

# Enamandla PV 5

## SCOPING HERITAGE ASSESSMENT: PROPOSED CONSTRUCTION OF SOLAR CSP AND PV FACILITIES ON THE REMAINING EXTENT OF THE FARM HARTBEEST VLEI 86, NEAR AGGENEYS, NORTHERN CAPE

(Assessment conducted under Section 38 (8) of the  
National Heritage Resources Act No 25 of 1999)

Prepared for:  
WSP/Parsons Brinckerhoff

On behalf of:  
BioTherm Energy (Pty) Ltd

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## EXECUTIVE SUMMARY

ACO Associates cc was appointed by WSP on behalf of BioTherm Energy (Pty) Ltd to undertake a Scoping Heritage assessment for the construction of two CSP (150MW each) solar power stations (Letsoai CSP Project) and five PV (75MW each) solar facilities (Enamandla PV Project) and associated infrastructure (substations, powerlines and water pipelines) on the Remainder of the Farm Hartebeest Vlei 86, some 16km south of the town of Aggeneys in the Northern Cape Province. This report only focuses on the Enamandla Site 5 (hereafter referred to as “Enamandla PV 5”).

Numerous renewable energy facilities have been proposed in the area around the Eskom Aggeneys substation and they have been subjected to the EIA process. The full range of heritage resources may occur on Hartebeest Vlei 86 including: palaeontology, archaeology, built environment, graves and cultural landscapes.

Based on the results of studies in areas adjoining Hartebeest Vlei 86, the following assumptions can be made about the heritage resources on the property.

### Conclusions

- It is assumed, based on our knowledge of the surrounding areas, that the most significant heritage resources inside the boundaries of Hartebeest Vlei 86, are likely to be archaeological sites;
- Our assumptions about the spread and density of archaeological resources is based on our knowledge of the landscape and archaeology of the area as well as assessments undertaken by other specialists on adjoining properties;
- Archaeological sites are likely to be located near rocky outcrops or low exposures of bedrock, particularly those which collect rainwater. It is also possible that archaeological sites may be found around natural pans and in the hollows between sand dunes;
- It is assumed that, given the sparse vegetation of the study area, the presence of archaeological resources should be readily apparent from a surface survey, which must be undertaken prior to the completion of the EIA phase of the project;
- Sections of the proposed water pipeline to the Orange River cross over homesteads and settlements and it is possible that the built environment/graves may be impacted by the pipeline;
- The last 500m of the pipeline to the Orange River are considered to be particularly sensitive because of the possibility of pre-colonial pastoralist encampments and graves.

### Recommendations for the HIA

The EIA phase study needs to fulfill the requirements of heritage impact assessment as defined in section 38 of the NHRA. This means that the assessment has to cover the full range of potential heritage resources as defined in the National Heritage Resources Act 25 of 1999.

The aim of the EIA would be to identify and assess the significance of all heritage resources on the property, to assess the preferred and alternative options and to rate them in terms of significance, to determine the potential impacts on the heritage resources, and where appropriate to recommend “no-go” areas and to propose mitigation if avoidance is not possible.

- SAHRA needs to be informed of the proposed development and they will indicate the range and type of specialist heritage studies they require;
- A palaeontological impact assessment may be requested by SAHRA;
- The proposed study area, including proposed routes of linear infrastructure (water pipe lines, power lines and access roads) must be subjected to a field survey by the heritage practitioner/archaeologist. They must walk those sections of the study area (including

powerline and water pipeline options) which have been identified in this report as of heritage sensitivity;

- The significance of each find will need to be assessed along with the impacts of the proposed activity;
- The visual impact specialist will need to consider the impacts of the proposed powerlines crossing the N14 (which can be considered of scenic significance);
- In the case of impacts to significance heritage resources, the proposed mitigation measures may include the “No-Go” alternative, avoidance, archaeological excavations or monitoring during earthworks;
- The heritage specialist should consider the cumulative impact of a number of solar facilities in the Aggeneys area on the heritage of the study area and make recommendations for mitigation.

Indications are that in terms of archaeological heritage and built environment the proposed activity is viable, impacts are expected to be limited and controllable. In terms of the information available at this time, no fatal flaws are anticipated.

The recommendations are that the study area should be subjected to the full EIA process.

## GLOSSARY

**Archaeology:** Remains resulting from human activity which is 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.

**Early Stone Age:** The archaeology of the Stone Age between 700 000 and 2500 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).

