

# Archaeological Impact Assessment

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**For the proposed Sonnenberg Photovoltaic Plant.  
Keimoes, Northern Cape**

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Prepared For

**Savannah Environmental (Pty) Ltd**

By



# HERITAGE

Contracts and Archaeological Consulting

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## EXECUTIVE SUMMARY

**Site name and location:** The proposed Sonnenberg photovoltaic plant is located approximately 30 km west of Keimoes in the Northern Cape. The proposed project is located on the farm Baviazanzkranz 471 within the Kai Garib Local Municipality and the Siyanda District Municipality.

**Purpose of the study:** Phase 1 Archaeological Impact Assessment to determine the presence of cultural heritage sites and the impact of the proposed project on these resources within the areas demarcated for the solar development.

**1:50 000 Topographic Map:** 2820 DA.

**EIA Consultant:** Savannah Environmental (Pty) Ltd

**Developer:** S28 Degrees Energy (Pty) Ltd

**Heritage Consultant:** Heritage Contracts and Archaeological Consulting CC (HCAC).

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**Date of Report: 28 October 2011**

### Findings of the Assessment:

The abundance of locally available quartz outcrops, as raw material for stone tools, resulted in the use of the landscape by Stone Age people, probably over several millennia. Stone Age remains are mostly represented by Middle Stone Age (MSA) stone tool scatters and quarries, found on quartz outcrops protruding through the thick sand cover. Erosion on the high-lying quartz areas causes the gravitating of rocks and artefacts towards the gently dipping plains, and some artefact deposits might be covered by the clay and sandy soils in these plains.

The predominant component of artefacts appears to be Pleistocene and early Holocene in age (artefacts are almost 100% made from milky and rose quartz that is abundant in the area). The Stone Age industries include MSA, but some Later Stone Age (LSA) assemblages can be expected.

If the recommendations as made under section 7 of this report are adhered to, there is from a heritage point of view no reason why the development cannot commence.

If during construction any possible finds such as stone tool scatters or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find.

## General

Low ground visibility is present on portions of the site due to high sand cover and the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded. If during construction any possible finds are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find.

**Disclaimer:** *Although all possible care is taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. Heritage Contracts and Archaeological Consulting CC and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

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- The results of the project;
- The technology described in any report
- Recommendations delivered to the Client.

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## ABBREVIATIONS

<b>ASAPA:</b> Association of South African Professional Archaeologists	<b>SAHRA:</b> South African Heritage Resources Agency
<b>CRM:</b> Cultural Resource Management	<b>MIA:</b> Middle Iron Age
<b>EIA Practitioner:</b> Environmental Impact Assessment Practitioner	<b>EIA:</b> Environmental Impact Assessment*
<b>EIA:</b> Early Iron Age*	<b>ESA:</b> Early Stone Age
<b>GPS:</b> Global Positioning System	<b>HIA:</b> Heritage Impact Assessment
<b>LSA:</b> Late Stone Age	<b>LIA:</b> Late Iron Age
<b>MSA:</b> Middle Stone Age	

*\*Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

## GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (2.6 million to 250 000 years ago)

Middle Stone Age (250 000 to 25 000 years ago)

Late Stone Age (25 000 to 500 years ago)

The Iron Age (AD 400 to 1840)

Historic (AD 1840 to 1950)

Historic building (over 60 years old)

## 1 BACKGROUND INFORMATION

<b>Kind of Study</b>	Archaeological Impact Assessment
<b>Type of development</b>	Solar Facility
<b>Rezoning/ subdivision of land</b>	Rezoning
<b>Developer:</b>	S28 Degrees Energy (Pty) Ltd
<b>Consultant:</b>	Savannah Environmental
<b>Farm Owner:</b>	Jannie-Spangenberg

A heritage scoping report was conducted by Heritage Contracts and Archaeological Consulting CC (2011) and the company was also contracted by Savannah Environmental (Pty) Ltd to conduct an Archaeological Impact Assessment for the proposed Sonnenberg Solar Facility, close to Keimoes in the Northern Cape. This report forms part of the EIA for the proposed project.

The aim of the study is to identify cultural heritage sites, document, and assess their importance within Local, Provincial and national context. To assess the impact of the proposed project on non-renewable heritage resources and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

The report outlines the approach and methodology utilized before and during the survey, which includes in Phase 1: Review of the heritage scoping report that includes collection from various sources and consultations; Phase 2: Physical surveying of the area on foot and by vehicle and Phase 3: Reporting the outcome of the study.

During the survey eight heritage sites were identified. General site conditions and features on sites were recorded by means of photos, GPS location, and description. Possible impacts were identified and mitigation measures are proposed in the following report.

This report must also be submitted to SAHRA provincial office for peer review.



