

**CULTURAL HERITAGE REVIEW**

**OF**

**PROPOSED ESTABLISHMENT OF PHOTO VOLTAIC (SOLAR  
POWER) PANELS ON THE FARM TAAIBOSCHFONTEIN, NO 41,  
HANOVER DISTRICT, NORTHERN CAPE**

**(As part of the Environmental Impact Assessment for the overall project)**

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**Prepared for:**  
Scatec Solar SA (Pty) Ltd

Sustainable Development Projects

**February 2011**

## **EXECUTIVE SUMMARY:**

### **Introduction:**

The specialist and writer of this report was appointed in January 2011 to undertake a cultural heritage review of the structures identified on a farm where it is proposed to construct photovoltaic panels for the production of solar power. The project is situated on the farm Taaiboschfontein, No 41 in the Hanover District of the Northern Cape Province.

Scatec Solar SA has identified the need for the provision of solar power and therefore proposes to establish between 5 and 9 solar farms on a number of properties in the Northern and Eastern Cape Provinces in order to produce between 10MW and 100MW of power that will be fed into the local power grid thereby supplementing power supply to the country.

### **Legislative Requirements:**

Heritage resources are protected in South Africa by the National Heritage Resources Act (NHRA), No. 25 of 1999. The assessment was undertaken in accordance with Section 34 of the NHRA that refers to the protection of structures. As stated in Section 34(1) of the NHRA: no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

### **Methodology:**

A site visit of the farm Taaiboschfontein was undertaken on 25 January 2011 by the writer. This was done not only to assess the redoubts and their significance but also to establish if any other heritage sites would be affected by the proposed development.

An electronic search of possible archival records regarding the farm and surrounding area was undertaken with no success as well as an internet search for pertinent information regarding the historical context of the project area in relation to the Anglo-Boer War (1899-1902) and redoubts.

### **Historical Background:**

During the Anglo-Boer War of 1899-1902, the De Aar/Hanover/Graaf Reinet area was a hive of activity. Boer forces were strong in Northern Cape as towns had been scarcely garrisoned and towns as far east as Molteno were occupied by Boer commandos.

The railway links between Cape Town and the interior were crucial for the British Army as they provided transport from the harbour to the interior that carried soldiers, food and other goods. Disruption of the railway line by the Boer forces was ongoing with Boer commandos blowing up railway lines, derauling trains, and taking supplies from the trains meant for the British forces.

In the cemetery on the outskirts of Hanover, a pyramid of stone marks the grave of three young men executed during the War for derauling and plundering a train at Taaibosch.

## **Site Report**

The redoubts were found to be located roughly in a straight row and this linear formation was possibly done to protect a linear structure such as a railway line

An elevated area north of the redoubts was reported to be the remains of the old railway line and this was confirmed by the landowner. According to the landowner, a train was derailed on his neighbour's farm during the Anglo-Boer War.

There are five redoubts in varying conditions. Some are relatively well preserved whilst others have collapsed over the years with areas covered in stone marking the site of the redoubt. The redoubts are made of local stone and are rough circular structures. That these stone structures are something other than redoubts is possible but appears unlikely. There are no (visible) entrances to the structures for people and animals to enter and remains of tins of seem to indicate that the structures were used by people.

Inspection of sections of the farm where the proposed project will take place revealed no other heritage resources of significance.

## **Assessment of Significance**

The redoubts and the elevated area where the old railway line was situated are assessed by the writer as significant local historical resources that are reminders of a conflict, the Anglo-Boer War.

Nationally, these structures have limited significance because of the remoteness of their location that has ultimately preserved them from outside interest and degradation. In addition, redoubts are found throughout South Africa making the redoubts less significant than structures that are few in number.

The cultural landscape of the area in which the redoubts and old railway line are found has changed to such an extent that the significance of the structures has diminished accordingly. With the addition of the substation and associated power lines as well as the electrified railway line, the landscape has been impacted on sufficiently to detract from the importance of the heritage resources within this landscape as well as lowering the overall cultural heritage significance of the landscape.

The redoubts are assessed as locally significant and therefore worthy of preservation but are not of high significance as to prevent the proposed project from taking place as long as the recommendations made are strictly enforced.

The significance of the elevated area that indicates where the old railway line was situated is of significance only in context with the redoubts as the old railway track provides the reason for the

location of the redoubts. Hence, it should be preserved if possible but it is not of sufficient significance to prevent the proposed project from proceeding.

An assessment of possible impacts on the redoubts and old railway line that may arise from the construction and operation phases of the proposed solar farm was also undertaken. For both the redoubts the overall impact of the proposed development on the redoubts and old railway line was assessed as low.

The difference between the assessments is that the score *post-mitigation* remains the same as that *pre-mitigation* during the construction and operational phase of the project for impacts on the old railway line. This is because the location of the old railway track is towards the centre of the project area where it is assumed that a high level of construction work will take place.

However, it is important to note that the overall risk of impact to the old railway line is **low** and not considered to be a significant problem.

#### **Conclusion and Recommendations:**

It has been assessed that possible impacts on identified heritage resources by the proposed development of a solar farm on the farm Taaiboschfontein is **low** during both the construction and operational phase of the project. It is the opinion of the specialist that the proposed development of a solar farm on the farm Taaiboschfontein can proceed as long as the mitigation measures provided are enforced.

#### Recommendations include:

Buffer area of no less than 15 metres around the redoubts;

Buffer area of no less than 5 metres to mark off the old railway line;

No construction of solar panels on the elevated area where the old railway line was located;

The buffer areas are recognised as 'no-go' areas where no construction or operational activities may take place; and

If sub-surface heritage sites are discovered during the construction process, work in the immediate vicinity of the find must be stopped, the relevant heritage agency informed and the services of an accredited heritage professional is obtained to assess the heritage resources found.