**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.

**Middle Stone Age:** The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.

**National Estate:** The collective heritage assets of the Nation

**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.

**Pleistocene:** A geological time period (of 3 million – 20 000 years ago).

**SAHRA:** South African Heritage Resources Agency – the compliance authority which protects national heritage in the Northern Cape.

**Structure (historic:)** Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

## Acronyms

DEA	Department of Environmental Affairs
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency

## Archaeologists/Heritage Specialists

Lita Webley is an archaeologist (PhD from the University of Cape Town 1992) with ACO Associates cc and has been conducting Heritage Impact Assessment and archaeological specialist studies in the Western Cape, Northern Cape and Eastern Cape Provinces since 1996. She is a member of the Archaeology, Palaeontology and Meteorites Committee and the Impact Assessment Committee of Heritage Western Cape (HWC), the Provincial Heritage Resources Authority. She is accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists (ASAPA) CRM section as follows:

- Principal Investigator: Stone Age, Shell Middens and Colonial Period; and
- Field Director: Grave Relocations.

ACO Associates cc has no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

David Halkett (BA, BA Hons, MA (UCT)) is an Archaeologist and Member of the Association of Professional Archaeologists of Southern Africa (ASAPA) and accredited with Principal Investigator status. He has been working in heritage management for 23 years and has considerable experience in impact assessments with respect to a broad range of archaeological and heritage sites in the Northern Cape.

## SPECIALIST DECLARATION

I, Lita Webley, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have potential of influencing – any decision to be taken with respect to the application by the competent authority; and – the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offense in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Signature of specialist



Specialist Field: Archaeology and Heritage

Name of Company: ACO Associates

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## 1 INTRODUCTION

ACO Associates cc was appointed by WSP on behalf of BioTherm Energy (Pty) Ltd to undertake a Scoping assessment for the construction of two CSP (150MW each) solar power stations (Letsoai CSP project) and five PV (75MW each) solar facilities (Enamandla PV Project) and associated infrastructure on the Remainder of the Farm Hartebeest Vlei 86, some 14km south of the town of Aggeneys in the Khai-Ma Municipality, Northern Cape Province (Figure 1). This report only focuses on the Enamandla PV Site 5 (hereafter referred to as “Enamandla PV 5”).



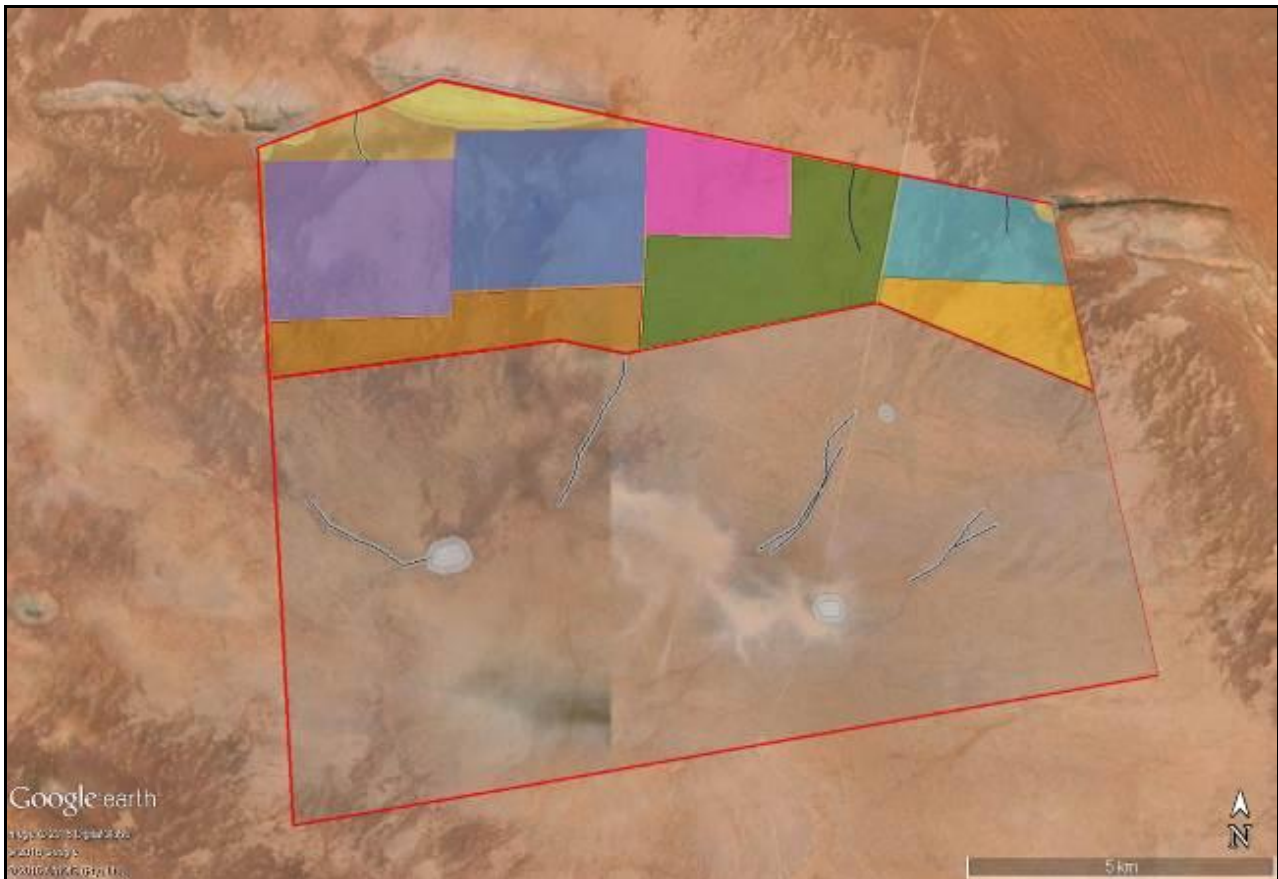
**Figure 1:** The location of the Solar CSP and PV facilities on the remainder of the farm Hartebeest Vlei 86, some 14 km south of the town of Aggeneys, on the N14 in the Northern Cape Province.

