

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

**FOR THE PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA
FACILITY MPUMALANGA**

Type of development:
Renewable Development

Developer:
Enertag (Pty) South Africa

Report prepared for:
WSP

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APPROVAL PAGE

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Report Title	Heritage Impact Assessment for the Hendrina Green Hydrogen and Ammonia facility, Mpumalanga Province
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	Enertrag South Africa (Pty) Ltd

Designation	Name	Qualifications and Certifications	Date
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Archaeologist	Ruan van der Merwe	BA Hons Archaeology	December 2022 and January 2023

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Amendments on Document

Date	Report Reference Number	Description of Amendment
6 April 2023	23021	Technical 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

WSP was appointed as the Environmental Assessment Practitioner (EAP) by Enertrag South Africa (Pty) Ltd to undertake the required Environmental Authorisation Process for the Hendrina Green Hydrogen and Ammonia Facility of up to 150MW and associated infrastructure. The Facility will encompass approximately 25 hectares of land (three alternative locations being assessed), in the Mpumalanga 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 Project area is characterised by extensive cultivated fields and is considered to be of low archaeological potential;
- This was confirmed during the field survey and no archaeological sites of significance were noted, and finds were limited to graves and ruins;
- According to the SAHRA Paleontological sensitivity map the study area is of very high paleontological significance and an independent study was conducted for this aspect. Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the loose soils and sands of the Quaternary. There is a very small chance that fossils may occur in the shales and siltstones of the early Permian Vryheid Formation, but only more than 5m below the surface, therefore, a Fossil Chance Find Protocol should be added to the EMP.
- All three facility alternatives are acceptable from a heritage point of view with the implementation of the recommendations in this report, but the facility alternative 2 is preferred from a heritage point of view;
- The options for the linear infrastructure (powerlines and water pipeline) will directly impact on burial sites and will therefore have to be rerouted.

The impact on heritage resources by the linear infrastructure is high but can be mitigated to an acceptable level and the Project can be authorised provided that the recommendations in this report are adhered to, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Graves at 093, 094, HD001, HD002, HD 004, HD101 and GA004 must be preserved *in situ* with a 30-meter buffer as mitigation measure (prescribed by SAHRA), which means that the linear infrastructure will have to be micro sited in the areas where HD002 and GA004 were recorded;
- Based on the current layout the ruins at GA002 are located in the H2 Option 3 footprint and the cluster of sites at 089 – 092 is located close to the Option 2 powerline. Although of low significance the possible presence of graves at the ruins is a risk. If avoidance is not possible the presence of graves should be confirmed during social consultation and the area should be monitored during construction;
- Implementation of the ENERTRAG Chance Find Procedure for the project (Appendix A);
- Pre-construction heritage walkdown of any deviations of the current layout.

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 (NEMA) (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:</p> <ul style="list-style-type: none"> • I act as an 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 49 A of the Act. of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	06/03/2023

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
DFFE: Department of Fisheries, Forestry and Environment,
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EAP Environmental Assessment Practitioner
EMPr: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA: Middle Stone Age
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 Green Hydrogen and Ammonia Facility (The Project). The Project is located 17km west of Hendrina, in the Steve Tshwete Local Municipality, of the Nkangala District Municipality, Mpumalanga Province (Figure 1.1 to 1.2). 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, burial sites and ruins 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 are outlined under Table 2 and 3.

Table 2: Project Description

Project details	Location	The Project is located 17km west of Hendrina, in the Steve Tshwete Local Municipality, of the Nkangala District Municipality, Mpumalanga Province.	
Properties	Parent Farm	Farm No	Portion No
	Facility Alternative Site 1		
	Dunbar	189IS	3
	Facility Alternative Site 2		
	Dunbar	189IS	3
	Weltevreden	193IS	18
	Facility Alternative Site 3		
	Weltevreden	193IS	14
	Weltevreden	193IS	15
	Associated pipelines and powerlines may affect portions of the following land parcels:		
	Bultfontein	187IS	1
	Bultfontein	187IS	2
	Bultfontein	187IS	3
	Bultfontein	187IS	4
	Bultfontein	187IS	6
	Bultfontein	187IS	10
	Bultfontein	187IS	14
	Dunbar	189IS	0
	Dunbar	189IS	1
	Dunbar	189IS	2
	Dunbar	189IS	4
	Dunbar	189IS	5
	Dunbar	189IS	6
	Dunbar	189IS	7
	Geluk	26IS	6
	Geluk	26IS	7
	Hartebeestkuil	185IS	3
	Komati Power Station	56IS	0
Wilmansrust	47IS	1	
Wilmansrust	47IS	3	
Wilmansrust	47IS	9	

Central co-ordinate of the development	-26.175277° 29.546533°
Topographic Map Number	2629 BA

Table 3: Infrastructure and project activities

Type of development	Green Hydrogen and Ammonia Facility
Size of development	The facility footprints assessed comprises 25 hectares.
Project details and components	<p>“Green” hydrogen and ammonia production differs from traditional production technologies in that the process relies exclusively on renewable resources (renewable energy) and for input air and water (feedstock), to produce commercially usable green hydrogen and ammonia. The only solid waste stream is the production of brine from the water treatment plant. Ammonia spillages may occur however these will be accidental and mitigation measures will be developed and implemented, including amongst others suitable containment related to storage and emergency response measures.</p> <p>A gaseous ‘waste’ (oxygen) is generated from the electrolyses process. Another source of gaseous ‘wastes’ is from the Air Separation Unit. This is where nitrogen is removed from the air and the other natural gases as expelled back to the environment.</p> <p>Traditional hydrogen and ammonia are produced through the burning of fossil fuels (coal or natural gas) to provide the required energy needed for their production. This method of production results in ‘brown’ hydrogen as fossil fuels are used and therefore carbon forms an integral part of such traditional hydrogen production. Commercially, hydrogen is used as a fuel for transport in hydrogen fuel cells. Alternatively, hydrogen is used for welding and in the production of other chemicals such as methanol and hydrochloric acid and also has other commercial uses like the filling of balloons. It is also a primary input to the production of ammonia. Ammonia in turn is primarily used in the production of ammonium nitrate (fertiliser) and is also used as refrigerant gas and the manufacture of plastics, explosives, textiles, pesticides and other chemicals. Ammonia can also be used as a stable ‘carrier’ of hydrogen, allowing hydrogen to be readily stored and transported.</p>

1.3 Alternatives

Three alternative project locations are being investigated for the development of the proposed Project: Site Alternative 1 is located on Portion 3 of the Farm Dunbar 189IS, at the site of an old abandoned farmyard and has three powerline options from the associated Hendrina North and South Wind Energy Facilities (“WEF”) as follows:

Powerline option 1 is up to 2km in length, to the Hendrina North WEF substation Option 1 on Portion 1 of the Farm Dunbar 189IS;

Powerline option 2 is up to 7km in length, to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS;

Powerline option 3 is up to 1.5km in length, to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS.

Water supply to the Site:

