HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES ON FARM HOEKPLAAS 146, COPPERTON, NORTHERN CAPE

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

Prepared for

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EXECUTIVE SUMMARY

ACO Associates cc was appointed by Aurecon South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might be experienced through construction and operation of several solar energy facilities on the farm Hoekplaas 146, near Copperton, Northern Cape. Alternative 1 would involve development of ten solar energy facilities (PV2-11) and related infrastructure, while Alternative 2 would see construction of 3 far larger facilities (Alternative PV2A-4A).

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

Archaeological resources were found to be widespread across the site but the majority are of low value. A few sites, located predominantly around the pans, were of higher value and would require mitigation if they cannot be protected. Particularly important in this regard is an MSA site with fossil bone located at a quarried pan alongside the main road. One area at PV11 has extensive archaeological resources and is best avoided. No built environment will be impacted and no graves were found. The local landscape would be strongly impacted but due to the remoteness of the site and very few visitors to the area this impact will be of limited significance.

The proposed project could be allowed to proceed with either Alternative, although Alternative 1, omitting PV11, is preferred. The following recommendations apply:

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

Contents

1. INTRODUCTION

ACO Associates cc was appointed by Aurecon South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might be experienced through construction and operation of several photovoltaic (PV) solar energy facilities on the farm Hoekplaas 146, near Copperton, Northern Cape (Figure 1).

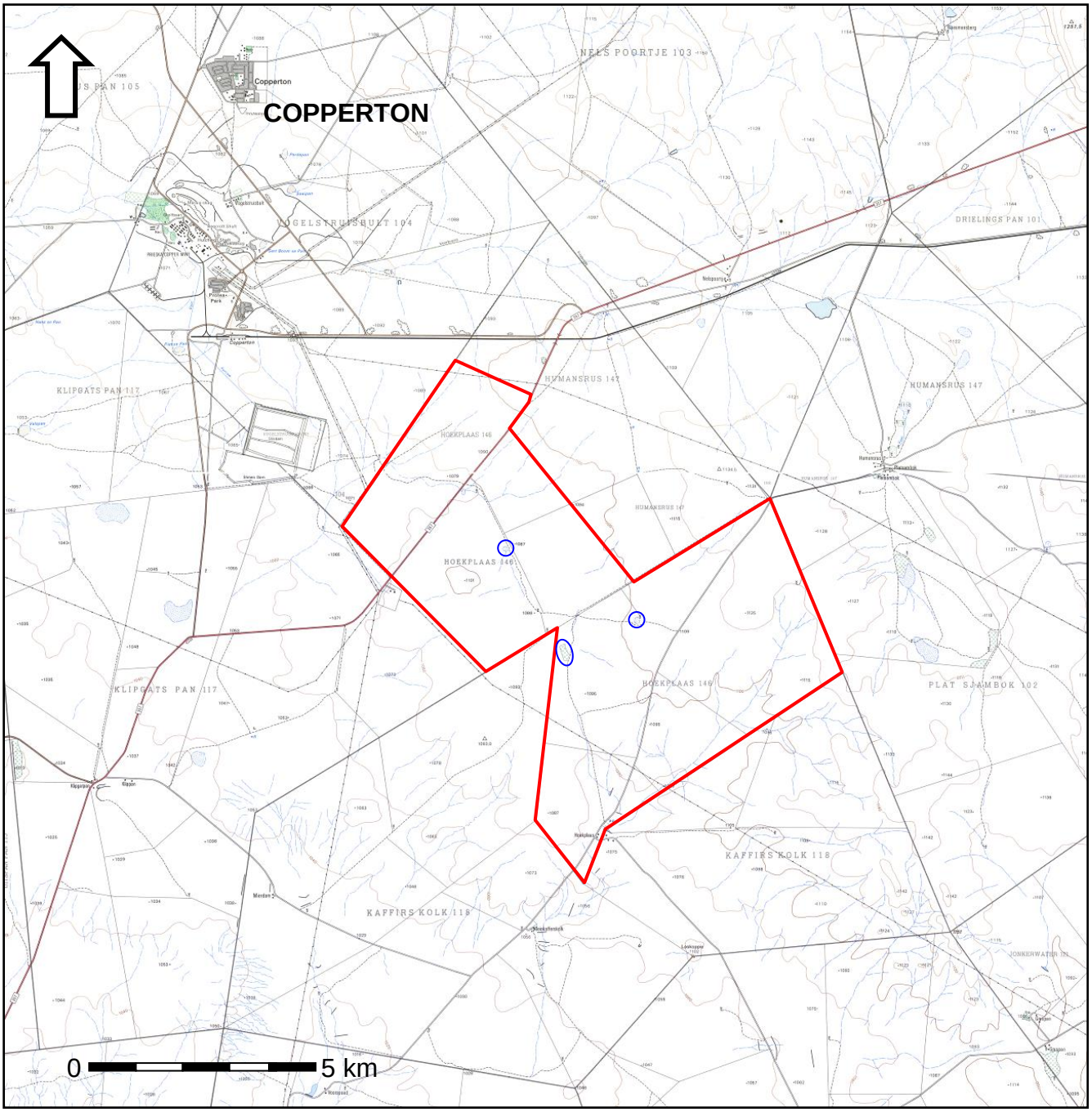

Figure 1: Map showing the location of the Hoekplaas study area (red polygon) relative to Copperton. Pans are indicated by blue ovals.

Each of the proposed PV facilities would consist of the following:

- Numerous arrays of PV panels and associated support infrastructure to generate up to 75MW alternative current (AC) per facility;
- 132kV overhead transmission lines to connect each facility to the central onsite substation or an existing Eskom substation;
- An onsite 132kV, 3 bay substation per facility and two central multi-bay substations; and
- A boundary fence for health, safety and security reasons (Aurecon 2013).

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

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

A single 75 MW facility (PV1; previously assessed by ACO Associates) has already been approved for the farm and the present study considers a further ten such facilities with a combined footprint of 2497 ha. These are known as PV2 to PV11. Several alternatives are being considered for the project as follows:

- Layout: At present legislation only permits development of 75 MW solar energy facilities but should this change then alternative layouts would see three facilities with capacities of up to 500 MW being considered;
- Technology: Different types of solar panels and mounting alternatives are being considered, but, since these do not variably affect the impacts to heritage resources, they are not described further;
- Transmission lines and substations: Two corridors, one leading to each of the two local off-site Eskom substations, have been identified for assessment; and
- The No-Go alternative assesses the status quo of the property (including the already authorised PV1; Aurecon 2013).

1.1. Terms of reference

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

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

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

    - Assess the sensitivity and significance of archaeological remains in the site;
    - Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction (medium term), more than 10 years after construction (long term));
    - Recommendation of mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance;
- The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also guidelines on procedures to be implemented if previously unidentified cultural resources are uncovered during later developments in the area.

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

2. HERITAGE LEGISLATION

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

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

3. METHODS

3.1. Literature survey

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

3.2. Field survey

The site was examined through a combination of driving and walking. Through driving across the site we were able to identify landscape features where heritage remains were more likely to be present. These included high ground, areas around pans and areas along water courses. Walking was then employed to examine specific locations considered to be of

heritage interest and also to conduct random examination of other areas. The survey was carried out on 1st and 2nd May 2013. During the surveys the positions of finds were recorded on a hand-held GPS receiver set to the WGS84 datum. Photographs were taken of representative samples of both the affected heritage and the landscape settings of the proposed developments.

3.3. Impact assessment

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

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

3.4. Limitations & assumptions

Due to the extensive footprint of the study area and, in places, dense vegetation, it was not possible to cover all the ground via a detailed foot survey. While all the areas affected by Alternative 1 were covered, certain parts of Alternative 2 were not examined. However, given the nature of the site and the heritage resources located thereon, it is believed that the survey has captured a representative sample of all heritage resources so as to enable accurate prediction of impacts. Heritage resources (in particular archaeological ones) were found to be tied to landscape features that are easily located by vehicle. Assuming this pattern to hold true, this suggests that relatively few such resources would have been missed during the survey.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The site is very flat containing knee- to waist-high vegetation over much of the area, as well as areas of gravel that afforded good ground visibility (Figure 2). Major landscape features present are three pans in the central part of the site (Figures 1 and 3). Just south of the main road is a large borrow pit. According to the farmer this used to be a pan and was quarried to source calcrete for road construction. Another more ephemeral pan in the southern part of the site has some large gum trees growing alongside it (Figure 4). In general, the substrate across the site varies from gravel to fine silt (compare Figures 2 and 5). North of the site the abandoned slimes dam from the old Prieska Copper Mine is visible on the skyline (Figure 5).

