

Phase 1 Cultural Heritage Impact Assessment:

**THE PROPOSED DEVELOPMENT OF THE VOGELSTRUISFONTEIN  
PHOTOVOLTAIC PROJECT ON THE FARM VOGELSTRUISFONTEIN  
231-IQ, PORTION 4, ROBERTVILLE, ROODEPOORT,  
GAUTENG PROVINCE**

**Prepared for:**

Mott MacDonald Africa (Pty) Ltd (Mr A Bennett)

- Postal Address: P O Box 7707, Johannesburg, 2000; Tel: 011 052 1000; E-mail: Adam.Bennett@mottmac.co.za

**Prepared by:**

J A van Schalkwyk (D Litt et Phil),

- Heritage Consultant: ASAPA Registration No.: 164 - Principal Investigator: Iron Age, Colonial Period, Industrial Heritage.
- Postal Address: 62 Coetzer Avenue, Monument Park, 0181; Tel: 076 790 6777; E-mail: jvschalkwyk@mweb.co.za

**Report No: 2017/JvS/059**

- Status: Final
- Date: November 2017
- Revision No: 1
- Date: December 2017



**Copy Right:**

This report is confidential and intended solely for the use of the individual or entity to whom it is addressed or to whom it was meant to be addressed. It is provided solely for the purposes set out in it and may not, in whole or in part, be used for any other purpose or by a third party, without the author's prior written consent.

**Declaration:**

I, J.A. van Schalkwyk, declare that:

- I am suitably qualified and accredited to act as independent specialist in this application.
- I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services, for which a fair remuneration is charged.
- The work was conducted in an objective manner and any circumstances that might have compromised this have been reported.



J A van Schalkwyk  
Heritage Consultant  
November 2017



## EXECUTIVE SUMMARY

### Phase 1 Cultural Heritage Impact Assessment:

### **THE PROPOSED DEVELOPMENT OF THE VOGELSTRUISFONTEIN PHOTOVOLTAIC PROJECT ON THE FARM VOGELSTRUISFONTEIN 231-IQ, PORTION 4, ROBERTVILLE, ROODEPOORT, GAUTENG PROVINCE**

SolarReserve South Africa Management (Pty) Limited intend to establish the Vogelstruisfontein Photovoltaic Project (SR PVP) on Portion 4 of the farm Vogelstruisfontein 231-IQ, in Robertville, Roodepoort, Gauteng Province.

In accordance with Section 38 of the National Heritage Resources Act (Act No. 25 of 1999) (NHRA), an independent heritage consultant was appointed by Mott MacDonald Africa (Pty) Limited to conduct a cultural heritage assessment to determine if the proposed development of the SR PVP would have an impact on any sites, features or objects of cultural heritage significance.

The landscape qualities of what became known as the Witwatersrand Gold Fields, is probably one of the regions in the world that, over a period of approximately 20 years after the discovery of gold in 1886 went from Stone Age and Iron Age communities practicing very low subsistence based economies to one of the most heavily industrialised regions anywhere. As the mines closed-down, the landscape underwent drastic change, with urbanisation and small business becoming the defining character.

#### Identified heritage sites

- No sites, features or objects of cultural heritage significance were identified on the SR PVP footprint and/or within the transmission line corridor.

#### Impact assessment

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

- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

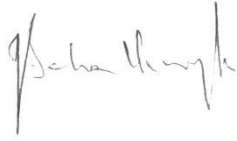
Heritage sites	Significance of impact	Mitigation measures
<b>SolarReserve site: Construction Phase</b>		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
<b>Power line route: Operation Phase</b>		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

#### 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.

Conditions for inclusion in the environmental authorisation:

- 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.



J A van Schalkwyk  
Heritage Consultant  
November 2017

### TECHNICAL SUMMARY

#### Project description

Description	Development of a 8.83MWp photovoltaic power plant
Project name	Vogelstruisfontein Photovoltaic Project (SR PVP)

#### Applicant

SolarReserve South Africa Management (Pty) Limited
----------------------------------------------------

#### Environmental assessors

Mott MacDonald Africa (Pty) Limited
Mr A Bennett

#### Property details

Property details						
Province	Gauteng					
Magisterial district	Roodepoort					
Local municipality	City of Johannesburg					
Topo-cadastral map	2627BB					
Farm name	Vogelstruisfontein 231-IQ					
Closest town	Roodepoort					
Coordinates	Centre point					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	-26.18555	27.91623			

#### 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 m <sup>2</sup>	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 m <sup>2</sup>	No
Any other development category, public open space, squares, parks, recreation grounds	No

#### Land use

Previous land use	Industrial (mining)
Current land use	Vacant

## TABLE OF CONTENTS

	Page
LIST OF FIGURES.....	V
GLOSSARY OF TERMS AND ABBREVIATIONS.....	VI
1. INTRODUCTION .....	1
2. TERMS OF REFERENCE .....	1
3. LEGISLATIVE FRAMEWORK.....	2
4. HERITAGE RESOURCES .....	3
5. STUDY APPROACH AND METHODOLOGY .....	4
6. PROJECT DESCRIPTION.....	6
7. SITE SIGNIFICANCE AND ASSESSMENT .....	1
8. DESCRIPTION OF THE AFFECTED ENVIRONMENT .....	4
9. MANAGEMENT MEASURES .....	11
10. RECOMMENDATIONS .....	13
11. REFERENCES.....	14
APPENDIX 1. INDEMNITY AND TERMS OF USE OF THIS REPORT .....	16
APPENDIX 2. SPECIALIST COMPETENCY .....	17
APPENDIX 3. CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE RESOURCES .....	18
APPENDIX 4. RELEVANT LEGISLATION.....	20
APPENDIX 5. INVENTORY OF IDENTIFIED CULTURAL HERITAGE SITES .....	22

## LIST OF FIGURES

	Page
Figure 1. Map indicating the track log (red) of the site survey.....	5
Figure 2: Location of the proposed SR PVP Project and Associated Transmission Line Corridors .....	9
Figure 3: Proposed Site Infrastructure Layout.....	10
Figure 4. Views of the SR PVP site. ....	4
Figure 5. Structures on the proposed SR PVP site. ....	5
Figure 6. Views of the transmission line corridor – power line route option B.....	6
Figure 7. The study area on the 1943 version of the topo-cadastral map. ....	6
Figure 8. Vogelstruisfontein on Troy's map dating 1890, showing the Bantjes and Vogelstruisfontein mines.....	8
Figure 9. Heritage resources linked to the Durban Roodepoort Deep.....	9

## GLOSSARY OF TERMS AND ABBREVIATIONS

### TERMS

**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	2 000 000 - 150 000 Before Present (BP)
Middle Stone Age	150 000 - 30 000 BP
Later Stone Age	30 000 - until c. Anno Domini (AD) 200

**Iron Age:** Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. 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

