

Phase 1 Cultural Heritage Impact Assessment:

**THE DEVELOPMENT OF THE PROPOSED ACRUX SOLAR PV PROJECT ONE NEAR
BLOEMFONTEIN, FREE STATE PROVINCE**

Prepared for:

Blue Crane Environmental: Mrs M Botha

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- Date: May 2023
- Revision No: 1
- Date: September 2023

Submission of the report:

It remains the responsibility of the client to submit the report to the South African Heritage Resources Agency (SAHRA) or relevant Provincial Heritage Resources Agency (PHRA) by means of the online SAHRIS System.



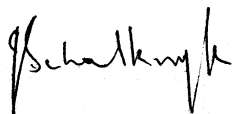
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Specialist competency:

Johan A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 40 years. Originally based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape Province, Northern Cape Province, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. Based on this work, he has curated various exhibitions at different museums and has published more than 70 papers, most in scientifically accredited journals. During this period, he has done more than 2000 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.



J A van Schalkwyk
Heritage Consultant
May 2023

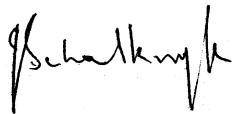


SPECIALIST DECLARATION

I, J A van Schalkwyk, as the appointed independent specialist, in terms of the 2014 EIA Regulations (as amended), hereby declare that I:

- I act as the independent specialist in this application;
- I 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;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 (as amended) and any specific environmental management Act;
- 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 have no vested interest in the proposed activity proceeding;
- 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;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist



J A van Schalkwyk
May 2023

EXECUTIVE SUMMARY

**Phase 1 Cultural Heritage Impact Assessment:
THE DEVELOPMENT OF THE PROPOSED ACRUX SOLAR PV PROJECT ONE NEAR
BLOEMFONTEIN, FREE STATE PROVINCE**

The Applicant, Acrux Solar PV Project One (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as Acrux Solar PV Project One) located on the Remaining Extent of Portion 6 of the Farm Brabant No. 205, approximately 17 km west of the city of Bloemfontein in the Free State Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200 MW. The development area is situated within the Mangaung Metropolitan Municipality.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Blue Crane Environmental* to conduct a cultural heritage assessment to determine if the development of the solar PV power site would have an impact on any sites, features or objects of cultural heritage significance.

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The investigation consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey that also included the interviewing of relevant people. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which eventually gave rise to an urban component.

From a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Acrux Solar PV Project One is in an area with a low presence of heritage sites and features.

- Reports indicate that Stone Age tools occur in very limited numbers sporadically across the larger region;
- Historic structures, inclusive of buildings, monuments and bridges, occur sporadically across the larger region;
- Formal and informal burial sites occur sporadically throughout the region.

Limitations encountered

- During the site visit conducted from 16 to 18 May 2023, the high and dense vegetation that covered sections of the project area limited ground visibility very much.
- The eastern section of the powerline route could not be directly assessed as access was not organised. However, it was reviewed from the road located to the north.

Identified sites

During the survey, conducted from 16 to 18 May 2023, the following sites, features or objects of cultural significance were identified.

- 7.3.1: What seems to be a very old and neglected burial site – there are no indications of recent visits by descendants. Due to the dense vegetation cover and the neglected state of the burials, it

was impossible to obtain details such as the number of graves or of the people who were buried there.

Impact assessment and proposed mitigation measures

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

Site No.	Site type	NHRA category	Field rating	Impact rating: Before/After mitigation
7.3.1	Graves, Cemeteries and Burial Grounds	Section 36	Generally protected 4A: High/medium significance.	Negative Low (24)
				Negative Low (6)
Mitigation: (1) Avoidance/Preserve: It is recommended that this site is fenced off with wire or danger tape with a buffer zone of at least 50m for the duration of the construction activities.				

Cumulative assessment

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the proposed development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

For the project area, the impacts to heritage sites are expected to be of low significance. This can further be lowered by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report.

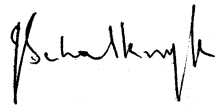
- For this proposed project, the assessment has determined that sites, features or objects of cultural heritage significance occur in the project area, therefore relevant permits would be required from SAHRA or the PHRA.
- If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed project be allowed to continue on acceptance of the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- The Palaeontological Sensitivity Map (<http://www.sahra.org.za/sahris/map/palaeo>) indicate that the southern part of the project area has a high sensitivity of fossil remains to be found and therefore a palaeontological assessment and protocol for finds is required. The northern section has a high sensitivity of fossil remains to be found and therefore a desktop assessment is required. Based on the outcome of that, a field assessment is likely.
- 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. The appropriate steps to take are indicated in Section 9 of the report, as well as in the **Management Plan: Burial Grounds and Graves, with reference to general heritage sites**, in the Addendum, Section 13.5.

A handwritten signature in black ink, appearing to read 'J A van Schalkwyk', written in a cursive style.


J A van Schalkwyk
Heritage Consultant
May 2023

TECHNICAL SUMMARY

Project description	
Description	Development of a solar power plant
Project name	Acrux Solar PV Project 1

Applicant
Acrux Solar PV Project One (Pty) Ltd

Environmental assessment practitioner
Ms M Botha
Blue Crane Environmental

Property details						
Province	Free State					
District Municipality	Mangaung					
Local Municipality	Mangaung					
Topo-cadastral map	2926AA					
Farm name	Remaining Extent of Portion 6 of the Farm Brabant 205					
Closest town	Bloemfontein					
Coordinates	Centre point (approximate)					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	S 29,09186	E 26,03407			
	.kml files ¹		 Acrux 1 Updated Layout - 18 August 2			

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	No
Any other development category, public open space, squares, parks, recreation grounds	No

Land use	
Previous land use	Farming (Planting/Grazing)
Current land use	Farming (Planting/Grazing)

¹ Left click on the coloured icon to open the file in Google Earth, if installed on the computer. Alternatively, right click on the icon. In dialog box, select "Save Embedded File to Disk" and save to folder of choice.

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GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Bioturbation: The burrowing by small mammals, insects and termites that disturb archaeological deposits.

Cumulative impacts: In relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Debitage: Stone chips discarded during the manufacture of stone tools.

Factory site: A specialised archaeological site where a specific set of technological activities has taken place – usually used to describe a place where stone tools were made.

Historic Period: Since the arrival of the white settlers - c. AD 1830 - in this part of the country.

Holocene: The most recent time period, which commenced c. 10 000 years ago.

Iron Age (also referred to as **Early Farming Communities**): 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 herded cattle, sheep and goats. As 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
Later Iron Age	AD 1300 - AD 1830

Midden: The accumulated debris resulting from human occupation of a site.

Mitigation: To anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

National Estate: The collective heritage assets of the Nation.

Pleistocene: Geological time period of 3 000 000 to 20 000 years ago.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 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	2 500 000 - 250 000 Before Present
Middle Stone Age	250 000 - 40-25 000 BP
Later Stone Age	40-25 000 - until c. AD 200

Tradition: As used in archaeology, it is a seriated sequence of artefact assemblages, particularly ceramics.

ACRONYMS and ABBREVIATIONS

AD	Anno Domini (the year 0)
ASAPA	Association of Southern African Professional Archaeologists
BA	Basic Assessment
BC	Before the Birth of Christ (the year 0)
BCE	Before the Common Era (the year 0)
BP	Before Present (calculated from 1950 when radio-carbon dating was established)
CE	Common Era (the year 0)
CRM	Cultural Resources Management
CS-G	Chief Surveyor-General
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Early Iron Age
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Early Stone Age
HIA	Heritage Impact Assessment
I & AP's	Interested and Affected Parties
ICOMOS	International Council on Monuments and Sites
LIA	Late Iron Age
LSA	Later Stone Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NASA	National Archives of South Africa
NEMA	National Environmental Management Act 107 of 1998
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
WUL	Water Use Licence

COMPLIANCE WITH APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R982	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain-	
a) details of-	
i. the specialist who prepared the report; and	Front page
ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page i Addendum Section 7
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 4
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 4
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 4
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 7; Figure 18
g) an identification of any areas to be avoided, including buffers;	Section 8
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 18 Section 7 & 8
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 7
k) any mitigation measures for inclusion in the EMPr;	Section 8 & 11
l) any conditions for inclusion in the environmental authorisation;	Section 11
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9
n) a reasoned opinion-	
i. whether the proposed activity, activities or portions thereof should be authorised;	Section 11
(iA) regarding the acceptability of the proposed activity or activities; and	
ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 8, 9 & 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	-
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	-
q) any other information requested by the competent authority.	-
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	-

**Phase 1 Cultural Heritage Impact Assessment:
THE DEVELOPMENT OF THE PROPOSED ACRUX SOLAR PV PROJECT ONE NEAR
BLOEMFONTEIN, FREE STATE PROVINCE**

1. INTRODUCTION

1.1 Background

The Applicant, Acrux Solar PV Project One (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as Acrux Solar PV Project One) located on the Remaining Extent of Portion 6 of the Farm Brabant No. 205, approximately 17 km west of the city of Bloemfontein in the Free State Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200 MW. The development area is situated within the Mangaung Metropolitan Municipality.

Energy generated by the facility will be evacuated into the National Grid via a 132 kV gridline connecting to the existing Eskom Harvard Substation located approximately 8 km east of the site. The Environmental Impact Assessment (EIA) assessment footprint is approximately 428 hectares in extent. A 200 m wide and 8 km long grid connection corridor will be assessed for placement of the grid connection infrastructure.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. However, according to Section 27(18) of the National Heritage Resources Act, No. 25 of 1999 (NHRA), 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 appointed by *Blue Crane Environmental* to conduct a cultural heritage assessment to determine if the development of the solar PV power site would have an impact on any sites, features or objects of cultural heritage significance.

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

1.2 Terms and references

The aim of a full heritage impact assessment (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.

The result of this investigation is a HIA report indicating the presence / absence of heritage resources and how to manage them in the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer may receive permission to proceed with the proposed development, on condition of successful implementation of proposed mitigation measures.

1.2.1 Scope of work

The aim of this study is to determine the cultural heritage significance of the area where the development of the solar PV power site is to take place. This included:

- Conducting a desk-top investigation of the project area; and
- A visit to the proposed project area.

The project area includes the following properties:

- Remaining Extent of Portion 6 of the Farm Brabant No. 205.

The objectives were to:

- 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; and
- Provide guideline measures to manage any impacts that might occur during the proposed project's construction and implementation phases.

1.2.2 Assumptions and Limitations

The investigation has been influenced by the following:

- It is assumed that the description of the proposed project, provided by the client, is accurate;
- It is assumed that the public consultation process undertaken as part of the Basic Assessment is sufficient and that it does not have to be repeated as part of the HIA;
- It is assumed that the information contained in existing databases, reports and publications is correct;
- The unpredictability of buried archaeological remains;
- No subsurface investigation (i.e. excavations or sampling) were undertaken, since a permit from SAHRA is required for such activities;
- The vegetation cover encountered during a site visit can have serious limitations on ground visibility, obscuring features (artefacts, structures) that might be an indication of human settlement.

2. LEGISLATIVE FRAMEWORK

2.1 Background

HIAs are governed by national legislation and standards and International Best Practise. These include:

- South African Legislation
 - National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA);
 - Mineral and Petroleum Resources Development Act, 2002 (Act No. 22 of 2002) (MPRDA);
 - National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA); and
 - National Water Act, 1998 (Act No. 36 of 1998) (NWA).
- Standards and Regulations
 - South African Heritage Resources Agency (SAHRA) Minimum Standards;
 - Association of Southern African Professional Archaeologists (ASAPA) Constitution and Code of Ethics;
 - Anthropological Association of Southern Africa Constitution and Code of Ethics.
- International Best Practise and Guidelines

- ICOMOS Standards (Guidance on Heritage Impact Assessments for Cultural World Heritage Properties); and
- The UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (1972).