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## **1 Introduction**

The specialist and writer of this report was appointed by Scatec Solar SA (Pty) Ltd and Sustainable Development Projects, the environmental assessment practitioner (EAP) for the project in January 2011 to undertake a cultural heritage review of the structures identified on a farm where it is proposed to construct photovoltaic panels for the production of solar power. The project is situated on the farm Taaiboschfontein, No 41 (on the portion known as the Extent of the farm Taaiboschfontein No 41) in the Hanover District of the Northern Cape Province.

Scatec Solar SA proposes to establish between 5 and 9 solar farms on a number of properties in order to produce between 10MW and 100MW of power that will be fed into the local power grid.<sup>1</sup> The farm Taaiboschfontein is indicated as site H in the Scoping Report for this project.<sup>2</sup>

The heritage review forms part of the wider environmental impact assessment (EIA) for the establishment of photovoltaic farms in the Northern and Eastern Cape provinces. There are several farms (including the farm Taaiboschfontein) that have been investigated as possible sites for the project. In terms of regulations promulgated under the National Environmental Management Act (NEMA), Government Notice 546 of August 2010, regulation 32 of Chapter 3, Part 3 a full EIA has to be undertaken for the overall project.

During the scoping phase of the EIA, several historical structures were identified on the farm, hence the appointment of the writer to undertake a review of the structures in order to indicate the significance of the sites and make recommendations regarding the integration of the structures into the photovoltaic farm where possible.<sup>3</sup>

## **2 Legislative Requirements**

Heritage resources are protected in South Africa by the National Heritage Resources Act (NHRA), No. 25 of 1999. A heritage resource is defined in the Act as any place or object of cultural significance. Cultural significance is defined as a place or object as having aesthetic, architectural, historical, scientific, social, spiritual, linguistic and technological value.

The above mentioned Act states that heritage resources that are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of the heritage resources authorities.

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<sup>1</sup> First Draft: Environmental Scoping Report. Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape, compiled by Sustainable Development Projects cc, November 2010, p 3

<sup>2</sup> Ditto, p 16

<sup>3</sup> Ditto, p 37

The term heritage resource is defined as places and objects of 'cultural significance' which is defined as "aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

The national estate may include-

- places, buildings, structures and equipment of cultural significance;
- places which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and paleontological sites;
- graves and burial grounds;
- sites of significance relating to the history in South Africa;
- movable objects, including-
  - objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
  - objects to which oral traditions are attached or which are associated with living heritage; etc.

This assessment is performed in accordance with Section 34 of the NHRA that refers to the protection of structures. As stated in Section 34(1) of the NHRA: *no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.*

Due to the possible age of the structures and their significance, an assessment of significance as well as an assessment of the possible impacts of the proposed project on the structures was undertaken for this review.

### **3 Details of Heritage Specialist**

The CV of the specialist, Jean Beater, is included as Appendix 1 of this report. A brief overview is provided here below:

- She managed the Burial Sites Unit of the South African Heritage Resources Agency (SAHRA) for 11 years (1991 – 2002)
- She established her own heritage consulting company (2003) before joining the Gauteng Department of Agriculture, Environment and Conservation (GDACE) (late 2003 – June 2005) working for the Management Authority of the Cradle of Humankind World Heritage Site.

- In 2005, she joined PBA International, Consulting Engineers, where she project managed many Environmental Impact Assessments (EIAs) including EIAs for power line projects. She also undertook heritage impact assessments (HIAs) for other projects (see attached CV).
- She left PBAI at the end of February 2010 and undertakes heritage impact assessments (HIAs) as an independent consultant.

#### **4 Assumptions & Gaps**

The writer was specifically asked to review the cultural historical significance of structures found on the farm Taaiboschfontein only. It is therefore assumed that no such structures as those found on Taaiboschfontein or any other heritage resources have been identified on the other sites that are under investigation for the proposed project.

In the Scoping Report mention is made regarding possible impacts on palaeontological resources from the proposed development. The writer of this report is not a palaeontologist and is therefore not in a position to comment on such impacts.<sup>4</sup>

#### **5 Study Area**

The farm Taaiboschfontein No. 41 is situated between the towns of Hanover and De Aar in the Northern Cape Province. It is situated parallel to the existing railway line that runs between De Aar and Hanover Road and Noupoot. See Map 1 below.

