



**SiVEST SA (PTY) LTD**

**PROPOSED CONSTRUCTION OF THE  
LEEUDORINGSTAD 132KV POWERLINE, NORTH  
WEST PROVINCE, SOUTH AFRICA**

## Heritage Impact Assessment

**DEFF Reference:** TBA  
**Report Prepared by:** PGS Heritage Pty Ltd  
**Issue Date:** 9 November 2022  
**Version No.:** 2.0

### Declaration of Independence

- I, Nikki Mann, declare that –
- General declaration:
- I act as the independent heritage practitioner in this application
- I will 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
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, 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 will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- 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 will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

### Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

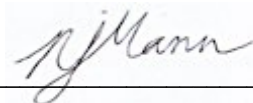
**HERITAGE CONSULTANT:** PGS Heritage (Pty) Ltd

**CONTACT PERSON:** Nikki Mann - Archaeologist

Tel: +27 (0) 12 332 5305

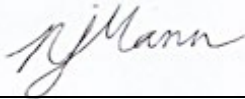

Email: nikki@pgsheritage.co.za

**SIGNATURE:**



\_\_\_\_\_

**ACKNOWLEDGEMENT OF RECEIPT**

<b>Report Title</b>	PROPOSED CONSTRUCTION OF THE LEEUDORINGSTAD 132KV POWERLINE, NORTH WEST PROVINCE, SOUTH AFRICA		
<b>Control</b>	<b>Name</b>	<b>Signature</b>	<b>Designation</b>
<b>Author</b>	<b>Nikki Mann</b>		<b>Archaeologist/ PGS Heritage</b>
<b>Reviewed</b>	<b>Wouter Fourie</b>		<b>Principal Heritage Specialist</b>
<b>Reviewed</b>			<b>SiVEST/Environmental Division</b>

<b>Date:</b>	9 November 2022
<b>Document Title:</b>	Heritage Impact Report
<b>Author:</b>	Nikki Mann
<b>Revision Number:</b>	2.0
<b>Checked by:</b>	
<b>For:</b>	SiVEST Environmental Division

*PGS confirms that this HIA report is done in accordance with the QMS implemented by PGS Heritage. The report structure and format followed is that of SIVEST Environmental as per the appointment scope and deliverable of SIVEST. The authors did implement the PGS HIA SOP and requirements.*

# SiVEST SA (PTY) LTD

## PROPOSED CONSTRUCTION OF THE LEEUDORINGSTAD 132KV POWERLINE, NORTH WEST PROVINCE, SOUTH AFRICA

### HERITAGE IMPACT ASSESSMENT

#### EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by SiVest (PTY) Ltd (hereafter referred to as “SiVEST”), on behalf of Upgrade Energy Africa (Pty) Ltd (hereafter referred to as “Upgrade Energy”), to undertake a Heritage Impact Assessment (HIA) as part of the Basic Assessment (BA) for the proposed construction of the Leeudoringstad 132kV powerline in the North West Province of South Africa.

#### 1. SITE NAME

The Leeudoringstad 132kV powerline

#### 2. SITE LOCATION AND DESCRIPTION

The following section details the layout area that was originally surveyed during the field assessment.

##### 2.1 Location

The proposed 132kV powerline will connect the Leeubosch Traction Substation to the Vaal reef ten Substation. It is located approximately 3km east of Leeudoringstad, within the Maquassi Hills Local Municipality within the Dr Kenneth Kaunda District Municipality in the North West Province (**Figure 1**). The powerline will be approximately 42km long, depending on the exact route taken. The GPS co-ordinates for the two proposed powerline alternatives:

Alternative 1 (Preferred): S -27.20343°, E 26.30841°

Alternative 2: S -27.20477°, E 26.31596°

The farm portions traversed by the proposed power lines includes:

Farm Name	Site Extent (Farm Area)
Farm Leeuwbosch No. 44 Portion 37	125.94ha
Farm Leeuwbosch No. 44 Portion 38	132.12ha
Farm Leeuwbosch No. 44 Portion 47	648.93ha
Farm Zwartlaagte No. 46 Portion 14	366.6ha
Farm Zwartlaagte No. 46 Portion 06	423.97ha

<b>Farm Name</b>	<b>Site Extent (Farm Area)</b>
Farm Matjiespruit No. 145 Portion 00	660.97ha
Farm Nevada Vaal No. 48 Portion 00	1524.01ha
Farm Klerksdrift No. 16 Portion 02	1396.53ha
Farm Klerksdrift No. 16 Portion 08	520.31ha
Farm Klerksdrift No. 16 Portion 05	644.82ha
Farm Yzerspruit No. 113 Portion 05	110.92ha
Farm Yzerspruit No. 113 Portion 36	123.82ha
Farm Yzerspruit No. 113 Portion 06	119.35ha
Farm Yzerspruit No. 113 Portion 00	200.70ha
Farm Wolvehuis No. 114 Portion 03	148.60ha
Farm Wolvehuis No. 114 Portion 36	296.85ha
Farm Wolvehuis No. 114 Portion 25	379.73ha
Farm Wolvehuis No. 114 Portion 06	405.05ha
Farm Wolvehuis No. 114 Portion 07	344.35ha
Farm Wolvehuis No. 114 Portion 21	394.72ha
Farm Wolvehuis No. 114 Portion 20	269.48ha
Farm Goedgenoeg No. 433 Portion 11	204.38ha
Farm Goedgenoeg No. 433 Portion 12	41.04ha
Farm Goedgenoeg No. 433 Portion 33	43.67ha
Farm Goedgenoeg No. 433 Portion 81	245.85ha
Farm Goedgenoeg No. 433 Portion 15	125.02ha
Farm Goedgenoeg No. 433 Portion 46	84.52ha
Farm Goedgenoeg No. 433 Portion 18	86.32ha
Farm Goedgenoeg No. 433 Portion 67	4.35ha
Farm Goedgenoeg No. 433 Portion 89	55.67
Farm Goedgenoeg No. 433 Portion 27	112.18ha
Farm Leeuwbosch No. 44 Portion 04	
Farm Goedgenoeg No. 433 Portion 24	



**Figure 1: Locality of the study area.**

## 2.2 Proposed Development Description

There are two proposed alternatives to connect the Leeuwbosch Traction Substation to the Vaal Reef ten Substation. The dedicated 132 kV power line will connect the Solar plant to Vaal reef ten Substation. The powerline will be around 42 km long depending on the exact route. The servitude width for a 132kV distribution line is 31m (15.5m on either side of the centre line of the power line).

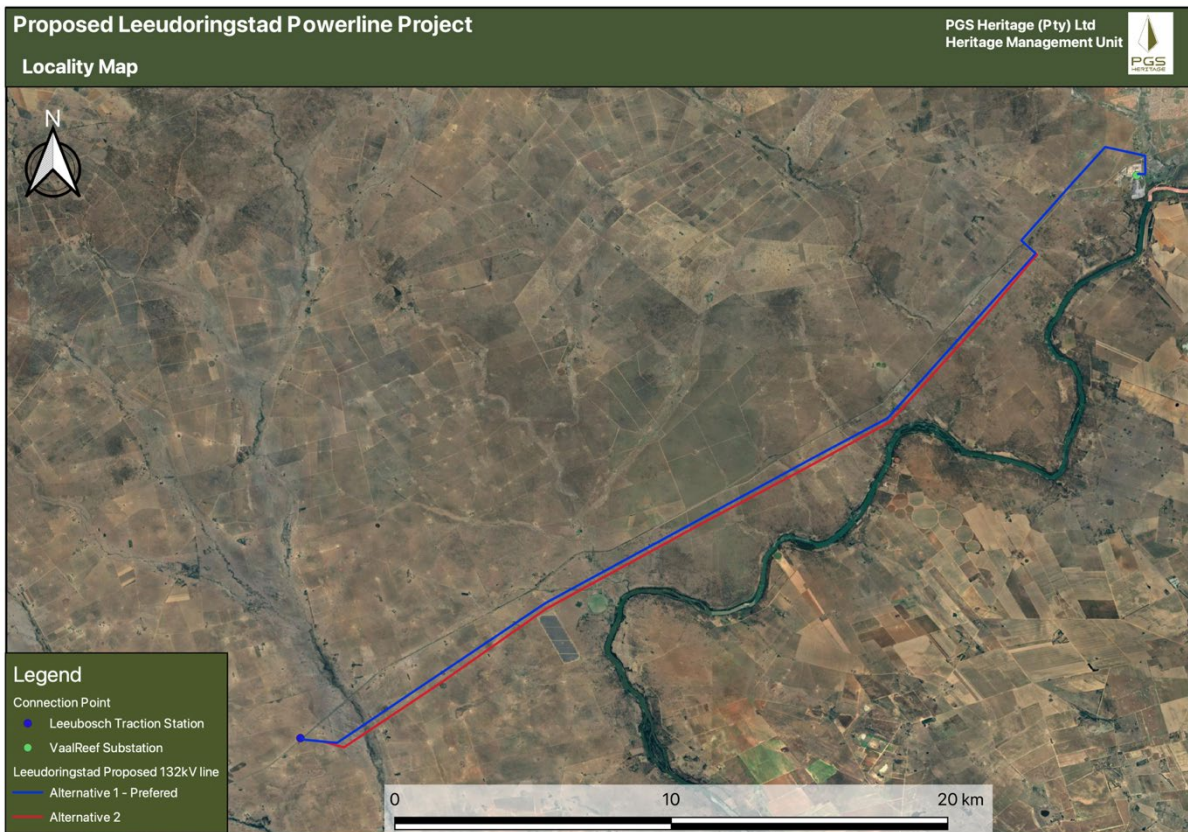


Figure 2: Proposed 132kV Power Line Route Alignment that was assessed during the fieldwork.

### 3. HERITAGE RESOURCES IDENTIFIED

The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance. A systematic controlled-exclusive surface survey was conducted on foot over four days by three archaeologists (Nikki Mann, Michelle Sachse, and Wynand van Zyl) from PGS. The fieldwork was conducted between 26<sup>th</sup>-29<sup>th</sup> September 2022.

Heritage resources are unique and non-renewable, and as such, any impact on such resources must be seen as significant.

#### Archaeology, built environment and burial grounds and graves

The fieldwork conducted to evaluate the possible impact of the new Leeudoringstad power line has revealed the presence of 4 heritage resources.

#### *Historical structures*

One (1) site (**LDS-01**), the remains of a square single stone packed foundation was identified. The structure is of low heritage significance, but the possibility of infant burials close to or in the remaining

foundation as per African custom cannot be excluded. The resource is thus graded as having medium local heritage significance.

#### *Burial ground*

One (1) burial ground (**LDS-02**) was identified and rated as having high heritage significance.

#### *Possible graves*

Two (2) sites with possible graves (**LDS-03, LDS-04**) were identified and rated as having high heritage significance.

## **4. PALAEOLOGICAL DESKTOP STUDY**

As per the palaeontological desktop assessment (Butler, 2022), the proposed development is underlain by the Allanridge Formation (Ventersdorp Supergroup) and the Rietgat Formation, (Platberg Group, Ventersdorp Supergroup), while Quaternary sediments are also present in the development. Updated geology (Council for Geosciences, Pretoria) of the proposed development indicates that the development is largely underlain by the Allanridge Formation (Ventersdorp Supergroup), and Rietgat Formation (Platberg Group, Ventersdorp Supergroup), while a small portion in the west is underlain by alluvium, colluvium, eluvium and gravel. According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Quaternary sediments and that of the Rietgat Formation is Moderate, while that of the Allanridge Formation is Low (Almond and Pether 2008, SAHRIS website).

It is considered that the proposed development will not lead to detrimental impacts on the palaeontological resources of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

**No further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.**

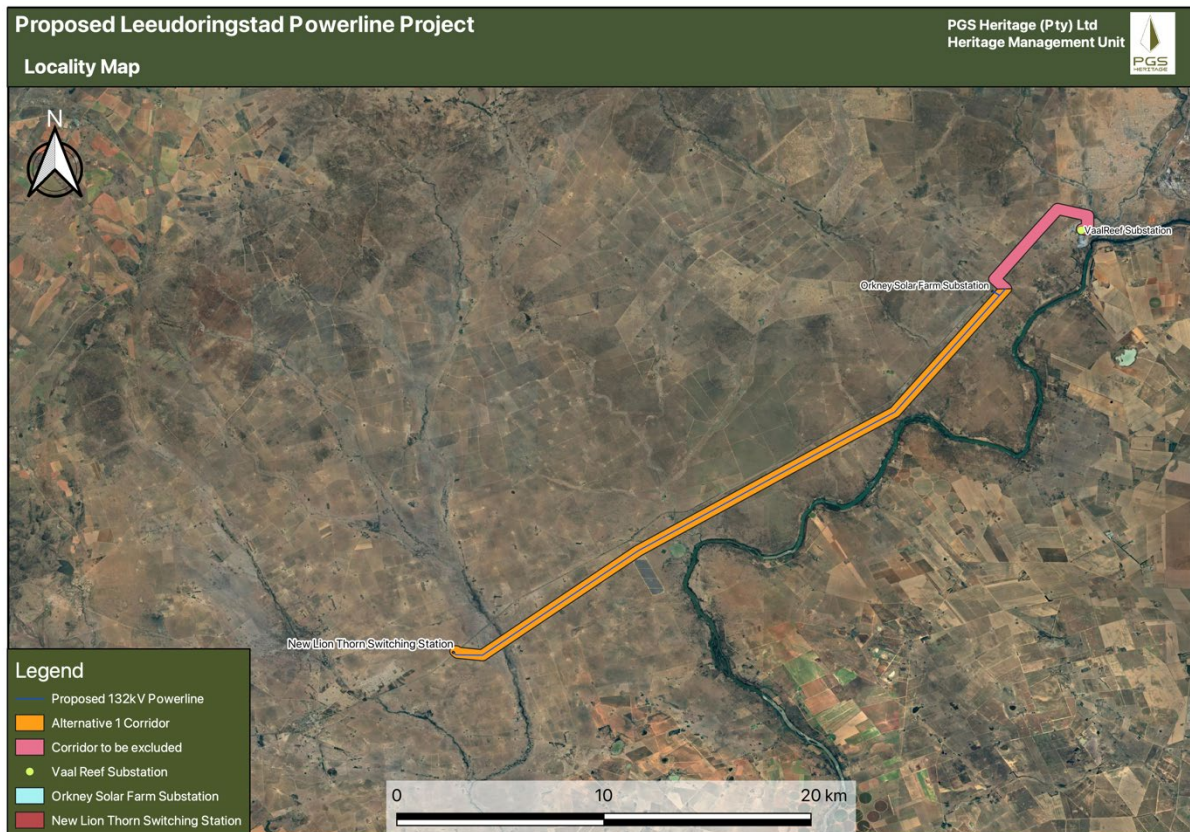
## **5. FINALISED PROPOSED POWERLINE LAYOUT**

The route of the alternative 1 and the associated infrastructure is shown in **Figure 3**.

The 132kV line will not start from the existing Leeubosch Traction station but from the adjacent new switching substation (for which there is an existing Environmental Authorisation (EA) in place).



A new switching station will be constructed next to the existing Leeubosch Traction Substation. A new IPP substation will be built adjacent to the new switching station to step up the voltage from 33kV to 132kV. From the new switching station, a 132kV powerline will run to Orkney Solar Plant (Genesis). The line will connect to the Genesis switching station and share a 132kV powerline to Vaalreef Ten.



**Figure 3: Final proposed 132kV powerline alignment (alternative 1 - preferred) for the Leeudoringstad powerline project.**

## 6. ANTICIPATED IMPACTS ON HERITAGE RESOURCES

The pre-construction and construction phase of the proposed development will entail surface clearance as well as excavations into the superficial sediment cover and underlying bedrock (e.g., for powerlines and new access roads).

The two alternative positions of the powerline were initially considered during the site visit and impact assessment. There was no preference for either powerline alternatives, as both would have the same low impact on heritage resources. **The two alternatives were considered acceptable subject to the recommended mitigation.**

From an archaeological and historical structure perspective, the proposed final layout will not change the impact on the identified heritage resources from the initial field assessment. By selecting the alternative 1 powerline route, the possible pre-construction impacts calculated on the tangible cultural heritage resources is overall **MODERATE NEGATIVE** rating but with the implementation of the recommended buffers and management guidelines will be reduced to a **LOW NEGATIVE** impact.

## 7. RECOMMENDATIONS

The calculated impact as summarised in **Section 9** of this report confirms the impact of the proposed powerline will be reduced with the implementation of the mitigation measures. This finding in addition to the implementation of a chance finds procedure, as part of the EMPr, will mitigate possible impacts on unidentified heritage resources. **The following mitigation measures will be required:**

**Table 1: Heritage management recommendations.**

Area and site no.	Mitigation measures
General project area	<ul style="list-style-type: none"> <li>▪ Implement a chance to find procedures in case where possible heritage finds are uncovered.</li> </ul>
Burial ground (LDS-02)	<ul style="list-style-type: none"> <li>▪ The site should be demarcated with a <b>50-meter</b> no-go-buffer-zone and the graves should be avoided and left in situ.</li> <li>▪ If the site is going to be impacted directly and the graves need to be removed a grave relocation process for these sites is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with SAHRA under the NHRA and National Health Act regulations.</li> </ul>
Remains of a square single stone packed foundation with possible graves (LDS-01).	<ul style="list-style-type: none"> <li>▪ A 20-meter buffer should be maintained.</li> <li>▪ It is recommended that further consultation with local communities on the previous inhabitants of these areas be initiated to determine the possibility of infant burials. In the event that such burial is confirmed a grave relocation process must be initiated.</li> </ul>
Possible grave sites (LDS-03, LDS-04)	<ul style="list-style-type: none"> <li>▪ Until such time that the presence of a grave at the site has been tested, the stone concentrations must be viewed as containing a grave.</li> <li>▪ The possible graves should be demarcated with a <b>50-meter buffer</b> and should be avoided and left in situ.</li> <li>▪ If the site cannot be avoided, then an application will be required for a test excavation and/or GPR permit to determine if the site contains graves.</li> <li>▪ If human remains are discovered a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA BGG under the NHRA and National Health Act regulations.</li> <li>▪ If, during test excavations, it is determined that the site does not contain graves, no further mitigation will be required.</li> </ul>
Palaeontology	<ul style="list-style-type: none"> <li>▪ If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington</li> </ul>

Area and site no.	Mitigation measures
	Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carry out by a palaeontologist.

