

## **HERITAGE IMPACT ASSESSMENT, EIA REPORT**

Proposed establishment of the Alldays (75 MW)  
Photovoltaic (PV) or Concentrated Photovoltaic (CPV)  
Solar Energy Facility on the Farm Gotha near Alldays in  
the Limpopo Province

Prepared By:



## **Credit Sheet**

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

## **Statement of Independence**

As the duly appointed representative of G&A Heritage, I Stephan Gaigher, hereby confirm my independence as a specialist and declare that neither I nor G&A Heritage have any interests, be it business or otherwise, in any proposed activity, application or appeal in respect of which the Environmental Consultant was appointed as Environmental Assessment Practitioner, other than fair remuneration for work performed on this project.

Signed off by S. Gaigher



**Site name and location:** Proposed establishment of the Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gotha near Alldays, Limpopo Province.

**Municipal Area:** Capricorn District Municipality.

**Developer:** BioTherm Energy

**Consultant:** G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa.  
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**Date of Report:** 29 July 2013

## **Management Summary**

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the construction of a new - Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gothanear Alldays, Limpopo Province. The site will impact on an area of 175 ha of the farm and is therefore subjected to an Environmental Impact Assessment (EIA).

The purpose of the HIA phase of the study is to determine the possible occurrence of sites with cultural heritage significance within the study area and the evaluation of the heritage significance of these sites as well as the possible impacts on such sites by the proposed development.

### **Findings**

The area under investigation falls on the outside perimeter of the Mapungubwe World Heritage Site and Cultural Landscape. The areas investigated showed no indications of occupational sites and the area is also not geographically conducive to occupation. Although only 175 ha is proposed for the development, a significant buffer zone around this area was investigated to ensure that movements in the actual placement of the site would not affect any area of heritage significance. No sites of heritage significance were identified within the study area. The area could however be evaluated as being part of the highly significant Mapungubwe Cultural Landscape and this will have a dramatic effect on the evaluation of the site's importance.

### **Recommendations**

It is recommended that a heritage specialist is contracted to monitor the construction phase of this project to ensure that no sites of heritage significance is damaged. This is necessary due to the high heritage significance of the Mapungubwe Cultural Landscape. In an effort to properly manage the development within the parameters of the MWHs Management framework, it is recommended that the developer appoint a panel of heritage experts to oversee the planning process and to determine acceptable actions. Although the area will have some short term impacts no long-term or compounded impacts are anticipated and it is envisaged that the proposed development will in the long run have more positive than negative impacts.

### **Fatal Flaws**

Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gotha - HIA vi

No fatal flaws were identified.

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## List of Abbreviations

Bp	Before Present
PV	Photovoltaic
EIA	Early Iron Age
ESA	Early Stone Age
GPS	Geographic Positioning System
HIA	Heritage Impact Assessment
LIA	Late Iron Age
LSA	Late Stone Age
MYA	Million Years Ago
MSA	Middle Stone Age
NHRA	National Heritage Resources Act no 22 of 1999
SAHRA	South African Heritage Resource Agency
S&EIR	Scoping & Environmental Impact Reporting
Um	Micrometre ( $10^{-6}$ m)
WGS 84	World Geodetic System for 1984
WHS	World Heritage Site

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# **EIA Heritage Impact Report for the Proposed Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gotha**

## **Introduction**

### **Legislation and methodology**

G&A Heritage was appointed by Savannah Environmental cc to undertake a heritage impact assessment for the Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gotha in the Limpopo Province. Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken for:

- (a) construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
- (b) construction of a bridge or similar structure exceeding 50 m in length; and*
- (c) any development, or other activity which will change the character of an area of land, or water –*
  - (1) exceeding 10 000 m<sup>2</sup> in extent;*
  - (2) involving three or more existing erven or subdivisions thereof; or*
  - (3) involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or*
  - (d) the costs of which will exceed a sum set in terms of regulations;*  
*or*
  - (e) any other category of development provided for in regulations.*

While the above describes the parameters of developments that fall under this Act., Section 38 (8) of the NHRA is applicable to this development. This section states that;

- (8) The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation*

*fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.*

In regards to a development such as this that falls under Section 38 (8) of the NHRA, the requirements of Section 38 (3) applies to the subsequent reporting, stating that;

(3) *The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2) (a): Provided that the following must be included:*

- (a) The identification and mapping of all heritage resources in the area affected;*
- (b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7;*
- (c) an assessment of the impact of the development on such heritage resources;*
- (d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) plans for mitigation of any adverse effects during and after the completion of the proposed development.*

- (a) places, buildings, structures and equipment;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological sites;
- (g) graves and burial grounds, including –
  - (1) ancestral graves,
  - (2) royal graves and graves of traditional leaders,
  - (3) graves of victims of conflict (iv) graves of important individuals,
  - (4) historical graves and cemeteries older than 60 years, and
  - (5) other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
- (h) movable objects, including ;

- (1) objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;
  - (2) ethnographic art and objects;
  - (3) military objects;
  - (4) objects of decorative art;
  - (5) objects of fine art;
  - (6) objects of scientific or technological interest;
  - (7) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
  - (8) any other prescribed categories, but excluding any object made by a living person;
- (i) battlefields;
  - (j) traditional building techniques.

A **'place'** is defined as:

- (a) A site, area or region;
- (b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
- (c) a group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

**'Structures'** means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

**'Archaeological'** means:

- (a) material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- (b) rock art, being a 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 is older than 100 years including any area within 10 m of such representation; and
- (c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;
- (d) features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

**'Paleontological'** means 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.

**'Grave'** means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this scoping study are as follows;

- Field investigations were hampered in areas with heavy plant growth.
- Sites were evaluated by means of description of the cultural landscape and analysis of written sources and available databases as well as field investigations.
- It was assumed that the site location as provided by Savannah Environmental cc is accurate.
- We assumed that the public participation process performed as part of the Scoping and Environmental Impact Reporting (S&EIR) process will be sufficiently encompassing not to be repeated in this phase.

Table 1. Impacts on the NHRA Sections

Act	Section	Description	Possible Impact	Action
National Heritage Resources Act (NHRA)	34	Preservation of buildings older than 60 years	No impact	None
	35	Archaeological, paleontological and meteor sites	Possible Impact	HIA
	36	Graves and burial	Possible Impact	HIA

		sites		
	37	Protection of public monuments	No impact	None
	38	Does activity trigger a HIA?	Yes	HIA

Table 2. NHRA Triggers

Action Trigger	Yes/No	Description
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes	Various distribution power lines and access roads
Construction of a bridge or similar structure exceeding 50m in length.	No	N/A
Development exceeding 5000 m <sup>2</sup>	Yes	75 MW PV Solar Array
Development involving more than 3 erven or sub divisions	No	N/A
Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years	No	N/A
Re-zoning of site exceeding 10 000 m <sup>2</sup>	No	N/A
Any other development category, public open space, squares, parks or recreational grounds	No	N/A

## Background Information

### Proposed Alldays PV Array

#### Project Description

The Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility is proposed on a section of the Gotha near Alldays in the Limpopo Province. The project will entail the construction of up to 75 MW Photovoltaic/Concentrated Photovoltaic Solar Array on approximately 175 ha with associated infrastructure such as access roads and distribution lines. The electricity generated at this sites will be integrated into the national grid via the Venetia Sub-Station on the northern side of the Venetia/Musina Access Road.

#### Site Location

The proposed development site is located on a 175 ha portion of the Farm Gotha, near Alldays in the Limpopo Province. This farm is located directly south of the DeBeers Venetia Diamond mine.

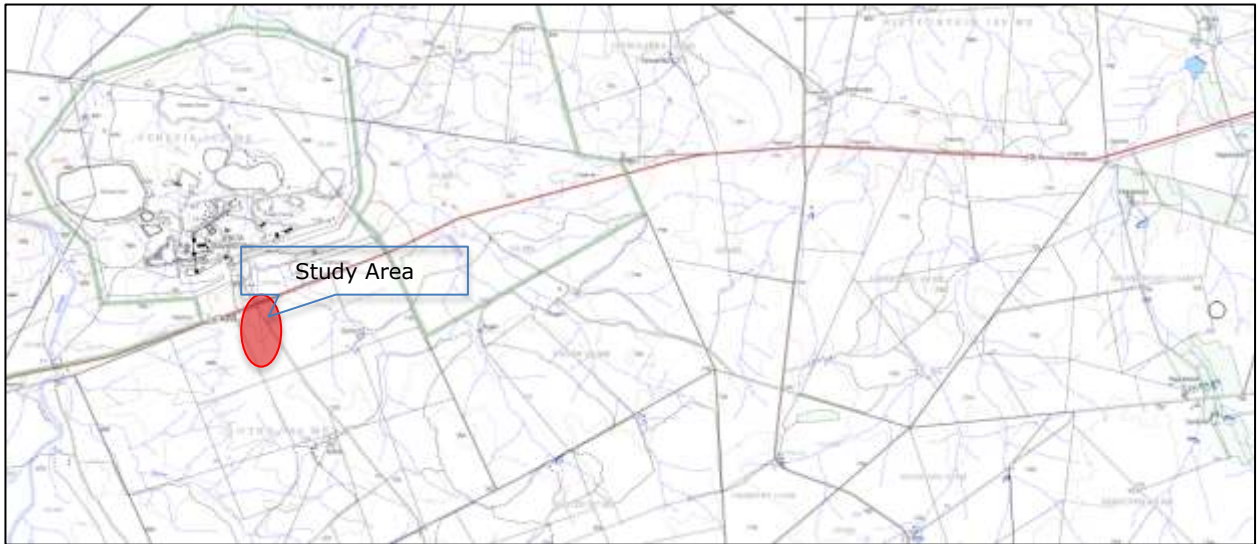


Figure 1. Location of study area



Figure 2. Landscape indicating calcrete deposits



Figure 3. Aerial View of Study Area

The red opaque area indicates the study area including the buffer zone.

