. (Lita recorded too.)	
	L100	S29 34 09.0 E18 25 59.4	Goebees se pan (L100-L130) Flat slab of rock a distance from the pan with about 10 grinding grooves. Around this is 1CCS and 1Q artefact and at least 4 very small potsherds. Fine-grained temper.	
	L101	S29 34 07.9 E18 26 01.0	Light scatter of OES and Q artefacts located between the bushes on a slight rise above the pan	
	L102	S29 34 07.0 E18 26 00.5	On the edge of the pan: OES, 2 potsherds, 1 hornfels blade, Q and CCS artefacts and one fragment of European ceramic	
	L103	S29 34 06.2 E18 26 00.3	Open, trampled gravel soil between the flat slabs of granite on the outer margins of the pan: 1 potsherd, Q core, CCS artefacts	
	L104	S29 34 05.3 E18 26 00.2	At least 5 grooves in the granite bedrock. The grooves are all on the flat rocks on the outer margins of the pan.	
	L105	S29 34 01.9 E18 26 01.0	At least 3 grinding grooves on a flat rock some distance from the pan	
	L106	S29 34 07.7 E18 25 58.3	At least 2 grinding grooves on the flat rock of the pan	
	L107	S29 34 07.2 E18 25 58.7	At least 2 grinding areas on the flat rock at the edge of the pan	
	L108	S29 34 05.5 E18 25 58.8	At least 1 grinding area on the flat rock at the edge of the pan	
	L109	S29 34 04.8 E18 25 58.2	At least 1 grinding area on the flat rock at the edge of the pan	
	L110	S29 34 04.2 E18 25 58.1	At least 3 grinding areas on the flat rock of the pan	
	L111	S29 34 03.3 E18 25 57.4	At least 5 grinding areas on the edge of the pan	
	L112	S29 34 09.0 E18 26 01.3	On the outer margins of the pan: small scatter of CCS and Q artefacts; 1 potsherd. Lid of bully beef nearby as well as two fragments of European ceramic	
	L113	S29 34 08.0 E18 26 01.5	On the outer margins of the pan: OES; CCS chips, 1 chal core, Q flakes	
	L114	S29 34 05.6 E18 26 02.6	On the outer margins of the pan: OES and Q artefacts	
	L115	S29 34 05.7 E18 26 01.5	Possibly a 20 th century ash heap of herder living on edge of pan. Lots of ash; broken glass, bits of burnt bone; iron; cigarette stub and one potsherd	
	L116	S29 34 01.7 E18 25 54.1	Single grinding groove on a flat rock at the edge of the pan	
	L117	S29 34 02.5 E18 25 53.7	Grinding area on a flat rock at the edge of the pan – next to it a cement marker with numbers	

Site Name	GPS point	Co-ordinates	Description	Significance
	L118	S29 34 02.7 E18 25 53.7	One grinding groove in the granite bedrock of the pan	
	L119	S29 34 02.5 E18 25 51.7	About 7 grinding grooves and grinding areas on a large flat rock at the edge of the pan	
	L120	S29 34 02.4 E18 25 50.7	2 grinding areas on the flat granite bedrock at the edge of the pan. A modern concrete base of a water tank built on the rock	
	L121	S29 34 03.1 E18 25 51.6	2 grinding grooves on flat granite bedrock	
	L122	S29 34 04.5 E18 25 52.4	At least 9 grinding grooves in the granite bedrock.	
	L123	S29 34 04.6 E18 25 53.6	One grinding groove in the granite bedrock	
	L124	S29 34 06.7 E18 25 52.0	At least 13 grinding grooves and grinding areas on a very flat rock on the margins of the pan.	
	L125	S29 34 07.2 E18 25 52.1	One grinding groove on the granite bedrock of the pan	
	L126	S29 34 08.4 E18 25 53.0	At least 16 grinding grooves and grinding surfaces on the granite bedrock on the edge of the pan. There are scatters of OES, Q and CCS artefacts on the gravel nearby	
	L127	S29 34 08.2 E18 25 54.9	1 grinding grooves and 1 grinding surface on the granite bedrock. A CCS bladelet nearby	
	L128	S29 34 08.3 E18 25 56.1	At least 3 grinding grooves in a boulder projecting out of the sand at the edge of the pan (J recorded?)	
	L129	S29 34 05.2 E18 25 55.1	A deep "puts" dug into the base of the pan and lined with rocks. It is partially full of clear water	
	L130	S29 34 06.4 E18 25 57.0	At the edge of the one granite area, a scatter of material including: dark green and aqua bottle glass fragments; pottery and stone artefacts in a disturbed context	
KNG2012/012	220	S29 31 37.8 E18 25 53.7	Goebees farm werf. Mostly modern buildings. Main house is 1960s or 1970s but a barn looks like it may be 1930s or so.	Low
---	L055	S29 37 35.4 E18 20 22.0	Ephemeral scatter of quartz artefacts on a "pan" – open patch of gravel slightly lower than surrounding landscape	---
---	L094	S29 33 43.9 E18 19 29.0	In a valley, a gravel plain with a ephemeral scatter of quartz artefacts	---
KNG2012/013	L095	S29 34 00.9 E18 19 39.9	A small cairn on soft sandy soil at the mouth of a valley. There is a large flat collapsed slab of rock which resembles a headstone but which has no inscription. Possible grave?	High (potentially)
---	L096	S29 36 05.4 E18 21 07.9	A cleared area/pan with a single lower grindstone made on quartz	---
---	L097	S29 35 11.8 E18 29 14.3	Scatter of quartz artefacts on a open pan area; one CCS artefact with retouch along both margins	---

