

**ARCHAEOLOGICAL IMPACT  
ASSESSMENT  
PROPOSED RICHTERSVELD SOLAR FACILITY  
(Richersveld Sun Spot)**

**Richtersveld Community Reserve**

(Assessment conducted under Section 38 (8) of the  
National Heritage Resources Act as part of an EIA.)

Prepared for:

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January 2015

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## EXECUTIVE SUMMARY

ACO Associates CC was appointed by Richtersveld Sunspot Pty Ltd to conduct an archaeological impact assessment as a contribution to the heritage component of an EIR (compiled by Cape EAprac) for a proposed photovoltaic facility on Richtersveld community land. The study area lies 25 km east of Alexander Bay and some 10 km south east of the Gariiep River. The closest town of any consequence is Alexander Bay. The study area lies outside of the diamond concessions on community land that has traditionally been used for communal grazing by Nama pastoralists for hundreds of years. The area which is one of the most arid in South Africa forms part of a landscape which is valued for its heritage, biodiversity and aesthetic significance. A large portion of the Richtersveld has been declared a World Heritage Site (WHS) and also falls under the protection of the South African heritage legislation. The study area falls outside the buffer zone of the proclaimed WHS.

A physical survey of the footprint areas (both the 100 hectare /50 MW and 200 hectare/75 MW alternatives) has shown that a small amount of archaeological material including a number of Middle Stone Age low density scatters, and a single Late Stone Age site exists in the study area. There is a likelihood of impacts of low significance, all of which can be mitigated.

The impacts to paleontological heritage are expected to be minimal/not at all as the project area is situated in an area of very low sensitivity.

It is concluded that both alternatives are acceptable.

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**SPECIALIST'S DECLARATION OF INTEREST FOR THE PROPOSED  
RICHTERSVELD SUNSPOT SOLAR ENERGY FACILITY**

DECLARATION OF EXPERTISE

I, *Timothy J.G. Hart* hereby declare that I have the necessary expertise to undertake the Archaeological Impact Assessment as requested by Richtersveld Sunspot PTY Ltd in terms of the requirements of section 32 of the Environmental Impact Assessment Regulations.

Qualifications

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*Master of Arts (Archaeology) member of ASAPA (PI) Member of APHP.*

DECLARATION OF INDEPENDENCE

I, *Tim Hart*, declare that

- Act as the independent specialist in this assessment;
- Do not have, and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations;
- Have and will not have any vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document;

All opinions expressed in my specialist report are my own.

*TJG Hart*

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Signature of the Specialist

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# 1 INTRODUCTION

ACO Associates CC was appointed by Richtersveld Sunspot (Pty) Ltd to conduct an archaeological impact assessment (as a component of an HIA) for a proposed photovoltaic facility on Richtersveld community land. The study area lies 25 km east of Alexander Bay and some 10 km south east of the Gariiep River (Figure 1). The closest town of any consequence is Alexander Bay, however the small settlements of Grootderm and Beauvallon on the Gariiep River which are closer, have become abandoned as a result of closure of diamond mining operations. The study area lies outside of the diamond concessions on community land that has traditionally been used for communal grazing by Nama pastoralists for hundreds of years. The area which is one of the most arid in South Africa forms part of a landscape which is valued for its heritage, biodiversity and aesthetic significance. A large portion of the Richtersveld has been declared a World Heritage Site (WHS) and also falls under the protection of the South African heritage legislation. The study area lies outside of the buffer zone of the World Heritage Site. Comments offered by SAHRA on the scoping report have been taken into consideration.



**Figure 1** Location of the project area.

## 1.1 Development Proposal

The proposed activity is the construction of a photovoltaic facility. Two alternative scenarios are being considered, namely a 100 hectare 50 MW facility or a 200 hectare 75 MW facility. The solar panels will be mounted on a combination of either tracking systems (CPV) or static photovoltaic panels (PV), or on tracking systems alone. The project will involve the construction of a substation and power lines to the nearest direct point where the national grid can be accessed. Three alternative power line routes are under investigation including a direct route to Oranjemund Substation.

Construction activities are anticipated to involve levelling the proposed construction area, formalising of the access tracks to the site into a road, and the erection of towers to support the power lines. The facility will have a substation and control room which will also need to be built within the land parcel. There will also be a need for laydown areas and a construction camp/yard in the area of the site.

### **1.1.1 ALTERNATIVES**

The photovoltaic array will be a large facility with a footprint of 100 or 200 hectares, all of which will be covered with solar arrays and related structures. Alternatives are as follows:

#### ***Alternative 1.***

A 100 ha 50 MW facility

#### ***Alternative 2.***

A 200 ha 75 MW facility

### **Technology alternatives**

***Alternative 1*** will consist exclusively of CPV arrays. These are tracking units which are taller than ordinary photovoltaic (PV) arrays. They require a foundation, however vegetation can continue to grow under the array.

***Alternative 2*** (most preferred) is a hybrid option that involves a mix of CPV and PV units.

### **Power lines**

Three alternative routes for power lines have been proposed.

***Alternative 1*** follows a direct route (North West 16 km) to the Oranjemund substation.

***Alternative 2*** runs north east to the Beesbank substation.

***Alternative 3*** follows the servitude of an existing 66kV power line that runs close to the site then north west towards the existing Oranjemund substation.

## **2 METHODOLOGY**

This study has been commissioned as the archaeological component of an EIA. It assesses the identified range of impacts in terms of accumulated knowledge of the area. The source of information that is used for this process is based on scientific publications related to archaeological work undertaken in the region and other unpublished reports on the history of the Richtersveld. A survey of heritage resources has been conducted on site and heritage indicators (conservation-worthy buildings, archaeological sites and places celebrated as heritage) identified and mapped where appropriate. Definitions of heritage and criteria for assessment of heritage are indicated in the National Heritage Resources Act while the Provincial Guidelines for assessing heritage in the Western Cape is useful within the Northern Cape Province. Both the NHRA and Provincial Guidelines require that cultural landscapes and areas of particular aesthetic and/or cultural heritage significance are included in the broader heritage assessment (presently being undertaken by Dr S Townsend).

The study reported on here which focuses on archaeology has been significantly reliant on a physical survey of the study area and the body of background information (published and unpublished) about the region. An independent visual assessment forms part of the EIA specialist studies.

