HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED ROAN 1 PV FACILITY AND ASSOCIATED INFRASTRUCTURE NEAR HARTBEESFONTEIN, NORTH-WEST PROVINCE.

Type of development:

Renewable Energy

Client:

Cape EA Prac

Developer:

AMDA Mike (Pty) Ltd

Beyond Heritage
Private Bag X 1049
Suite 34
Modimolle
0510
Tel: 082 373 8491
Fax: 086 691 6461
E-Mail: jaco@heritageconsultants.co.za

Report Author:
Mr. J. van der Walt
Project Reference:
Project number 2239
Report date:
April 2022

APPROVAL PAGE

Project Name	Roan 1 PV
Report Title	Heritage Impact Assessment for the proposed Roan 1 PV facility and associated infrastructure near Hartbeesfontein, North-West Province
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	AMDA Mike (Pty) Ltd

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	March 2022
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	March 2022
Palaeontological Assessment	Prof Marion Bamford – Palaeontologist	PhD Palaeobotany	March 2022

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Amendments on Document

Date	Report Reference Number	Description of Amendment

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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 - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(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 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	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 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 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 10.1
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to BAR report
(q) Any other information requested by the competent authority	N.A

Executive Summary

Cape EA Prac was appointed by AMDA Mike (Pty) Ltd to undertake a Basic Environmental Impact Assessment (BA) process for the proposed development of a photovoltaic (PV) solar energy facility known as Roan 1. The Project is situated within the City of Matlosana local Municipality within the Dr Kenneth Kaunda District Municipality, on the Farm Rhenosterfontein 338 approximately 3km south of Hartbeesfontein in the North-West Province. The project is situated within a Renewable Energy Development Zone (REDZ) known as the Klerksdorp REDZ (REDZ10). The solar PV facility will have a contracted capacity of up to 90 MW.

Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed on desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The Project area is surrounded by agricultural, mining, road and electrical infrastructure developments;
- The Project area is characterised by dense grass cover that limited archaeological visibility, however the field survey recorded Stone Age artefacts in varying densities as well as a stone cairn of unknown purpose and a degraded dwelling complex;
- According to the SAHRA Paleontological sensitivity map the study area is of insignificant to moderate paleontological significance, and an independent study was conducted for this aspect. Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the ancient volcanic rocks or in the sands and soils of the Quaternary but there is a very small chance that fossils may have been transported and deposited in the sands, these fossils would be fragmented and out of context and recommended the implementation of a chance find procedure.

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.

Recommendations:

- Implementation of a chance find procedure for the Project (as outlined in Section 10.2);
- Avoidance of known heritage sites, if this cannot be achieved the following mitigation will be required:
    - If impacted on the presence of graves at the stone cairn (R001) and dwelling complex (R003) must be confirmed prior to construction through social consultation and the features must be monitored as per the chance find procedure;
    - Surface sampling and test excavation of the Stone Age site at R002 with a relevant Section 35 permit.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I: • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	01/04/2022

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Guinea, Afghanistan and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DEA: Department of Environmental Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact 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
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)
Early 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 recently, 100 years ago)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a HIA for the proposed development of a photovoltaic (PV) solar energy facility known as Roan 1 located on the Farm Rhenosterfontein 338 approximately 3km south of Hartbeesfontein in the North-West Province. The project is situated within a Renewable Energy Development Zone (REDZ) known as the Klerksdorp REDZ (REDZ10). The solar PV facility will comprise or arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 90 MW. The project is situated within the City of Matlosana local Municipality within the Dr Kenneth Kaunda District Municipality of the North-West Province of South Africa (Figure 1.1 to 1.3). The report forms part of the Basic Assessment Report (BAR) and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to 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. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). 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, Stone Age features, a stone cairn and a structure were recorded. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. 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).

1.1 Terms of Reference

Field study
Conduct a field study to: (a) locate, identify, 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 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 ASAPA.
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 proposed PV Facility are outlined under Table 2 and 3.

Table 2: Project Description

Farm and Magisterial District	Farm 338. The project is situated within the City of Matlosana local Municipality within the Dr Kenneth Kaunda District Municipality of the North-West Province of South Africa.
Central co-ordinate of the development	26°49'24.54"S and 26°25'37.52"E
Topographic Map Number	2626 CD

Table 3: Infrastructure and project activities

Type of development	Renewable Energy Facility
Size of development	250ha
Project Components	Infrastructure associated with the 90 MW PV facility includes: • PV modules and mounting structures; • Inverters and transformers; • Cabling; • Battery Energy Storage System (BESS); • Site and internal access roads (up to 8 m wide); • Auxiliary buildings (33 kV switch room, gatehouse and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.); • Perimeter fencing and security infrastructure; • Rainwater tanks; • Temporary and permanent laydown areas; • Facility substation. • Grid connection solution, including: o On Site facility substation o On Site Eskom Switching Station o An up to 132kV overhead powerline from the on site switching station to the Existing Eskom Roan Substation. Additional associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays (inclusive of line bays, busbars, bussection and protection equipment), a fibre and optical ground wire (OPGW) layout, insulation and assembly structures. A grid connection corridor of approximately 300 m wide is being assessed to allow for the optimisation of the grid connection and associated infrastructure., The grid connection infrastructure will be developed within the 300m wide grid connection corridor, which will allow for the avoidance of identified environmental sensitivities. The grid corridor will connect the PV project to the Eskom Roan Substation. The gridline servitude, once registered, will be 31m in width

