

**ARCHAEOLOGICAL AND CULTURAL HERITAGE SITE SENSITIVITY VERIFICATION FOR THE
PROPOSED DEVELOPMENT OF RENEWSTABLE®BOKAMOSO ON THE FARM RIET FONTEIN
66HS WITHIN THE DR PIXLEY KA ISAKA SEME LOCAL MUNICIPALITY IN THE MPUMALANGA
PROVINCE**

Site Sensitivity Verification

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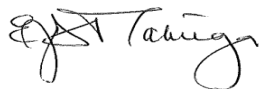
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DISCLAIMER

All possible care was taken to identify and document heritage resources during the survey in accordance with best practices in archaeology and heritage management. However, it is always possible that some hidden or subterranean sites are overlooked during a survey. AHSA will not be held liable for such oversights and additional costs thereof.



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ABBREVIATIONS

ASAPA	:	Association of South African Professional Archaeologists
BGG1	:	Burial Ground and Graves CFPs
CFP	:	Chance Finds Protocol
CMP	:	Conservation Management Plan
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
GPS	:	Global Positioning System
GRP	:	Grave Relocation Plan
HIA	:	Heritage Impact Assessment
LIA	:	Late Iron Age
LSA	:	Late Stone Age
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
PIA	:	Palaeontological Impact Assessment
SAHRA	:	South African Heritage Resources Agency

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EXECUTIVE SUMMARY

As part of the Eskom land tender MWP1247GX, Hydrogene de France (HDF) Energy has been awarded 1782 ha of Eskom's land to develop 8 Renewstable® power plants in Mpumalanga, South Africa. Distributed over Five (5) different plots within Tutuka and Majuba Coal Power Stations, HDF-Energy is part of a cluster of different project developers, also awarded with land in the area for developing infrastructure related to renewable energy production. HDF-Energy, under its Special Purpose Company (SPC) "Renewstable Mpumalanga (Pty) Ltd", is undertaking the development and implementation of 4 projects referred to as Majuba Cluster that consists of the following:

- Renewstable® Ntokozo
- **Renewstable® Bokamoso**
- Renewstable® Sivutse
- Renewstable® Qhakaza

These projects are high-capacity renewable power plants based on hydrogen energy storage technology, focusing on the 74MW Renewstable® Bokamoso. The power plant will harness renewable energy from a solar Photovoltaic (PV) plant and convert it into hydrogen using an electrolyser system.

The proposed 74MW Renewstable® Bokamoso will be within an agricultural area on Portions 4, 5, 10, and the Remaining Extent of the Farm Rietfontein 66HS, approximately 3 km northeast of Majuba Power Station and approximately 7 km southwest of Amersfoort. The site is within Ward 8 in the jurisdiction of Dr. Pixley Ka Isaka Seme Local Municipality in the Mpumalanga Province under the Gert Sibande District Municipality. The extent of the site is approximately 490 ha.

This report is the outcome of a site sensitivity verification (SSV) undertaken for the proposed Renewstable Bokamoso in Mpumalanga Province. An HIA is a pre-caution taken to make sure that the proposed development does not impact heritage resources that might occur in the footprint of the development.

General observations

Stone Ages sites are not commonly encountered on the central and eastern lowveld away from streams and pans. Furthermore, in areas that have been under commercial cultivation, no Stone Age artefacts or features can be expected.

The Stone Age

No Stone Age artefacts were found during the survey.

The Iron Age

No archaeological objects or features dating to the Iron Age were found.

Burial Grounds

Isolated graves has been documented. A 30m buffer has been applied to the graves and the footprint of the development has been reduced. An application will be made to SAHRA for regularisation of the proposed 30m buffer. Otherwise the developer will apply for an exhumation and relocation permit.

Cultural Landscape Significance

Cultural landscapes are cultural properties that represent the “combined works of nature and of man” designated in Article 1 of the World Heritage Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.

It is difficult to reconstruct the archaeological cultural landscape in the broader area. The present characteristics represents the impact of modern commercial farming. A typical footprint consists of barbed wire fenced divisions of open subtropical grasslands and/or cultivated fields. These landscape features are typical over a large area. The development will have low impact on this type of heritage.

Ranking of Sites and Risk Assessment

Grade I National	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2, or 3A heritage resources	
Grade II Provincial	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 2 heritage resources	

Medium IIIA	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 3A heritage resources	
Medium IIIB	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources	
Medium IIIB	Graves. Public sensibilities about the sanctity of graves and human remains	1
Low IIIC	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources	1
	TOTAL	

Applying the DFFE Site Sensitivity Verification

According to the DFFE Screening Tool, the presumed heritage sensitivity of the footprint of the proposed development is rated as very high. The site sensitivity was confirmed to be medium as a 30m buffer has been applied to the study area and the footprint of the development has been reduced.

Theme		Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Archaeological and Cultural Heritage	PRESUMED	X			
	ACTUAL		X		

Recommendations And Conclusion

The project must be given a green light while recommendations made on the treatment of the Burial Ground are heeded. In the event of other heritage resources being discovered during construction, the Provincial Heritage Resources Authority or SAHRA must be alerted immediately and an archaeologist be appointed for assessment.

