



PGS HERITAGE

Moeding Solar

Moeding Solar PV Facility, North West Province

Heritage Impact Assessment

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Declaration of Independence

- I, Wouter Fourie, declare that –
- General declaration:
- I act as the independent heritage practitioner in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will consider, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

HERITAGE CONSULTANT:

PGS Heritage (Pty) Ltd

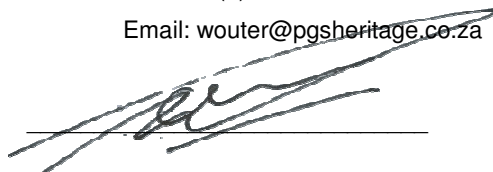
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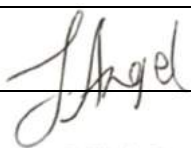
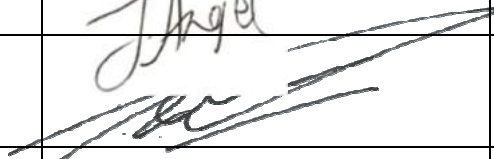
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ACKNOWLEDGEMENT OF RECEIPT

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The heritage impact assessment report has been compiled taking into account the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

NEMA Regs (2014) - Appendix 6	Relevant section in report
Details of the specialist who prepared the report	Page 2 of Report – Contact details and company
The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2
A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 5
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 3.1
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 3 and 5
An identification of any areas to be avoided, including buffers	Section 5
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer to Figure 77
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 5
Any mitigation measures for inclusion in the EMPr	Section 6
Any conditions for inclusion in the environmental authorisation	Section 6
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 6
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 7
A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process was handled as part of the EIA and EMP process.
A summary and copies if any comments that were received during any consultation process	Not applicable. To date not comments regarding heritage resources that require input from a specialist have been raised.
Any other information requested by the competent authority.	Not applicable.

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Savannah Environmental (Pty) Ltd to undertake a Heritage Impact Assessment that forms part of the Basic Assessment (BA) and Environmental Management Plan (EMP) for the proposed development of the Moeding Solar PV Facility, North West Province.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

The Heritage Impact Assessment has shown that the proposed Moeding Solar PV Facility ("Moeding Solar") project has heritage resources present on the affected properties. This has been confirmed through a field survey, archival research and evaluation of aerial photography of the sites.

During the field assessment 34 heritage sites were identified within the project site and power line corridor. These include 21 find spots, 1 erosion site exposing Stone Age materials (**007, 008**), 5 significant Stone Age sites (**011, 012, 013**), **035, 036, (037, 038, 039) and 041**, 1 Pan like site with extensive exposure of Stone Age artefacts (**014**), 3 Historical sites (**018, 019, 020, 022, 023**), (**026, 027, 028, 029**) and **034**, 1 burial ground (**021**), 1 area of stacked stones (**024**) and 1 possible grave (**032**).

Of all the above sites only sites **035-039** and **041** fall in the powerline corridor of the proposed project infrastructure.

The management and mitigation measures as described in **Section 7** of this report have been developed to minimise the project impact on heritage resources. Impacts on burial grounds and graves are rated as having a LOW significance before mitigation and a LOW Significance after mitigation measures are implemented. Impact on Historical sites is rated as having a LOW Significance before mitigation and a LOW Significance after mitigation measures are implemented. Impacts on archaeological sites are rated as having HIGH Significance before mitigation and LOW Significance after mitigation measures are implemented.

The overall cumulative impact on heritage resources is LOW.

The overall impact of the proposed PV and powerline development on the identified heritage resources is rated as MEDIUM with a post mitigation rating of LOW.

Considering the possible impacts on heritage resources of the proposed power line alternatives, Alternative 2 will be the preferred option from a heritage perspective.

It is my considered opinion that overall impact on heritage resources after the implementation of the recommended mitigation measures is acceptably low and that the project can be approved from a heritage perspective.

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TERMINOLOGY AND ABBREVIATIONS

Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil.

Early Stone Age

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

Fossil

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

Heritage

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

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa.

Holocene

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

Hominin

Any of a taxonomic tribe (Hominini) of hominids that includes recent humans together with extinct ancestral and related forms

Late Stone Age

The archaeology of the last 30 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

Palaeontology

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

Pastoralist

Communities dependent of their livelihood from livestock.

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

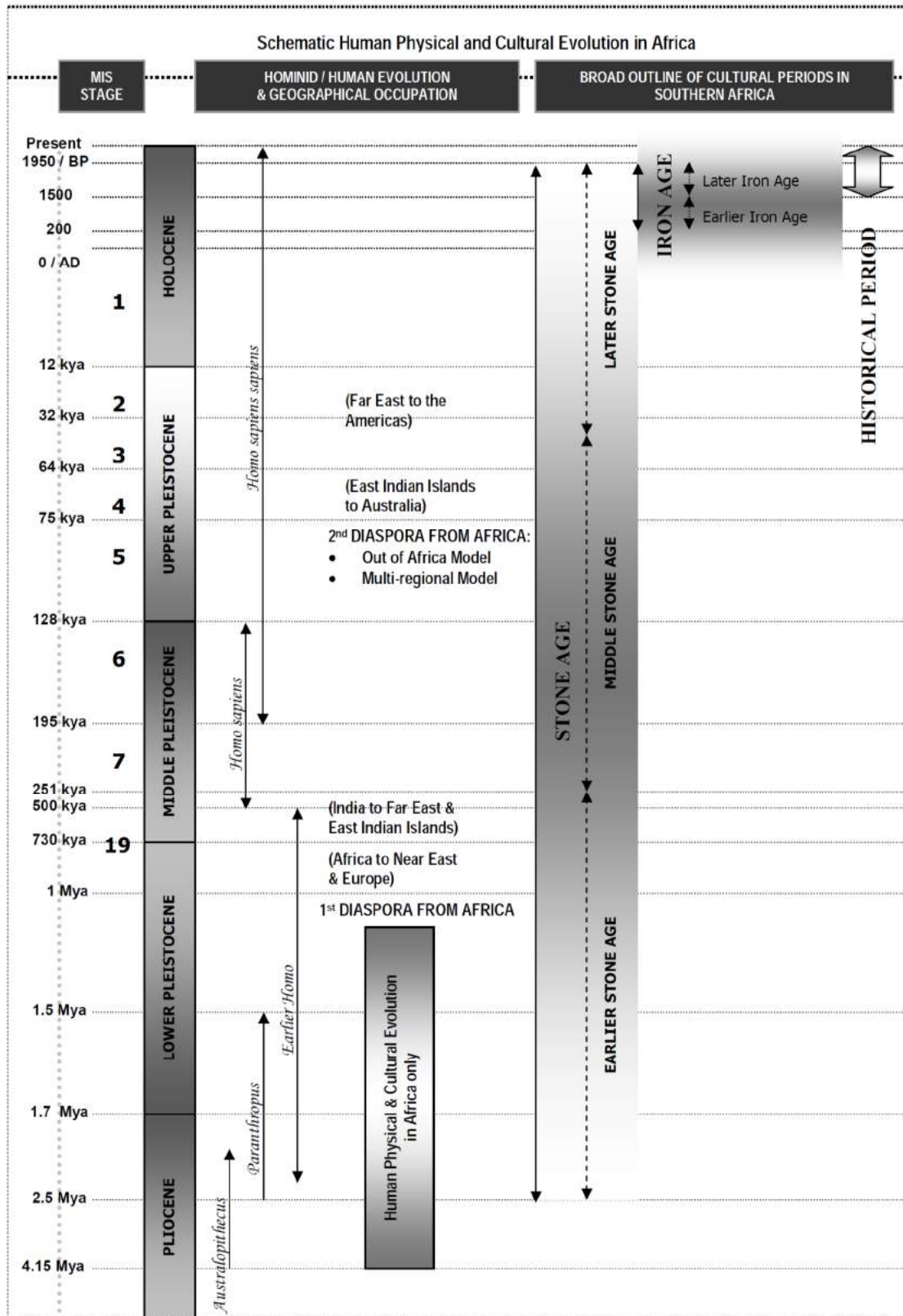


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Savannah Environmental (Pty) Ltd to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Assessment (BA) and Environmental Management Plan (EMP) for the proposed development of the Moeding Solar PV Facility, Portion 1 of the farm Champions Kloof 731, Portion 4 of the Farm Waterloo 730. While the power line assessment corridor of 300m in width will be situated within the Remaining Extent of the Farm Rosendal 673 and the Remaining Extent of Portion 3 of the Farm Waterloo 730, North West Province

1.1 Scope of the Study

The aim of the study is to identify possible heritage resources and finds that may occur in the proposed project site. The HIA aims to inform the BA to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

This HIA Report was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 40 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

Jessica Angel, Archaeologist and author, holds a Masters degree in Archaeology and is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA).

Dr. Matt Lotter acted as a Stone Age specialist and surveyor. He has undertaken extensive and in-depth research at several Earlier, Middle and Later Stone Age localities around southern Africa. He has also published several scientific articles with a focus on Earlier Stone Age technologies and geoarchaeology. He is registered with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation.

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed during any phase of the project, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA), Act 107 of 1998
- National Heritage Resources Act (NHRA), Act 25 of 1999
- Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- National Environmental Management Act (NEMA) Act 107 of 1998 – Regulation 326 (7 April 2017)
 - Basic Environmental Assessment (BEA) – Appendix 1 s (2)(d)
 - Environmental Scoping Report (ESR) – Appendix 1 s (3)(h)(iv) and Appendix 2 s(2)(g)(iv)
 - Environmental Impact Assessment (EIA) – Appendix 3 s (3)(h)(iv)/
- National Heritage Resources Act (NHRA) Act 25 of 1999
 - Protection of Heritage Resources – Sections 34 to 36; and
 - Heritage Resources Management – Section 38
- Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - Section 39(3)

The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA. This study falls under S38(8) and requires comment from the relevant heritage resources authority.

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Locality

The Moeding Solar PV facility is located approximately 8,6km south of Vryburg. The project site is 642ha in extent and is located within the Naledi Local Municipality and Dr Ruth Segomotsi Mompati District Municipality. The following properties form part of the project sites: □ Portion 1 of the farm Champions Kloof 731, Portion 4 of the Farm Waterloo. The power line assessment corridor 300m in width will be situated within the Remaining Extent of the Farm Rosendal 673 and the Remaining Extent of Portion 3 of the Farm Waterloo 730 North West Province (**Figure 2**).

The project site is located within Zone 6 of the Renewable Energy Development Zones (REDZ), which is otherwise known as the Vryburg REDZ.



Figure 2 – Moeding Solar PV Facility location

2.2 Technical Project Description

The following brief project description for the project has been supplied by Savannah Environmental (Pty) Ltd.

The development of a photovoltaic (PV) solar energy generation facility, and associated infrastructure on a site situated approximately 8 km south of Vryburg.

The facility is proposed to include multiple arrays (static or tracking) of photovoltaic (PV) solar panels with a contracted capacity of up to 100MW. The development footprint for the facility is anticipated to be approximately 300ha in extent.