## General

In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

From an archaeological and historical structure perspective, with the selection of the alternative 1 powerline route, the possible pre-construction impacts calculated on the tangible cultural heritage resources is overall **MODERATE NEGATIVE** rating but with the implementation of the recommended buffers and management guidelines, will be reduced to a **LOW NEGATIVE** impact.

Therefore, impacts on heritage resources can be mitigated to acceptable levels allowing for the development to be authorised.

**NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)**

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of 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 ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page ii of Report- Contact details and company  Section 1.2 and <b>Appendix A</b>
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 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2, 6 and 7
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8, 9 and 10
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2 and 6
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 7 and 8
g) an identification of any areas to be avoided, including buffers;	Section 8 and 12
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;	Section 8
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Executive Summary and Section 9, 10, 11 and 12

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
k) any mitigation measures for inclusion in the EMPr;	Section 11
l) any conditions for inclusion in the environmental authorisation;	Section 11
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8 and 11
n) a reasoned opinion- <ul style="list-style-type: none"> <li>i. (as to) whether the proposed activity, activities or portions thereof should be authorised;               <ul style="list-style-type: none"> <li>(iA) regarding the acceptability of the proposed activity or activities; and</li> </ul> </li> <li>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;</li> </ul>	Executive Summary; Section 12
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 <i>gazetted</i> 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.	NEMA Appendix 6 and GN648



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

### DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### PROJECT TITLE

Proposed Construction of the Leeudoringstad 132kV Powerline, North West Province, South Africa

#### Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

#### Departmental Details

##### Postal address:

Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Private Bag X447  
Pretoria  
0001

##### Physical address:

Department of Environmental Affairs  
Attention: Chief Director: Integrated Environmental Authorisations  
Environment House  
473 Steve Biko Road  
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:  
Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

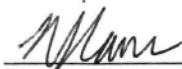
## 1. SPECIALIST INFORMATION

Specialist Company Name:	PGS Heritage Pty Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Nicole (Nikki) Mann			
Specialist Qualifications:	Msc Archaeology			
Professional affiliation/registration:	Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA). Membership No: 472			
Physical address:	7 Hanois Crescent, Plettenberg Bay, Western Cape			
Postal address:	7 Hanois Crescent, Plettenberg Bay, Western Cape			
Postal code:	6600	Cell:	078 140 2424	
Telephone:		Fax:		
E-mail:	nikki@pgsheritage.co.za			

## 2. DECLARATION BY THE SPECIALIST

I, \_\_\_\_\_ Nicole Mann \_\_\_\_\_, declare that –

- I act as the independent specialist in this application;
- I will 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;
- 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 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;
- all the particulars furnished by me in this form 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

PGS Heritage Pty Ltd

Name of Company:

10/10/2022

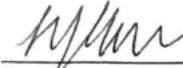
Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3

**3. UNDERTAKING UNDER OATH/ AFFIRMATION**

I, \_\_\_\_\_ Nicole Mann \_\_\_\_\_, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

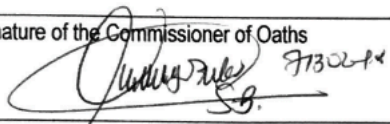
PGS Heritage Pty Ltd

Name of Company

10/10/2022

Date

Signature of the Commissioner of Oaths



Date 2022-10-10





# SIVEST (PTY) LTD

## PROPOSED CONSTRUCTION OF THE LEEUDORINGSTAD 132KV POWERLINE, NORTH WEST PROVINCE, SOUTH AFRICA

### HERITAGE IMPACT ASSESSMENT

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Appendix C – Impact Assessment Methodology

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Appendix E – Terms of Reference

## Glossary of Terms

### **Archaeological resources**

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

### **Cultural significance**

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

### **Development**

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

### **Early Stone Age**

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

## **Fossil**

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

## **Heritage**

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

## **Heritage resources**

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- 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, and
- sites of significance relating to the history of slavery in South Africa;

## **Holocene**

The most recent geological time period which commenced 20 000 years ago.

## **Late Stone Age**

The archaeology of the last 30 000 years associated with fully modern people.

## **Late Iron Age (Early Farming Communities)**

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

## **Middle Stone Age**

The archaeology of the Stone Age between 20 000-300 000 years ago, associated with early modern humans.

## **Site**

Site in this context refers to an area place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

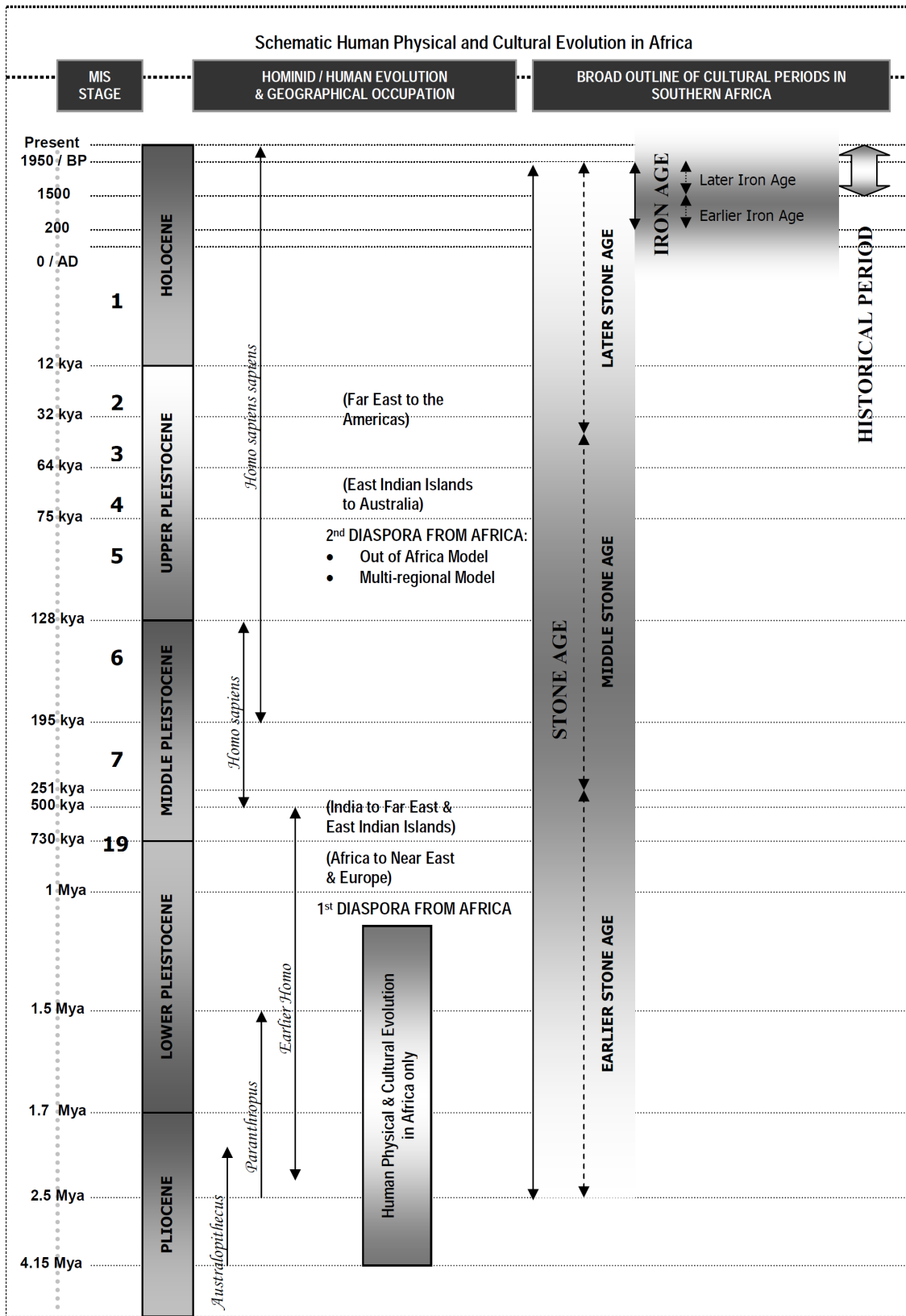


Figure 4: Human and Cultural Timeline in Africa (Morris, 2008).



### List of Abbreviations

Abbreviations	Description
AIA	Archaeological Impact Assessment
APHP	Association of Professional Heritage Practitioners
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEFF	Department of Environment, Forestry and Fisheries
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GN	Government Notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NCA	National Competent Authority
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
NW DEDECT	North West Department of Economic Development, Environment, Conservation and Tourism
NWPHA	North West Provincial Heritage Authority
PGS	PGS Heritage (Pty) Ltd
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SIVEST	SiVEST (PTY) Ltd
Upgrade Energy	Upgrade Energy Africa (Pty) Ltd

# SiVEST (PTY) LTD

## PROPOSED CONSTRUCTION OF THE LEEUDORINGSTAD 132KV POWERLINE, NORTH WEST PROVINCE, SOUTH AFRICA

### HERITAGE IMPACT ASSESSMENT

#### 1. INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by SiVest (PTY) Ltd (hereafter referred to as “SiVEST”), on behalf of Upgrade Energy Africa (Pty) Ltd (hereafter referred to as “Upgrade Energy”), to undertake a Heritage Impact Assessment (HIA) as part of the Basic Assessment (BA) for the proposed construction of the Leeudoringstad 132kV powerline in the North West Province of South Africa.

##### 1.1 Scope and Objectives

The study aims to identify possible heritage sites and finds that may occur in the proposed development area. The HIA aims to assist the developer in responsibly managing the discovered heritage resources, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

##### 1.2 Terms of Reference

Please see **Appendix E**.

##### 1.3 Specialist Credentials

This HIA was compiled by PGS.

The staff at PGS has a combined experience of nearly 90 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Nikki Mann, the author, graduated with her Master’s degree (MSc) in Archaeology and is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA).

Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

Michelle Sachse, field archaeologist, is registered with ASAPA as a Professional Archaeologist. She holds a MA in Archaeology and a BA (Hons) in Archaeology from the University of Pretoria.

Wynand van Zyl, field archaeologist, holds a BA (Hons) in Archaeology.

## **2. ASSESSMENT METHODOLOGY**

This HIA report was compiled by PGS for the proposed development of the Leeudoringstad 132kV powerline. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: A detailed archaeological and historical overview of the study area and surroundings were undertaken. This work was augmented by an assessment of reports and data contained on the SAHRIS. Additionally, an assessment was made of the available historic topographic maps. All these desktop study components were undertaken to support the fieldwork.

Step II – Physical Survey: The fieldwork was conducted on 26-29 September 2022. The fieldwork team consisted of three archaeologists, Nikki Mann, Michelle Sachse and Wynand van Zyl. Throughout the fieldwork, hand-held GPS devices were used to record the tracklogs showing the routes followed by the archaeological fieldwork team. All sites identified during the fieldwork were photographically and qualitatively recorded, and their respective localities were documented using a hand-held GPS device. The proposed 132kV powerline alternatives were surveyed as per the KML files received from the client.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
  - Low - <10/50m<sup>2</sup>
  - Medium – 10-50/50m<sup>2</sup>

- High - >50/50m2
- Uniqueness; and
- Potential to answer present research questions.

Impacts on these sites by the development will be evaluated as follows:

## 2.1 Site Significance classification standards

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 2** and **Table 3**).

**Table 2: Rating system for archaeological resources**

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by North West Provincial Heritage Authority (NWPFA). Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

**Table 3: Rating system for built environment resources**

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by NWPFA.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted	No research potential or other cultural significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	be retained as part of the National Estate.	by NWPFA for structures in this category if they are older than 60 years.	

### 3. ASSUMPTIONS AND LIMITATIONS

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites, land access restrictions and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. If any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out in **Section 11** .

## 4. TECHNICAL DESCRIPTION

The following information has been supplied by SiVEST.

### 4.1 Project Location and Description

The proposed 132kV powerline is located approximately 3km east of Leeudoringstad, within the Maquassi Hills Local Municipality within the Dr Kenneth Kaunda District Municipality in the North West Province (**Figure 1**).

#### 4.1.1 Footprint areas that were originally assessed

The GPS co-ordinates for the two proposed powerline alternatives assessed during the field work:

Alternative 1 (Preferred): S -27.20343°, E 26.30841°

Alternative 2: S -27.20477°, E 26.31596°

The proposed 132kV powerline will connect the Leeubosch Traction Substation to Vaal reef ten Substation. The powerline will be approximately 42km long, depending on the exact route taken.

The farm portions traversed by the proposed power lines includes:

Farm Name	Site Extent (Farm Area)
Farm Leeuwbosch No. 44 Portion 37	125.94ha
Farm Leeuwbosch No. 44 Portion 38	132.12ha
Farm Leeuwbosch No. 44 Portion 47	648.93ha
Farm Zwartlaagte No. 46 Portion 14	366.6ha
Farm Zwartlaagte No. 46 Portion 06	423.97ha
Farm Matjiesspruit No. 145 Portion 00	660.97ha
Farm Nevada Vaal No. 48 Portion 00	1524.01ha
Farm Klerksdrift No. 16 Portion 02	1396.53ha
Farm Klerksdrift No. 16 Portion 08	520.31ha
Farm Klerksdrift No. 16 Portion 05	644.82ha
Farm Yzerspruit No. 113 Portion 05	110.92ha
Farm Yzerspruit No. 113 Portion 36	123.82ha
Farm Yzerspruit No. 113 Portion 06	119.35ha
Farm Yzerspruit No. 113 Portion 00	200.70ha
Farm Wolvehuis No. 114 Portion 03	148.60ha
Farm Wolvehuis No. 114 Portion 36	296.85ha
Farm Wolvehuis No. 114 Portion 25	379.73ha
Farm Wolvehuis No. 114 Portion 06	405.05ha
Farm Wolvehuis No. 114 Portion 07	344.35ha
Farm Wolvehuis No. 114 Portion 21	394.72ha
Farm Wolvehuis No. 114 Portion 20	269.48ha
Farm Goedgenoeg No. 433 Portion 11	204.38ha
Farm Goedgenoeg No. 433 Portion 12	41.04ha
Farm Goedgenoeg No. 433 Portion 33	43.67ha

Farm Name	Site Extent (Farm Area)
Farm Goedgenoeg No. 433 Portion 81	245.85ha
Farm Goedgenoeg No. 433 Portion 15	125.02ha
Farm Goedgenoeg No. 433 Portion 46	84.52ha
Farm Goedgenoeg No. 433 Portion 18	86.32ha
Farm Goedgenoeg No. 433 Portion 67	4.35ha
Farm Goedgenoeg No. 433 Portion 89	55.67
Farm Goedgenoeg No. 433 Portion 27	112.18ha
Farm Leeuwbosch No. 44 Portion 04	
Farm Goedgenoeg No. 433 Portion 24	



Figure 5: Locality of the study area originally considered as part of the assessment process.

#### 4.1.1.1 Powerline Components

- The powerline will comprise of a 132kV powerline to connect the Leeubosch Traction Substation to the Vaal Reef ten Substation;
- The powerline will be approximately 42km long, depending on the exact route taken;



- The servitude width for the 132kV distribution line is 31m (15.5m on either side of the center line of the power line);
- Either Single or Double Circuit (Most likely a single Tern conductor) powerlines will be used;
- A substation consisting of combined IPP 132/33kV step-up substation and Eskom switching substation. The IPP Substation acts as a collector substation for the 33kV feeders and steps-up the voltage from 33kV to 132kV. This will be connected to an adjacent Vaal ten reef Eskom 132kV Switching Substation.
- The collected 33kV power will be stepped up to 132kV using a single 1 x 33/132kV 60MVA step-up substation. A new Eskom 132kV switching station will be built adjacent to the step-up substation. The substation will be demarcated into three (3) sections: the 33kV substation, 33/132kV IPP step-up substation and the 132kV Eskom Switching Station. Eskom metering and operations will take place inside the Eskom switching yard.
- The 33kV collector substation will consist of a prefabricated building mounted on a concrete support beams. The building shall include:
  - 33kV Switchgear Room
  - Control Room
  - Battery Room
- The collector substation shall be air-conditioned building with necessary fire and gas detectors. The cable entry to the building shall be from bottom.
- The IPP Step-up substation will include a 1 x 60MVA 132/33kV power transformer, 1 x NECRT and other associated HV equipment.

#### 4.1.2 *Finalised Project Layout*

The 132kV line will not start from the existing Leeubosch Traction station but from the adjacent new switching substation (for which there is an existing Environmental Authorisation (EA) in place). A new switching station will be constructed next to the existing Leeubosch Traction Substation. A new IPP substation will be built adjacent to the new switching station to step up the voltage from 33kV to 132kV. From the new switching station, a 132kV powerline will run to Orkney Solar Plant (Genesis). The line will connect to the Genesis switching station and share a 132kV powerline to Vaalreef Ten.

Please find an overview of the high-level scope below (subject to Eskom approval):

##### The scope of work in IPP substation:

- Install a compact 132/33kV transformer substation with the associated protection equipment
- Install 2x33kV containerized switchgear

##### The scope of work in the Leeubosch substation:

- Install 1 x 132kV feeder bays at Leeubosch substation to accommodate the IPP compact 132/33kV substation
- Establish a completely new 132 kV single busbar
- Build approximately 32 km of a single circuit Tern line from Leeubosch substation to New 132kV Collector at Orkney Solar Farm

The scope of work at the 132 kV Collector Station close to the Orkney Solar Farm:

- Establish a new 132kV single busbar collector substation
- Build 2 x 132 kV feeder bays to connect the Leeudoringstad IPP and Orkney Solar Farm.
- Build approximately 10 km of double circuit Twin Tern line from the new collector station to the VaalReef Ten substation

The scope of work at the VaalReef Ten substation:

- Equip 1 x 132 kV feeder bay for a 10 km double circuit Twin Tern line

Refer to **Figure 6** below for the final proposed project layout.



Locality Map



Figure 6: Locality of the final proposed powerline layout.

#### 4.1.3 *Site Access*

Access to the facility will be via an existing gravel road which connects to the tarred R502 road. Existing site roads will be used wherever possible. However, where required, new internal access roads will be constructed.

## 4.2 **Alternatives**

#### 4.2.1 *Location Alternatives*

Since the proposed Leeudoringstad 132kV powerline is to facilitate the connection for the Leeudoringstad solar plants. No location alternatives exist.