### **2.1 Method and sources of information**

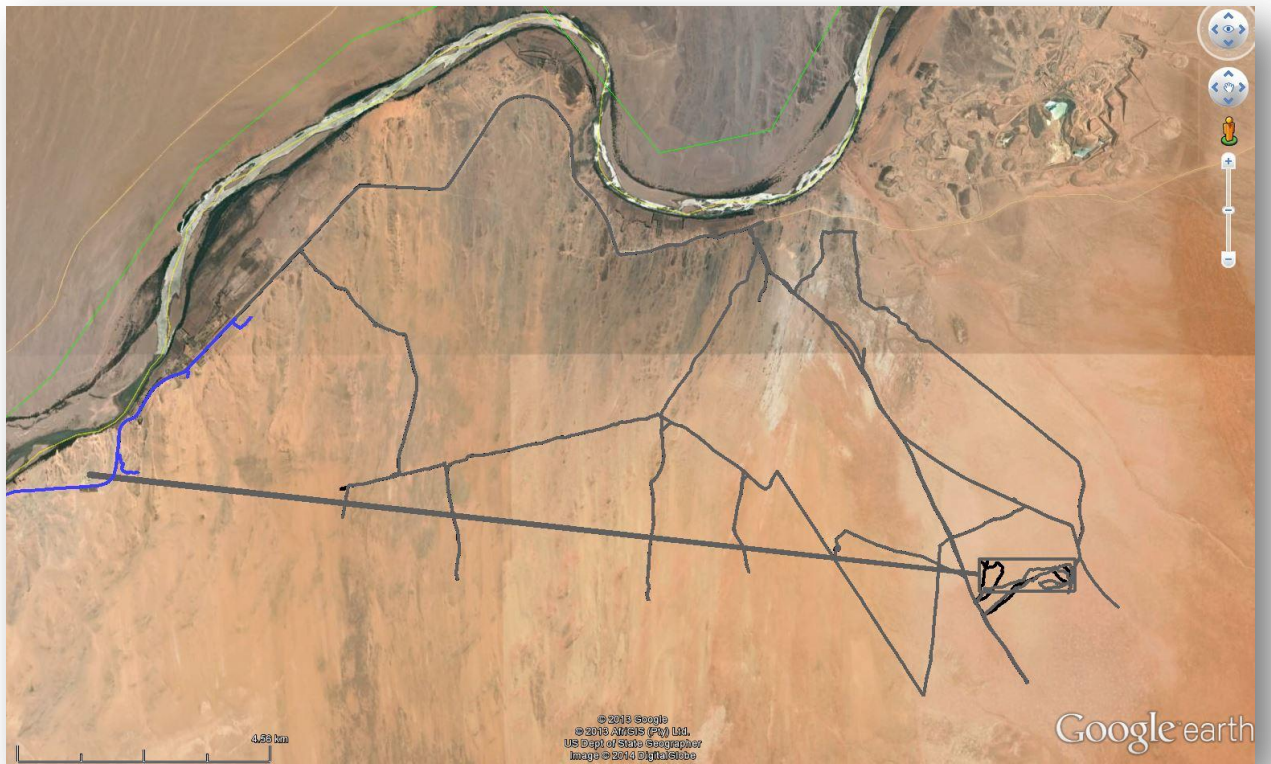
The project was commenced with a period of background desktop research and thereafter subject to a physical foot survey during which time heritage sites (including Nama *veeposte* (stock posts)) were recorded. The proposed routes for the power lines to the site remain in planning, however all three of the proposed alternative routes were physically checked where they could be reached. Track logs have been recorded and are presented in Figure 2.

There is good unpublished information on the archaeology of the area as De Beers mining operations have had archaeological surveys undertaken on an annual basis since 1995 until recently. Limited research work has been undertaken in the Alexkor diamond mining areas in the form of excavations at the Boegoeberg palaeontological and archaeological sites. The Gariep River Valley has been fairly well researched by a number of scholars while the ethnography of the Nama groups in the area has also been the subject of a solid body of research.

### **2.2 Limitations**

Being an arid area, ground surface visibility is excellent; however harsh climatic conditions in summer (strong wind or intense heat) can reduce the length of a working day. . It was noted that rapidly moving windblown sand is a characteristic of this area. It can obscure large tracts of land surface overnight.





**Figure 2.** Survey track-log in the study area. The footprint of the 100 hectare facility lies within the grey rectangle to the right.

### 3 REGULATORY AND LEGISLATIVE OVERVIEW

The basis for all heritage impact assessment is the National Heritage Resources Act 25 (NHRA) of 1999, which in turn prescribes the manner in which heritage is assessed and managed. The National Heritage Resources Act 25 of 1999 has defined certain kinds of heritage as being worthy of protection, by either specific or general protection mechanisms. In South Africa the law is directed towards the protection of human made heritage, although places and objects of scientific importance are covered. The National Heritage Resources Act also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage which must be considered in any heritage assessment includes:

- Any place of cultural significance (described below)
- Buildings and structures (greater than 60 years of age)
- Archaeological sites (greater than 100 years of age)
- Palaeontological sites and specimens
- Shipwrecks and aircraft wrecks
- Graves and grave yards.

Section 38 of the NHRA requires that Heritage Impact Assessments (HIA's) are required for certain kinds of development such as rezoning of land greater than 10 000 sq m in extent or exceeding 3 or more sub-divisions, or for any activity that will alter the character or landscape of a site greater than 5000 sq m.

#### 3.1 Cultural Landscapes (places of cultural significance)

*Section 3(3) of the NHRA, No 25 of 1999 defines the cultural significance of a place or objects with regard to the following criteria:*

- (a) its importance in the community or pattern of South Africa's history;
- (b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- (c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- (d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- (e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- (f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- (g) its strong or special association with a particular community or cultural group for social cultural or spiritual reasons;
- (h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- (i) sites of significance relating to the history of slavery in South Africa.

### 3.2 Scenic Routes

While not specifically mentioned in the NHRA, No 25 of 1999, Scenic Routes are recognised by as a category of heritage resources. In the DEA&DP (Western Cape) guidelines for involving heritage specialists in the EIA process, Baumann & Winter (2005) comment that the visual intrusion of development on a scenic route should be considered a heritage issue.

### 3.3 Heritage Grading

Heritage resources are graded following the system established by Winter and Baumann (2005) in the guidelines for involving heritage practitioners in EIA's (Table 1).

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

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

## 4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The project area is situated in the semi-desert region of the Richtersveld roughly 25 km inland of the coast. It is approached by driving eastwards along the South African side of the Gariiep River passing the small (now virtually abandoned) settlements of Grootderm and Beauvalon. Access to the site is via an informal road that heads southwards (close to Brandkaros) into the dessert.

Members of the Richtersveld community recently successfully contested the State Diamond Mine occupation of ancestral land with result that the Richtersveld Community Property Association now has control of vast tracts of land on the Namaqualand coast including the and stretching inland as far as Vioolsdrift. Historically, almost all of this land was the territory of the Nama herders, a Khoekhoen descendent community with roots in the area as long as 2000 years ago.