5. HERITAGE CONTEXT

Much of the Karoo is covered by gravels that contain abundant stone artefacts in varying densities (personal observation). Of the Bushmanland area, Beaumont *et al.* (1995: 240) declared that “thousands of square kilometres of Bushmanland are covered by a low density lithic scatter”. These artefacts are generally very well weathered and mostly pertain to the Early (ESA) and Middle Stone Age (MSA). They can be considered as background scatter in that their fine-scale distribution is conditioned more by geological actions than human actions. Occasional Later Stone Age (LSA) artefacts are also present within this scatter and

these were no doubt dropped there during recent millennia. These kinds of finds were made by Kaplan (2010) and Wiltshire (Kaplan & Wiltshire 2011) on proposed PV and wind energy sites nearby. According to Beaumont *et al* (1995) the ESA is said to be characterised by the presence of long blades, Victoria West cores and relatively few hand-axes and cleavers. Substantial MSA sites are rare with only a few isolated examples known (Beaumont *et al.* 1995). The open landscape holds few caves but one called Zoovoorbij Cave close to the Orange River near Upington did include an early MSA occupation (Smith 1995a).

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

Figure 2: General view across the Hoekplaas study area showing vegetation and gravel areas.

Figure 3: View across the large pan (indicated by the arrows) in the centre the Hoekplaas study area.

Figure 4: View of the gum trees at the edge of an ephemeral pan in the southern part of Hoekplaas.

Figure 5: Sandy/silty substrate on Hoekplaas with the slimes dam from the copper mine on the skyline.

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

Rock art, in the form of engravings, is widely known from Bushmanland and the Northern Cape in general (Beaumont *et al.* 1995; Beaumont & Vogel 1989; Rudner & Rudner 1968; Rusch & Parkington 2010; Wilman 1933). Examples of well-known sites include Wildebeest Kuil and Driekopseiland. Various styles occur and are attributed to different time periods: incised finelines extend back the furthest in time, while pecked and scraped engravings occured within the last 2000 years. The latter have the smallest distribution between Kenhardt, Beaufort West and De Aar (Beaumont & Vogel 1989).

During the initial site visit one of the farmers pointed out an engraving site along the road between Copperton and Vanwyksvlei. At this site scraped engravings of eland and ostrich as well as very recent (historical) incised (perhaps better termed scratched) engravings including horses with riders, one chariot and some writing were found. This site is known to researchers and is probably the nearest engraving site to Copperton (David Morris, pers. comm. 2012).

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

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

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

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

6. FINDINGS

The initial survey (Orton 2011) presented a set of findings from the farm and, while those findings are also directly relevant here, this section illustrates further examples. All finds from both surveys are tabulated in Appendix 1.

6.1. Archaeology

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

The Stone Age material dates to all three ages, ESA, MSA and LSA with the first two being represented more by the so-called “background scatter” of artefacts commonly found in the

gravel areas of the Karoo and Bushmanland region. Although larger artefacts, in general, are not readily assigned to one or other Age, some are highly weathered signifying great age while others are diagnostic. Relevant here are a number of hand-axes that were found across the study area, but usually associated with gravel areas. Figure 6 shows a selection of these artefacts from the 2013 survey. While a few were large (15-20 cm range), the majority of those observed were smaller being in the region of 10-12 cm in length. These smaller hand-axes were, prior to 1965, considered to signify a transitional stone tool industry between the Early and Middle Stone Ages termed the Fauresmith (Goodwin 1926; Goodwin & Van Riet Lowe 1929; Van Riet Lowe 1927). While Underhill (2011) has reviewed the literature on the Fauresmith and highlighted the need for further research to determine its validity as a separate industry, Fauresmith artefacts from Kathu Pan to the north of the Orange River have recently been dated to about 500 000 years old (Porat *et al.* 2010).

Figure 6: Selection of ESA hand-axes found at points J064, J068, J076, J083, J094 and J117 respectively. Scales are indicated in cm.

Much of the background scatter is likely to be of MSA origin and only one specific MSA site was recorded. This site was described fully in the earlier report (Orton 2011) but nonetheless is highlighted here for its very high significance. It was in and around a borrow pit (which apparently used to be a pan) alongside the main road and took the form of a buried horizon

of MSA artefacts along with a fossilised probable equid (horse) tooth. This site has been excluded from the proposed layouts but the extent of the site below ground level remains unknown.

It was also noticeable that LSA artefacts were often found in clusters suggestive of actual occupation sites. These artefacts are recognisable by their small size, their relatively unweathered surface appearance and the inclusion of quartz in the assemblages (Figures 7 and 8). Most LSA scatters were found to be located around pans (including ephemeral pans) occuring throughout the landscape. Figure 9 shows a quartzite outcrop that has been quarried to obtain stone. Several such outcrops were noted in the study area. This one was interesting in that many of the flakes removed had been left right there (Figure 10). These appeared to be quite fresh so, despite their relatively large size, they may well be LSA in age. At one site there was an extensive scatter of ostrich eggshell, but far too little to represent an old nesting site (Figure 11). A careful search yielded one fragment of a flask mouth made by piercing the shell and smoothing the edge of the hole (Figure 12). Such flasks are widely documented across the region.

Historical artefacts were absent from the study area with one exception where a single fragment of European ceramic and one of glass was found (HKP2013/002, point J066).

Figure 7: Artefacts from HKP2013/010 (point J086). Scale in cm.

Figure 8: Artefacts from HKP2013/008 (point J079). Scale in cm.

Figure 9: Quarried quartzite outcrop at HKP2013/016 (point J101).

Figure 10: Quartzite flakes removed the quartzite Outcrop at HKP2013/016 (point J101).

Figure 11: Scatter of ostrich eggshell at HKP2013/004 (J069).

Figure 12: Ostrich eggshell flask mouth from HKP2013/004 (J069). Scale in cm.

6.2. Built environment

No buildings were found to occur within the study area, although in the extreme south of the farm is the farm complex for Hoekplaas. It consists of just a few buildings – one farm house, a few outbuildings and a few labourers' cottages. The main house has a curved corner window and face brick detail which suggests the 1950s as a likely age. None of the structures has any heritage significance, although they may be older than 60 years.

Figure 13: The Hoekplaas farm house.

Figure 14: A labourers' cottage.

6.3. Graves

No graves or graveyards or potential graves were identified on or near the site.

6.4. Cultural landscapes

The 2011 report described the ephemeral pan and a few gum trees located around it. These trees are the only obvious signs of human modification of the landscape aside from roads, fences and occasional buildings. The rest of the site is basically unmodified.

6.5. Scenic routes and sense of place

The R357, which connects Prieska with Vanwyksvlei via Copperton, is generally scenic in that one experiences the typical vast, undeveloped open space of the Karoo while driving along it. The study area straddles this road with proposed PV2 and PV3 being to the northwest of it and the other proposed facilities all being to the southeast. However, it should be borne in mind that very few people use the road making any visual impacts to it of reduced concern. The general landscape is very typical of the area and retains a strong sense of place which could easily be impacted through construction of industrial facilities in the area.

7. ASSESSMENT OF IMPACTS

Archaeological resources are widespread but of generally limited significance. Those with the greatest research value tend to be located around pans. At present all well-defined pans are protected from development by at least 90 m but one ephemeral water course located in the far north of the PV3 project area is not. A number of archaeological sites were identified alongside this water course and would require mitigation.One LSA site located in a laydown area also requires mitigation. The other primary concern is the area of very dense background scatter in the far south of the study area (proposed PV11). It is preferable that this area be avoided entirely, but mitigation could be carried out if required. It is recommended that test excavations be undertaken in the northernmost section of PV4 located closest to the MSA site (HKP2011/002) to ensure that no subsurface material will be impacted. A significance of medium has been assigned pending further understanding of the subsurface layout of this potentially important site.

The mitigation measures required for important archaeological sites located within the proposed footprints are as follows (indexed to Table 1):

1. All mitigation-worthy sites falling into areas to be impacted should have archaeological mitigation in the form of excavation, sampling and analysis carried out. At present this only affects:
    a. two sites in the far north of the study area of PV3 (Figure 15);
    b. one in the centre of the farm (located at a laydown area; Figure 16); and
    c. the dense background scatter in the far south at PV11 (Figure 16).

