Archaeological Impact Assessment

For the proposed Tiger Kloof Photovoltaic Solar Energy Facility near Vryburg, North West Province

Prepared For

Savannah Environmental (Pty) Ltd

By

HERITAGE
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.

SIGNATURE: _____

EXECUTIVE SUMMARY

Site name and location: The Proposed Tiger Kloof Photovoltaic Solar Energy Facility near Vryburg, North West Province entails the development of a PV solar energy facility and associated infrastructure on a portion of Portion 3 (Remaining Extent) and Portion 4 of the farm Waterloo 730. The site can be directly accessed from the N18 that also forms the eastern boundary of the site.

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: 2724 BA

EIA Consultant: Savannah Environmental (Pty) Ltd

Developer: Kabi Solar (Pty) Ltd

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

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Date of Report: 11 December 2013, revised 21 January 2014

Findings of the Assessment:

The topography of the study area (250 ha) includes plains, gently undulating slopes, low ridges and a palaeo drainage channel that roughly traverses the study area in the centre from north to south and natural depressions or small pans. From an archaeological point of view the drainage channel and one of the ridges are of importance. East and west of the drainage channel calcrete is protruding through shallow soil cover and Middle Stone Age (MSA) and to a smaller degree Later Stone Age (LSA) occurrences were found scattered in low densities over this area showing signs of weathering probably from being washed.

These occurrences are of low archaeological significance because of their secondary deposition. However, several discrete MSA and LSA quarry/knapping site were found associated with a ridge (**Site** 1) where the abundant cryptocrystalline silica (CCS) was exploited. A single stone packed oval was also recorded that could possibly be a grave (**Site 2**). Both these sites were red flagged as no go areas and the developer went to great lengths to protect these sites in buffer zones and no go areas.

MSA artefacts consisted of radial and bipolar cores, triangular points, end scrapers, large utilized and retouched blade tools, and utilized and retouched flakes. Raw materials were predominant in CCS and to a lesser extend fine grained quartzite.

LSA tools were found in comparatively higher concentrations as compared to the MSA tallies at Site 1. LSA tools consisted mostly of CCS. Adzes, scrapers, retouched and utilized flakes, bladelets, small cores, and unmodified flakes and chunks were recorded. A study (van Schalkwyk 2012) to the east of the proposed Tigerkloof solar development recorded a similar site on a low ridge. SAHRA recommended that this is included in a no go area within the proposed development.

An independent paleontological desktop study was conducted by Dr John Almond (2013). He concluded: It is very likely that comparable, scientifically important fossil stromatolites also occur on Waterloo Farm 730. It is therefore recommended that a specialist palaeontological field assessment of the present study area be carried out during the EIA phase to record any fossils present and to make recommendations for the construction phase of the development, should this be approved. Cumulative impacts on fossil

heritage of the present project together with three other proposed solar projects in the immediate area - two on Waterloo 992 to the east and one on Rosendal 673 to the north - will need to be considered.

No standing 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 and are assessed by a specialist.

If the recommendations as made in section 8 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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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

Kind of study	Archaeological Impact Assessment
Type of development	Photovoltaic solar energy facilities
Rezoning/subdivision of land	Rezoning
Developer:	Kabi Solar (Pty) Ltd
Consultant:	Savannah Environmental

Heritage Contracts and Archaeological Consulting CC has been contracted by Kabi Solar (Pty) Ltd to conduct an Archaeological Impact Assessment for the proposed Tiger Kloof Photovoltaic Solar Energy Facility near Vryburg, North West Province. The Archaeological Impact Assessment report forms part of the Environmental Impact Assessment (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 background study 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 two sites of heritage significance and several Stone Age occurrences were identified within the solar development footprint. After the initial fieldwork was conducted power line options for connection into the grid was proposed by the client and the power line options outside of the surveyed area are assessed at a desktop level. 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 SAHRA for 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 as 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 of 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 38(1), Section 38(8) of the NEMA and 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.

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 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 Proposed Tiger Kloof Photovoltaic Solar Energy Facility near Vryburg, North West Province entails the development of a PV solar energy facility and associated infrastructure on a portion of Portion 3 (Remaining Extent) and Portion 4 of the farm Waterloo 730. The town of Vryburg (including the Huhudi township), is located approximately 2 km north of the proposed development. The topography of the study area (250 ha) includes plains, gently undulating slopes, low ridges and a palaeo drainage channel that roughly traverses the study area in the centre from north to south and natural depressions or small pans.

The study area falls within the Eastern Kalahari Bushveld Bioregion in a Savannah Biome as described by Mucina *et al* (2006) with the vegetation described as Ghaap Plateu Vaalbosveld. Land use in the general area is characterized by agriculture, dominated by cattle farming. The study area is mostly underlain by dolomite, sandstone and shale of the Campbell and Griquastad Groups of the Griqualand West Sequence (Geological Survey, 1984). The site was extensively used for grazing in the past.

1.3.2. Location Map

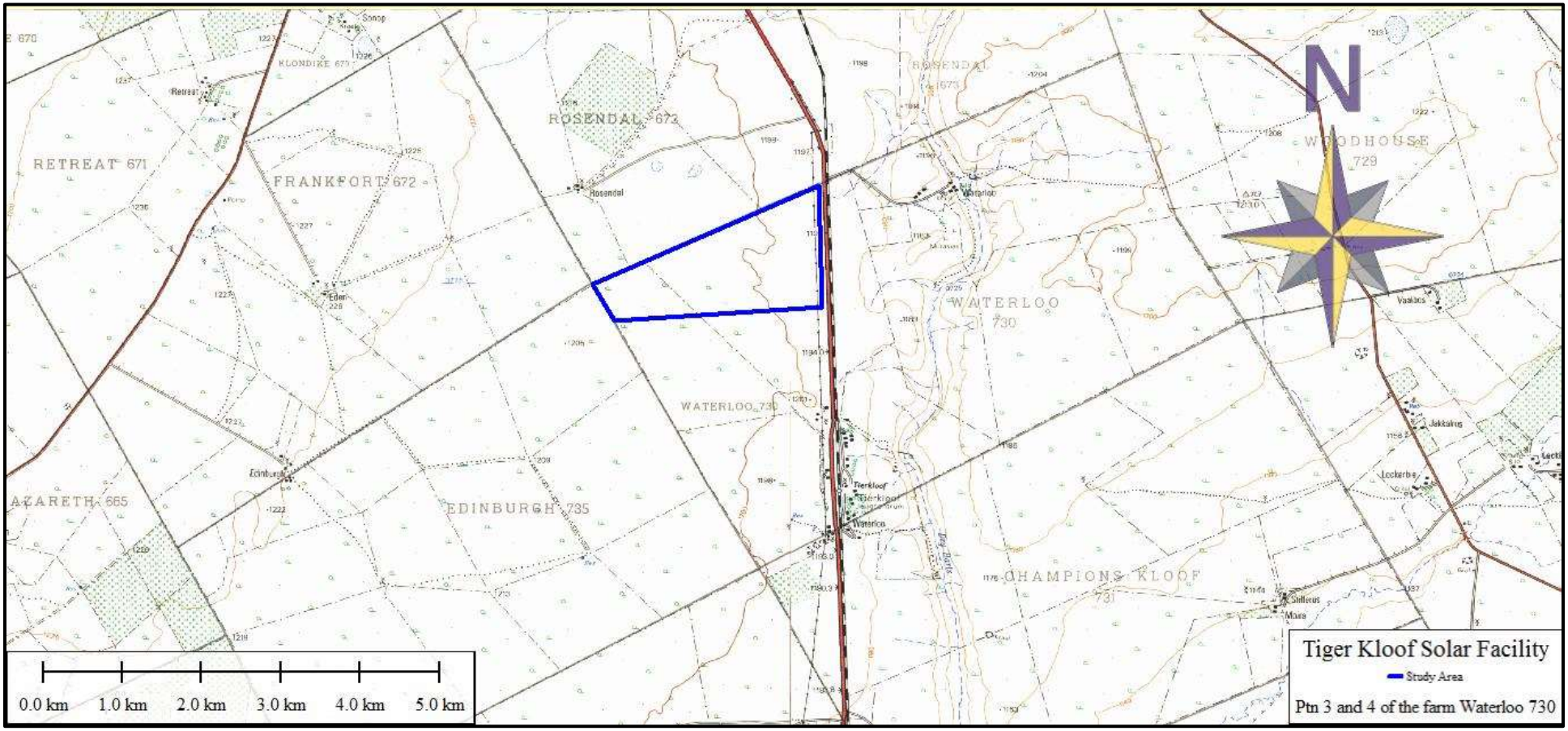

Figure 1a: Tiger KLoof Solar Facility Locality Map.

