



BIO THERM ENERGY (PTY) LTD

**TWO 75MW SOLAR PHOTOVOLTAIC (PV)
ENERGY FACILITIES – TLISITSENG
PROJECTS**

Heritage Scoping Report

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Executive Summary

PGS Heritage (Pty) Ltd (PGS) was appointed by SiVEST Environmental Division (SiVEST) to undertake a Heritage Scoping Report that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed development of two 75mw solar photovoltaic (PV) energy facilities near Lichtenburg, North West Province.

The Heritage Scoping Report has shown that the proposed Tlisitseng Solar projects may have heritage resources present on the property. This has been confirmed through archival research and evaluation of aerial photography of the sites.

Heritage sites

Through the analysis of the aerial photographs and available maps of the study area no obvious heritage sensitive areas were identified inside the study area. The only possible sensitivities identified is related to farmsteads situated outside the study area but within close proximity to the proposed development area. These farmsteads' experience of the rural cultural landscape could possibly be impacted on by the development. A single small farmstead was also identified inside the study area and will require assessment during the fieldwork component of the HIA.

Palaeontology

The study area is underlain by Vaalian aged dolomite of the Monte Christo Formation, Chuniespoort Group. Stromatolites are known to occur within these deposits and more modern fossiliferous Caenozoic cave breccias have been recorded associated with carst formation in the dolomite.

A full Palaeontological impact assessment will be required.

Cumulative impacts

An evaluation of the possible cumulative impacts from the combined solar projects in the area (**Table 3** and **Figure 6**) on heritage resources has shown that the biggest envisaged impact could be on the palaeontological heritage of the area with the Watershed Solar Energy facility just northwest of this proposed development increasing the possibility of impacts on the breccias that could occur in the area.

Though with the implementation of mitigation measures these impacts could be transformed into a positive impact through the discovery of previously unknown fossils and the subsequent study of such fossil finds adding to the academic knowledge of the palaeontological resources of the study area.

Possible impacts

The following impacts and possible mitigation associated with this project can be listed as:

- Impacts on palaeontology – **monitoring during construction where needed. Controlled collection of fossils;**
- Impact on historical structures – *evaluation of the identified structures during fieldwork and subsequent documentation of such structures and permitting under Section 34 of the NHRA before destruction;*
- Impact on unidentified graves – demarcation and protection where possible. Relocation of graves should only be considered as last resort and under strict permitting conditions.

Further studies during EIA hase

These findings provide the basis for the recommendation of further field truthing through an archaeological walk down and palaeontological desktop study covering the site. The aim of this will be to compile a comprehensive database of heritage sites in the study areas, with the aim of developing a heritage management plan for inclusion in the Environmental Management Plan as derived from the EIA.

To be able to compile a heritage management plan to be incorporated into the Environmental Management Plan the following further work will be required for the EIA.

- Archaeological walk through of the areas where the project will be impacting;
- Full Palaeontological Impact Assessment, the entails fieldwork and assessment of the potential impacts of the findings of such fieldwork;

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HERITAGE SCOPING REPORT

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1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by SiVEST Environmental Division (SiVEST) to undertake a Heritage Scoping Report that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed development of two 75mw solar photovoltaic (PV) energy facilities near Lichtenburg, North West Province.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites, finds and sensitive areas that may occur in the study area for the EIA study. The Heritage Impact Assessment (HA) aims to inform the Environmental Impact Assessment in the development of a comprehensive Environmental Management Plan 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

PGS Heritage (PGS) compiled this Heritage Scoping Report.

The staff at PGS has a combined experience of nearly 70 years in the heritage consulting industry. PGS and its staff have extensive experience in managing the HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, Project manager for this project, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation, as well as being accredited as a Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

1.3 Assumptions and Limitations

The aim of the scoping document is to identify the possible types of heritage resources that might be present in the study area, as well as possible hotspots for the locality of such resources.

This report can in no way be seen as the final report and study phase for the EIA project and it assumes that a full ground truthing and survey will be conducted during the EIA phase of the project to identify heritage sites present in the impacted areas.

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:

- i. National Environmental Management Act (NEMA), Act 107 of 1998
- ii. National Heritage Resources Act (NHRA), Act 25 of 1999
- iii. 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.

- i. National Environmental Management Act (NEMA) Act 107 of 1998
 - a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
 - b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
 - c. Environmental Impact Assessment (EIA) – Section (32)(2)(d)
 - d. Environmental Management Plan (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
 - a. Protection of Heritage Resources – Sections 34 to 36; and
 - b. Heritage Resources Management – Section 38
- iii. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - a. Section 39(3)

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...” 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, and those developments administered through NEMA, and MPRDA legislation. In the latter cases, the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Sections of these Acts relevant to heritage (Fourie, 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, “...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”.

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of

the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

Refer to **Appendix A** for further discussions on heritage management and legislative frameworks

Table 1: Terminology

Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
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 Agency
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

Archaeological resources

This includes:

- i. 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;

- ii. 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;
- iii. 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;
- iv. 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:

- i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- ii. carrying out any works on or over or under a place;
- iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- iv. constructing or putting up for display signs or boards;
- v. any change to the natural or existing condition or topography of land; and
- vi. 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, such as the caves with archaeological deposits identified close to both development sites for this study.