The Enamandla PV 5 facility covers an area of 325ha.

**Enamandla PV 5:** Enamandla PV 5 (The site access will be via a new 9.5km long road to the N14. Details of the site include:

- The Solar PV panels will be either fixed axis mounting or single axis tracking solutions, and will be either crystalline silicon or thin film technology;
- 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 medium voltage collector system will comprise of cables (1kV up to and including 33kV) that will be run underground, except where a technical assessment suggests that overhead lines are applicable;
- Sewage disposal facility and septic tanks;
- A laydown area for the temporary storage of material during the construction activities;
- Internal roads;
- Construction of a car park and fencing;

- Administration, control and warehouse buildings.



**Figure 2:** Close-up of the proposed layout. The CSP facilities are shown as purple and dark blue polygons, while the PV facilities are in dark orange, light orange, pink, green and light blue.

## 1.1 SCOPE AND LIMITATIONS

This study has been commissioned as a Scoping assessment. It provides a brief baseline description and attempts to predict the possible range of impacts and identify issues in terms of accumulated knowledge of the area. It sets out the methodology for a full heritage impact study.

The main deliverables are an Environmental Scoping Report with appropriate maps, drawings and figures and to include:

- Preparation of a desktop Scoping Report reviewing the existing literature on the heritage resources on the farm Hartebeest Vlei 86 and along the route of the pipeline;
- Describe and map the heritage characteristics of the study area;
- Map sensitive areas and provide location details (co-ordinates) of these areas;
- Integrate the results of the palaeontological study (independently commissioned) into the final heritage impact assessment (HIA).

This Scoping study includes a review of the published material as well as unpublished reports on the SAHRIS database. The 1:50 000 maps of the area as well as Google Earth aerial images were consulted. Numerous impact assessments have been conducted in proximity to the proposed facility as reflected on the SAHRIS database. The following CRM reports provide valuable information on the heritage resources of the area and were consulted:



- Morris (2013) assessed the proposed Aggeneys Solar Facility on the farm Bloemhoek immediately north of Letsoai and Enamandla;
- Webley & Halkett (2012) assessed the proposed Aggeneys Solar Facility on the farm Aroams to the north-east of Letsoai and Enamandla ;
- Morris (2011) and De Kock (2012) assessed the proposed Zuurwater Solar Facility of the farm Zuurwater 62, to the north-west of Letsoai and Enamandla;
- Hart et al. (2014) assessed the proposed Korana Solar Facility on the farm Namies South 212 to the east of Letsoai and Enamandla;
- Orton & Webley (2012b) assess the proposed Pofadder Wind and Energy facility on the farm Poortjie, to the east of Letsoai and Enamandla;
- Orton & Webley (2013) assessed the proposed Namies Solar facility on the farm Namies South 212, to the east of Letsoai and Enamandla;
- Orton (2015) is busy with the Scoping study for the Sol Invictus Solar facility on the farm Ou Taaibosmond 66, to the north-west of Letsoai and Enamandla.

