

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED ESTABLISHMENT OF THE ILANGA SOLAR THERMAL POWER PLANT, NEAR UPINGTON, NORTHERN CAPE

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Declaration:

I, J.A. van Schalkwyk, declare that I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services.



J A van Schalkwyk (D Litt et Phil)
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May 2011

EXECUTIVE SUMMARY

Ilangalethu Solar (Pty) Ltd proposes to develop a renewable energy facility consisting of a solar thermal energy component as well as associated infrastructure on a site located 30 km east of Upington in the Northern Cape Province.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), Act 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

The aim of this survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area of the proposed development, to assess the significance thereof and to consider alternatives and plans for the mitigation of any adverse impacts.

During the initial survey, the plans for the development of the required infrastructure were not available. Therefore this report only deals with the site where the solar plant will be developed.

The cultural landscape qualities of the study area essentially consist of a rural area in which the human occupation is made up of a pre-colonial element (Stone Age) as well as a much later colonial (farmer) component.

A non-perennial stream passes to the south of the development site, ending in pan. Significant numbers of stone tools dating to the Later Stone Age occur along this stream as well on the outer edge of the pan. This area is located outside the area of development and therefore there would be no impact on it resulting from the proposed development.

Two buildings occur on the northern edge of the development site. They are judged to be of low significance and are viewed to be recorded in full after listing in this report.

Therefore, from a heritage point of view it is recommended that the proposed development be allowed to continue. However, this is subject to the following to conditions:

- The areas where the infrastructure is to be developed should be surveyed as part of the larger heritage impact assessment.
- It is requested that should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

A handwritten signature in black ink, appearing to read 'J A van Schalkwyk', is centered on a light gray rectangular background.

J A van Schalkwyk
Heritage Consultant
May 2011

TECHNICAL SUMMARY

| Property details | |
|-------------------------|---|
| Province | Northern Cape |
| Magisterial district | Gordonia/Kenhardt |
| Local municipality | //Khara Hais |
| Topo-cadastral map | 2821BC |
| Closest town | Upington |
| Farm name | Zandemm 52, Karos 959, Annashoek 41, Matjiesrivier 41 |

| Development criteria in terms of Section 38(1) of the NHR Act | Yes/No |
|---|---------------|
| Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length | Yes |
| Construction of bridge or similar structure exceeding 50m in length | No |
| Development exceeding 5000 sq m | Yes |
| Development involving three or more existing erven or subdivisions | No |
| Development involving three or more erven or divisions that have been consolidated within past five years | No |
| Rezoning of site exceeding 10 000 sq m | Yes |
| Any other development category, public open space, squares, parks, recreation grounds | No |

| Land use | |
|-------------------|-------------------|
| Previous land use | Farming – grazing |
| Current land use | Farming – grazing |

| Development | |
|--------------------|--|
| Description | Development of a renewable energy facility consisting of a Solar Thermal energy plant as well as associated infrastructure |
| Project name | Ilanga Solar Thermal Power Plant |

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GLOSSARY OF TERMS

Study area: Refers to the entire study area as indicated by the client in the accompanying Fig. 1 & 2.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 2 - 3 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

| | |
|------------------|------------------------------------|
| Early Stone Age | 2 000 000 - 150 000 Before Present |
| Middle Stone Age | 150 000 - 30 000 BP |
| Late Stone Age | 30 000 - until c. AD 200 |

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to Southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. These people, according to archaeological evidence, spoke early variations of the Bantu Language. Because they produced their own iron tools, archaeologists call this the Iron Age.

| | |
|-----------------|-------------------|
| Early Iron Age | AD 200 - AD 900 |
| Middle Iron Age | AD 900 - AD 1300 |
| Late Iron Age | AD 1300 - AD 1830 |

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country

GLOSSARY OF ABBREVIATIONS

| | |
|-------|---|
| ADRC | Archaeological Data Recording Centre |
| ASAPA | Association of Southern African Professional Archaeologists |
| BP | Before Present |
| CS-G | Chief Surveyor-General |
| EIA | Early Iron Age |
| ESA | Early Stone Age |
| LIA | Late Iron Age |
| LSA | Later Stone Age |
| HIA | Heritage Impact Assessment |
| MSA | Middle Stone Age |
| NASA | National Archives of South Africa |
| NHRA | National Heritage Resources Act |
| PHRA | Provincial Heritage Resources Agency |
| SAHRA | South African Heritage Resources Agency |