Holocene

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

Late Stone Age

The archaeology of the last 20 000 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 20-300 000 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.

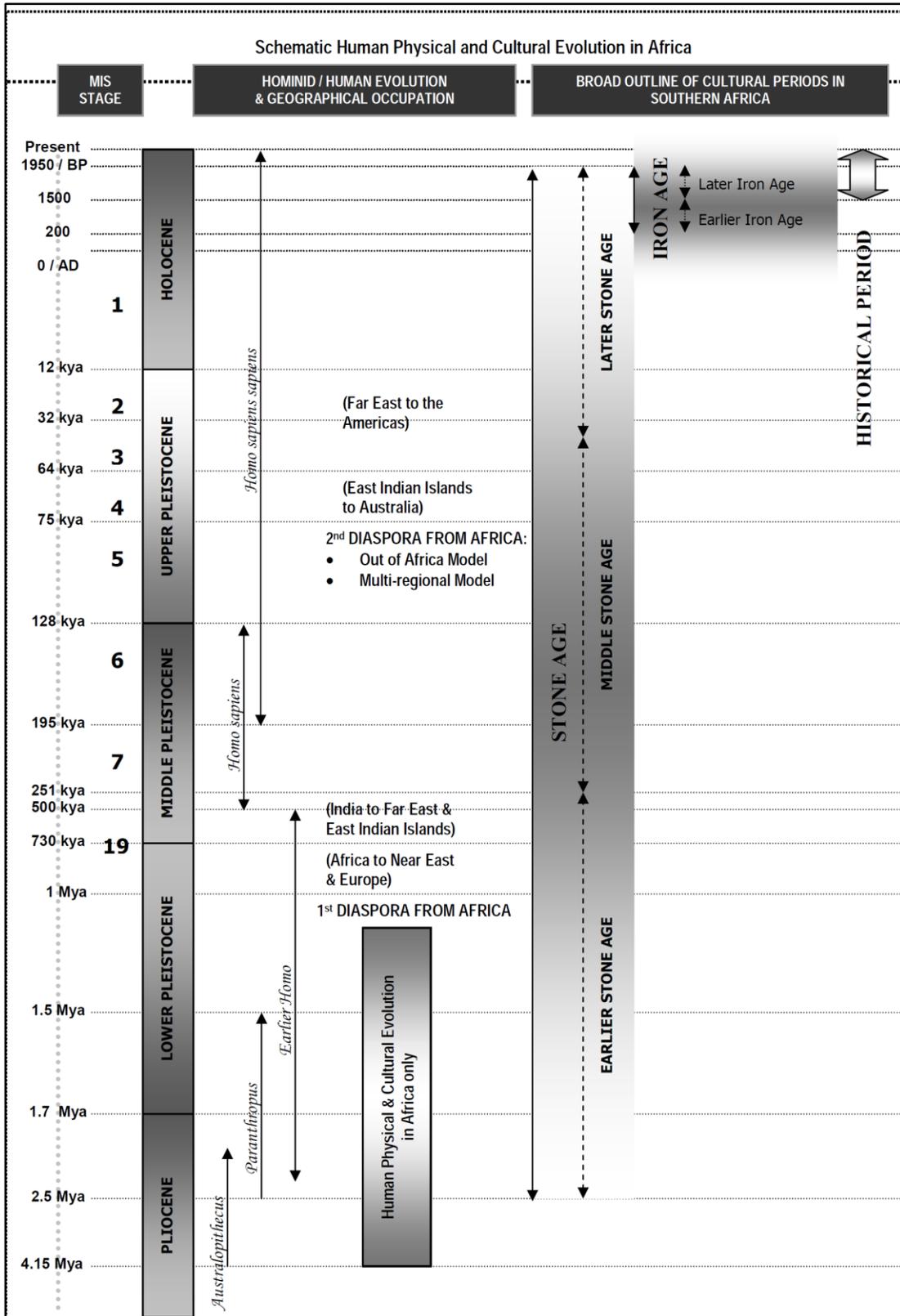


Figure 1: Human and Cultural Timeline in Africa (Morris, 2008)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

The proposed project is located within the North West Province approximately 6km north of Lichtenburg. It falls within the Ngaka Modiri Molema District (Figure 2).

