

**CCA Environmental
Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic
Power Project**

Heritage Impact Assessment Phase 2

Prepared by: _____ 2012 04 20
Elize Becker _____
Date

Approvals

Hatch

Approved by: _____
Anita Bron _____
Date

CCA Environmental [Jeremy Blood]

Approved by: _____
Date

Distribution List

Jeremy Blood, CCA Environmental

Specialist Declaration

PROJECT TITLE

Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic Power Project
--

Specialist:

Contact person:

Postal address:

Postal code:

Telephone:

E-mail:

Professional affiliation(s) (if any)

Elize Becker (Hatch)		
Elize Becker		
14 Harrowdene Business Park Woodmead		
2196	Cell:	0825699451
011 239 5659	Fax:	
ebecker@hatch.co.za		
ASAPA		

Project Consultant:

Contact person:

Postal address:

Postal code:

Telephone:

E-mail:

<i>CCA Environmental</i>		
<i>Jeremy Blood</i>		
<i>PO Box 10145 Caledon Square</i>		
<i>7905</i>	Cell:	
<i>021 461 1118</i>	Fax:	<i>021 461 1120</i>
<i>jeremy@ccaenvironmental.co.za</i>		

4.2 The specialist appointed in terms of the Regulations_

Elize Becker

I, _____, declare that --

General declaration:

- 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 the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Hatch

Name of company (if applicable):

2012 05 21

Date:

DISCLAIMER

Reports prepared by Hatch Africa (Pty) Ltd for CCA Environmental (Pty) Ltd as part of an Assignment (**Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic Power Project**) is subject to the following disclaimer:

The Reports may be used by the Client only in connection with the Assignment, and shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of the Consultant. The Client indemnifies Hatch against any liability, loss, damage, or cost howsoever arising, including by way of third party claim, from a breach of this undertaking by the Client. The findings, conclusions and opinions of the Consultant are based on the scope of the Consultant's services as defined within certain contractual undertakings between the Consultant and the Client, and are regulated by the terms and conditions contained in Agreements between these two parties (the "Agreements"). Portions of the Reports may be of a privileged and confidential nature relating to the Assignment. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the Reports. While it is believed that the information contained in the Reports is reliable under the conditions and subject to the limitations set forth in the Agreements, the Reports will be based in part on information not within the control of the Consultant and the Consultant therefore cannot and does not guarantee its accuracy. Unless otherwise expressly stated, the analyses contained in the Reports will be developed from information provided by the Client. The Consultant will not audit such information and the Consultant makes no representations as to the validity or accuracy thereof. The comments in the Reports will reflect the Consultant's best judgement in light of the information available to it at the time of preparation. The Consultant shall not be responsible for any errors or omissions in the Reports or in any information contained therein regardless of any fault or negligence of the Consultant or others. The principles, procedures and standards applied in conducting any environmental investigation are neither regulated by Government or any Governmental body nor are they universally the same. The Consultant will have conducted an investigation required in terms of the aforementioned scope of services in accordance with the methodology outlined in the Agreements.

Executive Summary

The proposed project could result in an impact of medium to low significance (before mitigation) and low significance (after mitigation) in terms of the status of heritage resources that are positioned on the property. The significance rating has been determined in terms of the possible threat that cultural heritage experiences at the site and if any cultural heritage will be lost if such a development is to commence.

It is recommended that a sampling / monitoring program is included in the Environmental Management Plan that will entail the rescue of archaeological material if discovered. It is recommended that the Environmental Control Officer is educated and the local construction workers are trained. It is advised that training is focused on providing visual display of the different type of artefacts that may be discovered and also the methodology to be used when such a discovery occur. The proposed development area is situated within a South African War and Stone Age archaeology landscape. The possibility of uncovering heritage objects that are associated with this time period is high.

Rock art sites have been identified during previous archaeological impact assessments at neighbouring farms that contributes to the cultural sensitivity of the site. In summary the proposed development site has historically and currently been used for farming activities, hunting of small animals, brick manufacturing, placement of power lines and a lodge for overnight stay by travellers. This means that the site is highly disturbed and the cultural landscape has been impacted upon for a lengthy time.

No indigenous groups are situated in the close vicinity. In terms of the living heritage of the proposed area, it is mostly defined to storytelling related to the South African War. Fossil bearing rocks have been identified by Palaeontologists during previous heritage impact assessments as part of other development proposals. A Palaeontologist has been requested to complete a Palaeontological Desktop Study to provide recommendations in terms of the protection and mitigation of possible Palaeontological material at the proposed development site.

Table of Contents

Specialist Declaration	ii
Executive Summary	v
1. Introduction	1
2. Terms of Reference, Project location / description and Scope of Work	1
2.1 The following general Terms of Reference will apply to the Specialist Studies:	1
3. Legislation	4
4. Heritage Impact Assessment Project Objective	4
5. Archaeological, Historical and Living Heritage Background	4
5.1 What is Cultural Heritage?	4
5.2 Archaeological Time Periods	5
5.3 Stone Age Archaeology	5
5.4 South African War	6
5.5 Railway Historical Resources	7
5.6 Rock Art	8
5.7 Living Heritage Resources.....	9
5.8 Palaeontology	9
6. Project Methodology	9
7. Findings	9
7.1 Summary of Findings	10
7.1.1 Stone Age Archaeology	10
7.1.2 Rock Art	10
7.1.3 Historical resources.....	10
7.1.4 Living Heritage	10
7.1.5 Cultural Heritage and Sense of Place.....	10
7.1.6 Palaeontology	10
8. Impact Assessment Table	11
8.1 Construction.....	11
8.2 Impact during Operation	12
8.3 Impact during decommissioning	13
9. No-Go Alternative	13
10. Basic Management Plan	13
10.1 Sampling prior to Construction	14
10.2 Permit Requirements	14
10.3 Heritage Training for Environmental Control Officer and Contractors.....	14
10.4 Contact Details for Professional Archaeologist and the South African Heritage Agency.....	14
11. Conclusion and the Way Forward	15
12. Bibliography	15