#### 4.2.2 *Technology Alternatives*

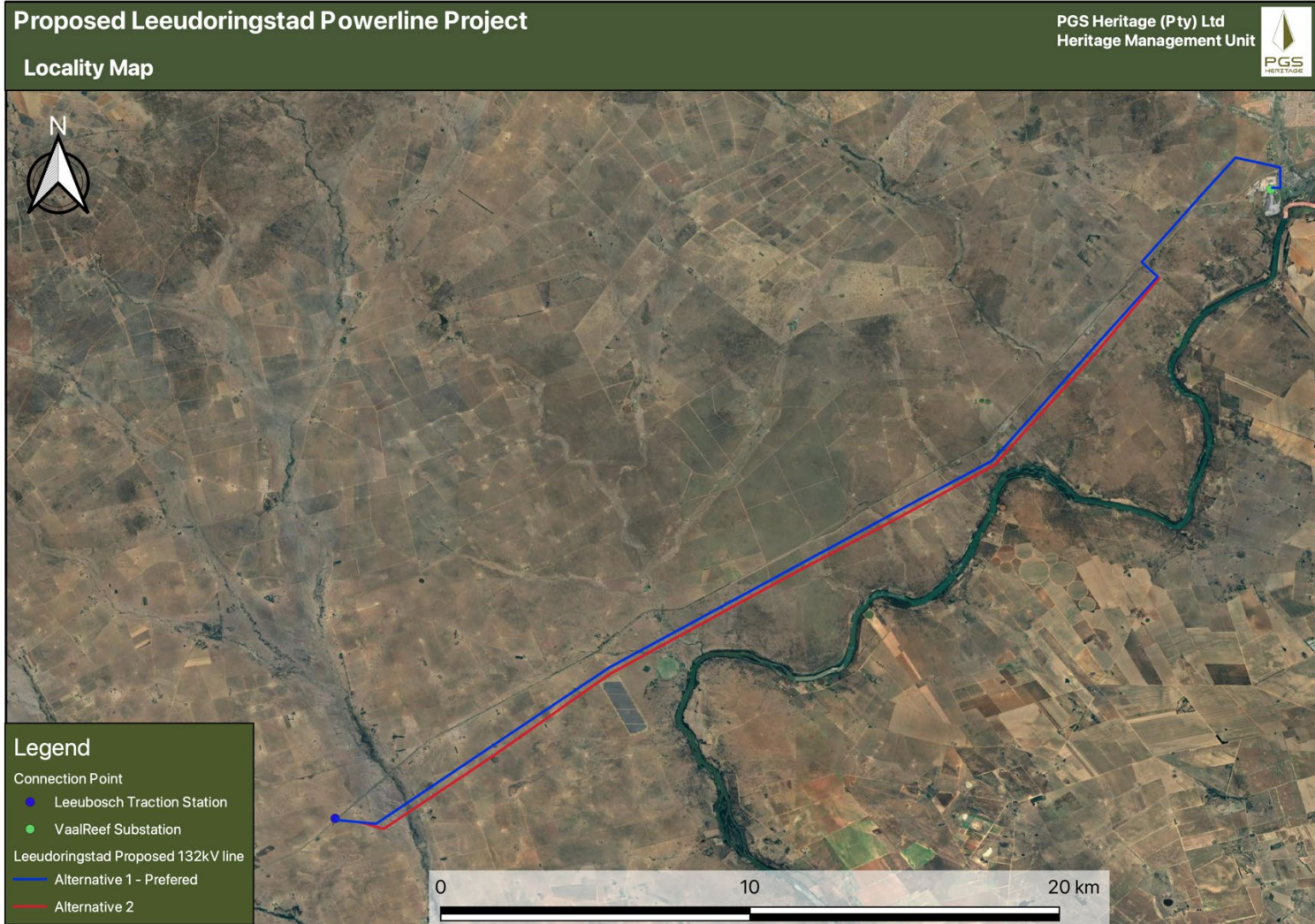
No technology alternatives exist for the distribution of electricity. Therefore, no technology alternatives are being assessed as part of this BA process.

#### 4.2.3 *Powerlines Layout Alternatives*

The proposed project includes two (2) power line route alignment alternatives to connect the Leeuwbosch Traction Substation to the Vaal Reef ten Substation, North West Province (**Figure 7**).

The dedicated 132 kV power line will connect the Solar plant to Vaalreefs Substation. The powerline will be around 42 km long depending on the exact route. The servitude width for a 132kV distribution line is 31m (15.5m on either side of the centre line of the power line). These alternatives were considered and assessed as part of the Basic Assessment Process.

**As shown in Figure 8, the powerline alternative 1 is the chosen route.**



**Figure 7: Proposed Power line alternatives originally proposed and considered as part of the assessment process.**

# Proposed Leudoringstad Powerline Project

PGS Heritage (Pty) Ltd  
Heritage Management Unit



## Locality Map



**Figure 8: Final layout for the proposed powerline for the Leudoringstad project.**



## 5. LEGAL REQUIREMENT AND GUIDELINES

### 5.1 Statutory Framework: The National Heritage Resources (Act 25 of 1999)

The NHRA has applicability, as the study forms part of an overall HIA in terms of the provisions of Section 34, 35, 36 and 38 of the NHRA and forms part of a heritage scoping study that serves to identify key heritage resources, informants, and issues relating to the palaeontological, archaeological, built environment and cultural landscape, as well as the need to address such issues during the impact assessment phase of the HIA process.

#### 5.1.1 Section 35 – Archaeology, Palaeontology and Meteorites

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the NHRA, PIAs and AIAs are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period.

#### 5.1.2 Section 36 – Burial Grounds & Graves

A section 36 permit application is made to the SAHRA or the competent provincial heritage authority which protects burial grounds and graves that are older than 60 years and 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. SAHRA must also 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 these graves and must maintain such memorials. A permit is required under the following conditions:

Permitting requirements for burial grounds and graves older than 60 years (prehistoric) and historic burials to the SAHRA:

- 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.



- d) 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.

### 5.1.3 Section 38 HIA as a Specialist Study within the EIA in Terms of Section 38(8)

A NHRA Section 38 (Heritage Impact Assessments) application to SAHRA is required when the proposed development triggers one or more of the following activities:

Permitting requirements for demolition of built environment features:

- a) the construction of a road, wall, power line, 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 50 m in length;
- c) any development or other activity which will change the character of a site,
  - i. exceeding 5 000 m<sup>2</sup> in extent; or
  - ii. Involving three or more existing erven or subdivisions thereof; or
  - iii. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
  - iv. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority

In this instance, the heritage assessment for the property is to be undertaken as a component of the BA for the project. Provision is made for this in terms of Section 38(8) of the NHRA, which states that:

This is an HIA submitted to the relevant authority in terms of Section 38(8) of the National Heritage Resources Act. The commenting authority is the SAHRA. The authorising government agency is the North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT).

An HIA report is required to identify, and assess archaeological resources as defined by the Act, assess the proposal's impact on the said archaeological resources, review alternatives and recommend mitigation (see methodology above).

Section 38 (3) Impact Assessments are required, in terms of the statutory framework to conform to basic requirements as laid out in Section 38(3) of the NHRA. These are:

- The identification and mapping of heritage resources in the area affected
- The assessment of the significance of such resources
- The assessment of the impact of the development on the heritage resources
- An evaluation of the impact on the heritage resources relative to sustainable socio/economic benefits
- Consideration of alternatives if heritage resources are adversely impacted by the proposed development
- Consideration of alternatives
- Plans for mitigation in the future

#### 5.1.4 Notice 648 of the Government Gazette 45421

Although minimum standards for archaeological (2007) and paleontological (2012) assessments<sup>1</sup> were published by SAHRA and Heritage Western Cape<sup>23</sup>, GN.648 requires sensitivity verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this Government Notice (GN) are listed in **Table 4** and the applicable section in this report noted. The screening tool indicated a **low to high** archaeological and cultural heritage significance (**Figure 9**) and palaeontology as very medium (**Figure 10**).

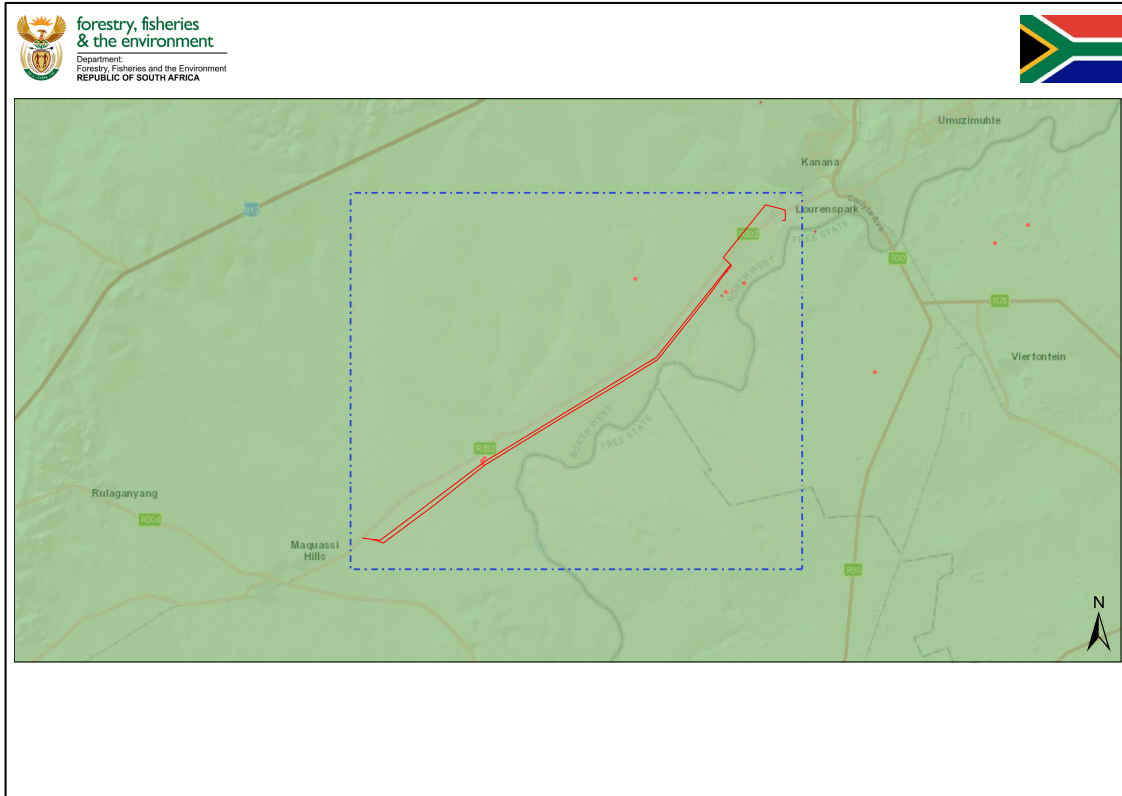
**Table 4: Reporting requirements for GN648**

GN 648	Relevant section in report	Where not applicable in this report
2.2 (a) a desktop analysis, using satellite imagery;	Section 7	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	Section 6	-
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web- based environmental screening tool;	Section 6	-
2.3(b) contains motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity;	Section 6 provides a description of the current use and confirms/doesn't confirm the status in the screening report.	-

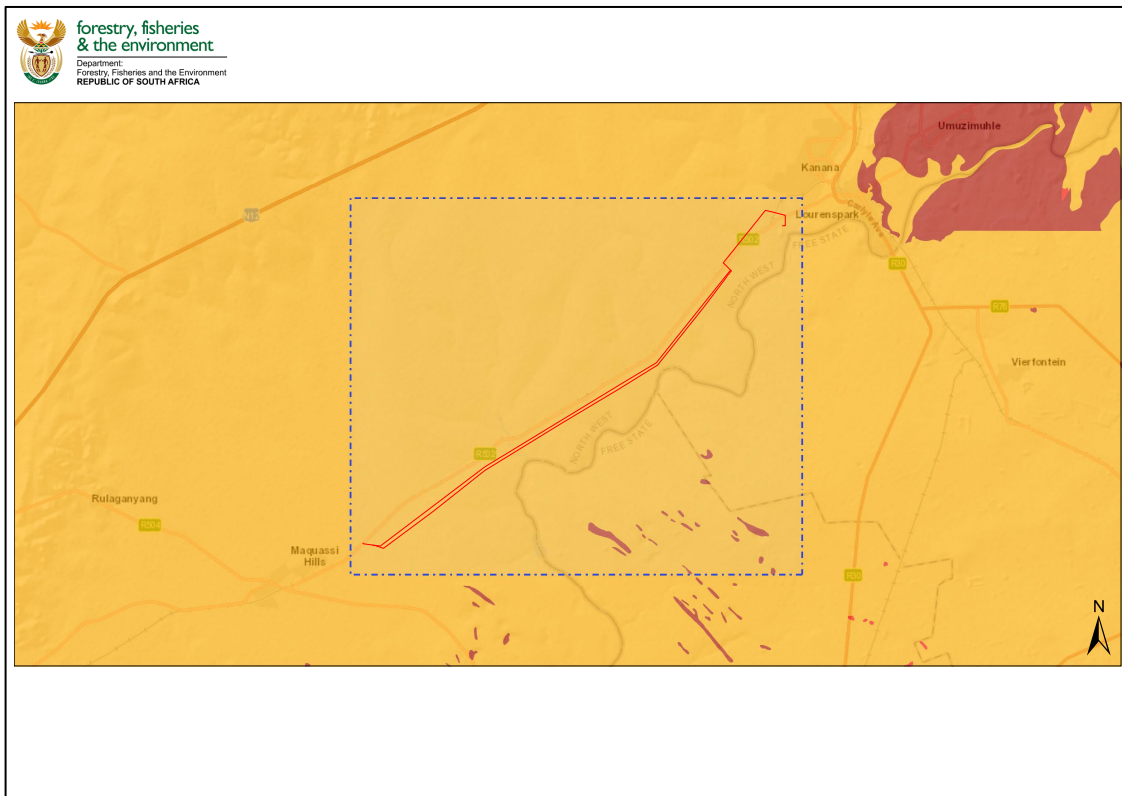
<sup>1</sup> South African Heritage Resources Agency. 2007. *Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports*. May 2007.

<sup>2</sup> Heritage Western Cape. 2016. *Guide for Minimum Standards for Archaeology and Palaeontology Reports Submitted to Heritage Western Cape*. June 2016.

<sup>3</sup> Heritage Western Cape 2016. *Guidelines for Heritage Impact Assessments required in terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)*.



**Figure 9: DEFF Screening tool outcome indicating low to high significance rating for archaeology and cultural heritage.**



**Figure 10: DEFF Screening tool outcome indicating medium significance rating for palaeontology.**

### 5.1.5 NEMA – Appendix 6 requirements

The HIA report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) Appendix 6 requirements for specialist reports as indicated in the table on page vi and vii of this report.

## 6. DESCRIPTION OF THE RECEIVING ENVIRONMENT

A site visit was conducted by three archaeologists from PGS from 26<sup>th</sup>-29<sup>th</sup> September 2021. The general vicinity of the proposed development area was assessed as per the KML file received from the client. At times, the archaeological visibility of the area was not ideal for surveying due to dense grass and thorny vegetation cover.

There was also restricted access to certain farm properties (Portion 36, RE 5 and RE 6 of Yzerspruit no.113 HP; RE 5 of Klerksdrift 16 HP; RE 7 and RE 21 of Wolvehuis 114 HP) due to land owners not giving permission to access their properties and dangerous game life (ostriches) on the properties.

The study area is located approximately 3km east of Leeudoringstad, within the Maquassi Hills Local Municipality within the Dr Kenneth Kaunda District Municipality in the North West Province. It can be accessed via the tarred R502, and informal roads. Portions of the study area, have been disturbed by the construction of farm roads, grazing and natural erosion (incl. sheet erosion and animal burrows). Existing infrastructure includes fences and powerlines.

The general landscape of the proposed development area comprised of rock outcrops, gullies (numerous streams) and flat alluvial plains that were mostly covered in moderate to dense vegetation. In some areas, the terrain has undergone erosion.

In terms of geology and soils, the area is characterised by the Allanridge Formation (Andesite, tuff), Rietgat Formation (Andesite to dacitic volcanic rocks, minor conglomerate, greywacke and shale) and Alluvium, Colluvium, Eluvium, gravel, scree, sand, soil and debris (Council of Geoscience, 2022).

In terms of vegetation, the study area is characterised by the following vegetation type.

The **Vaal-Vet Sandy Grassland** (Gh10) vegetation type: "Plains-dominated landscape with some scattered, slightly irregular undulating plains and hills. Mainly low-tussock grasslands with an abundant karroid element. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall." ([www.sanbi.org](http://www.sanbi.org); Mucina & Rutherford, 2006).

Photographs of the general study area are provided below.



**Figure 11: View of grazing lands.**



**Figure 12: View of thorny vegetation.**



**Figure 13: View of existing powerlines.**



**Figure 14: View of the Matjiespruit River.**



**Figure 15: General view of open veld**



**Figure 16: View towards the Vaal Reef ten Substation.**





**Figure 17: View of cattle and ostriches.**

## 7. BACKGROUND RESEARCH

The previous section provided a topographical description of the proposed development area. This section seeks to describe the historical origins of the receiving environment.

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore, an internet literature search was conducted, and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

### 7.1 Archival/Historical Maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

Historical topographic maps (1:50 000) for various years (1947, 1953, 1968, 1969, 1982) were available for utilisation in the background study. These maps were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA.

#### 7.1.1 SUD AFRICA, 1866

(David Rumsey Historical Map Collection: reference cfP6163)

The map depicted in **Figure 18** below is titled “*Sud Africa*”. The full title is: “*Sud Africa. Bearbeitet von Adolf Graf. Terrain v. G. Dietrich. Gest. v. G. Haubold. Weimar: Geographisches Institut. (to accompany) Hand - Atlas Der Erde Und Des Himmels.*”. The map dates from 1866 and the author was Adolf Graf (Publisher: Geographisches Institut (*Weimer, Germany*)). The map was colour coded by Europeans and shows the routes followed by the principal explorers from 1831 to 1862. The red represents the route that the Boers would have taken.