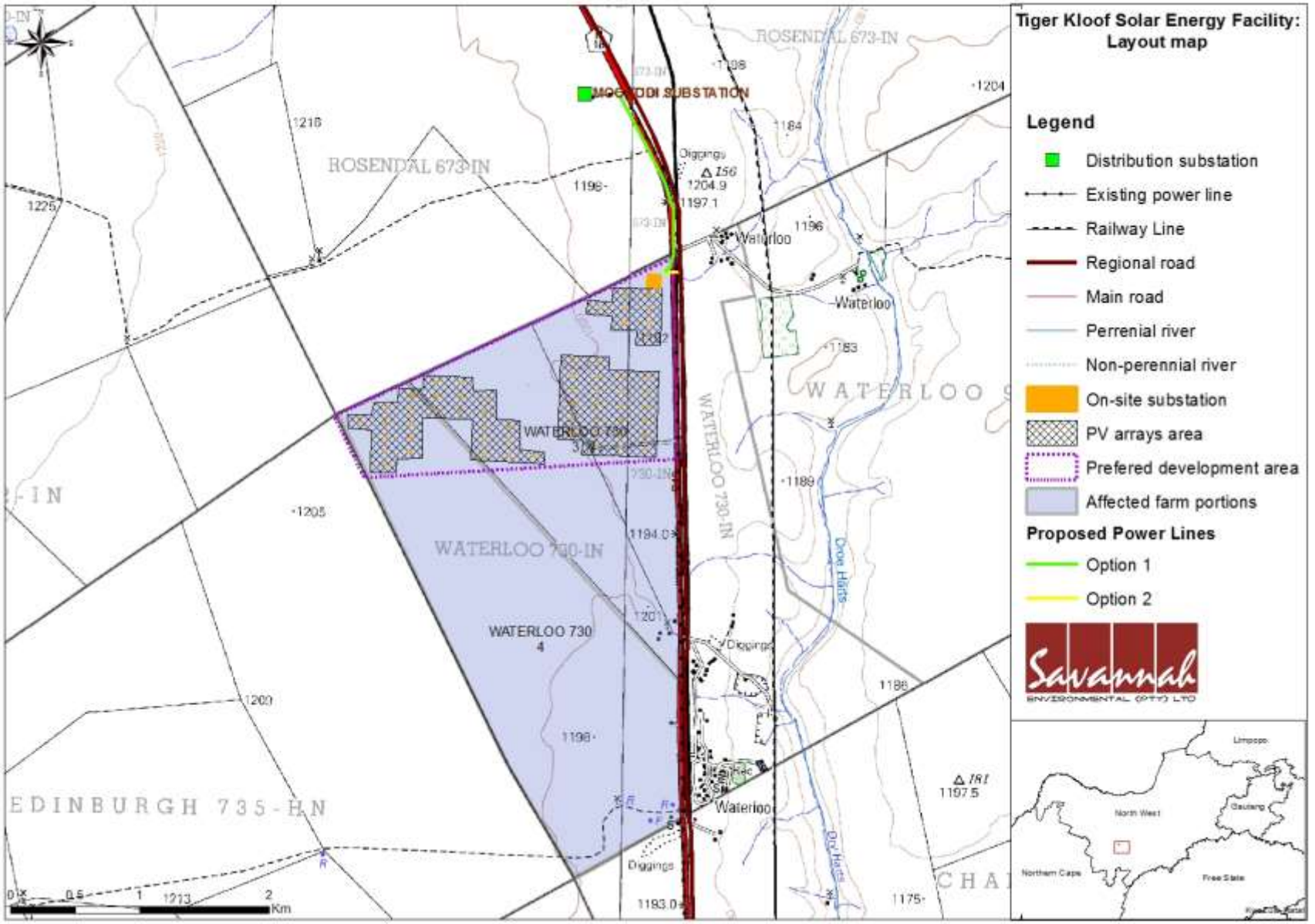

Figure 1b: Tiger Kloof power line options

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 (the results are represented in section 4 & 5 of this report).

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 and historical sites in the area.

2.1.1 Literature Search
By utilising data from previous CRM reports done in the area and a search in the National archives the study area is contextualised. The aim of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves of the area.

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. Three studies were conducted in the immediate vicinity by van Schalkwyk (2008, 2012a,b).

2.1.3 Consultation
A public participation process is facilitated by the Environmental Consultant for the project.

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 measuring approximately 250 ha was conducted over a period of two days, focusing 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 by a professional archaeologist in November 2013.

At the start of the survey a high density of Stone Age material was immediately noticed scattered in varying densities throughout the study area. Therefor low density scatters (between 3 - 5 artefacts per m²) was recorded as occurrences. Scatters higher than 5 artefacts per m² were given site numbers. Scatters with densities less than 2 artefacts per m² were not recorded as they occur through most of 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.

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. Only the surface infrastructure footprint areas were surveyed as indicated in the location map, and not the entire farm. 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 project entails the generation of approximately 75MW electrical power through solar PV panels. The total footprint of the project will be less than 250 hectares. The key components of the proposed project are described below:

- PV Panel Array - To produce 75MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.
- Wiring to Central Inverters - Sections of the PV array would be wired to central inverters sized from 500kW to 1MW. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 22kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Kabi Solar has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will be evacuated
- either via the new Mookodi substation approximately 1,75km north of the site, or via the (to be constructed) Mookodi-Magopela 132kV which is planned to follow the eastern border of the project site.
- Supporting Infrastructure - A control facility with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 400m² or less. Other supporting infrastructure includes voltage and current regulators and protection circuitry.
- Roads – An access road from the national road (N18) and an internal site road network to provide access to the solar field and associated infrastructure will be required. All site roads will require a width of approximately 5 m.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.

There are two alternatives that have been proposed for connection to the grid; generation from the facility will be evacuated either via the new Mookodi Substation approximately 1,75km north of the site (this would require the construction of a power line from the onsite substation to the Mookodi Substation), or via a loop in loop out connection to the 132 kV (to be constructed) Mookodi-Magopela power line.

4. REGIONAL OVERVIEW

4.1 General Information

Through CRM reports on the area together with secondary source material, primary sources, maps and online sources the study is contextualised. Three previous CRM studies were conducted in the immediate vicinity by van Schalkwyk (2008, 2012a, 2012b). The 2008 survey was conducted directly north of the current project area and recorded Stone Age material ascribed to the MSA. The 2012a study was conducted on the same farm as the current study area to the east and recorded stromatolites and MSA material, the 2012b study recorded MSA material also on the farm Waterloo.