- Constructing a new pipeline (up to 16km) from the Komati Power Station

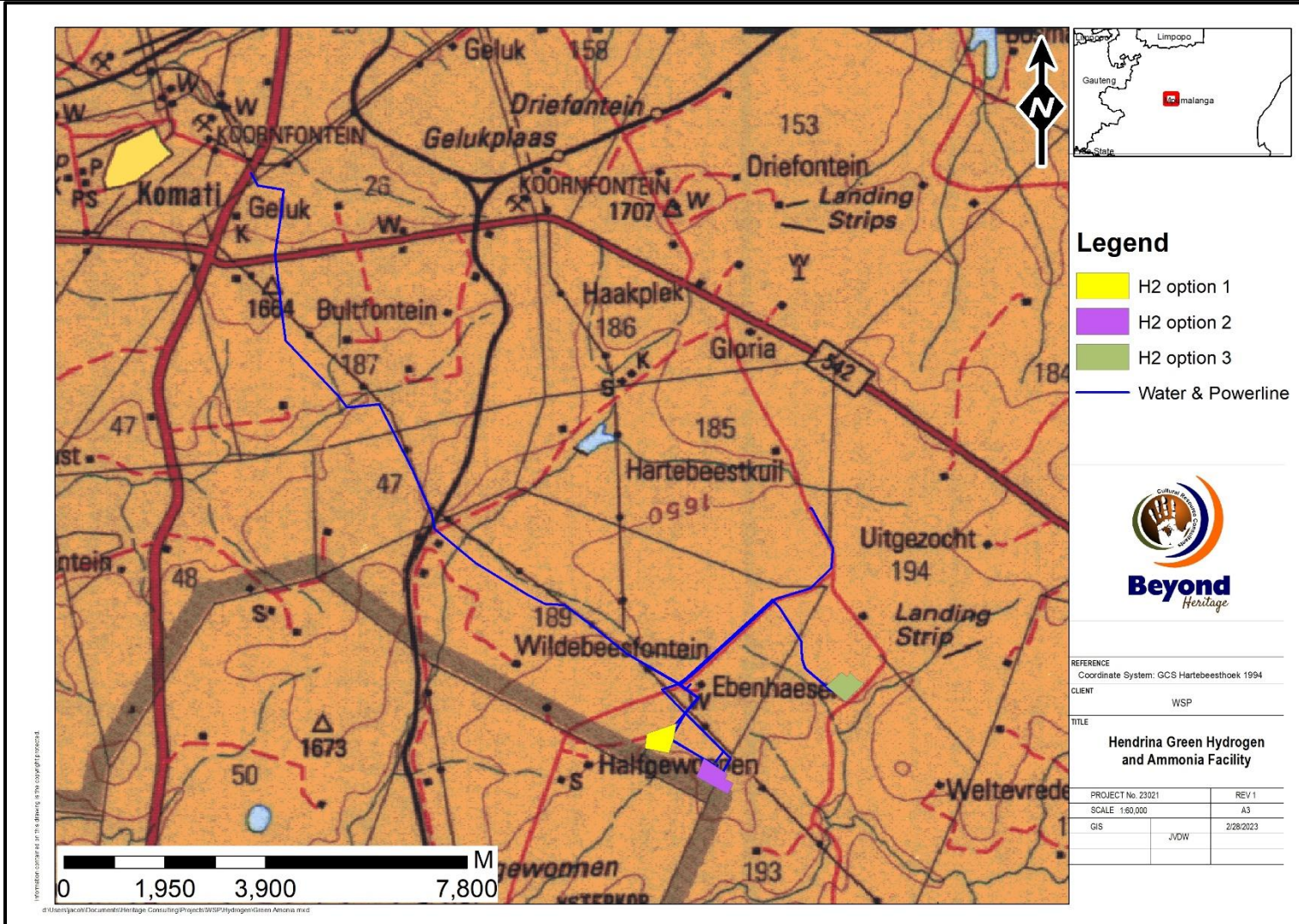


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

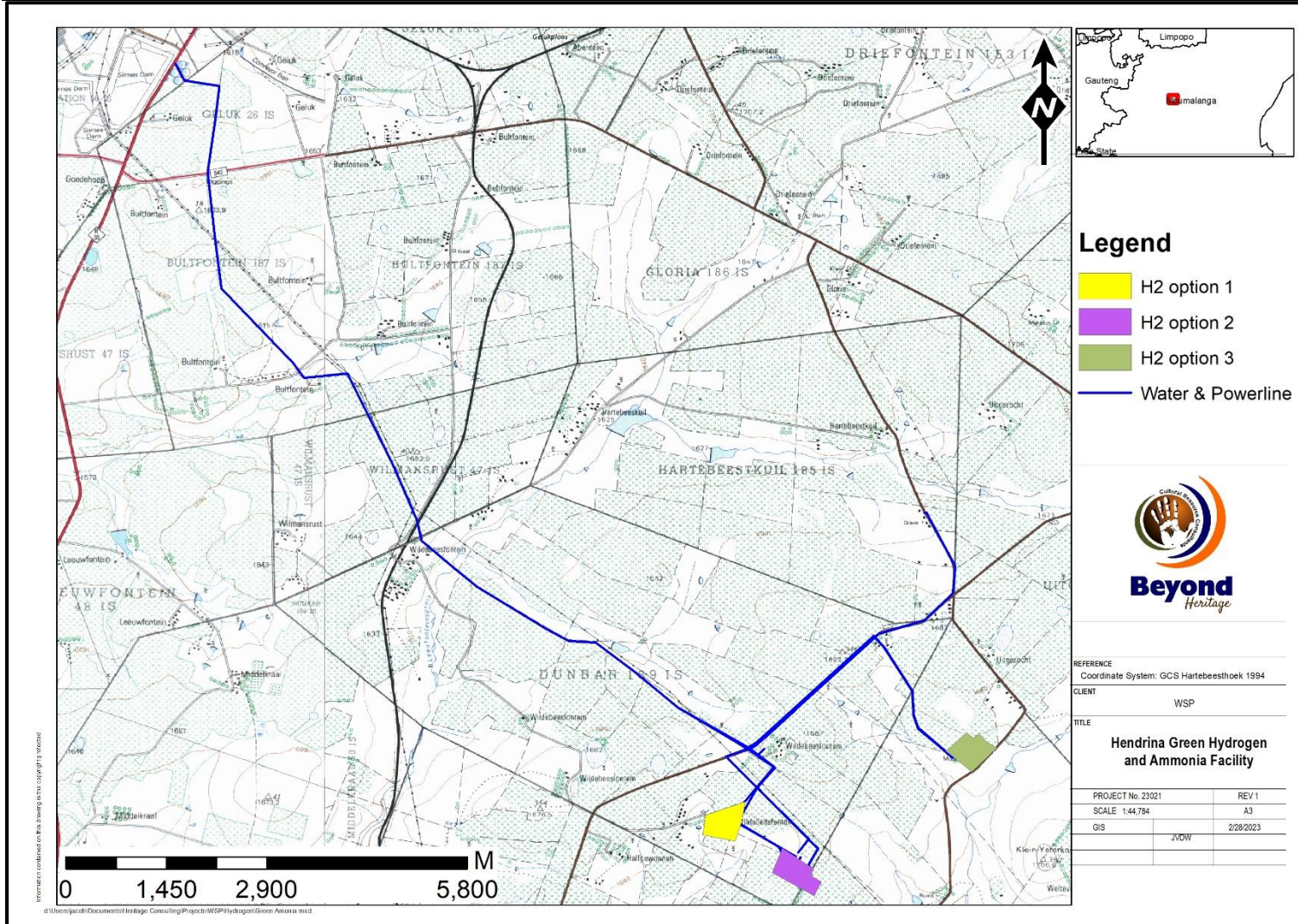


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

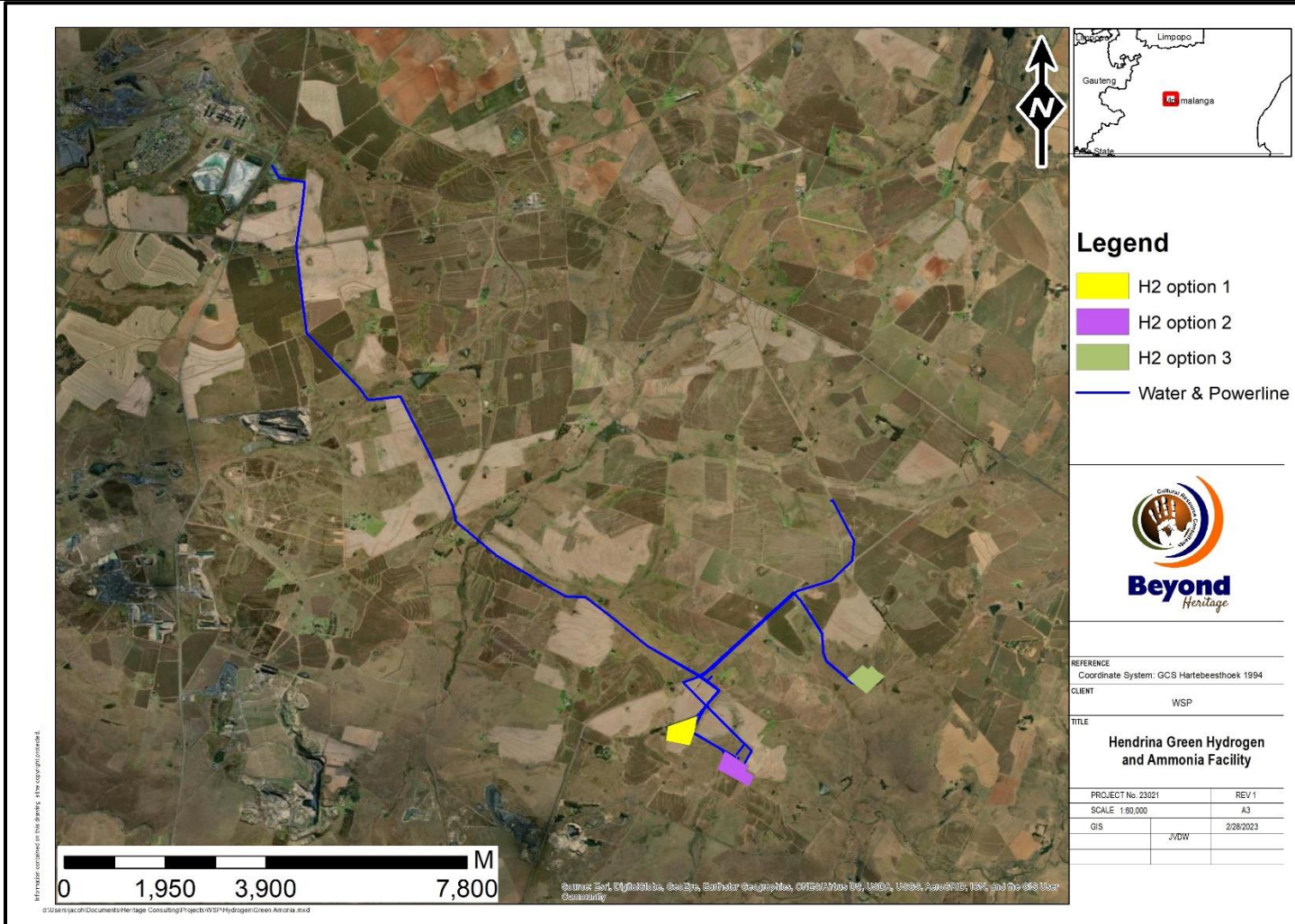


Figure 1.3. Aerial image of the development footprint and surrounds showing the project components.