### **Alternatives Considered.**

No alternatives were considered.

## **Methodology**

This study defines the heritage component of Environmental Impact Assessment process being undertaken for the Proposed Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gotha. It is described as a Heritage Impact Assessment. This report attempts to evaluate the accumulated heritage knowledge of the area as well as the heritage sensitivity of proposed development areas.

### **Evaluating Heritage Impacts**

The HIA relies on the analysis of written documents, maps, aerial photographs and other archival sources combined with the results of site investigations and interviews with effected people. Site investigations are not exhaustive and often focus on areas such as river confluence areas, elevated sites or occupational ruins.

The following documents were consulted in this study;



- South African National Archive Documents
- SAHRA Database of Heritage Studies
- Mapungubwe World Heritage Visitors Centre
- Internet Search
- Historic Maps
- 1936 and 1952 Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2011 & 2003 imagery
- Published articles and books
- JSTOR Article Archive

### **Field Methodology**

The study area was accessed on foot due to heavy vegetation in areas. This was easily facilitated due to the close proximity of the mine access road. The survey attempted to keep to parallel transects, however the topography and vegetation made this difficult. Possible site indicators were also investigated which caused deviations. Fig. 5 shows the track paths logged on the GPS during the survey and exported as a GPX file that was in turn plotted on Google Earth. The GPX files are available on request from G&A Heritage's office. An additional section to the study area was also surveyed for unrelated research purposes. The area already studied under the Basic Assessment was not re-surveyed



Figure 4. Landscape type



Figure 5. GPS Track Paths

### **Assessing Visual Impact**

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV and DEAP (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalized. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimize the visual impact.

The main impact is considered to be on the Mapungubwe Cultural Landscape, however taken into account the fact that the study area is outside of the Mapungubwe WHS Buffer Zone (3km) and is obscured by the extensive visual impacts of the Venetia Diamond Mine dumps, the actual visual impact is anticipated to be low. This impact should however still form part of the management parameters for the proposed development panel.

### **Assumptions and Restrictions**

- It is assumed that the SAHRA database locations are correct
- It is assumed that the social impact assessment and public participation process of the EIA phase will result in the identification of any intangible sites of heritage potential.

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# Heritage Indicators within the Receiving Environment

## Regional Cultural Context

### Stone Age

The Stone Age sites of this area fit within the later Earlier Stone Age and the Middle Stone Age (MSA) periods, and this section therefore discusses the relevant industries, beginning with the Acheulean. The rate of change seen in the lithics of the Acheulean is slow (Klein 2000), however by the MSA tools are becoming more detailed and varied as techniques improve (Barham 2000a, Beaumont & Vogel 2006). This period between the end of the Acheulean and the end of the MSA is a complex and controversial era (Tryon 2006). While the ESA could be defined as a cultural industry using mainly large tools used mainly for cutting, the MSA is traditionally seen as a time when more varied artifacts such as bone points are being used (Kuman, 2000).

The transition between the Acheulean and MSA has also been variably described as the "First Intermediate Period", however this was later dropped. The concept of an intermediate phase is however still supported by some researchers (Kuman, 2000). Clark sometimes refers to the Sangoan as the final "transitional" or ESA phase (Clark 1959). Although a lot of the research in the Mapungubwe area focusses on MSA and LSA sites (LSA sites are often researched as "by-finds" on lower level Iron Age excavations), there has been some ESA or Acheulean type sites identified. Although Beaumont and Vogel suggests a rather more complex transition between the Acheulean and MSA in some areas this era is still described to the Sangoan or Fauresmith Industries (Beaumont & Vogel 2006).

The MSA was followed in many places by the Late Stone Age (LSA). The LSA shows much more refined tool working and deposits are often found in association with Iron Age deposits. The reason for this has variably been given as interaction between Iron Age communities and LSA communities or as mere geographic suitability of the occupation sites resulting in superimposition.

### Iron Age

The Iron Age can be divided into the Early Iron Age (EIA) and the Late Iron Age (LIA). There is a growing support (based mostly on Mapungubwe research) for a Middle Iron Age (MIA). Although Huffman and Calabrese uses the term freely (Huffman 2000, Calabrese 2007) it is still considered a contentious term by many. Much of this criticism is the result of Huffman's continued insistence on the "replacement" of Zhizo by Leopards Kopje

communities, suggesting that there was a gap between these that could define a MIA border (Huffman 200).

The most significant sites here are Mapungubwe, K2, Schroda and Little Much.

Small Iron Age sites postdating Mapungubwe and K2 have been recorded on Greefswald, including some stone-walled sites on hilltops (Meyer 1996).



Figure 6. Mapungubwe hill

T.N. Huffman has identified some of these sites as Khami type ruins. According to oral tradition, communities belonging to the Lea and Twamamba tribes, related to the Venda and the Shona-speaking people, settled in the Greefswald region in historical times (Meyer, 2000).

### **The Historic Era**

The historic era is mostly concerned in this area with the discovery of the Mapungubwe site by westerners and the subsequent excavations and research (not always combined) of the main Iron Age site, agricultural activities and military activities.

The Mapungubwe site was discovered by a farmer in the area based on information supplied by a local informant. The discovery was relayed by a student at the University of Pretoria to the History Department and this subsequently resulted in the formation of the Department of Archaeology at the University of Pretoria (Meyer, 1996).

During the time of Southern Rhodesia the area was mostly used as farming and hunting land, however with the independence of Zimbabwe the area became of military importance and up to the formation of the Mapungubwe Park has been under military control.

### Cultural Landscape

The most prominent cultural landscape identified is the Mapungubwe World Heritage Site and Cultural Landscape (MCL). The study area lies on the southern edge of the buffer zone for this area (3 km away), however it is still recommended that the possible impacts on it be evaluated.

The following landscape types could possibly be present in the study area.

Landscape Type	Description	Occurrence still possible?	Likely occurrence?
1 Paleontological	Mostly fossil remains. Remains include microbial fossils such as found in Baberton Greenstones	Yes, sub-surface	Unlikely
2 Archaeological	Evidence of human occupation associated with the following phases – Early-, Middle-, Late Stone Age, Early-, Late Iron Age, Pre-Contact Sites, Post-Contact Sites	Yes	Unlikely
3 Historic Built Environment	<ul style="list-style-type: none"> <li>- Historical townscapes/streetscapes</li> <li>- Historical structures; i.e. older than 60 years</li> <li>- Formal public spaces</li> <li>- Formally declared urban conservation areas</li> <li>- Places associated with social identity/displacement</li> </ul>	No	No
4 Historic Farmland	These possess distinctive patterns of settlement and historical features such as: <ul style="list-style-type: none"> <li>- Historical farm yards</li> <li>- Historical farm workers villages/settlements</li> </ul>	No	No

	<ul style="list-style-type: none"> <li>- Irrigation furrows</li> <li>- Tree alignments and groupings</li> <li>- Historical routes and pathways</li> <li>- Distinctive types of planting</li> <li>- Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting.</li> </ul>		
5 Historic rural town	<ul style="list-style-type: none"> <li>- Historic mission settlements</li> <li>- Historic townscapes</li> </ul>	No	No
6 Pristine natural landscape	<ul style="list-style-type: none"> <li>- Historical patterns of access to a natural amenity</li> <li>- Formally proclaimed nature reserves</li> <li>- Evidence of pre-colonial occupation</li> <li>- Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages</li> <li>- Historical structures/settlements older than 60 years</li> <li>- Pre-colonial or historical burial sites</li> <li>- Geological sites of cultural significance.</li> </ul>	Yes	Likely
7 Relic Landscape	<ul style="list-style-type: none"> <li>- Past farming settlements</li> <li>- Past industrial sites</li> <li>- Places of isolation related to attitudes to medical treatment</li> <li>- Battle sites</li> <li>- Sites of displacement,</li> </ul>	No	Unlikely
8 Burial grounds and grave sites	<ul style="list-style-type: none"> <li>- Pre-colonial burials (marked or unmarked, known or unknown)</li> <li>- Historical graves (marked or unmarked, known or unknown)</li> <li>- Graves of victims of conflict</li> </ul>	Yes,	Unlikely