In terms of aesthetics the area is open and desolate (Figure 4). The coastal strip (west of the provincial road) has been subject to intense diamond mining for most of the 20<sup>th</sup> century, however those areas outside the mining concessions have powerful wilderness qualities – massive wide open and rugged spaces set against the backdrop of the Richtersveld Mountains. West of the R382 prospecting trenches, spoil heaps and bleak denuded areas litter the landscape. East of the R382 are the arid coastal lowlands consisting of large open tracts of sparsely vegetated dunes.



**Figure 3** The study area is located in the flatlands (middle ground).

### 4.1 Palaeontological heritage

According to the SAHRA palaeontological sensitivity overlay (Figure 5) the study area lies with the “blue” zone indicating that the proposed project area has very low palaeontological sensitivity. No paleontological impact assessment is required however a brief *finds protocol* for accidental palaeontological finds is offered in the recommendations section of this report.



**Figure 4** The palaeontological sensitivity overlay map produced by SAHRA indicates that the study area lies in the dark blue zone which has very low palaeontological sensitivity (SAHRIS 2013).

#### 4.1 Pre-colonial Heritage

Although little has been formally researched until relatively recently, the existence of shell middens on the coast of Namaqualand has been known since the 18<sup>th</sup> century travels of Robert Jacob Gordon. In August 1779 Gordon commented on the many shells and the remains of huts that littered the dunes (Cullinan 1992). In the early years of the 20<sup>th</sup> century Winifred Hoernlé (Carstens *et al.* 1987) also visited the area remarking on the archaeology present. In her diary she remarks that “all along the river there are evident signs of Bushman occupation for their shells are to be found in heaps on every side while here and there a piece of pot crops up too (Carstens *et al.* 1987:65). She comments that middens are plentiful along the shore but that nothing of interest is found on them. Recent heritage impact assessments along the Namaqualand coast have revealed just how remarkably rich the pre-colonial archaeology is, and that many middens do indeed contain nothing but shell and the occasional quartz flake (Halkett 2003; Orton 2005, 2007b; Orton & Halkett 2005, 2006; Webley, in prep.). Many thousands of shell middens occur, with some containing a rich array of finds including stone artefacts, pottery, bone tools, ostrich eggshell beads and animal bones.

Human burials occur widely and along the coast are completely unmarked. They are seldom found by archaeologists with the vast majority being dug up during diamond mining. Hoernlé (Carstens *et al.* 1987) also remarks on burials. She found a skeleton eroded out onto the surface near Kortdoorn and saw many stone-covered mounds along the river which she suspected to be graves. Upon excavating one of them she found a skeleton lying on its left side with the knees brought up beneath the chin. The skeleton was 5 feet below the surface and covered with three large, flat stones. ACO

has also recovered a number of burials from un-marked contexts in mining concessions.

Since the advent of heritage management and conservation programs ahead of diamond mining in coastal Namaqualand, academic research has also commenced.. A doctoral thesis has been completed (Dewar 2007) and published (Dewar 2008) and another has been recent completed by (Orton 2013). An earlier thesis examined mainly inland sites but also included the very important coastal site of Spoeg River Cave (Webley 1992b). Several academic journal articles have also been produced concerning coastal and near-coastal sites (Dewar *et al.* 2006; Dewar & Jerardino 2007; Jerardino *et al.* 1992; Orton 2007c, 2008; Orton *et al.* 2005; Webley 1992a, 2002, 2007). With archaeological research in Namaqualand being so youthful every contribution is valuable.

Further inland, both in the Richtersveld and in central Namaqualand, research has been underway for slightly longer, primarily through the efforts of Lita Webley (1984, 1986, 1990, 1992b, 1997, 2001, 2007; Brink & Webley 1996; Miller & Webley 1994; Webley *et al.* 1993) but including contributions by Smith *et al.* (2001) and Orton and Halkett (in press; Orton 2007a).

It has now been established that the archaeology of Namaqualand is long and complex, covering the entire time span between up to a million years ago to the present day. The archaeology of the last 5000 years is particularly interesting with human occupation of these arid areas pulsing with variations in climate. Namaqualand boasts possibly the longest unbroken record of human settlement in that Nama speaking herders who practise traditional lifestyles in the area are immediate descendants of Khoekhoen populations who first introduced stock keeping and ceramics making into southern Africa more than 2000 years ago.

## **4.2 Colonial Heritage**

The following account of activities in the Richtersveld area during the historical period is compiled from Carstens *et al.* (1987), Davenport (2010), Fleminger (2008) and Williamson (2000). The first travellers to the Gariep River included elephant hunters such as Jacobus Coetzee in 1660. The earliest European penetration of the Richtersveld via the coastal route was by William Paterson and Colonel Gordon in 1779. Dr E Richter, an inspector of the Rhenish Mission Society, visited the area in 1830. The area was subsequently named after him. A mission station was established at Kuboes in the mid-19<sup>th</sup> century.

Captain James Edward Alexander (geographer and explorer) visited the Sendelingsdrift area in 1837 and prospected for copper at Kodas. He explored the south bank of the Gariep from the mountains of the Richtersveld to the sea, and proposed transporting copper down the Gariep River by barge to the mouth, and then by ship to Europe. There is an inscription to this effect at the Baaken mine. A few years later, on 21 March 1846, the South African Mining Company was formed. They sent Thomas Fannin to the Gariep River to survey the area and begin mining the copper deposits. He started an open cast mine that is now thought to be the

oldest commercial mine in South Africa. Although the ore was rich and the progress good, the company faded away, probably due to logistical difficulties, the harsh environment and the lack of finance. In 1847 the British extended their control to the Gariiep River and the Richtersveld was included in the Namaqualand district. By the 1890s, the inhabitants of the Richtersveld demanded clarity regarding their ownership of the land. Eventually in 1934 a formal “ticket of occupation” was issued by the government giving the indigenous groups communal rights to the land which was technically still held in trust by the state. The Richtersveld then became a “coloured reserve” under a management board.

