Phase 1 Cultural Heritage Impact Assessment:

NEW 132KV POWER LINES BETWEEN THE ON-SITE SUBSTATIONS AND THE LOCAL GRID CONNECTION FOR THE PROPOSED MATJHABENG SOLAR PV PHASE 1 AND 2 DEVELOPMENT, ODENDAALRUS REGION, FREE STATE PROVINCE

Prepared for:
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Prepared by:
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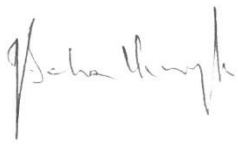
Report No: 2020/JvS/069
- Status: Final
- Date: October 2020
- Revision No: -
- Date: -

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.

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 or a chapters in books. 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
October 2020





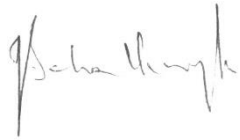


SPECIALIST DECLARATION

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
October 2020

EXECUTIVE SUMMARY

Phase 1 Cultural Heritage Impact Assessment:
NEW 132KV POWER LINES BETWEEN THE ON-SITE SUBSTATIONS AND THE LOCAL GRID CONNECTION FOR THE PROPOSED MATJHABENG SOLAR PV PHASE 1 AND 2 DEVELOPMENT, ODENDAALRUS REGION, FREE STATE PROVINCE

SunElex Energy (Pty) Ltd (the Applicant) has proposed the development of the Matjhabeng 400 MW Solar Photovoltaic (PV) Plant with 80 MW (320 MWh) Battery Energy Storage System (BESS), which is located north and south of the town of Odendaalsrus in the Free State Province. The proposed Project will be developed to serve the Matjhabeng Local Municipality's energy requirements and will generate power for delivery into the existing Eskom 132 kV distribution system.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Nemai Consulting* to conduct a cultural heritage assessment to determine if the development of the new 132kV power lines between the Solar Photovoltaic (PV) Plant on-site substations and the grid connection 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. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the larger region surrounding the study area consists two components. The first is a limited Stone Age occupation, which in most cases clustered in the vicinity of the various water sources as well as preferred habitable areas such as hills and outcrops. This period, spanning many thousands of years, was followed by a much shorter Late Iron Age occupation and an even shorter farming component. Urban centres that evolved as part of this latter period of occupation, e.g., Odendaalsrus, only came into being since the 1880s.

Identified sites

During the survey no sites, features or objects of cultural significance were identified that would be impacted on by the proposed development of the power lines and substations.

Mitigation measures

For the current projects, as no sites, features or objects of cultural significance were identified in the project area, no mitigation measures are proposed.

Alternatives assessment

For the purpose of the development of the power lines and substations, the alternatives are rated as follows:

- Phase 1: From a heritage point of view, all alternatives are suitable for the proposed development of the power lines and substations.
- Phase 2: From a heritage point of view, all alternatives are suitable for the proposed development of the power lines and substations.

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 no sites, features or objects of heritage

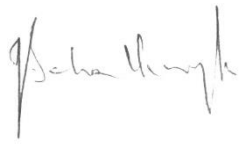
significance occur in the project area. If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

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

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the proposed mitigation measures 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 project area has a moderate sensitivity of fossil remains to be found and therefore a desktop palaeontological study is required.
- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.



J A van Schalkwyk
Heritage Consultant
October 2020

TECHNICAL SUMMARY

Project description	
Description	Development of two sections of 132kV power lines and associated substations
Project name	Matjhabeng Solar PV Phase 1 & 2 Powerlines

Applicant
Matjhabeng Local Municipality

Environmental assessors
Nemai Consulting
Mr D Henning

Property details						
Province	Free State					
Magisterial district	Odendaalsrus					
Local municipality	Matjhabeng					
Topographic map	2726DA, 2726DC					
Farm name	-					
Closest town	Odendaalsrus					
Coordinates	End points (approximate)					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	S 27,72413	E 26,69582	2	E 27,92947	E 26,71871
	.kml files[1]	 				

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
Current land use	Mining/Vacant

[1] Left click on the 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: "Cumulative Impact", 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 they herded cattle as well as 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, means 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

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
EAP	Environmental Assessment Practitioner
EIA	Early Iron Age
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
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

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 5
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 5
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 7
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 5
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;	Addendum Section 2; Figure 14
g) an identification of any areas to be avoided, including buffers;	Section 8; Fig. 14
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 14
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 & 10
l) any conditions for inclusion in the environmental authorisation;	Section 10
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; (iA) regarding the acceptability of the proposed activity or activities; and	Section 10
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.	-

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1. INTRODUCTION

1.1 Background

SunElex Energy (Pty) Ltd (the Applicant) has proposed the development of the Matjhabeng 400 MW Solar Photovoltaic (PV) Plant with 80 MW (320 MWh) Battery Energy Storage System (BESS), which is located north and south of the town of Odendaalsrus in the Free State Province. The proposed Project will be developed to serve the Matjhabeng Local Municipality's energy requirements and will generate power for delivery into the existing Eskom 132 kV distribution system.

Nemai Consulting (Pty) Ltd was appointed by *SunElex* as the independent Environmental Assessment Practitioner (EAP) to apply for Environmental Authorisation for the proposed Project in terms of NEMA.

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 (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Nemai Consulting* to conduct a cultural heritage assessment to determine if the development of the new 132kV power lines between the Solar Photovoltaic (PV) Plant on-site substations and the grid connection would have an impact on any sites, features or objects of cultural heritage significance.

This report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) 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 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 heritage impact assessment 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 will 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 if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where the new 132kV power lines between the Solar Photovoltaic (PV) Plant on-site substations and the grid connection is to take place. This included:

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

The project area includes the following properties:

- Phase 1 involves development on sections of the farm Kalkkuil 153 on the southern side of Odendaalsrus town; and
- Phase 2 involves sections of the farms Dolly 404, Ophir 405 and Paleis Heuvel 323 on the northern side of Odendaalsrus town.
    - A 40m wide corridor for each power line route, which includes 20m on either side of the centre line, needs to be assessed by the specialists.

The objectives were to:

- Identify possible archaeological, cultural and historic sites within the proposed development areas;
- Identify any potential 'fatal flaws' related to the proposed development;
- 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;
- Provide guideline measures to manage any impacts that might occur during the construction phase as well as the implementation phase.

1.2.2 *Assumptions and Limitations*

The investigation has been influenced by the following factors:

- It is assumed that the description of the proposed project, provided by the client, is accurate.
- 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.
- It is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is sufficient and that it does not have to be repeated as part of the heritage impact assessment.

2. LEGISLATIVE FRAMEWORK

2.1 Background

Heritage Impact Assessments 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 National Heritage Resources Act (Act No 25 of 1999, Section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority.