### **1.1.1 Assumptions**

It is assumed that the heritage resources on the farm Hartebeest Vlei 86 will resemble those found on other solar facility projects in adjoining areas (see list above). Further, it is assumed that the most significant heritage resources on the property will be the archaeological resources.

### **1.1.2 Limitations**

The resolution on aerial photography (Google Earth) is not sufficiently high to identify archaeological sites or graves. A field assessment is required to determine the heritage sensitivity of the area.

## **2 APPROACH AND METHODOLOGY**

In general, heritage resources are non-renewable, and once they are destroyed they cannot be recovered or re-introduced. This applies to palaeontological and archaeological resources, buildings that are older than 60 years as well as cemeteries and graves. It is therefore important that heritage resources are identified and their significance assessed prior to development.

Archaeological sites are particularly vulnerable as their significance is dependent on their context. The main cause of impacts to archaeological sites is direct, physical disturbance of the material itself and its context. The impacts are likely to be most severe during the construction period although indirect impacts may occur during the operational phase of the project.

It is preferable that archeological sites are conserved. Mitigation, in the form of archaeological excavations, means that while the material may have been retained and conserved in a museum, the context of the archaeological site has been lost forever.

With respect to cemeteries and graves, any impacts which result in a disturbance to a grave are considered high. They are best avoided by development. An extensive consultation process is required if exhumation is considered.

The significance of heritage resources is assessed according to the grading criteria established by the National Heritage Resources Act, No 25 of 1999.

**Table 1:** Grading of Heritage Resources

Grade	Level of significance	Description
I	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
II	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
IIIA	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3a heritage resources.
IIIB	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3b heritage resources.
IIIC	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3c heritage resources.

## 2.1 IMPACT SCREENING TOOL

The following impact screening table has been proposed to assess the significance of identified impacts. The screening tools will allow any impacts of very low significance to be excluded from the detailed studies in the impact assessment phase. The screening tool is based on two criteria, namely probability and severity.

Severity/Beneficial Scale					
Probability Scale		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

### Probability Scale

4	<b>Definite</b>
	Where the impact will occur regardless of any prevention measures
3	<b>Highly Probable</b>
	Where it is likely that the impact will occur
2	<b>Probable</b>
	Where there is a good possibility that the impact will occur
1	<b>Improbable</b>

**Severity/Beneficial Scale**

<b>4</b>	<b>Very severe</b> An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated	<b>Very beneficial</b> A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit
<b>3</b>	<b>Severe</b> A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	<b>Beneficial</b> A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit could be difficult, expensive or time consuming or some combination of these.
<b>2</b>	<b>Moderately severe</b> A medium to long term impacts on the affected system(s) or party(ies) that could be mitigated.	<b>Moderately beneficial</b> A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
<b>1</b>	<b>Negligible</b> A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	<b>Negligible</b> A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

**3 LEGISLATIVE BACKGROUND**

While the National Department of Environmental Affairs is the decision making authority acting in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and Regulations (2014), they must ensure that the evaluation of the statutorily defined broad range of heritage resources fulfils the requirements of the relevant heritage resources authority in terms of Section 38 (3) of the National Heritage Resources Act (Act 25 of 1999) (NHRA) and that any comments and recommendations of the relevant heritage resources authority with regard to proposed development have been taken into account prior to the granting of the consent.

This report is conducted in terms of Section 38 (8) of the National Heritage Resources Act, No 25 of 1999.

The NHRA provides protection for the following categories of heritage resources:

- Landscapes, cultural or natural (Section 3 (3))
- Buildings or structures older than 60 years (Section 34);
- Archaeological Sites, palaeontological material and meteorites (Section 35);
- Burial grounds and graves (Section 36);
- Public monuments and memorials (Section 37);
- Living heritage (defined in the Act as including cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems and the holistic approach to nature, society and social relationships) (Section 2 (d) (xxi)).

### **3.1 Structures (Section 34(1))**

No person may alter or demolish any structure part of a structure which is older than 60 years without a permit issued by the South African Heritage Resources Agency (SAHRA), the responsible provincial heritage resources authority.