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

4.2 Archaeological Background

The archaeological background and timeframe of the study area can be divided into the Stone Age and Iron Age.

4.2.1. Stone Age

The Stone Age is divided in Early; Middle and Late Stone Age and refers to the earliest people of South Africa who mainly relied on stone for their tools.

Early Stone Age: The period from ± 2.5 million yrs. - ± 250 000 yrs. ago. Acheulean stone tools are dominant. No Acheulean sites are on record near the project area, but isolated finds may be possible. However, isolated finds have little value. Therefore, the project is unlikely to disturb a significant site. The lack of any ESA sites was confirmed during the field investigation.

Middle Stone Age: The Middle Stone Age includes various lithic industries in SA dating from ± 250 000 yrs. – 25 000 yrs. before present. This period is first associated with archaic Homo sapiens and later Homo sapiens sapiens. Material culture includes stone tools with prepared platforms and stone tools attached to handles. MSA materials are found scattered widely across southern Africa and a significant factory site are recorded to the east of the study area (van Schalkwyk 2012). A Similar site was recorded during the current survey.

Late Stone Age: The period from ± 25 000-yrs before present to the period of contact with either Iron Age farmers or European colonists. This period is associated with Homo sapiens sapiens. Material culture from this period includes: microlithic stone tools; ostrich eggshell beads and rock art. Sites in the open are sometimes poorly preserved and therefore have less value than sites in caves or rock shelters. A Large factory site was recorded in the study area and is of significance. For the wider region an important LSA site is located to the North West of Stella at Thaba Sione and later used by Tswana people as a rainmaking site with several engraved boulders. Around Vryburg are various rock engraving sites (Bergh 1999).

4.2.2. Iron Age (general)

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

The Early Iron Age: Most of the first millennium AD.

The Middle Iron Age: 10th to 13th centuries AD

The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living.

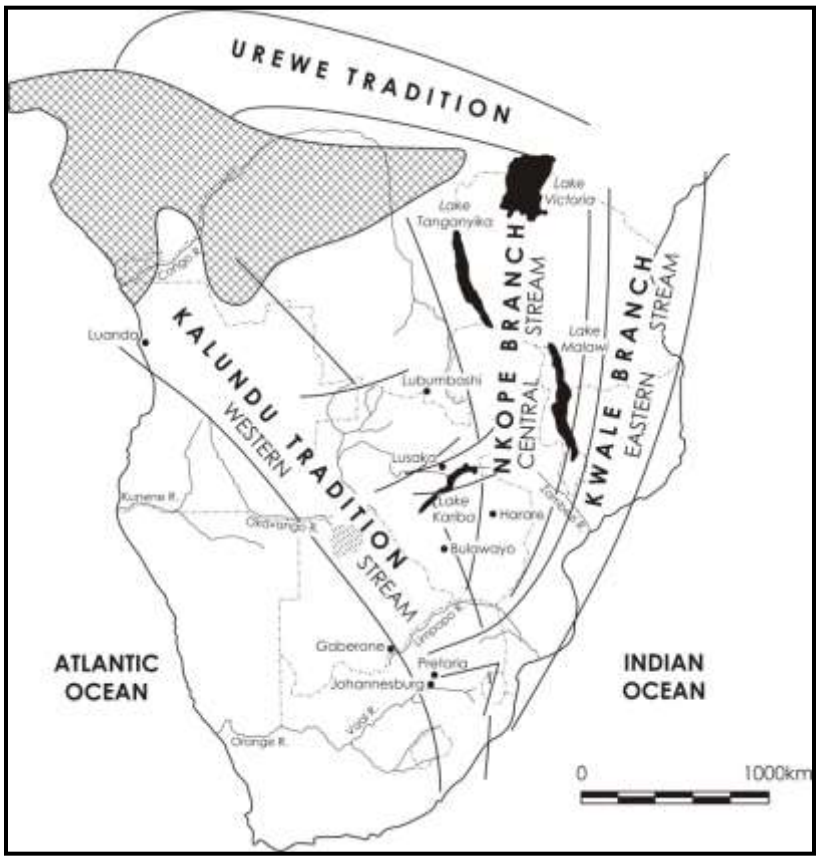

Figure 2: Movement of Bantu speaking farmers (Huffman 2007)

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 western periphery of distribution of Late Iron Age settlements in the North West Province although Breutz (1959) indicates that in the larger area stone walling associated with the Tswana occupation of the area can be expected. To the north east of the study area the area is well known for Later Iron Age stone walled settlements archaeologically referred to as Molokwane settlements (Pistorius 1992, Booyens 1998, Huffman 2007), to the east towards Klerksdorp and Potchefstroom some 88 stone walled settlements are recorded (Bergh 1999). No sites dating to this period was recorded in the study area.

4.3 Palaeontology

A paleontological study was commissioned by Heritage Contracts and Archaeological Consulting CC by Dr John Almond (2013). He reported the following:

"The southern and eastern margins of Waterloo Farm 730 are underlain by small outcrop areas of Permo-Carboniferous glacial rocks of the Dwyka Group (Karoo Supergroup) as well as by various Late Caenozoic superficial sediments such as pedogenic calcretes and surface gravels that are all of low palaeontological sensitivity.

Most of the study area is underlain by Late Archaean (Early Precambrian, c. 2.64 billion years old) sediments of the Schmidtsdrif Subgroup (Ghaap Group, Transvaal Supergroup). Fluvial quartzites and possible volcanic rocks of the Vryburg Formation cropping out in the north-eastern portion of the study area are probably unfossiliferous in this region (Almond 2013a). The overlying carbonate-rich Boomplaas Formation that underlies the majority of the study area is known to contain well-preserved stromatolite

(microbial dome) assemblages in the Vryburg region, including on the adjacent Waterloo Farm 992 immediately to the east (Almond 2013).

It is very likely that comparable, scientifically important fossil stromatolites also occur on Waterloo Farm 730. It is therefore recommended that a specialist palaeontological field assessment of the present study area be carried out during the EIA phase to record any fossils present and to make recommendations for the construction phase of the development, should this be approved. Cumulative impacts on fossil heritage of the present project together with three other proposed solar projects in the immediate area - two on Waterloo 992 to the east and one on Rosendal 673 to the north - will need to be considered."

The report is included as Annexure A.

5. HISTORICAL BACKGROUND

The following section will endeavour to give a brief overview of the history of the area and district in which it is located. The report has been divided into several sections that will focus on the following aspects:

- General history of human settlement in the area
- The history of black and white interaction in the area

5.1. Historiography And Methodology

It was necessary to use a range of sources in order to give an accurate account of the history of the area in which the study area is located. Sources include secondary source material, maps, electronic sources and archival documents. This study is by no means all-inclusive, and there are doubtlessly still sources to be found on the history of the property and area researched in this study.