1. INTRODUCTION

As part of the Eskom lander tender MWP1247GX, Hydrogene de France (HDF) has been awarded 1782 ha of Eskom's land to develop 8 Renewstable® power plants in the province of Mpumalanga, South Africa. Distributed over Five (5) plots within Tutuka and Majuba Coal Power Stations, HDF-Energy is part of a cluster of different project developers, also awarded land in the area to develop infrastructure related to renewable energy production. HDF-Energy, under its Special Purpose Company (SPC) "Renewstable Mpumalanga (Pty) Ltd", is undertaking the development and implementation of 4 projects referred to as Majuba Cluster that consists of the following:

- Renewstable® Qhakaza
- **Renewstable® Bokamoso**
- Renewstable® Sivutse
- Renewstable® Ntokozo.

The project's main objective is to design, develop, build, manufacture, operate, and maintain a 74MW Renewstable® Bokamoso power plant and related infrastructure near Amersfoort in Mpumalanga to generate clean energy/electricity, increase access to electricity and contribute to the country's sustainable development initiatives.

1.1. Location and Physical Setting

The proposed project is located outside an urban area on Portions 4, 5, 10 and the Remaining Extent of the Farm Rietfontein 66HS, approximately 3 km northeast of Majuba Power Station and approximately 7 km southwest of Amersfoort. The site is within Ward 8 in the Dr Pixley Ka Isaka Seme Local Municipality jurisdiction in the Mpumalanga Province under the Gert Sibande District Municipality.

The proposed development is situated on the high plains of southern Mpumalanga province 40 km northwest of Volksrust. Volksrust is of important geographical reference. As it is situated on the eastern Highveld, the eastern part of the high plateau flanked by the Drakensberg mountain range. The area is characterised by rolling plains covered with Savanna grass. Trees may be found in sheltered areas along streams, and exotic plantings found at farmsteads where they provide windbreaks. Woodland cover tends to be confined to sheltered river valleys. The rolling plains are host to large reserves of coal which have been exploited to supply several power stations in the eastern part of the highveld including Majuba.

2. NATURE OF PROPOSED DEVELOPMENT

The project involves developing the 74MW Renewstable® Bokamoso Power Plant, a high-capacity renewable power plant based on hydrogen BESS storage technology that harnesses renewable energy from a Photovoltaic (PV) Park and converts it into hydrogen using an electrolyser system. This hydrogen is stored in a compressed gas form; subsequently, when the photovoltaic park generates insufficient energy, the stored hydrogen is utilised to produce electricity for the grid through a fuel cell system. This innovative approach ensures a continuous and reliable power supply even when the PV park's energy production is inadequate. The system will only emit oxygen and water vapour as by-products.

The electricity produced by the plants will be purchased by a private(s) off-taker (s) at an agreed rate under the Power Purchase Agreement (PPA) for at least 25 years from the commissioning. The power plant is scheduled to be commissioned in 2027 and will contribute to the greening of the local power grid and enhance the territory's energy independence. The proposed development entails the following primary infrastructure:

Primary Infrastructure	Power produced
Baseload electricity	55MW day, and evening 12 MW night
Solar plant	210MWp
Electrolyser	60MW
Green H2 storage	250MWh
High-capacity fuel cells	12MW
Battery power	220MW
Battery storage	55MWh
Capacity production	87%
Land required	315 hectares
Electricity production	841.09 MWh daily 307 000 MWh yearly

Associated infrastructure includes the following:

- Hydrogen Power Centre
- Control Room

- Access/Service roads
- Buildings
- Fencing and Security
- Communications DC and AC cables installed underground and overhead
- High Voltage Collector station that will be shared with other IPPS

The development of power entails physical works which may cause damage or destruction of heritage resources:

- Clearance of vegetation, grubbing / stripping of topsoil
- Deep foundation excavations
- Development of permanent and temporary roads
- Clearance for the placement of plant and temporary offices
- Landscaping.

The aim of the heritage impact assessment is to identify heritage sites of value in the footprint of the development and recommended strategies for mitigating likely negative impacts of the development.