The National Heritage Resources Act (Act No. 25 of 1999, Section 38) provides guidelines 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 m^2 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 he 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 m^2 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 National Heritage Resources Act (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
    - ancestral graves;
    - royal graves and graves of traditional leaders;
    - graves of victims of conflict;
    - graves of individuals designated by the Minister by notice in the Gazette;
    - historical graves and cemeteries; and
    - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
    - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
    - objects to which oral traditions are attached or which are associated with living heritage;
    - ethnographic art and objects;
    - military objects;
    - objects of decorative or fine art;
    - objects of scientific or technological interest; and
    - books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 Cultural significance

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

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

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

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

A matrix (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 two project areas are located on the southern and northern side of Odendaalsrus in the Matjhabeng Local Municipality of Free State Province. For more information, see Figure 1 below and the Technical Summary on p. V above.

- Phase 1 involves development on sections of the farm Kalkkuil 153 on the southern side of Odendaalsrus town; and
- Phase 2 involves sections of the farms Dolly 404, Ophir 405 and Paleis Heuvel 323 on the northern side of Odendaalsrus town.

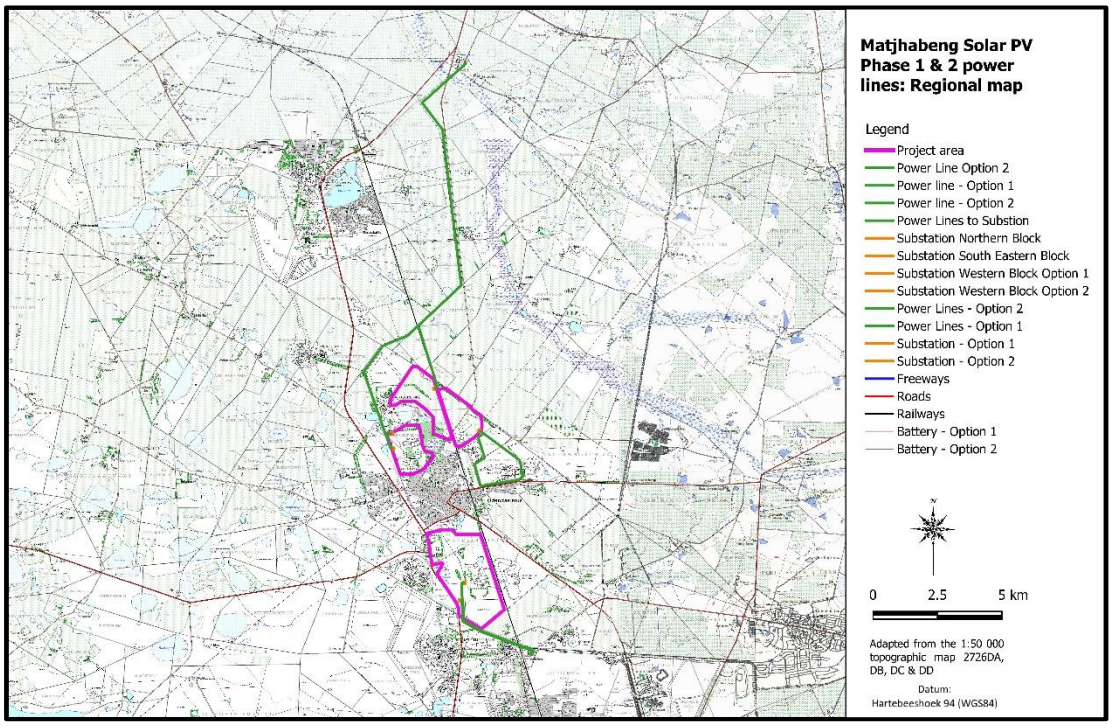


Figure 1. Location of the project areas in regional context

4.2 Development proposal

SunElex Energy (Pty) Ltd (the Applicant) has proposed the development of the Matjhabeng 400 MW Solar Photovoltaic (PV) Plant with 80 MW (320 MWh) Battery Energy Storage System (BESS), which is located north and south of the town of Odendaalsrus in the Free State Province. The electricity generated by the proposed Project will be injected into the existing Eskom 132 kV distribution system as follows:

Phase 1:

- New 132kV power lines between the on-site substation and the grid connection point at the existing Eskom Euclid Substation located to the south-east of the Phase 1 Site (Fig. 2).

Phase 2:

- Northern and western blocks – new 132kV power lines between the on-site substations and the grid connection points at the existing Eskom Grootkop Substation located to the north of the Phase 2 Site; and
- South-eastern block – new 132kV power line between the on-site substation and the grid connection point at the existing Eskom Geduld Substation located to the south-east of the Phase 2 Site (Fig. 3).

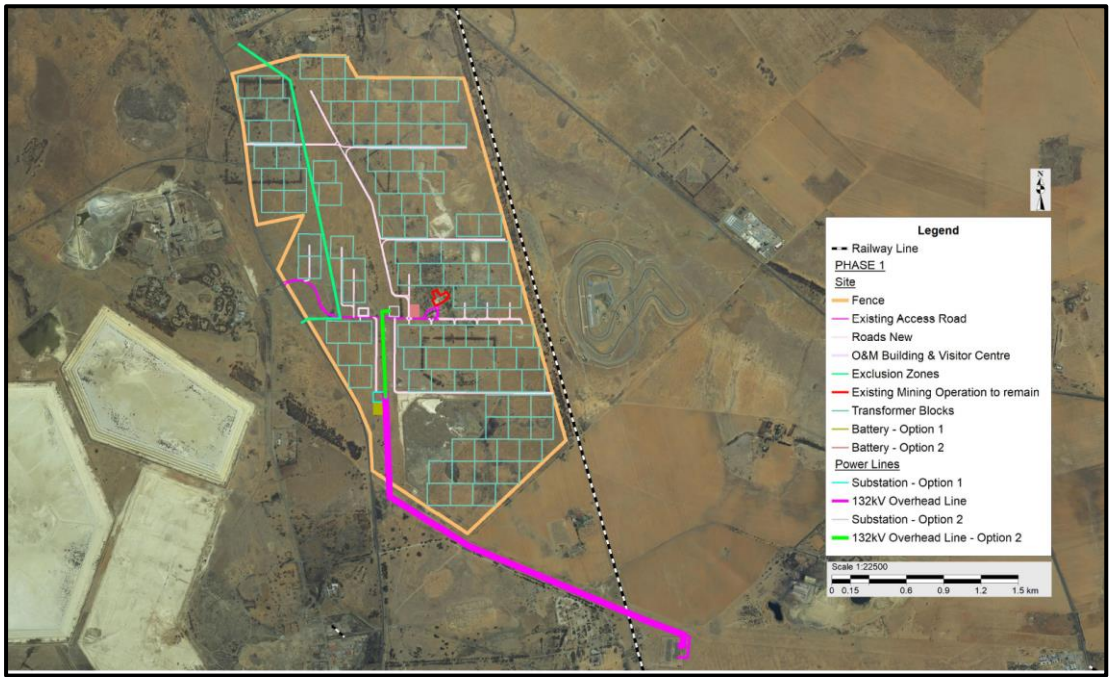


Figure 2. Layout of Phase 1 of the proposed project
(Map supplied by Nemai Consulting)