Infrastructure associated with the solar energy facility will include:

- Arrays of PV panels (either a static or tracking PV system) with a capacity of up to 100MW.
- Mounting structures to support the PV panels. □
- Cabling between the project components, to be laid underground where practical. □
- On-site inverters to convert the power from a direct current to an alternating current.
- An on- □site substation to facilitate the connection between the solar energy facility and the Eskom □electricity grid. □
- A new 132kV power line between the on-site substation and the Eskom grid connection point. □
- Battery storage with up to 6 hours of storage capacity. □
- Offices and workshop areas for maintenance and storage. □
- Temporary laydown areas. □
- Permanent laydown area. □
- Internal access roads and fencing. □

The power line assessment corridor 300m in width will be situated within the Remaining Extent of the Farm Rosendal 673 and the Remaining Extent of Portion 3 of the Farm Waterloo 730. Two power line alternatives are being considered: □

- Direct connection to the existing Mookodi Main Transmission Substation located approximately 4.5km north of the □project site. □
- A turn-in turn-out connection into the Mookodi - Magopela 132kV power line (proposed to be constructed along □the eastern boundary of the project site).

3 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

3.1 Methodology for Assessing Heritage Site significance

This HIA report was compiled by PGS for the proposed Moeding Solar PV Facility. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consist of three steps:

Step I – Literature Review: The background information to the field survey relied greatly on the Heritage Background Research.

Step II – Physical Survey: A physical survey was conducted on foot through the proposed project site by a qualified archaeologist and was aimed at locating and documenting sites falling within and adjacent to the proposed development footprint. The fieldwork was conducted from the 27th -29th June 2018.

Step III – The final step involved the recording and documentation of relevant heritage resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on five main criteria:

- Site integrity (i.e. primary vs. secondary context);
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures);
- Density of scatter (dispersed scatter)
 - Low - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²;
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or relocate development activity position;

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site.

Impacts on these sites by the development will be evaluated as follows:

3.1.1 Site Significance

Site significance classification standards prescribed by the SAHRA (2006) and approved by the ASAPA for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 1 - Site significance classification standards as prescribed by SAHRA

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.A)	-	Low Significance	Destruction

3.2 Methodology for Impact Assessment

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations (2014) and as prescribed by Savannah Environmental (Pty) Ltd.

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). □

3.3 Methodology for Cumulative Impacts

Cumulative Impact, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk □
- Unacceptable loss □
- Complete or whole-scale changes to the environment or sense of place □
- Unacceptable increase in impact □

3.4 Environmental Management Programme

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; these consider the findings of the environmental impact assessment specialist studies.

Project component/s	List of project components affecting the objective
Potential Impact	Brief description of potential environmental impact if objective is not met
Activity/risk source	Description of activities which could impact on achieving objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

Mitigation: Action/control	Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting

4 ARCHIVAL FINDINGS

The archival research focused on available information sources that were used to compile a background history of the study area and surrounds. This data then informed the possible heritage resources to be expected during field surveying.

4.1 Archaeological background

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore, an Internet literature search was conducted, and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

4.1.1 Overview of the archaeological fabric of the study area and surroundings

A small number of archaeological and heritage contract projects have been undertaken in the general surroundings of the study area. Of the three heritage studies located in this area, two were undertaken for proposed photovoltaic solar farms and one for an extension to an existing base metal mine. No purely academic archaeological research appears to have taken place in the direct vicinity of the study area, with the nearest known research locality the Taung Skull World Heritage Site situated 18.4 km south-east of the present study area. It is important to note that the information

listed here does not necessarily represent all the previous archaeological work undertaken in the vicinity of the study area. The second source is information from reports that were accessed from the SAHRA electronic database known as SAHRIS, and which for the most part came about due to the requirement for archaeological and heritage impact assessments to be undertaken for mining (and other development) activities.

4.1.2 Archaeological Sites as Revealed Through a Study of Published Literature

The following sites were identified by studying archaeological journals and books. The sites are grouped according to their respective farm names. At the end of each description the approximate distance between the site and the present study area is provided. No information could however be obtained with regard to any archaeological research that was undertaken in close proximity to the study area. In the surrounding landscape the following archaeological sites are known:

Taung

In 1924 Raymond Dart identified the skull of an infant gracile australopithecine from a limestone quarry near Taung. While numerous fossils have been recovered from the same quarry, the skull of the Taung Child is the only hominin remains recovered from this site. Taung is one of only three localities in South Africa where fossil evidence for early hominins were ever recovered, the other two being the Cradle of Humankind (with sites such as Sterkfontein and Kromdraai) and Makapansgat (Mitchell, 2002). The Taung Skull World Heritage Site is located 70 km south of the present study area.

Harts River Valley Survey Project

In 1989 the University of the Witwatersrand was commissioned to conduct an archaeological survey of a section of the Harts River valley that was scheduled to be flooded by the proposed construction of the Taung Dam. A total of 28 Stone Age and three pastoralist sites were identified during the survey. Of the 38 identified Stone Age sites, a total of 11 could be associated with the Early Stone Age.

The best-preserved sites identified during the survey were excavated in 1992, including two of the Early Stone Age sites namely 2724DB3 and 2724DB4. Incidentally, the research undertaken at these two sites has provided valuable insight into the Acheulian archaeology of South Africa. In the words of Prof. Kathleen Kuman (2001:20), the "...Harts Valley project provides further documentation for the South African part of this picture of technological continuity and the origins of prepared core technology within the Acheulian".

Seven rock art sites were also identified in the footprint area of the proposed Taung Dam. These seven sites comprise finger paintings of geometric patterns as well as one site which contains paintings of "...riders on horseback...riders on horseback chasing an elephant...and two geometric patterns" (Dowson et.al., 1992:28).

If any of these sites identified before the construction of the Taung Dam still exists, they would be located roughly 60 km south east of the present study area.



Figure 3 - Tracing of one of the rock art panels at a site located roughly 40 km east of the present study area (Dowson, et.al., 1992: 29).

The aim of the archival background research is to identify possible heritage resources that could be encountered during the field work, as summarised in **Table 2**.

Table 2 – Summary of the History of Vryburg Town and Surrounding Areas

DATE	DESCRIPTION
2.5 million to 250,000 years ago	<p>The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these technological phases is known as Oldowan which is associated with crude flakes and hammer stones and dates to approximately 2 million years ago. The second technological phase in the Earlier Stone Age of Southern Africa is known as the Acheulean and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulean phase dates back to approximately 1.5 million years ago.</p> <p>A total of 11 Early Stone Age sites with Acheulean lithics have been recorded in the Harts River valley, immediately east of the town of Taung and roughly 60 km east of the present study area (Kuman, 2001).</p>
250,000 to 30,000 years ago	<p>The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. It is associated with flakes, points and blades manufactured by means of the prepared core technique.</p>
30,000 years ago to the historic past	<p>The Later Stone Age (LSA) is the third phase in South Africa's Stone Age history. It is associated with an abundance of very small stone artefacts (microliths). The Later Stone Age is also associated with rock engravings and rock paintings.</p> <p>Rock engravings are known from the wider vicinity of the study area (Bergh, 1998), with one known site located at Dinkweneng (roughly 43 km east of the study area). Furthermore, a Low-Density Surface Scatter of Later Stone Age material was identified at the Pering Mine (approximately 60 km south-west of the study area) (Birkholtz, 2011).</p>
Early 1600s	<p>The Tswana groups known as the Thlaping and Thlaro moved southward into the area presently known as the Northern Cape. A century later they were settled in</p>

	areas as far south as Majeng (Langeberg), Tsantsabane (Postmasburg) and Tlhaka le Tlou (Daniëlskuil) (Snyman, 1986).
c. 1770	The Kora moved into the area. Due to their superior firearms they applied increasing pressure on the Thlaping and Thlaro groups. In the end the Thlaping moved into a north-eastern direction to settle in the general vicinity of Dithakong, north-east of present-day Kuruman. The Thlaro settled in areas to the west and north-west of the Thlaping (Snyman, 1986).
c. 1795	Legassick (2010) confirms the presence of the Thlaping, Thlaro and Kora in the general vicinity of the study area during this time.
Early 1800s	After the threat of the Kora became less intensive the Thlaping moved to the vicinity of present-day Kuruman. The Thlaro returned to the Langeberg, establishing them on a permanent basis during the 1820s (Snyman, 1986). During this time German-born deserter Jan Bloem and his followers established themselves at Lekatlong (Legassick, 2010).
1833	Hurutshe refugees established themselves at Taungs (Legassick, 2010). The present-day town of Taung is roughly 40 km due-south of the study area.
1834	Mahura and his Thlaping followers moved from the vicinity of Kuruman to Taungs. Apart from the 1,500 individuals that followed Mahura to Taungs, the settlement of Taungs at the time also included some 2,000 Hurutshe, the Kora leader Mosweu Taaibosch and his followers as well as some 1,500 Maudi (Legassick, 2010).
November 1840	Gasibonwe, the son of Mothibi, attacked Mahura's cattle posts at Taungs and further afield. His aim was to degenerate Mahura's rule and to achieve supremacy over all the Thlaping (Legassick, 2010).
22 April 1842	A treaty was signed between Griqua leader Andries Waterboer and Thlaping leader Mahura at Mahura's settlement near Taungs. The agreement included a definition of the boundary between the two groups. The section of the agreed upon boundary closest to the study area ran from Danielskuil to Boetsap, which meant that the study area was defined as part of this treaty as forming part of Thlaping land (Legassick, 2010). This boundary was very similar to an earlier treaty that was thought to have been agreed to during the 1820s as a boundary between the Griqua and the Thlaping (Legassick, 2010).
1867	Diamonds were discovered for the first time in South Africa near Hopetown. Alluvial diamonds were also discovered along both banks of the Orange River in the vicinity of the confluence of the Vaal and Harts Rivers (Van Staden, 1983). This resulted in large numbers of fortune seekers streaming into the area from overseas, which would have had a profound impact on the social-dynamics of the landscape.
27 October 1871	The area located in the triangle formed by the Orange and Vaal Rivers was proclaimed as British Territory and named Griqualand West. This proclamation came as a result of ownership disputes between the Griqua, the Boer Republic of the Orange Free State and the Boer Republic of the Zuid-Afrikaansche Republiek in terms of the newly discovered diamond diggings (Roberts, 1976).
1879	After Barend Barends was defeated by the Khumalo Ndebele of Mzilikazi, Boetsap was occupied by two shopkeepers, Hunter and Tasker.
1882-1885	The Boer Republic of Stellaland existed during this time in the general area of the Vryburg district. Stellaland had its roots in the conflict between Mankurwane's Thlaping and Mosweu's Kora over land. Both sides used white mercenaries who as part of their remuneration were to receive farms. Almost 300 Boers joined the side of Mosweu in this war and on 26 July 1882 Mankurwane sued for peace. As a result of the peace agreement a portion of land was set aside for the mercenaries. From September 1882 the capital of Stellaland was being laid out and named Vryburg. On 6 August 1883 the Republic of Stellaland was proclaimed. However, the republic ceased to exist when Sir Charles Warren proclaimed the Bechuanaland Protectorate on 30 September 1885 (Bergh, 1999). The Taungs area, including the farm Brakfontein, was located just outside the southern boundary of Stellaland.
30 September 1885	Sir Charles Warren proclaims British Bechuanaland. This proclaimed area included the study area (Mackenzie, 1887).
1895	British Bechuanaland was incorporated into the Cape of Good Hope (Richardson and Hillier, 1911). The study area now fell within the Cape of Good Hope. In the same year the Kaukwe Native Reserve was established in accordance with British Bechuanaland Proclamation No. 220 (Breutz, 1986). This reserve is located 60km south-west of the present study area
1904	Reverend William Charles Willoughby and his wife Bessie arrives in the vicinity of the current study area with the aim of assisting the Batswana to establish a school in Bechuanaland. After several attempts the Institution was finally established at Tiger Kloof. http://www.tigerkloof.com/index.php/about-us/history

4.2 Aspects of the area's history as revealed by the archival/desktop study

The pre-history of the area is evident through the presence of numerous farms with rock engravings, including Verdwaal Vlake, Bernauw, Schatkist, Wonderfontein and Kinderdam (Van Schalkwyk, 2012; Morris, 1998).

