# Appendix G.11

## HERITAGE AND PALAEONTOLOGY REPORT

**Beyond Heritage (Pty) Ltd**
**Registration number:**
**2021/598485/07**
**VAT no. 4660218696**
**Private Bag X1049**
**Suite 34**
**Modimolle**

4 June 2025

Attention: Ashlea Strong

WSP Group Africa (Pty) Ltd

Reference: **Heritage Statement – Phefumula Emoyeni WEF - Updated Layout (202505 72WTG Roads Layout)**

## 1. Background information

WSP Group Africa (Pty) Ltd, appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) for the proposed the development of the Phefumula Emoyeni One Wind Energy Facility (WEF) (up to 550MW) located approximately 16km north of Ermelo in the Msukaligwa Local Municipality and Gert Sibande District Municipality, near the town of Ermelo, in the Mpumalanga Province. The study area was assessed through a desktop assessment and by a non-intrusive pedestrian field survey.

The project area (Figure 1) was assessed during a Heritage Impact Assessment. The layout has been updated with the inclusion of additional roads (May 2025) (Figure 2).

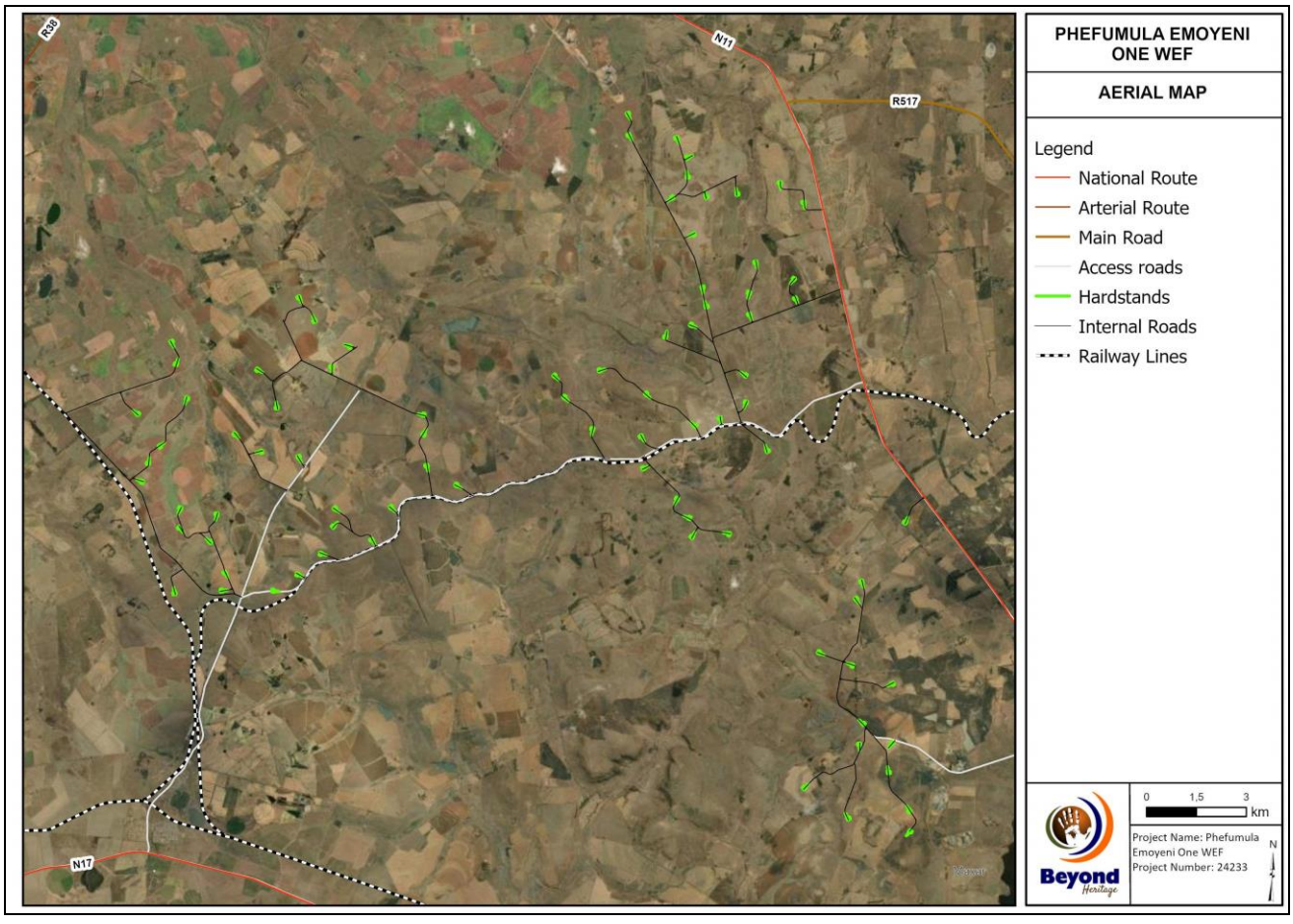


Figure 1. Aerial image of the Phefumula Emoyeni WEF initial layout.

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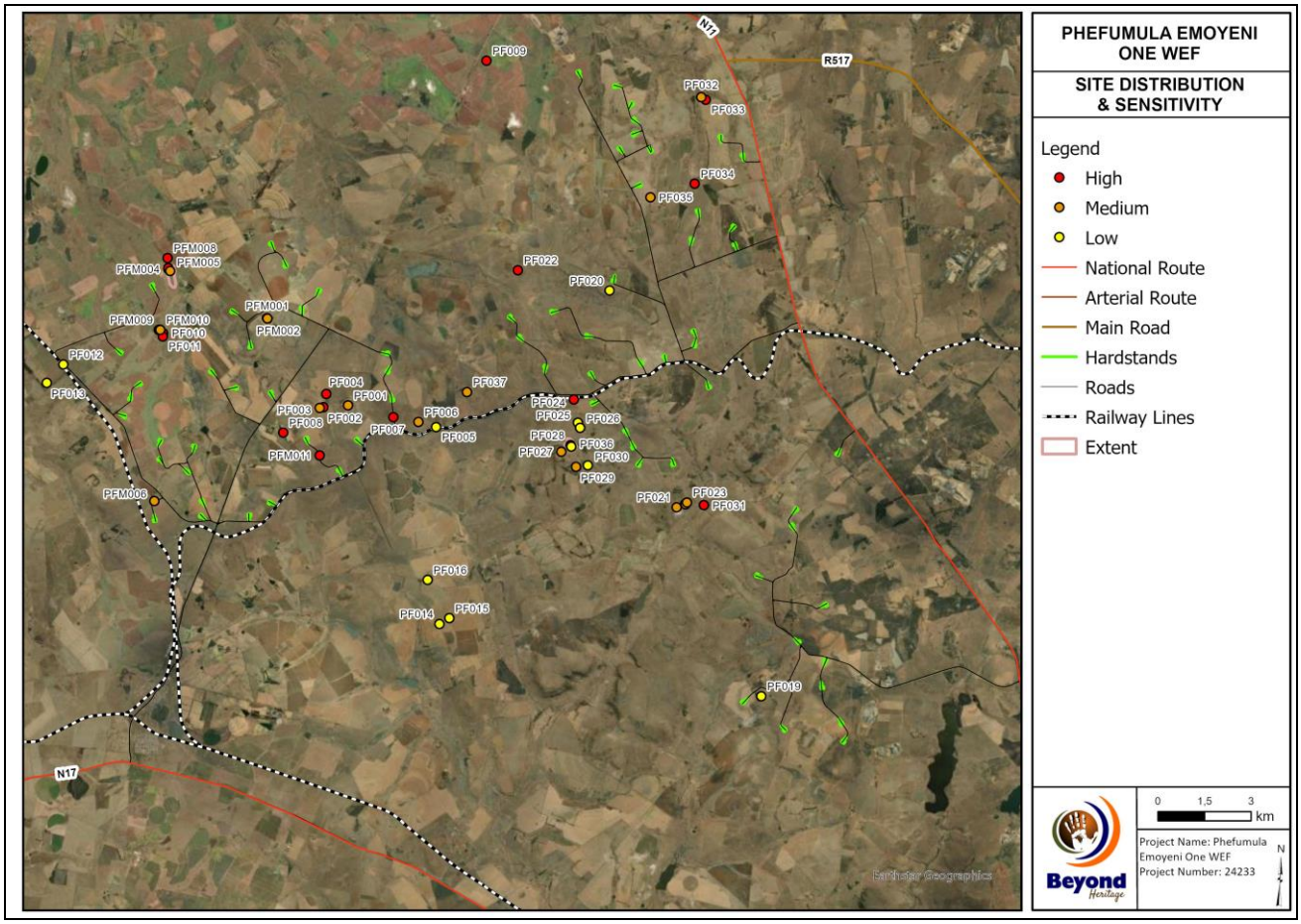


Figure 2. Map indicating the amended layout in relation to the recorded heritage resources (Kraljevic 2024).

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## 2. Heritage Opinion

Based on the findings of the 2025 HIA and the subsequent amended layout the following applies:

- The proposed layout is located within the area that was assessed as part of the HIA;
- The recommendations made in the 2025 heritage and paleontological reports (Kraljevic 2025 and Bamford 2025) are still applicable to the Project and must be adhered to;
- Burial site PF007 will be impacted by the access road which leads to WTG58. It is always preferable to avoid all burial sites with a 30m buffer zone. If avoidance of the burial site is not possible, the graves can be moved with the relevant permits as recommended in the HIA;
- A Grave management plan for the burial sites will also have to be compiled as well as access provided to burial sites for family members wishing to visit the graves;
- Although the other burial sites and medium significance sites will not be impacted by the current layout, they must be added to development plans and avoided with a 30m buffer zone;
- The Project area must be monitored by the ECO during pre-construction and construction phases for heritage and palaeontology chance finds, if chance finds are encountered to implement the Chance Find Procedure for the Project as outlined in the HIA and PIA (Kraljevic 2025 and Bamford 2025).

The proposed development remains subject to approval from SAHRA,

Kindly contact me with any queries or concerns.

Sincerely

Lara Kraljević

Archaeologist and heritage specialist
Beyond Heritage

## References

Kraljevic, L. 2025. Heritage Impact Assessment for the proposed Phefumula Emoyeni One Wind Energy Facility (WEF), Mpumalanga. Unpublished report.

Bamford, M.K. 2025. Palaeontological Site Report for the proposed Phefumula Emoyeni One Wind Energy Facility (WEF), Mpumalanga Province. Unpublished report.

# HERITAGE IMPACT ASSESSMENT

**(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999)**

**FOR THE PROPOSED PHEFUMULA EMOYENI ONE WIND ENERGY FACILITY (WEF), MPUMALANGA**

**Type of development:**

Wind Energy Facility (WEF)

**Client:**

WSP Group Africa (Pty) Ltd

**Applicant:**

Phefumula Emoyeni One (Pty) Ltd

**Report Prepared by:**


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Report Author:
Ms. L. Kraljević
Project Reference:
Project number 24233
Report date:
8 July 2024
Revised 3 September 2024
Revised 11 March

## APPROVAL PAGE

| | |
|---|---|
| **Project Name** | Phefumula Emoyeni One WEF |
| **Report Title** | Heritage Impact Assessment for the proposed Phefumula Emoyeni One Wind Energy Facility (WEF), Mpumalanga |
| **Authority Reference Number** | TBC |
| **Report Status** | Final Report |
| **Applicant Name** | Phefumula Emoyeni One (Pty) Ltd |

| Responsibility | Name | Qualifications and Certifications | Date |
|---|---|---|---|
| **Fieldwork** | Ruan van der Merwe - Archaeologist | Hons Archaeology<br>ASAPA #667 | May 2024<br>February 2025 |
| **Fieldwork** | Hannes Visser – Archaeologist | BA Hons Archaeology<br>ASAPA #617 | February 2025 |
| **Report writing and archaeological support** | Lara Kraljević - Archaeologist | MA Archaeology<br>ASAPA #661 | July 2024<br>March 2025 |
| **Palaeontological Report** | Prof Marion Bamford | PhD Palaeobotany | July 2024<br>March 2025 |

## DOCUMENT PROGRESS

### Distribution List

| Date | Report Reference Number | Document Distribution | Number of Copies |
|---|---|---|---|
| 8 July 2024 | 24233 | WSP Group Africa (Pty) Ltd | Electronic Copy |
| 3 September 2024 | 24233 | WSP Group Africa (Pty) Ltd | Electronic Copy |
| 11 March 2025 | 24233 | WSP Group Africa (Pty) Ltd | Electronic Copy |

### Amendments on Document

| Date | Report Reference Number | Description of Amendment |
|---|---|---|
| 3 September 2024 | 24233 | Technical revision |
| 11 March 2025 | 24233 | Layout update |

## INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

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

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## REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the Environmental Authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

**Table 1. Specialist Report Requirements.**

| Requirement from Appendix 6 of GN 326 EIA Regulation 2017 | Chapter |
|---|---|
| (a) Details of -<br>(i) the specialist who prepared the report; and<br>(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae. | Section a |
| (b) Declaration that the specialist is independent in a form as may be specified by the competent authority. | *Declaration of Independence* |
| (c) Indication of the scope of, and the purpose for which, the report was prepared. | Section 1 |
| (cA) An indication of the quality and age of base data used for the specialist report. | Section 3.4. |
| (cB) A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change. | Section 9 |
| (d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment. | Section 3.4 |
| (e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used. | Section 3 |
| (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 site plan identifying site alternatives. | Section 7, 8 and 9 |
| (g) Identification of any areas to be avoided, including buffers. | Section 7,8 and 9 |
| (h) 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) Description of any assumptions made and any uncertainties or gaps in knowledge. | Section 3.7 |
| (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. | Section 1.3 |
| (k) Mitigation measures for inclusion in the EMPr. | Section 9.1 and 9.5 |
| (l) Conditions for inclusion in the environmental authorisation. | Section 9. 1 and 9.5 |
| (m) Monitoring requirements for inclusion in the EMPr or environmental authorisation. | Section 9.6 |
| (n) Reasoned opinion -<br>(i) As to whether the proposed activity, activities or portions thereof should be authorised;<br>(iA) Regarding the acceptability of the proposed activity or activities; and<br>(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan. | Section 9.3 |
| (o) Description of any consultation process that was undertaken during the course of preparing the specialist report. | Section 5 |
| (p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto. | Refer to the EIA report |
| (q) Any other information requested by the competent authority. | No other information requested at this time |

## Executive Summary

Phefumula Emoyeni One (Pty) Ltd, is proposing the development of the Phefumula Emoyeni One Wind Energy Facility (WEF) (up to 550MW) located approximately 16km north of Ermelo in the Msukaligwa Local Municipality and Gert Sibande District Municipality, near the town of Ermelo, in the Mpumalanga Province. Phefumula Emoyeni One (Pty) Ltd, appointed WSP Group Africa (Pty) Ltd as the independent environmental assessment practitioner (EAP) to apply for Environmental Authorization for the Project. WSP Group Africa (Pty) Ltd, in turn, appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed through a desktop assessment and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The Project area is situated within a large, open landscape of which large sections have been used for agricultural activities as well as cattle farming. Many farmsteads are also situated throughout the Project area, with some still being occupied.
- Due to layout changes to the Project after the survey was conducted, the final layout of the Project including final Turbine positions, and ancillary infrastructure was subject to an additional survey by two archaeologists;
- A total of 47 sites were recorded during two surveys (Feb 2022 and Feb 2025) which include multiple burial sites, farmsteads, ruins, circular stone enclosures, and possibly Historically planted trees;
- Burial site PF007 will be impacted by the access road which leads to WTG58. It is always preferable to avoid all burial sites with a 30m buffer zone. If avoidance of these burial sites is not possible, the graves can be moved with the relevant permits. A Grave management plan for the burial sites will also have to be compiled as well as access provided to burial sites for family members wishing to visit the graves;
- PFM011 is a possible burial site and if the site cannot be avoided with a 30m buffer further investigation will be required to determine whether it is indeed a grave;
- According to the South African Heritage Resource Authority (SAHRA) Paleontological sensitivity map the study area is of insignificant and very high palaeontological sensitivity and an independent study was commissioned for this aspect (Bamford 2024).

The impact on heritage resources can be mitigated to an acceptable level, and the Project can be authorised provided that the recommendations in this report are adhered to and based on the SAHRA's approval.

**Recommendations:**

The following recommendations for Environmental Authorisation apply and the Project may only proceed after receiving comment from SAHRA:

- If the site at PFM011 cannot be avoided with a 30m buffer zone, the presence of a grave at PFM011 should be confirmed through Ground Penetrating Radar (GPR) and test excavations. If confirmed to be a grave, it can be removed with the necessary permits;
- Burial sites which will be impacted by access roads (PF007, PFM011) should preferably be avoided with a 30m buffer zone with access provided to family members
    - » If avoidance is not possible, the graves can be moved with the necessary permits.
- All sites of medium and high significance should be added to development plans and avoided with a 30m buffer zone;
- Although of low significance, ruins should preferably be avoided as they have the risk of having associated graves present;
- A Grave Management Plan should be compiled for the burial sites present within the Project area;
- Development activities must be confined to the approved development footprint only;
- Monitoring of the Project area by the ECO during pre-construction and construction phases for heritage and palaeontology chance finds, if chance finds are encountered to implement the Chance Find Procedure for the Project as outlined in Section 9.

**Declaration of Independence**

| | |
|---|---|
| **Specialist Name** | Lara Lucija Kraljević |
| **Declaration of Independence** | I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:<br>• I act as an independent specialist in this application;<br>• 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;<br>• I declare that there are no circumstances that may compromise my objectivity in performing such work;<br>• 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;<br>• I will comply with the Act, Regulations and all other applicable legislation;<br>• I have no, and will not engage in, conflicting interests in the undertaking of the activity;<br>• 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;<br>• All the particulars furnished by me in this form are true and correct; and<br>• I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 49 A of the Act. |
| **Signature** |  |
| **Date** | 24/06/2024 |

**a) Expertise of the specialist**

Lara Kraljević completed her masters in archaeology at the University of Pretoria specialising in chemical and mineralogical studies of Iron Age ceramics. Lara is an accredited member of the Association of South African Professional Archaeologists (ASAPA) (#661). She has co-authored over 100 impact assessments in Gauteng, Limpopo, Mpumalanga, Northern Cape, Eastern Cape, and North West Provinces in South Africa.

TABLE OF CONTENTS

**LIST OF FIGURES**

## List of Tables

## ABBREVIATIONS

| | |
|---|---|
| ASAPA | Association of South African Professional Archaeologists |
| BGG | Burial Ground and Graves |
| CFPs | Chance Find Procedures |
| CMP | Conservation Management Plan |
| CoGHSTA | Co-operative Governance, Human Settlements and Traditional Affairs |
| CRR | Comments and Response Report |
| CRM | Cultural Resource Management |
| DFFE | Department of Fisheries, Forestry and Environment, |
| EA | Environmental Authorisation |
| EAP | Environmental Assessment Practitioner |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment* |
| EIA | Early Iron Age* |
| EAP | Environmental Assessment Practitioner |
| EMPr | Environmental Management Programme |
| ESA | Early Stone Age |
| ESIA | Environmental and Social Impact Assessment |
| GIS | Geographical Information System |
| GPS | Global Positioning System |
| GRP | Grave Relocation Plan |
| HIA | Heritage Impact Assessment |
| LIA | Late Iron Age |
| LSA | Late Stone Age |
| MEC | Member of the Executive Council |
| MIA | Middle Iron Age |
| MPRDA | Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) |
| MSA | Middle Stone Age |
| NCHM | National Cultural History Museum |
| NEMA | National Environmental Management Act, 1998 (Act No. 107 of 1998) |
| NHRA | National Heritage Resources Act, 1999 (Act No. 25 of 1999) |
| NID | Notification of Intent to Develop |
| NoK | Next-of-Kin |
| PRHA | Provincial Heritage Resource Agency |
| SADC | Southern African Development Community |
| SAHRA | South African Heritage Resources Agency |

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

## GLOSSARY

| | |
|---|---|
| Archaeological site | Remains of human activity over 100 years old |
| Earlier Stone Age | ~ 2.6 million to 250 000 years ago |
| Middle Stone Age | ~ 250 000 to 40-25 000 years ago |
| Later Stone Age | ~ 40-25 000, to the historic period |
| The Iron Age | ~ AD 400 to 1840 |
| Historic | ~ AD 1840 to 1950 |
| Historic building | Over 60 years old |

# 1 Introduction

WSP Group Africa (Pty) Ltd, appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) for the proposed the development of the Phefumula Emoyeni One Wind Energy Facility (WEF) (up to 550MW) located approximately 16km north of Ermelo in the Msukaligwa Local Municipality and Gert Sibande District Municipality, near the town of Ermelo, in the Mpumalanga Province. The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the development and informs the EIA phase of this process.

The aim of the study was to survey the proposed development footprint to understand the cultural layering of the area, and if heritage features are found, to assess their importance within local, provincial, and national context. It further served to assess the impact of the proposed Project on non-renewable heritage resources. The study will submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. Recommendations are included to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999) (NHRA).

The report outlines the approach and methodology utilized before and during the survey, which includes:

- Phase 1, review of relevant literature;
- Phase 2, the physical surveying of the area on foot and by vehicle;
- Phase 3, reporting the outcome of the study.

During the survey, multiple burial sites, farmsteads, ruins, and circular stone enclosures were recorded in the study area. General site conditions and features in the study area were recorded by means of photographs, GPS locations and descriptions. Possible impacts were identified, and mitigation measures are proposed in this report.

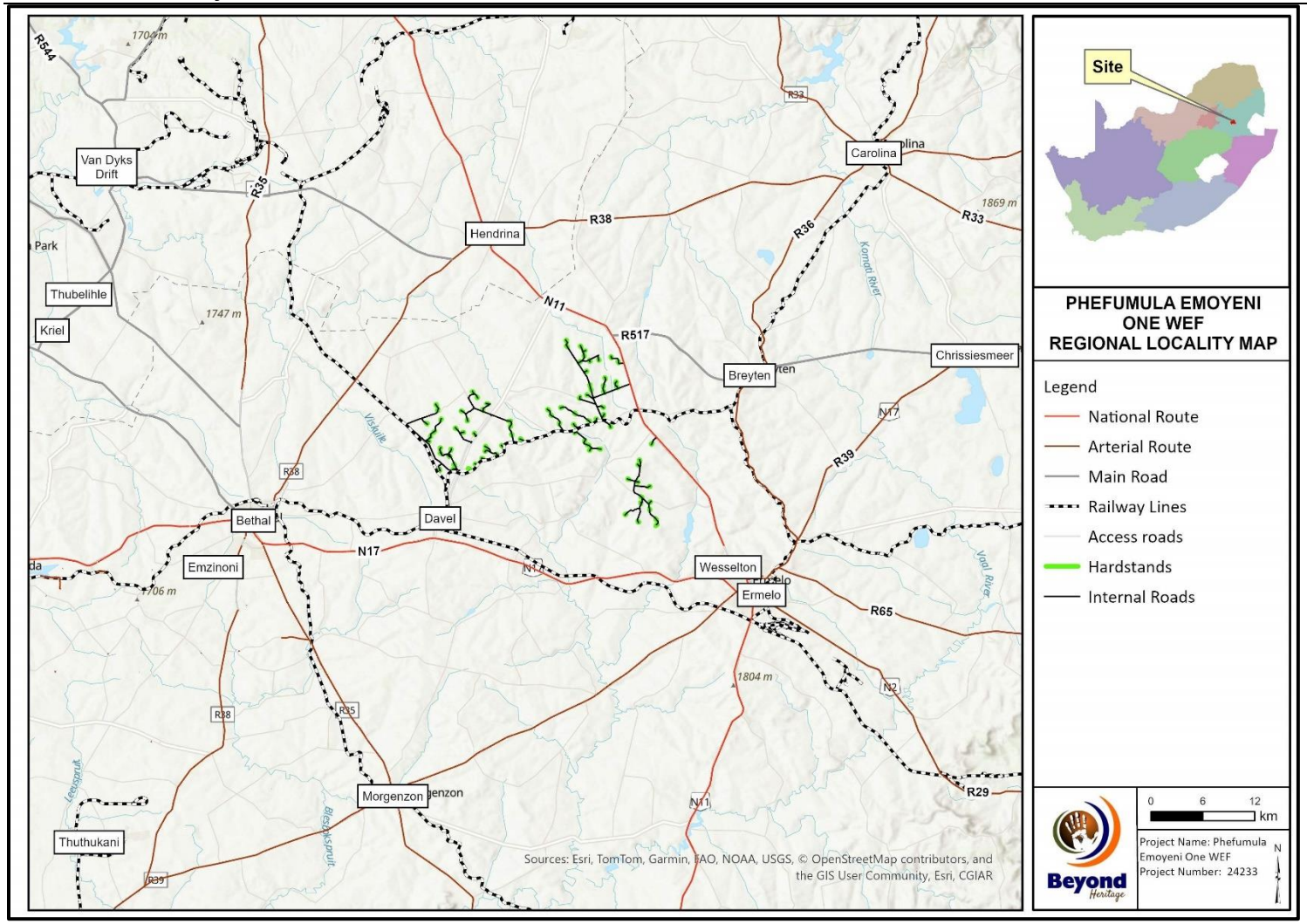


Figure 1.1. Regional setting of the Project.