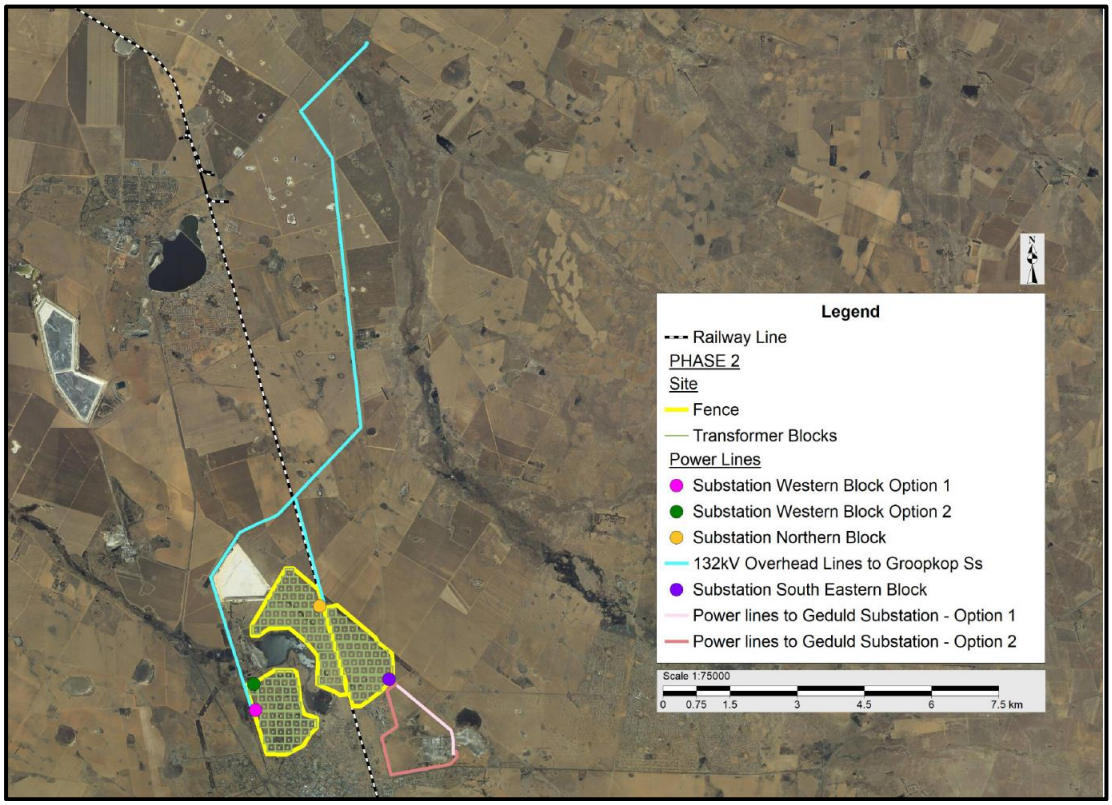


Figure 3. Layout of Phase 2 of the proposed project
(Map supplied by Nemai Consulting)

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 Figures 1 & 2.

5.2 Methodology

5.2.1 *Pre-feasibility assessment*

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 11.

- 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 11.

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

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

The results of the above investigation are presented in Figure 4 below – see list of references in Section 11 – and can be summarised as follows:

- Stone walled sites dating to the Late Iron Age occur to the eat in the region of the Sandrivier;
- Historic structures, inclusive of buildings and bridges, occur in a sporadic manner across the larger landscape as well as in the various urban centres;
- Formal and informal burial sites occur sporadically in towns and across the countryside.

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

Table 1: Pre-Feasibility Assessment

Category	Period	Probability	Reference
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	None	-
	Later Stone Age	None	-
	Rock Art	None	-
Iron age	Holocene		
	Early Iron Age	None	-
	Middle Iron Age	None	-
	Late Iron Age	Low	Huffman (2007); Maggs (1976)
Colonial period	Holocene		
	Contact period/Early historic	Possible	
	Recent history	Possible	Spies & Du Plessis (1973); Van Schalkwyk (2008, 2010, 2015, 2016)
	Industrial heritage	None	Heritage Atlas Database; Robb & Robb (1998)

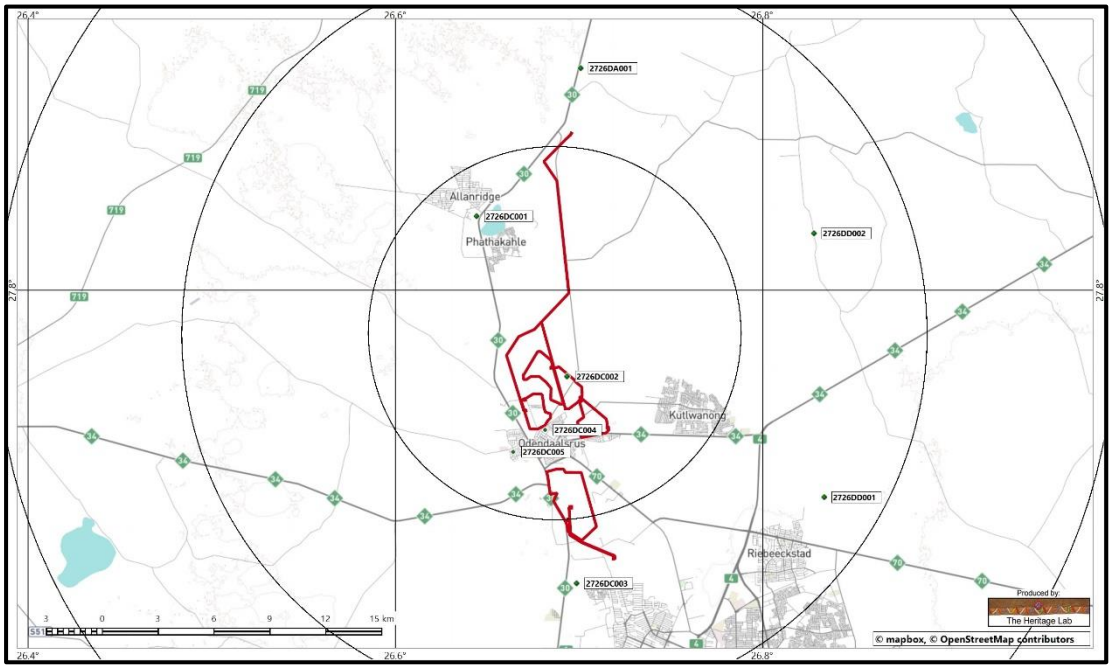


Figure 4. Location of known heritage sites and features in relation to the project area
(Circles spaced at 10km; heritage sites = green dots)

5.2.2 *Field survey*

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible sites, objects and structures. The areas that had to be investigated was identified by the *Nemai Consulting* by means of maps and .k*ml* files. This was loaded onto a Samsung digital device and used in Google Earth during the field survey to access the areas.

