

HERITAGE IMPACT ASSESSMENT

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

FOR THE HOUTHAABOOMEN NORTH GRID CONNECTION LICHTENBURG, NORTHWEST PROVINCE

Type of development:

Grid Infrastructure

Developer:

Euphorbia PV (Pty) Ltd

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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	<i>Declaration of Independence</i>
(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
(l) 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 BA 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 Euphorbia PV (Pty) Ltd to undertake the required Environmental Authorisation Process for the construction and operation of the required connection and grid infrastructure for the proposed Houthaalboomen North PV cluster of three facilities near Lichtenburg in the North West Province. 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 study area is characterised by agricultural activities including limited cultivation from the 1970's and is currently used for grazing;
- The general area has been subjected to various heritage assessments for renewable energy projects e.g., Van der Walt 2014 (SAHRIS Case ID 2657) Fourie 2016 (SAHRA Case Number 11319) and Lavin 2022 (SAHRA Case Number 18761);
- Heritage finds from these studies are mainly limited to widespread low-density Stone Age scatters dating to the Middle Stone Age (MSA) with few formal tools and are considered as background scatter (Orton 2016). The finds are generally speaking of low significance. Van der Walt, 2014 recorded a single informal grave to the west (about 260 m) of the grid corridor;
- The study by Lavin (2022) assessed the south-eastern section of the grid corridor and SAHRA provided final comment on the HIA. This section was not surveyed again as SAHRA approved the project;
- 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.
- A heritage walk down of the final pylon positions prior to construction.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>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:</p> <ul style="list-style-type: none"> • 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	08/09/2022

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 the 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 grid connection infrastructure for the Houthaalbomen North PV cluster of three facilities near Lichtenburg in the North West Province (Figure 1.1 to 1.4). The report forms part of the Basic Assessment (BA) 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, no sites of significance 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 BA 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 grid connection corridor are outlined under Table 2 and 3.

Table 2: Project Description

Farm and Magisterial District	<ul style="list-style-type: none"> • HOUTHAALBOOMEN, Portion 4 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 5 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 6 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 7 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 8 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 9 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 10 of the Farm Houthaalboomen 31 • HOUTHAALBOOMEN, Portion 1 of the Farm Houthaalboomen 31 • Portion 0 of Farm Talene 25 • ELANDSFONTEIN, being Portion 39 of Farm 34- • ELANDSFONTEIN, being Portion 93 of Farm 34 • ELANDSFONTEIN, being Portion 41 of Farm 34 • PRIEM, being Portion 0 of Farm 30 • HOUTHAALBOOMEN, being Portion 25 of Farm 31 • LICHTENBURG TOWN AND TOWNLANDS, being Portion 1 of Farm No 27
Central co-ordinate of the development	26° 5'50.77"S 26° 6'34.82"E
Topographic Map Number	2626 AA

Table 3: Infrastructure and project activities

Type of development	Grid Infrastructure	
Size of development	Corridor of 9 km in length	
Project Components		
Grid connection	Substation to which project will connect.	The Houthaalboomen North grid connection infrastructure will facilitate the connection of three facility substations to a collector substation/ switching station, and then a single or double circuit 132 kV overhead powerline will connect the collector substation/ switching station to the National Grid via the Watershed Main Transmission Substation (MTS).
	Capacity of substations to connect facilities	One Eskom collector substation/ switching station which is referred to as the Houthaalboomen North collector substation/ switching station is required for the Houthaalboomen North Grid Connection Infrastructure.
Power line/s	Number of overhead power lines required	A single or double circuit 132 kV overhead powerline from the Houthaalboomen North collector substation/ switching station to the Watershed MTS is required for the Houthaalboomen North Grid Connection Infrastructure.
	Voltage of overhead power lines	132 kV

	Height of the Power Line	< 32 m
	Servitude Width	Maximum of 31 m – 36 m.
Auxiliary Infrastructure		
Other infrastructure	Additional Infrastructure	<ul style="list-style-type: none"> • Access tracks/ roads • Laydown areas
	Details of access roads	The access roads will not exceed 8 m in width. Access to the grid connection infrastructure will be possible via existing roads in close vicinity to the infrastructure. Apart from these existing roads, the proposed Houthaalbomen North solar PV facilities will contain access roads that can also be used to access the infrastructure. Formal roads will not be constructed underneath the power lines for maintenance purposes; access for maintenance purposes will be limited to jeep tracks.
	Extent of areas required for laydown of materials and equipment	Approximately 1- 2 ha of laydown areas will be required (Laydown areas will not exceed 2 ha).