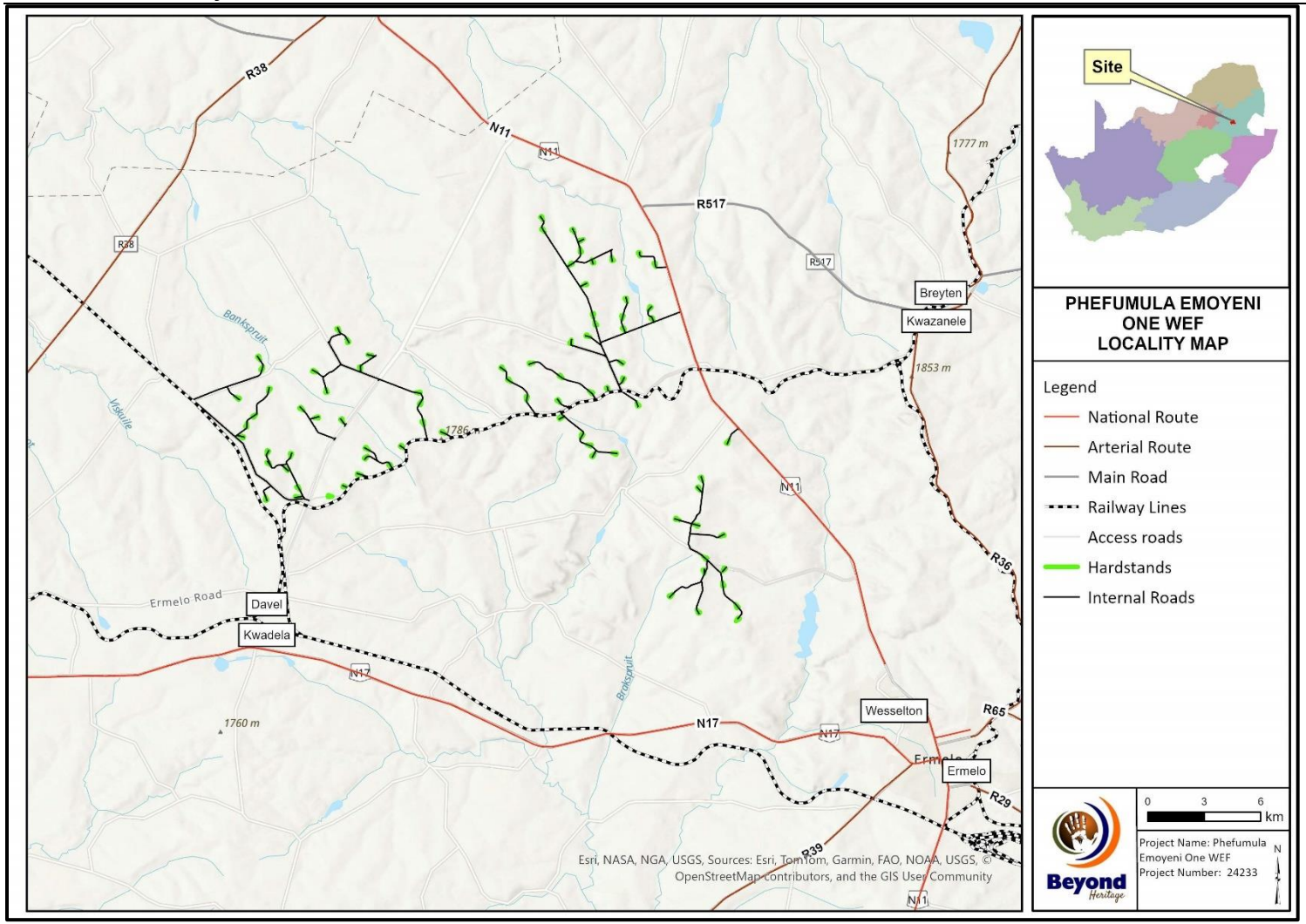


Figure 1.2. Local setting of the Project.

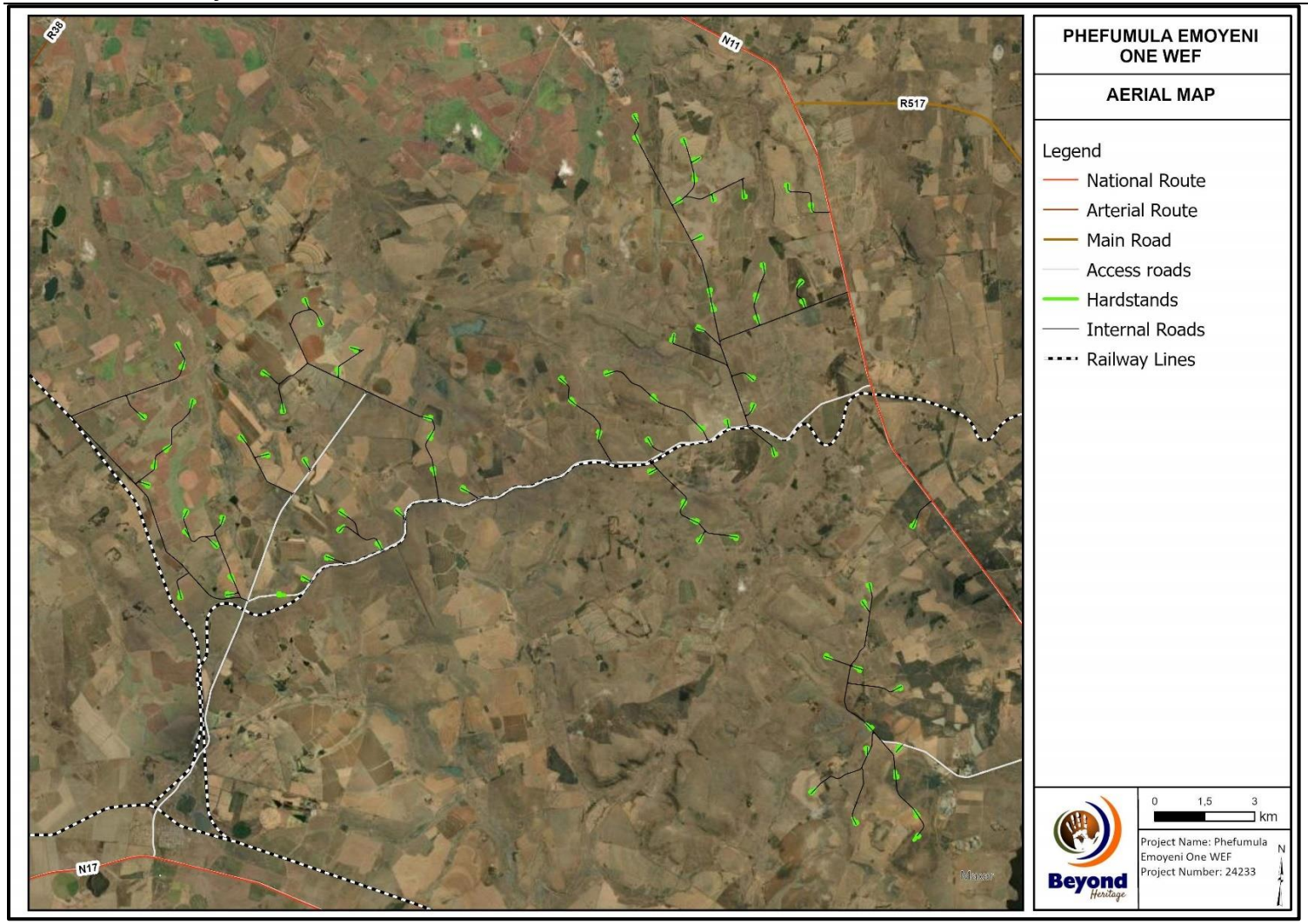


Figure 1.3. Aerial image of the Project area and surrounds.

## 1.1 Terms of Reference

The following Terms of Reference were adhered to in conducting this HIA.

**Field study**

Conduct a field study to: (a) survey the development footprint to understand the heritage character of the impact area; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

**Reporting**

Report on the identification of anticipated and cumulative impacts the operational units of the proposed Project activity may have on the identified heritage resources for all 3 phases of the project, i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of Association of South African Professional Archaeologists (ASAPA).

Recommendations are provided to assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

## 1.2 Project Description

Project components and the location of the Phefumula Emoyeni One WEF Project are outlined in Tables 2 - 5.

**Table 2: Project Description**

| | |
|---|---|
| **Magisterial District** | Msukaligwa Local Municipality within the Gert Sibande District Municipality |
| **Central co-ordinates of the development** | 26°21'14.25"S<br>29°45'39.81"E |
| **1:50 000 Topographic Map Number** | 2629 BC & BD |

**Table 3. Farm portions affected by the Project.**

| Farm Name and Number | Portion | 21 Digit Surveyor General Code of Each Cadastral Land Parcel |
|---|---|---|
| ISRAEL 207 IS | 0 | T0IS00000000020700000 |
| BOSMANSKRANS 217 IS | 0 | T0IS00000000021700000 |
| BOSMANSKRANS 217 IS | 3 | T0IS00000000021700003 |
| BOSMANSKRANS 217 IS | 4 | T0IS00000000021700004 |
| BOSMANSKRANS 217 IS | 6 | T0IS00000000021700006 |
| BOSMANSKRANS 217 IS | 7 | T0IS00000000021700007 |
| BOSMANSKRANS 217 IS | 8 | T0IS00000000021700008 |
| BOSMANSKRANS 217 IS | 9 | T0IS00000000021700009 |
| VAALBANK 233 IS | 6 | T0IS00000000023300006 |
| KUILFONTEIN 234 IS | 1 | T0IS00000000023400001 |
| KUILFONTEIN 234 IS | 2 | T0IS00000000023400002 |
| KUILFONTEIN 234 IS | 7 | T0IS00000000023400007 |
| KUILFONTEIN 234 IS | 8 | T0IS00000000023400008 |
| KUILFONTEIN 234 IS | 9 | T0IS00000000023400009 |
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| KUILFONTEIN 234 IS | 14 | T0IS00000000023400014 |
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| KUILFONTEIN 234 IS | 16 | T0IS00000000023400016 |
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| KUILFONTEIN 234 IS | 23 | T0IS00000000023400023 |

| Farm Name and Number | Portion | 21 Digit Surveyor General Code of Each Cadastral Land Parcel |
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| BOSMANSHOEK 235 IS | 3 | T0IS00000000023500003 |
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| WITBANK 236 IS | 4 | T0IS00000000023600004 |
| WITBANK 236 IS | 5 | T0IS00000000023600005 |
| WITBANK 236 IS | 7 | T0IS00000000023600007 |
| WITBANK 236 IS | 10 | T0IS00000000023600010 |
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| NOOITGEDACHT 237 IS | 5 | T0IS00000000023700005 |
| NOOITGEDACHT 237 IS | 7 | T0IS00000000023700007 |
| NOOITGEDACHT 237 IS | 8 | T0IS00000000023700008 |
| NOOITGEDACHT 237 IS | 9 | T0IS00000000023700009 |
| NOOITGEDACHT 237 IS | 10 | T0IS00000000023700010 |
| NOOITGEDACHT 237 IS | 11 | T0IS00000000023700011 |
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| NOOITGEDACHT 237 IS | 13 | T0IS00000000023700013 |
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| KRANSPOORT 248 IS | 0 | T0IS00000000024800000 |
| KRANSPOORT 248 IS | 2 | T0IS00000000024800002 |
| KRANSPOORT 248 IS | 3 | T0IS00000000024800003 |
| KRANSPOORT 248 IS | 4 | T0IS00000000024800004 |
| KRANSPOORT 248 IS | 6 | T0IS00000000024800006 |
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| KRANSPOORT 248 IS | 10 | T0IS00000000024800010 |
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| KRANSPOORT 248 IS | 12 | T0IS00000000024800012 |
| KRANSPOORT 248 IS | 13 | T0IS00000000024800013 |
| KRANSPOORT 248 IS | 18 | T0IS00000000024800018 |

| Farm Name and Number | Portion | 21 Digit Surveyor General Code of Each Cadastral Land Parcel |
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| TWEEFONTEIN 249 IS | 2 | T0IS00000000024900002 |
| TWEEFONTEIN 249 IS | 3 | T0IS00000000024900003 |
| TWEEFONTEIN 249 IS | 8 | T0IS00000000024900008 |
| TWEEFONTEIN 249 IS | 9 | T0IS00000000024900009 |
| VOORZORG 250 IS | 0 | T0IS00000000025000000 |
| NOOITGEDACHT 251 IS | 0 | T0IS00000000025100000 |
| NOOITGEDACHT 251 IS | 2 | T0IS00000000025100002 |
| NOOITGEDACHT 251 IS | 5 | T0IS00000000025100005 |
| NOOITGEDACHT 251 IS | 6 | T0IS00000000025100006 |
| NOOITGEDACHT 251 IS | 7 | T0IS00000000025100007 |
| NOOITGEDACHT 251 IS | 9 | T0IS00000000025100009 |
| NOOITGEDACHT 251 IS | 10 | T0IS00000000025100010 |
| NOOITGEDACHT 251 IS | 11 | T0IS00000000025100011 |
| SPION KOP 252 IS | 1 | T0IS00000000025200001 |
| SPION KOP 252 IS | 2 | T0IS00000000025200002 |
| UITZICHT 266 IS | 4 | T0IS00000000026600004 |
| UITZICHT 266 IS | 15 | T0IS00000000026600015 |
| DAVELFONTEIN 267 IS | 7 | T0IS00000000026700007 |
| MIDDELPLAAT 271 IS | 2 | T0IS00000000027100002 |
| MIDDELPLAAT 271 IS | 3 | T0IS00000000027100003 |
| MIDDELPLAAT 271 IS | 4 | T0IS00000000027100004 |
| MIDDELPLAAT 271 IS | 5 | T0IS00000000027100005 |
| MIDDELPLAAT 271 IS | 8 | T0IS00000000027100008 |
| DRIEHOEK 273 IS | 0 | T0IS00000000027300000 |
| DRIEHOEK 273 IS | 2 | T0IS00000000027300002 |
| DRIEHOEK 273 IS | 1 | T0IS00000000027300001 |
| DRIEHOEK 273 IS | 3 | T0IS00000000027300003 |
| DRIEHOEK 273 IS | 7 | T0IS00000000027300007 |
| SPITSKOP 276 IS | 59 | T0IS00000000027600059 |
| SPITSKOP 276 IS | 68 | T0IS00000000027600068 |
| KRANSPOORT 827 IS | 0 | T0IS00000000082700000 |

**Table 4: Infrastructure and project activities**

| DETAIL | INFORMATION |
|---|---|
| Applicant Name: | Phefumula Emoyeni One (Pty) Ltd |
| Municipalities | Msukaligwa Local Municipality<br>Gert Sibande District Municipality |
| Extent | 33 660 ha |
| Buildable area | Subject to finalization based on technical and environmental requirements |
| Export Capacity | Up to 550MW |
| Power system technology | Wind |
| Number of Turbines | Up to 76 |
| Turbine capacity | Between 6 MW and 15 MW each |
| Rotor Diameter | Up to 200m |
| Hub Height | Up to 200m |
| Hard Standing Dimensions | Approximately 75m x 120m |
| Turbine Foundations | Diameter of up to 40m per turbine – excavation up to 6 m deep, constructed of reinforced concrete to support the mounting ring. Once tower established, footprint of foundation is covered with soil. |
| Substation and internal powerlines | 33kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.<br>3 x 33kV/132kV onsite collector substation (IPP Portion), each being up to 5ha.<br>Cabling between turbines, to be laid underground where practical |

| DETAIL | INFORMATION |
|---|---|
| Construction camp and laydown area | Construction compounds including site office (approximately 300m x 300m in total but split into 3ha each of 150m x 200m):<br>3 x Batching plant of up to 4ha to 7ha.<br>3 x construction compound / laydown area, including site office of 3ha each (150m x 200m each).<br>Laydown and crane hardstand areas (approximately 75m x 120m). |
| Internal Roads | 12-13m wide roads with 12m radius turning circles, gravel surface |
| O&M Building | 3 x O&M office of approximately 1.5ha each adjacent to each collector Sub Station. |
| Batching Plant | Up to 3 x Batching plants of up to 4ha to 7ha. |
| BESS | Battery Energy Storage System (BESS) (200MW/800MWh).<br>Type has not been confirmed at this stage. It is proposed that all impacts related to both types be assessed in the EIA.<br>Export Capacity of up to 800MWh<br>Total storage capacity 200MW<br>Storage capacity of up to 6-8 hours<br>The BESS will be housed in containers covering a total approximate footprint of up to 5ha.<br>Battery types to be considered: Solid State Batteries as the preferred (Lithium Ion) and Redox Flow Batteries as the alternative (Vanadium Redox). |

### 1.3 Alternatives

No alternatives were provided, but the area assessed allows for siting of the development to avoid impacts to heritage resources.

## 2 Legislative Requirements

The HIA, as a specialist study to the EIA, is required under the following legislation:

- National Heritage Resources Act ((NHRA), Act No. 25 of 1999)
- National Environmental Management Act ((NEMA), Act No. 107 of 1998 - Section 23(2)(b))

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the Provincial Heritage Resource Agency (PHRA) or to The South African Heritage Resources Agency (SAHRA). SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

SAHRA as a commenting authority under section 38(8) of the NHRA require all environmental documents, compiled in support of an EA application as defined by the National Environmental Management Act (NEMA) (Act No 107 of 1998) to be submitted to SAHRA for commenting. Environmental Impact Assessment (EIA) Regulations section 40 (1) and (2). The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended) Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 HIAs are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance (refer to Section 3.5). Relevant conservation or mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

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

Conservation or mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement. After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 of the National Heritage Resources Act (NHRA), as well as the National Health Act of 2003 and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925) re-instituted by Proclamation 109 of 17 June 1994 and implemented by CoGHSTA as well as the National Health Act 2003 and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under the National Health Act of 2003.

# 3 METHODOLOGY

## 3.1 Literature Review and background study

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). Findings are included in Section 6.1 and 6.2.

## 3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 topographic maps of the area were utilised to identify possible places of heritage sensitivity might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society of South Africa (GSSA) was consulted to collect data on any known graves in the area. Results are included in Section 6.3.

## 3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EIA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process undertaken by the EAP was to capture and address any issues raised by community members and other stakeholders. Results are included in Section 5 and the final EIA report.

### 3.4 Site Investigation

The aim of the site visit was to:

a) survey the proposed Project area to understand the heritage character of the area and to record, photograph and describe sites of archaeological, historical or cultural interest;

b) record GPS points of sites/areas identified as significant areas;

c) determine the levels of significance of the various types of heritage resources recorded in the Project area.

**Table 5: Site Investigation Details**

| | **Site Investigation** |
|---|---|
| Date | Week of 20 May 2024, 3 and 4 June 2024 and the week of 5 February 2025 |
| Season | The overall archaeological visibility across the proposed project area was fairly high in areas consisting of open veld. The grasses within the proposed project area have been grazed to a degree that visibility was fairly high. Visibility across the agricultural landscape was however fairly low due to high levels of surface disturbances such as ploughed fields. The heritage character of the Project area is however well understood (Figure 3.1). |

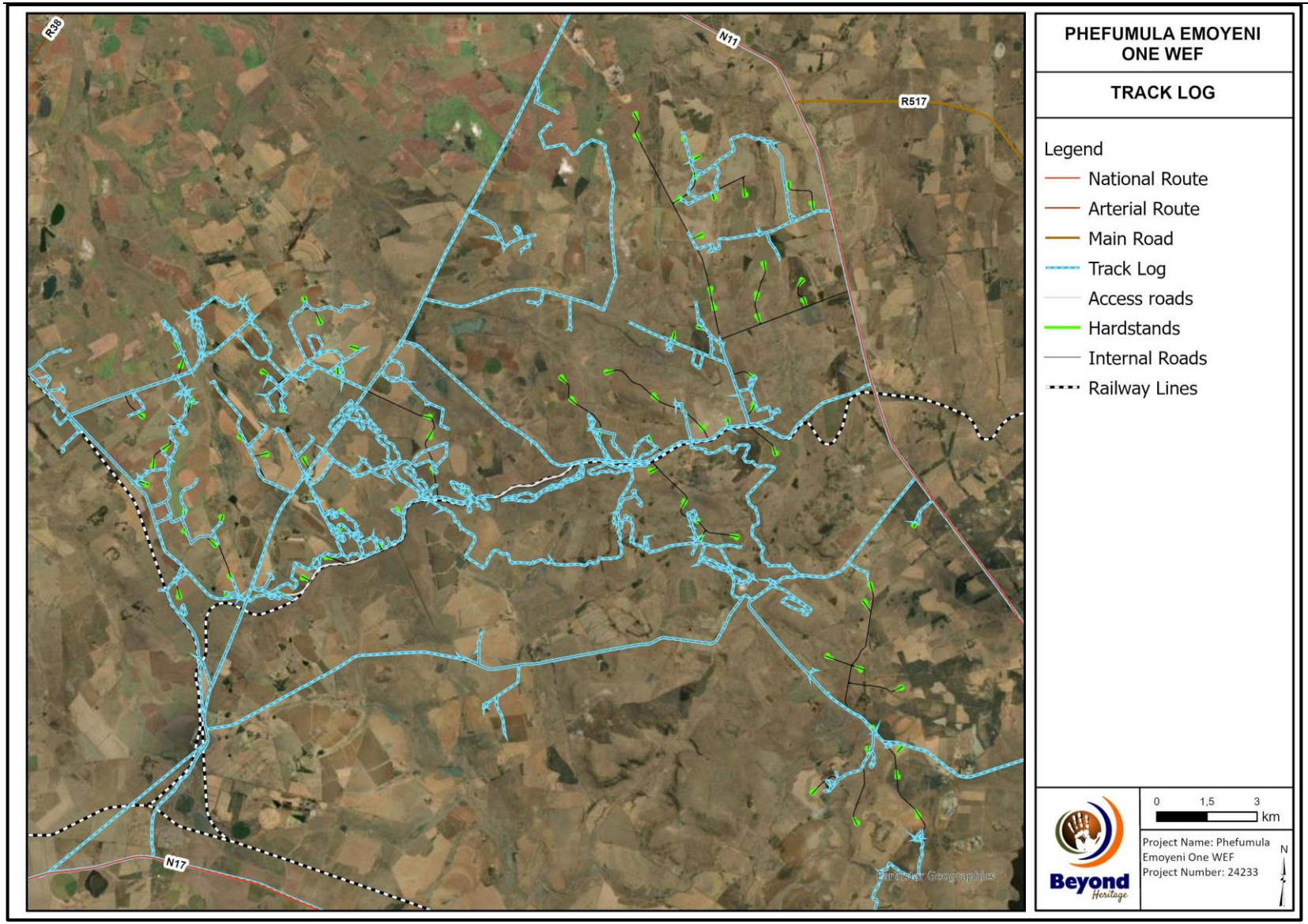



Figure 3.1. Tracklog of the survey path in orange.

### 3.5 Site Significance and Field Rating

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire Project area, or a representative sample, depending on the nature of the project. In the case of the proposed Project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 9 of this report.

**Table 6. Heritage significance and field ratings**

| ***FIELD RATING*** | ***GRADE*** | ***SIGNIFICANCE*** | ***RECOMMENDED MITIGATION*** |
|---|---|---|---|
| National Significance (NS) | Grade 1 | - | Conservation; national site nomination |
| Provincial Significance (PS) | Grade 2 | - | Conservation; provincial site nomination |
| Local Significance (LS) | Grade 3A | High significance | Conservation; mitigation not advised |
| Local Significance (LS) | Grade 3B | High significance | Mitigation (part of site should be retained) |
| Generally Protected A (GP. A) | - | High/medium significance | Mitigation before destruction |
| Generally Protected B (GP. B) | - | Medium significance | Recording before destruction |
| Generally Protected C (GP.C) | - | Low significance | Destruction |

### 3.6 Impact Assessment Methodology

The criteria used to establish the impact rating on sites was provided by WSP Group Africa (Pty) Ltd:

| CRITERIA | SCORE 1 | SCORE 2 | SCORE 3 | SCORE 4 | SCORE 5 |
|---|---|---|---|---|---|
| **Impact Magnitude (M)** The degree of alteration of the affected environmental receptor | Very low: No impact on processes | Low: Slight impact on processes | Medium: Processes continue but in a modified way | High: Processes temporarily cease | Very High: Permanent cessation of processes |
| **Impact Extent (E)** The geographical extent of the impact on a given environmental receptor | Site: Site only | Local: Inside activity area | Regional: Outside activity area | National: National scope or level | International: Across borders or boundaries |
| **Impact Reversibility (R)** The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change | Reversible: Recovery without rehabilitation | | Recoverable: Recovery with rehabilitation | | Irreversible: Not possible despite action |
| **Impact Duration (D)** The length of permanence of the impact on the environmental receptor | Immediate: On impact | Short term: 0-5 years | Medium term: 5-15 years | Long term: Project life | Permanent: Indefinite |
| **Probability of Occurrence (P)** The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation | Improbable | Low Probability | Probable | Highly Probability | Definite |
| **Significance (S)** is determined by combining the above criteria in the following formula: | $[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$ | | | | |
| **IMPACT SIGNIFICANCE RATING** | | | | | |
| **Total Score** | **4 to 15** | **16 to 30** | **31 to 60** | **61 to 80** | **81 to 100** |
| **Environmental Significance Rating (Negative (-))** | **Very low** | **Low** | **Moderate** | **High** | **Very High** |
| **Environmental Significance Rating (Positive (+))** | **Very low** | **Low** | **Moderate** | **High** | **Very High** |

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in Figure 3.2 below.

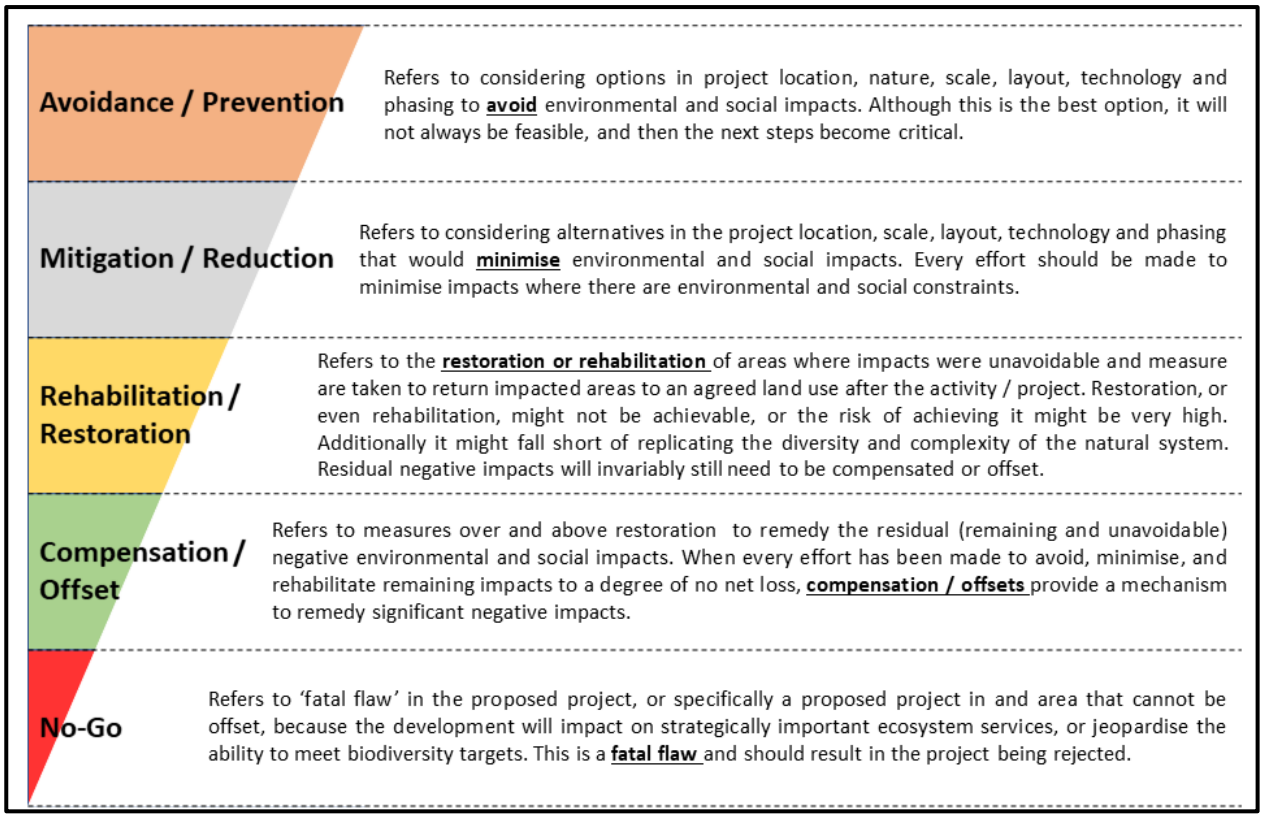



Figure 3.2. Mitigation Sequence/Hierarchy

### 3.7 Assumptions and limitations of the study

- The authors acknowledge that the brief literature review is not exhaustive of the literature of the area.
- Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a Chance Find Procedure (CFP) and monitoring of the study area by the Environmental Control Officer (ECO).
- This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys.
- Field data were recorded by handheld GPS and Mobile GPS applications. It must be noted that during the process of converting spatial data to final drawings and maps the accuracy of spatial data may be compromised. Printing or other forms of reproduction might also distort the spatial distribution in maps. Due care has been taken to preserve accuracy
- This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components will be highlighted through the public consultation process if relevant. This process is facilitated by the EAP and if not done this can be considered a significant limitation and as a potential Project risk. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.
- Project infrastructure located within cultivated areas could not be accessed due to the transformed nature of the area and was assessed on a desktop level.