## 1.1 Terms of Reference

### Conduct a field study to:

Systematically survey the proposed project area to locate, identify record, photograph and describe sites of archaeological, historical or cultural interest; and record GPS points of significant areas identified. Determine the levels of significance of the various types of heritage resources recorded in the project area;

### Reporting

Identify the anticipated impacts, as well as cumulative impacts, of the operational units of the proposed project activity on the identified heritage resources for all 3 phases of the project, i.e. construction, operation and decommissioning phases. Consider alternatives should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results are sufficient to comply with the relevant legislation and the code of ethics and guidelines of the Association of Southern African Professional Archaeologist (ASAPA).

To assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

## 1.2. ARCHAEOLOGICAL LEGISLATION AND BEST PRACTICE

Phase 1 Archaeological Impact Assessments or Heritage Impact Assessments are a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of a heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources;
- Make recommendations for the appropriate heritage management of these impacts.

The AIA or HIA, as a specialist sub-section of the Environmental Impact Assessment [EIA] is required under the National Heritage Resources Act NHRA of 1999 (Act 25 of 1999)., Section 38(1), Section 38(8) the National Environmental Management Act (NEMA) and the Mineral and Petroleum Resources Development Act (MPRDA).

The AIA should be submitted, as part of the EIA, BIA or Environmental Management Plan [EMP], to the PHRA if established in the province or to SAHRA. SAHRA will be ultimately responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and required additional development information, as per the EIA, BIA / EMP, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level).

Minimum standards for reports, site documentation and descriptions are set by the Association of Southern African Professional Archaeologists [ASAPA] in collaboration with SAHRA. ASAPA is a legal body, based in South Africa, representing professional archaeology in the Southern African Development Community [SADC] region. ASAPA is primarily involved in the overseeing of archaeological ethical practice and standards. Membership is based on proposal and secondment by other professional members.

**Phase 1 AIA's are primarily concerned with** the location and identification of sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidance **in the developer's decision making process:**

Phase 2 archaeological projects are primarily based on salvage / mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations should be done under a permit issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes as minimum requirements reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation is conducted on a site, a destruction permit must be applied for from SAHRA before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation. If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning or in some cases the MEC for Housing and Welfare.

Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

### **1.3 Description of Study Area**

#### ***1.3.1 Location Data***

The study area is located 30km west of Keimoes to the north of the Orange River. There are various drainage lines draining the study area all flowing in a southern direction to the Orange River. The topography of the area is relatively gentle sloping in a southern direction towards the Orange River, apart from a ridge aligning east to west almost in the middle of the farm but outside of the study area.

The climate can be described as arid to semi-arid with rainfall occurring from November to April. Historical imagery on Google earth indicates that the land has been fallow for a number of years.