The numerous dry pans in the northern section of the project site also increase the probability of finding Stone Age Sites associated with hunter gatherer subsistence.

Heritage Resources associated with the South African War can be traced through the presence of blockhouse lines between Taung and Vryburg and onwards towards Madibogo, as well as the Vryburg concentration camp situated on the Vryburg Allotment area that is now part of the Leon Taljaard Nature Reserve to the north west of Vryburg.

Other areas of significance identified are the Devondale Mission (*circa* pre-1900), Tiger Kloof Institute (*circa* 1904) as well as the farmstead of the first and only president, Gerrit Jacobus van Niekerk, of the republic of Stellaland on the farm Niekerksrus some 36 kilometres northwest of Vryburg.

5 FIELD WORK FINDINGS

Due to the nature of cultural remains, with the majority of artefacts occurring below the surface, a controlled-exclusive surface survey was conducted over a period of three days by vehicle and on foot by one archaeologist from PGS. The fieldwork was conducted from the 27th -29th June 2018. The fieldwork was logged with a GPS receiver and all finds were marked

During the field assessment 34 heritage sites were located. These include 21 find spots, 1 erosion site exposing Stone Age materials **(007, 008)**, 5 significant Stone Age sites **(011, 012, 013), 035, 036, (037, 038, 039) and 041**, 1 Pan like site with extensive exposure of Stone Age artefacts **(014)**, 3 Historical sites **(018, 019, 020, 022, 023), (026, 027, 028, 029) and 034**, 1 burial ground **(021)**, 1 area of stacked stones **(024)** and 1 possible grave **(032)**.

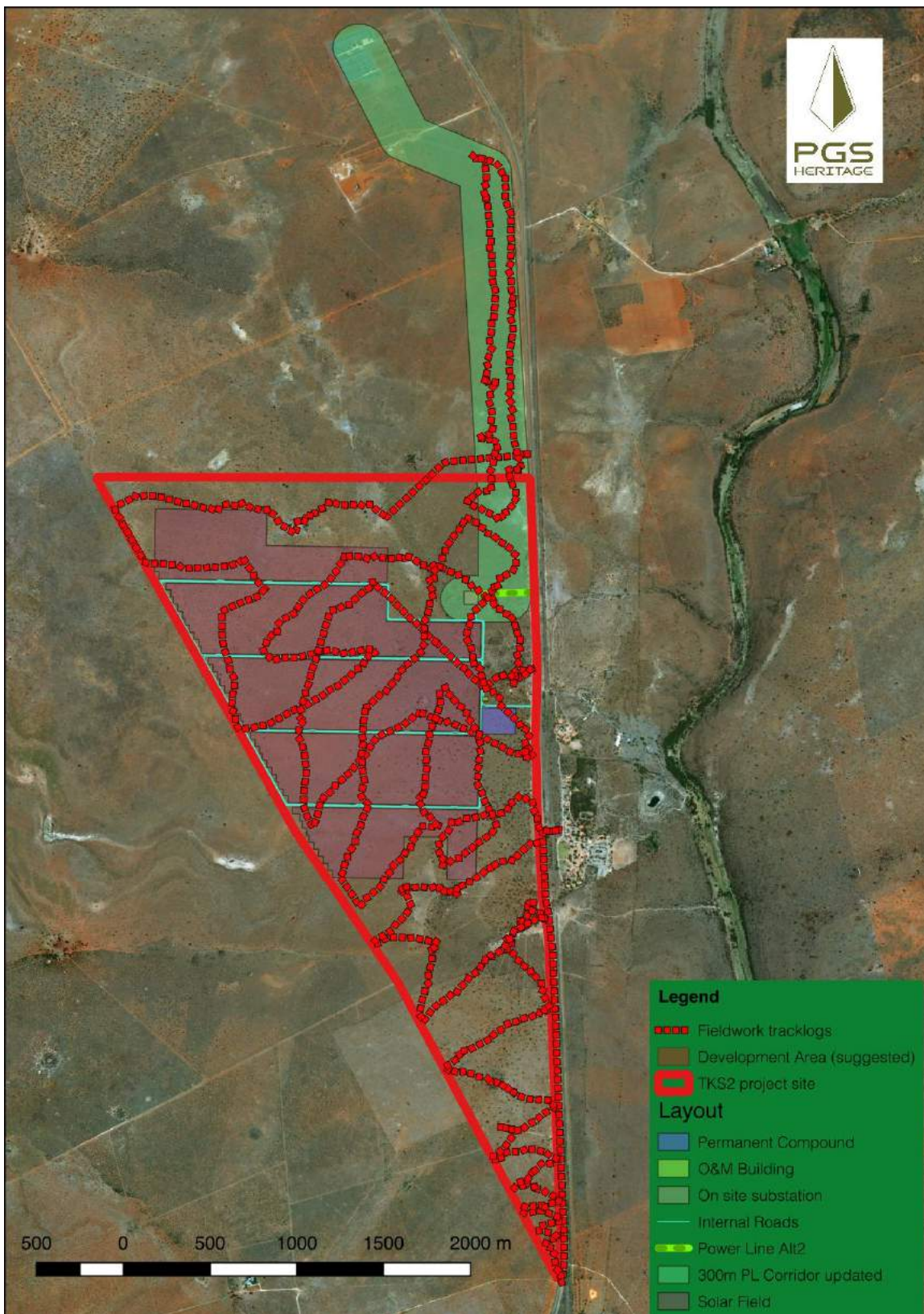


Figure 4 – Track log of Field Assessment

5.1 Site Descriptions

Refer to section 7.2.4 for the recommended management measures as proposed for inclusion in the EMPr.

5.1.1 Site 001

GPS: -27.078467°, 24.755624°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Earlier Stone Age (ESA, due to presence of a single Large Cutting Tool, ie., handaxe, and possible Late Acheulean given its morphology and production).

Description: Small area of artefacts on the surface of a dirt road. Artefacts have collected here due to colluvial processes (sheetwash), and they have become deflated and concentrated at the surface, albeit in a low density. Artefact burial at depth is uncertain. Artefacts are produced on a range of materials (quartzite and chert) and include a range of flakes and formal tools. All artefacts occur in secondary context.

Site size: 3 x 3 m

Site significance: GP.C

Recommendation: None. Can be destroyed



Figure 5 - The dirt road on the southern portion of the property, with the sparse distribution of artefacts in the foreground (bottom right).



Figure 6 - Formal tool (handaxe) and a range of flakes found at the surface. The handaxe shows a high level of reduction and based on its morphology this may indicate a Late Acheulean age for the project site.

5.1.2 Site 002

GPS: -27.076736°, 24.754814°

Site type: Find spot. Low density Stone Age surface scatter

Chronology: Stone Age

Description: Small area of natural colluvial gravels and Stone Age artefacts, forming a deflated surface. Natural gravels, pebbles and cobbles indicate severe surface abrasion, very likely due to their movement at the surface for a long period of time as a result of colluvial processes. The artefacts are in secondary context. Artefacts include a single polyhedral core on chert and a range of flakes, some of which are on quartzite. Artefact burial at depth is uncertain.

Site size: 8 x 5 m

Site significance: GP.C

Recommendation: None. Can be destroyed



Figure 7 - Natural gravels, pebbles and cobbles exposed on the surface. Note their sub-angular to sub-rounded surface texture, which indicates extensive edge modification due to abrasion and weathering processes.



Figure 8 - Small polyhedral core on chert. Retains a fresher exterior condition in comparison to the surrounding gravels, pebbles and cobbles.

5.1.3 Site 003

GPS: -27.075589°, 24.754294°

Chronology: Stone Age

Site type: Find spot. Low density Stone Age surface scatter

Description: Similarly, with site 002, this site also comprises a small area of natural colluvial gravels and Stone Age artefacts, forming a deflated surface. Natural gravels, pebbles and cobbles indicate severe surface abrasion, very likely due to their movement at the surface for a long period of time as a result of colluvial processes. The artefacts are in secondary context. Artefacts include core fragments and a single chopper-core on a quartzite cobble. Artefact burial at depth is uncertain.

Site size: 8 x 5 m

Site significance: GP.C

Recommendation: None. Can be destroyed



Figure 9 - Two quartzite cores found at the surface (left=bifacial chopper-core).



Figure 10 - Sparsely vegetated area where the lithics occur at the surface in a very low density.

5.1.4 Site 004

GPS: -27.074727°, 24.754170°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age

Description: Similarly, with sites 002 and 003, this site comprises a larger area of natural colluvial gravels and Stone Age artefacts, forming a deflated surface. Natural gravels, pebbles and cobbles indicate severe surface abrasion, very likely due to their movement at the surface for a long period of time as a result of colluvial processes. The artefacts are in secondary context. Artefacts comprise primarily quartzite flakes, some of which are considerably large (>10 cm). Artefact burial at depth is uncertain.

Site size: 5 x 15 m

Site significance: GP.C

Recommendation: None. Can be destroyed



Figure 11 - large quartzite flake found at the surface, which indicate percussive edge damage, likely due to natural processes.



Figure 12 – A second large quartzite flake found at the surface, which indicate percussive edge damage, likely due to natural processes.

5.1.5 Site 005

GPS: -27.073970°, 24.755592°

Site type: Find spot. Low density Stone Age surface scatter

Chronology: Earlier Stone Age (ESA, due to presence of a single Large Cutting Tool, i.e., handaxe).

Description: Three artefacts exposed at the surface in an area where calcretised deposits occur (grey sediments and sporadic nodules of calcrete); the site is also adjacent to a road. Artefact burial at depth is uncertain. One of the artefacts comprises a quartzite handaxe, which shows a somewhat crude morphology, and the remaining pieces are flakes.

Site size: 10 x 20 m

Site significance: GP.C

Recommendation: None. Can be destroyed.



Figure 13 - General area around site 005. Note presence of calcrete nodules in the foreground.



Figure 14 - Handaxe on quartzite (top left) and two flakes found at site 005.

5.1.6 Site 006

GPS: -27.073937°, 24.751999°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Sparse surface scatter of artefacts and natural gravels exposed on a section of dirt road. Flakes are most frequent, and artefact burial at depth is uncertain.

Site size: 3 x 30 m

Site significance: GP.C

Recommendation: None. Can be destroyed.



