

# Archaeological Impact Assessment

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For the proposed Watershed Solar Energy Facility, Lichtenburg, North West Province

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Prepared For  
**Savannah Environmental (Pty) Ltd**

By



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Contracts and Archaeological Consulting

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I, Jaco van der Walt as duly authorised representative of Heritage Contracts and Archaeological Consulting CC, hereby confirm my independence as a specialist and declare that neither I nor the Heritage Contracts and Archaeological Consulting CC have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which the client was appointed as Environmental Assessment practitioner, other than fair remuneration for work performed on this project.



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## EXECUTIVE SUMMARY

**Site name and location:** The proposed Watershed Solar Facility is located on Portion 1, 9, 10 and 18 of Farm Houthaalbomen 31, approximately 5 km north west of Lichtenburg, North West Province. The project consists of two proposed phases and was assessed as per figure 1.

**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:** 2626 AA

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

**Developer:** FRV Energy South Africa (Pty)

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

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**Date of Report:** 12 November 2013

### Findings of the Assessment:

Savannah Environmental (Pty) Ltd, on behalf of FRV Energy South Africa (Pty), appointed Heritage Contracts and Archaeological Consulting CC (HCAC) to conduct an Archaeological Impact Assessment for a proposed solar energy facility (referred to as Watershed) and power lines for connection into the national grid. Two phases are proposed on approximately 320 ha and this area was surveyed over a period of two days during August 2013. The footprint of phase 2 was changed early November 2013 and as a result some sections of phase 2 were not surveyed and will require further investigation before construction can start.

The site lies on a featureless flat plain. The entire development footprint was extensively utilised for crop farming and ploughing through the years resulted in a lateral and downward migration of artefacts making it virtually impossible to identify knapping or manufacture sites and site extent. In some areas borrowing animals brought MSA artefacts to the surface where the sand cover is more than a meter and a half thick and the possibility of finding subsurface material cannot be excluded. Most of the Stone Age archaeology in the study area consists of low densities of scattered (and possibly mixed) MSA and LSA artefacts. These occurrences are documented as "occurrences" and are of low significance but more substantial and higher density scatters of MSA material do occur, and were recorded as "sites" (**Site 1 & 2**). All of these recorded occurrences and Site 1 & 2 will be impacted on by the proposed development. Apart from the Stone Age component a single unmarked grave (**Site 3**) was documented just outside of the study area and no direct impact is foreseen on the site.

No buildings exist on the site and no cultural landscape elements were noted. Visual impacts to scenic routes and sense of place are slightly higher due to the projects close proximity to the road but are still not assessed to be high.

If the recommendations as made in section 7 of this report are adhered to (subject to approval from SAHRA) there is from an archaeological point of view no reason why the development should not proceed

## General

Due to extensive sand cover, ground visibility was low on portions of the site during survey. The possible occurrence of unmarked or informal graves and subsurface finds can thus not be excluded. If during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must 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

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BIA: Basic Impact Assessment
CRM: Cultural Resource Management
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMP: Environmental Management Plan
ESA: Early Stone Age
GPS: Global Positioning System
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act
MSA: Middle Stone Age
NEMA: National Environmental Management Act
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

*\*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 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 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>	Photovoltaic solar energy facilities
<b>Rezoning/subdivision of land</b>	Rezoning
<b>Developer:</b>	FRV Energy South Africa (Pty)
<b>Consultant:</b>	Savannah Environmental
<b>Farm owner:</b>	Heinrich Kruger

A heritage scoping report was conducted by Heritage Contracts and Archaeological Consulting CC (van der Walt 2013), for the scoping phase of the project. The company was then also contracted by Savannah Environmental (Pty) Ltd to conduct an Archaeological Impact Assessment for the proposed commercial photovoltaic solar energy facilities that will be developed in two phases as well as associated infrastructure on portions of the farm Houthaalboomen 31. The Archaeological Impact Assessment 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. It serves 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. It is also conducted to protect, preserve, and develop such resources 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: Phase 1, a review of the heritage scoping report that includes collection from various sources and consultations; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey several stone age occurrences were identified. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report.

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



## 1.1 Terms of Reference

### Field study

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of identified significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

### Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have 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 comply with the relevant legislation and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and 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, an AIA or a HIA is 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 EIA, is required under the National Heritage Resources Act NHRA of 1999 (Act 25 of 1999), Section 23(2)(b) of the NEMA and sections 39(3)(b)(iii) of the MPRDA.

The AIA should be submitted, as part of the EIA, BIA or 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 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 or with a proven ability to do archaeological work.

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 ASAPA in collaboration with SAHRA. ASAPA is a legal body, based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIAs 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 guidelines 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 can only be conducted with 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 of a site, a destruction permit must be applied for from SAHRA by the client 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 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 this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to 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. 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 topography of the area is relatively flat and was extensively used for crop farming but is currently used for grazing purposes. An existing power line forms the southern boundary of the study area and will be used for connection into the grid. The solar energy facility will be developed in phases (Figure 1). Phase 1 was surveyed in its entirety (Figure 2 & 5) but Phase two's footprint was slightly altered (Figure 3 & 4) three months after the survey resulting in a portion to the south west not covered during the survey (Figure 6).

The study area falls within a Grassland Bioregion as described by Mucina et al (2006) with the vegetation described as Carltonville dolomite Grassland. Land use in the general area is characterized by agriculture, dominated by crops and cattle farming. The study area is characterised by deep sandy to loamy soils based on the extensive agricultural activities. The area that will be utilised for the photovoltaic facility measures approximately 320 ha.