The different development areas were visited on 26 October 2020 and was investigated by following the alignments of the proposed 132kV power lines – see Fig. 5 below.

5.2.3 *Factors influencing the field survey*

- During the site visit, archaeological visibility was overall good due to the lack of vegetation in the landscape.

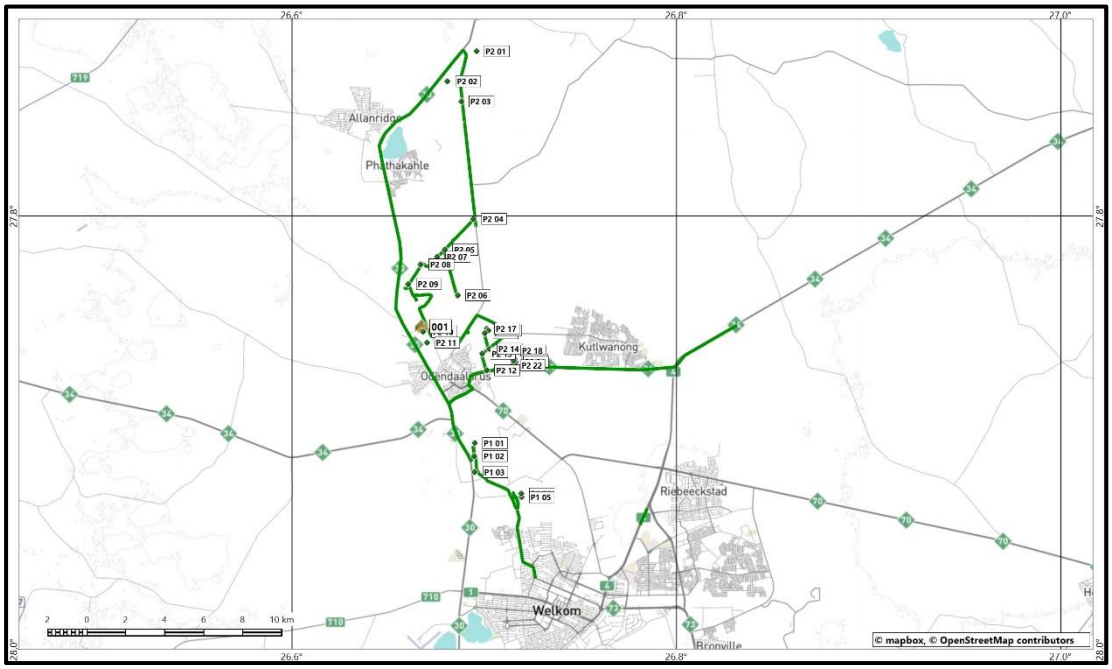


Figure 5. Map indicating the track log of the field survey

5.2.4 *Documentation*

All sites, objects and structures that are 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 in order 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.

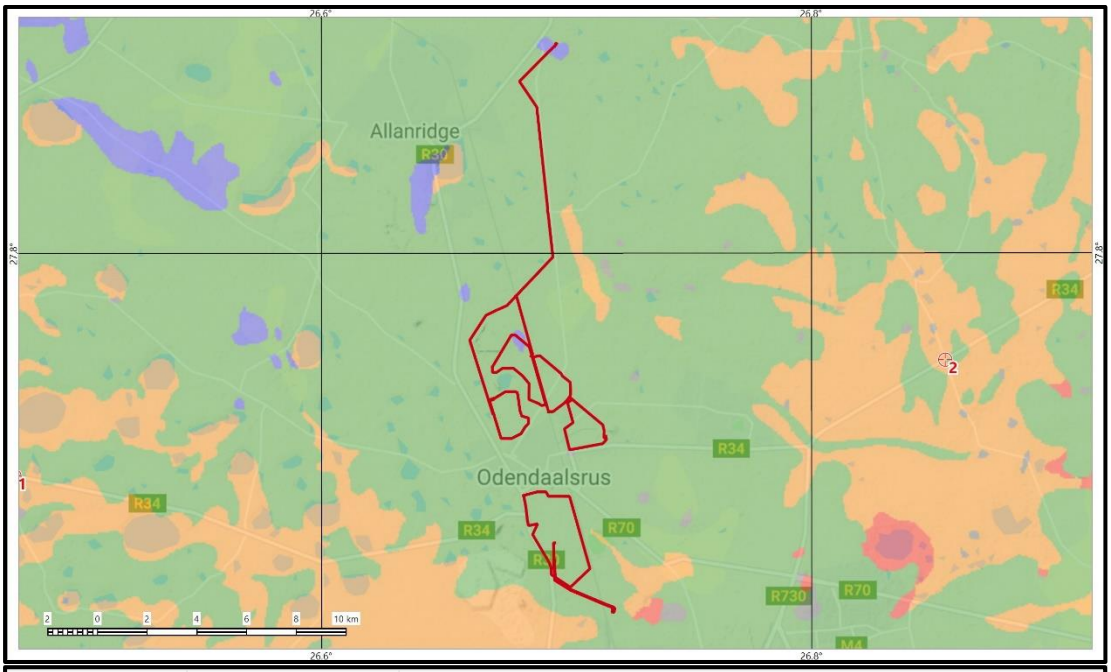
6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1 Natural Environment

The geology of the project area is made up of mudrock belonging to the Volksrus Formation of the Ecca Group of the Karoo Supergroup. The topography of the terrain is described as plains and pans. A number of streams occurs in the region, with the largest being the Sandspruit which passes to the east of the project areas, flowing from south to north.

The original vegetation in the northern part of the project area is classified as Vaal-Vet Sandy Grassland biome. In the south this changes to the Western Free State Clay Grassland biome. Both of these forms part of the Dry Highveld Grassland Bioregion (Muncina & Rutherford 2006). Over large sections this has been transformed either by farming, urbanization or mining activities.

The Palaeontological Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo) indicate that project area (Fig. 6) has a moderate sensitivity of fossil remains to be found and therefore a desktop palaeontological study is required.



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 6. The Palaeontological sensitivity of the project areas

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 larger region surrounding the study area consists two components. The first is a limited Stone Age occupation, which in most cases clustered in the vicinity of the various water sources as well as preferred habitable areas such as hills and outcrops. This period, spanning many thousands of years, was followed by a much shorter Late Iron Age occupation and an even shorter farming component. Urban centres that evolved as part of this latter period of occupation, e.g., Odendaalsrus, only came into being since the 1880s.