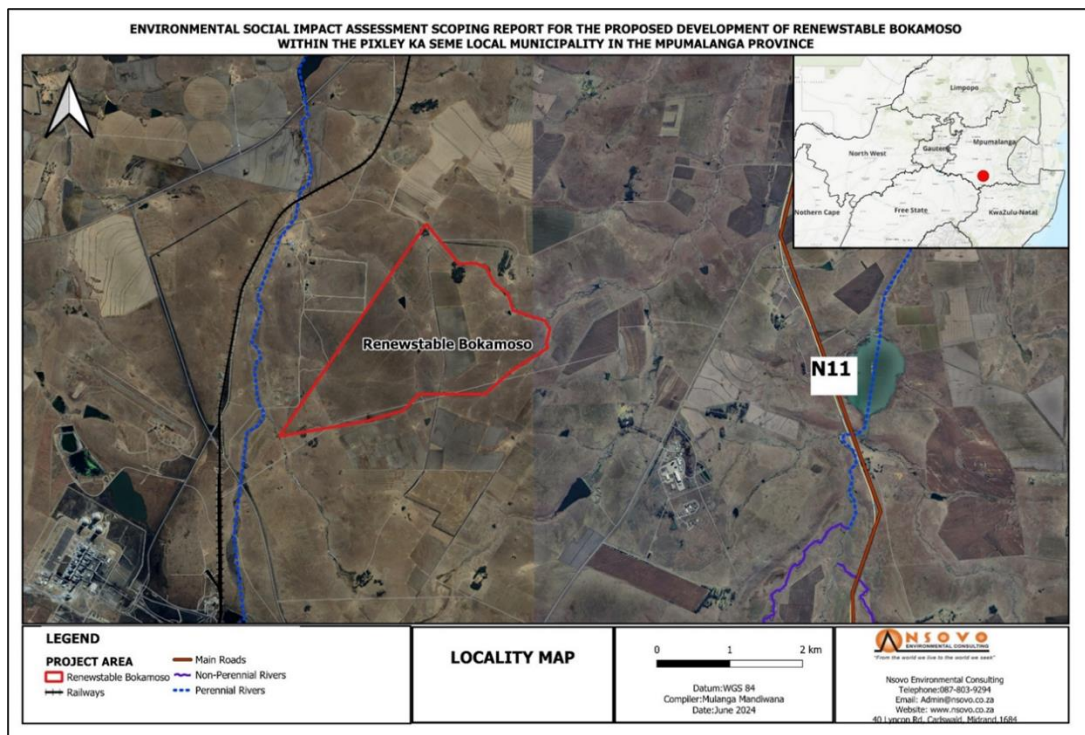


Figure 1: Google Earth map showing the footprint of the proposed power generation project.

3. LEGAL FRAMEWORK

A Heritage Impact Assessment is governed by the NHRA and of particular relevant application are Sections 38, 34, 35, and 36. In this instance, it is necessary to provide details of the legal provisions.

3.1. Heritage Impact Assessment

Section 38 of the NHRA specifies the nature and scale of development projects which require a Heritage Impact Assessment as mitigation:

38. (1) Subject to the provisions of subsections (7), (8), and (9), any person who intends to undertake a development categorised as—

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site—

(i) exceeding 5 000m² in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m² in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

An impact assessment is necessary given the distance threshold set in Section 38(1)(a).

3.2. Protection of Historic Buildings

Section 34 of the NHRA provides for automatic provisional protection of all structures/buildings and features older than 60 years unless proof can be furnished that they do not carry heritage value.

3.3. Protection of Archaeological and Palaeontological Sites

Section 35 (4) of the NHRA prohibits the destruction of archaeological, palaeontological and meteorite sites. A palaeontological desktop survey was undertaken, and a report is appended to this heritage report.

3.4. Protection of Graves and Burial Grounds

Section 36 of the NHRA gives priority to the protection of Graves and Burial Grounds of victims of conflict and graves and burial grounds more than 60 years old. Within this frame cautious approaches are considered including managed exhumations and re-interment to pave way for development.

Graves are generally classified under the following categories:

- Graves younger than 60 years;
- Graves older than 60 years, but younger than 100 years;
- Graves older than 100 years;
- Graves of victims of conflict;
- Graves of individuals of royal descent; and
- Graves that have been specified as important by the Ministers of Arts and Culture.

This study is however mindful of public sensibilities about the sanctity of graves and burial grounds whether they are protected by the law or not.

The **World Archaeological Congress (WAC)** has set international ethical standards for the treatment of human remains. In 1989 the WAC Inter-Congress in South Dakota (USA) adopted the **Vermillion Accord on Human Remains**. Accordingly, respect for the mortal remains of the dead shall be accorded to all, irrespective of origin, race, religion, nationality, custom and tradition.

3.5. The National Environmental Management Act (No 107 / 1999)

This act states that a survey and evaluation of cultural resources must be done in areas where development projects that will affect the environment will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management is a much broader undertaking to cater to cultural and social needs of people. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

3.6. The Burra Charter on Conservation of Places of Cultural Significance

Some generic principles and standards for the protection of heritage resources in South Africa are drawn from international charters and conventions. In particular, South Africa has adopted the **Australia Charter for the Conservation of Places of Cultural Significance (the Burra Charter 1999)** as a benchmark best practice in heritage management.

4. APPROACH AND METHODOLOGY

International best practice in archaeology and heritage management underpins our theoretical approach and methodology. The following tasks define the streams of work that were undertaken:

4.1. Literature Study

This study is primarily based on a desktop study which is a search for relevant literature to provide an understanding of a subject or situation, identify potential risks and inform the detail, scope and methodology of subsequent investigations. To build context a variety of data is needed, including physical and human geography, as well as archaeology and history. The documentary analysis encompassed a wide range of sources including books, reports, articles, and previous impact assessments in the broader area. The internet is an important portal for accessing reports of previous research in the broader area. Heritage Impact Assessment reports are published on the SAHRIS platform managed by the South African Resources Agency (SAHRA). An outline of the cultural sequence in South Africa based on available literature provided context for the identification of heritage resources in the study area.

A site visit was conducted in 2023, and the findings form the backbone of this site sensitivity verification (SSV).¹ Furthermore, the author is familiar with the Majuba area based on previous heritage impact studies in the broader region.

¹ Magoma, M. 2023. Phase I Archaeological and Cultural Heritage Impact Assessment Specialist Report for the Proposed Hydrogen Power Plant near Majuba Power Station On Site Central Riet, Corner and Retaining Dam Riet in the Pixley Ka Seme Local Municipality Of Gert Sibande District Municipality, Mpumalanga Province.