It is interesting that although copper was mined in the mid-19<sup>th</sup> century by the colonists and long before that by the prehistoric inhabitants of the area (Goodwin 1956), diamonds were only discovered by Europeans in the early 20<sup>th</sup> century. In 1908 Dr Bernhard Dernburg discovered diamonds in southern Namibia (Davis 2008) and the area became known as the ‘Sperrgebiet’. Earlier, someone called Pohle had been the first to recognise the potential for finding diamonds in the Gariiep River. He had reasoned that since the river ran past the Kimberley diamond fields it must be carrying the gems downstream, but his limited prospecting yielded no result (Coetzer 1997). It was only in 1925 that the first Namaqualand diamond was discovered. It came from a site 10.5 km south of Port Nolloth and was found by Jack Carstens on 15th August using very rudimentary techniques (J. Carstens 1962; P. Carstens 2001). He continued his work to the south, since his father had found nothing around Alexander Bay while prospecting between 1899 and 1901. Subsequently, in November 1926, Dr Ernst Reuning, a geologist employed by Dr Hans Merensky, found the first diamonds at Alexander Bay (P. Carstens 2001). It was near the ruins of an old stone house used in the 1830s by Alexander as a copper store that Merensky noted an outcrop of shingle containing oysters. He had earlier noted the co-occurrence of oysters and diamonds to the south and set Reuning to work at that location. This spot was at the northern end of the so-called “Oyster line” which was a very rich source of diamonds. Earlier, a solicitor from Springbok named Israel Gordon, his two brothers and two others had first found diamonds near Alexander Bay. On 28<sup>th</sup> December 1926 Reuning and Merensky visited their claims and came to an agreement with the Gordon syndicate for 6 months of work on their claims but within a few days made a formal offer to purchase the property. This was accepted and Merensky obtained it for £17 500. Merensky then appealed to the state to prevent public digging at Alexander Bay and on 22 February 1927 the government banned prospecting on Crown land and, amidst much wheeling and dealing, began planning the establishment of the state diggings there (Rudd & Watson 1956 in P. Carstens 2001). It took over all mining operations there in 1928 (Keyser 1972). This was later to become the Alexcor or State Diamond mines. After almost a century of mining, the Richtersveld community, comprising mainly people of Nama origin, once again obtained their rights to the land.

#### **4.2 Living heritage: The Nama**

Historical accounts up until 1913 suggest that Nama-speakers were living very much like their ancestors of centuries before. The Nama-speaking inhabitants of the region follow a seasonal transhumant cycle. This means that they are not nomadic but tend to use a specific area on a seasonal basis. There is no clear indication of specific

boundaries, and early traveller's record meeting with Nama groups as far south as Steinkopf. While pastoralism did allow for larger herder settlements, historic accounts suggest that the dry Northern Cape could not support the group sizes of several hundred observed further to the southwest. Since population density was low, there was little competition for land. Villages or kraals were centered on certain important water holes - the presence or absence of water was the first consideration when planning a move to a new area. Certain families, through time, come to be associated with a certain area.

Each herder settlement consisted of male members of the same patri-clan, with their wives and children. All the settlements (or kraals) in a given area were often part of the same tribal structure, owing allegiance to the most senior member or captain. These chiefs decided, together with senior members of the village on when and where to move, and they gave permission to *outsiders* who wished to enter their area to use their resources. However, ultimately, economic survival depends on flexibility and reciprocity.

The definitive account of the social organisation of the Nama-speaking Khoekhoen is that of Winifred Hoernle who travelled through the region in 1912 and 1922/3. Khoekhoen society emphasized various rituals which took place at times of transition in an individual's life, such as birth, puberty, marriage and death. Water was associated with the concept of *Inau* (danger or vulnerability) which occurred during these periods of transition. Water was therefore used in many ceremonies, including that of rain making, initiation, birth, etc. Men and women had different tasks in ceremonies and in society. Interestingly, there are many indications that women exerted considerable authority within the household but they could also own and inherit stock and on rare occasions become regents or temporary chiefs.

The villagers of Kuboes, for example, moved to the Gariep River in summer and to a variety of winter locations such as Springklip and Jakkalsputs. This type of information, which is readily available, can assist when interpreting archaeological deposits and determining prehistoric seasonal patterns.

While resources were often shared, there was also the understanding that certain groups or individuals had rights to particular resources (such as a honey nest) and that permission had to be obtained to use them. Ethno-botanical research by Archer (1994) has focused on the indigenous plant use of the descendants of the Nama-speaking Khoekhoen of the area. Knowledge on plant resources has declined during the 20<sup>th</sup> century and it is only the rural poor who use plants to supplement their diet, for medicinal purposes and in domestic architecture. She has identified at least 75 different, edible plant species many of which are used by children as snacks. At least 45 different plants are used as medicines, some are common knowledge while others are only used by herbalists and healers. At least 22 different plants are used for utilitarian purposes including the construction of the traditional *matjiesbuis*, in leatherwork, in making soap and in making household items.

The original inhabitants of the area (the San and the Nama) spoke related but different languages. San is no longer spoken although some 6000 Nama speakers are still found in the Northern Cape. The South African San Institute (SASI) was



founded in 1997 to research and protect the rights of indigenous minorities like the Khoe and San. During land claims investigations, SASI discovered 11 fluent southern San speakers in the Northern Cape, meaning that this language is effectively extinct. Crawhall, a sociolinguist who works for SASI has identified 6000 Nama speakers and has been concerned with the continued survival of this language.

Today there is dissent among the members of the Richtersveld community as the recent awarding of land to the indigenous inhabitants has created a plethora of management and leadership problems in a community who survival has depended very old traditional values for hundreds of years.

Within the Study Area today is evidence active or recently active stock posts. Although the '*matjehuisies*' are no longer built of traditional materials, they are rendered in modern materials and the style and size of the encampments follow traditional form. The stock posts are actively used indicating the people are practising traditional herding activities in the area today.



**Figure 5** A Nama stock post close to the study area.

## **5 FINDINGS**

### **5.1 Findings of the physical survey of the proposed solar site**

Locations and details of observations are reflected in appendix A

The proposed site for the solar energy facility lies in a flat and almost featureless plain. The overall setting is however spectacular as the mountains of the Richtersveld form a backdrop to this wide open wilderness area. Within the project area there are no rocky outcrops or dunes, or even any erosion features apart from a few sheet wash areas (pans). It is also sparsely vegetated. Outside the study area is a wind pump, dam and stock post – the only formal built element in the vicinity (dis-used). The road to the project area is an informal track which diverges into as many as three parallel tracks as road users take shortcuts *at will* to avoid ruts or sand accumulations.

The survey was undertaken in two stages, initially Hart and Webley surveyed the 100 hectare 50 kW while Halkett and Kendrick surveyed the remainder to make up the 200 hectare 75 kW alternative.

The survey revealed that the proposed site is of minimal heritage significance in terms of archaeology. All of the archaeological occurrences consist of thin scatters of flaked and fractured quartz without associated organic material. Formal artefacts were not noted and the material itself is a-diagnostic in terms of assigning secure cultural affiliations. Only one archaeological site of medium significance was recorded (Figure 7). This consisted of a spatially intact quartz scatter and an associated broken ostrich eggshell. This little site is easily mitigated through archaeological collection if the development proposal is approved.