	<ul style="list-style-type: none"> <li>- Human remains (older than 100 years)</li> <li>- Associated burial goods (older than 100 years)</li> <li>- Burial architecture (older than 60 years)</li> </ul>		
9 Associated Landscapes	<ul style="list-style-type: none"> <li>- Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes</li> <li>- Sites associated with displacement &amp; contestation</li> <li>- Sites of political conflict/struggle</li> <li>- Sites associated with an historic event/person</li> <li>- Sites associated with public memory</li> </ul>	No	No
10 Historical Farmyard	<ul style="list-style-type: none"> <li>- Setting of the yard and its context</li> <li>- Composition of structures</li> <li>- Historical/architectural value of individual structures</li> <li>- Tree alignments</li> <li>- Views to and from</li> <li>- Axial relationships</li> <li>- System of enclosure, e.g. defining walls</li> <li>- Systems of water reticulation and irrigation, e.g. furrows</li> <li>- Sites associated with slavery and farm labour</li> <li>- Colonial period archaeology</li> </ul>	Yes	No
11 Historic institutions	<ul style="list-style-type: none"> <li>- Historical prisons</li> <li>- Hospital sites</li> <li>- Historical school/reformatory sites</li> <li>- Military bases</li> </ul>	No	Unlikely
12 Scenic visual	<ul style="list-style-type: none"> <li>- Scenic routes</li> </ul>	Yes	Mapungubwe Cultural Landscape
13 Amenity	<ul style="list-style-type: none"> <li>- View sheds</li> </ul>	No	No



landscape	<ul style="list-style-type: none"> <li>- View points</li> <li>- Views to and from</li> <li>- Gateway conditions</li> <li>- Distinctive representative landscape conditions</li> <li>- Scenic corridors</li> </ul>		
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## The Mapungubwe Cultural Landscape

The Mapungubwe Cultural Landscape (MCL) is located within the Shashi-Limpopo Confluence area on the connecting borders of South Africa, Botswana and Zimbabwe. On the Botswana side lays the Tuli Conservation Area, while the Zimbabwean side contains the Maremani community area and the privately owned Sentinel Ranch and Nottingham Bridge. The Shashi River between Botswana and Zimbabwe and the Limpopo River between South Africa and Zimbabwe/Botswana divides these three countries.

The nomination of the Mapungubwe Cultural Landscape (MCL) for World Heritage Site (WHS) Status was based on a combination of its exceptional cultural and natural resources. The heritage resources in question could be found mainly on a corridor of sandstone ridges (Clarence Sandstone), close and parallel to the Limpopo River. On the flat sandstone incline approximately 300 meters south of the Southern terrace of Mapungubwe Hill the remains of vertebra and some long bones of a *Massospondylus sp.* can be found, similar, though better defined, fossils are also found in a creek bed on the Sentinel Ranch in Zimbabwe.

The main Iron Age Site of Mapungubwe is located on this sandstone ridge, close to the confluence of the two rivers.

The natural landscape varies greatly and although the northern parts are mostly covered in Mopane (*Collospermum Mopani*) stands, the southern parts, as soon as you descended into the river valley, varies between acacia thorn thicket to lush riverine forest along the banks of the Limpopo River. This variety in vegetation means that the area can play host to a significant variety of animals within its confines. The partially evergreen character of the riverine forest also helps to make survival possible during especially dry winters in the area. It should however be noted that elephant was only relatively recently allowed back into the area and they have subsequently had a severe impact on this vegetation type.

The core area of the MCL consists of several farms that have been bought outright by SANParks. A further 100 000ha of conservation area is formed when the outlying buffer zone is included with this. This buffer zone consists of several privately owned properties as well as mining areas owned by DeBeers. The establishment of the Peace Parks Foundation in 1997 has now made it possible to eventually integrate the conservation areas in Botswana

and Zimbabwe into a larger trans-frontier park that will be called the Trans-Frontier Conservation Area or TFCA. The on-going negative political climate in Zimbabwe has however hampered the implementation of this policy (Verhoef, 2005, *pers comm.*).

The re-introduction of many animals that originally occurred in the TFCA has resulted in a massive increase in the biodiversity of the area. This has in turn created several research opportunities for biological scientists. It is anticipated that the new Mapungubwe Park could attract as much as 30 000 new visitors to this area (*World Heritage Nomination Dossier, 2002*). These figures have as yet not been verified by SANParks.

Research in the MCL is closely related to the history and work of the Department of Archaeology at the University of Pretoria. The original archaeological investigations followed the following rough order;

- 1933 – South African Government purchases the farm Greeswald (the site where Mapungubwe is located) from its owner
- 1933 – Exavation rights are given to the Department of Archaeology at UP
- 1933 – UP establishes an archaeological committee
- 1934-1935 – Rev. Neville Jones and J.F. Schofield undertakes first fieldwork with the assistance of Prof. C van Riet-Lowe at Mapungubwe hill, the southern terrace and K2.
- 1935-1940 – Guy A. Gardner undertakes excavations at K2 and Mapungubwe Hill
- 1953 – 1954- Various excavations under the Department of Archaeology UP
- 1968 – 1970 – J.F. Eloff focuses on the southern terrace at Mapungubwe
- 1970 – 1995 – Various excavations by the Department of Archaeology at UP.
- 1983 – Faunal remains by Voigt
- 1994 – 1997 – Human skeletal remains is researched by Steyn & Henneberg
- 1996 – Stone features on Mapungubwe Hill – S. Gaigher
- 2000 – Human skeletal remains – Steyn & Nienaber (excavations and sketches by S. Gaigher)
- 2000 – Gold objects – Miller et al.
- 2000 – Wood – Glass beads
- 2000 - C14 dates – Vogel

Other sites further afield that were researched by UP and Wits are Skutwater, Greefswald (Leokwe Hill), Little Much and Balerno.

As part of the Mapungubwe Rehabilitation Program (MRP) under the Poverty Alleviation Program of the Government, Gaigher and Hutten conducted extensive re-excavation of historic excavations and materials from 2003 until 2005. As part of this program all unstable excavation or exposed

excavations on K2, Mapungubwe Hill, the Southern Terrace, Schroda, Pons 5 and several other smaller sites were re-opened, re-documented and stabilised. This was the most extensive excavation work to be performed in the MCL for the past 70 years.

An overview of the historic eras involved in the MCL will not be given here. Suffice it to say that the transition from the Stone Age (discussed under a previous heading) to the Iron Age occurred between AD 250 – 900. The earliest Iron Age pottery is described as Bambata or Happy Rest. Hereafter three distinct phases are identified as; the Zizho, Leopards Kopje/K2 and Mapungubwe Period.

Although there is contention regarding the transition between these phases it is widely accepted that these three phases encompass the whole Iron Age sequence of the MIA in this area.

### ***Research publications***

- a. Summaries of research projects in the Limpopo Valley, edited by Mary Leslie and Tim Maggs, have been published in the South African Archaeological Society Goodwin Series, Vol. 8. December 2000, entitled African Naissance: the Limpopo Valley 1000 years ago.
- b. A book on The Archaeological sites of Greefswald: Stratigraphy and chronology of the sites and a history of investigations has been published by Meyer (1998).
- c. An illustrated publication intended for the general public summarising the results of the University of Pretoria excavations on Greefswald was published by Meyer (1996).
- d. A comprehensive report on The Rock Art of the Limpopo-Shashe Confluence Area has been prepared for the World Heritage nomination dossier by Eastwood (2001)
- e. The relationship between the Limpopo Valley sites and those in Zimbabwe is described in the book Snakes and Crocodiles: power and symbolism in ancient Zimbabwe by Huffman (1996).

### ***Unpublished Reports, Surveys and Pamphlets (World Heritage Nomination Dossier, 2002)***

- a. An initial scoping of the tourism potential of the Mapungubwe area was undertaken for the Mapungubwe Tourism Development Initiative (Norton et al. 2000). This included extensive community consultation.
- b. Between 1995 and 1998, Archaeological Resources Management at the University of the Witwatersrand undertook a review for De Beers Consolidated Mines Ltd of the archaeology of precolonial farming societies in the Shashe-Limpopo Basin (Huffman 1999).
- c. A programme to catalogue the Mapungubwe archive and collections at the University of Pretoria was begun in the mid-1990s. In 1997, the artefacts from the so-called gold burials on top of Mapungubwe Hill were declared a national cultural treasure and a full inventory with photographs of all the items was compiled by Professor Meyer.

- d. In 1999, the University of Pretoria placed many of the objects on permanent display in their SASOL African Heritage Exhibition. An illustrated pamphlet was published. As part of this initiative, conservation work was undertaken on the gold objects by a professional conservator at the British Museum.
- e. In 2000, some of the gold objects were loaned for an exhibition entitled *Musuku: Golden Links with our Past* at the South African National Gallery in Cape Town, sponsored by AngloGold. A colour catalogue was produced for the exhibition.
- f. A catalogue and analysis of the baked clay figurines from Schroda has been undertaken by Edwin Hanisch of the University of Venda and Dr J van Schalkwyk of the African Window Museum in Pretoria and is nearing completion. It will be published with illustrations when the collection is put on display at the museum in March 2002.
- g. SANParks have compiled a Draft Management Plan for the Vhembe Dongola National Park (Maphasa 2001).
- h. The Peace Parks Foundation has prepared a report on the Current status of the properties in the proposed 'core area' of the Limpopo / Shashe Transfrontier Conservation Area (Coetzee 2001).
- i. Professor V. Ralushai undertook an oral history project in the Mapungubwe Cultural Landscape and surrounding area to establish the nature and extent of cultural and genealogical links between present-day communities and the Mapungubwe period (Ralushai 2001).