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))

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 (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMP, to the Provincial Heritage Resource Agency (PHRA) 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 EMP, 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 Southern African Development Community (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 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (NHRA), as well as the National Health Act of 2003 and are under the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999 is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

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

3 METHODOLOGY

3.1 Literature Review

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 understand the cultural layering of the area;
- b) record GPS points of sites/areas identified as significant areas;
- c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 4: Site Investigation Details

	Site Investigation
Date	13 December 2022 and the week of 25 January 2023
Season	Summer – The time of year and season did affect the survey since vegetation was high after the summer rains and planting along the agricultural fields. The impact area was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

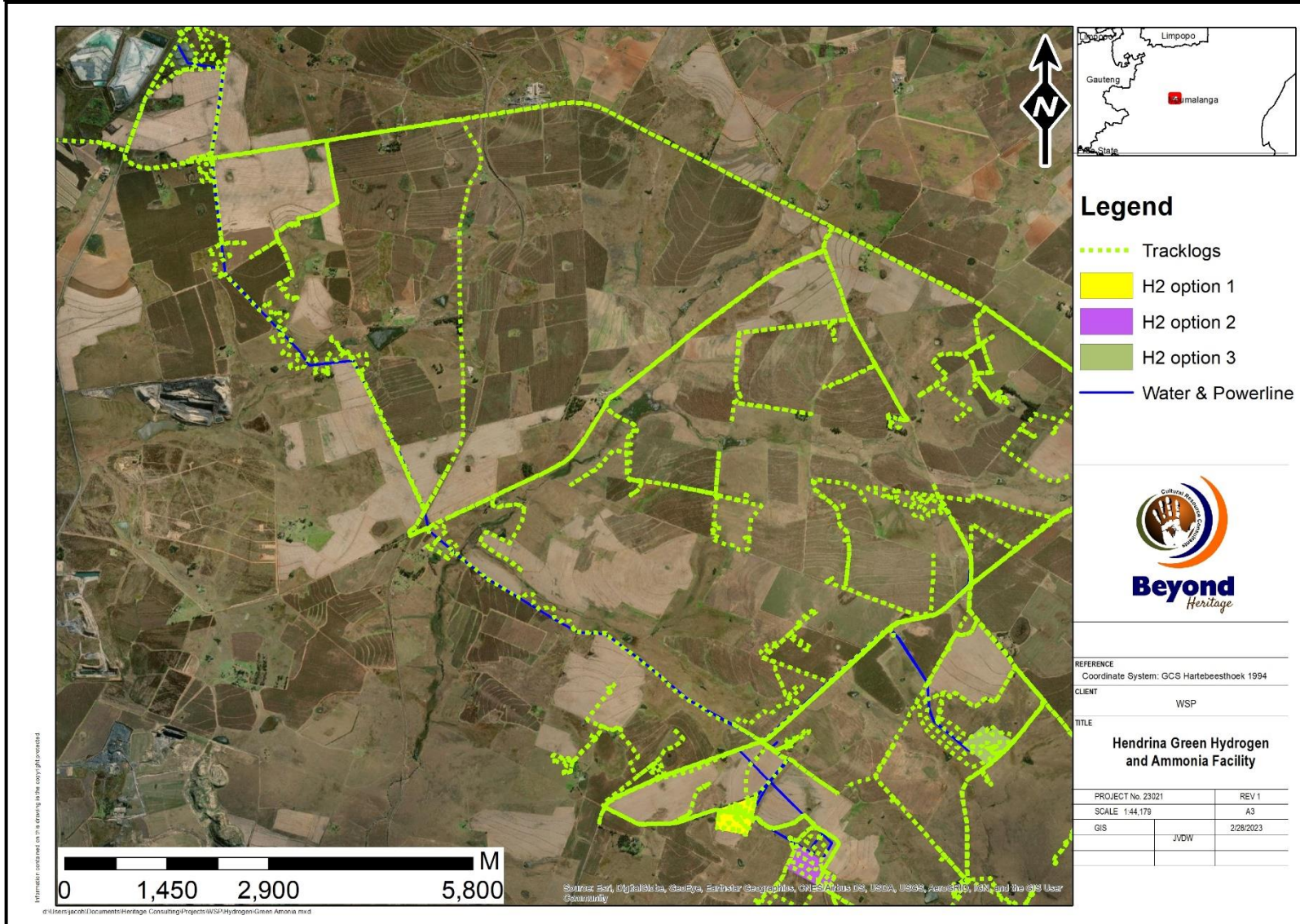


Figure 3.1. Tracklog of the survey path in green.

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 impact assessment was done as per the provided Environmental Impact Assessment Methodology included as Appendix B.

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. The discrepancy between Google Earth, handheld GPS and GIS projections could cause some deviation on actual locations of sites and should be verified. The EAP must also confirm if all the project components have been addressed during this study. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys focussing on tangible heritage along the project footprint. The corridors were assessed on desktop level only. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to Census 2011, Steve Tshwete Local Municipality has a total population of 217 073 people, of whom 73,6% are black African, and 21,8% are white. The other population groups make up the remaining 4,6%. Of those aged 20 years and older, 3,4% have completed primary school, 30,8% have some secondary education, 35% have completed matric, and 14,4% have some form of higher education, while 7,4% of have no form of schooling. According to Census 2011, Govan Mbeki Local Municipality has a total population of 294 538, of which 80,5% are black African, 16,0% are white, with the other population groups making up the remaining 3,5%.

Of those 20 years and older, 3,9% completed primary school, 33,9% have some secondary education, 31,4% completed matric, and 12,6% have some form of higher education. The percentage of those aged 20 years and older with no form of schooling is 7,9%.

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 thus far.

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
Huffman, T.N.	1995	Archaeological Survey of Forzano Coal Holdings	Homesteads and Cemeteries
Van Schalkwyk, J	1997	A Survey of Cultural Resources in The Proposed Kleinfontein Mining Area, Mpumalanga Province	Cemeteries and a farm house as well as Stone Age scatters
Van Schalkwyk, J.	2002	A Survey of Cultural Resources for the Koorfontein Mining Development, Middelburg District, Mpumalanga Province	Farmsteads and cemeteries
Van Schalkwyk, J.	2003	Goedehoop Mine, Mpumalanga: Archaeological and Cultural Historical Survey and Impact Assessment	No Sites
Van Vollenhoven, A.C.	2013	A Report on A Cultural Heritage Impact Assessment for A Proposed Mining Right Amendment Application at The Halfgewonnen Colliery, Between Bethal And Hendrina, Mpumalanga Province	No Sites
Van der Walt, J.	2019	Heritage Impact Assessment For The Proposed Dunbar Opencast Coal Mine Mpumalanga Province	Stone cairn, a farmstead and a structure
Van der Walt, J.	2022	Heritage Impact Assessment for the Hendrina North Wind Energy Facility	Ruins and Graves

6.1 Archaeological Background

6.1.1 Stone Age

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

Very few Early Stone Age (ESA) sites are on record for Mpumalanga and no sites dating to this period are expected for the study area. An example in Mpumalanga is Maleoskop on the farm Rietkloof where ESA tools have been found. This is one of only a handful of such sites in Mpumalanga.

The Middle Stone Age (MSA) has not been extensively studied in Mpumalanga, but evidence of this period has been excavated at Bushman Rock Shelter, a well-known site on the farm Klipfonteinhoek in the Ohrigstad district. This cave was excavated twice in the 1960's by Louw and later by Eloff. The MSA layers show that the cave was repeatedly visited over a long period. Lower layers have been dated to over 40 000 BP (Before Present) while the top layers date to approximately 27 000 BP (Esterhuizen & Smith in Delius, 2007; Bergh, 1998). Some isolated finds were recorded close to Witbank as well by Huffman (1999) on the farm Rietfontein.

The Later phases of the Stone Age (LSA) began at around 20 000 years BP. This period was marked by numerous technological innovations and social transformations within these early hunter-gatherer societies. These people may be regarded as the first modern inhabitants of Mpumalanga, known as the San or Bushmen. They were a nomadic people who lived together in small family groups and relied on hunting and gathering of food for survival. Evidence of their existence is to be found in numerous rock shelters throughout the Eastern Mpumalanga where some of their rock paintings are still visible. A number of these shelters have been documented throughout the province (Bornman, 1995; Schoonraad in Barnard, 1975; Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad.

Three LSA sites are on record in the greater area. The sites are Welgelegen Skuiling close to Ermelo, Chrissiesmeer (also known for rock art) and lastly Groenvlei close to Carolina, this area is also known for rock art (Bergh 1999).

6.1.2 Iron Age

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

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

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. No Early Iron Age sites are on record in the greater region. Around 220 Late Iron Age stone walled sites are on record to the east of the study area (Bergh 1999) and is also associated with numerous pre-*difaqane* and *difaqane* wars that took place during the last quarter of the 18th century and during the first three decades of the 19th century. The sites are located close to Bethal. The study area was most probably inhabited by the Phuting group (Berg 1999). Around the study area the Phuting moved south due to the Ndebele migration (Difaqane). These wars led to the displacement of large numbers of Tswana clans on the Highveld where Mzilikazi's Ndebele caused chaos and havoc.

Late Iron Age settlements are characterised by extensive dry stonewalls and dates back to the 17th century. Late Iron Age communities who contributed to this stone walled architecture were the Sotho, Pedi, Ndebele and Swazi. The stone building tradition that these indigenous groups established many decades before the first colonial settlers arrived, may have influenced the colonial farmers to utilize these same resources as building material for the first farmsteads which arose on the Eastern Highveld (Pistorius 2006).