2.2 Heritage Impact Assessment Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the NHRA (Section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority, subject to the provisions of Section 38(8) of the NHRA. The NHRA, Section 38, contains requirements for Cultural Resources Management and prospective developments:

"38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*
- (c) any development or other activity which will change the character of a site:*
 - (i) exceeding 5 000 m² in extent; or*
 - (ii) involving three or more existing erven or subdivisions thereof; or*
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."*

And:

"38 (3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

- (a) The identification and mapping of all heritage resources in the area affected;*
- (b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (c) an assessment of the impact of the development on such heritage resources;*
- (d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) plans for mitigation of any adverse effects during and after the completion of the proposed development."*

3. HERITAGE RESOURCES

3.1 The National Estate

The NHRA 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 (see Section 2 of Addendum) was developed whereby the above criteria were applied for the determination of the significance of each identified site. This allowed some form of control over the application of similar values for similar identified sites.

4. PROJECT DESCRIPTION

4.1 Site location

The project area is located approximately 20km west of the Bloemfontein CBD (Fig. 1). A development footprint of 320 ha (excluding linear components) has been identified within the Remaining extent of Portion 6 of the Farm Brabant No. 205 for the placement of the development footprint which will ultimately house the Acruz Solar PV Project One. For more information, please see the Technical Summary on p. V above.

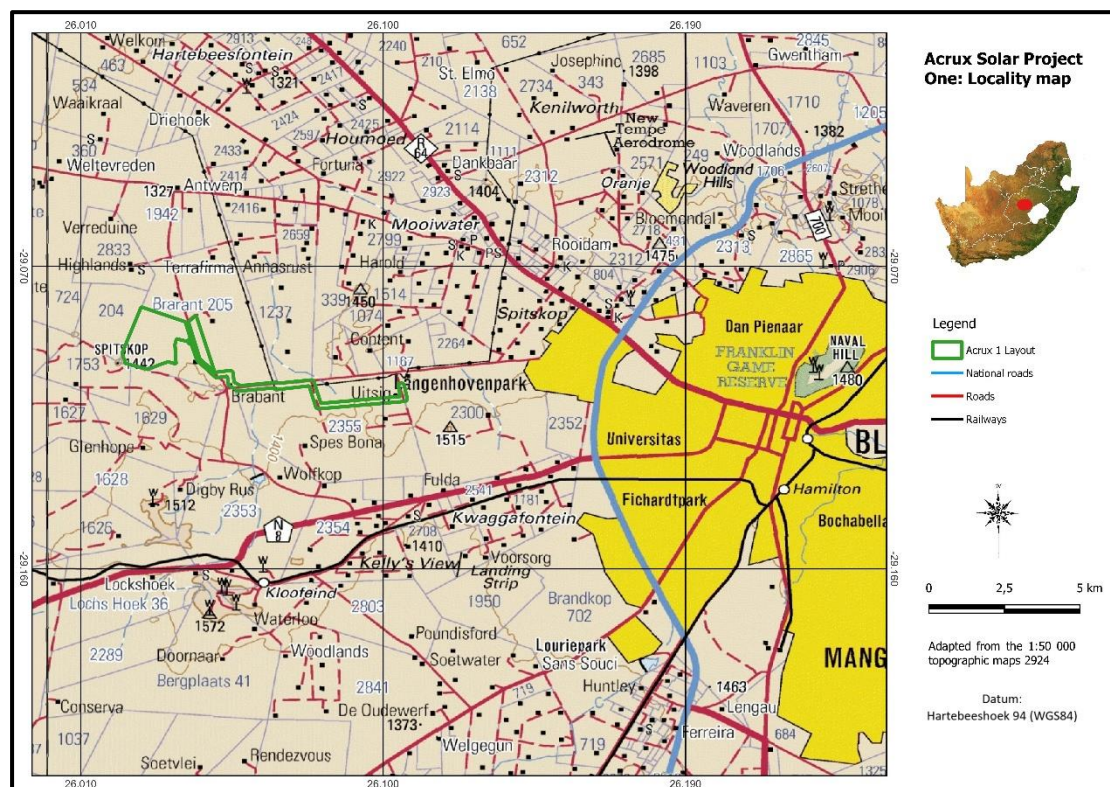


Figure 1. Location of the project area in regional context

4.2 Development proposal

The proposed Acruz Solar PV Project One will include the following infrastructure:

- PV modules and mounting structures
- Inverters and transformers
- Battery Energy Storage System (BESS)

- Site and internal access roads (up to 8 m wide)
- Supporting infrastructure such as operations and maintenance building/office, switch gear and relay room, staff lockers and changing room, security control, and offices.
- Temporary and permanent laydown areas
- Grid connection infrastructure, including:
 - 33 kV cabling between the project components and the facility substations;
 - Two facility substations up to 132 kV (one located on either side of the road);
 - A collector switching station up to 132kV;
 - A 132 kV single/double circuit overhead power line linking the two facility substations; and
 - A 132 kV single/double circuit overhead power line linking the facility substation / Eskom switching station to the existing Harvard Transmission Substation

The proposed Acrux Solar PV Project One is undergoing a Scoping and Environmental Impact Assessment (S&EIA) process.



Figure 2. Layout of the project, also indicating the power line corridor (Map: Google Earth)

5. STUDY APPROACH AND METHODOLOGY

5.1 Extent of the Study

This survey and impact assessment cover all facets of cultural heritage located in the project area, as presented in Section 4 above and illustrated in Figure 1 and 2.

5.2 Methodology

5.2.1 Pre-feasibility assessment

The objectives of this review were to:

- Gain an understanding of the cultural landscape within which the project is located;
- Inform the field survey.

5.2.1.1 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. In this regard, various anthropological, archaeological and historical sources were consulted – see list of references in Section 12.

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

5.2.1.2 Survey of heritage impact assessments (HIAs)

A survey of HIAs done for projects in the region by various heritage consultants was conducted with the aim of determining the heritage potential of the area – see list of references in Section 12.

- Information on sites and features in the larger region were obtained from these sources.

5.2.1.3 Data bases

The *Heritage Atlas Database*, various SAHRA databases, the *Environmental Potential Atlas*, the *Chief Surveyor General* and the *National Archives of South Africa* were consulted.

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

5.2.1.4 Other sources

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

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

5.2.1.5 Results

A number of HIA's have been completed in the immediate vicinity of the project area, as well as on the project site itself. The results of the above investigation are presented in Table 1 and Figure 3 below. Also see the list of references in Section 12. All of these reports indicate that the larger region have a low sensitivity of heritage sites and features.

Based on the above review the following can be said :

- Reports indicate that stone tools, mostly dating to the Early or Middle Stone Age, occur in low densities sporadically across the larger region;
- Historic structures, inclusive of buildings, monuments and bridges, occur sporadically across the larger region;
- Formal and informal burial sites occur sporadically throughout the region.

Two sites identified by SAHRA as of National significance (Grade I) are located in Bloemfontein to the east of the project areas:

- The grave of Mr Thomas Mapikela, a founding father of the ANC and an iconic leader of the liberation struggle, buried in the Hero's Acre in Phahameng Cemetery;
- The Waaihoek Wesleyan Church, seen as the birth place of the South African Native National Congress (SANNC), predecessor of the ANC.

There are approximately 31 sites identified by SAHRA as of Provincial significance (Grade II), located in Bloemfontein:

- These invariably consists of historic buildings and burial sites.

Based on the above assessment, the probability of cultural heritage sites, features and objects occurring in the project area is considered to be **low**.

Table 1: Pre-Feasibility Assessment

Category	Period	Probability	Reference (only reports listing heritage sites are included here)
Natural			
Landscapes		Low	Historic maps/aerial photographs
Early hominin	Pliocene – Lower Pleistocene		
	Early hominin	None	-
Stone Age	Lower Pleistocene – Holocene		
	Early Stone Age	None	-
	Middle Stone Age	Possible	Fairhurst <i>et al</i> (2022a)
	Later Stone Age	None	-
	Rock Art	None	-
Iron age	Holocene		
	Early Iron Age	None	-
	Middle Iron Age	None	-
	Late Iron Age	Low	Dreyer (2005c)
Colonial period	Holocene		
	Contact period/Early historic	Possible	Dreyer (2005c, 2015); Rossouw & Haasbroek (2016); Heritage Atlas Database
	Recent history	Possible	Dreyer (2015); Fairhurst <i>et al</i> (2022a, 2022b); Rossouw & Haasbroek (2016)
	Industrial heritage	Possible	Heritage Atlas Database

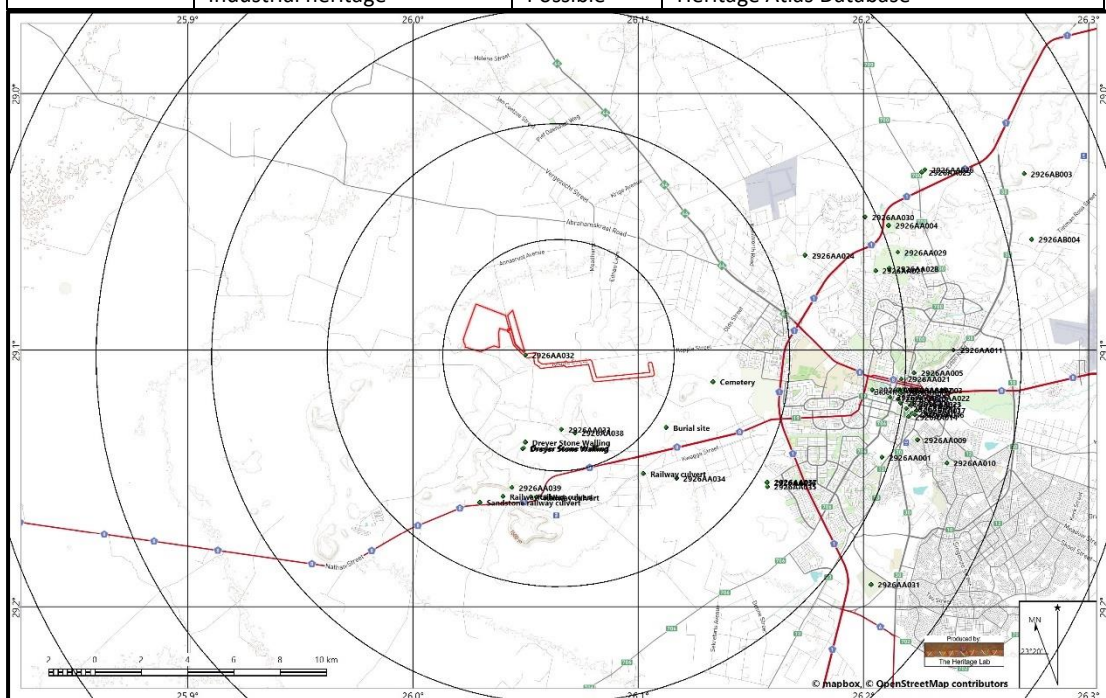


Figure 3. Location of known heritage sites and features in relation to the project area (Circles spaced at 5km; heritage sites = coded green dots)

5.2.2 Field survey

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible heritage sites, objects and structures. The area that had to be investigated was identified by *Blue Crane Environmental* by means of maps and .kml files indicating the project area, including the power line corridor. This was loaded onto a Samsung digital device and used in Google Earth during the field survey to access the project area.

The various project sites were visited on 16 to 18 May 2023 and was investigated by accessing it by farm tracks and then walking transects across it inspecting various natural as well as man-made features (Fig. 4). Acrux 1, the proposed power line route was first survey by travelling the route across the Acrux 2 property eastwards. As access was not organised for the eastern part of this route, it was surveyed only from the road running parallel to it, on the outside of the property.