A single Nama shelter was recorded in the study area (Figure 8). This consisted of a small brush windbreak and covering of brush supported on small poles. The presence of a few rusty tins indicates that it was probably erected a few years ago and had been recently occupied.

### **5.2 Findings of the physical survey of the power line alternatives.**

No archaeological sites of any kind were noted on any of the proposed power line alternatives. Proximity to water was such a critical issue in this landscape, that the majority of archaeological sites were located within 1 km of the permanent waters of the Gariiep River.

## 6 IMPACT IDENTIFICATION



Figure 6 This scatter of quartz artefacts (point 04) and ostrich egg is the only archaeological site located that has spatial integrity (scale 20 cm).



Figure 8. A small shelter constructed from poles and brush used by Nama herders in the recent past.

Archaeological sites are vulnerable to physical disturbance. Once they are disturbed and their physical context is destroyed, they become meaningless. Artefacts that have no provenance are almost impossible to date, very difficult to assign cultural affiliation and are useless for any form of research or knowledge advancement. Similarly it is important to know the geological context of a fossil find – without context these are little more mantelpiece curiosities.

Hence in both archaeology and palaeontology context is all important. The proposed activity will require some levelling of the terrain, possibly piling and casting of foundations. These are all factors that are potentially dangerous for context sensitive heritage.

The study has indicated that within the site and on the power line alternatives, there is no palaeontology sensitivity and those archaeological sites that do exist are of low significance. In these terms the site is suited to the proposed activity.

The impact of the proposed activity will depend on what alternative is favoured for the solar facility – the larger it is the greater the impact albeit that indications are that the archaeology of the area is of low significance. The actual assessment of impacts will be done using standard criteria and ratings as furnished by Cape EAprac.

## **6.1 Alternatives**

### **6.1.1 TECHNOLOGY ALTERNATIVE**

In terms of heritage impacts, the visual impact in this instance will be a contributor to the heritage impact. The findings of the visual impact assessment apply.

### **6.1.2 TRANSMISSION LINES**

In terms of physical heritage all the power line options will have a low impact, however in the interests of conserving the landscape, the alternative that utilises the existing Eskom 66 kV servitude is deemed the best (subject to findings of the visual impact assessment).

## **6. IMPACT IDENTIFICATION AND ASSESSMENT**

Archaeological sites are vulnerable to physical disturbance. Once they are disturbed and their physical context is destroyed, they become meaningless. Artefacts that have no provenance are almost impossible to date, very difficult to assign cultural affiliation and are useless for any form of research or knowledge advancement. Similarly it is important to know the geological context of a fossil find – without context these are little more mantelpiece curiosities.

Hence in both archaeology and paleontology context is all important. The proposed activity will require some leveling of the terrain, possibly piling and casting of foundations. These are all factors that are potentially dangerous for context sensitive heritage. Within the site and on the power line alternatives, there is no paleontology and those archaeological sites that do exist are of low significance. Only one small site will need mitigation. In these terms the site is suited to the proposed activity.

**Table 2.** The potential impact of construction of access roads and power lines and the solar facility on the palaeontological heritage of the Study Area

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Nature/Type</b>	N/a	N/a
<b>Extent</b>	N/a	N/a
<b>Duration</b>	N/a	N/a
<b>Probability/likelihood</b>	N/a	N/a
<b>Significance</b>	N/a	N/a
<b>Irreplaceable loss of resources?</b>	N/a	N/a
<b>Can impacts be mitigated?</b>	N/a	N/a
<b>Mitigation:</b> None required – area is palaeontologically sterile..		
<b>Operational Phase:</b> n/a		
<b>Decommissioning Phase:</b> n/a		
<b>Cumulative impacts:</b> n/a		

**Table 3** The potential impact of the construction of the access roads and power line and solar facility on the pre-colonial archaeology and built environment of the Study Area

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Nature/Type</b>	Negative	Neutral - positive
<b>Extent</b>	Local	On-site
<b>Duration</b>	Permanent	Permanent
<b>Probability/likelihood</b>	Highly likely	Unlikely
<b>Significance</b>	Medium	Minor
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b> A single small archaeological site will need to be “rescued” before development activities begin. No mitigation required for the built environment.		
<b>Operational Phase:</b> N/a		
<b>Decommissioning Phase:</b> N/a		
<b>Cumulative impacts:</b> Minor		

**Table 4** The potential impact of the construction of the, access roads and power line and solar facility on the on buried graves in the Study Area

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Nature/Type</b>	Negative & Direct	Neutral
<b>Extent</b>	Local	On-site

<b>Duration</b>	Permanent	Permanent
<b>Probability/likelihood</b>	Possible	Unlikely
<b>Significance</b>	Major	Minor
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	yes	
<b>Mitigation:</b> The Northern Cape heritage authority and SAHRA should be notified immediately if a burial/human remains are uncovered during the construction of the Facility. Work in the area must stop while an archaeologist investigates – mitigation may involve exhumation.		
<b>Operational Phase:</b> None		
<b>Decommissioning Phase:</b> None		
<b>Cumulative impacts:</b> Undeterminable as the “population” of buried human remains is unknown.		

## 6.2 Cumulative impacts

The proposed facility is the only one of its kind so far proposed for the western Richtersveld. The archaeological heritage of the site is ephemeral and of low significance which means its loss is of minor concern. In this part of the Richtersveld water sources and springs attracted the bulk of precolonial occupation – no such features exist in the study area. Archaeological sites were quite numerous in the Orange River Valley flood plains, however many more significant archaeological sites than any of those in the study area have been destroyed by mining operations. Compared with this impact, the impact of the proposed PV facility (either alternative) is negligible.

## 7 CONCLUSION AND RECOMMENDATIONS

Indications are that the small amount of archaeological heritage present in the footprint areas (both alternatives) can be mitigated successfully through a minor excavation program prior to commencement of construction. No archaeological sites were found on any of the power line alternatives therefore the impact of this activity is likely to be of low significance.

In terms of archaeology construction of the 75 MW facility as opposed to the 50 MW will involve disturbing a greater land parcel however the archaeological material on the landscape is of low significance. There are no immediate reasons to suggest that the 75MW alternative would have a greater negative impact than the 50 MW alternatives.

The impacts to paleontological heritage are expected to be *minimal/not at all* as the project area is situated in an area of very low sensitivity (see finds protocol hereafter).

The finding of this archaeological impact assessment is that the proposed activity is likely to result in impacts of low significance. The finding of this report the proposed activity in the form of either alternative 1 or 2 is considered acceptable.