Figure 15 - General area around site 006. Small natural gravels can be seen on the surface of the road, in the foreground. Artefacts occur in a low-density scatter.

5.1.7 Site 007 and 008

GPS: -27.072121°, 24.752323°

GPS: -27.072335°, 24.753383°

Site type: Erosion feature (donga-like), due to localized digging for a man-made structure

Chronology: Earlier Stone Age (ESA, due to presence of a single Large Cutting Tool, i.e., handaxe).

Description: A fenced off concrete platform and metal box occurs at site 007, and a trench/channel has been dug that runs all the way to site 008, possibly extending even further towards the nearby house and road, 200 m away. Overall, the surveyed area covers approximately 3 x 100 m. Stone Age artefacts occur within this channel, within the sediments excavated from this channel and within the vertical walls of the channel. This area is therefore important as it suggests that Stone Age artefacts occur at depth, and this could be to around 20 cm. Artefacts include an array of flakes and a single bifacial handaxe on quartzite. Worth noting is the presence of calcrete nodules, within the excavated sediments of the trench.

Site size: 3x100m

Site significance: GP.B

Recommendation: If any future development is planned that can directly impact site 007 and 008, a controlled archaeological excavation needs to take place here to obtain a sample of the Stone Age materials before any construction activities commence in this area. , The developer must appoint a qualified archaeologist to conduct this excavation. During topsoil stripping and trenching this area, the activities need to be monitored by a qualified archaeologist given the high likelihood of artefact preservation at depth.



Figure 16 - Vertical edges of the channel walls, showing artefacts and natural gravels embedded at depth.



Figure 17 - Handaxe made of quartzite, found near site 008.

5.1.8 Site 009 and 010

GPS: -27.071023°, 24.755415°

GPS: -27.070777°, 24.755426°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Sparse surface scatter of Stone Age flakes and cores along a slightly raised area of sediments, which contain calcrete nodules. This raised area runs continuously from site 009 to 010 and it is adjacent to the main road, running south out of Vryburg (N18). Artefacts are primarily on quartzite and flakes are most frequent. Artefact burial at depth is uncertain.

Site size: 4 x 30 m

Site significance: GP.C

Recommendation: None. Can be destroyed.



Figure 18 - A core on quartzite (top) and flake (bottom) found at site 007



Figure 19 - Surface deposits at site 008 showing high prevalence of calcrete nodules.

5.1.9 Site 011, 012 and 013

GPS: -27.070110°, 24.753102°

GPS: -27.069776°, 24.752576°

GPS: -27.069601°, 24.752294°

Site type: Low to medium density Stone Age surface scatter.

Chronology: Stone Age.

Description: Varying density surface scatter of Stone Age artefacts across at least 100 m, adjacent to the pan site (014, see discussion below). Cores and flakes are predominantly made on quartzite, with some dolerite, and many of the flakes are large; this could indicate Earlier Stone Age technology. The sediments in this area are primarily grey, and calcrete nodules also occur. The whole area appears to represent a colluvial concentration and deflation of the artefacts and the local landscape. Artefact burial at depth is uncertain.

Site size: 100m in length.

Site significance: GP.B

Recommendation: If any future development is planned within 100 meters from the pan at site 014. The activities need to be monitored by a qualified archaeologist given the high likelihood of artefact preservation in the vicinity of the pan.



Figure 20 - Surface accumulation of large quartzite cobbles, and smaller pebbles, gravels and calcrete nodules. Artefacts occur sporadically amongst these surface materials.



Figure 21 - One large quartzite flake (left) and a smaller dolerite flake (right), both showing extensive edge damage due to prolonged surface exposure.

5.1.10 Site 014

GPS: -27.069485°, 24.752033°

Site type: Pan-like site with extensive exposure of Stone Age artefacts

Chronology: Stone Age, possibly Earlier and Middle Stone Age

Description: A low-lying depression on the landscape that may represent a pan or pan-like area (100 m circular area). Currently this area collects water, and it is very likely it did so in the past, and therefore this feature would have been an important area for resources. There are clear changes in the local vegetation as one move through the area, and the sediments are very grey, although calcrete was not visible at the surface. A high quantity of artefacts (cores, flakes and formal tools) occur in the center of this feature in amongst natural gravels, pebbles and cobbles, all primarily on quartzite. Interestingly, the artefacts retain a mix of conditions (both fresh/unabraded and heavily abraded/rolled pieces), which would suggest reuse of the site over time by different populations, or varied exposure of the artefacts to surface processes (the former is most likely, given the varied morphology of the artefacts and changes in raw material use between the fresher vs. the more abraded pieces).

A single handaxe on banded chert indicates that Earlier Stone Age populations may have frequented this area; although not certain, the fresher artefacts appear to indicate a later form of technology. Many of the artefacts occur dug up in mud, within the middle of the feature, and this provides strong support for artefact burial at depth.

Site size: 100m diameters

Site significance: GP.A

Recommendation: Given that artefacts occur at depth, they occur here in high frequency and that their character suggests reuse of this site over time, excavations will be required to obtain a sample of the artefacts.



Figure 22 - Abundance of gravels and artefacts in the center of site 014. Quartzite gravels, pebbles and cobbles occur in high abundance with the artefacts.



Figure 23 - Cores, flakes and formal tools from site 014. Raw materials include dolerite, quartzite and banded chert. Note the heavily abraded exterior of some of the artefacts

5.1.11 Site 015

GPS: -27.068828°, 24.749567°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age

Description: Very sparse distribution of lithics across a large 50 x 50 m area, including natural colluvial gravels, pebbles and cobbles. The artefacts are in secondary context. Artefacts are primarily small to medium sized flakes, and their burial at depth is uncertain.

Site size: 50 x 50 m

Site significance: GP.C

Recommendation: None. Can be destroyed.

5.1.12 Site 016

GPS: -27.067840°, 24.750066°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Low density scatter of lithics across a 25 m circular area, comprising quartzite flakes and cores. Colluvial gravels, pebbles and cobbles are also abundant in this area, and all materials are in secondary context. Artefact burial at depth is uncertain.

Site size: 25 m diameter.

Site significance: GP.C

Recommendation: None. Can be destroyed.



Figure 24 - General landscape photo at site 016 showing the high frequency of gravels at the surface.



Figure 25 - Quartzite stone tools comprising a chopper-core (top) and three flakes.

5.1.13 Site 017

GPS: -27.065327°, 24.754923°

Site type: Find spot. Low density Stone Age surface scatter

Chronology: Stone Age

Description: Low density scatter of lithics across a large 30 x 50 m area. Colluvial gravels, pebbles, cobbles and calcrete nodules dominate the area, and artefacts are infrequent. The area is also

characterised by grey sediments and sparse vegetation. All materials are in secondary context and artefact burial at depth is uncertain.

Site size: 30 x 50 m

Site significance: GP.C

Recommendation: None. Can be destroyed.



Figure 26 - Quartzite flake exposed on the surface at site 017. Calcrete fragments can be seen to the left and right of the flake.



Figure 27 - General landscape photo showing sparse vegetation and the frequency of calcrete nodules at the surface

5.1.14 Site 018, 019, 020, 022 and 023

GPS: -27.060500°, 24.753727° - Site 018

GPS: -27.059224°, 24.753883° - Site 019

GPS: -27.059170°, 24.754254° - Site 020

GPS: -27.060110°, 24.754321° - Site 022

GPS: -27.060280°, 24.754113° - Site 023

Site type: Settlement, likely residential and of European origin, with nearby graveyard (021).

Chronology: Uncertain, although the earliest buildings in this area date to 1904, so anything at or younger than this.

Description: Multiple structures/buildings occur adjacent to the N18 and opposite the current Tiger Kloof Educational Institution. The graveyard is closest to the N18.

Site 018 comprises a single room stonewalled structure that occurs in conjunction with exterior stonewalls and foundations for another structure, which has since collapsed. The standing single room structure and exterior foundations are rectangular, and a wide array of metal implements

occurs in and around the site (tin cans, spray paint bottle and wire). Nearby wooden fence posts suggest that a vehicle was used to access this property, forming an entrance. The stone used for building has been carefully shaped and they are attached to one another using cement.

The standing single room stonewalled structure at site 019 is constructed in a similar manner, although here the walls are plastered and painted on the inside, and a wooden doorframe is partially preserved. Modern bricks have been dumped outside the front of the building and they do not appear to have been used in the original construction of the building.

Site 020 comprises a large area covered by bricks, stone, concrete and cement, the remains of what would once have been a multi-roomed structure. Two large cement/concrete reservoirs also occur here, and a windmill occurs towards the west. Foundations here are also rectangular and are comprised primarily of bricks. Sloping concrete platforms may indicate this was a form of garage or workshop.

Site 022 comprises a midden that occurs approximately 20 m from the structure located at site 023. This midden covers a 4 m circular area and contains ceramics (porcelain), ash, glass, tin bowls, fabric, bricks and metal.

The construction of the structure at site 023 appears similar to that of the others, although overall the preservation of the structure is poor and there are no standing walls. Bricks and concrete occur amongst the rectangular ruins of the structure, which may indicate later phases of occupation/development. The bricks appear to have been used for the construction of a chimney.

Site size: 120 x 150 m

Site significance: GP.B

Recommendation: These buildings may relate to the original initial occupation in the area, by Reverend William Charles Willoughby. It is recommended that a 20-meter buffer is included around the site and development not considered in this area.

In the event that any development is considered, and the site directly impact a detailed in-depth historical study linked to extensive archaeological excavations and site documentation of the structure are completed by a qualified archaeologist and heritage practitioner. Based on the outcomes of the research and documentation a destruction permits maybe considered by SAHRA and the provincial heritage authority.



Figure 28 - Single room stonewalled structure at site 018.



Figure 29 - Stone exterior walling and additional foundations located adjacent to the standing structure.



Figure 30 - Single room stonewalled structure at site 019.



Figure 31 - Brick, stone, concrete and cement remains of the multi-roomed structure at site 020.



Figure 32 - Midden, showing raised elevation and characteristic grey/ashy sediments; artefacts are eroding out at the surface.



Figure 33 - Collapsed structure at site 023, showing a mix of constructive elements (concrete, bricks and cement).

5.1.15 Site 021

GPS: -27.060043°, 24.754909°

Site type: Burial ground

Chronology:

Description: Site 021 is a graveyard that covers approximately 10 x 30 m, most likely associated with the buildings/structures above and of the same age. A total of 23 graves occur here, which run in a north to south direction with graves aligned west to east; where headstones do occur, these indicate an east facing orientation. No grave goods or artefacts were found associated with the graves, although a single broken cross was found adjacent to one grave. All of the graves are stone packed with calcrete nodules and they are not rectangular in shape. There are clear differences in size for some, with the three northernmost graves possibly representing child burials.

Site size: 10 x 30 m

Site significance: GP.A.

Recommendation: It is important to understand that the identified burial ground and the graves could have significant heritage value to the relevant families (if identified) and should therefore be preserved. The site is deemed to be of High Significance and is rated as Generally Protected A (GP.A).

The burial ground will need to either be demarcated with a 50 m buffer and avoided, or a full grave relocation process will need to take place.



Figure 34 – Stone packed grave at 021.