1.3 Alternatives

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

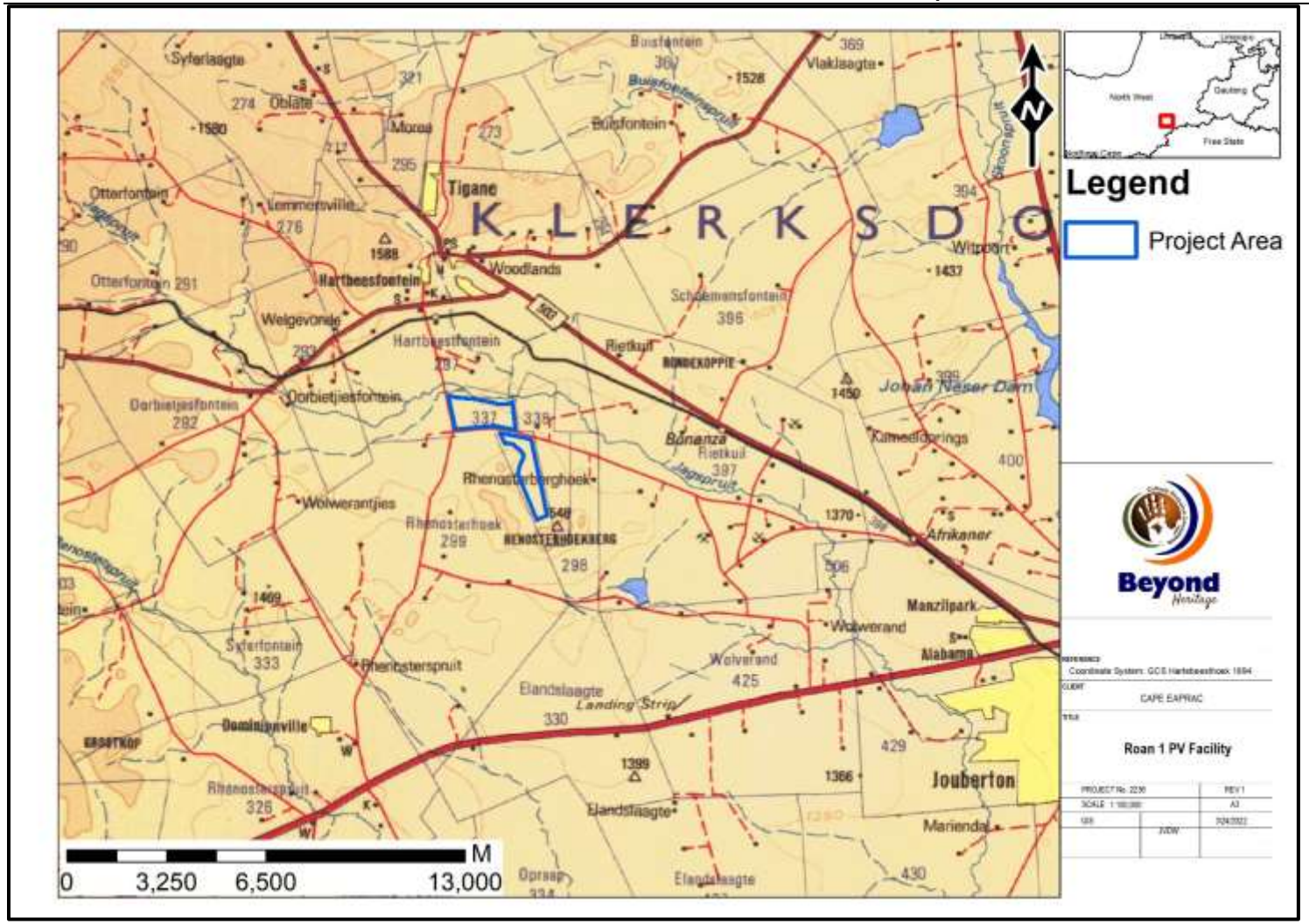

Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

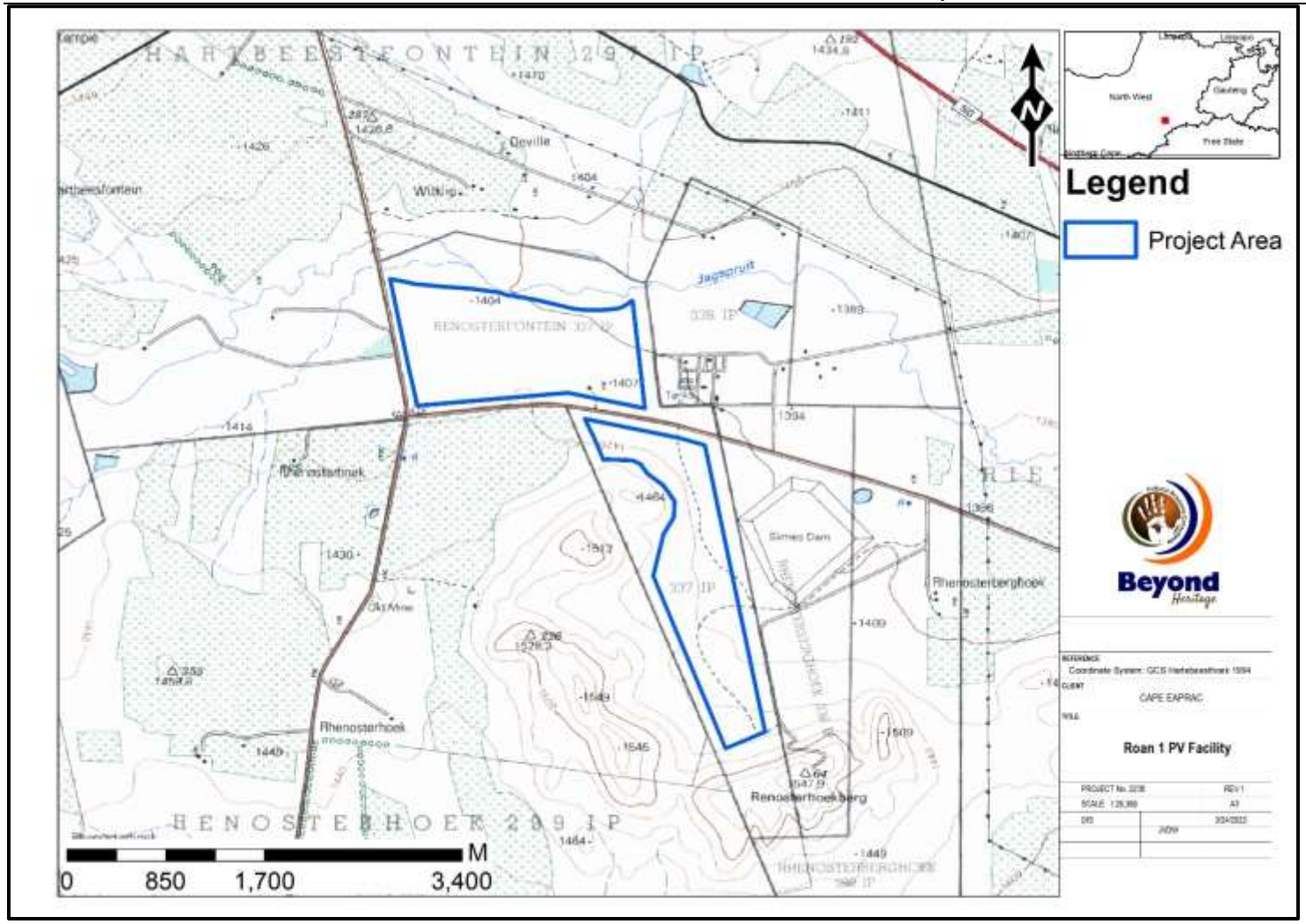

Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

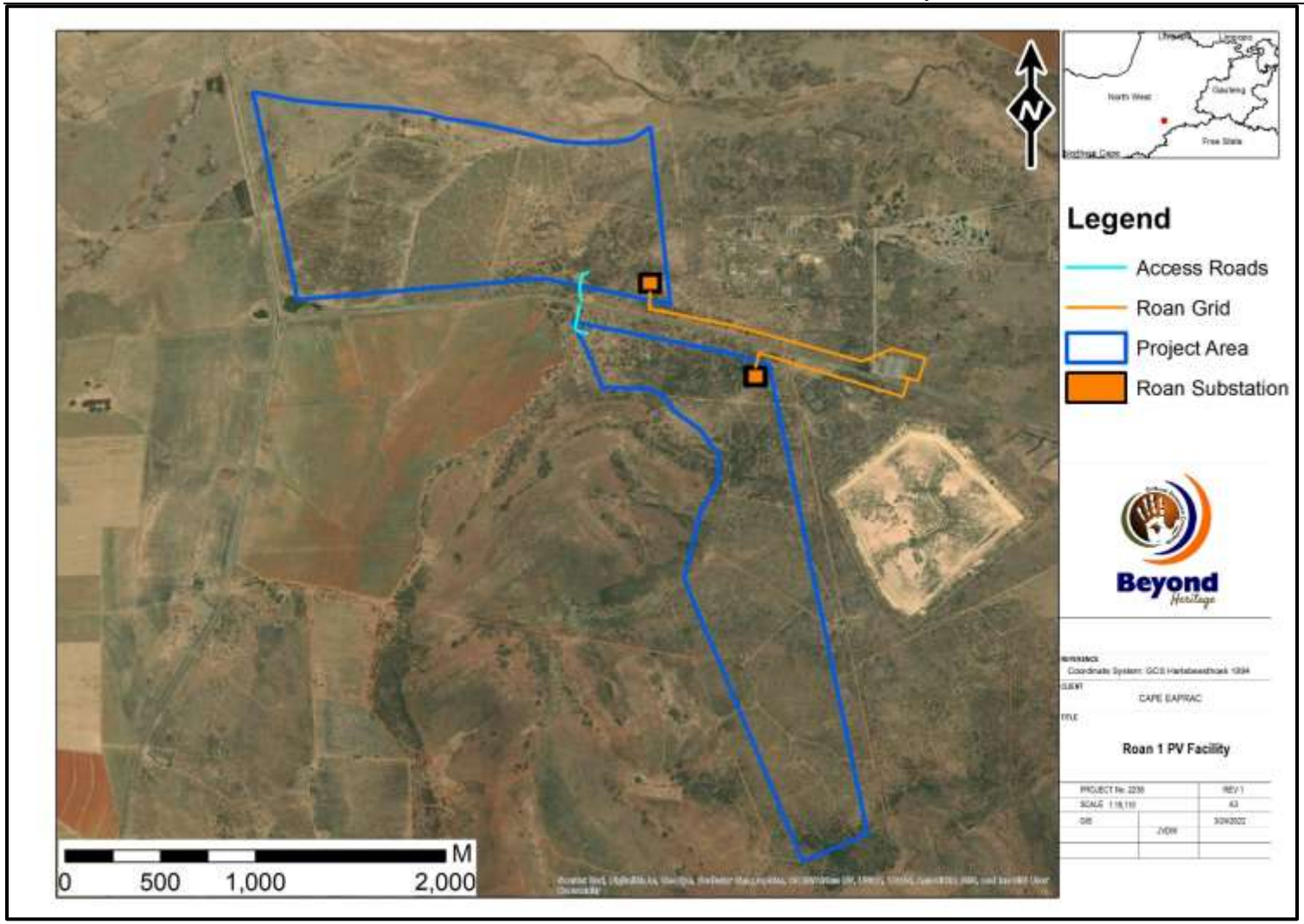

Figure 1.3. Aerial image showing the Project area.

2 Legislative Requirements

The HIA, as a specialist sub-section of 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)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

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;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to 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.

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 HIA's 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. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 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. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) 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), as well as the Human Tissues Act (Act 65 of 1983) 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. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. 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 Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

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).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EA 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 was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings.

3.4 Site Investigation

The aim of the site visit was to:

a) survey the proposed project area to locate, identify, 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 4: Site Investigation Details

	Site Investigation
Date	18 &19 January 2022
Season	Summer – The site is characterised by dense vegetation cover limiting archaeological visibility. The development footprint was sufficiently covered to understand the heritage character of the area (Figure 3.1).