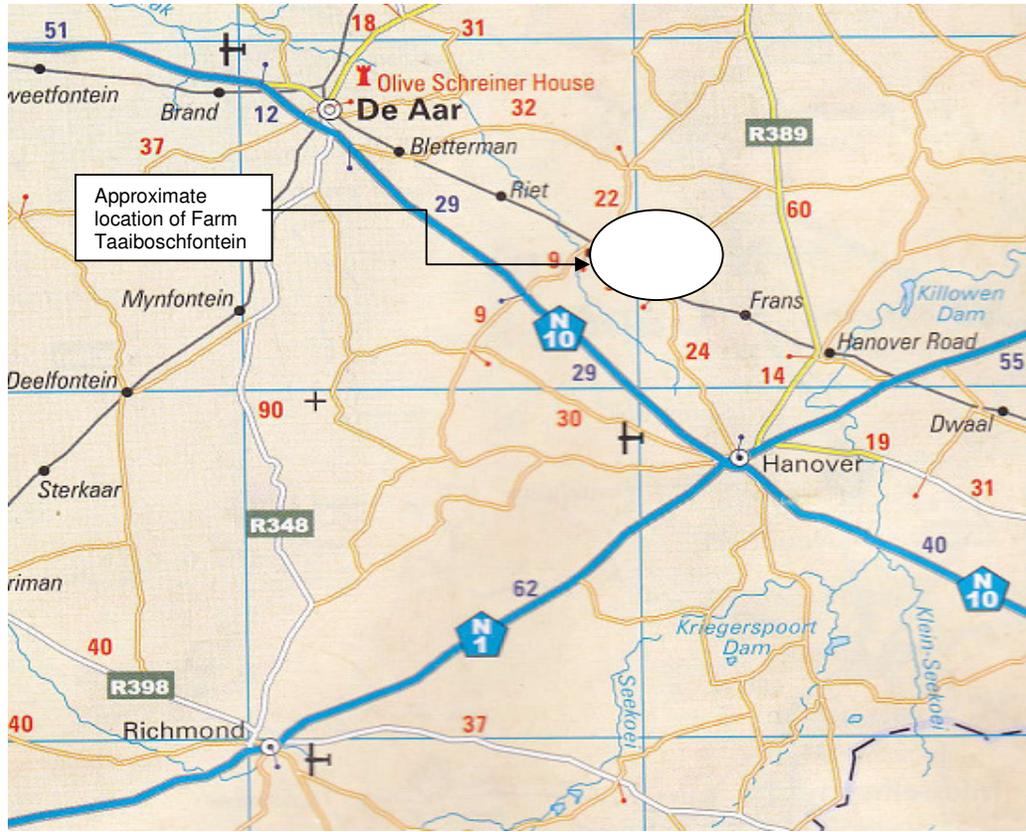
The farm falls is designated as 'zoned' agricultural land<sup>5</sup> and appears to be mainly used for sheep farming. The farm is also already disturbed by an adjacent Eskom substation and the power lines that cross the farm after exiting from the substation. Other structures are the railway line mentioned above as well as the railway and substation servitude road that runs parallel to the railway line.

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<sup>4</sup> First Draft: Environmental Scoping Report. Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape, p 22

<sup>5</sup> Ditto, p 16

**Map 1: Location of Farm Taaiboschfontein between De Aar and Hanover**



**Map 2: Google Earth image of Farm Taaiboschfontein and surroundings**



## **6 Project Motivation and Description**

### **6.1 Project Motivation<sup>6</sup>**

The provision of power or energy has become a significant limiting factor to both economic growth and competitiveness in South Africa. Additionally, there are both mandatory and voluntary directives for the establishment of sustainable energy projects, including wind and solar energy.

The Applicant has identified the need for the provision of solar power and through its international sister organisation is proposing the establishment of a number of solar farms that will supplement power to the power grid. Solar power is considered a desirable energy production mechanism as its utilisation has no adverse bi-products; the method of harnessing solar energy is relatively innocuous in comparison to fossil fuel power production and most existing land use practices can continue with little interruption.

It is also stated by the Applicant that photo voltaic centres offer significant employment opportunities with approximately 80 people been required on a 10MW plant.

### **6.2 Project Description<sup>7</sup>**

Identified or selected sites will have panels of photo voltaic (PV) cells mounted on wood or aluminium frames across level areas of the sites. Minor earthworks may have to be undertaken to accommodate such frames and such excavations will be surface related and is required to ensure that the orientation of the panels is congruous throughout the PV farm. Small concrete plinths will be established to anchor the panels.

The panels will be approximately 2.2m in height above ground level with a width of approximately 3.0m. The panels are constructed of selenium based material encapsulated in a laminated plastic of high durability. Each panel is edged in plastic and feeds a small circuit board that delivers a direct current to the inverter that step up the current for delivery to the grid. The panels are non-reflective and are of a dark grey colour.

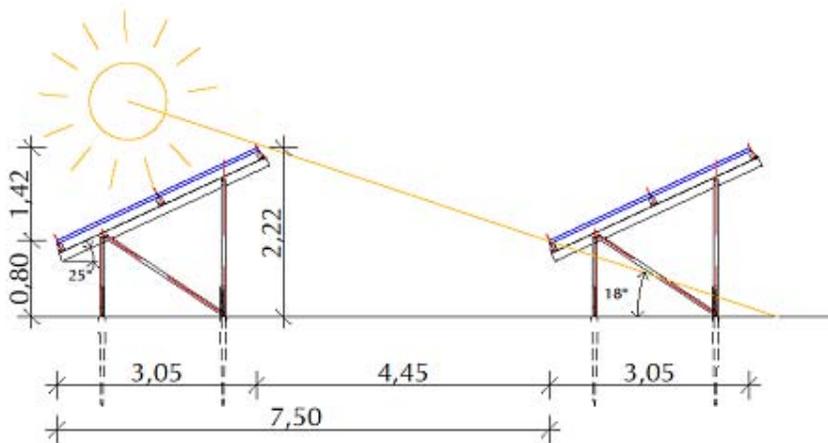
The schematic diagram below indicates the approximate size of the proposed solar panels.

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<sup>6</sup> First Draft: Environmental Scoping Report. Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape, p 11-12

<sup>7</sup> Ditto, p 12-13

**Diagram 1: Schematic Diagram of Photo Voltaic Panels**



## **7 Methodology**

- An electronic survey of the archival records held in the National Archives Depot in Tshwane (Pretoria) was undertaken to establish if there were any records relating to the farm Taaiboschfontein as well as establishing whether there were any records relating to the project area. Very few records regarding the farm Taaiboschfontein were found and were of no relevance to this review and references to Hanover and the larger area again were of no relevance to the study.
- A site visit of the new study area to investigate the area for a potential substation site and route for the proposed power line turn-ins was undertaken on 25 January 2011 and was done not only to assess the already identified redoubts and their significance but also to establish if any other heritage sites would be affected by the proposed building of the photo voltaic panels. Special attention was given to clusters of bushes and rocky outcrops where heritage resources might be found.
- An internet search revealed general information regarding the larger area around the project site including the history of Hanover and Hanover Road. Specific mention is made of a train derailment on the farm Taaibos that could relate to the farm under investigation.
- Relevant Google Earth images of the farm were closely scrutinized. However, the close-up quality of the image was not sufficiently clear to identify any visible heritage resources.