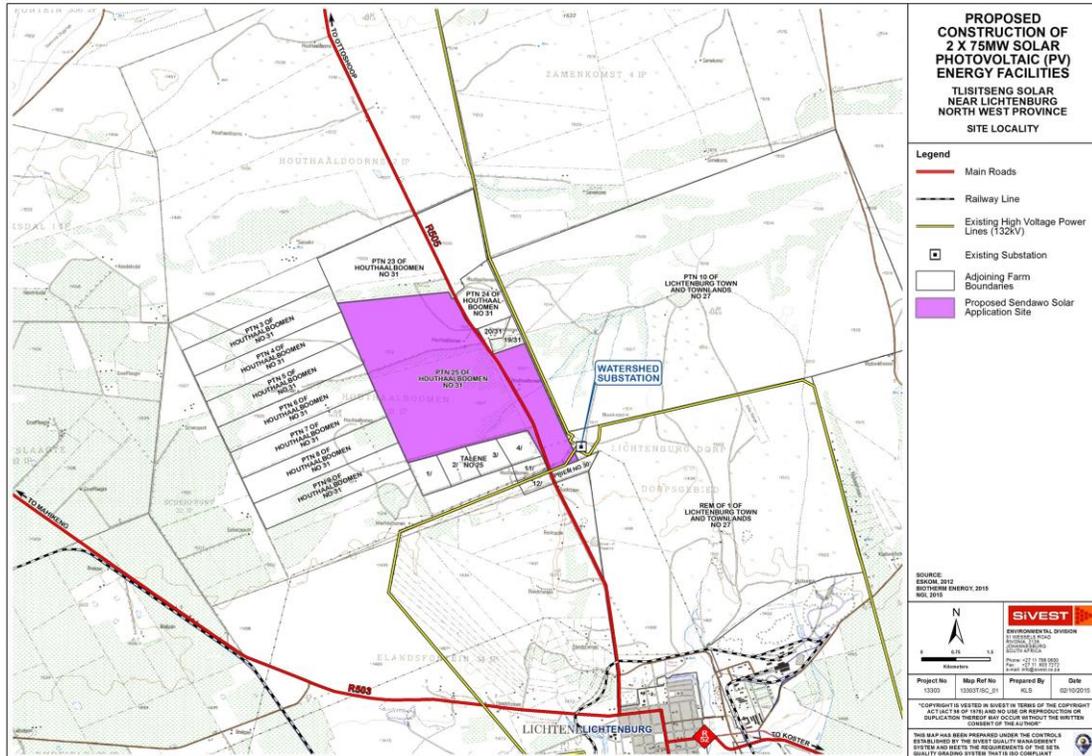


Figure 2: Tlisitseng Solar Locality

The application site is approximately 1000ha however the buildable area will be significantly smaller than this and will be determined by sensitive areas identified during the Scoping Phase of the EIA. Tlisitseng Solar will consist of two (2) 75MW solar PV facilities, namely Tlisitseng Solar 1 and Tlisitseng Solar 2. Additionally, 132kV power lines will connect the PV facilities to the proposed Tlisitseng substation.

Panels will be either fixed axis mounting or single axis tracking solutions, and will be either crystalline silicon or thin film technology. In addition to the PV panels each project will consist of:

- An onsite switching station, with the transformers for voltage step up from medium voltage to high voltage;

- The panels will be connected in strings to inverters and inverter stations will be required throughout the site. Inverter stations will house 2 x 1MW inverters and 1 x 2MVA transformers;
- DC power from the panels will be converted into AC power in the inverters and the voltage will be stepped up to 22-33kV (medium voltage) in the transformers.
- The 22-33kV cables will be run underground in the facility to a common point before being fed to the onsite switching station where the voltage will be stepped up to 132kV.
- A power line with a voltage of 132kV to the proposed Tlisitseng substation;
- A laydown area for the temporary storage of materials during the construction activities;
- Access roads and internal roads;
- A car park and fencing; and
- Administration, control and warehouse buildings.

3 ASSESSMENT METHODOLOGY

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

3.1 Methodology for Assessing Heritage Site significance

PGS compiled this Heritage Scoping Document as part of the Heritage Impact Assessment (HIA) report for the proposed Tlisitseng Solar facilities. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

3.1.1 Scoping Phase

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

3.1.2 Impact Assessment Phase

Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by a qualified archaeologist, which aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

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

Appendix B, outlines the Plan of study for the Heritage Impact Assessment process, while **Appendix C** provides the guidelines for the impact assessment evaluation that will be done during the EIA phase of the project.

4 BACKGROUND RESEARCH

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 Previous Studies

A search of the SAHRIS (SA Heritage Resources Information System) database identified the following Heritage Impact Assessment (HIA) and Palaeontological Impact Assessment (PIA) reports for the study area and general surrounding region:

- Heritage Impact Assessment for the proposed rerouting of four existing 132kv power lines at the Eskom Watershed Substation, Lichtenburg, Ditsobotla Local Municipality, Ngaka Modiri Molema District Municipality, North-West Province. PGS Heritage (Pty) Ltd
- Cultural Heritage Resources Impact Assessment of Portion 151 Of Lichtenburg Town and Townlands 27 IP (Lichtenburg Extension 10), North West Province. Dr Udo Küsel. African Heritage Consultants CC. Prepared for Lockeport Projects (Pty) Ltd. July 2008
- Heritage Impact Report for the Proposed 88kv Power Line from Watershed Substation, Lichtenburg, to the Mmabatho Substation, North West Province. J van Schalkwyk. Prepared for Arcus Gibb. November 2008.
- Cultural Heritage Resources Impact Assessment of a Feedlot on the Farm Kalkfontein, Lichtenburg District, North West Province. Dr Udo Küsel. African Heritage Consultants CC. Prepared for Ekolnfo CC. May 2011.
- Heritage Impact Assessment for the Proposed Lichtenburg Solar Park, North-West Province. Compiled for Africa Geo-Environmental Services (AGES) by Marko Hutten, Hutten Heritage Consultants. May 2012.
- Lichtenburg Solar Park, North West Province - Palaeontological Impact Assessment. Prof. Bruce Rubidge. Prepared for AGES (Pty) Ltd. July 2012.