### 1.3.2. Location Map

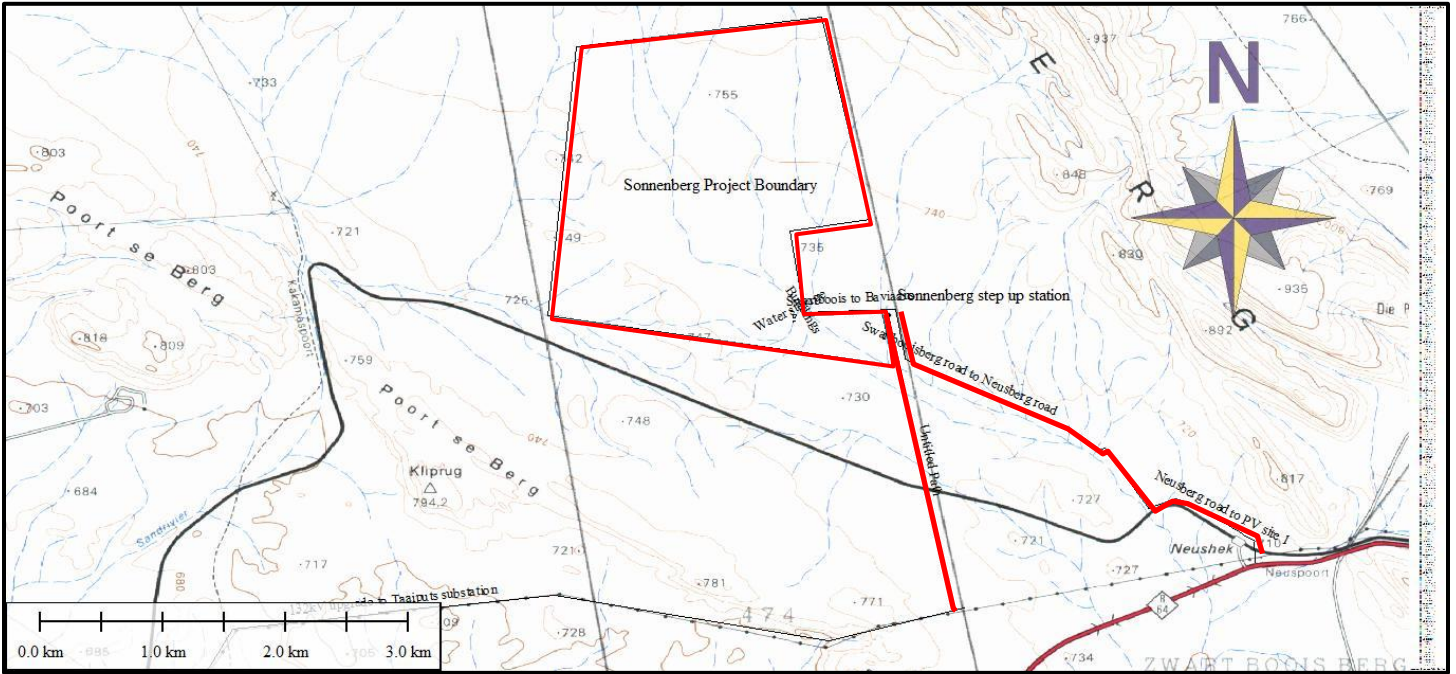


Figure 1: Location map of the proposed project and the areas that was assessed in red.

### 1.3.3. Google Maps

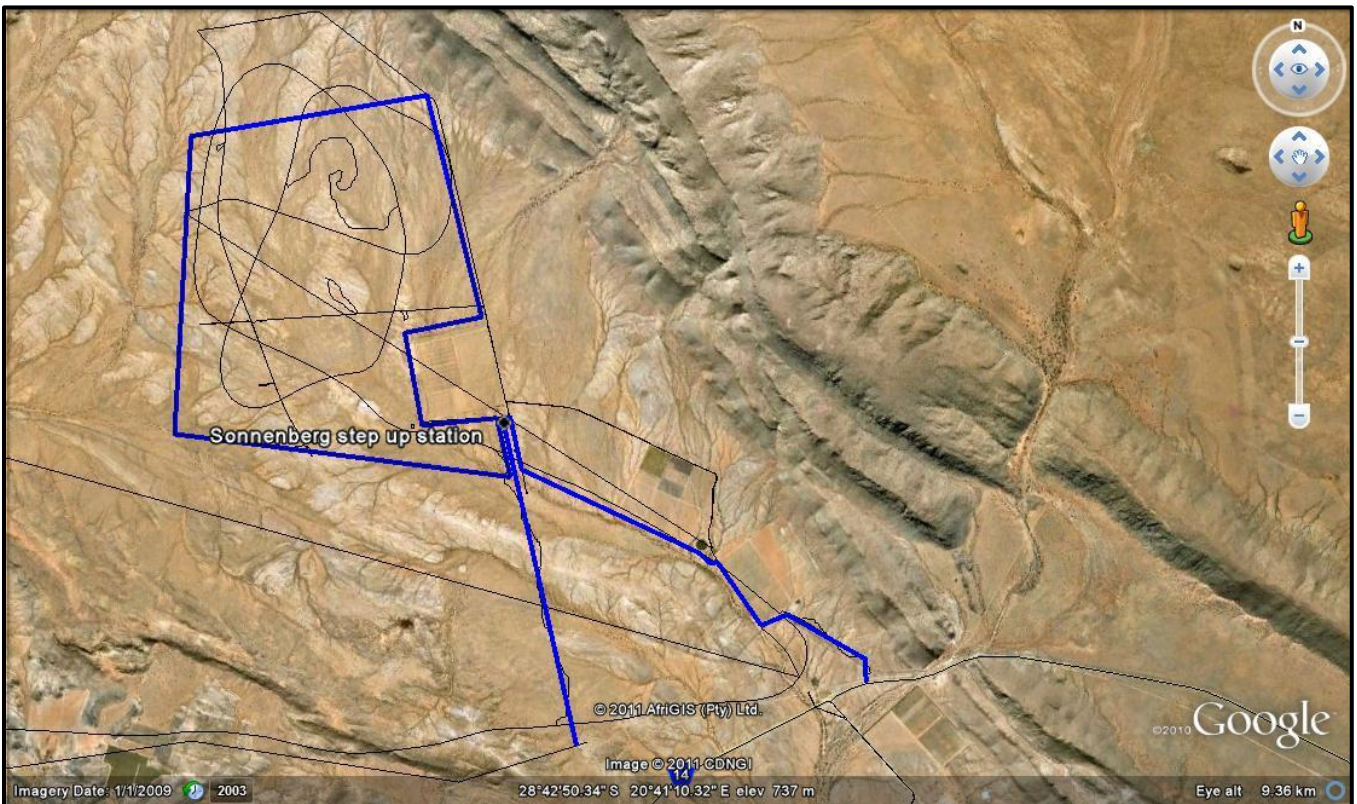


Figure 2: Google image showing the study area in blue and track log of the areas that was covered.

## **2. APPROACH AND METHODOLOGY**

The aim of the study is to cover archaeological databases and historical sources to compile a background history of the study area followed by field verification; this was accomplished by means of the following phases.

