HERITAGE IMPACT ASSESSMENT

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

FOR THE VERBENA PV ON PORTIONS 2, 3 AND 4 OF THE FARM HOUTHAALBOOMEN 31, NORTH WEST PROVINCE

Type of development:

Renewable Energy

Developer:

Verbena PV (Pty) Ltd

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APPROVAL PAGE

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Report Title	Heritage Impact Assessment for the Verbena PV Project, North West Province
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	Verbena PV (Pty) Ltd

	Name	Qualifications and Certifications	Date
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Amendments on Document

Date	Report Reference Number	Description of Amendment
30 June 2022	2212A	Technical amendment due to lay out changes.

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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
(I) 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 EIA report
(q) Any other information requested by the competent authority	N.A

Executive Summary

Cape EA Prac was appointed as the Environmental Assessment Practitioner (EAP) by Verbena PV (Pty) Ltd to undertake the required Environmental Authorisation Process for the Renewable Energy Facility on Portions 2, 3 and 4 of the Farm Houthaalboomen 31, Lichtenburg, North West Province. Two additional 120 MW PV facilities (Euphorbia PV and Hillardia PV) are concurrently being considered on the Project site (within Portion 2, Portion 3, and Portion 4 of the Farm Houthaalboomen 31) and are assessed through separate Environmental Impact Assessment (EIA) processes. 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. This report is applicable to the Verbena PV Project and key findings of the assessment include:

- The study area is characterised by agricultural activities including limited cultivation from the 1970's and is currently used for grazing;
- Heritage finds were limited to widespread low-density Stone Age scatters mostly dating to the Middle Stone Age (MSA) with few formal tools and are considered as background scatter (Orton 2016) that is of low significance.
- Higher density Stone Age scatters were recorded around HB015 and HB015/4 mostly along existing roads that will be used for access to the PV Facility (Alternative 1,2 and 3). Artefacts within the existing roads are out of context and all three alternatives are acceptable from a heritage point of view;
- An assessment of the paleontological significance of the area (Bamford 2022) concluded that the impact on palaeontological resources is low and the project should be authorised from a paleontological point of view.

The impact to heritage resources is low and the project can commence 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;
- Monitoring of the project area by the ECO.
- It is recommended that a surface sample of lithics (at the higher density scatter around HB 015) should be analysed in the field to accurately describe the typology of the various lithic industries and test excavations to determine the depth of deposit prior to construction (as part of the recommended mitigation for Euphorbia PV).

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	10/05/2022

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, Nigeria and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
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 Verbena PV Project on Portions 2, 3 and 4 of the Farm Houthaalboomen 31, Ditsobotla Local Municipality, Ngaka Modiri Molema District Municipality, North West Province (Figure 1.1 to 1.4). The report forms part of the Environmental Impact Assessment (EIA) Report 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, low density scatters of Stone Age artefacts 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 renewable energy facility are outlined under Table 2 and 3.

Table 2: Project Description

Farm and Magisterial District	The development area for the PV facility and associated infrastructure will be located on the following properties: • Portion 2 of the Farm Houthaalboomen 31 • Portion 3 of the Farm Houthaalboomen 31 • Portion 4 of the Farm Houthaalboomen 31
Central co-ordinate of the development	26° 4'5.27"S 26° 4'48.92"E
Topographic Map Number	2626 AA

Table 3: Infrastructure and project activities

Type of development	Renewable Energy
Size of development	220 hectares
Project Components	An assessment area of approximately 220 ha is being assessed as part of this EIA process and the infrastructure associated with the 120 MW facility includes: » PV modules (mono- or bifacial) and mounting structures; » Inverters and transformers; » Battery Energy Storage System (BESS); » Site access road up to 8m wide (three alternative access points assessed) ; » Internal access roads (up to 8m wide); » Auxiliary buildings (22kV or 33kV switch room, gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.); » Temporary and permanent laydown area; » Cabling between the panels, to be laid underground where practical; and » Grid connection infrastructure, including: • Underground medium-voltage cabling between the project components and the facility substation (within a 100 m wide and 1.5 km in length corridor); and • Up to 132kV facility substation The Verbena PV facility substation (as well as the Hillardia PV and Verbena PV facility substations) will be located directly adjacent to the Houthaalboomen North collector switching station in the south-eastern corner of Portion 4 of the Farm Houthaalboomen 31. The Houthaalboomen North collector substation/ switching station will facilitate the connection of the cluster facility substations to the Watershed Main Transmission Substation (MTS) via a single or double circuit 132 kV overhead powerline. The connection infrastructure associated with this grid solution (i.e. between the collector switching station and the MTS) will be assessed as part of a separate Environmental Application.

1.3 Alternatives

No alternatives were provided for assessment for the PV site. The alternative site access points and associated routes assessed include:

Access Road Alternative 1: Access to the facility off the R505-5 at a new farm access point at km 13. This road alternative is ~5.9 km long and aligned as follows:

- From the R505-5, this route follows the northern boundary of Portion 25 of Farm Houthaalboomen in a westerly direction for ~2.5 km. This portion of the route will be new;
- Continues in a southerly direction along the eastern boundary of Portions 3 and 4 of Farm Houthaalboomen 31 for 0.8 km; and
- Continues in westerly direction along the southern boundary of Portion 4 of Farm Houthaalboomen 31 for ~1.5 km. This portion of the route will be new and is common amongst the other access road alternatives.

Access Road Alternative 2: .Access to the facility off the R505-5 at an existing farm access point at km 11.59. This road alternative is ~6.1 km long and aligned as follows:

- From the R505-5, this route follows an existing farm road that dissects Portion 25 of Farm Houthaalboomen in a westerly direction for ~2.5 km;
- Continues along an existing gravel road in a northerly direction along the eastern boundary of Portions 5 and 6 of Farm Houthaalboomen 31 for ~1 km; and
- Continues in westerly direction along the southern boundary of Portion 4 of Farm Houthaalboomen 31 for ~1.5 km. This portion of the route will be new and is common amongst the other access road alternatives.

Access Road Alternative 3: Access to the facility off the R505-5 at an existing farm access point at km 14.87. This road alternative is ~6.7 km long and aligned as follows:

- From the R505-5, this route follows an existing farm road on the southern border of Remaining Extent and Portion 3 of Farm Houthaaldoorns 2 in a westerly direction for ~2.2 km;
- Continues along an existing gravel road in a southerly direction along the eastern boundary of Portions 3 and 4 of Farm Houthaalboomen 31 for ~1.9 km; and
- Continues in westerly direction along the southern boundary of Portion 4 of Farm Houthaalboomen 31 for ~1.5 km. This portion of the route will be new and is common amongst the other access road alternatives.