13. List of Figures 16

14. List of Tables..... 16



1. Introduction

The purpose of this project is to complete a Phase 2 Heritage Impact Assessment that is required in terms of the National Heritage Resources Act (No. 25 of 1999). The aim of this project is to identify the significance of heritage resources that are positioned on the proposed development area and also to assess the impact that the construction and operation activities may have on these resources.

The proposed development area is situated at Portion 3 of Farm Hartebeestplaats 135 positioned close to the town of De Aar in the Northern Cape Province.

Scattered stone age artefacts were discovered during the Phase 1 Heritage Impact Assessment. Although they are not concentrated, other stone age material was identified on the neighbouring properties as part of other solar development projects. This means that a stone age cultural landscape exists and it is of importance to document as much of the artefacts available.

Secondly the area is positioned in an area linked to the South African War (Anglo – Boer War) in 1899-1902. It may happen that historical artefacts are exposed when earthmoving activities commence.

2. Terms of Reference, Project location / description and Scope of Work

2.1 The following Terms of Reference will apply to the Specialist Studies:

The specific terms of reference for the heritage assessment are as follows:

- Provide a description of the archaeology, palaeontology and cultural heritage of the site and identify and map any sites of archaeology, palaeontology or cultural significance that may be impacted by the proposed project;
- Assess the sensitivity and conservation significance of any sites of archaeological, palaeontology or cultural heritage significance affected by the proposed plant;
- Identify and assess the significance of the potential impacts of the proposed project on archaeological, palaeontology and cultural heritage;
- Make recommendations on the protection and maintenance of any significant cultural heritage and/or archaeological / palaeontology sites that may occur on site;
- Identify practicable mitigation measures to reduce negative impacts on the archaeological /palaeontology resources and indicate how these can be incorporated into the construction and management of the proposed project;
- Provide guidance for the requirement of any permits from the South African Heritage Resources Agency (SAHRA) or the Provincial Heritage Resources Authority (Ngwao Boswa Kapa Bokoni) that might become necessary;
- Compile the Notice of Intent to Develop Form for submission to the competent authority.

Business Venture Investments 1421 (Pty) Ltd is proposing to develop the De Aar Solar One Photovoltaic Power Project on Portion 3 of Farm Hartebeestplaats 135 (CCA, 2012). The proposed photovoltaic power plant would consist of a 25 to 30 MWp AC power plant that would be connected to the existing Hydra substation via a 132 kV overhead power line (CCA, 2012). The figure below indicates where the proposed development site would be located.



Figure 1: Proposed development area positioned on Portion 3 of Farm Hartebeestplaats 135.

It is the legal responsibility of the client to ensure that the cultural heritage that has been identified during the reconnaissance survey and that the mitigation procedures are implemented. It is also the responsibility of the client to ensure that competent professionals are available to assist with the identification and protection of heritage resources.

A gap analysis has been completed in terms of previous heritage resources impact assessments that were completed. This provided an indication of where areas of concern were missed or not properly assessed. This also allowed the determination of any other or similar projects that have been proposed in the area.

The heritage principle that focuses on the prevention of the destruction of heritage resources has been taken into account. This principle was used to determine what the possible impacts may be, if development commences at the proposed area.

The impact assessment table allowed for proposed mitigation procedures and the management of possible impacts at the proposed development area.

The proposed photovoltaic power project consists of a 25 to 30 megawatt peak alternating current (MWp AC) photovoltaic plant that would be connected to the existing Hydra substation via a 132 kV power line, approximately 2 to 23.5 km in length. The project would entail the generation of electrical power by converting solar radiation into direct current electricity. The generation of power would include the placement of solar panels or modules that consist of solar cells connected to a range of photovoltaic material.

The module dimensions are expected to be 1 m by 2 m and would be mounted on racks to be able to form arrays. The solar racks would have a ballasted or piled foundation. A tracker system is also being considered, which could increase the performance of modules during early morning and late afternoon periods.

The size of the modules would be in 1.25 MW blocks of an approximate 3.5 ha size that would be tilted to a 30 degree angle. This would result in covering an area of 75 to 80 ha. Additional construction would include access roads, pylons and installation of internal underground cables.

The photovoltaic plant would be connected to the Hydra substation that is positioned 1.5 km in the eastern direction of the site. Three alternative power lines routes are being considered.

Monopole steel towers with an approximate 17.5 m to 21 m would be used for the power line (CCA, 2012). The plant would also require a transformer (22/132kV 75 MVA sub-station) and a photovoltaic inverter (250 kW) (CCA, 2012).