### 7.1 Paleontological finds protocol

The study area is not considered to be paleontologically rich therefore finds of macro-fossil are deemed to be unlikely. However give that chance fossil finds have been known to occur the following advice is offered on the treatment of *ad hoc* finds. A find in this paleontologically poor could be quite rare and important.

In South Africa all archaeological and paleontological material is the property of the state. Private possession of such material is a contravention of the law.

It is possible that depending on the prevailing geology that fossil material may be found during construction of development projects. Fossils are important sources of information about past conditions on the planet and the kinds of environments that prevailed. These can take the form of silicified animal bone, fish, sharks teeth, trace fossils (foot prints and animal burrows in mudstone) and fossil plants and ferns as well as shellfish and other invertebrates.

#### 7.1.1 WHAT SHOULD BE DONE WHEN A FOSSIL IS FOUND

Occasional loose fossil should be collected and the location of the find photographed and position recorded by GPS. Such material should be placed in a safe place until the fossils and the find data can be handed in to regional museum or a palaeontologist. It would be a good idea to send electronic photographs of the find for examination by a palaeontologist (advice can be sought from SAHRA or a museum)

Dense clusters of fossil bone or fossil bone that is articulated must be flagged and left in position. Don't attempt to extract the fossil from the rock or sandstone in which

it is found – this work is best left to someone who knows how to do this. Digital photographs must be sent to a palaeontologist, who if necessary will need to come to site to extract the find. Until the palaeontologist and his/her assistants are able to get to site, keep the find site secure and erect a safety tape cordon around it.

Most regional museums and heritage bodies will be able to locate a palaeontologist for you. Alternatively the project Heritage consultant will be able to assist.



## 8 LIST OF DEFINITIONS AND ABBREVIATIONS

**Archaeology:** *Remains resulting from human activity which is in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.*

**Early Stone Age:** *The archaeology of the Stone Age between 700 000 and 2500 000 years ago.*

**Fossil:** *Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.*

**Heritage:** *That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).*

**Holocene:** *The most recent geological time period which commenced 10 000 years ago.*

**Late Stone Age:** *The archaeology of the last 20 000 years associated with fully modern people.*

**Middle Stone Age:** *The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.*

**National Estate:** *The collective heritage assets of the Nation.*

**Palaeontology:** *Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.*

**SAHRA:** *South African Heritage Resources Agency – the compliance authority which protects national heritage.*

**Structure (historic:)** *Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.*

### Acronyms

BP	Before the Present
DEA	Department of Environmental Affairs
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment

HWC	Heritage Western Cape
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act, No 25 of 1999
SAHRA	South African Heritage Resources Agency
WHS	World Heritage Site

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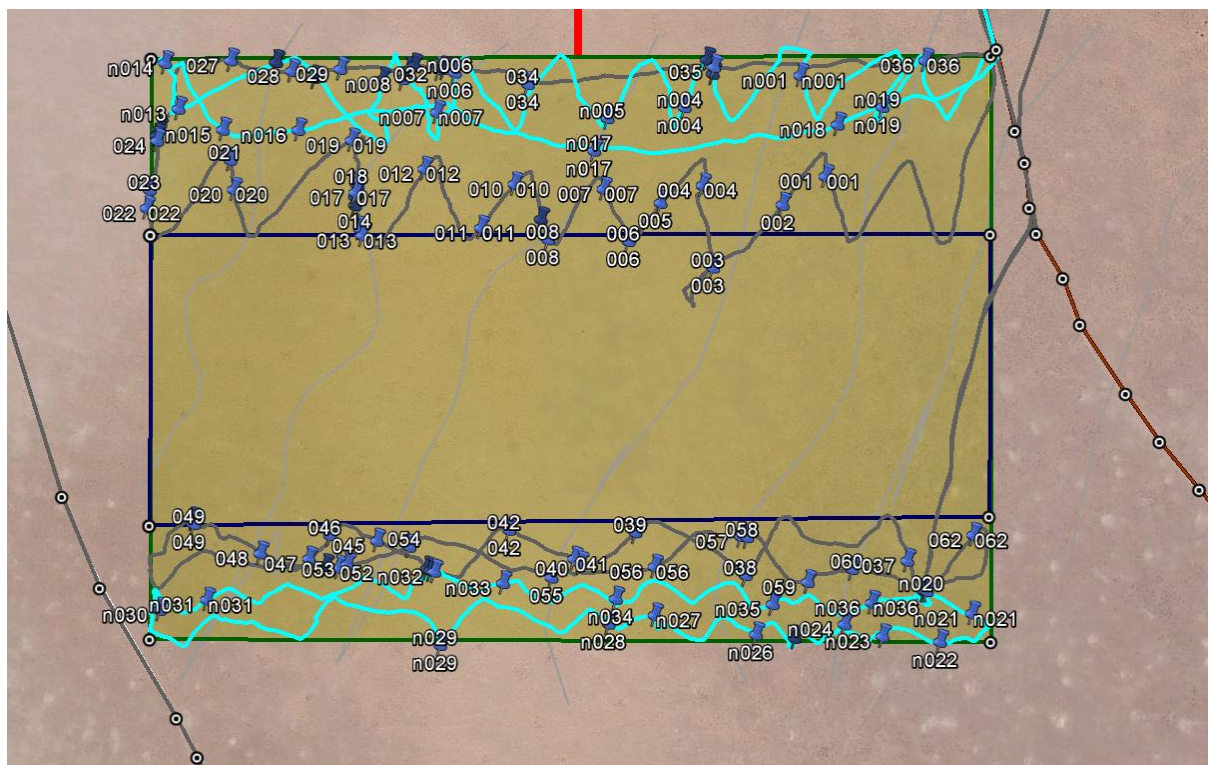
### **Web based resources**

*UNESCO (2007) World Heritage Committee Decision Adopted: 32COM 7B.52.  
Christchurch, New Zealand*

<http://whc.unesco.org/en/list/1265>



Appendix A – archaeological observations



*Track log and locations of observations 200 hectare 75kV extension.*

Archaeobservations and positions. 200 hectare 75kV extension.