With the publishing of the National Heritage Resources Act (25 of 1999) all previous National Monuments (as per the National Monuments Act. 28 of 1969) became Provincial Heritage Sites. The MCL core area has now been proclaimed as a National Heritage Site – the highest level of significance that can be attributed to a heritage site.

The above is a condensation of information included in the *January 2002 World Heritage Nomination Dossier* and updated with relevant information to date.

The scientific and historic importance of the MCL is thus defined above and it is now necessary to look at how this significance influences the proposed solar plant development and more importantly how the development could impact on this unique National Heritage Site and World Heritage Site. For the purpose of this document only the cultural values will be analysed, as the biological values are not part of the scope of this study.

From the above it is clear that the main archaeological value that defines the MCL is the occurrence of unique and rich Middle Iron Age deposits associated with the Zhizho, K2 and Mapungubwe eras. This is also specifically stated in the 2002 Nomination Dossier and it even goes as far as to limit the sites with defining OUV (overall universal value) as sites originating in the period AD 900 – 1300.

To understand the concept of the MCL it is important to illustrate the process of nomination. To define the MCL as significant and unique we need to firstly identify its *Overall Universal Value* (OUV). The criteria of OUV were used for the nomination of the MCL as a World Heritage Site (WHS). During the nomination process and based on the background information above, UNESCO formulated the following criteria that give the MCL a significant UOV;

- *Criterion 1: The MCL contains evidence for an important interchange of human values that led to far-reaching cultural and social changes in Southern Africa between AD 900 and 1300.*
- *Criterion 2: The remains in the MCL are a remarkably complete testimony to the growth and subsequent decline of the Mapungubwe State, which at its height was the largest kingdom in the African subcontinent.*
- *Criterion 3: The establishment of Mapungubwe as a powerful state trading through the East African ports with Arabia and India was a significant stage in the history of the African sub-continent.*
- *Criterion 4: The remains in the Mapungubwe cultural landscape graphically illustrate the impact of climate change and record the growth and then decline of the Kingdom of Mapungubwe as a clear record of a culture that became vulnerable to irreversible change (World Heritage Nomination Dossier, 2002).*

To facilitate decisions regarding the impact on attributes of OUV, the ICOMOS Guidance on Impact Assessment (2011), stresses the need to identify, list and define the attributes that convey OUV. The criteria above can therefore be applied to the study area to determine its contribution to the OUV of the MCL.

Criterion	Contribution of study area to overall OUV
1. MCL shows evidence of interchange of human values	This criterion is dependant on the occurrence of heritage sites of different cultural industries. No such sites were identified in the study area and as a result no contribution can be made to this component. The whole study area falls within one historic cultural unit and does not transverse others. Its development can therefore not have an impact on this criterion.
2. MCL contain evidence of the rise and fall of the Kingdom of Mapungubwe	This component is reliant on the occurrence of Mapungubwe type-sites within the study area. No such sites were present in the study area and as a result no contribution can be made to this component. Once again the

	small footprint makes any impacts on this insignificant. Studies regarding the rise and fall of Mapungubwe also focus on interaction with areas directly adjacent to or north of the site and not to the south
3. Evidence of the trading importance for the sub-continent of the Mapungubwe culture.	Again, this component is reliant on the occurrence of Mapungubwe related sites. No known trade routes transverse the study area. Trading was performed mainly along the flow of the Limpopo River.
4. Illustrating the impact of climate change and the impact this had on the decline of Mapungubwe	Possible pollen analysis could contribute here, however it is not part of the scope of this study to identify such components.

The above criteria has already been amply motivated and described in the nomination document and this will not be reproduced here.

Of secondary, however also high, importance is the occurrence of Stone Age Sites of all three periods as well as Rock-Art sites associated with LSA deposits. The development site is far removed from the core sandstone ridge of the MCL and as such there are no suitable sites for rock-art in the study area. These criteria will therefore not be discussed further since the development can also not have any secondary impacts such as pollution or acid rain that could negatively affect rock art sites. Impacts on rock art sites are therefore not possible.

It should of course be realised that the MCL is not *exclusively* defined by the OUV criteria as defined by UNESCO, an aspect often overlooked by this organisation. There are several other components that define the MCL that are maybe not universally unique but still essential in defining its character. It is important to understand that the MCL is not just a list of sites of heritage importance, but rather an entity of its own where its major as well as minor components play equality important roles in defining its value. While a single component could be of little archaeological value, its potential value suddenly increases when it is part of the MCL. For this reason any heritage components in this area should be evaluated differently to similar sites in other areas.

One aspect that has been a major drawback in the management and protection of the MCL is the poorly defined buffer zone. Several version of the buffer zone exist in several documents, however a definitive description has yet to be put forward. The UNESCO World Heritage Committee Decision – 36COM 7B.48 (2012) still refers to the buffer zone as “proposed” and reiterates the need for a more definitive version. Since the study area falls right outside of the generally excepted buffer zone it should be considered that in future revisions it might as well be included on the inside of the

buffer zone. For this reason any major impacts that the development could have on the MCL should be evaluated as if it was located within the buffer zone.

Taken the vaguely defined buffer zone for the MCL as well as the less prominent elements that make up the MCL (such as spiritual, educational, political social, economic and scientific values), it is prudent to evaluate impacts associated with the MCL not individually in isolation but associative as a whole.

The main possible impact on the MCL from the proposed development would be visual. The modern design and futuristic materials used in the construction clashes with the historic and even ancient undertones of the MCL character. This impact is in a large overshadowed by the massive visual impact resulting from the directly adjacent Venetia Mine. It is therefore foreseeable that this impact will be of such diminished nature that no mitigation would be necessary, however the compounding effect of the impact should also be take into account.

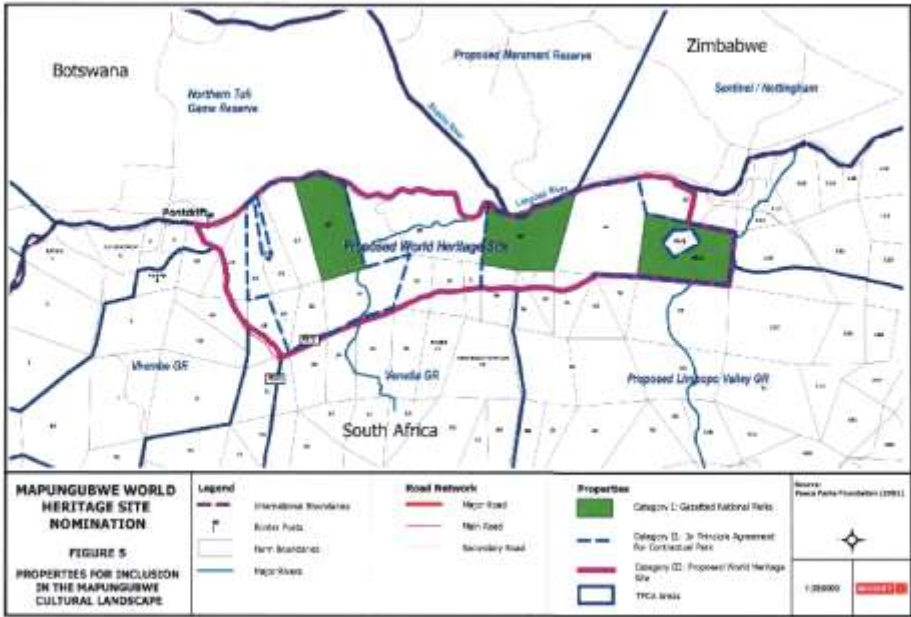


Figure 7. Mapungubwe World Heritage Site

The purple line in the above map shows the extent of the Mapungubwe WHS.

**Previous Heritage Studies**

The following heritage management studies were located on the SAHRIS website;

- Gaigher, S. 2009, Heritage Impact Assessment for a prospecting application - Alldays Limpopo Province. G&A Heritage
- Gaigher, S. 2011, A PHASE I ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) STUDY FOR DE BEERS CONSOLIDATED MINES (VENETIA MINE) IN THE LIMPOPO PROVINCE. G&A Heritage
- Gaigher, S. 2012. Heritage Impact Assessment - Proposed establishment of the Krone-Endora Diamond Mine on a Portion of the farm Krone as well as a Portion of the Farm Endora 66MS adjacent to Venetia Mine near Alldays, Limpopo Province. G&A Heritage.
- Huffman, T.N. 2003. Archaeological Assessment of Tourist Developments in the Mapungubwe Cultural Landscape.
- Bonner, P. 2003. Mapungubwe Cultural Heritage Resources Survey: The Recent History of the Mapungubwe Area.
- Nienaber, W.C. 2003. Mapungubwe Rehabilitation Project: Progress Report
- Meyer, A. 2004. A Report on the Stabilization of an Erosion Gully on Mapungubwe Hill: Greefswald 37 MS.
- Pikirayi, 2012, HERITAGE IMPACT ASSESSMENT REPORT AND MANAGEMENT PLAN RELATING TO THE ESTABLISHMENT OF THE VELE COLLIERY NEAR MAPUNGUBWE WORLD HERITAGE SITE, MUSINA, LIMPOPO PROVINCE: SOUTH AFRICA

An extensive survey for archaeological sites on the farms Venetia 103MS, Rugen 105MS and Krone 104MS was undertaken by Mr. E.O.M. Hanisch of the University of Venda during 1989. The pipeline route between the Venetia Mine and the well fields on Schroda 46MS and and Greefswald 37MS was also inspected and during the course of its excavation was periodically checked to see if any archaeological finds were unearthed.