## 4 Description of Socio-Economic Environment

According to Census 2011, Msukaligwa Local Municipality has a total population of 149 377 people, of which 88,1% are black African, 9,8% are white, 1,1% are Indian/Asian, and 0,6% are coloured. The other population groups make up the remaining 0,3%. Of those aged 20 years and older, 4,5% have completed primary school, 32,7% have some secondary education, 29,3% have completed matric, 9,6% have some form of higher education, and 12,3% have no form of schooling. According to Census 2011, 41 698 are employed whereas 5 311 are discouraged work-seekers. The unemployment rate is 26,8%. There are 15 267 unemployed people. Of the youth aged 15–34, 20 261 are employed while 10 679 are unemployed. The unemployment rate for the youth is 34,5% (statssa.gov.za).

## 5 Results of Public Consultation and Stakeholder Engagement:

In line with the NHRA, stakeholder engagement is a key component of any EA process, it involves stakeholders interested in or affected by the proposed development. At the time of writing no heritage concerns have been raised.

# 6 Contextualising the study area

## 6.1 Archaeological Background

### 6.1.1 Stone Age

The Stone Age of southern Africa starts when hominins (ancestral to modern-day humans) first started to produce crude tools made with stone. The Earlier Stone Age (ESA 2 million – 200 000 years ago) is associated with hominins such as *Homo habilis* and *Homo erectus* (Dusseldorp *et al*. 2013). Mpumalanga currently does not have an extensive ESA archaeological record, at Maleoskop on the farm Rietkloof, only a few ESA artefacts have been found and stone tools consisted of choppers (Oldowan), hand axes, and cleavers (Acheulean) (Esterhuysen & Smith 2007) and some surface scatters have been recorded near Piet Retief (Nel & Karodia 2013).

Middle Stone Age (MSA) artefacts represent archaic and modern humans that occupied the landscape between 300 000 to 40 000 years before present. Later Stone Age (LSA) occupational sequences reflect San and Khoisan communities from 40 000 years ago until recently (Dusseldorp *et al.* 2013). Although the MSA and LSA has not been extensively studied in Mpumalanga, evidence for these periods has been excavated from Bushman Rock Shelter in the Ohrigstad District (Esterhuysen & Smith 2007; Lombard *et al*. 2012) and it is known that San communities lived near Lake Chrissie as recently as the 1950s (e.g., Schlebusch *et al*. 2016). MSA and LSA surface scatters have also been investigated in the vicinity of Piet Retief, and De Wittekrans nearby Camden is a Later Stone Age archaeological rock art site complex (Nel & Karodia 2013).

### 6.1.2 Iron Age

The archaeology of farming communities of southern Africa encompasses three phases. The Early Iron Age (200-900 CE) represents the arrival of Bantu-speaking farmers in southern Africa. Living in sedentary settlements often located next to rivers, these farmers cultivated sorghum, beans, cowpeas, and kept livestock. The Middle Iron Age (900-1300 CE) is mostly confined to the Limpopo Valley in southern Africa with Mapungubwe Hill probably representing the earliest ‘state’ in this region (Huffman 2007).

The Late Iron Age (LSA - 1300-1840s CE) marks the arrival and spread of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities into southern Africa. The location of Late Iron Age settlements is usually on or near hilltops for defensive purposes. The Late Iron Age as an archaeological period ended by 1840 CE, when the Mfecane caused major socio-political disruptions in southern Africa (Huffman 2007). Close to Ermelo, on Tafelkop Mountain, is the well-known LIA Tafelkop Settlement. It consists of various settlement complexes with over 100 corbelled huts in numerous clusters on the mountain top (Esterhuysen & Smith 2007; Figure 3). The site was declared a Provincial Heritage Site.

Dates from Early Iron Age sites indicated that by the beginning of the 5th century CE Bantu-speaking farmers had settled in the Mpumalanga lowveld. Subsequently, farmers continued to move into and between the lowveld and highveld of Mpumalanga. Iron Age sites such as Welgelegen Shelter, Robertsdrift situated 50-100 km west of Camden dates from the 12th to the 18th century (Derricourt & Evers 1973; Esterhuysen & Smith 2007).

During the mid-17th century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. A period that is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Giliomee & Mbenga 2007).

### 6.1.3 Historical Background

Camden power station was commissioned in 1967 (Gaigher 2011; Matenga 2020). However, the nearby town of Ermelo has a rich history. The earliest record for settlers in Ermelo is from 1860, when the area was under the jurisdiction of Zulu-speaking Nhlapo communities (Nhlapo 1945). The construction of the town of Ermelo was initiated by the Dutch Reform Church, which purchased the eastern part of the farm Nooitgedacht on 26 May 1879. The town was officially proclaimed on 12 February 1880 by William Owen Lanyon, the Administrator of the Transvaal (Greyling 2017).

### 6.1.4 Battlefield and War History

Due to the proximity of Ermelo to the Nederlandsche Zuid-Afrikaansche Spoorweg-Maatskappij railway line linking Pretoria with Lourenço Marques (Maputo), the area was subject to various skirmishes during the Anglo-Boer War of 1899-1902. At the time there were about 100 families residing in the town and many women and children were sent to British concentration camps. In 1901, British troops burnt the town down due to their scorched earth policy, and Ermelo was rebuilt in 1903 (Moody 1977; Pretorius 2000; Van Schalkwyk 2012; Greyling 2017).

### 6.2 Literature Review (SAHRIS)

Several Cultural Resource Management (CRM) surveys are on record for the general area and the relevant results of these studies are briefly discussed below and outlined in Table 8.

**Table 7. Studies consulted for the project.**

| Author | Year | Project | Findings |
|---|---|---|---|
| Van Schalkwyk, L. | 2006 | Heritage Impact Assessment for the Majuba-Umfolozi 765 KV Transmission Line in Mpumalanga and KwaZulu-Natal, South Africa, Pietermartizburg: eThembeni Cultural Heritage | Ancestral graves: Rock painting sites that were recorded along and below the eastern uKhahlamba escarpment; Stone Age open air sites; Stone walled settlements dating to the Late Iron Age; Battlefields of:<br>- Majuba (1887);<br>- Hlobane (1879);<br>- Holkrantz (1879);<br>- Khambula (1879 |
| Fourie, W. | 2008 | Camden Power Station Rail expansion project on portions of the farm Mooiplaats 290 IT and the farm Camden Power Station 329 IT, District Ermelo, Mpumalanga | The remains of a stone ruin were identified at this location. The structure consists of two rooms. Only the foundations and rubble remain of the structure. Recent historic |
| Gaigher, S. | 2011 | First Phase Heritage Impact Assessment for the Proposed Extension to the Camden Ash Disposal Facilities | Small graveyard (5 graves), historic farmland reservoirs, furrows, pathways. |
| Pistorius, J.C.C. | 2011 | Kusipongo Expansion Project: A Heritage Baseline Study for Proposed Adit Positions in a Project Area near the Heyshope Dam to the West of Piet Retief in the Mpumalanga Province of South Africa, KwaZulu-Natal: Environmental Resources Management (South Africa) Pty Ltd (ERM) | A single, historic informal grave with stone dressing. A single square cattle enclosure. Late Iron Age site with stone wall enclosures. historical graveyard demarcated with stone walling. A sandstone bank that may be associated with Stone Age sites. |
| Van Schalkwyk, J. | 2012 | Basic assessment and environmental management programme: Construction of a 132kV transmission Line from the Kliphoek to Panbult Substation and Kliphoek to Uitkoms Substation: Mpumalanga Province | Some farmsteads and other farming related features. A number of formal and informal cemeteries |
| Nel, J. & Karodia, S. | 2013 | Heritage Impact Assessment Report Kangra Coal | Historical structures and associated trees, cemeteries, sandstone outcrop with potential for Rock Art |
| Van der Walt, J. | 2015 | Camden Ash Disposal – Grave confirmation study | Four cemeteries and two historical structures as well as stone cairns. |
| Gaigher, S. | 2015 | Report on the Social Consultation Regarding the Relocation of Graves within the Proposed Development Area for the Camden Ash Disposal Facilities | Burial sites (19 graves, 7 graves 2 graves and 5 graves respectively). |
| Van Schalkwyk, J. | 2016 | Cultural Heritage Impact assessment for the planned borrow pits and quarries for the improvement of the national route N2, km 60 (Leiden) to km 87.4 (Camden), Gert Sibande District Municipality, Mpumalanga Province | Historic informal cemetery with more than 35 graves.<br>Three old railway culverts that formed part of the original railroad alignment which was constructed in 1911.<br>An old sheep dip constructed from concrete. |
| Matenga, E. | 2020 | Heritage Impact Assessment for the proposed improvements to the existing waste reticulation system at Camden power station in Ermelo, Mpumalanga Province | No sites were identified. |
| Van der Walt, J. | 2022a | Heritage Impact Assessment for the proposed Camden I Wind Grid Connection, Mpumalanga Province | Burial sites and structural remains |
| Van der Walt, J. | 2022b | Heritage Impact Assessment for the Proposed Camden I Solar Energy Facility (100MW), Mpumalanga Province, South Africa | Burial sites and structural remains |

| Author | Year | Project | Findings |
|---|---|---|---|
| Van der Walt, J. | 2022c | Heritage Impact Assessment for the Proposed Camden I Wind Energy Facility (up to 210MW), Mpumalanga Province, South Africa | Burial sites and structural remains |
| Van der Walt, J. | 2022d | Heritage Impact Assessment for the Proposed Camden II Wind Energy Facility (up to 210MW), Mpumalanga Province, South Africa. | Burial sites and structural remains |
| Van der Walt, J. | 2022e | Heritage Impact Assessment for the proposed Camden powerline and collector substation, Mpumalanga Province | Burial sites and structural remains |
| Van der Walt, J. | 2022f | Heritage Impact Assessment for the Hendrina South Wind Energy Facility | Burial sites and structural remains |
| Van der Walt, J. | 2022g | Heritage Impact Assessment for the Hendrina North Wind Energy Facility | Burial sites and structural remains |
| Van der Walt, J. | 2022h | Heritage Impact Assessment for the Hendrina South Grid Infrastructure | Burial sites and structural remains |

### 6.3 Google Earth and the Genealogical Society of South Africa (Graves and Burial Sites)

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located. Numerous burial sites are indicated by the Genealogical Society of the South Africa (GSSA) for the study area. The known cemeteries are summarised in Table 9. These cemeteries must be avoided with a 30m buffer zone.

**Table 8. Cemeteries indicated by the GSSA.**

| Cemetery | Location | Number of Graves |
|---|---|---|
| **Witbank** | 26°19'0.00"S; 29°43'60.00"E | 11 |
| **Nooitgedacht 237** | 26°21'17.64"S; 29°48'26.16"E | 1 |
| **Bosmanskrans 217 (3)** | 26°14'56.70"S; 29°49'48.72"E | 8 |
| **Bosmanskrans 217 (2)** | 26°16'13.20"S; 29°50'12.54"E | 8 |
| **Bosmanskrans 217 (1)** | 26°17'16.86"S; 29°50'35.40"E | 8 |
| **Elim 247** | 26°18'17.76"S; 29°51'18.72"E | 12 |
| **Nooitgedacht 237** | 26°21'17.64"S; 29°48'26.16"E | 1 |

# 7 Heritage Baseline

## 7.1 Description of the Physical Environment

The vegetation of the Project area belongs to the Eastern Highveld Grassland and Soweto Highveld Grassland of the Grassland Biome. The Eastern Highveld Grassland is described as Slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra*, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Rhus magalismontanum*). The Soweto Highveld Grassland is described as Gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover (Mucina and Rutherford 2006).

The proposed project area is situated in the large triangular open landscape between Hendrina, Ermelo and Bethal surrounding the small town of Davel in Mpumalanga. The proposed project landscape is dominated by large open fields of grass and small thickets of shrubs and trees scattered throughout. Large sections of the proposed project landscape also consist of agricultural activities. These mainly include cultivated crops and cattle farming. The cultivated crops consist of large, ploughed fields as well as circular crops under pivot irrigation. The landscape is divided mainly into large farms with scattered farmsteads throughout. Informal settlements and labour housing is also scattered throughout the landscape creating a high probability of graves near these areas.

The landscape is largely flat with some low hills visible throughout. Some of the hills within the proposed project landscape have rocky sandstone outcrops. A high number of small streams and drainage lines run throughout the proposed project area.

A degraded and disused railway line runs through the proposed project area. General site conditions are indicated in (Figure 7.1 to 7.4).

Figure 7.1. General site conditions showing large, ploughed fields.

Figure 7.2. General site conditions showing a generally flat terrain.

Figure 7.3. Large, ploughed fields are found across the Project area.

Figure 7.4. Existing powerlines within the Project area.

## 7.2 Heritage Resources

Heritage observations within the study area included multiple burial sites, farmsteads, ruins, and circular stone enclosures and were recorded as waypoints. General site distribution of the recorded observations in relation to the Project layout is spatially illustrated in Figure 7.5 and briefly described in Table 10. Selected features are illustrated in Figure 7.6 to 7.125.

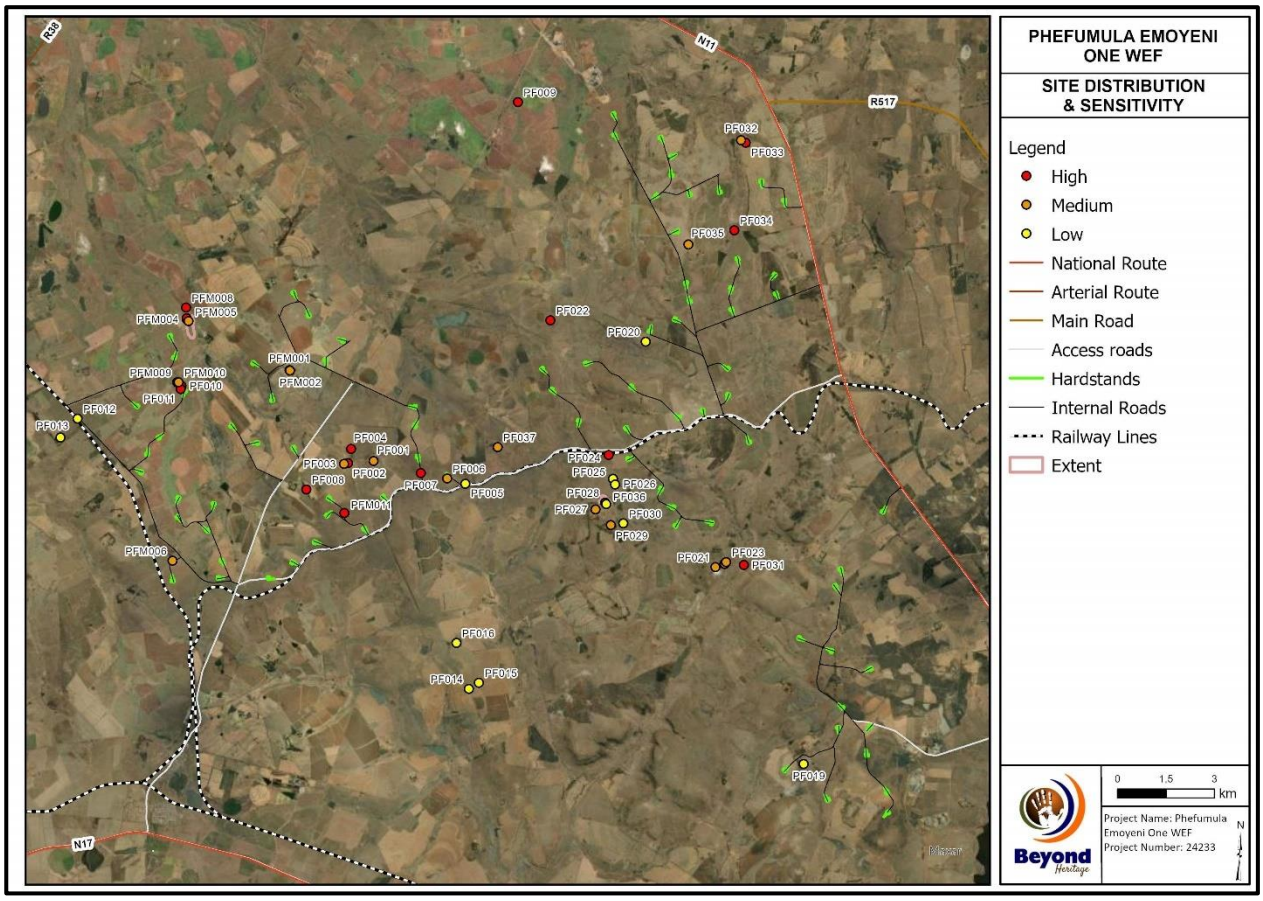



Figure 7.5. Site distribution map. Zoomed in maps are included in Appendix A.

Table 9. Sites recorded in the study area.

| Label | Longitude | Latitude | Description | Significance |
|---|---|---|---|---|
| **PF001** | 29°43'30.73"E | 26°21'46.70"S | Historical farmstead – Still occupied | Medium Significance GP B |
| **PF002** | 29°43'2.21"E | 26°21'49.53"S | Historical Burial site – 6 graves located within a brick-built family cemetery | High Significance 3A |
| **PF003** | 29°42'57.77"E | 26°21'50.46"S | Historical farmstead – Still occupied | Medium Significance GP B |
| **PF004** | 29°43'4.94"E | 26°21'35.42"S | Large burial site – 65 – 70 packed stone and various cement graves, some graves have newer granite headstones and skirting. | High Significance 3A |
| **PF005** | 29°45'14.07"E | 26°22'5.62"S | Ruins/Packed stone foundations related to possible historical railroad | Low Significance GP C |
| **PF006** | 29°44'53.51"E | 26°22'1.12"S | Ruins/Packed stone foundations and semi-circular enclosures. | Medium Significance GP B |
| **PF007** | 29°44'24.13"E | 26°21'56.96"S | Burial site. 13 to 15 graves situated within a cement and concrete built cemetery. The graves consist of various degraded and collapsed granite headstones and skirting. | High Significance 3A |
| **PF008** | 29°42'16.53"E | 26°22'17.56"S | Burial site situated under a large thicket of trees along the edge of existing agricultural fields. – 70 to 80 various graves built from granite, packed stone, cement and brick. Sections of the cemetery is still being maintained. | High Significance 3A |
| **PF009** | 29°45'56.03"E | 26°15'41.45"S | Burial site – 3 graves situated on the edge of an existing agricultural field on top of the ploughed contour line. 1 grave has a granite headstone and skirting with the other 2 having degraded brick and stone skirting. The burial site is highly disturbed. | High Significance 3A |
| **PF010** | 29°39'52.78"E | 26°20'38.67"S | Burial site – 1 brick built grave situated in a small open field. | High Significance 3A |
| **PF011** | 29°39'52.12"E | 26°20'42.16"S | Burial site – 1 fenced off grave with an overgrown granite headstone. | High Significance 3A |
| **PF012** | 29°37'58.02"E | 26°21'15.57"S | Ruin/Degraded railway structure. | Low Significance GP C |
| **PF013** | 29°37'39.59"E | 26°21'35.23"S | Historical farmstead - Ruins | Low Significance GP C |
| **PF014** | 29°45'27.12"E | 26°25'30.85"S | Possible historical plantation of trees. | Low Significance GP C |
| **PF015** | 29°45'38.22"E | 26°25'24.46"S | Possible historical lane of trees. | Low Significance GP C |
| **PF016** | 29°45'11.15"E | 26°24'45.46"S | Broken down and degraded informal settlement. | Low Significance GP C but graves may be associated with the ruins and will then be High Significance |
| **PF017** | 29°50'7.41"E | 26°23'15.59"S | Two packed stone graves situated within a circular packed stone enclosure. | High Significance 3A |
| **PF018** | 29°50'7.75"E | 26°23'15.77"S | Packed stone ruins with circular packed stone enclosures. | Medium Significance GP B |

| Label | Longitude | Latitude | Description | Significance |
|---|---|---|---|---|
| **PF019** | 29°51'44.90"E | 26°26'32.68"S | Broken down informal settlement – Site is completely demolished – Only some evidence left such as lower grinding stone. | Low Significance GP C but graves may be associated with the ruins and will thenbe High Significance |
| **PF020** | 29°48'29.40"E | 26°19'36.12"S | Ruins - Packed stone foundations - Historical | Low Significance GP C |
| **PF021** | 29°49'57.57"E | 26°23'19.22"S | Ruins – Packed stone ruins with some circular packed stone enclosures. | Medium Significance GP B |
| **PF022** | 29°46'42.13"E | 26°19'18.65"S | Burial site – 28 graves. Majority have granite headstones and skirting. Some made from packed stone, and some built from brick and cement. Fenced off. | High Significance 3A |
| **PF023** | 29°50'9.33"E | 26°23'13.73"S | Packed stone ruins/Circular packed stone walling and enclosures | Medium Significance GP B |
| **PF024** | 29°47'53.13"E | 26°21'31.13"S | Burial site – Large cemetery situated next to a possible historical railway line. Contains 75+ graves made from various materials such as packed stone, granite and brick. | High Significance 3A |
| **PF025** | 29°47'58.84"E | 26°21'54.99"S | Ruins/Broken down structure | Low Significance GP C |
| **PF026** | 29°48'1.64"E | 26°22'0.51"S | Degraded school building/fairly recent. | Low Significance GP C |
| **PF027** | 29°47'40.90"E | 26°22'26.23"S | Large historical farmstead – Currently occupied. | Medium Significance GP B |
| **PF028** | 29°47'51.12"E | 26°22'18.92"S | Burial site containing two packed stone graves and metal grave markers. | High Significance 3A |
| **PF029** | 29°47'58.85"E | 26°22'41.36"S | Historical farmhouse – Intact but not occupied. | Medium Significance GP B |
| **PF030** | 29°48'12.50"E | 26°22'39.17"S | Large historical packed stone kraal. 25x15m | Low Significance GP C |
| **PF031** | 29°50'29.24"E | 26°23'15.85"S | Burial site containing 20-25 graves made from various materials such as granite, cement and brick and packed stone. | High Significance 3A |
| **PF032** | 29°50'7.05"E | 26°16'10.68"S | Historical farmstead-Various masoned stone ruins and structures. Some of the historical structures have been renovated. | Medium Significance GP B |
| **PF033** | 29°50'12.11"E | 26°16'13.07"S | Burial site – Historical cemetery with large cement and brick wall. Containing 8 graves with granite and cement headstones and covers. Oldest grave 1908 | High Significance 3A |
| **PF034** | 29°50'3.57"E | 26°17'41.09"S | Burial site – Large informal burial site containing 30 – 35 graves made from packed stone, granite and cement. | High Significance 3A |
| **PF035** | 29°49'12.76"E | 26°17'57.31"S | Historical farmstead – Fairly degraded and abandoned. Structures fairly intact. | Medium Significance GP B |
| **PF036** | 29°47'52.40"E | 26°22'20.52"S | Large broken down and degraded informal settlement. Only building rubble remains. | Low Significance GP C |
| **PF037** | 29°43'30.73"E | 26°21'46.70"S | Historical farmstead – Abandoned and degraded. | Medium Significance GP B |

Figure 7.6. General view of the farmstead at PF001.

Figure 7.7. Occupied building at the farmstead PF001.

Figure 7.8. Brick fenced burial site at PF002.

Figure 7.9. Grave at PF002.


Figure 7.10. Mouton grave at PF002.


Figure 7.11. Botha grave at PF002 (2005 and 2018).

Figure 7.12. Structure at the farmstead PH003.

Figure 7.13. Occupied building at farmstead PH003.

Figure 7.14. Overview of graves at burial site PF004.

Figure 7.15. Stone packed graves at PF004.

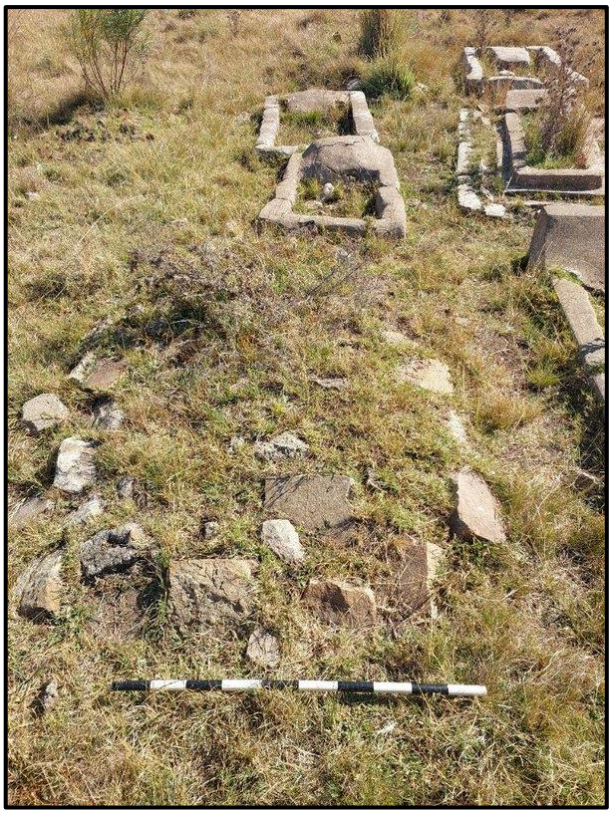


Figure 7.16. Overgrown stone packed grave at PF004.