1.3 Alternatives

No alternatives were provided for assessment. The 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).

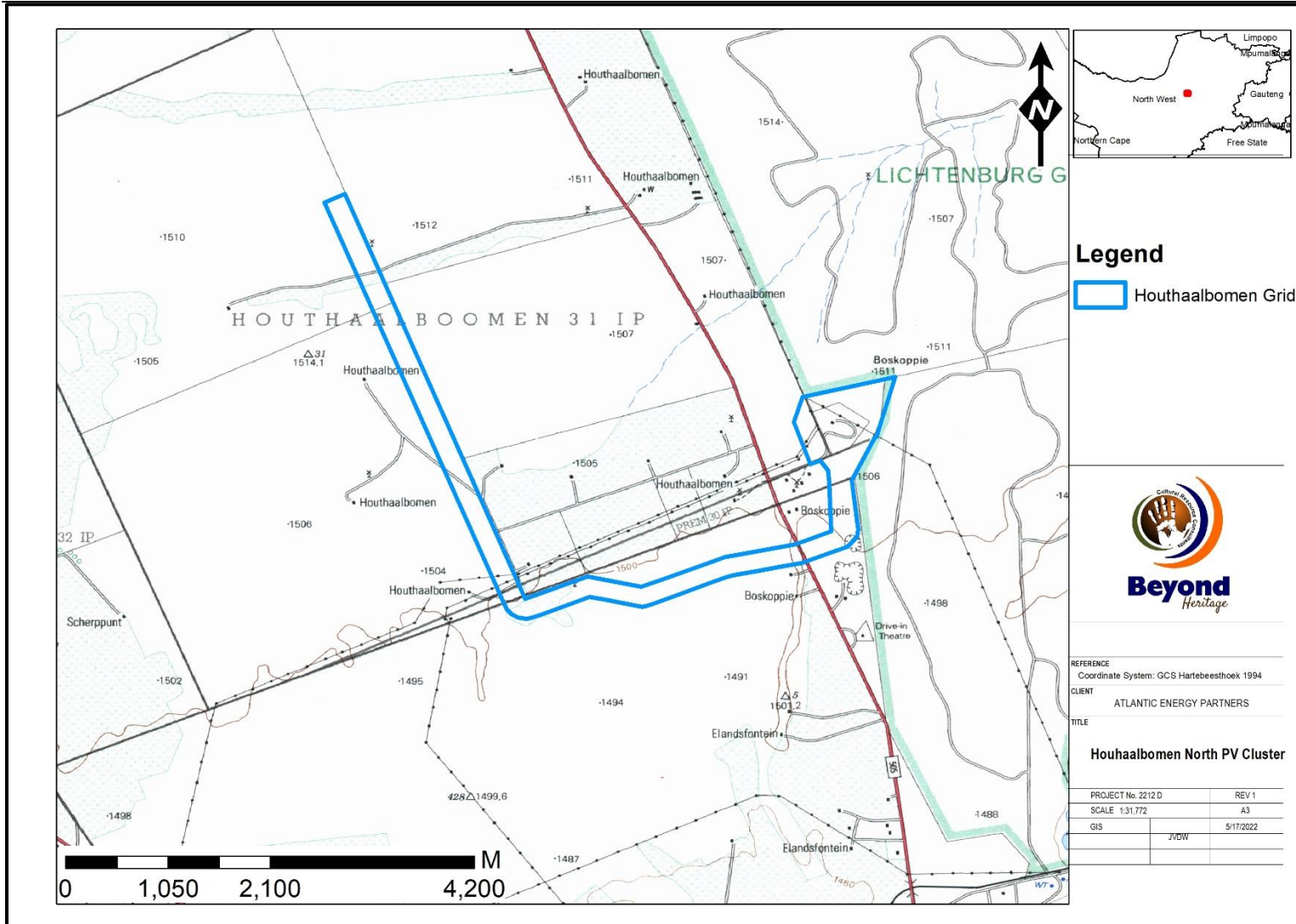