Site Name	GPS point	Co-ordinates	Description	Significance
Karas 76				
---	154	S29 31 04.7 E18 18 43.7	Good cave with just a few quartz flakes in it... Quite high in a steep kloof.	---
KAR2012/001	155	S29 30 49.8 E18 18 49.8	Water pit, 3 m deep and fully stone-lined.	Medium
Koeris 78				
KOE2012/001	L056	S29 39 43.3 E18 23 42.2	Kromneus – large granite outcrop with rock art and historical graffiti dating back to 1879. Rock art consists of geometric images, circles, grids and similar shapes. Two gemsbok are also evident. All images are finger-painted. Granite floor with little deposit. Artefact scatter spread to the east of the site	High (Avoid)
	L057	S29 39 41.9 E18 23 43.5	Flaked quartz scatter to the east of Kromneus as well as one small potsherd	
	L058	S29 39 40.3 E18 23 45.4	Quartz and CCS artefact scatter.	
	L059	S29 39 41.1 E18 23 43.9	Two bedrock quartzite grooves situated in this open gravel area. Quartzite flake nearby	
	L060	S29 39 41.1 E18 23 43.1	Single bedrock grinding groove in a slab of bedrock	
	L061	S29 39 37.2 E18 23 41.4	Drop in the density of quartz artefacts	
	L062	S29 39 36.5 E18 23 38.1	Low density of CCS artefacts	
	L063	S29 39 39.8 E18 23 38.7	Large area of grinding on granite bedrock as well as a grinding groove	
	L064	S29 39 44.2 E18 23 44.1	One weathered silcrete MSA flake amongst large scatter of quartz and CCS artefacts	
	117	S29 39 42.2 E18 23 40.6	One shallow grinding groove in bedrock.	
	124	S29 39 43.3 E18 23 41.2	Lots of ostrich eggshell in this area compared to the rest of the site.	
	125	S29 39 40.3 E18 23 39.3	Three shallow grinding grooves in bedrock.	
---	128	S29 38 51.0 E18 32 30.5	Area of multiple pans with ephemeral quartz scatter all around.	---
---	L066	S29 39 03.5 E18 32 21.6	Next to small sand dune, a deflated gravel area with an ephemeral scatter of CCS and quartz artefacts	---
KOE2012/002	L067	S29 39 00.4 E18 32 33.3	Next to a small second dune, many CCS artefacts as well as quartz artefacts, on a hard red ferruginous surface	Low
KOE2012/003 (Springbokvlei)	129	S29 36 36.0 E18 30 04.2	Artefact scatter on edge of pan. Quartz, CCS, OES	High-Medium
	130	S29 36 36.3 E18 30 04.7	Four shallow grinding grooves in bedrock.	
	131	S29 36 33.1 E18 30 04.6	Two shallow grinding grooves in bedrock. Ephemeral scatter of quartz, CCS and OES all over here.	
	132	S29 36 27.5 E18 30 07.8	Artefacts scatter. Quartz, CCS.	
	133	S29 36 26.3	One shallow grinding groove in bedrock. Scatter of quartz, CCS and pottery (2	

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 30 09.2	very thin, one thick).	
	134	S29 36 27.0 E18 30 09.5	Two shallow grinding grooves in bedrock. Quartz, OES, pottery (very thin).	
	135	S29 36 27.5 E18 30 10.1	Five shallow grinding grooves in bedrock.	
	136	S29 36 27.8 E18 30 10.7	Five shallow grinding grooves in bedrock.	
	137	S29 36 28.1 E18 30 11.7	Two shallow grinding grooves in bedrock.	
	138	S29 36 28.0 E18 30 12.5	One shallow grinding groove in bedrock.	
	139	S29 36 28.4 E18 30 13.3	One shallow grinding groove in bedrock. Artefact scatter. CCS, Lots of OES.	
	140	S29 36 28.3 E18 30 13.9	Artefact scatter with quartz, CCS and coarse porcelain.	
	141	S29 36 29.7 E18 30 13.2	Nine shallow grinding grooves in bedrock. Artefact scatter. Quartz, CCS.	
	142	S29 36 31.0 E18 30 14.7	Artefact scatter. Quartz and CCS.	
	143	S29 36 32.7 E18 30 16.3	Artefact scatter. Quartz, CCS, lots of OES, one grass-tempered potsherd.	
	144	S29 36 32.4 E18 30 11.0	Artefact scatter. Quartz, CCS.	
	145	S29 36 32.6 E18 30 07.7	Three shallow grinding grooves in bedrock.	
	146	S29 36 34.2 E18 30 07.2	Two shallow grinding grooves in bedrock. Quartz, quartzite, OES.	
	147	S29 36 34.8 E18 30 07.8	Artefact scatter. Quartz, CCS, OES, upper grindstone fragment in quartzite.	
	148	S29 36 34.3 E18 30 08.8	Two shallow grinding grooves in bedrock. Large number of heavily weathered MSA flakes here.	
	149a	S29 36 35.0 E18 30 10.0		
	149b	S29 36 36.8 E18 30 09.9	Artefact scatter. Quartz, CCS, FGBR (mostly very weathered again).	
	149c	S29 36 36.2 E18 30 11.7		
	150	S29 36 35.3 E18 30 05.6	Artefact scatter. Quartz, CCS.	
	L068	S29 36 39.5 E18 30 04.4	Steenbokvlei: on soft red soils on the edge of the pan, some CCS and quartz artefacts as well as OES	
	L069	S29 36 39.4 E18 30 04.7	Two grooves in granite bedrock in a granite ridge on edge of pan	
	L070	S29 36 39.7 E18 30 04.6	Bedrock grinding surface	
	L071	S29 36 39.9 E18 30 05.0	Bedrock grinding groove; fragment of green bottle glass nearby	
	L072	S29 36 41.2 E18 30 07.3	At rocky edge overlooking the pan; on soft red soils a single potsherd about 3-4mm, with grass temper	
	L073	S29 36 42.9 E18 30 07.6	At least 12 grinding grooves and grinding surfaces on the granite koppie	
	L074	S29 36 43.6	Between the rocks at the granite koppie,	

