A PHASE 1 HERITAGE IMPACT ASSESSMENT STUDY FOR THE PROPOSED PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITIES (IN SANNASPOS), NEAR BLOEMFONTEIN, FREE STATE PROVINCE: DEA REF NO.: 14/12/16/3/3/2/360 (Phase 1); DEA REF NO.: 14/12/16/3/3/1/615 (Phase 2)

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DECLARATION OF INDEPENDENCE

This report has been compiled by Nkosinathi Tomose, appointed Heritage Consultant, for Zone Land Solutions. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the project.

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EXECUTIVE SUMMARY

Zone Land Solutions (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd in terms of NEMA, 107 of 1998 (as amended & applicable EIA Regulations of 2010) to conduct a VIA and a HIA studies for the proposed development of Sannaspos Solar Park, in Sannaspos, Mangaung Metropolitan Municipality, Free State Province South Africa. Nkosinathi Tomose (the lead archaeologist & heritage consultant) for Zone Land Solutions was instructed (in terms of Section 38 of NHRA, No. 25 of 1999 (as amended), the NEMA, No.107 of 1998 (as amended & the applicable 2010 Regulations) as well as other applicable legislations) as archaeologist and heritage specialist to conduct a full Phase 1 HIA study for the proposed Sannaspos Solar Park on following farm: Portion 0 of the Farm 1808 Besemkop and Portion 0 of the Farm Lejwe. This report is the result of the above integrated process from the various fields of speciality and involvement. The following results, conclusions and recommendations are made about the identified heritage resources based on existing literature about the project area, site survey, SAHRA minimum standards for evaluation and grading of archaeological (and other heritage) resources as well as the NHRA, No 25 of 1999 for the protection, conservation and management of the Nation Estate (Section 3 of the NHRA, No 25 of 1999):

- Five heritage sites were identified and are referred to as: Sannas-1, 2, 3, 4 and Sannas-5.
- All the identified sites fall directly with the proposed development footprint in Besemkop portion – Sannaspos-1 to Sannaspos-5.
- Three of the identified five sites are deemed to be of High/Medium significance – i.e. Sannas-1, Sannas-3 and Sannas-5.
- These sites are not seen as being under threat during the construction activities because they are located within close proximity to the Farm Besemkop farmstead which the author doubt it will be relocated to make way for the proposed development. However, should the proposed development come as close as the farmstead a Phase 2 study for these three sites should be

conducted by a professional and qualified archaeologist or heritage specialist. For Sannas-1 and Sannas-5 this process will involve an appointment of a qualified archaeologist to conduct a detailed social consultation and public participation process, apply for permits with SAHRA-BGG and other relevant bodies. Or alternatively a buffer of 20m should be created between the site and construction activities during the project construction phase to mitigate potential impacts of the site.

- While for Sannas-3 the process will include a detailed recording/sampling/documentation and mapping of the site before destruction – this will involve applying for permission with SAHRA-Built Environment and Landscape office.
- No mitigation measures are proposed for Sannas-2 and Sannas-4 due to the low significance.

Based on existing literature and physical survey of the proposed development area it is the author's views that the development should be granted a go ahead provided that the developer complies with the above recommendations.

**** Refer to Conclusion section of this report for detailed conclusions and recommendations and proposition on the management of chance finds during the construction phase of the project.***

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ABREVIATIONS

Acronyms	**Description**
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DoE	Department of Energy
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GIS	Geographic Information System
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
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NEMA	National Environmental Management Act
PHRA	Provincial Heritage Resources Agency
PHRA-FS	Provincial Heritage Resources Agency-Free State
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

SPV	Special Purpose Vehicle
VIA	Visual Impact Assessment

TERMS & DEFINITION

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 the 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

Heritage resources

This means any place or object of cultural significance

1. INTRODUCTION

1.1. Project Background

1.1.1. Developer and the Proposed Project

SolaireDirect South Africa (Pty) Ltd proposed to establish a commercial photovoltaic solar energy facility on a site located some 45km east of Bloemfontein, the Capital of the Free State Province, South Africa.

The proposed solar power park, to be known as Sannaspos Solar Park, will include photovoltaic (PV) solar panels and associated infrastructure with a total power generating capacity of ~ 85MW. The maximum amount of power to be generated at the proposed power park has been kept at megawatts level in line with the Department of Energy (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa. DoE stresses a threshold amount of megawatts per project entered into bid, and the power generating threshold for a single solar PV facility for submission into a bid has been set at 75 MW. To comply with the above thresholds, the proposed Sannaspos Solar Park will be split into two phases - Phase 1 of 75MW and Phase 2 of 10WM respectively. The two phases will be known as: Sannaspos PV plant phase 1 (75MW) and Sannaspos PV plant Phase 2 (10MW). As such, each stage of the project will be managed by a separate SPV. (*Refer – Appendix 1*, BID document).

1.1.2. Proposed Project Aims

The objective of the proposed PV facility is to evacuate the generated power into the Eskom electricity grid within that province.

This forms part of Eskom strategies to boost its electricity power generation and supply capacity, in the process, providing unlimited energy in the province like the Free State with accelerated growth and development.

1.1.3. Terms of Reference for the Appointment of Archaeologist and Heritage Specialist

Because of the nature and size of the proposed development, power generating park and associated infrastructure to be built in an area covering approximately 600 ha, a Scoping and EIA phase (i.e. for Sannaspos PV plant Phase 1) as well as the Basic Assessment (i.e. Sannaspos PV plant Phase 1) processes were required in terms of the NEMA, No. 107 of 1998.

Savannah Environmental (Pty) Ltd was appointed by SolaireDirect South Africa (Pty) Ltd as a lead Environmental Impact Practitioner to manage the EIA process and associated impact studies for the proposed development project. Savannah appointed Zone Land Solutions (Pty) Ltd to conduct both VIA and HIA studies for the proposed development as part of specialists impact assessment studies required to fulfil the EIA process and its requirements. Nkosinathi Tomose (the lead archaeologist & heritage consultant) was sub-contracted by Zone Land Solutions to conduct a Phase 1 HIA study for the proposed Sannaspos Solar Park proposed on the following farms: Portion 0 of the Farm 1808 Besemkop and Portion 0 of the Farm Lejwe within Mangaung Metropolitan Municipality, Free State Province (*Figure 1*). The appointment of an archaeologist and heritage specialist is in terms of both the NHRA, No. 25 of 1999 (as amended), the NEMA, No.107 of 1998 (as amended & the applicable 2010 Regulations) as well as other applicable legislations.