5.2. Maps Of The Area Under Investigation

Figure 3: Google Earth image showing the project area in relation to Vryburg (Google Earth 2013)

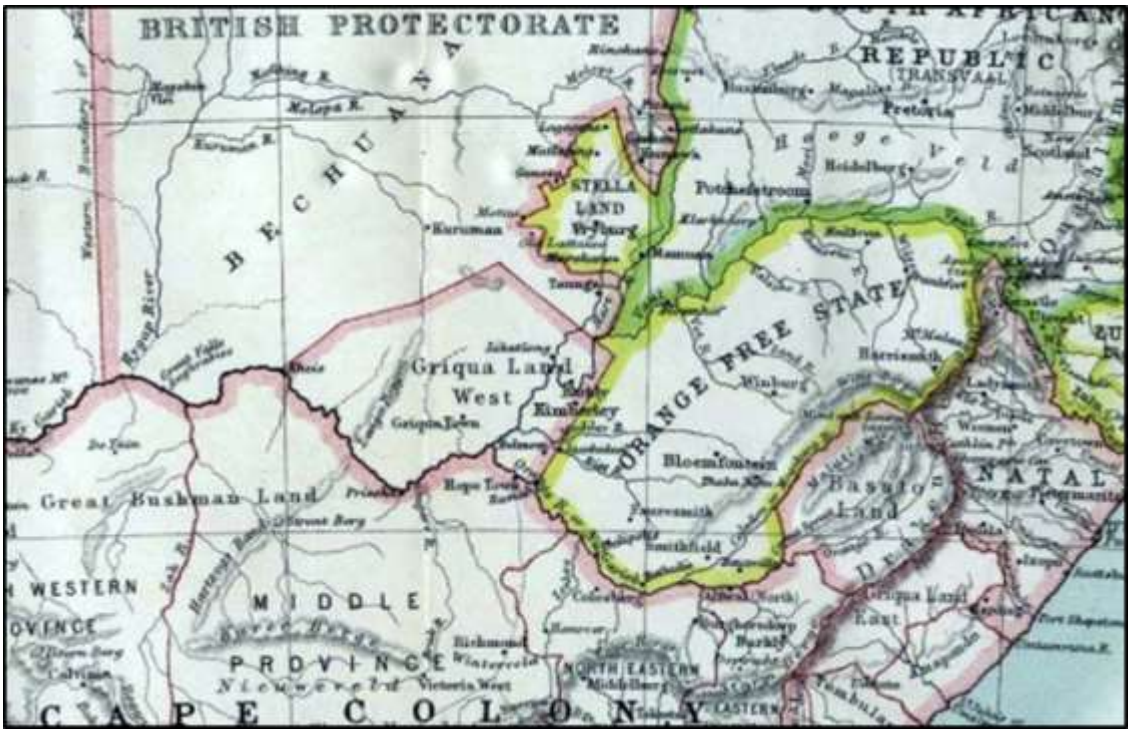

Figure 4: 1885 Map showing the area of Stellaland, Vryburg and the farm area were located in this district. The map indicates Stellaland before unification with Goshen to the North East (The British Empire 2011)

5.3. A Brief History of Human Settlement and Black And White Interaction In The greater study Area

A farm does not exist in isolation, and it is important to understand the social history of the surrounding area. It is essential to consider the history of towns in the vicinity of the property under investigation, since these social centres would have affected those individuals living in the rural areas. In the case if Vryburg it is interesting to note that this town was once the capital of an independent republic – Stella Land.

The area was initially under the control of competing Griqua and Tswana groups, while the United Kingdom laid claim to it as part of the emerging protectorate of British Bechuanaland. One of the indigenous groups was under the leadership of chief Mankoroane of the Thlaping who were loyal to the British and another one under the leadership of chief Massouw of the Korana (they were loyal to the Boers). When a feud erupted between Mankoroane and Massouw, each side resorted to recruiting volunteers, promising them land in return for their assistance. More than 300 Boer Soldiers joined Massouw, with the promise of being paid in land for their services as mercenaries. Massauw and his army soon had the overhand and subsequently a peace agreement was signed by Mankoroane on 26 June 1882. The Boer volunteers would as per this agreement be granted land and the boundaries of their areas would be determined by both Mankuroane and Massouw. In September 1882 the town of Vryburg was laid out. Work was halted as Makuroane did not name a representative but the town was nonetheless laid out by the end of 1882. The Republic of Stellaland was proclaimed by GJ van Niekerk on 6 August 1883.

The neighbouring land Goshen had a similar tale – Moshwete and Montshiwa took up arms against each other in 1881. Moshwete also made use of Boer volunteer soldiers under leadership of Gey van Pittius. On 11 January 1882 they entered into a formal agreement with Moshwete where the volunteers would each receive a farm form their efforts. Two days later the volunteers declared themselves an independent community. The war against Montshiwa continued, but ended in a peace agreement on 24 October 1882. Both the independent community (they appointed a management body) and Montshiwa appointed commissions to establish boundaries of the new area. However due to a lack of cooperation between the commissions and the Rolang's negativity towards the Boer volunteers the final arrangements were never made. It was also clear that Moshwete was unwilling to cooperate.

The two states later unified and were known as the United States of Stellaland. In 1884 the existence of the two states were under threat from Britain as the Covention of Londen determined that the boundaries of the Transvaal were moved to such an extent that the western border of the Transvaal now went through the middle of both Stellaland and Goshen. Montshiwa also determined that due to this, he was no longer bound by the provisions of the peace agreement and there were some skirmishes between Montshiwa and his followers and the Goshenites. The future of the area was no longer in the hands of either party when in 1885 Sir Charles Warren and his army of 4000 men were sent to defend the Western border of the Transvaal. Without one shot being fired what remained of Goshen and Stellaland were reclaimed as part of British Bechuanaland and Warren proclaimed this on 30 September 1885.

5.4. Tiger Kloof School

In 1895 Kgosi (Chief) Khama III, Kgosi Bathoen and Kgosi Sebele visited Queen Victoria and Lord Chamberlain to convince them not to incorporate British Bechuanaland into the Cape Colony. They were accompanied by Rev. W.C. Willoughby, who was a missionary working amongst the Batswana.

The local people wanted a good education for their sons and had approached the London Missionary Society to establish a school in Bechuanaland. After many negotiations the Institution was established at Tiger Kloof that is located on the same farm as the proposed Tiger Kloof solar facility on the farm Waterloo 730.

In 1904 Reverend William Charles Willoughby and his wife Mary arrived on the banks of the Dryharts River, 10 km south of Vryburg.

The aim of the original LMS Tiger Kloof Native Institution according to Rev. Willoughby, was "The equipment of an African ministry for an African Church. …And the first work of Tiger Kloof is to train their ministers in true leadership, knowledge, and spiritual vision." Secondly the Institution wanted to train African schoolmasters and schoolmistresses for African schools and to educate the sons and daughters of the comparatively high-born and wealthy natives so that their public opinion should be essentially Christian. Lastly they also wanted to train the men as craftsmen and teach the women skilled work (http://www.tigerkloof.com/index.php/about-us/history).

The first principals of the school included:

Rev. Willoughby was principal from 1904 to 1914. Willoughby was part of the establishment of the institution and in this time the first buildings and facilities were constructed.

Rev. Arthur Haile was principal from 1915 to 1945. During this time various buildings, roads and sports fields were constructed. The Girls' School envisaged during Willoughby's time became a reality and the Arthington memorial church was built by masonry apprentices of Tiger Kloof School.

The training school for teachers was built and an annex added later on. An isolation hospital and water reservoirs were added and cattle kraals built. A visiting medical doctor served the school and a nurse worked and stayed on campus. A Bible school was started and African ministers trained and sent out to work in surrounding areas and further afield.

At its height the Institution comprised nine different training schools on one campus (http://www.tigerkloof.com/index.php/about-us/history).

The Prince of Wales and The King both paid a visit to the Institution during Haile's time and the King's Jubilee was also celebrated.

Rev. Aubrey Lewis was in charge from 1945 to 1955. During his time a few more buildings were added and changes made to the training offered at the school. A highlight that occurred during his time was when electricity finally came to the Institution in 1952! The Institution also boasted rugby and boxing clubs.

Sadly the days of the LMS involvement at Tiger Kloof were numbered after the infamous Bantu Education Act was passed in 1953. At the end of 1955 the LMS withdrew from the Institution and Rev. Lewis resigned (http://www.tigerkloof.com/index.php/about-us/history).