### **2.1 Phase 1 - Desktop Study**

The first phase comprised of a desktop study, gathering data to compile a background history of the area in question, looking at archaeological sites, historical sites, graves, architecture, oral history and ethnographical information on the inhabitants of the area. This phase comprised of a heritage scoping report done by Heritage Contracts and Archaeological Consulting CC (2011).

#### **2.1.1 Literature Search**

See Annexure A for the full Heritage Scoping Report. In addition to the information from the scoping study the following actions was taken.

#### **2.1.2 Information Collection**

The SAHRA report mapping project (Version 1.0) was consulted to further collect data from CRM practitioners who undertook work in the area to provide the most comprehensive account of the history of the area where possible.

#### **2.1.3 Public Consultation**

A Brief consultation with the landowner was conducted during this phase.

#### **2.1.4 Google Earth And Mapping Survey**

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where heritage significant sites might be located.

#### **2.1.5 Genealogical Society Of South Africa**

The database of the genealogical society was consulted to collect data on any known graves in the area.

### **2.2 Phase 2 - Physical Surveying**

Due to the nature of cultural remains, the majority that occurs below surface, a field survey of the study area of 400ha was conducted, focussing on drainage lines, hills and outcrops, high lying areas and disturbances in the topography. The study area was surveyed by means of vehicle and extensive surveys on foot.

All sites discovered inside the proposed development area was plotted on 1:50 000 maps and their GPS co-ordinates noted. 35mm photographs on digital film were taken at all the sites.

### **2.3. Restrictions**

Due to the nature of cultural remains that occur, in most cases, below surface, the possibility remains that some cultural remains may not have been discovered during the survey. Low ground visibility is present on parts of the study area due to deep sand cover and the possibility of the occurrence of unmarked graves and cultural material cannot be excluded. Only the surface infrastructure footprint area was surveyed as indicated in the location map and not the entire farm. Although Heritage Contracts and Archaeological Consulting CC surveyed the area as thorough as possible, it is incumbent upon the developer to inform the relevant heritage agency should further cultural remains be unearthed or laid open during the process of development.

### **3 NATURE OF THE DEVELOPMENT**

The proposed photovoltaic plant will have a maximum generating capacity of 100 MW to be developed in phases on 400 ha of the farm Baviaanzkranz 471.

The following associated infrastructure is part of the project proposal:

- » Numerous arrays of photovoltaic panels, which will be linked together to form individual strings.
- » Underground cabling of 33 kV in order to distribute the power to a central on-site substation.
- » A transformer together with the on-site substation to increase the power from 33 kV – 132 kV to be distributed between the photovoltaic plant and the Eskom grid.
- » Connection of each facility to the power distribution grid consisting of a loop-in/loop-out connection
- » Internal access roads for construction and maintenance purposes.
- » Maintenance, security buildings, and a workshop.

### **4. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND OF THE STUDY AREA**

#### **4.1 Databases Consulted**

##### ***Wits and McGregor Museum Archaeological Data Bases***

On the 1:50 000 map sheet 2820 DA no previously recorded sites exist.

##### ***SAHRA Report Mapping Project***

Several previous archaeological or heritage impact studies were conducted within the immediate vicinity of the study area. These include reports by Beaumont (2005, 2008), Van Ryneveld (2007a, 2007b) and Dreyer (2006).

##### ***Genealogical society and Google Earth Monuments***

Neither the genealogical society nor the monuments database at Google Earth (Google Earth also include some archaeological sites and historical battlefields) have any recorded sites in the study area.

**Public Consultation**

During consultation with the landowner no significant heritage sites were mentioned

**4.2 Archaeological and Historical Information Available on The Study Area**

This scoping study revealed that a range of heritage sites occur in the larger region and similar sites can be expected within the study area. Every site is relevant to the heritage landscape, but it is anticipated that few, if any, sites in the area have conservation value.

There is a high likelihood of Stone Age sites in the area, as well as historical sites, based on the human occupation of the area from the 1800's as well as people moving through the area. The possibility of graves and cemeteries in the area cannot be excluded.



## 5. HERITAGE SITE SIGNIFICANCE AND MITIGATION MEASURES

The presence and distribution of heritage resources define a Heritage Landscape. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of Sonnenberg Solar Facility the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface.

This chapter describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance

- » The unique nature of a site;
- » The integrity of the archaeological/cultural heritage deposit;
- » The wider historic, archaeological and geographic context of the site;
- » The location of the site in relation to other similar sites or features;
- » The depth of the archaeological deposit (when it can be determined or is known);
- » The preservation condition of the site;
- » Potential to answer present research questions.

According to the Heritage Act the following criteria should also be taken into account. The National Heritage Resources Act (Act No 25 of 1999, Sec 3) distinguishes nine criteria for places and objects to **qualify as 'part of the national estate if they have** cultural significance or other special value. These criteria are the following:

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

### 5.1. Field Rating Of Sites

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 9 of this report.