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

**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.

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

### ABBREVIATIONS

AC/DC	Alternating current/direct current
AD	Anno Domini - the number of years since the birth of Jesus Christ
ADRC	Archaeological Data Recording Centre
ASAPA	Association of Southern African Professional Archaeologists
BA	Basic Assessment
BAR	Basic Assessment Report
BP	Before present
CS-G	Chief Surveyor-General
EIA	Early Iron Age
EMPr	Environmental Management Programme report
EPC	Engineering, Procurement, and Construction
ESA	Early Stone Age
ft	Feet
GDARD	Gauteng Department of Agriculture and Rural Development
GIIP	Good International Industry Practice

---

GPS	Global Positioning System
LIA	Late Iron Age
LSA	Later Stone Age
I&APs	Interested and Affected Parties
HIA	Heritage Impact Assessment
Ha	Hectare
Km	Kilometre
kV	Kilo volt
m <sup>2</sup>	Square Metre
M	Metre
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 22 of 2002)
MSA	Middle Stone Age
MWh	Mega watt hour
MW	Mega watt
NASA	National Archives of South Africa
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
PHRA	Provincial Heritage Resources Agency
PV	Photovoltaic
SAHRA	South African Heritage Resources Agency
SR PVP	SolarReserve Vogelstruisfontein Photovoltaic Project
V	Volts



**Phase 1 Cultural Heritage Impact Assessment:****THE PROPOSED DEVELOPMENT OF THE VOGELSTRUISFONTEIN PHOTOVOLTAIC PROJECT ON THE FARM VOGELSTRUISFONTEIN 231-IQ, PORTION 4, ROBERTVILLE, ROODEPOORT, GAUTENG PROVINCE****1. INTRODUCTION**

SolarReserve South Africa Management (Pty) Limited intend to establish the Vogelstruisfontein Photovoltaic Project (SR PVP) on Portion 4 of the farm Vogelstruisfontein 231-IQ, in Robertville, Roodepoort, Gauteng Province. Mott MacDonald Africa (Pty) Ltd has been appointed by SolarReserve to provide environmental services associated with the establishment of the SR PVP.

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), Act 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(1) of the NHRA, an independent heritage consultant was appointed by Mott MacDonald Africa (Pty) Limited to conduct a cultural heritage assessment to determine if the proposed development of the SR PVP would have an impact on any sites, features or objects of cultural heritage significance.

This report is compiled on the following grounds:

- Under the NHRA, Section 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;
  - (c) any development or other activity which will change the character of a site:
    - (i) exceeding 5000m<sup>2</sup> in extentis required to undertake a Heritage Impact Assessment.
- The South African Heritage Resources Agency (SAHRA) requested that a HIA be completed on-site for inclusion in the final BAR
- Forms part of the Basic Assessment (BA) as required by the Environmental Impact Assessment Regulations in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) as amended in 2017.

**2. TERMS OF REFERENCE**

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.

### 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 photovoltaic project is to be developed. This includes:

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

The objectives were to:

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

### 2.2. 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.
- 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 is sufficient and that it does not have to be repeated as part of the heritage impact assessment.
- The unpredictability of buried archaeological remains.
- This report does not consider the palaeontological potential of the site.

## 3. LEGISLATIVE FRAMEWORK

The HIA is 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) – see Appendix 4 for more detail on this Act
  - 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).

## 4. HERITAGE RESOURCES

### 4.1. 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).

### 4.2. Cultural significance

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

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

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- sites of significance relating to the history of slavery in South Africa.

A matrix was developed whereby the above criteria were applied for the determination of the significance of each identified site (see Appendix 3). This allowed some form of control over the application of similar values for similar identified sites.

## 5. STUDY APPROACH AND METHODOLOGY

### 5.1. Extent of the Study

This survey and impact assessment covers the area as presented in Section 7 below and illustrated in Figures 2 & 3.

### 5.2. Methodology

#### 5.2.1. 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.

#### 5.2.2. 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.

#### 5.2.3. Other sources

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

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

*The results of the above investigation are summarised in Table 1 below – see list of references in Section 11.*

**Table 1: Pre-Feasibility Assessment**

Category	Period	Probability	Reference
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	
	Later Iron Age	Low	Mason (1986)
Colonial period	Holocene		
	Contact period	Low	Horn (1996); Mason (1986)
	Recent history	Medium	Brodie (2008); Municipal Council of Krugersdorp (1936); Van Vuuren & Van Schalkwyk (2005, 2017)
	Industrial heritage	Medium	Du Pisanie (2014); Handley (2004); Heritage Database; Mendelsohn & Potgieter (1986); Praagh (1906)

#### 5.2.4. 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 SR PVP project footprint that had to be investigated was identified by Mott MacDonald Africa (Pty) Limited by means of maps and *kml* files. This was loaded onto an Asus device and used in Google Earth during the field survey to access the area.

The site was visited on 17 November 2017. The site was investigated by walking various transects across it (Fig. 1).

During the site visit, the archaeological visibility was good on some sections of the survey area, whereas other sections were deemed unsafe to access due to cable burning and other activities taking place.

**Figure 1. Map indicating the track log (red) of the site survey.**



Source: Google Earth, November 2017 as amended

### 5.2.5. 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.

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.

Map datum used: Hartebeeshoek 94 (WGS84).

## 6. PROJECT DESCRIPTION

### 6.1. Site location

The SR PVP and associated infrastructure is proposed for development on the Remaining Extent of Portion 4 of the Farm Vogelstruisfontein 231IQ with a total size of 65.78ha (larger property), located in Roodepoort area within the City of Johannesburg municipal district. (Fig. 2 and Table 6). The project will be constructed on a portion of the larger property, 16.616ha portion, which will be leased by the Applicant from the land owner. During the construction phase, access to the property will be via a constructed temporary gravel access road from Hebbard Road, off Main Reef Road. The permanent access road to the site for the operational phase of the site will be via Kloppers street, off Albertina Sisulu road.

### 6.2. Development proposal

#### 6.2.1. SR PVP

The SR PVP is proposed to include several arrays of photovoltaic (PV) panels as well as utility scale integrated storage system (60MWh of flow battery storage) with a combined export capacity limit of 9.9 MW (Fig. 2 and Fig. 3). The infrastructure proposed for the development includes, but not limited to:

- PV array comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fixed hardware, protection systems i.e. masts and electronics)
- 7000m<sup>2</sup> hard standing battery storage facility platform. Fifteen 1MW/4MWh vanadium flow batteries (total capacity of 60MWh) housed in 40ft containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment)
- Inverters, transformers and switchgear with integrated battery storage
- An on-site substation consisting of a 40ft container split with Project and City Power equipment in each respective section of the substation. 33kV transmission line buried from City Power substation to:
  - Option A: Florida substation (±47m – yellow line) or
  - Option B: Sentraal substation connecting into City Power's 33kV (±1.7 km – blue & green line) (Figure 2)
- Cabling between the project components
- Pre-fabricated housing for administration offices, security and guard houses, maintenance and storage
- Temporary construction laydown area of approximately 1ha
- Internal gravel service roads constructed by removing 300mm topsoil and backfilling with type 1 crushed stone, compacted to 97% Mod Ashto. Roads shall ± 4m in width cantilevered either side for storm water run-off
- Raw water storage tank

- Project primary and/or secondary access road/s, associated access point/s, internal distribution roads and crossings
- Fencing and perimeter security system around the project development footprint, and all other necessary related infrastructure.