    Some sites fall within the corridors identified for linear infrastructure and, once the exact layouts have been decided upon, these should be mitigated if required. An estimate on the amount of time required on site for each archaeological site is indicated in Appendix 2. Note that avoiding and protecting these sites is always preferred when feasible, but they are not of such a nature that their protection should be required;
2. The area of PV4 closest to the HKP2011/002 MSA site should have test excavations conducted. This site also lies within the identified transmission line corridor but, subject to the test excavations, this may not be a problem. For Alternative 2, test excavations would also be required around the pans in PVs 3A and 4A; and
3. Should Alternative 2 receive environmental approval, the area in the far southeast (part of PV4A) would need to be assessed for archaeological remains through a pre-construction survey.

While visual impacts to the local landscape will undoubtedly be the most significant heritage-related impacts that would be experienced through implementation of the proposed developments, the significance of this impact is to a large degree off-set by the other renewable energy facilities being planned for the surrounding landscape and the existing copper mine to the north. Furthermore, the area is sparsely populated and does not see tourist traffic.

Alternative 2 would have far greater archaeological impact than Alternative 1 since the pans and all surrounding archaeological sites would also be directly impacted. The landscape impacts will not be any different (Table 1). The No-Go alternative would result in maintenance of the status quo. Impacts to archaeological resources would continue at a very limited scale through trampling by grazing livestock and possibly collection of artefacts by visitors to the farm, while the onsite cultural landscape would remain entirely unchanged and experience neutral impacts. At the broader scale, however, the possible construction of renewable energy projects on nearby farms will degrade the cultural landscape.

Cumulative impacts are not very easy to assess, since archaeological resources, in particular, are point-specific. Each is unique and, while the general location of sites can often be predicted, there is no guarantee that a site would be found in an expected location. For this reason one cannot be sure how many sites could be lost relative to the number and type of sites occurring in the local and wider regions. A review of reports conducted for other renewable energy projects in the area suggests that the MSA and LSA material found on Hoekplaas is fairly typical of the area, although for its rarity and potentially very high research value, the MSA site at HKP2011/002 would be regarded as exceptional. Due to the uncertainties, the significance of impacts has thus been kept the same at all scales (Table 2). The cultural landscape is of very limited value and it is extensive, stretching well beyond the immediate surroundings. For this reason it is given a low rating consistent across all extents.

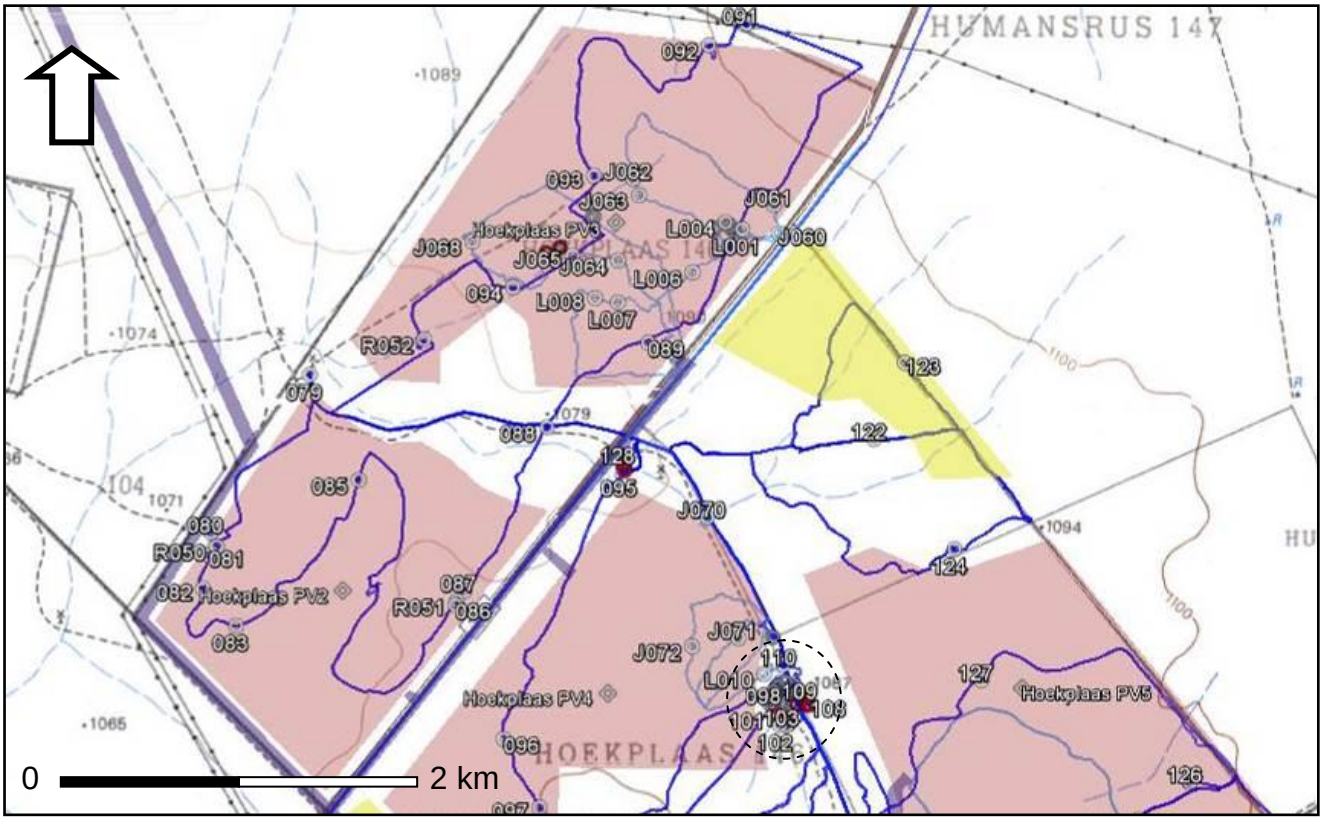

Figure 15: Map of the northern part of the study area with Alternative 1 indicated and showing the locations of archaeological sites requiring mitigation (red symbols). Pink areas are proposed PV footprints and yellow areas are proposed laydown areas. The blue lines indicate search paths and the dashed circle the location of a pan.