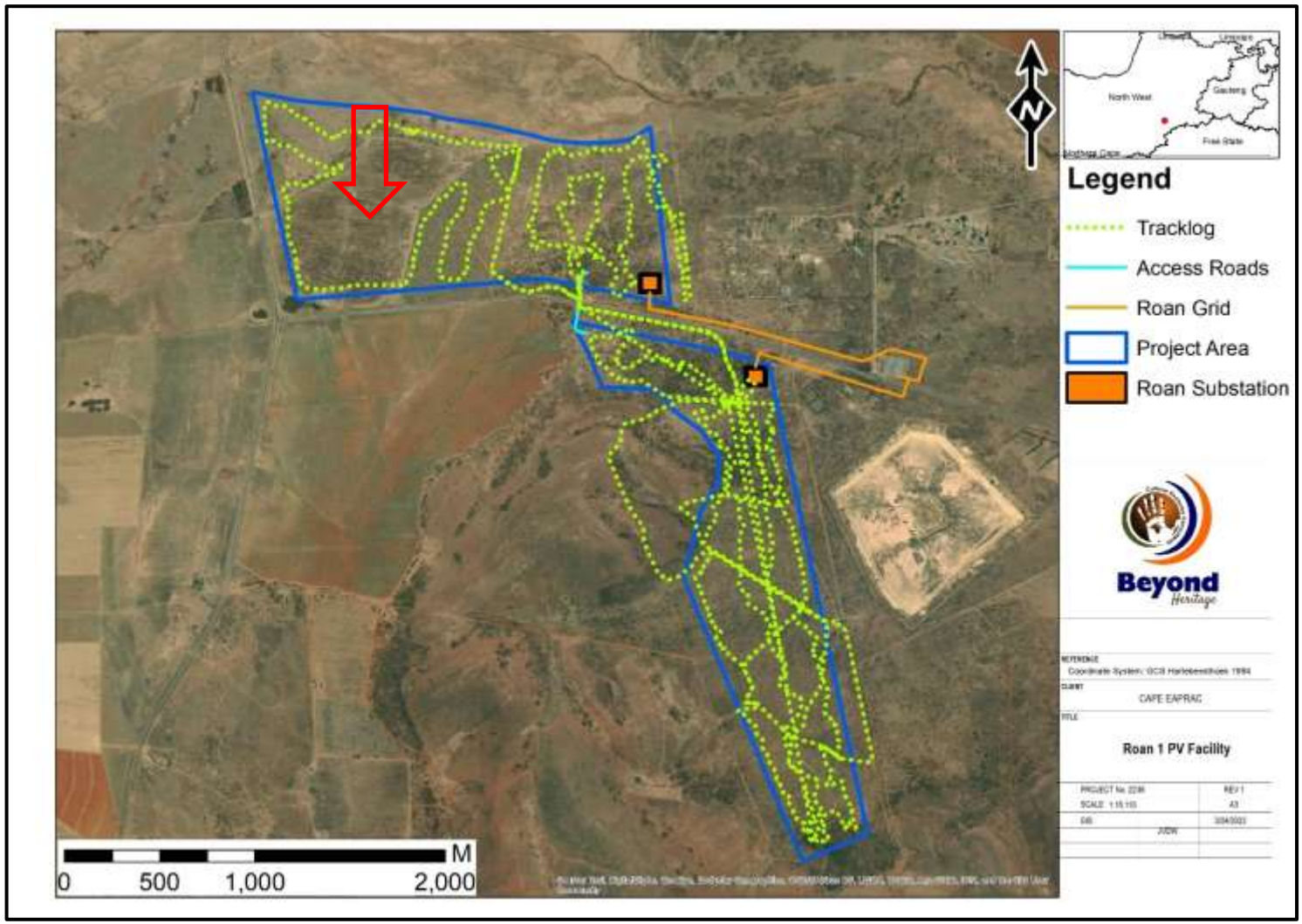

Figure 3.1. Tracklog of the survey path in green. Cultivated area with no access is indicted by a red arrow.

3.5 Site Significance and Field Rating

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.

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 10 of this report.

Table 5: 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 below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
  - medium-term (5-15 years), assigned a score of 3;
  - long term (> 15 years), assigned a score of 4; or
  - permanent, assigned a score of 5;
  - The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
  - The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
  - The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
  - the **status**, which will be described as either positive, negative or neutral.
  - the degree to which the impact can be reversed.
  - the degree to which the impact may cause irreplaceable loss of resources.
  - the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:
S=(E+D+M) P
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on 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 report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to the IDP for the City of Matlosana and estimates based on the population growth rate of SA Statistics (1.04%) and the Matlosana Socio- Economic Report, the City of Matlosana has a total population of 438 486 people, of whom 103 407 (92%) are urbanised and 35 079 (8%) are rural. (Mining villages form part of the urban areas). The largest population concentrations are in Jouberton (31%), Kanana, Khuma and Tigane, which represent 67% of the total urban population. The City of Matlosana has a population density of 123 persons per km² people of which 92% are urbanised and 8% rural. Economic drivers in the area are mostly mining and agriculture.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the BA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process. No heritage concerns were raised.
During the survey the owner John Lemmer 082 944 4512 - indicated that a small cemetery is located near an existing powerline north and outside of the project areas. These graves were not located during the survey possibly due to the dense vegetation in the area.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

The area under investigation was not previously covered by heritage surveys and few HIA's was conducted in the immediate area. Studies conducted in the general area that were consulted is listed in Table 6.

Table 6. Studies conducted in the greater area.

Author	Year	Project	Findings
Kusel, U.	2007	Cultural Heritage Resources Impact Assessment of Portions 252, 413 & 449 Of The Farm Hartbeesfontein 297 Ip Matlosana Local Municipality North West Province	Iron Age
J.A. van Schalkwyk	2010	Heritage Impact Assessment For The Proposed Hermes/Dominion Reefs 132kv Power Line Development, Klerksdorp Magisterial District, North West Province	No sites
Van der Walt, J.	2016	Archaeological Impact Assessment –Buffels Solar 1	No sites
Van der Walt, J.	2016	Archaeological Impact Assessment –Buffels Solar 2	No sites
Van der Walt, J	2016	AIA Orkney Solar Farm, North West Province	Burial sites

6.1.1 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. The database of the Genealogical Society of South Africa indicated no known grave sites within the study area

6.2 Archaeological Background

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

6.2.1.1 Stone Age

The Stone Age is divided in the Early; Middle and Late Stone Age. It refers to the earliest people of South Africa who mainly relied on stone for their tools.

Earlier Stone Age: The period from ± 2.5 million yrs. - ± 250 000 yrs. ago. Acheulean stone tools are dominant. No Acheulean sites are on record near the study area, but isolated finds may be possible. However, isolated finds have little value. Therefore, the project is unlikely to disturb a site of significance. The lack of any ESA sites was confirmed during the field investigation.

Middle Stone Age: The Middle Stone Age includes various lithic industries in SA dating from ± 250 000 yrs. – 25 000 yrs. before present. This period is first associated with archaic *Homo sapiens* and later *Homo sapiens sapiens*. Material culture includes stone tools with prepared platforms and stone tools attached to handles.

Later Stone Age: The period from ± 25 000-yrs before present to the period of contact with either Iron Age farmers or European colonists. This period is associated with *Homo sapiens sapiens*. Material culture from this period includes: microlithic stone tools; ostrich eggshell beads and rock art. Sites located in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters.

Since there are no caves in the study area no Stone Age sites of significance are expected. The well-known rock art site of Bosworth that also included Later Stone Age artifacts (Mason 1962) is located to the north of Klerksdorp.

6.2.1.2 The Iron Age

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD.
- The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. No Sites dating to the Iron Age have been recorded for the study area. However, towards Zeerust and towards Mafikeng, the area is well known for Later Iron Age stone walled settlements archaeologically referred to as Molokwane settlements (Pistorius 1992, Booyens 1998, Huffman 2007). Bergh (1999) reported on some 88 Late Iron Age sites towards Klerksdorp.

There are some Late Iron Age sites in the larger geographical area north and west of the town of Klerksdorp (Bergh 1999: 6-7). Some well-known examples are Platberg (Wells 1933) and Buisfontein (Thabeng) (Maggs 1976). Another site Palmietfontein (30km north of Klerksdorp), excavated in 1975 by D.A. White. An article on this work also indicated that the area north of Klerksdorp is relatively rich in terms of Late Iron Age sites, and that the Rolong capital of Thabeng lies within this area (White 1977: 89). Based on the research by Huffman it is possible that sites are related to the Olifantspoort facies of the Urewe Tradition, dating to around AD 1500-1700, and the Thabeng facies of the same tradition (AD 1700-1840) could possibly be found in the area (Huffman 2007).