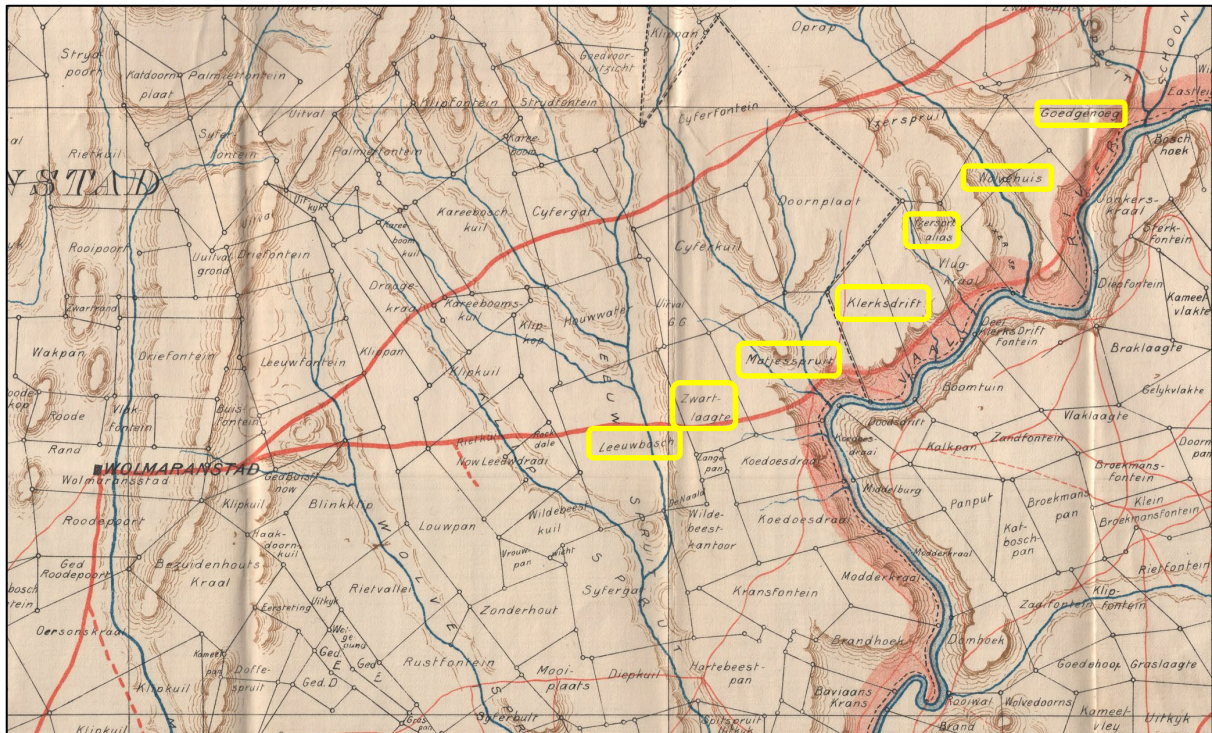


Figure 18: Section of the 1866 Sud Africa map (orange polygon: approximate location of study area).

#### 7.1.2 BLOEMHOF, 1900

(University of Cape Town Libraries, South Africa)

The map depicted in **Figure 19** below is titled “*Bloemhof*”. It was created by John T. Wood, and the contributors were the Great Britain Army Field Intelligence Dept. The map dates from 1900.

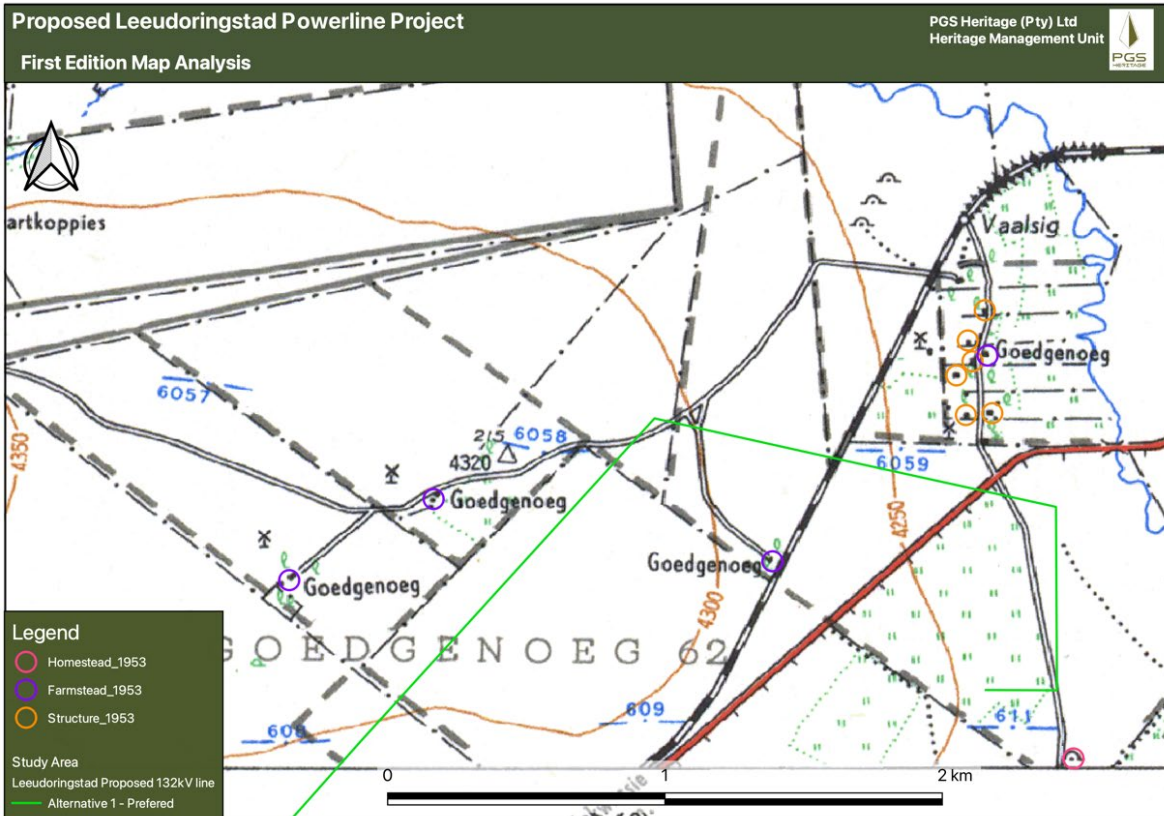


**Figure 19: Section of the 1900 Bloemhof map highlighting the names of the Goedgenoeg, Klerksdrift, Leeuwbosch, Matjiespruit, Wolvehuis, Yzerspruit and Zwartlaagte farms (University of Cape Town Libraries, South Africa).**

### 7.1.3 1: 50 000 Topographical Map 2626DC– First Edition 1953

A section of the First Edition of the 2626DC (KLERKSDORP) Topographical Sheet is depicted in **Figure 20**. This map sheet was based on aerial photography undertaken in 1945, was surveyed in 1953 and drawn by the Trigonometrical Survey Office in 1957.

Several sites containing homesteads (“huts”), farmsteads and structures are depicted in the vicinity of the study area. All these identified sites are likely to be at least 69 years old.

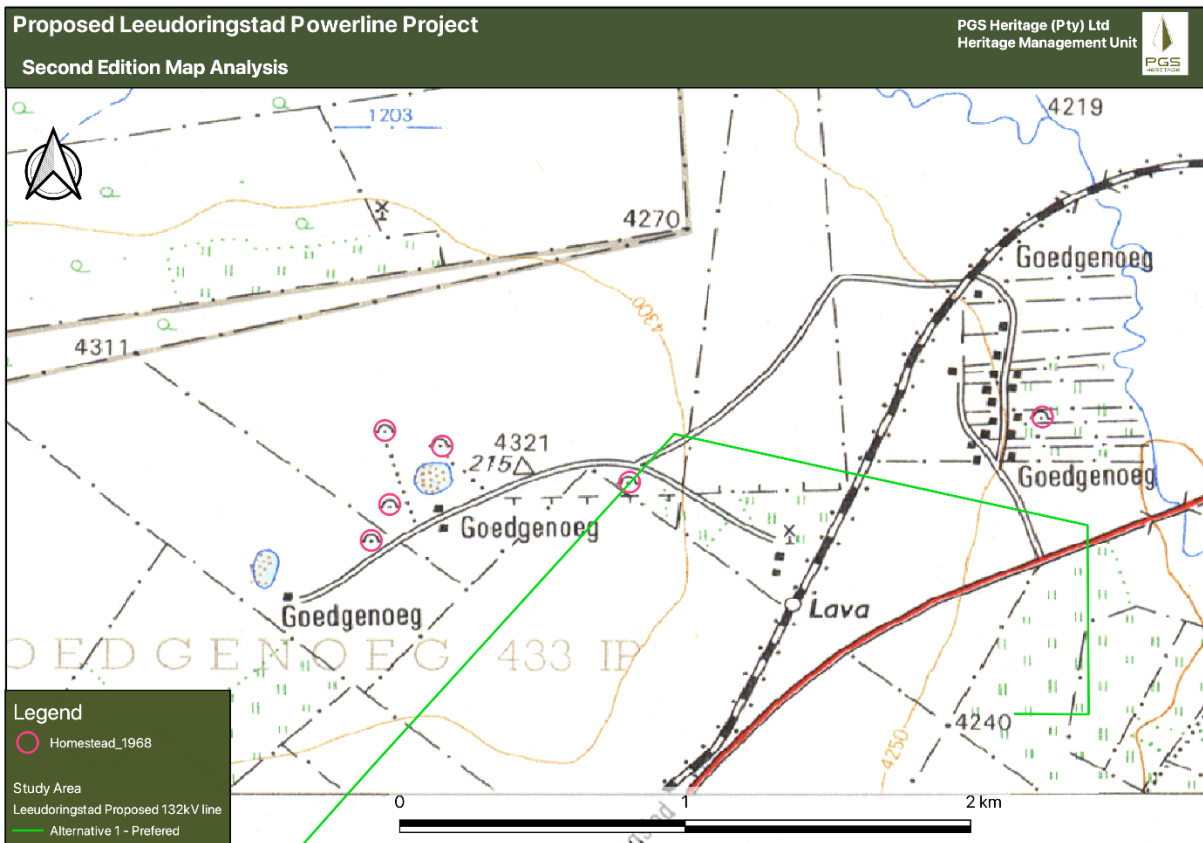


**Figure 20: First Edition of 2626DC Topographic Map 1: 50 000 dating to 1953, showing the proposed development, with possible heritage features (Homestead: pink polygon; Farmstead: purple polygon, Structure: orange polygon) located adjacent to the project area.**

7.1.4 1: 50 000 Topographical Map 2626DC – Second Edition 1968

A section of the Second Edition of the 2626DC (KLERKSDORP) Topographical Sheet is depicted in **Figure 21**. This map sheet was based on aerial photography undertaken in 1966, was surveyed in 1968 and drawn by the Trigonometrical Survey Office in 1969.

Several sites containing homesteads are depicted in the vicinity of the study area. All these identified sites are likely to be at least 54 years old.

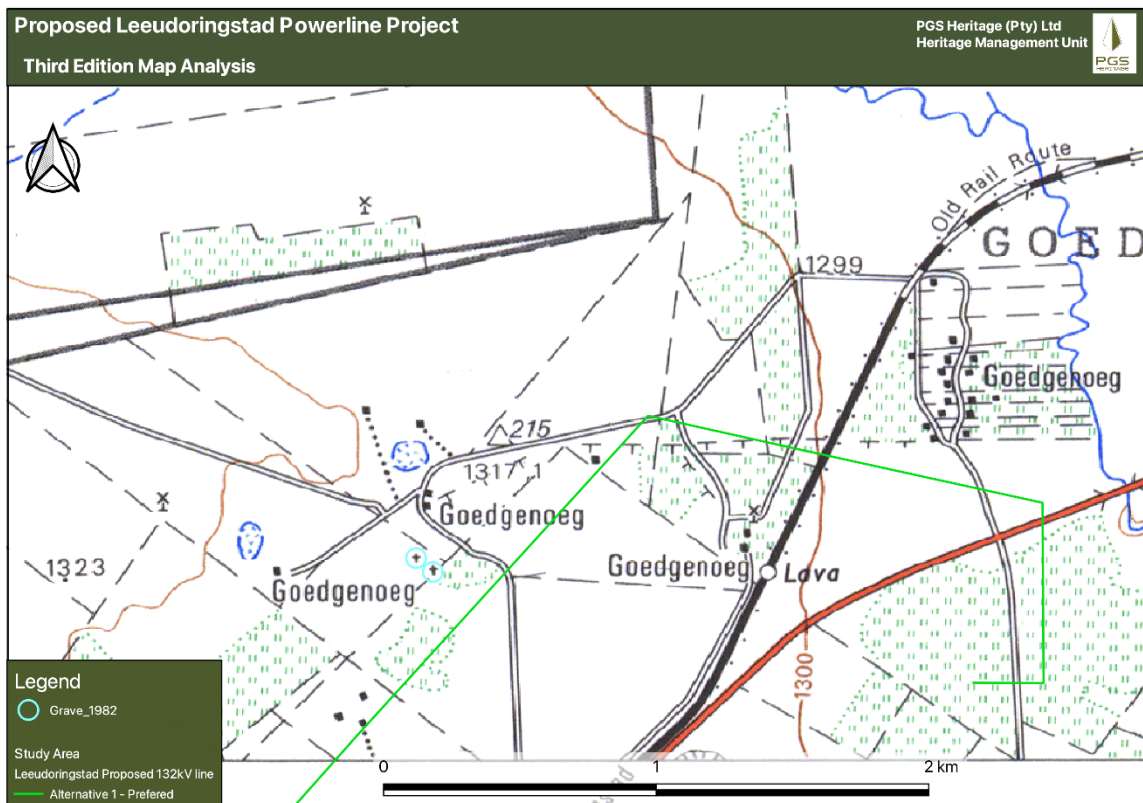


**Figure 21: Second Edition of 2626DC Topographic Map 1: 50 000 dating to 1968, showing the proposed development, with possible heritage features (Homestead: pink polygon) located within and adjacent to the project area.**

7.1.5 1: 50 000 Topographical Map 2626DC – Third Edition 1982

A section of the Second Edition of the 2626DC (KLERKSDORP) Topographical Sheet is depicted in **Figure 22**. This map sheet was published by the Chief Director of Surveys and Mapping in 1982.

Two grave sites are depicted in the vicinity of the study area.

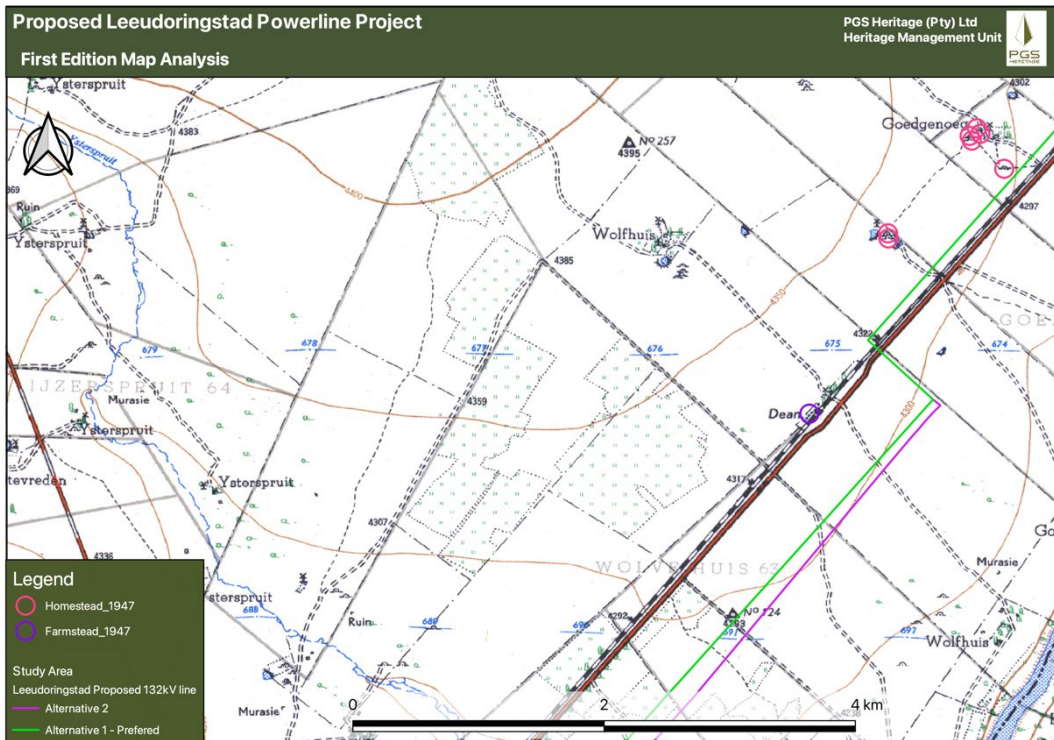


**Figure 22: Third Edition of 2626DC Topographic Map 1: 50 000 dating to 1982, showing the proposed development, with possible heritage features (Grave: cyan polygon) located adjacent to the study area.**

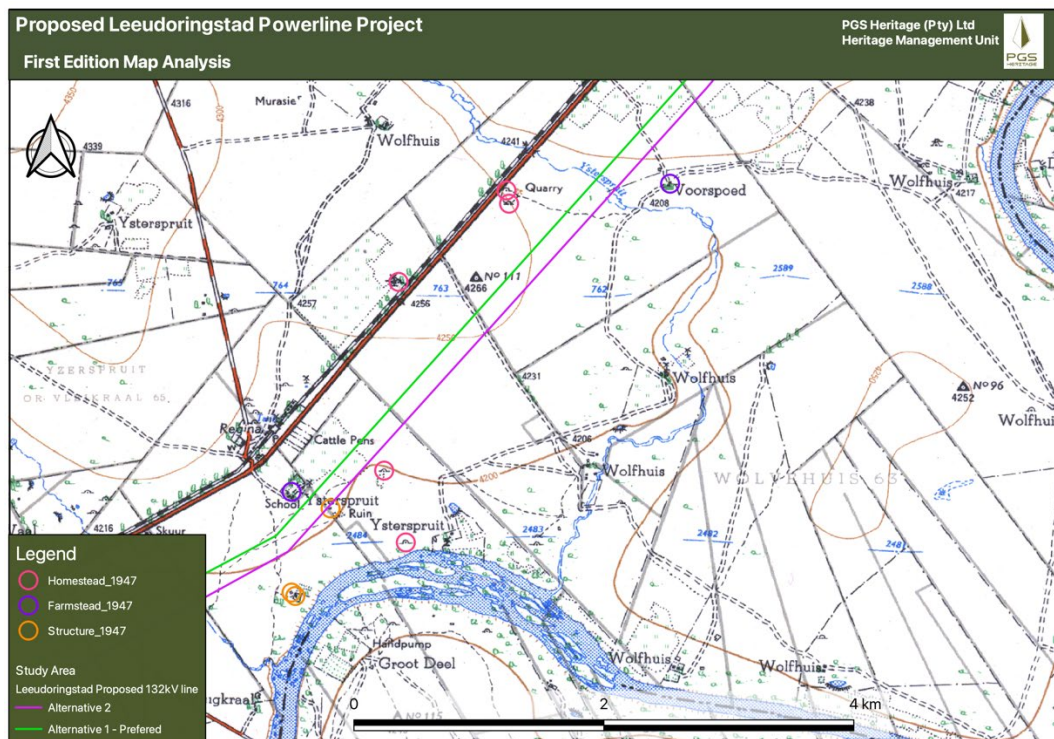
7.1.6 1: 50 000 Topographical Map 2726BA– First Edition 1947

A section of the First Edition of the 2726BA (VAALBRUG) Topographical Sheet is depicted in **Figure 23** and **Figure 24**. This map sheet was based on aerial photography undertaken in 1944, was surveyed and compiled in 1947 and drawn by the Trigonometrical Survey Office in 1951.