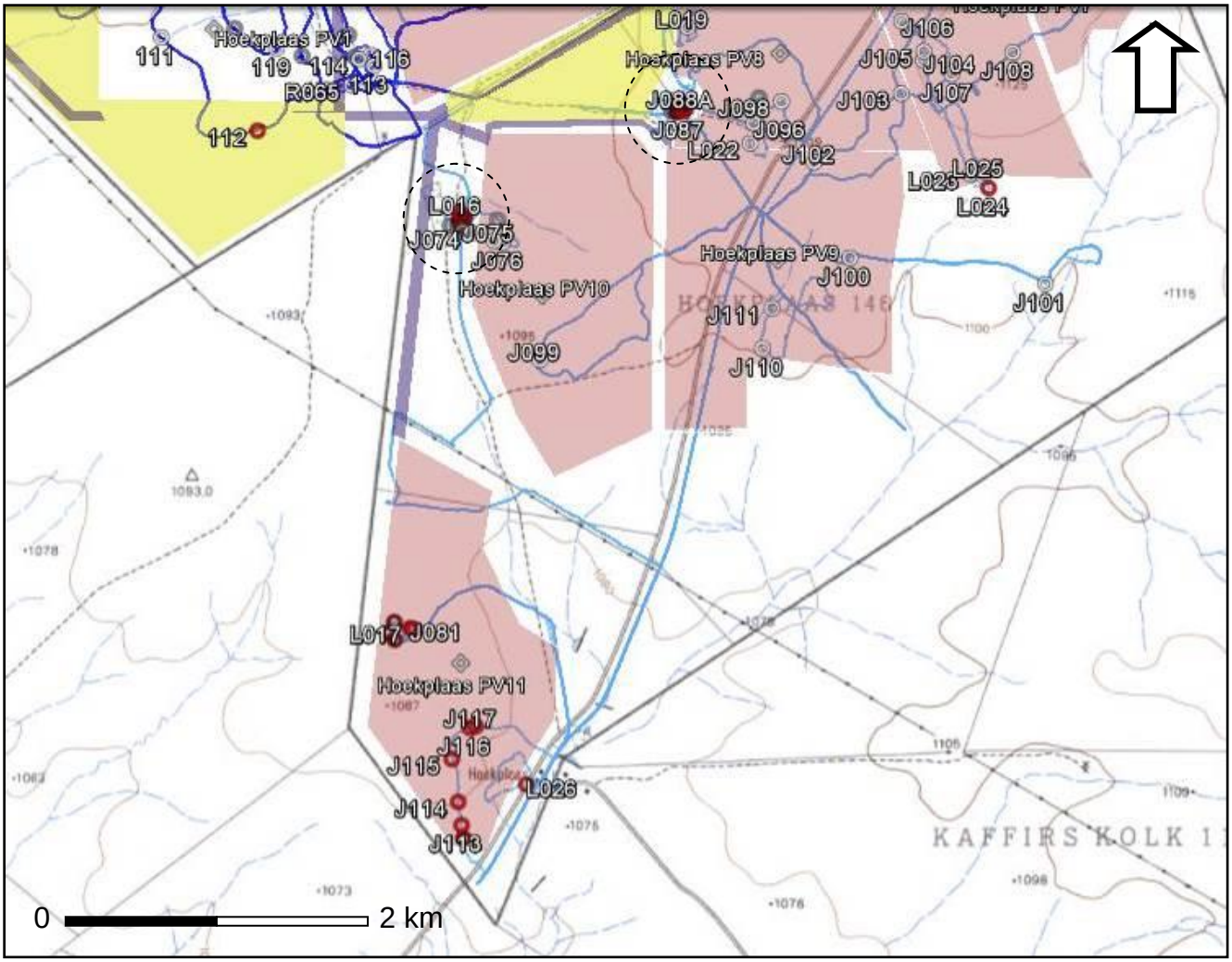

Figure 16: Map of the southern part of the study area with Alternative 1 indicated and showing the locations of archaeological sites requiring mitigation (red symbols). Pink areas are proposed PV footprints and yellow areas are proposed laydown areas. The blue lines indicate search paths and the dashed circles are the locations of pans.

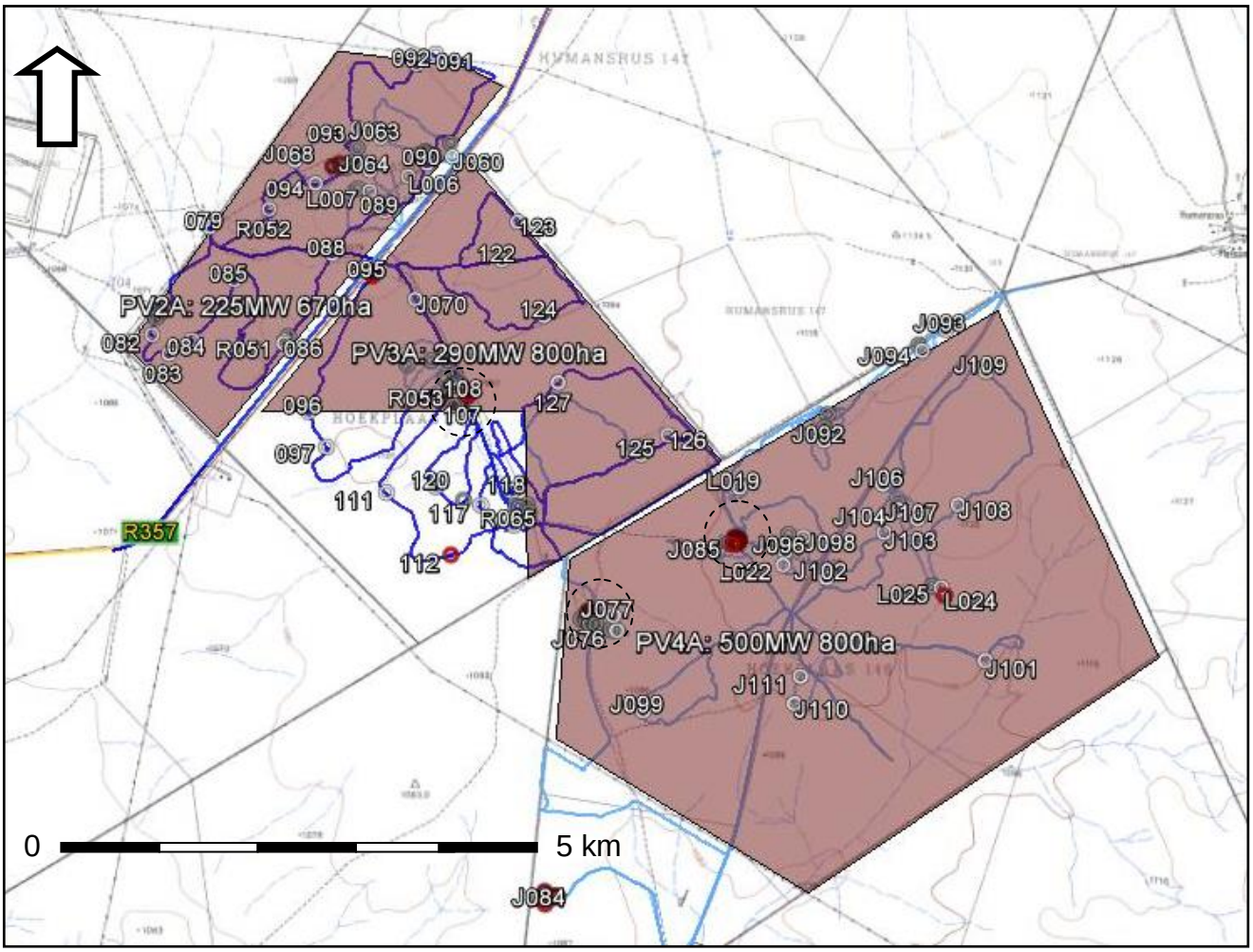

Figure 17: Map of the study area with Alternative 2 indicated and showing the locations of archaeological sites requiring mitigation (red symbols). Brown areas are proposed PV footprints. The blue lines indicate search paths and the dashed circles are the locations of pans.

Table 1: Assessment of heritage impacts for all Alternatives. Mitigation measures as described above.

Impact on Heritage Resources:

project	Key impacts	No mitigation /Mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Mitigation measures
Alt. 1, PV2	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV3	Archaeology	No mitigation	Site specific	Low	Permanent	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV4	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	2
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV5	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV6	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV7	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV8	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV9	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None

project	Key impacts	No mitigation /Mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Mitigation measures
Alt. 1, PV10	Archaeology	No mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	None
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 1, PV11	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	Avoid or 1
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 2, PV2A	Archaeology	No mitigation	Site specific	Low	Permanent	Low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 2, PV3A	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1, 2
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
Alt. 2, PV4A	Archaeology	No mitigation	Site specific	Medium	Permanent	Medium (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	1, 2
	Cultural landscape	No mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	
		Mitigation	Local	Low	Long term	Low (negative)	Definite	Sure	Reversible	None
No-Go	Archaeology	No mitigation	Site Specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
		Mitigation	Site specific	Very low	Permanent	Very low (negative)	Definite	Sure	Irreversible	
	Cultural landscape	No mitigation	Local	Very low	Long term	Very low (neutral)	Definite	Sure	Reversible	
		Mitigation	Local	Very low	Long term	Very low (neutral)	Definite	Sure	Reversible	None

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

Cumulative impact on Heritage Resources:

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

8. CONCLUSIONS

This heritage impact assessment has found that there would be impacts to heritage resources should the proposed solar energy facilities be constructed. Two major types of heritage resources would be impacted: archaeological sites and the cultural landscape / sense of place.

The most important archaeological sites are located in and around the various pans on the farm and, while these are avoided by Alternative 1, they would be impacted by Alternative 2. Although protection of archaeological sites is desirable, mitigation can be conducted for all. Alternative 2 would have generally widespread archaeological impacts, particularly around the pans. These pans are generally avoided by PV2-11 (Alternative 1) and Alternative 1 is therefore preferred. However it would be desirable to avoid development of PV11 due to the extensive archaeological material located in this area. It should also be noted that the buried MSA deposits at and around the pans could potentially have very high significance that can only be quantified through test excavations. The landscape impacts will be substantial and cannot easily (if at all) be mitigated. Given the scale of solar and wind energy developments planned for the region, there is little sense in attempting to shield the presently proposed developments from view.

In conclusion, Alternative 1 omitting PV11 would be favoured, followed by Alternative 1 with all PVs. Alternative 2 is least favoured.

9. RECOMMENDATIONS

The proposed project could be allowed to proceed with either Alternative, although Alternative 1 omitting PV11 is preferred. The following recommendations apply:

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

10. HERITAGE MANAGEMENT

In addition to the recommendations made above, the following management measure is suggested:

- All mitigation-worthy archaeological sites that are avoided by the development and are not mitigated should be protected from incidental damage (for example from vehicles driving over them or through the establishment of power line access tracks).