The interconnection solution for the proposed project will evacuate the power generated by the SR PVP via a 33kV power line from the on-site Project Substation and City Power substation to the existing City Power Florida (Option A) or Sentraal substation (Option B). Approval in principle to connect to both substations have been provided by City Power, subject to a technical evaluation and review.

The SR PVP interconnection infrastructure will comprise of the following:

- SR PVP substation and City Power substation both housed in a single 40ft container measuring 12.5m x 3m x 3m
- 33kV MV XLPE 300mm copper cable buried and secured (concrete) minimum depth 1m from City Power Substation to either substation Florida (circa 100 m length) or Sentraal substation (circa 1.2km west) of the proposed site
- 48 Core optical ground wire
- One additional breaker in the existing Florida and Sentraal substations;
- Cable trenches and cabling
- One 25m lighting/lightning masts
- Short access roads to the substations
- Standard control room located within the combined 40ft container substation
- Control Plant, AC/DC, Metering, SCADA and Telecoms
- The proposed transmission line will be a City Power owned asset, and only constructed by the Applicant under a self-build agreement with City Power.

### 6.2.2. Transmission line corridors

The point of interconnection for the proposed 33kV buried power transmission line is still under investigation and has not been concluded. Two interconnection options are provided below (**Error! Reference source not found.**):

- Option A) Florida substation ( $\pm 47$  meters – Yellow line) located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent)
- Option B) Sentraal substation connecting into City Power's 33kV ( $\pm 1.7$ km – Blue & green line) located on located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent) and Vogelstruisfontein 231IQ, portion 152

The exact location of the transmission lines is still under investigation however Table 6 represents the approximate centre line of the envisaged transmission line corridor. Variation off this centre line (if required) will be limited to 25m in radius either side.

Once the evacuation point has been agreed (between City Power & SolarReserve) and environmental authorisation received from GDARD, the selected transmission line route will be constructed by SolarReserve's EPC Contractor. Ownership and further responsibility for the transmission line will then be past across to City Power.

### 6.2.3. Associated Project Services

Services required for the SR PVP will include:

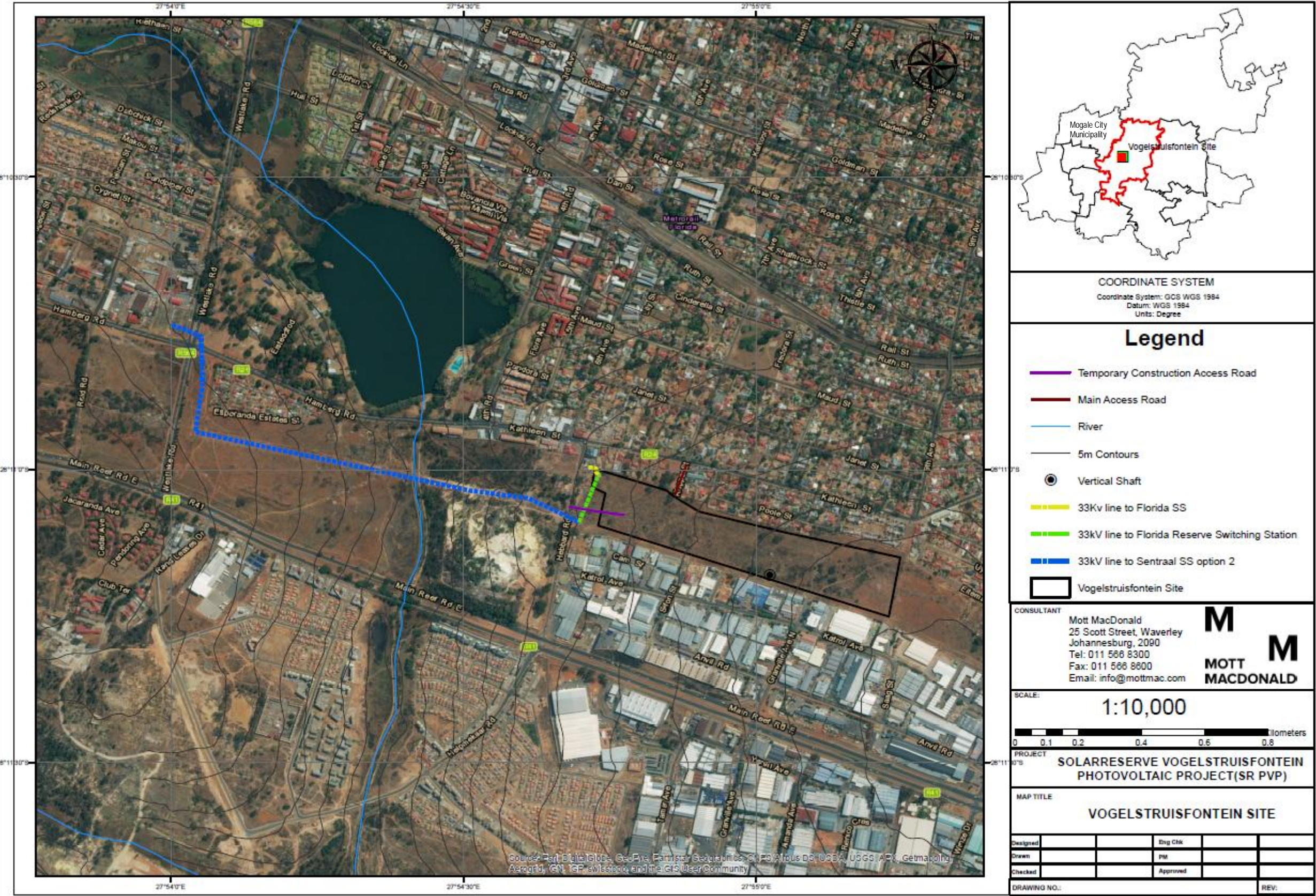
- **Waste Management** - all refuse material generated from the proposed development will be collected by a contractor and disposed of at a licensed waste disposal site. It is most likely that the waste will be disposed of at the Marie Louise landfill site. This service will be arranged with the municipality and/or waste management services provider when required.
- **Sanitation** – The project will construct and utilise its own sanitation services as the City of Johannesburg Municipality does not service the project site. All sewage/effluent water originating from the facilities will be managed utilising temporary portable chemical toilets during construction and via a portable modular sewage treatment facilities (package plants) during operations. The volume of sewage proposed during the operational phase will be very low – with only security personnel occupying the site full time. Operational

and Maintenance Contractors will periodically visit the site for facility maintenance when required.