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 30 08.3	large scatter of CCS and quartz artefacts and one bedrock groove	
	L075	S29 36 42.1 E18 30 08.1	At least 5 grinding grooves in granite bedrock	
	L076	S29 36 41.7 E18 30 08.3	Very dense artefact scatter on a fine gravel surface.	
	L078	S29 36 44.1 E18 30 10.3	At least 3 grinding grooves on granite bedrock	
	L079	S29 36 44.8 E18 30 10.6	At least 3 grinding grooves on granite bedrock surrounded by OES but not many artefacts	
	L080	S29 36 44.3 E18 30 10.7	At least grinding grooves in granite bedrock	
	L081	S29 36 43.6 E18 30 10.4	At least 4 grinding grooves in granite bedrock	
	L082	S29 36 43.0 E18 30 10.5	At least 6 grinding grooves/grinding areas	
	L083	S29 36 41.6 E18 30 10.7	One grinding groove in red granite bedrock	
	L084	S29 36 40.2 E18 30 11.5	Three grooves in red granite bedrock; very few artefacts around here	
	L085	S29 36 40.1 E18 30 12.1	Ten grinding grooves in red granite bedrock	
	L086	S29 36 38.2 E18 30 12.9	Recent well cut into the red granite bedrock, surrounded by a wooden fence. No artefacts nearby	
	L087	S29 36 37.1 E18 30 13.9	An old "puts" dug into the bottom of the pan and lined with stones; filled in with soil	
	L088	S29 36 36.4 E18 30 12.1	Bottom of the pan, covered in fine gravel with many artefacts, around 10 every square metre.	
	L089	S29 36 36.7 E18 30 10.7	At least five grooves in the red granite bedrock	
	L090	S29 36 37.8 E18 30 10.1	At least six grooves/grinding areas in the red granite bedrock. Quartz and CCS artefact scatters nearby	
	L091	S29 36 38.9 E18 30 09.8	At least 12 grooves on the red granite bedrock; seven in a small area of 2m ² .	
	L092	S29 36 35.9 E18 30 07.3	Deep "put" dug into granite	
	L093	S29 36 35.9 E18 30 07.2	A grinding groove in the granite bedrock	
KOE2012/004	L077	S29 36 43.3 E18 30 10.2	A "puts" dug into the base of the pan next to a large granite boulder; roughly circular and lined with rocks	Medium
KOE2012/005	L065	S29 38 33.4 E18 26 48.4	Kouberg werf. A 1960s house, servants quarters, outside oven and reservoir.	Low
	126	S29 38 28.7 E18 26 51.1	Kouberg werf. Mid-20 th century shed/workshop with wool sorting table and work bench inside. Three windmills and a big iron pump wheel.	
---	151	S29 36 44.4 E18 28 49.1	Ephemeral pans with rare quartz artefacts.	---
---	152	S29 36 52.4 E18 23 29.2	Four wind pumps – cultural landscape.	---

Site Name	GPS point	Co-ordinates	Description	Significance
KOE2012/006	175	S29 39 43.6 E18 23 56.0	Ephemeral pan close to Kromneus. Artefact scatter. Quartz, CCS. Granite probable lower grindstone.	Low
KOE2012/007	176	S29 38 57.3 E18 28 11.1	Pan with artefact scatter. Quartz, CCS, banded ironstone. MSA. Lots of retouched pieces.	Medium-Low
	176b	S29 39 00.8 E18 28 10.3		
	L098	S29 39 00.5 E18 28 08.2	Shallow pan with gravel base; quartz and CCS artefacts. Spread over a wide area.	
KOE2012/008	177	S29 38 58.3 E18 29 38.7	Pan with artefact scatter. CCS. MSA.	Low
	L099	S29 39 00.0 E18 29 39.8	Shallow pan with gravel base; CCS and quartz artefacts. MSA? No distinctive MSA attributes	
---	178	S29 35 15.3 E18 29 59.6	Pan with quartz background scatter.	---
Smorgen Schaduwe 127				
SMS2012/001	026	S29 32 21.4 E18 14 43.6	Old house and barn. Maybe late 1800s? Also a mid-20 th century labourer's cottage and the main house which is probably 1940s with a late 1950s/1960s enclosure of the porch.	Medium
SMS2012/002	027	S29 33 12.5 E18 13 57.6	Stone-walled structure. Boer War. Some tins around about. Circular with entrance facing downslope. About 4 m diameter.	Medium
SMS2012/003	028	S29 33 13.3 E18 13 58.5	Two stone-walled structures. Boer War. One is V-shaped, 2 m deep and 3 m between ends. Larger is a wide semi-circle about 9 m across. Walls are low (c. 0.6 m high). Look like shooting hides but no gun ports. Cans and metal around them.	Medium
SMS2012/004	029a	S29 33 19.2 E18 13 57.5	Stone-walled structure. Boer War. Looks like a very large and oddly shaped kraal. Cans found at point 29A.	Medium
	029b	S29 33 19.7 E18 13 58.4		
	029c	S29 33 19.8 E18 13 58.8		
	029d	S29 33 19.1 E18 13 59.0		
	029e	S29 33 17.7 E18 13 57.9		
	029f	S29 33 18.1 E18 13 59.0		
	029g	S29 33 18.0 E18 14 00.9		
	029h	S29 33 18.4 E18 14 00.7		
SMS2012/005	030	S29 33 16.9 E18 14 00.9	Stone-walled structure. Boer War. Circular enclosure with entrances at SE and W. 6.5 m x 7.5 m. Tin cans and a yellow bottle neck fragment found inside.	Medium
SMS2012/006	031	S29 33 19.6 E18 14 03.5	Stone-walled structure. Boer War. Wide semi-circle 11 m across with walls partly tumbled. Highest walls currently about 0.8 m high. Built between rocky outcrops.	Medium

Site Name	GPS point	Co-ordinates	Description	Significance
SMS2012/007	032	S29 33 21.4 E18 14 02.3	Stone-walled structure. Boer War. Two sided structure with walls downslope. North end has a cleared path leading westwards down the hill.	Medium
SMS2012/008	033	S29 33 37.3 E18 13 34.0	Stone-walled structure. Single row of stones against a cliff.	Medium
	033b	S29 33 37.1 E18 13 35.2		
SMS2012/009	034	S29 33 37.4 E18 13 34.3	LSA artefact scatter with lots of quartz, CCS and pottery.	Low
SMS2012/010	035	S29 33 40.5 E18 13 32.9	Small rock shelter in kloof. Animal lair in the back with lots of bone out front. There is also some burnt bone, quartz, OES and pottery. A broken lower grindstone lies on the talus. Two large blocks in the shelter are very worn on top as if they have been sat on/used extensively. Most artefacts on the terrace out front of the cave.	Low
---	036	S29 33 41.3 E18 13 29.7	Two 'klipbak' pools in the river: estimated capacities: 0.6 m ³ and 1.0 m ³ .	---
---	037	S29 33 40.9 E18 13 31.3	A large pool just downstream another rock pool with capacity c. 7-8 m ³ .	---
---	038	S29 33 35.6 E18 13 39.6	An isolated and out of context (in a cairn) lower grindstone and one quartz flake nearby.	---
SMS2012/011	039	S29 32 21.2 E18 14 49.4	Old kraal, mostly broken down. It comes right to the edge of the access road.	Low
SMS2012/012	040	S29 33 58.5 E18 15 13.9	Rock wall with a large lower grindstone at the base. Also an endscraper/thumbnail scraper on crystal. One tine can and a few flakes (1 definite MSA) on the talus slope away from the wall.	Low
SMS2012/013	041	S29 34 03.6 E18 15 15.8	LSA artefact scatter of probably mixed age. Includes Quartz, CCS and fine-grained black rock. 1 CCS backed scraper. Pottery is very thin-walled. Probably same site as 41B.	Medium
	041B	S29 34 02.4 E18 15 15.5	Centre-point of huge scatter of quartz and CCS with occasional other stone types. (A bit like JKB N without the OES and pottery.)	
SMS2012/014	042	S29 34 00.4 E18 15 25.8	Quartz and OES scatter at the base of rocky ridge. Quartz, CCS, OES. Lots of CCS including 1 segment. One cluster of rocks. Alongside a decent river channel.	Medium
	042b	S29 34 00.6 E18 15 27.6		
	042c	S29 34 02.3 E18 15 27.7		
SMS2012/015	043	S29 34 04.8 E18 15 18.0	Large artefact scatter. Quartz, CCS, OES, pottery. 1 large thumbnail scraper. Site runs for 100 m along the mountain and extends out about 30 m.	Medium
---	044	S29 34 05.6 E18 15 34.2	Isolated grooved lower grindstone in the middle of the veld.	---
SMS2012/016	045	S29 35 29.5 E18 15 12.6	Small stone enclosure against the cliff. Old can nearby and another about 70 m	Low