Several sites containing homesteads, farmsteads and structures are depicted in the vicinity of the study area. All these identified sites are likely to be at least 75 years old.



**Figure 23: First Edition of 2726BA Topographic Map 1: 50 000 dating to 1947, showing the proposed development, with heritage features (Homestead: pink polygon; Farmstead: purple polygon) located adjacent to the project area.**



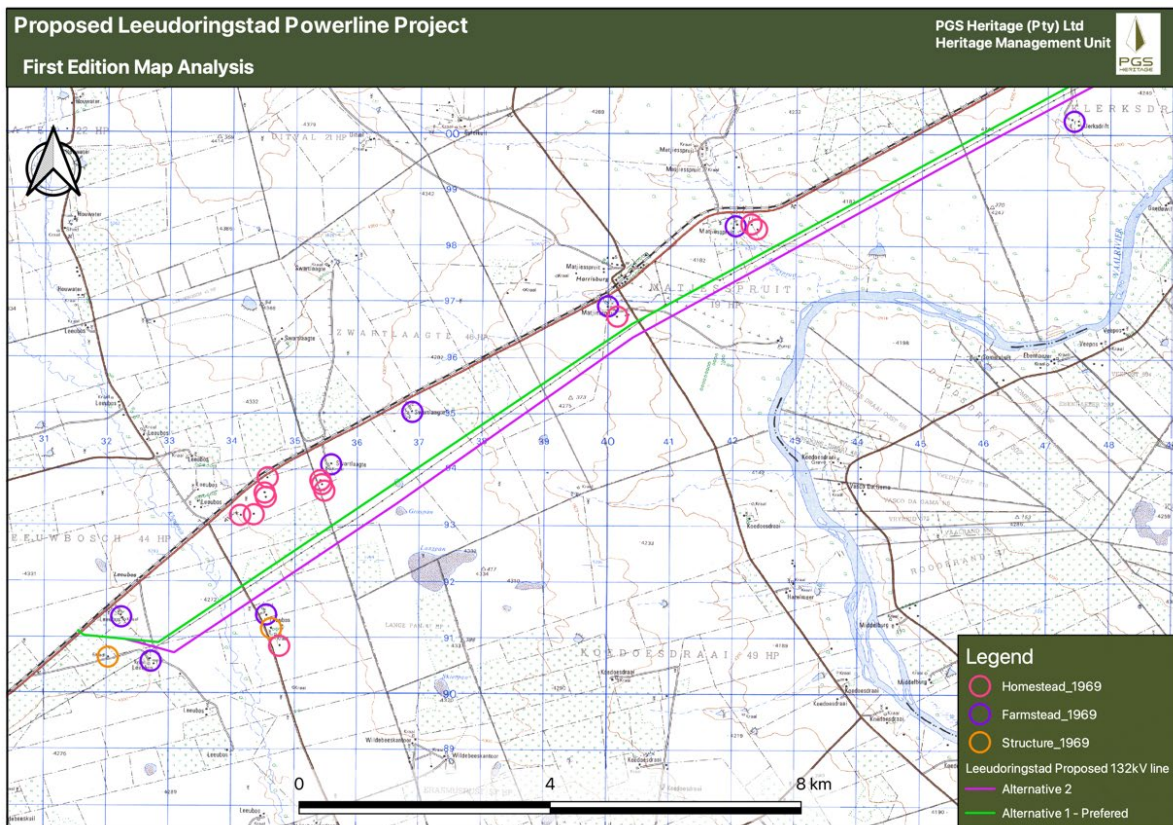
**Figure 24: First Edition of 2726BA Topographic Map 1: 50 000 dating to 1947, showing the proposed development, with possible heritage features (Homestead: pink polygon; Farmstead: purple polygon, Structure: orange polygon) located adjacent to the project area.**



7.1.7 1: 50 000 Topographical Map 2726AB– First Edition 1969

A section of the First Edition of the 2726AB (HARRISBURG) Topographical Sheet is depicted in **Figure 25**. This map sheet was based on aerial photography undertaken in 1961, was surveyed in 1969 and drawn by the Trigonometrical Survey Office in 1970.

Several sites containing homesteads, farmsteads and structures are depicted in the vicinity of the study area. All these identified sites are likely to be at least 53 years old.



**Figure 25: First Edition of 2726AB Topographic Map 1: 50 000 dating to 1969, showing the proposed development, with possible heritage features (Homestead: pink polygon; Farmstead: purple polygon, Structure: orange polygon) located adjacent to the project area.**

## 7.2 Historical Overview of the Study Area

DATE	DESCRIPTION
2.5 million to 250,000 years ago	<p>The Earlier Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these technological phases is known as Oldowan, which is associated with crude flakes, and hammer stones and dates to approximately 2 million years ago. The second technological phase in the Earlier Stone Age of Southern Africa is known as the Acheulean and comprises more refined and better made stone artefacts such as the cleaver and bifacial handaxe. The Acheulean phase dates back to approximately 1.5 million years ago.</p> <p>Prof. Revil Mason identified early Stone Age material along the banks of the Vaal River during an archaeological survey of the footprint of the Oppermandrift Dam (Bloemhof Dam) in 1966. One of the sites (Munro's Site) identified during the survey was subsequently excavated (Mason, 1969).</p>
250,000 to 40,000 years ago	<p>The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique.</p> <p><i>No MSA sites are known from the vicinity of the study area.</i></p>
40,000 years ago to the historic past	<p>The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. A well-known feature of the Later Stone Age is rock art in the form of rock paintings and engravings.</p> <p>The Munro Site found by Revil Mason during his survey of the Oppermandrift Dam (see above) also included a Later Stone Age component. The Later Stone Age is also associated with rock engravings and rock paintings. Rock engravings are known from the direct and wider vicinity of the study area (Bergh, 1998). Dr. Benjamin Smith of the Rock Art Research Institute at the University of Witwatersrand indicates that two San rock engraving sites are located on the farm Kareeboom 228 HO (Smith, 2011). This farm is located approximately 30 km West of the present study area.</p>
1500 – 1700	<p>This period is associated with a Late Iron group referred to as the Olifantspoort facies of the Urewe Tradition. The Olifantspoort facies originated from the Icon facies (AD1300 – 1500) and led to the Thabeng facies (AD1700 – 1840) (Huffman, 2007). The Olifantspoort facies (with the Letsibogo facies in Botswana and the Madikwe facies in the area between Makapansgat and Botswana) represents the second phase in the development of Moloko and were represented by an absence of any stonewalling. Olifantspoort pottery is characterised by "<i>multiple bands of fine stamping or narrow incision separated by colour</i>" (Huffman, 2007:193).</p>
1700 – 1820	<p>This period is associated with the Late Iron Age group known as the Thabeng facies of the Urewe Tradition. As indicated above this facies followed on the Olifantspoort facies as the third facies in the development of Moloko in this area. The Thabeng pottery is characterised by "<i>incised triangles, coloured chevrons and arcades</i>" (Huffman, 2007:197) whereas the settlements are stonewalled. Their layout conformed to Type Z settlements which can be described as "<i>...a loose circle of individual bilabial households surrounding the core...</i>" (Huffman, 2007:41).</p>

DATE	DESCRIPTION
1795	<p>During this time Legassick (2010) indicates that the study area fell within the Rolong sphere of influence.</p> <p>Before this time the Rolong were mainly settled south of the Vaal River. Under their leader Tau (c. 1700 – 1760) they were a strong group with a vast sphere of influence and in control of strong trade networks. However, after his death the Rolong moved northward to settle along the headwaters of the Molopo River. The period after Tau's death saw fissures develop which (after the death of Tau's son Ratlou and in turn the death of his son Seitshiro) led to the division of the once united Rolong into at least five groups, namely the Rolong-Mariba, Rolong-Ratlou, Rolong-Tshidi, Rolong-Seleka and Rolong-Rapulana. In roughly 1790 the Rolong-Seleka, followed by the Rolong-Rapulana, left the Molopo River to settle at Thabeng near Klerksdorp (Legassick, 2010).</p>
Early 1820s	<p>During the early 1820s Burchell records the Tlhaping at Dithakong, the missionary Broadbent records the Rolong on top of the Platberg (at Thabeng) and the Kubung were associated with several localities in the Free State such as OMB1. These three groups form a South-western Sotho-Tswana cluster which can be associated with Thabeng pottery and Type Z walling (Huffman, 2007).</p>
1823	<p>As a result of increasing numbers of raiding groups crossing over the Vaal River from the south as part of the social dynamics of the Difaqane, the Rolong-Seleka abandoned their settlement at Thabeng and moved along the northern bank of the Vaal River in a western direction.</p>
February 1823	<p>The Methodist Reverends Samuel Broadbent and Thomas Hodgson (with their respective families) established a mission station on the farm Leeuwfontein a short distance east of Wolmaransstad (Oberholster, 1972) and 20 km NW of the present study. The two missionaries had met Chief Sefunelo of the Rolong-Seleka on his movement away from Thabeng, and asked him to settle in this vicinity (Legassick, 2010). It is worth noting that Breutz (1955) indicates that the Rolong-Seleka was already settled here when the missionaries arrived.</p> <p>It is significant to note that the Broadbent mission station was the first one to be established north of the Vaal River (Oberholster, 1972).</p> <p>During 1824 Hodgson was instructed to return to Cape Town with the Reverend Archbell sent up to replace him. However, before Archbell could reach the mission station Broadbent left due to ill health. Although Hodgson rebuilt the mission station in 1826 he later abandoned it and moved to Boetsap (Oberholster, 1972).</p>
January 1824	<p>The Taung under their leader Moletsane attacked the Rolong-Seleka of Sefonela at their settlement in the vicinity of the Broadbent mission station. This attack was believed to have been in response to an earlier attack of the Rolong-Seleka on them. The Rolong-Seleka were forced to abandon their settlement, and eventually joined to the Rolong-Ratlou and Rolong-Tshidi at Phitsane on the Molopo River (Legassick, 2010). The mission station was also destroyed during the attack.</p>
c. 1827	<p>During this time the Taung under Moletsane crossed over the Vaal River from the south and settled along the Makwassie Stream. From here they undertook various attacks on the peripheral</p>

DATE	DESCRIPTION
	settlements and outposts of the Khumalo-Ndebele of Mzilikazi, who were established along the Magaliesberg Mountains further to the east (Bergh, 1998).
c. July 1829	The Khumalo-Ndebele attacked the Taung along the Makwassie Stream in response to an attack, which a combined Taung, Griqua and Koranna force had made the previous year on the Ndebele. The Taung were defeated and fled to the Modder River to the south (Bergh, 1998).
1839	In 1839 the town and district of Potchefstroom were established (Bergh, 1998). This followed on the arrival of the Voortrekkers in the wider landscape during 1836.  The establishment of a Voortrekker town at Potchefstroom led to the increasing expansion of white farms toward the west. As a result, the 1840s saw the establishment of the first white farms along the Makwassie Stream. Some of the earliest farms on the eastern bank of the Makwassie Stream included Vlakfontein, Rietfontein, Zendingfontein and Goedvoorzicht (Bergh, 1998). These farms are all located north of Wolmaransstad.
1841 - 1850	During this time the establishment of farms by Voortrekkers expanded from Potchefstroom and reached the Makwassie Stream (Bergh, 1998).
April - June 1871	An arbitration commission held hearings in Bloemhof during this period. The commission was asked to provide an arbitrated solution to the exact position of the western boundary of the <i>Zuid-Afrikaansche Republiek</i> . It came because of increasing levels of disagreement and discontent between the Z.A.R. on the one hand, and the Rolong, Tlhaping and the Koranna (amongst others) on the other. The commission comprised the British magistrate at Klipdrif, John Campbell and the Z.A.R. magistrate of Wakkerstroom, A.A. O' Reilly. When the two individuals failed to reach an agreement, the Lieutenant-Governor of Natal, R.W. Keate, was asked to provide the final recommendations of the commission.  Near the study area the Keate Award (as Keate's findings are referred to) defined the western boundary of the Z.A.R. along the Makwassie Stream (Bergh, 1998). This means that the study area now fell outside of the Z.A.R.
1881	After the end of the Anglo-Transvaal War (also referred to the First Boer War), which terminated the two-year British annexation of the Z.A.R., the Pretoria Convention of 1881 redefined the western boundary of the Z.A.R. The recommendations of the convention were largely based on the investigations undertaken by Lieutenant-Colonel C.J. Moysey who had been appointed by the British government during the previous year to investigate the Keate Award of 1871 through map surveys and field assessments. According to the recommendations of the Pretoria Convention the western boundary of the Z.A.R. was moved from the Makwassie Spruit to roughly the Harts River. In 1884 the western boundary of the Z.A.R. was again moved further west as a result of the recommendations of the London Convention (Bergh, 1998).
19 August 1884	The government of the <i>Zuid-Afrikaansche Republiek</i> (Z.A.R.) provided permission for a town to be established in the Makwassie ward. This permission came as a result of the investigations undertaken by J.M.A. Wolmarans and Commandant Piet Cronjé of Potchefstroom. Although stands for the town were already being laid out in 1888, a dispute arose as to exactly where the new town should be established. The three disputed localities for the new town were Witpoort in

DATE	DESCRIPTION
	<p>the east, portions of the farms Rooderand and Vlakfontein in the centre and Leeufontein in the west. When President Paul Kruger heard of the dispute he paid a visit to the area and personally viewed each of the three possibilities. Before he returned to Pretoria he decided that the town would be laid out on the western bank of the Makwassie Stream on portions of the farms Rooderand and Vlakfontein. On 16 February 1891 the town of Wolmaransstad was officially proclaimed by the government of the Z.A.R (Van Zijl, 1966).</p>
1899 – 1902	<p>A number of significant events can be associated with the general vicinity of the study area during the South African War.</p> <p>The town of Wolmaransstad was occupied by Republican forces at the beginning of 1901 and shortly thereafter a military court known as the <i>Militaire Hof voor de Westelijke Districten der ZAR</i> was established by the Boer authorities. The reason for the establishment of an almost permanent court in the town was due to the fact that Wolmaransstad was not connected to the railway system and as a result British forces only occupied the town for short periods of time. Although the court proceedings took place under difficult circumstances due to the effect of war and numerous attacks on the town, a large number of cases were tried. Of specific interest is that the court had jurisdiction in terms of Boer forces and men in both the Z.A.R. and Free State Republic. Boer general and later prime minister of South Africa, General Jan Smuts, referred to this court as the start of a united South Africa because of its jurisdiction over international boundaries between the Boer republics. However, the British viewed the court in a completely different light and after the war numerous attempts were made to have at least some members of the court charged with war crimes (Blake, 2010).</p> <p>During the war the nearby town of Wolmaransstad was attacked and occupied by the British on a number of occasions. One of these attacks took place on 5 March 1901 when a British column under Lord Methuen attacked the town. The column then turned south intending to assist the British garrison at Hoopstad. However, a skirmish developed with the local Boer commando between Wolmaransstad and the Vaal River. The British eventually managed to reach Commando Drift but found the river in flood and had to follow the bank of the river for almost 10 days before eventually reaching Fourteen Streams (Van Zijl, 1966).</p> <p>Two more attacks on Wolmaransstad took place on 17 December 1901 and 28 December 1901. On 10 February 1902 Lieutenant-Colonel Von Donop occupied the town again after receiving instructions to do so from Lord Methuen. He remained in town for roughly a month (Van Zijl, 1966).</p>
c. 1910	<p>The town of Makwassie (also known as Maquassi) was established during this time. The establishment of the town was as a result of the work undertaken by local shopkeeper Charles Cherrie. The first health committee of the town had Cherry as chairman and R. Reid, J. Lamont, H. Bloch as well as P. Quin as members. The secretary was Jack Wride (Van Zijl, 1966).</p>
1911	<p>The discovery and proclamation of an extensive diamond field at Mooifontein (north-west of Bloemhof) in 1911 attracted roughly 5,000 people to these diggings with other 1,200 fortune seekers setting their sights on the Bloemhof townlands. By the end of the year the two fields had yielded more than 37,000 carats, a yield that was maintained for the following two years as well (Van Onselen, 1996).</p>

DATE	DESCRIPTION
1914 - 1915	<p>Even before the outbreak of the First World War in 1914, the Union of South Africa's responsibility to Britain in such a war was the subject of a heated debate for quite some time. With the outbreak of hostilities the South African Government of General Louis Botha notified Britain of their willingness to assist in the war effort.</p> <p>Many of the Afrikaans people found it intolerable that South Africa should assist their erstwhile enemy in her international conflicts and more so against a country with which they still had very strong ties. Subsequently many of them rose up in armed rebellion under the leadership of former Boer Generals such as Christiaan de Wet and J.C.G. Kemp. Another such a rebellion leader was Boer War leader General Christiaan Frederik Beyers who at the time was the commander of the Union Defence Force. After resigning his post he became one of the leaders of the rebellion.</p> <p>He instructed the members of his commando that they should never be the first to shoot at government troops. As a result he spent most of his time as rebel leader on the move to stay ahead of the government troops. Eventually his commando only comprised 25 men and they were chased without recourse from Kroonstad to the Vaal River. On the morning of 8 December 1914 government troops attacked the commando where they were camped in close vicinity to the Vaal River on the Free State farm Greyling's. In an attempt to allow their leader to escape, 23 members of the commando resisted while Beyers and Jan Pieterse tried to cross over the Vaal River on horseback. The river was however in flood and both men drowned (Van Zijl, 1966).</p> <p>As the South African government did not want to allow the family of General Beyers to bury him in Makwassie, he was buried in the Van Zijl family cemetery on the farm Oersonskraal 207 HO directly east of present-day Makwassie.. Pieterse was buried on the Free State side of the river (Möller, n.d.).</p> <p>Van Onselen (1996) indicates that on 1 November 1914 a skirmish took place between rebels under the command of P.J.K. van Vuuren and government troops on the farm Zoutpan 212 HO. Another skirmish took place shortly thereafter at the railway siding by the name of Kingswood.</p>
October 1918	<p>The Influenza Pandemic reached the general vicinity of the study area during this time. In his book <i>The Seed of Mine</i> Dr. Charles van Onselen (1996) relates how the crowded and unsanitary diamond diggings dotted across the wider landscape, resulted in large numbers of fatalities. At the diggings on the farms Kameelkuil 88 HO and London 112 hundreds of people died. One eyewitness account reveals how dozens of corpses were buried in mass graves near these diggings. As people starting leaving the diggings out of fear of getting infected, they brought the disease to their homesteads, villages and farms. Many of these returning workers also died along the roads on their way home and were often buried where they died. The farms themselves were also not immune to the disease and many people died as a result of it on the farms as well (Van Onselen, 1996).</p>
1920	<p>The Town Leeudoringstad was established.</p>
1922	<p>The diamond diggings in the wider vicinity were expanded in 1922 with the proclamation of Kareepoort 210 HO (with a number of other farms in the district which appears to have included Oersonskraal, Boskuil and Kareepan) as alluvial diggings. Thousands of white and black unemployed flocked to these diggings. On the farm Kareepoort a number of informal 'locations'</p>

DATE	DESCRIPTION
	comprising clusters of makeshift shanties and cabins sprung up. These included Fly Camp, Velskoen, Vuilkantien and Rooistad (Van Onselen, 1996).
1925	The northern portion of the farm Oersonskraal 250 HO was proclaimed an alluvial diggings (URU, 767, 2348).
1932	17 July 1932 when a train carrying 320 to 330 tons of dynamite from the De Beers factory at Somerset West to the Witwatersrand exploded and flattened the town of Leeudoringstad.
1940	The ruins of the mission station, which had been established, by Broadbent and Hodgson was proclaimed a Historical Monument (Bergh, 1998).