### 1.3.2. Location Map

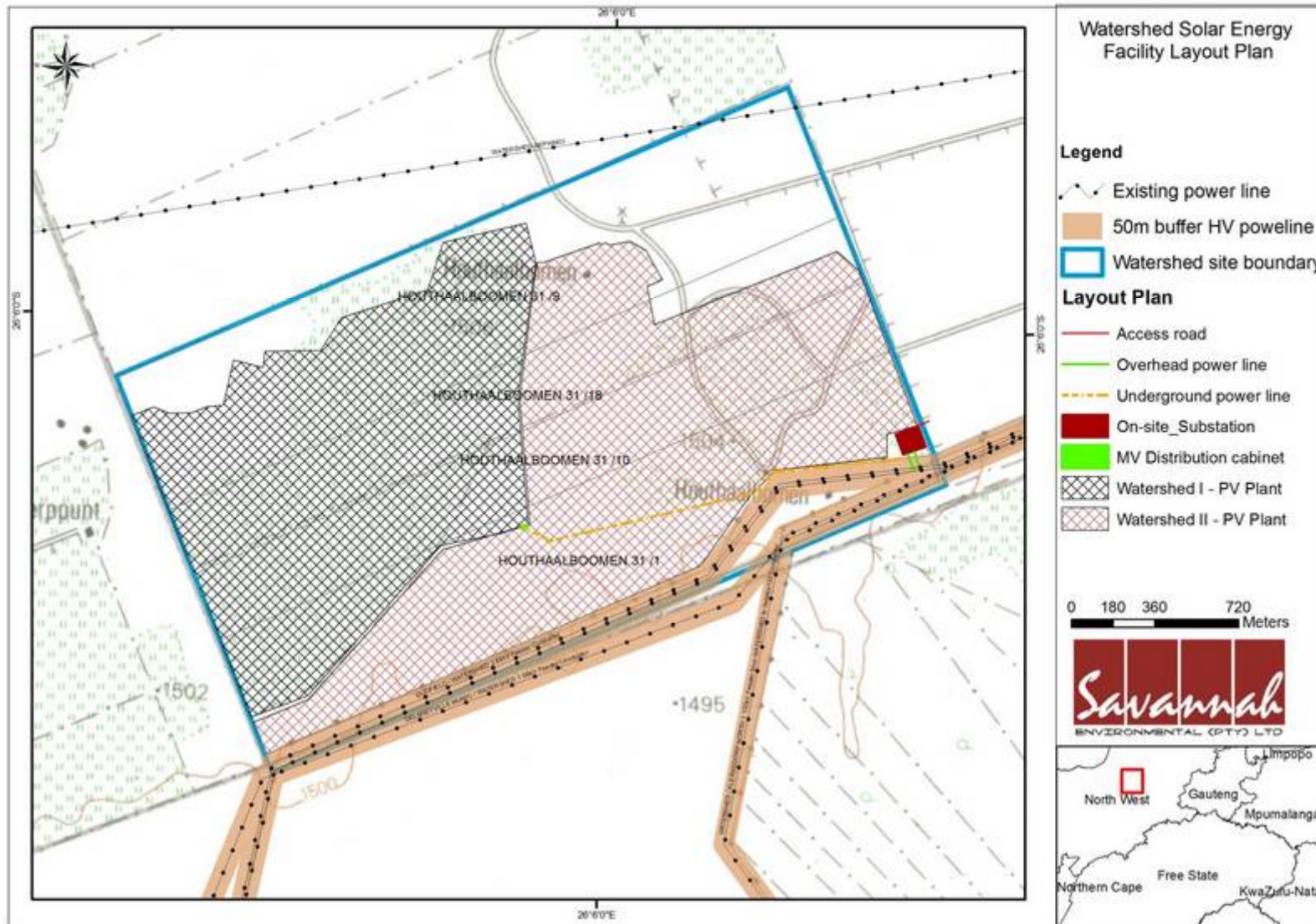


Figure 1: Location map of Watershed layout provided by Savannah.