Mr. S.M. Smithen took over from 1956 to 1963, she was formerly the Principal of the Training school and became the Principal of the Institution that was handed over to the Cape Provincial Education department. After much unrest and rioting, as well as the burning down of the boys' dormitories, the Institution finally closed its doors at the end of 1963.

Contracts were given out for the destruction of the buildings and many were torn down: the African staff village, the academic school, the remainder of the Boys' dormitories, the tannery and boot-making department, the isolation hospital, the carpentry building and the girls' school staff house.

The other buildings either lay fallow or were used as sheep pens, stores or farmhouses. Mr. David Matthews, who had been the headmaster of Maru-a-Pula school in Botswana, became intrigued by the buildings standing empty next to the road on the way to Kimberley and in 1991 he started to investigate and set the ball rolling to have the Institution reopened.

In 1995 the Institution reopened amidst great celebrations, led by Archbishop Desmond Tutu, with a group of 25 grade 8 learners. Subjects offered were only academic and for children of school-going age.

Since 1995 all the land that belonged to the LMS has been returned to Tiger Kloof with the final handover in 2004, the year of the Institution's centenary (http://www.tigerkloof.com/index.php/about-us/history).

6. 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.

6.1. 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 8 of this report.

FIELD RATING	***GRADE***	***SIGNIFICANCE***	***RECOMMENDED MITIGATION***
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

6.2 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).

7. BASELINE STUDY-DESCRIPTION OF SITES

From the site distribution map (Figure 5) it is clear that most of the recorded Stone Age occurrences occur within the south eastern portion of the area that was surveyed (Figure 6) where the calcrete is eroding from under the calcic soil form Coega where the soil cover is very shallow (Gotze 2013). Artefact counts drastically drop in the west and the north eastern corner where slightly deeper but still shallow lithic soil form Mispah dominates (Gotze 2013). However, the occasional MSA or LSA flake was noted in these areas. Soils within the study area vary between shallow (5 – 40 cm) and moderately deep (41 – 90 cm) soils (Gotze 2013). The study area (Figure 7 -10) includes plains, gently undulating slopes, low ridges and ground visibility is high as grass cover is low, however small trees and shrubs standing waist high hampers overall visibility. The palaeo drainage channel that links up with the dry Harts River to the south east is easily visible on Google earth and a light blue polygon indicate this area within the study area (Figure 15). This drainage channel is associated with quartzite pebbles that was utilised by MSA communities. Where calcrete protrudes through the thin sand cover around this drainage channel, quartzite pebbles as well as artefacts are imbedded in the calcrete (Figure 14).

Artefacts were observed in varying densities over the study area where quartzite and cryptocrystalline silica (CCS) is used as raw material. In areas where slightly elevated frequencies of artefacts occurred these where documented as occurrences (scattered isolated artefacts were not recorded) and when the artefact ratio is higher than 5 per m² these were documented as 'sites'. MSA artefacts are predominantly on the quartzite while the LSA are mostly on CCS. GPS points were taken at such places and selections of artefacts were photographed. MSA and LSA artefacts are mixed and indicate that a possible downward deflation had occurred in the study area.

Two sites were recorded consisting of a mixed MSA and LSA factory/knapping site (**Site 1**) and a possible grave site (**Site 2**). At Site 1 higher artefact concentrations or where a clear edge to a concentration could be determined within this area were recorded as Site 1 A to Site 1 I. Both these sites are included in no go areas to preserve these sites. A further total of 7 occurrences (**Occurrence 1 -7**) were mapped, recorded and digitally photographed. These 7 occurrences are dominated by MSA artefacts that show some weathering probably from being washed in from their original context and are therefore of little archaeological value.

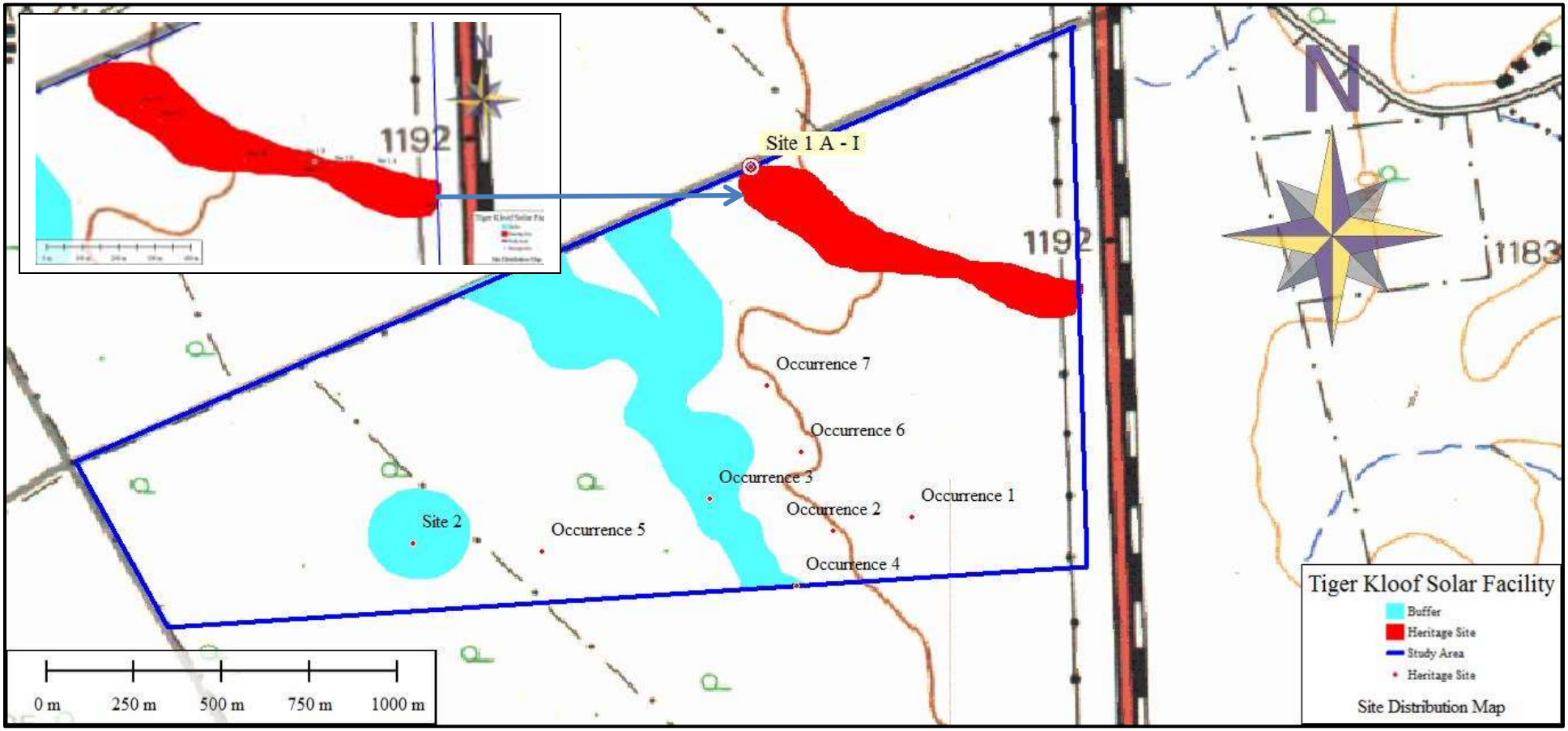

Figure 5. Site distribution map showing sites and occurrences in relation to buffer zones.