Figure 7.17. Grave at PF004 (2001).

Figure 7.18. Grave at PF004.

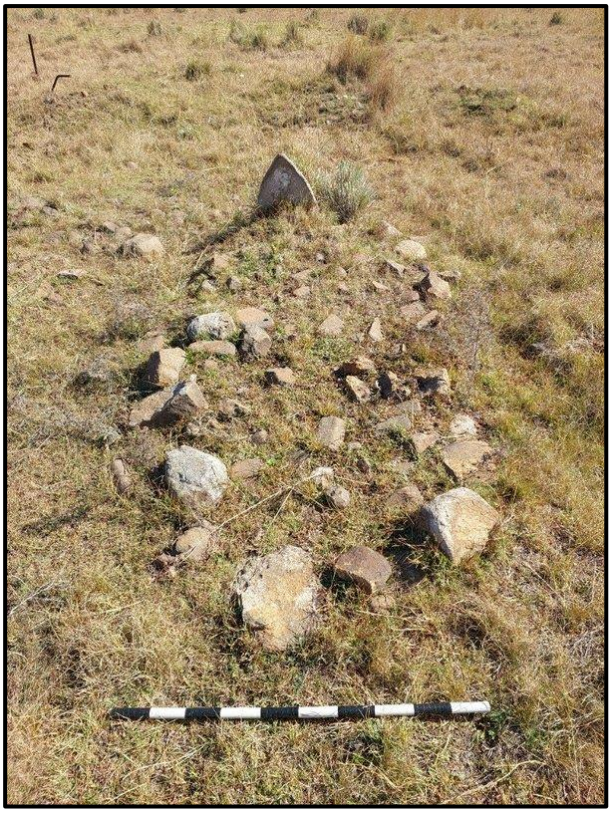


Figure 7.19. Grave at PF004.

Figure 7.20. Grave at PF004.

Figure 7.21. Grave at PF004.

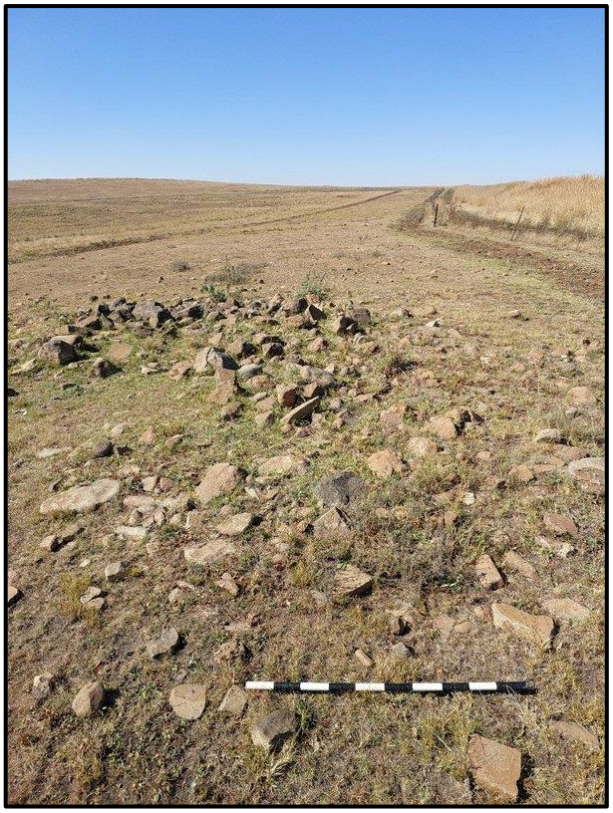


Figure 7.22. Ruins at PF005.

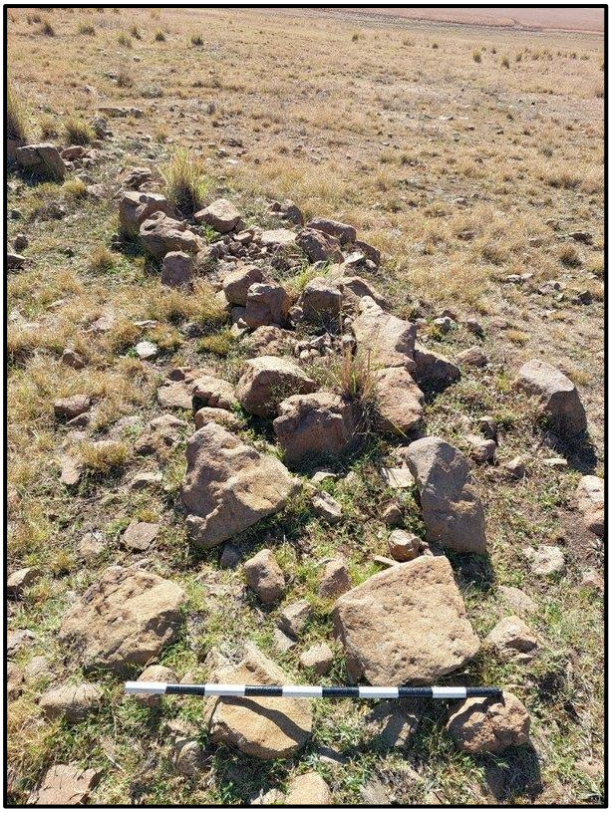


Figure 7.23. View of a semi- circular enclosure at PF006.

Figure 7.24. Overview of the ruins at PF006.

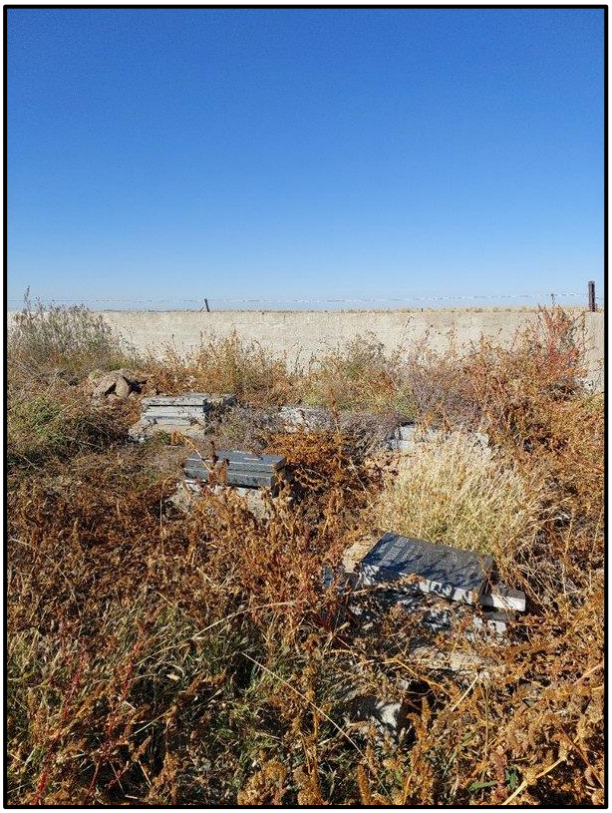


Figure 7.25. Overview of burial site PF007.

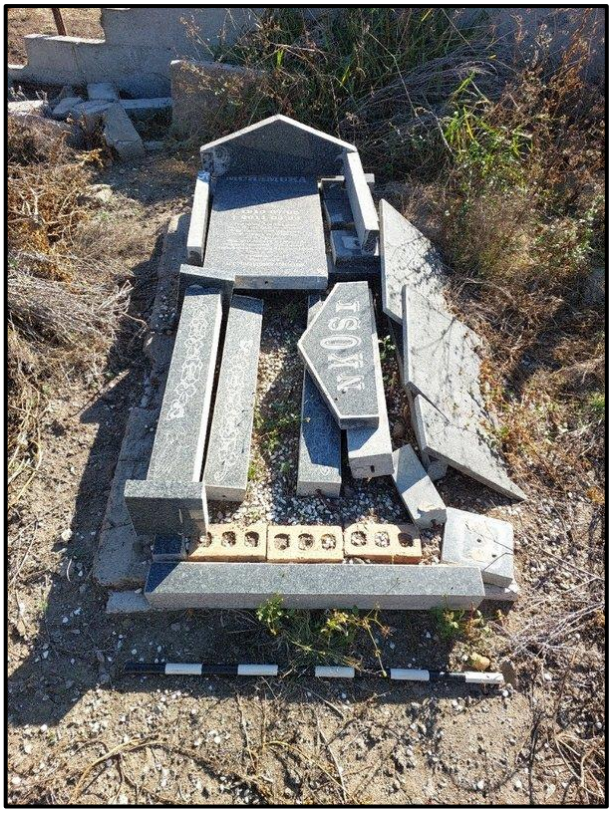



Figure 7.26. Degraded granite grave at PF007 (2011).


Figure 7.27. Granite and cement grave at PF007 (1965).


Figure 7.28. Granite and cement grave at PF007 (1953).

Figure 7.29. Stone packed grave at PF007.

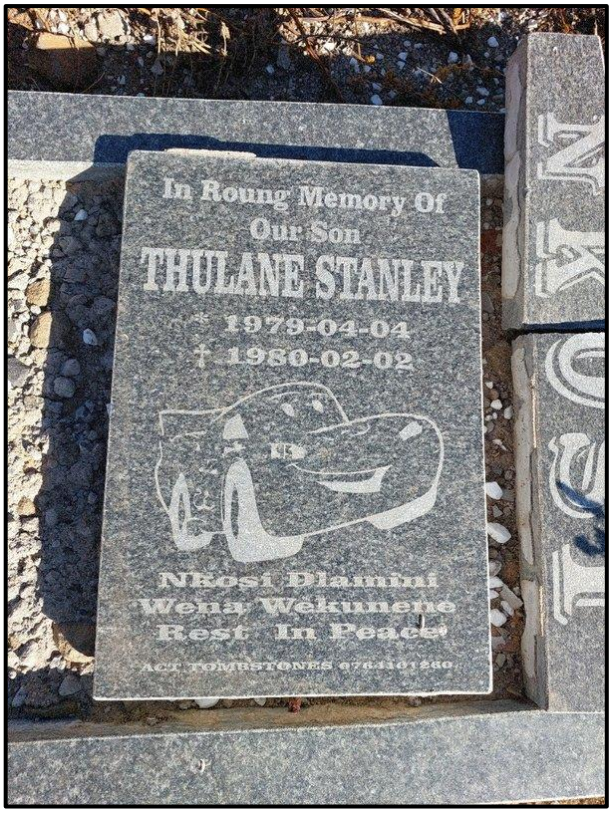


Figure 7.30. Granite grave at PF007 (1980).

Figure 7.31. Grave at PF007.

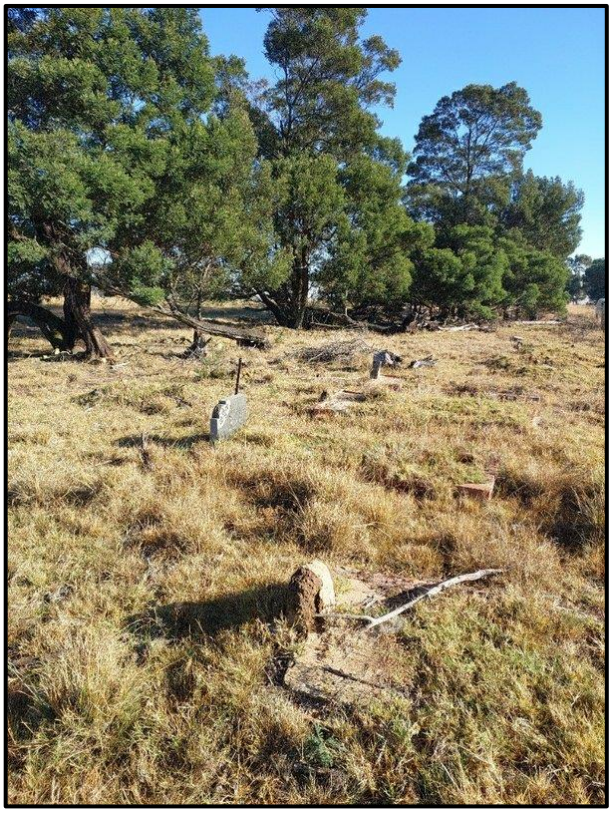


Figure 7.32. View of graves in the burial site PF008.

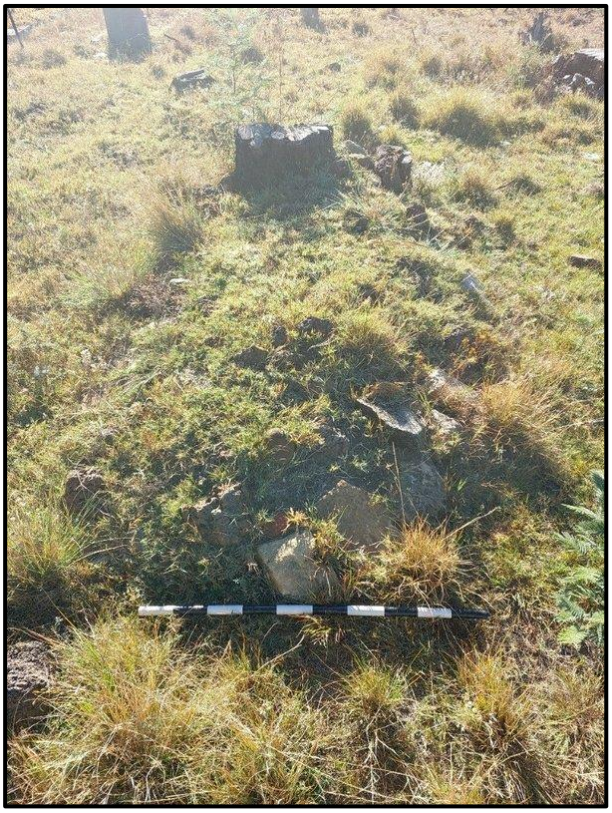


Figure 7.33. Overgrown grave at PF008.

Figure 7.34. Grave at PF008.

Figure 7.35. Brick grave at PF008 (1978).

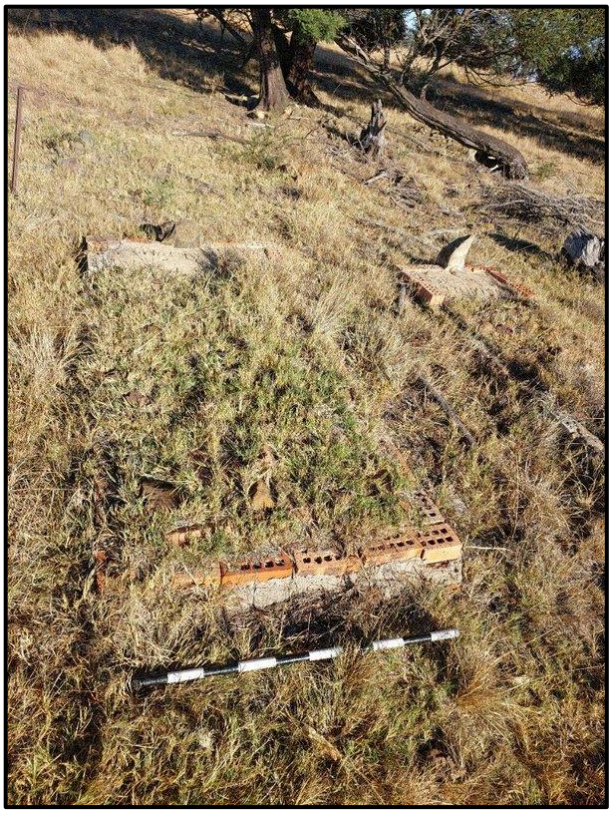


Figure 7.36. Brick built grave at PF008.

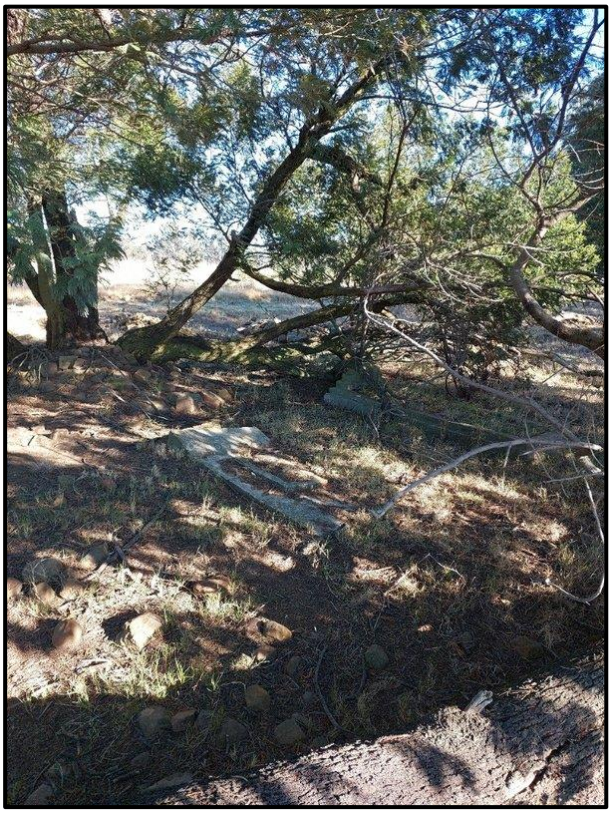


Figure 7.37. View of graves under thicket of trees at PF008.

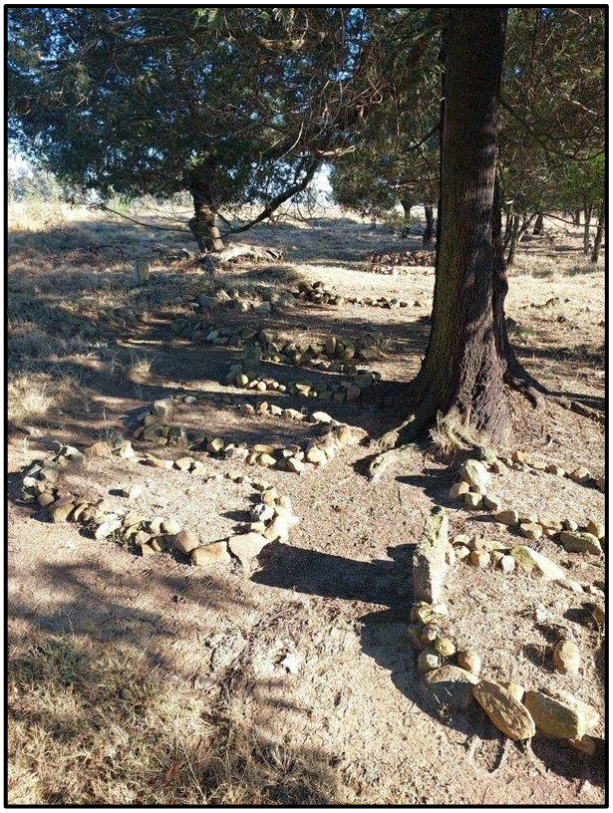


Figure 7.38. View of graves under thicket of trees at PF008.

Figure 7.39. Graves at PF008.

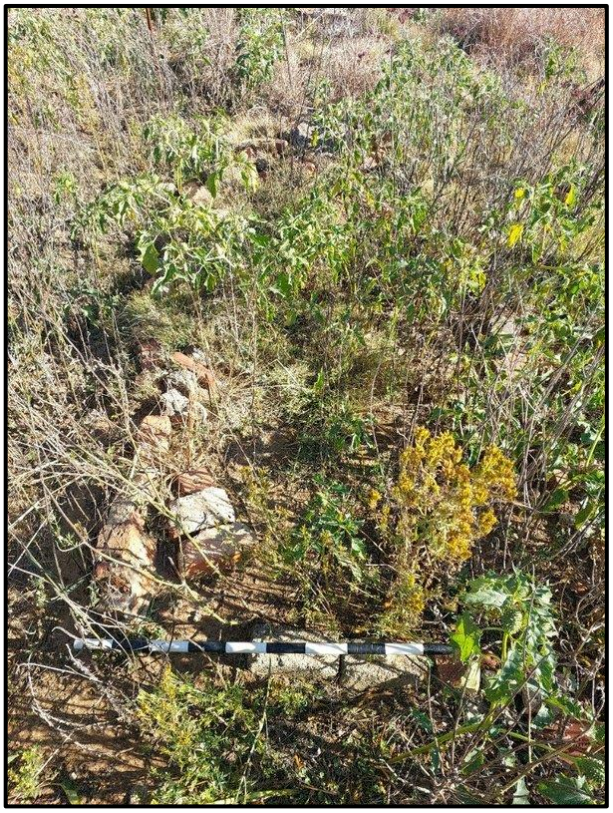


Figure 7.40. Overgrown grave at PF009.

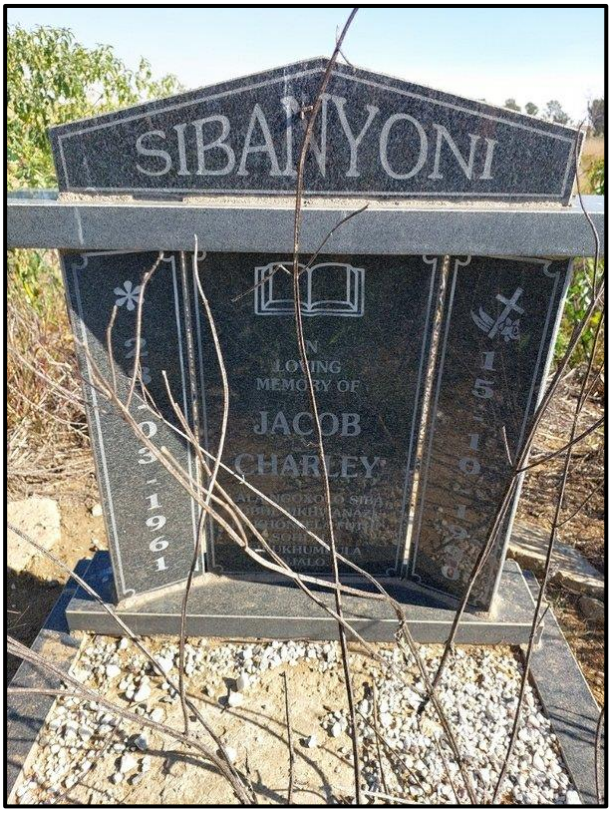



Figure 7.41. Granite grave at PF009 (1990).

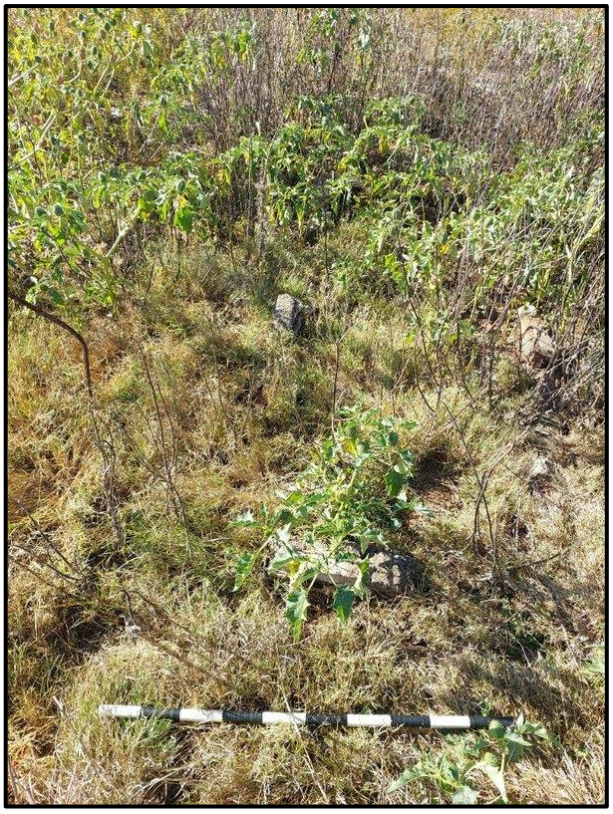


Figure 7.42. Overgrown grave at PF009.

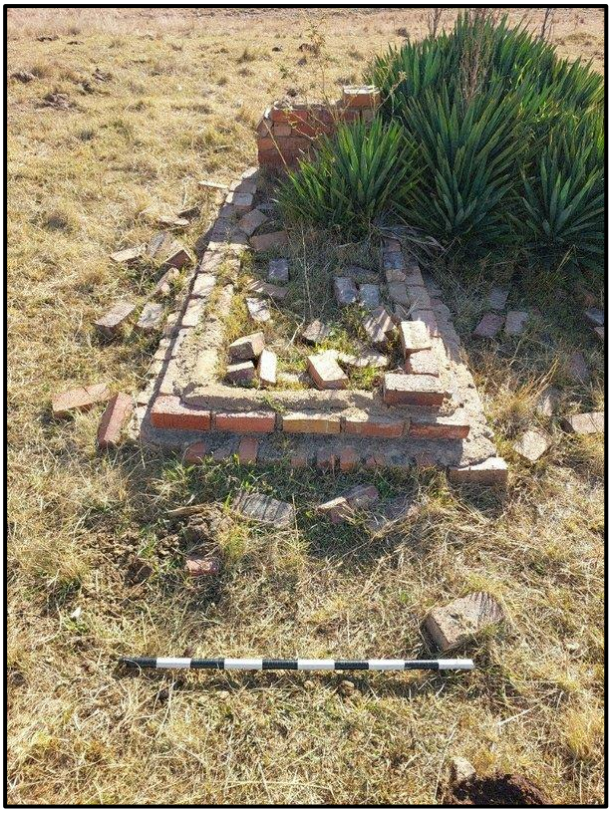


Figure 7.43. Single grave at PF010.

Figure 7.44. Single fenced off grave at PF011.

Figure 7.45. Single grave at PF011.

Figure 7.46. Ruins at PF012.

Figure 7.47. Ruin at PF012.

Figure 7.48. Ruin at PF013.

Figure 7.49. Ruins at PF013.

Figure 7.50. View of possible Historical tree plantation at PF014.

Figure 7.51. Possible historical lane of trees at PF015.

Figure 7.52. Ruins at PF016.

Figure 7.53. Site overview of burial site PF017.