### **3.2 Archaeology & Palaeontology (Section 35(4))**

No person may, without a permit issued by SAHRA, destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite.

Archaeological is defined as: “material remains resulting from human activity which is in a state of disuse and is in or on land and which is older than 100 years, including artefacts, human and hominid remains and artificial features and structures”.

Palaeontological is defined as: “any fossilised remains or 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”.

### **3.3 Burial grounds and graves (Section 36(3))**

No person may, without a permit issued by the South African Heritage Resources Authority (SAHRA), destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority.

## **4 REGIONAL OVERVIEW**

### **4.1 Environmental attributes**

The environment is arid and comprises relatively flat drainage plains with inselbergs such as the Aggeneys Mountains, Black Mountain and Gamsberg rising above the plains (Figure 1). The landscape is sparsely vegetated making surface heritage resources highly visible.

### **4.2 Palaeontology**

Insert PIA by Dr John Almond

### **4.3 Archaeological Background**

#### *Early and Middle Stone Age*

There is a widespread, but ephemeral distribution of stone artefacts of Pleistocene age across Bushmanland. The ESA, according to Morris (2013) includes Victoria West cores, long blades and a low incidence of handaxes and cleavers. According to Morris (2013) there is a MSA site on the top of the Gamsberg and at the base of hills. Orton (2013b) collected both ESA and MSA material from the top of the mountain. Webley & Halkett (2012) also recorded MSA stone artefact scatters to the north-east of the proposed development on the farm Aroams.

In their assessment of the Korana WEF, Hart et al (2014) recorded a few concentrations of MSA scatters, but otherwise no definable archaeological sites. Smith (2012) recorded a low density distribution of ESA and MSA flakes on the Zuurwater Solar Facility.

## *Later Stone Age*

According to Morris (2013) the predominant archaeological resource in the area belongs to the Late Holocene Later Stone Age. Orton & Webley (2013) note that the pre-colonial archaeology is strongly linked to landscape features. Ephemeral LSA scatters are found across the area and are generally in close proximity to fountains, small, seasonal pans or hollows in the bedrock which collect seasonal rainfall (“klipbakke”). More substantial herder encampments are found along the Orange River floodplain (Morris & Beaumont 1990), reflecting “the higher productivity and carrying capacity” along the river. After good rains, herders may have moved from the Orange River into Bushmanland, as indicated at sites near Aggeneys with pottery and the archaeological site of Schuifdrift South east of Pofadder (Morris 1999a). Beaumont et al (1995) have argued that the arrival of the herders around 2000 years ago, may have led to competition for resources and the marginalisation of hunter-gatherers who may have made more frequent use of the Bushmanland resources.

Morris (2013) refers to grinding grooves in the rock outcrops of the Aggeneys/Gamsberg area. Similar grinding grooves in the bedrock have been recorded on the Pofadder WEF (Orton & Webley (2012b) to the east of the study area and at the Kangnas WEF (Orton & Webley 2012a) to the west of the study area. A single site with rock paintings (consisting of simple finger paintings including two star motifs and an indented oval shape image) has been recorded from a boulder alongside the Aggeneys/Black Mountain aggregate quarry. Morris (2013) also refers to some engraved cupule sites at two sites on the Black Mountain Mining Property, Aggeneys and at the foot of the Swartberg on Zuurwater 62 (Morris 2013). This appears to be similar to the cupule site recorded by Orton & Webley (2012a) on the Kangnas WEF site some distance to the west.

In fieldwork conducted by Webley & Halkett (2011) for a new transmission line commencing at the Aggeneis substation, it was observed that LSA sites (consisting mainly of quartz flakes) were concentrated at the base of small koppies.

## **4.4 Historical Background**

Penn (1995) has summarised the colonial history of this frontier zone for the Aggeneys and Gamsberg areas. The area adjacent Aggeneys was visited by eighteenth and nineteenth century explorers (Thompson 1827; Dunn 1931; Robinson 1978). Many of the local place names are of Khoe-San origin. Thompson (1827) recorded that the local people were known as the “Obseses”, they were a formidable amalgamation of various tribes who had been involved in conflict with bands of Afrikaner.

The indigenous groups faced onslaughts from the 1770s and by the end of the 19<sup>th</sup> century the independent San groups had disappeared. There are references to a massacre of San groups in a kloof at Aggeneys although other sources link the killing of the Bushmen with Gamsberg rather than Aggeneys. Morris (2010) notes that recently appreciation has started to emerge regarding the “genocide of the Bushmen in this area, with certain mountainous areas (like the Gamsberg) being likely massacre sites”.