### 7.3 South Africa Heritage Resources Information System (SAHRIS)

A scan of SAHRIS and project databases has revealed numerous studies conducted in and around the study area of this report.

#### 7.3.1 Previous Archaeological and Heritage Studies from the General Region around the Study Area

- KUSEL, U., 2006. Cultural Heritage Resources Impact Assessment of Goudkoppie Klerksdorp Northwest Province. –**The study area was situated approximately 15km north-east of the current study area. Historical heritage remains, such as a historical mine and the remains of a British Block house, historical wartime rock engravings, LSA artefacts and flakes were recorded in this assessment.**
- DREYER, C., 2007. First phase archaeological and historical investigation of the proposed residential developments on the farm Kransdrift 243, Bothaville, Free State. – **The study area was situated approximately 20km west-east of the current study area. No archaeological or historical sites were recorded.**
- KUSEL, U., 2007. Cultural Heritage Resources Impact Assessment of Goedvoornuitzicht 242 IP Hartbeesfontein, North West Province. - **The study area was situated approximately 53km north-west of the current study area. Late Iron Age settlements were recorded.**
- VAN der WALT, J., 2007. AIA, Township development on Subdivision of AH 19, Pretoriuskraal, Orkney, North West Province. - **The study area was situated approximately 13km north-east of the current study area. No sites were recorded.**
- COETZEE, F. P., 2012. *Cultural Heritage Scoping (Predictive) Survey of the Proposed Kabi Witkop Solar PV Facility near Orkney, Dr Kenneth Kaunda District, NorthWest Province.* - **The study area was situated approximately 13km north-east of the current study area. No sites were located.**

- COETZEE, F. P., 2012. *Cultural Heritage Survey of the Proposed Kabi Vaalkop Solar PV Facility near Orkney, Dr Kenneth Kaunda District, NorthWest Province*. - **The study area was situated approximately 13km north-east of the current study area. Two historical structures were recorded.**
- PELSER, A. J., 2012a. Report on a Phase 1 HIA for the Alabama Extension 4 Township Development on the remaining extent of portion 1 of Town & Townlands of Klerksdorp 424IP near Klerksdorp (Matlosana), Northwest Province. - **The study area was situated approximately 13km north-west of the current study area. A few MSA/LSA tools were identified in the area close to the Jagspruit.**
- PELSER, A. J., 2012b. Report on a Phase 1 HIA for the Proposed Matlosana Estate & Uraniaville Ext 2 developments on various portions of portion 1 of the Farm Town & Townlands of Klerksdorp 424IP in Klerksdorp, Northwest Province. - **The study area was situated approximately 13km north of the current study area. No sites of any cultural heritage significance were recorded.**
- VAN SCHALKWYK, J., 2013. Heritage impact Assessment for the proposed development of a PV Power Plant on a portion of the farm Matjesspruit 145HP, Leeudoringstad Region, North West Province. - **The study area was situated within and adjacent to the current study area. Graves, historical structures and stone age material was recorded.**
- DREYER. C., 2014. First phase archaeological and historical investigation of the proposed Eskom Power Line at Brakspruit near Klerksdorp, North West Province. – **The study area was situated approximately 30km north of the current study area. Two large graveyards were recorded.**
- PELSER, A. J., 2015. Phase 1 HIA report for the proposed Wolmaransstad extension 17 Township Development on the remaining extent of Portion 32 of the farm Wolmaransstad Town and Townlands 184HO, Wolmaransstad, Northwest Province. - **The study area was situated approximately 34km west of the current study area. Several historical structures and Stone Age material were located.**
- VAN der WALT, J., 2017. Archaeological Impact Assessment for the proposed Orkney Solar Farm, North West Province. - **The study area was situated adjacent to the current study area. Two cemeteries, widely dispersed scatters of isolated MSA tools, one stone cairn of unknown purpose and the foundations of 7 demolished structures (farm labourer dwellings) were identified.**
- Integrated Specialist Services (Pty) Ltd, 2020. Phase 1 HIA For Mining Right Application On The Farm Kafferskraal 400 IP, Klerksdorp, In City Of Matlosana Local Municipality, North West Province - **The study area was situated approximately 14km north of the current study area. A LIA site with three stone walled clusters and seven burial sites were located.**
- PELSER, A. J., 2021. Phase 1 HIA report for the proposed Township establishment (Flimedia Extension 3) on portion 127 & 128 of the Farm Elandsheuvel 402IP City of Matlosana Local Municipality (Klerksdorp), Northwest Province. - **The study area was situated approximately 18km north-east of the current study area. Two low significance sites, one recent structure and one MSA/LSA scatter, were recorded.**
- VAN der WALT, J., 2022. Heritage Impact Assessment for the proposed Doornhoek 1 PV Facility and associated infrastructure, Klerksdorp, North West Province. - **The study area was situated approximately 30km north of the current study area. Heritage finds in the area are limited to ruins and a low-density scatter of Stone Age material outside of the Project footprint.**



### 7.3.2 *Previous Archaeological and Heritage Studies Associated with the Current Project*

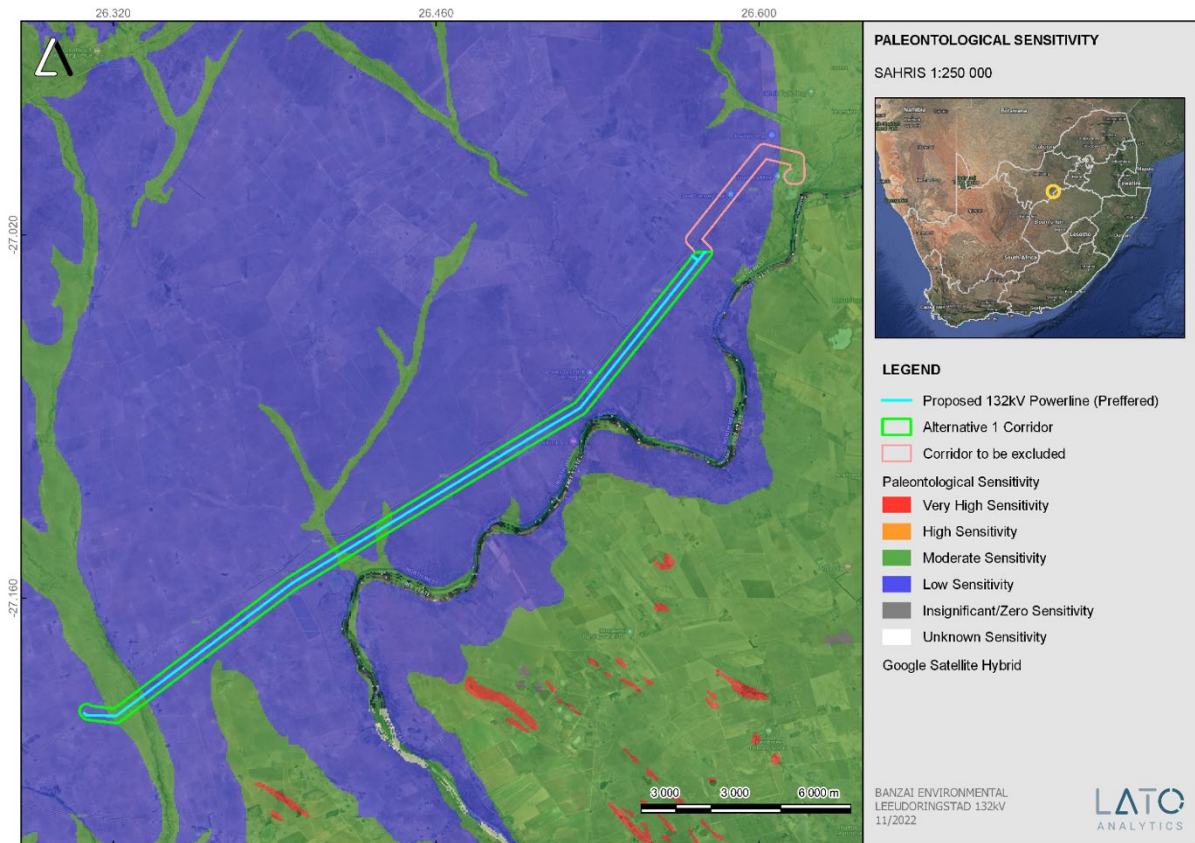
- PGS Heritage Pty Ltd, 2021a. HIA: Development of the 9.9MW Leeuwbosch 1 Solar PV Plant, 9.9MW Leeuwbosch 2 Solar PV Plant and Associated infrastructure near Leeudoringstad in the North West Province. – **“The fieldwork identified 13 heritage resources in the greater study area of the Leeuwbosch 1 and 2 Solar PV projects, however, none of the heritage resources identified are within the development footprint of Leeuwbosch 1 Solar PV or Leeuwbosch 2 Solar PV, as the layout design took the position of these resources into consideration”. Square single stone packed foundations, ash middens, burial ground, and a historic handling kraal were recorded.**
- PGS Heritage Pty Ltd, 2021b. HIA: Development of the 9.9MW Wildebeestkuil 1 Solar PV Plant & 132kV Power line, 9.9MW Wildebeestkuil 2 Solar PV Plant & 132kV Power line and Associated infrastructure near Leeudoringstad in the North West Province. – **The fieldwork identified 7 heritage resources (incl. structural remains of single room dwellings, remains of farmsteads, burial ground), a recent wind pump and a cement dam.**
- PGS Heritage Pty Ltd, 2021c. HIA: Proposed Development of the 132/11kV Leeudoringstad Solar Plant Substation near Leeudoringstad in the North West Province. – **“The fieldwork identified 13 heritage resources in the greater study area of the greater Leeudoringstad Solar photovoltaic (PV) Project, however, none of the heritage resources identified are close to either of the substation site alternatives associated with this proposed substation development”.**

## 7.4 Findings of the historical desktop study

### 7.4.1 *Palaeontological Heritage*

The palaeontological desktop assessment completed by Butler (2022) indicates that the proposed development is underlain by the Allanridge Formation (Ventersdorp Supergroup) and the Rietgat Formation, (Platberg Group, Ventersdorp Supergroup), while Quaternary sediments are also present in the development. Updated geology (Council for Geosciences, Pretoria) of the proposed development indicates that the development is largely underlain by the Allanridge Formation (Ventersdorp Supergroup), and Rietgat Formation (Platberg Group, Ventersdorp Supergroup), while a small portion in the west is underlain by alluvium, colluvium, eluvium and gravel.

According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Quaternary sediments and that of the Rietgat Formation is Moderate, while that of the Allanridge Formation is Low (**Figure 26**, Almond and Pether 2008, SAHRIS website).



**Figure 26: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences) indicating the location of the proposed development.**

It is considered that the proposed development will not lead to detrimental impacts on the palaeontological resources of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: [www.sahra.org.za](http://www.sahra.org.za)) so that mitigation can be carry out by a palaeontologist.

**No further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.**

#### 7.4.2 Heritage Screening

A Heritage Screening Report was compiled using the DFFE National Web-based Environmental Screening Tool as required by Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended. According to the Heritage screening report, the directly affected area has a **low to high** sensitivity rating (**Figure 9**). The field work in the study area demonstrates that only one burial ground and a few possible graves of heritage significance warrant conservation. This is most likely due to the level of disturbance and dense vegetation in the study area. Therefore, in the case of this study area, the DFFE screening tool sensitivity map is only partly supported based on the findings of this fieldwork

#### 7.4.3 Heritage Sensitivity

The sensitivity maps were produced by overlying:

- Satellite Imagery;
- Current Topographical Maps;
- First edition Topographical Maps dating from the 1940's

This enabled the identification of possible heritage sensitive areas around the proposed development area that included:

- Cluster of dwellings (farmsteads);
- Homesteads ("huts") and
- Structures/Buildings.

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in **Table 5**.

**Table 5: Tangible heritage sites in the study area**

Name	Description	Legislative protection
Architectural Structures/Dwellings	Possibly older than 60 years	NHRA Sect 3 and 34
Archaeological sites	Artefacts and/or structures/sites	NHRA Sect 3 and 35 and Sect 27

Observation of the previous heritage reports has shown that archaeological sites are in abundance in the surrounding areas and especially near certain landscape features. This factor needs to be held in consideration.

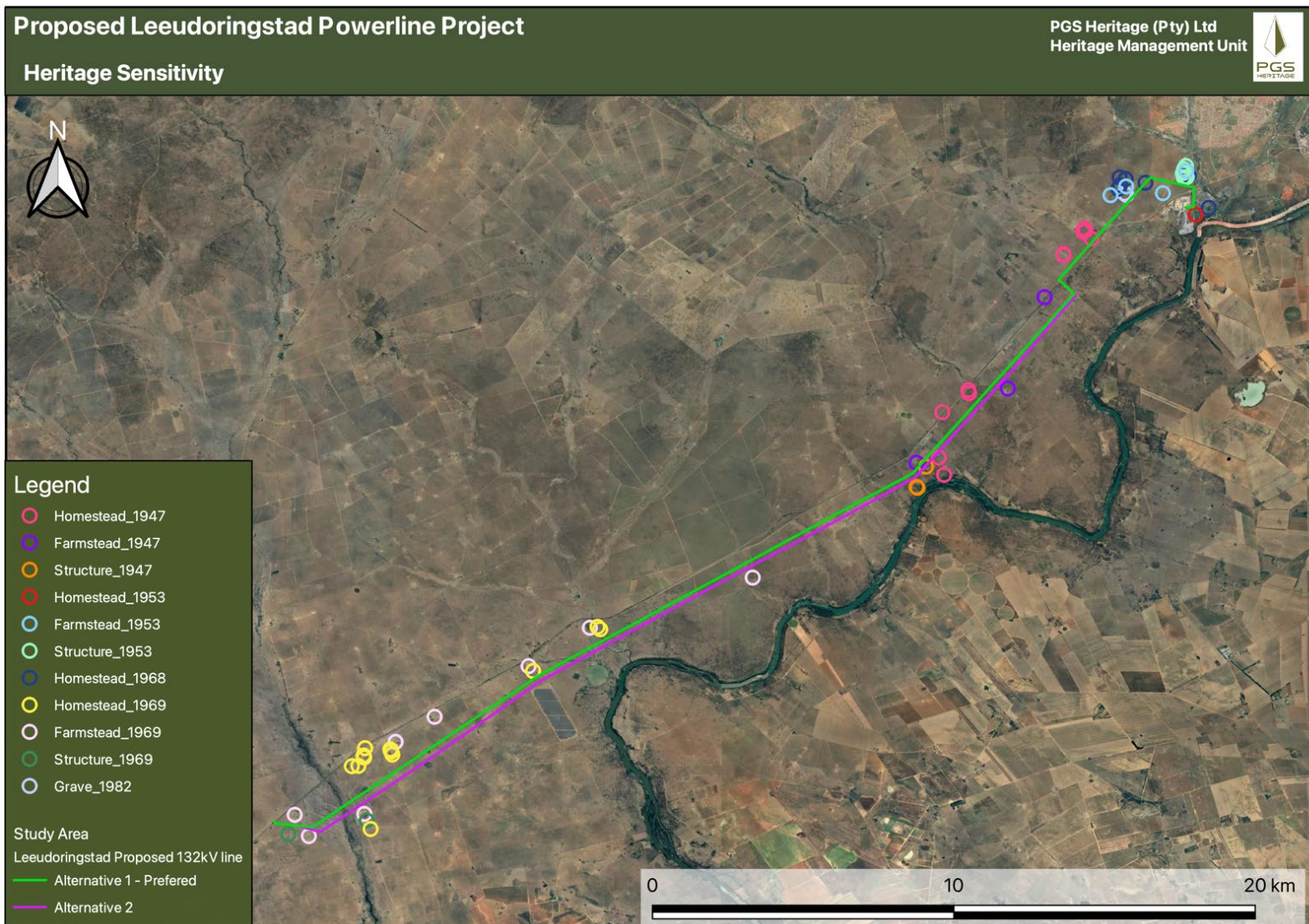
#### 7.4.4 Possible Heritage Finds

The evaluation of satellite imagery and the analysis of the studies previously undertaken in the area has indicated that certain areas may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform to heritage find matrix in **Table 6**.