Site number	Co-ordinate	Description	Significance
001	Latitude: -28.557702 Longitude : 16.77913098	Single quartz chunk	Low
002	Latitude: -28.5582200065 Longitude : 16.7782379687	Low density quartz artefact scatter – 3 per sqm.	Low
003	Latitude: -28.5593689978 Longitude : 16.7767879833	Quartz scatter	Low
004	Latitude: -28.5578630213 Longitude : 16.7765679583	Quartz flake	Low
005	Latitude: -28.5581829585 Longitude : 16.7756900378	Quartz flakes	Low
006	Latitude: -28.5588830151 Longitude : 16.7750189826	Quartz Flakes	Low
007	Latitude: -28.5579289868 Longitude : 16.7744940240	Quartz scatter (sheet wash area)	Low
008	Latitude: -28.5588499904 Longitude : 16.7733359803	Few flakes	Low
009	Latitude: -28.5584800132 Longitude : 16.7731840163	Quartz flakes and hornfels scraper	Low
010	Latitude: -28.5578350257 Longitude : 16.7726289667	Quartz chunks	Low
011	Latitude: -28.5586400237 Longitude : 16.7719279882	E quartz flakes	Low

012	Latitude: -28.5575539805 Longitude : 16.7707410268	Concentration of large quartz chunks	Low
013	Latitude: -28.5587769840 Longitude : 16.7694389820	013-22 quartz chunks and cores, some flakes.	Low
014	Latitude: -28.5586550273 Longitude : 16.7693870142	013-22 quartz chunks and cores, some flakes.	Low
015	Latitude: -28.5582200065 Longitude : 16.7692819890	013-22 quartz chunks and cores, some flakes.	Low
016	Latitude: -28.5580650251 Longitude : 16.7692829948	013-22 quartz chunks and cores, some flakes.	Low
017	Latitude: -28.5579869896 Longitude : 16.7692919634	013-22 quartz chunks and cores, some flakes.	Low
018	Latitude: -28.5578259733 Longitude : 16.7693119962	013-22 quartz chunks and cores, some flakes.	Low
019	Latitude: -28.5570239928 Longitude : 16.7692059651	013-22 quartz chunks and cores, some flakes.	Low
020	Latitude: -28.5579269752 Longitude : 16.7667219881	013-22 quartz chunks and cores, some flakes.	Low
021	Latitude: -28.5573770385 Longitude : 16.7666459642	013-22 quartz chunks and cores, some flakes.	Low
022	Latitude: -28.5582670290 Longitude : 16.7648880277	013-22 quartz chunks and cores, some flakes.	Low
023	Latitude: -28.5579279810 Longitude : 16.7649460305	Large low density quartz scatter	Low
024	Latitude: -28.5570199694 Longitude : 16.7650969885	Quartz scatter (pans)	Low
025	Latitude: -28.5569250025 Longitude : 16.7650880199	Quartz scatter (pans)	Low
026	Latitude: -28.5568059795 Longitude : 16.7651430052	Quartz scatter (pans)	Low
027	Latitude: -28.5555440001 Longitude : 16.7666519992	Quartz scatter	Low
028	Latitude: -28.5557449982 Longitude : 16.7679409683	Quartz scatter	Low
029	Latitude: -28.5557090398 Longitude : 16.7689669970	Quartz scatter exposed in a pan	Low
030	Latitude: -28.5557220317 Longitude : 16.7704049964	Quartz scatter exposed around a pan	Low
031	Latitude: -28.5556500312 Longitude : 16.7705199961	5 Quartz chunks	Low
032	Latitude: -28.5557190143 Longitude : 16.7710410152	5 Quartz chunks	Low
033	Latitude: -28.5557070281 Longitude : 16.7711460404	Quartz scatter	Low
034	Latitude: -28.5559910070 Longitude : 16.7729059886	Quartz scatter	Low
035	Latitude: -28.5556930304 Longitude : 16.7768070102	Large quartz core	Low
036	Latitude: -28.5555819701 Longitude : 16.7812100239	large scatter of low density of quartz cores and chunks around a large pan up to 20m in diameter	Low
037	Latitude: -28.5647250339 Longitude : 16.7808249593	Quartz scatter	Low
038	Latitude: -28.5649990384 Longitude : 16.7774680071	Quartz scatter	Low
039	Latitude: -28.5642200243	Quartz scatter	Low

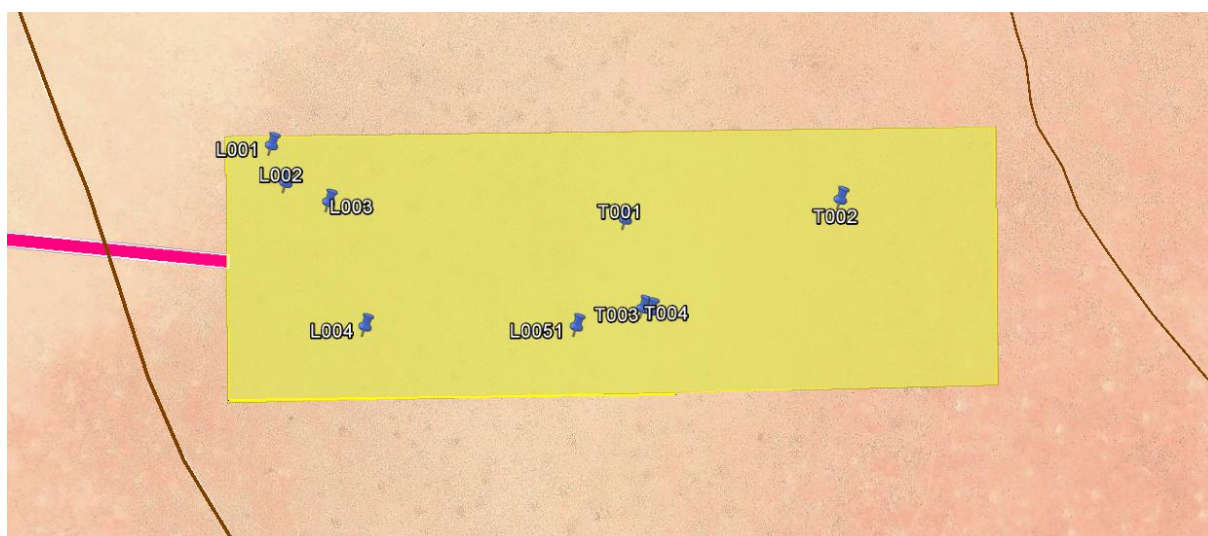
	Longitude : 16.7751690187		
040	Latitude: -28.5647940170 Longitude : 16.7740170099	Quartz scatter	Low
041	Latitude: -28.5647090245 Longitude : 16.7738900241	Quartz scatter	Low
042	Latitude: -28.5641819704 Longitude : 16.7725240253	Quartz scatter	Low
043	Latitude: -28.5649289656 Longitude : 16.7708820105	Quartz scatter	Low
044	Latitude: -28.5648999643 Longitude : 16.7708029691	Quartz scatter	Low
045	Latitude: -28.5643869918 Longitude : 16.7697539739	Quartz scatter	Low
046	Latitude: -28.5642859899 Longitude : 16.7687639873	Quartz scatter	Low
047	Latitude: -28.5647220165 Longitude : 16.7683250271	Quartz scatter	Low
048	Latitude: -28.5646269657 Longitude : 16.7672979925	Quartz scatter	Low
049	Latitude: -28.5640859976 Longitude : 16.7659050040	Quartz scatter	Low
050	Latitude: -28.5640020110 Longitude : 16.7658790201	Quartz scatter	Low
051	Latitude: -28.5648559593 Longitude : 16.7686729599	Quartz scatter	Low
052	Latitude: -28.5648869723 Longitude : 16.7689469643	Quartz scatter	Low
053	Latitude: -28.5648260359 Longitude : 16.7691290192	Quartz scatter	Low
054	Latitude: -28.5644930229 Longitude : 16.7704370152	Quartz scatter	Low
055	Latitude: -28.5650520120 Longitude : 16.7734170333	Quartz scatter	Low
056	Latitude: -28.5648500081 Longitude : 16.7755679972	Quartz scatter	Low
057	Latitude: -28.5642859899 Longitude : 16.7773670051	Quartz scatter	Low
058	Latitude: -28.5643060226 Longitude : 16.7775000259	Quartz scatter	Low
059	Latitude: -28.5651220009 Longitude : 16.7787630111	Quartz scatter	Low
060	Latitude: -28.5648810212 Longitude : 16.7796840146	Quartz scatter	Low
061	Latitude: -28.5652789939 Longitude : 16.7811749876	Quartz scatter	Low
062	Latitude: -28.5642539710 Longitude : 16.7821959872	Quartz scatter	Low
n001	Latitude: -28.5558520351 Longitude : 16.7786030006	Quartz scatter	Low
n002	Latitude: -28.5558169987 Longitude : 16.7767790146	Quartz scatter	Low
n003	Latitude: -28.5555559862 Longitude : 16.7766530346	Quartz scatter	Low
n004	Latitude: -28.5564270336 Longitude : 16.7761930358	Quartz scatter	Low
n005	Latitude: -28.5566250142 Longitude : 16.7745800223	Quartz scatter	Low
n006	Latitude: -28.5557800345	Quartz scatter	Low