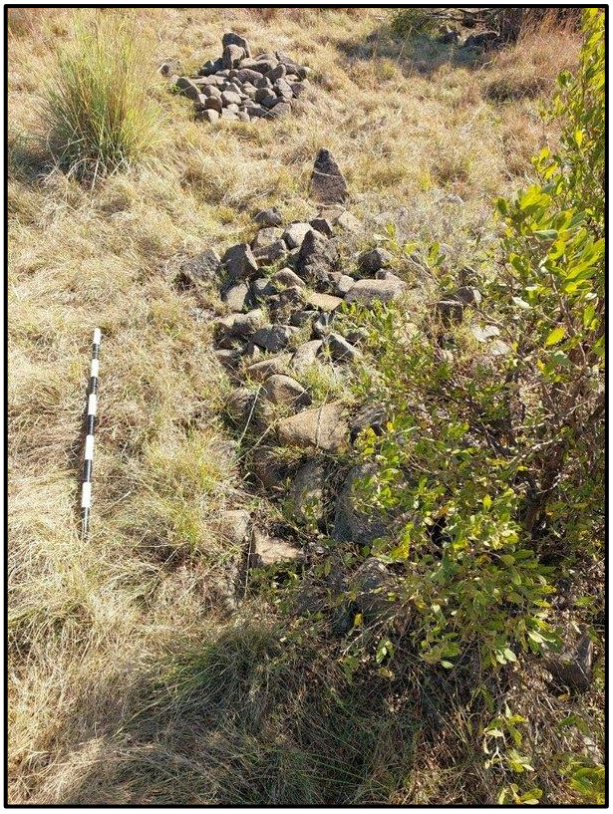


Figure 7.54. Stone packed grave at PF017.

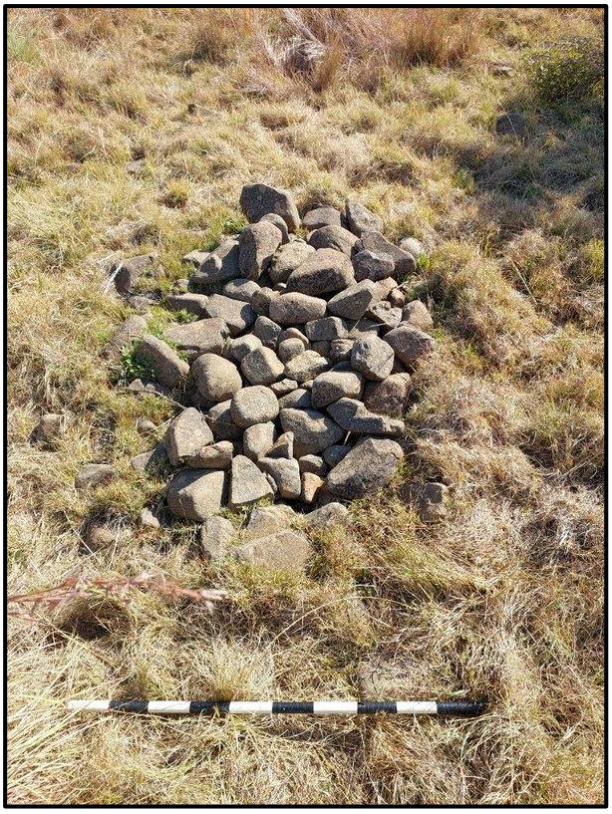


Figure 7.55. Stone packed grave at PF017.

Figure 7.56. Site overview of stone ruins at PF018.

Figure 7.57. Section of packed stone enclosure at PF018.

Figure 7.58. View of demolished structures at PF019.

Figure 7.59. Stone foundations at PF020.

Figure 7.60. Stone foundations at PF020.

Figure 7.61. Packed stone ruins at PF021.

Figure 7.62. General site overview of stone packed ruins at PF021.

Figure 7.63. View of stone packed graves at PF022.


Figure 7.64. Grave at PF022 (1976).

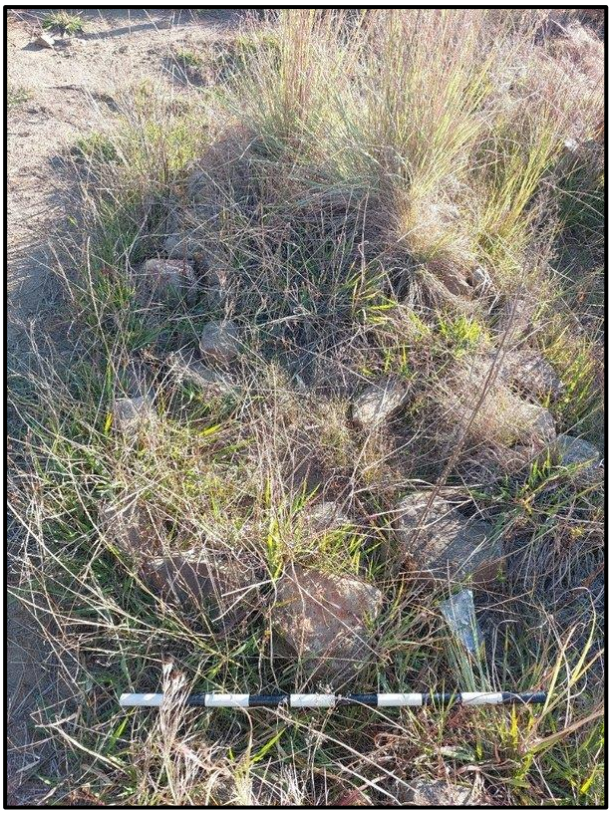


Figure 7.65. Overgrown stone packed grave at PF022.

Figure 7.66. Overgrown brick-built grave at PF022.

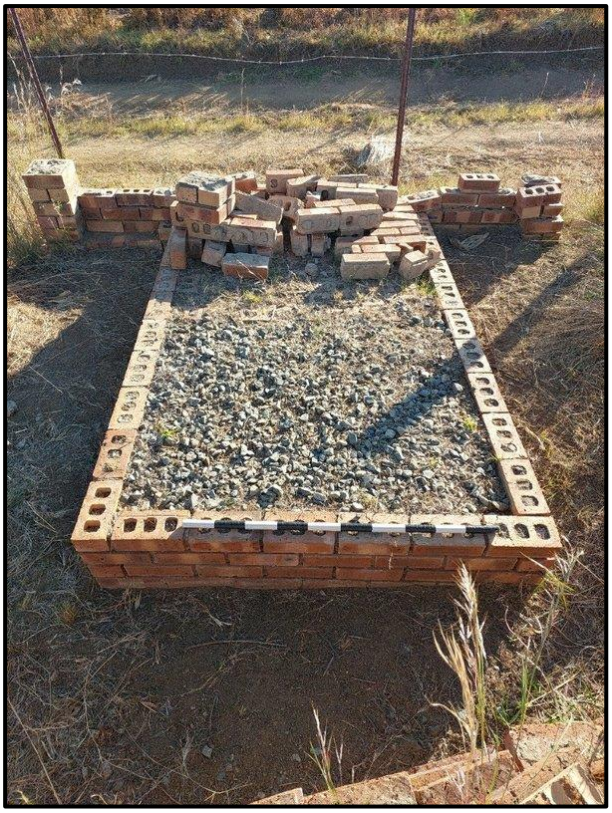


Figure 7.67. Brick built grave at PF022.

Figure 7.68. Stone packed graves at PF022.

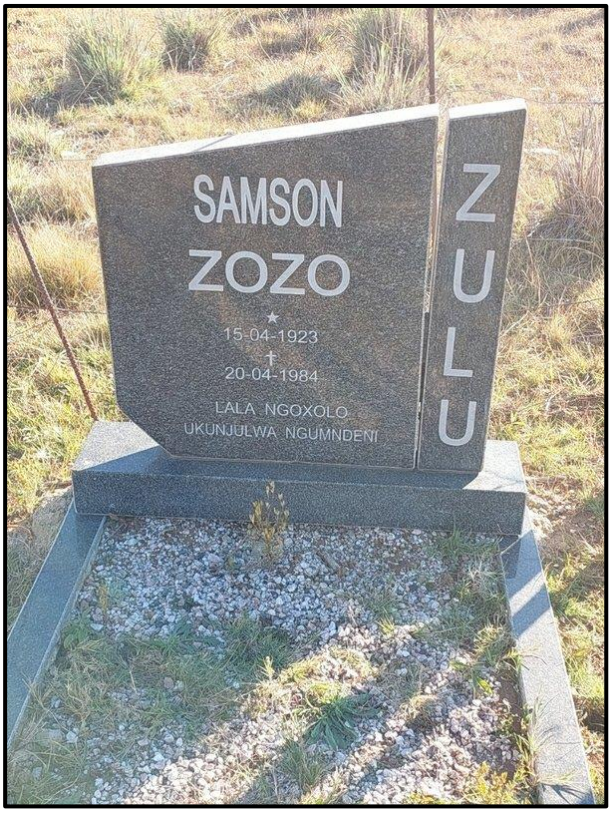



Figure 7.69. Granite grave at PF022 (1984).

Figure 7.70. Fenced off grave at PF022.

Figure 7.71. View of fenced off graves at PF022.

Figure 7.72. Overview of packed stone ruins at PF023.

Figure 7.73. Section of stone packed wall at PF023.

Figure 7.74. Overview of burial site PF024.

Figure 7.75. Stone packed grave at PF024.


Figure 7.76. Granite grave at PF024 (2014).


Figure 7.77. Granite grave at PF024 (2011).

Figure 7.78. Granite and stone grave at PF024.

Figure 7.79. Overgrown stone packed grave at PF024.

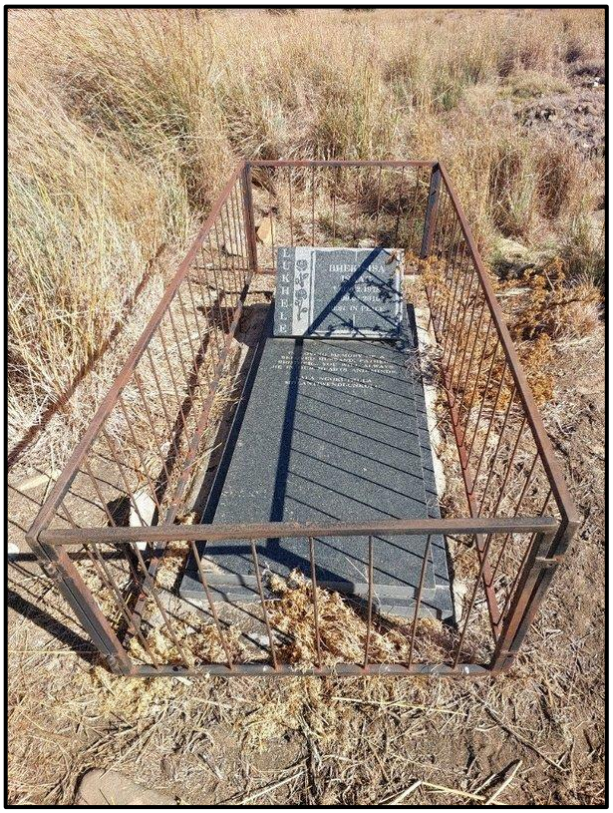


Figure 7.80. Fenced off granite grave at PF024.


Figure 7.81. Fenced off granite grave at PF024 (2022).


Figure 7.82. Overgrown and degraded grave at PF024 (1998).

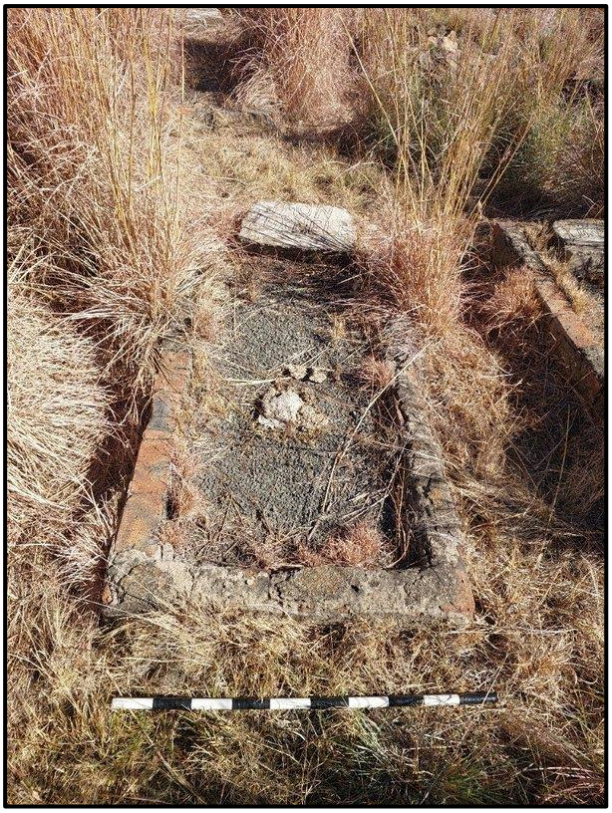


Figure 7.83. Brick built grave at PF024.


Figure 7.84. Overgrown granite and cement grave at PF024.

Figure 7.85. View of broken down structure at PF025.

Figure 7.86. Broken down structure at PF025.

Figure 7.87. Degraded school building at PF026.

Figure 7.88. View of various structures at the farmstead PF027.

Figure 7.89. View of occupied farmstead at PF027.

Figure 7.90. View of the two graves at burial site PF028.

Figure 7.91. Stone packed grave with headstone at PF028.

Figure 7.92. Stone packed grave with headstone at PF028.

Figure 7.93. View of intact farmhouse at PF029.

Figure 7.94. Alternative view of the farmhouse at PF029.

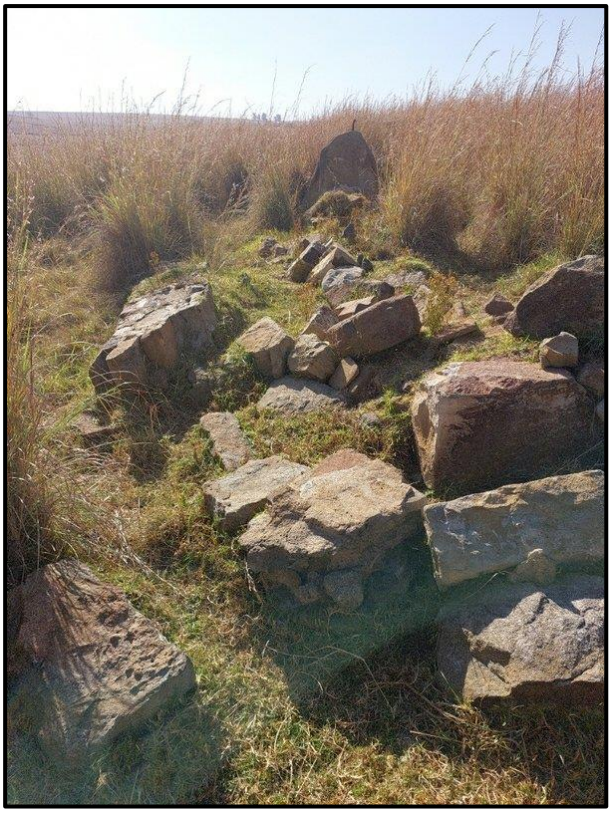


Figure 7.95. Stone packed kraal at PF030.

Figure 7.96. Stone packed kraal at PF030.

Figure 7.97. View of fenced off burial site PF031.


Figure 7.98. Granite grave at PF031.


Figure 7.99. Overgrown stone packed grave at PF031.

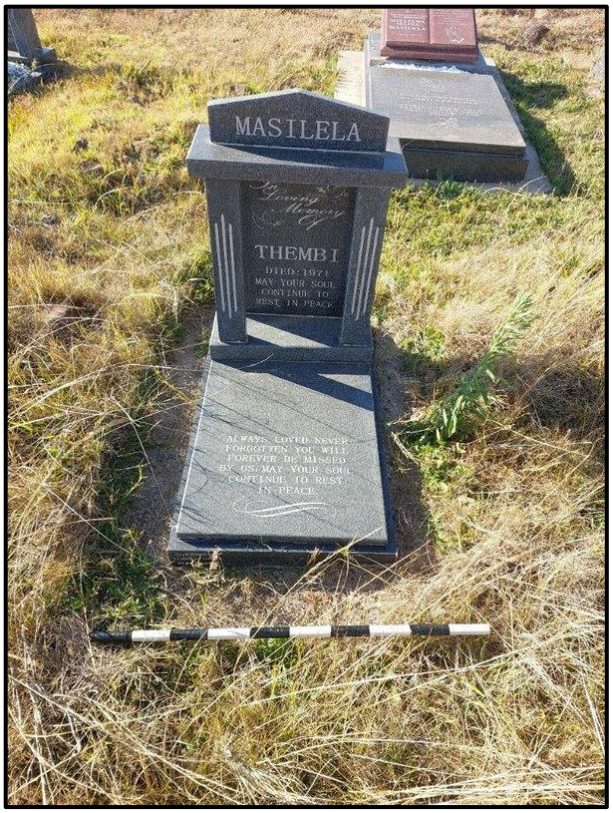



Figure 7.100. Granite grave at PF031 (1971).

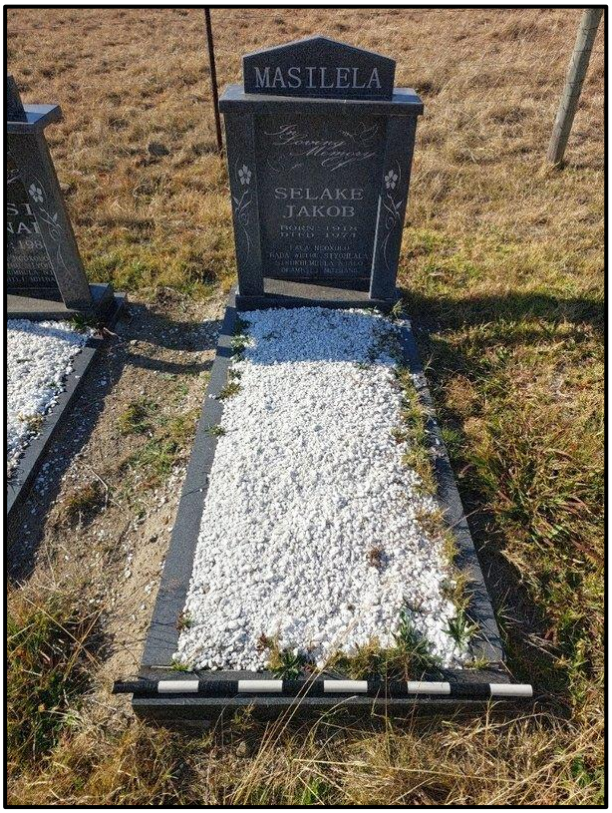



Figure 7.101. Granite grave at PF031 (1974).

Figure 7.102. Granite grave at PF031 (1980).


Figure 7.103. Packed grave at PF031.

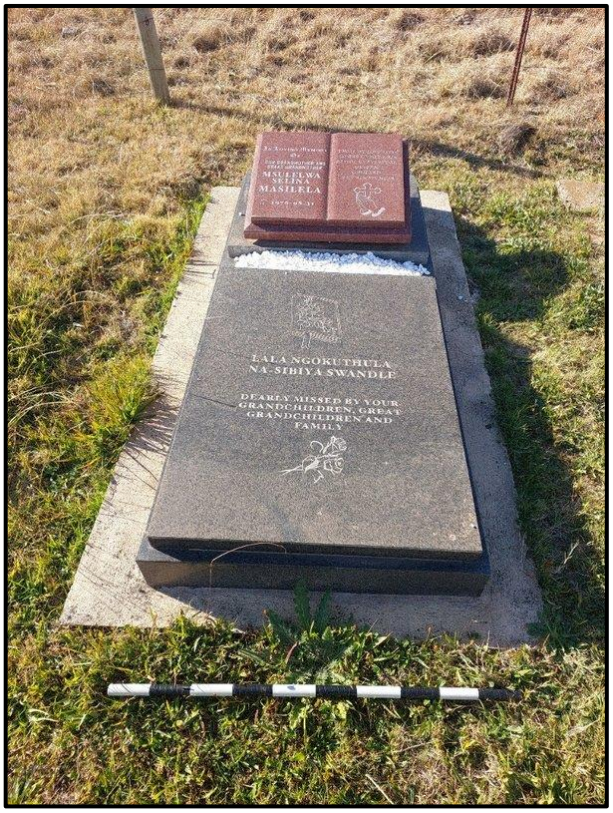


Figure 7.104. Granite grave at PF031 (1976).

Figure 7.105. Granite grave at PF031 (1961).

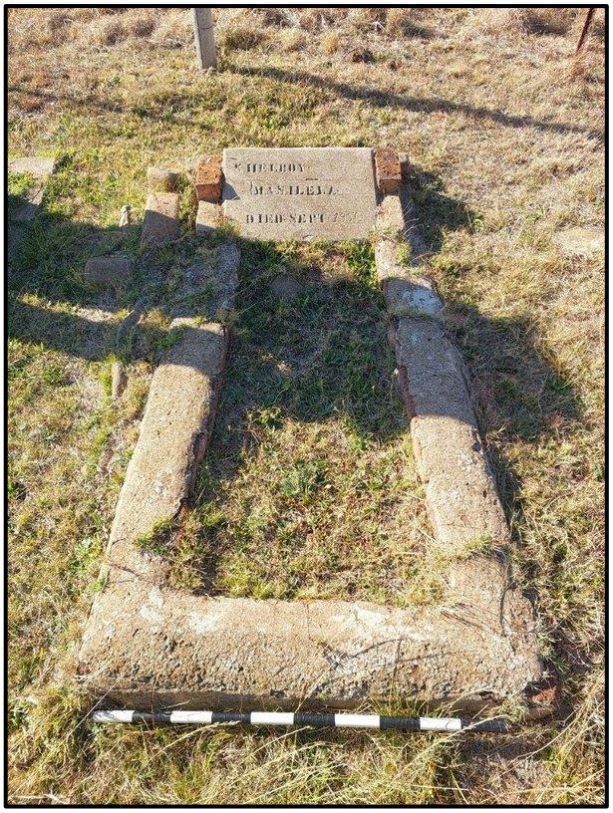


Figure 7.106. Cement and brick grave at PF031 (1950).


Figure 7.107. Granite grave at PF031 (1997).

Figure 7.108. Brick built grave at PF031.

Figure 7.109. Overview of the farmstead PF032.

Figure 7.110. Structure ruin at PF032.

Figure 7.111. Cement and brick wall enclosing burial site PF033.

Figure 7.112. Family grave at PF033.


Figure 7.113. Stone and granite grave at PF033 (1932).

Figure 7.114. Stone and granite grave at PF033 (1903).

Figure 7.115. Grave with cover at PF033.

Figure 7.116. Overview of burial site PF034.

Figure 7.117. Stone circle packed graves at PF034.


Figure 7.118. Granite and stone grave at PF034 (1958).

Figure 7.119. Stone packed grave at PF034.


Figure 7.120. Granite grave at PF034 (1972).

Figure 7.121. Stone packed grave at PF034.

Figure 7.122. Overgrown grave at PF034.

Figure 7.123. Historical farmstead PF035.

Figure 7.124. Degraded structures at PF035.

Figure 7.125. Broken down structure at PF036.

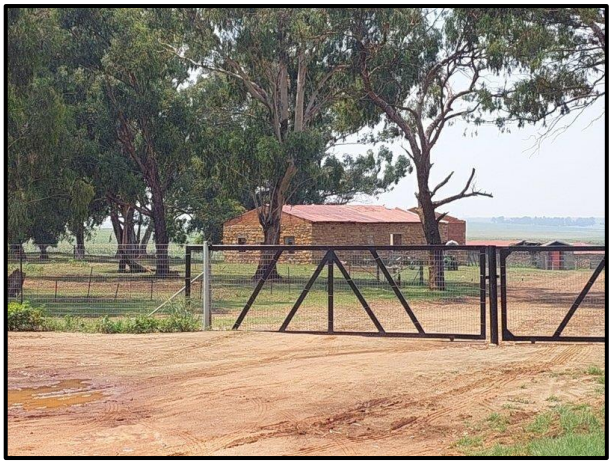


Figure 7.126. View of large structure within the farmstead PFM002.

Figure 7.127. View of the single grave at PFM003.

Figure 7.128. View of various stone packed graves in burial site PFM004.

Figure 7.129. View of various mounded graves in burial site PFM004.

Figure 7.130. Stone packed graves in burial site PFM004.

Figure 7.131. Cement grave with granite dressing (1984).

Figure 7.132. Mounded remains of settlement at PFM005.

Figure 7.133. Ruins at PFM005.

Figure 7.134. General view of historical structures PFM006.

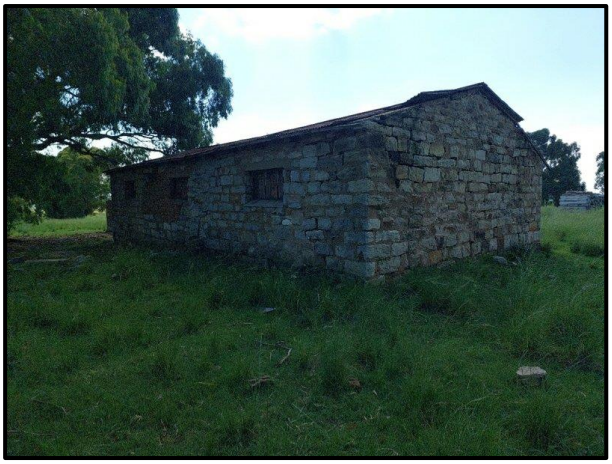


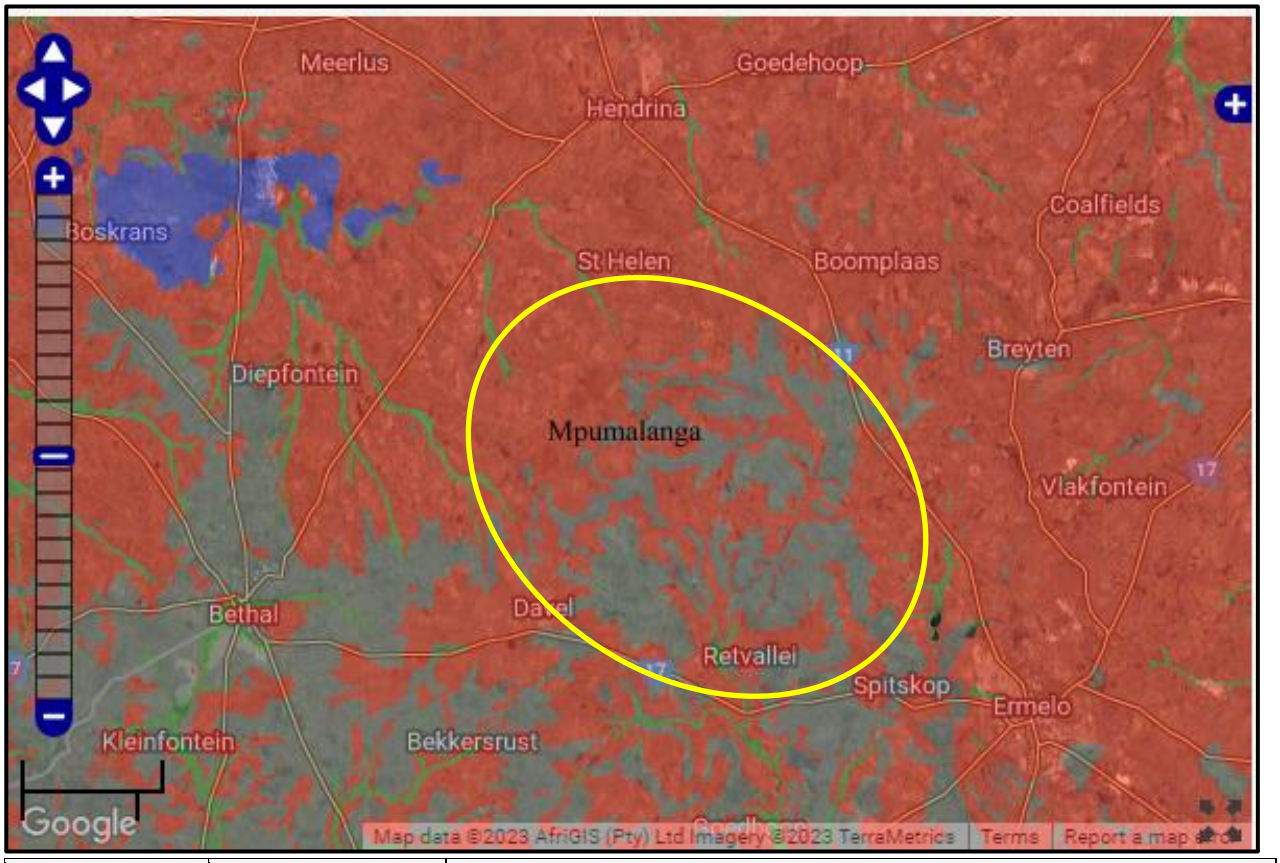
Figure 7.135. Stone masoned structure at PFM006.