1. INTRODUCTION

Ilangaletu Solar (Pty) Ltd proposes to develop a Solar Thermal Power Plant (STPP) as well as associated infrastructure on a site located 30 km east of Upington in the Northern Cape Province.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), Act 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed by **Savannah Environmental** to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where it is planned to develop the STPP, to assess the significance thereof and to consider alternatives and plans for the mitigation of any adverse impacts.

This HIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and is intended for submission to the South African Heritage Resources Agency (SAHRA).

2. TERMS OF REFERENCE

The aim of this HIA, broadly speaking, is to determine if any sites, features, or objects of cultural heritage significance occur within the boundaries of the area where it is planned to develop the STPP.

The scope of work for this study consisted of:

- Conducting of a desk-top investigation of the area, in which all available literature, reports, databases and maps were studied;
- A visit to the proposed development area.

The objectives were to

- Identify possible archaeological, cultural and historic sites within the proposed development area;

- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

Table 1: Applicable category of heritage impact assessment study and report.

| Type of study | Aim | SAHRA involved | SAHRA response |
|---------------|---|----------------|----------------|
| Screening | <p>The aim of the screening investigation is to provide an overview of possible heritage-related issues regarding the proposed development by an appropriate heritage specialist. It is based on the review and use of existing heritage data pertaining to the site.</p> <p>The result of this investigation is a brief statement indicating potential heritage impacts/issues and can assist the developer in preliminary planning.</p> <p>This report does grant the developer permission to proceed with the proposed development.</p> | Not necessary | |
| Scoping | <p>The aim of the scoping investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives are to assess heritage sites and their significance (involving site inspections, existing heritage data); to review the general compatibility of the development proposals with heritage policy and possible heritage features on the site.</p> <p>The result of this investigation is a heritage scoping report indicating the presence/absence of heritage resources and what would be required to manage them in the context of the proposed development.</p> <p>This report does not grant the developer permission to proceed with the proposed development.</p> | Not compulsory | |

| Type of study | Aim | SAHRA involved | SAHRA response |
|----------------------------|--|--|--|
| Heritage Impact Assessment | <p>The aim of a full HIA investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives are to identify heritage resources (involving site inspections, existing heritage data and additional heritage specialists if necessary); assess their significances; assess alternatives in order to promote heritage conservation issues; and to assess the acceptability of the proposed development from a heritage perspective.</p> <p>The result of this investigation is a heritage impact assessment report indicating the presence/ absence of heritage resources and how to manage them in the context of the proposed development.</p> <p>Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, on condition of successful implementation of proposed mitigation measures.</p> | <p>Provincial Heritage Resources Authority</p> <p>SAHRA Archaeology, Palaeontology and Meteorites Unit</p> | <p>Comments on built environment and decision to approve or not</p> <p>Comments and decision to approve or not</p> |

3. HERITAGE RESOURCES

3.1. The National Estate

The NHRA (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- Places, buildings, structures and equipment of cultural significance;
- Places to 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 palaeontological sites;
- Graves and burial grounds, including-
 - Ancestral graves;

- Royal graves and graves of traditional leaders;
- Graves of victims of conflict;
- Graves of individuals designated by the minister by notice in the gazette;
- Historical graves and cemeteries; and
- Other human remains which are not covered in terms of the human tissue act, 1983 (act no. 65 of 1983);
- Sites of significance relating to the history of slavery 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;
 - Ethnographic art and objects;
 - Military objects;
 - Objects of decorative or fine art;
 - Objects of scientific or technological interest; and
 - Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the national archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2. Cultural significance

In the NHRA, Section 2 (vi), it is stated that "cultural significance" means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature's uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of:

- Its importance in the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- Sites of significance relating to the history of slavery in South Africa.

A matrix was developed whereby the above criteria were applied for the determination of the significance of each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar sites.

4. STUDY APPROACH AND METHODOLOGY

4.1. Extent of the Study

This survey and impact assessment covers the area as presented in Section 5 and as illustrated in Figures 1 & 2.