Figure 35 – Burial ground at 021.

5.1.16 Site 024

GPS: -27.062216°, 24.751776°

Site type: Stacked stones.

Chronology: likely modern.

Description: Small 15 x 15 m area comprising a large quantity of informally packed stones (primarily dolerite cobbles and boulders), none of which illustrate any specific structural form, or intended construction. Originally these appeared similar to the construction of walling in Iron Age settlements, but these stacked stones look more like an intentional relocation of stones, versus their placement for walling purposes. Perhaps these stones were cleared/dumped here from a nearby field, or road. These 'walls' do not illustrate the characteristic infilling of smaller stones between two rows of larger stones, evident in most Iron Age sites. In addition, no artefacts were found at the surface that would suggest an Iron Age occupation (ceramics, beads, metal fragments etc.).

Site size: 15 x 15 m

Site significance: None.

Recommendation: None, can be destroyed.



Figure 36 - Irregular stacked cobbles and boulders at site 024, none of which appear to be intended for the purposes of creating 'walling.'



Figure 37 - Irregular stacked cobbles and boulders at site 024.

5.1.17 Site 025

GPS: -27.058210°, 24.748385°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Small 3 m circular area where Stone Age lithics occur at the surface, in the middle of a larger low-lying depression that is pan-like. The sediments around the artefacts are grey in colour, and locally this area is slightly raised in elevation. Artefacts include cores, flakes and a single formal tool (possible retouched denticulate), all primarily on quartzite and exhibiting a range of preservation conditions (fresh to abraded). All materials are in secondary colluvial context, and artefact burial at depth is uncertain.

Site size: 3 m diameter.

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 38 - Stone Age artefacts found on the surface, showing cores, flakes and a single retouched tool (denticulate).



Figure 39 - Low-lying pan-like depression at site 025; the trees demarcate the boundary of the depression.

5.1.18 Site 026, 027, 028 and 029

GPS: -27.045549°, 24.754154° - Site 026

GPS: -27.045368°, 24.754135° - Site 027

GPS: -27.045627°, 24.753188° - Site 028

GPS: -27.046337°, 24.753109° - Site 029

Site type: Mixed-use settlement, likely residential and farming, and of European origin.

Chronology: Uncertain, although the earliest buildings in this area date to 1904, so anything at or younger than this.

Description: Multiple structures/buildings occur adjacent to the N18 and opposite the current Tiger Kloof Educational Institution.

Site 026 is a large, long multi-roomed structure (8 x 20 m) that appears to have been used to keep livestock. The construction of this building is similar to those buildings at sites 018-023 (stone, cement and concrete), although here there are clear differences in the phases of construction (earlier stonework versus later brickwork, showing reuse of the structure over time). This large building has 12 sections, all-facing north with six low-walled sections towards the north and six high-walled sections towards the south. The low-walled north sections have troughs, likely for animal food and water, and for some of the high-walled south sections there are entrances. Glass, metal and tin fragments occur frequently around the structure.

Site 027 is a large raised midden (3 x 5 m) that occurs close to the structure above (± 20 m). It is very likely that this midden is associated with this structure, and the contents of the midden include fragments of: glass, metal and ceramics (porcelain).

Nearby to both these sites occur two animal troughs (1 x 7 m), also of stone and cement construction, and a large circular reservoir.

Site 028 comprises a large area (± 20 x 20 m) where stone and brick ruins occur, which indicate that an additional structure/s stood here. Preservation is poor, and it was not possible to determine the extent or shape of any of the foundations, yet the construction would appear similar to that at site 026 given the presence of stone, brick and cement.

Site 029 comprises a residential settlement of stonewalled construction over a 50 x 50 m area, located in amongst modern buildings that are currently in use for livestock purposes (primarily metal sheet buildings). The construction here is the same as at site 026 and sites 018-023. Later reuse of these structures is indicated by brickwork construction, in addition to the more recently constructed metal sheet buildings.

Site size: 150 x 100 m

Site significance: GP.A

Recommendation: These buildings may relate to the original initial occupation in the area, by Reverend William Charles Willoughby. It is recommended that a 20-meter buffer is included around the site and development not considered in this area.

In the event that any development is considered, and the site directly impact a detailed in-depth historical study linked to extensive archaeological excavations and site documentation of the structure are completed by a qualified archaeologist and heritage practitioner. Based on the outcomes of the research and documentation a destruction permits maybe considered by SAHRA and the provincial heritage authority.



Figure 40 - Large multi-roomed stonewalled structure at site 026, likely used for keeping livestock. Note north and south sections of the building, with drinking/food troughs in the low-walled north sections. Also note a mix of construction materials (stone, cement and brick).



Figure 41 - Midden at site 027, showing modern items and calcrete.



Figure 42 - Poorly preserved structure at site 028, showing presence of bricks, stone and cement.



Figure 43 - Residential structure, in amongst modern buildings. This area is currently being used for livestock farming.

5.1.19 Site 030

GPS: -27.045866°, 24.752499°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Very limited scatter of artefacts in an old farm road (3 x 25 m). Bedrock outcrops here locally, which suggests artefact burial at depth is unlikely. Artefacts are made on quartzite and chert, and they retain a fresh condition.

Site size: 3 x 25 m

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 44 - Chopper-core on quartzite (right) and chert flake (left) at site 030.

5.1.20 Site 031

GPS: -27.043968°, 24.748628°

Site type: Find Spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Low density Stone Age surface scatter of artefacts along a farm road running NW-SE. Locally this scatter covers 5 x 5 m, yet sporadic artefacts occur in the loose sands all along this road. Cattle every morning and evening use this road, and therefore artefact preservation is poor both in terms of context and surface condition (trampling damage would be extensive). Artefacts here are made on quartzite and include flakes and cores, and burial at depth is uncertain.

Site size: 5 x 5 m

Site significance: None

Recommendation: None, can be destroyed.



Figure 45 - Farm road used by cattle to reach the center of the property.



Figure 46 - Quartzite lithics; flake (left) and discoidal core (right).

5.1.21 Site 032

GPS: -27.050326°, 24.753573°

Site type: Possible Grave

Chronology: Uncertain, but likely modern.

Description: Small collection of dolomite boulders around an area of gravel (2 x 2 m). This does not seem to be a grave, given that there is no specific spatial arrangement of the boulders surrounding the gravel. A broken metal key was also found here. This site may represent a rock and gravel dump of some kind, situated a short distance from the N18.

Site size: 2 x 2 m

Site significance: None.

Recommendation: : If any future development is planned that can directly impact site 032 a test excavation to determine if the structure is a grave must be conducted by a qualified archaeologist before any activities commence. If it is determined that it is a grave a grave relocation process must be implemented by an experienced grave relocation company appointed by the developer.



Figure 47 - Small area with dolomite boulders surrounding gravel. Not likely a grave given the lack of spatial arrangement between the boulders and the gravel.

5.1.22 Site 033

GPS: -27.040729°, 24.751985°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: A large area (at least 50 x 50 m) with a considerable deflated surface concentration of colluvial gravels, pebbles and calcrete nodules, in amongst outcropping dolomite bedrock. Artefacts occur sporadically amongst these natural gravels and include a selection of flakes and cores on both chert and quartzite. Edge damage is common, suggesting their long-term exposure at the surface. All materials are in secondary context and artefact burial at depth is unlikely given the exposures of bedrock.

Site size: 50 x 50 m

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 48 - Sparsely vegetated area at site 033, showing dense colluvial accumulation of gravels, pebbles and calcrete.



Figure 49 - unifacial and bifacial chopper-cores and flakes found at the surface.

5.1.23 Site 034

GPS: -27.052989°, 24.753662°

Site type: Mixed-use settlement, likely residential and farming, and of European origin.

Chronology: Uncertain, although the earliest buildings in this area date to 1904, so anything at or younger than this.

Description: Multiple structures/buildings occur adjacent to the N18 and opposite the current Tiger Kloof Educational Institution (50 x 100 m area). This site was not accessed since it is currently occupied. It comprises multiple stonewalled structures that are being used for both residential and livestock purposes. The construction of these buildings is the same as those at sites 018-023 and 026-029 and is indicative that some of the building are older than 60 years. Based on this these would need to be investigated prior to development.

Site size: 50 x 100 m

Site significance: GP.A

Recommendation: These buildings may relate to the original initial occupation in the area, by Reverend William Charles Willoughby. It is recommended that a 20-meter buffer is included around the site and development not considered in this area.

In the event that any development is considered, and the site directly impact a detailed in-depth historical study linked to extensive archaeological excavations and site documentation of the structure are completed by a qualified archaeologist and heritage practitioner. Based on the outcomes of the research and documentation a destruction permits maybe considered by SAHRA and the provincial heritage authority.



Figure 50 - Mixed-use settlement adjacent to the N18 and opposite the Tiger Kloof School. Construction is primarily stone, with the recent addition of newer materials due its current occupation.



Figure 51 - Mixed-use settlement adjacent to the N18 and opposite the Tiger Kloof School.

5.1.24 Site 035

GPS: -27.033944°, 24.753409°

Site type: Low density Stone Age surface scatter.

Chronology: Stone Age, possibly Middle Stone Age given that some of the cores look prepared.

Description: A large slightly raised 50 x 100 m area with a considerable deflated surface concentration of colluvial gravels and pebbles, in amongst outcropping dolomite bedrock. Artefacts occur sporadically amongst these natural gravels and include a selection of flakes and cores on both chert and quartzite. Edge damage is common, suggesting their long-term exposure at the surface, yet artefact condition is fresh. All materials are in secondary context and artefact burial at depth is unlikely given the local exposures of bedrock. A large quantity of geofacts also occurs in this area.

Site size: 50 x 100 m

Site significance: GP.B

Recommendation: This large area may form part of a palaeo-landscape, in conjunction with other sites in the area. If any future development is planned that can directly impact site 035, a controlled archaeological excavation needs to take place here to obtain a sample of the Stone Age materials before any construction activities commence in this area. The developer must appoint a qualified archaeologist to conduct this excavation before any construction activities commence. During topsoil stripping and trenching this area, the activities need to be monitored by a qualified archaeologist given the high likelihood of artefact preservation at depth.



Figure 52 - Surface exposure of gravels at site 035.



Figure 53 - A selection of flakes and cores on chert and quartzite. Two cores suggest preparation and would thus indicate Middle Stone Age technology.

5.1.25 Site 036

GPS: -27.036761°, 24.752162°

Site type: Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: A large slightly raised area (at least 30 m wide) with a considerable deflated surface concentration of colluvial gravels, pebbles, cobbles and calcrete nodules; this area is adjacent to a low-lying depression (possible pan). Artefacts occur sporadically amongst these natural gravels and include a selection of flakes and cores on quartzite. It is very likely that they occur around the entire edge of this depression. Edge damage is common, suggesting their long-term exposure at the surface. All materials are in secondary context and artefact burial at depth is uncertain.

Site size: 30 m diameter

Site significance: GP.B

Recommendation: If any future development is planned that can directly impact site 036, a controlled archaeological excavation needs to take place here to obtain a sample of the Stone Age materials before any construction activities commence in this area. The developer must appoint a qualified archaeologist to conduct this excavation before any construction activities commence. During topsoil stripping and trenching this area, the activities need to be monitored by a qualified archaeologist given the high likelihood of artefact preservation at depth.