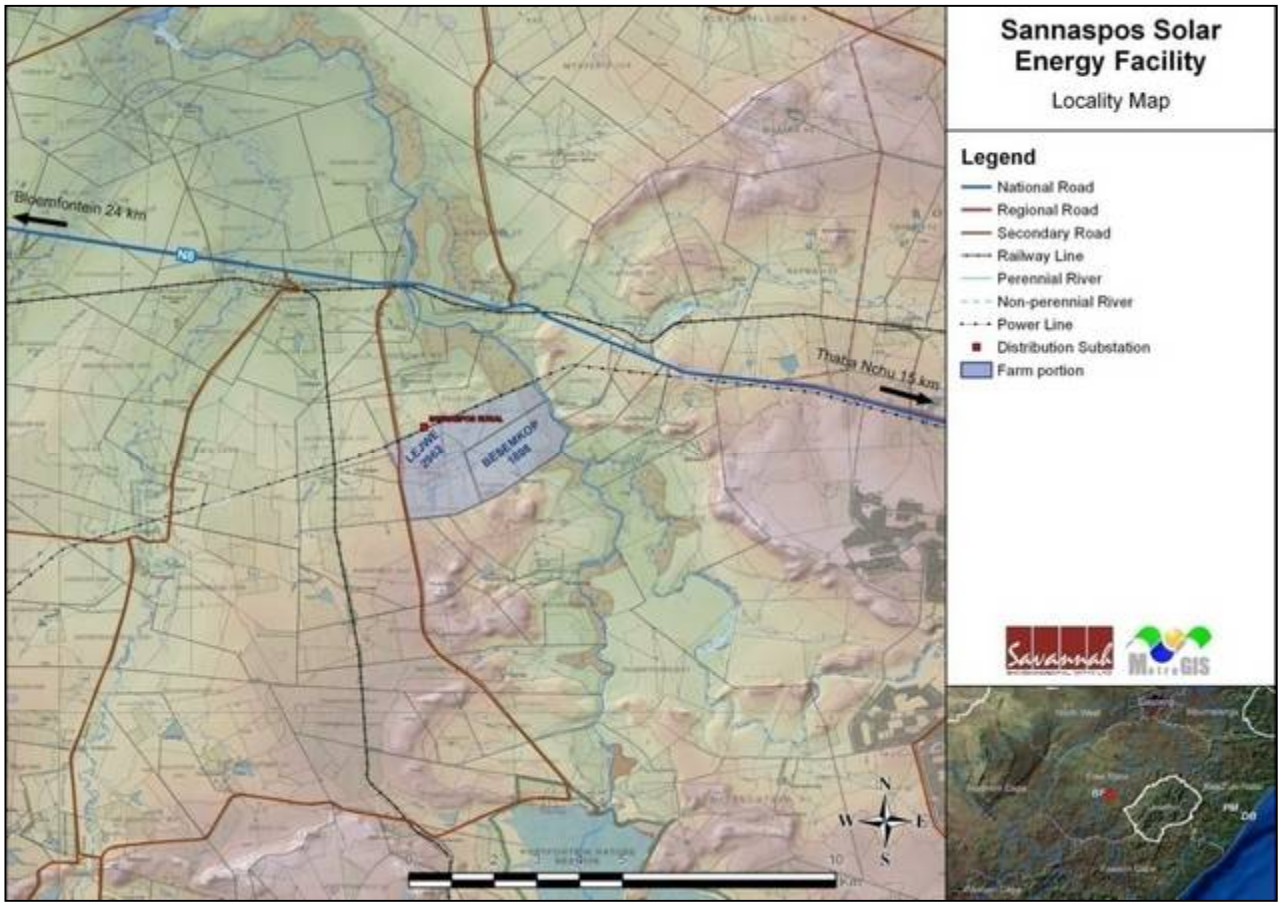

Figure 1 – Propose area of development for the proposed 85WM Sannaspos Solar Park. Note the existing power distribution Substation marked in red.

2. BACKGROUND OF THE STUDY AREA

2.1. Description of the affected environment

The study area is located in a landscape that is generally dry and flat with few ridges and hills (e.g. Koppies) that characterise the south-eastern and north-eastern portions of the proposed development area (PDA). The PDA is located west of the Modder Rive, and its eastern boundaries stops on the banks of the river itself. It lies some tens of kilometres south of the N8 to Bloemfontein (in the north-west) and Thaba Nchu (in the south-east). Its northern and western boundary in the portion of the Farm Lejwe 2962, it is characterised by existing Eskom 250kV Lines (and approximately 4x125kV Lines feeding

into & from the Substation). The existing Eskom distribution Substation is located in the west and east of the secondary road that crosses the PDA on the western boundary jointing the N8 north-east.

Various agricultural activities were observed, ranging from: cattle ranching to sheep herding, with small fields used for crops and most probable Maize. Near the south-western end of the PDA a number of natural and man-made/altered perennial water features are are observed.

The PDA is generally highly disturbed with various human activities varying from technological (Figures - 2 & 3), settlement (Figure - 4), cultural such as burials (*Figures- 12 & 16*), to agricultural (Figures- 5 & 6).

Figure 2- Panoramic view looking into the substation. Note the flatness and dry landscape with small undulating ridges. Also note the distribution of existing Power Lines.

Figure 3 - Picture of the existing Substation. Note the various feeder Power Lines.

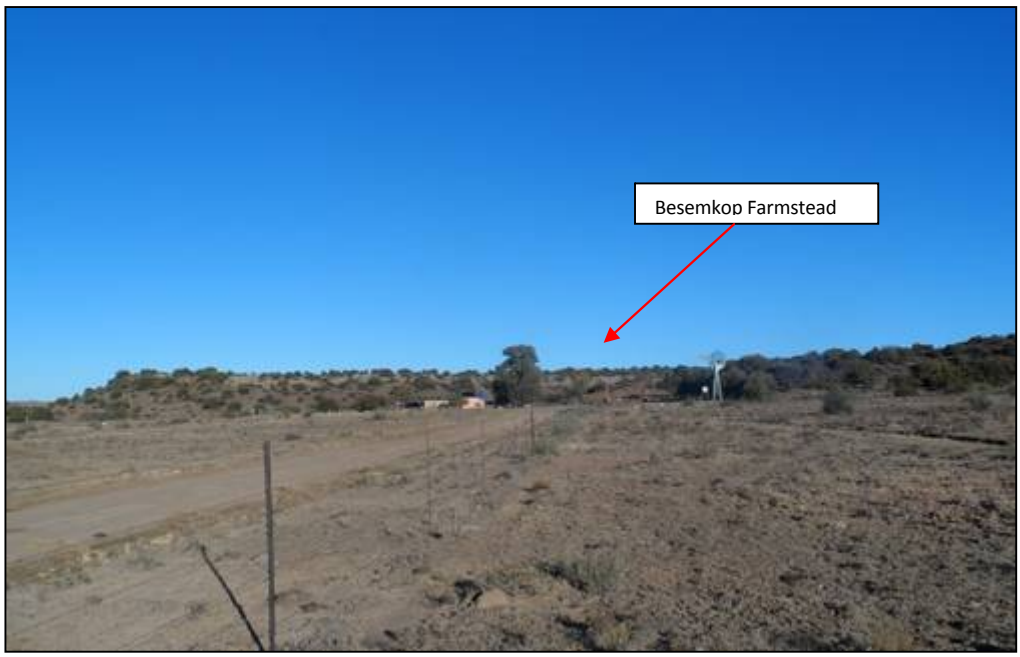

Figure 4 - Picture of the farm steads. Note the ridge/hill in the background. These are the ridges that characterise the PDA in the south.

Figure 5 -Sheep and cattle.

Figure 6 - Fields use for crops.

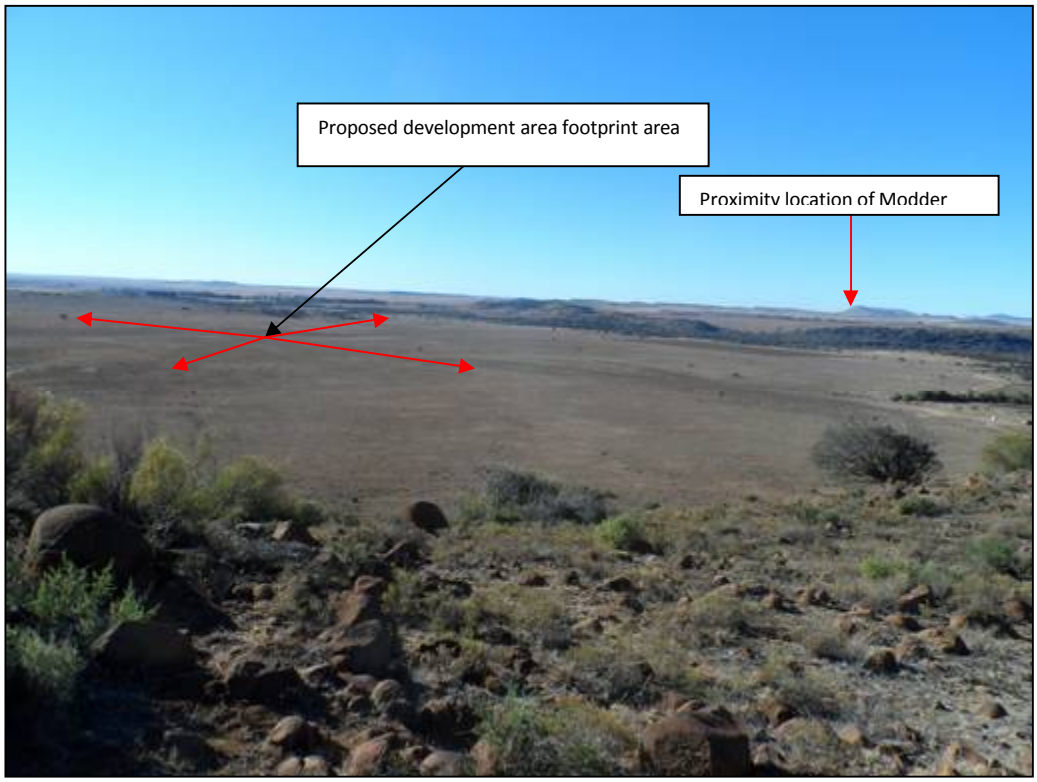

Figure 7 - General overview of the site looking north-east from one of the ridges in the south.

2.2. Desktop Study: Archaeological and Heritage

South Africa is rich in diverse forms and types of heritage, ranging from natural to cultural heritage. The natural include among other things palaeontological, geological and the various plant and animal species that define the country. The cultural heritage, which dates as far back as 2.5 million years age (m.y.a), includes - Stone Age Archaeology, Iron Age Archaeology, Historical and Industrial Archaeology, the "Political/Historic" geographies.

2.2.1. Stone Age Archaeology:

The Stone Age archaeology is divided into three categories, namely: the ESA, MSA and the LSA. These Stone Age industries are well documented throughout southern Africa regions including the Free State province where the current study is located. Below are detailed summaries of the traits that characterises each industry artefact and/or material culture.