### 7.3 Cultural Landscape

The surrounding and most of the impact area are cultivated, and forms part of a landscape characterised by wide scale cultivation and mining activities. Development in the study area is limited to farming infrastructure such as access roads, fences, and agricultural developments. The clusters of trees around farmsteads are generally planted to protect the houses from wind and they form part of the cultural landscape.

## 7.4 Paleontological Heritage

According to the SAHRA palaeontological sensitivity map, the study area is indicated as insignificant and very high palaeontological sensitivity (Figure 7.126), and an independent study was commissioned for this aspect (Bamford 2024).




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

Figure 7.136. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

# 8 Assessment of impacts

## 8.1 Impacts on tangible heritage resources.

The main cause of impacts to archaeological resources is physical disturbance of the material itself and its context during removal of topsoil and vegetation as well as the excavations associated with the establishment of infrastructure. In terms of this project the main source of impacts will happen during the following activities:

- Establishment of new roads and upgrade of existing roads;
- Excavations of foundations for the turbines at WEF;
- Flicker effect associated with rotating blades of the WEF towers on the surrounding landscape;
- Visual impact of the WEF towers on the landscape and sense of place;
- Establishment of laydown areas;
- Excavation and levelling of the WEF facility footprint;
- Trenches for cables and erection of powerlines;
- Excavations during construction of the sub stations;

Burial site PF007 will be impacted by the access road which leads to WTG58. It is always preferable to avoid all burial sites with a 30m buffer zone. If avoidance of these burial sites is not possible, the graves can be moved with the relevant permits. A Grave management plan for the burial sites will also have to be compiled as well as access provided to burial sites for family members wishing to visit the graves. PFM011 is a possible burial site and if the site cannot be avoided with a 30m buffer further investigation will be required to determine whether it is indeed a grave.

Although the other burial sites and medium significance sites will not be impacted by the current layout, they must be added to development plans and avoided with a 30m buffer zone.

### 8.1.1 Cumulative impacts

Cumulative impacts within the region are expected to rise with the accumulation of renewable projects within the 55km radius of the Project area. Cumulative impacts to the Project can be mitigated to an acceptable level as only four heritage resources will be impacted on the current layout, all of which can be mitigated through recommendations in this report.

## 8.2 Impact Assessment Tables

**Table 10. Impact assessment for Construction phase of the Project.**

| Impact number | Aspect | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | Rating | (M+ | E+ | R+ | D)x | P= | S | Rating |
| **Impact 1:** | PF007, PFM011 | Impact to graves in burial sites | Construction | Negative | moderate | 4 | 2 | 5 | 5 | 3 | **48** | **N3** | 4 | 2 | 5 | 5 | 1 | **16** | **N2** |
| | | | | | **Significance** | **N3 - Moderate** | | | | | | | **N2 - Low** | | | | | | |

**Table 11. Impact assessment for Operational phase of the Project.**

| Impact number | Aspect | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | Rating | (M+ | E+ | R+ | D)x | P= | S | Rating |
| **Impact 2:** | PF007, PFM011 | Impact to graves in burial sites | Construction | Negative | moderate | 4 | 2 | 5 | 5 | 3 | **48** | **N3** | 4 | 2 | 5 | 5 | 1 | **16** | **N2** |
| | | | | | **Significance** | **N3 - Moderate** | | | | | | | **N2 - Low** | | | | | | |

**Table 12. Impact assessment for Decommissioning phase of the Project.**

| Impact number | Aspect | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | Rating | (M+ | E+ | R+ | D)x | P= | S | Rating |
| **Impact 2:** | PF007, PFM011 | Impact to graves in burial sites | Construction | Negative | moderate | 4 | 2 | 5 | 5 | 3 | **48** | **N3** | 4 | 2 | 5 | 5 | 1 | **16** | **N2** |
| | | | | | **Significance** | **N3 - Moderate** | | | | | | | **N2 - Low** | | | | | | |

**Table 13. Cumulative Impact Assessment for the Project**

| Impact number | Receptor | Description | Stage | Character | Ease of Mitigation | Pre-Mitigation | | | | | | | Post-Mitigation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (M+ | E+ | R+ | D)x | P= | S | | (M+ | E+ | R+ | D)x | P= | S | |
| **Impact 1:** | Impacted sites (PF007, PFM011) | Cumulative impacts to heritage resources | Cumulative | Negative | Moderate | 4 | 2 | 5 | 5 | 3 | **48** | **N3** | 4 | 2 | 5 | 5 | 1 | **16** | **N2** |
| | | | | | **Significance** | **N3 - Moderate** | | | | | | | **N2 - Low** | | | | | | |

## 9 Conclusion and recommendations

The Project area is situated within a large, open landscape of which large sections have been used for agricultural activities as well as cattle farming. Many farmsteads are also situated throughout the Project area, with some still being occupied.

Due to layout changes to the Project after the initial survey was conducted, the final layout of the Project including final Turbine positions, and ancillary infrastructure was subject to an additional survey by two archaeologists. During the surveys, a total of 47 sites were recorded which includes multiple burial sites, farmsteads, ruins, circular stone enclosures, and possibly Historically planted trees. Informal settlements and labour housing and ruins thereof are found across the Project area and these sites pose the risk of associated graves and should preferably be avoided.

Burial site PF007 will be impacted by the access road which leads to WTG58. It is always preferable to avoid all burial sites with a 30m buffer zone. If avoidance of these burial sites is not possible, the graves can be moved with the relevant permits. A Grave management plan for the burial sites will also have to be compiled as well as access provided to burial sites for family members wishing to visit the graves. PFM011 is a possible burial site and if the site cannot be avoided with a 30m buffer further investigation will be required to determine whether it is indeed a grave.

According to the South African Heritage Resource Authority (SAHRA) Paleontological sensitivity map the study area is of insignificant, and very high palaeontological sensitivity and an independent study was commissioned for this aspect (Bamford 2024).

The impact to heritage resources can be mitigated to an acceptable level provided that the recommendations in this report are adhered to, based on the South African Heritage Resource Authority (SAHRA) ’s approval.

### 9.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and the Project may only proceed based on approval from SAHRA:

The following recommendations for Environmental Authorisation apply and the Project may only proceed after receiving comment from SAHRA:

- If the site at PFM011 cannot be avoided with a 30m buffer zone, the presence of a grave at PFM011 should be confirmed through Ground Penetrating Radar (GPR) and test excavations. If confirmed to be a grave, it can be removed with the necessary permits;
- Burial sites which will be impacted by access roads (PF007, PFM011) should preferably be avoided with a 30m buffer zone with access provided to family members
    - » If avoidance is not possible, the graves can be moved with the necessary permits.
- All sites of medium and high significance should be added to development plans and avoided with a 30m buffer zone;
- Although of low significance, ruins should preferably be avoided as they have the risk of having associated graves present;
- A Grave Management Plan should be compiled for the burial sites present within the Project area;
- Development activities must be confined to the approved development footprint only;
- Monitoring of the Project area by the ECO during pre-construction and construction phases for heritage and palaeontology chance finds, if chance finds are encountered to implement the Chance Find Procedure for the Project as outlined in Section 9.

## 9.2 Chance Find Procedure

### 9.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines applicable to the Chance Find procedure is discussed below and monitoring guidelines for this procedure are provided in Section 9.5.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this Project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

### 9.2.2 Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the Project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this Project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the Project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

## 9.3 Reasoned Opinion

The overall impact of the Project with the recommended mitigation measures is acceptable and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the Project.

## 9.4 Potential risk

Potential risks to the proposed Project are the occurrence of intangible features and unrecorded cultural resources (of which graves, and subsurface cultural material are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation and possible layout changes. The stakeholder engagement process will assess intangible heritage resources further if this is listed as a concern.

### 9.5 Monitoring Requirements

Day to day monitoring can be conducted by the ECO. The ECO or other responsible persons should be trained along the following lines:

- *Induction training:*
  - Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
  - Staff should also receive training on the CFP.
- *Site monitoring and watching brief*: As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from pre-construction and construction activities. The ECO should monitor all such activities. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 14. Monitoring requirements for the Project

| **Heritage Monitoring** | | | | | |
|---|---|---|---|---|---|
| **Aspect** | **Area** | **Responsible for monitoring and measuring** | **Frequency** | **Proactive or reactive measurement** | **Method** |
| Cultural Heritage Resource Chance Find | Entire Project area | ECO | Weekly (Pre construction and construction phase) | Proactively | If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented:<br>1. Cease all works immediately;<br>2. Report incident to the Sustainability Manager;<br>3. Contact an archaeologist to inspect the site;<br>4. Report incident to the competent authority; and<br>5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.<br>Only recommence operations once impacts have been mitigated. |

### 9.7 Management Measures for inclusion in the EMPr

**Table 15. Heritage Management Plan for EMPr implementation**

| Area | Mitigation measures | Phase | Timeframe | Responsible party for implementation | Target | Performance indicators (Monitoring tool) |
|---|---|---|---|---|---|---|
| General Project area | Monitoring of the Project area by the ECO during pre-construction and construction phases for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project | Pre-Construction & Construction | Weekly | Applicant Construction Contractor | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA | ECO Checklist/Report |
| General Project Area | Development activities must be confined to the approved development footprint only. | Construction | Construction | Applicant Construction Contractor | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA | ECO Checklist/Report |
| Final Project Layout | The Final Project Layout of the Turbines and ancillary infrastructure will be subject to a Heritage Walk-Down prior to construction. | Pre-Construction | Pre-Construction | Applicant Construction Contractor<br><br>Appointed Archaeologist | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA | ECO Checklist/Report |
| PF006 | The ruins and semi-circular stone enclosures should preferably be added to development plans and avoided with a 30m buffer zone.<br>If the site cannot be avoided, it must be mapped and recorded prior to the application of a destruction permit. | Throughout the Project | Throughout the Project | Applicant Construction Contractor | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA | ECO Checklist/Report |

| | | | | | | |
|---|---|---|---|---|---|---|
| PF007, PF008, PF009 | Avoidance of the burial sites is preferable with a 30 m buffer zone and demarcation of the features. An access protocol should be compiled for Next of Kin (NoK) who might want to visit the site as well as a grave management plan to ensure the site is protected.<br><br>If the burial sites cannot be avoided, the graves can be relocated with the necessary approvals. | Throughout the Project | Throughout the Project | Applicant Construction Contractor | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA | ECO Checklist/Report |

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## 11 Appendix A

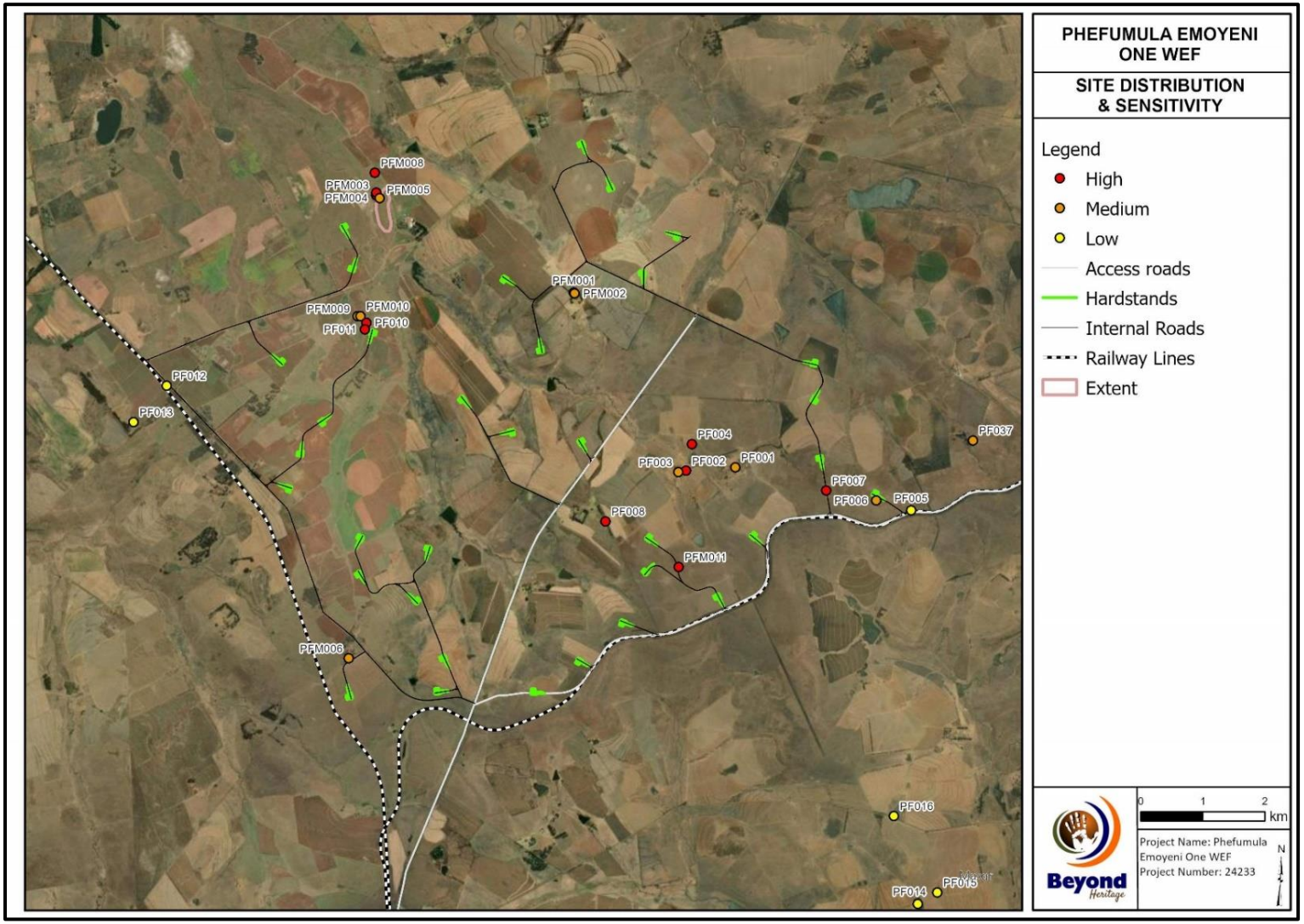


Figure 11.1. Zoomed in Site distribution map (1 of 3). PF011 is located 92 m from turbine 79. PFM011 is located 20 m from the internal road. PF007 is traversed by an internal road and PF006 is 73m from the internal road to Turbine 55. PF010 and PF011 is located more than 90 m from Turbine 79.

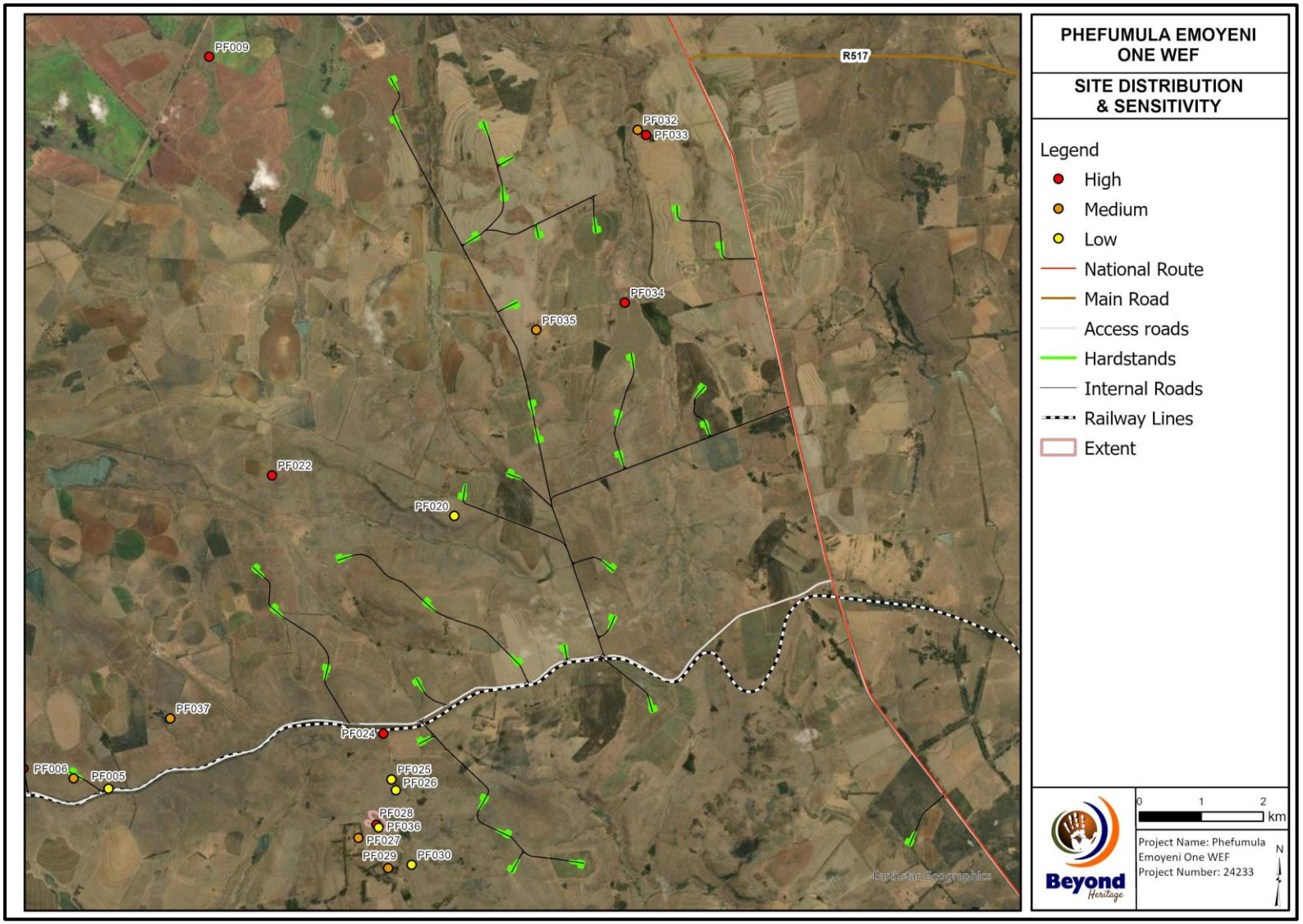


Figure 11.2. Zoomed in Site distribution map (2 of 3). PF024 is located 124 m from the proposed internal road, PF005 and PF006 are located more the 32 m from any infrastructure.

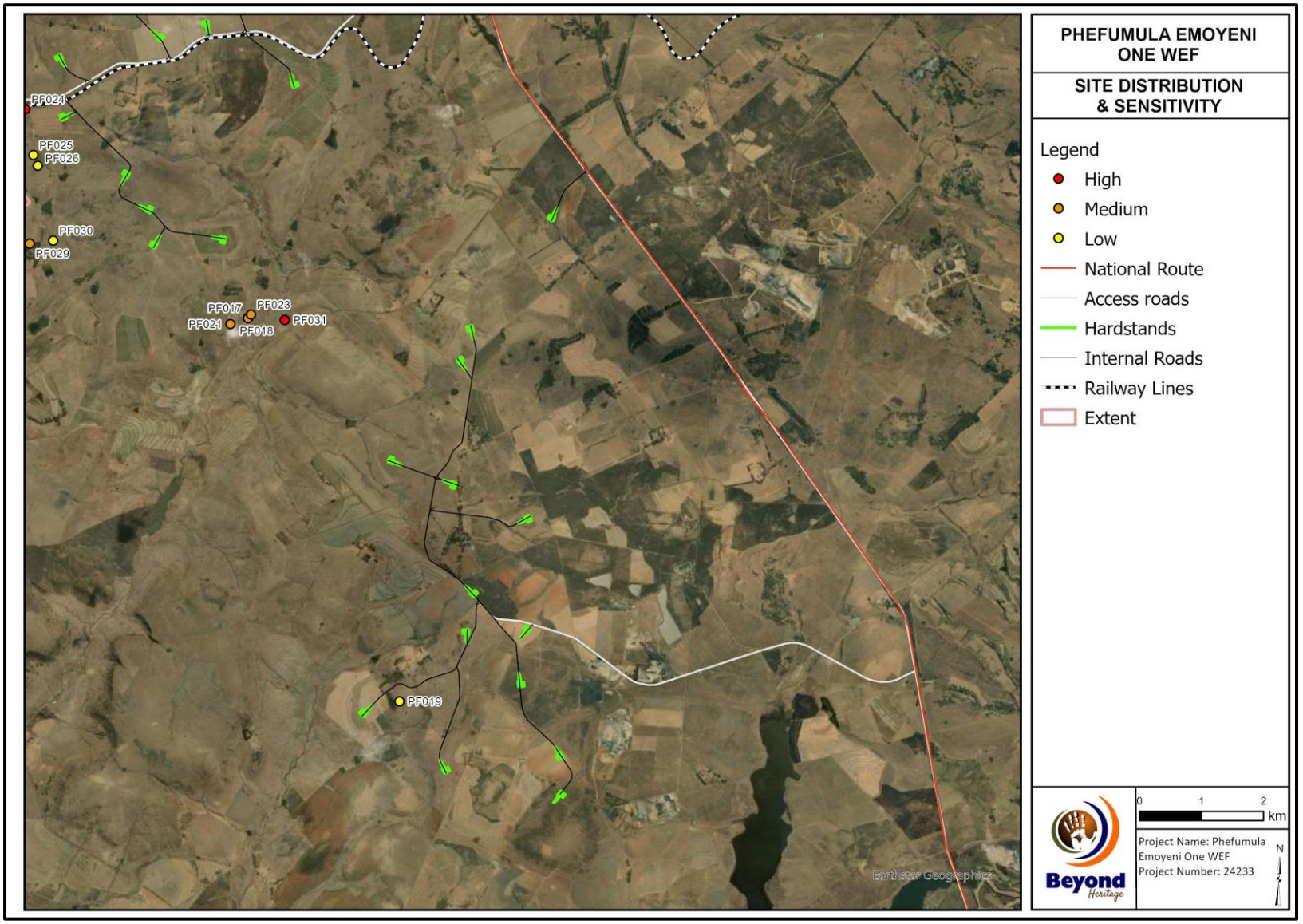


Figure 11.3. Zoomed in Site distribution map (3 of 3). None of the recorded sites on this map will be directly impacted on by the project.

# Palaeontological Site Report

**For the proposed Phefumula Emoyeni One Wind Energy Facility (WEF), Mpumalanga Province**

**Client:**
WSP Group Africa (Pty) Ltd

**Client contact:**
Ashlea Strong

**Report Prepared by:**

**28 July 2024**
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## EXECUTIVE SUMMARY

Phefumula Emoyeni One (Pty) Ltd proposes the development of the Phefumula Emoyeni One Wind Energy Facility (WEF), near Ermelo, Mpumalanga Province. Marion Bamford consulting was subcontracted by Beyond Heritage to assess the potential impacts to the palaeontological resources by the Project. This report is for the site visit verification (Phase 2) of the Project and is based on a site visit and walkdown study that provides an assessment of the palaeontology of the area and potential sites to be avoided. Key findings include:

- Although much of the area lies on potentially highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup that could preserve fossil plants of the *Glossopteris* flora, it is covered by soils, grasslands or ploughed fields.
- The study area has no rocky outcrops that could reveal fossils and no fossils were seen on the land surface.
- To comply with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and with cognisance of known heritage resources in the area, the development footprint was subjected to a field-based Palaeontological Impact Assessment (PIA) of the final impact areas.
- It is not known if fossils lie below the surface, and this will only be revealed once excavations commence. Therefore, a Fossil Chance find Protocol should be followed in the CONSTRUCTION phase only.