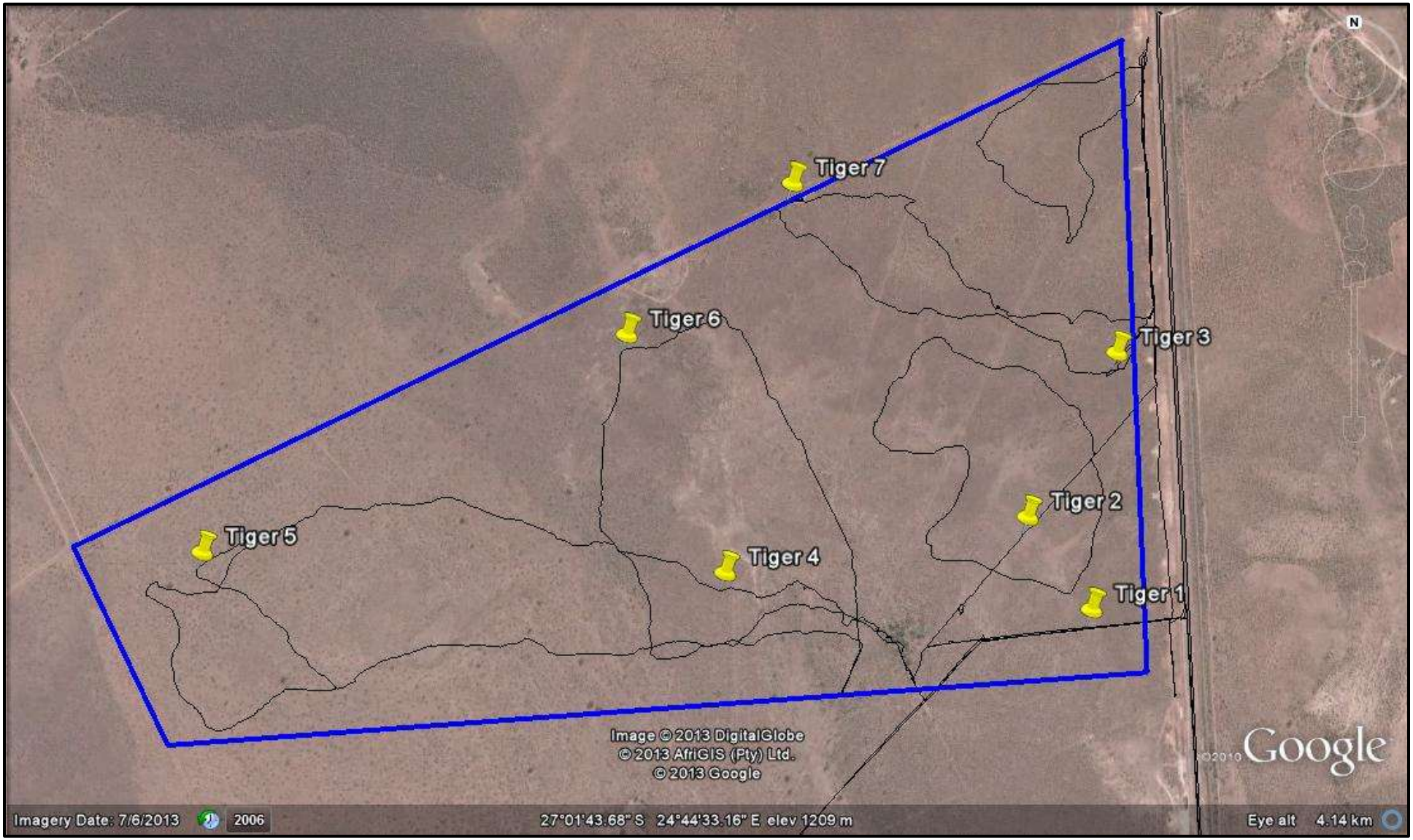

Figure 6: Track logs of the area that was covered in black. Tiger 1 – 6 indicates where photographs were taken to give the reader of the report a better indication of the context of the study area.

Figure 7. Environment at point - Tiger 1.

Figure 8. Environment at point - Tiger 2.

Figure 9. Environment at point - Tiger 3.

Figure 10. Environment at point - Tiger 4.

Figure 11. Environment at point - Tiger 5.

Figure 12. Environment at point - Tiger 6.

Figure 13. Environment at point - Tiger 7.

Figure 14: MSA Artefact from quartzite embedded in calcrete.

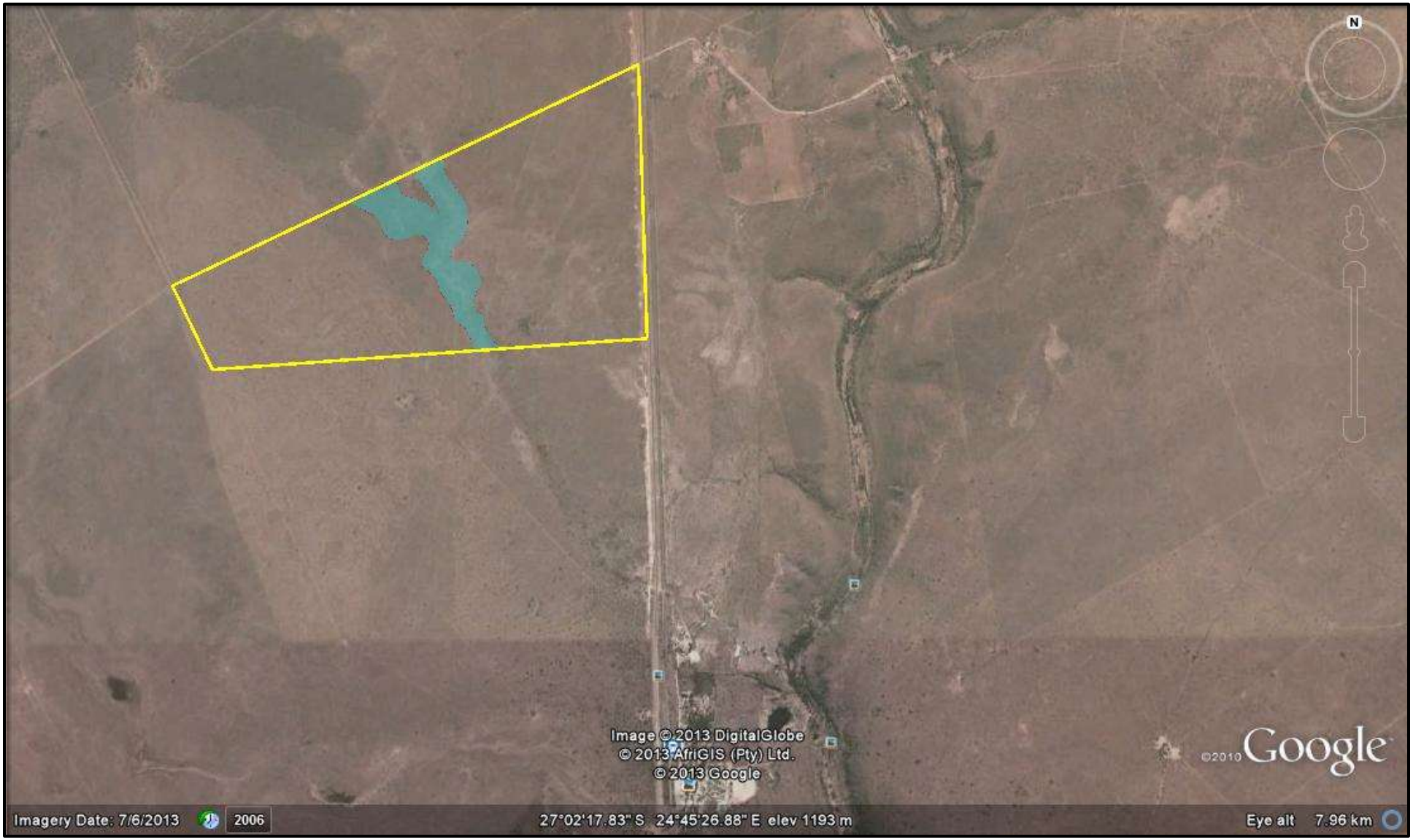

Figure 15: Google Earth image of the study area clearly indicating the palaeo channel