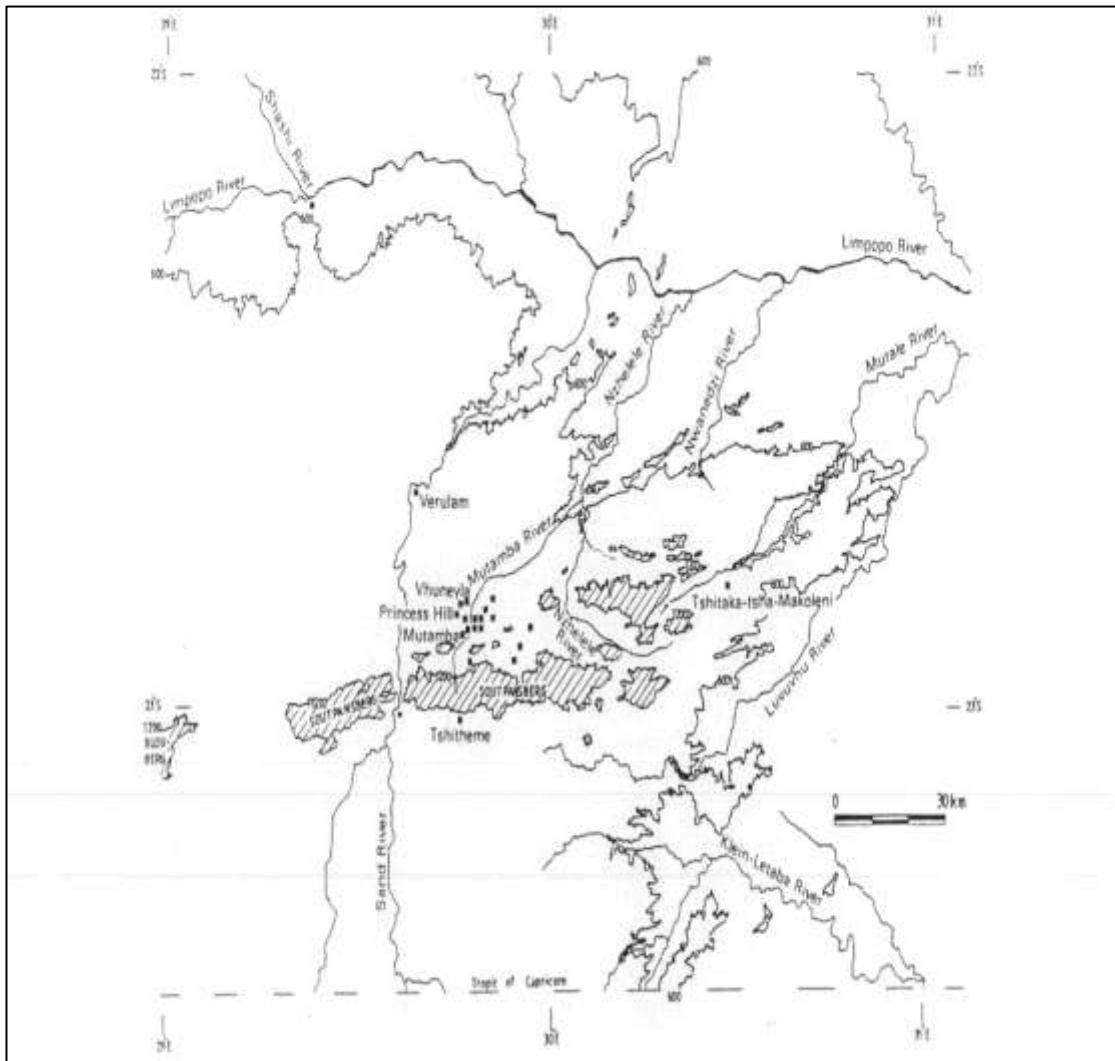


Figure 8. Distribution of Mapungubwe Pottery from Loubser 1988

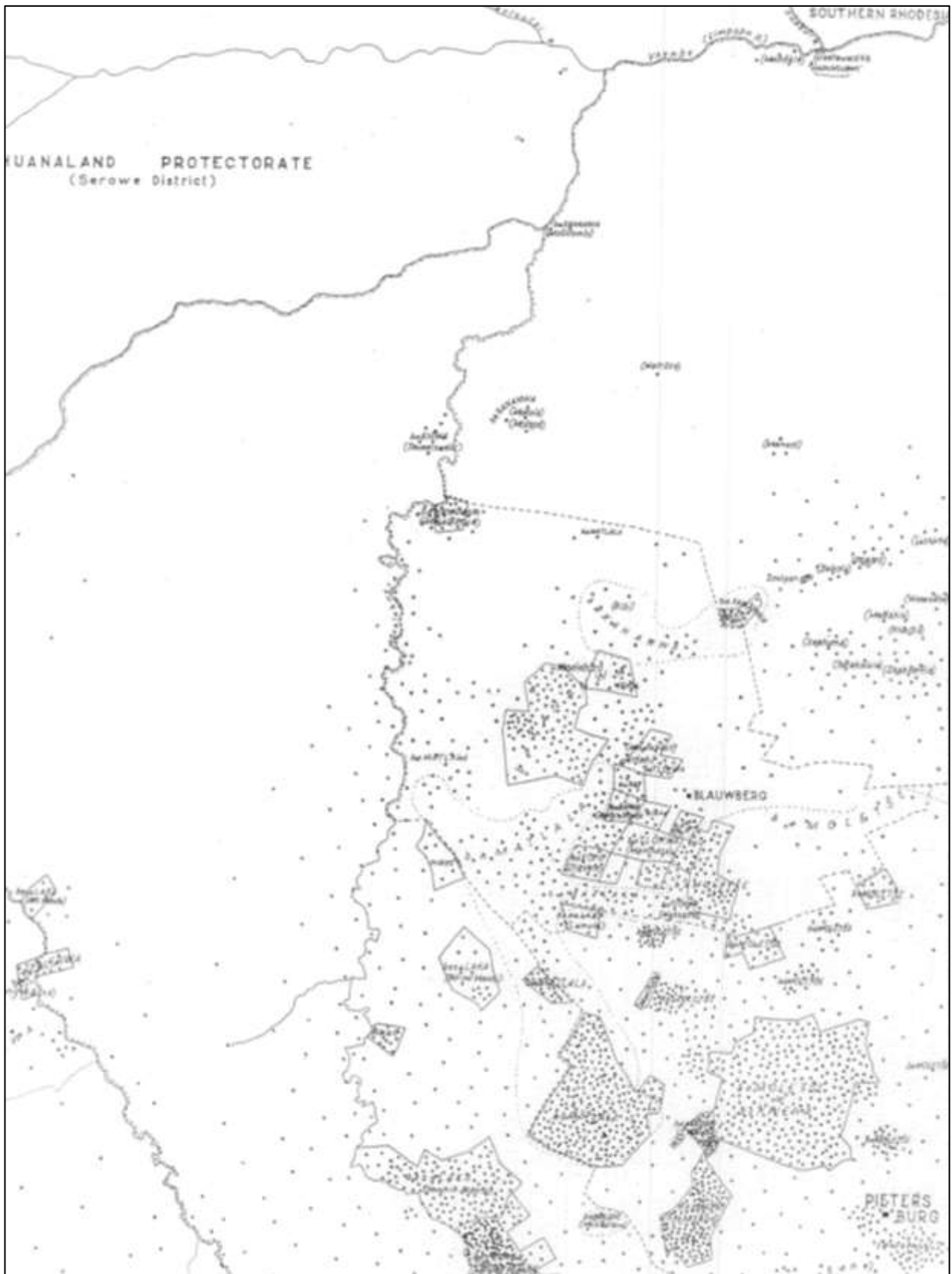


Figure 9. Distribution of African People in North West Transvaal from Van Warmelo 1935



Figure 10. Distribution of pre-Difiquane Chiefdom (from Parsons 1945)