	REPORT	FINDINGS
1	Magoma, M. 2023. Phase I Archaeological and Cultural Heritage Impact Assessment Specialist Report for the Proposed Hydrogen Power Plant near Majuba Power Station on Site Central Riet, Corner and Retaining Dam Riet in the Pixley Ka Seme Local Municipality of Gert Sibande District Municipality, Mpumalanga Province	Burial grounds, stone cairns and graves.
2	Van Der Walt, J. 2015. Archaeological Impact Assessment for the Proposed Establishment of the Proposed solar PV Facility at Tutuka, Mpumalanga Province. (The study was undertaken on Portions 4, 11, 12 of the Farm Pretorius Vley 374 IS on the south side of Tutuka Power Station).	The area had been under cultivation for some time. No archaeological sites or relics were found (page 24).
3	Schalkwyk, J. A. 2012. <i>Heritage Impact Assessment for the Proposed Continuation of Tutuka Ash Disposal Facilities, Mpumalanga province.</i>	No sites or objects of archaeological and historical significance were found (page 9).
4	Matenga, E. 2022. Heritage Impact Assessment (including a Palaeontological Assessment) in Terms of Section 38(8) of the National Heritage Resources Act (No 25 of 1999) for the Proposed Installation of Dual Flue Gas Conditioning Plant at Tutuka Power Station near Standerton, Mpumalanga Province	No heritage resources found.
5	Matenga, E. 2024. Request for Exemption from a Heritage Impact Assessment for The Proposed Extension Of 132kv Eskom Majuba Substation and Associated Infrastructure, Pixley Ka Seme Local Municipality, Mpumalanga	This followed a site visit and ground survey on 28 May 2024. No heritage resources were found.
6	Schalkwyk, J. A. 2022. Heritage Impact Assessment for the Development of a General Waste Disposal Site at the Eskom Majuba Power Station, Mpumalanga Province.	No sites, objects or features of heritage significance found.
7	Vollenhoven, A. C. 2012. Report On a Heritage Impact Assessment for the Proposed Consolidation of Erven 269 And 272 In Volksrust, Mpumalanga Province	No sites of heritage significance identified.

4.2. Ground Survey

A site visit was conducted in July 2023.

4.3. Ranking of Finds

The Table below is used for ranking the significance of the findings.

Grade I National	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2, or 3A heritage resources
Grade II Provincial	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 2 heritage resources
Medium IIIA	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 3A heritage resources
Medium IIIB	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources
Medium IIIB	Graves. Public sensibilities about the sanctity of graves and human remains
Low IIIC	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources
	TOTAL

5. ARCHAEOLOGICAL AND HISTORICAL CONTEXT

The cultural sequence in South Africa begins with the Stone Age and spans nearly four million years. The cultural sequence has specific attributes or identifiers that we look for in an HIA such as stone tools (Stone Age) and pottery and metal implements (Iron Age).

5.1. Cultural Sequence Summary

Table 1: Cultural Sequence Summary

PERIOD	EPOCH	ASSOCIATED CULTURAL GROUPS	TYPICAL MATERIAL EXPRESSIONS
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominids: <i>Australopithecines</i> <i>Homo habilis</i> <i>Homo erectus</i>	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First <i>Homo sapiens</i> species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	<i>Homo sapiens</i> including San people	Typically small to minute stone tools such as arrowheads, points and bladelets.
Early Iron Age / Early Farmer Period c300 – 900 AD (or earlier)	Holocene	Iron Age Farmers	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Ntshekane Facies (950 to 1050 AD)	Holocene	Iron Age Farmers, the emergence of complex state systems	Typically distinct ceramics, evidence of long-distance trade and contacts
Blackburn Facies	1050 – 700AD		Defined by ceramics
Moor Park Facies	1350 – 700AD		Defined by ceramics
(ii) Historical period	Nguni / Sotho people	Iron Age Farmers	Mfecane / Difaqane
(iii) Colonial period	19 th Century	European settlers / farmers / missionaries/ industrialisation	Buildings, Missions, Mines, metals, glass, ceramics

5.2. Hominids

The area around Tutuka is rich in fossils, which is the reason why we mention hominids in the cultural context of the area. South Africa's human history and heritage span more than three million years. The stage is set with the appearance of hominids in the proto-Stone Age era. Hominid sites and their fossil remain are found in limestone caves on the highveld in Gauteng, Limpopo and Northwest Provinces.² Hominid refers to primate species that are the immediate ancestors of man. These sites in the Sterkfontein Caves, Makapansgat, and Taung respectively have been inscribed on the UNESCO World Heritage List in a serial nomination.

² Deacon, J. and N. Lancaster. 1986. *Later Quaternary Palaeo-environments of Southern Africa*. Oxford: Oxford University Press.

5.3. The Stone Age

5.3.1. Early Stone Age [c. 2 million – 250 000 yrs BP]

The Early Stone Age marks the earliest appearance of stone artefacts about 1.4 million years ago. Such tools bore a consistent shape such as the pear-shaped handaxe, cleavers and core tools (Deacon & Deacon, 1999). These tools, which have been called Acheulian after a site in France, were probably used to butcher large animals such as elephants, rhinoceros and hippopotamus. Acheulian artefacts are usually found near sites where they were manufactured and thus close to the raw material or at butchering sites. The early hunters are classified as hominids meaning that they had not evolved to the present human form.