There are various interpretations of the name Aggeneys (original spelling Aggeneis). Nienaber & Raper (1977) list “Place of Water”, “Place of Blood”, “Place where they slaughtered” or possibly “Place of red clay”. Pella was originally known as “Kammas”, which means “fountain with water”.

According to a British Intelligence Map of 1900 (Figure 5), the wagon track across Bushmanland ran past Aggeneys, and then south of the Gamsberg, through the village of Namies which now lies in ruins. We know from Burke (1995) that during the Anglo-Boer War skirmishes in the Northern Cape around 1901, there were approximately 200 Boers at Namies. Aggeneys itself, which also had an important water source, was also held by a small Boer commando unit. The farm at Aggeneys was acquired by a former British soldier in 1905 and the ruins of the original farmhouse

are still visible. There was some Boer war action around Aggeneys and the old fortifications are apparently visible on the valley sides.

The village of Namies was an important water supply point for people trekking across Bushmanland and was the last water stop before Gamoep, some 100km to the southwest (Eksteen 2012; Orton & Webley 2013). After good rains, the Trekboers used to camp at Namies. Namies was abandoned around 1923, when Pofadder became the most important town in the area. According to Figure 5, there was a track which ran through the eastern section of the Hartebeest Vlei 86. A pan in the south part of farm was called Goneroop.

The first known investigation of the mineral potential of the Aggeneys area dates to 1928, while the first mining at Swartberg (Black Mountain) dates to the 1970s.

#### **4.5 Archaeology of the Water Pipelines to the Orange River**

Two alternative routes have been proposed for the water pipelines (Figure 3). The eastern route follows an existing overhead powerline and the old waggon track through Pella (Figure 4) to the Orange River. The most southerly section of the eastern pipeline travels through the proposed Aggeneys PV facility (Webley & Halkett 2012) which is located near the town of Aggeneys.

The western route swings to the west of the Aggeneis substation and travels underneath the existing overhead powerline to the Orange River. The most southerly section of the western route travels through an area which has already been surveyed for the Zuurwater PV (Morris 2011; De Kock 2012 & Smith 2012).

Briefly, the pre-colonial archaeology of the southern section of both pipeline options comprises sparse scatters of Middle Stone Age material, generally on gravel pavements, or on the slopes of small rocky koppies. In fieldwork for a new transmission line commencing at the Aggeneis substation, Webley & Halkett (2011) observed that LSA sites, consisting mainly of quartz flakes, were concentrated at the base of small koppies. Smith (2012) reported a few ESA and MSA pieces during his survey of the Zuurwater PV facility but the low density of archaeological remains was confirmed by Morris (2011) who notes “extremely minimal traces were found on the plains”.

It is anticipated that the distribution of pre-colonial archaeological material between the N14 and the Orange River will be low, with the exception of those areas around fountains, springs and pans. There is also a possibility that rock paintings and/or engravings may be found in rocky outcrops. Similarly, small settlements and farm complexes may include family cemeteries or isolated graves.