Site Name	GPS point	Co-ordinates	Description	Significance
			to the east.	
SMS2012/017	046	S29 35 29.4 E18 15 25.8	Scatter of quartz and 1 banded ironstone flake.	Low
SMS2012/018	047	S29 34 40.2 E18 17 50.5	Historical stone enclosure built as 2 skins with a rubble fill. One side of the wall is a low row of stones on a bedrock outcrop and wall continues along on sand. 5 m long along rock and extends out for 3 m.	Low
SMS2012/019	048	S29 34 41.5 E18 17 49.0	Small koppie with an overhang containing 7 "cupules". Some are very deep which is unusual. 2 about 20 mm and one at 35 mm deep. Rock wall only about 1.8 m high above a ledge and entire koppie is about 2.5 m high.	High
---	049	S29 34 41.8 E18 17 49.4	Single shallow grinding groove in bedrock.	---
---	050	S29 34 42.2 E18 17 49.6	Single shallow grinding groove in bedrock.	---
---	051	S29 34 42.5 E18 17 50.1	Single shallow grinding groove in bedrock. Very rare quartz flakes in the area.	---
---	052	S29 34 44.9 E18 17 50.1	One shallow grinding groove in bedrock and one open grinding area.	---
---	053	S29 34 45.9 E18 17 48.3	Single shallow grinding groove in bedrock.	---
SMS2012/020	054	S29 34 48.6 E18 17 48.7	Two low stone mounds (suspiciously grave-like). Occasional quartz and OES around the area.	High (potentially)
SMS2012/021	055	S29 34 48.5 E18 17 47.4	Area with quartz, one thin-walled potsherd, glass and metal scattered about.	Low
SMS2012/022	056	S29 34 50.2 E18 17 47.1	Stone enclosure against a boulder. Enclosure about 3 m by 7 m.	Low
SMS2012/023	057	S29 34 50.4 E18 17 46.2	Light scatter of quartz and OES.	Low
---	058	S29 34 54.6 E18 17 50.1	Single shallow ground area.	---
---	059	S29 34 54.9 E18 17 50.1	Two shallow grinding grooves in bedrock.	---
SMS2012/024	060	S29 34 55.3 E18 17 50.2	Eighteen shallow grinding grooves and open grinding areas in bedrock.	Medium-Low
---	061	S29 34 56.2 E18 17 50.5	One shallow grinding groove in bedrock.	---
SMS2012/025	062	S29 34 56.3 E18 17 50.3	At least eight shallow grinding grooves and open grinding areas in bedrock.	Medium-Low
SMS2012/026	063	S29 34 57.2 E18 17 49.8	Semi-circular stone enclosure against a boulder and with a glass bottle inside. Enclosure about 7 m by 7 m.	Low
---	064	S29 34 58.3 E18 17 50.9	One shallow grinding groove in bedrock and one open grinding area.	---
SMS2012/027	065	S29 35 00.3 E18 17 49.8	Single shallow cupule on a 1.2 m high overhanging boulder. A few quartz flakes present out the front.	High
SMS2012/028	066	S29 34 59.9 E18 17 48.3	Straight stone alignment running away from a rock outcrop.	Low
SMS2012/029	067	S29 34 59.5	Small possible enclosure with 5 quartz	Low

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 17 49.1	flakes inside. There are a few other patches of possible piled stones around here on a small rocky koppie.	
SMS2012/030	068	S29 35 04.4 E18 17 43.1	Good quartz scatter in front of a boulder.	Low
SMS2012/031	069	S29 35 05.7 E18 17 42.7	One shallow grinding groove in bedrock and an upper grindstone fragment lying nearby. Also a stone and soil feature here to dam water in the 'klipbakke'.	Low
SMS2012/032	070	S29 35 06.5 E18 17 40.9	Multiple stone and soil features making small dams in the bedrock. The 'dam walls' block of narrow channels in the rock.	Low
---	071	S29 35 03.8 E18 17 41.5	One shallow grinding groove in bedrock.	---
SMS2012/033	072	S29 32 11.5 E18 14 44.3	Family graveyard – not visited.	High
SMS2012/034	073	S29 34 00.1 E18 15 07.9	Light quartz and CCS scatter in a sandy area.	Low
SMS2012/035	074	S29 34 00.0 E18 15 09.3	Light quartz and CCS scatter in a sandy area.	Low
SMS2012/036	075	S29 33 58.8 E18 15 11.7	Rock wall 5 m high with c. 27 cupules on it. Off to the right two of the cupules are only pecked and have not been ground at all. In general the cupules at this site are rougher and may be older? There is no associated archaeology out front at all.	High
---	076	S29 34 26.7 E18 16 47.8	Example of a deflated open area with rare quartz artefacts (background scatter) amongst the ubiquitous quartz gravel.	---
---	077	S29 36 06.0 E18 18 10.4	Light, widespread scatter of quartz, silcrete and quartzite (1) in deflated area – area is an ephemeral pan.	---
	077b	S29 36 11.2 E18 18 11.7		
	L031	S29 36 09.6 E18 18 12.4	Quartz flakes and one silcrete flakes in a open gravel area	
	L032	S29 38 05.7 E18 18 13.7	Extension of same site as L031	
---	078	S29 38 02.4 E18 18 14.4	Another ephemeral pan with occasional quartz, silcrete and CCS artefacts, mostly all very weathered.	---
	L033	S29 38 13.5 E18 18 13.3	Extension of site recorded by J. Large gravel area with quartz artefacts and occasional silcrete cores and flakes – widespread but ephemeral	
---	079	S29 38 14.5 E18 18 14.1	Another ephemeral pan but with bedrock exposures in it. Occasional quartz, silcrete and CCS artefacts, mostly all very weathered.	---
	L034	S29 38 36.3 E18 17 29.5	Bedrock present – surrounded by some silcrete flakes	
---	080	S29 38 36.7 E18 17 30.6	One shallow grinding groove in bedrock.	---
SMS2012/037	081	S29 38 37.0 E18 17 30.0	Granite boulder with quartz, CCS, OES, glass, coarse porcelain and bone.	Low