The following can be said about the field survey:

- During the site visit, sections of the project area was covered by high and dense vegetation cover, limiting the ground visibility seriously – see Figure 5 below.
- The site topography is very flat and the area was extensively used for cultivation of crops (Fig. 4). Some hills occur on the southern section of the project area, but it is not included in the project area.
- Mr Werner Bosch, owner of this portion of the farm Brabant was interviewed as to the possible presence of heritage sites on the farm. He identified one informal burial site, which has already been excised from the project area. A second reference to a burial site, also outside the project area, was unknown to him.

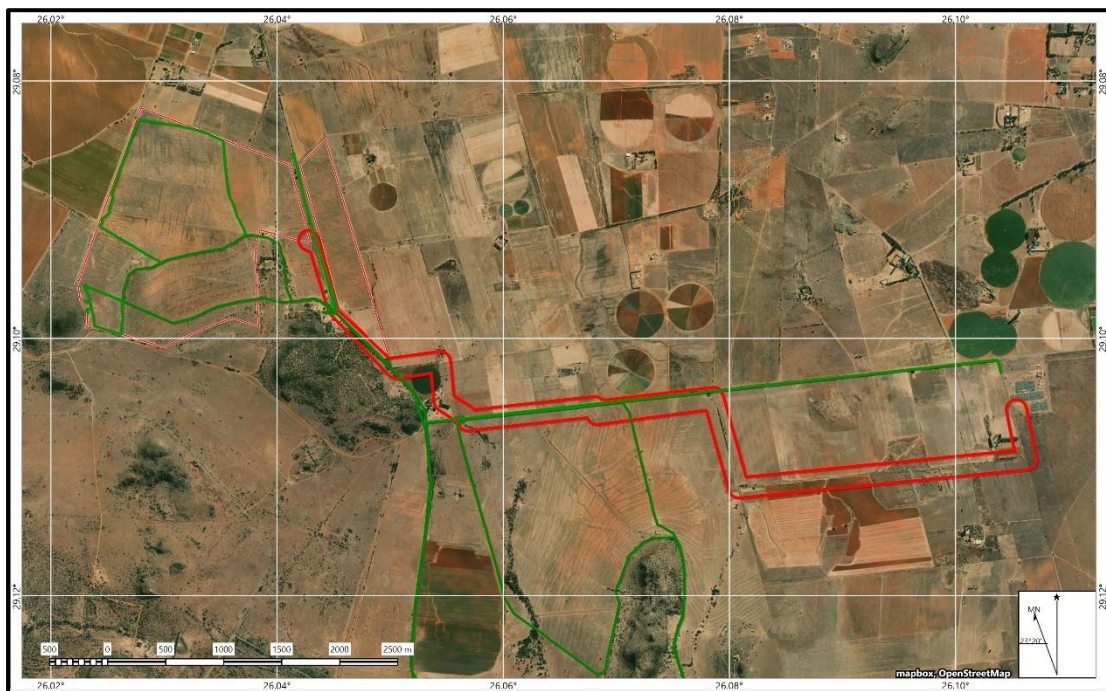


Figure 4. Map indicating the track log of the field survey (Site = purple polygon; track log = green line)

5.2.3 Documentation

All sites, objects and structures that were identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of the *Global Positioning System* (GPS) and plotted on a map. This information is added to the description to facilitate the identification of each locality. Map datum used: Hartebeeshoek 94 (WGS84).

The track log and identified sites were recorded by means of a Garmin Oregon 550 handheld GPS device. Photographic recording was done by means of a Canon EOS 550D digital camera. Geo-rectifying of the aerial photographs and historic maps was done by means of a professional software package: ExpertGPS.

6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1 Natural Environment

The original vegetation of the larger northern section of the project area is classified as Bloemfontein dry Grassland, a grassland biome, forming part of the Dry Highveld Grassland Bioregion. To the south of that it changes to Winburg Grassy Shrubland, also a grassland biome forming part of the Dry Highveld Grassland Bioregion (Muncina & Rutherford 2006). However, over most of the project area this has been impacted on by the making of agricultural fields. Most of the fields have been allowed to go fallow and is now covered by grass used for grazing (Fig. 5).



Figure 5. Views over the project area – note the vegetation cover

The geology of the northern part of the project area consists of mudrock of the Volksrust Formation of the Ecca Group of the Karoo Supergroup. To the south it changes to mudrock and subordinate sandstone of the Adelaide Subgroup of the Beaufort Group of the Karoo Supergroup.

The Palaeontological Sensitivity Map (<http://www.sahra.org.za/sahris/map/palaeo>) indicate that the southern part of the project area (Fig. 6) has a high sensitivity of fossil remains to be found and therefore a palaeontological assessment and protocol for finds is required. The northern section has a high sensitivity of fossil remains to be found and therefore a desktop assessment is required. Based on the outcome of that, a field assessment is likely.

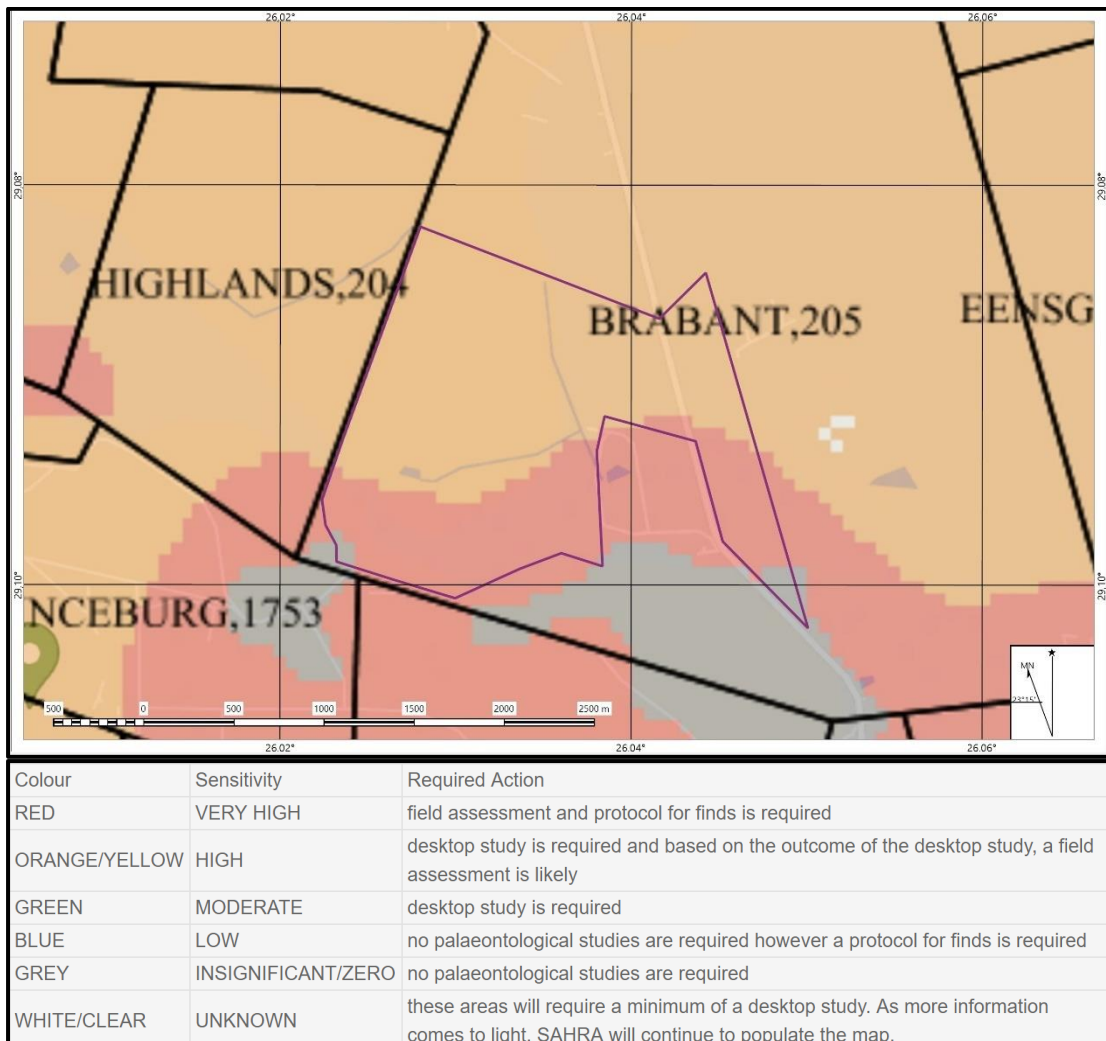


Figure 6. The Palaeontological sensitivity of the project area

6.2 Cultural Landscape

The aim of this section is to present an overview of the history of the larger region in order to eventually determine the significance of heritage sites identified in the project area, within the context of their historic, aesthetic, scientific and social value, rarity and representivity.

The cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which eventually gave rise to an urban component.

6.1.1 Stone Age

Little is known about the Stone Age of the Bloemfontein region, as it was all destroyed by the rapid urban development in the region (Henderson 2004). Most sources indicate the presence of low density surface scatters of MSA and LSA stone tools, mostly occurring on hills and outcrops surrounding the city.

6.1.2 Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area. Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating conditions that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the Witwatersrand and the treeless plains of the Free State.

Similar to the Stone Age, information on Iron Age settlement in the larger Bloemfontein region is lacking due to the urbanisation process. Dreyer (2005c) identified what he believed to be stone walling dating to the Late Iron Age on the farm Wolfkop northwest of the project area. However, on closer inspection, it is believed that these sites are of early historic origin and probably were occupied by early farm labourers.

6.1.3 Historic period

When Major H D Warden was commissioned to serve as British Resident in the region between the Orange and Vaal Rivers, he bought the farm Bloemfontein from J N Brits in 1846 and established himself there. When the British government annexed the territory in 1848, Bloemfontein became the seat of the new administration. When the republic of the Orange Free State was established in 1854, the seat of government was moved from Winburg to Bloemfontein. The rise of Bloemfontein coincided with the discovery of diamonds in the decade 1860-1870 and the later discovery of gold in the ZAR (SESA 1970:366-372).

During the Second South African War (1899-1902), the town housed a large contingent of British troops. Most of their activities centred around what was to become known as Naval Hill. A concentration camp for women and children was set up on the western side of town, at the Tempe military base. Soldiers built long walls across the landscape, probably for defence, but also to keep busy and as a relieve of boredom. Numerous lookout posts, also referred to as *sangars*² were constructed on hills and outcrops around the area where they kept watch over the landscape, fearing attacks from the Republicans (see Bennyworth 2004; Henderson 2004, 2006; Van Schalkwyk 2018).

² A term originally used in Persia to refer to a small, temporary fortified position on the perimeter of a base, and mostly used by sentries while on watch. The term was taken over by the British army and used all over the world.

6.3 Site specific review

Although landscapes with cultural significance are not explicitly described in the NHRA, they are protected under the broad definition of the National Estate (Section 3): Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate.

The examination of historical maps and aerial photographs help us to reconstruct how the cultural landscape has changed over time as is show how humans have used the land.

From a review of the available old maps and aerial photographs (Fig. 7 – 14) it can be seen that the project area has always been open space, with the main activity being grazing and agricultural fields. Farming related features such as tracks and dams are the only built elements to be seen.