5.3.2. Middle Stone Age (MSA) [250 000yrs – 40 000yrs BP]

The Middle Stone Age (MSA), which appeared 200 000 years ago, is marked by the introduction of a new tool kit that included prepared cores, parallel-sided blades, and triangular points hafted to make spears. By then humans had become skillful hunters, especially of large grazers such as wildebeest, hartebeest and eland. It is also believed that by then, humans had evolved significantly to become anatomically modern. Caves were used for shelter suggesting permanent or semi-permanent settlement. Furthermore, there is archaeological evidence from some of the caves indicating that people had mastered the art of making fire. These were two remarkable steps in human cultural advancement.³

5.3.3. Later Stone Age (LSA) [40 000 yrs to c. 2000 yrs BP]

By the beginning of the LSA, humans are classified as *Homo sapiens* which refers to the modern physical form and thinking capabilities. Several behavioural traits are exhibited, such as rock art and purposeful burials with ornaments, which became a regular practice. The practitioners of rock art are the ancestors of the San and sites abound in the whole of Southern Africa. LSA technology is characterised by microlithic scrapers and segments made from very fine-grained rock. Spear hunting continued, but LSA people also hunted small game with bows and poisoned arrows. Because of poor preservation, open sites become of less value compared to rock shelters.

5.4. The Iron Age Culture [ca 2000 years BP]

5.4.1. Early Iron Age Culture

³ Deacon, J & H. Deacon. 1999. *Human Beginnings in South Africa*. Cape Town: David Philip.

The Iron Age culture, which supplanted the Stone Age at least 2000 years ago, is associated with the introduction of farming and the use of several metals and pottery, with one of the oldest better-known sites at Silver Leaves southeast of Tzaneen dating to AD 270.⁴

Popular theory tends to see a rapid north-south movement of speakers of Bantu languages into eastern and southern Africa from a hypothetical source in West Africa.⁵ The concept of migration itself has been vehemently questioned, since these people are indigenous to Africa. An alternative position is in favour of a gradual “expansion” or “spread” theory (rather than migration in the strict sense). Pottery classification has been used to characterize and identify archaeological traditions within the broad Iron-using culture and to further isolate geographical variations, which have been called *facies*.⁶

Metal working represented a new technology not found among the Stone Age hunters. As mixed farmers, iron-using peoples practiced agriculture and kept domestic animals such as cattle, sheep, goats, and chicken amongst others. There is however increasing evidence that sheep might have moved into the area much earlier than the Iron Age.

According to Huffman (2007), there was two streams of Early Iron Age (EIA) expansion converging in South Africa, one originating in eastern Africa which has been called the *Urewe-Kwale Tradition* (or the eastern stream) and another from the west, spreading through Zambia and Angola, which he termed the *Kalundu Tradition* (or western stream).

5.5. The Mfecane (the Upheavals)

The Mfecane triggered migrations culminating in the establishment of the Swati Kingdom in present-day eSwatini, formerly the Kingdom of Swaziland (east of the study area). Historically the area is home to the Swati with their territory contiguous with present-day eSwatini. The path of Mzilikazi’s Ndebele in their great flight from Tshaka’s *impis* following the historic fallout around 1820/1821 lies in the region of Ermelo and Carolina.

⁴ Schalkwyk, J. 2014. Cultural Heritage Impact Assessment for the Proposed Swaziland Rail Link, Western Section, Mpumalanga Region. p13.

⁵ Phillipson, D. W. 2005. *African Archaeology*. Cambridge: University of Cambridge Press. p249.

⁶ Evers, T. M. 1988. *Recognition of Groups in the Iron Age of Southern Africa*. Unpublished PhD Thesis, University of Witwatersrand. Huffman 2007. *A Handbook on the Iron Age*. Scottsville: UKZN Press

5.6. European Contact Period

The Voortrekkers settled in the area in the middle of the 19th century. The town of Standerton was founded in 1878 and received municipal status in 1903. There were some skirmishes in the area during the Anglo-Boer War (1899-1902). Construction of the Tutuka Power Station commenced in 1980, and the first unit was commissioned on 1 June 1985 and the last unit on 4 June 1990. Tutuka was established on the farm, Pretorius Vley 374 IS was registered in 1875 (Van Schalkwyk 2012, p7).

6. FINDINGS OF THE SURVEY

6.1. General observations

Stone Ages sites are not so commonly encountered on the central and eastern lowveld away from streams and pans. Furthermore, in areas that have been under commercial cultivation, no Stone Age artefacts or features can be expected to be found in an undisturbed context.

- **The Stone Age**

No Stone Age artefacts were found during the survey.

- **The Iron Age**

No archaeological objects or features dating to the Iron Age were found.

- **Burial Grounds**

Two Burial ground Are in the footprint of the proposed project.