ESA – Early Stone Age:

The ESA is dated between 2.5m.y.a and 250 k.y.a (thousand years ago) – during this period predecessors of *Homo Sapien Sapiens* started making stone artefacts. The earliest known Stone Age industry is referred to as the *Olduwan Industry*. It derives its name from the first known Stone Age industry recorded in Olduvia Gorge, Tanzania north-east Africa. Stone artefacts associated with this industry are often described as crude and rudimentary in making – they define the earliest form of Stone Age technological innovation. The Olduwan is replaced, in the archaeological records, by the *Acheulian Industry* some 1.5 m.y.a. The Acheulian is characterised by large cutting tools (also referred to as *bifaces*) - hand axes and cleavers are the dominant forms of artefacts found in this industry.

In the Free State, the earliest known ESA industry is the Victoria West Stone Industry which also spreads to the Northern Cape where it becomes dominant. The Victoria West Stone Industry was first recorded and defined by R. A., Smith in 1915 and in the Free State region it is found along the Vaal River basin. Tools found in this industry included hand axes and what Smith refers to as '*Tortoise Cores'* (Smith, 1920). This was probably Smith reference to the peculiar feature or morphology of *Prepared Cores* – where different pieces of where chipped off from a single piece of parent material to make way for the ultimate removal or shaping of a specific tool and most likely a well defined hand axe. A. H. J., Goodwin (1935) defines the Victoria West Industry with and without cores. Meaning that hand axes and cleavers could have been produced without necessarily have to prepare a parent material to a point to which a single definable tool could be produced. The absence of prepared cores in relation to hand axes and cleaver did not mean the end to this stone tool manufacturing techniques for it become a dominant and defining feature towards the end of the ESA into the MSA (Middle Stone Age). What first became known as '*Tortoise Cores'* was later defined as the transition marker between the ESA and the MSA. Therefore, the *Prepared Cored* of the Victoria West industry can be taken as the markers of transitional period in the Stone Age industry from Acheulian into the MSA, a second clearly defined phase in Stone

Age technological innovation. Lycett (2009) sees the Victoria West as an evolutionary step towards the *Levallois Prepared Core Technique* which signifies the outwards spread of the Stone Age technology.

Stone artefacts dated to the above ESA industries are commonly found in open sites as secondary occurrences and/or scatters and not within their primary context. It is there argued here it is important during the survey to pay special attention to open air area that may potential yield some of these artefacts.

MSA – Middle Stone Age:

The MSA stone artefact replace the dominant large and often imposing hand axes and cleavers that characterise the ESA. Such a distinction or transition in archaeological records has this far be dated to 250 k.y.a. During this period, smaller artefacts define the archaeological records and the most dominant ones are flake and blade industry. This period has been defined by some in archaeological circles as a period that signifies a secondary step towards the modern human behaviour through technology, physical appearance, art and symbolism (e.g. Binneman *et al*. 2011). This industry innovation is suggested to have been at its most probable peak during the last 120 k.y.a. With surface scatters of the flake and blade industries found throughout the southern Africa regions (Thompson & Maream, 2008). They often occur between surface and approximately 50-80cm below ground. Fossil bones may be associated with the MSA in some sites. The flakes and blade industries are often found in secondary context as surface scatters and occurrence like their predecessor industries. Malan (1949) defines the earliest MSA stone industry as the Mangosia and its distribution stretching across the Limpopo, the Qriqualand in Northern Cape, Natal, the Cape Point and the Free State our region of interest in the case. The Prepared Core Technique which had become the defining technological technique of the MSA is in this industry replaced by the Micro Lithics that become a dominant feature or trait in the LSA (Late Stone Age). In the Free State artefacts associated with the Mangosia industry are known to have been made from indurate shale raw material (Binneman *et al*. 2011). They mostly occur as surface scatter. The MSA tools include flakes, blades and points. Their time sequence is often not known because they mostly occur in surface. Other industries within the MSA include:

- The Howieson's Poort which is known to have wide distribution throughout southern African including the Free State province.

- The Orangia 128 to 75 k.y.a.
- Florisbad and Zeekoegat industries dated between 64 and 32 k.y.a - Florisbad is dominant in the Free State province.

Most of the MSA stone artefacts are made from the following materials: fine grain quartzite, quartz, silcrete, chalcedony and hornfels (Binneman *et al*. 2011, see also Binneman *et al*. 2010a). Like the ESA artefacts, the MSA stone artefacts occur in secondary context owing to a variety of reasons. One is due to natural events and/or activities such as erosion and being wash down by water and riverine activities, animal and human disturbances and so forth. It would therefore be in the best interest of the author (and the involved archaeologist and heritage consultant) to pay special attention to exposed surfaces, disturbed pieces of land and along any gullies and down slopes during the survey process.

LSA – Late Stone Age:

The LSA spans a period from 30 k.y.a to the historical time i.e. the last 500 years to 100 years ago. It is associated in archaeological records with the San hunter-gathers. This is particular important for the last 10 k.y.a whereby the San material culture dominate the archaeological records -mostly in rock shelters, caves as well as open air sites in both the interior and coastal regions. However, the San open air sites are not always easy to find because they are in most cases covered by the various forms and types of vegetation and the other contributing factor is the mobility nature of these people. They were not sedentary like their Iron Age counter parts who need to settled the land for ploughing etc. In the coastal regions, sand dunes sometimes become impediments in locating LSA sites. Owning to all these factors the preservation state of the LSA archaeology is often poor and not easily disenable (Deacon & Deacon 1999). Caves and rock shelters provide a more substantial preservation record of pre-colonial record of indigenous people's archaeology. This is in form of stone artefacts, rock art and other material culture such as beads etc. However, the LSA archaeology was not only dominated by the San hunter-gathers because in some 2 k.y.a the southern Africa landscape was penetrated by the Khoekhoe pastoralist introducing sheep, cattle and goal along with them (e.g. Hall & Smith, 2000). Ceramic vessels are some of the material culture that signifies the Khoekhoe material culture in archaeological records – including the depiction of sheep and cattle often found in San hunter-gather rock art (ibid). Smith and Hall (2000) give detailed descriptions of potential relations that could have taken place between the San, the Khoekhoe and the Iron Age farmers. They also argue that the material culture of the Khoekhoe

herders included among other things the art of making rock art in form of geometrics, concentric circles etc. Binneman (*et al*. 2011) asserts that the diet of this new group of people would have also included muscle collected along the muddy river banks, coastal line and riverine and terrestrial foods. Other than the material culture such as artefacts found within the LSA industries, burials or human remains become dominant in the landscape. In the coast they are often found buried underneath middens (dumpsites) (Deacon & Deacon 1999). While in the interior regions they are sporadic and can occur across various features in the landscape.

The LSA archaeology is therefore rich and varied consisting of stone artefacts, other forms of material cultures such as beads (ostrich egg shell beads are dominant), pottery, rock art in form of paintings and engravings with engraving dominating the central low land interior regions but also found elsewhere. Among stone tools, bifaces still continue and are supplemented by tanged barbed arrow heads made from the various materials found with the southern Africa regions. Dark or black fine grained chalcedony would have been the most preferred form of material in the Karoo (Northern Cape regions), the Free State Province and Lesotho (Humphrey, 1969).

Smithfield settlement sites are concentrated among hills and ridges in preference to flat and mountains. Smithfield was divided into three phases using scrapper size and shape (Goodwin & Van Riet Lowe 1929). Smithfield A – large scrappers

Smithfield B – long and narrow scrappers

Smithfield C – small thumbnail scrappers.

2.2.2. Iron Age Archaeology:

Like the Stone Age this archaeological period is divided into three categories, namely the EIA (Early Iron Age), MIA (Middle Iron Age) and the LIA (Late Iron Age).

The EIA communities first appear in southern African archaeological records in the 1st Millennium AD. The eastern regions of the country were their preferred regions because of their rainfall patterns – summer rainfall climates conducive for ploughing and growing crops like sorghum and millet. In the

interior region the former Transvaal (Limpopo and Gauteng Province) were preferred. In the Free State their first evidence is documented south-eastern region where they can into contact with the San people. Most of existing evidence about the Iron Age communities in the Free State dates to the 16th and 18th when they moved across the Vaal River coming to contact with the San hunter-gather people (Klatzow 1994). Numerous stone wall structures and pottery dating to this period have been recorded and lie on the frontier zone where the San people come into contact with agro-pastoralist (Thorp 1996).

Stonewalls are one major characteristic of the Iron Age people. However, they are not the only characteristic of features of the Iron Age. Huffman (1982) described cattle dug, both vitrified and unverified, as one of the Iron Age traits. He also included pits and burials, with some located inside the cattle kraals (ibid).

Among the well known and documented areas with evidence of the Iron Age farmers in the Free State region is the Caledon River Valley -known to have been settled by the Fokeng group of Iron Age speakers (the Sotho Speakers). The Fokeng are suggested to have later settled in Metlaeeng, after dwelling the foothill of Ntsuana-tsatsi between Frankfort and Vrede (Walton 1953).

North of the Vaal River in what is today known as the Limpopo Province the Iron Age communities are known to have also practice the tradition of making rock art, especially during the last period of the Iron Age characterised by the different encounters between these communities and the colonial settlers. The Makgabeng rock art is known to have depict conflict scenes associated with the Malebogo Wars – war between Chief Malebogo of the Hananwa people and President Kruger of the ZAR (e.g. Van Schalkwyk & Smith,).