Access would be received via the existing Hydra substation access road that is positioned off the N10 and the existing farm access road at the northern side. Access roads (4 to 7 metre wide) would also be constructed between individual solar arrays. Tree planting would occur along the Hydra substation access road and along the N10 boundary fence (CCA, 2012).

Various maintenance buildings would be constructed that are inclusive of a main building ($\pm 150\text{m}^2$) for use by control and security staff. A store room of an estimate size of $\pm 500\text{m}^2$, main electrical substation and transformers of an average size of 500m^2 would be developed (CCA, 2012). Inverter structures made of prefabricated concrete or steel structures would be constructed between arrays (CCA, 2012). Small concrete or steel transformer structures would be developed as well (CCA, 2012).

The brick or stone buildings would be a single storey with metal roofing (CCA, 2012). The store would be clad portal frame type of structure (CCA, 2012).

Fencing would be required that include a 2.5m high wire mesh security fence and access would be gained via a security gate (CCA, 2012).

Additional boreholes would maybe sunk and storage tanks would be located close to office buildings (CCA, 2012).

3. Legislation

The South African Heritage Resources Agency (SAHRA) is a statutory organisation established in terms of the National Heritage Resources Act (No. 25 of 1999) as the national body responsible for the protection of South Africa's cultural heritage resources. SAHRA manage the issuing of permits for destruction, alteration or demolition of structures older than sixty years, needs and desirability permits linked to development activities, sampling permits that allow the removal of heritage objects for research purposes or rescue archaeology, rock art documentation permits, grave exhumation and removal as well as archaeological excavation permits.

The primary triggers that result in the need for heritage resources input are statutory requirements, nature and degree of the significance linked to the identified heritage resources and heritage resources emerging from the stakeholder consultation process (Provincial Government Western Cape, 2005).

4. Heritage Impact Assessment Project Objective

The heritage impact assessment objective is to determine what the impact of the proposed development would be on the heritage resources that are positioned in the area. The area includes the development footprint, but also the surrounding environment. The secondary objective is to determine the indirect impacts that the development may have on the cultural landscape of the De Aar region.

5. Archaeological, Historical and Living Heritage Background

The heritage resources that are positioned in and around the proposed impact area vary from Archaeological Sites, Palaeontological Sites and Living Heritage. The proposed site has evidence of stone tool material that is similar to findings discovered at the neighbouring areas.

5.1 What is Cultural Heritage?

Cultural heritage resources are evident of tangible and intangible resources. The list of heritage resources that are protected in terms of the National Heritage Act (No. 25 of 1999) is inclusive of the following:

- Tangible moveable and immovable objects.
- Property sites, structures, group of structures older than sixty years.
- Palaeontological sites and objects.
- Archaeological sites and objects.
- Sacred rocks, lakes and waterfalls.
- Places of historic, cultural, artistic and religious value.
- Unique natural features.
- Intangible forms of culture that are inclusive of forms of cultural knowledge, innovations and traditional lifestyles.

5.2 Archaeological Time Periods

Heritage resources and cultural landscapes are linked to specific time periods. In summary the various eras are as follows:

1. The former period occurred in southern Africa from Common Era (CE) (2000 years ago to 1950) to historical periods. The definition is divided between Early (c. 200 CE to c. 1400 CE) and Late (c. 1400 CE to 1800's) (Archaic, 2008). The historical period that indicates dates from 1500s to present (Natalie Swanepoel, Amanda Esterhuysen and Phillip Bonner, 2007).
2. The Iron Age is defined as a time period that occurred during c. 200 to c. 1000 Common Era named as the early period and c. 1000 to 1800's Common Era (Archaic, 2008).
3. The Stone Age time period are divided between three different time periods, namely:
 - Early: c. 2 500 000 to 150 000 Before Common Era (before 1950).
 - Middle: c. 150 000 to 30 000 Before Common Era (before 1950).
 - Late: c. 30 000 Before Common Era until the historical time periods commenced (before 1950).

5.3 Stone Age Archaeology

The De Aar area is evident of the existence of rock art engravings and the associated Middle Stone Age period. The Wilton and Smithfield industries have been recognized as part of the Holocene of South Africa (Deacon J, 1974). The Smithfield industry was originally defined as an indigenous element that occurred in the Orange Free State, Northern Cape and the previously named Transvaal areas. Smithfield variants were discovered at Natal and along the Southern Cape areas as well. The Smithfield industries (Figure 2) were categorized between the Smithfield A that was evident of large circular and concavo-convex scrapers as well as the Smithfield B that was evident of long-end scrapers (Deacon J, 1974). The Smithfield C was used to describe the small convex scrapers (Deacon J, 1974).