Site Name	GPS point	Co-ordinates	Description	Significance
			Surface scatter only.	
SMS2012/038	082	S29 38 38.0 E18 17 29.9	Artefact scatter among boulders alongside granite koppie. Quartz, silcrete, CCS, glass, coarse porcelain, bone.	Low
SMS2012/039	083	S29 38 37.0 E18 17 28.7	8 mm thick pot sherd with ochred outer wall, clear quartz backed piece fragment nearby. On neighbouring terrace below koppie there are several other potsherds with 6-7 mm thick walls, a CCS flake and some OES.	Low
SMS2012/040	084	S29 38 36.4 E18 17 29.1	Scatter of quartz, silcrete, OES and pottery at the base of the granite koppie.	Low
---	085	S29 38 36.0 E18 17 25.2	Widespread quartz scatter among klipbakke away from the koppie.	---
---	086	S29 38 35.6 E18 17 30.4	One shallow grinding groove in bedrock. Plenty of artefacts all over this area but low density scatter. Quartz, CCS and silcrete. Silcrete looks mostly MSA.	---
SMS2012/041	087	S29 32 37.7 E18 15 45.7	Light quartz scatter 50 m from the rocks.	Low
SMS2012/042	088	S29 35 44.2 E18 15 38.8	Widespread light quartz scatter in sandy area in front of rocky hills.	Low
---	089	S29 35 44.1 E18 15 36.9	Three items only, 1 OES, 1 coarse porcelain fragment and one ?flaked green bottle base in a sandy area in front of the rocks.	---
SMS2012/043	090	S29 35 45.5 E18 15 33.9	Light quartz scatter 50 m from the rocks.	Low
SMS2012/044	091	S29 35 48.3 E18 15 33.9	Quartz and CCS artefact scatter on raised flat platform between the rocky hills. Extensive scatter about 50 m wide.	Medium-Low
SMS2012/045	092	S29 35 57.9 E18 15 28.9	Large semi-circular stone wall of 23 m length along the rocky hill with a rectangular enclosure of 5.5 m by 7.0 m within it. Close by was a small semi-circular enclosure. Some bits of plastic here and a large tin about 30 m away to the east.	Low
SMS2012/046	093	S29 35 56.8 E18 15 22.9	Artefact scatter on a flat area on top of the hill. Quartz and CCS.	Low
SMS2012/047	L003	S29 33 11.8 E18 13 39.5	Very large cairn made of quartz blocks, 50 or more stones, forming a rough circle 2m x 2m. On a sandy patch on the slopes of the little koppie.	High
SMS2012/047	L004	S29 33 37.2 E18 13 35.4	Site near the stone walling (only single course of stones) in the kloof. 5 potsherds, about 4-5 mm thick, some evidence of grass temper. One has some red ochre staining inside (not burnish). 1 ccs thumbnail scraper, 2 flakes on fine-grained material, OES.	Low
SMS2012/048	L005	S29 33 37.9 E18 13 35.5	Three pieces of pottery on the opposite site of the kloof, about 5mm, black outside and reddish inside. Also OES.	Low
SMS2012/049	L006	S29 34 01.9 E18 15 13.1	At foot of reddish koppie. Some stone features? Nearby 3 potsherds, 5mm thick, fine temper, black colour. 1 ccs	Low

Site Name	GPS point	Co-ordinates	Description	Significance
			backed scraper.	
SMS2012/050	L007	S29 34 02.1 E18 15 14.0	Around corner of koppie, large cairn of flat granite (sandstone?) slabs. Covered with small quartz pebbles.	High
SMS2012/051	L008	S29 34 01.5 E18 15 14.3	A background of fine-grained ccs/sil as well as quartz (milky and clear) flakes and cores. Widespread. In this cleared area, occasional slab of rock suggests they are for securing matjies houses.	High-Medium
	L009	S29 34 01.5 E18 15 13.8	A hearth consisting of a number of fragments of charcoal and oes. Possibly related to a stockpost in the area.	
SMS2012/052	L010	S29 34 03.4 E18 15 17.2	Spread of stone artefacts including 2 fine-grained red sil/ccs flakes and 1 qzte upper grindstone. Some aqua glass nearby. 1 ccs bladelet, large silcrete core, one "green" flake.	Low
SMS2012/053	L011	S29 34 05.3 E18 15 17.0	More flakes on fine-grained yellow ccs	High (cairn)
	L012	S29 34 05.7 E18 15 17.3	A cairn of small stones, about 1m ² . Possible grave?	
	L030	S29 36 07.0 E18 18 11.6	A potsherd amongst the widespread scatter of artefacts at the foot of the koppie. About 6-7mm thick, fine grained temper and black in colour	Low (artefacts)
SMS2012/054	L013	S29 34 07.7 E18 15 13.9	A rock art panel (2-3m) comprising about 30 ground cupules, ranging in size from 2-5cm in diameter. Arranged more or less in rows. There is a large flat rock in front of panel, with 4-5 grinding surfaces (usual boat shape). Cartridge case in front of site, and tin can lid. Scatter of quartz flakes in the area.	High
SMS2012/055	L014	S29 34 08.2 E18 15 13.3	A rock art panel comprising about 70 ground cupules, a crack separates them from 2 more. Arranged in rows, small top and large below. 7 rows of small cupules, 1 row of large cupules. No deposit in front of the site.	High
SMS2012/056	L015	S29 34 08.1 E18 15 12.9	Large rock panel about 4m long, but surface partly obscured by water streaks. Rows of ground cupules. About 30 cupules, 2-5cm in size. Floor is sandy and has limited archaeological potential. There are 3 stones placed in a semi-circle angling away from rock. 7 pieces of ceramic (one base, one brown sponge ware and one annular ware). Base of dark green bottle	High
SMS2012/057	L016	S29 34 05.4 E18 15 16.4	Rock art panel on a large vertical slab (about 2m long and 80cm wide) of rock close to the ground. 35 ground cupules in about two rows. Small hollows, about 2cm diameter. No floor and no artefacts	High
SMS2012/058	L017	S29 34 04.3 E18 15 16.0	Rock art panel on a projecting rock outcrop against the side of the koppie. Under the projected rock is a further area of ground cupules. There are about 80 cupules at the top and 10 cupules below.	High