## 8 Historical Background

More than two hundred million years ago, the Karoo landscape was part of a large lake. A succession of wet and dry periods saw both the vegetation and the animal life vary and change. The landscape was also changing, with the Karoo topography constantly being shaped and re-shaped by volcanic activity, much of this taking place in the Triassic and Jurassic Periods some 225 to 190 million years ago. The inland lake gave way to vast plains with a few fountains, rivers and streams providing sources of water.<sup>8</sup>

The prehistory of the Great Karoo, like that of the rest of the country, is conventionally divided into the Early (approx. 2 million to 200 000 years ago), Middle (250 000 to 20 000 years ago) and Late Stone Ages (20 000 years BP to historic times). The Early Stone Age people who roamed the Karoo were the Australopithecines. These Early Stone Age people were essentially hunters and gatherers and used their stone tools for butchering meat, making other stone tools and cutting and shaping plants and wood. As the intellectual capacity and skills of the early Karoo humans improved, they produced more effective and smaller tools from harder materials. Thus, during the Middle Stone Age they hunted more efficiently and hunted smaller species and they seemed to prefer caves and shelters to live in.<sup>9</sup>

The Later Stone Age is characterised by the prehistory of the more recent and historically more familiar people of the Karoo, the gathering-hunting |Xam (San/Bushmen) and the herding Khoekhoen (Griqua, Korana/'Hottentots').<sup>10</sup> Iron Age crop farmers probably entered southern Africa along the north eastern coastal margins in or before the 3<sup>rd</sup> Century AD and within a few years descendants of these farmers moved westwards along river valleys.

White farmers moved gradually northwards and settled in the Hanover and De Aar area in the 18th century. One of the early farms was Petrusvallei which became Hanover. Petrusvallei was part of an outlying district of Graaff-Reinet and simply known as Bo-Zeekoeirivier). Farmers petitioned the Government for a town and on 17 July 1854, a six-man committee bought the farm to start a settlement. Hanover was declared a magisterial district on 13 November 1876.<sup>11</sup>

During the Anglo-Boer War of 1899-1902, the De Aar/Hanover/Graaf Reinet area was a hive of activity. Boer forces were strong in Northern Cape as towns had been scarcely garrisoned and towns as far east as Molteno were occupied by Boer commandos. The Cape Colony was initially seen as

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<sup>8</sup> [www.karogariiep.co.za](http://www.karogariiep.co.za)

<sup>9</sup> ditto

<sup>10</sup> ditto

<sup>11</sup> [www.en.wikipedia.org/wiki/Hanover\\_Northern\\_Cape](http://www.en.wikipedia.org/wiki/Hanover_Northern_Cape)

safe as it was a British Colony but Boers from the Orange River Colony crossed into the Cape Colony and occupied several towns.<sup>12</sup>

The railway links between Cape Town and the interior as well as smaller railway lines were crucial for the British as they provided transport from the harbour to the interior that carried soldiers, food and other goods. Disruption of the railway line by the Boer forces during the guerrilla warfare period from 1900 was ongoing and deliberate with the Boer commandos blowing up railway lines, derailing trains, and taking supplies from the trains meant for the British forces. Between December 1900 and September 1901 135 train wrecking incidents were recorded.<sup>13</sup>

Due to the expanding activities of the Boer commandos in the Cape more British troops had to be detailed to guard the Cape railways and from July 1901 onwards blockhouses and redoubts were built, eventually all the way down to Wellington in the Western Cape. Lord Kitchener was also forced to divert increasing numbers of troops from the occupied Boer Republics to aid the colonial detachments in dealing with the Boer commandos.<sup>14</sup>

In the cemetery on the outskirts of Hanover, a pyramid of stone marks the grave of three young men executed during the Anglo-Boer War of 1899-1902. A train had been derailed and plundered at **Taibosch**, 20 km from town. Shortly afterwards several young men sleeping in the outside rooms of a nearby farm were taken into custody. They were charged with 'maliciously assisting Boer forces,' robbery and the deaths of passengers. Tried on somewhat dubious authority by a military court at De Aar, Sarel Nienaber, J. P. Nienaber and J. A. Nieuwoudt, were shot. They protested their innocence to the end.<sup>15</sup>

It is possible that the incident occurred on the farm under investigation and re-enforcing the purpose of the redoubts found on it. However, the writer was unable to confirm this.

A search of the archival records held in the National Archives in Tshwane revealed no references to the farm, Anglo-Boer War activities and railway line derailments during the War.

## 9 Site Investigation Report

On the 25<sup>th</sup> of January 2011, a site investigation of the farm was undertaken by the writer. Sections of the farm where the proposed development is to take place were walked to see if there were other heritage resources on site and the redoubts were inspected.