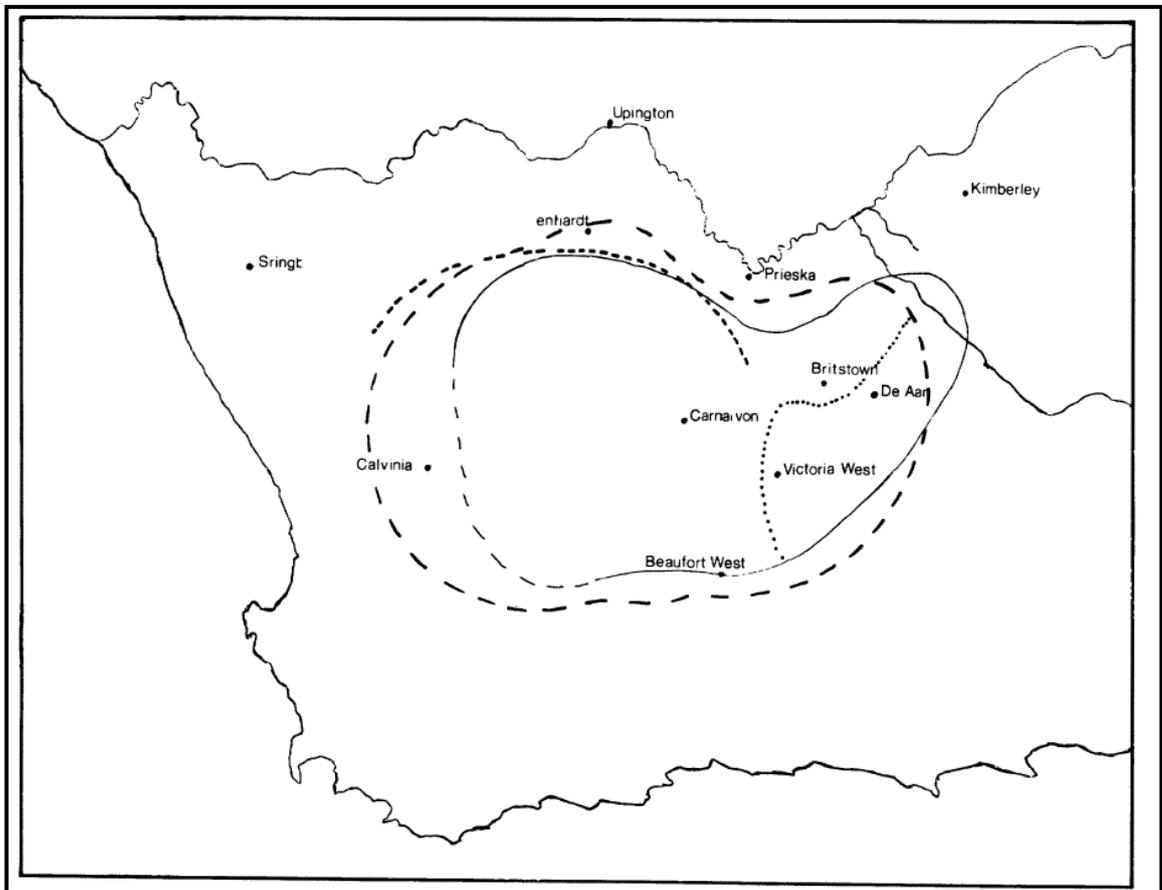


Figure 2: An approximate indication of the occurrence of scraped engravings and the western limits of the Smithfield Industry (Beaumont Peter B and Vogel John C, 1989).

Smithfield A and B industries preferred the use of lydianite or shale raw material (Deacon J, 1974). The smaller scrapers produced during the Smithfield C industries preferred using chalcedonies and agates (Deacon J, 1974).

5.4 South African War

De Aar played a significant role during the South African War and the two battles of significance occurred at the area. The historical events relates to Battle of Stormberg and the Battle of Colenso. (PGS Grave Consultants, 2011)

De Aar was used as a central storage place for ammunition and horses. The shortage in water resulted in the death of horses and cattle. It was not only animals that suffered during this time period but also the wounded soldiers that were transported from Magersfontein, Modderfontein and Graspan to the De Aar hospitals to receive medical treatment (Marais, 1977). The high level in deaths resulted in the development of a significant amount of grave yards that are still positioned at the area today. Fortifications have been developed at the hilltop areas and the railway station has been guarded by the placement of strategic blockhouses in the area (Marais, 1977). Well known officials visited the area for example Kitchener and French (Marais, 1977).

5.5 Railway Historical Resources

Trains carrying goods for the British soldiers were regularly attacked by the Boers and one of these events occurred at the Taaibosch-sideline (Marais, 1977).

The railway lines between Kimberley and De Aar were strategically attacked by the Boers and this resulted in Milner being concerned that they will lose territory at Kimberley and Bloemfontein. During the Battle of Stormberg, Gatacre lost 548 men during an evening march. Another battle was lost at Magersfontein under the control of Methuen. This is when Buller decided to assist the British troops against the Boer attacks (Thomas Pakenham, 1981 Afrikaanse Vertaling).

Three strategic railway stations positioned at Stormberg, De Aar and Noupoot were protected by military resources that came from the Cape Colony. These railway stations and the Orange River railway bridge were railway core areas and had to be protected from any Boer attacks. The Boers aimed at destructing the railway lines between Kimberley and De Aar that resulted in continuous telegraphs forwarded to warn that access to the southern side of the Orange river is becoming difficult and sometimes impossible (Thomas Pakenham, 1981 Afrikaanse Vertaling).

The Colenso Battle was used by the British to transfer ammunition between Cape Town, the central interior and the Natal region (PGS Grave Consultants, 2011).

It is known that Winston Spencer Churchill passed via De Aar as a war correspondent (PGS Grave Consultants, 2011).

De Aar (Figure 3) is well known for the occurrence of the significant railway line historical resources. The De Aar railway junction was opened in 1884 and during this development labour shortages resulted in the killing of thirty workers. The reason for the killing was that labour were imported from Natal and other areas that created unhappiness with the local people (PGS Grave Consultants, 2011).