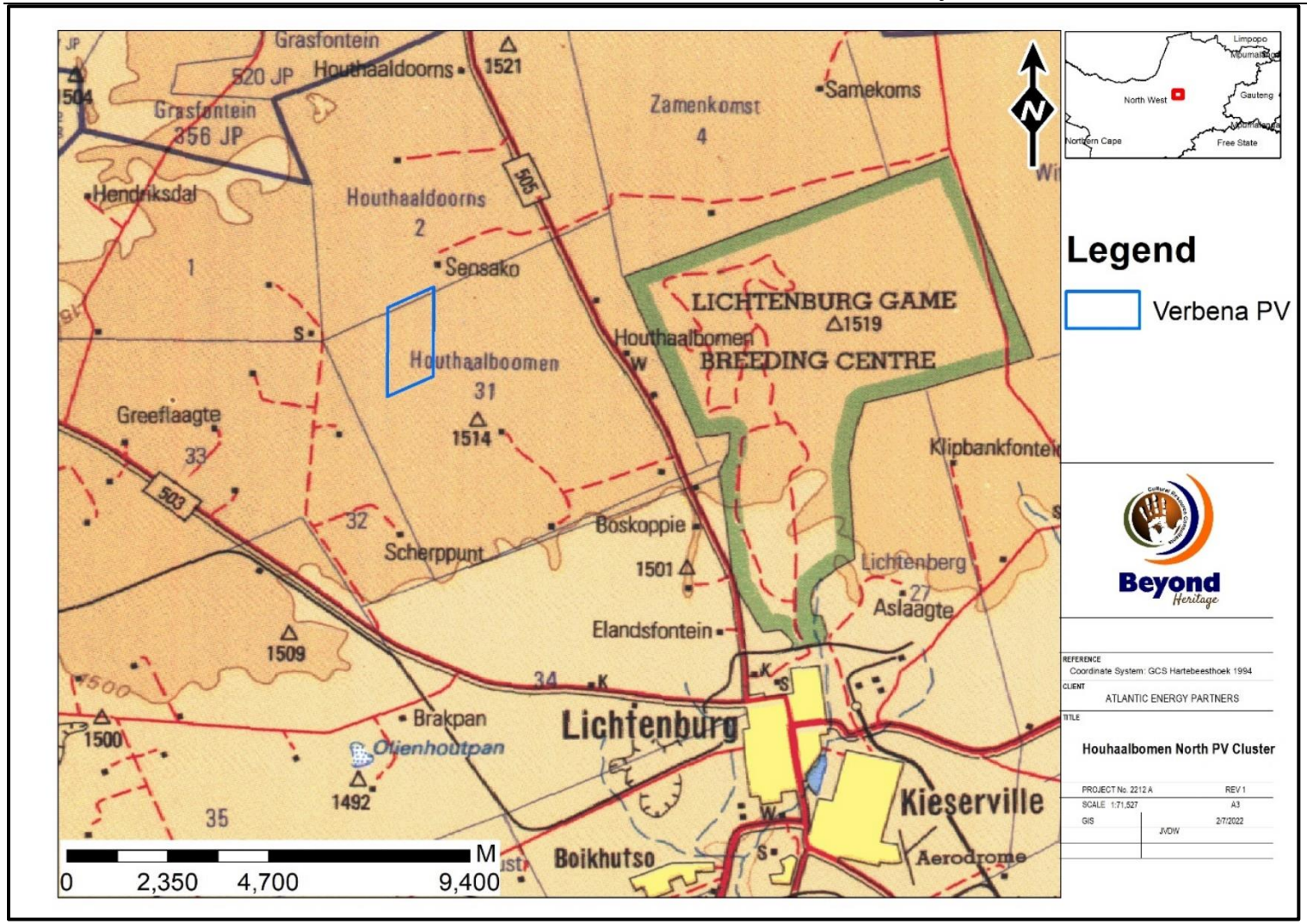


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

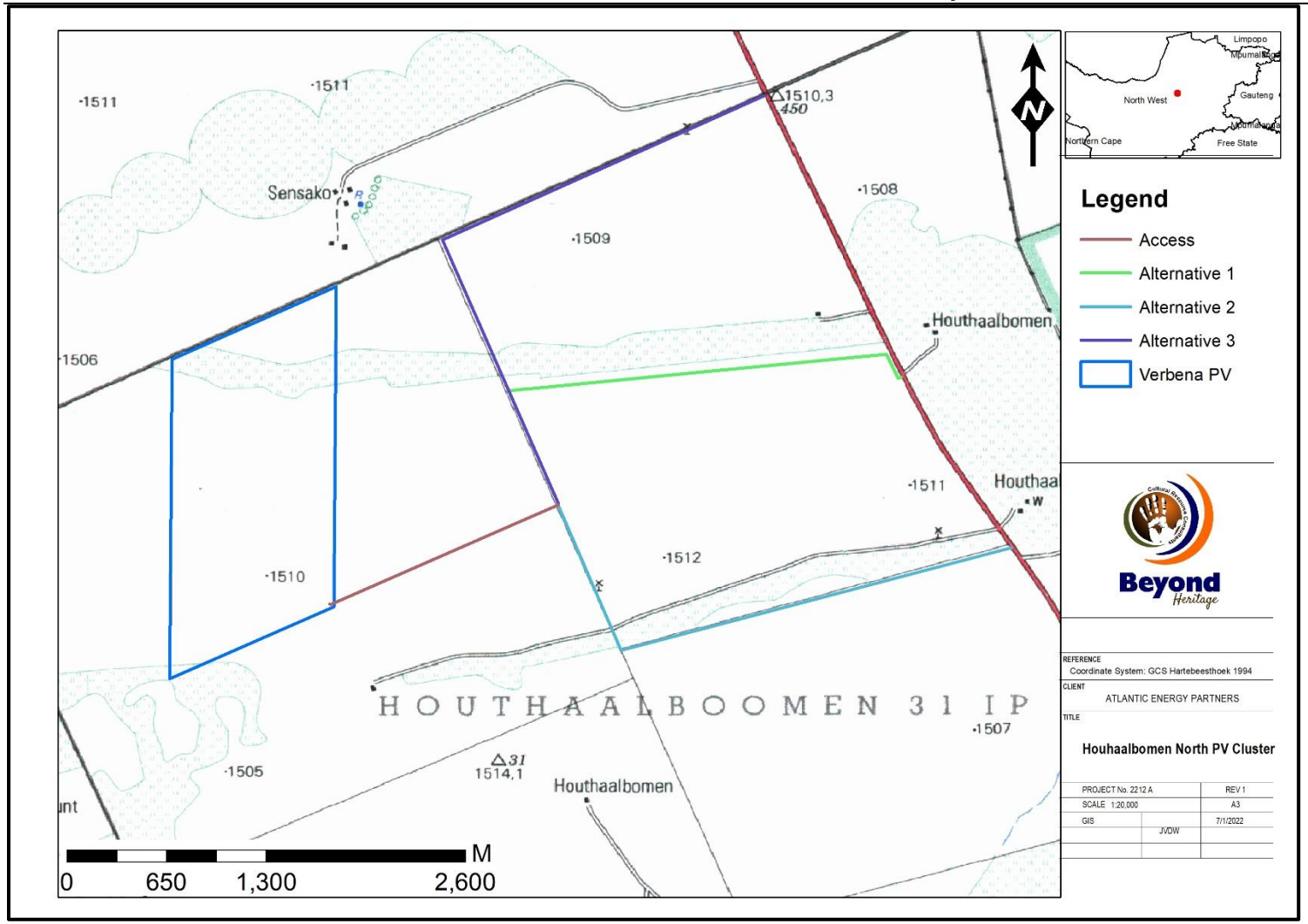


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

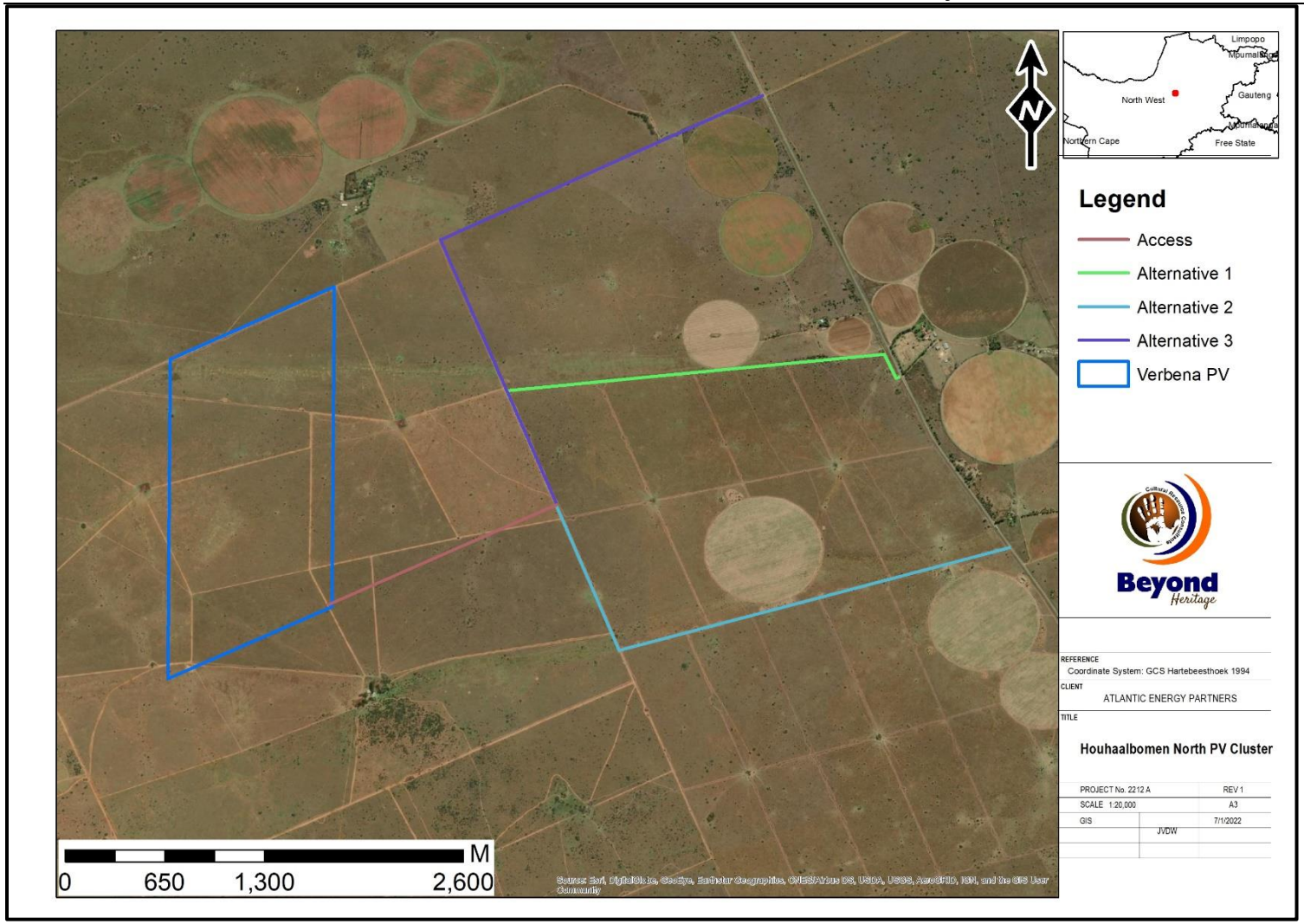


Figure 1.3. Aerial image of the development footprint and surrounds.

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	The week of 31 January 2022