In the Free State rock art linked to the Iron Age communities by association, it is not directly executed or engraved by them. For example, in the south-eastern Orange Free State recordings of cattle paintings are found, with some depicting conflict scenes – figures include 'hour-glass' Sotho shields which Binneman (*et al*. 2011) argues could be referring to the period of unrest in southern Africa called *Imfecane (or Difaqane in some literature)*. However, it would not be totally truthful to argue that the south eastern Free State only depict conflict paintings of sheep are found. One such site is known to exist on the Farm Kwartelfontein near Smithfield and is found in association with the depiction of cattle (Manhire *et al*. 1986). Other painting include ma walking with hunting dogs etc. Other than rock art, stone walls and pottery – the material culture of the Iron Age communities also includes Iron Implements, traded beads, rainmaking site features, spear sharpening groves on rock surfaces, grinding

stones etc (e.g. Huffman, 2007). These are some of the material culture expected to be found in the eastern Free State where our proposed development area for the Sannaspos Solar Power is located.

2.2.3. Colonial Archaeology:

The Colonial or Historical archaeology is a period in archaeological records that refers to the last 500 years when European settlers and colonialists entered into southern Africa. Bloemfontein is one of the interior towns that were established by the European settlers of Dutch descent – the Afrikaans communities after the Trekked from the then Cape Colony to avoid British Administration. Various monuments, statues and memorials associated with this period are found across the Free State province. The same is true with architectural styles found in some of the still standing farmsteads. Also associated with colonial archaeology are two South African Wars commonly known as the Anglo-Boer Wars in the 1860s and in the late 1890s to 1901.

To illuminate the war events that unfolded with the close proximity of the proposed development area of Sannaspos it is best to understand how such events came about. On the 10th of January of 1901 the new Commander-in-chief of the British army in South Africa, Lord Roberts and his chief of staff, Lord Kitchener landed in South Africa. On the eve of their arrived in the Cape Colony Roberts and his chief of staff Kitchener had already planned to conquer the two Boer Republics that existed at the time – the Orange Free State and the Transvaal Zuid Afrikaansche Republiek (ZAR). Their strategy was to conquer these republics from the Cape Colony. They would first enter the north and central regions of what is today South Africa through the western railway line through Kimberly – the primary objective was to first relieve Kimberley. Following the relief of Kimberley Roberts and Kitchener had planned to leave the railway line and attack eastwards into Bloemfontein (Orange Free State Republiek) and later Pretoria (ZAR) in the north. In January 1900 Roberts and Kitchener had manage to gather some 50000 men for their upcoming campaigns – first for the relief of Kimberley, then eastward attack into Bloemfontein and northwards attack into Pretoria. However, this was not to be as easy as one would have, atleast from the perspective of Roberts, would been. In Kimberley they would have to first have to defeat General PA Cronje and CR De Wet. On the 15 of February Roberts and Kitchener's men had entered Kimberley, the French Cavalry leading the march. Following few days of battle it is reported that General Piet Cronje had retreated from Magersfontein to Paardeberg with a convoy of wagons – he was later circled here (together with some 4000 men) by Roberts and his men in February 27 1900, following ten days of

intense battle between the two sides. The capture of General Piet Cronje was a blow for the Burghers and many fled is despair. The battle was now to advance eastwards towards Bloemfontein where General De Wet had prepared his men, using Poplar Grove on the 7 of March 1900 as the scout point, against the advancing British forces. On the 10 March 1900 the Burghers, under the leadership of General De la Rey, had offered courageous resistance at Driefontein (Abrahamskraal) but had to retreat before they could be outflanked by the Brits. Such a retreat would have strengthened the advancement of the British forces under Lord Roberts and his chief of staff because on the 13 March they had occupied Bloemfontein with little resistance from Burghers there. Similar advancement by the British forces had been gaining momentum and their advancement into the interior regions was becoming inevitable. In Natal Buller had advanced against General Bother in Ladysmith, the Hlangwane Hills, the Thukela River and northeast of Colenso. The same was true what is today the North West Province – on the 17 of May 1900 Conel BT Mahon and Conel Plumer had captured Mafikeng. This fragmented the Boer resistance in against the advancing British forces and they had to find new ways of fighting the war and used the Commando strategy (the Guerrilla war tactic) abandoning the wagon laagers. This strategy was first adopted in Kroonstad on the 17 March 1900 following a joint council meeting of war. The Commando strategy proved to be effective and many Burghers were now stimulated to fight the war. The east of the Free State and Bloemfontein was also not immune to the war events. Following a bried leave of absence that the Burghers had experienced in the request of General De Wet they regroup on the 25 March 1900, 10 days following the capture of Bloemfontein of the 13 of March that same year. Now Chief Commandant of the Orange Free State, General De Wet was using the Commando strategy in his frequent attacks of the British forces, primary targeting isolated British Columns.

Using the new Commandos tactic, Chief Commandant De Wet defeated British forces under Brigadier-General RG Broadwood in Sannaspos, some 28km east of Bloemfontein. This is in close proximity to the proposed development area. In this battle the British lost 159 men with the Boer Commandos only losing 13 – a huge and significant blow to the British.

The defeated British garrison in Sannaspos had been protected the Sannaspos water works, the main water supply to the newly Capture Bloemfontein by the British forces. This is how Sannaspos became involved in the Second South African War.

A monument commemorating this event has been established and its currently used as one of the tour attraction of the Free State province battle fields tours - refer to *Figure 10* for its proximity location in the landscape. Other archaeological remains associated with these periods of unrest in the Free State

province are expected to be found in areas in and around the propose Sannaspos Solar Park. At times there is a peculiar form of rock art that is associated with this period if we use the 60-80 year period to distinguish rock art and graffiti – the War Inscriptions often found in mountainous or hill site where soldiers involved in the war would have found defence and inscribed their names on the rocks as either their pastime activities or document their frustration with the status core at the time. As such one needs to be also weary of such sites during the survey.

3. METHODOLOGY

3.1. Legislative Requirements

The NEMA, No. 107 of 1998 stipulated that for any development in South African to be granted permission to go ahead an impact assessment of the potential impacts of the proposed development on both the natural and cultural environment need to be conducted. As such this HIA fulfil the requirements of NEMA and is conducted inline with Section 38 (1) of the NHRA, No. 25 of 1999. Because of the nature of the proposed development – energy related development the Minerals and Petroleum Resources Development Act (MPRDA) (28 of 2002) is also applicable.

3.2. Methodology

This chapter outline the methodologies used in conducting this study. This HIA report was compiled by Nkosinathi Tomose for the proposed Sannaspos Solar Farm project. The following steps were following in conducting the study:

3.2.1. Step I – Literature Review:

- The background information of the proposed area of development following the receipt of the BID document and sites maps from the client. Sources used included, but not limited to

published academic papers and HIA studies conducted in and around the region where the current development will take place.

- Map Archives: Historical maps of the proposed area of development and its surround were assessed to aid information of the proposed area development and its surround.

3.2.2. Step II – Physical Survey:

- A physical survey of the proposed development area footprint was conducted a qualified archaeologist on the 28 June 2012. The survey was in two fold – some areas of the proposed development footprint were covered on foot while others were traverse in a car. The objective of this was to located and identify sites in the landscape, record them using necessary and applicable tools and technology.
- The survey also paid special attention to disturbed and exposed layers of soils as well as gullies and eroded surfaces because these areas are more likely to exposed or yield archaeological resources.
- The following technological tools were deemed important for documenting and recording located and/or identified sites:
    - Garmin GPS – to take Lat/Long coordinates of the identified sites
    - Lenovo ThinkPad aided Garmin Basecamp Software – to plot the identified sites and assess site boundaries
    - Samsung – to take photos of the affected environment and identified sites

3.2.3. Step III – Data Consolidation and Report Writing:

This stage of the report considered both heritage sites significance assessment and basic assessment criteria for the assessment of heritage significance and assessment of potential impacts of the identified and mapped heritage resources from the proposed development project – Sannaspos PV Solar Plant. This methodological proved important for the study. Below is the chronological alignment of steps followed in the process of compiling this report:

- The final step involved the consolidation of the data collected using the various sources as recommended above.
- This involved the manipulation of the recorded GPS coordinates for plotting of GIS maps of the identified heritage sites within and adjacent to the proposed development footprint.
- Assessing the significance and potential impact of the identified sites, discussing the finds, report writing and making recommendation of the management and mitigation measures of the

identified sites as well as the impact and influence of heritage in the proposed development area.

3.2.3.1. Assessment of site significance

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 - <10/50m^2
        - Medium - 10-50/50m^2
        - High - >50/50m^2
- **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

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

Site Significance

The following site significance classification minimum standards as prescribed by the SAHRA (2006) and approved by the ASAPA for the SADC region were used for the purpose of this report.