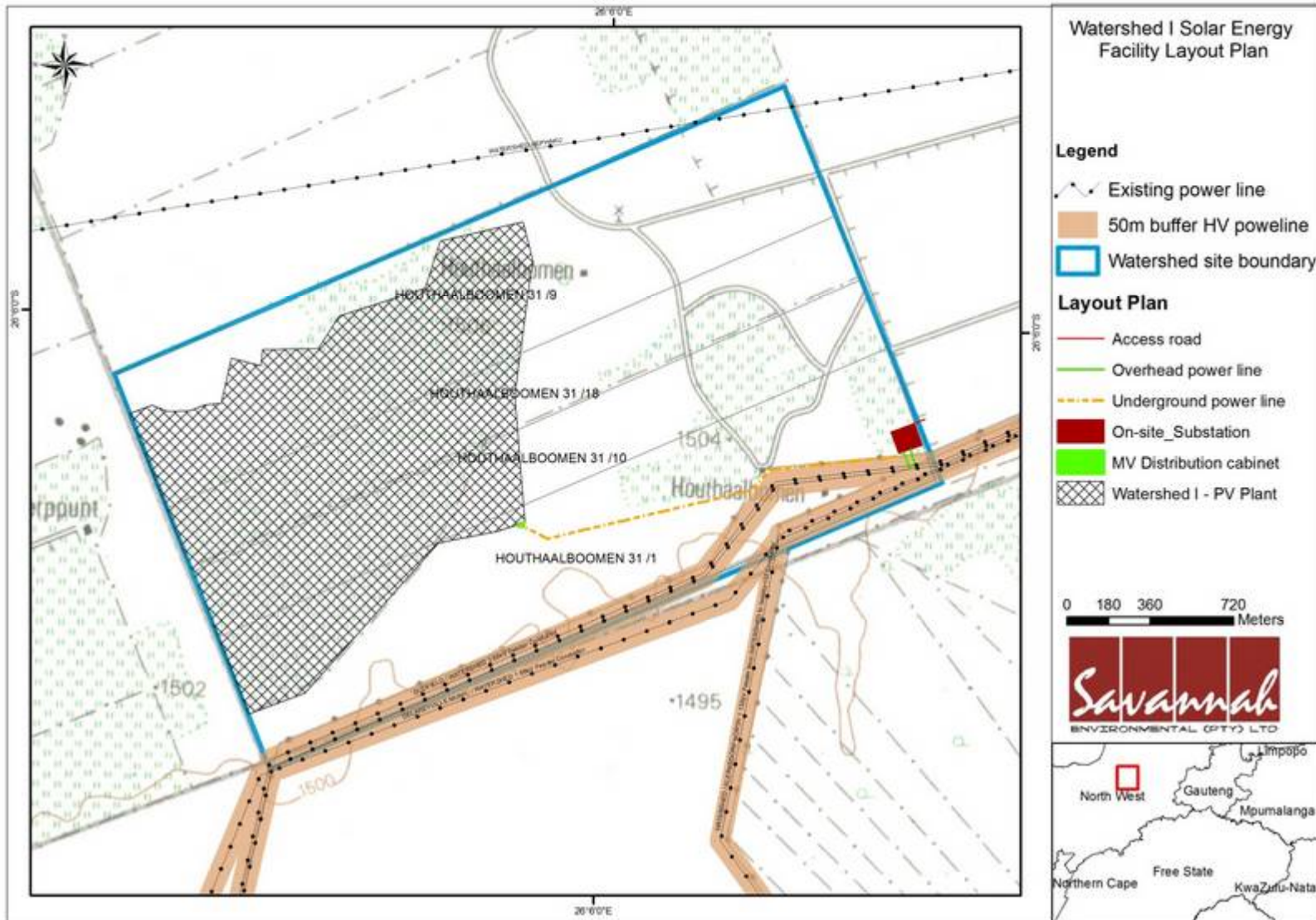


Figure 2: Location map of Watershed 1 layout provided by Savannah.