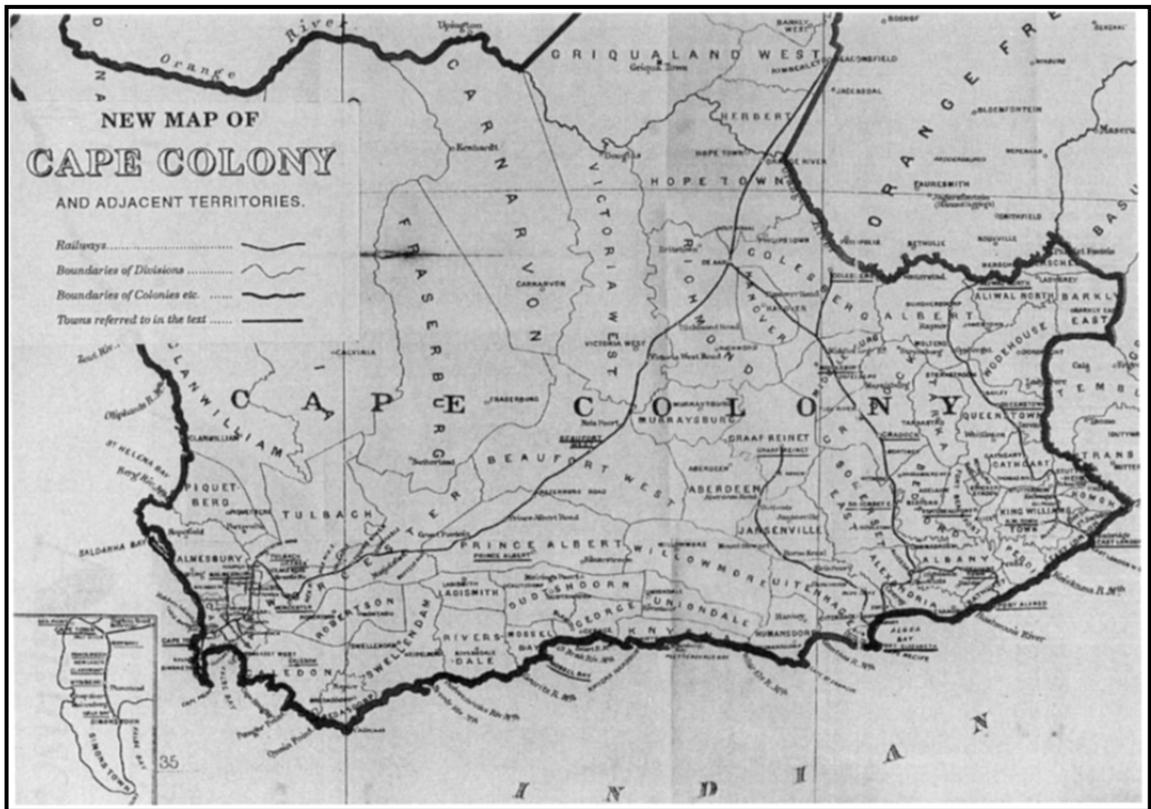


Figure 3: Historical Map of the Cape Colony. The image provides an explanation of the railway infrastructure that was in operation during the historical times, divisions and colonies. (Morag Bell, 1993)

5.6 Rock Art

In South Africa rock paintings (Figure 4) are mainly distributed along the mountain areas in the south-western Cape or the northern areas of the Drakensberg (Beaumont Peter B and Vogel John C, 1989). The petroglyphs (Figure 4) mostly occur in the inland plateau of the Northern Cape, the western Orange Free State and sites clustering along the Vaal as well as Orange River areas (Beaumont Peter B and Vogel John C, 1989).

A rock art site is positioned in the vicinity of De Aar that shows weathered, lightly pecked outlines of a buck (Beaumont Peter B and Vogel John C, 1989). The site is positioned north of the town of De Aar, but it is part of the overall Stone Age landscape that is evident of the area.