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<sup>12</sup> Reader's Digest. Illustrated History of South Africa, the Real Story. Expanded second edition. The Reader's Digest Association Limited, Cape Town, 1992, p 247

<sup>13</sup> [www.anglo-boer.co.za/intro/the-guerilla-war.php](http://www.anglo-boer.co.za/intro/the-guerilla-war.php)

<sup>14</sup> [www.samilitaryhistory.org/vol073vm.html](http://www.samilitaryhistory.org/vol073vm.html)

<sup>15</sup> [www.en.wikipedia.org/wiki/Hanover\\_Northern\\_Cape](http://www.en.wikipedia.org/wiki/Hanover_Northern_Cape)

It was noted that the farm is already disturbed by sheep farming, the existence of an Eskom substation on the adjacent property and power lines that cross the farm under discussion after exiting the substation. In addition, a railway line and servitude road for both the substation and railway line run on the eastern boundary of the farm. See Photograph 1 below.

**Photograph 1: Existing infrastructure adjacent to and on farm Taaiboschfontein**



It is of interest that the redoubts are located roughly in a straight line or row and this linear formation was possibly done to protect a linear structure such as a railway line or road. The redoubts run parallel to the existing railway line on the eastern boundary of the farm.

An elevated area north of the redoubts was reported to be the remains of the old railway line<sup>16</sup>. It was also identified as a drainage berm by the geo-technical specialist.<sup>17</sup> According to the owner of the farm, Mr Stefaans du Plessis, this elevated or raised area is the remains of the old train line track and that no remnants of the old railway track have remained.<sup>18</sup>

In conversation with a steam train enthusiast, the old railway lines were often built along the natural contours of the area they crossed to assist with getting through valleys as well as avoiding the flooding of the lines when there were heavy rains. The contours were also often built up to reduce the

<sup>16</sup> Environmental Scoping Report. Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape, p 21

<sup>17</sup> On-site observation of Mr Francis Smith, the geo-technical specialist for the project on 25-01-2011.

<sup>18</sup> Telephonic discussion with landowner on 04-02-2011

risk of flooding.<sup>19</sup> The elevated area is visible on the photograph below and can also be seen on the Google Earth image below.

According to Mr du Plessis, a train was derailed on his neighbour's farm during the war. The farm is called de Bad and this incident may refer to the same derailing as reported in Section 8 above regarding the derailing of a train at Taaibos. He said that those responsible for derailing the train thought there were supplies on the train but instead the train was carrying horses only.<sup>20</sup>

**Photograph 2: Elevated Track of Old Railway Line with Boundary Fence in foreground**

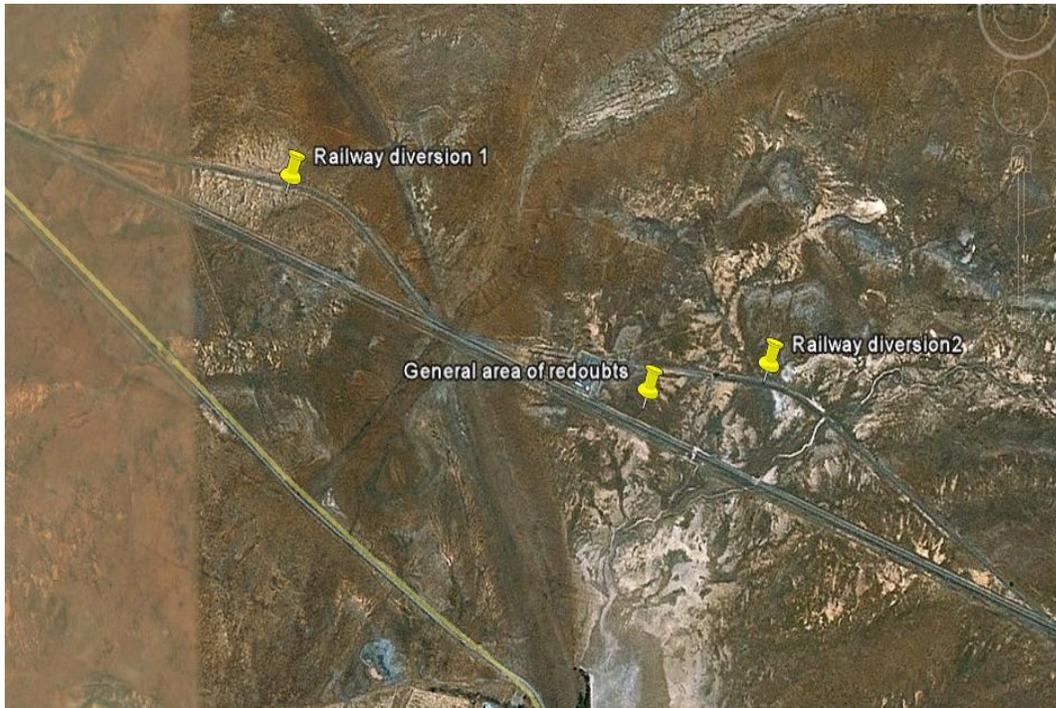


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<sup>19</sup> Telephonic discussion with Geoffrey Bennett of the Railway Society of South Africa, KwaZulu Natal Branch on 04-02-2011

<sup>20</sup> Ditto

### Map 3: Google Earth map indicating railway diversions



There are five redoubts in varying conditions. Some are relatively well preserved whilst others have collapsed over the years with areas covered in stone marking the site of the redoubt. All the redoubts are overgrown with the local bush and grass but are still visible. The redoubts are made of local stone and are rough circular structures approximately one to two metres high. Remains of tins of food still can be found in and around some of the redoubts. See photographs 2, 3 and 4.