	Longitude : 16.7713760398		
n007	Latitude: -28.5565130319 Longitude : 16.7709990218	Quartz scatter	Low
n008	Latitude: -28.5558989737 Longitude : 16.7702810280	Quartz scatter	Low
n009	Latitude: -28.5559029970 Longitude : 16.7698490247	Quartz scatter	Low
n010	Latitude: -28.5558699723 Longitude : 16.7684280407	Quartz scatter	Low
n011	Latitude: -28.5555770248 Longitude : 16.7676099669	Quartz scatter	Low
n012	Latitude: -28.5555770248 Longitude : 16.7676089611	Quartz scatter	Low
n013	Latitude: -28.5564309731 Longitude : 16.7655470129	Quartz scatter	Low
n014	Latitude: -28.5555880051 Longitude : 16.7652630340	Quartz scatter	Low
n015	Latitude: -28.5568219889 Longitude : 16.7664899770	Quartz scatter	Low
n016	Latitude: -28.5568319634 Longitude : 16.7680830415	Quartz scatter	Low
n017	Latitude: -28.5572219733 Longitude : 16.7742999829	Quartz scatter	Low
n018	Latitude: -28.5567540117 Longitude : 16.7793840263	Quartz scatter	Low
n019	Latitude: -28.5564339906 Longitude : 16.7803200334	Quartz scatter	Low
n020	Latitude: -28.5652799997 Longitude : 16.7812319845	Quartz scatter	Low
n021	Latitude: -28.5656840075 Longitude : 16.7821679916	Quartz scatter	Low
n022	Latitude: -28.5662040208 Longitude : 16.7815069947	Quartz scatter	Low
n023	Latitude: -28.5661079641 Longitude : 16.7803160101	Quartz scatter	Low
n024	Latitude: -28.5658919625 Longitude : 16.7795270216	Quartz scatter	Low
n025	Latitude: -28.5661419947 Longitude : 16.7784940358	Quartz scatter	Low
n026	Latitude: -28.5660799686 Longitude : 16.7776819970	Quartz scatter	Low
n027	Latitude: -28.5657399986 Longitude : 16.7755730264	Quartz scatter	Low
n028	Latitude: -28.5658929683 Longitude : 16.7746110354	Quartz scatter	Low
n029	Latitude: -28.5662920307 Longitude : 16.7710880376	Quartz scatter	Low
n030	Latitude: -28.5656679980 Longitude : 16.7651819810	Quartz scatter	Low
n031	Latitude: -28.5654779803 Longitude : 16.7661769968	Quartz scatter	Low
n032	Latitude: -28.5649510100 Longitude : 16.7709619738	Quartz scatter	Low
n033	Latitude: -28.5651579592 Longitude : 16.7723999731	Quartz scatter	Low
n034	Latitude: -28.5654379986 Longitude : 16.7747609876	Quartz scatter	Low
n035	Latitude: -28.5655280203	Quartz scatter	Low

	Longitude : 16.7780280020		
n036	Latitude: -28.5654960014 Longitude : 16.7800929677	Quartz scatter	Low

Archaeological occurrences recorded by Hart and Webley 100 hectare 50kV  
Alternative

Name	Description	Significance
L001	A very shall depression, cleared of vegetation, about 5 m in diameter, containing a scatter of 6 quartz flakes and chunks. There is no diagnostic elements to determine whether the artefacts are MSA or LSA although the latter is more likely. Few photos	Low
L002	A very slight hollow, about 8 m in diameter, containing about 8 quartz flakes and chunks. There are no diagnostic elements, but some of the quartz flakes appear to be fresh, suggesting LSA. Few photos	Low
L003	A scatter of about 5 quartz flakes and chunks in a slightly hollowed, cleared area of around 3 m in diameter. No photos	Low
L004	A scatter of about 5 quartz flakes and chunks in a very slight hollow, cleared of vegetation, about 8 m in diameter. No photos.	Low
T001	A small shelter made of branches and brush that may be attributed to recent activities of Nama herders. 8x8 m	Low
T002	An ephemeral scatter consisting of three quartz chunks and 4-5 flakes. 4x4m.	Low
T003	Several large quartz chunks and associated waste flakes. 4x4 m.	Low
T004	A small dense well defined scatter of quartz flakes, large chunks and discrete pile of ostrich egg shell. About 60 artefacts were observed in 3x5 m area.	Medium (Mitigation required).



Archaeological observations 100 hectare 50 kV alternative