Figure 54 - Slightly raised elevation of site 036, with low-lying pan-like feature in the distance.



Figure 55 - Artefacts, calcrete and gravels exposed at the surface at site 036. Quartzite flakes are most frequent.

5.1.26 Site 037, 038 and 039

GPS: -27.032721°, 24.752072° -Site 037

GPS: -27.032206°, 24.751669° -Site 038

GPS: -27.031682°, 24.751923° -Site 039

Site type: Low density Stone Age surface scatter.

Chronology: Stone Age, possible MSA.

Description: A very large area (100 x 200 m) with a continuous deflated surface concentration of colluvial gravels, pebbles, cobbles and calcrete nodules; this area is adjacent to a low-lying depression (possible pan; chert and dolomite outcrops occur here). Artefacts occur sporadically amongst these natural gravels and include a selection of flakes and cores on chert, all generally in fresh condition. Edge damage is common, suggesting their long-term exposure at the surface. All materials are in secondary context and artefact burial at depth is uncertain, given that bedrock outcrops occur in the area.

Site size: 100 x 200 m

Site significance: GP.B

Recommendation: If any future development is planned that can directly impact site 037-039, a controlled archaeological excavation needs to take place here to obtain a sample of the Stone Age materials before any construction activities commence in this area. The developer must appoint a qualified archaeologist to conduct this excavation before any construction activities commence. During topsoil stripping and trenching this area, the activities need to be monitored by a qualified archaeologist given the high likelihood of artefact preservation at depth.



Figure 56 - Colluvial concentration of artefacts and natural gravels at site 037.



Figure 57 - Selection of cores and flakes on chert at 037.



Figure 58 - General landscape around site 038, as well as bedrock exposures in the local area.



Figure 59 - Selection of flakes on chert from site 039. Note that the left flake in the top row is embedded in sediment.

5.1.27 Site 040

GPS: -27.029014°, 24.752067°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age, possibly MSA

Description: Small 20 x 20 m area of natural colluvial gravels and Stone Age artefacts, forming a deflated surface. The artefacts are in secondary context and include those made on both chert and quartzite. Artefact burial at depth is uncertain.

Site size: 20 x 20 m

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 60 - Colluvial surface concentration of natural gravels and artefacts, primarily on chert, at site 040.

Figure 61 - Selection of cores and flakes, on both chert and quartzite. Note that some of the artefacts occur embedded in the surface sediments.

5.1.28 Site 041

GPS: -27.028883°, 24.751440°

Site type: Low to medium density Stone Age surface scatter.

Chronology: Stone Age, possibly MSA

Description: A very large raised area (at least 200 m long) with a continuous deflated surface concentration of colluvial gravels, pebbles and cobbles; bedrock in the form of chert also occurs here. Artefacts occur sporadically amongst these natural gravels and include a selection of flakes and cores on chert and quartzite, all generally in fresh condition. All materials are in secondary context and artefact burial at depth is uncertain, given that bedrock outcrops occur in the area.

Site size: 200m in length

Site significance: GP.B

Recommendation: Given that bedrock occurs here, and that artefact density is higher than for all the other surface scatters, this may represent a factory site for the production of stone tools. An test excavation would be needed here to assess artefact burial at depth, and to assess the relationship of the artefacts to the outcropping chert bedrock. This mitigation must be done by a qualified archaeologist appointed by the developer before any activity commence.



Figure 62 - Chert and quartzite flakes and cores from site 041.

Figure 63 - Surface artefact exposures around site 041, as well as the minimally vegetated landscape.

5.1.29 Site 042

GPS: -27.025103°, 24.751946°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Circular 50 m area of natural colluvial gravels and Stone Age artefacts, forming a deflated surface amongst outcropping bedrock. The artefacts are in secondary context and include those made on both chert and quartzite. Artefact burial at depth is uncertain.

Site size: 50m diameter

Site significance: None

Recommendation: None, can be destroyed.



Figure 64 - Landscape around site 042.



Figure 65 - Irregular core (bottom right), and three flakes embedded in the surface sediments (bottom left, middle left and top right).

5.1.30 Site 043 and 044

GPS: -27.018057°, 24.751473° - Site 043

GPS: -27.017360°, 24.751522° - Site 044

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age, Possible MSA

Description: Large 100 m exposure of natural colluvial gravels and Stone Age artefacts, forming a continuous deflated surface. The artefacts are in secondary context and include both flakes and cores made on chert, and the artefacts are in fresh condition. Artefact burial at depth is uncertain.

Site size: 100 m

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 66 - Selection of chert flakes showing minimal edge damage.



Figure 67 - Landscape at site 044, showing deflated gravels and artefacts in the foreground and the electrical pylon in the background.

5.1.31 Site 045

GPS: -27.024154°, 24.753043°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age.

Description: Large 70 m circular area with exposure of natural colluvial gravels and Stone Age artefacts, forming a deflated surface. The artefacts are in secondary context and include both flakes and cores made on chert, and the artefacts are in fresh condition. Artefact burial at depth is uncertain.

Site size: 70 m diameter

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 68 - Landscape around site 045.



Figure 69 - Flake made on chert.

5.1.32 Site 046 and 047

GPS: -27.027538°, 24.752882°

GPS: -27.028155°, 24.752865°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age

Description: Long 100 m exposure of natural colluvial gravels and Stone Age artefacts, forming a deflated surface in amongst exposed dolerite bedrock. The artefacts are in secondary context and include flakes made on dolerite. Artefact burial at depth is uncertain.

Site size: 100 m in length

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 70 - Exposed bedrock at site 046



Figure 71 - Large dolerite flake.

5.1.33 Site 048

GPS: -27.029360°, 24.752894°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age

Description: Small 10 x 20 m exposure of natural colluvial gravels and Stone Age artefacts, forming a deflated surface in amongst exposed bedrock. The artefacts are in secondary context and include flakes made on chert. Artefact burial at depth is uncertain.

Site size: 10 x 20 m

Site significance: GP.C

Recommendation: None, can be destroyed.



Figure 72 - Chert flakes found at site 048, nearby to bedrock exposures.

5.1.34 Site 049, 050 and 051

GPS: -27.031508°, 24.753081°

GPS: -27.032390°, 24.753178°

GPS: -27.033081°, 24.753331°

Site type: Find spot. Low density Stone Age surface scatter.

Chronology: Stone Age

Description: Long 200 m exposure of natural colluvial gravels and Stone Age artefacts, forming a continuous deflated surface in amongst exposed bedrock. The artefacts are in secondary context and include flakes and cores. Artefact burial at depth is uncertain.

Site size: 200m in length

Site significance: GP.C

Recommendation: No mitigation required. Given that these three sites occur nearby to 037-039, and given the closer proximity of these latter three sites to what may have been a palaeo-landscape feature, it is more worthwhile to conduct test excavations at sites 037-039.



Figure 73 - General landscape for sites 049-051

6 IMPACT ASSESSMENT

The fieldwork findings have shown that the study area is characterised by a background scatter of Stone Age artefacts. The methodology utilised in the identification and classification of finds between find spots and sites enable a clear distinction between groupings.

The aim of the impact evaluation is to determine the extent of the impact of the proposed project on the identified heritage resources and predict possible impacts on unidentified heritage resources.

During the field assessment 34 heritage sites were located. These include 21 find spots, 1 erosion site exposing Stone Age materials (**007, 008**), 5 significant Stone Age sites (**011, 012, 013**), **035, 036, (037, 038, 039) and 041**, 1 Pan like site with extensive exposure of Stone Age artefacts (**014**), 3 Historical sites (**018, 019, 020, 022, 023**), (**026, 027, 028, 029**) and **034**, 1 burial ground (**021**), 1 area of stacked stones (**024**) and 1 possible grave (**032**). Refer to **Table 3** for a summary of the heritage resources identified during the field work.

It must be considered that the heritage significance of the identified sites plays a role in the evaluation of the impact and must influence the magnitude rating of the impact tables. Thus, a heritage resource with a high heritage significance rating will have a higher impact magnitude rating than a resource with a low or no heritage significance rating. Consequently, mitigation measures will be more extensive for a heritage resource with a high heritage significance than for those with a low heritage significance.

Table 3 - Summary of heritage resources in project area

Site Number	Description	Heritage Significance	Mitigation	Buffer (m)	Area of development
007	Erosion Feature (Donga-like), due to localized digging. ESA	GP.B	Excavation/site monitoring during construction – only required if layout is adjusted and impact site directly	20	Application area outside Development area
008	Erosion Feature (Donga-like), due to localized digging. ESA	GP.B	Excavation/site monitoring during construction – only required if layout is adjusted and impact site directly	20	Application area outside Development area
011	Low to medium density Stone Age surface scatter	GP.B	Excavation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
012	Low to medium density Stone Age surface scatter	GP.B	Excavation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
013	Low to medium density Stone Age surface scatter	GP.B	Excavation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
014	Pan-like site with extensive exposure of Stone Age artefacts	GP.A	Excavation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
018	Settlement (European), stone walled structure	GP.B	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
019	Settlement (European), stone walled structure	GP.B	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
020	Settlement (European), broken down multi room structure	GP.B	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
021	Settlement (European) Burial ground, 23 stone packed graves	GP.A	Either demarcated with a 50m buffer or a full grave relocation process will need to take place – only required if layout is adjusted and impact site directly	50	Application area outside Development area
022	Settlement (European) Midden	GP.B	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
023	Settlement (European) Broken down structure	GP.B	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
026	Mixed-use settlement, likely residential and farming, and of European origin. Multi room structure	GP.A	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
027	Mixed-use settlement, likely residential and farming, and of European origin. Midden	GP.A	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
028	Mixed-use settlement, likely residential and farming, and of European origin. Broken down structure	GP.A	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
029	Mixed-use settlement, likely residential and farming, and of	GP.A	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area

Site Number	Description	Heritage Significance	Mitigation	Buffer (m)	Area of development
	European origin. Stone walled structure with modern adaptations				
034	Mixed-use settlement, likely residential and farming, and of European origin.	GP.A	Documentation – only required if layout is adjusted and impact site directly	20	Application area outside Development area
035	Low density Stone Age surface scatter	GP.B	Possible excavation	20	PL Corridor – Alt1
036	Low density Stone Age surface scatter	GP.B	Possible excavation	20	PL Corridor – Alt1
037	Low density Stone Age surface scatter	GP.B	Possible excavation	20	PL Corridor – Alt1
038	Low density Stone Age surface scatter	GP.B	Possible excavation	20	PL Corridor – Alt1
039	Low density Stone Age surface scatter	GP.B	Possible excavation	20	PL Corridor – Alt1
041	Low density Stone Age surface scatter	GP.B	Excavation	20	PL Corridor – Alt1

All the impacts are envisaged to happen during construction activities.

6.1 Status Quo and “No Go” option

6.1.1 Status Quo

No fatal flaws were identified from a cultural, historical, archaeological and paleontological perspective.

6.1.2 “No go” Option

No such option is contemplated.

6.2 Project Impact

The impact assessment section deals with both the impacts received for the PV foot print as well as the two power line alternatives. Impacts on burial grounds, historical and archaeological resources are addressed each in its own subsection. Where impacts are specific to either the PV or power lines they are rated in their own tables.