**Table 6: Landform type to heritage find matrix**

Landform Type	Heritage Type
Crest and foot hill	LSA and MSA scatters, LIA settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Watering holes/Pans/Rivers	LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements
Forested areas	LIA sites

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (**Figure 27**).



**Figure 27: Possible heritage sensitivity areas within the Leudoringstad powerline study area.**

## 8. FIELDWORK FINDINGS

A selective survey of the study area was conducted from the 26<sup>th</sup> – 29<sup>th</sup> September 2022. Three archaeologists from PGS conducted a vehicle and foot-survey of the proposed development area. The fieldwork was logged with GPS devices to provide a tracklog of the area covered (**Figure 28**).

At times, the archaeological visibility of the area was not ideal for surveying due to dense grass and thorny vegetation cover. There was also restricted access to certain farm properties (Portion 36, RE 5 and RE 6 of Yzerspruit no.113 HP; RE 5 of Klerksdrift 16 HP; RE 7 and RE 21 of Wolvehuis 114 HP) due to land owners not giving permission to access their properties and dangerous game life (ostriches) on the properties.

The fieldwork identified four heritage finds that were then classified as either structures, burial grounds or possible graves. The fieldwork confirmed the presence of 1 structure (**LDS-01**), 1 burial ground (**LDS-02**) and 2 possible graves (**LDS-03** and **LDS-04**) that may be affected by the proposed development (**Figure 30, Figure 31**).

See **Section 11** for a discussion regarding the site-specific mitigation measures and the Guidelines for the Management Plan.

Refer to **Appendix B** for full site descriptions (incl. photographs).



Survey Tracklogs



Figure 28: Track log recordings from the field assessment.

# Proposed Leudoringstad Powerline Project

PGS Heritage (Pty) Ltd  
Heritage Management Unit



## Survey Tracklogs

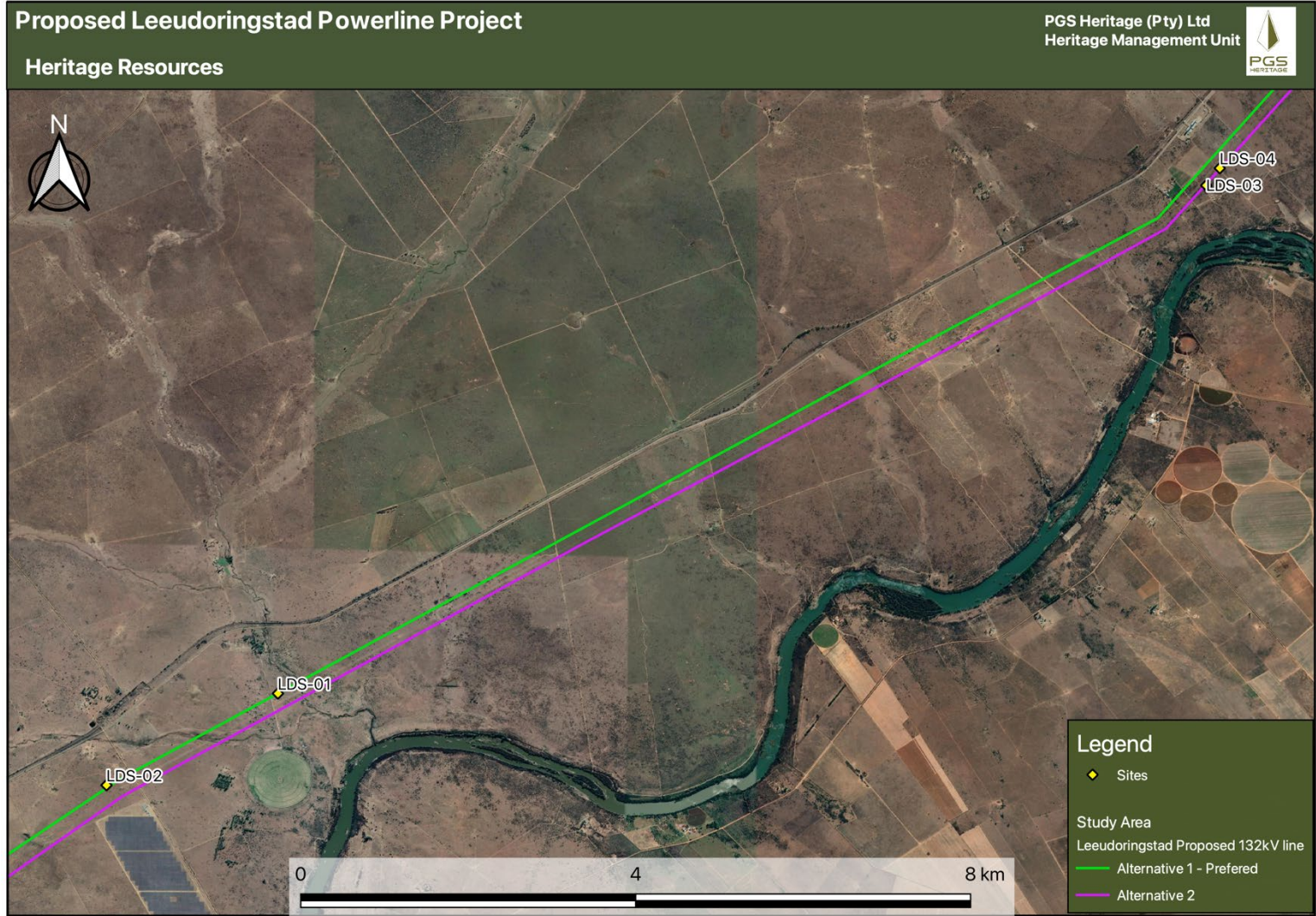


**Figure 29: Track log recordings from the original field assessment in relation to the proposed alternative 1 powerline route.**





**Figure 30: Locality of the heritage resources identified within the study area. See inset A below.**



**Figure 31: Inset A.**

# Proposed Leudoringstad Powerline Project

PGS Heritage (Pty) Ltd  
Heritage Management Unit



## Heritage Resources



Figure 32: Locality of the heritage resources identified within the study area in relation to the proposed alternative 1 powerline route.

## 8.1 Sites

**Table 7: Heritage Resources identified during the field survey**

Site Nr	Site Co-ordinates		Time Period	Brief Site Description	Grading	Heritage Significance
	x	y				
LDS-01	26.41636	-27.144	Historical Period	<p><b>Remains of a square single stone packed foundation with possible graves.</b></p> <p>The possibility does exist for unmarked stillborn graves to be located at this site. Until such time that the presence of graves at the site has been tested, the stone concentrations must be viewed as containing graves.</p>	Grade 3 - C (IIIC)	Medium - Low
LDS-02	26.3957	-27.15505	Historical Period	<p><b>Burial ground</b> located within an overgrown bushy environment. Informal graves.</p>	Grade 3 - A (IIIA) –	High
LDS-03	26.52826	-27.08277	Historical Period	<p><b>Possible Grave.</b> The site was recorded out of caution because the piles of rocks resemble a grave.</p>	Grade 3 - A (IIIA) –	High
LDS-04	26.52989	-27.0807	Historical Period	<p><b>Possible Graves</b> located within an overgrown bushy environment. The site was recorded out of caution because the piles of rocks resemble a grave.</p>	Grade 3 - A (IIIA) –	High

8.1.1 Selected Photographic Record



**Figure 33: View of the foundation at LDS-01.**



**Figure 34: General view of heritage resource at LDS-02.**

## 9. IDENTIFICATION AND ASSESSMENT OF IMPACTS

The fieldwork findings have shown that the study area is characterised by a structure, burial grounds and possible graves. From the proposed location of the powerline, the cultural significance of some of the heritage resources and their context may be impacted by proximity to development area.

Archaeological remains are rare objects, often preserved due to unusual circumstances and are non-renewable resources. When a development is proposed, and specialist studies are undertaken as part of the wider evaluation of heritage resources, this provides an opportunity into a depository that would not otherwise exist. In this sense the impact is POSITIVE for archaeology provided that efforts are made to preserve or mitigate heritage resources in the study footprint, prior to and during the construction phase of the development. For this reason, four development scenarios, informed by EIA constraints are considered in this study, including the no-development / no-go option.

The general nature of impacts from the proposed development will be visual with regard to spatial and built heritage, and physical with regard to archaeological heritage resources. Mitigation measures for heritage resources will be recommended to mitigate impacts.

### 9.1 General Observations

In this section, an assessment will be made of the impact of the proposed development on the identified heritage sites. The assessment of the impact of the proposed powerline alternatives will be addressed separately. An overlay of all the heritage sites identified during the fieldwork over the proposed development footprint areas was made to assess the impact of the proposed development on these identified heritage sites. This overlay resulted in the following observations:

The following general observations will apply for the impact assessment undertaken in this report:

- The impact assessment rating is based on the rating scale as contained in **Appendix C**.
- One structure (**LDS-01**) of medium to low heritage significance, was located less than 50m from the proposed development areas. As a result, an impact is expected from the proposed development on this site.
- A burial ground (**LDS-02**) and two possible graves (**LDS-03, LDS-04**) of high heritage significance, were located less than 50m from the proposed development areas. As a result, an impact is expected from the proposed development on these sites.
- It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the size of the study area and the subterranean nature of some heritage sites. The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such.

- Three project phases have been identified by SiVEST namely the Pre-Construction Phase, Construction Phase and Operational Phase. As site clearing activities of all the development footprint areas are grouped under the Pre-Construction Phase, the highest level of impact on the identified heritage sites is expected during this phase. No impacts are expected during the Construction and Operational Phases. All the identified heritage sites are expected to be destroyed in terms of the pre-mitigation impact assessments undertaken below, whereas only those sites not mitigated by amendments to the proposed development footprints will also be destroyed in terms of the post-mitigation impact assessment calculations undertaken below.

The following impact rating tables are based on the proposed powerline development layout within the region.

9.2 Pre-construction

Table 8: Assessment of the Impact of Proposed Powerline Alternative 1 on Heritage Sites

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
<b>Pre-Construction Phase</b>																				
Damage to 1 burial ground (LDS-02)	The burial ground is located in close proximity to an existing powerline. The construction of the proposed alternative 1 powerline may impact these sites.	2	3	4	4	4	2	34	-	Medium	1. The site should be demarcated with a 50-meter no-go-buffer-zone and the graves should be avoided and left in situ. 2. If the site is going to be impacted directly and the graves need to be removed a grave relocation process for these sites is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with SAHRA under the NHRA and	2	1	4	4	4	1	15	-	Low



ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION														
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S						
												National Health Act regulations.														
Damage to square single stone packed foundation with possible graves (LDS-01)	The structure is located in close proximity to the proposed alternative 1 powerline and may be impacted upon by the proposed development.	2	3	4	4	4	2	34	-	Medium	1. A 20-meter buffer should be maintained. 2. It is recommended that further consultation with local communities on the previous inhabitants of these areas be initiated to determine the possibility of infant burials. In the event that such burial is confirmed a grave relocation process must be initiated.	2	1	4	4	4	1	15	-	Low						
Unidentified heritage resources	Due to the size of the area assessed and the current vegetation cover, there's a possibility of encountering heritage features in the study area does exist.	1	3	4	2	4	2	28	-	Medium	1. A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	1	3	4	2	4	1	14	-	Low						

**Table 9: Assessment of the Impact of Proposed Powerline Alternative 2 on Heritage Sites**

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
<b>Pre-Construction Phase</b>																				
Possible graves (LDS-03 and LDS-04)	The possible graves are located in close proximity to an existing powerline. The construction of the proposed alternative 2 powerline may impact these sites.	2	3	4	4	4	2	34	-	Medium	1. Until such time that the presence of a grave at the site has been tested, the stone concentrations must be viewed as containing a grave. 2. The possible graves should be demarcated with a <b>50-meter buffer</b> and should be avoided and left <i>in situ</i> .  <b>If the graves cannot be avoided:</b> 1. If the site cannot be avoided and the site is going to be impacted, then an application to SAHRA will be required for a test excavation and/or GPR permit to determine if the site contains graves.	2	1	4	4	4	1	15	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION														
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S						
												2. If human remains are discovered, a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA BGG, under the NHRA and National Health Act regulations. 3. If, during test excavations, it is determined that the site does not contain graves, no further mitigation will be required.														
Unidentified heritage resources	Due to the size of the area assessed and the current vegetation cover, there's a possibility of encountering	1	3	4	2	4	2	28	-	Medium	1. A management plan, after a walkdown of the final layout, for the heritage resources needs then to be	1	3	4	2	4	1	14	-	Low						

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
	heritage features in the study area does exist.											compiled and approved for implementation during construction and operations.								

**Table 10: Assessment of paleontological heritage impacts for the proposed Leeudoringstad powerline (Construction Phase)**

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS	S		E	P	R	L	D	I / M	TOTAL	STATUS	S
<b>Construction Phase</b>																				
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	1	2	4	4	4	2	30	-	Medium	Chance Fossil Finds Procedure during construction phase.	1	2	4	4	4	1	15	-	Low

## 10. COMPARATIVE ASSESSMENT OF ALTERNATIVES

Two different alternatives for the powerline were identified and assessed. The two alternative positions of the powerline were considered during the site visit and impact assessment.

**The powerline alternative 1 has been selected as the proposed powerline route.**

### Key

<b>PREFERRED</b>	The alternative will result in a low impact/reduce the impact
<b>FAVOURABLE</b>	The impact will be relatively insignificant
<b>NOT PREFERRED</b>	The alternative will result in a high impact/increase the impact
<b>NO PREFERENCE</b>	The alternative will result in equal impacts

Alternative	Preference	Reasons
<b>POWER LINE</b>		
Alternative 1 - preferred	<b>NO PREFERENCE</b>	The impact on heritage resources will be the same
Alternative 2	<b>NO PREFERENCE</b>	The impact on heritage resources will be the same

### 10.1 The No-Go Alternative

Environmental and heritage legislation requires the consideration of the no-go option. There will be impacts as the project would not proceed. There would also be no socio-economic benefits or increase in energy generation of renewable energy sources.

## 11. GENERAL RECOMMENDATIONS AND MITIGATION MEASURES

### 11.1 Construction Phase

The project will encompass a range of activities during the construction phase, including vegetation clearance, excavations and infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past, and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project, and these must be catered

for. Temporary infrastructure developments are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

## 11.2 Chance Finds Procedure

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts.
- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

## 11.3 Possible finds during construction

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed development activities, could uncover the following:

- Historical homestead remains
- Unmarked graves

## 11.4 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 11** gives guidelines for lead times on permitting.

**Table 11: Lead times for permitting and mobilisation**

<b>Action</b>	<b>Responsibility</b>	<b>Timeframe</b>
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of burial grounds or graves in the way of construction	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

## 11.5 Heritage Management Plan for EMPr implementation

Table 12: Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	<ul style="list-style-type: none"> <li>▪ An archaeological walk down of the final approved layout will be required before construction commences.</li> <li>▪ Implement chance find procedures in cases where possible heritage finds are uncovered.</li> </ul>	Pre-construction and Construction	During construction and operation	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Damage to square single stone packed foundation with possible graves (LDS-01)	<ul style="list-style-type: none"> <li>▪ A 20-meter buffer should be maintained.</li> <li>▪ It is recommended that further consultation with local communities on the previous inhabitants of these areas be initiated to determine the possibility of infant burials. In the event that such burial is confirmed a grave relocation process must be initiated.</li> </ul>	Construction	Prior to and during construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
Burial ground (LDS-02)	<ul style="list-style-type: none"> <li>▪ The site should be demarcated with a 50-meter no-go-buffer-zone and the graves should be avoided and left in situ.</li> <li>▪ If the site is going to be impacted directly and the graves need to be removed a grave relocation process for these sites is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with SAHRA under</li> </ul>	Construction	Prior to and during construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report



Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	the NHRA and National Health Act regulations.						
Possible grave sites ( <b>LDS-03, LDS-04</b> ) that was located within the proposed development area and was rated as high local heritage significance and had a heritage grading of IIIA.	<ul style="list-style-type: none"> <li>▪ Until such time that the presence of a grave at the site has been tested, the stone concentrations must be viewed as containing a grave.</li> <li>▪ The possible graves should be demarcated with a <b>50-meter buffer</b> and should be avoided and left in situ.</li> <li>▪ <b>If the site cannot be avoided</b>, then an application will be required for a test excavation and/or GPR permit to determine if the site contains graves.</li> <li>▪ If human remains are discovered a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA BGG under the NHRA and National Health Act regulations.</li> <li>▪ If, during test excavations, it is determined that the site does not contain graves, no further mitigation will be required.</li> </ul>	Pre-construction	Pre-construction	Applicant ECO Archaeologist	None	Ensure compliance with relevant legislation recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly checklist/report
<b>Palaeontological finds</b>	<ul style="list-style-type: none"> <li>▪ If fossil remains are discovered during construction, either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments.</li> </ul>	Construction	During construction	Applicant ECO Palaeontologist	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 of NHRA	ECO Monthly Checklist/Report

## 12. CONCLUSION

PGS was appointed by SIVEST, on behalf of Upgrade Energy to undertake a HIA as part of the BA for the proposed construction of the Leeudoringstad 132kV powerline in the North West Province of South Africa.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

The fieldwork conducted for the evaluation of the possible impact of the new Leeudoringstad power line has revealed the presence of 4 heritage resources.

### *Historical structures*

One (1) site (**LDS-01**), the remains of a square single stone packed foundation was identified. The structure is of low heritage significance, but the possibility of infant burials close to or in the remaining foundation as per African custom cannot be excluded. The resource is thus graded as having medium local heritage significance.

### *Burial ground*

One (1) burial ground (**LDS-02**) was identified and rated as having high heritage significance.

### *Possible graves*

Two (2) sites with possible graves (**LDS-03**, **LDS-04**) were identified and rated as having high heritage significance.

### **Palaeontological Desktop Study**

As per the palaeontological desktop assessment (Butler, 2022), the proposed development is underlain by the Allanridge Formation (Ventersdorp Supergroup) and the Rietgat Formation, (Platberg Group, Ventersdorp Supergroup), while Quaternary sediments are also present in the development. Updated geology (Council for Geosciences, Pretoria) of the proposed development indicates that the development is largely underlain by the Allanridge Formation (Ventersdorp Supergroup), and Rietgat Formation (Platberg Group, Ventersdorp Supergroup), while a small portion in the west is underlain by alluvium, colluvium, eluvium and gravel. According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Quaternary sediments and that of the Rietgat Formation is Moderate, while that of the Allanridge Formation is Low (Almond and Pether 2008, SAHRIS website).