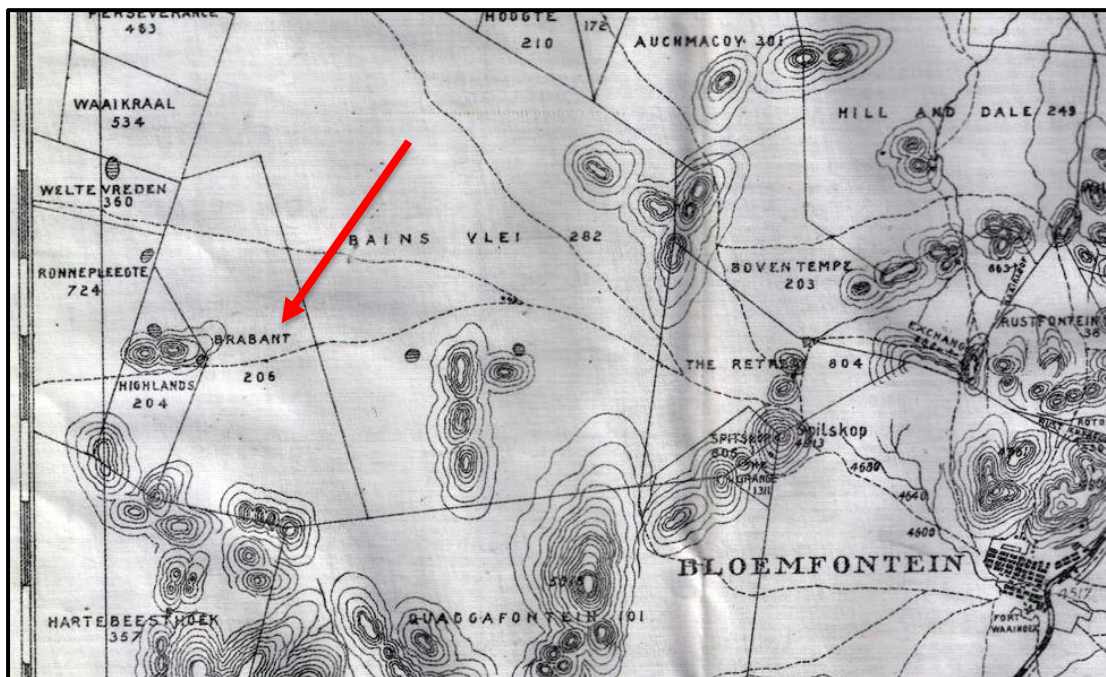


Figure 7. The original farm Brabant 205 as indicated on the Bloemfontein section of the *Field Intelligence Department Map* (Compiled for Field Intelligence Department, Bloemfontein, 1901)

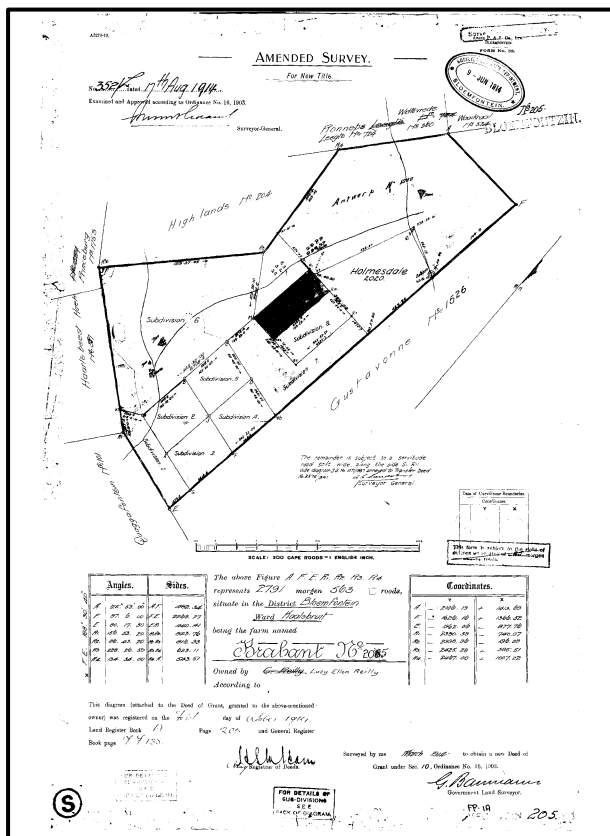


Figure 8. The farm Brabant 205, showing the various subdivisions that were made over time (Deed of Grant: 4976/1929; CS-G image: 352L191A)

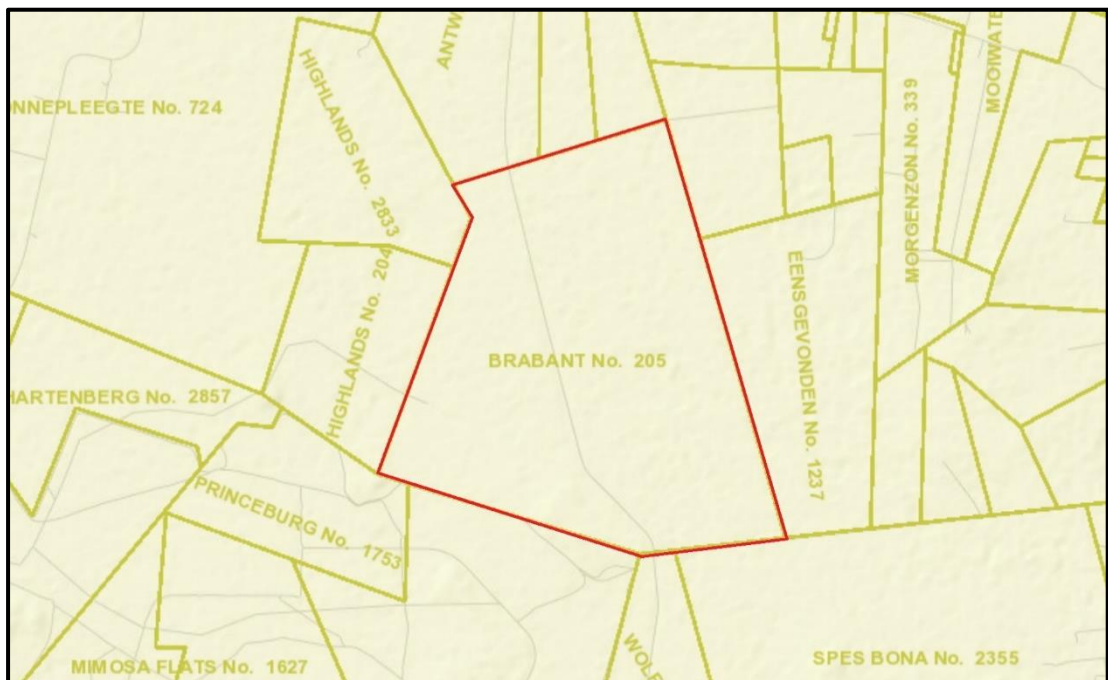


Figure 9. The farm Brabant as it exists today (CS-G: <https://csggis.drdlr.gov.za/psv/>)



Figure 10. The project area on the 1941 version of the aerial photograph (NGI photographs: 161_017_47326; Red wheel-crosses = calibration points)

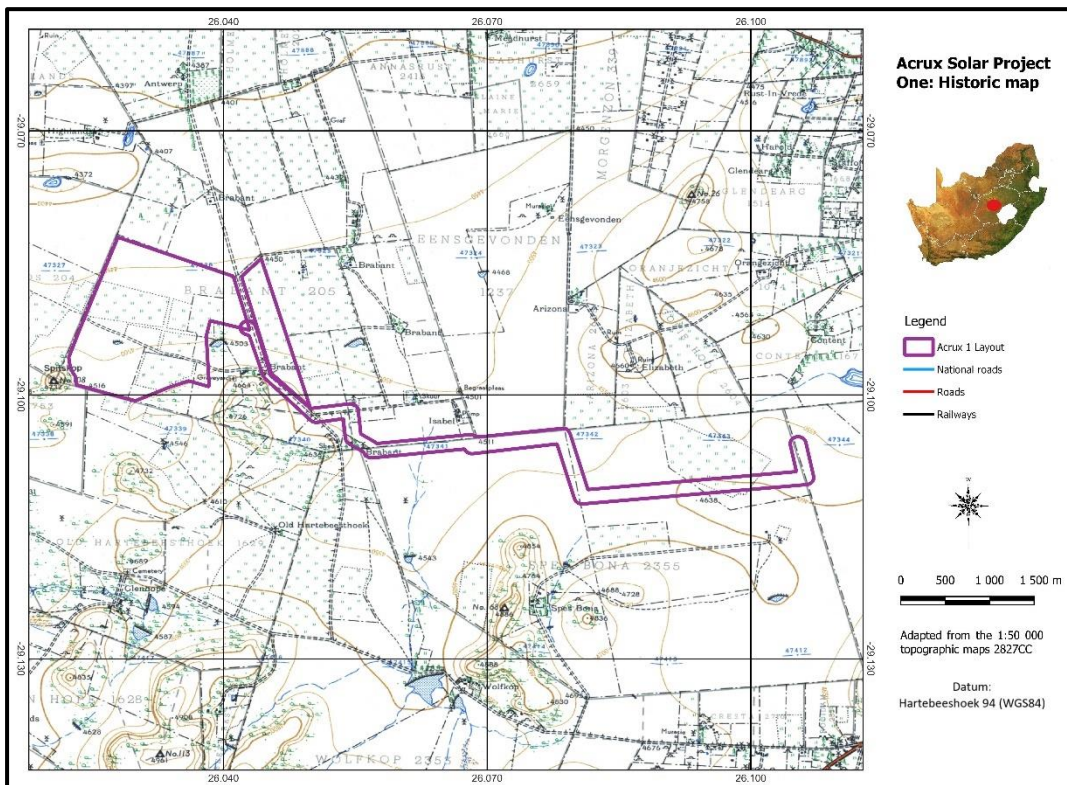


Figure 11. The project area on the 1949 version of the 1:50 000 topographic map

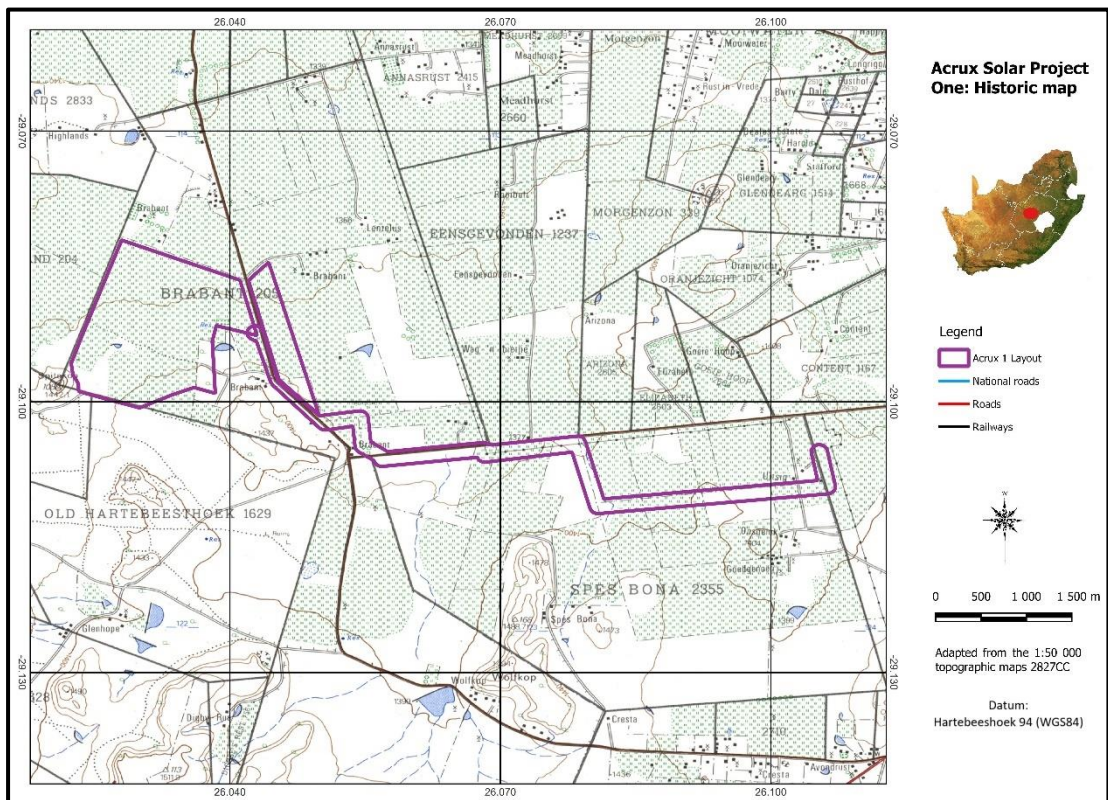


Figure 12. The project area on the 1974 version of the 1:50 000 topographic map



Figure 13. Aerial view of the project area dating to 2009 (Image: Google Earth)



Figure 14. Aerial view of the project area dating to 2023
(Image: Google Earth)

A burial site has been identified by means of different sources to occur in the vicinity of the project area:

- 1. According to the 1949 version of the topographic map a cemetery occurs west of the farmstead, outside of the project area. Interestingly, it does not feature on any of the later maps. Mr. Bosch does not have any information on this site or its existence.
 - It is important to note that this site is located outside of the project area would therefore not be impacted on by the proposed development of the solar project.