- **Water** - Water for the construction phase will be transported to the site, using water tankers. During the operational phase, the need is minimal and will be trucked to site.
- **Construction electricity** – the use of generators will be required during the construction phase of the plant.
- **Operational power** – power for all auxiliary power services shall be drawn from the 33kV connection to the City Power network. On site step-down auxiliary transformers will step down the 33kV supply to 400V.
- **Storm Water Management** – Based on the planned construction activities, no significant scaled ground works will act to change the flow of surface water across the site other than the gravel access roads to the infrastructure. The existing grass vegetation will be retained as far as possible and managed as stipulated in the Environmental Management Programme report (EMPr). No asphalt or layer works will cover any section of the site requiring storm water channelling and associated drainage. Surface water on site is thus anticipated to naturally infiltrate and drain in alignment with the existing topography of the site. A storm water management plan will be implemented where compaction of soils takes place i.e. roads, and where severe flow changes is expected based on panel direction.



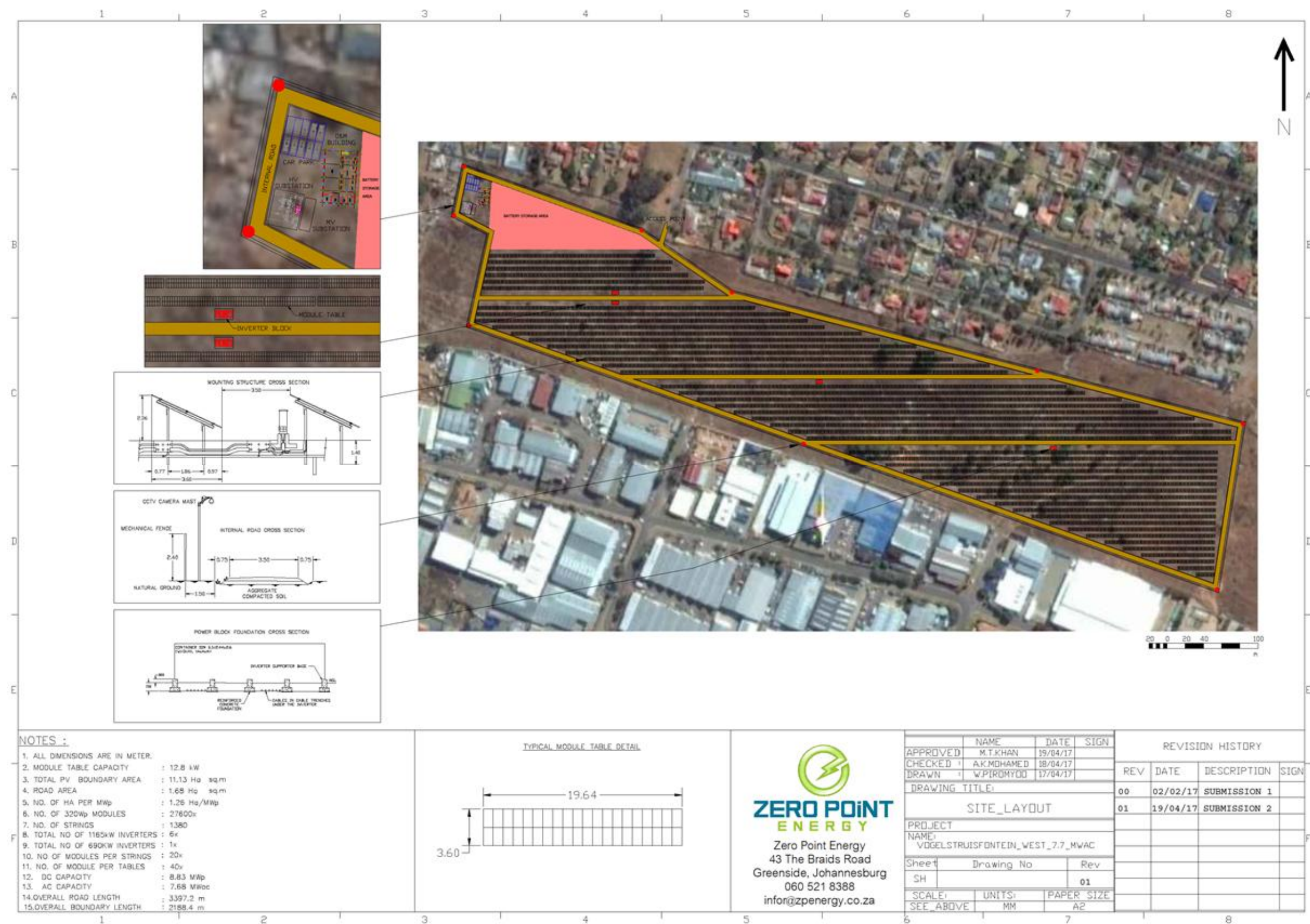
Figure 2: Location of the proposed SR PVP Project and Associated Transmission Line Corridors



Source: Mott MacDonald, 2017



Figure 3: Proposed Site Infrastructure Layout



Source: Zero Point Energy, 2017

**Table 2: GPS coordinate locations of the proposed transmission line route options**

<b>OPTION A: 33kV line to Florida SS: total length 47m</b>		
Starting point of the activity	26°11'0.37"S	27°54'43.86"E
Middle point of the activity	26°10'59.84"S	27°54'43.60"E
End point of the activity	26°10'59.55"S	27°54'42.99"E
<b>Note:</b> No significant turning points are anticipated for the yellow route transmission line as the route is an approximate straight-line connection		
<b>OPTION B: 33kV line to Sentraal SS: total length 1515m</b>		
Starting point of the activity	26°10'45.08"S	27°54'0.31"E
Turning point 1	26°10'46.32"S	27°54'3.11"E
250 m	26°10'51.74"S	27°54'3.36"E
Turning point 2	26°10'56.12"S	27°54'2.53"E
500 m	26°10'57.04"S	27°54'6.50"E
750 m	26°10'58.84"S	27°54'15.42"E
1000 m	26°11'0.87"S	27°54'24.43"E
1250 m	26°11'2.64"S	27°54'32.89"E
1500 m	26°11'5.27"S	27°54'41.23"E
End point of the activity	26°11'5.33"S	27°54'41.81"E
Starting point of the activity	26°10'45.08"S	27°54'0.31"E
<b>Option B continued: 33kV line to Florida Solar Reserve Switching Station: total length 152m</b>		
Starting point of the activity	26°11'5.33"S	27°54'41.81"E
Middle point of the activity	26°11'3.02"S	27°54'42.78"E
End point of the activity	26°11'0.41"S	27°54'43.87"E