## The Current MLC Buffer

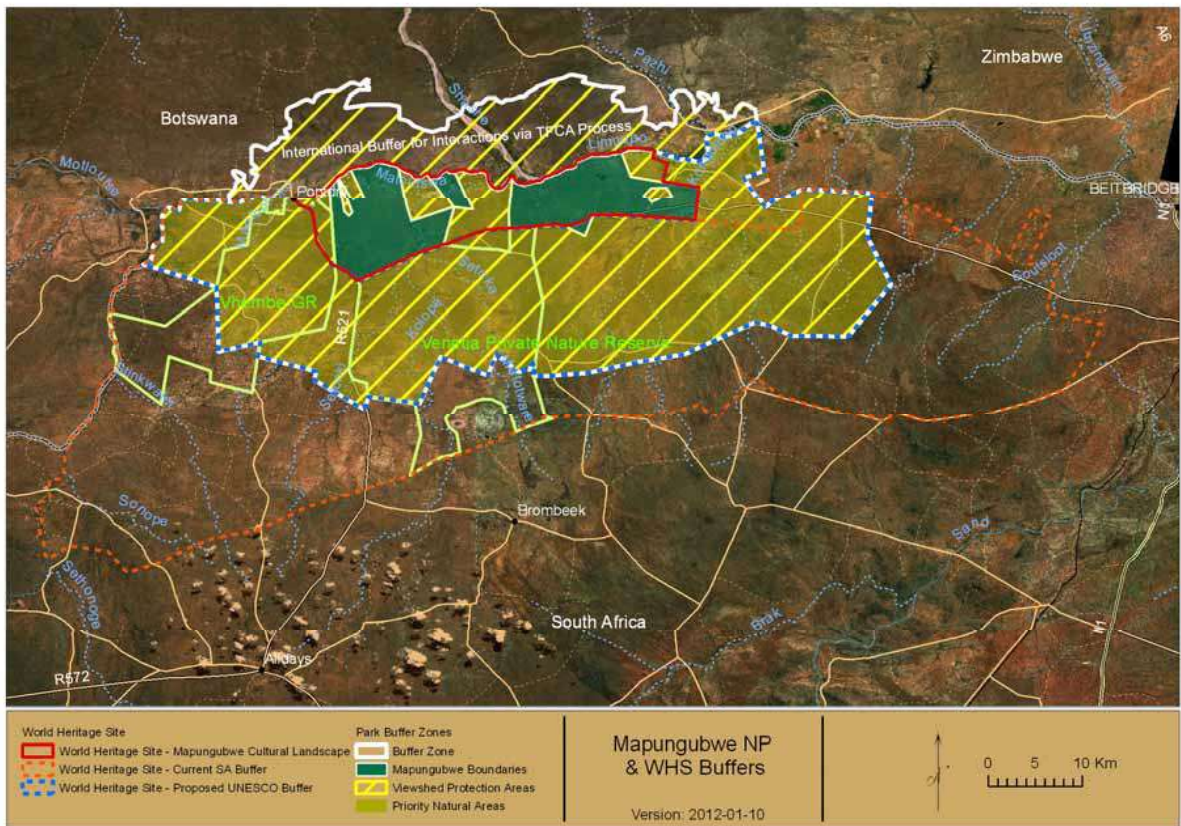


Figure 11. Mapungubwe Buffer

The red line in Fig 6 shows the extent of the generally excepted Mapungubwe WHS.

“Many World Heritage properties face problems that directly or indirectly derive from the situation of their buffer zone. New constructions within a buffer zone may have an impact on the World Heritage property and could threaten its Outstanding Universal Value; a different legal status of a buffer zone could also impact the conservation, the protection or management plan of a site.” (<http://whc.unesco.org/en/events/473>)

### **The Origins of Mapungubwe Project (WITS Phase)**

Since the 1990s, Wits archaeologists have worked in the Mapungubwe landscape investigating Stone Age, Rock Art and Iron Age sites. They concentrated on the last 2000 years. The systematic survey of the National Park and buffer zone, including Little Muck, Schroda and Venetia, has now recorded some 1000 Iron Age sites. Using this data, various graduate students have investigated ethnic stratification (Calabrese PhD 2005), glass beads and international trade (Wood MA 2005), the ethno-archaeology (Murimbika PhD 2006) and archaeology (Schoeman PhD 2006) of rainmaking, the relationship of settlements to the landscape (du Piesanie MSc 2008), faunal remains (Fatherley MSc 2009), agricultural production (Chandler Honours 2009) and spherulites in cattle dung. Current research includes settlements during the Khami Period (du Piesanie PhD) and herding strategies.

Although the survey has not included the study area, they have been investigating neighbouring properties and the results of site location patterns were useful in this study.