### Photograph 3: Redoubt in Fair Condition



**Photograph 4: Remains of a Redoubt**



**Photograph 5: Remains of a Redoubt**

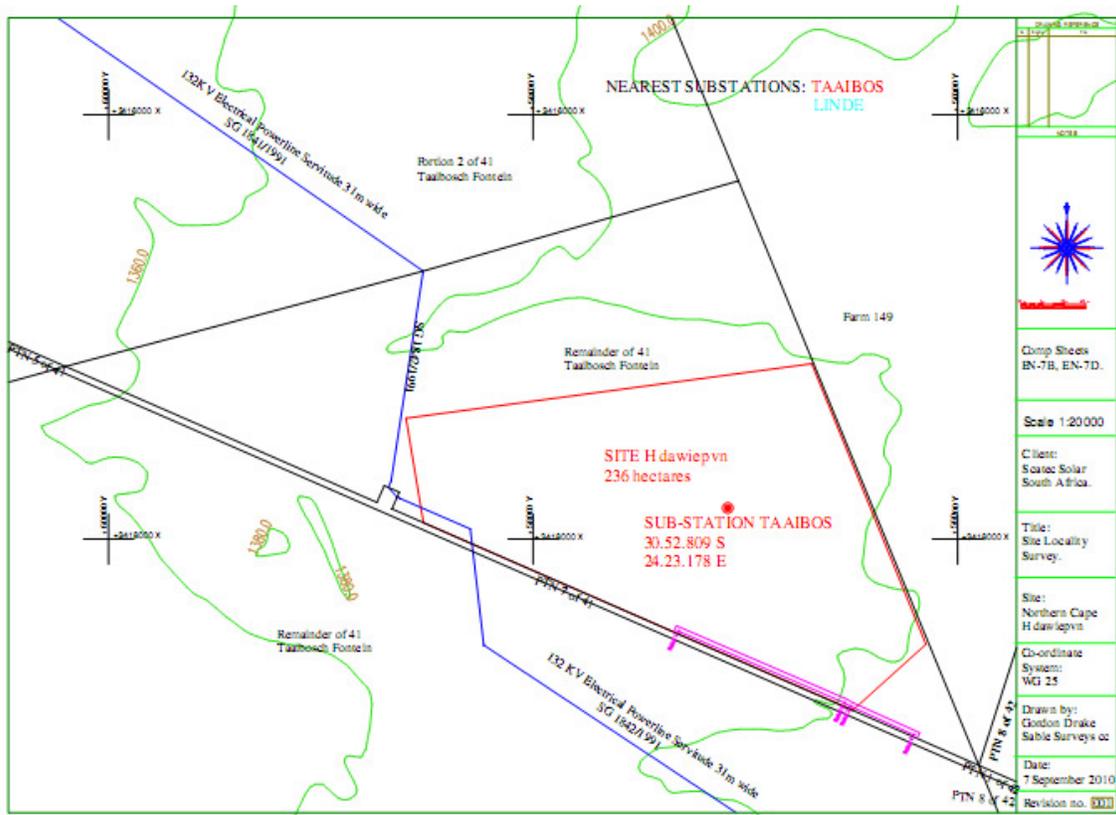


That these stone structures are something other than redoubts is possible but appears unlikely. There are no (visible) entrances to the structures hence it appears as if they were not used as kraals or enclosures for animals. The remains of tins seems to indicate that there were used by people and the lack of roofing material indicates that there also not used for storing food, supplies, etc. The lack of roofing also indicates temporary structures that were built to used for short term piquet duty and not for long term use such as block-houses that were built also during the Anglo Boer War.

Inspection of sections of the farm where the proposed project will take place revealed no other heritage resources of significance. A single old metal fence standard was found as well as stone tools scattered over the area walked. However, only a limited number of stone tools were seen and the farm has been disturbed to such an extent that their context is unclear hence their significance is considered to be low.

The map below indicates the position of the redoubts and the 15m buffer in purple within the context of the project site as a whole. The map also indicates the substation position, contours, power lines and railway line.

**Map 4: Cadastral of Site H: Farm Taaiboschfontein**



## 10 Assessment of Significance

The redoubts and the elevated area where the old railway line was situated are assessed by the writer as significant local historical resources that are reminders of a conflict, the Anglo-Boer War that changed the shape of South Africa.

Nationally, these structures have limited significance because of the remoteness of their location that has ultimately preserved them from outside interest and degradation.

In addition, redoubts are found throughout South Africa making the redoubts somewhat less significant than structures that are few in number.

The cultural landscape of the area in which the redoubts and old railway line were built has changed to such an extent that significance of the redoubts and the old railway line has diminished accordingly. With the addition of the substation and associated power lines as well as the electrified railway line, the landscape has been impacted on sufficiently to detract from the importance of the heritage resources within this landscape as well as lowering the overall cultural heritage significance of the landscape.

Hence, the redoubts are assessed as locally significant and therefore worthy of preservation but are not of high significance as to prevent the proposed project from taking place as long as the recommendations suggested below are strictly enforced.

As the redoubts are deemed to be older than 60 years, they are automatically protected by Section 34(1) of the NHRA (Act 25 of 1999) that states that no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

Demolition of the structures is not recommended as the structures will have little impact on the proposed development as they are located in a row parallel to the access road and not scattered throughout the proposed project area. It should also be noted that the nature of the proposed development is such that the redoubts can be avoided through variation in layout of the solar panels if this is necessary.

The significance of the elevated area that indicates where the old railway line was situated is of significance only in context with the redoubts as the old railway track provides the reason for the location of the redoubts. Hence, contextually the elevated area is important and should be preserved but it is not of such significance to prevent the proposed project from proceeding.

It is however recommended that no solar panels be placed on the elevated area and, if feasible, the solar panels are situated away from the elevated area.