4.2. Methodology

4.2.1 Preliminary investigation

4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. The following sources were consulted – Rudner 1953, Humphreys 1976, Morris 1995, Couzens 2004, Raper 2006, De Jong 2010.

- Limited information on events, sites, and features in the larger region were obtained from these sources.

4.2.1.2 Data bases

The *Heritage Atlas Database*, the *Environmental Potential Atlas*, the *Chief Surveyor-General (CS-G)* and the *National Archives of South Africa (NASA)* were consulted.

- Database surveys produced a number of sites located in the larger region of the proposed development.

4.2.1.3 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Information of a very general nature was obtained from these sources.

4.2.2 Field survey

The area that had to be investigated was identified by **Savannah Environmental** by means of maps. The site was surveyed by walking a number of parallel transects over it. Special attention was given to stream beds and outcrops. In principle, an area slightly larger than the development site was investigated to accommodate possible construction overruns.

4.3. Limitations

The investigation has been influenced by the following factors:

- During the initial survey, the plans for the development of the required infrastructure were not available. Therefore this report only deals with the site where the solar plant will be developed. The infrastructure sites will be surveyed in the immediate future.
- Availability and reliability of baseline information about the affected area. For example, from SAHRA's *Archaeology and Palaeontology Report Mapping Project* (November 2009), it was determined that only a few surveys concerned with very small areas have been done in the larger region.

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1. Site location and description

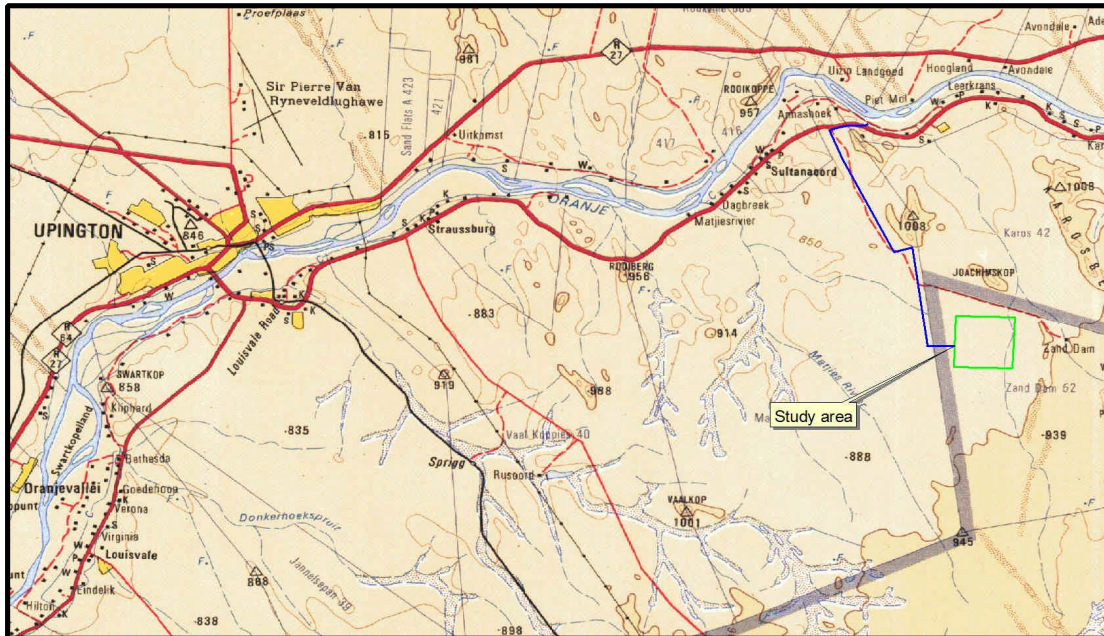


Fig. 1: Location of the study area in regional context. (Map 2820: Chief Surveyor-General)

The study area is a rectangular shaped section of land on the farm Zandemm 52, as well as on sections of Karos 959, Annashoek 41, and Matjiesrivier 41 located approximately 30 km east of the town of Upington in the Northern Cape Province (Fig. 1 & 2). For more information, please see the Technical Summary presented above.