6.1.3 Historical Background

Sites dating to the historic period occur sporadically in the study area. These are mostly farming related, although some mining sites also occur. The farming related sites are usually farmsteads and farm cemeteries, either belonging to the landowners or their labourers. Mining related sites are for example the old Albion Colliery, dating to the 1940's.

6.1.4 The Anglo-Boer War (1899-1902)

The Anglo-Boer War, which took place between 1899 and 1902 in South Africa, was one of the most turbulent times in South Africa's history. Even before the outbreak of war in October 1899 British politicians, including Sir Alfred Milner and Mr. Chamberlain, had declared that should Britain's differences with the Z.A.R. result in violence, it would mean the end of republican independence. This decision was not immediately publicized, and therefore republican leader based their assessment of British intentions on the more moderate public utterances of British leaders. Consequently, in March 1900, they asked Lord Salisbury to agree to peace based on the status quo ante bellum. Salisbury's reply was, however, a clear statement of British war aims (Du Preez 1977).

During the Anglo-Boer War, several battles took place in the region. The one closest to the study area took place on the farm Wilmansrust, some distance to the east, in June 1901. During this clash, more than 50 British troops were killed.

7 Description of the Physical Environment

The landscape consists of slightly to moderately undulating plains with some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition, including species from the genera *Aristida*, *Digitaria*, *Eragrostis*, *Themeda* and *Tristachya*, with small, scattered rocky outcrops of wiry, sour grasses and some woody species such as *Senegalia caffra*, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Englerophytum magalismontanum* (Mucina & Rutherford, 2010). Large sections of the area consist of ploughed fields that have been extensively cultivated for several years and other areas are used for grazing. The study area also includes existing water and powerline infrastructure, roads and farm fences. General site conditions are illustrated in Figure 7.1 to 7.6.



Figure 7.1. General view of the landscape showing the dense grass cover across the Project area.



Figure 7.2. General view of the waterlogged conditions in the Project area. - Image showing the inundated smaller gravel roads.



Figure 7.3. Image showing the existing crops that are scattered across the entire Project area.



Figure 7.4. General view of the landscape around the south eastern end of the Project area marked by dense grass cover and clusters of trees.

8 Findings of the Survey

8.1 Heritage Resources

Most of the Project area and surrounding environment consists of active agricultural lands that have been cultivated. Existing powerlines, water pipelines and railroad infrastructure traverse the larger area. The continuous ploughing and the existing infrastructure would have impacted on archaeological sites if any were present in these areas and the Project area is of low archaeological potential.

This was confirmed during the survey and finds were limited to burial sites and ruins. Recorded heritage features along the line were given waypoint numbers. The field surveys were conducted from 2021 onwards and different site numbers reflect respective site visits. General site conditions, site distribution and selected features are illustrated in Figures 8.2 – 8.15. Recorded observations are briefly described in Table 7.

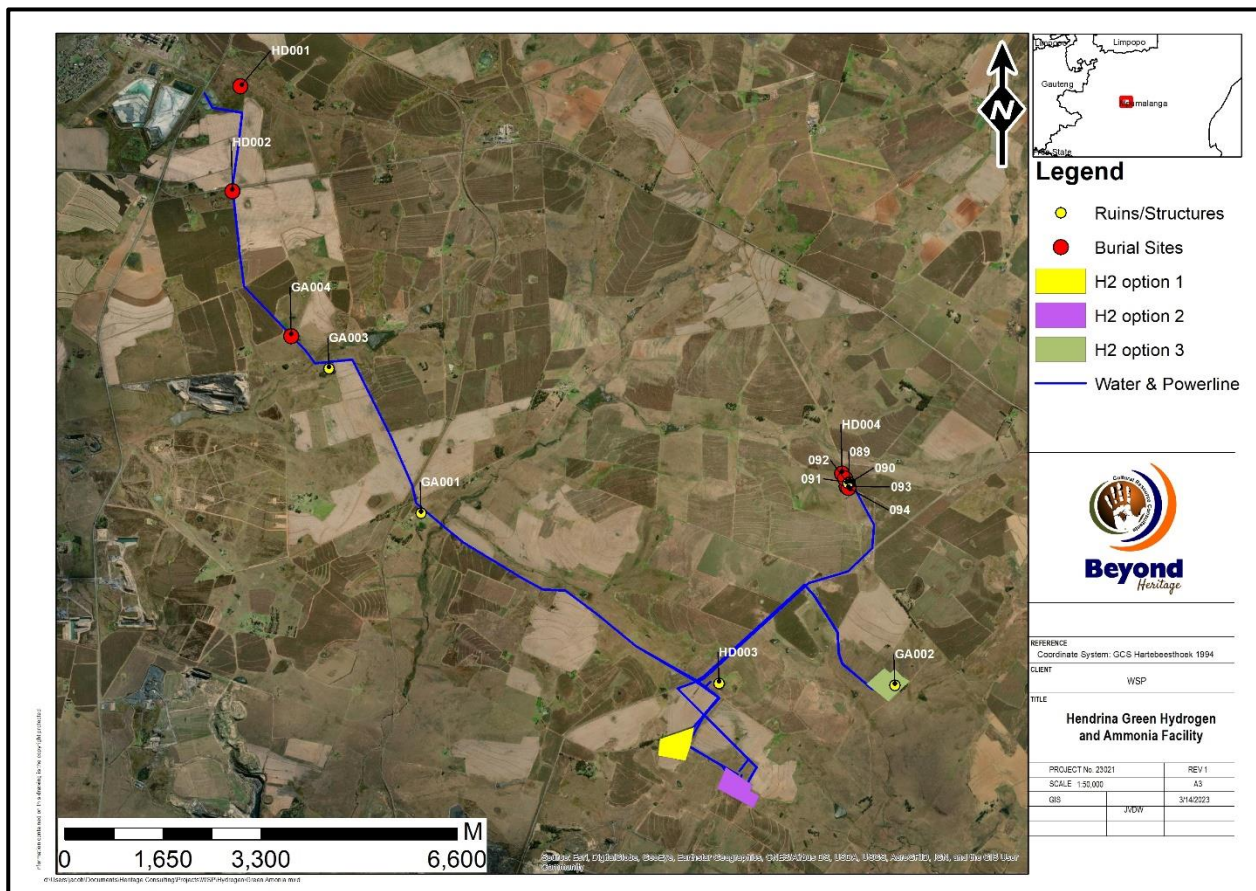


Figure 8.1. Site distribution map.

Table 7. Recorded observations

Label	Longitude	Latitude	Type Site	Description	Significance And Field Rating
089, 090, 091, 092	29° 34' 40.8793" E	26° 09' 28.7928" S	Ruins	Remains of a small homestead on the side of a large gravel road. The site consists of the remains of multiple small, demolished structures that are half buried under overgrown grass over an area measuring ~ 40 x 40m. Only the ephemeral foundations of the structures are left. These features are located in association with burial sites recorded as 093 and 094.	The ruins potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (GP C) unless associated with burial sites (e.g., still born graves) in which case the burial sites are of high social significance (GP A)
093	29° 34' 41.0124" E	26° 09' 28.6452" S	Cemetery	Four graves situated in a small fenced off area (4 x 10 m) near an existing access road. New granite gravestones and skirting have been placed over the graves with the older material laying on the side of the small cemetery.	GP A High Social significance
094	29° 34' 40.3177" E	26° 09' 28.3643" S	Cemetery	A single grave that is fenced off and is probably that of a child due to its size. The grave also has a fairly modern granite gravestone and cover. - Dated 1932.	GP A High Social significance
HD001 (previously recorded as 095)	29° 34' 40.0296" E	26° 09' 28.9980" S	Burial Sites	Two graves situated near the Komati power station. The graves are situated directly under an existing powerline. The graves both have granite headstones and grave dressings. The area measures 4 x 2 m. The graves date to 1965 and 1975 respectively. This site is located outside of the study area and are not further discussed here as they will not be impacted on by the proposed project.	GP A High social significance
HD002 (Previously recorded as 096)	29° 34' 39.1189" E	26° 09' 30.7548" S	Cemetery	Informal cemetery located next to the main road. The cemetery has recently been cleaned of most vegetation suggesting recent use. The cemetery is partially fenced off with a degraded wire fence. Various graves are found within the cemetery including infant and adult graves. Grave dressings consist of packed stone, cement, tiles and granite. The cemetery measures 25 x 15 m. Visible dates on the headstones include 1948 and 2011.	GP A High social significance
HD003 (Previously recorded as 097)	29° 34' 40.2529" E	26° 09' 31.5505" S	Ruins	Large partially broken-down farmstead situated near the main road. The farmstead contains multiple broken-down structures scattered across a wide area including a large farmhouse, brick silo and various cement foundations. The structures are mostly broken down and overgrown. The site is also surrounded by maize fields.	The ruins potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (GP C) unless associated with burial sites (e.g., still born graves) in which case the burial sites are of high social significance (GP A)
HD004 (Previously recorded waypoint 098)	29° 29' 08.6315" E	26° 05' 52.7605" S	Cemetery	4 to 5 graves in a small cemetery situated on the fence line of a large cultivated field. The cemetery is degraded and overgrown. The feature measures 4 x 2 m.	GP A High Social significance
HD101	29° 29' 04.3223" E	26° 06' 49.9068" S	Grave	Possible packed stone grave situated in an area close to the aforementioned sites. The potential	GP A High Social significance if it is a burial site

				grave site consists of multiple stones that seem to have been packed as grave dressing with a piece of corrugated iron situated nearby that could have formed part of a grave marker.	
GA001	29° 34' 36.6059" E	26° 09' 23.6628" S	Built Environment	Large degraded and disused farmstead containing multiple structure associated with cattle farming. These include a large degrading structure that contains feeding bays and multiple rooms, various feeding troughs spread throughout the area, a large brick and cement silo and a series of large raised cement foundations	GP C Low significance
GA002	29° 34' 38.3377" E	26° 09' 26.3447" S	Built Environment	Series of extremely degraded and overgrown foundations as well as some lines of packed stone possibly indicating the remnants of a packed stone wall. The foundations or mounds resemble small informal structures that include one rondawel and a small multi-roomed structure. The features are all situated within a thicket of Eucalyptus trees on the edge of a gravel road that runs along the southern edge of the project.	GP C Low significance
GA003	29° 30' 47.2104" E	26° 09' 45.3060" S	Built Environment	Series of broken-down structures and foundations built from cut stone, brick and cement. The site contains multiple foundations scattered across the area and resemble a past farmstead that has been demolished	GP C Low significance
GA004	29° 35' 05.4383" E	26° 11' 19.1256" S	Burial Site	Small cemetery (10 – 15 graves) situated next to an existing agricultural field near a small gravel road. A small stream also runs towards the eastern edge of the small burial site. The burial site contains various graves made from packed stones, cement and brick, granite as well as various headstones such as granite and metal grave markers and measures 30 x 10 m.	GP A High Social significance