The above-noted studies identified the following sites:

4.1.1 Archaeological and Historical Sites:

- No sites dating to the Stone Age were identified in the region of the study area
- No sites dating to the Iron Age were identified in the region of the study area.
- A number of features dating to the historic period were identified in the region surrounding the study area. This includes the remains of an old house in Bakerville, and a number of cemeteries. However, none of these sites is located within or adjacent to the study area.

4.1.2 Palaeontological sites:

The PIA for the Watershed Substation upgrade, which is located immediately southeast of the study area, noted the following:

“The study area is underlain by Vaalian aged Chert-rich Dolomites of the Monte Christo Formation, Malmani Subgroup, Chuniespoort Group, Transvaal Sequence. The Monte Christo Formation begins with an erosive breccia and continues with stromatolitic and oolitic platformal dolomites.

Stromatolites are recorded from the dolomite layers. Highly fossiliferous Caenozoic cave breccias are also known to occur within the dolomite layers, but are not mapped individually. These fossiliferous deposits often contain more recent mammal and hominid fossils, e.g. in the Cradle of Humankind.”



Figure 3: Geology of the study area (in purple)

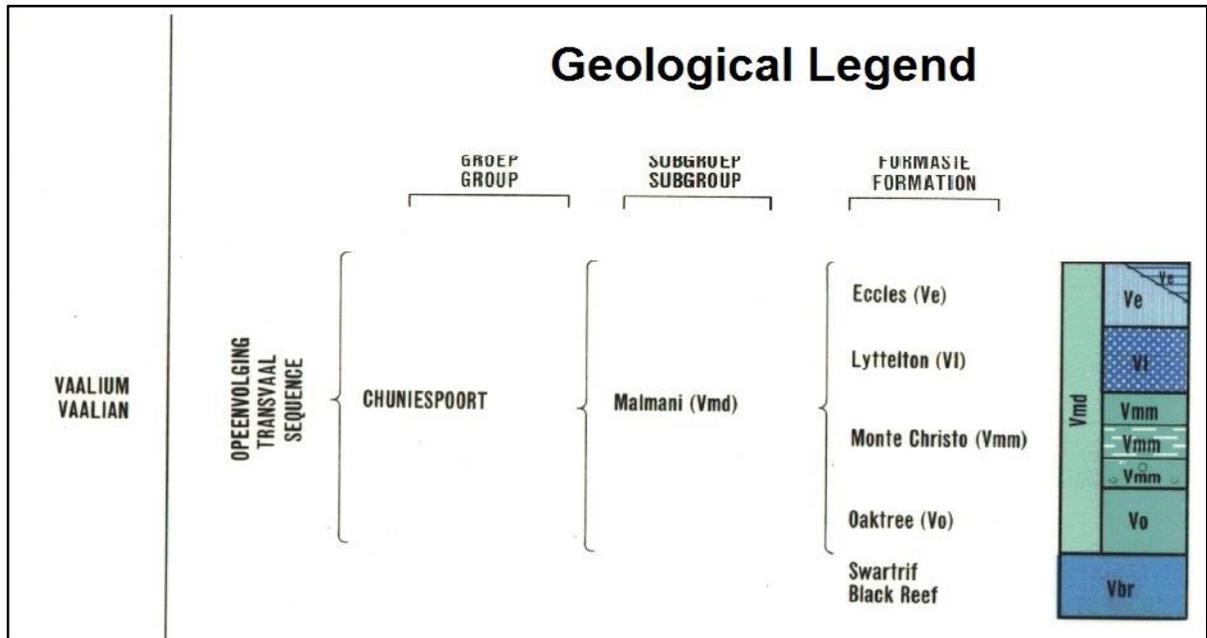


Figure 4: Geological legend for Figure 3

4.2 Archival findings

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 History of Lichtenburg Town and Surrounding Area