The geology is made up of granite in the south, which in an igneous intrusion in the surrounding schist. The latter is a sedimentary rock formed by the hardening of glacial till (in other words, material deposited by a glacier). The morphology of the region is described as irregular plains, with hills occurring to the south. The vegetation is classified as Orange River Nama Karoo.



Fig. 2: Views of the landscape.



Fig. 3: Aerial view of the landscape near the development site.
(Photo: Google Earth)

5.2. Development information

The development site consists of a STPP and will encompass an area of approximately 2.2 x 2.2 km. From there the power will be transmitted along a route that will run parallel with the current access track. The track will also be used to install the water supply to the site. The power will be transmitted north to join up with the northern 132kV overhead line.

In addition, a water extraction point will be developed in the Orange River, a pumping station will be developed to pump the water to the site and a holding reservoir will be developed on the highest point along the route. These facilities are indicated as the blue line in Fig. 4. Staff accommodation and a training centre are to be developed and will be located in the area depicted as a red dot on the map in Fig. 4.

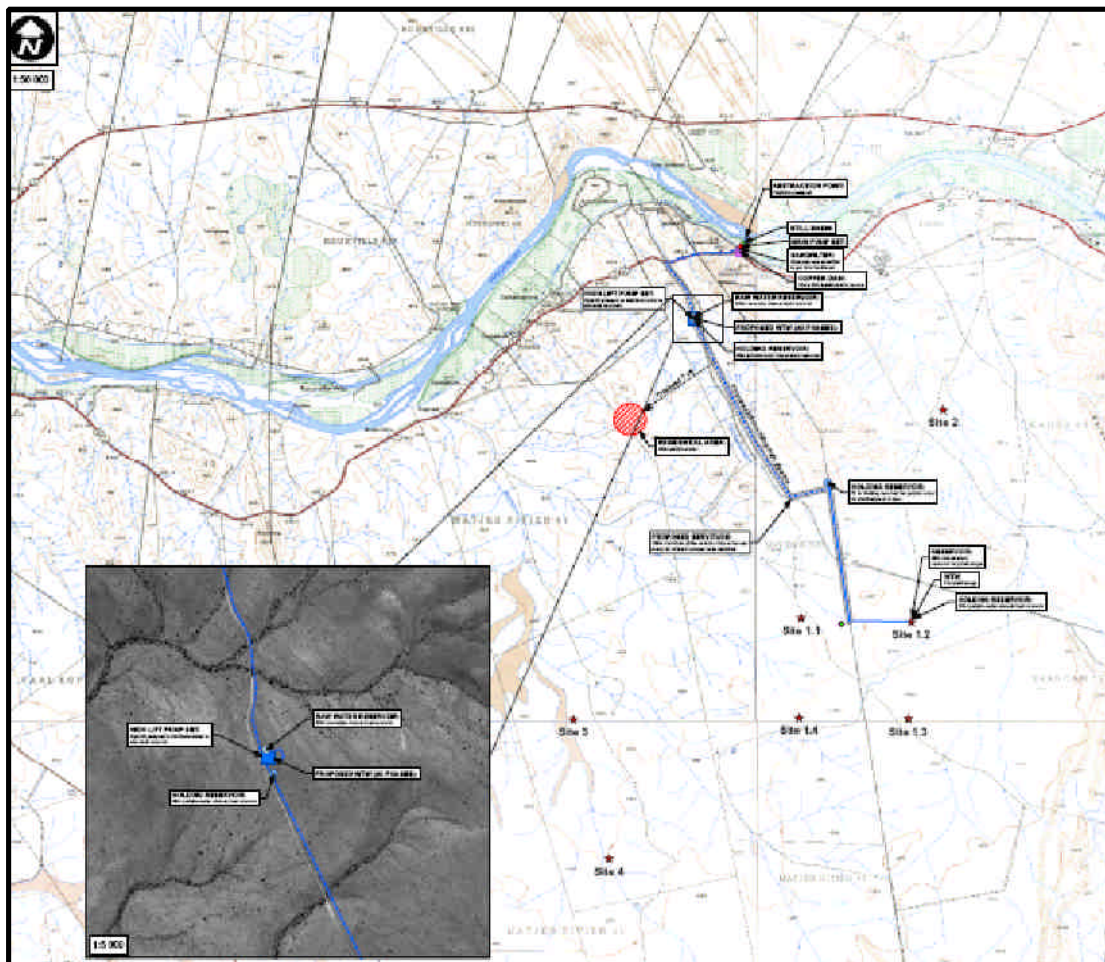


Fig. 4: Location of the required infrastructure.