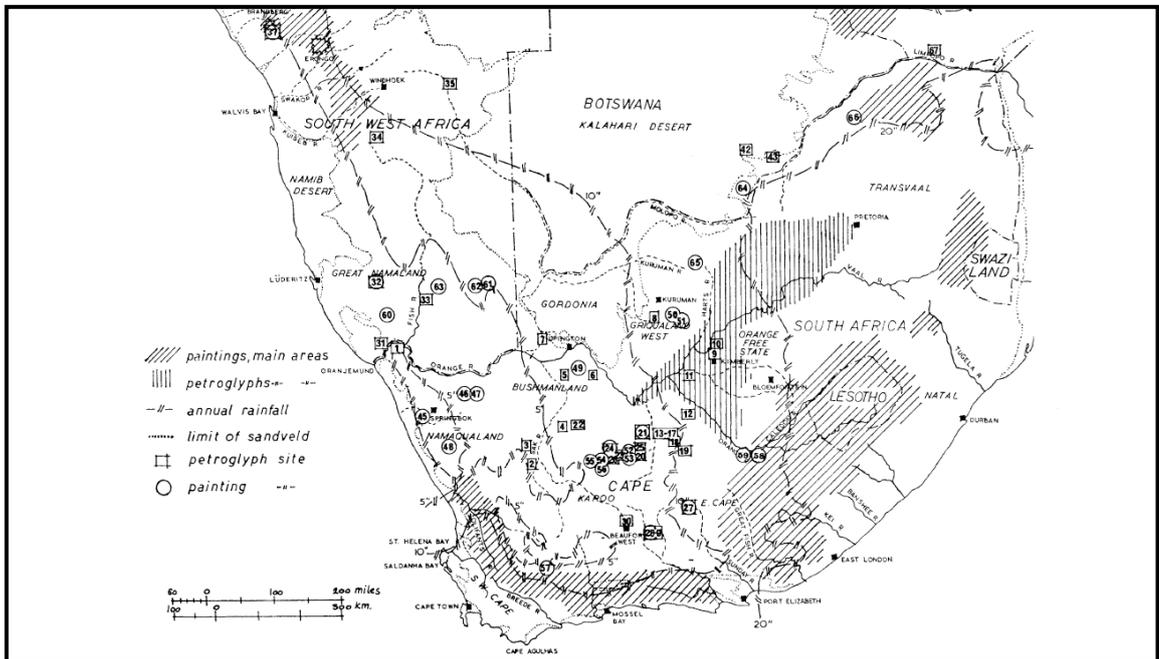


Figure 4: Main Rock Art Painting Regions in South Africa (Rudner J and Rudner I, 1968).

5.7 Living Heritage Resources

Intangible heritage and living heritage informs about who they are and the past that has shaped them (South African Heritage Agency, 2012). Living heritage is transferred by usage and observation of individuals, families, community and society by practice. These practices and skills are verbally transferred to the immediate community members and visitors from foreign areas.

5.8 Palaeontology

Previous Palaeontological Assessments have indicated that fossil bearing rocks are situated in the De Aar area.

6. Project Methodology

The project methodology entailed a foot survey of the proposed site that would be impacted upon. Thereafter a Baseline Heritage Specialist Report was completed that indicated the sensitivity areas and if any issues may have a serious impact on the development timeline. Further literature review and field data analysis assisted in determining the potential impact of the proposed project. Additional work was completed to determine the impact and site mitigation as well a basic heritage management plan.

7. Findings

Scattered Middle Stone Age artefacts were discovered close to the hilltop area. The assumption is that the hilltop area will not be impacted at all. In terms of the cultural landscape that surrounds the proposed development area, it may happen that heritage objects would be exposed during the implementation of earthmoving activities. The pattern of Stone Age material could not be

clearly identified, because the site has been used for various land use activities. This included the disturbance of the original archaeological horizon and phases.

7.1 Summary of Findings

7.1.1 Stone Age Archaeology

The Stone Age Archaeology landscape in the Bo-Karoo region close has proved to be of significant value in terms of the type of findings, but also to contribute to the understanding of the manner that Hunter- Gatherers used to live. The cultural landscape is evident of vast open spaces that are currently under threat because of an increase in proposed solar developments. This is the reason why it is recommended to document as much as possible of the current sense of place, outlook of the cultural environment and sample as many artefacts as possible. The artefacts would be placed in a repository for further preservation and research purposes. Even areas that are not evident of Stone Age Archaeology is part of displaying where people preferred to live, to hunt and develop stone tools for functional values.

7.1.2 Rock Art

Stone Age people had a sense for creativity and symbolism that can be seen at the rock art sites that are positioned at the Bo-Karoo area. The proposed development site is embedded in Stone Age Cultural environment associated with rock art sites. No rock art is positioned on the proposed development property.

7.1.3 Historical resources

The De Aar landscape is evident of the origins of the South African war. This has been described in detail and can be found at a range of literature available. Old railway stations, blockhouses and foundations have been discovered at the surrounding landscapes closer to town. The current site is highly disturbed, which means that heritage objects could have been disturbed during previous land use activities. In this case scenario it could happen that heritage objects related to the South African War are exposed during earthmoving activities.

7.1.4 Living Heritage

No indigenous groups are positioned in the development footprint area. Other types of living heritage associated to storytelling is evident at the De Aar region. A range of literature exists that captured the storytelling of the local people and is verbally transferred to the next generations.

7.1.5 Cultural Heritage and Sense of Place

The cultural landscape and sense of place are characterized by the Stone Age Archaeology and South African War events. These two time periods have provided a unique sense of place that have been included in academic and tourism literature. The increase in developments have an automatic impact on not only the accessibility to these cultural landscapes, but also the heritage experience that tourists are looking for.

7.1.6 Palaeontology

A Desktop Palaeontological study will determine the overall impact and any methods available in terms of mitigation procedures. The type of excavation to occur is shallow and a possible impact may occur on the palaeontological resources. This process can be mitigated via sampling and monitoring.

8. Impact Assessment Table

8.1 Construction

The following impact assessment is based on the activities that are related to the construction phase of the proposed development. The proposed construction activities related to the photovoltaic power project may have an impact on the cultural landscape typical of the De Aar area and the Stone Age time period that is linked to the proposed development site.