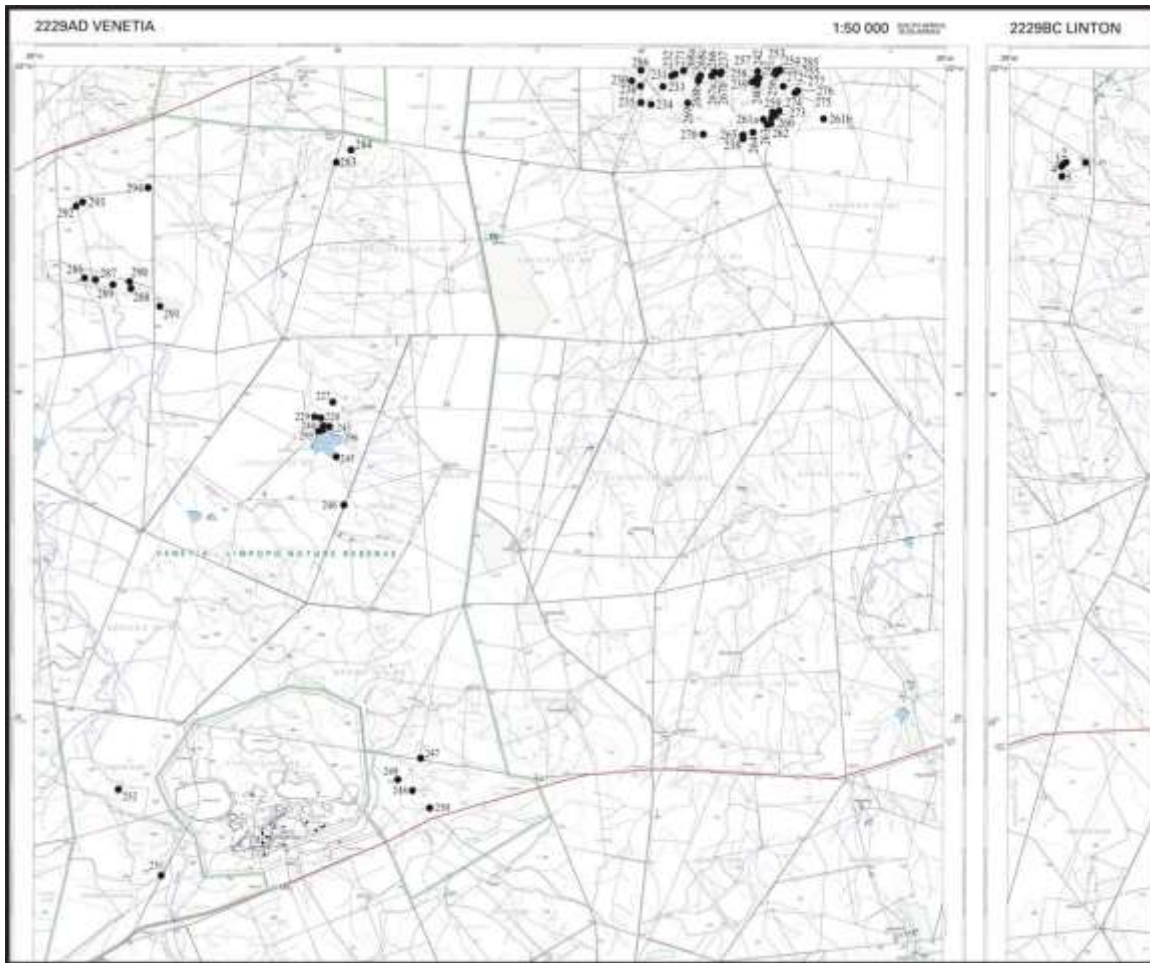


Figure 12. Results of the 2008 season

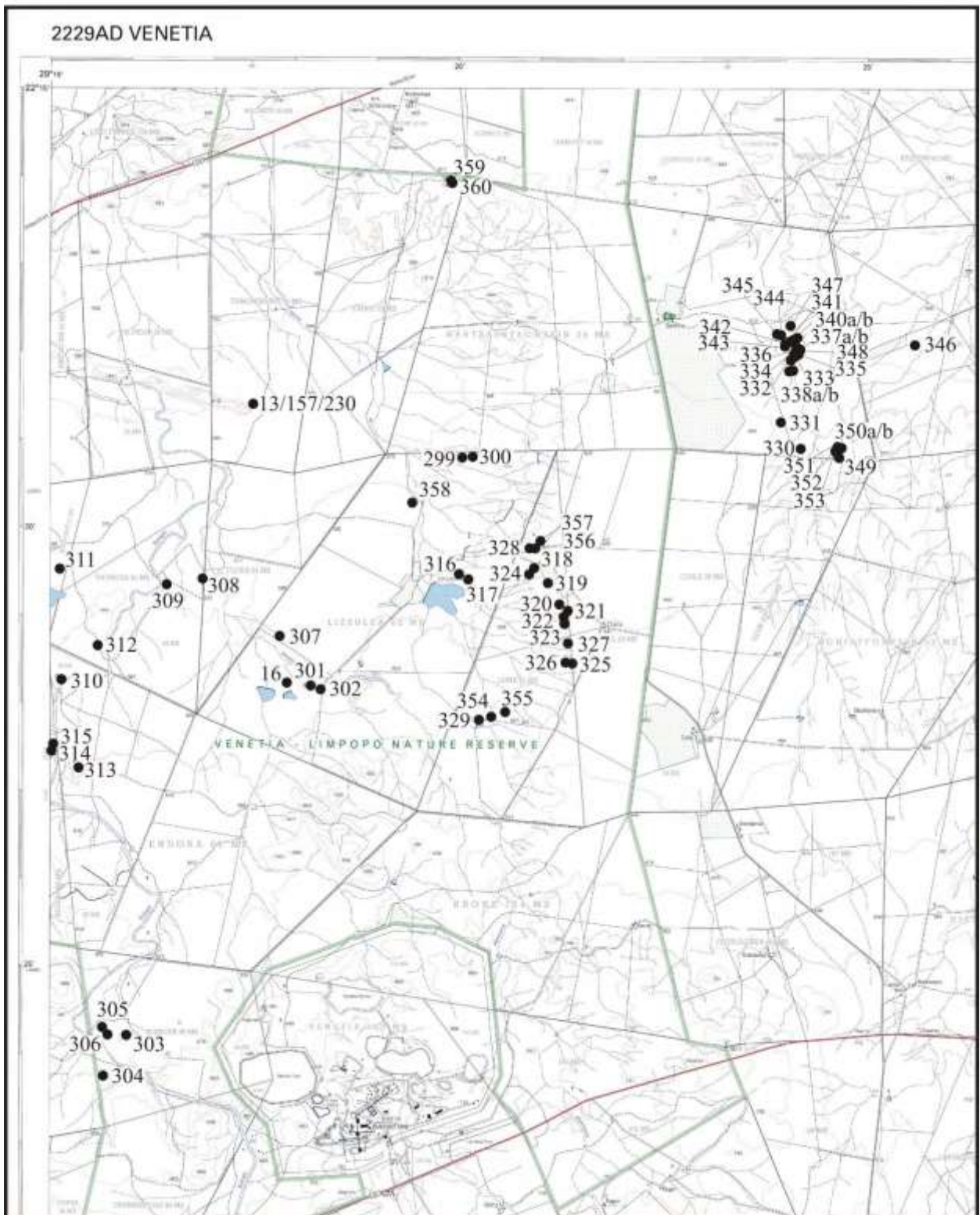


Figure 13. Results of the 2009 - 2010 season

It is significant to note that documented sites were clustered along riverbeds or other sources of water or around elevated areas.

## Impacts Anticipated

In 2003 the SAHRA compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

### TYPE OF RESOURCE

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

### TYPE OF SIGNIFICANCE

#### 1. HISTORIC VALUE

It is important in the community, or pattern of history

- Important in the evolution of cultural landscapes and settlement patterns
- Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

#### 2. AESTHETIC VALUE

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified

aesthetic qualities of the cultural environs or the natural landscape within which it is located.

- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

### 3. SCIENTIFIC VALUE

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

### 4. SOCIAL VALUE

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

## **DEGREES OF SIGNIFICANCE**

### 1. RARITY

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

### 2. REPRESENTIVITY

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.



- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

The table below illustrates how a site's heritage significance is determined

Spheres of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific Community			

What other similar sites may be compared to this site?

## Impact Statement

### Assessment of Impacts

#### Heritage Environments that will be affected

Archaeological Sites - Pre-Contact Heritage (Stone Age Sites)

Proposed 75 MW site and associated infrastructure (roads and power lines)

*Nature of Impacts:* All the proposed development activities could negatively affect sites associated with the Stone Age.

*Extent of Impacts:* Localised damage to the sites (see *Impact Statement* section for application).

Nature of Impact: Possible post-contact site could be damaged locally by excavation activities and associated activities		
	Without Mitigation	With Mitigation
Extent	<b>Local (2)</b>	<b>Local (2)</b>
Duration	<b>Long term (5)</b>	<b>Long term (5)</b>
Magnitude	<b>Medium (4)</b>	<b>Low (1)</b>
Probability	<b>Probable (3)</b>	<b>Improbable (1)</b>
Significance	<b>Medium (33)</b>	<b>Low (8)</b>
Status	<b>Negative</b>	<b>Positive</b>
Reversibility	<b>Irreversible</b>	<b>Irreversible</b>
Irreplaceable loss of resource	<b>Yes</b>	<b>No</b>
Can impacts be	<b>No</b>	<b>Yes</b>

mitigated		
Mitigation	<b>Excavation activities should be monitored by a qualified heritage practitioner</b>	
Cumulative impacts	<b>None</b>	
Residual impacts	<b>Loss of heritage related information</b>	

### **Paleontological sites**

*Nature of Impacts:* No paleontological sites of high value could be identified. Paleontological sites could be affected if bedrock was to be disturbed during the excavation activities associated with the construction of the foundations. It was however determined that the ground intrusion of the development would be limited and that base rock would not be affected. A paleontological study for this general area was commissioned, however and can be made available should it be found necessary.

*Extent of Impact:* Localised damage to possible paleontological sites where bedrock is close to the surface or exposed.

Nature of Impact: Paleontological sites could be affected if bedrock was to be disturbed during the excavation activities associated with the construction.		
	Without Mitigation	With Mitigation
Extent	<b>Local (2)</b>	<b>Local (2)</b>
Duration	<b>Short term (2)</b>	<b>Long term (5)</b>
Magnitude	<b>Low (2)</b>	<b>Low (1)</b>
Probability	<b>Improbable (2)</b>	<b>Improbable (1)</b>
Significance	<b>Low (12)</b>	<b>Low (8)</b>
Status	<b>Negative</b>	<b>Positive</b>
Reversibility	<b>Irreversible</b>	<b>Reversible</b>
Irreplaceable loss of resource	<b>Yes</b>	<b>No</b>
Can impacts be mitigated	<b>No</b>	<b>Yes</b>
Mitigation	<b>No further mitigation is recommended provided bedrock is not to be disturbed</b>	
Cumulative impacts	<b>None</b>	
Residual impacts	<b>None</b>	

### **Mitigation**

Paleontological monitoring during excavation activities if bedrock is to be disturbed.

### **Built Environment**

Although some built structures were noted, none will be affected by the proposed development.

*Nature of Impacts:* No built environment sites were located within the study area.

*Extent of Impact:* No damage is anticipated as no sites were identified.

Nature of Impact: No sites falling within the Built Environment were identified within the study.		
	Without Mitigation	With Mitigation
Extent	<b>Local (1)</b>	<b>Local (1)</b>
Duration	<b>Short term (1)</b>	<b>Long term (1)</b>
Magnitude	<b>Low (1)</b>	<b>Low (1)</b>
Probability	<b>Improbable (1)</b>	<b>Improbable (1)</b>
Significance	<b>Low (3)</b>	<b>Low (3)</b>
Status	<b>Positive</b>	<b>Positive</b>
Reversibility	<b>Reversible</b>	<b>Reversible</b>
Irreplaceable loss of resource	<b>No</b>	<b>No</b>
Can impacts be mitigated	<b>Yes</b>	<b>Yes</b>
Mitigation	<b>No further mitigation is recommended</b>	
Cumulative impacts	<b>None</b>	
Residual impacts	<b>None</b>	

### **Mitigation**

No sites were identified and therefore no mitigation is recommended.

### **Cultural Landscape – Visual Impact**

Several possible cultural landscape components were identified especially associated with the Mapungubwe WHS Cultural Landscape (MCL)

*Nature of Impacts:* The construction of the PV/CPV Site could result in alterations to the visual characteristics of the landscape.

*Extent of Impact:* Limited impacts on the cultural landscape are anticipated due to the influence of the existing Venetia Diamond Mine.

Nature of Impact: Limited impacts on the cultural landscape are anticipated.		
	Without Mitigation	With Mitigation
Extent	<b>Local (2)</b>	<b>Local (2)</b>
Duration	<b>Short term (2)</b>	<b>Long term (2)</b>
Magnitude	<b>Low (1)</b>	<b>Low (1)</b>
Probability	<b>Improbable (3)</b>	<b>Improbable (3)</b>

Significance	<b>Low (15)</b>	<b>Low (15)</b>
Status	<b>Positive</b>	<b>Positive</b>
Reversibility	<b>Reversible</b>	<b>Reversible</b>
Irreplaceable loss of resource	<b>No</b>	<b>No</b>
Can impacts be mitigated	<b>Yes</b>	<b>Yes</b>
Mitigation	<b>No further mitigation is recommended</b>	
Cumulative impacts	<b>None</b>	
Residual impacts	<b>None</b>	

### **Mitigation**

No further mitigation is recommended.

### **Selection of alternatives**

No alternatives were indicated.

### **Heritage Management Planning**

#### **Minimising the impact on Archaeological Sites (as per the NHRA)**

Objective 1: Minimising the impact on archaeological sites

The construction of the PV/CPV array could impact on unidentified sites of archaeological importance.

Project Component	PV/CPV Array, power lines, roads and construction camps
Potential Impact	Destruction of sub-surface archaeological sites
Activity/Risk source	Foundations, power lines and roads
Mitigation Target	Conserve archaeological sites

Mitigation: Action	Responsibility	Time Frame
Monitoring of any excavation activities during the construction phase of the project.	Contracting of a qualified heritage practitioner to monitor excavations	During excavations associated with the construction phase

Performance Indicator	No destruction of archaeological sites
Monitoring	Monitoring during excavation phase

#### **Minimising the impact on the MCL**

Objective 1: Minimising the impact on the cultural landscape

The proposed site lies outside of the southern boundary of the buffer zone for the Mapungubwe WHS and Cultural Landscape. The bufferzone is poorly

defined and impacts on the MCL is still possible.