### **10.1 Assessment of Impacts**

The writer has also assessed possible impacts on the redoubts and old railway line that may arise from the construction and operation phases of the proposed solar farm. The table below also determines before and after impacts with the implementation of recommended mitigation measures. The level of significance of each identified impact was assessed according to the following criteria:

- The **extent (E)** of the impact refers to the spatial scale of the impact, that is, will the impact be felt at local, regional or global scale.

- The **duration (D)** of the impact looks at the lifespan of the impact on the environment.
- The **magnitude (M)** of the impact looks at the intensity or severity of the impact on the environment by establishing whether natural, cultural and social functions can continue unharmed or can continue albeit that these functions are affected or modified.
- The likelihood or **probability (P)** of the impact actually occurring is also evaluated.
- The **status** of the impact on the environment, for example, positive, negative or neutral impact.

To allow for the impacts to be described in quantitative terms, a rating scale of between 1 and 5 (which is explained in the table below) was used for each of the above criteria and the significance of the impact is based on a synthesis of the information contained in the rankings attributed to each criteria by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact hence  $S=(E+D+M)P$ . The significance of the impact is classified according to 6 classes:

Negligible = 0

Low = 1 – 15

Low-Medium: 16 - 30

Medium: 31 - 45

Medium-High: 46 – 60

High: > 60

The identified impact that could occur is the destruction of these structures either through the placement of the solar panels in or close to the redoubts and railway line track or through damage by construction and maintenance vehicles.

It should be noted that the writer has chosen to assess all the redoubts in one table as the impacts to each redoubt is the same, that being the destruction of the structures either during the construction phase (more likely) or during the operational/maintenance phase.

It should be noted that the post – mitigation levels of significance are included in the tables and can be identified as the numbers in **red in brackets ( )**. The table also provides requirements that should be included in the Environmental Management Program (EMP) for the project.

**Table 1: Impact Assessment of Redoubts**

PHOTO VOLTAIC (SOLAR POWER FARM) – REDOUBTS ON FARM TAAIBOSCHFONTEIN		
<b>Theme</b>	<b>Heritage</b>	
<b>Nature of issue</b>	<i>Destruction of protected or significant heritage sites</i>	
Legal requirements	<i>Sections 34 of the National Heritage Resources Act, No. 25 of 1999</i>	
Stage	<b>Construction and Decommissioning:</b> <i>{these are assumed to have similar impacts}</i>	<b>Operation:</b>
Extent of impact	<i>2 (Local/Municipal)</i>	<i>1 (limited to site &amp; immediate surroundings)</i>
Duration of impact	<i>1 (Construction completed within 1 year)</i>	<i>4 (Long term - impact will cease after life span of project)</i>
Intensity/Magnitude	<i>2 (Low – environment affected in such a way that natural, cultural &amp; social processes are slightly affected)</i>	<i>2</i>
Probability of occurrence	<i>3 (Medium – the impact may will occur) (2)(Low)</i>	<i>2 Low (1) (Improbable – possibility of impact occurring is very low due to design &amp; layout alternatives &amp; implementation of mitigation measures)</i>
Status of the impact	<i>Negative</i>	<i>Negative</i>
Cumulative Impact	<i>Negligible</i>	<i>Negligible</i>
<b>Level of significance</b>	<b>15 (Low) (2+1+2x3)</b>	<b>14 (Low)</b>
Mitigation measures	<ul style="list-style-type: none"> <li><i>15m buffer area around the redoubts in which no construction may take place; no solar panels are to be erected; no access roads may cross the buffer and no power lines may cross the redoubts, i.e. the redoubts are not to be situated in power line servitudes</i></li> <li><i>Buffer area to be clearly co-cordoned off or marked off with construction tape thereby ensuring integrity of buffer area as well as increasing visibility of structures to construction workers &amp; vehicles</i></li> <li><i>The removal of the stone from the redoubts by construction workers is forbidden</i></li> <li><i>Heritage resources such as archaeological sites are often found below surface. If such sites are uncovered during construction, work in vicinity of find must be stopped and a heritage specialist consulted and their recommendations implemented</i></li> </ul>	<ul style="list-style-type: none"> <li><i>Ensure that buffer area is maintained/respected by marking buffer as a 'no-go' area on site maps and any other maps utilised by operational staff;</i></li> <li><i>Maintenance vehicles to stay on existing roads; no off-road travel</i></li> <li><i>Removal of the stone from the redoubts by construction workers is forbidden</i></li> </ul>
<b>Level of significance after mitigation</b>	<b>10 (Low) (2+1+2x2)</b>	<b>6 (Low)</b>
EMP requirements	<i>Implementation of mitigation measures as provided above</i>	<i>Implementation of mitigation measures as provided above</i>
<i>Discussion {use this box to expand on issues that need clarity, explanation, etc.}</i>		