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age (ESA). The Earlier Stone Age 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 is known as the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial handaxe. The Acheulian phase dates back to approximately 1.5 million years ago. The rock engraving site at Bosworth Farm, near Klerksdorp also contains many stone artefacts (lithics) which date to over one million years ago (http://www.nasmus.co.za/departments/rock-art/public-rock-art-sites). No sites are known in or near the study area.
250 000 to 40 000 years ago	The Middle Stone Age (MSA). The Middle Stone Age 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. No sites are known in the vicinity of the study area.
40 000 years ago to the historic past	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. Rock engravings are known from the wider vicinity of the study area (Bergh, 1998). See below for two well-known sites in the greater vicinity of the study area (Thaba Sione and Bosworth Farm).
Rock Art	<p>Thaba Sione: this site is located in the middle of Thaba Sione town, some 60km south-west of Mmabatho. The site contains over 559 engravings located on rocks and boulders. The engravings are dominated by depictions of rhinoceros – some have been rubbed smooth. There are also buffalo, eland, shamanic human figures, wildebeest and a rare lizard. The site is still important today to local Tswana people and is used by the Zion Christian Church as a rain-making centre. (http://www.nasmus.co.za/departments/rock-art/public-rock-art-sites)</p> <p>Bosworth Farm: this site is located some 22km north-west of Klerksdorp on the Bosworth Farm property. It is a large site with over 400 San and Khoe (herder) rock engravings. There many depictions of human figures as well as animals: a charging rhinoceros, a large elephant, a flight of birds. There are also many geometric motifs. The site also has many stone artefacts (lithics) which date to over one million years ago. Bosworth is one of South Africa's 12 Rock Art sites formally protected under the National Heritage Resources Act (25 of 1999). (http://www.nasmus.co.za/departments/rock-art/public-rock-art-sites)</p>
AD 200 - 900	Early Iron Age (EIA). Known sites in the region include Kruger Cave near Rustenburg and Broederstroom near Hartebeespoort Dam. Both sites are located to the east of the study area and date to approximately 460 AD (Mason 1974). No recorded sites were located within the study area during the desktop study.
AD 900 - 1300	Middle Iron Age (MIA). No recorded sites were located during the desktop study.
AD 900 - 1840	Late Iron Age (LIA). Various well-known sites from this period are located in the greater North-West Province, including the stone walled complexes at Buispoort and Braklaagte, the Makgame megasite, the 18 th century capital at Kaditshwene and the copper mines at Dwarsberg in the Madikwe Game Reserve. These sites date to between the 15 th and 19 th centuries and record the arrival and development of the early Moloto Sotho-Tswana speakers (Boeyens, 2003).
	<p>Four groups are of importance in the study area. These are the Bakolobeng, Batlounge, Banogeng, and the Barolong. The following information was derived from a study conducted by the Lichtenburg Museum under P. M. Ntamu, 1996. The origins of the tribes of the Lichtenburg area follows (Fourie, 2009).</p> <p><i>The Bakolobeng:</i> Oral sources indicate that the Bakolobeng originated from Tsaong near Silverkrans. Chief Kelly Molete concurs with Breutz's informants that the Bakolobeng were led</p>

through the present Kwena-Reserve of Botswana by Chief VI Molete-wa-Modikwagae in about 1769 or 1770, and later moved to Tsaong. Around 1830, they experienced a difficult period, which began with the death of their Chief, Kgosi VIII Molete when the Ndebele Group attacked them. This period of Difagane was also characterised by the Bakolobeng's flight to Thaba 'Nchu (in the Free State) and to Dimawe (Klerksdorp District) where they joined other refugees like the Batlounge and Banogeng. After 1837, the Thaba 'Nchu Group of the Bakolobeng returned and settled temporarily at Bodumatau (Lichtenburg District) until they came into contact with Hermannsburg Mission.

Batlounge:

They are also known as Batlhako, because they were originally with the Batlhako when they departed from the present Pretoria District and migrated to the areas of Rustenburg in about 1650. Oupa Mogorosi, one of the oldest informants, stated that: "... (they) departed from Mabalstadt along with Baphiring ... who controlled a section of people who were later to settle at Putfontein." Breutz's informants hold that in about 1750, the Batlounge became an independent chiefdom and went to settle at Dipakane, in the Klerksdorp area. The Batlounge later went to stay in a farm at Gruisfontein, accompanied by Rev Schnell of the Hermannsburg Lutheran Mission.

At that time the Tribe was so scattered that one section was at Bodibe (Polfontein) and other places in the district. The idea of buying a farm as their ultimate settlement brought them together.

Banogeng:

According to oral sources collected by Breutz, the Banogeng are believed to be an ancient branch of the Digoja, i.e. forerunners of the Batswana Tribes who passed the Mafikeng area in small clan units. They are believed to be related to the Bakubung, Bataung and the Barolong Tribes, who originally shared the same totem; Tholo (Kudu) with them. For reasons better known to themselves; the Banogeng were destroyed and separated even before the period of Mzilikatzi attacks, except for remnants who stayed in the Lichtenburg District. The Ndebele continued to pose a threat to them so that they fled to Dimawe in the District of Klerksdorp. Here they merged with refugees from Baphiring, Batlounge and Bakolobeng Tribes. Except for those who were assimilated into the already mentioned tribal groups, Ramosiane attempted to gather the remains of the Banogeng. They stayed at Kolong (Rietfontein) until 1960 when the tribe applied for its recognition and the re-establishment of the tribe.

The two Barolong tribes:

There are presently so many Barolong Tribes whose origin has been attributed to the first Chief Morolong, and the second Chief Noto. It is interesting to note that the totems, Tholo (Kudu) and Tshipi (Iron), were respectively taken from the names of the Chiefs mentioned. In his book, "History of the Batswana", Natal, 1989, Breutz indicate that "the