The table below provides information regarding the outcome of the Department of Forestry, Fisheries and the Environment (DFFE) Screening tool in terms of the Paleontological theme sensitivities associated with the proposed project and the specialist sensitivity verification (more detail is included in Appendix A).

| ASPECT | SCREENING TOOL SENSITIVITY | VERIFIED SENSITIVITY | PLAN OF STUDY | RELEVANT SECTION MOTIVATING VERIFICATION |
|---|---|---|---|---|
| Palaeontology | Very high | Low | Paleontological Impact Assessment | Section 7.2. SAHRA Requirements<br><br>SAHRIS Paleontological Map |

Contents

**Figures**



Tables

**ABBREVIATIONS**

| |
|---|
| BIA: Basic Impact Assessment |
| ECO: Environmental Control Officer |
| EIA: Environmental Impact Assessment* |
| EIA Practitioner: Environmental Impact Assessment Practitioner |
| EMPr: Environmental Management Programme |
| Fm: Formation |
| GPS: Global Positioning System |
| HIA: Heritage Impact Assessment |
| Ma: million years ago |
| MPRDA: Mineral and Petroleum Resources Development Act |
| NEMA: National Environmental Management Act |
| PRHA: Provincial Heritage Resource Agency |
| SADC: Southern African Development Community |
| SAHRA: South African Heritage Resources Agency |
| SG: Supergroup |
| UNESCO: The United Nations Educational, Scientific and Cultural Organization |
| WEF: Wind Energy Facility |

## 1. INTRODUCTION

Marion Bamford Consulting was subcontracted to do the palaeontological assessment by Beyond Heritage who were contracted by WSP (Pty) Ltd to conduct a heritage scoping study for the Phefumula Emoyeni One WEF, located approximately 16km north of Ermelo in the Msukaligwa Local Municipality and Gert Sibande District Municipality, near the town of Ermelo, in the Mpumalanga Province of South Africa. The affected farm portions are indicated below:

**Table 1. Farm portions affected by the Project.**

| FARM NAME AND NUMBER | PORTION | 21 DIGIT SURVEYOR GENERAL CODE OF EACH CADASTRAL LAND PARCEL |
|---|---|---|
| ISRAEL 207 IS | 0 | T0IS00000000020700000 |
| BOSMANSKRANS 217 IS | 0 | T0IS00000000021700000 |
| BOSMANSKRANS 217 IS | 3 | T0IS00000000021700003 |
| BOSMANSKRANS 217 IS | 4 | T0IS00000000021700004 |
| BOSMANSKRANS 217 IS | 6 | T0IS00000000021700006 |
| BOSMANSKRANS 217 IS | 7 | T0IS00000000021700007 |
| BOSMANSKRANS 217 IS | 8 | T0IS00000000021700008 |
| BOSMANSKRANS 217 IS | 9 | T0IS00000000021700009 |
| VAALBANK 233 IS | 6 | T0IS00000000023300006 |
| KUILFONTEIN 234 IS | 1 | T0IS00000000023400001 |
| KUILFONTEIN 234 IS | 2 | T0IS00000000023400002 |
| KUILFONTEIN 234 IS | 7 | T0IS00000000023400007 |
| KUILFONTEIN 234 IS | 8 | T0IS00000000023400008 |
| KUILFONTEIN 234 IS | 9 | T0IS00000000023400009 |
| KUILFONTEIN 234 IS | 11 | T0IS00000000023400011 |
| KUILFONTEIN 234 IS | 12 | T0IS00000000023400012 |
| KUILFONTEIN 234 IS | 14 | T0IS00000000023400014 |
| KUILFONTEIN 234 IS | 15 | T0IS00000000023400015 |
| KUILFONTEIN 234 IS | 16 | T0IS00000000023400016 |

| | | |
|---|---|---|
| KUILFONTEIN 234 IS | 17 | T0IS00000000023400017 |
| KUILFONTEIN 234 IS | 21 | T0IS00000000023400021 |
| KUILFONTEIN 234 IS | 22 | T0IS00000000023400022 |
| KUILFONTEIN 234 IS | 23 | T0IS00000000023400023 |
| BOSMANSHOEK 235 IS | 3 | T0IS00000000023500003 |
| WITBANK 236 IS | 2 | T0IS00000000023600002 |
| WITBANK 236 IS | 4 | T0IS00000000023600004 |
| WITBANK 236 IS | 5 | T0IS00000000023600005 |
| WITBANK 236 IS | 7 | T0IS00000000023600007 |
| WITBANK 236 IS | 10 | T0IS00000000023600010 |
| WITBANK 236 IS | 11 | T0IS00000000023600011 |
| WITBANK 236 IS | 13 | T0IS00000000023600013 |
| NOOITGEDACHT 237 IS | 0 | T0IS00000000023700000 |
| NOOITGEDACHT 237 IS | 2 | T0IS00000000023700002 |
| NOOITGEDACHT 237 IS | 4 | T0IS00000000023700004 |
| NOOITGEDACHT 237 IS | 5 | T0IS00000000023700005 |
| NOOITGEDACHT 237 IS | 7 | T0IS00000000023700007 |
| NOOITGEDACHT 237 IS | 8 | T0IS00000000023700008 |
| NOOITGEDACHT 237 IS | 9 | T0IS00000000023700009 |
| NOOITGEDACHT 237 IS | 10 | T0IS00000000023700010 |
| NOOITGEDACHT 237 IS | 11 | T0IS00000000023700011 |
| NOOITGEDACHT 237 IS | 12 | T0IS00000000023700012 |
| NOOITGEDACHT 237 IS | 13 | T0IS00000000023700013 |
| ORPENSKRAAL 238 IS | 0 | T0IS00000000023800000 |
| ORPENSKRAAL 238 IS | 2 | T0IS00000000023800002 |

| | | |
|---|---|---|
| GELIKSDRAAI 240 IS | 1 | T0IS00000000024000001 |
| GELIKSDRAAI 240 IS | 2 | T0IS00000000024000002 |
| ELIM 247 IS | 0 | T0IS00000000024700000 |
| KRANSPOORT 248 IS | 0 | T0IS00000000024800000 |
| KRANSPOORT 248 IS | 2 | T0IS00000000024800002 |
| KRANSPOORT 248 IS | 3 | T0IS00000000024800003 |
| KRANSPOORT 248 IS | 4 | T0IS00000000024800004 |
| KRANSPOORT 248 IS | 6 | T0IS00000000024800006 |
| KRANSPOORT 248 IS | 8 | T0IS00000000024800008 |
| KRANSPOORT 248 IS | 9 | T0IS00000000024800009 |
| KRANSPOORT 248 IS | 10 | T0IS00000000024800010 |
| KRANSPOORT 248 IS | 11 | T0IS00000000024800011 |
| KRANSPOORT 248 IS | 12 | T0IS00000000024800012 |
| KRANSPOORT 248 IS | 13 | T0IS00000000024800013 |
| KRANSPOORT 248 IS | 18 | T0IS00000000024800018 |
| KRANSPOORT 248 IS | 19 | T0IS00000000024800019 |
| KRANSPOORT 248 IS | 21 | T0IS00000000024800021 |
| KRANSPOORT 248 IS | 22 | T0IS00000000024800022 |
| KRANSPOORT 248 IS | 23 | T0IS00000000024800023 |
| TWEEFONTEIN 249 IS | 1 | T0IS00000000024900001 |
| TWEEFONTEIN 249 IS | 2 | T0IS00000000024900002 |
| TWEEFONTEIN 249 IS | 3 | T0IS00000000024900003 |
| TWEEFONTEIN 249 IS | 8 | T0IS00000000024900008 |
| TWEEFONTEIN 249 IS | 9 | T0IS00000000024900009 |
| VOORZORG 250 IS | 0 | T0IS00000000025000000 |

| | | |
|---|---|---|
| NOOITGEDACHT 251 IS | 0 | T0IS00000000025100000 |
| NOOITGEDACHT 251 IS | 2 | T0IS00000000025100002 |
| NOOITGEDACHT 251 IS | 5 | T0IS00000000025100005 |
| NOOITGEDACHT 251 IS | 6 | T0IS00000000025100006 |
| NOOITGEDACHT 251 IS | 7 | T0IS00000000025100007 |
| NOOITGEDACHT 251 IS | 9 | T0IS00000000025100009 |
| NOOITGEDACHT 251 IS | 10 | T0IS00000000025100010 |
| NOOITGEDACHT 251 IS | 11 | T0IS00000000025100011 |
| SPION KOP 252 IS | 1 | T0IS00000000025200001 |
| SPION KOP 252 IS | 2 | T0IS00000000025200002 |
| UITZICHT 266 IS | 4 | T0IS00000000026600004 |
| UITZICHT 266 IS | 15 | T0IS00000000026600015 |
| DAVELFONTEIN 267 IS | 7 | T0IS00000000026700007 |
| MIDDELPLAAT 271 IS | 2 | T0IS00000000027100002 |
| MIDDELPLAAT 271 IS | 3 | T0IS00000000027100003 |
| MIDDELPLAAT 271 IS | 4 | T0IS00000000027100004 |
| MIDDELPLAAT 271 IS | 5 | T0IS00000000027100005 |
| MIDDELPLAAT 271 IS | 8 | T0IS00000000027100008 |
| DRIEHOEK 273 IS | 0 | T0IS00000000027300000 |
| DRIEHOEK 273 IS | 2 | T0IS00000000027300002 |
| DRIEHOEK 273 IS | 1 | T0IS00000000027300001 |
| DRIEHOEK 273 IS | 3 | T0IS00000000027300003 |
| DRIEHOEK 273 IS | 7 | T0IS00000000027300007 |
| SPITSKOP 276 IS | 59 | T0IS00000000027600059 |
| SPITSKOP  276 IS | 68 | T0IS00000000027600068 |

| | | |
|---|---|---|
| KRANSPOORT 827 IS | 0 | T0IS00000000082700000 |

The report outlines the approach and methodology utilised for the site sensitivity verification phase of the Project. Possible impacts are identified, as well as potential risks to the Project.

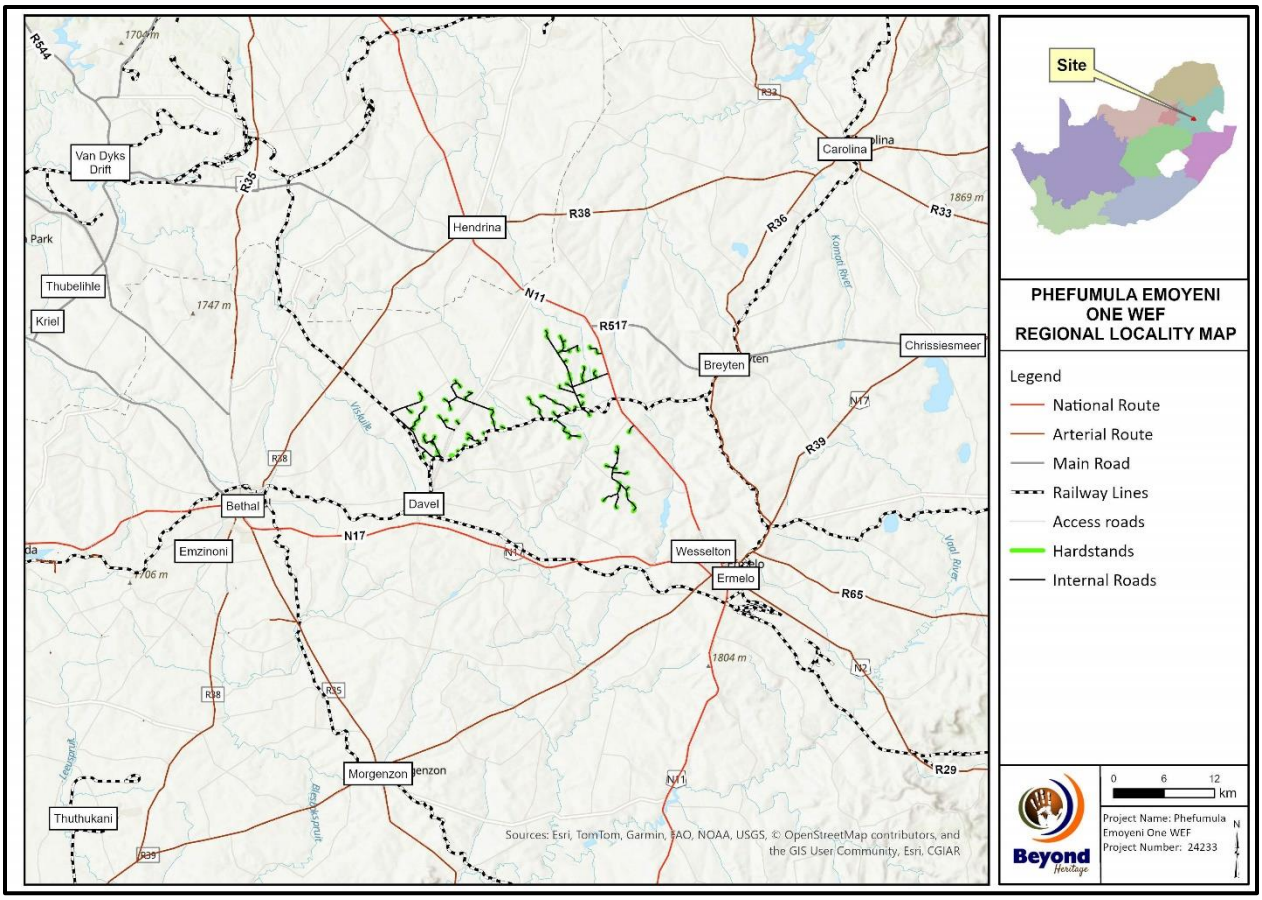


Figure 1.1. Regional setting of the study area.

### 1.1 Terms of Reference

The main aim of this site report is to verify the potential impacts of any palaeontological resources that might occur, based on the 1:250 000 geological map and sensitivities from the SAHRIS palaeosensitivity that was guided by the Palaeotechnical Reports. For this area the report for Mpumalanga by Groenewald at al. (2014), is relevant. Based on the geological formations and known fossil occurrence from other areas, the palaeosensitivity map can only predict the likelihood of fossils occurring in another area in the same formation. A site visit can determine whether fossils are present on the land surface. It is not the palaeontologist's mandate to excavate. The objectives of the site visit and report were to:

- Conduct a site visit based on:
    - Review available literature, previous palaeontological studies and other relevant information sources to obtain a thorough understanding of the most sensitive sites in the area;
    - Avoid sites with no fossils such as dolerite (intrusive volcanic rock do does not preserve fossils),
    - Visit the highly sensitive sites to verify the presence (or absence of fossils). Recommend the next course of action (no-go area / remove fossils / fossil chance find protocol for any fossils found during excavations / no fossils so no action required.
- Report

The reporting of the site verification component is based on the observations and findings during the walkdown and recommendations follow the SAHRA Legislation to protect the fossils.

### 1.2 Nature of the development

#### 1.2.1. Project Details (as provided)

The proposed Phefumula Emoyeni One WEF will be developed within a project area of approximately 33 660 hectares (ha). The site will be accessed via the N11 and existing access roads. The proposed project description is outlined in Table 2 & 3 below.

**Table 2: Phefumula Emoyeni One WEF Technical Details**

| DETAIL | INFORMATION |
|---|---|
| Applicant Name: | Phefumula Emoyeni One (Pty) Ltd |
| Municipalities | Msukaligwa Local Municipality<br>Gert Sibande District Municipality |
| Extent | 33 660 ha |
| Buildable area | Subject to finalization based on technical and environmental requirements |
| Export Capacity | Up to 550MW |

| DETAIL | INFORMATION |
|---|---|
| Power system technology | Wind |
| Number of Turbines | Up to 76 |
| Turbine capacity | Between 6 MW and 15 MW each |
| Rotor Diameter | Up to 200m |
| Hub Height | Up to 200m |
| Hard Standing Dimensions | Approximately 75m x 120m |
| Turbine Foundations | Diameter of up to 40m per turbine – excavation up to 6 m deep, constructed of reinforced concrete to support the mounting ring. Once tower established, footprint of foundation is covered with soil. |
| Substation and internal powerlines | 33kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.<br>3 x 33kV/132kV onsite collector substation (IPP Portion), each being up to 5ha.<br>Cabling between turbines, to be laid underground where practical |
| Construction camp and laydown area | Construction compounds including site office (approximately 300m x 300m in total but split into 3ha each of 150m x 200m):<br>1 x Batching plant of up to 4ha to 7ha.<br>3 x construction compound / laydown area, including site office of 3ha each (150m x 200m each).<br>Laydown and crane hardstand areas (approximately 75m x 120m). |
| Internal Roads | 12-13m wide roads with 12m radius turning circles, gravel surface |
| O&M Building | 3 x O&M office of approximately 1.5ha each adjacent to each collector Sub Station. |
| Batching Plant | Up to 3 x Batching plants of up to 4ha to 7ha. |
| BESS | Battery Energy Storage System (BESS) (200MW/800MWh).<br>Type has not been confirmed at this stage. It is proposed that all impacts related to both types be assessed in the EIA. |

| DETAIL | INFORMATION |
|---|---|
| | Export Capacity of up to 800MWh<br>Total storage capacity 200MW<br>Storage capacity of up to 6-8 hours<br>The BESS will be housed in containers covering a total approximate footprint of up to 5ha.<br>Battery types to be considered: Solid State Batteries as the preferred (Lithium Ion) and Redox Flow Batteries as the alternative (Vanadium Redox). |

### 1.2.2. Project Alternatives

The following alternatives will be considered in the impact assessment:

**Layout Alternatives**

- Layout alternatives were considered, optimised and finalised in the EIA Phase. The final layout is considered in this report.
- The Alternative of utilising ready-mix trucks instead of the temporary cement batching plant should also be considered.

**No-Go Alternative**

- The no-go alternative, i.e. the Phefumela Emoyeni One WEF will not be developed.

## 1.3 The receiving environment

The study area is rural in character and sparsely developed. Infrastructure includes fences, windpumps, and access roads all associated with the farming activities in the study area. The Project area is undulating and used for cultivation and grazing.

## 2. APPROACH AND METHODS

The assessment was undertaken in two phases. First, a scoping phase included in the Heritage Impact Assessment (HIA) phase, as part of the EIA process, that recommended a site verification phase. This report concerns the site verification phase.

This was accomplished by means of the following phases (the results are represented in section 7 of this report):

### 2.1 Literature search

A literature search was conducted utilising data from published articles on the geology and palaeontology of the area. The aim of this is to extract data and information on the area in question, and focussng on potential fossil sites.

### 2.2 Information collection

South African Heritage Resources Information System (SAHRIS) was consulted to collect data from Palaeontology practitioners who undertook work in the area.

### 2.3 Public consultation

A full public consultation process will be facilitated by the Environmental Assessment Practitioner (EAP). Any heritage concerns raised during this process will be addressed in the HIA.

### 2.4 Google Earth and mapping survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where fossil sites might be located.

## 3. LEGISLATION

For this project, the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is of importance and the following sites and features are protected:

a. Archaeological artefacts, structures and sites older than 100 years.
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography.
c. Objects of decorative and visual arts.
d. Military objects, structures and sites older than 75 years.
e. Historical objects, structures and sites older than 60 years.
f. Proclaimed heritage sites.
g. Grave yards and graves older than 60 years.
h. Meteorites and **fossils**.
i. Objects, structures and sites or scientific or technological value.

The national estate includes the following:

a. Places, buildings, structures and equipment of cultural significance.
b. Places to which oral traditions are attached or which are associated with living heritage.
c. Historical settlements and townscapes.
d. Landscapes and features of cultural significance.
e. Geological sites of scientific or cultural importance.
f. Archaeological and palaeontological importance.
g. Graves and burial grounds.
h. Sites of significance relating to the history of slavery.
i. Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books etc.).

Section 34 (1) of the act deals with structures which is older than 60 years. Section 35(4) of this act deals with archaeology, palaeontology and meteorites. Section 36(3) of the NHRA deals with human remains older than 60 years. Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

### 3.1 Palaeontological Site Significance and Mitigation Measures

Fossils tend to be distributed within a geological stratum or formation, not to a single site, although they be visible or exposed in one site, within the landscape. However, in practice their distribution is not uniform and is not predictable because many taphonomic features come into play. Fossils are non-renewable but some are very abundant, some are common, some are poorly preserved and some are rare and very important for understanding the biostratigraphy and evolution of the organism and the palaeoecology.

There is no list of criteria for assessing the importance of fossils in South Africa and may come down to the personal preference of the palaeontologist. A more general approach, therefore, is used here to establish site significance:

- The unique nature of a site;
- The integrity of the palaeontological deposit;
- The preservation of the fossils: complete animal or plant, or partial skeletons or separate plant parts, identifiable fragments of animal or plant, or unidentifiable fragments.
- The location of the site in relation to other similar sites or features;
- The depth of the deposit (when it can be determined or is known);
- The preservation condition of the site as a whole; and
- Potential to answer present research questions.

# 4. REGIONAL OVERVIEW

## 4.1 General Information

### 4.1.1. Literature search

The reports indicated in Table 5 were conducted in the greater study area (by the author) and were consulted for this report. The reports all recommended that the projects could proceed with the implementation of a detailed Chance Find Procedure.

**Table 3. Palaeontological impact reports conducted in the greater study area.**

| Author | Year | Project |
|---|---|---|
| Bamford, M.K. | 2022a | Heritage Impact Assessment for the proposed Camden I Wind Grid Connection, Mpumalanga Province |
| Bamford, M.K. | 2022b | Heritage Impact Assessment for the Proposed Camden I Solar Energy Facility (100MW), Mpumalanga Province, South Africa |
| Bamford, M.K. | 2022c | Heritage Impact Assessment for the Proposed Camden I Wind Energy Facility (up to 210MW), Mpumalanga Province, South Africa |
| Bamford, M.K. | 2022d | Heritage Impact Assessment for the Proposed Camden II Wind Energy Facility (up to 210MW), Mpumalanga Province, South Africa. |
| Bamford, M.K. | 2022e | Heritage Impact Assessment for the proposed Camden powerline and collector substation, Mpumalanga Province |
| Bamford, M.K. | 2022f | Heritage Impact Assessment for the Hendrina South Wind Energy Facility |
| Bamford, M.K. | 2022g | Heritage Impact Assessment for the Hendrina North Wind Energy Facility |
| Bamford, M.K. | 2022h | Heritage Impact Assessment for the Hendrina South Grid Infrastructure |

### 4.1 2. Public consultation

A public participation process is facilitated by the EAP and potential heritage concerns raised will be included in the HIA report.

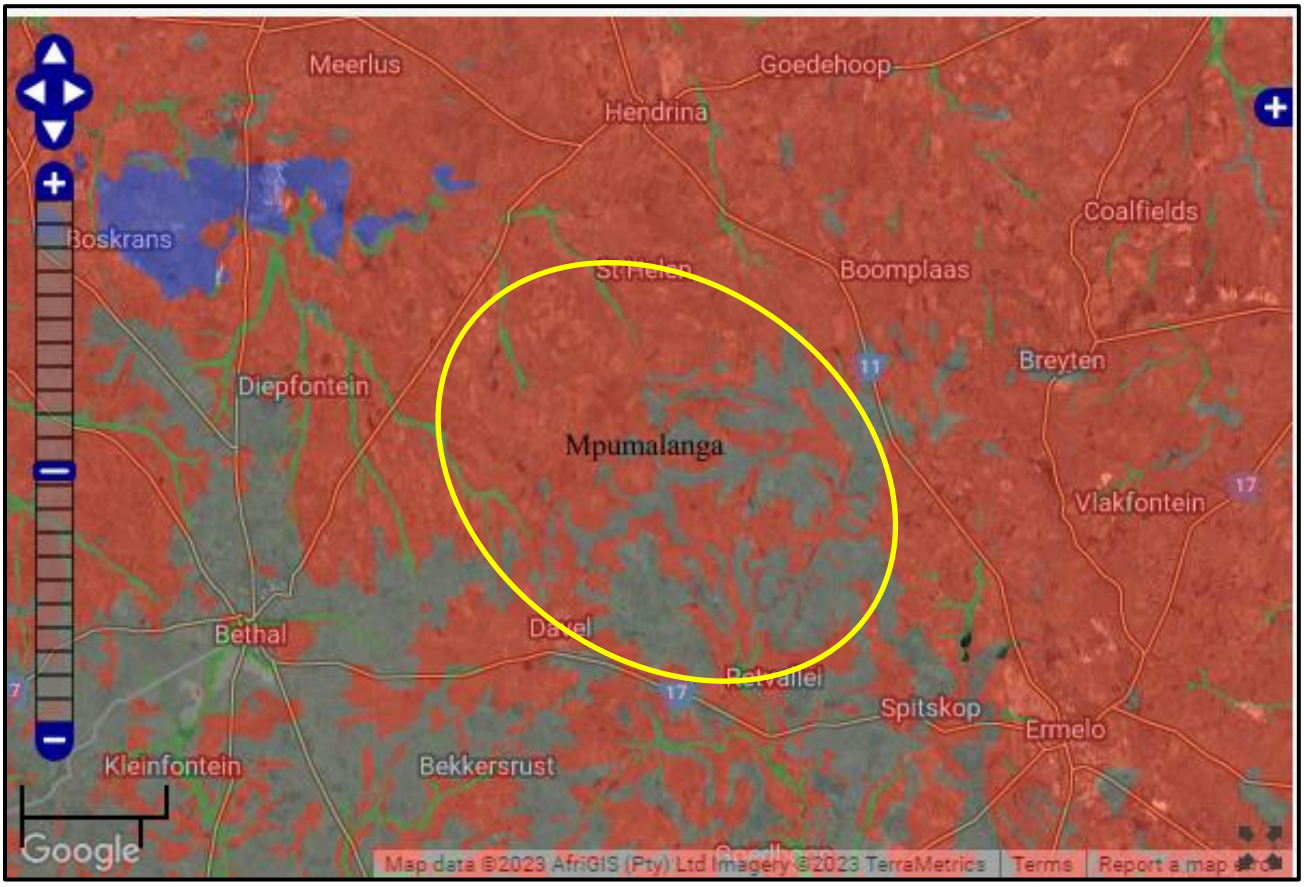
### 4.1.3. Google Earth and mapping survey

Google Earth and 1:50 000 maps of the area was utilised to identify possible places where archaeological sites might be located.

## 4.2. Palaeontology

The study area is of insignificant and very high palaeontological sensitivity (Figure 4.1) and further studies will be required in the EIA phase. Previous assessments by Bamford (2022 and 2023) concluded that based on the fossil record and confirmed by site visits, there were NO FOSSILS of the *Glossopteris* flora even though fossils have been recorded from rocks of a similar age and type in South Africa. It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Vryheid Formation (Ecca Group, Karoo Supergroup) so a Fossil Chance Find Protocol should be added to the EMPr.

As recommended an independent study was conducted for this project in early May 2024 (early winter) and is reported herein.




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

Figure 4.1. Palaeontological sensitivity map of the approximate study areas (yellow polygon).

### 4.2 Geology of the project area

The project lies in the central part of the main Karoo Basin where the basal rocks have been intruded by dolerite of Jurassic age. Much younger sands and alluvium of Quaternary age have accumulated in some depressions and river valleys (Figure 4.2).

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

Overlying the basal Dwyka Group glacigene rocks are rocks of the Ecca Group that are Early Permian in age. There are eleven formations recognised in this group but they do not all extend throughout the Karoo Basin. In the central and eastern part are the following formations, from base upwards: Pietermaritzburg, **Vryheid** and Volksrust Formations. All of these sediments have varying proportions of sandstones, mudstones, shales and siltstones and represent shallow to deep water settings, deltas, rivers, streams and overbank depositional environments.

Overlying the Ecca Group are the rocks of the Beaufort Group that has been divided into the lower Adelaide Subgroup for the Upper Permian strata, and the Tarkastad Subgroup for the Early to Middle Triassic strata. As with the older Karoo sediments, the formations vary across the Karoo Basin.