6.2.1 *Stone Age*

The larger region has probably been inhabited by humans since Early Stone Age (ESA) times, although evidence of this is very limited. Tools dating to this period are mostly, although not exclusively, found in the vicinity of watercourses. The oldest of these tools are known as choppers, crudely produced from large pebbles found in the river. Later, *Homo erectus* and early *Homo sapiens* people made tools shaped on both sides, called bifaces.

During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. Open sites were still preferred near watercourses. These people were adept at exploiting the huge herds of animals that passed through the area, on their seasonal migration. As a result, tools belonging to this period also mostly occur in the open or in erosion dongas. Similar to the ESA material, artefacts from these surface collections are viewed not to be in a primary context and have little or no significance.

Later Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. The stone artefacts they produced are much smaller than those of the Middle Stone Age and consist of a great variety of functional types. LSA people preferred, though not exclusively, to occupy rock shelters and caves and it is this type of sealed context that make it possible for us to learn much more about them than is the case with earlier periods. At present, no stratified, sealed site dating to the Stone Age is known for the immediate region.

Habitation of the larger geographical area took place since Early Stone Age times. This is confirmed by the occurrence of stone tools dating to the Early, Middle and Late Stone Age found in a number of places. However, these are mostly located in the vicinity of rivers, such as the Doringspruit north of Kroonstad and the Vals River south of Kroonstad.

6.2.2 *Iron Age*

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known site at Silver Leaves south east of Tzaneen dating to AD 270. The oldest local EIA site is located at Broederstroom south of Hartebeestpoort Dam and has a radio-carbon date of AD 470.

The occupation of the larger geographical area (including the project area) did not start much before the 1500s. To understand all of this, we have to take a look at the broader picture. Towards the end of the first millennium AD, Early Iron Age communities underwent a drastic change, brought on by increasing trade on the East African coast. This led to the rise of powerful ruling elites, for example at Mapungubwe. The abandonment of Mapungubwe (c. AD 1270) and other contemporaneous settlements show that widespread drought conditions led to the decline and eventual disintegration of this state Huffman (2005).

By the 16th century things changed again, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the Witwatersrand and the treeless, wind-swept plains of the Free State and the Mpumalanga escarpment.

This period of consistently high rainfall started in about AD 1780. At the same time, maize was introduced from Maputo and grown extensively. Given good rains, maize crops yield far more than sorghum and millets. This increase in food production probably led to increased populations in coastal area as well as the central highveld interior by the beginning of the 19th century. Due to their specific settlement requirements, Late Iron Age people preferred to settle on the steep slope of a mountain, possibly for protection, or for cultural considerations such as grazing for their enormous cattle herds. Because of the lack of trees, they built their settlements in stone.

During the first part of the 19th century, the two travellers/missionaries, Thomas Arbousset and Francois Daumas, passed through the larger region, leaving behind in their writings a wealth of information regarding the population and settlements in the region (Dreyer 2001). The complexity of these communities, as is reflected in their settlement layout, has been demonstrated for example by the extensive archaeological excavations done on some of these sites by Tim Maggs (Maggs 1976).

Sites dating to the Late Iron Age are known to occur in the larger region, especially to the south, in the vicinity of the Sandrivier. These are typical stone walled sites that are linked with Sotho-speakers and date to the period after 1600.

6.2.3 *Historic period*

The historic period started with the arrival, in the late 18th century by Korana raiders in the area. European hunting parties allegedly crossed the Orange River in the first two decades of the 19th century, exploring as far as the current Wepener district. On the heels of these explorers, cattle farmers from the Cape Colony started moving out of the northern Cape Colony borders from 1821 for seasonal grazing, but did not encounter any Bantu-speakers. Driven by droughts in the Cape, loss of livestock during the seasonal travels and the uninhabited district of the Transgariep led to numerous farmers settling themselves permanently in the area after 1824.

By the middle of the 19th century, farms were taken up and later towns were developed – Theunessin was established in 1907 and named Smaldeel, which was changed to Theunissen in 1912. Towns such as Virginia (1954) and Welkom (1946) were only established as part of the development of the gold mining industry in the region. Infra-structural development, such as the development of roads, bridges and railway lines also took place. One of the original stations was called Virginia and was established in 1892. This makes the former town actually much older (Nienaber & le Roux 1982).

The farm Kalkkuil was first settled by the trekker H.W. Huyser. In 1878 he sold the farm to J.J. Odendaal, after whom the town is named. The first stands in the town were sold in 1899. Although gold was discovered in 1896 north of the town, it was only after the discovery of the ore body on the farm Geduld, located south of Odendaalsrus that development took off (Spies & Du Plessis 1973:292).

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.

Due to the intensive mining activities, the remains of mining related infrastructure occur all over the project areas. Most of this has been abandoned, vandalised or are in the process of being informally recycled (Fig. 7).

Figure 7. The inevitable path of built features in the larger landscape

6.3.1 *Phase 1*

The Phase 1 project area formed part of the Free State Geduld Mine. The Free State or Welkom gold field came into being in 1945 when a mining lease was granted to the St Helena Gold Mine. Eventually the gold field consisted of some 20 mines that were exploiting five principal ore bodies. Over time they were amalgamated into larger and more cost-effective units, of which Free State Geduld is one unit of the larger Freegold North mine (Robb & Robb 1998:314).

From the various maps and aerial photographs presented below (Fig. 8, 9 & 10), it is clear that the proposed powerline alternatives as well as the substation locations would not impact on any built features.