5.3. Regional overview

The cultural landscape qualities of the study area, as well as the larger region, essentially consist of a single component. This is a sparsely populated rural area in which the human occupation is made up of a pre-colonial element (Stone Age) as well as a much later colonial (farmer) component. The reason for this is that there are very little open water available, forcing people, in the past as well as today, to concentrate their activities in the vicinity of the Orange River. It was only with the development of drilling rigs that sub-surface water sources could be accessed, allowing people to develop more permanent settlements.

Stone Age

Surveys done for example by Sampson (1985) to the south-east of the study area indicated a rich legacy in Stone Age sites in the Karoo. However, the region of the study area seems to have been a bit more marginal as no major sites or traditions have been identified in the region.

Occupation by early humans would probably date to the Middle Stone Age and would consist of open sites in the vicinity of stream beds or hills and outcrops. Population density might have increased during the Later Stone Age and people would have occupied rock shelters where available as well as open sites. During this later period they also produced rock engravings, although none are known from the immediate region.

Historic period

The town of Upington, originally known as Olyvenhoutsdrift, was founded in 1871 as part of a mission station by the German missionary Rev Schröder. The town was renamed in 1884 after Sir Thomas Upington, who was the Prime Minister of the Cape Colony and who visited the town in 1884.

An irrigation canal was started by Rev Schröder in 1883. It was completed in 1885. By 1884 there were already 77 irrigation farms. Nowadays, it is disputed that Schröder was the original builder of the canal, and it is claimed that he only carried on with an idea that was started by a local inhabitant by the name of Abraham September.

The Title Deeds of the relevant farms could not be traced. However, it seems as if they were used for grazing purposes and farmsteads were not developed. It is only on the sections close to the Orange River where such features were developed. These areas will be investigated when the survey for the infrastructural development is conducted.

5.4. Identified heritage sites

5.4.1. Stone Age

- A non-perennial stream passes to the south of the development site, ending in pan. Significant numbers of stone tools dating to the Later Stone Age occur along this stream as well on the outer edge of the pan. It is believed that the granite outcrop occurring in the stream bed retain water for much longer, drawing people to settle here.

| | |
|--------------------------|--|
| NHRA Category | Archaeological and palaeontological sites |
| Protection status | General Protection - Section 35: Archaeology, palaeontology and meteorites |