Figure 8.2. Demolished remains of structures at Feature 091.



Figure 8.3. General site conditions showing the ephemeral remains of the structures at Feature 091.



Figure 8.4. Grave dressings at Feature 093.



Figure 8.5 Single grave at Feature 094.

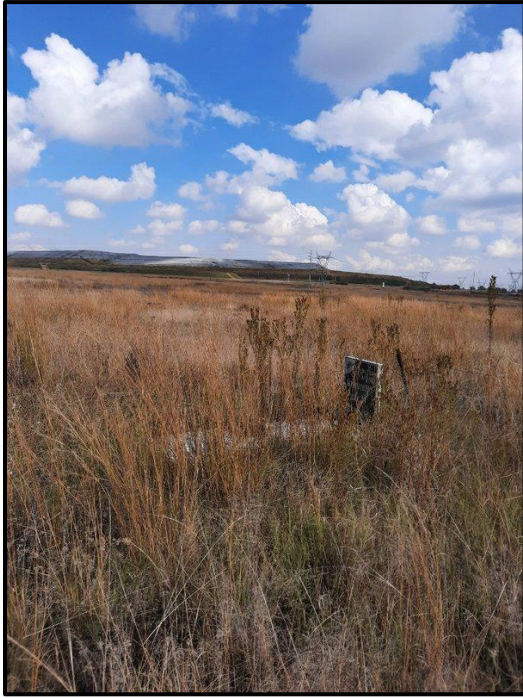


Figure 8.6. Graves recorded at Waypoint 095.



Figure 8.7. Graves recorded at Waypoint 096.



Figure 8.8. Brick structures at Waypoint 097.



Figure 8.9. Cemetery recorded at HD004.

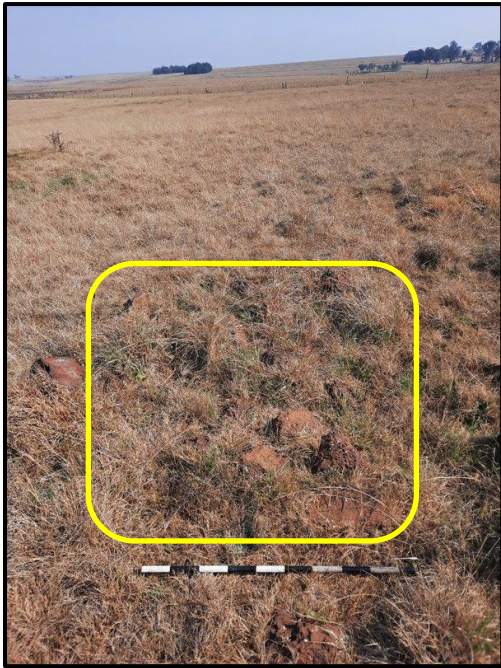


Figure 8.10. Potential stone packed grave at HD101.



Figure 8.11. Corrugated iron that could have been a grave marker at HD101.



Figure 8.12. Built feature at GA001 – north facing wall.



Figure 8.13. Stone packed feature on Eastern site of GA002.



Figure 8.14. Remains of a rectangular structure at GA003.



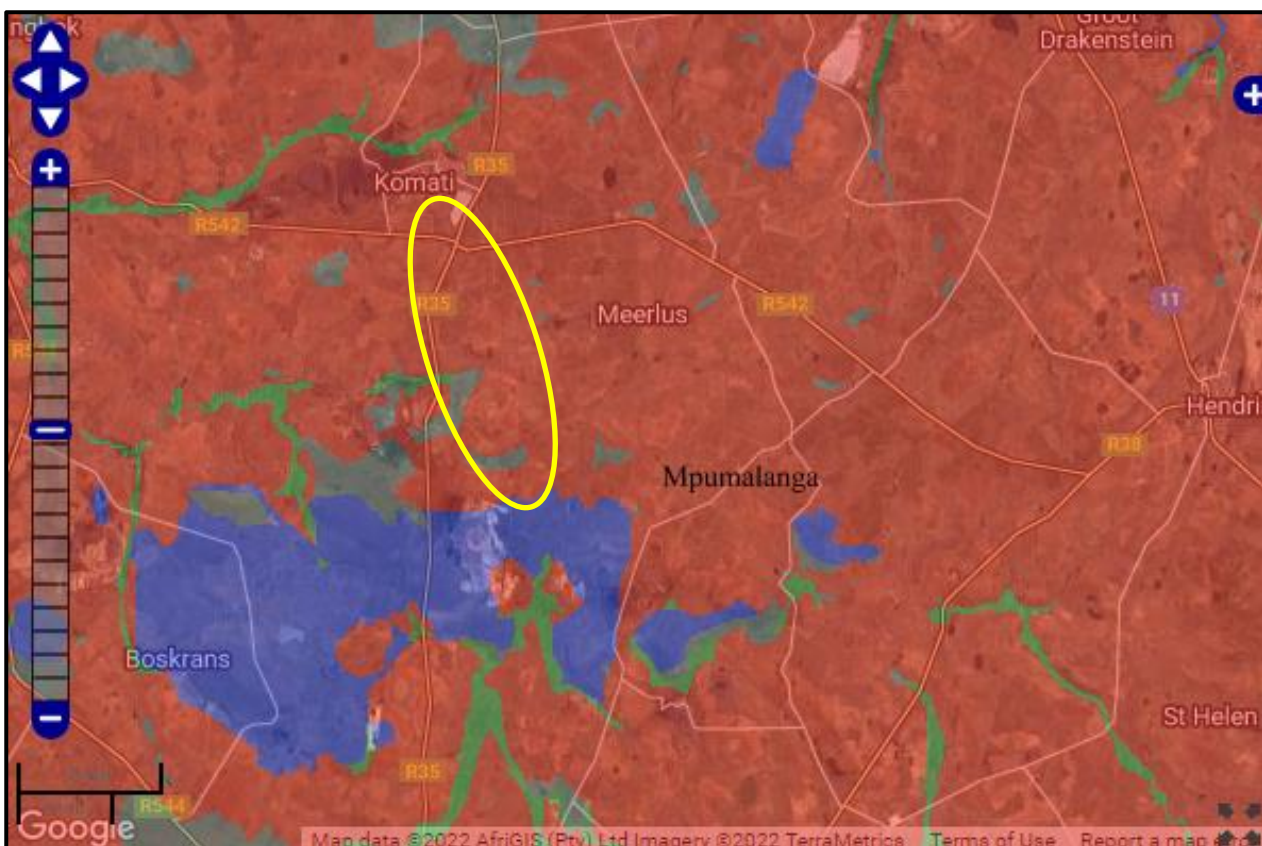
Figure 8.15. General view of graves in the cemetery at GA004.

8.2 Cultural Landscape

The study area is in a rural setting and characterised by cultivation and agricultural activities with a historical layering consisting of burial sites and historical occupation.

8.3 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of very high paleontological significance (Figure 8.16) and an independent study was conducted for this aspect. Bamford (2022) found that the proposed routes lie on the potentially very highly sensitive Vryheid Formation (Ecca Group, Karoo Supergroup) that could preserve impressions of fossil plants of the *Glossopteris* flora. The site visit and walk through by the palaeontologist at the end of 2022 (summer) confirmed that there were NO FOSSILS of any kind present on the land surface. Most of the route is adjacent to existing roads and servitudes or across secondary grasslands or agricultural fields so there were no rocky outcrops and no fossils. 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 contractor, developer, environmental officer, or other designated responsible person once excavations for pole foundations, access roads or the new substation have commenced. Both routes are on the Vryheid Formation so there is no preferred option as far as the palaeontology is concerned. Since the impact will be low to moderate, 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 8.16. 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. It is assumed that the pre-construction and construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can impact on heritage features and impacts include destruction or partial destruction of non-renewable heritage resources. Impacts during the operation phase is considered to affect the cultural landscape and sense of place.