Season	Summer – Vegetation cover limited archaeological visibility, but the footprint was sufficiently covered to understand the heritage character of the area (Figure 3.1). The development footprint was surveyed during the combined field work for the three facilities on the farm Houthaalbomen.

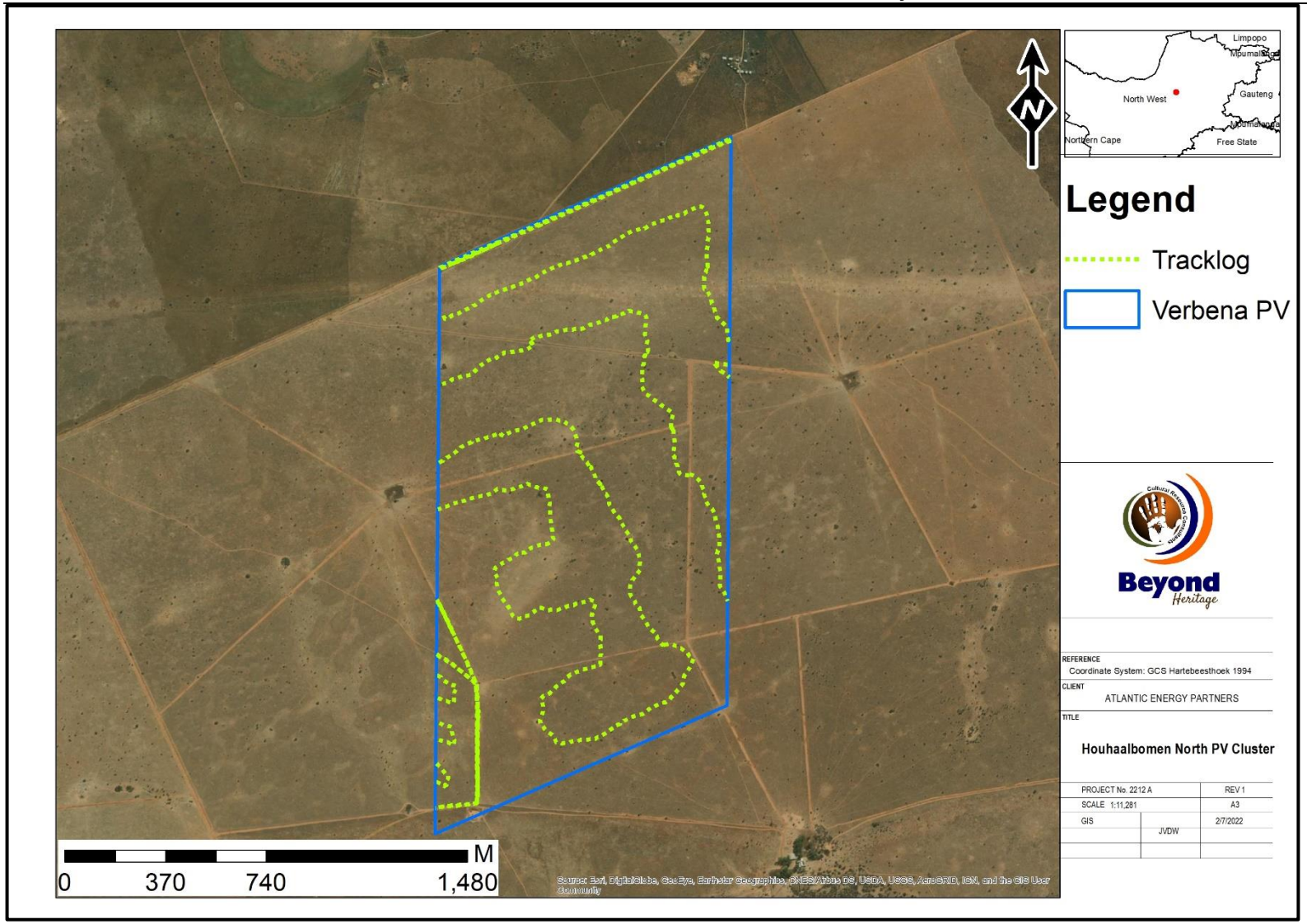


Figure 3.1. Extracted tracklog of the survey path in green.