Site Name	GPS point	Co-ordinates	Description	Significance
			The top appear to be arranged in diagonal lines. No archaeology.	
	L029	S29 34 05.7 E18 15 16.8	Five roughly chipped areas on a boulder next to L017 (possibly natural exfoliation). No floor or deposit and no associated remains	
---	L018	S29 34 44.4 E18 17 42.1	2 bedrock grooves	---
---	L019	S29 34 46.5 E18 17 43.4	2bedrock grooves	---
---	L020	S29 34 46.9 E18 17 44.4	A large grinding surface	---
---	L021	S29 34 48.7 E18 17 44.0	A bedrock groove	---
SMS2012/059	L022	S29 34 48.9 E18 17 41.5	A spread of OES and some quartz artefacts in a small area of red soil on one of the highest stone koppies. 1 piece of pottery, 5mm thick, fine grained temper.	Low
SMS2012/060	L023	S29 34 51.1 E18 17 42.0	On a little terrace overlooking the plains, a scatter of OES, quartz (both milky and clear) artefacts in an area around 2m x 5m.	Low
SMS2012/061	L024	S29 34 52.1 E18 17 41.6	Extension of the same terrace, sheltered by the koppie. More OES and quartz artefacts	Low
SMS2012/062	L025	S29 34 53.4 E18 17 39.8	Short section of rough stone walling forming a small kraal against the koppie. About 3m x 2m. Lots of broken glass around	Low
SMS2012/063	L026	S29 34 51.3 E18 17 45.1	A spread of OES and quartz artefacts	Low
SMS2012/064	L027	S29 34 47.2 E18 17 48.2	OES, quartz artefacts and one potsherd, 5mm thick, fine grained temper	Low
---	L028	S29 34 04.3 E18 15 15.9	Broken granite lower grindstone on a ledge on the side of the koppie	---
---	L035	S29 38 31.5 E18 17 24.0	Koppie at the corner of farm. Grinding groove in granite bedrock	---
---	L036	S29 38 36.4 E18 17 22.1	Silcrete flakes around granite bedrock with "klipbakke"	---
---	L037	S29 32 37.1 E18 15 46.5	Spread of silcrete flakes and cores between the granite bedrock	---
SMS2012/065	L038	S29 33 24.0 E18 15 52.6	Possible old stockpost on degraded area of veld in front of mountain. Few loose stones – with 9 ceramic fragments: 3 pieces of white refined earthenware; coarse glazed Chinese porcelain (ginger jar), 2 pieces of lusterware, one white plate fragment with moulded rim; one white fragment with black transfer decoration	Low
SMS2012/066	L039	S29 35 51.1 E18 15 43.7	Single row of rocks forming rough semi-circle in front little stone koppie associated with 20 th century glass	Low
---	L040	S29 35 46.3 E18 15 37.0	Dark green and blue bottle glass fragments in front of two small shelters	---
SMS2012/067	L041	S29 35 46.3	Large koppie – a little sandy patch of soil	Low

Site Name	GPS point	Co-ordinates	Description	Significance
		E18 15 36.7	(2m ²) containing about 7 quartz flakes	
	L042	S29 35 45.7 E18 15 36.4	A small collection of about 20 quartz flakes in a 5m ² area. Also one quartzite flake	
SMS2012/068	L043	S29 35 53.7 E18 15 29.1	A collection of quartz artefacts between granite boulders	Low
SMS2012/069	L044	S29 36 00.4 E18 15 19.6	Scatter of quartz artefacts next to a koppie	Low
SMS2012/070	L045	S29 34 51.3 E18 17 45.1	OES and quartz flakes on a sandy terrace on top of the koppie.	Low