	<p>first Tswana Tribe to come to South Africa under the rule of a Chief were the Barolong who arrived sometime between 1 200 and 1 300 or earlier".</p> <p>These migrations which continued even beyond the years 1450 and 1700 made the divisions of the Batswana Tribes like the Bahurutshe and the Bakwena more conspicuous. From 1823 - 1830, several Barolong Tribes fled from their Tribal land in the Transvaal as a result of Bataung raids and the Mzilikazi raids.</p> <p>Towards the end of the eighteenth century, the Barolong had divided into four groups, under Rratlou, Rrapulana, Seleka and Tshidi. The first two groups, namely the Barolong Boo-Ratlou and the Barolong Boo-Rapulana came to stay in the District of Lichtenburg. The Barolong Boo-Rapulana's residence was Lotlhakane (Rietfontein) in the Lichtenburg District. In 1882 moved to Bodibe (Polfontein) in the District of Lichtenburg. The last of the Barolong Boo-Ratloung, Chief Noto Moswete and his tribe were moved to Kopela.</p>
AD 1873	<p>Historical period</p> <p>The town of Lichtenburg: Hendrik Adriaan Greeff was born on the farm Lichtenburg close to Durbanville in the Cape Province. He became a hunter and started to frequent the then ZAR area. Greeff settled in the late 1860 on the farms Doornfontein and Kaalplaats. Potchefstroom was the closest trading centre and approximately 150 km or "14 uur rijdens te paarde" away. A need for a town with a church and shops became stronger and Greeff and the Boers in the area saw Doornfontein with its abundant water, firewood and building material as the designated place.</p> <p>In 1865 the first application for town establishment was addressed to the House of Assembly, signed by 132 males in the area, and they started compiling a number of town regulations. Greeff wanted to name the town Lichtenburg, a name that he carried from his birth and because he wanted it to be a town whose light would shine over the area, not just with regard to hospitality and prosperity, but also in respect of religion.</p> <p>In 1868 the name "Lichtenberg", (a mistake still commonly made) appeared on the official map of the SAR, but the House of Assembly did not react yet. The men met again to discuss the town regulations and to obtain an appeal on speedy proclamation from the House of Assembly. The well-known Voortrekker savant, JG Bantjes, also established himself in Lichtenburg and signed the regulation as witness.</p> <p>Eventually Lichtenburg was officially proclaimed as town in mid-winter on 25 July 1873 by Pres. TF Burgers. (Lichtenburg Museum, 2009; cited in Fourie 2009).</p>
1900-1902	<p>Boer War</p> <p>During the Boer War the town of Lichtenburg was occupied by a British garrison of 620 men under the command of Lieutenant-Colonel CGC Money. The market square was turned into a fortified redoubt and strong pickets and sangars on the outskirts of town. On 3 March 1901, General De la Rey planned to attack the town with the help of General Cilliers and Commandant Lemmer and their followers, amounting to 1200 men. An attacking force of between 300-400 men was to assault the town. Due to the marshy terrain and a premature charge by General Liebenberg, the attack was repulsed with equal loses on both sides (Cloete, 2000).</p>

Diamond Rush 1927	<p>Diamond Rush 1927</p> <p>The Lichtenburg area is known for the 1926-27 diamond rush. In December 1924, a diamond of 3 carats was discovered by the Voorendyk family on the farm Elandsputte. Initial prospecting in 1925 produced a high yield of diamonds and the area was proclaimed as a “diggings” in February 1926. By 1945 a total of 104 diggings were proclaimed on 13 farms. It was the richest public diggings in the world, with the biggest gathering of diggers in history. A shanty town rose within a year or two, which housed in the region of 150 000 people, about 5 times as big as Lichtenburg today. Bakers, called after the owner Albert Baker, and later known as Bakerville, was the "main town". Here the houses and shacks stood 'cheek by jowl' for several kilometers. In the business centre there were as many as 250 diamond buyers' offices, as well as about 60 cafes, shops, barbers, butcheries and other businesses (Lichtenburg Museum, 2009). Bakerville is situated 10 kilometers to the north of Houthaalboomen, the proposed development farm for this project.</p>
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4.2.1 Findings from the studies

Through the analysis of the aerial photographs and available maps of the study area no obvious heritage sensitive areas were identified inside the study area. The only possible sensitivities identified is related to farmsteads situated outside the study area but within close proximity to the proposed development area. These farmsteads' experience of the rural cultural landscape could possibly be impacted on by the development. A single small farmstead was also identified inside the study area and will require assessment during the fieldwork component of the HIA. Figure 5 Indicates the possible heritage sensitive areas.