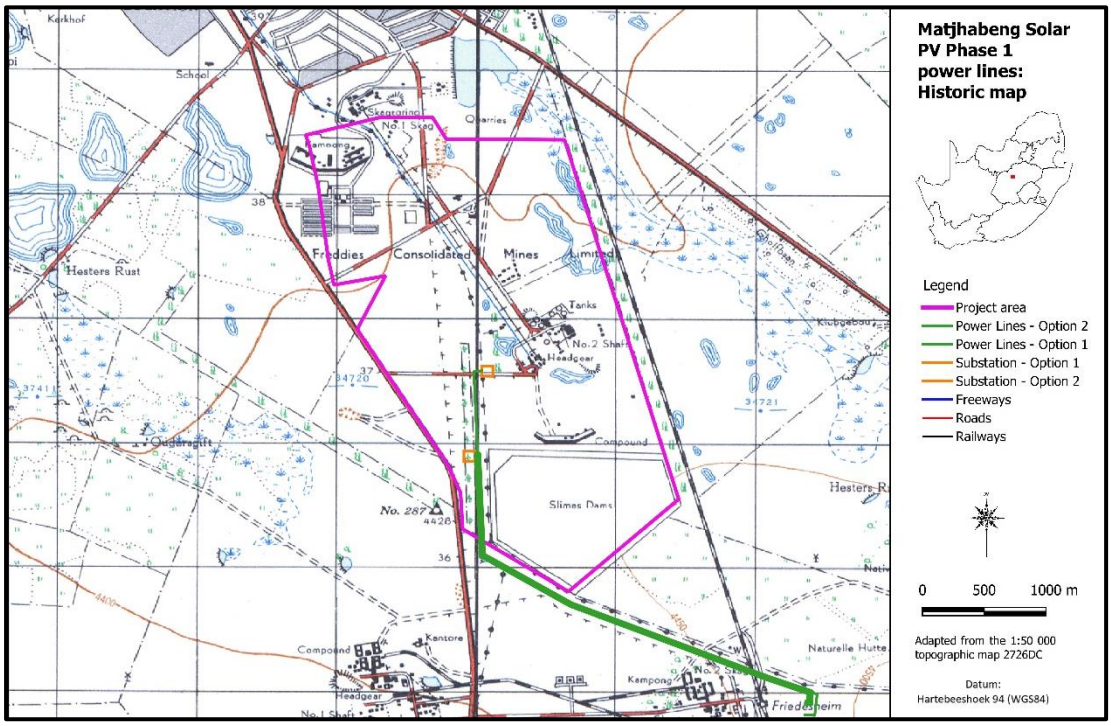


Figure 8. The Phase 1 project area on the 1952 version of the 1:50 000 topographic map

Figure 9. The project area on the 1952 version of the 1:50 000 topographic map

Figure 10. The Phase 1 project area on the Google Earth image dating to 2020

6.3.2 *Phase 2*

The Phase 2 project area formed part of the Freddies Consolidated Mines Limited which ceased operations some years ago. Freddies became part of Harmony Gold's Free State Operations. All of the shafts were dormant when Harmony took over but they have restarted the Nyala shaft which is used to hoist rock and is available as a second escape route for the Phakisa Mine which is 5,5km away (www.harmony.co.za/b/ops_sa_ phakisa.asp).

From the various maps and aerial photographs presented below (Fig. 11, 12 & 13), it is clear that the proposed powerline alternatives as well as the substation locations would not impact on any built features, succeeding to bypass whatever remains still occurs in the landscape.

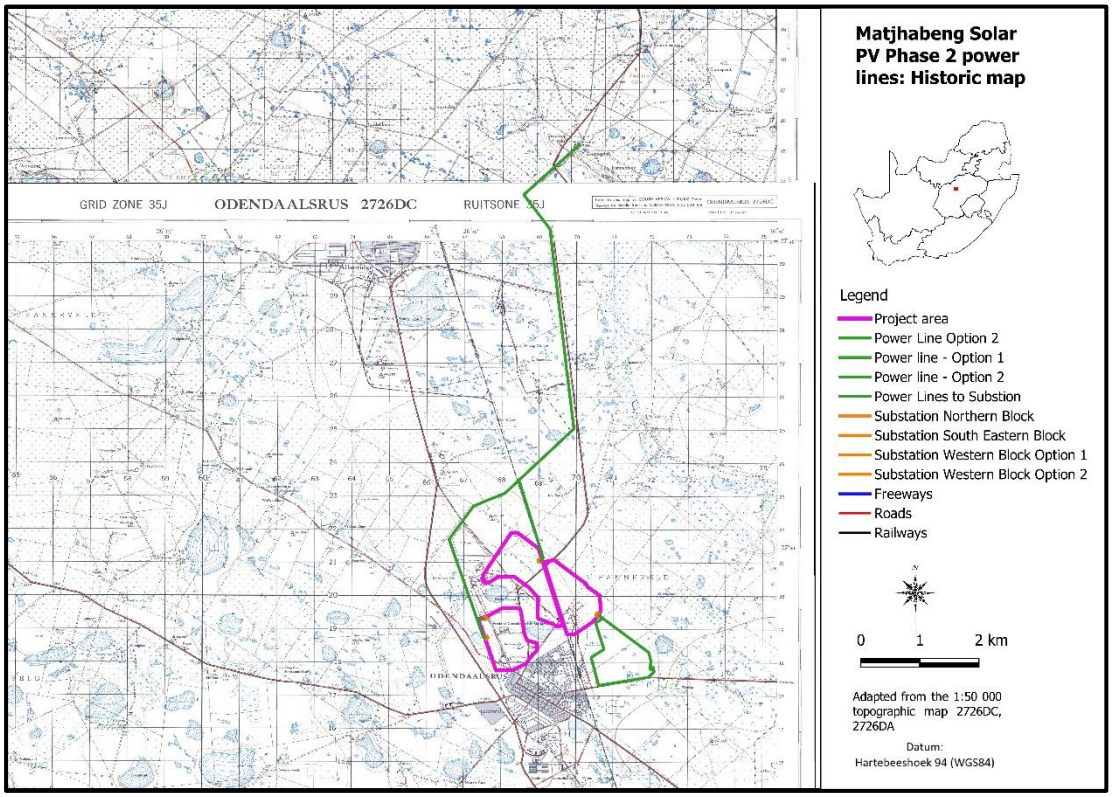


Figure 11. The Phase 2 project area on the 1952 version of the 1:50 000 topographic map

Figure 12. Different views across the power line route, working from north to south