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

- Establishment of new roads and upgrade of existing roads;
- Earthworks for temporary infrastructure including laydown areas;
- Visual impact of The Project on the landscape and sense of place;
- Excavation and levelling of facility footprint;
- Trenches for pipelines and excavations for the erection of powerlines;

The powerline Alternatives (1,2 and 3) will have a direct impact on some of the identified heritage features. Table 8 indicates the distance of the sites from the proposed infrastructure and recommended mitigation.

Table 8. Recorded features in relation to the project infrastructure.

Label	Type Site	Significance And Field Rating	Impact	Mitigation
089, 090, 091, 092	Ruins	The ruins potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (GP C) unless associated with burial sites (e.g., still born graves) in which case the burial sites are of high social significance (GP A)	Option 2 Powerline	If avoidance is not possible the presence of graves should be confirmed during social consultation and the area should be monitored during construction.
093	Cemetery	GP A High Social significance	90 m from Option 2 Powerline	Avoid with a 30m buffer zone and ensure access for family members
094	Cemetery	GP A High Social significance	90 m from Option 2 Powerline	Avoid with a 30m buffer zone and ensure access for family members
HD001 (previously recorded as 095)	Burial Sites	GP A High social significance	No direct impact expected	Avoid with a 30m buffer zone and ensure access for family members
HD002 (Previously recorded as 096)	Cemetery	GP A High social significance	7 m east of Powerlines	Avoid with a 30m buffer zone and ensure access for family members
HD003 (Previously recorded as 097)	Ruins	The ruins potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (GP C)	188 m Southeast of Powerlines – no impact expected	No preconstruction mitigation required.
HD004 (Previously recorded waypoint 098)	Cemetery	GP A High Social significance	130m from Powerlines – no impact expected.	Avoid with a 30m buffer zone and ensure access for family members
HD101	Grave	GP A High Social significance if it is a burial site	50 m from Powerlines	Avoid with a 30m buffer zone and ensure access for family members
GA001	Built Environment	GP C Low significance	75 m from Option 1 Powerline	No preconstruction mitigation required.

GA002	Built Environment	GP C Low significance	H2 Option 3	If avoidance is not possible the presence of graves should be confirmed during social consultation and the area should be monitored during construction.
GA003	Built Environment	GP C Low significance	120 m South of the powerline – no direct impact expected	No preconstruction mitigation required.
GA004	Cemetery	GP A High Social significance	8m from Powerline	Avoid with a 30m buffer zone and ensure access for family members

Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the pre-construction and construction activities. Graves at 093, 094, HD001, HD002, HD 004, HD101 and GA004 must be preserved *in situ* with a 30-meter buffer as mitigation measure (prescribed by SAHRA), which means that the linear infrastructure will have to be micro sited in the areas where HD002 and GA004 were recorded. As best practice these features should be indicated with buffer zones on development plans.

Based on the current layout the ruins at GA002 are in the H2 Option 3 footprint and the cluster of sites at 089 – 092 is located close to the Option 2 powerline. Although of low significance the possible presence of graves at the ruins is a risk. If avoidance is not possible the presence of graves should be confirmed during social consultation and the area should be monitored during construction.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. With the implementation of the recommended mitigation measures impacts of the project on heritage resources is acceptable (Table 9).

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

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.

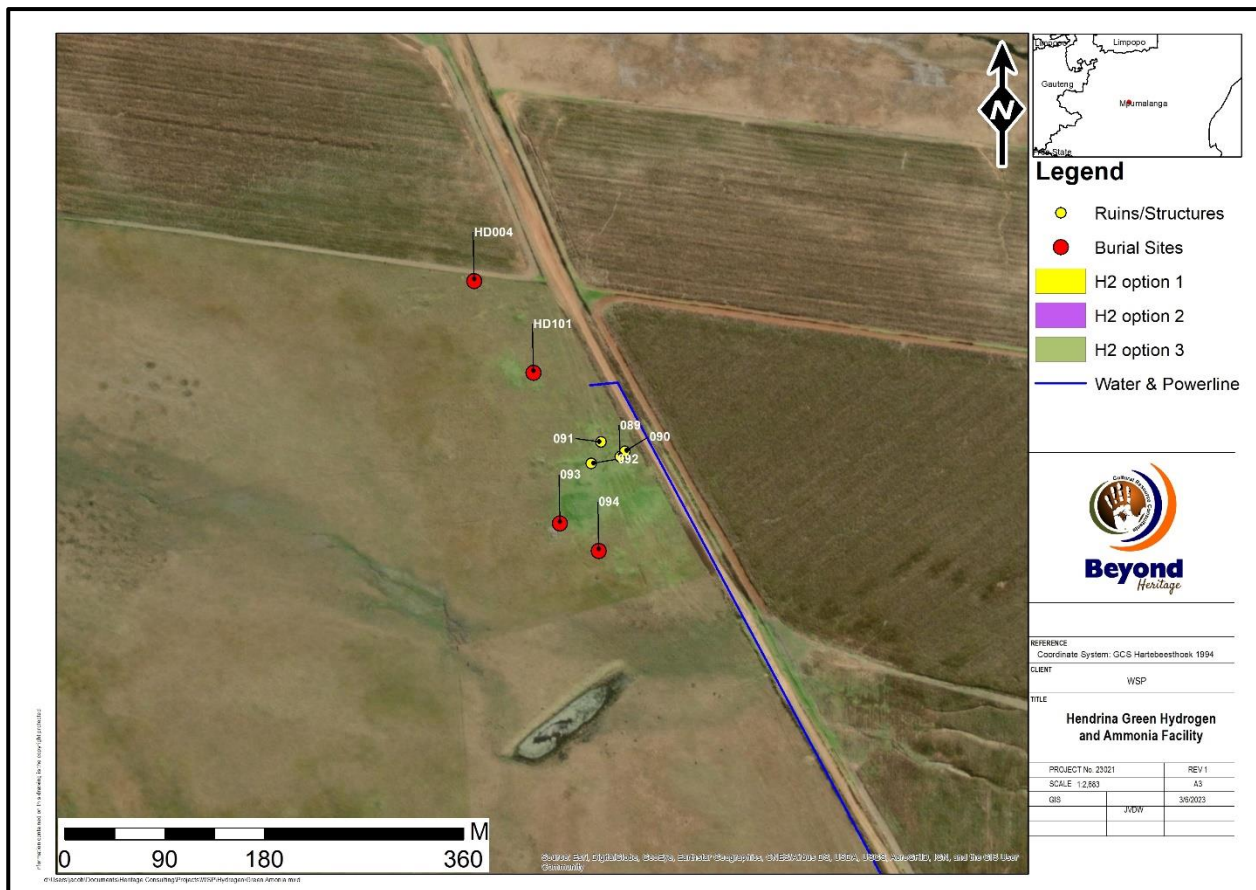


Figure 9.1. Heritage observation in relation to Option 2 of the powerline.

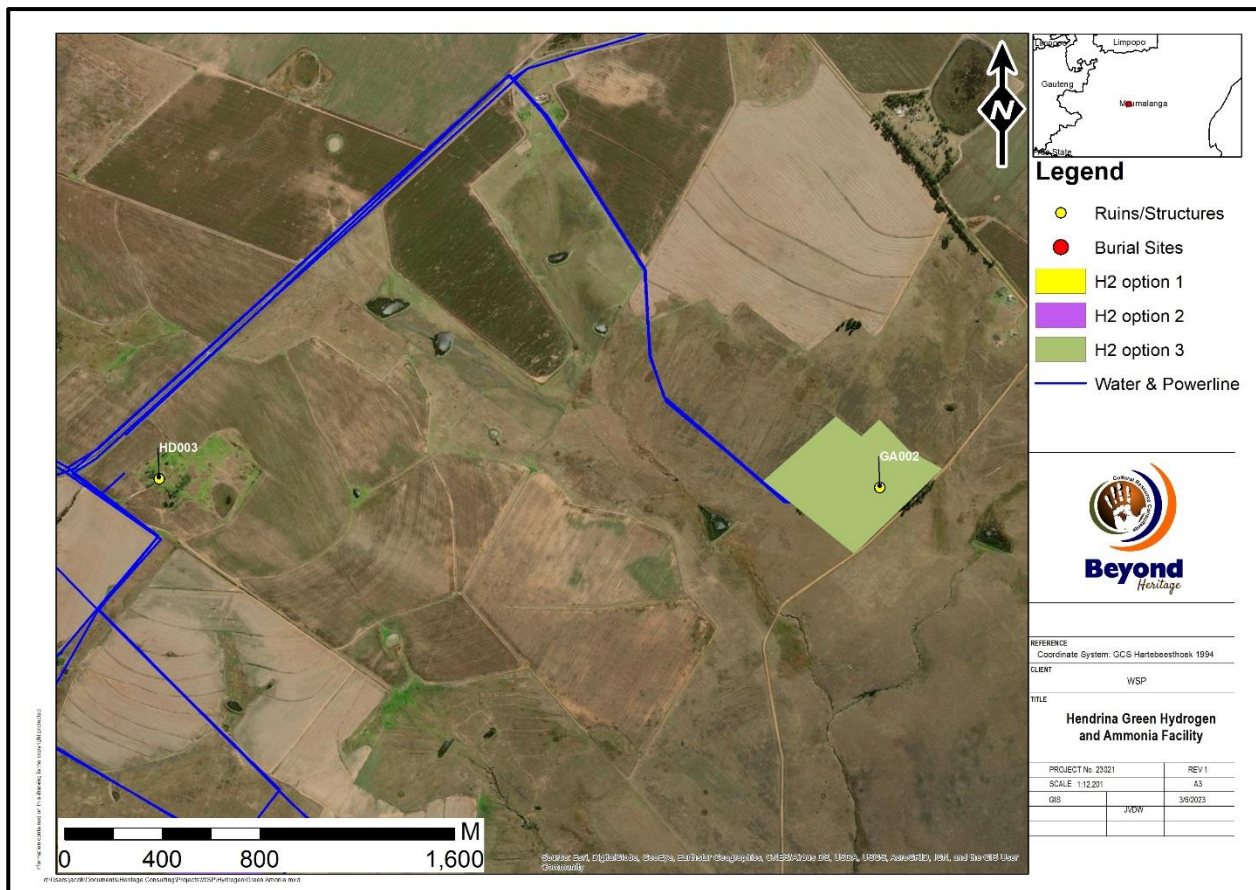


Figure 9.2. GA002 is located in the footprint of H2 Option 3.