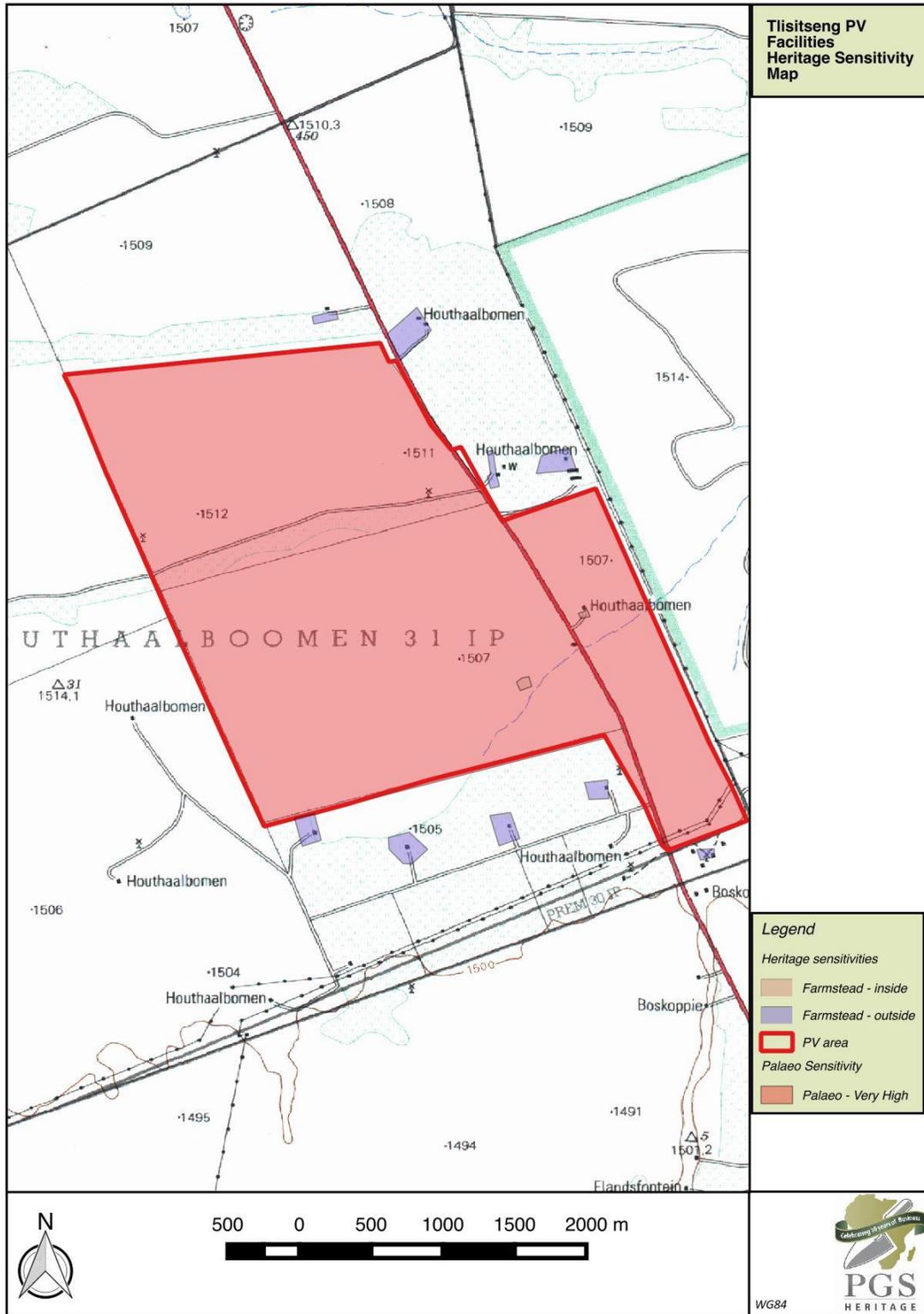


Figure 5: Tlitseng Solar heritage sensitivity map

To be able to compile a heritage management plan to be incorporated into the Environmental Management Plan the following further work will be required for the EIA.

- Archaeological walk through of the areas where the project will be impacting;
- Full Palaeontological Impact Assessment, the entails fieldwork and assessment of the potential impacts of the findings of such fieldwork;

4.3 Environmental Issues and Potential Impacts

ISSUE	Impact on archaeological sites
DISCUSSION	No indication of archaeological finds have been found during the desktop assessment. However this cannot exclude the possibility of archaeological finds .
EXISTING IMPACT	None known
PREDICTED IMPACT	Unidentified archaeological sites and the discovery of such sites during construction can seriously hamper construction timelines. Fieldwork can thus provide valuable information on such site in the study area and provide timeous management of such site through realignment of development or mitigation of such sites where needed.
EIA INVESTIGATION REQUIRED	Archaeological walk down of impact areas
CUMULATIVE EFFECT	None foreseen at this stage.

ISSUE	Impact on palaeontological sites
DISCUSSION	The palaeontological potential of the area has been confirmed as being very high by the palaeontological desktop assessment
EXISTING IMPACT	Site impacted by existing developments such as transmission lines and road networks.
PREDICTED IMPACT	Due to the known occurrence of stromatolites within the dolomite of the Monte Christo Formation, as well as the possibility of Cave Breccias being present, a very high Palaeontological sensitivity rating is given to the study area.
EIA INVESTIGATION REQUIRED	A full Palaeontological impact assessment will be required
CUMULATIVE EFFECT	Refer to Section 4.4 of this report

ISSUE	Impact on historical sites
DISCUSSION	The archival research has shown that the historical activities in the area was wide spread during the South African War as well as the diamond rush of the 1920's. The position of Bakerville just 10 km to the north, show the possibility of finding historical remains within the study area.
EXISTING IMPACT	None known
PREDICTED IMPACT	Unidentified historical structure and the discovery of such structures during construction can seriously hamper construction timelines. Fieldwork can thus provide valuable information on such site in the study area and provide timeous management of such site through realignment of development or mitigation of such sites where needed.
EIA INVESTIGATION REQUIRED	Archaeological walk down of impact areas will identify possible impacted sites
CUMULATIVE EFFECT	None foreseen at this stage.