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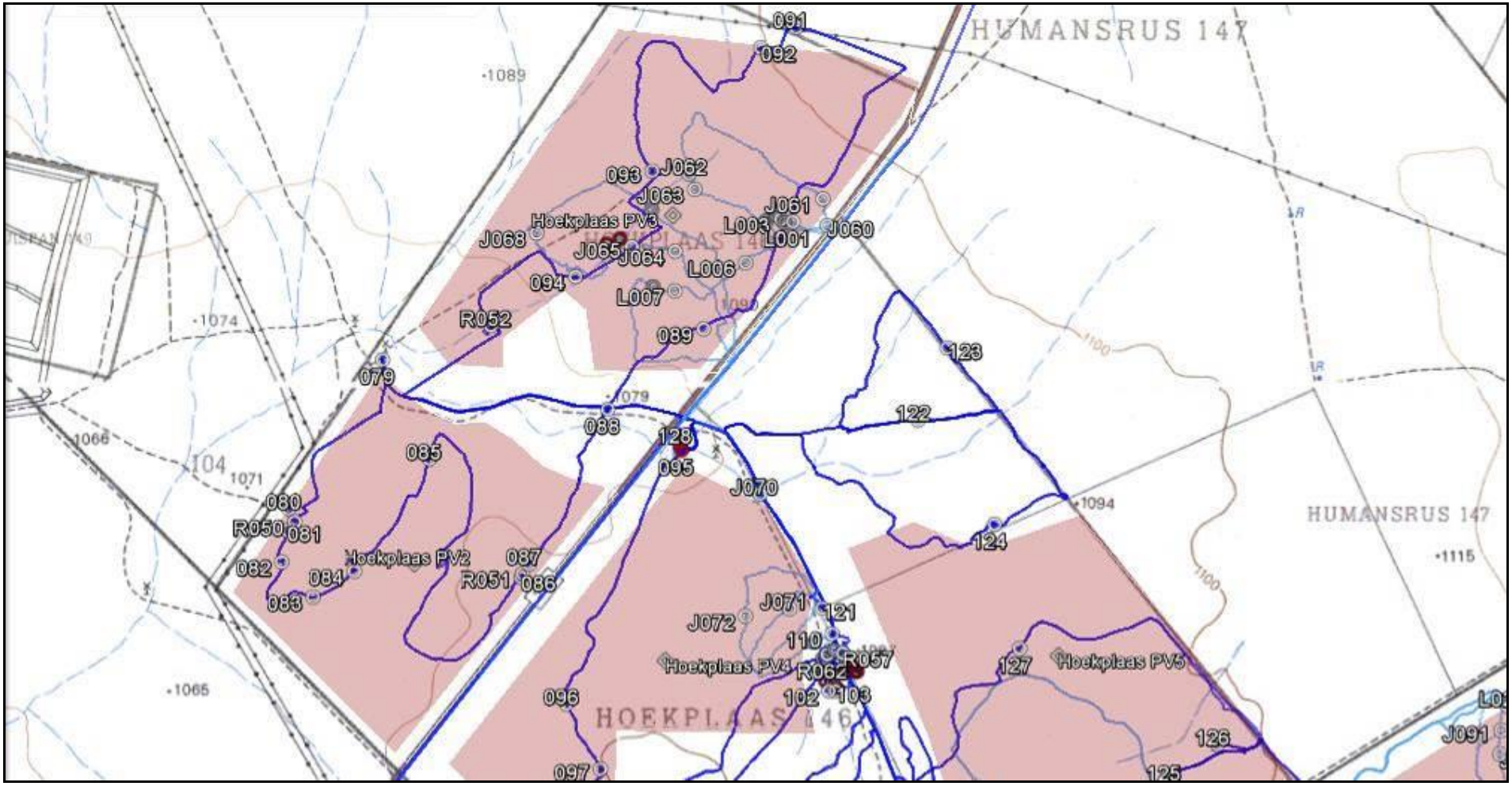
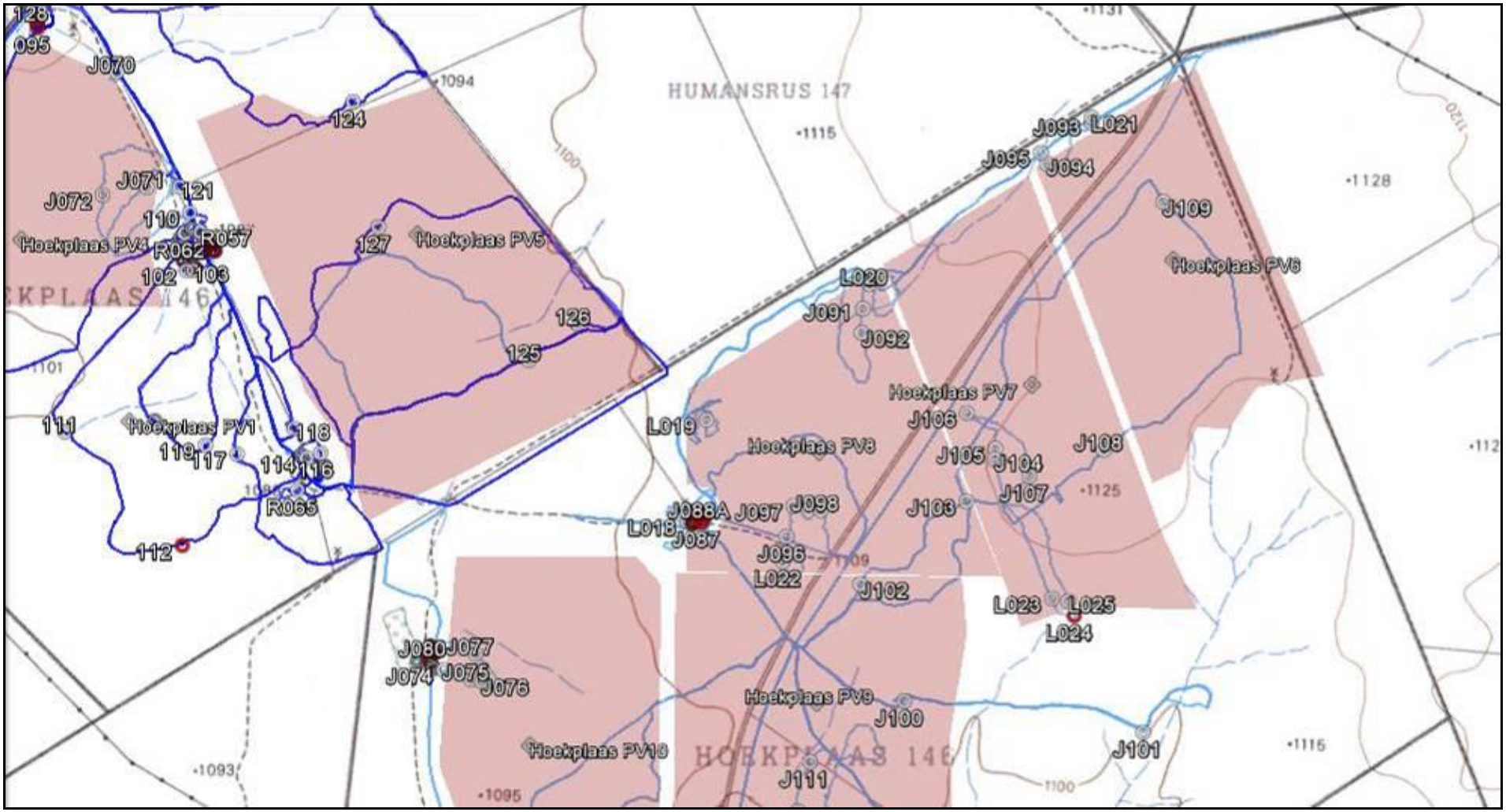
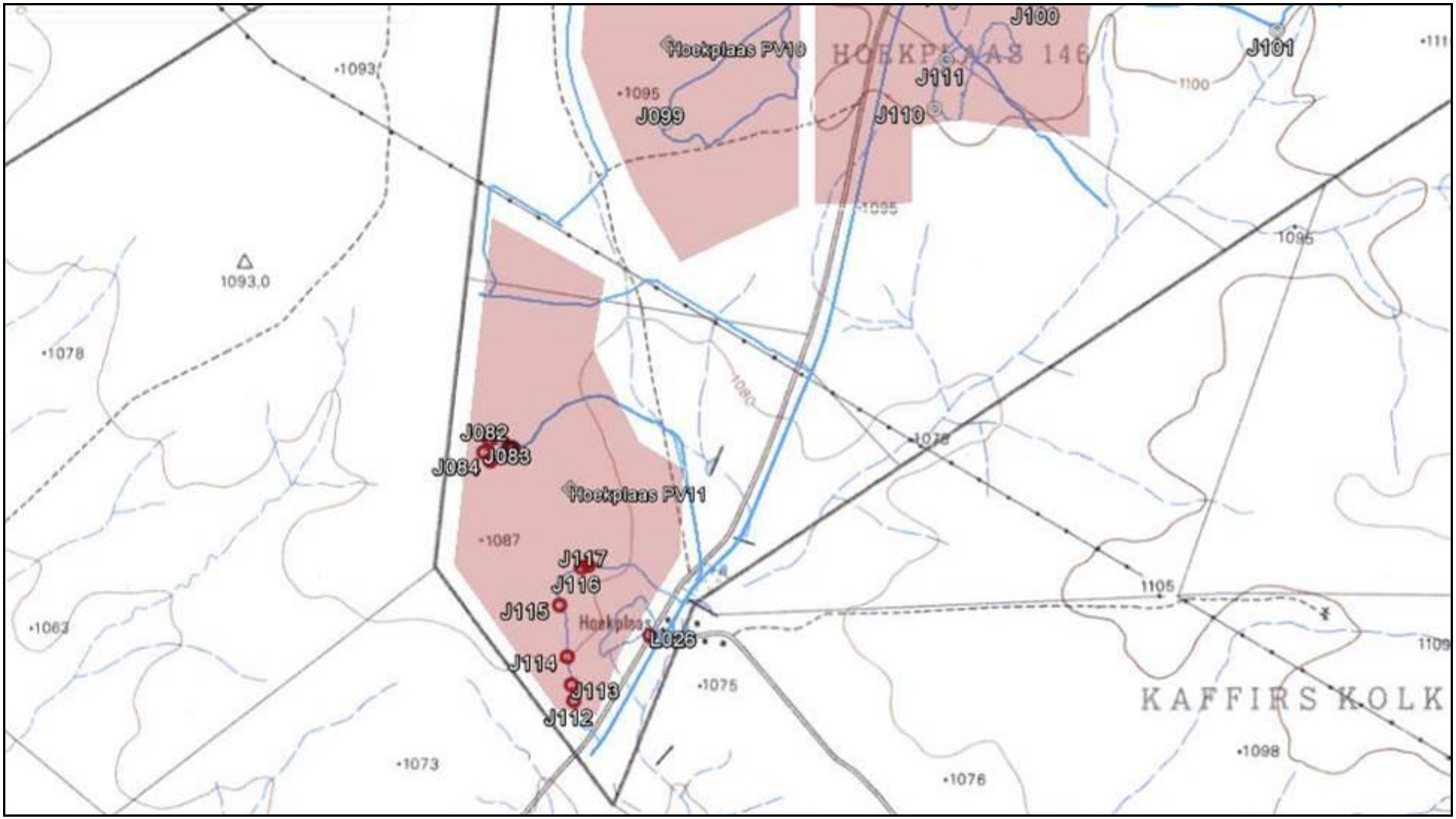
APPENDIX 1: Walk and drive paths from 2011 and 2013 site visits