Project Component	PV/CPV Array, power lines, roads and construction camps
Potential Impact	Negative impacts on the Mapungubwe cultural landscape
Activity/Risk source	PV/CPV Array, power lines and roads
Mitigation Target	Preservation of cultural landscape components

Mitigation: Action	Responsibility	Time Frame
A panel of heritage experts should formulate a development plan for the proposed development taking into account it's proximity to the MCL. Development parameters should be drawn up. The panel should liaise with the necessary groups and entities to ensure that the development has minimal impact on the MCL	Appointed panel of heritage experts	Before construction commences

Performance Indicator	No impact on Mapungubwe WHS and Cultural Landscape
Monitoring	Throughout construction phase

### **Minimising the impact on Unidentified Sites (as per the NHRA)**

Objective 1: Minimising the impact on unidentified sites

Unidentified or sub-surface sites could still be encountered during the construction phase

Project Component	PV/CPV Array, power lines, roads and construction camps
Potential Impact	Destruction of unidentified sites
Activity/Risk source	Foundations, power lines and roads
Mitigation Target	Minimize impact on unidentified sites

Mitigation: Action	Responsibility	Time Frame
Monitoring of excavation	Contracted heritage	During construction

activities during the construction phase of the project.	practitioner	phase
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Performance Indicator	No destruction of archaeological sites
Monitoring	Monitoring during construction phase

### **Minimising the impact on Burial and Grave Sites (as per the NHRA)**

Objective 1: Minimising the impact on burial and grave sites
The placement of the PV/CPV Array and associated infrastructure could impact on unidentified burial or grave sites

Project Component	PV/CPV Array, power lines, roads and construction camps
Potential Impact	Destruction of grave and burial sites
Activity/Risk source	PV/CPV Array foundations, power lines and roads
Mitigation Target	Mitigate impacts on burial or grave sites

Mitigation: Action	Responsibility	Time Frame
On uncovering a possible grave or burial site it is imperative that construction be ceased immediately. The area should be marked and a heritage practitioner be informed immediately.	Environmental control officer	Immediately

Performance Indicator	Mitigation of burial and grave sites
Monitoring	No monitoring is required

## **Discussion on Site Location and Mapungubwe CL**

The study area is located on a slight rise to the south of the Venetia Mine. The area investigated showed several characteristics that would indicate a likely absence of heritage sites within. Several Iron Age and Stone Age sites have been identified in the surrounding areas. Most of these were identified through the Wits University regional survey. Analysis of the identified sites in this study indicated the following pre-requisites for sites;

- Iron Age sites were all found within 1km of a watercourse (many of these are now dried up, however could have been holding water earlier.
- The predominant amount of Stone Age sites was found close to sandstone or granite ridges or on dried-out pans.

- A regional survey performed by the author on proposed development areas for the Mapungubwe National Park also indicated that areas where calcrete deposits were dominant were never occupied. The reason for this is unclear however, it could possibly be due to the significant increase in poisonous invertebrates within these areas (pers. observation).
- Watersheds in-between run-off areas were distinctly devoid of any occupational sites.
- Heritage sites were found to be clustered close to each other rather than evenly spread out over the study area.

The above information relates directly to the study area resulting in the postulation that it is not conducive to occupation. The site is located on a watershed ridge where no sites have been identified by any other study. There is a poorly defined drainage running from north to south in the eastern third of the study area. This was investigated thoroughly and no sites were found along it. The predominant base substrate is calcrete, which does not hold sites. No stony ridges are located on the study area. It is flat and featureless at the top of the watershed.

Historic investigations also show a distinct lack of occupation in the study area. The 1935 Van Warmelo map of tribal occupational areas showed no sites within a 30km radius from the study area. The 1988 Mapungubwe Pottery survey by Loubser also indicates a distinct lack of deposits within the study area.

## **Conclusion**

The Mapungubwe Cultural Landscape (MCL) can be seen to include the study area even though the current buffer zone excludes it. The MCL was defined based on the occurrence of high-value heritage sites within an exceptional natural backdrop. Although these sites are highly significant their distribution is governed by very specific requirements. These are discussed in the previous section and they are found to be distinctly absent in the study area. The importance of the MCL is based on both tangible and intangible components and even though high profile heritage sites could be absent from the area it could still have defining characteristics that makes it part of the larger MCL.

The development will result in an alteration of the local landscape to a more industrial and modern feel, however this has in large already happened with the development of the Venetia mine to the south. The visual impact of the proposed development will therefore be blocked from the northern perspective by the mining activities already underway.

Taken the significance of the MCL and the ephemeral characteristics that define it, it is suggested that development be approached very carefully due to the myriad of unforeseen impacts that could later result from a seemingly small alteration to the landscape. For this reason it is recommended that the developer puts in place a panel of heritage experts to analyse the

specific development components against the preservation requirements of the MCL. This panel will then liaise with the relevant authorities and interest groups and ensure that all possible impacts are mitigated before any construction begins and that decisions are taken in line with the proposed Management Plans for the MCL WHS. Monitoring of unforeseen effects will also be necessary during, before and after construction.

Although it is unlikely that any finds will be made during the construction phase of the project, the MCL is of such significance that it is proposed that the construction activities are monitored to ensure that no sub-surface sites sustains damage. It is the opinion of the author that the social and environmental benefits of the proposed project far outweigh the perceived possible negative impacts on the MCL.



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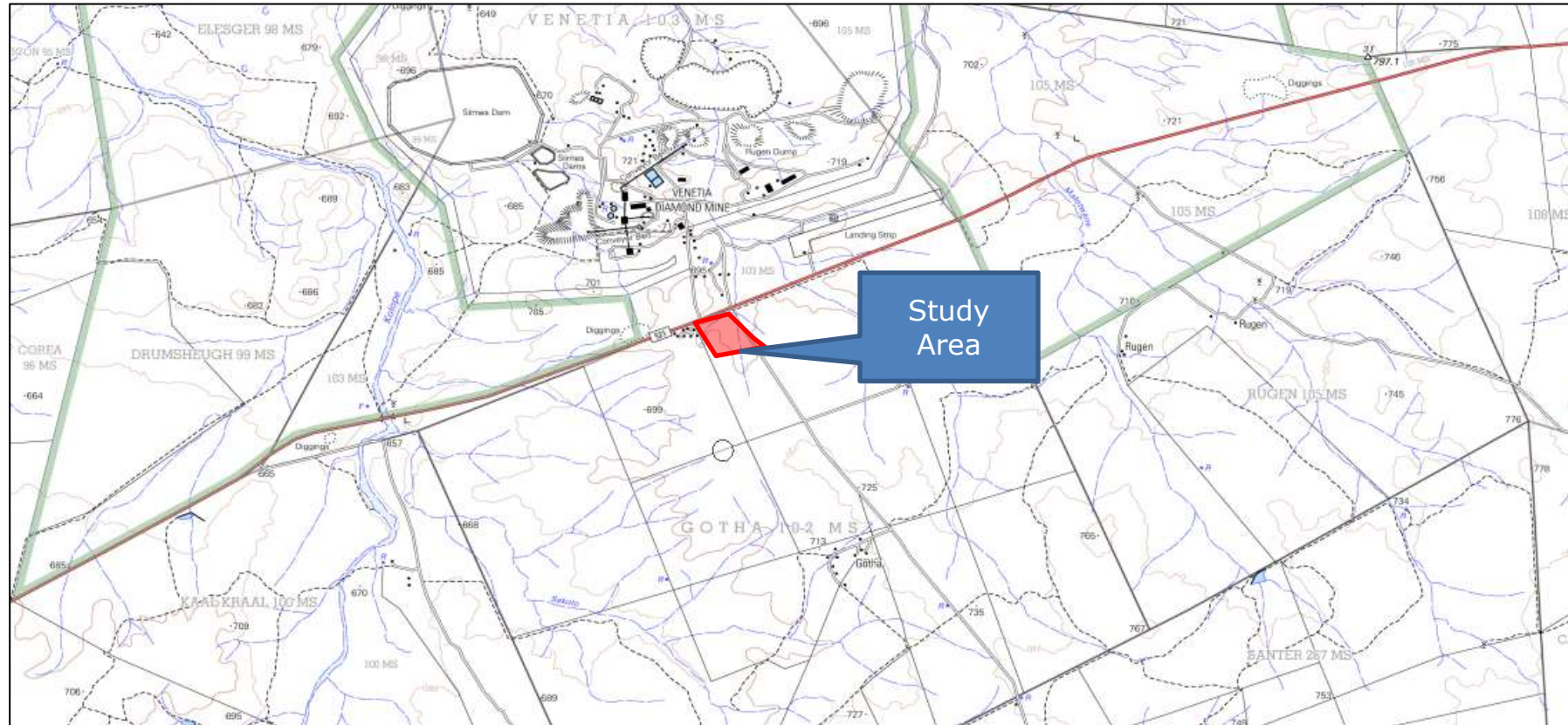
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## APPENDIX A



1:50 000 Map Location  
Map Reference 2229 DA



Alldays (up to 75 MW) - Photovoltaic (PV) or Concentrated Photovoltaic (CPV) Solar Energy Facility on Farm Gotha -HIA