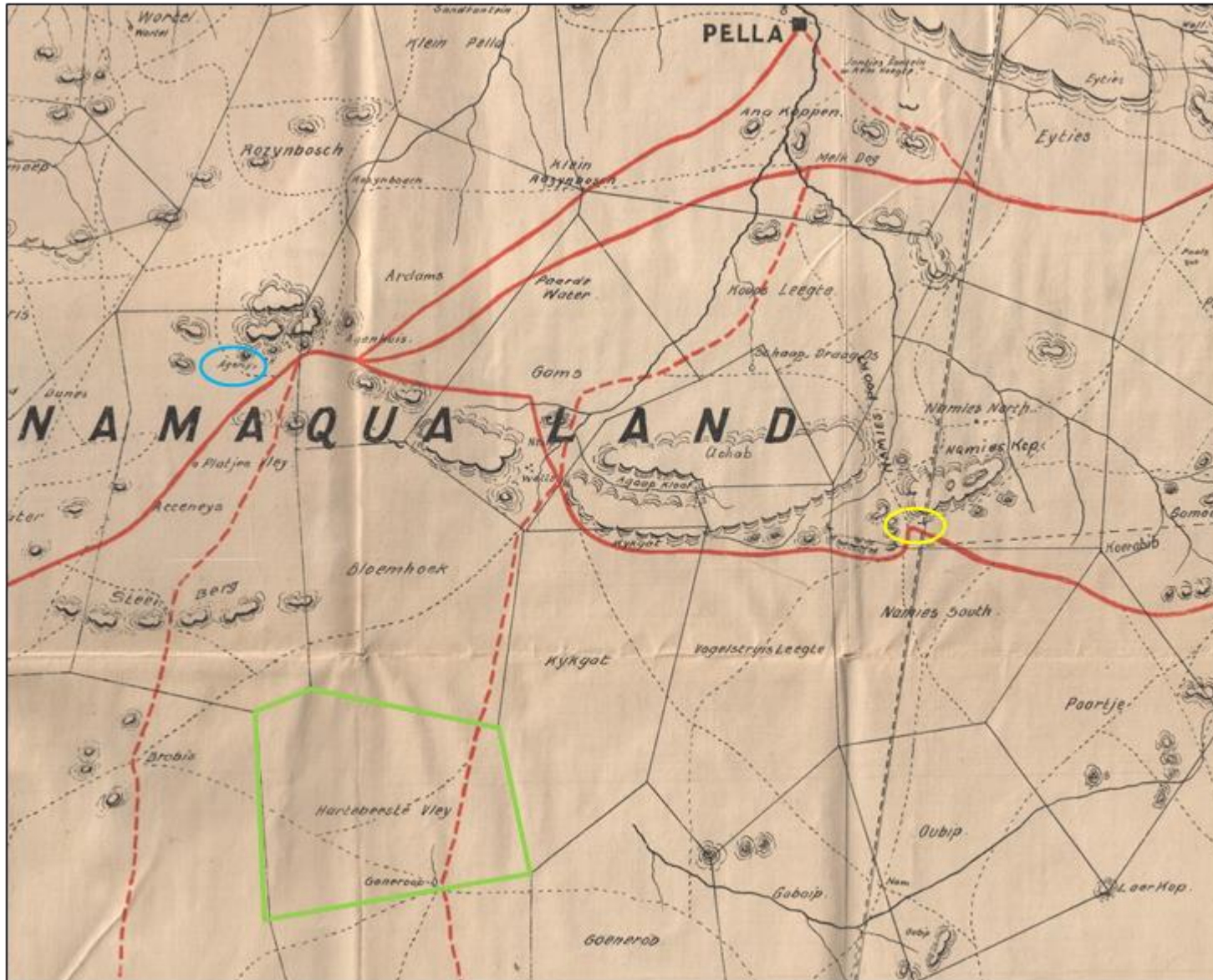
The Orange River itself, however, was an important focus for human settlement from pre-colonial times. We know that Khoekhoen pastoralists, known as the Einiqua, were living along the lower and middle Orange River by the late 18<sup>th</sup> century, although the earliest inhabitants of the Pella area were apparently San hunter-gatherers (Penn 1995). Important archaeological sites, such as Jakkalsberg, have been found on the banks of the Orange River further downstream in the Richtersveld (Webley 1997).

Archaeological excavations by amateur archaeologists of graves and burial cairns along the Orange River, particularly between the Augrabies Falls and Prieska, have produced large collections of human skeletal material (Morris 1992). Since the stretch of the Orange River between Pella and Goodhouse has **not** been subjected to systematic archaeological field surveys, it may be equally sensitive to those areas upstream and downstream.

#### **4.6 Cemeteries and Graves/Cairns**

Graves are occasionally recorded next to old farmsteads. Morris (2011) recorded some stone cairns, possibly pre-colonial burials, to the north-west of the Gamsberg.





**Figure 5:** Map compiled by the British Intelligence Department (1900) of Bushmanland (scale 1:250 000). Note the position of Hartbeest Vlei. The location of Aggeneys is shown in blue, and Namies is shown in yellow.

#### 4.7 Landscape and Scenic Routes

The only aspect of the landscape which has been identified as being of cultural significance is the Gamsberg some 12km to the north-east. Morris (2010) observes that there has been some discussion around including the Gamsberg into a potential /Xam and Khomani Heartland World Heritage Site, but there has been no progress on this matter since 2010.

The N14 which runs 10km north of the site can be considered a scenic route because of the aesthetic qualities of the surrounding landscape. However, the distance between the site and the proposed development means it is unlikely that the PV facilities will be visible from the road. The possibility that the CSP facility will be visible from the N14 will need to be determined by the visual specialist.