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

The total population in the Ditsobotla Local municipality is 168 902 people. Almost 89,1% of the population is black African, with the white population making up 8,2%. The other population groups make up the remaining 2,4%. The majority of the population is the youth (15–35 years), and the high unemployment rate leads to socio-economic problems such as substance abuse, crime and early pregnancy, to name a few. Of the 44 500 households in the municipality, 34,9% have piped water inside the dwelling. Only 6,2% of households have no access to piped water, and 74% of households have access to electricity for lighting.

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 EIA 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.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

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). Studies listed in Table 6 were consulted for this project.

Table 6. Studies consulted for this report.

Author	Year	Project	Findings
Küsel, U.S.	2008	Cultural Heritage Resources Impact Assessment of Portion 151 Of Lichtenburg Town And Townlands 27 Ip (Lichtenburg Extension 10) North West Province	None
van Schalkwyk, J.A.	2008	Proposed 88kv Power Line from Watershed Substation, Lichtenburg, to the Mmabatho Substation, North West Gauteng Province	Features dating to the historic period were identified in the study area as well as cemeteries.
Hutten, M.	2012	Heritage Impact Assessment for the proposed Lichtenburg Solar Park, North West Province.	No sites
van der Walt, J.	2013	Archaeological Impact Assessment Report, Watershed Solar facility	Low densities of MSA and LSA scatters. Single unmarked stone grave
van der Walt, J. & Almond, J.E.	2013	Archaeological Impact Assessment for the Proposed Hibernia Solar Project near the town of Lichtenburg in the North West Province of South Africa	MSA scatter and an informal cemetery
Van der Walt, J.	2014	Archaeological Impact Assessment For the proposed Watershed Solar Energy Facility, Lichtenburg, North West Province	Stone Age Artefacts and graves
Levin, J.	2018	Heritage Impact Assessment for the development of the Lichtenburg 1PV Solar Energy Facility and Associated Infrastructure on a site near Lichtenburg, North West Province	Historic farmhouse
Miller, S.	2021	Phase I Heritage Impact Assessment of a 35 ha study area on portion 18 of the farm Dufield 35 IR, Lichtenburg district, North-western Province	None
van Schalkwyk, J.A.	2021	Phase 1 Cultural Heritage Impact Assessment: The Proposed Lerato Solar Power Plant Near Lichtenburg, North West Province.	Two informal burial sites, with 80 stone cairn graves in total.
Van der Walt, J.	2022a	Heritage Baseline Report for the Houthaalbomen North PV Cluster, Lichtenburg, North-West Province	Stone Age Scatters and Structures
Van der Walt, J.	2022b	Heritage Baseline Report for the Elandsfontein PV Cluster, Lichtenburg, North-West Province	Middle and Later Stone Age scatters

6.1 Archaeological Background to the study area.

A brief summary of archaeological and historical events in South Africa is included in Figure 6.1 and the background to the study area is discussed below.

Published Stone Age and Iron Age archaeological sites are absent from the immediate study area. Stone Age lithic scatters occur near watercourses, and some were exposed due to diamond mining in the wider area, suggesting that the landscape was used since the ESA. However, currently, published references only include Later Stone Age sites such as Jubilee and Holkrans rock shelters, which are ~ 200 km north-east of Lichtenburg, as well as rock art occurring at Driekuil and Gestoptefontein (e.g., Wadley 1989, 1996; Bradfield & Sadr 2011; Hollmann 2013) to the south at Ottosdal.

Early Iron Age farmers settled at Broederstroom *ca*. 500 CE (Mason 1981), the oldest Iron Age site in the North-West Province. Agropastoral communities preferred open woodland areas with readily available access to water and cultivatable soils. Due to their particular homestead economy, farmers did not occupy the central highveld area of Lichtenburg. During the Late Iron Age when climatic conditions became more favourable people started to occupy areas previously considered unsuitable (Maggs 1994; Huffman 2007). The earliest Iron Age farmers who moved into the North-West Province were Tswana-speakers such as the BaRolong probably from the 18th century onwards. According to traditional history BaRolong king Tau died in 1760 CE, he was succeeded by his son Nôtô. During the reign of Nôtô it is said that they settled in the region of Molopo, while others say it was only during the time of Morara's kingship, son of Nôtô. However, during the early 1820s Methodist missionaries had contact with BaRolong communities as they fled from the chaos caused by the ongoing Mfecane, settling near Maquassi hills in modern-day Potchefstroom. Peace was short-lived and communities decided in 1833 to move towards Thaba Nchu under the protection of king Moshoshoe. The region was also a focal point for *Voortrekkers* such as Hendrik Potgieter and Sarel Cilliers, as they moved further towards the interior violent battles took place between local Sotho-Tswana, Ndebele and Zulu chiefdoms *(*Matthews 1945; Breutz 1957; Giliomee & Mbenga 2007).

6.2 Historical background

The surrounding area of Lichtenburg was only occupied from the 1850s as resources were few and Lichtenburg was established in 1873. During the South African War 1899-1902, a number of skirmishes took place in the larger region. The area included concentration camps and the famous battle of Mafikeng took place close-by. Lichtenburg is also home to the infamous General Koos de la Rey. The town was the seat of the local Senator, and he died in 1914 on his way home from a meeting in parliament about South Africa's participation in World War I. During the 1920s the town experienced a diamond rush that lasted 10 years. Today Lichtenburg is known for cattle and crop farming (e.g., Bergh 1998; Scholtz & Theron 2000; van der Walt 2013; Coetzee 2017).

South Africa: A short chronology

Early Stone Age: 2 million - 250 000 BP. Hominins producing core and pebble tools, later stages includes handaxes and blades.

Middle Stone Age: 250 000 - 40 000 / 25 000 BP. *Homo Sapiens.* Prepared core techniques, formal tools, points, scrapers and backed artefacts. Occasionally includes bone points and ostrich eggshell fragments and grindstones.

Later Stone Age: 40 000 - 100 BP. Wide range of formal microlithic tools. Ostrich eggshell fragments, beads, rock art.

Ceramic Final Later Stone Age: 2000 BP. Wide range of formal microlithic tools, with thin-walled pottery, with some sites having faunal remains of ovicaprids.

Early Iron Age: 200 - 900 CE. Arrival of Bantu-speaking farmers who lived in sedentary settlements often located next to rivers. They kept livestock, cultivated sorghum, beans and cowpeas. Introduced metallurgy to the region and manufactured thick-walled pottery.

Middle Iron Age: 900 - 1300 CE. Confined to the modern-day Limpopo Province, and associated with early state formation, such as Mapungubwe and associated sites.

Late Iron Age: 1300 - 1840 CE. Marks the arrival of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities. Settlements are often located on or near hilltops for defensive purposes. The Iron Age as an archaeological period ends with the Mfecane, 1820s to 1840s CE. An event that caused major socio-political upheavel.