Large exposures of Jurassic dolerite dykes occur throughout the area. These intruded through the Karoo sediments around 183 million years ago at about the same time as the Drakensberg basaltic eruption.

Younger sands and alluvium that have eroded from the older rocks have accumulated in some of the river valleys and depressions during the Quaternary period. These sediments are hard to date as they have been weathered, eroded and transported

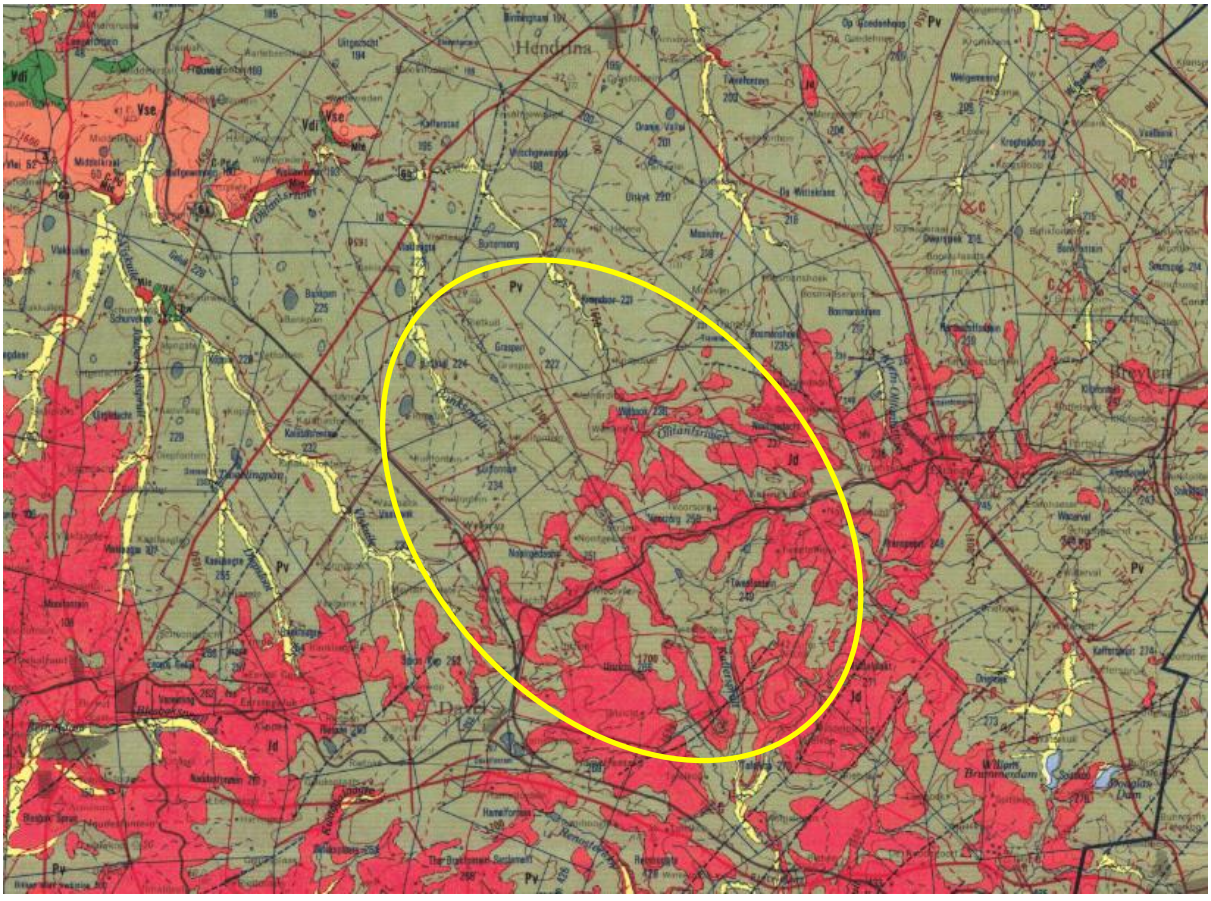



Figure 4.2. Geological map of the study area (yellow outline). Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2628 East Rand.

Table 2: Explanation of symbols for the geological map and approximate ages (Johnson et al., 2006; Partridge et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

| Symbol | Group/Formation | Lithology | Approximate Age |
|---|---|---|---|
| Q | Quaternary | Alluvium, sand, calcrete | Quaternary<br>Ca 1.0 Ma to present |
| Jd | Jurassic dykes | Dolerite dykes, intrusive | Jurassic,<br>approx. 183 Ma |
| Pv | Vryheid Fm, Ecca Group, Karoo SG | Shale, mudstone, coal, sandstone | Middle Permian ca 266 – 260 Ma |

### 4.3. Palaeontology of the greater study area

The palaeontological sensitivity of the area under consideration is presented in Figure 4.1. The site for development is in the very highly sensitive Vryheid Formation (red) and the non-fossiliferous Jurassic dolerite (grey). The Quaternary sands and alluvium are indicated as moderately sensitive (green).

The **Vryheid Formation** lies on the uneven topography of pre-Karoo or Dwyka Group rocks in the northern and northwestern margins, but lies directly on the Pietermaritzburg Formation in the central and eastern part. The lithofacies show a number of upward-coarsening cycles, some very thick, and they are essentially deltaic in origin. There are also delta-front deposits, evidence of delta switching, and fluvial deposits with associated meandering rivers, braided streams, back swamps or interfluves and abandoned channels (Cadle et al., 1993; Cairncross, 1990; 2001; Johnson et al., 2006). Coal seams originated where peat swamps developed on broad abandoned alluvial plains, and less commonly in the backswamps or interfluves. Most of the economically important coal seams occur in the fluvial successions (ibid). In the east (Mpumalanga and northern KwaZulu Natal), the Vryheid formation can be subdivided into a lower fluvial-dominated deltaic interval, a middle fluvial interval, and an upper fluvial-dominated deltaic interval again (Taverner-Smith et al., 1988).

Fossil plants of the *Glossopteris* flora occur in the Vryheid Formation. This flora includes *Glossopteris* leaves, seeds, fructifications, roots and wood, as well other groups such as the lycopods, sphenophytes, ferns, cordaitaleans and early gymnosperms (Plumstead, 1969; Anderson and Anderson, 1985; Bamford, 2004).

## 5. ASSUMPTIONS AND LIMITATIONS

The study area was subjected to a field survey as is required for the EIA phase. It is assumed that information obtained for the wider area is applicable to the study area and the authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of fossil deposits, the possibility exists that some fossils were not visible on the land surface because of the cover of Quaternary sands and soils.

## 6. FINDINGS

Based on the site visit walkdown specifically to the sites for the turbines as currently positioned, the area is open and almost flat. It is covered with soils and grasslands used for grazing, some croplands too. Ther were no rocky outcrops, no rocks and NO FOSSILS were seen. Site visit photographs are presented in figures 6.1 to 6.5.

Figure 6.1.Site visit photographs. General area showing the open grasslands and some powerlines. Note no rocky outcrops and no fossils visible in the land surface.

Figure 6.2. Site visit photographs. General area showing the open grasslands and some powerlines. Note no rocky outcrops and no fossils visible in the land surface.

Figure 6.3. Site visit photographs. General area showing the open grasslands and some powerlines. Note no rocky outcrops and no fossils visible in the land surface.

Figure 6.4. Site visit photographs. General area showing the open grasslands and some powerlines. Note no rocky outcrops and no fossils visible in the land surface. Crops have been harvested and the flat soil covered terrain is clearly visible.

Figure 6.5. Site visit photographs. General area showing the open grasslands and some powerlines. Note no rocky outcrops and no fossils visible in the land surface.

## 7. POTENTIAL SIGNIFICANCE OF PALAEONTOLOGICAL RESOURCES

Based on the current information obtained for the area and the site visit verification, it is anticipated that no fossils occur within the development areas. Although the area is indicated as very highly sensitive, in practice, there are no fossils visible in the surface. It is not known, however, what lies below the soil surface.

## 8. CUMULATIVE IMPACT ASSESSMENT

A cumulative impact assessment is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (IFC GPH).

Cumulative impacts with existing and planned facilities may occur during construction and operation of the proposed Phefumula Emoyeni One WEF. While one project may not have a significant negative impact on sensitive resources or receptors, the collective impact of the projects may increase the severity of the potential impacts.

Therefore, a number of renewable energy developments within the surrounding area which have submitted applications for environmental authorisation (some of which have been approved) have been considered. It is important to note that the existence of an approved EA does not directly equate to actual development of the project.

The existing surrounding projects are presented in Error! Reference source not found.. The proposed Phefumula Emoyeni One WEF is not located within one of the promulgated Renewable Energy Development Zones (REDZ).

The following renewable energy projects are located within a 55km radius of the site, and have been considered in the cumulative impact assessment:

- The Halfgewonnen solar photovoltaic (PV) facilities on portions 7,8,9 and 16 of the farm Halfgewonnen 190 IS (DFFE Ref: 14/12/16/3/3/2/2068) located 19km northeast of the site; Case id: 15315 – project approved (No impact on the palaeontology).
- The authorised Forzando North Coal Mine Solar PV Facility, 9.5MW, (DFFE Ref: 14/12/16/3/3/1/452) is located 13km northwest of the site; Case id 661, 2012 – project approved (No impact on the palaeontology
- Eskom Arnot PV Facility at the Arnot Power Station on Remainder of Portion 24 of Reitkuil 491 JS near Middleburg in Mpumalanga (DFFE Ref: 14/12/16/3/3/2/760) is located 35km north of the site; Case id 7183, 2012. Project approved (No impact on the palaeontology).
- Proposed establishment of the Haverfontein wind energy facility near Carolina, Mpumalanga Province (DFFE Ref: 12/12/20/2018/AM2) is located 42km Northwest of the site; PIA completed 2011 by John Almond. No impact on the palaeontology.
- Camden I Wind Energy Facility (WEF) (up to 200MW) (subject to a Scoping and Environmental Impact Reporting (S&EIR) process) (DFFE Ref: 14/12/16/3/3/2/2137) located approximately 28km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology.
- Camden I WEF Grid Connection (up to 132kV) (DFFE Ref: 14/12/16/3/3/1/2769) located approximately 28km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology

- Camden Grid Connection and Collector substation (up to 400kV) (DFFE Ref: 14/12/16/3/3/2/2134) located approximately 28km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology
- Camden I Solar (up to 100MW) (DFFE Ref: 14/12/16/3/3/2/2136) located approximately 28km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology
- Camden I Solar Grid Connection (up to 132kV) (DFFE Ref: 14/12/16/3/3/1/2768) located approximately 28km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology
- Camden II Wind Energy Facility (up to 200MW) (DFFE Ref: 14/12/16/3/3/2/2135) located approximately 35km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology
- Camden II Wind Energy Facility up to 132kV Grid Connection located approximately 35km southeast of the site; Case approved 197952 (2022). No impact on the palaeontology
- Hendrina North WEF (up to 200MW) (DFFE Ref: 14/12/16/3/3/2/2130) located approximately 16km northwest of the site; approved. Case id 17754 . No impact on the palaeontology
- Hendrina North Grid Infrastructure (up to 275kV) (DFFE Ref: 14/12/16/3/3/2/2128) located approximately 16km northwest of the site; Case id 17754 . No impact on the palaeontology
- Hendrina South WEF (up to 200MW) (DFFE Ref: 14/12/16/3/3/2/2131) located approximately 16km northwest of the site; Case id 22888 . No impact on the palaeontology
- Hendrina South Grid Infrastructure (up to 275kV) (DFFE Ref: 14/12/16/3/3/2/2129) located approximately 16km northwest of the site; Case id 22888 . No impact on the palaeontology
- Ummbila Emoyeni WEF (up to 900MW) (DFFE Ref: 14/12/16/3/3/2/2160) located approximately 10km southwest of the site; Case approved 199804. No impact on the palaeontology.
- Ummbila Emoyeni Grid Connection (up to 400kV) (DFFE Ref: 14/12/16/3/3/2/2162) located approximately 10km southwest of the site; and
- Ummbila Emoyeni PV (up to 150MW) (DFFE Ref: 14/12/16/3/3/2/2161) located approximately 17km southwest of the site. Case approved 199804. No impact on the palaeontology

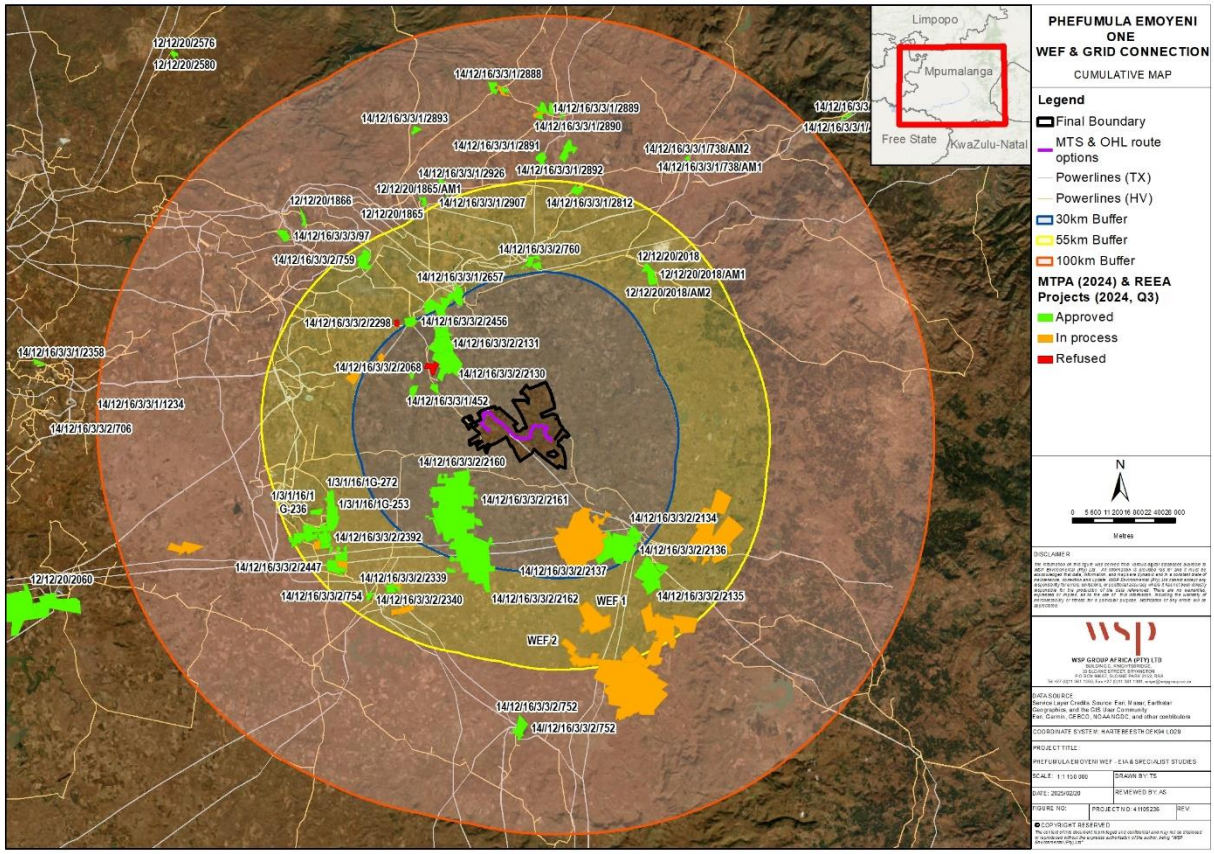



Figure 8.1. Renewable Energy Projects within 55km of the Phefumula Emoyeni One WEF. The WEF and SEF projects listed above that fall in this area have been approved and none has an impact on the palaeontology.

## 9. CONCLUSION AND RECOMMENDATION

Much of the area is indicated as very highly sensitive based on the presence of the Vryheid Formation that does preserve fossils in some areas. The areas underlain by dolerite do not have surface or underground fossils. The potentially highly sensitive areas do not have fossils visible on the soils that cover the basal rocks. Since it is not possible to determine if indeed fossils are present below the soils until excavations for foundations and infrastructure commence, a fossil chance find protocol should be added to the EMPr (see below) and followed during the CONSTRUCTION phase only. This way any impact on the fossils heritage can be effectively mitigated. The following requirements apply:

### 9.1. Fossil Chance Find Protocol

**Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.**

- The following procedure is only required if fossils are seen on the surface and when drilling/excavations/mining commence.
- When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
- Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Appendix A). This information will be built into the EMP's training and awareness plan and procedures.
- Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
- If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
- Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
- If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
- If no fossils are found and the excavations have finished then no further monitoring is required.

## 10. LIST OF PREPARERS

Marion Bamford (Palaeontologist subcontracted for this project).

## 11. STATEMENT OF COMPETENCY

The author of the report is a member of the professional society, the Palaeontological Association of Southern Africa (PSSA) and has served as the president in the past (Note: The PSSA does not yet have an accreditation system like ASAPA does). She holds a PhD in Palaeontology (Wits:1990), is the Director of the Evolutionary Studies Institute in the University of the Witwatersrand, lectures palaeobotany to undergraduate students and supervises postgraduate students. She has published over 180 scientific works and reviews manuscripts and funding proposals for local and international bodies. She has been doing palaeontological impact assessments for more than 25 years and has completed over 350 desktop and site reports for mining, energy, roads and infrastructure.

## 12. STATEMENT OF INDEPENDENCE

I, Marion Bamford, subcontracted by Beyond Heritage, hereby confirm my independence as a specialist and declare that I do have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which the client was appointed as the EAP, other than fair remuneration for work performed on this project. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision-making process for the Project.

**SIGNATURE:**

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**Appendix A – Photographs of fossils that could occur in the Vryheid Formation rocks.**

## Appendix B: WSP Impact Assessment Method

### High-Level Screening of Impacts and Mitigation

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and, consequence (**Table 0-3**), where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table** 0-3 and **Table 0-2** respectively.

Table 0-1: Probability Scores and Descriptors

| SCORE | DESCRIPTOR |
|---|---|
| 4 | Definite: The impact will occur regardless of any prevention measures |
| 3 | Highly Probable: It is most likely that the impact will occur |
| 2 | Probable: There is a good possibility that the impact will occur |
| 1 | Improbable: The possibility of the impact occurring is very low |

Table 0-2: Consequence Score Descriptions

| SCORE | NEGATIVE | POSITIVE |
|---|---|---|
| 4 | Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. | Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. |
| 3 | Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these. | Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. |
| 2 | Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated. | Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way. |
| 1 | Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. | Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these. |

Table 0-3: Significance Screening Tool

| | CONSEQUENCE SCALE | | | |
|---|---|---|---|---|
| PROBABILITY SCALE | 1 | 2 | 3 | 4 |
| 1 | Very Low | Very Low | Low | Medium |
| 2 | Very Low | Low | Medium | Medium |
| 3 | Low | Medium | Medium | High |
| 4 | Medium | Medium | High | Very High |

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (
Table 0-4) has been applied according to the nature and significance of the identified impacts.

Table 0-4: Impact Significance Colour Reference System to Indicate the Nature of the Impact

| Negative Impacts (-ve) | Positive Impacts (+ve) |
|---|---|
| Negligible | Negligible |
| Very Low | Very Low |
| Low | Low |
| Medium | Medium |
| High | High |
| Very High | Very High |

Environmental impact assessment Reporting Requirements

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of methodology (as required)
- Update and/or confirmation of Baseline Environment – including update and / or confirmation of sensitivity mapping
- Site Sensitivity Verification Assessment (including sensitivity mapping) (as applicable)
- Identification and description of Impacts
- Full impact assessment (including Cumulative)
- Mitigation measures
- Impact Statement

**Assessment of Impacts and Mitigation**

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in Table A.

Table A: Impact Assessment Criteria and Scoring System

| CRITERIA | SCORE 1 | SCORE 2 | SCORE 3 | SCORE 4 | SCORE 5 |
|---|---|---|---|---|---|
| Impact Magnitude (M)<br>The degree of alteration of the affected environmental receptor | Very low:<br>No impact on processes | Low:<br>Slight impact on processes | Medium:<br>Processes continue but in a modified way | High:<br>Processes temporarily cease | Very High:<br>Permanent cessation of processes |

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

| CRITERIA | SCORE 1 | SCORE 2 | SCORE 3 | SCORE 4 | SCORE 5 |
|---|---|---|---|---|---|
| Impact Extent (E) The geographical extent of the impact on a given environmental receptor | Site: Site only | Local: Inside activity area | Regional: Outside activity area | National: National scope or level | International: Across borders or boundaries |
| Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change | Reversible: Recovery without rehabilitation | | Recoverable: Recovery with rehabilitation | | Irreversible: Not possible despite action |
| Impact Duration (D) The length of permanence of the impact on the environmental receptor | Immediate: On impact | Short term: 0-5 years | Medium term: 5-15 years | Long term: Project life | Permanent: Indefinite |
| Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation | Improbable | Low Probability | Probable | Highly Probability | Definite |
| Significance (S) is determined by combining the above criteria in the following formula: | $[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$ | | | | |
| IMPACT SIGNIFICANCE RATING | | | | | |
| Total Score | 4 to 15 | 16 to 30 | 31 to 60 | 61 to 80 | 81 to 100 |
| Environmental Significance Rating (Negative (-)) | Very low | Low | Moderate | High | Very High |
| Environmental Significance Rating (Positive (+)) | Very low | Low | Moderate | High | Very High |

**Impact Mitigation**

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so

that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Error! Reference source not found.**below.

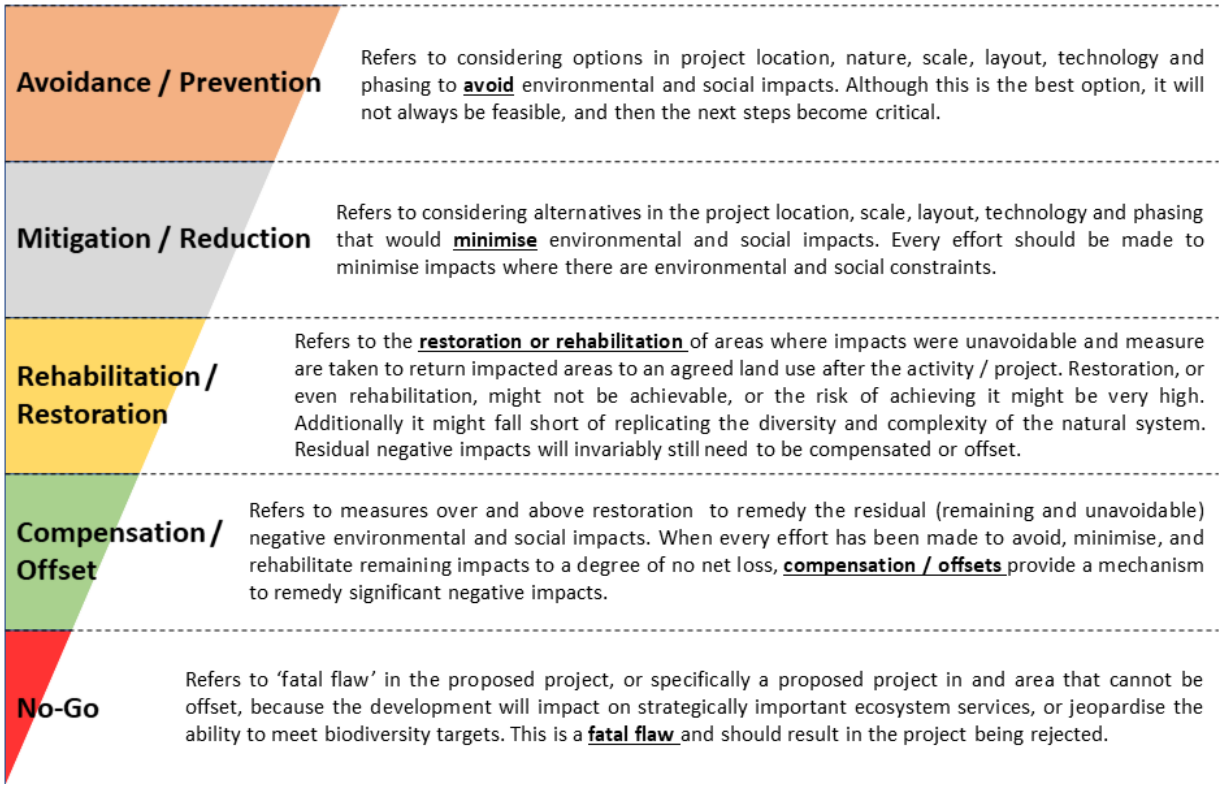


Figure A: Mitigation Sequence/Hierarchy

Table B: Impact Assessment score and significance for Palaeontology for the project.

| Project: Phefumulo Emoyeni One WEF | | |
|---|---|---|
| Criteria (from table above) | Scores | |
| | Pre-mitigation | Post-mitigation |
| Impact Magnitude (M) | 3 | 1 |
| Impact Extent (E) | Site only 1 | Site only 1 |
| Impact Reversibility (R) | 3 | 3 |
| Impact Duration (D) | Short 3 | Short 3 |
| Probability of Occurrence (P) | Low 2 | Low 2 |
| Significance (M+E+R+D) x P | (3+1+3+3) x 2 | (1+1+3+3)2 |
| Significance Rating | 20 | 16 |

| | | |
|---|---|---|
| Negative / Positive | Low negative | Low positive |

**Mitigation**
The impact on the palaeontological heritage can be reduced greatly by a palaeontologist conducting a pre-construction site visit to look for fossils and removing any scientifically important fossils with the relevant SAHRA permit. (See Section 8 and Appendix A).

**Positive/Negative Impact**
The discovery and removal of fossils as a direct result of this project has a positive impact because prior to this the particular fossils or fossil deposit were unknown to science.

**Additional Environmental Impacts**
As far as the palaeontology is concerned, there are no additional impacts because the fossils are inert and inactive.

**Cumulative Impacts**
As far as the palaeontology is concerned, there are no cumulative impacts, firstly because there are no fossils in the footprint and not likely to be. Second, each site is unique and may or may not have fossils. Fossil bones may be scattered over the landscape but their distribution is erratic and unpredictable. If a bone-bed or plant outcrop occurs this would be an aerially small concentration of fossils and very unlikely to extend beyond tens of metres. Therefore, projects on adjacent land parcels are unlikely to add any impact on this project.

**No-Go areas**
There are NO no-go areas because the fossils, if present, can be removed ad curated in a recognised institution such as a museum or university that has the facilities to store and research the fossil material.

**Impact Phase**
It is only the **Construction Phase** that there could be any impact on the palaeontological heritage because this is when the ground will be broken for excavations for foundations and infrastructure. Fossils occur in the ground. The operational and de-commissioning phases will not affect the palaeontology.