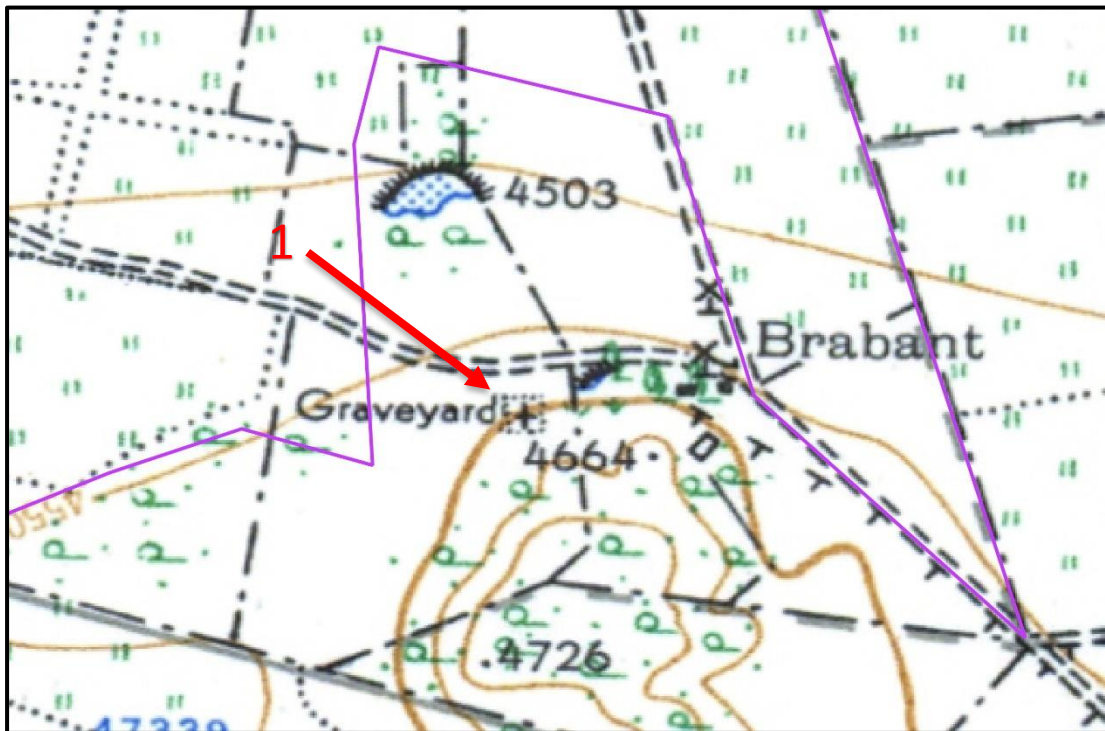
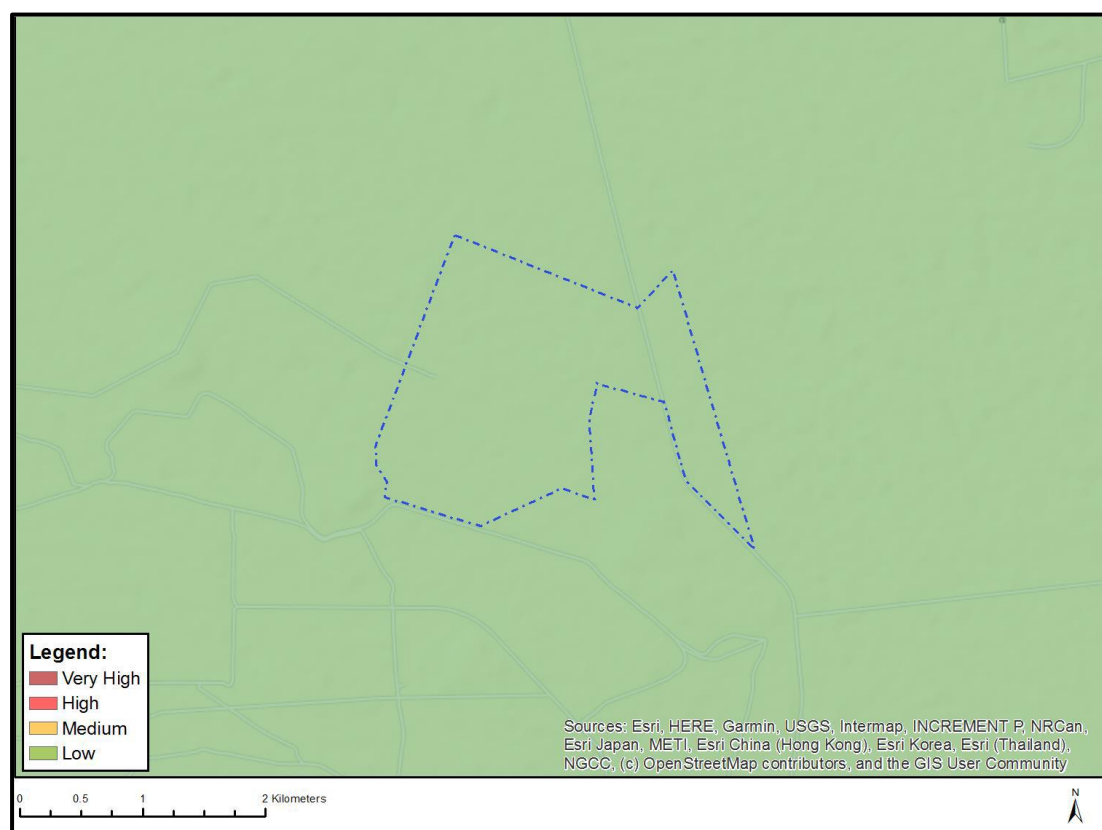


Figure 15. The location of the burial site

6.4 Site Sensitivity Verification

According to the *DFFE National Screening Tool*, the project area has a low sensitivity for archaeological and cultural heritage themes, as indicated on the map in Fig. 16 below. The results of the investigation have indicated that this is the case, as recent heritage impact assessments have identified only a very limited number of a number of features such as farmsteads and burial sites in the larger region:

- Section 5.2.1: Prefeasibility Assessment (also see Table 1 & Fig. 3);
- Section 5.2.2 Field Survey;
- Section 6.2: Cultural Landscape;
- Section 6.3: Site Specific Review (also see Fig. 7 – 14).



Very high sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity features:

Sensitivity	Features (s)
Low	Low sensitivity

Figure 16. Archaeological and cultural heritage sensitivity as per the DFFE National Screening Tool (<https://screening.environment.gov.za/screeningtool>)

7. SURVEY RESULTS

During the survey, the following sites, features and objects of cultural significance were identified in the project area (Fig. 17).

7.1 Stone Age

- No sites, features or objects of cultural significance dating to the Stone Age were identified in the project area.

7.2 Iron Age

- No sites, features or objects of cultural significance dating to the Iron Age were identified in the project area.

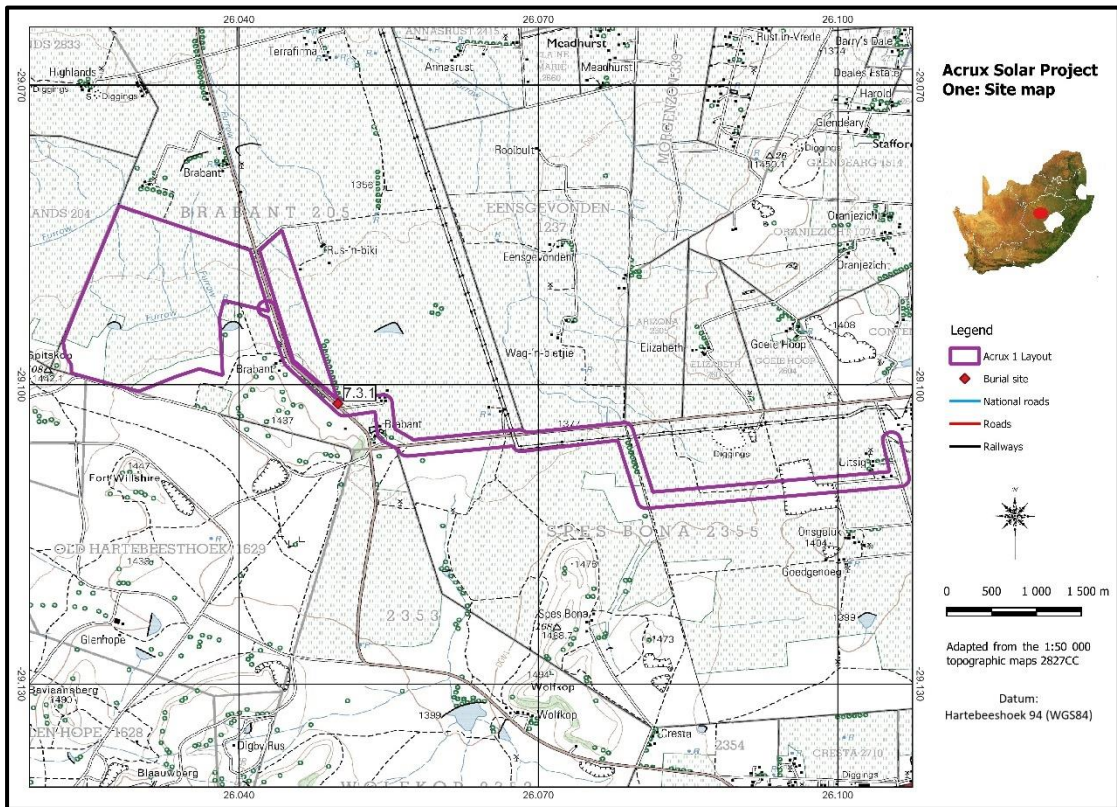


Figure 17. Location of heritage sites in the project area

7.3 Historic period



NHRA Category	Graves, Cemeteries and Burial Grounds - Section 36
7.3.1 Type: Burial site. Farm: Brabant 205. Coordinates: S 29,10191; E 26,04991	
Description: What seems to be a very old and neglected burial site – there are no indications of recent visits by descendants. Due to the dense vegetation cover and the neglected state of the burials, it was impossible to obtain details such as the number of graves or of the people who were buried there.	
Significance of site/feature	Generally protected 4A: High/medium significance.
Reasoned opinion: Burial sites are viewed as having high emotional and sentimental value. However, mitigation is possible if proper procedures have been followed.	
References:	
	

Figure 18. Views of the burial site identified by Mr Bosch

8. IMPACT ASSESSMENT RATINGS AND MITIGATION MEASURES

8.1 Heritage Impacts

Heritage impacts are categorised as:

- Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries;
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment;
- Cumulative impacts that are combinations of the above.

The EIA Regulations (as amended in 2017) determine that cumulative impacts, *“in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.”* Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the site that can be attributed to the project and other existing and planned future projects.