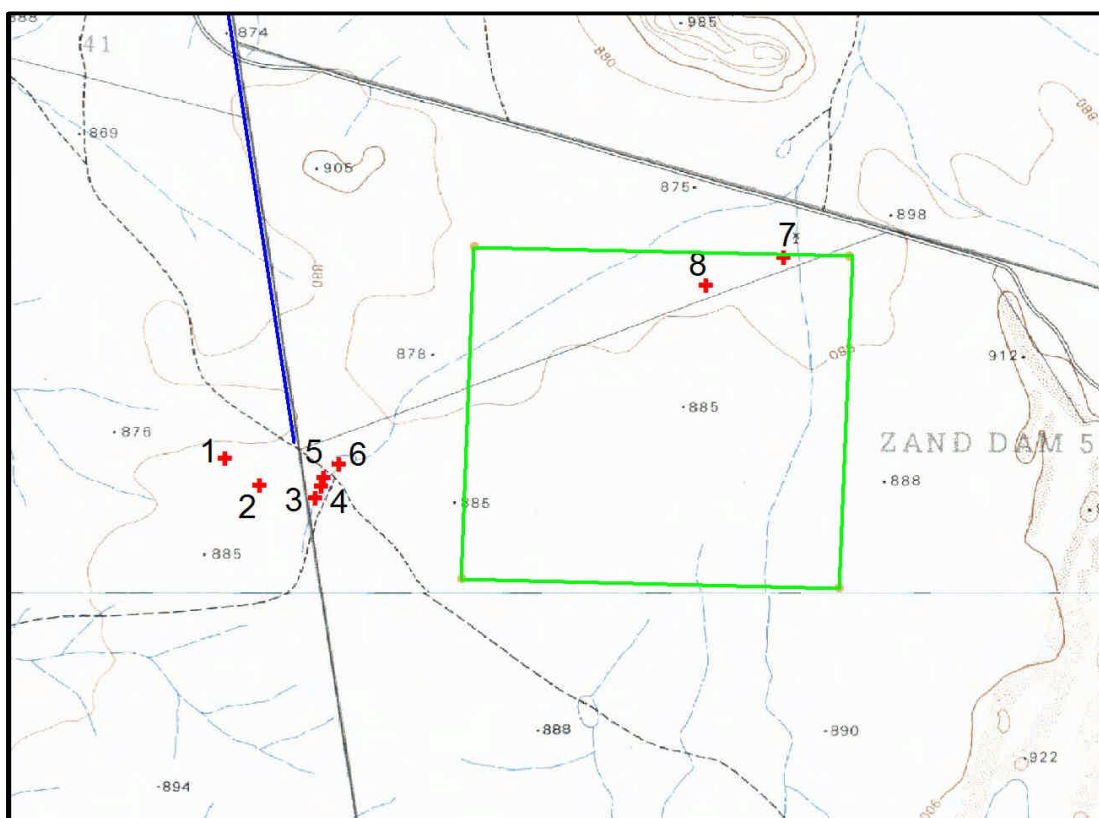


Fig. 5: Map of the study area, showing known sites of cultural significance (red crosses). (Map 2821BC: Chief Surveyor-General)

| Location | | | | | |
|---|------------|-----------------------------------|---|------------|------------|
| 1 | S 28.49227 | E 21.51588 | 2 | S 28.49389 | E 21.51799 |
| 3 | S 28.49464 | E 21.52133 | 4 | S 28.49395 | E 21.52172 |
| 5 | S 28.49341 | E 21.52184 | 6 | S 28.49263 | E 21.52279 |
| Description | | | | | |
| The material identified include tool, flakes and cores, indicated that people stayed here for some time. The material used in the production of the stone tools is mostly banded iron stone. | | | | | |
| Significance | | High on a local level – Grade III | | | |
| Mitigation | | | | | |
| Fortunately this area is located outside the area of development and therefore there would be no impact on it resulting from the proposed development. However, a buffer area of at least 50 metres from the outer edges of the various identified areas (pans) should be set out in order for the developers not to encroach on the sites. | | | | | |



Fig. 6: Stone Age sites and material.

5.3 2. Iron Age

- No sites, features, or objects dating to the Iron Age were identified in the study area.

5.4.2. Historic period

- Two small house structures were identified on the northern edge of the development site.

| | |
|---|--|
| NHRA Category | Buildings, structures, places and equipment of cultural significance |
| Protection status | |
| General Protection - Section 34: Structures older than 60 years | |

| | | | |
|---|----------------------------------|------------|------------|
| Location | No. 7 | S 28.48176 | E 21.54503 |
| Description | | | |
| Rectangular house with a fire-place added to the one side wall. It is built with clay bricks and has a flat roof. The door and window frames are of iron. | | | |
| Significance | Low on a local level – Grade III | | |
| Mitigation | | | |
| This site is located right on the border of the development site and would therefore not be impacted on. Furthermore, it is viewed to have a low significance and is viewed to be documented in full after submission of this report to SAHRA. Therefore no mitigation is necessary | | | |

| | | | |
|--|----------------------------------|------------|------------|
| Location | No. 8 | S 28.48010 | E 21.54974 |
| Description | | | |
| A single roomed structure built with clay bricks. It is approximately 2 x 2 metres in size. The roof and other fittings have been removed. It is difficult to determine the age of the structure, but, as it seem to have had steel window frames it is judged not to be very old. | | | |
| Significance | Low on a local level – Grade III | | |
| Mitigation | | | |
| As this structure is viewed to be of low significance, it is viewed to be documented in full after submission of this report to SAHRA. Therefore no mitigation is necessary. | | | |



Fig. 7: The identified structures.