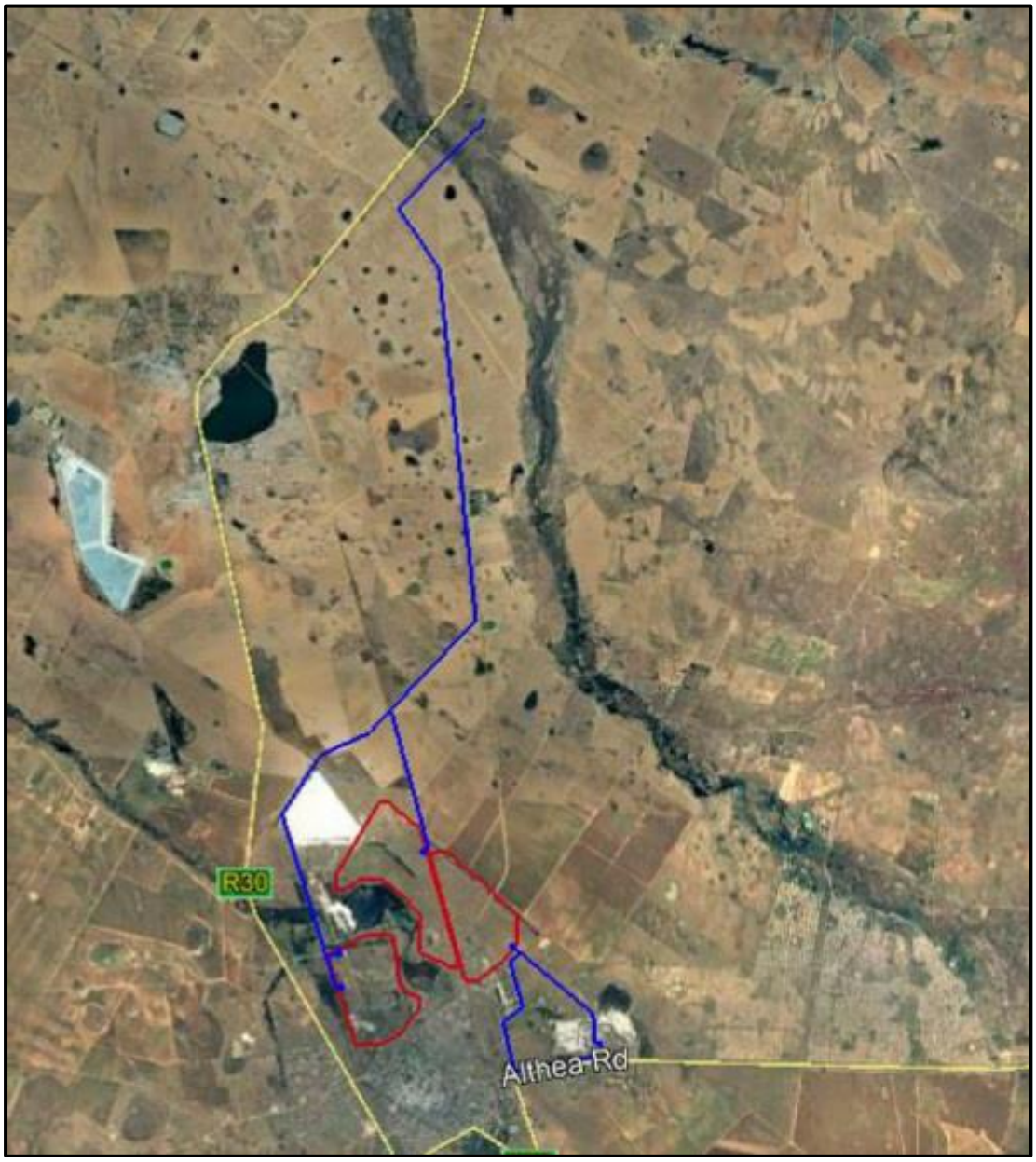


Figure 13. The Phase 2 project area on the Google Earth image dating to 2020

7. SURVEY RESULTS

During the survey, the following sites, features and objects of cultural significance were identified in the project area (see Fig. 14 below).

7.1 Phase 1

7.1.1 Stone Age

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

7.1.2 Iron Age

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

7.1.3 Historic period

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

7.2 Phase 2

7.2.1 Stone Age

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

7.2.2 Iron Age

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

7.2.3 Historic period

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

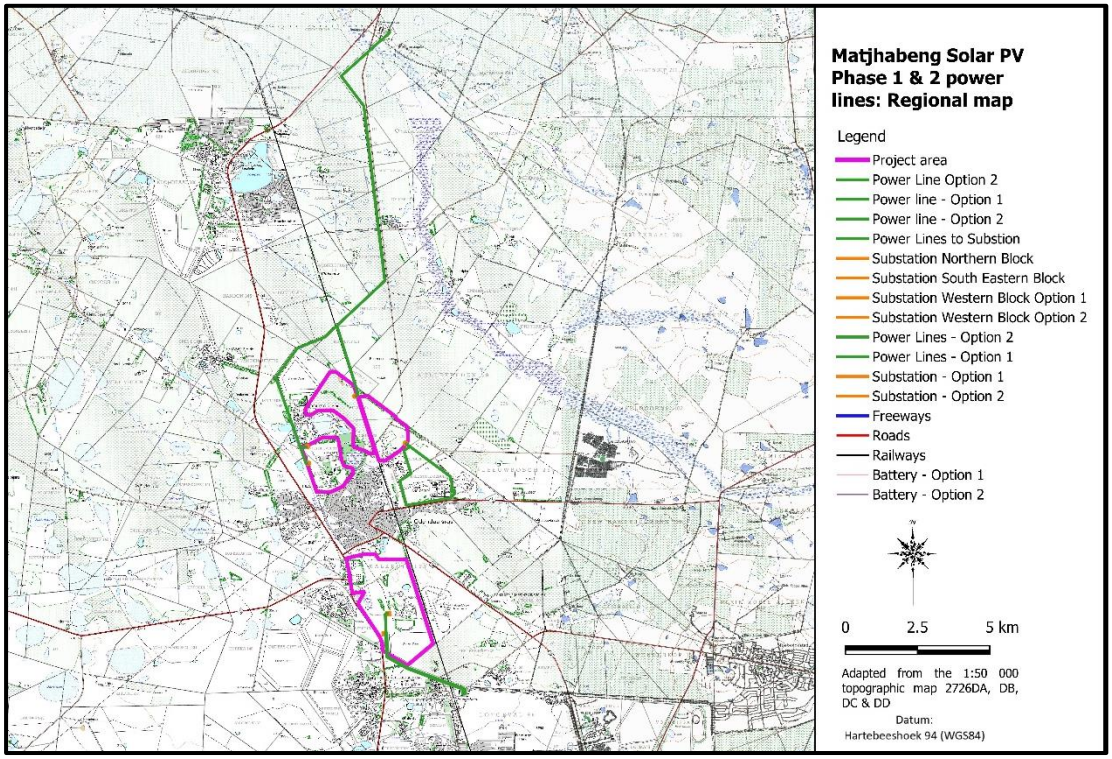


Figure 14. Site map
(Please note that as nothing was found in the project areas, nothing is indicated on the map)

8. IMPACT ASSESSMENT RATINGS AND MITIGATION MEASURES

8.1 Impact assessment

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.

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development and is summarised in Table 2 below:

Table 2: Calculation of the impact on the identified heritage features

Matjhabeng Phase 1 Power Lines and Substations		
Impact assessment: As no sites, features or objects of cultural heritage significance were identified on the project area, there would be no impact as a result of the proposed development		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Intensity	Minor (2)	Minor (2)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (1)
Status (positive or negative)	Negative	Neutral
Reversibility	n/a	n/a
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	n/a	
Mitigation: n/a		
Cumulative impact: None		

Matjhabeng Phase 2 Power Lines and Substations		
Impact assessment: As no sites, features or objects of cultural heritage significance were identified on the project area, there would be no impact as a result of the proposed development		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Intensity	Minor (2)	Minor (2)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (1)
Status (positive or negative)	Negative	Neutral
Reversibility	n/a	n/a
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	n/a	
Mitigation: n/a		
Cumulative impact: None		

8.2 Mitigation measures

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

For the current projects, as no sites, features or objects of cultural significance were identified in the project area, no mitigation measures are proposed.

8.3 Alternatives assessment

For the purpose of the development of the power lines and substations, the alternatives are rated as follows:

- Phase 1: From a heritage point of view, all alternatives are suitable for the proposed development of the power lines and substations.

- Phase 2: From a heritage point of view, all alternatives are suitable for the proposed development of the power lines and substations.