### 5 IMPACTS AND ISSUES IDENTIFICATION

In the case of the proposed Enamandla PV 5 facility, it is expected that impacts will be extensive. During the construction phase, the following activities will result in direct impacts to the landscape and any heritage that lies on it:

- Bulldozing of roads to the site with a possibility of cut and fill operations in places;
- Upgrading of existing roads;
- Creation of working and lay-down areas;
- Flattening and clearing of land for the solar facility;
- Excavations of small foundations or piling.
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The main impacts resulting from the operational phase of the PV facility are potential vandalism of heritage sites by staff of the solar facility(s). This includes stripping of fittings from abandoned farm buildings, careless damage to kraal walls, graffiti on rock art sites, etc.

Impacts resulting from the de-commissioning of the PV facility may include the dumping of electrical infrastructure on heritage sites.

These impacts are all considered to be negative.

The main cause of impacts to archaeological sites is direct, physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. It is not anticipated that there will be any impacts to the Built Environment. Historic structures and graveyards are sensitive to physical damage such as demolition as well as neglect. They are also context sensitive, in that changes to the surrounding landscape (i.e. visual impacts) will affect their significance.



The five PV facilities are shown as dark orange, light orange, pink, green and light blue polygons on Figure 2. Sensitive landscape areas which might contain heritage sites are indicated in dark pink (Figure 6).

With respect to the Enamandla PV Site 2, the probability of encountering heritage sites is “probable” and the severity impact is likely to be “moderately severe” (see Figure 6). In other words, mitigation would be possible.

## 5.1 ENAMANDLA PV SITE 5

Severity/Beneficial Scale					
Probability Scale		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	<del>Low</del>	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

The five PV facilities are shown as dark orange, light orange, pink, green and light blue polygons on Figure 2. Sensitive landscape areas which might contain heritage sites are indicated in dark pink (Figure 6).

With respect to the Enamandla PV Site 5, the probability of encountering heritage sites is “probable” and the severity impact is likely to be “moderately severe” (see Figure 6). In other words, mitigation would be possible.

## 6 TERMS OF REFERENCE FOR THE IMPACT ASSESSMENT PHASE

The EIA phase study needs to fulfill the requirements of heritage impact assessment as defined in section 38 of the NHRA. This means that the assessment has to cover the full range of potential heritage resources as defined in the National Heritage Resources Act 25 of 1999.

The aim of the EIA would be to identify and assess the significance of all heritage resources on the property, to assess the preferred and alternative options and to rate them in terms of significance, to determine the potential impacts on the heritage resources, and where appropriate to recommend “no-go” areas and to propose mitigation if avoidance is not possible.

- SAHRA needs to be informed of the proposed development and they will indicate the range and type of specialist heritage studies they require;
- The proposed study area, including proposed routes of linear infrastructure (water pipe lines, power lines and access roads) must be subjected to a field survey by the heritage practitioner/archaeologist. They must walk those sections of the study area (including powerline and water pipeline options) which have been identified in this report as of heritage sensitivity;
- The significance of each find will need to be assessed along with the impacts of the proposed activity;
- In the case of impacts to significance heritage resources, the proposed mitigation measures may include the “No-Go” alternative, avoidance, archaeological excavations or monitoring during earthworks;
- The heritage specialist should consider the cumulative impact of a number of solar facilities in the Aggeneys area on the heritage of the study area and make recommendations for mitigation.

## 7 CONCLUSIONS AND RECOMMENDATIONS

- A palaeontological impact assessment may be requested by SAHRA;
- It is assumed, based on our knowledge of the surrounding areas, that the most significant heritage resources inside the boundaries of Hartebeest Vlei 86, are likely to be archaeological sites;
- Our assumptions about the spread and density of archaeological resources is based on our knowledge of the landscape and archaeology of the area as well as assessments undertaken by other specialists on adjoining properties;
- Archaeological sites are likely to be located near rocky outcrops or low exposures of bedrock, particularly those which collect rainwater. It is also possible that archaeological sites may be found around natural pans and in the hollows between sand dunes;
- It is assumed that, given the sparse vegetation of the study area, the presence of archaeological resources should be readily apparent from a surface survey, which must be undertaken prior to the completion of the EIA phase of the project.

Indications are that in terms of archaeological heritage and built environment the proposed activity is viable, impacts are expected to be limited and controllable. In terms of the information available at this time, no fatal flaws are anticipated.

The recommendations are that the study area should be subjected to the full EIA process.

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