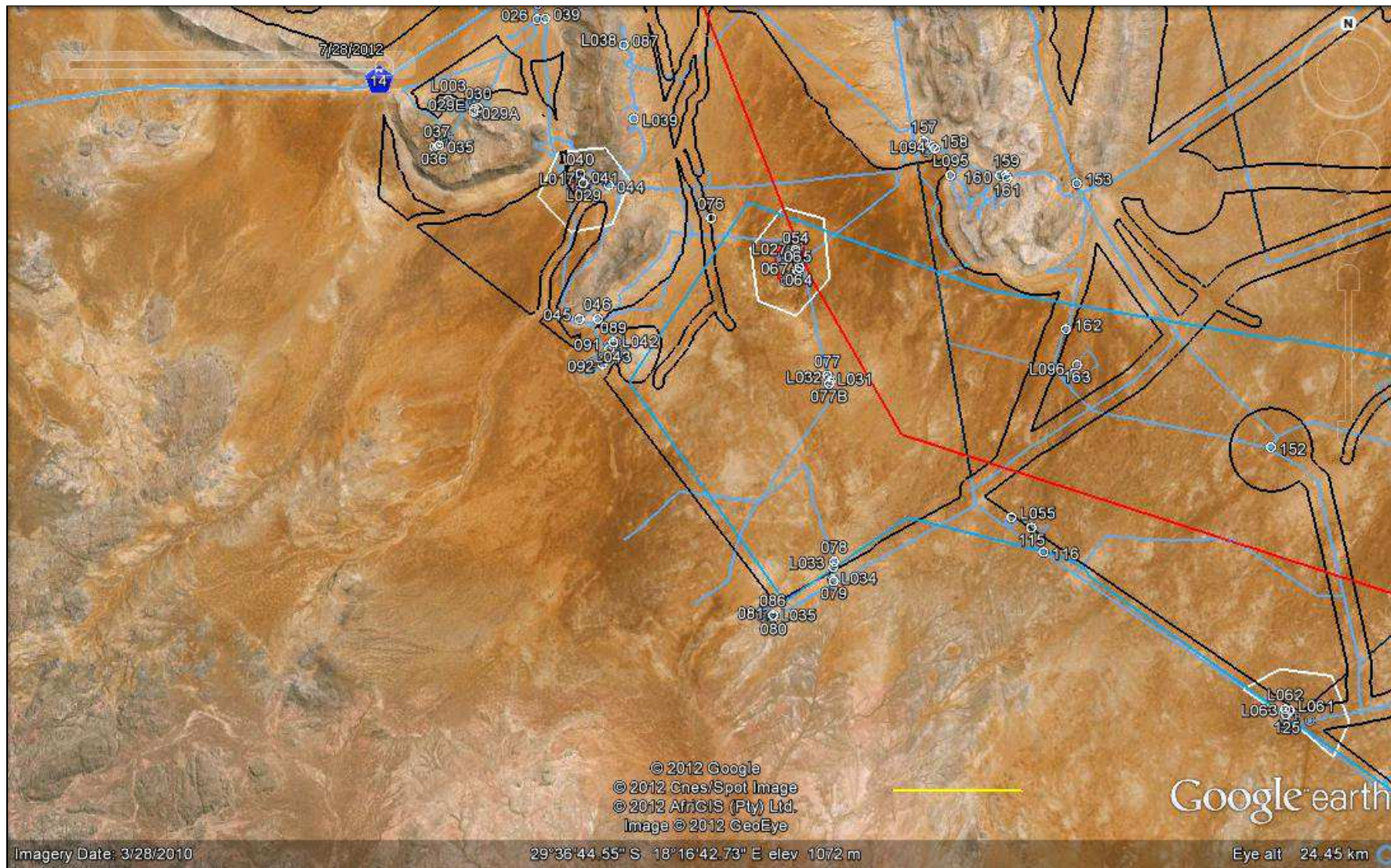
APPENDIX B : Mapping of all heritage occurrences.

In the maps that follow:

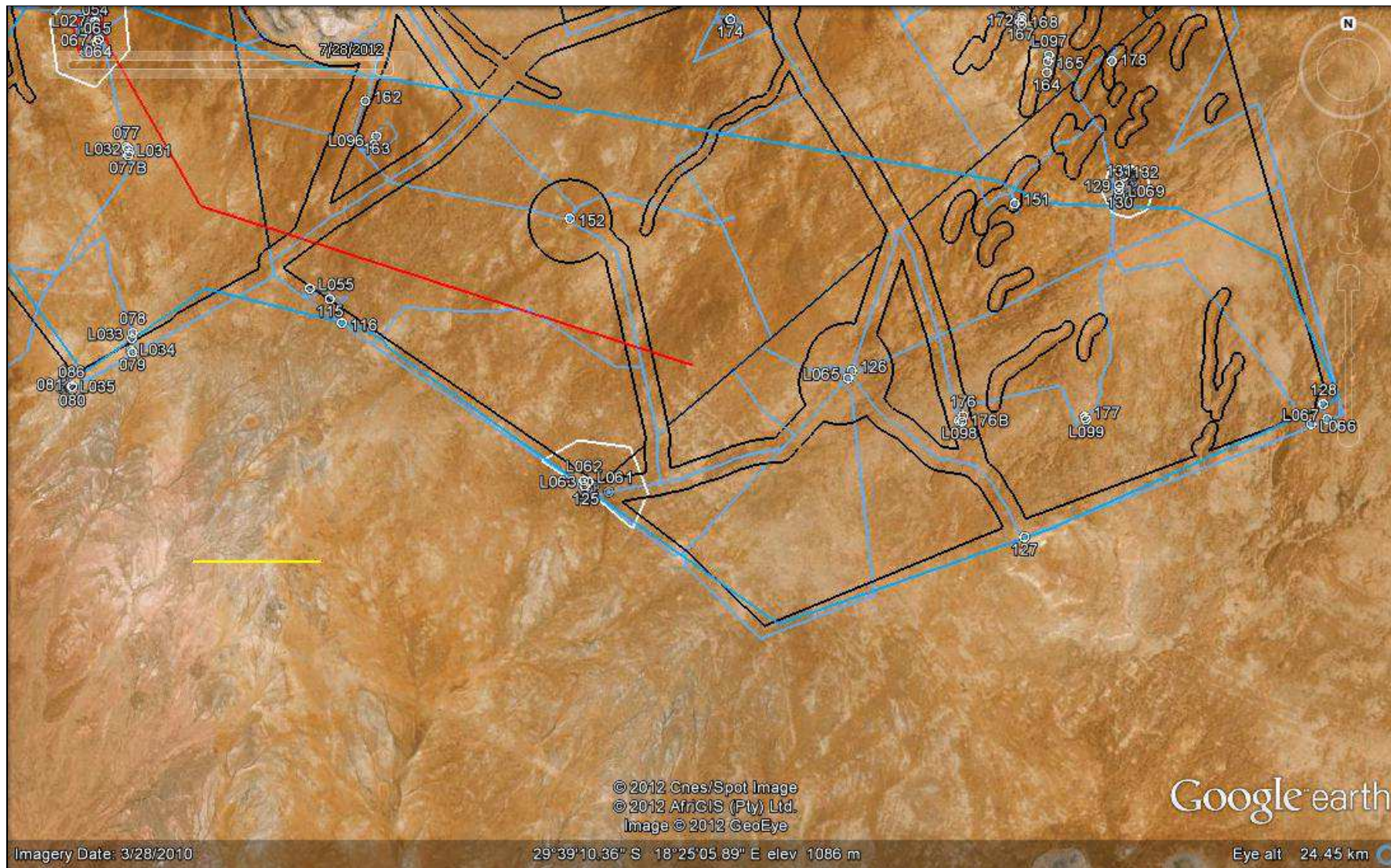
- White numbered circles represent heritage occurrences as documented in Appendix A;
- Thin blue lines denote GPS tracks created during the survey;
- The black lines show the development area as identified after the scoping study;
- The yellow outlined area is the solar focus area;
- the turquoise outlined area is the wind focus area;
- The red line shows the proposed power line route; and
- The yellow bar for scale represents 2.5 km