8-1 Impact Assessment during Construction

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	The impact will have an effect on the overall cultural landscape. The impact will be local.	The impact will have an effect on the proposed development site only.
Duration	The chance of impact is permanent.	The chance of impact is permanent, but with mitigation data can still be preserved by sampling.
Intensity	The intensity is medium because the site is disturbed already.	The intensity is low, if mitigated by sampling and monitoring.
Probability	The chance of the impact is probable to occur.	The chance of the impact is possible to occur.
Confidence	Likely and is related to previous studies completed. Confidence level is medium to high.	Likely and is related to previous studies completed. Confidence level is medium.
Significance	Medium if not mitigated.	Low if mitigated and scattered heritage objects are rescued for conservation as well research purposes.
Cumulative impact	Medium to high.	The impact is medium because of the high intensity of solar developments that are proposed at the area.
Nature of Cumulative impact	The cumulative effect could result in a significant loss of the cultural landscape that is focused on the Stone Age Horizon that is evident of the Bo-Karoo region, the South African War battlefield sites and the sense of place that is associated with the area.	
Degree to which impact can be reversed	Irreversible - The impact on Archaeological And Palaeontological Resources cannot be reversed. Earthmoving activities have a negative impact on in situ artefacts and cannot be corrected in any manner. The impact on a cultural landscape can only be reversed if the area is rehabilitated to display the original open space landscapes without any infrastructure.	
Degree to which impact may cause irreplaceable loss of resources	The rating is medium to high. The proposed developments in the area would have a significant impact on the Stone Age Cultural Landscape, The South African War landscape, Palaeontological resources and sense of place. The visual intrusion by a range of already listed developments may have a negative impact on the heritage resources positioned at the De Aar area.	

Degree to which impact can be mitigated	The degree to which rating can be mitigated is medium. In terms of a cumulative point of view, the only method of mitigation is sampling of scattered heritage objects , detailed documentation of heritage resources positioned at the area, undertake monitoring during construction and complete a heritage management plan.
--	---

8.2 Impact during Operation

8-2: Impact Assessment during Operation

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	The extent would have a provincial impact, meaning that the effect will be at the Bo-Karoo region cultural landscape. Regional extent.	The impact would have an effect on the local cultural landscape.
Duration	The impact would be medium.	The impact would be short term.
Intensity	The intensity would be medium to low.	The intensity would be low.
Probability	The chance of impact will be probable.	The chance of impact will be improbable.
Confidence	Likely and related to previous studies completed. Confidence is medium to high.	Likely and related to previous studies completed. The confidence is medium.
Significance	Medium to low.	Low
Cumulative impact	Medium	Low
Nature of Cumulative impact	During operation and decommissioning few impacts may occur.	
Degree to which impact can be reversed	The site is already disturbed and could not be reversed to the original characteristics associated with the previous cultural landscape. The degree is irreversible.	
Degree to which impact may cause irreplaceable loss of resources	During operation the site will have been impacted upon already. No further intensive impacts are expected.	
Degree to which impact can be mitigated	None. The impact cannot only be mitigated if in the event of discovery of heritage objects.	

8.3 Impact during decommissioning

8-3: Impact Assessment during decommissioning

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	The extent would have a provincial impact, meaning that the effect will be at the Bo-Karoo region cultural landscape. Regional extent.	The impact would have an effect on the local cultural landscape.
Duration	The impact would be permanent.	The impact would be permanent.
Intensity	The intensity would be medium to low.	The intensity would be low.
Probability	The chance of impact will be probable.	The chance of impact will be improbable.
Confidence	Likely and related to previous studies completed. Confidence is medium to high.	Likely and related to previous studies completed. The confidence is medium.
Significance	Medium to low.	Low
Cumulative impact	Medium	Low
Nature of Cumulative impact	During decommissioning few impacts may occur.	
Degree to which impact can be reversed	The site is already disturbed and could not be reversed to the original characteristics associated with the previous cultural landscape. The degree is irreversible.	
Degree to which impact may cause irreplaceable loss of resources	During decommissioning the site will have been impacted upon already. No further intensive impacts are expected.	
Degree to which impact can be mitigated	None. The impact cannot only be mitigated if in the event of discovery of heritage objects.	

9. No-Go Alternative

If the No-Go Alternative is followed, no further destruction or disturbance to the cultural landscape will occur.

10. Basic Management Plan

Scattered stone tools were identified when the reconnaissance survey was completed in 2010 as part of the Phase 1 Heritage Impact Assessment. This is the reason why a decision was made to complete a Basic Management Plan. The objective of the Basic Management Plan is to provide guidance in terms of the management of heritage resources that may be discovered during earthmoving activities.

In terms of the guidelines set out in the Site Management Plans presented by the South African Heritage Resources Authority, a Cultural Management Plan is a policy that focuses on management of heritage resources (South African Heritage Resources Agency, 2012). The policy also refers to an Integrated Management Plan that involves different policies of which the Cultural Management Plan is one of them (South African Heritage Resources Agency, 2012).

Various heritage management plans exist and they are heritage conservation plans, heritage management plans and site management plans. The management plan may be used as part of a general project or it can be used for a specific site.

According to SAHRA heritage site management is inclusive of the control of elements that make up a physical and social environment, physical condition, land use, human visitors and interpretation (South African Heritage Resources Agency, 2012). The completion of a heritage management plan is to conserve and minimize damage to a site. The reason for completing a heritage management plan is to protect the significance of a place. It is aimed at conservation, enhancement, presentation and maintenance of a site (South African Heritage Resources Agency, 2012).

10.1 Sampling prior to Construction

It is proposed that sampling is undertaken at the proposed development area, before construction commences. This will allow for the collection of scattered stone tools at the site, but also to prevent loss of any material that could carry significant research information. It is proposed that a local archaeologist is used for this purpose as they have the best knowledge of the archaeological resources that are positioned in the area.