<b>FIELD RATING</b>	<b>GRADE</b>	<b>SIGNIFICANCE</b>	<b>RECOMMENDED MITIGATION</b>
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium Significance	Recording before destruction
Generally Protected C (GP.C)	-	Low Significance	Destruction

## 5.2 Impact Rating Of Assessment

The following criteria are used to establish the impact rating of a site as provided by the client:

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- » The **duration**, wherein it will be indicated whether:
  - \* the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - \* the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - \* medium-term (5–15 years) – assigned a score of 3;
  - \* long term (> 15 years) - assigned a score of 4; or
  - \* permanent - assigned a score of 5;
- » The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- » the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » the **status**, which will be described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the **degree** to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- » < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- » 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

## 6. BASELINE STUDY -DESCRIPTION OF SITES

### 6.1 Site Layout Map

It is important to note that the entire farm was not surveyed but only the footprint of the proposed PV Layout area, access route and power line for connection to the grid as indicated in figure 1.

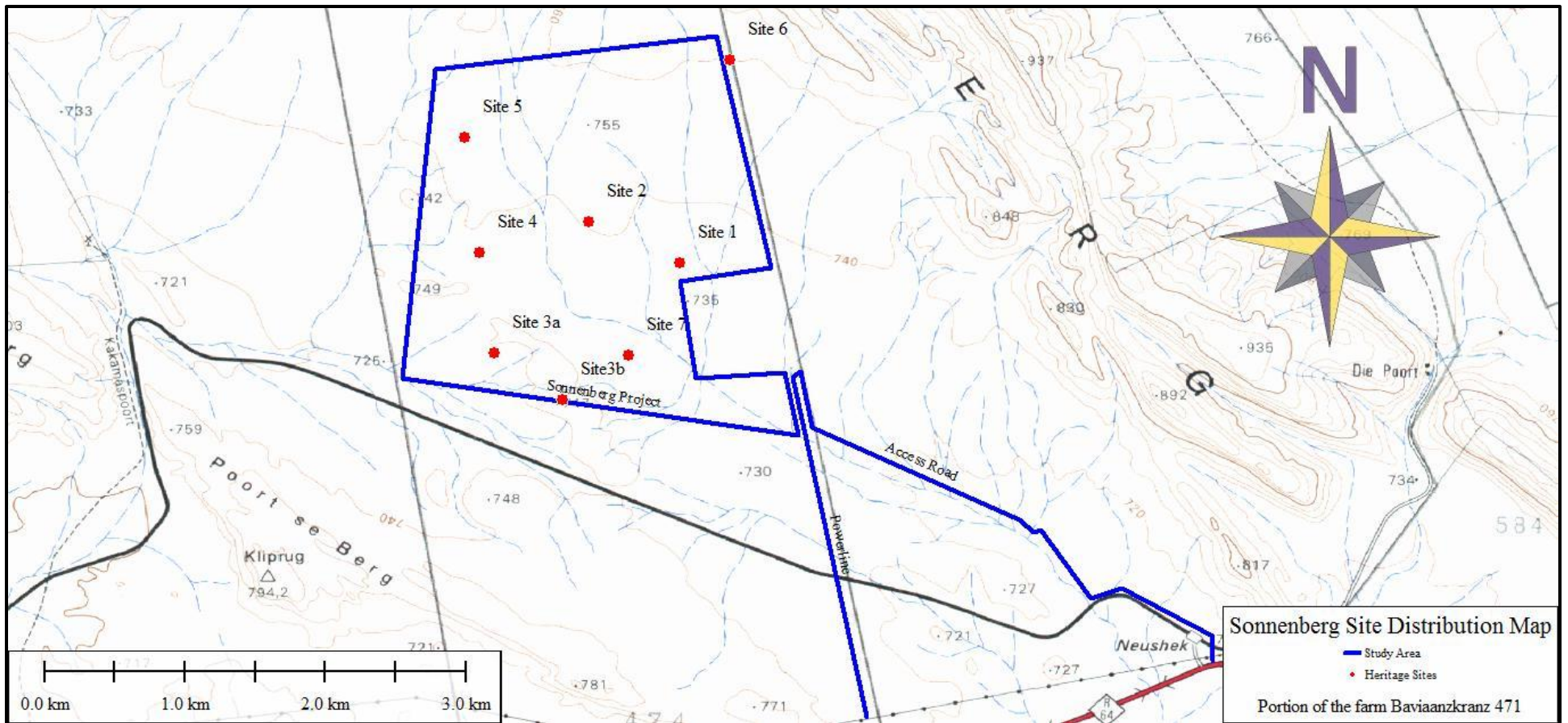


Figure 3: Showing the distribution of heritage sites and the area that was surveyed.