Historic events

1652: Dutch East India Company establishes refreshment station at modern-day Cape Town.

1658: First slave ships arrive at Table Bay.

1660 - 1793: Various armed conflicts between Khoisan and Europeans, several frontier wars between Europeans, Khoisan and Xhosa communities.

1795 - 1807: First British occupation of the Cape, the Dutch East India Company collapses, and slave trade is abolished.

1808 - 1820: Several frontier wars and first British Settlers arrive.

1820 - 1840: Onset of the Mfecane, abolishment of slavery and slaves are freed at the Cape. Dutch farmers started to migrate towards the interior of South Africa, what will become known as the 'Great Trek'.

1860 - 1880: Discovery of mineral wealth, diamons and gold. Establishment of the Zuid-Afrikaansche Republiek (ZAR).

1899 - 1902: The South African War.

1910 - 1945: Unifaction of South Africa, formation of the ANC, World War I and World War II.

BP - Before Present
CE - Common Era

Figure 6.1. Summary of archaeological and historical events in South Africa.

7 Description of the Physical Environment

The Project area is situated about 12km north of Lichtenburg. The landscape is primarily used for cattle grazing and measures approximately 220ha. The topography is slightly undulating without major focal points like pans or rocky outcrops marked by thick grass cover while bushes and tall trees are sparse but scattered throughout the landscape. Large piles of stones are scattered across the project area as a result of clearing agricultural fields for cultivation. And broken pieces of agricultural implements are found in the area. The study area falls within a Grassland Bioregion as described by Mucina *et al* (2006) with the vegetation described as Carltonville dolomite Grassland.

Figure 7.1. General site conditions indicating grass cover and small trees throughout the study area.

Figure 7.2. General site conditions in the study area showing the flat typography.

8 Findings of the Survey

8.1 Heritage Resources

At the start of the survey Stone Age material (Figure 8.3) was noticed scattered in varying densities in an open-air context throughout the study area. Raw material for tool manufacture is almost exclusively on chert that is readily available in the area resulting in various expediently knapped flakes and chunks. Typologically the lithics are associated with the MSA marked by faceted striking platforms and irregular cores. Smaller undiagnostic pieces are considered to date to the LSA exclusively by their size as no formal artefacts were noted dating to this period. The study area is marked by a thin layer of topsoil with a gravel substrata and artefacts were mostly noted in scraped roads (Figure 8.2) and animal borrows and more can occur in the area.

Low-density scatters (between 3 - 5 artefacts per m²) were recorded as observation points of low significance. Scatters with densities less than 2 artefacts per m² were not recorded as they occur throughout the area. Individual occurrences were not point plotted unless they were considered diagnostic artefacts. GPS readings were taken roughly in the middle of each identified scatter. Historical topographic maps and areal imagery also showed no structures or stonewalled settlements within the project area. The study area was surveyed together with the project areas for Hillardia PV and Euphorbia PV and observations were numbered sequentially with the prefix HB for Houthaalboomen. The distribution of observation points in the study area is illustrated in Figure 8.1 and locations are provided in Table 7.

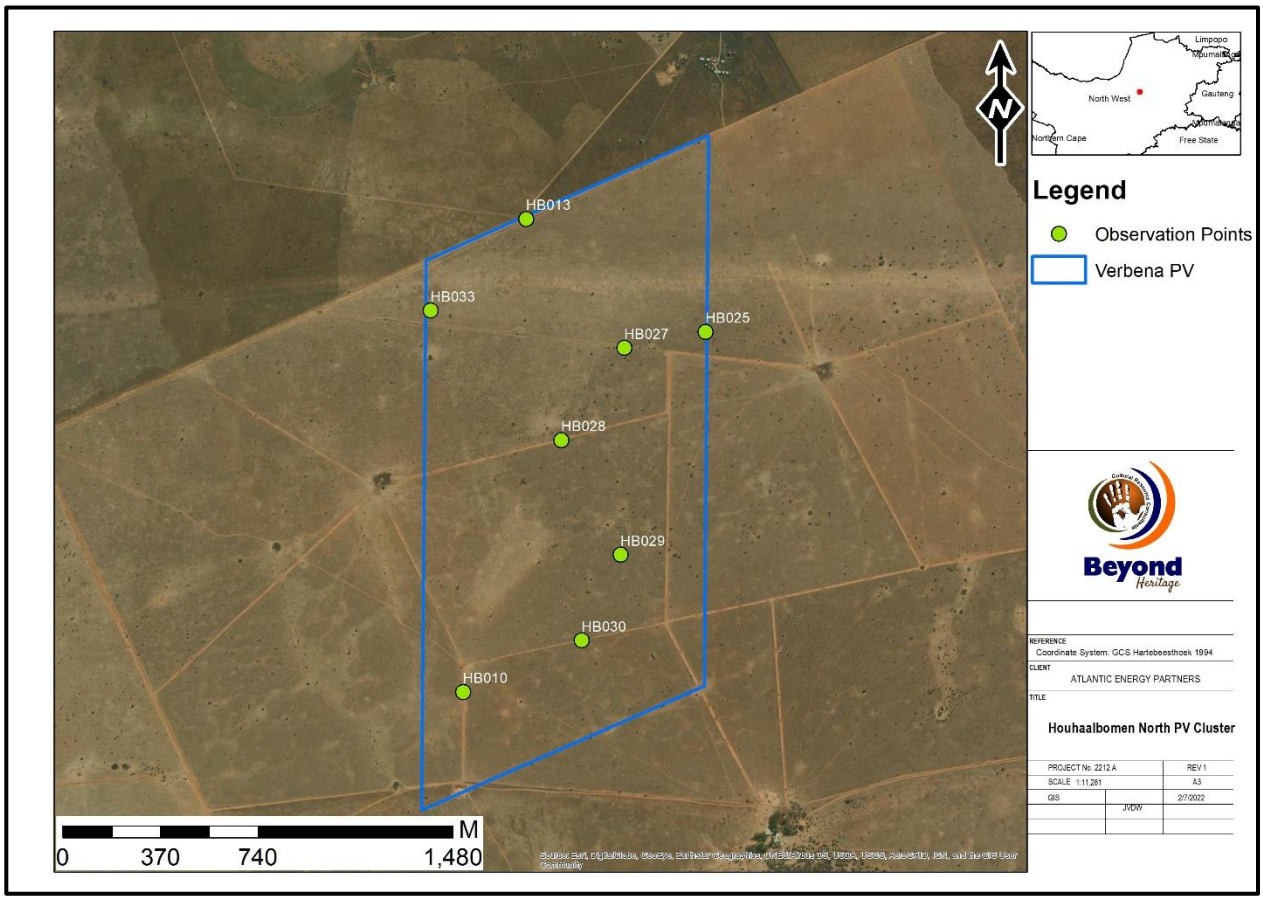


Figure 8.1. Observation points in relation the project area.