Cumulative impacts are addressed separately in section 6.3.

All impacts are envisaged to be during construction activities.

6.2.1 Heritage resources and sensitivity

The identified heritage resources are allocated a sensitivity buffer based on the recognised management buffers accepted by SAHRA in the past few years. No regulations in the NHRA provide guidelines on buffer zones. In the case of heritage sensitivity, a buffer of 20 – 50 meters is proposed based on the type of heritage resource. In the case of burial grounds and graves (BGG) a buffer of 50 meters is generally proposed and 20 meters for a heritage structure such as ruins and other built structure.

6.2.2 Impact on burial grounds

One burial ground was identified during the fieldwork. Due to the social and cultural significance of burial grounds and graves, a high heritage significance is given to such sites. **Site 021** has not been demarcated formally.

The impact of the proposed project on the burial ground is rated as having a LOW significance before mitigation and with the implementation of mitigation measures as having a LOW significance.

In the event of any graves or burial grounds being uncovered, SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on mitigation.

Table 4 – Assessment of Impact of the PV as well as power line options on Burial Grounds

Impact on Burial Grounds				
	Power line Alternative 1		Power line Alternative 2	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)	Very short (1)	Very short (1)
Magnitude	Small (0)	Small (0)	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)	Very improbable (1)	Very improbable (1)
Significance	Low (2)	Low (2)	Low (2)	Low (2)
Status (positive or negative)	Neutral	Neutral	Neutral	Neutral
Reversibility	High	High	High	High
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes		Yes	
	Mitigation: <ul style="list-style-type: none"> ▪ Site 021 and 032 will need to be demarcated during construction if any activities are planned within 50 meters from the site. ▪ A 50m buffer must be provided around the BGG. 			
	Residual Impacts: No residual impacts are expected to occur with the implementation of mitigation measures.			

6.2.3 Impact on Historical Structures

The impact of the proposed project on the historic heritage resources is rated as LOW significance before mitigation and with the implementation of the mitigation measures the impact significance is LOW.

Table 5 – Assessment of Impact of the PV as well as power line options on Historical Structures

Impact on Historical structures				
	Power line Alternative 1		Power line Alternative 2	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)	Very short (1)	Very short (1)
Magnitude	Small (0)	Small (0)	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)	Very improbable (1)	Very improbable (1)
Significance	Low (2)	Low (2)	Low (2)	Low (2)
Status (positive or negative)	Neutral	Neutral	Neutral	Neutral
Reversibility	High	High	High	High
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes		Yes	
	Mitigation: Demarcate with a 20 meter buffer during construction.			

	<i>In the event that any development is considered, and the site directly impact a detailed in-depth historical study linked to extensive archaeological excavations and site documentation of the structure are completed by a qualified archaeologist and heritage practitioner. Based on the outcomes of the research and documentation a destruction permits maybe considered by SAHRA and the provincial heritage authority.</i>
	Residual Impacts: No residual impacts are expected to occur with the implementation of mitigation measures.

6.2.4 Impact on Archaeological Sites

The impact of the proposed project on the archaeological resources (Stone Age sites, Erosion site and Pan site) is rated as HIGH significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW.

Archaeological resources are generally protected by the NHRA through S35 and any alteration, excavations or destruction of such site can only be done after the issuing a permit by the SAHRA. The recommended mitigation measures in this report will be dependent on this permitting.

In the event of any heritage resources being uncovered, SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on mitigation.

The archaeological resources at site 041, 036, 035 and cluster 037-039 are all impacted by the proposed 300m power line corridor (Alt 1). NO sites are directly impacted by the PV development foot print.

Table 6 – Assessment of Impact of the power lines on Archaeological Sites

Assessment of Impact of Development on Archaeological Sites				
	Power line Alternative 1		Power line Alternative 2	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (3)	Local (3)	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)	Very short (1)	Very short (1)
Magnitude	High (10)	Low (4)	Small (0)	Small (0)
Probability	Most Likely (4)	Improbable (2)	Very improbable (1)	Very improbable (1)
Significance	High (72)	Low (24)	Low (2)	Low (2)
Status (positive or negative)	Negative	Neutral	Neutral	Neutral
Reversibility	Low	Low	High	High
Irreplaceable loss of resources?	Yes	No	No	No
Can impacts be mitigated?	Yes		Yes	
	Mitigation:			

	<p>Alternative 1 <i>Sites 035, 036, (037, 038, 039) and 041 require mitigation in the form of archaeological excavations if Alt 1 cannot avoid the sites.</i></p> <p>Demarcate 035, 036, (037, 038, 039) and 041 with a 20 buffer during construction.</p>
	<p>Residual Impacts: <i>The impact may result in the irreplaceable loss of resources of high value (services and/or functions) should archaeological sites not be avoided.</i></p>

6.3 Cumulative Impacts

This section evaluates the possible cumulative impacts (CI) on heritage resources with the addition of the Moedig PV project. The CI on heritage resources evaluated a 30-kilometer radius (Figure 74).

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- **Fixed datum or dataset:** There is no comprehensive heritage data set for the region and thus we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated;
- **Defined thresholds:** The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And therefore, will the tipping threshold for impacts on a certain type of heritage resource;
- **Threshold crossing:** In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011)

Keeping the above short comings in mind, the methodology in evaluating cumulative impacts on heritage resources has been as follows.

The analysis of the competed studies as listed in **Table 7**, took in to account the findings and recommendation of each of the evaluated HIA's. The cumulative impact on the cultural landscape was discounted as the HIA's, in most cases, did not address this and the Visual Impact Assessment covers such analysis in detail.

The overall findings of the 23 studies all concur that the area is characterised by numerous Stone Age find spots and archaeological resources. Many these concentrated around pans and outcrops

in a landscape where water, food and shelter came at a premium. The sites around the pans and the outcrops where in most cases given a medium to high heritage significance on a local scale and in the majority of the cases were recommended as being no-go areas or extensive mitigation is required.

This cumulative assessment has also not addressed the possible cumulative impacts on the heritage landscape.

Overall, the project site does contain many instances of Historical and Stone Age heritage resources of which only a few will be directly impacted. While there are a fair number of sites, there are few that, in my considered opinion, would have high heritage significance.

It is due to this, coupled with the fact that the development layout of the Moeding PV and power line corridor will have a low impact on heritage resources after mitigation, that the additional load on heritage resources will be low. With a detailed and comprehensive regional dataset this rating could possibly be adjusted and more accurate.

The overall cumulative impact on heritage resources is LOW.

Table 7 – Renewable energy developments proposed near the application site

Project Name	Location	Approximate distance from the project site	Project Status
Sonbesie Solar Power Plant	Remaining Extent of the farm Retreat 671	6,2km north west of the site	Authorised
Sediba Solar Energy Facility (Rosendal)	Remaining Extent of the Farm Rosendal 673	Located within the project site	Authorised
Protea Solar Power Plant	Remaining Extent of the farm Hartsboom 734	Located adjacent (west)	Authorised
Waterloo Solar Park	Remaining Extent of Farm Waterloo 992	Located adjacent (east)	Authorisation granted (Preferred Bidder Round 4)
Khubu Solar Power Plant	Portion 5 of Championskloof 731	Located adjacent (south east)	Authorised
Gamma Solar Power Plant	Portion 4 Championskloof	5,9km east of the site	Authorised
Sendawo PV 1 Facility	Portion 1 of Edinburgh 735	Located adjacent (west)	Authorised
Sendawo PV 2 Facility	Portion 1 of Edinburgh 735	Located adjacent (west)	Authorised
Sendawo PV 3 Facility	Portion 1 of Edinburgh 735	Located adjacent (west)	Authorised
Tiger Kloof Solar Energy Facility	Remaining Extent of Portion 3 and Portion 4 of the Farm Waterloo 730	Located within the project site	Authorised
Woodhouse Solar 1 PV Facility	Remaining Extent of the Farm Woodhouse 729	8km east of the site	Authorised
Woodhouse Solar 2 PV Facility	Remaining Extent of the Farm Woodhouse 729	8km east of the site	Authorised
Alpha Solar Power Plant	Remaining Extent of farm Middelpan 605	30km west of the site	Authorised
Klondike PV1 Facility	Remaining Extent of the Farm Klondike 670	8,5km north west of the site	Authorised

Project Name	Location	Approximate distance from the project site	Project Status
Klondike PV2 Facility	Remaining Extent of the Farm Klondike 670	8,5km north west of the site	Authorised
Klondike PV3 Facility	Remaining Extent of the Farm Klondike 670	8,5km north west of the site	Authorised
Meerkat Solar Power Plant	Portion 3 of Vyflings Pan 598	28,5km west of the site	Authorised
Carocraft Solar Park	Remaining Extent of Farm Weltevrede 681	19km north east of the site	Authorised
60MW Carocraft PV Solar Park	Remaining Extent of Farm Weltevrede 681	19km north east of the site	Authorised
Vryburg Solar 1	Portion 2 of Farm Frankfort 672	5km west of the site	Authorised
Vryburg Solar 2	Portion 1 of Farm Retreat 671	7.7km north west of the site	Authorised
Vryburg Solar 3	Portion 1 of Farm Retreat 671	8.3km north west of the site	Authorised

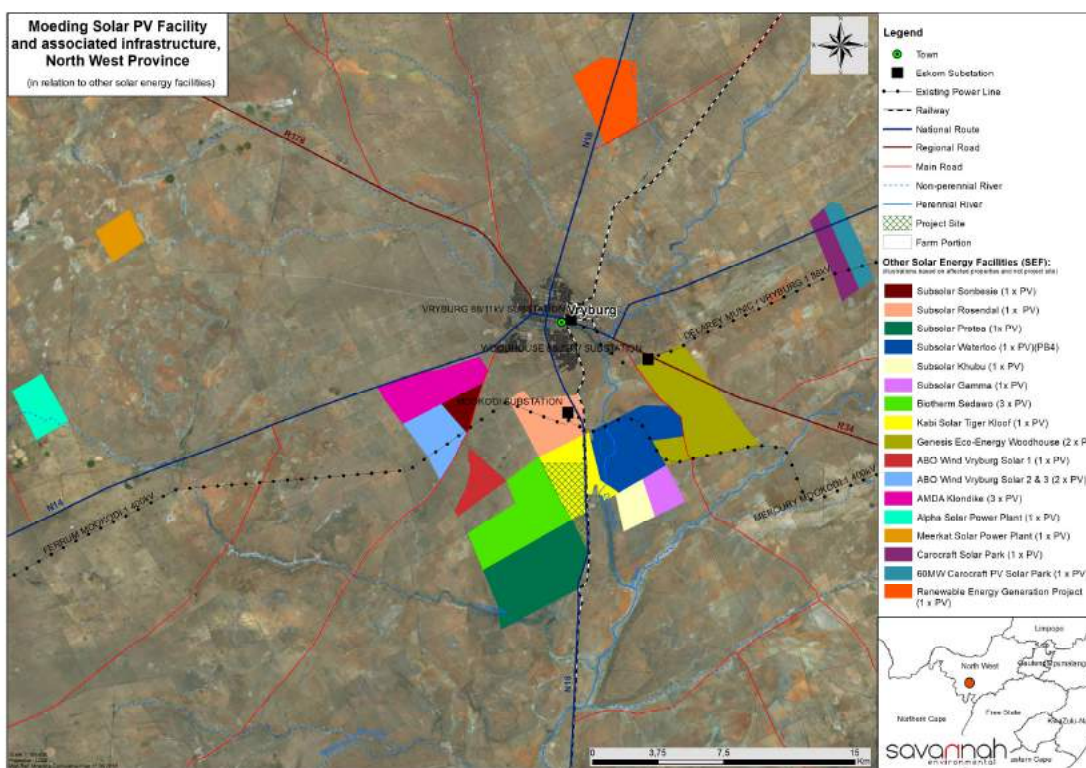


Figure 74 – Geographical position of renewably energy developments in relation to the Moeding Solar PV Facility.