8.2 Geographic area of evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to below.

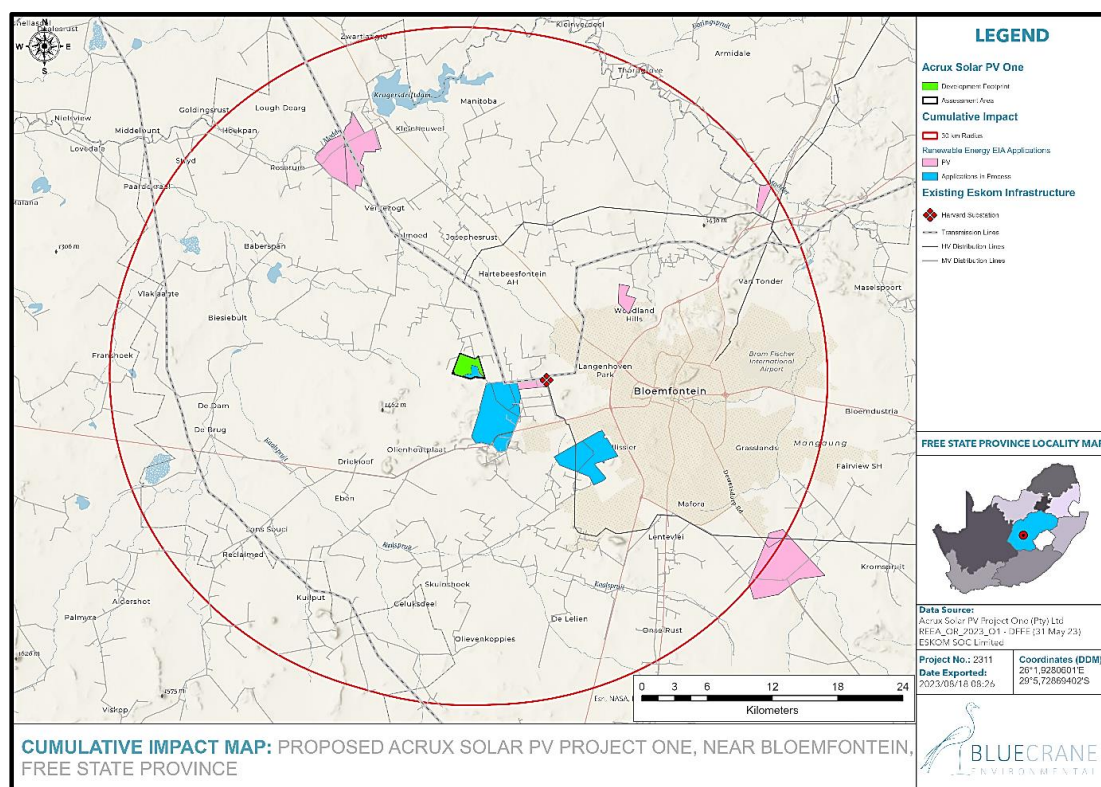


Figure 19. Cumulative impact map

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Northern Cape Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socioeconomic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

Table 2. Renewable energy facilities within a 30 km radius from the proposed development

Project name	Distance from study area	Proposed generating capacity (MW)	DFFE reference	EIA process	Project status
Projects included in the REEA database (May 2023)					
Jedwater Solar Power Facility	18 km	164	12/12/20/1972	Scoping and EIA	Approved
SSS1 5MW Solar PV Power Plant	2.7 km	5	14/12/16/3/3/1/1092	BAR	Approved
SSS1 5MW Solar PV Power Plant	2.7 km	5	14/12/16/3/3/1/1093	BAR	Approved

Solaire Direct Glen Thorne Solar PV Facility	14 km	10	14/12/16/3/3/1/455	BAR	In process
Farm Mara No. 2571 PV Solar Facility	29 km	15	14/12/16/3/3/1/564	BAR	Approved
Portion 1 and Portion 9 Spes Bona PV Solar Facility	0.7 km	75	14/12/16/3/3/2/641	Scoping and EIA	Approved
Sonneblom photovoltaic solar energy facility	29 km	84	14/12/16/3/3/2/673	Scoping and EIA	Approved
Serurubele photovoltaic solar energy facility	30 km	84	14/12/16/3/3/2/675	Scoping and EIA	Approved
Projects not included in REEA database or Applications in process					
Acrux Solar PV Project Two	< 1 km	650	14/12/16/3/3/2/2390	Scoping and EIA	In process
Mira Solar PV Project One	10 km	TBC	TBC	Scoping and EIA	In process

It is unclear whether other projects not related to renewable energy is or has been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development may take place within the general area.

From a review of available databases, publications, as well as available³ heritage impact assessments done for the purpose of developments in the region, see list of references in Section 12.2 below, it was determined that the Acrux One site is in an area with a low presence of heritage sites and features.

- Reports indicate that stone tools, mostly dating to the Early or Middle Stone Age, occur in low densities sporadically across the larger region;
- Historic structures, inclusive of buildings, monuments and bridges, occur sporadically across the larger region;
- Formal and informal burial sites occur sporadically throughout the region.

Heritage resources which can be classified as highly significant (Grade 1) are absent from the immediate region.

For the project area, the impacts to heritage sites are expected to be of low significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.

³ Only reports that were available on the SAHRIS database were consulted.

8.3 Heritage Impact Assessment

The potential impact that the proposed development might have, has been calculated and is presented for each individual site in Table 3 below (this also include the cumulative impact assessment).

Table 3: Impact assessment

7.3.1. Type: Burial site			
Impact assessment: Although this site is located in an area that has already been excised from the project area, it is close to the proposed power line therefore there is a possibility that it might accidentally be damaged.			
		Without mitigation	With mitigation
Geographical Extent		Site (1)	Local area (1)
Probability		Possible (2)	Unlikely (1)
Duration		Long term (3)	Short term (1)
Intensity/Magnitude		Medium (2)	Low (1)
Reversibility		Partly reversible (2)	Completely reversible (1)
Irreplaceable loss of resources?		Marginal loss of resources (2)	No loss of resources (1)
Cumulative Effect		Low (2)	Negligible (1)
Significance			
Site type	NHRA category	Field rating	Impact rating: Before/After mitigation
Burial site	Section 36	Generally protected 4C: Low significance	Low (24)
			Low (6)

8.3 Mitigation measures

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

7.3.1. Type: Burial site
Mitigation
(1) Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.
<ul style="list-style-type: none"> It is recommended that this site is fenced off with wire or danger tape with a buffer zone of at least 50m for the duration of the construction activities.
Requirements: In the event of an impact occurring on the identified burial site, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out.
<ul style="list-style-type: none"> The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5.

9. MANAGEMENT MEASURES

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

Sources of risk were considered with regards to development activities defined in Section 2(viii) of the NHRA that may be triggered and are summarised in Table 4A and 4B below. These issues formed the basis of the impact assessment described. The potential risks are discussed according to the various phases of the project below.

9.1 Objectives

- Protection of archaeological, historical and any other site or land considered being of cultural value within the Project Area against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities.

The following shall apply:

- Known sites (where discovered) must be clearly marked, so that they can be avoided during construction activities;
- The contractors and workers must be notified that archaeological sites might be exposed during the construction activities;
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, must cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible;
- All discoveries must be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO must advise the necessary actions to be taken;
- Under no circumstances must any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).

9.2 Control

In order to achieve this, the following must be in place:

- A person or entity, e.g. the ECO, must be tasked to take responsibility for the maintenance heritage sites (where present).
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it must be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official must be part of the team executing these measures.

Table 4A: Construction Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	The identified risk is damage or changes to resources that are generally protected in terms of Sections 27, 28, 31, 32, 34, 35, 36 and 37 of the NHRA that may occur in the Project Area.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	Mitigation: Action/control	Responsibility	Timeframe
1. Removal of Vegetation	See discussion in Section 9.1 above	Environmental Control Officer & the Contractor	During construction only

2. Construction of required infrastructure, e.g. access roads, water pipelines			
Monitoring	See discussion in Section 9.2 above		

Table 4B: Operation Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	It is unlikely that the negative impacts identified for pre-mitigation will occur if the recommendations are followed.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	Mitigation: Action/control	Responsibility	Timeframe
1. Additional construction / development of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During operation and maintenance only
Monitoring	See discussion in Section 9.2 above		

9.3 Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report.

- For this proposed project, the assessment has determined that sites, features or objects of heritage significance occur in the project area. Therefore, relevant permits might be required from SAHRA or the PHRA.
- If heritage features are identified during construction, as stated in the management recommendations, these finds must be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

10. CONSIDERATION OF ALTERNATIVES

The DEAT 2006 guidelines on ‘assessment of alternatives and impacts’ proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only ‘feasible’ and ‘reasonable’ alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site screening was conducted by the developer the affected properties and the farm portions were found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. These factors were then taken into consideration and avoided as far as possible.

The following alternatives were considered in relation to the proposed activity and all specialists should also make mention of these:

No-go alternative

This alternative considers the option of ‘do nothing’ and maintaining the status quo. The site is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

Location alternatives

No other possible sites were identified on the farm Brabant. This site is referred to as the preferred site. Additional land (if any) will be acquired to generate additional capacity in the future. The Harvard Substation is located approximately 8 km from the preferred site. Connection to the grid plays a vital role in the site location for renewable energy facilities. The location of the preferred site shortens the length of the required grid connection in order to evacuate energy into the national grid. There are some limited sensitive features that occur on the site. However, the size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the EIA process and will ensure that potential impacts are adequately mitigated.

Battery storage facility

It is proposed that a nominal up to 500 MW Battery Storage Facility for grid storage would be housed in stacked containers, or multi-storey building, with a maximum height of 4m with associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. The preferred battery technology is Lithium-ion.

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the base load and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

Design and layout alternatives

Design alternatives will be considered throughout the planning and design phase and specialist studies are expected to inform the final layout of the proposed development.

Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon (Mono-facial and Bi-facial) and thin film. The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

11. CONCLUSIONS AND RECOMMENDATIONS

The Applicant, Acrux Solar PV Project One (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as Acrux Solar PV Project One) located on the Remaining Extent of Portion 6 of the Farm Brabant No. 205, approximately 17 km west of the city of Bloemfontein in the Free State Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200 MW. The development area is situated within the Mangaung Metropolitan Municipality.

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The investigation consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey that also included the interviewing of relevant people. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which eventually gave rise to an urban component.

From a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Mira One Solar Site is in an area with a low presence of heritage sites and features.

- Reports indicate that Stone Age tools occur in very limited numbers sporadically across the larger region;
- Historic structures, inclusive of buildings, monuments and bridges, occur sporadically across the larger region;
- Formal and informal burial sites occur sporadically throughout the region.

Limitations encountered

- During the site visit, the high and dense vegetation that covered sections of the project area limited ground visibility very much.
- The eastern section of the powerline route could not be directly assessed as access was not organised. However, it was reviewed from the road located to the north.

Identified sites

During the survey the following sites, features or objects of cultural significance were identified.

- 7.3.1: What seems to be a very old and neglected burial site – there are no indications of recent visits by descendants. Due to the dense vegetation cover and the neglected state of the burials, it was impossible to obtain details such as the number of graves or of the people who were buried there.

Impact assessment and proposed mitigation measures

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

Site No.	Site type	NHRA category	Field rating	Impact rating: Before/After mitigation
7.3.1	Graves, Cemeteries and Burial Grounds	Section 36	Generally protected 4A: High/medium significance.	Negative Low (24)
				Negative Low (6)
Mitigation: (1) Avoidance/Preserve: It is recommended that this site is fenced off with wire or danger tape with a buffer zone of at least 50m for the duration of the construction activities.				

Cumulative assessment

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the proposed development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

For the project area, the impacts to heritage sites are expected to be of low significance. This can further be lowered by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report.

- For this proposed project, the assessment has determined that sites, features or objects of cultural heritage significance occur in the project area, therefore relevant permits would be required from SAHRA or the PHRA.
- If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed project be allowed to continue on acceptance of the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- The Palaeontological Sensitivity Map (<http://www.sahra.org.za/sahris/map/palaeo>) indicate that the southern part of the project area has a high sensitivity of fossil remains to be found and therefore a palaeontological assessment and protocol for finds is required. The northern section has a high sensitivity of fossil remains to be found and therefore a desktop assessment is required. Based on the outcome of that, a field assessment is likely.
- 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. The appropriate steps to take are indicated in Section 9 of the report, as well as in the **Management Plan: Burial Grounds and Graves, with reference to general heritage sites**, in the Addendum, Section 13.5.