Site Name	GPS	Descriptions	Threats	Action
Rit001	27° 04'22.40"S 29°49'39.10"E	A burial ground which possibly belong to former farm workers	Construction activities	CMP, Monitoring
Rit002	27° 04'22.10"S 29°49'38.4"E	An isolated grave was noted on the area proposed for development. It is marked by a stone a cairn Significance: High	High possibility of threat from construction workers. Magnitude: Medium	CMP, Monitoring



Figure 2: Burial Ground marked with a stone cairn



Figure 3: Burial marked with a stone cairn

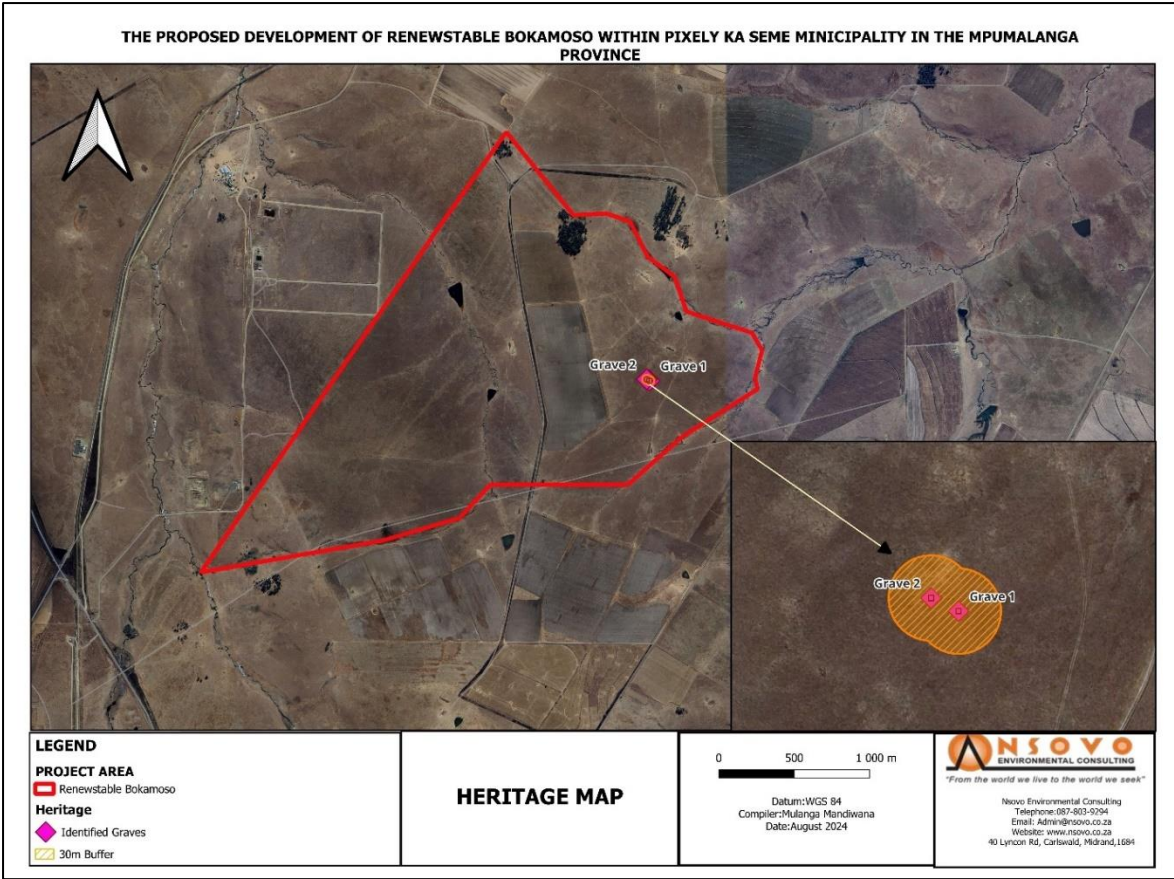
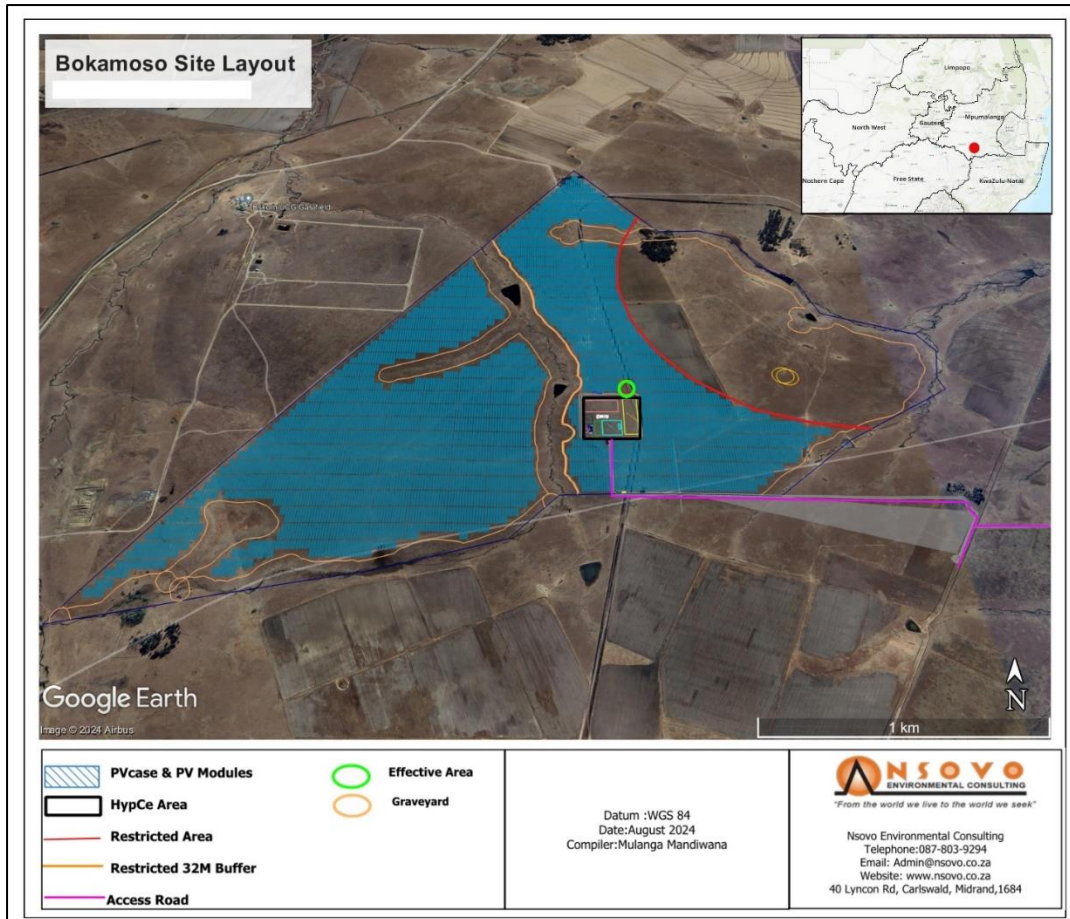