Table 8 – Cumulative Impact on Archaeological Resources

Nature: Impact on Archaeological resources		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (2)	Low (2)
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High

Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: Implement recommendations as per this report on identified site for the project to reduce the impact load on the larger landscape's heritage resources		
Residual Impacts: None		

Table 9 – Cumulative Impact on Burial Grounds

Nature: Impact on Burial Grounds		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (2)	Low (2)
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: Implement recommendations as per this report on identified site for the project to reduce the impact load on the larger landscape's heritage resources		
Residual Impacts: None		

Table 10 – Cumulative Impact on Historical Resources

Nature: Impact on Historical Resources		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (2)	Low (2)
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	..
Mitigation: Implement recommendations as per this report on identified site for the project to reduce the impact load on the larger landscape's heritage resources		
Residual Impacts: None		

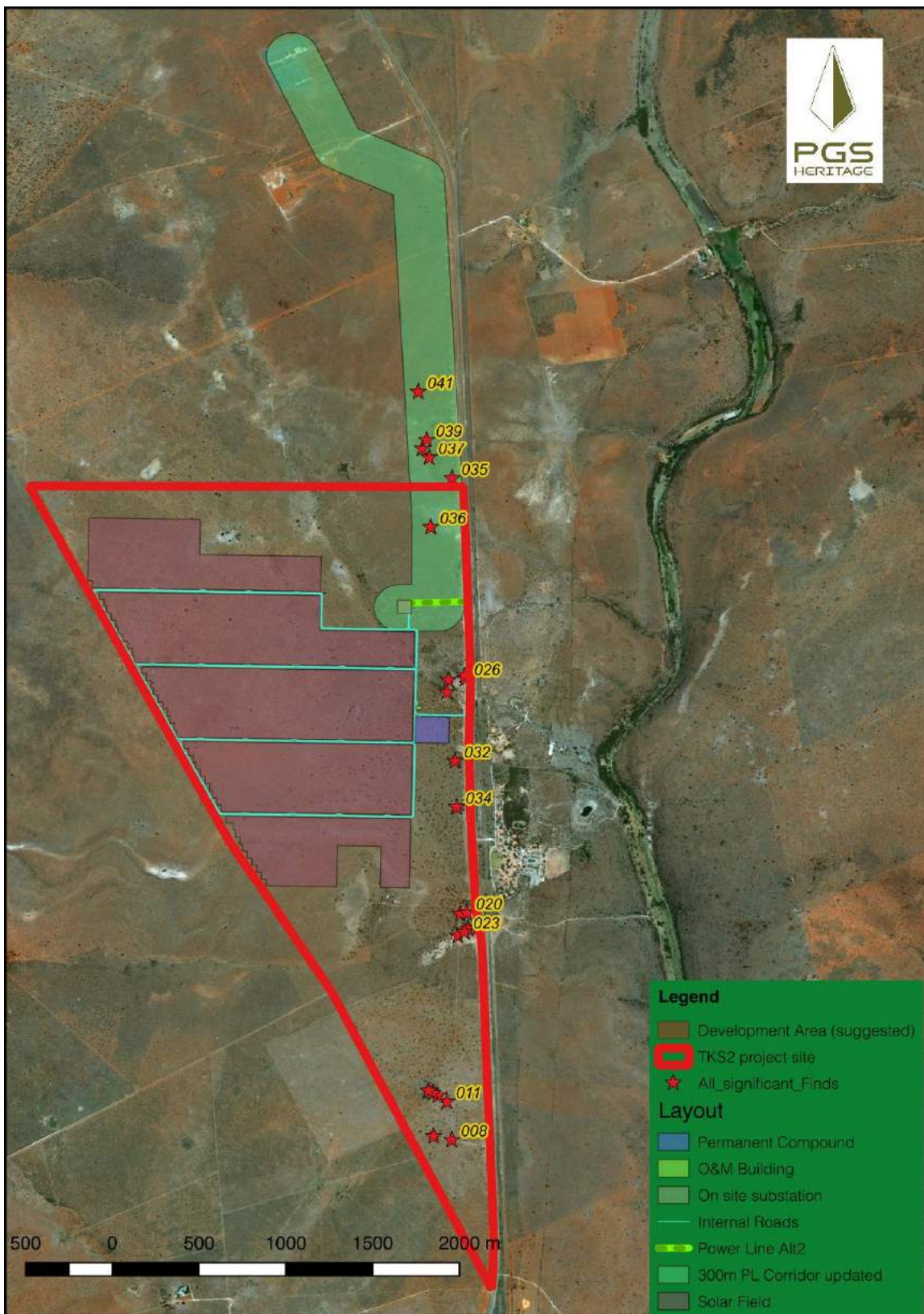


Figure 75 – Map showing position of all significant heritage finds.

7 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

7.1 Construction phase

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure, such as construction camps and laydown areas, is often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure is implemented.

7.2 Chance find procedure

7.2.1 Archaeology

- A heritage practitioner should be appointed to develop a heritage induction programme and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts.
- An appropriately qualified archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities be halted.
- The qualified archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the archaeologist.

7.2.2 Graves

In the case where a grave is identified during construction the following measures must be taken:

- Upon the accidental discovery of graves, a buffer of at least 50 meters should be implemented.
- If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a permit must be applied for from SAHRA (Section 36 of the NHRA) and other relevant authorities (National Health Act and its regulations). The local South African Police Services must immediately be notified of the find.
- Where it is recommended that the graves be relocated, a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

- i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
- ii. Site notices indicating the intent of the relocation;
- iii. Newspaper notices indicating the intent of the relocation;
- iv. A permit from the local authority;
- v. A permit from the Provincial Department of Health;
- vi. A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
- vii. An exhumation process that keeps the dignity of the remains intact;
- viii. The whole process must be done by a reputable company that is well versed in relocations;
- ix. The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

7.2.3 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 11** gives guidelines for lead times on permitting.

Table 11 - Lead times for permitting and mobilisation

ACTION	RESPONSIBILITY	TIMEFRAME
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 months
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	1 month
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks

ACTION	RESPONSIBILITY	TIMEFRAME
Relocation of burial ground or graves in the way of construction	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

7.2.4 Heritage Management Plan for EMP Implementation

OBJECTIVE: Reduce the impact on heritage resources located within the project area	
Project component/s	Construction
Potential Impact	Destruction of heritage resources
Activity/risk source	Soil stripping, trenching and road construction. Digging of foundations
Mitigation: Target/Objective	Obtain clearance of footprint areas where heritage resources occur prior to construction start.

Mitigation: Action/control	Responsibility	Timeframe
Implement chance find procedures in case where possible heritage finds area made	Applicant ECO Heritage Specialist	Weekly
Burial Grounds and graves: <ul style="list-style-type: none"> Demarcate sites with a 50-meter buffer and avoid them. Stakeholder engagement will need to be implemented If this is not possible a detailed grave relocation process must be implemented as required under the NHRA and National Health Act regulations. 	Applicant ECO Heritage Specialist	Before construction commences Weekly monitoring of demarcated sites when construction activities are in close proximity.
Historical structures: <ul style="list-style-type: none"> The sites should be avoided with at least a 20 m buffer if activities should occur near them. If the sites will be affected directly, they will need to be documented before a destruction permit can be applied for at 	Applicant ECO Heritage Specialist	Before construction commences Weekly monitoring of demarcated sites when construction activities are in close proximity.

Mitigation: Action/control	Responsibility	Timeframe
<p>the provincial heritage resource authority (North West Province).</p> <ul style="list-style-type: none"> If any other heritage resources are uncovered SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on 		
<p>Archaeological resources:</p> <ul style="list-style-type: none"> The sites should be avoided with at least a 20 m buffer if activities should occur near them. If the sites 035, 036, (037,038, 039) and 041 will be affected directly, the sites will need to be documented with sites being fully excavated before a destruction permit can be applied for at the provincial heritage authority (North West Province). In the event that any other heritage resources are uncovered SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on mitigation 	<p>Applicant ECO Archaeologist</p>	<p>Before construction commences Weekly monitoring of demarcated sites when construction activities are in close proximity.</p>

Performance indicator	<p>Chance find procedure: ECO Monthly Checklist/Report Issuing of destruction permits for archaeological site directly impacted by construction activity by SAHRA Demarcation of heritage resources not directly impacted.</p>
Monitoring	<p>Weekly monitoring of demarcated sites when construction activities are in close proximity.</p>

8 CONCLUSIONS AND RECOMMENDATIONS

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. This report focuses expressly on the new proposed infrastructure, other management measures as listed and required in other HIA's conducted in the area must still be implemented for other heritage features identified in the larger mining area.

The HIA has shown that the proposed Moeding Solar project has heritage resources present on the affected properties. This has been confirmed through a field survey, archival research and evaluation of aerial photography of the sites.

During the field assessment 34 heritage sites were located. These include 21 find spots, 1 erosion site exposing Stone Age materials (**007, 008**), 5 significant Stone Age sites (**011, 012, 013**), **035, 036, (037, 038, 039) and 041**, 1 Pan like site with extensive exposure of Stone Age artefacts (**014**), 3 Historical sites (**018, 019, 020, 022, 023**), (**026, 027, 028, 029**) and **034**, 1 burial ground (**021**), 1 area of stacked stones (**024**) and 1 possible grave (**032**).

Of all the above sites only sites **035-039** and **041** fall in the foot print area of Alt 1 of the power line alignment of the proposed project infrastructure.

The management and mitigation measures as described in **Section 7** of this report have been developed to minimise the project impact on heritage resources. Impacts on burial grounds and graves are rated as having a LOW significance before mitigation and a LOW Significance after mitigation measures are implemented. Impact on Historical sites is rated as having a LOW Significance before mitigation and a LOW Significance after mitigation measures are implemented. Impacts on archaeological sites are rated as having HIGH Significance before mitigation and LOW Significance after mitigation measures are implemented.

The overall cumulative impact on heritage resources is LOW.

The overall impact of the proposed PV and powerline development on the identified heritage resources is rated as MEDIUM with a post mitigation rating of LOW.

Considering the possible impacts on heritage resources of the proposed power line alternatives, Alternative 2 will be the preferred option from a heritage perspective.

It is my considered opinion that overall impact on heritage resources after the implementation of the recommended mitigation measures is acceptably low and that the project can be approved from a heritage perspective.

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