12. REFERENCES

12.1 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)
SAHRIS Database

12.2 Literature

Bennyworth, G. 2004. *Report on the burial site and associated terrain Lilyvale, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2004a. *First phase heritage/archaeological assessment of the proposed residential development at Hillandale, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2004b. *Archaeological and historical investigation of the proposed developments at the remainder of the farm Boven Teme 203, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2004c. *First phase archaeological and cultural heritage investigation of the proposed housing developments at Grasslands Smallholdings Phase III, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2005a. *Archaeological and Historical Investigation of the proposed residential development on a portion of the farm Bayswater 2865, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2005b. *First phase archaeological and heritage assessment of the proposed residential development on plots 18, 20, & 21 on the farm Deales Gift 2804, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2005c. *First phase heritage / archaeological assessment of the proposed residential developments at the farm Wolfkop 2353, Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2006. *First phase archaeological and cultural heritage assessment of Phase II residential developments of Woodland Hills Wildlife Estate, Hillandale 2960 (249), Bloemfontein*. Bloemfontein: Unpublished report.

Dreyer, C. 2015. *First phase archaeological and heritage assessment of the proposed mixed-use development on Porion 5 of Brandkop 702, Bloemfontein, Free state*. Bloemfontein: Unpublished report.

Blue Crane Environmental, 2023. *Project Description Document: The Development of the Proposed Mira Solar PV Project One near Quaggafontein, Free State Province*.

Fairhurst, S-L., Fivaz, H. & Engelbrecht, J. 2022a. *Proposed development of solar photovoltaic (PV) facility on the farm Spes Bona No. 2355, Portion 8 (Harvard 1), Bloemfontein, Mangaung Metropolitan Municipality, Free State Province*. Askham: Unpublished report.

Fairhurst, S-L., Fivaz, H. & Engelbrecht, J. 2022b. *Proposed development of solar photovoltaic (PV) facility on the farm Spes Bona No. 2355, Portion 5 (Harvard 2), Bloemfontein, Mangaung Metropolitan Municipality, Free State Province*. Askham: Unpublished report.

Fourie, W. 2013a. *Proposed construction of the Sss1 5mw solar photovoltaic (PV) plant on the western part of Portion 6 (Portion of Portion 5) of farm Spes Bona 2355 near Bloemfontein*. Pretoria: Unpublished report.

Fourie, W. 2013b. *Proposed construction of the Sss2 5mw solar photovoltaic (PV) plant on the eastern part of Portion 6 (Portion of Portion 5) of farm Spes Bona 2355 near Bloemfontein*. Pretoria: Unpublished report.

Henderson, Z.L. 2004. *Report on the archaeological survey of subdivision 7, remainder and portion of subdivision 25, of the farm Lilyvale 2313, Bloemfontein*. Bloemfontein: Unpublished report.

Henderson, Z. 2006. Walls and a remount farm: the Anglo-Boer War landscape of northern Bloemfontein. *Culna* 61:14-15.

Henderson, Z., Koortzen, C., Philip, L. & Uys, T. 2008. *Assessment of Bayswater 2865/10,11,12, 3, Mangaung Municipality, Free State Province in terms of archaeological and other heritage sites*. Bloemfontein: Unpublished report.

Huffman, T.N. 2007. *Handbook to the Iron Age*. Scottsville: University of KwaZulu-Natal Press.

Muncina, L. & Rutherford, M.C. 2006. *The Vegetation Map of South Africa, Lesotho and Swaziland*. Pretoria: SANBI.

Rossouw, L. 2012. *Phase 1 Archaeological Impact Assessment of Portions of Lilyvale 2313 and Bayswater 2865, Bloemfontein*. Bloemfontein: Unpublished report.

Rossouw, L. 2015. *Phase 1 Heritage Impact Assessment of the Remainder of the farm Cecilia 2352, Remainder of the farm Bloemfontein 654 and a portion of the farm Kwaggafontein 9300, Bloemfontein, FS Province*. Bloemfontein: Unpublished report.

Rossouw, L. 2017. *Phase 1 Heritage Impact Assessment with regard to planned Township development on the Farm Lilyvale 30/2313, Bloemfontein, Free State Province*. Bloemfontein: Unpublished report.

Rossouw, L. & Haasbroek, H.J. 2016. *Phase 1 Heritage Impact Assessment of a proposed new residential development on the farm Brandkop 702 near Bloemfontein, FS Province*. Bloemfontein: Unpublished report.

Standard Encyclopaedia of Southern Africa 1970. Cape Town: Nasou Limited. Vol. 2.

Van Schalkwyk, J.A. 2014. *Cultural heritage impact assessment for the proposed development of photovoltaic power plants on seven different locations in North West and Free State Provinces*. Unpublished report 2014/JvS/040.

Van Schalkwyk, J.A. 2018. *Phase 1 Cultural Heritage Impact Assessment: The proposed Wildealskloof mixed use development, Bloemfontein region, Mangaung Metropolitan Municipality, Free State Province*. Pretoria: Unpublished report 2018/JvS/011

Van Schalkwyk, J.A. 2019. *Phase 1 Cultural Heritage Impact Assessment: Mining right application of dolomite, aggregate and sand on the remaining extent of the Farm Lynhare 1720, Bloemfontein region, Mangaung Metropolitan Municipality, Free State Province*. Pretoria: Unpublished report 2019/JvS/014.

Van Schalkwyk, J.A. 2022a. *Phase 1 Cultural Heritage Impact Assessment: The Sonneblom Photovoltaic (PV) Solar Power Project near Bloemfontein in the Free State Province*. Pretoria: Unpublished report 2022/JvS/046.

Van Schalkwyk, J.A. 2022b. *Phase 1 Cultural Heritage Impact Assessment: proposed Paradise 100mW solar photovoltaic (PV) and 40mW battery energy storage system (BESS) project south of Bloemfontein, Free State Province*. Pretoria: Unpublished report 2022/JvS/071.

12.3 Archival sources, maps and aerial photographs

1: 50 000 Topographic maps

Google Earth

Aerial Photographs: National Geospatial Information

<http://artefacts.co.za>

<http://vmus.adu.org.za>

<http://www.sahra.org.za/sahris/map/palaeo>

13. ADDENDUM

1. Indemnity and terms of use of this report

The findings, results, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and the author reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. The author of this report will not be held liable for such oversights or for costs incurred as a result of such oversights.

Although the author exercises due care and diligence in rendering services and preparing documents, he accepts no liability and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

2. Assessing the significance of heritage resources

A system for site grading was established by the NHRA and further developed by the South African Heritage Resources Agency (SAHRA 2007) and has been approved by ASAPA for use in southern Africa and was utilised during this assessment.

2.1 Significance of the identified heritage resources

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it 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. SITE EVALUATION				
1.1 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				
1.2 Aesthetic value				
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group				
1.3 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				
1.4 Social value				
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons				
1.5 Rarity				
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage				
1.6 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.				
2. Sphere of Significance		High	Medium	Low
International				
National				
Provincial				
Regional				
Local				
Specific community				
3. Field Register Rating				
1.	National/Grade 1: High significance - No alteration whatsoever without permit from SAHRA			
2.	Provincial/Grade 2: High significance - No alteration whatsoever without permit from provincial heritage authority.			
3.	Local/Grade 3A: High significance - Mitigation as part of development process not advised.			

4.	Local/Grade 3B: High significance - Could be mitigated and (part) retained as heritage register site	
5.	Generally protected 4A: High/medium significance - Should be mitigated before destruction	
6.	Generally protected 4B: Medium significance - Should be recorded before destruction	
7.	Generally protected 4C: Low significance - Requires no further recording before destruction	

3. Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in the Table below.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact the following criteria is used:

Table 1: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		

This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.

2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

4. Mitigation measures

- *Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.*

Impacts can be managed through one or a combination of the following mitigation measures:

- Avoidance
- Investigation (archaeological)
- Rehabilitation
- Interpretation
- Memorialisation
- Enhancement (positive impacts)

For the current study, the following mitigation measures are proposed, to be implemented only if any of the identified sites or features are to be impacted on by the proposed development activities:

- (1) Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources. The site should be retained *in situ* and a buffer zone should be created around it, either temporary (by means of danger tape) or permanently (wire fence or built wall). Depending on the type of site, the buffer zone can vary from
 - 10 metres for a single grave, or a built structure, to
 - 50 metres where the boundaries are less obvious, e.g. a Late Iron Age site.
- (2) Archaeological investigation/Relocation of graves: This option can be implemented with additional design and construction inputs. This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated. Mitigation is to excavate the site by archaeological techniques, document the site (map and photograph) and analyse the recovered material to acceptable standards. This can only be done by a suitably qualified archaeologist.
 - This option should be implemented when it is impossible to avoid impacting on an identified site or feature.
 - This also applies for graves older than 60 years that are to be relocated. For graves younger than 60 years a permit from SAHRA is not required. However, all other legal requirements must be adhered to.
 - Impacts can be beneficial – e.g. mitigation contribute to knowledge
- (3) Rehabilitation: When features, e.g. buildings or other structures are to be re-used. Rehabilitation is considered in heritage management terms as an intervention typically involving the adding of a new heritage layer to enable a new sustainable use.
 - The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
 - Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
 - Conservation measures would be to record the buildings/structures as they are (at a particular point in time). The records and recordings would then become the ‘artefacts’ to be preserved and managed as heritage features or (movable) objects.
 - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (4) Mitigation is also possible with additional design and construction inputs. Although linked to the previous measure (rehabilitation) a secondary though 'indirect' conservation measure would be to use the existing architectural 'vocabulary' of the structure as guideline for any new designs.
 - The following principle should be considered: **heritage informs design**.
 - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (5) No further action required: This is applicable only where sites or features have been rated to be of such low significance that it does not warrant further documentation, as it is viewed to be fully documented after inclusion in this report.
 - Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation to ensure that no undetected heritage/remains are destroyed.

5. Management Plan: Burial Grounds and Graves, with reference to general heritage sites

1. Background

Burial grounds and graves are viewed as having high emotional and sentimental value and accordingly always carry a high cultural heritage significance rating. Best practice principles dictate that they should preferably be preserved *in situ*. It is only when it is unavoidable and the site cannot be retained, that the graves should be exhumed and relocated after all due processes had been successfully implemented.

For retaining the burial sites and graves, the SAHRA Burial Grounds and Graves (BGG) unit requires a detailed Heritage Management Plan (HMP) clearly outlining a grave management plan that provides details of grave management and access protocols. In addition, the HMP should also provide detailed change finds protocol or procedures in the case of the identification human remains.

The primary aim of the Burial Grounds and Graves Management Plan therefore is to assist in the implementation of mitigation measures to reduce potential negative impacts through the modification of the proposed project development design.

2. Legal Implications

South Africa's unique and non-renewable archaeological and palaeontological heritage sites, inclusive of burial grounds and graves, are 'generally' protected in terms various laws and by-laws:

- Nationally: National Heritage Resources Act, No. 25 of 1999;

In addition, the following also refer specifically to burial grounds and graves:

- Human Tissue Act, No. 65 of 1983;
- Section 46 of the National Health Act, No. 61 of 2003;
- Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925)
- By-laws:
 - R363 of 2013: Regulations Relating to the Management of Human Remains
 - Local Authorities Notice 34 of 2017, Cemeteries, Crematoria and Funeral Undertakers By-Laws as per Provincial Gazette of 7 April 2017 No. 2800.

In terms of the National Heritage Resources Act, No. 25 of 1999, graves and burial grounds are divided into the following categories:

- 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);

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

- 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;
- Destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

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

Marked graves younger than 60 years do not fall under the protection of the NHRA (Act No. 25 of 1999) with the result that exhumation, relocation and reburial can be conducted by a register undertaker. This will include logistical aspects such as social consultation, purchasing of plots in cemeteries, procurement of coffins, etc.