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

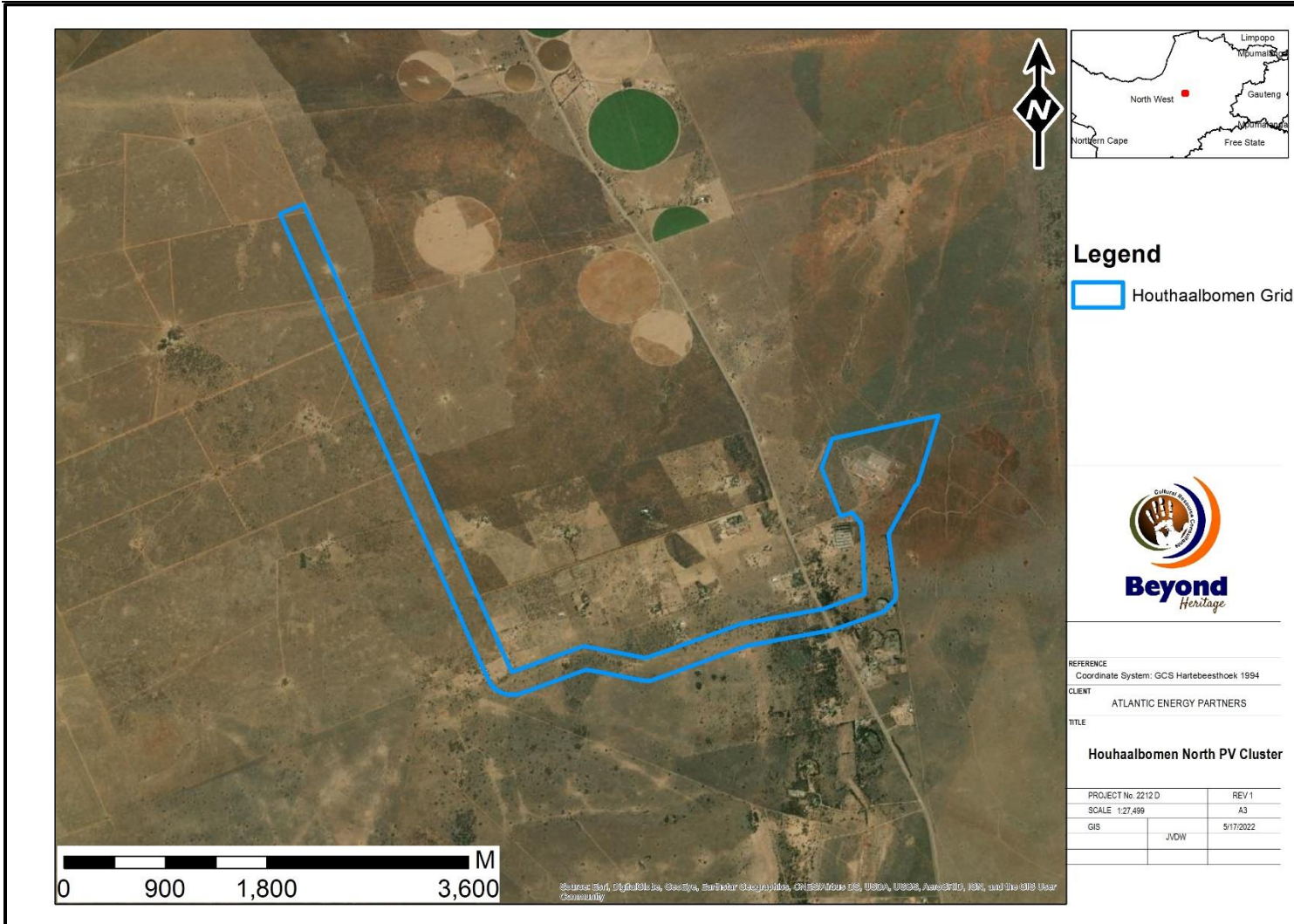


Figure 1.3. Aerial image of the development footprint and surrounds.