6. SITE SIGNIFICANCE AND ASSESSMENT

6.1. Heritage assessment criteria and grading

The NHRA stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation on a local authority level.

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the applicable of mitigation measures would allow the development activities to continue.

6.2. Statement of significance

A matrix was developed whereby the above criteria, as set out in Sections 3(3) and 7 of the NHRA, No. 25 of 1999, were applied for each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar sites. Three categories of significance are recognized: low, medium and high. In terms of Section 7 of the NHRA, all the sites currently known or which are expected to occur in the study area are evaluated to have a grading as identified in the table below.

Table 2: Summary of identified heritage resources in the study area.

| Identified heritage resources | |
|--|-----------------------------------|
| <i>Category, according to NHRA</i> | <i>Identification/Description</i> |
| Formal protections (NHRA) | |
| National heritage site (Section 27) | None |
| Provincial heritage site (Section 27) | None |
| Provisional protection (Section 29) | None |
| Place listed in heritage register (Section 30) | None |
| General protections (NHRA) | |
| Structures older than 60 years (Section 34) | None |
| Archaeological site or material (Section 35) | Yes: Stone Age material |

| | |
|--|------|
| Palaeontological site or material (Section 35) | None |
| Graves or burial grounds (Section 36) | None |
| Public monuments or memorials (Section 37) | None |
| Other | |
| Any other heritage resources (describe) | None |

6.3. Impact assessment

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase are assessed in terms of the criteria set out in Appendix 2 of this report and are summarised in the tables below.

Table 3: Summary of impact assessments.

| Nature: Small surface scattering of stone tools dating to the Later Stone Age | | |
|---|---------------------------|------------------------|
| | Without mitigation | With mitigation |
| Extent | Local (1) | Local (1) |
| Duration | Permanent (5) | Permanent (5) |
| Magnitude | Moderate (2) | Moderate (2) |
| Probability | Probable (1) | Probable (1) |
| Significance | 8 (Low) | 8 (Low) |
| Status (positive or negative) | Negative | Negative |
| Reversibility | Low | Low |
| Irreplaceable loss of resources? | Yes | Yes |
| Can impacts be mitigated? | Yes | |
| Mitigation: As these objects are surface material, they are out of primary context and are viewed to have a low significance. No mitigation measures are therefore required. | | |
| Cumulative impacts: None | | |
| Residual Impacts: None | | |

| Nature: Farming related structures | | |
|---|---------------------------|------------------------|
| | Without mitigation | With mitigation |
| Extent | Local (1) | Local (1) |
| Duration | Permanent (5) | Permanent (3) |
| Magnitude | Moderate (2) | Moderate (4) |
| Probability | Probable (1) | Probable (3) |
| Significance | 8 (Low) | 8 (Low) |
| Status (positive or negative) | Negative | Negative |
| Reversibility | Low | Low |

| | | |
|--|-----|-----|
| Irreplaceable loss of resources? | Yes | Yes |
| Can impacts be mitigated? | Yes | |
| Mitigation: As these structures are viewed to have low significance, no mitigation measures are required. | | |
| Cumulative impacts: None | | |
| Residual Impacts: None | | |

6.4. Environmental Management Programme

OBJECTIVE: Protection of heritage resources

Archaeological or other heritage materials occurring in the path of any surface or sub-surface disturbances associated with any aspect of the development are highly likely to be subject to destruction, damage, excavation, alteration, or removal. The objective should be to limit such impacts to the primary activities associated with the development and hence to limit secondary impacts during the medium and longer term working life of the facility.

| | |
|-------------------------------------|---|
| Project Component/s | Excavation activities, construction of access roads and establishment of water supply pipeline and transmission pylons and staff accommodation. |
| Potential Impact | Wider areas or extended linear developments may result in further destruction, damage, excavation, alteration, removal, or collection of heritage objects from their current context on the site. |
| Activity/Risk Source | Activities which could affect achieving this objective include deviation from the planned lay-out of road/s and infrastructure without considering heritage impacts. |
| Mitigation: Target/Objective | A facility EMP that takes cognisance of heritage resources in the event of any future extensions of roads or other infrastructure. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|-----------------------|------------------------------------|
| Provision for on-going heritage monitoring which provides guidelines on what to do in the event of any major heritage feature being encountered during any phase of development or operation. | ECO | Before commencement of development |

| | |
|------------------------------|---|
| Performance Indicator | Inclusion of further heritage impact consideration in any future extension of infrastructural elements. Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or |
|------------------------------|---|

| | |
|-------------------|---|
| | operation of the facility. |
| Monitoring | Officials from relevant heritage authorities (National and Provincial) to be permitted to inspect the operation on agreement with the contractor relating to the heritage component of the EMP. |