Marked graves older than 60 years are protected by the NHRA (Act No. 25 of 1999) as a result an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. Unmarked graves are by default regarded as older than 60 years and therefore also falls under the NHRA (Act No. 25 of 1999, Section 36).

3. Management Plan

3.1 Definitions

Heritage Site Management: Heritage site management is the control of the elements that make up physical and social environment of a site, its physical condition, land use, human visitors, interpretation, etc. Management may be aimed at preservation or, if necessary, at minimizing damage or destruction or at presentation of the site to the public. A site management plan is designed to retain the significance of the place. It ensures that the preservation, enhancement, presentation and maintenance of the place/site is deliberately and thoughtfully designed to protect the heritage values of the place (from: SAHRA Site management plans: guidelines for the development of plans for the management of heritage sites or places).

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

3.2 Heritage management plan (HMP)

3.2.1 Phase 1: Site identification and verification

This part of the process usually take place during the Phase 1 heritage impact assessment and is discussed in Section 7 of the main body of the HIA.

Locality and identification:

- The location of the identified site (e.g. farm name, GPS coordinates) is given;
- Determination of the number of graves and the date range of the burials.

The physical condition of the site is also described in terms of:

- The condition of the burial grounds and graves, e.g. has the headstones been pushed over;
- The approximate number of graves and the date range of the graves;
- Is the site fenced off;
- Is there access to the site, in the case it is fenced off;
- Has the site recently been visited by next of kin or other individuals;
- The status of the vegetation cover on the site.

3.2.2 Phase 2: Determination of the potential impact on the identified sites

Identified impacts on the graves and burial sites are calculated and discussed in Section 8.1 of the main body of the HIA.

The second phase consists of information that should be collected in order to develop the conservation management plan. This includes:

- The needs of the client;
- External needs, i.e. the next of kin;
- Requirements for the maintenance of the cultural significance.

From the above an evaluation is made of the impact of the proposed development project on the status of each of the identified burial grounds and graves.

3.2.3 Phase 3: Mitigation measures

Proposed mitigation measures for each identified burial ground or graves are developed and is discussed in the main body of the HIA (Section 8.2).

The main aim of the mitigation measures, as far as is feasible, is to remove any physical, direct impacts on the burial grounds and graves.

- A minimum buffer of 20m must be established around known burial grounds and graves for the duration of the mining/construction phase. This is relevant where the burial site has been static for a considerable period of time and has already been fenced off;
- In cases the burial site is still in use and might expand in the future and is not fenced off, a minimum buffer of 100m should be implemented;
- In the case where blasting takes place during mining activities, the buffers should increase correspondingly to 200m;
- The buffers must be clearly demarcated, and signage placed during the construction/mining period;
- Access to the graves should be allowed to the descendants. However, they should adhere to the managing authorities' conditions regarding permissions, appointments, health, environment and safety.
- The areas with graves should be kept clean and the grass short so that visitors may enter it without any concerns.
 - However, this might create problems as in many cases not all graves are well-marked, carrying the possibility that they might inadvertently be damaged and therefore contractors/land-owners might not be will to accept this responsibility. The descendants should therefore be held responsible for the maintenance of the site.
- Sites that are located close to access/haul roads might need additional mitigation. All personnel and especially drivers of heavy haul vehicles should be informed where these sites are, and they should keep to the speed limits (usually 30km/h on mining sites);
- Any change in the development layout, future development plans, condition of the grave sites and individual graves should immediately be reported to the heritage inspector/SAHRA for guidance;
- Relevant strategies should be put in place for the managing of the burial grounds and graves after the closure of the mine or the completion of the project. It needs to be stated that the land-owner or developer always will be responsible for the preservation of the site. Therefore, measures should be put in place to ensure that the site is handled appropriately after closure, which, in essence would entail the continuation measures already put in place;

3.3 Management strategy

A general approach to this is set out in Section 9 of the main body of the HIA report and is equally applicable to general heritage sites and feature as well as to burial grounds and graves.

A strategy for the implementation of the conservation plan is developed:

- A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts;
- Known sites must be demarcated and fenced off and signage placed during the construction/mining period;
- This management strategy should be applicable to the construction, operation as well as the post operation phases of the development/mining activities.
- Relevant strategies should be put in place for the managing of the burial grounds and graves after the closure of the mine or the completion of the project. It needs to be stated that the land-owner or developer always will be responsible for the preservation of the site. Therefore, measures should be put in place to ensure that the site is handled appropriately after closure, which, in essence would entail the continuation measures already put in place;
- The managing authority should be able to regularly inspect the sites in order to ensure that construction and other such activities do not damage the graves;
 - SAHRA and the relevant PHRA are the competent authorities responsible for the regulation of the HMP in terms of the national legislative framework. The NHRA states:

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 the necessary arrangement for their conservation as they see fit.

4. Relocation of graves

Once it has been decided to relocate particular graves, the following steps should be taken:

- Notices of the intention to relocate the graves need to be put up at the burial site for a period of 60 days. This should contain information where communities and family members can contact the developer/archaeologist/public-relations officer/undertaker. All information pertaining to the identification of the graves needs to be documented for the application of a SAHRA permit. The notices need to be in at least 3 languages, English, and two other languages. This is a requirement by law.
- Notices of the intention needs to be placed in at least two local newspapers and have the same information as the above point. This is a requirement by law.
- Local radio stations can also be used to try contact family members. This is not required by law, but is helpful in trying to contact family members.
- During this time (60 days) a suitable cemetery need to be identified close to the development area or otherwise one specified by the family of the deceased.
- An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account. This is a requirement by law.
- Once the 60 days has passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement by law.
- Once the permit has been received, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any items found in the grave.

Information needed for the SAHRA permit application:

- The permit application needs to be done by an archaeologist.
- A map of the area where the graves have been located.
- A survey report of the area prepared by an archaeologist.
- All the information on the families that have identified graves.

- If graves have not been identified and there are no headstones to indicate the grave, these are then unknown graves and should be handled as if they are older than 60 years. This information also needs to be given to SAHRA.
- A letter from the landowner giving permission to the developer to exhume and relocate the graves.
- A letter from the new cemetery confirming that the graves will be reburied there.
- Details of the farm name and number, magisterial district and GPS coordinates of the gravesite.

5. Defining next of kin

An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding relocation of graves.

Anthropologically speaking three type of kin are distinguished: patrilineal (called *agnates*), maternal (*uterine* kin) and kin by marriage (*affines*). All three categories have their important part to play in social life.

In terminologies used in the west the close-knit group of family members is clearly marked off from other kin - family terms, such as 'father', 'mother', 'brother' and 'sister' are never used for aunts, uncles and cousins.

In many non-western societies this is not the case and the family is merged with the wider group of kin and the family terms are applied much more widely. Next of kin for the Southern Bantu-language speakers is based on a classificatory system where a man uses a term to refer to three significant relatives – his father, his father's brother and his mother's brother.

For example, a man (A) may call his father's brother (i.e. uncle) also a father. All of that latter person's children will then also be called his (A) brothers and sisters, prohibiting him from marrying any of them (however, *vide* preferred marriages). In Anthropology this system is referred to as the Iroquois system (with reference to the North American Indian tribe where it was first described). When a man calls his father's brother 'father' a suffix is usually added to indicate whether he is an elder or junior brother (e.g. *(ra)mogolo* = elder brother; *(ra)ngwane* = junior brother; also *(ra)kgadi* = younger sister; *(ma)lome* = mother's brother)(SePedi terminology is used).

Consultants having to relocate graves might find it confusing if they do not have insight into this complex system of kinship, where, for example a single individual can have more than one father or mother.

6. Chance find procedures

A general approach to this is set out in Section 9 of the main body of the HIA report and is equally applicable to general heritage sites and features as to burial grounds and graves.

- A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts;
- An appropriately qualified heritage consultant should be identified to be called upon if any possible heritage resources or artefacts are identified;
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities be halted;

- The qualified archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and impact on the heritage resource;
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered;
- Should the heritage consultant conclude that the find is a heritage resource protected in terms of the NHRA (1999) Sections 34, 35, 37 and NHRA (1999) Regulations (Regulation 38, 39, 40), he or she should notify SAHRA and/or the relevant PHRA;
- Based on the comments received from SAHRA and/or the PHRA, the heritage consultant would present the relevant terms of reference to the client for implementation;
- Construction/Operational activities can commence as soon as the site has been cleared and signed off by the archaeologist.

7. Curriculum vitae

Johan Abraham van Schalkwyk

Personal particulars

Date of birth: 14 April 1952
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Qualifications

1995 DLitt et Phil (Anthropology), University of South Africa
1985 MA (Anthropology), University of Pretoria
1981 BA (Hons), Anthropology, University of Pretoria
1979 Post Graduate Diploma in Museology, University of Pretoria
1978 BA (Hons), Archaeology, University of Pretoria
1976 BA, University of Pretoria

Non-academic qualifications

12th HSRC-School in Research Methodology - July 1990
Dept. of Education and Training Management Course - June 1992
Social Assessment Professional Development Course - 1994
Integrated Environmental Management Course, UCT - 1994

Professional experience

Private Practice
2017 - current: Professional Heritage Consultant

National Museum of Cultural History

1992 - 2017: Senior researcher: Head of Department of Research. Manage an average of seven researchers in this department and supervise them in their research projects. Did various projects relating to Anthropology and Archaeology in Limpopo Province, Mpumalanga, North West Province and Gauteng. Headed the Museum's Section for Heritage Impact Assessments.
1978 - 1991: Curator of the Anthropological Department of the Museum. Carried out extensive fieldwork in both anthropology and archaeology

Department of Archaeology, University of Pretoria

1976 - 1977: Assistant researcher responsible for excavations at various sites in Limpopo Province and Mpumalanga.

Awards and grants

1. Hanisch Book Prize for the best final year Archaeology student, University of Pretoria - 1976.
2. Special merit award, National Cultural History Museum - 1986.
3. Special merit award, National Cultural History Museum - 1991.
4. Grant by the Department of Arts, Culture, Science and Technology, to visit the various African countries to study museums, sites and cultural programmes - 1993.
5. Grant by the USA National Parks Service, to visit the United States of America to study museums, sites, tourism development, cultural programmes and impact assessment programmes - 1998.
6. Grant by the USA embassy, Pretoria, under the Bi-national Commission Exchange Support Fund, to visit cultural institutions in the USA and to attend a conference in Charleston - 2000.
7. Grant by the National Research Foundation to develop a model for community-based tourism - 2001.

8. Grant by the National Research Foundation to develop a model for community-based tourism - 2013. In association with RARI, Wits University.

Publications

Published more than 70 papers, mostly in scientifically accredited journals, but also as chapters in books.

Conference Contributions

Regularly presented papers at conferences, locally as well as internationally, on various research topics, ranging in scope from archaeology, anthropological, historical, cultural historical and tourism development.

Heritage Impact Assessments

Since 1992, I have done more than 2000 Phase 1 and Phase 2 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.

Latest publications

Van Schalkwyk, J.A. 2020. A cognitive approach to ordering of the world: some case studies from the Sotho- and Tswana-speaking people of South Africa. In Whitley, D.S., Loubser, J.H.N. & Whitelaw, G. (eds.) *Cognitive Archaeology. Mind, Ethnography, and the Past in South African and Beyond*. London: Routledge. Pp. 184-200.

Namono, C. & Van Schalkwyk, J.A. 2020. Appropriating colonial dress in the rock art of the Makgabeng plateau, South Africa. In Wingfield, C., Giblin, J. & King, R. (eds) *The pasts and presence of art in South Africa: Technologies, Ontologies and Agents*. University of Cambridge: McDonald Institute for Archaeological Research. Pp. 51-62.