**Table 2: Impact Assessment on Remains of Railway Line**

PHOTO VOLTAIC (SOLAR POWER FARM) –OLD RAILWAY LINE, FARM TAAIBOSCHFONTEIN		
<b>Theme</b>	<b>Heritage</b>	
<b>Nature of issue</b>	<i>Destruction of protected or significant heritage sites</i>	
Legal requirements	<i>Sections 34 of the National Heritage Resources Act, No. 25 of 1999</i>	
Stage	<i>Construction and Decommissioning: {these are assumed to have similar impacts}</i>	<b>Operation:</b>
Extent of impact	<i>2 (Local/Municipal)</i>	<i>1</i>
Duration of impact	<i>1 (Construction completed within 1 year)</i>	<i>4</i>
Intensity/Magnitude	<i>2 (Low – environment affected in such a way that natural, cultural &amp; social processes are slightly affected)</i>	<i>2</i>
Probability of occurrence	<i>3 (Low – possibility that impact will occur)</i>	<i>2</i>
Status of the impact	<i>Negative</i>	<i>Negative</i>
Cumulative Impact	<i>Negligible</i>	<i>Negligible</i>
<b>Level of significance</b>	<b>15 (Low) (2+1+2x3 = 15)</b>	<b>14 (Low)</b>
Mitigation measures	<ul style="list-style-type: none"> <li>• <i>5m buffer area around old railway line where no construction should take place;</i></li> <li>• <i>no solar panels are to be erected on elevated area;</i></li> <li>• <i>no access roads may cross the elevated area</i></li> <li>• <i>Buffer area to be clearly co-cordoned off with construction tape thereby ensuring integrity of buffer area as well as increasing visibility of old line for construction workers &amp; vehicles</i></li> <li>• <i>Removal of earth from elevated area where old railway track used to be is forbidden</i></li> <li>• <i>If other heritage resources are uncovered during construction process, work in vicinity of find must be stopped and a heritage specialist consulted and their recommendations implemented</i></li> </ul>	<ul style="list-style-type: none"> <li>- <i>Ensure that buffer area is maintained/respected by marking buffer as a 'no-go' area on site maps and any other maps utilised by operational staff;</i></li> <li>- <i>Maintenance vehicles to stay on existing roads; no off-road travel</i></li> <li>• <i>Removal of earth from elevated area where old railway track used to be is forbidden</i></li> </ul>
<b>Level of significance after mitigation</b>	<b>15 (Low)</b>	<b>14 (Low)</b>
EMP requirements	<i>Implementation of mitigation measures as provided above</i>	<i>Implementation of mitigation measures as provided above</i>
Discussion {use this box to expand on issues that need clarity, explanation, etc.}		

## 11 Discussion of Impact Assessments

For both the redoubts the overall impact of the proposed development on the redoubts and old railway line was assessed as Low.

The operational impacts (maintenance vehicles driving over the redoubts, etc) on the redoubts is especially low as the nature of the proposed development is such that the redoubts can be avoided through variation in layout of the solar panels if this is necessary.

The difference between the assessments is that the score *post-mitigation* remains the same as that *pre-mitigation* during the construction and operational phase of the project for the old railway line. This is because the location of the old railway track is towards the centre of the project area where it is assumed that construction work (construction vehicles, construction staff) will take place.

This level of activity increases the risk of possible damage to the old railway line even with mitigation measures as the elevated area can easily be mistaken as an earthen berm. The risk on the redoubts is considered to be lower as they are clearly identifiable and are located away from the main area of activity. The writer is not sure if the potential for variation in layout of the solar panels with regard to the old railway line is as possible as it is for the redoubts that are situated along the boundary of the farm and away from the areas where the solar panels could be placed.

A 5 metre buffer area around the elevated area of the railway track is considered to be sufficient as the significance of the area is low. In addition, the elevated stands out in the otherwise flat topography of the farm hence if the buffer is clearly marked, the risk of impacts should remain low.

## 12 Conclusions

It has been assessed that possible impacts on identified heritage resources by the proposed development of a solar farm on the farm Taaiboschfontein is **low** during both the construction and operational phase of the project.

Hence, it is the opinion of the specialist that the proposed development of a solar farm on the farm Taaiboschfontein can proceed as long as the mitigation measures as detailed in **Tables 1 and 2** above are enforced and adhered to.

## 13 Recommendations

The following is recommended for the redoubts and the remains of the old railway line:

- A buffer area of no less than 15 metres must be implemented around all of the redoubts.
- A buffer area of no less than 5 metres must mark off the old railway line.

- No construction of solar panels takes place on the elevated area where the old railway line was located.
- The buffer area, redoubts and old railway line must be clearly marked to avoid accidental damage and destruction.
- The buffer area is identified as a 'no-go' area where no construction or operational activities may take place.
- Existing access roads be utilised instead of the construction of a new access road where possible.
- If heritage sites are discovered during the construction process, work in the immediate vicinity of the find must be stopped, the Northern Cape Provincial Heritage Agency informed and the services of an accredited heritage professional is obtained for an assessment of the heritage resources found.
- All mitigation measures recommended by the heritage professional must be implemented and adhered to.

## **14 Sources Consulted**

### **Archival Records**

Electronic search of records of the Cape Records Centre through the homepage of the National Archives of South Africa

Electronic search of records of the South African Archives Collection through the homepage of the National Archives of South Africa

### **Internet Search**

[www.anglo-boer.co.za/intro/the-guerilla-war.php](http://www.anglo-boer.co.za/intro/the-guerilla-war.php)

[www.africanhistory.about.com/library/weekly/aa-SAColonists1.htm](http://www.africanhistory.about.com/library/weekly/aa-SAColonists1.htm)

[www.karogariiep.co.za](http://www.karogariiep.co.za)

[www.routes.co.za/nc/hanover/index.html](http://www.routes.co.za/nc/hanover/index.html)

[www.samilitaryhistory.org/vol073vm.html](http://www.samilitaryhistory.org/vol073vm.html)

[www.wordnetweb.princeton.edu/perl/webwn](http://www.wordnetweb.princeton.edu/perl/webwn)

[www.en.wiktionary.org/wiki/redoubt](http://www.en.wiktionary.org/wiki/redoubt)

[www.en.wikipedia.org/wiki/Hanover\\_Northern\\_Cape](http://www.en.wikipedia.org/wiki/Hanover_Northern_Cape)

### **Publications and Reports:**

First Draft: Environmental Scoping Report. Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape. Sustainable Development Projects cc, Ballito, November 2010

Illustrated History of South Africa. The Real Story. The Reader's Digest Association South Africa (Pty) Ltd. Cape Town, 1992