## 6.2. Sites with Coordinates

Site Number	Landscape	Type Site	Cultural Markers	Co ordinate
Site 1	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.70728 E20.66560
Site 2	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.70461 E20.65978
Site3	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.71303 E20.65376 to S28.71601 E20.65811
Site 4	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.70663 E20.65278
Site 5	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.69927 E20.65190
Site 6	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.69428 E20.66884
Site 7	Archaeological and Cultural Heritage	Middle Stone Age	Stone tools with facets on the striking platform	S28.71314 E20.66237

### 6.3. Site Descriptions

#### 6.3.1 Site 1

<b>Site Number</b>	Site 1	<b>1:50 000 map nr</b>	2820 DA
<b>Site Data</b>	<b>Description:</b>		
<b>Type of site</b>	Open scatter		
<b>Site categories</b>	Middle Stone Age (quarry/workshop)		
<b>Context</b>	The site consists of MSA artefacts eroding around a quartz outcrop that protrudes through the thick sand cover of the area. The readily available quartz resulted in a quarry/workshop site where stone artefacts were manufactured over millennia.		
<b>Cultural affinities, approximate age and significant features of the site;</b>	Approximate age for MSA in southern Africa dates to ~ 30 – 300 thousand years ago.		
<b>Description of artefacts</b>	Almost all the artefacts are made from quartz. Features on the tools include facets on the striking platform considered characteristic of the MSA. Some cores are also present. Artefact ratio is approximately 5 artefacts per m <sup>2</sup> .		
<b>Estimation or measurement of the extent</b>	Artefacts are found scattered around an area of approximate 60 x 60 meters.		
<b>Depth and stratification of the site</b>	Not known.		

**Photographs**



Figure 4: Thick sand cover.



Figure 5: Stone tools found at Site 1.



Figure 6: General Site conditions.

**Field Rating**

(Recommended grading or field significance) of the site:

Generally Protected B.

**Statement of Significance (Heritage Value)**

Low to Medium significance.



## Impact Evaluation

**Nature:** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position Stone Age Material or objects.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>45 (Medium)</b>	<b>24 (Low)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	

**Mitigation:**

If impact on the site is definite, surface sampling should be conducted and the site should be monitored during construction. Alternatively, the general location should be demarcated to avoid impact on the site.

**Cumulative impacts:**

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

**Residual Impacts:** Depletion of Archaeological record of the area.

### 6.3.2 Site 2

<b>Site Number</b>	Site 2	<b>1:50 000 map nr</b>	2820 DA
<b>Site Data</b>	<b>Description:</b>		
<b>Type of site</b>	Open scatter.		
<b>Site categories</b>	Middle Stone Age (quarry/workshop), possibly also used during the LSA.		
<b>Context</b>	The site consists of MSA artefacts gravitating down from a large quartzite ridge protruding through the thick sand cover of the area. The readily available raw material resulted in a quarry/workshop site where stone artefacts have been manufactured over millennia consisting almost 100% of quartz.		
<b>Cultural affinities, approximate age and significant features of the site;</b>	Approximate age for MSA in this region dates to 30 – 300 thousand years ago		
<b>Description of artefacts</b>	Almost all of the artefacts are made from quartz, but isolated pieces with scraper retouch, made on banded iron stone, were also observed. Features on the tools consist of facets on the striking platform, a feature characteristic of the Middle Stone Age. Cores are also present, and the small size of some of these pieces may indicate the presence of humans on the landscape during the last 10 000 years (LSA). Artefact ratio is approximately 10 artefacts per m <sup>2</sup>		
<b>Estimation or measurement of the extent</b>	Artefacts are found scattered around a large area of approximate 800 x 300 meters.		
<b>Depth and stratification of the site</b>	Not known.		

**Photographs**



Figure 7: Quartz outcrop and source of raw material.



Figure 8: Stone tools found at Site 2.



Figure 9: General Site conditions.

**Field Rating**

(Recommended grading or field significance) of the site:

Generally Protected B.

**Statement of Significance (Heritage Value)**

Medium significance.

## Impact Evaluation

**Nature:** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position Stone Age Material or objects.

	Without mitigation	With mitigation
<b>Extent</b>	Local (2)	Local (2)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>45 (Medium)</b>	<b>33 (Medium)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	

### **Mitigation:**

If impact on the site is definite surface sampling should be conducted and the site should be monitored during construction. Alternatively the site should be demarcated to avoid impact on the site.