Source: Mott MacDonald, 2017

## 7. SITE SIGNIFICANCE AND ASSESSMENT

### 7.1. Heritage assessment criteria and grading

The National Heritage Resources Act, Act no. 25 of 1999, stipulates the assessment criteria and grading of heritage sites. The following grading categories are distinguished in Section 7 of the Act:

**Table 3: Site Grading System.**

<b>SAHRA Cultural Heritage Site Significance</b>			
Field Rating	Grade	Significance	Recommended Mitigation
National Significance	Grade I	High significance	Conservation by SAHRA, national site nomination, mention any relevant international ranking. No alteration whatsoever without permit from SAHRA
Provincial Significance	Grade II	High significance	Conservation by provincial heritage authority, provincial site nomination. No alteration whatsoever without permit from provincial heritage authority.
Local Significance	Grade III-A	High significance	Conservation by local authority, no alteration whatsoever without permit from provincial heritage authority. Mitigation as part of development process not advised.
Local Significance	Grade III-B	High significance	Conservation by local authority, no external alteration without permit from provincial heritage authority. Could be mitigated and (part) retained as heritage register site.
Generally Protected A	Grade IV-A	High/medium significance	Conservation by local authority. Site should be mitigated before destruction. Destruction permit required from provincial heritage authority.
Generally Protected B	Grade IV-B	Medium significance	Conservation by local authority. Site should be recorded before destruction. Destruction permit required from

SAHRA Cultural Heritage Site Significance			
Field Rating	Grade	Significance	Recommended Mitigation
			provincial heritage authority.
Generally Protected C	Grade IV-C	Low significance	Conservation by local authority. Site has been sufficiently recorded in the Phase 1 HIA. It requires no further recording before destruction. Destruction permit required from provincial heritage authority.

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

## 7.2. Methodology for the assessment of environmental impacts

### 7.2.1. Assessment of impact significance

For each specialist chapter, the assessment will identify impacts and report the likely significant environmental or social impacts. The criteria for determining significance are specific for each environmental and social aspect and will be defined in the relevant specialist chapters. In broad terms, it can be characterised as the product of the degree of change predicted (the magnitude of impact) and the value of the receptor/resource that is subjected to that change (sensitivity of receptor). For each impact, the likely magnitude of the impact and the sensitivity of the receptor are defined, quantitatively to the extent possible. Generic criteria for the definition of magnitude and sensitivity are summarised below.

### 7.2.2. Magnitude Criteria

The assessment of impact magnitude is undertaken in two steps. Firstly, the identified impacts of the Project are categorised as beneficial or adverse. Secondly, impacts are categorised as major, moderate, minor, or negligible based on consideration of parameters such as:

- Duration of the impact – ranging from ‘beyond decommissioning’ to ‘temporary with no detectable impact’
- Spatial extent of the impact – for instance, within the site boundary, within district, regionally, nationally, and internationally
- Reversibility – ranging from ‘permanent thus requiring significant intervention to return to baseline’ to ‘no change’
- Likelihood – ranging from ‘occurring regularly under typical conditions’ to ‘unlikely to occur’
- Compliance with legal standards and established professional criteria – ranging from ‘substantially exceeds national standards or international guidance’ to ‘meets the standards’ (i.e. impacts are predicted to be less than the standard would allow)

Table 4 presents generic criteria for determining impact magnitude (for adverse impacts). Each detailed assessment will define impact magnitude in relation to its environmental or social aspect.

**Table 4: Criteria for Determining Impact Magnitude**

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Industry Practice (GIIP) without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but small change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

Source: Mott MacDonald, 2017

### 7.2.3. Sensitivity criteria

Sensitivity is specific to each aspect and the environmental resource or population affected, with criteria developed from baseline information. Generic criteria for determining sensitivity of receptors are outlined in Table 5. Each detailed assessment will define sensitivity in relation to its environmental or social aspect.

**Table 5: Criteria for Determining Sensitivity of a Receptor**

Category	Description
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes and/or minimal opportunities for mitigation.
Medium	Receptor with little capacity to absorb proposed changes and/or limited opportunities for mitigation.
Low	Receptor with some capacity to absorb proposed changes and/or reasonable opportunities for mitigation.
Negligible	Receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation.

Source: Mott MacDonald, 2017

### 7.2.4. Impact Evaluation

Likely impacts are evaluated taking into account the interaction between the magnitude and sensitivity criteria as presented in the impact evaluation matrix in Table 6.

**Table 6: Impact Evaluation Matrix**

		Magnitude						
		Adverse				Beneficial		
		Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Sensitivity	High	Major	Major	Moderate	Negligible	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
	Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor



## 8. DESCRIPTION OF THE AFFECTED ENVIRONMENT

### 8.1. Site description

The geology of the region is underlain quartzite and conglomerate of the Johannesburg formation, the Turfontein subgroup and the Central Rand Supergroup. The original vegetation is classified as Rocky Highveld Grassland, but, due to mining activities and urban development, this has been degraded with few vestiges of the original remaining. The topography of the region is classified as hills and lowlands. A number of unnamed streams all drain in a southern direction.

As the land is vacant and unmaintained, many areas on site are being used on a regular basis for illegal dumping of waste including: garden waste, waste construction materials, building rubble and general domestic waste (Fig. 4).

**Figure 4. Views of the SR PVP site.**



In some places, the remains of what might have been early mining features were located. These are concrete slabs, probably serving as foundations for buildings, and concrete pedestals, probably to house structures such as hoisting gears. Some back-filled holes that might have been vertical shafts were also identified on site.