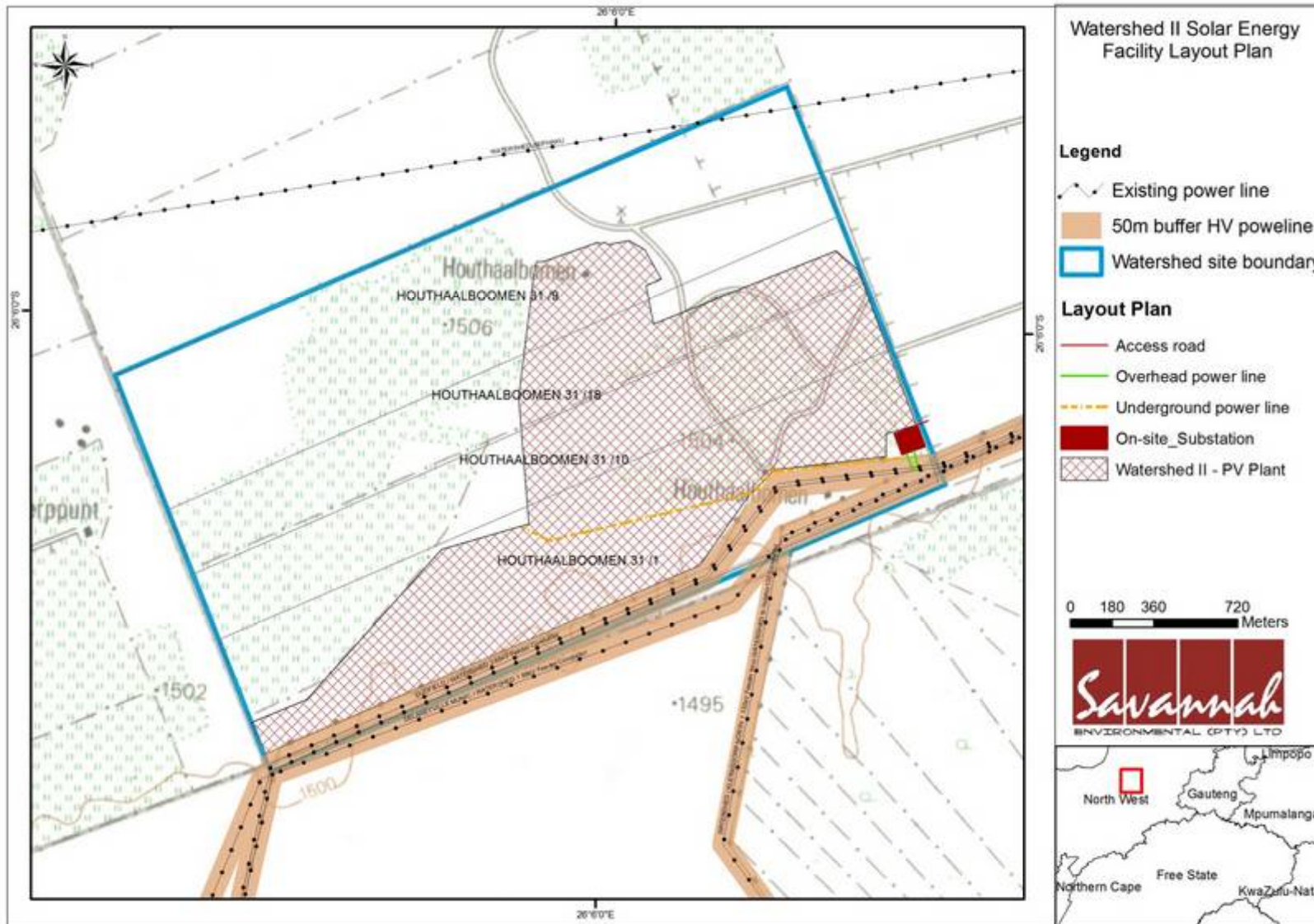


Figure 4: Updated version of Watershed II layout provided by Savannah.

### 1.3.3. Google Maps



Figure 5: Google Image showing Watershed Phase 1 in blue and track logs (black) of the areas that were covered during the survey.



Figure 6: Google Image showing Watershed Phase 1 in blue and track logs (black) of the areas that were covered during the survey.



## **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 a desktop study, gathering data to compile a background history of the area in question. It included scanning existing records for archaeological sites, historical sites, graves, and ethnographical information on the inhabitants of the area. This phase consisted of a heritage scoping report done by Heritage Contracts and Archaeological Consulting CC (van der Walt 2013).

#### **2.1.1 Literature Search**

In addition to the archival study from the scoping study the actions indicated below were also taken.

#### **2.1.2 Information Collection**

The SAHRA report mapping project (Version 1.0) and SAHRIS was consulted to collect data from previously conducted CRM projects in the region to provide a comprehensive account of the history of the study area.

#### **2.1.3 Consultation**

A Public Participation process was conducted by Savannah Environmental for this project. No heritage concerns were raised.

#### **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 sites of heritage significance 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**

A field survey of the study area of approximately 370 ha was conducted; focusing on drainage lines, outcrops, high lying areas and disturbances in the topography. The study area was surveyed by means of vehicle and extensive surveys on foot by a professional archaeologist on 21 and 28 August 2013.

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

### **2.3. Restrictions**

Due to the fact that most cultural remains may occur below surface, the possibility exists that some features or artefacts may not have been discovered/ recorded during the survey. Low ground visibility of parts of the study area is due to crop farming, and the possible occurrence of unmarked graves and other cultural material cannot be excluded. Only the surface infrastructure footprint areas were surveyed as indicated in the location map, and not the entire farm. This study did not assess the impact on the palaeontological component of the project. Although Heritage Contracts and Archaeological Consulting CC surveyed the area as thoroughly as possible, it is incumbent upon the developer to stop operations and inform the relevant heritage agency should further cultural remains, such as stone tool scatters, artefacts, bones or fossils, be exposed during the process of development.

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

The Watershed solar energy facility is proposed to accommodate Photovoltaic (PV) panel technology and include the following infrastructure:

- » Arrays of photovoltaic (PV) panels
- » Mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels.
- » Cabling between the project components, to be laid underground where practical.
- » A new on-site substation to evacuate the power from the facility into the Eskom grid (point of connection to be advised)
- » Internal access roads and fencing.
- » Workshop area for maintenance, storage, and offices.

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

#### **4.1 General Information**

CRM reports on the area together with secondary source material, primary sources, maps and online sources the study area were used to contextualise the study area. At least 2 CRM projects were conducted within a 10km radius of the study area (SAHRIS & SAHRA report mapping version 1 (van Schalkwyk 1995 & 2008, Hutten 2012) currently several more studies are being conducted as part of mineral right applications but these studies are not in the public domain at the time of this report. None of the sites recorded are in close proximity to the site but consisted of mining infrastructure and cemeteries.

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located. The database of the Genealogical Society of South Africa indicated no known grave sites within the study area.

Various inquiries were done on the database of the National Archives of South Africa and several documents was located that deal with the history of the farm Houthaalboomen 31. What was of interest is that the farm was utilized from at least 1886 and sites relating to farming infrastructure were expected for the study area (van der Walt 2013).

The scoping study also highlighted the fact that it was not anticipated that ESA sites of significance will be encountered or LSA sites of significance due to the lack of caves in the area. It was however anticipated that some MSA finds might be possible around pans on the farm. It is important to note that the lack of sites can be attributed to a lack of sustainable water sources (no pans exist in the development footprint) in the development area as well as the lack of raw material for the manufacturing of stone tools.

No Sites dating to the Early or Middle Iron Age have been recorded or is expected for the study area. The same goes for the Later Iron Age period where the study area is situated outside the southern periphery of distribution of Late Iron Age settlements in the North West Province. However to the north of the study area towards Zeerust and to the north-west towards Mafikeng, the area is well known for Later Iron Age stone walled settlements archaeologically referred to as Molokwane settlements (Pistorius 1992, Booyens 1998, Huffman 2007). There is however a low likelihood of finding sites dating to this period in the study area.

Please refer to the scoping study (vd Walt 2013) for a more comprehensive background study on the area

## 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 the proposed PV 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 section 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 deposits;
- » 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/is known);
- » The preservation condition of the sites;
- » Potential to answer present research questions.