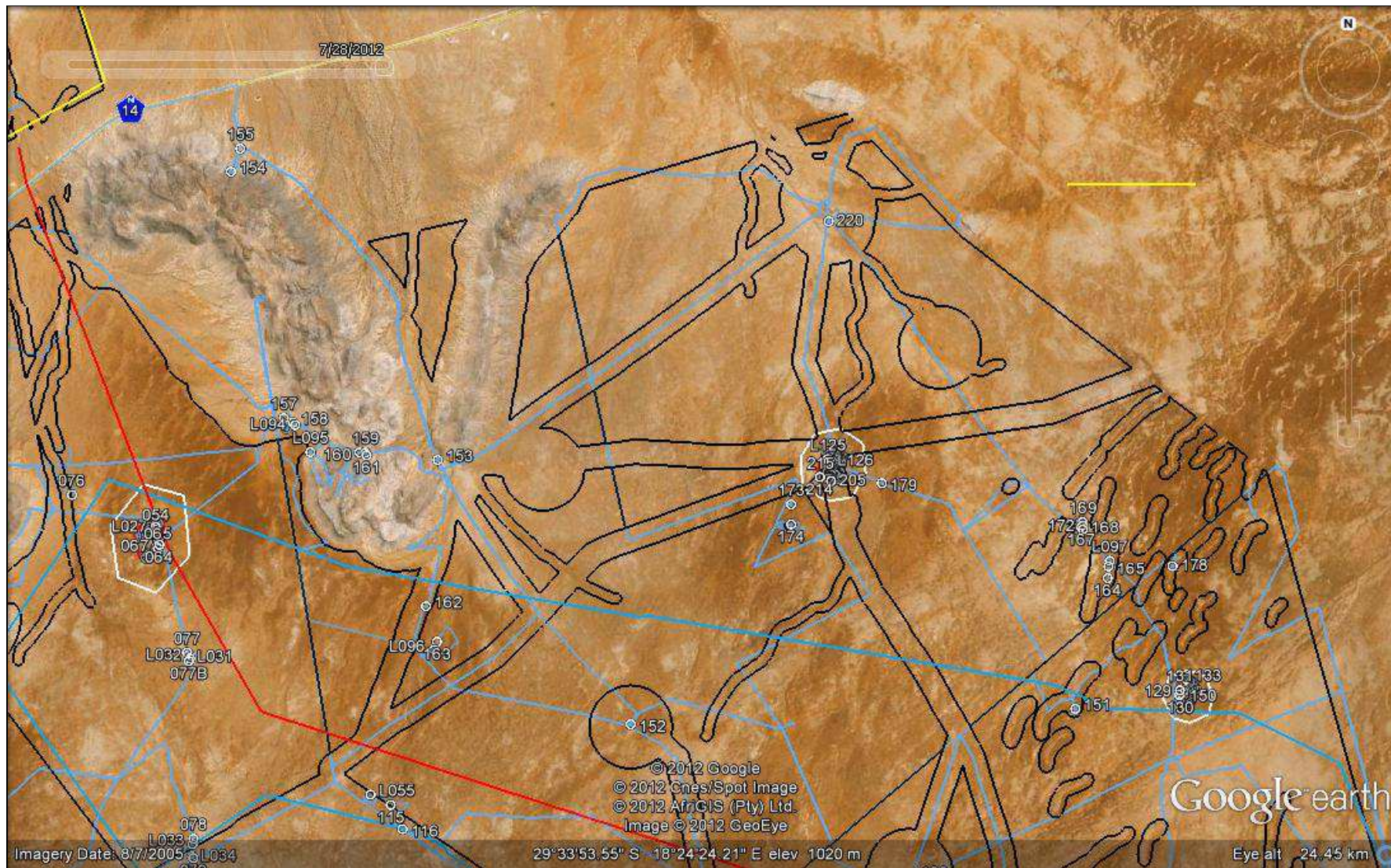
North-western part of the study area.



South-western part of the study area.



South-eastern part of the study area.



North-eastern part of the study area.

APPENDIX C : DEA specialist declaration



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Proposed wind and solar (photovoltaic) energy facilities near Springbok, Northern Cape

Specialist:	ACO Associates cc		
Contact person:	Jayson Orton		
Postal address:	8 Jacob's Ladder, St James		
Postal code:	7945	Cell:	083 272 3225
Telephone:	021 706 4104	Fax:	086 603 7195
E-mail:	Jayson.Orton@aco-associates.com		
Professional affiliation(s) (if any)	Association of Southern African Professional Archaeologists (ASAPA) member No. 233		

Project Consultant:	Aurecon South Africa (Pty) Ltd		
Contact person:	Louise Corbett / Cornelia Steyn		
Postal address:	PO Box 494, Cape Town		
Postal code:	8000	Cell:	
Telephone:	021-526-6027	Fax:	021-526-9400
E-mail:	Louise.corbett@aurecongroup.com / cornelia.steyn@aurecongroup.com		

4.2 The specialist appointed in terms of the Regulations_

I, **JAYSON ORTON** , declare that

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:



Name of company (if applicable):

ACO ASSOCIATES

Date:

21 AUGUST 2012

Cornelia Steyn

From: Jayson Orton <jayson.orton@aco-associates.com>
Sent: 08 November 2012 02:38 PM
To: Cornelia Steyn
Subject: Re: Kangnas

Dear Corlie

Thanks for this. I see no issues with this revised Solar layout area except perhaps for its proximity to the national road as a scenic route. But visual will probably raise this issue as well.

all the best
Jayson

On 8 November 2012 14:27, Cornelia Steyn <Cornelia.Steyn@aurecongroup.com> wrote:

Hi Everyone

Based on the outcome of your studies, the applicant have revised the layout / location for the solar facility. We realise that you are working under a lot of pressure with many other consultants.

So to make things easier, we would appreciate if you could please **respond in email (PLEASE DON'T UPDATE YOUR REPORTS!)** on how your assessments (especially significance) are impacted by the new layout.

These emails will be included in the EIR as an annexure. If possible, please send your email by tomorrow.

Kind Regards

Corlie Steyn | Environmental Management

Environmental Practitioner | Aurecon

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Jayson Orton

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