2 Legislative Requirements

The HIA, as a specialist sub-section of the BA, 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 – he time of year and season did affect the survey. Dense vegetation cover limited archaeological visibility. The corridor was however sufficiently covered to understand the heritage character of the area. The development footprint was surveyed during the combined field work for the three PV facilities on the farm Houthaalbomen. The south eastern portion of the grid was previously assessed and approved and this area was not surveyed again (Figure 3.1).

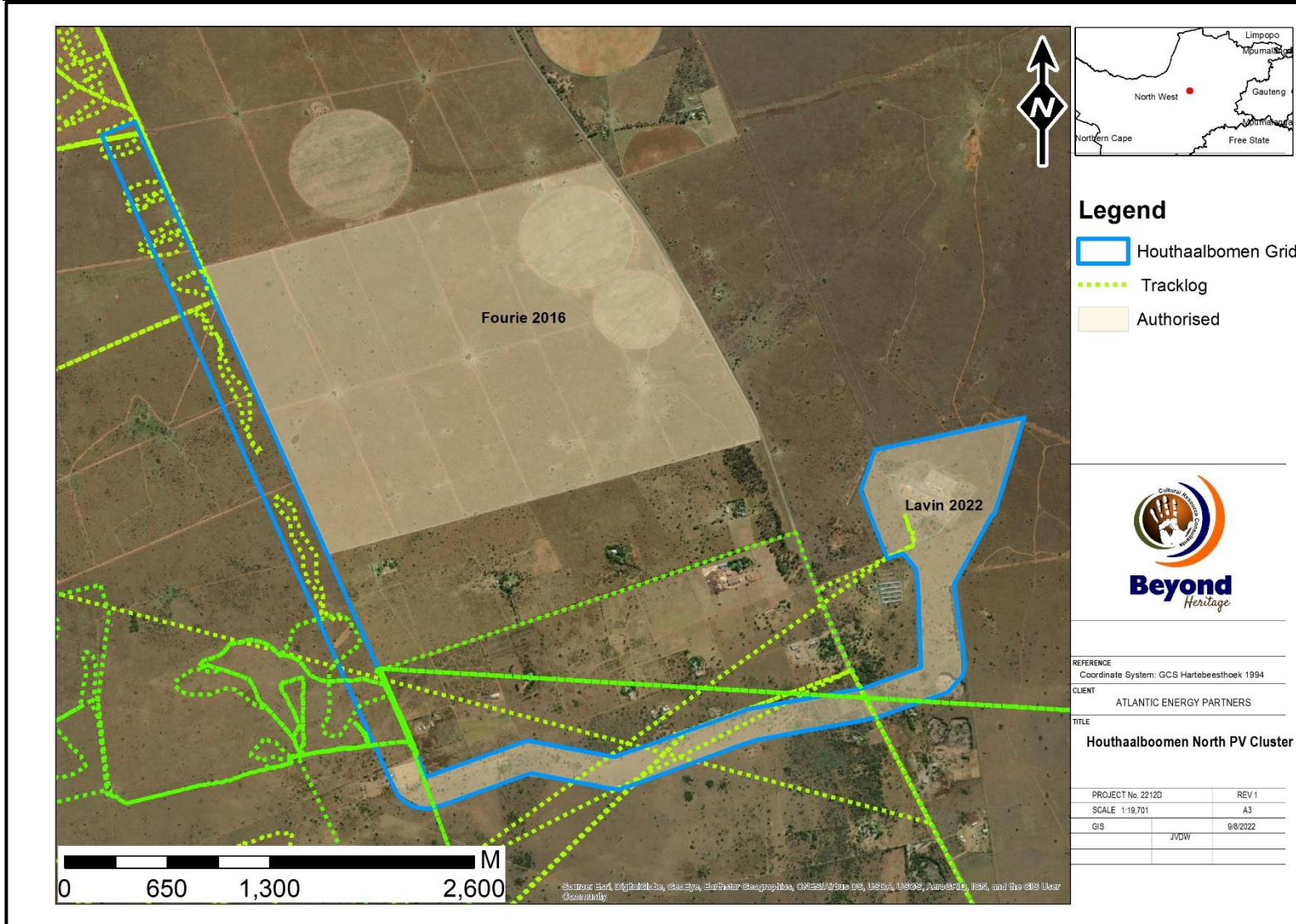


Figure 3.1. Tracklog of the survey path in green. Shaded sections show areas that was previously assessed.

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 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.

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.

The south eastern portion of the grid was previously assessed and approved (Lavin 2022 SAHRA Case Number 18761). Studies by van der Walt 2014 (SAHRIS Case ID 2657) and Fourie 2016 (SAHRA Case Number 11319) covered the boundaries of the grid corridor

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
Lavin, 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 upheaval.

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, diamonds and gold. Establishment of the Zuid-Afrikaansche Republiek (ZAR).

1899 - 1902: The South African War.

1910 - 1945: Unification 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. 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. The study area falls within a Grassland Bioregion as described by Mucina *et al* (2006) with the vegetation described as Carltonville dolomite Grassland. General site conditions area illustrated in Figure 7.1 and 7.2.



Figure 7.1. General site conditions indicating grass cover and graded areas in the corridor.



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

8 Findings of the Survey

8.1 Heritage Resources

Stone Age material are noted scattered in varying densities in an open-air context throughout the greater 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 based on 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 are noted mostly where disturbance occurred such as animal borrows and scraped roads. Spot checks within the corridor did not reveal any sites or features worth recording.