7.1 DESCRIPTION OF FINDS

7.1.1 Sites with Coordinates

Site Number	Type Site	Description	Co ordinate
Site 1A	MSA and LSA mixed	MSA consisting of broken blades, side scrapers and large flakes on CCC and Quartzite. LSA mostly on CCS	S27 01 35.7 E24 45 05.0
Site 1B	MSA and LSA mixed	MSA consisting of broken blades, side scrapers and large flakes on CCC and Quartzite. LSA mostly on CCS	S27 01 35.5 E24 45 01.1
Site 1C	MSA and LSA mixed	MSA consisting of triangular flakes, blades, side scrapers mostly on CCS. LSA also on CCS	S27 01 35.2 E24 44 59.6
Site 1D	MSA and LSA mixed	Small concentration of mostly MSA but some LSA also present. CCS dominates.	S27 01 34.9 E24 44 58.5
Site 1E	MSA and LSA mixed	High concentration 22-m² of MSA and LSA tools from CCS and Quartzite.	S27 01 26.3 E24 44 40.3
Site 1F	MSA and LSA mixed	MSA concentration of blades, triangular flakes and cores. LSA flakes with retouch. High concentration of 20-m².	S27 01 30.3 E24 44 44.0
Site 1G	MSA and LSA mixed	MSA concentration of blades, triangular flakes and cores. LSA flakes with retouch. High concentration of 20-m².	S27 01 31.5 E24 44 45.6
Site 1H	Predominantly LSA	Artefact count 15-m². LSA dominates with some MSA. Raw material on CCS and quartzite	S27 01 35.1 E24 44 53.3
Site 1I	Predominantly LSA	Artefact count 13-m². LSA dominates with some MSA. Raw material on CCS and quartzite	S27 01 39.7 E24 45 09.2
Site 2	Possible Grave	Stone packed feature	S27 02 01.1 E24 44 09.2

Site 1

The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. Artefact counts within these concentrations vary from 2-m² (Site 1A) to 20-m² (Site 1E), 22-m² (Site 1F) and 15-m² (Site 1H).

The site was red flagged as a no-go area during the planning phase of the project and incorporated into open areas within the development (Figure 16) to protect the site and no impact is foreseen on the site.

Heritage significance: Local Significance (LS) - Grade 3AHigh High significance

Site 2

The site consists of an elongated feature with a stone packed boundary. The stone feature measures approximately 2 meter in length and is 1 meter wide. The feature is aligned east west and could possibly be a grave. The feature is however in a pan where one would not expect to find a grave. Until proven that this is not a grave the site is given a high social significance rating.

Heritage significance: Generally Protected A (GP.A) - High/medium significance

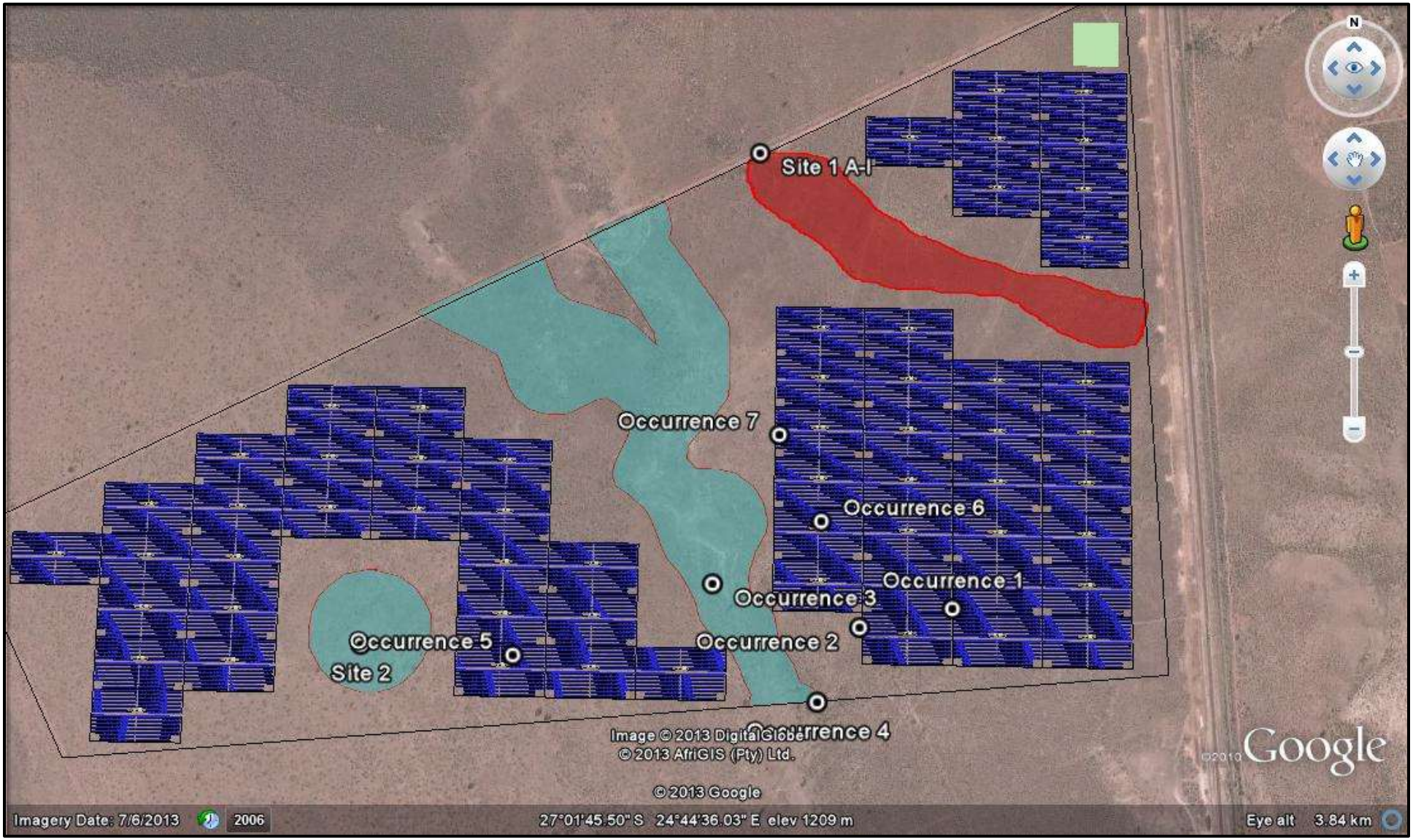

Figure 16: Development layout

Figure 17: Range of artefacts from Site 1 A

Figure 18: MSA component at Site 1D

Figure 19: Concentration of mostly LSA artefacts at Site 1E

Figure 20: Possible grave at Site 2

7.1.2 Occurrences with Coordinates

Site Number	Type Site	Description	Co ordinate
Occurrence 1	Stone Age	MSA on quartzite (side scraper) and LSA on CCS (blades, flakes with retouch and chunks).	S27 01 58.6 E24 44 55.2
Occurrence 2	Stone Age	MSA visible on exposed calcrete from quartzite some artefacts from CCS. Quartzite pebbles stuck in calcrete.	S27 01 59.9 E24 44 47.9
Occurrence 3	Stone Age	MSA on exposed calcrete from quartzite some artefacts stuck in calcrete.	S27 01 56.9 E24 44 36.5
Occurrence 4	Stone Age	MSA on exposed calcrete from quartzite some artefacts stuck in calcrete.	S27 02 05.0 E24 44 44.6
Occurrence 5	Stone Age	MSA visible on exposed calcrete from quartzite some artefacts from CCS.	S27 02 01.8 E24 44 21.0
Occurrence 6	Stone Age	MSA on quartzite (triangular flakes and blades) and LSA on CCS. Highest frequency of all occurrences 7 – 2m²	S27 01 52.6 E24 44 45.0
Occurrence 7	Stone Age	MSA on quartzite (blades) and LSA on CCS (flakes with retouch).	S27 01 46.5 E24 44 41.8