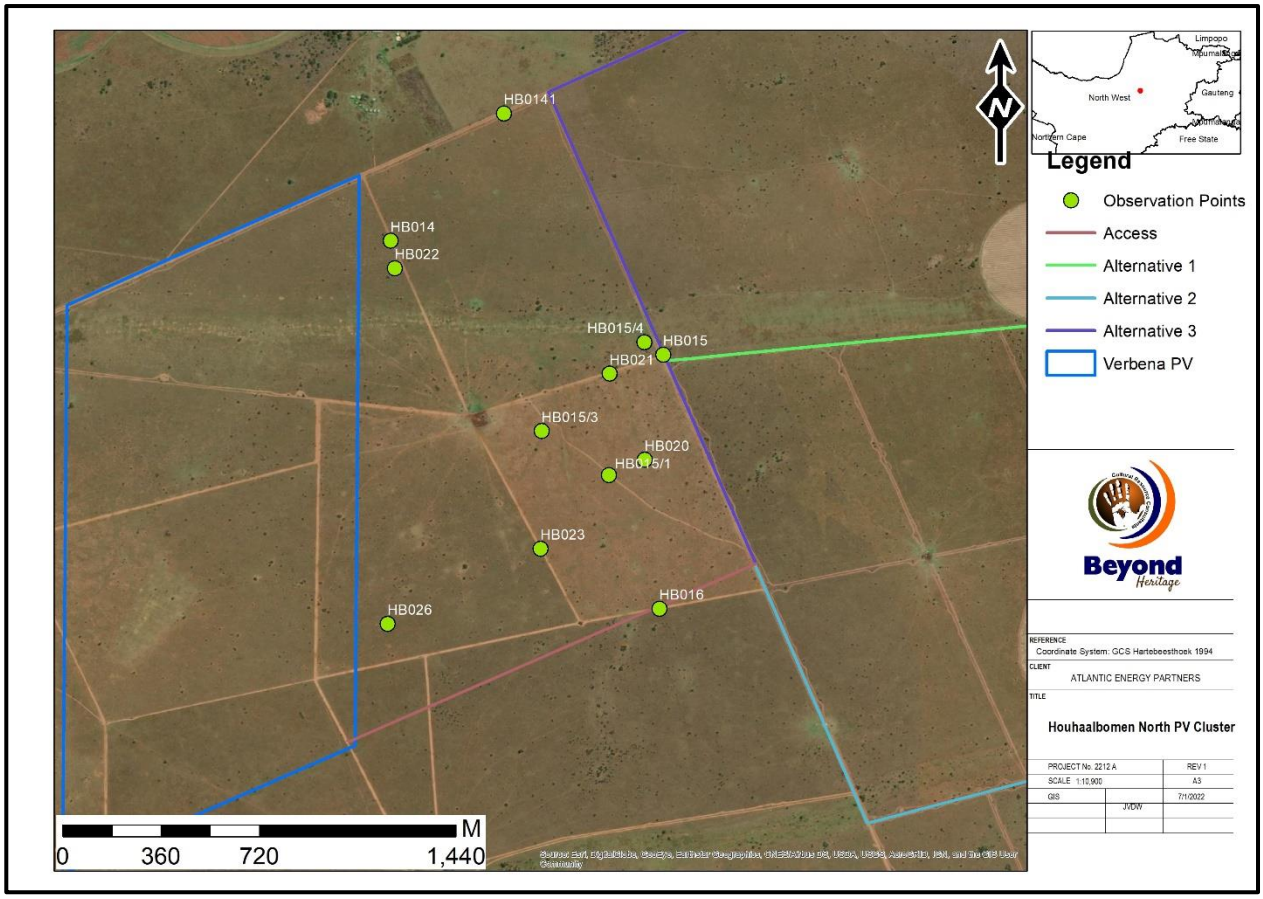


Figure 8.2. Observation points in relation to the access roads.

Figure 8.3. Scraped roads exposing subsurface artefacts.

Figure 8.4. Dorsal and ventral view of flakes and chunks that characterise the Stone Age assemblage in the study area.

Table 7. Observation points in the study area.

LABEL	Description	LONGITUDE	LATITUDE	SIGNIFICANCE/ FIELD RATING
HB010	All observations were exposed in scraped gravel roads apart from an isolated MSA flake at HB029. Raw material is exclusively on chert and artefacts ratio is less than 5 artefacts per m². No diagnostic artefacts were recorded, and the assemblage is a deflated context and consist of a palimpsest of MSA and to a lesser extent LSA Material	26° 04' 36.6743" E	26° 04' 32.3291" S	Heritage significance Low Field Rating GP C
HB013		26° 04' 44.4180" E	26° 03' 34.2181" S	
HB016		26° 05' 42.4500" E	26° 04' 15.3947" S	
HB027		26° 04' 56.4853" E	26° 03' 50.0544" S	
HB028		26° 04' 48.7201" E	26° 04' 01.4089" S	
HB029		26° 04' 56.0136" E	26° 04' 15.4740" S	
HB030		26° 04' 51.2219" E	26° 04' 25.9969" S	
HB033		26° 04' 32.6927" E	26° 03' 45.4645" S	
HB015	Part of a large scatter of lithic artefacts on the eastern edge of the project area. The scatter was first located on a freshly graded gravel road where the gravel layer has been exposed by the grading of the road. A density higher than 5 artefacts per m² were recorded extending approximately in a 100m radius around the central point and is located on a slightly elevated area.	26° 05' 42.8604" E	26° 03' 45.2268" S	Medium significance Field Rating GP B

8.2 Cultural Landscape

The area is rural in character with no developments older than 60 years in the impact area (Figure 8.4 and 8.5). The cultural landscape contains elements dating to the Stone Age, historic agricultural activities and recently mining activities.