**Figure 5. Structures on the proposed SR PVP site.**

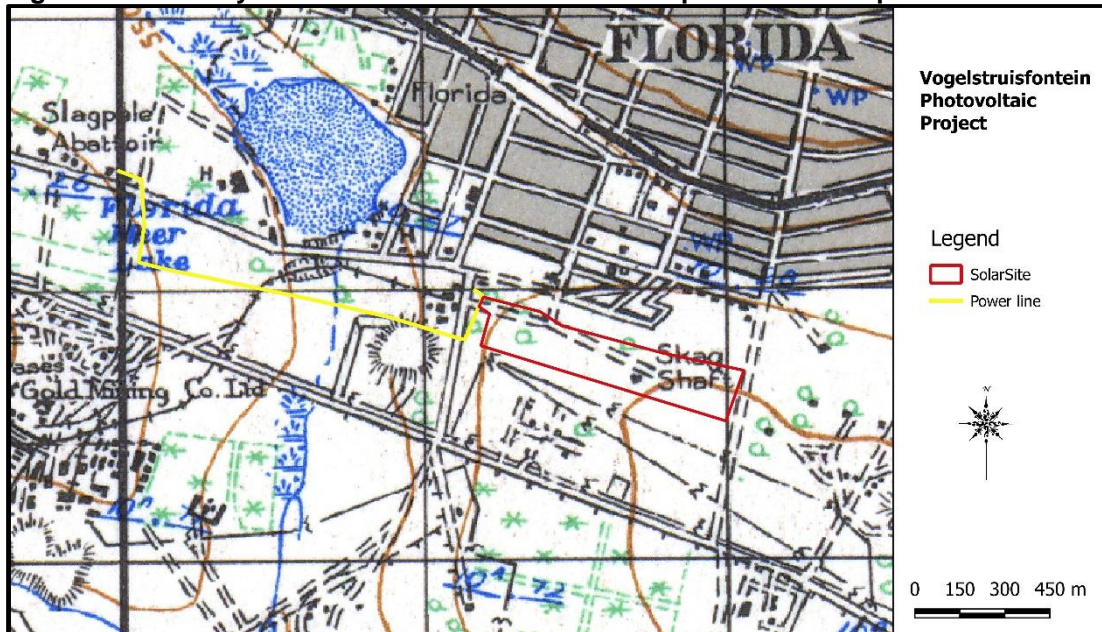


The same situation holds true for the area over which the power line route will cross. The eastern section of the transmission line corridor is highly degraded by waste dump. This is most probably linked to the informal waste recycling businesses that take place along Hebbart Street. During the site visit, there was evidence of people burning off the plastic cover on 'electricity' wire. The original stream bed crossing the area was formalised in 2012 with a concrete channel, forming an effective barrier



**Figure 6. Views of the transmission line corridor – power line route option B.**

From the 1943 version of the topocadastral map in Fig. 7 it can be seen that only a mine shaft and associated access road existed on the SR PVP. In the area where the power line is to cross, apart from a slimes dump, that still partially exists today, no other structures occurred.

**Figure 7. The study area on the 1943 version of the topocadastral map.**

Source: Map 2627BB: Chief Surveyor-General, 1943



## 8.2. Overview of the surrounding region

The aim of this section is to present an overview of the history of the larger region (i.e. City of Johannesburg and Mogale City – Fig 2) to eventually determine the significance of heritage sites identified in the study area, within the context of their historic, aesthetic, scientific and social value, rarity and representivity – see Section 3.2 and Appendix 3 for more information.

It is said that cultural landscapes cannot be destroyed, but their integrity is eroded and their character changed through development. This change is evident in the landscape surrounding the SR PVP and transmission line corridor.

The landscape qualities of the Witwatersrand Gold Fields, is probably one of the region's in the world that, over a period of approximately 20 years after the discovery of gold in 1886, went from Stone Age and Iron Age communities practicing very low subsistence based economies to one of the most heavily industrialised regions. As the mines closed down, the landscape underwent drastic change, with urbanisation and small business becoming the defining character.

### 8.2.1. Stone Age

The larger region including the City of Johannesburg and Mogale City (Fig. 2) have been inhabited by different hominids since early Pliocene times, but it was only from about 2.5 million years ago that they started to produce stone tools, effectively beginning the Early Stone Age (ESA) (Pollarolo *et al* 2010). During Middle Stone Age (MSA) times (c. 150 000 - 30 000 BP), people became more mobile, occupying areas formerly avoided.

During the Late Stone Age (LSA) people had even more advanced technology than the MSA people, and therefore succeeded in occupying even more diverse habitats. Also, for the first time we now find evidence of human activities deriving from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA. A number of sites dating to this period have been studied by Wadley (1987) in the Magaliesberg area. In the case of the LSA people, they have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes.

### 8.2.2. Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom - located south of Hartebeespoort Dam just outside of the World Heritage area - dating to AD 470, (Mason 1974; Huffman 1990). Having only had cereals (sorghum, millet) that needed summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area.

The occupation of the region by Iron Age communities did not start much before the 1500s. Due to climatic fluctuations, bringing about colder and drier conditions, people were forced to avoid this area. Following a dry spell that ended just before the turn of the millennium the climate became better again until about AD 1300. This coincided with the arrival of the ancestors of the present-day Sotho-, Tswana- and Nguni-speakers in southern Africa, which forced the Iron Age Settlers to avoid large sections of the interior (Dreyer 1995; Mason 1986). A number of sites dating to this period have been excavated by Prof Revil Mason (1986) in the larger region, to the east and northeast of the development site.

### 8.2.3. Historic period

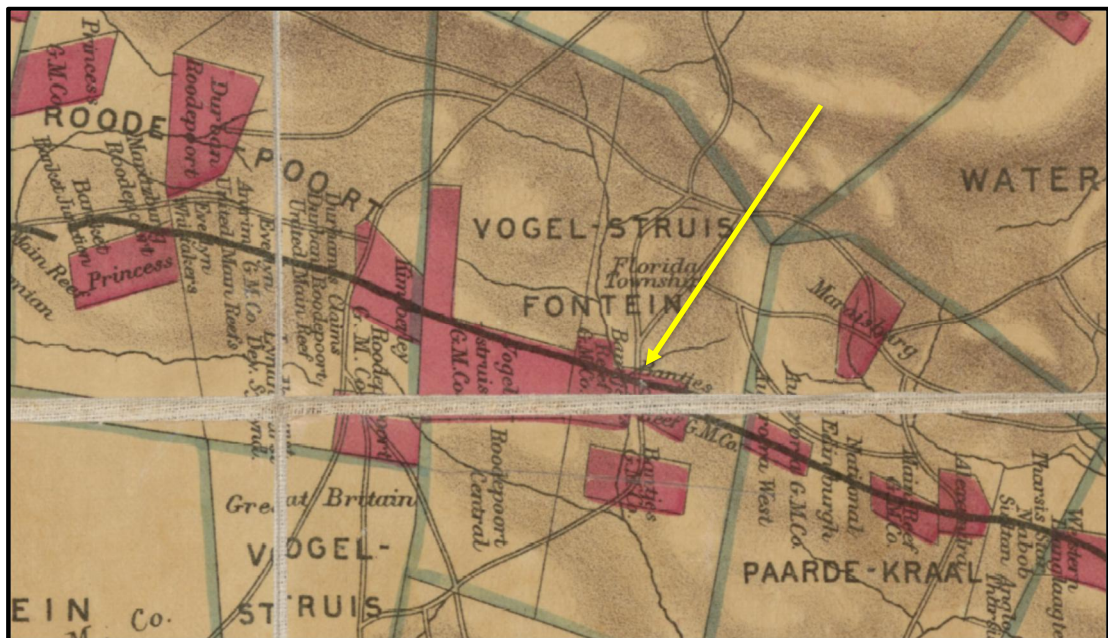
It is documented that originally the Voortrekkers who settled in the region occupied themselves with farming. One of the oldest gold mines was established in 1874 at Blaauwbank and another in 1891 on the farm Kromdraai. After the discovery of gold on the Witwatersrand, exploration also began in this area, e.g. the well-known Harry and Fred Struben were exploring in the Sterkfontein area during 1884. By 1895 the lime quarry had developed and the fossil-bearing caves were well known. However, it was more than forty years later, in 1936, that Robert Broom first identified the remains of a number of fossil hominids.