Occurrence 1 -7

Artefacts (mostly MSA) were observed in low densities on both sides of the palaeo channel over an area of approximately 15ha where calcrete is exposed. This calcrete formed during a cold period with alternating wet and dry episodes that allowed calcium carbonate to precipitate on to the land surface. Some MSA artefacts on

quartzite as well as quartzite pebbles occurred embedded in the calcrete (Figure 30), and so they predate this geo-morphological formation. As stated, quartzite strongly dominates the MSA component and to a lesser degree CCS from the nearby ridges. Artefacts consist mostly of radial and bipolar cores, large flakes and blades with faceted buts. The LSA component is mostly made from CCS and is micro lithic and fresher looking than the MSA artefacts supporting an ascription to the LSA (Figure 28).

Figure 21: Range of raw material at occurrence 1.

Figure 22: Artefacts embedded in calcrete at occurrence 2.

Figure 23: Concentration of artefacts on exposed calcrete at occurrence 7

Figure 24: Calcrete protruding through thin soil cover

7.2. Impact evaluation of the proposed project on heritage resources

Sites 1 -2

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 archaeological and paleontological material or objects.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8)
Probability	Improbable (1)	Improbable (1)
Significance	**15 (low)**	**15 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:
Two sites were identified during the survey. None of these sites will be directly impacted by the proposed development. However, if any archaeological 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.

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.

Occurrences that might be impacted. Find spots 1 - 4.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may impact in the following manner:
PV panels on occurrence 1 - 4.

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

Mitigation:
The sites should be monitored during construction. Alternatively, the general location should be demarcated to avoid impact on the sites.

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.

Occurrence 5- 7

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 archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	**9 (low)**	**8 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: The new revised layout facilitated the protection of these sites and no direct impact is foreseen on the sites and no mitigation is required. However, if any archaeological material is uncovered during construction or operation in these areas 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.		
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.		

Possible impacts on Paleontological resources based on scoping information

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 archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8)
Probability	Probable (4)	Probable (3)
Significance	**60 (high)**	**45 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		

As per the scoping recommendation a qualified palaeontologist must conduct field work as part of the EIA phase before construction starts (Almond 2013). Mitigation will then possibly include documentation, collection and sampling of the material. .
Cumulative impacts: Paleontological sites are non-renewable and impact on any paleontological context or material will be permanent and destructive.
Residual Impacts: Depletion of paleontological record of the area.

Based on available information, three other solar energy facilities (SEF's) are located in relatively close proximity to the proposed Tiger Kloof SEF. Two of the SEFs are located to the east of the Tiger Kloof SEF on the farm Waterloo 922 (Waterloo SEF and Bophirima SEF) and one on the farm Rosendal (Sediba SEF) to the north of the site. SAHRA needs to take cognisance of the cumulative impact of these applications on the heritage resources documented in the area thus far. The impact on archaeological sites and occurrence's are once-off permanent destructive events. A positive impact is also possible like in this case where 2 previously unknown sites are identified, documented and preserved in a no go zone both on the farm Waterloo (van der Walt 2013; van Schalkwyk 2012).

7.3 Measures for inclusion in the draft environmental management programme

OBJECTIVE: To minimise impacts on archaeological and paleontological resources affected by the proposed PV plant and power line infrastructure.

Project Component/s	Construction and operational phases of the PV plant lay-out and Power line.
Potential Impact	Any construction activity could result in the accidental damage, destruction, alteration, removal or collection of non-renewable heritage resources in particular to the no go heritage sensitive areas.
Activity/Risk Source	Any deviation from the planned lay-out of infrastructure without taking heritage impacts into consideration. Uncontrolled movement of construction vehicles and staff could unknowingly impact negatively on no-go areas and heritage sites.
Mitigation: Target/Objective	Demarcation of no go areas and implementation of a heritage management plan as part of the EMP. This will then be part of EMP to take note of heritage resources in the event of any future extensions of any infrastructure and a protocol for accidental finds.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Provision for on-going heritage monitoring and providing guidelines on what to do in the event of chance finds. This will ensure that workers and construction vehicles stay away from no go areas.	Tiger Kloof PV facility management and ECO for the project.	To be in place before commencement of construction and enforced during all three phases of the development

Performance Indicator	In situ preservation of no go areas.
Monitoring	Officials from relevant heritage authorities (National and Provincial) to be permitted to inspect the operation at any time in relation to the heritage component of the management plan. No pedestrians or construction vehicles allowed inside the no go areas.

8. CONCLUSION AND RECOMMENDATIONS

Most of the Stone Age archaeology in the study area consists of low densities of scattered (and mixed) MSA and LSA artefacts. These finds are documented as 'occurrences' and are of low significance, but more substantial and significant MSA and LSA archaeological sites do occur, and were recorded as 'sites'. These sites were identified during the planning stages of the development and are now included in no-go and buffer areas within the development that facilitate the *in-situ* protection of the sites. Apart from the Stone Age component a possible grave site was recorded that will also be preserved.
For the proposed project the following recommendations are made:

- Two sites (**Site 1 and Site 2**) have been identified as **no go** areas and are now excluded from the development to facilitate the protection of these sites. These sites must be demarcated with danger tape during the construction phase of the project to protect the site from accidental damage. Due to the nature of a PV plant, security is of utmost importance and no unauthorised pedestrian traffic is foreseen on the area during the operation phase.
- An existing gravel road traverses Site 1 on the northern boundary of the study area and has already impacted on the site. This existing road can be used without further mitigation.
- Occurrence 1 and 5 – 7 might be impacted on by the proposed PV layout. These sites are sufficiently recorded and no further mitigation will be necessary as the impact of the PV panels are considered to be extremely low in comparison to the lateral distribution of artefacts that are *ex-situ*. Furthermore comparative material will remain on the unaffected areas of the site.
- It is further recommended that a Conservation Management Plan is drawn up and included in the EMP for the project to protect no go areas in the study areas.
- The Palaeontological desktop study recommended further work and constitutes a second phase of study and must be addressed before construction start.
- If any possible finds such as tool scatters, bone or fossil remains are exposed or noticed during construction, the operations must be stopped and a qualified archaeologist must be contacted to assess the find.

With respect to the magnitude and extent of the potential impacts of the proposed power line options for connection into the grid, Garth Sampson indicated that power lines have a relatively small impact on Stone Age sites based on his observations during surveys beneath power lines in the Karoo. For the study area the preferred option is the loop in loop out lines on site (option 1) as this was covered during this AIA and would not impact on any of the recorded sites. A large section of option 2 was covered by van Schalkwyk (2008, 2012b) and he did not record any sites in these areas and option 2 is also considered to be satisfactory. If option 2 is the preferred alternative the line must be subjected to a heritage walk down when the tower positions have been determined.

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.

If the recommendations as made in section 8 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

9. PROJECT TEAM

Jaco van der Walt, Project Manager and Archaeologist

Liesl Bester, Archival Specialist

John Almond , Palaeontologist

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.

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

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