Furthermore, 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:

- » Its importance in/to 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 SAHRA (2006), and approved by ASAPA for the 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	Grade 1	-	Conservation; national site

(NS)			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 criteria below 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**

It is important to note that the entire farm was not surveyed but only the footprint of the proposed phases for the PV layout area, power line for connection to the grid and access routes as indicated in Figure 1 and 2. It is evident from satellite imagery that the area was extensively cultivated and would have destroyed most of the surface indicators of archaeological sites. These agricultural fields are now rehabilitated with grass for cattle grazing and the grass is knee to waist high limiting archaeological visibility.

At the start of the survey a high density of Stone Age material was noticed scattered in varying densities throughout the study area. Therefor low density scatters (between 3 - 5 artefacts per m<sup>2</sup>) was recorded as occurrences. Scatters higher than 5 artefacts per m<sup>2</sup> were given site numbers. Scatters with densities less than 2 artefacts per m<sup>2</sup> were not recorded as they occur throughout the area. Individual occurrences were not point plotted within the recorded scatters however an attempt was made at determining site extent. GPS readings were taken roughly in the middle of each identified scatter.

In the northern and southern portions of the study area archaeological visibility was at its lowest due to deep sand cover. This sand cover together with the extensive ploughing of the area also hampered an accurate estimation of site density and site extent as a horizontal migration of artefacts occurred over time due to the ploughing. This also disturbed any possible workshop or knapping sites as the material is now scattered from their original location. Depending on erosion and sand movement artefact ratio and site extent can vary to a large degree when the site is revisited in future.



Figure 7. Phase 1 viewed from the North.



Figure 8. General Site conditions in the north eastern portion of Phase 1.



Figure 9. General Site conditions in the north western portion of Phase 1.



Figure 10. Large rock heaps as a result of rock clearing for agricultural purposes.



Figure 11. Phase 2 viewed from the North.



Figure 12. General Site conditions in the northern portion of Phase 2.



Figure 13. Western portion of Phase 2.



Figure 14. Large rock heaps as a result of rock clearing for agricultural purposes.



From the site distribution map (Figure 15) it is clear that most of the recorded occurrences and sites occur within the central portion of the surveyed area where there seems to be a "ridge" roughly running from east to west of raw material protruding/eroding from under the sand cover. In the northern and southern portion sand cover is much deeper, in some cases at least a meter to a meter and a half deep, as exposed by ant bear activity. In these areas borrowing animals dig up MSA artefacts to the surface indicating a possibly much deeper stratigraphy of artefacts. Artefact counts dropped drastically as one moves from south to north into these sandy areas.

As stated as before artefacts were observed in varying densities over much of the study area where chert/cryptocrystalline silica (CCS) is used as raw material. Some of the artefacts show a high degree of recent scar flaking from the effects of the extensive ploughing distracting from their archaeological value. In areas where slightly elevated frequencies of artefacts occurred these were documented as occurrences and when the artefact ratio is higher than 5 per m<sup>2</sup> these were documented as "sites". The use of the term 'site' was entirely arbitrary and does not necessarily reflect a knapping, quarry or habitation site. GPS points were taken at these points and selections of artefacts were photographed. MSA and possible LSA artefacts are mixed and indicate that downward deflation had occurred in the study area probably due to the ploughing activities.

Two sites were recorded consisting of a concentration of MSA artefacts (Site 1 and 2) and a third site consisting of a single grave (Site 3). A further total of 20 occurrences were mapped and recorded but not digitally photographed. Artefacts at these locations consist mainly of MSA with some flakes micro-lithic in nature flakes possibly LSA.