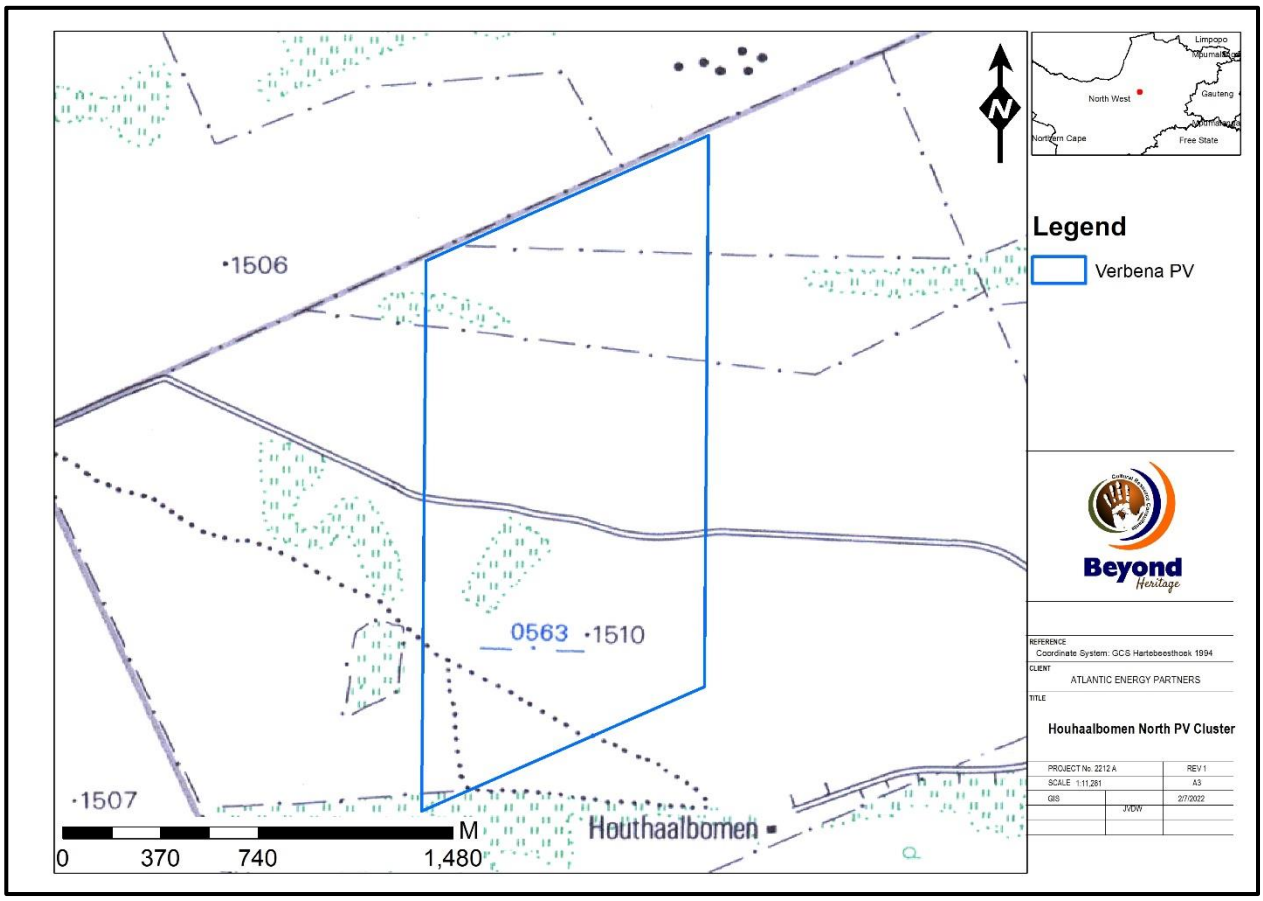


Figure 8.5. 1972 Topographic map of the study area indicating some cultivation activities and a road as well as some tracks that traverse the study area.

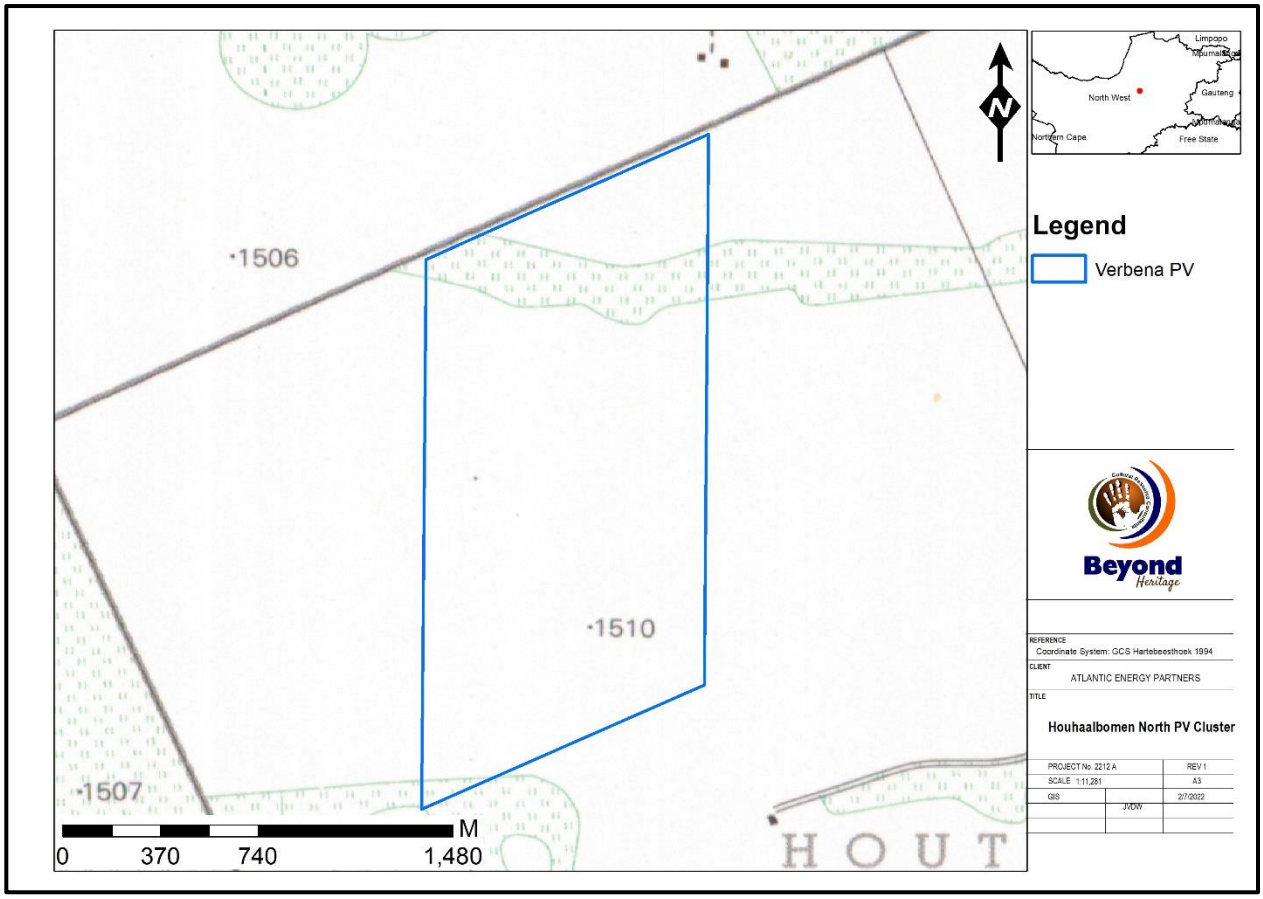
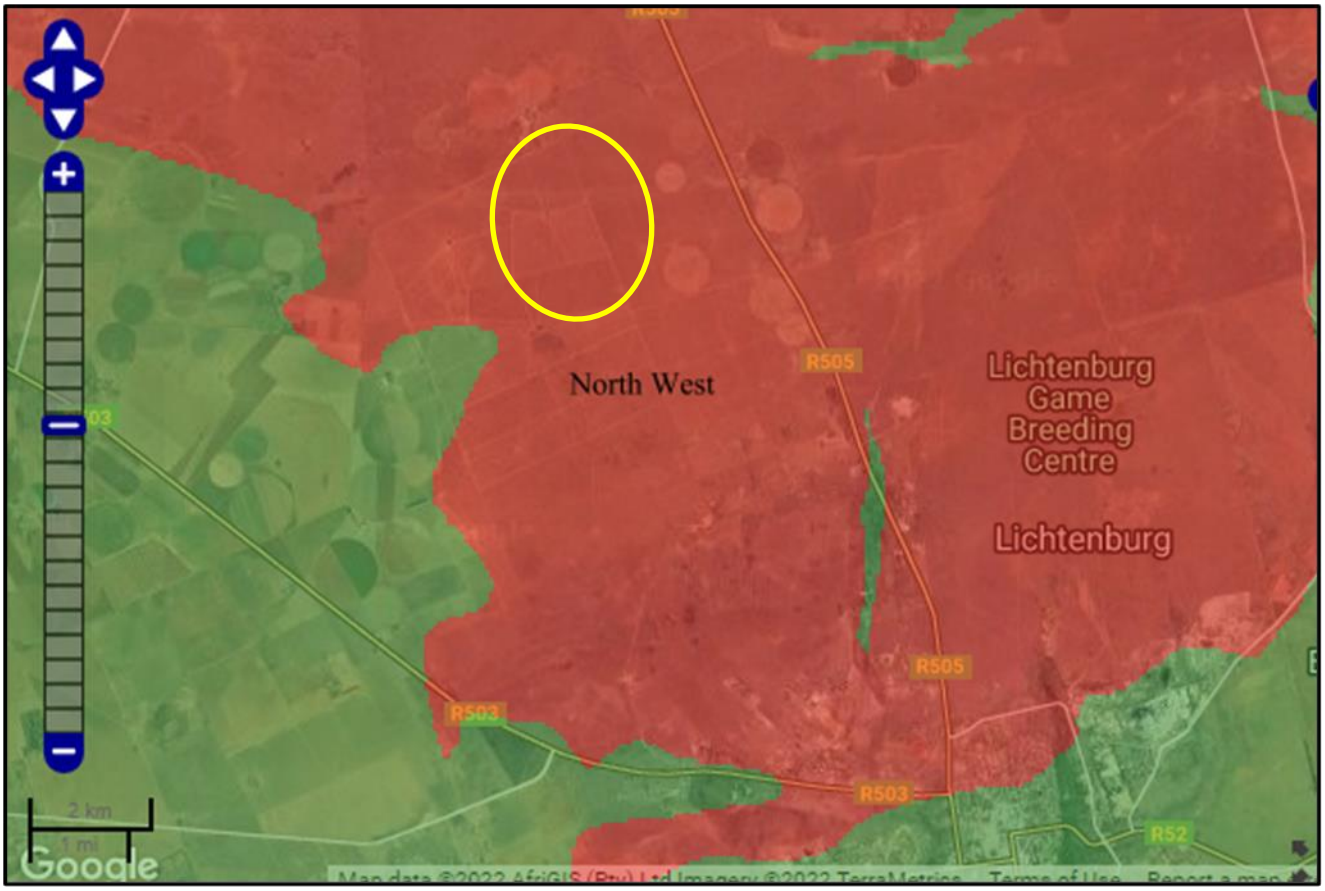