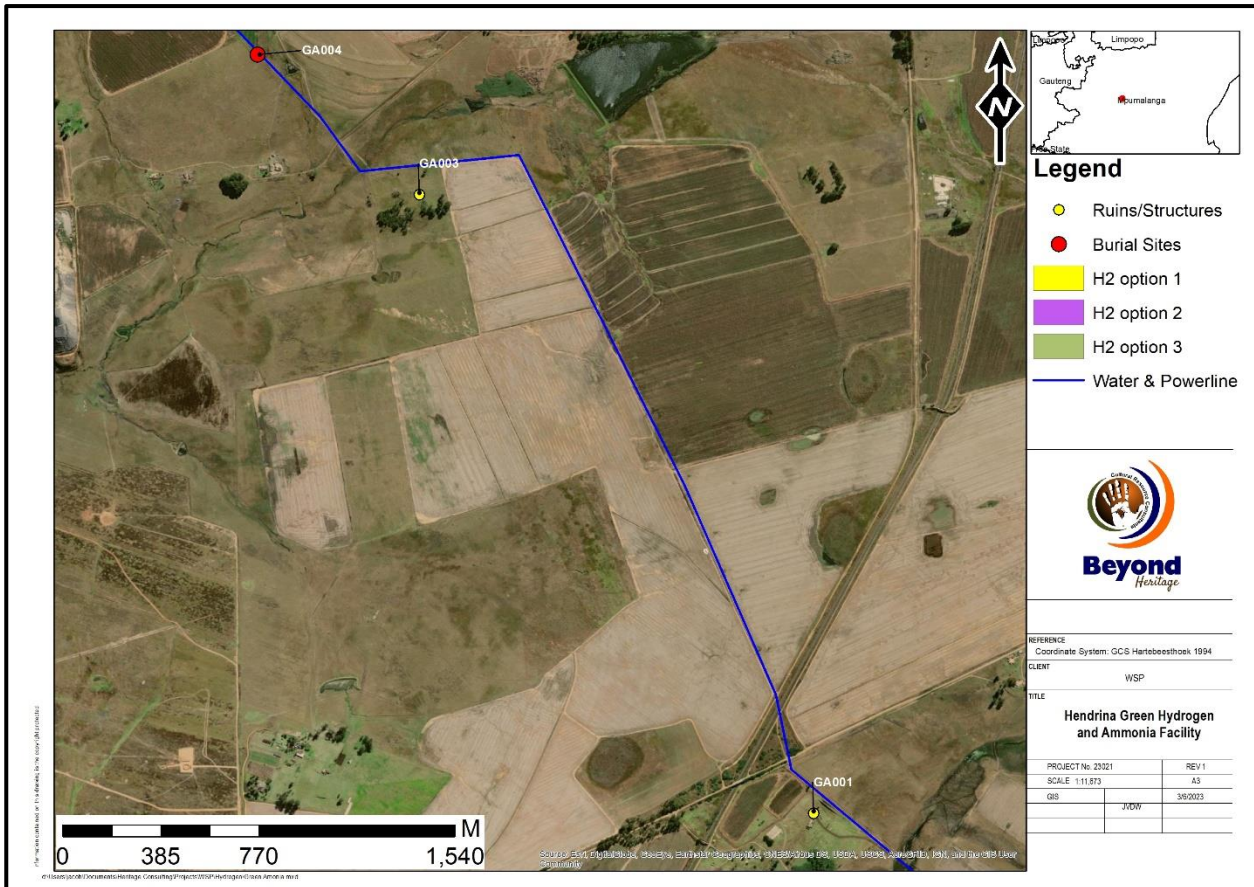


Figure 9.3. Recorded features GA001, GA003 and GA004 in relation to the water and powerline.



Figure 9.4. Graves at GA004 and HD002 in relation to the Water and Powerline.

9.1.4 Impact Assessment for the Project

The impact assessment was done in Appendix B and a comparative assessment of the Alternatives and Project Components is included in Table 9 and Table 10.

Table 9. Comparative Assessment of Alternatives

Alternative	Preference	Reasons (incl. potential issues)
<p>Site Alternative 1 is located on Portion 3 of the Farm Dunbar 189IS, at the site of an old abandoned farmyard and has three powerline options from the associated Hendrina North and South Wind Energy Facilities (“WEF”) as follows:</p> <ul style="list-style-type: none"> • Powerline option 1 is up to 2km in length, to the Hendrina North WEF substation Option 1 on Portion 1 of the Farm Dunbar 189IS; • Powerline option 2 is up to 7km in length, to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS; • Powerline option 3 is up to 1.5km in length, to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS. 	<p>Due to the proximity of a number of sites and high significance burial sites this option is not preferred from a heritage point of view (Option 2 of the powerline).</p>	<p>The Alternative 1 Option 2 Powerline and Option 1 Water Pipeline will directly impact on burial sites of high social significance and with the implementation of mitigation measures the impact of the alternatives can be mitigated to an acceptable level. The water and powerlines will have to be rerouted to avoid heritage sites.</p>
<p>Site Alternative 2 is located on Portion 3 of the Farm Dunbar 189IS and Portion 18 of the Farm Weltevreden 193IS, adjacent to the proposed Hendrina South WEF substation and has three powerline options from the associated wind farms as follows:</p> <ul style="list-style-type: none"> • Powerline option 1 is up to 3km in length to the Hendrina North WEF Option 1 substation on Portion 1 of the Farm Dunbar 189IS; • Powerline option 2 is up to 8km in length to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS; • Powerline option 3 is up to 0.5km in length to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS; <p>water supply to the Site:</p> <ul style="list-style-type: none"> • constructing a new pipeline (up to 16km) from the Komati Power Station 	<p>From a heritage perspective this is the most acceptable option with the implementation of the recommendations in this report.</p>	<p>The alternatives (specifically the Water pipeline) will directly impact on burial sites of high social significance and with the implementation of mitigation measures the impact of the alternatives can be mitigated to an acceptable level. The water and powerlines will have to be rerouted to avoid heritage sites.</p>

Alternative	Preference	Reasons (incl. potential issues)
<p>Site Alternative 3 is located on Portions 14 and 15 of the Farm Weltevreden 193IS and has three powerline options from the associated wind farms as follows:</p> <ul style="list-style-type: none"> • Powerline option 1 is up to 5km in length to the Hendrina North WEF Option 1 substation on Portion 1 of the Farm Dunbar 189IS; • Powerline option 2 is up to 5km in length to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS; • Powerline option 3 is up to 7km in length to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS. <p>water supply to the Site:</p> <ul style="list-style-type: none"> • constructing a new pipeline (up to 16km) from the Komati Power Station 	Not preferred from a heritage point of view.	The footprint of H2 Option 3 will directly impact on a recorded site (GA002) and should preferably be avoided. The alternatives (specifically the Water pipeline) will directly impact on burial sites of high social significance and with the implementation of mitigation measures the impact of the alternatives can be mitigated to an acceptable level. The water and powerlines will have to be rerouted to avoid heritage sites.

Table 10. Impact of components

Alternatives	Impact on Heritage Resources	Suitability	Required Mitigation
Alternative 1	No Impact	Suitable	Implement chance find procedure.
Option 1 A Water	Impact on Graves (GA04 and HD002) and ruins (GA03 and GA01).	With the implementation of the recommended recommendation the alternative is suitable.	Realignment of linear infrastructure to avoid heritage resources.
Option 1 Powerline	Impact on ruin at HD003	With the implementation of the recommended recommendation the alternative is suitable.	Implement chance find procedure.
Option 2 Powerline	Impact on ruins and graves (089 – 094, HD101 and HD004)	With the implementation of the recommended recommendation the alternative is suitable.	Realignment of linear infrastructure to avoid heritage resources.
Alternative 2	No Impact	Suitable	Implement chance find procedure.

Option 2 A Water	Impact on Graves (GA04 and HD002) and ruins (GA03 and GA01).	With the implementation of the recommended recommendation the alternative is suitable.	Realignment of linear infrastructure to avoid heritage resources.
Option 1 Powerline	Impact on ruin at HD003	With the implementation of the recommended recommendation the alternative is suitable.	Implement chance find procedure.
Option 2 Powerline	Impact on ruins and graves (HD003, 089 – 094, HD101 and HD004)	With the implementation of the recommended recommendation the alternative is suitable.	Realignment of linear infrastructure to avoid heritage resources.
Option 3 Powerline	No impact	Suitable	Implement chance find procedure.
Alternative 3	Impact on GA002	With the implementation of the recommended recommendation the alternative is suitable.	Implement chance find procedure.
Option 3 A Water	Impact on Graves (GA004 and HD002) and ruins (GA003, GA002 and GA001).	With the implementation of the recommended recommendation the alternative is suitable.	Realignment of linear infrastructure to avoid heritage resources.
Option 1 Powerline	Ruins at HD003 and GA002	With the implementation of the recommended recommendation the alternative is suitable.	Implement chance find procedure.
Option 2 Powerline	GA002 and 089 – 094 as well as HD101 and HD002	With the implementation of the recommended recommendation the alternative is suitable.	Realignment of linear infrastructure to avoid heritage resources.
Option 3 Powerline	GA002 and HD003	With the implementation of the recommended recommendation the alternative is suitable.	Implement chance find procedure.