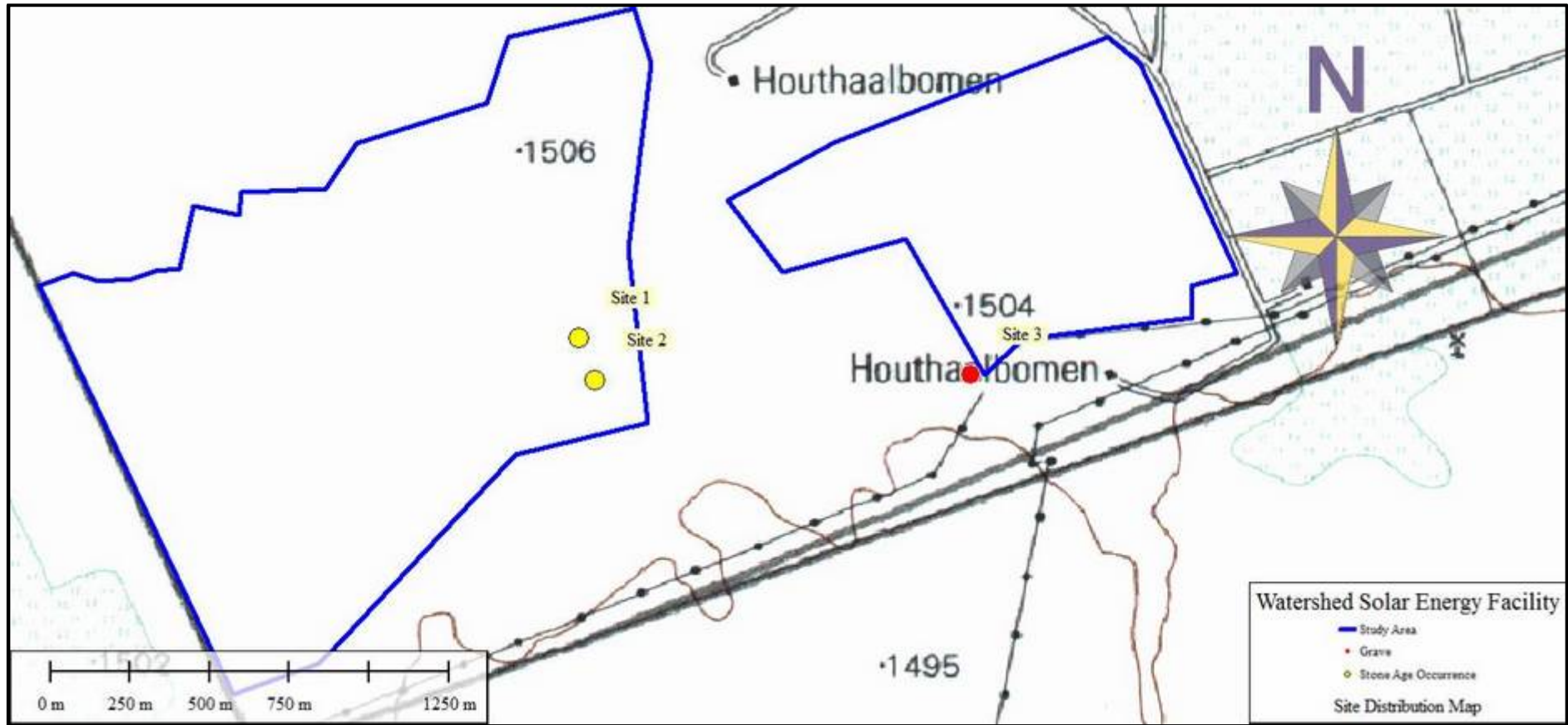


Figure 15. Site distribution map for phase 1 and 2.

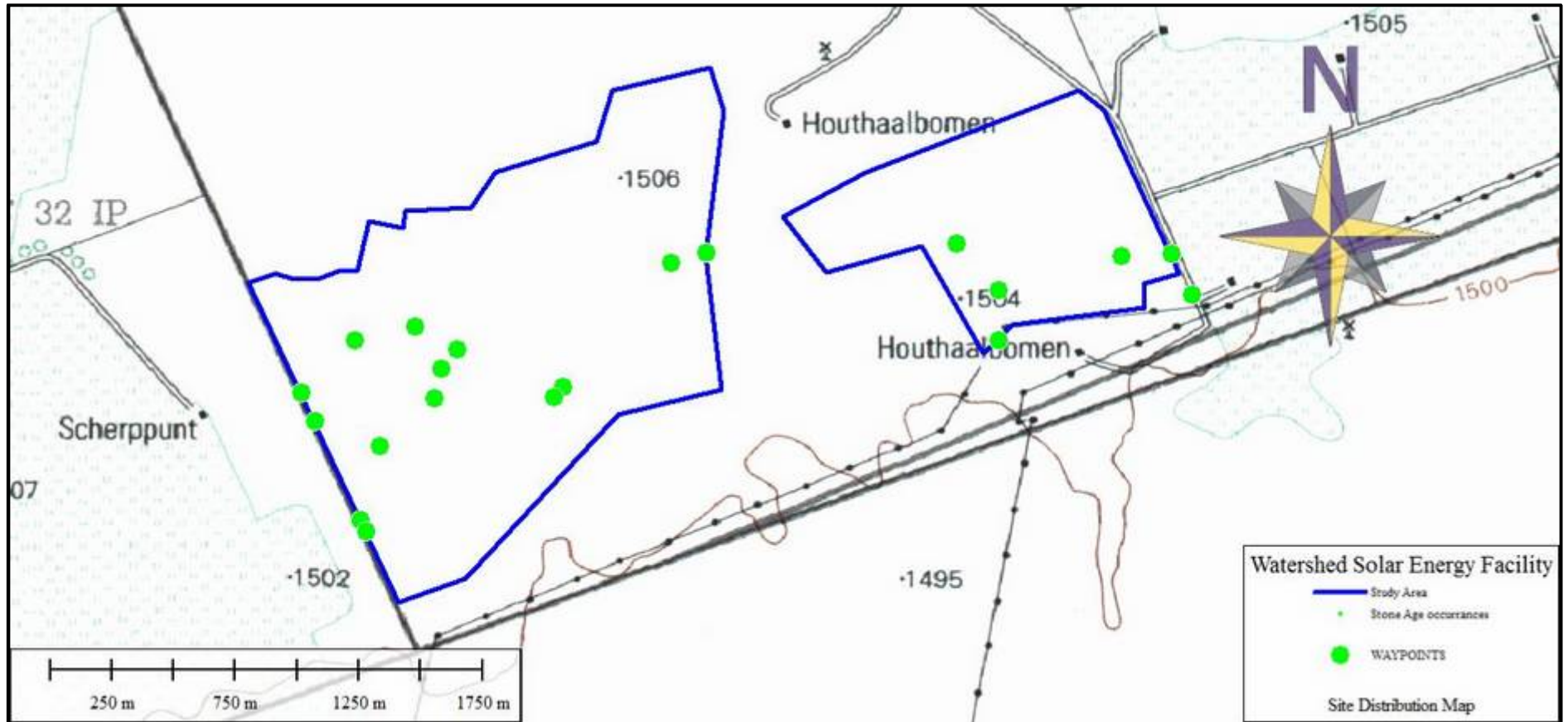


Figure 16: Stone Age occurrences recorded in phase 1 and 2

## 6.2 DESCRIPTION OF FINDS

### 6.2.1 Sites with Coordinates

Site Number	Type Site	Cultural Markers	Co ordinate
Site 1	Stone Age	Medium density scatters of tools. Blades, flakes, cores. MSA mainly of chert.	S26 06 19.7 E26 05 40.7
Site 2	Stone Age	Medium density scatters of tools. Blades, flakes, cores. MSA mainly of chert.	S26 06 24.0 E26 05 42.4
Site3	Single Grave	Stone Packed grave	S26 06 23.3 E26 06 20.5