Figure 8.6. 1992 Topographic map of the study area indicating some cultivation in the study area, but no other developments.

8.3 Paleontological Heritage

Based on the SAHRA sensitivity map the area is of very high sensitivity, concurring with the DEA Screening Tool as the Monte Christo and Oaktree Formations of the Malmani Subgroup are indicated as very highly sensitive (red) because of the potential of finding trace fossils, in particular stromatolites. This aspect was addressed in an independent study by Prof Marion Bamford (2022) included as Appendix A. The assessment found that there were good exposures of dolomite, but no stromatolites were noted. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the developer/ environmental officer/ other designated responsible person once excavations/drilling activities have commenced. As far as the palaeontology is concerned, the project should be authorised.



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 8.7. 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 Age observations at HB010, HB013, HB016, HB027, HB028, HB029, HB030 and HB033 are scattered too sparsely to be of significance apart from mentioning them in this report. The higher density scatter around HB015, HB015/4 and HB021 is of medium significance and will require mitigation prior to construction. The site will have to be surface sampled, and test excavated to accurately describe the typology of the various lithic industries prior to construction. Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures as recommended in this report should be implemented during all phases of the project. Impacts of the project on heritage resources is expected to be low during all phases of the development (Table 8).

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. The area is marked by a widespread low density Stone Age scatter which, in isolation, is of low significance. Considering the existing impacts of renewable energy developments in the broader area, the cumulative impact on resources is higher, but this can be mitigated to an acceptable level. In order to mitigate the loss of widespread low-density Stone Age lithics mitigation measures employed in areas with higher density artefacts located in the Euphorbia PV project area will sufficiently mitigate this aspect. This and other projects in the area can have an additional negative impact on the Stone Age record of the area where these sites have been destroyed. Additional impacts can be successfully mitigated with the implementation of a chance find procedure.

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.

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	Improbable (2)	Improbable (2)
Significance	**18 (Low)**	**18 (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: • Implementation of a chance find procedure for the project;		
Cumulative impacts: The proposed project will have a low to medium cumulative impact considering the existing impacts of renewable energy developments on the broader area and the development of two more facilities on the Project site. The cumulative impact on widespread low-density Stone Age lithics can be mitigated to an acceptable level by surface sampling and analysis of higher density scatters on the Project site at Euphorbia PV prior to construction.		
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. Impacts of project including alternative 1,2 and 3.

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)	Minor (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: • Implementation of a chance find procedure for the project; • To mitigate the cumulative impact on the Stone Age background scatter (Around HB 015) it is recommended that a surface sample of the artefacts should be analysed in the field to accurately describe the typology of the various lithic industries and test excavations to determine the depth of deposit should be done prior to construction. • Monitoring of the project area during construction by the ECO.		
Cumulative impacts: The proposed project will have a low to medium cumulative impact considering the existing impacts of renewable energy developments on the broader area and the development of two more facilities on the Project site. The cumulative impact on widespread low-density Stone Age lithics can be mitigated to an acceptable level by surface sampling and analysis of higher density scatters on the Project site at HB015 prior to construction.		
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 a characterised by agricultural activities (mainly grazing) without any major focal points like pans or hills that would have attracted human occupation in antiquity. Heritage finds were limited to Stone Age scatters in varying densities in an open-air context throughout the study area. Raw material for tool manufacture is almost exclusively on chert that is readily available in the area and the artefacts are associated with the MSA and LSA. Higher density Stone Age scatters were recorded around HB015 and HB015/4 mostly along existing roads that will be used for access to the PV Facility (Alternative 1,2 and 3). Artefacts within the existing roads are out of context and all three alternatives are acceptable from a heritage point of view;

Examination of historical topographic maps and aerial images also showed no structures or stone walled settlements in the study area. According to the SAHRA Paleontological sensitivity map the study area is of very high paleontological significance, and this was addressed in an independent study by Bamford (2022). The study conclude that 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 dolomites of the Oaktree and Monte Christo Formation (Malmani Subgroup, Chuniespoort Group, Pretoria Supergroup) and may be disturbed, so a Fossil Chance Find Protocol should be added to the EMPr.

No adverse impact on heritage resources is expected by the project and it is recommended that the project can commence on the condition that the following recommendations (Section 10) are implemented as part of the EMPr and based on approval from SAHRA.

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).
- The study area should be monitored by the ECO.
- It is recommended that a surface sample of lithics (at the higher density scatter around HB 015) should be analysed in the field to accurately describe the typology of the various lithic industries and test excavations to determine the depth of deposit prior to construction (as part of the recommended mitigation for Euphorbia PV).

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 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 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 (for example see Figure 8). 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.

10.3 Reasoned Opinion

The overall impact of the project is considered to be low 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.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves 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 10. 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. • Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 11. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Construction	Throughout the construction phase	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
Stone Age Scatter around HB015	A surface sample of the artefacts should be analysed in the field to accurately describe the typology of the various lithic industries and test excavations to determine the depth of deposit should be done prior to construction	Pre Construction	Pre Construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA	ECO Report and relevant permits
General project area	Monitoring by the ECO.	Construction	Throughout the construction phase	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 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.

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