10 Conclusion and recommendations

The Project area is characterised by extensive cultivated fields and is of low archaeological potential. This was confirmed during the field survey and no archaeological sites of significance were noted and finds were limited to burial sites (Feature 093, 094, HD001, HD002, HD 004, HD101 and GA004) as well as ruins (Feature 089, 090, 091, 092, HD003, GA001, GA002, and GA003). The survey focused on tangible heritage resources within the proposed footprint however several features (residential dwellings and settlements) were also noted outside of the proposed project footprint. These features (Figure 8.1) were not assessed as they will not be directly impacted on, but burial sites can be found in these areas.

All three powerlines and water supply pipeline will impact on burial sites at HD002 and GA004. The sites must be preserved *in situ* with a 30-meter buffer as mitigation measure (prescribed by SAHRA), which means that the powerlines and water supply pipeline will have to be micro sited in these areas.

Based on the current layout the ruins at GA002 are located in the H2 Option 3 footprint and the cluster of sites at 089 – 092 is located close to the Option 2 powerline. Although of low significance the possible presence of graves at the ruins is a risk. If avoidance is not possible the presence of graves should be confirmed during social consultation and the area should be monitored during construction.

According to the SAHRA Paleontological sensitivity map the study area is of very high paleontological significance (Figure 8.16) and an independent study was conducted for this aspect. Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the loose soils and sands of the Quaternary. There is a very small chance that fossils may occur in below the ground surface in the shales of the Vryheid Formation but more than 20m down, so a Fossil Chance Find Protocol should be added to the EMP.

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

10.1 Recommendations for condition of authorisation

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

Recommendations:

- Graves at 093, 094, HD001, HD002, HD 004, HD101 and GA004 must be preserved *in situ* with a 30-meter buffer as mitigation measure (prescribed by SAHRA), which means that the linear infrastructure will have to be micro sited in the areas where HD002 and GA004 were recorded.
- Based on the current layout the ruins at GA002 are located in the H2 Option 3 footprint and the cluster of sites at 089 – 092 is located close to the Option 2 powerline. Although of low significance the possible presence of graves at the ruins is a risk. If avoidance is not possible the presence of graves should be confirmed during social consultation and the area should be monitored during construction.
- Implementation of the ENERTRAG Chance Find Procedure for the project (Appendix A);
- Pre-construction heritage walkdown of any deviations of the current layout.

10.2 Reasoned Opinion

The overall impact of the project and residual impacts can be mitigated 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 11. 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	Daily	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 12. Heritage Management Plan for EMPr implementation

Impact Management Actions		Implementation		Monitoring	
Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Applicant EAP	Implementation of the ENERTRAG Chance Find Procedure for the project (Appendix A);	Throughout the construction phase	EO	Daily	ECO Checklist/Report
Applicant EAP	Monitoring by the ECO.	Throughout the construction phase	ECO	Weekly	ECO Checklist/Report
Applicant EAP	Heritage Walkdown of any deviation on the current layout prior to construction.	Pre-Construction	Archaeologist appointed by developer	Once off	Walkdown report
Applicant EAP	Based on the current layout the ruins at GA002 are located in the H2 Option 3 footprint and the cluster of sites at 089 – 092 is located close to the Option 2 powerline. Although of low significance the possible presence of graves at the ruins is a risk. If avoidance is not possible the presence of graves should be confirmed during social consultation	Pre-Construction	Developer	Continuously	ECO Checklist/Report

	and the area should be monitored during construction.				
Applicant/ EAP	Graves at 093, 094, HD001, HD002, HD 004, HD101 and GA004 must be preserved <i>in situ</i> with a 30-meter buffer as mitigation measure (prescribed by SAHRA), which means that the linear infrastructure will have to be micro sited in the areas where HD002 and GA004 were recorded.	Pre-Construction	Developer	Continuously	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. The discrepancy between Google Earth, handheld GPS and GIS projections could cause some project components to not be addressed during this study. This should be verified by the client.

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Appendix A

ENERTRAG Chance Find Procedure

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1 Introduction

Cultural heritage can represent irreplaceable sources of life and inspiration and should be safeguarded. Although there are always cultural heritage studies conducted in the Project and its area of influence, there is always potential for new discoveries to be made, especially during excavation activities. Finds can include fossils, archaeological, paleontological or sacred sites as well as more modern graves.

Heritage resources are protected in terms of the Heritage Resources Act (Act No 25 OF 1999). The Act usually sets out the overarching administrative processes for protecting and preserving cultural heritage and management by the Developer. Successful implementation requires everyone being alert to the possibility of finds, applying the specified measures and notifying immediate Site Supervisor, Environmental Officer, Environmental Control Officer (ECO) that should in turn inform relevant Authorities as appropriate.

2. Objectives

This Procedure aims to protect and preserve any cultural heritage discovery from potential adverse impacts associated with the construction and operation activities of the proposed Project.

3. Responsibilities

a. Developer

Developer shall:

- Ensure correct implementation of chance find procedure upon any chance finds or suspected discoveries.

b. Contractor

The Contractor shall:

- Oversee and provide resources for the implementation of this procedure;
- Co-ordinate the chance find with the Archaeologist / other Heritage Specialist.
- Inform relevant Authorities as appropriate in case of find; and
- Obtain any necessary permits if required

4. Training

Awareness training should be conducted by the EPC Environmental Officer (EO) for all Employees. The training should include, as a minimum, the following:

- Identifying potential features of heritage significance;
- Procedures for dealing with heritage resources discovered on site;
- Applicable Legislation pertaining to the protection of heritage resources; and
- The importance of protecting heritage resources.

Photographs of similar fossil plants must be provided to the EPC to assist in recognizing the fossil plants in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures

5. Procedure

a. Archaeological Heritage and Palaeontological Discoveries during Works

Any archaeological or heritage site discoveries during works should be reported to immediate Supervisor, EO and/ECO and treated as an incident. Following the incident and within two hours the Contractor EO

notify Developer in writing. Work at the affected area should cease immediately, the area should be demarcated until further instructions by relevant Specialist and /or relevant Authorities. The EPC Contractor or other person discovering a potentially significant site or artefact should initiate the following actions:

i. Stop Work

- Inform the immediate Supervisor, EO, ECO and Developer;
- Stop work in the immediate area and take digital photographs to record the find; and
- Install temporary site protection measures (e.g. delineate a 'no-go' area using warning tape, stakes and signage / deploy worker and give instructions to prevent access or further disturbance) and take all reasonable steps to avoid any further disturbance or damage from excavation, vibration, plant or machinery.

ii. Reporting

- Inform all relevant Employees of the chance find and whether access to the work area is being restricted;
- EPC EO to consult with an Archaeologist / Palaeontologist Specialist, providing photographic records for a preliminary assessment.
- The specialist shall be responsible for evaluating whether the chance find needs to be classified as cultural heritage etc and if so, whether it is isolated or part of a larger site or feature;
- The specialist will be required to highlight the way forward
- EPC will notify the relevant Authorities
- Should any fossils or artefact need to be removed from the site a SAHRA permit must be obtained by the EPC.
- Annual reports must be submitted to SAHRA as required by the relevant permits.

iii. General Mitigation / Treatment Strategies

- Artefacts are to be left in place for recording by the specialist/archaeologist. It is important they are not disturbed or moved as their setting is as important as the artefact/fossil; if materials are to be collected they should be placed in bags and labelled by the Specialist /Archaeologist and forwarded to the Authorities in a manner that ensures the integrity of the 'chain of custody';
- Project personnel are not permitted to take or keep artefacts as personal possessions as that is a criminal offence;
- Any damage, accidental or otherwise, should be investigated by the EPC Contractor detailing corrective actions, with digital images, maps and plans showing any locations that are no-go, limited access or present risks of further chance finds;
- Stakeholder engagement may be needed with affected communities to determine the correct mitigation actions or, if applicable, suitable compensation (e.g. reburial costs). Site treatment scenarios may include:
 - Preservation in place through avoidance or re-routing or specialized construction techniques, and/or
 - Rescue excavations to remove, record and relocate in advance of further construction work if avoidance is not possible.
- If the chance find is an isolated artefact/site or is not classed as cultural heritage, the Site Supervisor should approve the removal of site protection measures and activity can resume only with consultation and approval of the Local Authorities;
- While required treatment is ongoing, EPC Contractor should coordinate with the relevant Employees keeping them informed as to the status and schedule of investigations / actions, and informing them when activities may resume;

6. Monitoring

Monitoring should be conducted as required to assess control success, to gauge the effectiveness of prevention plans. The Contractor should monitor their activities to prevent the damaging of heritage resources. Monitoring for heritage resources should be integrated into EO and ECO monitoring Programme.

Appendix B – Impact Assessment Methodology.