#### Site 1 and 2: Stone Age concentrations

The sites consist of a low to medium density of artefacts (3 -5 artefacts per m<sup>2</sup>) with a MSA and possible LSA component. Artefacts consist of unretouched flakes, blades, radial cores mainly on CCS. The sites are located in close proximity to each other and the artefacts are scattered in varying densities over an area of 20 x 10 meters. It is unsure if this was a manufacturing/knapping site as there is a lateral distribution of artefacts due to the extensive ploughing activities in the past.

These sites are already disturbed by the extensive agricultural activities conducted on the farm but fall inside the proposed development footprint and will be impacted on by the proposed solar facility.

<b>Heritage significance:</b> Generally Protected B (GP.B)
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#### Site 3: Single grave

The site consists of a single grave of an adult (based on size) orientated east to west. The site is located on the edge of the development footprint, just outside of the fence marking the southern boundary of the site. Grave dressing consist of locally sources rocks with no headstone or inscription.

The site will not be directly impacted on by the proposed development as it is located just outside of the proposed development footprint. However an indirect impact may occur.

<b>Heritage significance:</b> The site is of high social significance -Generally Protected A (GP.A)
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### 6.2.1 Occurrences with Coordinates

<b>WPT number</b>	<b>Type Site</b>	<b>Cultural Markers</b>	<b>Co ordinate</b>
<b>003</b>	Stone Age	Discoid Core.	S26 06 25.5 E26 05 11.1
<b>004</b>	Stone Age	Unretouched flakes from CCS. Exposed by borrowing animals	S26 06 21.8 E26 04 59.97
<b>005</b>	Stone Age	Unretouched flakes from CCS. Exposed by borrowing animals	S26 06 20.0 E26 05 07.7
<b>006</b>	Stone Age	MSA flakes from CCS.	S26 06 23.1 E26 05 13.2
<b>007</b>	Stone Age	Unretouched flakes from CCS. Exposed by borrowing animals	S26 06 28.0 E26 05 27.0
<b>008</b>	Stone Age	Unretouched flakes from CCS. Exposed by borrowing animals	S26 06 29.3 E26 05 25.9
<b>09</b>	Stone Age	Unretouched flakes from CCS. Exposed in scraped road.	S26 06 45.3 E26 05 00.5
<b>010</b>	Stone Age	Unretouched flakes from CCS. Exposed in scraped road.	S26 06 46.9 E26 05 01.3
<b>011</b>	Stone Age	Unretouched flakes from CCS. Exposed in scraped road.	S26 06 32.4 E26 04 54.5
<b>012</b>	Stone Age	Unretouched flakes from CCS. Exposed in scraped road.	S26 06 28.7 E26 04 52.9
<b>0 13</b>	Stone Age	Unretouched flakes from CCS. Exposed by borrowing animals	S26 06 35.6 E26 05 03.1
<b>014</b>	Stone Age	Unretouched flakes from CCS. Exposed in scraped road.	S26 06 29.4 E26 05 10.3
<b>015</b>	Stone Age	Similar scenario as above	S26 06 11.8 E26 05 41.1
<b>016</b>	Stone Age	Similar scenario as above	S26 06 10.4 E26 05 45.8
<b>018</b>	Stone Age	Low density MSA flakes	S26 06 21.9 E26 06 24.0

Artefacts were observed in low densities over much of the study area where CCS strongly dominates the MSA component. Artefacts consist mostly of radial and bipolar cores and large flakes. The LSA component is mostly made from chert and is micro lithic supporting an ascription to the LSA.



Figure 17: Collection of artefacts at Site 1 & 2.



Figure 18: Core found at occurrence WPT 003.



Figure 19: Single grave at Site 3.



Figure 20: Deep sand cover.



Figure 21: Range of artefacts exposed by borrowing animals from Fig 15.



Figure 22: Collection of artefacts from occurrence WPT 19 & 20.

### 6.3. Impact evaluation of the proposed project on heritage resources Sites 1 -2

<b>Nature:</b> During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological 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>	Low (2)	Low (1)
<b>Probability</b>	Probable (4)	Probable (4)
<b>Significance</b>	<b>Medium (45)</b>	<b>Low (28)</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	
<b>Mitigation:</b> It is recommended that earth works must be monitored during construction to determine if any stratigraphy exist that was not disturbed by ploughing, if any stratigraphy is encountered further mitigation measures might be recommended by the archaeologist. A surface sample should be collected as an analysis of these artefacts will determine the age and industries of the Stone Age component. If any archaeological or cultural material is uncovered during construction or operation a qualified archaeologist must be contacted to verify and record the find. Mitigation will then include documentation and sampling of the material. This will also be required if any paleontological material is uncovered.		
<b>Cumulative impacts:</b> Archaeological and cultural sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.		
<b>Residual Impacts:</b> Depletion of archaeological record of the area.		