6.3 Historical Information

Klerksdorp was founded in 1837 when the Voortrekkers settled on the banks of the Schoonspruit, which flows through the town. The first settlers included C.M. du Plooy, he claimed a farm of about 160 km² and called it Elandsheuwel. Du Plooy gave plots of land and communal grazing rights on this farm to other Voortrekkers in return for their assistance in building a dam and an irrigation canal. This collection of smallholdings was later given the name of Klerksdorp after the first magistrate of the area, Jacob de Clerq. In August 1886, gold was discovered in the Klerksdorp district as well as on the Witwatersrand about 160 km to the east. Fortune-seekers descended on the small village, turning it into a town with 70 taverns and even a stock exchange of its own. The nature of the gold reef demanded expensive and sophisticated equipment to mine and extract the gold, causing the majority of diggers to move away in the late 1890's and a decline in the gold mining industry.

During the Second Boer War (1899-1902), there were many battles in the area and the area also housed a large concentration camp. The most famous battle in the Klerksdorp area, is the Battle of Ysterspruit. The Boer General, Koos de la Rey, achieved a great victory here and the battle is one of the most celebrated of the general's career. It was this battle in which the Boer soldiers pioneered the art of firing from horseback.

On April 11, 1920, Rooiwal, near Klerksdorp, saw the battle of Rooiwal, the last major engagement of the war, where a Boer charge was beaten off by entrenched British troops.
Just under a thousand graves of the victims of the concentration camps, namely Boer women and children can still be visited today in the old cemetery just outside of Klerksdorp. Klerksdorp was connected by rail to Krugersdorp on 3 August 1897 and to Kimberley in 1906.

The gold mining industry was revived by large mining companies in 1932, causing the town to grow, which accelerated after World War II.

7 Description of the Physical Environment

The project area is situated about 4 km south of Hartbeesfontein on the southern edge of the Jagspruit. The project area is divided into two portions on either side of the main road used to access the area. The landscape is dominated by dense vegetation consisting of thickets of trees and tall grass limiting visibility and access. The Project area is situated next to a large disused mine situated on the eastern edge of the Project area with large features still visible on the landscape such as spoil heaps and broken-down infrastructure.

The Project area falls within the Dry Highveld Grassland Bioregion as described by Mucina *et al* (2006) with the vegetation described as Klerksdorp thornveld. Land use in the general area is characterized by agriculture, dominated by cattle farming (Figure 7.1 to 7.4).

Figure 7.1. Dense vegetation cover in the study area.

Figure 7.2. Grass cover in the study area.

Figure 7.3. Vegetation and cattle farming infrastructure in the study area.

Figure 7.4. Overgrown gravel roads in the study area.

8 Findings of the Survey

8.1 Heritage Resources

The study area is characterised by dense vegetation that restricted heritage visibility. However during the survey the ruins of a mud brick dwelling, a stone cairn and Stone Age artefacts were recorded and numbered numerically with the prefix R for Roan. General site conditions, site distribution and selected artefacts are illustrated in Figure 8.1 – 8.9. Recorded observations are briefly described in Table 7.

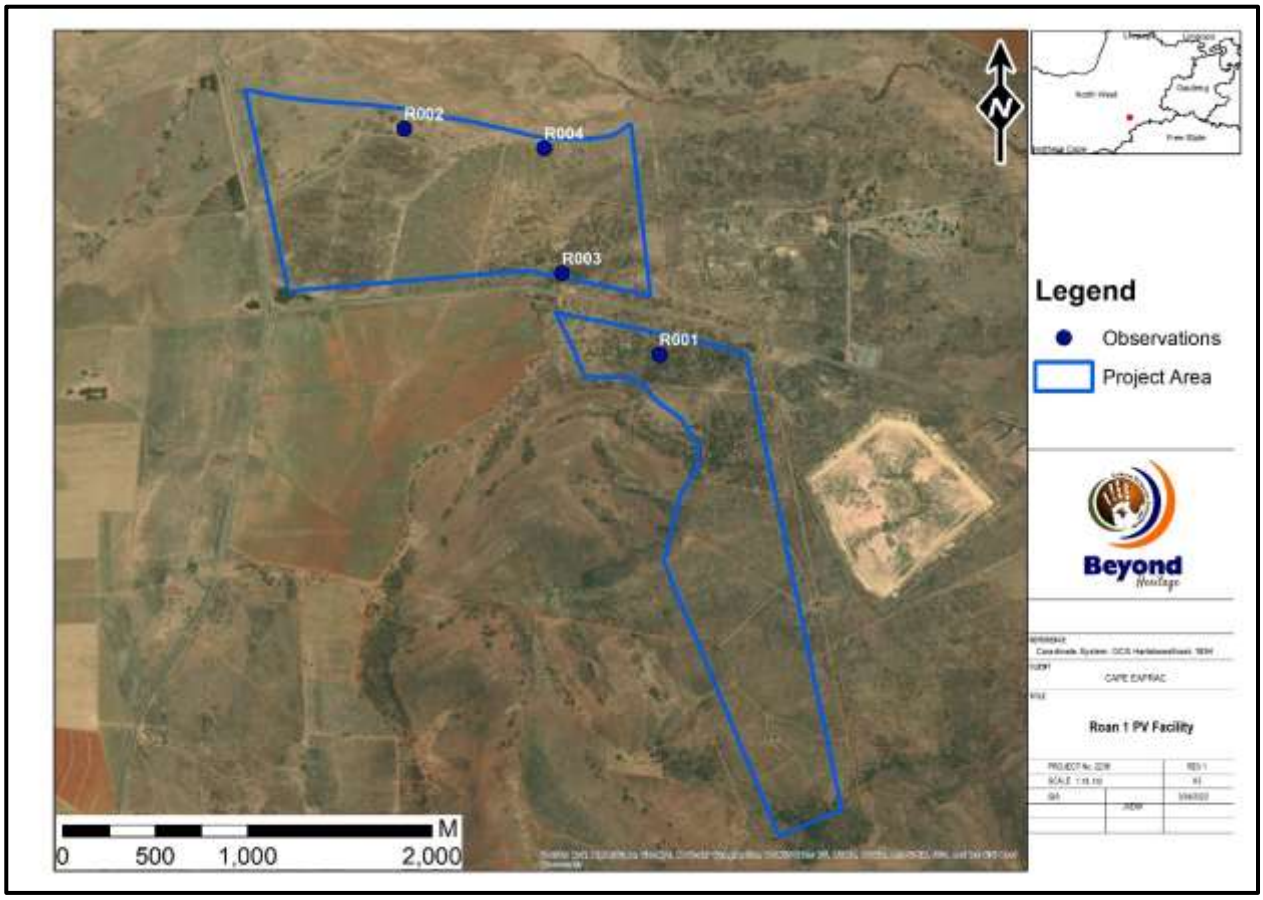

Figure 8.1. Site distribution.

Table 7. Sites recorded in the study area.