The Struben brothers, Fred and Henry, are largely credited with the discovery of gold in the Witwatersrand. In 1884 they formed the Sterkfontein Junction Mining Syndicate to work on the farms Sterkfontein and Swartkrans. In 1885 they obtained a concession for Wilgespruit and this was soon followed up by taking up a lease on Vogelstruisfontein.

Apart from the Struben brothers prospecting in the larger region, a prospector named Jan Bantjes secured prospecting right on the farm Roodepoort – he discovered gold on the farm in 1886 (Fig. 8). In the same year, gold was also discovered on Paardekraal. On 15 September 1886, along with the farms that was to become Johannesburg, the farms Paardekraal, Vogelstruisfontein and Roodepoort were proclaimed a goldfield. Soon afterwards the Main Reef Leader was identified on Vogelstruisfontein (Mendelsohn & Potgieter 1986).

Between 1886 and 1888 four mining towns, Roodepoort, Florida, Hamberg and Maraisburg developed on these farms. In 1977 Roodepoort was granted city status (Brodie 2008).

**Figure 8. Vogelstruisfontein on Troy's map dating 1890, showing the Bantjes and Vogelstruisfontein mines**



Source: Troy's Map, 1890

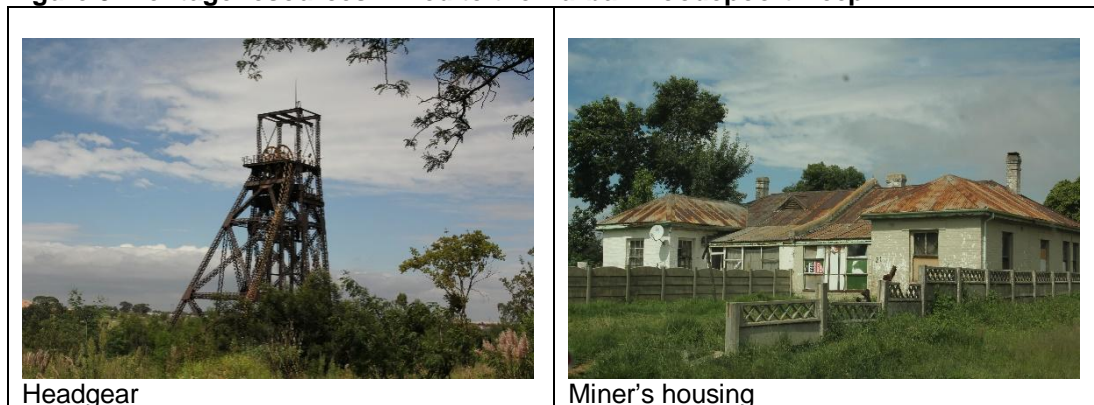
As the mines had to dig deeper to reach the gold bearing layers (Fig. 8), they soon ran out of money to finance the excavation. However, over time the price of gold increased, it again became feasible/affordable to mine. In 1933 a new mining group – Anglo-Transvaal Consolidated Investment Company Limited was established. They had pegged claims on various properties, e.g. the old Vogel Deep Mine, Vogelstruis Estate (where the Strubens pegged their claims in 1886) and the Bantjes Consolidated Mines, all of which had ceased

operations by the late 1910s. This new venture became Rand Leases Gold Mine and was one of the first ventures in which the public at large were allowed to subscribe for a portion on the shares (Cartwright 1962).

By the late 1940s a number of mines, including Durban Roodepoort Deep Gold Mine, Rand Leases Gold Mine and Consolidated Main Reef Gold Mine, all located in the vicinity of the study region, reached depths of 8 000ft (2 450m) allowing them access to reefs such as Ventersdorp Contact and Carbon Leader (Cartwright 1962:319).

However, rising costs, lower ore content and difficult mining challenges forced many of the mines to finally close down by the early 1960s, with the Durban Roodepoort Deep Mine lasting until 1993 (Fig. 9). DRD were experts in mining the various reefs, especially the Kimberley Reef, probably giving rise to the old shaft now referred to as the Kimberley Shaft.

**Figure 9. Heritage resources linked to the Durban Roodepoort Deep.**



Note: These sites are not located inside the study area.

### 8.3. 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.

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

- Mitigation
- Avoidance
- Compensation
- Enhancement (positive impacts)
- Rehabilitation
- Interpretation
- Memorialisation

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 7 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.

**Table 7. Potential Risk Sources.**

	Activity	Description	Risk
Issue 1	Removal of Vegetation	Vegetation removal for site preparation and the installation of required infrastructure, e.g. access roads and water pipelines.	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.
Issue 2	Construction of required infrastructure, e.g. access roads, power line (cabled)	Construction machinery and vehicles will be utilised to construct the required infrastructure, e.g. access roads and power lines (cabled)	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.

#### 8.4. Identified heritage sites

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 8 below:

##### 8.4.1. Identified sites of significance

During the site visit no sites, features and objects of cultural significance were identified in the study area.

###### 8.4.1.1 Stone Age

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

###### 8.4.1.2 Iron Age

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

###### 8.4.1.3 Historic period

No sites, features or objects dating to the historic period were identified in the study area.

As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development (Table 8).

**Table 8: Impacts on identified Heritage Sites**

Heritage sites	Significance of impact	Mitigation measures
Solar reserve site: Construction Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
Power line route: Operation Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

#### 8.5. Comparison of alternatives

No alternatives were considered. However, in terms of knowledge and understanding of the immediate heritage landscape, sites and features in the region, the potential sources of risk

would be the same for any alternative located within a reasonable distance of the original prospecting sites.

### 8.6. 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 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 mining activities:

- (1) Avoidance: This is viewed to be the primary form of mitigation. 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
  - 5 metres for a single grave, to
  - 50 metres where the boundaries are less obvious, e.g. a Late Iron Age site.
- (2) Archaeological investigation: This option can be implemented with additional design and construction inputs. 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 have to be adhered to.
    - § Impacts can be beneficial – e.g. mitigation contribute to knowledge
- (3) Rehabilitation: When features, e.g. buildings or other structures, e.g. bridges, are to be re-used. 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.
  - It is recommended that detail plan drawings are made (if the originals cannot be located) and that the current situation is photographed in detail.
    - § This approach automatically also leads to the enhancement of the sites or features that are re-used.
- (4) 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.