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



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



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

APPENDIX 2: List of heritage findings

Field No	Site No	Co-ords	Description	Significance/ Mitigation
079		S29 59 57.0 E22 20 17.1	Dense background scatter in gravel patch.	Very low
080		S30 00 25.0 E22 19 56.7	Background scatter in gravel area.	Very low
081		S30 00 29.0 E22 19 56.3	Odd pile of stones over bedrock outcrop.	Very low
082		S30 00 34.9 E22 19 55.1	Background scatter in gravel area. Also the remains of a mounting of something (possibly a pump) and a hole and an old tyre and hub cap.	Very low
083		S30 00 41.5 E22 20 01.9	Background scatter in gravel area.	Very low
084		S30 00 36.7 E22 20 10.9	Background scatter in gravel area.	Very low
085		S30 00 15.6 E22 20 27.2	Background scatter in gravel area.	Very low
086		S30 00 37.8 E22 20 47.2	Background scatter in sandy area with many cores and one hand-axe.	Very low
087		S30 00 35.3 E22 20 49.0	Background scatter including one bifacial artefact near R051.	Very low
088		S30 00 06.3 E22 21 06.0	Background scatter in sandy area.	Very low
089		S29 59 51.3 E22 21 26.8	Background scatter in sandy area with some gravel.	Very low
090		S29 59 34.3 E22 21 43.5	Background scatter in gravel area including one very large possibly unfinished cleaver.	Very low
091		S29 58 54.9 E22 21 46.9	Background scatter in gravel area.	Very low
092		S29 58 58.6 E22 21 39.2	Odd rectangular stone feature. 0.5 x 1.0 m. Unlikely to be a grave.	Very low
093		S29 59 21.7 E22 21 15.7	Background scatter in gravel area.	Very low
094	HKP2011/001	S29 59 41.4 E22 20 59.0	Discrete quartzite scatter with allartefacts of same type of rock which looks fresh. Likely LSA.	Low
095	HKP2011/002	S30 00 14.0 E22 21 22.0	This site is revealed in the eroded edge of a pan which has been quarried for road material. There is a layer of pebbles and artefacts about 0.3 m to 0.5 m below surface and is a reburied lag deposit. The assemblage is blade-rich MSA quartzite but includes an LSA cryptocrystalline silica (CCS) and quartz component in the same horizon. A fossil tooth (most likely equid) was found at the site. A single MSA unifacial point was also found, as well as one old hammer stone. The site continues around the southwest edge of the pit. 128 = Position of unifacial point at HKP2011/002.	High **(mitigation: 7 days)** or **(Test excav. 1 day)**
128		S30 00 12.6 E22 21 21.6		
096		S30 01 01.5 E22 20 57.1	Background scatter in gravel area. This is up on the high ground where the gravel and artefacts are extremely extensive.	Very low
097		S30 01 13.7 E22 21 04.4	Background scatter in gravel area. Big ESA radial core and some ESA/MSA blades.	Very low
098	HKP2011/003	S30 00 55.3 E22 21 51.7	Small LSA CCS, quartz and quartzite scatter in open sandy area.	Low **(1 hour)**
099		S30 00 55.7 E22 21 52.4	More of 098.	

100		S30 00 56.7 E22 21 54.8	Background scatter in gravel area on the edge of the pan. Artefacts seem to be more dense closer to the pan.	Very low
101	HKP2011/004	S30 00 57.3 E22 21 53.2	LSA scatter of CCS, quartz, quartzite and ostrich eggshell in sandy (but bushy) area. Also a lower grindstone and a hammer stone / upper grindstone.	Low **(4 hours)**
102	HKP2011/005	S30 00 59.2 E22 21 54.0	LSA scatter of CCS, quartz and quartzite in sandy area with some gravel.	Low
103		S30 00 59.1 E22 21 55.4	Background scatter in gravel area.	Very low
104	HKP2011/006	S30 00 58.9 E22 21 55.8	LSA scatter of CCS, quartz and quartzite and including one CCS backed point.	Medium **(4 hours)**
105		S30 00 57.8 E22 21 54.9	Dense background scatter but including quite a lot of fresh, possibly LSA, quartzite.	Low
106	HKP2011/007	S30 00 55.5 E22 21 57.4	Good LSA quartzite scatter on the edge of the pan. Also some quartz and CCS. Many blades.	Low-medium **(4 hours)**
107	HKP2011/008	S30 00 55.4 E22 21 59.7	LSA CCS, quartz, quartzite and hornfels scatter including one hornfels backed point.	Medium (**8 hours**)
108		S30 00 55.5 E22 22 00.1	As above but a dense patch here with an anvil stone and plenty of CCS.	
109	HKP2011/009	S30 00 54.4 E22 21 59.0	LSA scatter of CCS, quartz and quartzite in sandy area with some calcrete fragments.	Low-medium (**4 hours**)
110	HKP2011/010	S30 00 48.4 E22 21 54.7	Ephemeral LSA scatter of CCS, quartz and quartzite in a sandy area.	Low
111	HKP2011/011	S30 01 29.2 E22 21 28.0	Flaked outcrop of quartzite but also background scatter occurs widely over the hilltop.	Very low
112	HKP2011/012	S30 01 50.3 E22 21 53.2	LSA scatter of CCS, quartz, quartzite and ostrich eggshell. Some bone noted and one CCS endscraper. Also background scatter in the area.	Low-medium **(4 hours)**
113	HKP2011/013	S30 01 35.6 E22 22 23.7	Cultural landscape. Several blue gum trees, old dam, windmill, troughs.	Low
114		S30 01 34.1 E22 22 19.8	The large but ephemeral pan here has artefacts occurring as background scatter around and in it. No obvious concentrations and generally little LSA.	Very low
115		S30 01 33.6 E22 22 18.6	Background scatter on edge of pan.	Very low
116		S30 01 33.1 E22 22 22.8	Quite a lot of background scatter here but it is of mixed age. It includes one MSA denticulate blade.	Very low
117		S30 01 33.4 E22 22 04.8	Background scatter in gravel area and including a large unifacially worked flake fragment.	Very low
118	HKP2011/014	S30 01 28.6 E22 22 17.0	Ephemeral LSA scatter of CCS, quartz and quartzite in a sandy area.	Low
119		S30 01 31.7 E22 21 58.1	Background scatter in gravel area.	Very low
120		S30 01 27.1 E22 21 47.2	Background scatter in gravel area.	Very low
121	HKP2011/015	S30 00 43.6 E22 21 52.5	Ephemeral LSA quartzite, as well as background scatter in a sandy area.	Very low
122		S30 00 08.4 E22 22 13.3	Background scatter in gravel area.	Very low
123		S29 59 54.8 E22 22 19.6	Background scatter in gravel area and including one hand-axe.	Very low
124		S30 00 27.9 E22 22 29.9	Background scatter in a sandy area.	Very low
125		S30 01 15.9 E22 23 07.6	Background scatter in gravel area.	Very low
126		S30 01 09.1 E22 23 18.1	Background scatter in gravel area.	Very low
127		S30 00 51.1 E22 22 35.3	Background scatter in gravel area.	Very low