Label	Location	Type Site	Description	Significance and Field Rating
R001	-26.8132317, 26.4472199	Stone Packed Cairn	Cairn consisting of loosely packed stones. The cairn is overgrown making it impossible to determine size or function. Although unlikely the cairn could mark a grave.	Low Significance GP C . Unless proven to be a grave then High Significance GP A.
R002	-22.8106444, 28.1505803	Stone Age Site	High density scatter (<15 lithics per square meter) of MSA and LSA lithic artefacts found in a deflated context. Few formal tools present apart from side scrapers, broken bladelets with a few multidirectional cores. The site is located near a small river where the vegetation is less exposing the	GP B - Medium significance Recording before destruction (surface sampling)

			artefacts over an area of 50m x 50 m.	
R003	-26.809577, 26.442165	Built environment	Degrading mudbrick structure that has been partially overgrown with weeds. The structure is built from clay and mudbrick and shows signs of recent habitation however the structure is currently in an extremely poor condition. Some walls are still intact. This was presumably the dwelling of farm labourers and could contain graves.	The features potential to contribute to aesthetic, historic, scientific and social aspects are non-existent and is therefore of low heritage significance unless associated with burial sites in which case the burial sites are of high social significance.
R004	-26.767032, 26.4225242	Stone Age Scatter	Low density scatter (less than 5 per square meter of lithics possibly dating to the MSA and LSA exposed in a gravel road. No formal tools present. The scatter is isolated and out of context and of no significance apart from mentioning it in this report.	Low Significance GP C

Figure 8.2. Stone cairn at R001.

Figure 8.3. Dense vegetation cover at R001.

Figure 8.4. Dorsal and ventral view of lithic artefacts located near the Jagspruit at R002.

Figure 8.5. Exposed section of soil containing dense accumulation of lithic artefacts at R002

Figure 8.6. Degraded mudbrick structure at R003

Figure 8.7. Southern view of degraded mudbrick structure at R003.

Figure 8.8. Flakes and chunks recorded at R004. Scale is at 10 cm intervals

Figure 8.9. Scatter of lithics exposed in gravel road at R004.

8.2 Cultural Landscape

The study area is rural in character with developments limited to cutlines, tracks, mining activities, some cultivation and structures that probably relate to labourer housing (Figure 8.10 to 8.12).

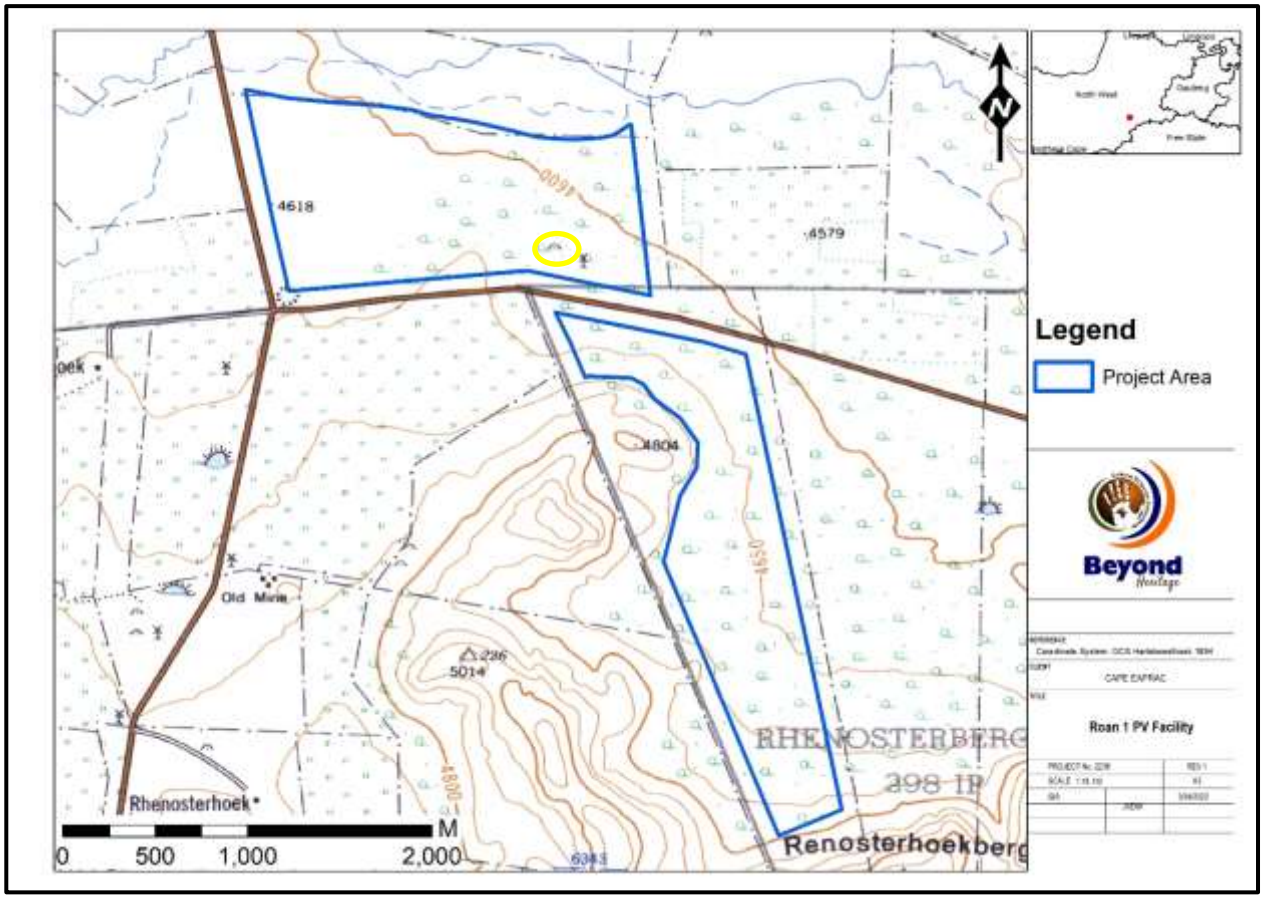

Figure 8.10. 1967 Topographic map of the study area. A hut is indicated in the northern section of the study area where R003 was recorded (yellow polygon).