10.2 Permit Requirements

No heritage objects are allowed to be removed from the site, without a permit issued by the South African Heritage Agency. It is proposed that a local archaeologist applies for a sampling permit before construction commences.

10.3 Heritage Training for Environmental Control Officer and Contractors

It is recommended that the Environmental Control Officer and Contractors are provided with a one day workshop to explain the type of heritage objects that may be uncovered and the methodology to follow in such an event.

10.4 Contact Details for Professional Archaeologist and the South African Heritage Agency

It is proposed that a local archaeologist assist during heritage resources sampling and monitoring. It is recommended that McGregor Museum in Kimberley is contacted to provide support in this regard. McGregor Museum's contact details are as follows:

McGregor Museum

Physical address: Postal address:

5 Atlas Street PO Box 316

Belgravia KIMBERLEY

KIMBERLEY, 8301 8300

Telephone: +27 (0) 53 839 2700

The South African Heritage Agency must be contacted in the event of permit applications and approval of the Phase 2 Heritage Impact Assessment. SAHRA's contact details are as follows:

South African Heritage Resources Agency

111 Harrington Street

PO Box 4637, Cape Town 8000,

South Africa

Phone : +27 (0)21 462 4502

Fax : +27 (0)21 462 4509

Web : www.sahra.org.za

11. Conclusion and the Way Forward

The overall impact related to Archaeology, Palaeontology and Historical Resources are of low significance (after mitigation) because of the current disturbed status of the proposed development area. If the no-go option is decided upon, no further disturbances will occur to the cultural landscape and the sense of place will stay as is. The surrounding area has already experienced significant development activities and as a result the cumulative effect would be of low significance.

12. Bibliography

- Archaic. (2008). *Final Report Heritage Resources Survey and Preliminary Assessment, Transnet Freight Line EIA, Eastern Cape and Northern Cape*. Pretoria: ERM.
- Australia ICOMOS. (2000). *The Burra Charter*. Burwood, Australia.
- Beaumont Peter B and Vogel John C. (1989). Patterns in the Age and Context of Rock Art in the Northern Cape. *The South African Archaeological Bulletin, Vol. 44, No. 150*, 73-81.
- CCA, E. (2012). *Environmental Impact Assessment for the Proposed De Aar Solar One Photovoltaic Power Project, Northern Cape*. Final Scoping Report.
- Chalcedony or Cryptocrystalline Quartz*. (2012). Retrieved from About.com.Geology.
- Deacon J. (1974). Patterning in the Radiocarbon Dates for the Wilton/Smithfield Complex in Southern Africa. *South African Archaeological Bulletin, Vol. 29*, 3-18.
- Department of Indigenous Affairs, Government of Australia. (2009, October). *Aboriginal Cultural Heritage Management Plan*. Australia.
- Marais, J. (1977). *De Aar Stad in Wording 1902 - 1977*. De Aar: Colourtone Press Edms Bpk Elsiesrivier.
- Morag Bell. (1993). "The Pestilence that Walketh in Darkness". *Imperial Health, Gender and Images of South Africa c. 1880-1910. Transactions of the Institute of British Geographers, New Series, Vol. 18, No. 3*, 327-341.
- Natalie Swanepoel, Amanda Esterhuysen and Phillip Bonner. (2007). *Five Hundred Years Rediscovered, Southern African Precedents and Prospects*. Johannesburg: Wits University Press.
- PGS Grave Consultants. (2011). *Concentrated Solar Power EIA - De Aar*.
- Provincial Government Western Cape. (2005). *Guidelines for Involving Heritage Specialists in EIA Processes*.
- Rudner J and Rudner I. (1968). Rock Art in the Thirstland Areas. *The South African Archaeological Bulletin, Vol. 23, No. 91*, 75 - 89.
- shalegasnow*. (2012). Retrieved from www.bing.com/images.

South African Heritage Agency. (2012). <http://www.sahra.org.za/LivingHeritage.htm>. Retrieved from www.sahra.org.za.

South African Heritage Resources Agency. (2012). *Conservation Principles*. Retrieved from SAHRA.

South African Heritage Resources Agency. (2012). *Site Management Plans: Guidelines for the developemnt of plans for management of heritage sites or places*. Retrieved from SAHRA.org.za.

Stovel Herb. (1998). *Risk Preparedness: A Management Manual for World Cultural Heritage*. Rome: UNESCO ICCROM.

Thomas Pakenham. (1981 Afrikaanse Vertaling). *Die Boereoorlog*. Jeppestown: Jonathan Ball Uitgewers.

13. List of Figures

Figure 1: Proposed development area positioned at Portion 3 of Farm Hartebeestplaats 135..... 2

Figure 2: An approximate indication of the occurrence of scraped engravings and the western limits of the Smithfield Industry (Beaumont Peter B and Vogel John C, 1989). 6

Figure 3: Historical Map of the Cape Colony. The image provides an explanation of the railway infrastructure that was in operation during the historical times, divisions and colonies. (Morag Bell, 1993) 8

Figure 4: Main Rock Art Painting Regions in South Africa (Rudner J and Rudner I, 1968). 9

14. List of Tables

8-1 Impact Assessment during Construction 11

8-2: Impact Assessment during Operation..... 12

8-3: Impact Assessment during decommissioning 13