7. CONCLUSIONS

The aim of this survey was to locate, identify, evaluate, and document sites, objects and structures of cultural significance found within the area of the proposed development, to assess the significance thereof and to consider alternatives and plans for the mitigation of any adverse impacts.

During the initial survey, the plans for the development of the required infrastructure were not available. Therefore this report only deals with the site where the solar plant will be developed.

The cultural landscape qualities of the study area essentially consist of a rural area in which the human occupation is made up of a pre-colonial element (Stone Age) as well as a much later colonial (farmer) component.

A non-perennial stream passes to the south of the development site, ending in pan. Significant numbers of stone tools dating to the Later Stone Age occur along this stream as well on the outer edge of the pan. This area is located outside the area of development and therefore there would be no impact on it resulting from the proposed development.

Two buildings occur on the northern edge of the development site. They are judged to be of low significance and are viewed to be recorded in full after listing in this report.

Therefore, from a heritage point of view it is recommended that the proposed development be allowed to continue. However, this is subject to the following to conditions:

- The areas where the infrastructure is to be developed should be surveyed as part of the larger heritage impact assessment.
- It is requested that should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

8. REFERENCES

8.1. Data bases

Chief Surveyor General

Environmental Potential Atlas, Department of Environmental Affairs and Tourism.

Heritage Atlas Database, Pretoria.

National Archives of South Africa

SAHRA Archaeology and Palaeontology Report Mapping Project (2009)

8.2. Literature

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Humphreys, A.J.B. 1976. Note on the southern limits of Iron Age settlement in the Northern Cape. *South African Archaeological Bulletin* 31(121/122): 54-57

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Parsons, I. 2008. Five Later Stone Age artefact assemblages from the interior Northern Cape province. *South African Archaeological Bulletin* 63(187):51-60.

Raper, P.E. 2004. *South African place names*. Johannesburg: Jonathan Ball Publishers.

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8.3. Maps and aerial photographs

1: 50 000 Topocadastral maps: 2821BC

Google Earth

APPENDIX 1: CONVENTIONS USED TO DETERMINE THE SIGNIFICANCE OF CULTURAL HERITAGE RESOURCES

Significance

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature.

| | | | |
|---|------|--------|-----|
| 1. Historic value | | | |
| Is it important in the community, or pattern of history | | | |
| Does it have strong or special association with the life or work of a person, group or organisation of importance in history | | | |
| Does it have significance relating to the history of slavery | | | |
| 2. Aesthetic value | | | |
| It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group | | | |
| 3. Scientific value | | | |
| Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage | | | |
| Is it important in demonstrating a high degree of creative or technical achievement at a particular period | | | |
| 4. Social value | | | |
| Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons | | | |
| 5. Rarity | | | |
| Does it possess uncommon, rare or endangered aspects of natural or cultural heritage | | | |
| 6. Representivity | | | |
| Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects | | | |
| Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class | | | |
| Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design, or technique) in the environment of the nation, province, region, or locality. | | | |
| 7. Sphere of Significance | High | Medium | Low |
| International | | | |
| National | | | |

| | | | | |
|--|--------|--|--|--|
| Provincial | | | | |
| Regional | | | | |
| Local | | | | |
| Specific community | | | | |
| 8. Significance rating of feature | | | | |
| 1. | Low | | | |
| 2. | Medium | | | |
| 3. | High | | | |

APPENDIX 2: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF IMPACTS ON HERITAGE RESOURCES

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

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

probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

- » the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » the **status**, which will be described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the *degree* to which the impact can be *mitigated*.

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

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

APPENDIX 3. RELEVANT LEGISLATION

All archaeological and palaeontological sites and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

(1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8) (a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority-

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of

this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, 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; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3) (a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.