Table 1: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	-	Low Significance	Destruction

3.2.3.2. Methodology for Impact Assessment in terms of *Basic Assessment Methodologies including Measures for Environmental Management Plan Consideration*:

The Basic Assessment 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 Basic Assessment & Environmental Impact Assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts:

The Basic Assessment included:

- an indication of the methodology used in determining the significance of potential environmental impacts

- a description of all environmental issues that were identified during the environmental impact assessment process
- an assessment of the significance of direct, indirect and cumulative impacts in terms of the following criteria:
    - the *nature* of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected
    - the *extent* of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
    - the *duration* of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0–5 years), medium-term (5–15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent
    - the *probability* of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood), probable (distinct possibility), highly probable (most likely), or definite (impact will occur regardless of any preventative measures)
    - the *severity/beneficial scale*, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit, with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect
    - the *significance*, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high
    - the *status*, which will be described as either positive, negative or neutral
    - the *degree* to which the impact can be reversed
    - the *degree* to which the impact may cause irreplaceable loss of resources
    - the *degree* to which the impact can be *mitigated*
- a description and comparative assessment of all alternatives identified during the environmental impact assessment process
- recommendations regarding practical mitigation measures for potentially significant impacts, *for inclusion in the Environmental Management Plan (EMP)*

- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- a description of any assumptions, uncertainties and gaps in knowledge
- an environmental impact statement which contains:
    - a summary of the key findings of the environmental impact assessment;
    - an assessment of the positive and negative implications of the proposed activity (one alternative only in EIA phase);
    - a comparative assessment of the positive and negative implications of identified alternatives

Assessment of Impacts

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- The **status**, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

S= (E+D+M)P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),

- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included.

Example of Impact table summarising the significance of impacts (with and without mitigation)

Nature:		
	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**36 (Medium)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: Mitigation Measures		
Cumulative impacts: Cumulative Impacts		
Residual Impacts: Residual Impacts		

Measures for inclusion in the draft Environmental Management Plan:

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

Project component/s	List of project components affecting the objective		
Potential Impact	Brief description of potential environmental impact if objective is not met		
Activity/risk source	Description of activities which could impact on achieving objective		
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion		
Mitigation: Action/control		**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above		Who is responsible for the measures	Time periods for implementation of measures
Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.		
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting		

4. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations exist in terms of the present study:

- The current study is a Phase 1 Heritage Impact Assessment. As such, a historical and archival desktop study as well as a field survey were undertaken to identify tangible heritage resources located in and around the proposed area of development. While semi-formal discussions took place with the farm owner in Besemkop and some few farm workers who showed some interest and enthusiasm on what the archaeology aims to achieve not public participation process was undertaken as part of this study.

- The Deed search at the National Archives in Pretoria also did not yield any information about previous farm owners of the farms affected – this may limit the study in terms of understanding the different cultural activities that took place in the affected farms and why such activities took place. As such as some of the area's intangible heritage and stories maybe be missing.

5. FINDINGS

5.1. Maps

A number of observations are made of the evolution of the landscape in and around the PDA (proposed development are). The farms in which the site is located have experience subdivisions and change hands over time and space – this is observed in a number of maps assessed:

The 1901 Map of the area does not show the Farm Besemkop and Lejwe -there is one big farm called Paardenkop 799. Two old roads are observed crisscrossing the PDA. Portions of the current proposed area would have crossed into Farm Sannah's Post 276. A farmstead is observed in Farm Paardenkop where the current Besemkop farmstead is located (*Figure 8*).

The 1910 map depicts a number of changes in and around the affected landscape or the PDA. A number of subdivisions of the existing farms had taken place – for example, the Farm Paardenkop had already been subdivided into Omloop 1005, Diepfontein 1865 and Besemkop 1808 (*Figure 9*). There is now a steady increase in the number of farmstead in the farm that used to big one big farm – each of the three subdivision has its own farmstead (*Figure 9*). In the northern and western regions of the current PDA railway lines are observed – these lines would have been constructed during or just after the Second South African War. These railway lines exist up to this day and they present technological innovation of their time and industrial heritage of the Free State province (*Figure 11*).

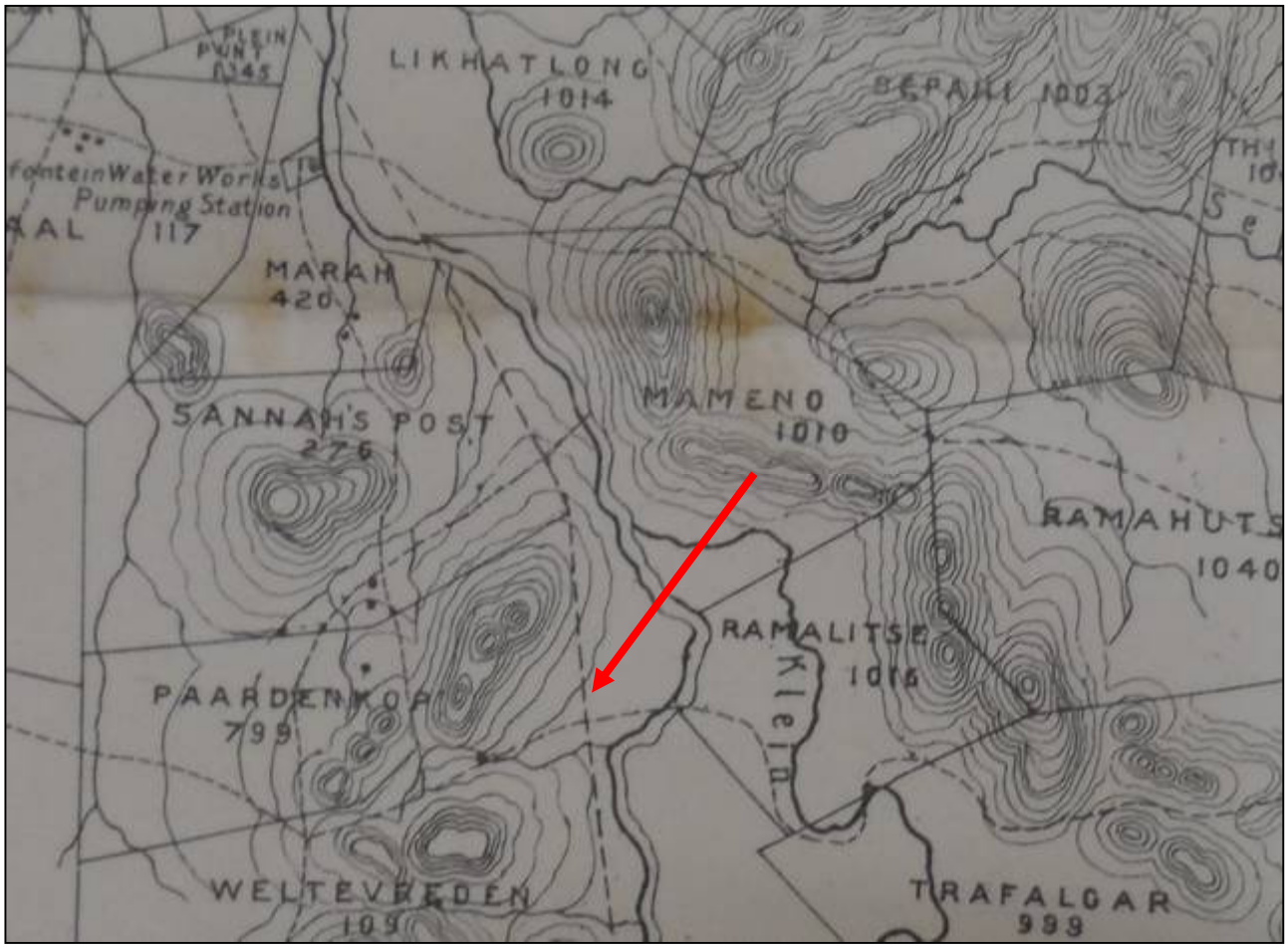

Figure 8 - 1901 Map of Sannaspos. Lithography, Mapping Section Field Intelligence. Department A^y Ltd Q^rs Pretoria 1901 Compiled in S.G Office Bloemfontein from Orange Free State forum surveys under the direction of A. H. F Duncan Esq. Field. @ Wits Cullen Library, Map Archives, 2012.