It is considered that the proposed development will not lead to detrimental impacts on the palaeontological resources of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

**No further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.**

### Anticipated impacts

The pre-construction and construction phase of the proposed development will entail surface clearance as well as excavations into the superficial sediment cover and underlying bedrock (e.g., for powerlines and new access roads).

The two alternative positions of the powerline were assessed during the site visit and impact assessment. It was our opinion that no preference for either of the sites existed as both would have the same low impact as assess on heritage resources. The two alternatives were considered acceptable subject to the recommended mitigation.

**From an archaeological and historical structure perspective, the final proposed layout will not change the impact on the identified heritage resources from the initial field assessment.** By selecting the alternative 1 powerline route, the possible pre-construction impacts calculated on the tangible cultural heritage resources is overall **MODERATE NEGATIVE** rating but with the implementation of the recommended buffers and management guidelines will be reduced to a **LOW NEGATIVE** impact.

### Recommendations

The calculated impact as summarised in **Section 9** of this report confirms the impact of the proposed powerline will be reduced with the implementation of the mitigation measures. This finding in addition to the implementation of a chance finds procedure, as part of the EMPr, will mitigate possible impacts on unidentified heritage resources. **The following mitigation measures will be required:**

**Table 13: Heritage management recommendations.**

Area and site no.	Mitigation measures
<b>General project area</b>	<ul style="list-style-type: none"> <li>▪ Implement a chance to find procedures in case where possible heritage finds are uncovered.</li> </ul>
Burial ground ( <b>LDS-02</b> )	<ul style="list-style-type: none"> <li>▪ The site should be demarcated with a 50-meter no-go-buffer-zone and the graves should be avoided and left in situ.</li> <li>▪ If the site is going to be impacted directly and the graves need to be removed a grave relocation process for these sites is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with SAHRA under the NHRA and National Health Act regulations.</li> </ul>
Remains of a square single stone packed foundation with possible graves ( <b>LDS-01</b> ).	<ul style="list-style-type: none"> <li>▪ A 20-meter buffer should be maintained.</li> <li>▪ It is recommended that further consultation with local communities on the previous inhabitants of these areas be initiated to determine the possibility of infant burials. In the event that such burial is confirmed a grave relocation process must be initiated.</li> </ul>
Possible grave sites ( <b>LDS-03, LDS-04</b> )	<ul style="list-style-type: none"> <li>▪ Until such time that the presence of a grave at the site has been tested, the stone concentrations must be viewed as containing a grave.</li> </ul>



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Kultuurvereniging

## **13.1 Internet**

DNGI GEOSPATIAL PORTAL

Council of Geoscience: Geology of South Africa Interactive Online Map

[www.nwpg.gov.za](http://www.nwpg.gov.za)

[www.sanbi.org](http://www.sanbi.org)

[www.wikipedia.org](http://www.wikipedia.org)

## **13.2 Google Earth**

All the aerial depictions and overlays used in this report are from Google Earth.





## APPENDIX A – CV

## **WOUTER FOURIE**

### **Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage**

#### **Summary of Experience**

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave “rescue” excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
- Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

#### **Key Qualifications**

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

#### **Key Work Experience**

2003- current - Director – PGS Heritage (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique, Malawi, Mauritius, Zimbabwe, Zambia and the Democratic Republic of the Congo

## PROFESSIONAL CURRICULUM VITAE FOR NIKKI MANN

### Key Qualifications:

**MSc Archaeology** (phytolith analysis) - University of Cape Town - 2017

**BSc Honours Archaeology** - University of Cape Town – 2014

**Bachelor of Science (BSc)** - University of Cape Town - Majors in Archaeology, and Environmental and Geographical Science -2013

Professional Archaeologist – Association of Southern African Professional Archaeologists (**ASAPA**)

### **Archaeological Experience**

- 2021- Current – Archaeologist – PGS Heritage (Pty) Ltd
- Kathu Tyre Management Plant HIA. Kathu. EXM. Position: Heritage Specialist.
- Kathu Borrow Pit Screening. Kathu. EXM. Position: Heritage Specialist.
- Harmony Kareerand Pipelines Project. Between Klerkdorp and Potchefstroom, North West Province. EIMS. Position: Heritage Specialist
- Black Mountain PV. Northern Cape. Uvuna. Position: Heritage Specialist
- Proposed amendment of existing mining activities for Kolomela Mine. South-west of Postmasburg, Northern Cape. EXM. Position: Heritage Specialist.
- Proposed amendment of existing mining activities for Kudumane Mine. Hotazel, Northern Cape. SRK. Position: Heritage Specialist.
- Victoria West Pipeline project. Victoria West. iXEng. Position: Heritage Specialist.
- Koup 1 and Koup 2 WEF. Beaufort West, Western Cape. SiVEST. Position: Heritage Specialist.
- Victoria West Pipelines. Victoria West, Northern Cape. iXEng. – Position: Heritage Specialist.
- East Orchards Poultry Farm Project. Delmas, Mpumalanga. EcoSphere. – Position: Heritage Specialist.
- Phase 1 Archaeological Impact Assessment (Phase 1 AIA): Gunstfontein Wind Energy Facility (WEF) and overhead powerline, near Sutherland, Northern Cape, South Africa. – Position: Archaeological Specialist (November 2020).
- Phase 1 Archaeological Impact Assessment (Phase 1 AIA): Proposed development of an overhead powerline for the approved Oya PV Facility, between Sutherland and Matjiesfontein, Northern and Western Cape, South Africa. – Position: Archaeological Specialist (October 2020).
- Phase 1 Archaeological Impact Assessment (Phase 1 AIA): Proposed development of infrastructure for the approved Kudusberg Wind Energy Facility (WEF), between Sutherland and Matjiesfontein, Northern and Western Cape, South Africa. – Position: Archaeological Specialist (October 2020).
- Phase 1 Archaeological Impact Assessment (Phase 1 AIA): Proposed Square Kilometre Array (SKA) fibre optic cable, between Beaufort West and Carnarvon, Northern and Western Cape, South Africa. (September 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Kolkies PV (Photovoltaics) Project, north of Touws River, Western Cape, South Africa. – Position: Archaeological Specialist (September 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Pienaarspoort Wind Energy Facility (WEF) Project 1 and 2, north-west of Matjiesfontein, Western Cape, South Africa. – Position: Archaeological Specialist (September 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Swellendam Wind Energy Facility (WEF), Swellendam, Western Cape, South Africa. – Position: Archaeological Specialist (August 2020).
- **Phase 2 Archaeological Mitigation**: Proposed development of infrastructure in the Port of Ngqura within the Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality, Eastern

- Cape, South Africa: Contract Archaeologist, excavation of Later Stone Age (LSA) shell middens (July 2020). Contracted to work with PGS Heritage.
- Polihali Dam Heritage Management Project, Lesotho: Junior field archaeologist, excavation of Later Stone Age (LSA) sites (May 2019- May 2020) as part of PGS Heritage.
    - Duties included excavation of rock shelters, site supervision, site recording, photography, lab work, section drawing and digital illustration (Inkscape and Photoshop), assisting in report writing and implementation of HSE practices.
  - Ledi-Geraru Research Project, Ethiopia: excavation of Early Stone Age (ESA) sites (February-March 2020; Directed by Dr David R. Braun)
  - Gorras Farm, Northern Cape, South Africa: excavation of middens next to a corbelled building; Historical site (October 2018; supervised by Simon Lee Hall and UCT PhD student Ms Vuyiswa Thembehile Lupuwana)
    - Duties included excavation of middens and surface collection.
  - **Phase 2 Archaeological Mitigation:** Proposed development of boreholes and associated pipelines for the Langebaan Aquifer within the Hopefield Private Nature Reserve, Hopefield, Western Cape. - Position: Archaeological specialist (August 2018).
  - Koobi Fora Field School, Kenya: Intern, excavation of Early Stone Age (ESA) and Middle Stone Age (MSA) sites (June-July 2018; Directed by Dr David R. Braun, Kathryn Ranhorn (Postdoctoral Research Fellow at Harvard University) and Jonathan Reeves (PhD student at The George Washington University))
  - Data extraction to SAHRIS (South African Heritage Resource Agency) for CTS Heritage (April 2018)
  - Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Matjiesfontein Road Extension Project. Matjiesfontein, Western Cape. – Position: Archaeological Specialist (April 2018).
  - Ledi-Geraru Research Project, Ethiopia: excavation of Early Stone Age (ESA) sites (February-March 2018; Directed by Dr David R. Braun)
  - Ferrycarrig, Irish National Heritage Park, Wexford, southeast Ireland: Excavation of ringwork castle site associated with the Anglo-Norman invasion of Ireland (January 2018; Directed by Dr Denis Shine and Dr Stephen Mandal)



## APPENDIX B – Site Descriptions (incl. photographs)

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
LDS-01	-27.144	26.41636	<p><b>General Landscape Characteristics</b> Flat lying area, Grassy vegetation</p> <p><b>Site Conditions</b> Overgrown/ limited visibility</p> <p><b>Time Period</b> Historical Period</p> <p><b>Site Type</b> Historical Homestead</p> <p><b>Site Extent</b> 10m x 10m</p> <p><b>Notes</b> The site consists of a square single stone packed foundation. The structure is of low heritage significance, but the possibility of infant burials close to or in the remaining foundation as per African custom cannot be excluded. The resource is thus graded as having medium local heritage significance.</p>	Medium to Low	Grade 3 – C (IIIC)

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					
<p><b>Figure 35: View of the foundations at LDS-01.</b></p>					



Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
LDS-02	-27.15505	26.3957	<p><b>General Landscape Characteristics</b> Flat lying area</p> <p><b>Site Conditions</b> Overgrown/ limited visibility</p> <p><b>Time Period</b> Historical Period</p> <p><b>Site Type</b> Graves</p> <p><b>Site Extent</b> 30m x 50m</p> <p><b>Notes</b> An informal burial ground was identified at this locality. Approximately 15 stone packed graves were identified (W-E orientation). The site was previously recorded by Van Schalkwyk (2013). The fence around the site needs to be repaired.</p>	High	Grade 3 - A (IIIA)



**Figure 36: General view of heritage site at LDS-02.**



**Figure 37: The fence demarcating the site needs repair.**


Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					

Figure 38: Views of stone packed graves.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
LDS-03	-27.08277	26.52826	<p><b>General Landscape Characteristics</b> Bushy/Shrubby vegetation, Grassy vegetation</p> <p><b>Site Conditions</b> Clear</p> <p><b>Time Period</b> Historical Period</p> <p><b>Site Type</b> Possible Grave.</p> <p><b>Site Extent</b> 1,8m x 1 m</p> <p><b>Notes</b> Small cluster of stones indicating a possible grave.</p>	High	Grade 3 - A (IIIA)

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
<p><b>Figure 39: Views of LDS-03.</b></p>					

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
LDS-04	-27.0807	26.52989	<p><b>General Landscape Characteristics</b> Flat lying area, Bushy/Shrubby vegetation</p> <p><b>Site Conditions</b> Overgrown/ limited visibility</p> <p><b>Time Period</b> Historical Period</p> <p><b>Site Type</b> Possible Graves</p> <p><b>Site Extent</b> 20m x 20m</p> <p><b>Notes</b> Two possible graves. Stone packed features (W-E orientation).</p>		Grade 3 - A (IIIA)



**Figure 40: General view of LDS-04.**



Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
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Figure 41: Views of possible graves at LDS-04.



## **APPENDIX C – IMPACT ASSESSMENT METHODOLOGY**

# 1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

## 1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e., site, local, national or global), whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

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

## 1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

***The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).***

### 1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

**Table 1:** Rating of impacts criteria

<b>ENVIRONMENTAL PARAMETER</b>		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
<b>ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE</b>		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
<b>EXTENT (E)</b>		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
<b>PROBABILITY (P)</b>		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
<b>REVERSIBILITY (R)</b>		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
<b>IRREPLACEABLE LOSS OF RESOURCES (L)</b>		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
<b>DURATION (D)</b>		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
<b>INTENSITY / MAGNITUDE (I / M)</b>		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
<b>SIGNIFICANCE (S)</b>		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:		
<b>Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.</b>		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

## **APPENDIX D:**

### **SITE SENSITIVITY VERIFICATION (IN TERMS OF PART A OF THE ASSESSMENT PROTOCOLS PUBLISHED IN GN 320 ON 20 MARCH 2020**

#### **Introduction**

PGS Heritage (Pty) Ltd (PGS) was appointed by SiVest (PTY) Ltd (hereafter referred to as “SiVEST”), on behalf of Upgrade Energy Africa (Pty) Ltd (hereafter referred to as “Upgrade Energy”), to undertake a Heritage Impact Assessment (HIA) as part of the Basic Assessment (BA) for the proposed construction of the Leeudoringstad 132kV powerline in the North West Province of South Africa.

The powerline project area is located approximately 3km east of Leeudoringstad, within the Maquassi Hills Local Municipality within the Dr Kenneth Kaunda District Municipality.

In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification has been undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

#### **2. Site sensitivity verification**

The site sensitivity verification of the proposed Leeudoringstad Powerline is based on:

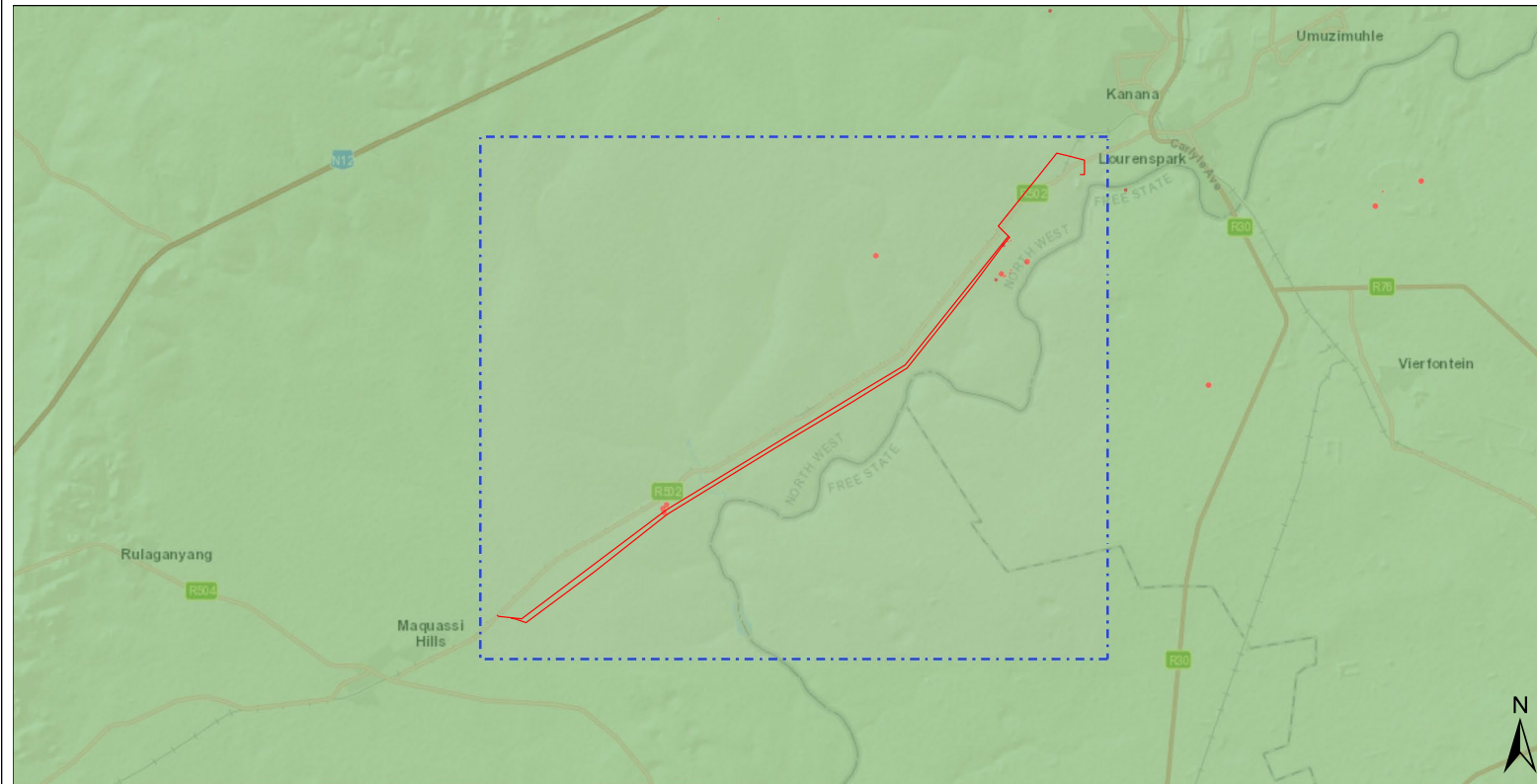
- A desktop review of (a) the relevant 1:50 000 scale topographic maps: 2626DC (KLERKSDORP) 2726BA (VAALBRUG) and 2726AB (HARRISBURG) – Current and historical editions (1947, 1953, 1968, 1969, 1982), (b) Google Earth© satellite imagery, (c) published historical and archaeological literature, as well as (d) several previous HIA and AIA assessments undertaken in the general vicinity of the study area.
- A four-day field assessment of the project area by the author and field assistants during the period 26 to 29 September 2022. Accessible portions of the proposed development area were surveyed.

#### **3. Outcome of site sensitivity verification**

The region surrounding the study area contains a long and rich archaeological and historical mining record. However, vast areas of the region have yet to be subjected to systematic analytical research.







**Figure 1: Archaeology and Heritage screening map for the proposed powerline.**

## **5. Conclusion**

The Archaeological and Cultural Heritage sensitivity of the project areas for the proposed Leeudoringstad 132KV powerline has been evaluated, based on desktop studies and a four-day field assessment.

It is concluded that the low rating as provided by the Environmental Screening Tool likely reflects the scarcity of heritage reports conducted in the region. The field work in the study area demonstrates that only one burial ground and a few possible graves of heritage significance warrant conservation. This is most likely due to the level of disturbance and dense vegetation in the study area. Therefore, in the case of this study area, the DFFE screening tool sensitivity map is only partly supported based on the findings of this fieldwork.