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 that 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 3A and 3B 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 boundary 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 should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should 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, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall 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 Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

9.2 Control

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

- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.
- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

Table 3A: 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 proposed 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 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

Table 3B: 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. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

10. CONCLUSIONS AND RECOMMENDATIONS

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. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the larger region surrounding the study area consists two components. The first is a limited Stone Age occupation, which in most cases clustered in the vicinity of the various water sources as well as preferred habitable areas such as hills and outcrops. This period, spanning many thousands of years, was followed by a much shorter Late Iron Age occupation and an

even shorter farming component. Urban centres that evolved as part of this latter period of occupation, e.g., Odendaalsrus, only came into being since the 1880s.

Identified sites

During the survey no sites, features or objects of cultural significance were identified that would be impacted on by the proposed development of the power lines and substations.

Mitigation measures

For the current projects, as no sites, features or objects of cultural significance were identified in the project area, no mitigation measures are proposed.

Alternatives assessment

For the purpose of the development of the power lines and substations, the alternatives are rated as follows:

- Phase 1: From a heritage point of view, all alternatives are suitable for the proposed development of the power lines and substations.
- Phase 2: From a heritage point of view, all alternatives are suitable for the proposed development of the power lines and substations.

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 no sites, features or objects of heritage significance occur in the project area. 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 development be allowed to continue on acceptance of the proposed mitigation measures 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 project area has a moderate sensitivity of fossil remains to be found and therefore a desktop palaeontological study is required.
- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

11. REFERENCES

11.1 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

11.2 Literature

Cloete, P.G. 2000. *The Anglo-Boer War: a Chronology*. Pretoria: JP van der Walt

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

Legassick, M. 1969. The Sotho-Tswana Peoples before 1800. In Thompson, L. (ed) 1969. *African Societies in southern Africa*. London: Heinemann. Pp. 86-125.

Maggs, T.M.O'C. 1976. Iron Age communities of the southern Highveld. Pietermaritzburg: Natal Museum.

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

Nienaber, P.J. & le Roux, C.J.P. 1982. *Vrystaat-fokus*. Roodepoort: Cum-Boeke.

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

Robb, L.J. & Robb, V.M. 1998. Gold in the Witwatersrand Basin. In Wilson, M.G.C. & Anhaeusser, C.R. (eds.) *The Mineral Resources of South Africa*. Sixth Edition. Handbook 16. Pretoria: Council for Geosciences.

Spies, J.J & Du Plessis, P.C. (eds.) 1973. *Standard Encyclopaedia of Southern Africa*, Vol. 8. Elsiesrivier: Nasou Ltd.

Van Schalkwyk, J.A. 2008. *Heritage survey report for the area known as the Hennenman Exploration Area, Hennenman magisterial district, Free State Province*. Unpublished report 2008/JvS/013.

Van Schalkwyk, J.A. 2010. *Heritage impact assessment report for the proposed Highland Virginia production right EMPR, Free State Province*. Unpublished report 2008/JvS/013.

Van Schalkwyk, J.A. 2014. *Cultural heritage impact assessment report for the proposed Sanral Thabong interchange development, Welkom region, Free State Province*. Unpublished report 2014/JvS/015.

Van Schalkwyk, J.A. 2015. *Cultural heritage impact assessment for the development of the proposed Matjhabeng PV solar field, Odendaalsrus, Free State Province*. Unpublished report 2015/JvS/077.

Van Schalkwyk, J.A. 2016. *Cultural heritage impact assessment for the development of the proposed Matjhabeng Solar Park Phase 2, Odendaalsrus, Free State Province*. Unpublished report 2016/JvS/021.

11.3 Archival sources, maps, aerial photographs and websites

1: 50 000 Topographic maps
Google Earth
Aerial Photographs: Chief Surveyor-General
http://artefacts.co.za
https://csg.esri-southafrica.com
https://screening.environment.gov.za/screeningtool
http://*vmus*.adu.org.za

12. 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 project 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 and potential impacts

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	

2.2 *Significance of the anticipated impact on heritage resources*

All impacts identified during the HIA stage of the study will be classified in terms of their significance. Issues would be assessed in terms of the following criteria:

Nature of the impact
A description of what causes the effect, what will be affected and how it will be affected.

Extent
The physical **extent**, wherein it is indicated whether:
- 1 - The impact will be limited to the site;
- 2 - The impact will be limited to the local area;
- 3 - The impact will be limited to the region;
- 4 - The impact will be national; or
- 5 - The impact will be international.

Duration
Here it should be indicated whether the lifespan of the impact will be:
- 1 - Of a very short duration (0–1 years);
- 2 - Of a short duration (2-5 years);
- 3 - Medium-term (5–15 years);
- 4 - Long term (where the impact will persist possibly beyond the operational life of the activity); or
- 5 - Permanent (where the impact will persist indefinitely).

Magnitude (Intensity)
The magnitude of impact, quantified on a scale from 0-10, where a score is assigned:
- 0 - Small and will have no effect;
- 2 - Minor and will not result in an impact;
- 4 - Low and will cause a slight impact;
- 6 - Moderate and will result in processes continuing but in a modified way;
- 8 - High, (processes are altered to the extent that they temporarily cease); or
- 10 - Very high and results in complete destruction of patterns and permanent cessation of processes.

Probability
This describes the likelihood of the impact actually occurring and is estimated on a scale where:
- 1 - Very improbable (probably will not happen);
- 2 - Improbable (some possibility, but low likelihood);
- 3 - Probable (distinct possibility);
- 4 - Highly probable (most likely); or
- 5 - Definite (impact will occur regardless of any prevention measures).

Significance
The significance is determined through a synthesis of the characteristics described above (refer to the formula below) and can be assessed as low, medium or high:

S = (E+D+M) x P; where
S = Significance weighting

E = Extent
D = Duration
M = Magnitude
P = Probability

Significance of impact		
Points	Significant Weighting	Discussion
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area.
31-60 points	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated.
> 60 points	High	Where the impact must have an influence on the decision process to develop in the area.

Confidence
This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Status
- The status, which is described as either positive, negative or neutral.

Reversibility
- The degree to which the impact can be reversed.

Mitigation
- The degree to which the impact can be mitigated.

Nature:		
	Without mitigation	With mitigation
Construction Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Operation Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Reversibility		
Irreplaceable loss of resources?		
Can impacts be mitigated		

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.*

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 in order to ensure that no undetected heritage/remains are destroyed.

4. Relocation of graves

If the graves are younger than 60 years, an undertaker can be contracted to deal with the exhumation and reburial. This will include public participation, organising cemeteries, coffins, etc. They need permits and have their own requirements that must be adhered to.

If the graves are older than 60 years old or of undetermined age, an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. This is a requirement by law.

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. Curriculum vitae

Johan Abraham van Schalkwyk

Personal particulars

Date of birth:	14 April 1952
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Marital status:	Married; one daughter
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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.