## 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.

### 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:

- The EPC Contractor will be tasked with the preservation and responsibility for 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 EPC Contractor who are specifically authorised to enter such areas.
- 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 9: Environmental Management Programme for the project:**

<b>Construction</b>			
<b>Action required</b>	Protection of heritage sites, features and objects		
<b>Potential Impact</b>	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.		
<b>Risk if impact is not mitigated</b>	Loss or damage to sites, features or objects of cultural heritage significance		
<b>Activity / issue</b>	<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1	Environmental Control Officer	During construction only
<b>Monitoring</b>	See discussion in Section 9.2		

<b>Operation</b>			
<b>Action required</b>	Protection of heritage sites, features and objects		
<b>Potential Impact</b>	It is unlikely that the negative impacts identified for pre-mitigation will occur if the recommendations are followed.		
<b>Risk if impact is not mitigated</b>	Loss or damage to sites, features or objects of cultural heritage significance		
<b>Activity / issue</b>	<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1	Environmental Control Officer	During construction only
<b>Monitoring</b>	See discussion in Section 9.2		

## 10. RECOMMENDATIONS

The receiving environment is categorised as being highly disturbed and developed transforming from Stone Age and Iron Age communities practicing very low subsistence based economies to heavily industrialised practices in a very short period of time. In recent years, the landscape is again being transformed, changing to urban, commercial and light industrial activities.

- During the desktop and field assessment no sites, features or objects of cultural heritage significance were identified in the study area (i.e. SR PVP project footprint and transmission line corridor). As such, there would be no impact as a result of the proposed development.

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

- From a heritage point of view, it is recommended that the SR PVP be allowed to continue on acceptance of the proposed mitigation measures, where applicable.

Conditions for inclusion in the environmental authorisation:

- 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.

**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**

Acocks, J.P.H. 1975. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No. 40. Pretoria: Botanical Research Institute.

Brodie, N. (ed.) 2008. *The Joburg Book: a guide to the city's history, people and places*. Northlands: Pan MacMillan.

Du Piesanie, J. 2014. *Mining Rights Application for Reclamation of the Soweto Cluster Dumps, Roodepoort, Gauteng Province*. Unpublished report. Randburg: Digby Wells.

Handley, J.R.F. 2004. *Historic overview of the Witwatersrand Goldfields*. Howick: RF Handley

Horn, A.C. 1996. Okkupasie van die Bankeveld voor 1840 n.C.: 'n sintese. *South African Journal of Ethnology* 19(1):17-27.

Huffman, T.N. 1990. Broederstroom and the origins of cattle-keeping in southern Africa. *African Studies* 49(2): 1-12.

James, H. 2000. *The engravings of several portions of the farm Doornkloof 393JQ along the Magaliesberg Range*. Unpublished MA thesis. Pretoria: University of Pretoria.

Mason, R.J. 1969. *Prehistory of the Transvaal*. Johannesburg: Witwatersrand University Press

Mason, R.J. 1986. *Origins of the Black People of Johannesburg and the southern western central Transvaal AD 350-1880*. Occasional Paper No. 16. Johannesburg: Archaeological Research Unit, University of the Witwatersrand.

Mendelsohn, F. & Potgieter, C.T. (reds.). 1986. *Guidebook to Sites of Geological and Mining Interest on the Central Witwatersrand*. Johannesburg: The Geological Society of South Africa.

Municipal Council of Krugersdorp. 1936. *Krugersdorp, Capital of the Western Witwatersrand*. Official Illustrated Handbook. Krugersdorp: The Municipal Council of Krugersdorp

Praagh, L.V. (ed.) 1906. *The Transvaal and its Mines*. London: Praagh & Lloyd.



Van Schalkwyk, J.A. 2003. *A Survey of Heritage Resources in the Proposed Dobsonville X9 Development, Dobsonville, Soweto*. Unpublished report 2003KH023

Van Schalkwyk, J. 2004. *Heritage Impact Assessment for the Proposed Waste Blending Platform Project, Roodepoort District, Gauteng*. Unpublished report 2004KH045.

Van Schalkwyk, J.A. 2017. Phase 1 Cultural Heritage Impact Assessment: The proposed cemetery development in Witpoortjie Extension 71, City of Johannesburg Metropolitan Municipality, Gauteng Province. Unpublished report 2017/JvS/002.

Van Vuuren, C.J. & Van Schalkwyk, J.A. 2005. *Survey report of sites of cultural significance in the Mogale City municipal area, Gauteng*. African Centre for Arts, Culture and Heritage Studies, University of South Africa.

### 11.3 Maps and aerial photographs

Google Earth

1: 50 000 Topocadastral maps

Map of the Pretoria and Heidelberg Gold Fields, 1887

Troye's Map of the Witwatersrandt Gold Fields, 1890

**APPENDIX 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.

**APPENDIX 2. SPECIALIST COMPETENCY**Johan (Johnny) van Schalkwyk

J 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, Northern Cape, 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.

A complete *curriculum vitae* can be supplied on request.

### APPENDIX 3. CONVENTIONS USED TO ASSESS 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.

#### Significance

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

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

1. 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 A: High/medium significance - Should be mitigated before destruction	
6.	Generally protected B: Medium significance - Should be recorded before destruction	
7.	Generally protected C: Low significance - Requires no further recording before destruction	

**APPENDIX 4. RELEVANT LEGISLATION**

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

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

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

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

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

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

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

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

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

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

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

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

The National Heritage Resources Act (Act no 25 of 1999) stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation, and which prescribes heritage resources assessment criteria, consistent with the criteria set out in section 3(3), which must be used by a heritage resources authority or a local authority to assess the intrinsic, comparative and contextual significance of a heritage resource and the relative benefits and costs of its protection, so that the appropriate level of grading of the resource and the consequent responsibility for its management may be allocated in terms of section 8.

Presenting archaeological sites as part of tourism attraction requires, in terms 44 of the Act, a Conservation Management Plan as well as a permit from SAHRA.

(1) Heritage resources authorities and local authorities must, wherever appropriate, co-ordinate and promote the presentation and use of places of cultural significance and heritage resources which form part of the national estate and for which they are responsible in terms of section 5 for public enjoyment, education, research and tourism, including-

- (a) the erection of explanatory plaques and interpretive facilities, including interpretive centres and visitor facilities;
- (b) the training and provision of guides;
- (c) the mounting of exhibitions;
- (d) the erection of memorials; and
- (e) any other means necessary for the effective presentation of the national estate.

(2) Where a heritage resource which is formally protected in terms of Part I of this Chapter is to be presented, the person wishing to undertake such presentation must, at least 60 days prior to the institution of interpretive measures or manufacture of associated material, consult with the heritage resources authority which is responsible for the protection of such heritage resource regarding the contents of interpretive material or programmes.

(3) A person may only erect a plaque or other permanent display or structure associated with such presentation in the vicinity of a place protected in terms of this Act in consultation with the heritage resources authority responsible for the protection of the place.

**APPENDIX 5. INVENTORY OF IDENTIFIED CULTURAL HERITAGE SITES**

Nil