4.4 Cumulative impacts

An evaluation of the possible cumulative impacts from the combined solar projects in the area (**Table 3** and **Figure 6**) on heritage resources has shown that the biggest envisaged impact could be on the palaeontological heritage of the area with the Watershed Solar Energy facility just northwest of this proposed development increasing the possibility of impacts on the breccias that could occur in the area.

Though with the implementation of mitigation measures these impacts could be transformed into a positive impact through the discovery of previously unknown fossils and the subsequent study of such fossil finds adding to the academic knowledge of the palaeontological resources of the study area.

5 CONCLUSIONS AND RECOMMENDATIONS

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

The Heritage Scoping Report has shown that the proposed Tlisitseng Solar projects may have heritage resources present on the property. This has been confirmed through archival research and evaluation of aerial photography of the sites.

Heritage sites

Through the analysis of the aerial photographs and available maps of the study area no obvious heritage sensitive areas were identified inside the study area. The only possible sensitivities identified is related to farmsteads situated outside the study area but within close proximity to the proposed development area. These farmsteads' experience of the rural cultural landscape could possibly be impacted on by the development. A single small farmstead was also identified inside the study area and will require assessment during the fieldwork component of the HIA.

Palaeontology

The study area is underlain by Vaalian aged dolomite of the Monte Christo Formation, Chuniespoort Group. Stromatolites are known to occur within these deposits and more modern fossiliferous Caenozoic cave breccias have been recorded associated with carst formation in the dolomite.

A full Palaeontological impact assessment will be required.

Cumulative impacts

An evaluation of the possible cumulative impacts from the combined solar projects in the area (**Table 3** and **Figure 6**) on heritage resources has shown that the biggest envisaged impact could be on the palaeontological heritage of the area with the Watershed Solar Energy facility just northwest of this proposed development increasing the possibility of impacts on the breccias that could occur in the area.

Though with the implementation of mitigation measures these impacts could be transformed into a positive impact through the discovery of previously unknown fossils and the subsequent study of such fossil finds adding to the academic knowledge of the palaeontological resources of the study area.

Possible impacts

The following impacts and possible mitigation associated with this project can be listed as:

- Impacts on palaeontology – ***monitoring during construction where needed. Controlled collection of fossils;***

- Impact on historical structures – *evaluation of the identified structures during fieldwork and subsequent documentation of such structures and permitting under Section 34 of the NHRA before destruction;*
- Impact on unidentified graves – demarcation and protection where possible. Relocation of graves should only be considered as last resort and under strict permitting conditions.

Further studies during EIA hase

These findings provide the basis for the recommendation of further field truthing through an archaeological walk down and palaeontological desktop study covering the site. The aim of this will be to compile a comprehensive database of heritage sites in the study areas, with the aim of developing a heritage management plan for inclusion in the Environmental Management Plan as derived from the EIA.

To be able to compile a heritage management plan to be incorporated into the Environmental Management Plan the following further work will be required for the EIA.

- Archaeological walk through of the areas where the project will be impacting;
- Full Palaeontological Impact Assessment, the entails fieldwork and assessment of the potential impacts of the findings of such fieldwork;

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6.1 Archival Resources

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Appendix A

LEGISLATIVE PRINCIPLES

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

3.1 General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In the new legislation, permits are required to damage, destroy, alter, or disturb them. People who already possess material are required to register it. The management of heritage resources are integrated with environmental resources and this means that before development takes place heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves, which are older than 60 years and are not in a cemetery (such as ancestral graves in rural areas), are protected. The legislation protects the interests of communities that have interest in the graves: they may be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle will be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resource authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the developer's cost. Thus, developers will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection, to all historic and pre-historic cultural remains, including graves and human remains.

3.2 Graves and cemeteries

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administered by a local authority. Graves in the category located inside a formal cemetery administered by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.



Appendix C

Heritage Assessment Methodology

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

The Heritage Impact Assessment (HIA) report to be compiled by PGS Heritage (PGS) for the proposed Tlisitseng Solar projects will assess the heritage resources found on site. This report will contain the applicable maps, tables and figures as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998) and the Minerals and Petroleum Resources Development Act (MPRDA) (28 of 2002). The HIA process consists of three steps:

- Step I – Literature Review: The background information to the field survey leans greatly on the Heritage Scoping Report completed by PGS for this site.
- Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by qualified archaeologists, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.
- Step III – The final step involved the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

The significance of heritage sites was based on four 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 pylon position
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site

Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 4: 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)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	Grade 4C	Low Significance	Destruction



Appendix C

**Impact Assessment Methodology to be utilised
during EIA phase**

Methodology for Impact Assessment

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics, which include context, and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 5: Description

NATURE		
<p>Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.</p>		
GEOGRAPHICAL EXTENT		
<p>This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.</p>		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
<p>This describes the chance of occurrence of an impact</p>		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
<p>This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.</p>		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

DURATION

This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).

CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY/ MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

$(\text{Extent} + \text{probability} + \text{reversibility} + \text{irreplaceability} + \text{duration} + \text{cumulative effect}) \times \text{magnitude/intensity}$.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic, which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

The 2010 regulations also specify that alternatives must be compared in terms of impact assessment.