### Sites 3

<b>Nature:</b> No direct impact is foreseen on this site.		
	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 (1)	Not Probable (1)
<b>Significance</b>	Low (15)	Low (8)
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b> There is no direct impact foreseen on site 3 as it is located outside the proposed development footprint. It is recommended that the site should be demarcated to protect it during construction. (Please refer to section 7 for full details on recommendations).		
<b>Cumulative impacts:</b> Archaeological and cultural sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.		
<b>Residual Impacts:</b> N.A		

### Occurrences WPT 003 -016. 018 -23

<b>Nature:</b> During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological 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>	Low (2)	Low (1)
<b>Probability</b>	Probable (4)	Probable (4)
<b>Significance</b>	<b>Medium (45)</b>	<b>Low (28)</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	
<p><b>Mitigation:</b>  It is recommended that earth works must be monitored during construction to determine if any stratigraphy exist that was not disturbed by ploughing, if any stratigraphy is encountered further mitigation measures might be recommended by the archaeologist. A surface sample should be collected as an analysis of these artefacts will determine the age and industries of the Stone Age component.  If any archaeological or cultural material is uncovered during construction or operation a qualified archaeologist must be contacted to verify and record the find. Mitigation will then include documentation and sampling of the material. This will also be required if any paleontological material is uncovered.</p>		
<p><b>Cumulative impacts:</b>  Archaeological and cultural sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.</p>		
<p><b>Residual Impacts:</b> Depletion of archaeological record of the area.</p>		

## 7. CONCLUSIONS AND RECOMMENDATIONS

The impacts to heritage resources by the proposed development are not considered to be highly significant and the impact on archaeological sites can very easily be mitigated. Other studies (e.g Hutton 2012) did not record any Stone Age finds close to the current study area however the proposed Watershed footprint is not devoid of archaeological material. Most of the Stone Age archaeology in the study area consists of low densities of scattered (and possibly mixed) MSA and LSA artefacts. These occurrences are documented as "occurrences" and are of low significance but more substantial and higher density scatters of MSA material do occur, and were recorded as "sites" (**Site 1 & 2**). All of these recorded occurrences and Site 1 & 2 will be impacted on by the proposed development. Apart from the Stone Age component a single unmarked grave (**Site 3**) was documented just outside of the study area and no direct impact is foreseen on the site. However some recommendations are made to protect the site from accidental damage during the construction phase of the project.

The entire development footprint was extensively utilised for crop farming and ploughing through the years resulted in a lateral and downward migration of artefacts making it virtually impossible to identify knapping or manufacture sites and site extend. Borrowing animals exposed a thick sand cover (in some places a meter and half deep) bringing MSA flakes to the surface giving the impression that artefacts occur deeper down from the present surface level, possibly undisturbed by the intensive ploughing. Due to the extensive disturbance to the area further excavations are not recommended at this point. It is however recommended that earth works must be monitored during construction to determine if any stratigraphy exist that was not disturbed by ploughing. If any stratigraphy is encountered further mitigation measures might be recommended by the archaeologist In the interim it is recommended that a surface sample is collected. Analysis of these artefacts will determine the age and industries of the Stone Age component.

The layout of Watershed PV 2 was changed 12 weeks after the field survey was conducted and subsequently the entire new development footprint was not surveyed. It is recommended that the additional areas should be subjected to a field survey before the project commences. The area has been disturbed but Stone Age material as well as possible graves can be expected in the area.

Management measures would need to be taken into account to avoid damage to the informal cemetery. Damage can be caused by construction vehicles unknowingly damaging the graves. To prevent this, the area should be demarcated with a fence and all construction activities should be located 15 meters away from the fence around the cemetery. **It is important to educate workers about the possibility of finding more informal, unmarked graves.**

**OBJECTIVE:** Prevent unnecessary disturbance and/or destruction of archaeological sites or features that has not been mitigated for the development.

Project component/s	All phases of construction.		
Potential impact	Damage/disturbance to grave site.		
Activity risk/source	Construction vehicles working in that area.		
Mitigation: target/objective	To retain grave in undisturbed condition.		
Mitigation: Action/control	Responsibility	Timeframe	
Ensure that workers and construction vehicles remain away from the grave sites.	Watershed PV Facility Management and ECO	Construction	
Performance indicator	Cemetery remains undamaged.		
Monitoring	No pedestrians or construction vehicles allowed inside the demarcated area.		

No buildings exist on the site and no cultural landscape elements were noted. Visual impacts to scenic routes and sense of place are slightly higher due to the projects close proximity to the road but are still not assessed to be high. No further mitigation is recommended for this aspect.

An independent Palaeontological desktop study (Millsteed 2013) was conducted on the area as part of the scoping phase. Recommendations and mitigation measures in this report are to be implemented prior to development based on comments and approval from SAHRA.

Due to the subsurface nature of archaeological material and unmarked graves the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded. If during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find.

If the recommendations as made in section 7 of this report are adhered to (subject to approval from SAHRA) there is from an archaeological point of view no reason why the development should not proceed

## **8. PROJECT TEAM**

Jaco van der Walt, Project Manager

## **9. 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.

I have been involved in research and contract work in South Africa, Botswana, Zimbabwe, Mozambique and Tanzania as well as the DRC; and have conducted more than 300 AIAs since 2000

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