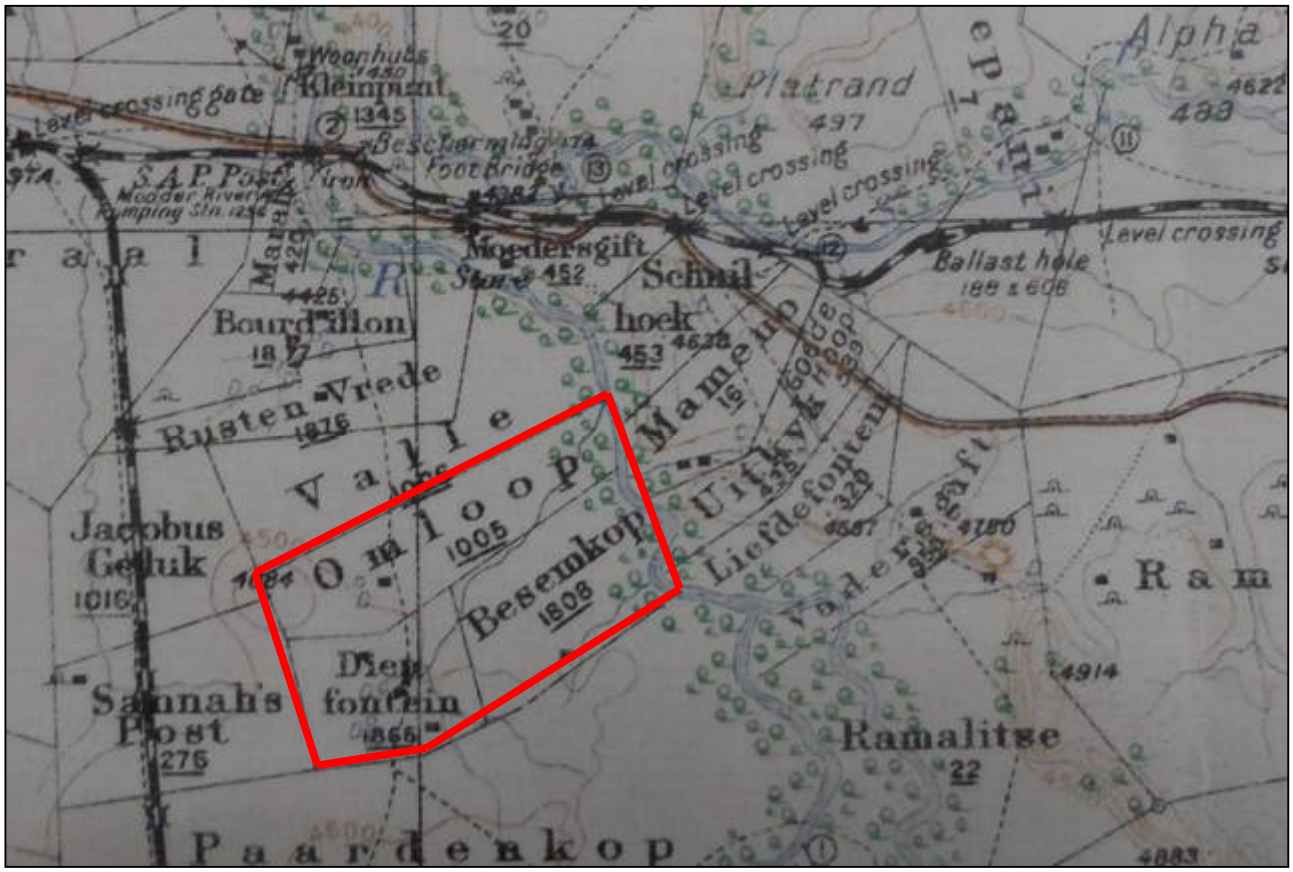

Figure 9 - Surveyed by the Colonial Survey Section, R. E 1910 Cadastral work completed in Surveyor General Office, Bloemfontein 1912. Engrave by Mess[rs] W & A. k. Johnson, L[td] Edinburgh, and Printed at the War Office, 1913. @ Wits Cullen Library, Map Archives, 2012.

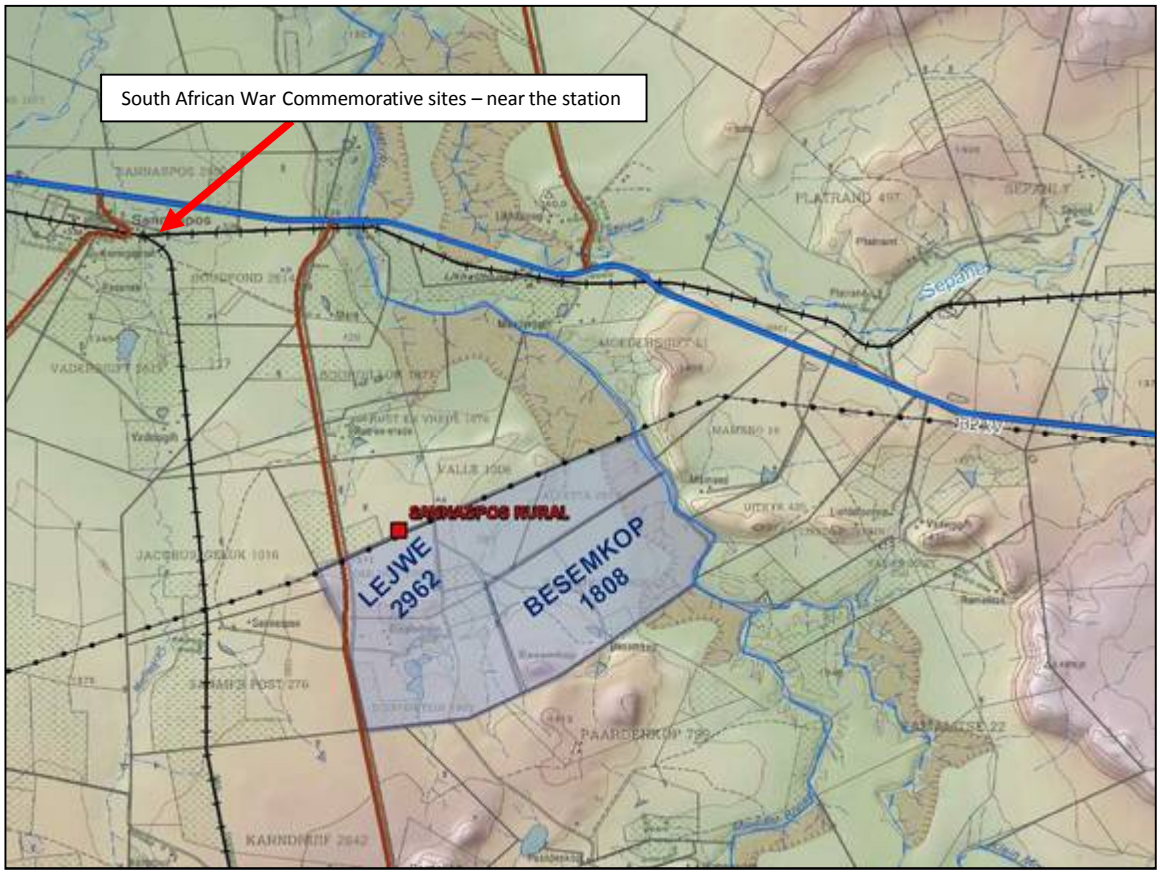

Figure 10 - Besemkop & Lejwe Site @ Savannah, 2012.

Figure 11 - Examples of old bridges that were built between 1901 and 1910. There are two bridges - one is a railway line bridge and the other is the old N8 road. The two bridges are observed over Modder River.

5.2. Deeds Search:

The Deeds search of the following farms took place at the National Archive in Pretoria:

Farm Paardenkop 799, Omloop 1005, Diepfontein 1865, Besemkop 1808, Lejwe 2962. However, the search did not yield any results regarding the farm owners both current and previous owners. When the staff at the National Archives was approached they suggested that the reason for this was that the farms are located in a different province and they only housed archival material of the former Transvaal. However, the archival maps obtained at the Cullen Library Wits University are deemed sufficient enough to reveal information about the proposed development area tangible resources sites.

5.3. Field Survey:

The physical survey of the PDA made a number of observations about the PDA and itself landscape as described in the affected environment section above. Other than the effected environment observations were made about the different types or forms of heritage resources located in and around the PDA.

Approximately 5 heritage sites where observed during the survey and they are named and numbered Sannas-1 to 5. Below is the description of each site, evaluation of its significance, impact ratings and recommended management/mitigation measures.

5.3.1. Identified: Sites their description and evaluation

Sannas-1

Site Type: Cemetery

GPS: S29 12 09.3 E26 35 31.2 (WGS -84)

Site Description:

On the foot hill of one of the Koppies an un-formalised and/or none municipal cemetery i.e. not formalised in terms of bylaws regulating parks and cemeteries or being declares formal in terms tradition council, cemetery was located with approximately 13 graves. The graves are characterised by stone cairns or stone mound dressing. One grave out of the 13 has a cross to mark the headstone. The graves are all facing east-west in a typical burial orientation. The archaeologist was led to the site by farm workers after he asked about possible graves in the area.