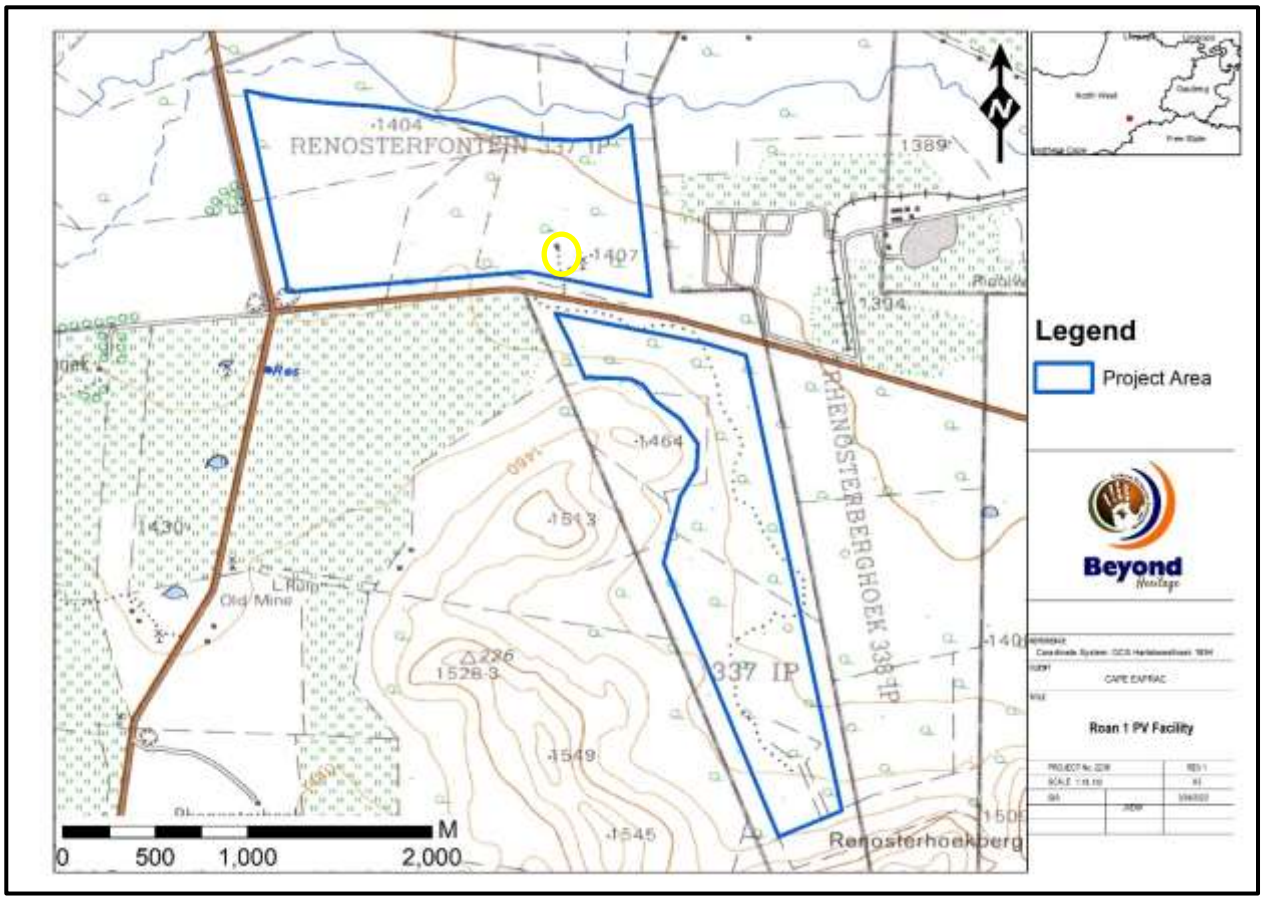

Figure 8.11. 1982 Topographic map of the study area. A dwelling is indicated in the northern section of the study area where R003 was recorded (yellow polygon).

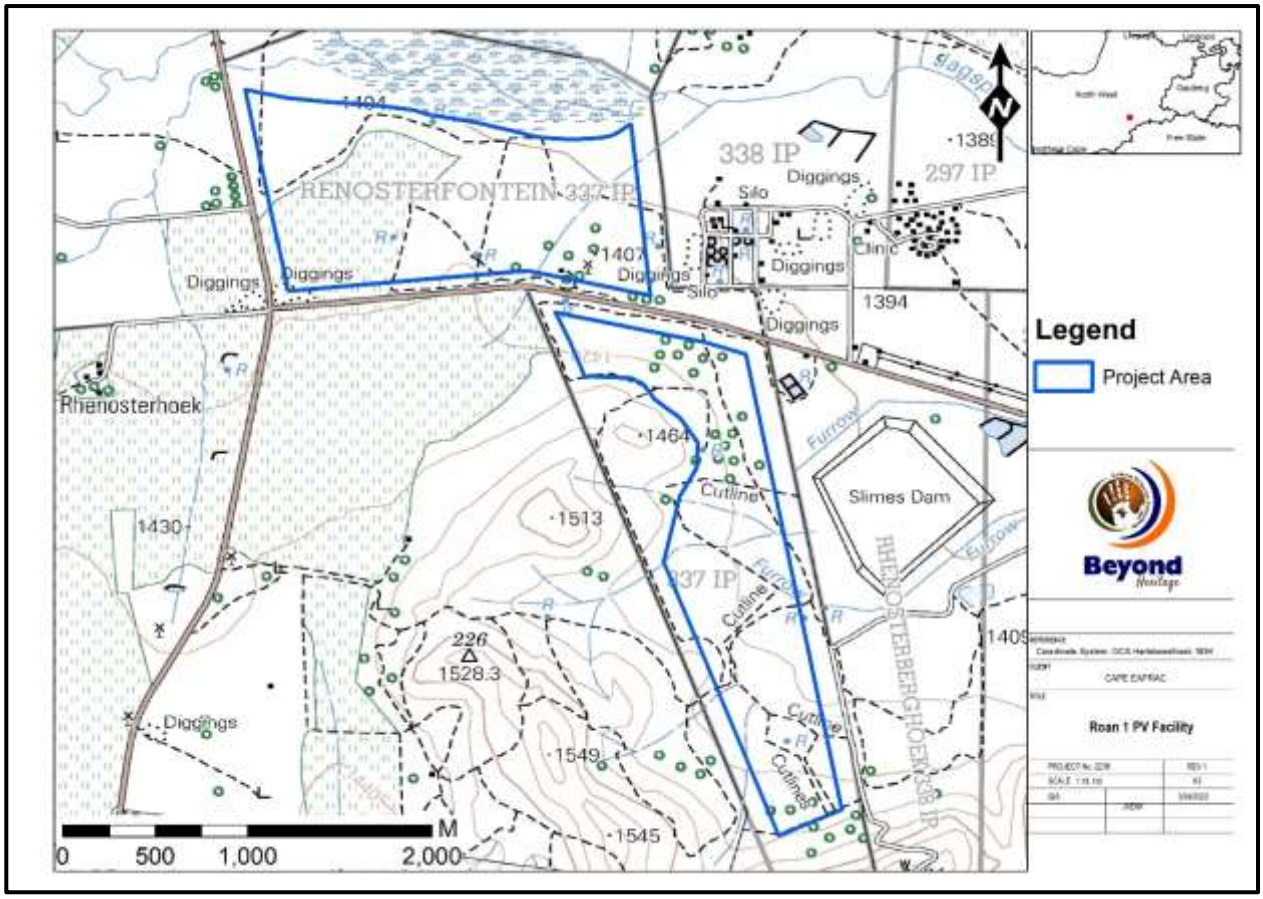

Figure 8.12. 2006 Topographic map of the study area. Tracks and cultivation as well as cutlines are visible. The structures in the Northern section are still indicated.