### **Cumulative impacts:**

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

**Residual Impacts:** Depletion of Archaeological record of the area.

**6.3.3 Site 3**

<b>Site Number</b>	Site 3	<b>1:50 000 map nr</b>	2820 DA
<b>Site Data</b>	<b>Description:</b>		
<b>Type of site</b>	Open scatter		
<b>Site categories</b>	Middle Stone Age (quarry/workshop)		
<b>Context</b>	The site consists of MSA artefacts gravitating down from an extensive quartzite ridge running roughly south to north-west in the south-western portion of the study area. The readily available quartz resulted in a quarry/workshop site where stone artefacts have been manufactured over millennia.		
<b>Cultural affinities, approximate age and significant features of the site;</b>	Approximate age for MSA in this region dates to 30 – 300 thousand years ago.		
<b>Description of artefacts</b>	Almost all of the artefacts are made from quartz, but some pieces were made on banded iron stone. Features on the tools consist of facets on the striking platform, a feature characteristic of the Middle Stone Age. Cores are also present. Artefact ratio is approximately 10 artefacts per m <sup>2</sup>		
<b>Estimation or measurement of the extent</b>	Artefacts are found scattered in varying degrees of concentrations over a large area of approximately 12 ha.		
<b>Depth and stratification of the site</b>	Not known.		

**Photographs**



Figure 10: Raw material scattered over the site.



Figure 11: View to the north east of Site 3 showing the flat area where the PV plant will be located.

**Field Rating**

(Recommended grading or field significance) of the site:

Generally Protected B

**Statement of Significance (Heritage Value)**

Medium significance.

## Impact Evaluation

**Nature:** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position Stone Age Material or objects.

	Without mitigation	With mitigation
<b>Extent</b>	Local (2)	Local (2)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>45 (Medium)</b>	<b>33 (Medium)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	

### **Mitigation:**

If impact on the site is definite surface sampling should be conducted and the site should be monitored during construction. Alternatively the site should be demarcated to avoid impact on the site.

### **Cumulative impacts:**

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

**Residual Impacts:** Depletion of Archaeological record of the area.

### 6.3.4 Site 4 and Site 5

<b>Site Number</b>	Site 4 and Site 5	<b>1:50 000 map nr</b>	2820 DA
<b>Site Data</b>	<b>Description:</b>		
<b>Type of site</b>	Open scatter		
<b>Site categories</b>	Middle Stone Age (quarry/workshop)		
<b>Context</b>	<p>Site 4 and Site 5 are discussed together as they occur on the same quartz ridge. The artefacts probably originate from different parts of a single site consisting of an elongated quartz ridge. s. The readily available raw material resulted in a quarry/workshop site where stone artefacts have been manufactured over millennia consisting almost 100% of quartz. Waypoints 4 and 5 represent two clusters/scatters of MSA artefacts, but more knapped pieces can be expected between the marked areas.</p>		
<b>Cultural affinities, approximate age and significant features of the site;</b>	Approximate age for MSA in this region dates to 30 – 300 thousand years ago		
<b>Description of artefacts</b>	<p>Almost all of the artefacts are made from quartz. Features on the tools consist of facets on the striking platform, a feature characteristic of the Middle Stone Age. Some cores are also present. Artefact ratio is approximately 8 artefacts per m<sup>2</sup></p>		
<b>Estimation or measurement of the extent</b>	Artefacts are found scattered in varying degrees of concentrations over a large area of approximately 700 x 200 meter.		
<b>Depth and stratification of the site</b>	Not known.		



**Photographs**



Figure 12: Southern view of ridge note the abundance of raw material scattered over the site.



Figure 13: Radial core found at site 5.

**Field Rating**

(Recommended grading or field significance) of the site:

Generally Protected B

**Statement of Significance (Heritage Value)**

Low - Medium significance.

## Impact Evaluation

**Nature:** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position Stone Age Material or objects.

	Without mitigation	With mitigation
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (7)	Low (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>42 (Medium)</b>	<b>24 (Low)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	

### **Mitigation:**

If impact on the site is definite surface sampling should be conducted and the site should be monitored during construction. Alternatively the site should be demarcated to avoid impact on the site.

### **Cumulative impacts:**

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

**Residual Impacts:** Depletion of Archaeological record of the area.

### 6.3.5 Site 6

<b>Site Number</b>	Site 6	<b>1:50 000 map nr</b>	2820 DA
<b>Site Data</b>	<b>Description:</b>		
<b>Type of site</b>	Open scatters		
<b>Site categories</b>	Middle Stone Age (quarry/workshop)		
<b>Context</b>	The site consists of an eroded quartz scatter containing some MSA artefacts. It is located just outside of the development footprint and almost no impact is foreseen on the site.		
<b>Cultural affinities, approximate age and significant features of the site;</b>	Approximate age for MSA in this region dates to 30 – 300 thousand years ago		
<b>Description of artefacts</b>	Almost all of the artefacts are made from quartz. Features on the tools consist of facets on the striking platform, a feature characteristic of the Middle Stone Age. Some cores are also present. Artefact ratio is approximately 5 artefacts per m <sup>2</sup>		
<b>Estimation or measurement of the extent</b>	Artefacts are found scattered over an area of approximately 50 x 50 meters.		
<b>Depth and stratification of the site</b>	Not known.		

**Photographs**



Figure 14 General Site Conditions



Figure 15 Areal view of study area note the thick sand cover

**Field Rating**  
(Recommended grading or field significance) of the site:

Generally Protected B

**Statement of Significance (Heritage Value)**

Low - Medium significance.