Approximate Age: Over 60 years to 100 years old

Section of the NHRA, No 25 of 1999: Section 36

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Impact	Impact Significance	Heritage Significance	Certainty	Duration	Mitigation
Localised	High/Medium	Generally Protected A (GPA)	Highly probable	Long-term : Construction & operational phases	E

Nature: *Construction activities (& development of associated infrastructure) will impact on the identified cemetery by destructing the cemetery markers, exposing the remains and creating access challenges for the relatives of the deceased.*		
	Without mitigation	**With mitigation**
Extent	Local (5)	Local (3)
Duration	Permanent (5)	Medium-term (3)
Magnitude	High (10)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)

Significance	**(80) High**	**(48) Medium**
Status (positive or negative)	Negative	Neutral
Reversibility	Low	Medium
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: The cemetery must be fence-off from the rest of construction activities (& associated infrastructure development). A cemetery management plan must be developed to manage the graves and access to the grave site by the descendants of the deceased during the construction and operational phases of the project.		
Cumulative impacts: *Archaeological and cultural sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.*		
Residual Impacts: *Access to the gravesite will be the only impact that remains after the construction phase of the project has pass*		

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:

The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint. In order to achieve this goal it is recommended that the cemetery with approximately 13 graves be fenced-off from the rest of the construction activities (& associated infrastructure development). A cemetery management plan should be developed to manage the gravesite during both the construction and operation phases of the project.

Project component/s	Construction and operational phases of the project
Potential Impact	In case where the identified cemetery/gravesite is not fenced-off from construction and operational activities and the management plan is not developed as recommended above, the following impacts are predicted: disturbance of the cemetery/gravesite (e.g. exposure of the remains as a result of machinery excavation activities; destruction of grave markers/headstones/dressers –making it difficult for the deceased families to recognise their graves resulting to legal disputes between the developer and affected families), uncontrolled

	access to the gravesite may also pose security threat to the actual Sannaspos PV Plant.
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan
Mitigation: Target/Objective	The cemetery management plan should be developed prior to the construction phase of the project; this should also include the physical construction of the fence around the grave site leaving a buffer (+/- 5m buffer) between the grave site and construction activities. An access gate to the cemetery/gravesite should also be developed with the construction of the fence. The dates (e.g. days/months/years) for the project life span are not yet known

Mitigation: Action/control	**Responsibility**	**Timeframe**
With the approval of the project, the Environmental Consultant and/or ECO should consult with the appointed archaeologist/heritage consultant (preferable the one already familiar with the project) to develop the cemetery/gravesite management plan (including recommendation on control measures for access to the gravesite by the families of the deceased) and advise on the fencing process and procedures	Environmental Control Officer in consultation with the appointed archaeologist/heritage consultant	Prior to the construction phase, during and post the construction phase to project operational phase.

Performance Indicator	The type of indicator used here will be **Actionable Indicators** – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.
Monitoring	With the approval of the project the Environmental consultant and appointed ECO should consult with the appointed archaeologist/heritage consultant (preferable the one already familiar with the project) to develop the cemetery/gravesite management plan prior to the commencement of the project construction activities. The cemetery management plan should include a plan/strategy on how to best manage issues of access to the cemetery/gravesite by relatives of the deceased during the project construction and operational phases. The cemetery/gravesite management plan

	should then be incorporated into the project Environmental Management Framework. Once included, during the project construction phase the ECO should do weekly monitoring of the cemetery/gravesite disturbances and record the visitor's numbers to the cemetery and report to the Environmental Consultant. A bi-weekly report on the state of the identified heritage resources should be developed and submitted to the Environmental Consultant by the ECO – this should be done in the first 3 months of the project commencement of construction activities, thereafter a monthly report. However, should any graves or burials previously unidentified around the cemetery/gravesite be exposed during the construction phase the ECO should report these urgently.

Figure 12 - Stone mound graves, located on the foothill of a koppie in Farm Besemkop

Sannas- 2

Site Type: MSA stone artefacts scatter

GPS: S29 12 11.6 E26 35 32.7 (WGS-84)

Site Description:

Two MSA stone scatter were found at the foothill of a hill in Besemkop in an exposed calcrete layer.

Approximate Age: +/- 250 – 60 k.y.a

Section of the NHRA, No 25 of 1999: Section 35

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Impact	Impact Significance	Heritage Significance	Certainty	Duration	Mitigation
Localised	Low	Generally Protected C (GP.C)	Probable	Short-term: Construction phase	A

Nature: *destruction of the two MSA stone artefact scatters during construction by either covering the in soil removing them from their current context which is already secondary*		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (0)	Low (0)
Probability	Probable (3)	Improbable (3)
Significance	**(6) Low**	**(6) Low**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: *There are not mitigation measures proposed - the resources are insignificant stone artefact scatters in their secondary context*		
Cumulative impacts: *No cumulative impacts are predicted for the two MSA stone artefact scatters*		
Residual Impacts: *No residual impacts are predicated – resources are two insignificant MSA stone artefact scatters*		

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:

The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint. For these two stone artefact scatters there are no further management measures proposed.

Project component/s	N/A
Potential Impact	N/A
Activity/risk source	N/A
Mitigation: Target/Objective	N/A

Mitigation: Action/control	**Responsibility**	**Timeframe**
N/A	N/A	N/A

Performance Indicator	N/A
Monitoring	N/A

Figure 13- MSA stone tool scatter, located on the foothill of a Koppie if Farm Besemkop.

Sannas- 3

Site Type: Historic stone shed

GPS: S29 12 04.0 E26 35 43.4 (WGS-84)

Site Description:

Site number 3 is a historic stone shed located within Besemkop farmstead. The main farmhouse and its out buildings are modernised and the shed is the only remaining historical structure that exist in the farmstead. The shed has 3 north facing windows, 2 doors on either sides, 1 door on its southern façade. The shed is built using stone and has corrugate iron sheet roof which seem to have been recently added on or refurbished.

Approximate Age: +/- 100 years old or over 100 years

Section of the NHRA, No 25 of 1999: Section 34

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Impact	Impact Significance	Heritage Significance	Certainty	Duration	Mitigation
Local/regional in terms of the architectural vernacular	Low	Generally Protected B (GP.B)	Probable	Long/Medium-term: construction & operational phase	D

***Nature**: the destruction of the historic stone shed may occur as a result of construction activities. The shed may further be visual dwarfed during the project operational phase if not destructed by construction activities.*		
	Without mitigation	**With mitigation**
Extent	Local/regional (i.e. in terms of architectural vernacular) (3)	Local/regional (i.e. in terms of architectural vernacular) (2)
Duration	Long/Medium-term (3)	Medium-term (3)
Magnitude	Moderate (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**(24) Low**	**(21) Low**
Status (positive or negative)	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Should the development activities extend to the farmstead itself - the historic stone shed should be fully documented (i.e. by a conservationist architect, including photographic recording etc), its architectural vernacular should be defined, destruction permit be applied for with FS-PHRA (Free State Provincial Heritage Authority) before its destruction. However, should the Sannaspos PV construction activities not go as far as the farmstead the above		

mitigation measures will not be applicable.
Cumulative impacts: *No cumulative impacts are predicted for the structure during the construction phase of the project, provided that construction activities do not affect the farmstead. Neither are there any significant cumulative impacts predicted for the operation phase of the project except for the visual dwarfing of the whole farmstead.*
Residual Impacts: *The residual impact will be visual dwarfing of the whole farmstead*

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:

The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint. In order to achieve this goal it is recommended that the historic stone shed be fully documented, its architectural vernacular be defined, destruction permit applied for with a relevant heritage authority should the construction activities affect the farmstead.

Project component/s	Construction and operational phases of the project
Potential Impact	In the case where development activities move to the farmstead itself and the above mitigation measures are not applied by the developer – the following impacts are predicted: disturbance/destruction of historic shed and loss of its architectural fabric/value.
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan
Mitigation: Target/Objective	With the approval of the project – it should be specified by the developer on whether the farmstead will have to be relocated or adversely affected – in which case the above recommended mitigation measures should be applied prior to the commencement of the project construction phase

Mitigation: Action/control	**Responsibility**	**Timeframe**
With the approval of the project (& clear indication on whether or not the farmstead will be relocated is given), the environmentalist consultant and/or appointed ECO should	Environmental consultant and/or ECO in consultation with the appointed	Prior to the project construction phase.

consult with an archaeologist/heritage consultant (preferable the one already familiar with the project) to assist guide the documentation process of the historic shed and apply for its destruction permit	archaeologist/heritage consultant	

Performance Indicator	The type of indicator used here will be **Actionable Indicators** – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.
Monitoring	With the approval of the project, and the decision on whether the farmstead will be move or not, the Environmental Consultant/ECO should consult with the appointed archaeologist/heritage consultant to develop time frames for the documentation and destruction of the historic stone shed. This will influence the type of monitoring measures.

Figure 14 - Stone shed located in Farm Besemkop. It is located within the farmstead which has been significantly modernised. The shed is the only existing historical feature.

Sannas-4

Site Type: Inscriptions graffiti site

GPS: S29 12 13.6 E26 35 22.3(WGS-84)

Site Description:

Graffiti inscription site located on the hill located south of Besemkop. The inscription show 1990s date and are considered to be a form of graffiti- year than the 100 year mark for rock art consideration. The archaeologist was led to the site after he asked the farm workers about possible rock art sites on the hill.