R050		S30 00 27.4 E22 19 57.9	Background scatter in gravel area.	Very low
R051	HKP2011/016	S30 00 37.1 E22 20 47.4	Background scatter plus some ostrich eggshell and fresh quartz artefacts in a sandy area.	Low
R052		S29 59 50.6 E22 20 40.6	Background scatter in gravel area.	Very low
R053		S30 00 53.8 E22 21 55.3	Background scatter in gravel area in the middle of the pan.	Very low
R056		S30 00 53.3 E22 21 57.7	Background scatter in a sandy area with calcrete fragments near pan and including a lower grindstone with a flaked edge.	Very low
R057		S30 00 52.0 E22 21 57.0	Background scatter in a sandy area with calcrete fragments near pan.	Very low
R061		S30 00 51.5 E22 21 55.1	Background scatter in a sandy area with calcrete fragments near pan.	Very low
R062		S30 00 52.3 E22 21 53.6	Background scatter in a sandy area with calcrete fragments near pan.	Very low
R063		S30 00 53.1 E22 21 52.6	Background scatter in a sandy area with calcrete fragments near pan.	Very low
R065		S30 01 40.1 E22 22 17.8	Background scatter in gravel area near pan.	Very low
J060		S29 59 31.9 E22 21 53.6	Background scatter with quartzite and CCS	Very low
J061		S29 59 26.9 E22 21 52.7	Background scatter with quartz, quartzite and CCS	Very low
J062	HKP2013/001	S29 59 22.2 E22 21 23.7	LSA scatter in a sandy area in an ephemeral pan. Quartz, quartzite and CCS and some ostrich eggshell (OES) nearby.	Low
J063		S29 59 25.1 E22 21 24.9	Background scatter with quartz, quartzite and CCS	Very low
J064		S29 59 36.7 E22 21 20.6	Extensive background scatter in gravel and calcrete area. Includes quartzite and CCS. 1 hand-axe.	Very low
J065		S29 59 35.8 E22 21 11.3	Extensive background scatter in gravel and calcrete area.	Very low
J066	HKP2013/002	S29 59 34.4 E22 21 08.7	Mixture of background scatter and an LSA scatter amongst taller bushes in a shallow water course. Includes quartz, quartzite, porphyry, CCS, ceramic, glass. Mitigate in the densest LSA area only.	Low-medium **(1 day)**
J067	HKP2013/003	S29 59 35.3 E22 21 05.9	LSA scatter among bushes in shallow water course. Includes quartz, quartzite, CCS, OES.	Low **(2 hours)**
J068		S29 59 33.3 E22 20 50.6	Background scatter in sandy area among bushes. Probably only background scatter. Includes 1 hand-axe.	Very low
J069	HKP2013/004	S29 59 28.9 E22 21 15.6	Broken OES flask and two bone fragments in a sandy area along the shallow water course. Nearby area a CCS flake, a small metal sheet (*c.* 30 cm by 20 cm)	Very low
J070		S30 00 22.2 E22 21 39.0	Light OES scatter and some background scatter in a shallow, sandy pan.	Very low
J071		S30 00 43.7 E22 21 45.4	Background scatter in a shallow pan area.	Very low
J072		S30 00 45.1 E22 21 35.9	Background scatter in sandy area.	Very low
J073	HKP2013/005	S30 02 13.3 E22 22 47.0	LSA scatter of quartz, quartzite, CCS and OES at edge of grassy pan. Also quartzite background scatter here.	Low
J074	HKP2013/006	S30 02 13.5 E22 22 49.2	LSA scatter of quartz, quartzite, CCS and OES near grassy pan.	Low
J075	HKP2013/007	S30 02 15.3 E22 22 55.1	LSA scatter of quartz, quartzite, CCS and OES near grassy pan. Also some background scatter here.	Low

J076		S30 02 15.6 E22 22 57.4	Quartzite background scatter on the slope above the pan. Includes 1 hand-axe.	Very low
J077		S30 02 10.5 E22 22 56.1	Ephemeral LSA in this area near grassy pan.	Very low
J078	HKP2013/008	S30 02 10.2 E22 22 47.4	LSA scatter of quartz, quartzite and CCS on edge of pan.	Low **(2 hours)**
J079		S30 02 10.1 E22 22 46.4	Good LSA scatter of quartz, quartzite and CCS inside edge of grassy pan. Fairly continuous scatter at this distance in from edge of grassy pan.	Medium **(2 hours)**
J080		S30 02 10.9 E22 22 45.9	Similar to the above but mostly quartzite.	Low-medium **(1 hour)**
J081		S30 03 43.1 E22 22 33.2	Continuous low density background scatter across this hill. The area is very rocky. There are large numbers of particularly large artefacts and most of this material is probably ESA. No doubt the hill provided a good source of stone materials for flaking. At 082 there was a 10 cm long hand-axe. At 084 was a quartzite bedrock outcrop that had been flaked *in situ*. (J112-J117 are part of the same area.)	Low-medium **(24hrs for the whole area)**
J082		S30 03 41.7 E22 22 29.0		
J083		S30 03 44.1 E22 22 27.7		
J084	HKP2013/009	S30 03 45.7 E22 22 29.1		
J085		S30 01 46.2 E22 23 42.8	Mixed background scatter just inside the edge of a pan in a gravel area.	Low
J086	HKP2013/010	S30 01 45.8 E22 23 43.4	LSA scatter with CCS, quartz, quartzite, bladelets, tooth fragment. Dense scatter in a gravel-free area inside the edge of the pan.	Medium **(4 hours)**
J087	HKP2013/011	S30 01 46.0 E22 23 44.7	LSA scatter with CCS, quartz, quartzite, bladelets in a sandy area with bushes near the pan. Might be subsurface material present here.	Medium **(4 hours)**
J088	HKP2013/012	S30 01 45.1 E22 23 45.3	LSA scatter among calcrete nodules. CCS, quartz, quartzite. Extensive scatter.	Medium **(4 hours)**
		S30 01 44.3 E22 23 44.9		
J089	HKP2013/013	S30 01 43.9 E22 23 43.5	LSA scatter and some background scatter inside the edge of the pan in a sandy area. Quite widespread.	Low-medium **(2 hours)**
J090	HKP2013/014	S30 01 44.9 E22 23 43.8	LSA scatter in a sandy area inside the edge of the pan. Quartz, CCS, quartzite, bladelets, one large thumbnail scraper.	Low-medium **(2 hours)**
J091		S30 01 06.4 E22 24 19.3	Background scatter of quartzite and CCS, very low density.	Very low
J092		S30 01 10.8 E22 24 19.1	Background scatter of quartzite and CCS, low density.	Very low
J093		S30 00 32.1 E22 25 08.3	Background scatter of quartzite and CCS, low density but more than in the sandy/calcrete areas to the southwest. In gravel/rocky area.	Very low
J094		S30 00 39.5 E22 24 58.7	Background scatter in sandy area with cobbles. Includes one 9 cm long hand-axe.	Very low
J095		S30 00 37.5 E22 24 57.4	Background scatter in sandy area with cobbles. Includes one 11.5 cm long hand-axe.	Very low
J096	HKP2013/015	S30 01 48.7 E22 24 03.0	Fresh macrolithic quartzite scatter among the usual background scatter in a gravel area.	Low
J097		S30 01 43.0 E22 24 04.4	Background scatter with quartzite, CCS and quartz.	Very low
J098		S30 01 43.8 E22 24 10.3	Background scatter with quartzite and CCS. One very weathered hand-axe. In an area of calcrete gravel with sandy patches.	Very low
J099		S30 02 42.2 E22 23 07.2	Background scatter of quartzite in a gravel area.	Very low
J100		S30 02 19.2	Background scatter of quartzite in a gravel and	Very low