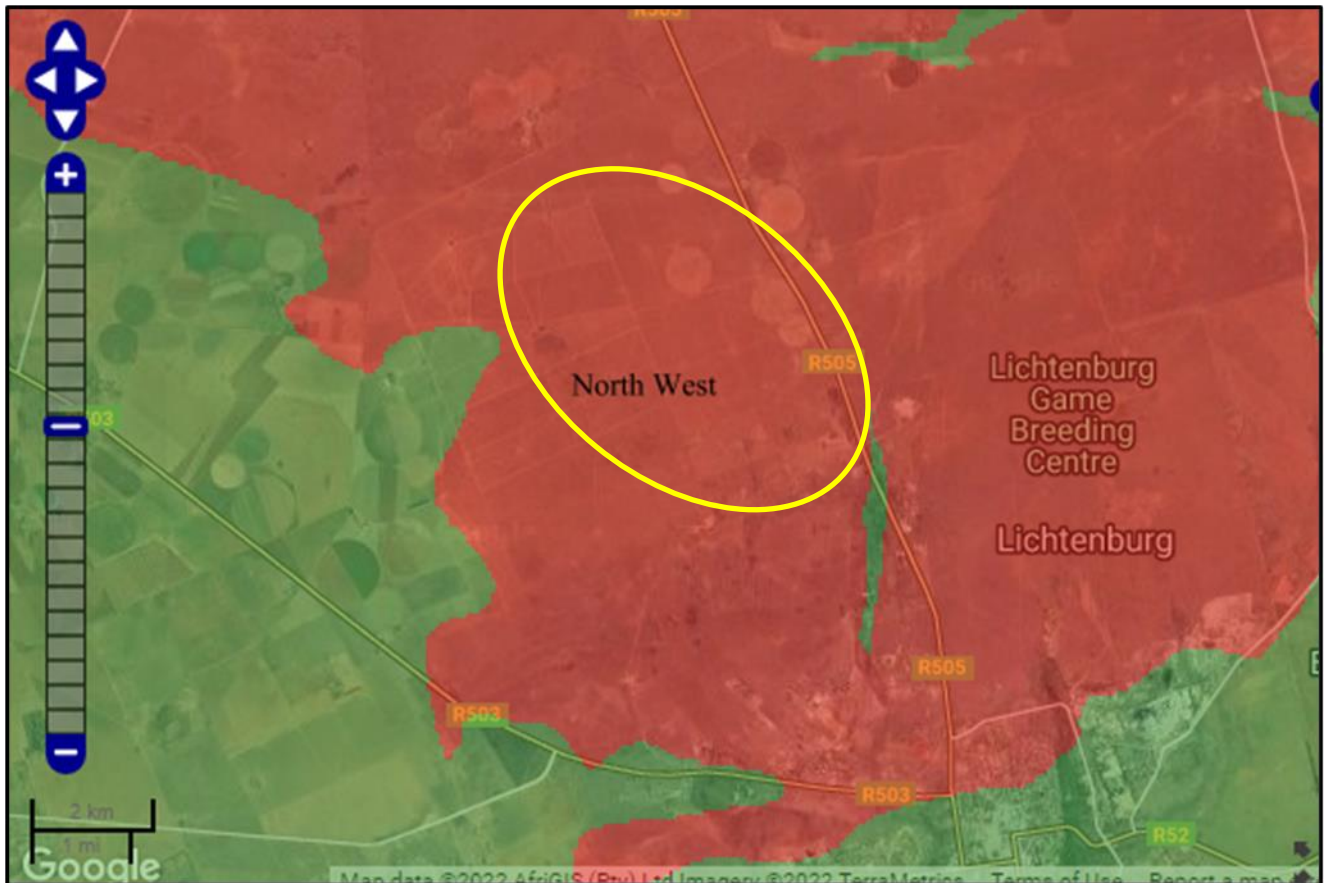
Historical topographic maps and areal imagery also showed no structures or stonewalled settlements within the project area. The study area was surveyed together with the project areas for Verbena PV, Hillardia PV and Euphorbia PV.

8.2 Cultural Landscape

The cultural landscape contains elements dating to the Stone Age, historic agricultural activities and recently mining activities.

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 EMP. 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 8.1. 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. Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Powerlines have a relatively small impact on Stone Age sites due to the small footprint of the pylons as shown by Sampson (1985). Due to the lack of significant heritage resources and the limited impact from powerlines the 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 general 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 is still considered to be low. 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 7. 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 general 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 is still considered to be low.

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 characterised by agricultural activities (mainly grazing) without any major focal points like pans or hills. Stone Age material are however noted scattered in varying densities in an open-air context throughout the wider area assessed for the Houthaalbomen North PV cluster. 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 based on their size as no formal artefacts were noted dating to this period. Artefacts are noted mostly where disturbance occurred like animal borrows and scraped roads. Spot checks within the grid corridor did not reveal any sites or features of significance although MSA artefacts are expected to occur sporadically. The lack of significant sites is in line with an assessment of the south eastern portion of the grid corridor that was previously assessed and approved by SAHRA (Lavin 2022 SAHRA Case Number 18761). Studies by van der Walt 2014 (SAHRIS Case ID 2657) and Fourie 2016 (SAHRA Case Number 11319) covered the boundaries of the grid corridor and also recorded no sites of significance in proximity to 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 powerlines have a relatively small impact on Stone Age sites due to the small footprint of the pylons as shown by Sampson (1985). It is therefore 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.
- A heritage walk down of the final pylon positions prior to construction.

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 therefore 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 8. Monitoring requirements for the project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Cultural Heritage Resources chance finds	Entire project area	ECO	Weekly (Pre construction and construction phase)	Proactively	<ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 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 9. 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
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
Pylon Positions	Heritage Walkdown of the final pylon positions prior to construction.	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 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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