## Impact Evaluation

**Nature:** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position Stone Age Material or objects.

	Without mitigation	With mitigation
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (2)
<b>Probability</b>	Not Probable (2)	Not Probable (2)
<b>Significance</b>	<b>30 (Medium)</b>	<b>16 (Low)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	

### **Mitigation:**

If impact on the site is definite surface sampling should be conducted and the site should be monitored during construction. Alternatively the site should be demarcated to avoid impact on the site.

### **Cumulative impacts:**

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

**Residual Impacts:** Depletion of Archaeological record of the area.

### 6.3.6 Site 7

<b>Site Number</b>	Site 7	<b>1:50 000 map nr</b>	2820 DA
<b>Site Data</b>	<b>Description:</b>		
<b>Type of site</b>	Open scatter		
<b>Site categories</b>	Middle Stone Age (quarry/workshop)		
<b>Context</b>	The site consists of a quartz ridge protruding from the thick sand cover containing MSA artefacts. The readily available raw material resulted in a quarry/workshop site where stone artefacts have been manufactured over millennia consisting almost 100% of quartz.		
<b>Cultural affinities, approximate age and significant features of the site;</b>	Approximate age for MSA in this region dates to 30 – 300 thousand years ago		
<b>Description of artefacts</b>	Almost all of the artefacts are made from quartz. Features on the tools consist of facets on the striking platform, a feature characteristic of the Middle Stone Age. Some cores are also present. Artefact ratio is approximately 9 artefacts per m <sup>2</sup>		
<b>Estimation or measurement of the extent</b>	Artefacts are found scattered over an area of approximately 100 x 80 meters.		
<b>Depth and stratification of the site</b>	Not known.		

**Photographs**



Figure 16 General site conditions at Site 7

**Field Rating**

(Recommended grading or field significance) of the site:

Generally Protected B

**Statement of Significance (Heritage Value)**

Low - Medium significance.

## Impact Evaluation

**Nature:** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position Stone Age Material or objects.

	Without mitigation	With mitigation
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>45 (Medium)</b>	<b>24 (Low)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	

### **Mitigation:**

If impact on the site is definite surface sampling should be conducted and the site should be monitored during construction. Alternatively the site should be demarcated to avoid impact on the site.

### **Cumulative impacts:**

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

**Residual Impacts:** Depletion of Archaeological record of the area.



## **7. RECOMMENDATIONS**

Seven Stone Age sites were identified during the survey. They are mostly considered to be of MSA origin, but some LSA material may be present. Site 6 falls just outside of the development footprint and no further action is necessary for this site.

Due to the wide scatter of knapped material on the readily available quartz outcrops, I recommend that the two sites with the highest artefact ratio is sampled as a representative sample of the material culture on in the study area. Site 2 and Site 3 have the highest concentration of artefacts and will be the best suited for this. Alternatively, Sites 1-5 and Site 7 should be demarcated to avoid impact on them during the development process. No further action is necessary for Site 6.

If these recommendations are adhered by there is from a heritage point of view no reason why the development cannot commence.

## **8. CONCLUSIONS**

The abundance of locally available raw material in the form of quartz outcrops resulted in the use of the landscape over millennia by Stone Age people. Stone Age remains are mostly represented by MSA scatters and quarries that are found on quartz outcrops protruding through the thick sand cover. Erosion on the high lying quartz areas results in the gravitating of raw material and artefacts towards gently dipping plains and some artefact deposits might be covered by the clay and sandy soils in the plains.

The predominant component of artefacts appears to be Pleistocene and early Holocene in age (artefacts are almost 100% made from milky and rose quartz that is abundant in the area). Stone Age industries present certainly include Middle Stone Age and some Later Stone Age assemblages can be expected (referred to as MSA and LSA).

If during construction any possible finds are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find.

### **General**

Low ground visibility is present on portions of the site due to high sand cover and the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded. If during construction any possible finds are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find.

## **9. PROJECT TEAM**

Jaco van der Walt, Project Manager

Dr. Marlize Lombard, Principle Investigator

## **10. STATEMENT OF COMPETENCY**

I (Jaco van der Walt) am a member of ASAPA (no 159), and accredited in the following fields of the CRM Section of the association: Iron Age Archaeology, Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation. This accreditation is also valid for/acknowledged by SAHRA and AMAFA.

Currently, I serve as Council Member for the CRM Section of ASAPA, and have been involved in research and contract work in South Africa, Botswana, Zimbabwe, Mozambique and Tanzania; having conducted more than 300 AIAs since 2000.

Dr Marlize Lombard lectures in the Anthropology Department of the University of Johannesburg, where she also conducts research and publishes on the Stone Age of Southern Africa,. She is an accredited Stone Age Principal Investigator with ASAPA, SAHRA and AMAFA..

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