		E22 24 28.2	sand area.	
J101	HKP2013/016	S30 02 25.0 E22 25 19.5	Quarried quartzite bedrock outcrop with a large scatter of the same quartzite around the outcrop.	Low
J102		S30 01 57.5 E22 24 18.8	Background scatter in a gravel area including a nice faceted platform MSA blade.	Very low
J103		S30 01 42.1 E22 24 41.5	Background scatter of quartzite in a gravel area.	Very low
J104		S30 01 34.3 E22 24 47.6	Background scatter of quartzite in a gravel and sand area.	Very low
J105		S30 01 32.4 E22 24 47.7	Background scatter of quartzite in a calcrete, gravel and sand area.	Very low
J106		S30 01 25.7 E22 24 41.6	Background scatter of quartzite and CCS in a calcrete, gravel and sand area. There was a CCS core with old weathered scars and also fresh scars.	Very low
J107		S30 01 37.4 E22 24 55.0	Background scatter of quartzite in an ephemeral sandy pan area.	Very low
J108		S30 01 32.5 E22 25 10.9	Background scatter of quartzite in a gravel area.	Very low
J109		S30 00 46.6 E22 25 23.6	Background scatter of quartzite in a gravel area.	Very low
J110		S30 02 39.7 E22 24 05.4	Background scatter of quartzite in a gravel area.	Very low
J111		S30 02 30.5 E22 24 08.0	Light ostrich eggshell scatter in a sandy area. One fragment is possibly engraved with a single line across it. Scatter is about 15 m in diameter.	Very low
J112		S30 04 30.8 E22 22 47.2	Background scatter of quartzite in a gravel area.	Low-medium **(see 081-084 above)**
J113		S30 04 27.8 E22 22 46.7	Background scatter of quartzite in a gravel area.	
J114		S30 04 22.6 E22 22 45.8	Background scatter of quartzite in a gravel area.	
J115	HKP2013/017	S30 04 12.8 E22 22 44.1	Scatter of large, grey quartzite flakes and cores amongst plenty of the usual background scatter. One episode of flaking happened here.	
J116	HKP2013/018	S30 04 05.7 E22 22 48.9	Quarried quartzite outcrop.	
J117		S30 04 05.4 E22 22 50.4	Background scatter of quartzite in a gravel area with one 12 cm long hand-axe and a radial core.	
L001		S29 59 31.2 E22 21 46.1	Background scatter on a calcrete floor of quartzite cores and flakes; quartz core, weathered chert core, chips and one scraper in chert.	Very low
L002		S29 59 31.4 E22 21 44.4	Background scatter of MSA material. MSA blade in quartzite; quartzite cobble; chert adze (probable); chert flaked cobble; several quartz flaked cobbles. Density not high but extensive scatter.	Very low
L003	HKP2013/019	S29 59 30.7 E22 21 43.6	Background scatter. Some very weathered hornfels (?) artefacts including one handaxe. Spread of relatively recently flaked quartzite flakes nearby, probably LSA superimposed on MSA and ESA.	Low
L004		S29 59 30.0 E22 21 42.7	Background scatter. Unifacially flaked chert flake. Some recently flaked quartzite flakes and cores. Grey CCS artefacts.	Very low
L005	HKP2013/020	S29 59 31.0 E22 21 40.5	A scatter of large fresh quartzite cores and flakes.	Low
L006		S29 59 38.9 E22 21 35.9	In a slight depression, more sandy without the calcrete pebbles – occasional flaked artefacts including a grey quartzite triangular MSA flake with facetted platform and one long flake/blade with retouch along the margins; radial core; snapped blade.	Very low

L007		S29 59 44.1 E22 21 20.6	Ephemeral background scatter on calcrete surface of black quartzite flake/blade; fresh quartzite flake, flaked quartz cobble.	Very low
L008		S29 59 43.3 E22 21 15.9	Background scatter. One radial core in quartzite; one snapped MSA blade with retouch in quartzite.	Very low
L010	HKP2013/021	S30 00 50.0 E22 21 50.7	A large block of quartzite protruding from the ground has been quarried, there are recent flakes lying around.	Low
L011		S30 02 13.0 E22 22 46.8	One the inside margins of an ephemeral pan – a scatter of artefacts: recently flaked cobbles, stone flakes, chunks and chips on chert; quartz and also red jasper.	Very low
L012	HKP2013/022	S30 02 12.0 E22 22 46.4	Very dense distribution of artefacts on the inside margins of the same pan in chert, quartz, quartzite and CCS. MSA artefacts are present.	Low – Medium **(2 hours)**
L013	HKP2013/023	S30 02 12.4 E22 22 45.8	Collection of 5-6 boulders inside the edge of the pan, near the artefact scatters. Potential cairn?	Low-Medium
L014	HKP2013/024	S30 02 11.8 E22 22 43.6	Definite cairn. Comprising about 50 rocks, collapsed, covering an area 3m x 2m. One piece of rusty wire nearby. L013 & L014 on the inside edge of the pan, but L015 is close to the middle.	?High **(Avoid / Test)**
L016	HKP2013/025	S30 02 09.0 E22 22 46.4	Cairn located in centre of pan. More dispersed than L014. About 3m x 2m in size. Rocks are larger than L014. No artefacts nearby.	?High **(Avoid / Test)**
L016	HKP2013/026	S30 02 09.0 E22 22 46.4	On inside margin of the pan, another scatter of artefacts. Both MSA and LSA present. Many pieces on quartz, chert also some jasper.	Low – Medium **(2 hours)**
L017		S30 03 43.3 E22 22 34.0	Background scatter. Dense distribution of artefacts on the top of the hill, near the farmhouse. Very extensive scatter. (Part of J081-J084.)	Low-medium **(see 081-084 above)**
L018		S30 01 45.8 E22 23 41.6	Background scatter of artefacts inside the edges of a distinct pan. Quartzite MSA flakes; quartz chunks, cores and flakes; chert flakes with retouch. Scatter appears in the middle of the pan.	Very low
L019	HKP2013/027	S30 01 27.0 E22 23 45.8	Evidence for flaking of a large block of black quartzite protruding from the earth, possible quarry site with small chips nearby.	Low
L020	HKP2013/028	S30 01 01.8 E22 24 20.8	Distribution of 'recently' flaked quartzite in flat area. Also grey CCS.	Low
L021		S30 00 31.0 E22 25 08.3	Rocky area on the side of the road – background scatter of MSA artefacts but also handaxe (same area as J093.)	Very low
L022		S30 01 53.3 E22 24 02.1	Ephemeral background scatter of ESA/MSA material on rocky surface. Includes large quartzite implements	Very low
L023	HKP2013/029	S30 02 00.1 E22 24 59.9	On lower slopes of a slight ridge, about 100m from the slightly deflated area at the base of the hill, a spread of 'recently' flaked black quartzite	Low
L024	HKP2013/030	S30 02 03.3 E22 25 04.6	Site. In the slightly deflated area at the base of the hill, several large bushes. Near one such bush, evidence of 'recently' flaked artefacts in ?CCS. Pale grey. Scatter about 5m x 3m in size.	Low-medium **(3 hours)**
L025		S30 02 00.6 E22 25 03.3	Again on the lower slopes of the ridge (see L023), a background scatter of large weathered artefacts thought to be ESA.	Very low
L026	HKP2013/031	S30 04 18.6 E22 23 03.7	Large quartzite rock protruding from the ground. Evidence of knapping with quartzite flakes and chips lying nearby.	Low-medium **(see 081-084 above)**