Figure 4: Graves within the study area

A 100m buffer must be reserved in terms of SAHRA regulations. Otherwise a permit must be obtained from SAHRA for exhumation and relocation of the grave to a formal cemetery.

For this development, a buffer has been applied to the study area which led to the footprint of the development being reduced to avoid impacts on the graves. An exemption will be applied for with the South African Heritage Resource Agency. Therefore, the site sensitivity can be confirmed to be of Medium sensitivity.



6.2. Cultural Landscape Significance

Territorial approaches to heritage shifted emphasis from sites to the recognition of broader territorial attributes of heritage. In this international discourse a genre of heritage called Cultural Landscapes emerged in the 1990s. Article 47 of the Operational Guidelines for the Implementation of the World Heritage Convention (2005) defines Cultural Landscapes as:

Cultural landscapes are cultural properties that represent the “combined works of nature and of man” designated in Article 1 of the World Heritage Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.

It is difficult to reconstruct the archaeological cultural landscape in the broader area. The present characteristics represents the impact of modern commercial farming. A typical footprint consists of barbed wire fenced divisions of open subtropical grasslands and/or cultivated fields. These landscape

features are typical over a large area. The proposed development will have low impact on this type of heritage.



Figure 5: A typical view of the footprint of the development shows open grassland used as natural pasture. It is interrupted by isolated colonies of exotic plantings (in the background)

6.3. Ranking of Sites and Risk Assessment

The ranking system is adapted from Bauman and Winter 2005.⁷

Table 3 Significance Ranking

Grade I National	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2, or 3A heritage resources	0
Grade II Provincial	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 2 heritage resources	0
Medium IIIA	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 3A heritage resources	0

⁷ Baumann, N. and S Winter. 2005. Guidelines for involving heritage specialists in Environmental Impact Assessment Processes. Western Cape Government.

Medium IIIB	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources	0
Medium IIIB	Graves. Public sensibilities about the sanctity of graves and human remains	1
Low IIIC	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources	0
	TOTAL	1

6.4. Applying the DFFE Site Sensitivity Verification

According to the DFFE Screening Tool, the presumed heritage sensitivity of the footprint of the proposed development is rated as very high. The site sensitivity was confirmed to be medium as a 30m buffer has been applied to the study area and the footprint of the development has been reduced.

Theme		Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Archaeological and Cultural Heritage	PRESUMED	X			
	ACTUAL			X	

6.5. Assessment of Impacts using the Heritage Impact Assessment Statutory Framework

Section 38 of the NHRA

Section 38 (Subsection 3) of the NHRA also provides a schedule of tasks to be undertaken in an HIA process:

Section 38(3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

(a) The identification and mapping of all heritage resources in the area affected

Two burial grounds were recorded.

(b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7

Burial grounds are sacred and ranked Medium IIIB based on the criteria indicated in Section 7 of the National Heritage Resources Act (No 25 of 1999).

(c) An assessment of the impact of the development on such heritage resources

A 100m buffer must be reserved in terms of SAHRA regulations. Otherwise a permit must be obtained from SAHRA for exhumation and relocation of the grave to a formal cemetery.

For this development, a buffer has been applied to the study area which led to the footprint of the development being reduced to avoid impacts on the graves. An exemption will be applied for with the South African Heritage Resource Agency.

(i) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development

The desirability of implementing a Photovoltaic (PV) plant coupled with hydrogen storage in South Africa's Mpumalanga Province is undeniable. This innovative energy solution aligns perfectly with the region's abundant solar resources and growing energy demands. Further, the project is expected to play a central role in supporting Africa's drive to achieve electricity connection for nearly 3 million people without access to electricity, as estimated by the South African National Energy Development Institute (SANEDI), to reduce widespread reliance on coal for power generation, and to fast-track the continent's slowed industrial expansion.

Consequently, this project aims to respond to the government initiative driven by the need to diversify the country's energy sources and create a balanced and more sustainable energy mix. The proposed project will allow for energy diversification as coal power plants dominate South Africa's electricity market. The past decade has seen the introduction of renewable energy initiatives, such as wind and solar power and battery energy storage technologies. The proposed new hydrogen-to-power

technology is expected to add value and enhance the country’s energy mix by reducing reliance on coal.