8.3 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of insignificant to moderate paleontological significance (Figure 8.13) and an independent study was conducted for this aspect. Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the ancient volcanic rocks or in the sands and soils of the Quaternary. There is a very small chance that fossils may have been transported and deposited in the sands, but they would be fragmented and out of context. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr.

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

9 Potential Impact

Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the pre-construction and construction activities. The stone cairn (R001) of unknown purpose is of low significance unless proven to be a grave. The Stone Age site (R002) is of higher significance that based on the final layout could potentially be impacted on by the project, and if so, mitigation will be required. The ruin at R003 is degraded and is of low significance but graves can be associated with sites like these, and burial sites are always of high social significance. The recorded Stone Age scatter at R004 is out of context/deflated and scattered too sparsely to be of significance and the impact on this feature is low.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures for specific sites as outlined under Table 8, 9, 10 and 11 and additional recommendations in this report should be implemented during all phases of the project. With the implementation of the recommended mitigation measures impacts of the project on heritage resources is expected to be low during all phases of the development (Table 9 & 10).

Cumulative impacts considered as an effect caused by the proposed action that results from the incremental impact of an action when added to other past, present, or reasonably foreseeable future actions. (Cornell Law School Information Institute, 2020). Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of this project, impacts can be mitigated to an acceptable level. However, this and other projects in the area can have a negative impact on Stone Age sites in the area where these sites have been destroyed unknowingly. Additional impacts can be successfully mitigated with the implementation of a chance find procedure (Table 8 and 9).

9.1.1 Pre-Construction phase

It is assumed that the pre-construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can have a negative and irreversible impact on heritage features if any occur. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. Potential impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.3 Operation Phase

No impacts are expected during the operation phase.

9.1.4 Impact Assessment for the Project

Table 8. Impact assessment of the proposed project on the Stone cairn - R001

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**27 (Low)**	**27 (Low)**

Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • Preservation of the feature in situ if this is not possible confirmation of whether the feature represents a grave (either through social consultation/ test excavation with the relevant permits) prior to construction; • Implementation of a chance find procedure for the project.		
Cumulative impacts: With the implementation of the mitigation measures in this report the proposed project will have a low cumulative impact on heritage resources.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 9: Impact assessment of the proposed project on the Stone Age site RB002.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**39 (Medium)**	**22 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • Avoidance and in situ preservation of the site, if this cannot be achieved mitigation will be required (surface sampling and test excavation) subject to a Section 35 SAHRA permit.		
Cumulative impacts: With the implementation of the mitigation measures in this report the proposed project will have a low cumulative impact as archaeological data will not be lost.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 10: Impact assessment of the proposed project on the dwelling ruin at R003

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.

	Without mitigation	With mitigation (Preservation/ excavation of site)
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**33 (Medium)**	**22 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • Preservation of the feature in situ if this is not possible confirmation of whether graves are present through social consultation prior to construction.		
Cumulative impacts: With the implementation of the mitigation measures in this report the proposed project will have a low cumulative impact on heritage resources.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 11: Impact assessment of the proposed project on the Stone Age scatter RB004

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (23)
Significance	**27 (Low)**	**27 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • The artefact density is too low and scattered too sparsely to be of significance apart from mentioning it in this report and no further mitigation is required.		
Cumulative impacts: With the implementation of the mitigation measures in this report the proposed project will have a low cumulative impact on the extensive natural landscape.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

10 Conclusion and recommendations

The Project area is surrounded by agricultural; mining, road and electrical infrastructure developments and the impact area is currently characterised by dense grass cover that limited archaeological visibility. Nonetheless, the field survey recorded Stone Age artefacts in varying densities (namely R002 a high-density scatter of medium significance and R004 that is isolated and out of context and of no significance apart from mentioning it in this report), a stone cairn (R001) of unknown purpose that although unlikely could indicate a grave, and the ruin of a clay brick dwelling (R003). The structure's potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance unless associated with burial sites (e.g., still born graves) in which case the burial sites are of high social significance.

According to the SAHRA Paleontological sensitivity map the study area is of insignificant to moderate paleontological significance, and an independent study was conducted for this aspect. Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the ancient volcanic rocks or in the sands and soils of the Quaternary but there is a very small chance that fossils may have been transported and deposited in the sands, these fossils would be fragmented and out of context and recommended the implementation of a chance find procedure.

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

10.1 Recommendations for condition of authorisation

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

Recommendations:

- Implementation of a chance find procedure for the Project (as outlined in Section 10.2);
- Avoidance of known heritage sites if this cannot be achieved the following mitigation will be required:
    - If impacted on the presence of graves at the stone cairn (R001) and dwelling complex (R003) must be confirmed prior to construction through social consultation and the features must be monitored as per the chance find procedure;
    - Surface sampling and test excavation of the Stone Age site at R002 with a relevant Section 35 permit.

10.2 Chance Find Procedures

10.2.1 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 for this procedure are provided in Section 10.5.

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.

10.2.2 Chance find protocol for Paleontology – to commence once the excavations / mining activities begin.

1. The following procedure is only required if fossils are seen on the surface and when mining commences.
2. When excavations begin the sand must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) 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 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.
6. Fossil plants or vertebrates that are 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.

10.3 Reasoned Opinion

The overall impact of the project 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.

10.4 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.

10.5 Monitoring Requirements

Day to day monitoring can be conducted by the Environmental Control Officers (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.
- *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 daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 12. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Cultural Heritage resources	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: 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
					• Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 13. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
All impact areas	Implement chance find procedures in case possible heritage finds are uncovered	Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
R001 and R003	If impacted on the presence of graves at the stone cairn (R001) and dwelling complex (R003) must be confirmed prior to construction through social consultation and the features must be monitored as per the chance find procedure	Pre-Construction and construction	Pre-Construction and construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
R002	If impacted on surface sampling and test excavation of the Stone Age site at R002 prior to construction with a relevant Section 35 permit.	Pre-Construction	Pre-Construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

10.7 Knowledge Gaps

Due to the altered character of the study area, dense vegetation and the often-ephemeral nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure and monitoring of the study area by the ECO.

11 References

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