Approximate Age: +/- 41 years old

Section of the NHRA, No 25 of 1999: Section 36

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Impact	Impact Significance	Heritage Significance	Certainty	Duration	Mitigation
Local	Low	Low : not even GPC	Improbable	Short-term – construction phase	A

Nature: Graffiti Site Disturbance		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (0)	Low (0)
Probability	Probable (3)	Improbable (3)
Significance	**(6) Low**	**(6) Low**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: *There are no mitigation measures proposed for the graffiti site*		

Cumulative impacts: *there are no cumulative impacts predicted for the graffiti site*
Residual Impacts: *there are no residual impacts predicated for the graffiti site*

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:

The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint. For the graffiti site there is no further management/mitigation measures proposed.

Project component/s	N/A
Potential Impact	N/A
Activity/risk source	N/A
Mitigation: Target/Objective	N/A

Mitigation: Action/control	**Responsibility**	**Timeframe**
N/A	N/A	N/A

Performance Indicator	N/A
Monitoring	N/A

Figure 15- Example of one of the inscriptions, dated to 1971.

Sanna-5

Site Type: Cemetery

GPS: S29 11 54.4 E26 35 40.6 (WGS-84)

Site Description:

The site is located along the road leading to the farmstead. It is a cemetery, possible first farm owners, consisting of approximately 8 graves. The graves have granite dressing and headstones. The graves burial orientation is east-west a typical burial position.

Approximate Age: Over 60 years to 100 years old

Section of the NHRA, No 25 of 1999: Section 36

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Impact	Impact Significance	Heritage Significance	Certainty	Duration	Mitigation
Localised	High/Medium	Generally Protected A (GPA)	Highly probable	Long term - Construction & operational phases	E

Nature: *Construction activities (& development of associated infrastructure) will impact on the identified cemetery by destructing the cemetery markers, exposing the remains and creating access challenges for the relatives of the deceased.*

	Without mitigation	**With mitigation**
Extent	Local (5)	Local (3)
Duration	Permanent (5)	Medium-term (3)
Magnitude	High (10)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**(80) High**	**(48) Medium**
Status (positive or negative)	Negative	Neutral
Reversibility	Low	Medium
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation: The cemetery must be fenced-off from the rest of construction activities (& associated infrastructure development). A cemetery management plan must be developed to manage the graves and access to the grave site by the descendants of the deceased during the construction and operational phases of the project.

Cumulative impacts: *Depletion of archaeological record of the area.*

Residual Impacts: *Access to the gravesite will be the only impact that remains after the construction phase of the project has pass*

Measures for inclusion in the draft Environmental Management Plan:

Objective: The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint. In order to achieve this goal it is recommended that the cemetery with approximately 13 graves be fenced-off from the rest of the construction activities (& associated infrastructure development). A cemetery management plan should be developed to manage the gravesite during both the construction and operation phases of the project.

Project component/s	Construction and operational phases of the project
Potential Impact	In case where the identified cemetery/gravesite is not fenced-off from construction and operational activities and the management plan is not developed as recommended above, the following impacts are predicted: disturbance of the cemetery/gravesite (e.g. exposure of the remains as a result of machinery excavation activities; destruction of grave markers/headstones/dressers –making it difficult for the deceased families to recognise their graves resulting to legal disputes between the developer and affected families), uncontrolled access to the gravesite may also pose security threat to the actual Sannaspos PV Plant..
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan
Mitigation: Target/Objective	The cemetery management plan should be developed prior to the construction phase of the project; this should also include the physical construction of the fence around the grave site leaving a buffer (+/- 5m buffer) between the grave site and construction activities. An access gate to the cemetery/gravesite should also be developed with the construction of the fence. The dates (e.g. days/months/years) for the project life span are not yet known

Mitigation: Action/control	**Responsibility**	**Timeframe**
With the approval of the project, the Environmental Consultant and/or ECO should consult with the appointed archaeologist/heritage consultant (preferable the one already familiar with the project) to develop the cemetery/gravesite management plan (including recommendation on control measures for access to the gravesite by the families of the deceased) and advise on the fencing process and procedures	Environmental Control Officer in consultation with the appointed archaeologist/heritage consultant	Prior to the construction phase, during and post the construction phase to project operational phase.

Performance Indicator	The type of indicator used here will be **Actionable Indicators** – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.
Monitoring	With the approval of the project the Environmental consultant and appointed ECO should consult with the appointed archaeologist/heritage consultant (preferable the one already familiar with the project) to develop the cemetery/gravesite management plan prior to the commencement of the project construction activities. The cemetery management plan should include a plan/strategy on how to best manage issues of access to the cemetery/gravesite by relatives of the deceased during the project construction and operational phases. The cemetery/gravesite management plan should then be incorporated into the project Environmental Management Framework. Once included, during the project construction phase the ECO should do weekly monitoring of the cemetery/gravesite disturbances and record the visitor's numbers to the cemetery and report to the Environmental Consultant. A bi-weekly report on the state of the identified heritage resources should be developed and submitted to the Environmental Consultant by the ECO – this should be done in the first 3 months of the project commencement of construction activities, thereafter a monthly report. However, should any graves or burials previously unidentified around the cemetery/gravesite be exposed during the construction phase the ECO should report these urgently.

Figure 16 - Granite and brick graves located along the road to Besemkop farmstead. The graves have the following family names inscribed - Van Der Merwe, Coetzee & Jacomina

6. DISCUSSION

The desktop study yielded information about the existence of heritage resources in the Free State regions. This included archaeological, historical and industrial heritage resources. The south-eastern Free State Province region proved, from a desktop search point of view, to be the most saturated region with known archaeological resources. This study falls directly in the south east of the province, located some 28km south-east of the capital Bloemfontein. However, even though the south-eastern regions of the Free State are known to be saturated in archaeological sites and resources, the proposed area of development yielded insignificant number of such resources. Two MSA stone artefact scatters were found on the foothill of a Koppie in the Farm Besemkop (*Figure 13*) – refer to *Figure 17* for the position of the scatter within the PDA landscape. In terms of assessment of significance criteria recommended above the density of these scatter is very insignificant to even warrant them a site status. Therefore, no further action is recommended in terms of their management.

The bulk of sites identified within the PDA date to the historic period. Inscriptions were located on top of Besemkop koppie (*Figure 17 – location of these inscriptions*). These inscriptions only date to 41 years ago and can therefore not be considered to be worth of been give a status of rock art using the 100 year rule as stipulated in the NHRA, No. 25 of 1999 (*Figure 15*).

The survey, therefore, only yielded only three significant sites within the PDA. These sites include the two cemeteries (*Figure 12 & 16; refer to Figure 17 for the location in the landscape*) and a stone shed located within the Besemkop farmstead which has consist of modern buildings with exception to the shed itself (*Figure 13 – refer to Figure 17 for its location within the landscape*). The shed has also been altered on a number of times. The NHRA, No.25 of 1999 makes categorises sites into three categories – sites of national, provincial and local significance. The two cemeteries and the historic shed are for the purposed of this report graded to category 3 – they are of local significance.

Figure 17 - Distribution of heritage sites within Sannaspos PDA.

7. CONCLUSIONS

The physical survey of the PDA yielded five heritage resources sites, namely: Sannas-1, Sannas-2, Sannas-3, Sannas-4 and Sannas-5.

- Out of the five sites yielded, only one archaeological site was observed in form of two MSA stone tool scatter and has been named Sannas-2. The significance of this site is low and no further actions with regards to it management is required.
- Inscriptions were also found on to of a Koppie in the Farm Besemkop and they are also of low significance and no further action is required with regards to their management (Sannas-4).

- The three other sites, two cemeteries and a stone shed are deemed to be of high significance and graded to level 3 (local significance):
    - It is proposed that the three sites should be preserved in situ and not be disturbed or altered during the Sannaspos Solar Farm construction activities.
    - Should construction activities come closer to these sites a buffer of approximately 20m should be retained between graves and construction activities – for example, for Sannas-5 and Sannas-1 (*Figure 17*).

In conclusion, based on the results yielded by both the archaeological and heritage resources desktop study and physical survey of the PDA:

- It is the author's views that the proposed development can go ahead as planned in terms of heritage resources management and planning.
- However, due to subterranean nature of some archaeological resources and sites and that such site could have not be observed during the physical survey of the PDA, the following recommendations are made:
    - It is recommended that the proposed project construction phase should pay special attention to possible encounter of archaeological resources and sites such as unmarked graves or stone and iron implements (dating to Iron Age and to events of the Second South African War as discussed above).
    - Should such sites be discovered during the construction phase, construction activities need to be stopped with immediate effect and a professional archaeologist need to be called on site to inspect and investigate the finds and make recommendations on further actions that need to take place to rescue or mitigate the finds. For example, applying for rescue permits with SAHRA-BGG Unit in case of discovery of unmarked graves and SAHRA-APM Unit in case of archaeological and palaeontological remains.
    - To achieve the above two recommendation – it is further recommended that an Environmental Control Officer should be inducted on heritage management before the commencement of construction activities and that he/she should be to take responsibility for heritage sites and resources during the construction phase of the project.

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