(e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources

Stakeholder consultation will be done within the ambit of the broad EIA public participation process.

(f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives

N/A

(g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.

In the event of the discovery of other heritage resources during site preparation and construction, the Provincial Heritage Resources Authority must be informed immediately and an archaeologist be appointed.

6.6. Risk Assessment of the Findings

Table 2: Risk assessment of findings

EVALUATION CRITERIA	RISK ASSESSMENT
Description of the potential impact	Negative impacts range from partial to total destruction of surface and under-surface movable/immovable remnants.
Nature of Impact	Negative impacts can both be direct or indirect.
Legal Requirements	Sections 34, 35, 36, 38 of NHRA
Stage/Phase	Foundation excavations
Extent of Impact	Excavations will result in the damage or destruction of heritage resources if they exist.
Duration of Impact	Any accidental destruction of surface or subsurface relics is not reversible but can be mitigated.
Intensity	Uncertain.
Probability of occurrence	Low.

Confidence of assessment	High.
Level of significance of impacts before mitigation	Medium.
Mitigation measures	If archaeological or other heritage relics are found during the construction phase, heritage authorities will be advised immediately, and a heritage specialist will be called to attend. This is a standard precaution given the inherent limitations of archaeological fieldwork.
Level of significance of impacts after mitigation	Low.
Cumulative Impacts	None.
Comments or Discussion	None.

7. RECOMMENDATIONS AND CONCLUSION

The project must be given a green light while recommendations made on the treatment of the Burial Ground are heeded. In the event of other heritage resources being discovered in future phases of the project, the Provincial Heritage Resources Authority or SAHRA must be alerted immediately and an archaeologist or heritage expert called to attend. It is recommended that mitigation measures for the protection of graves and maintenance of the 30 buffer be applied. Otherwise an exhumation and relocation permit must be obtained from SAHRA.

A compliance statement will be compiled during the EIA Phase.

8. GLOSSARY

Archaeology: The study of the humans' past through their material remains.

Archaeological material: remains resulting from human activity left as evidence of their presence which, as proscribed by South African heritage legislation, are older than 100 years, which are in the form of artefacts, food remains and other traces such as rock paintings or engravings, burials, fireplaces and structures.

Artefact/Ecofact: Any movable object that has been used, modified or manufactured by humans.

Assemblage: A group of artefacts recurring together at a particular time and place and representing the sum of human activities.

Catalogue: An inventory or register of artefacts and/or sites.

Conservation: All the processes of looking after a site/heritage place or landscape including maintenance, preservation, restoration, reconstruction and adaptation.

Culture: A contested term, “culture” could minimally be defined as the learned and shared things that people have, do and think.

Cultural Heritage Resources: refers to physical cultural properties such as archaeological sites, palaeontological sites, historic and prehistorical places, buildings, structures and material remains, cultural sites such as places of rituals, burial sites or graves and their associated materials, geological or natural features of cultural importance or scientific significance. This includes intangible resources such religious practices, ritual ceremonies, oral histories, memories and indigenous knowledge.

Cultural landscape: “the combined works of nature and man” and demonstrate “the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both internal and external”.

Cultural Significance: is the aesthetic, historical, scientific and social value for past, present and future generations.

Early Stone Age: Predominantly the Oldowan and Acheulean hand axe industry complex dating to + 1Myr yrs – 250 000 yrs. before present.

Early Iron Age: Refers cultural period of the first millennium AD associated with the introduction of metallurgy and agriculture in Eastern and Southern Africa

Later Iron Age: Refers to the period after 1000AD marked by increasing social and political complexity. Evidence of economic wealth through trade and livestock keeping especially cattle

Excavation: A method in which archaeological materials are extracted, involving systematic recovery of archaeological remains and their context by removing soil and any other material covering them.

Grave: a place of burial that includes materials such as tombstones or other marker such as crosses etc.

Historic material: means remains resulting from human activities, which are younger than 100 years and no longer in use, which include artefacts, human remains and artificial features and structures.

Intangible heritage: Something of cultural value that is not primarily expressed in a material form e.g. rituals, knowledge systems, oral traditions, transmitted between people and within communities.

Historical archaeology: the study of material remains from both the remote and recent past in relationship to documentary history and the stratigraphy of the ground in which they are found; or archaeological investigation on sites of the historic period. In South Africa it refers to the immediate pre-colonial period, contact with European colonists and the modern industrial period.

In situ material means material culture and surrounding deposits in their original location and context, for instance archaeological remains that have not been disturbed.

Later Iron Age: The period from the beginning of the 2nd millennium AD marked by the emergence of complex state society and long-distance trade contacts.

Late Stone Age: The period from ± 30 000-yr. to the introduction of metals and farming technology

Middle Stone Age: Various stone using industries dating from ± 250 000 yr. - 30 000 yrs. ago

Monuments: architectural works, buildings, sites, sculpture, elements or structures of an archaeological nature, inscriptions, cave dwellings that are outstanding from the point of view of history, art and science.

Place: means site, area, building or other work, group of buildings or other works, together with pertinent contents, surroundings and historical and archaeological deposits.

Preservation: means protecting and maintaining the fabric of a place in its existing state and retarding deterioration or change and may include stabilization where necessary.

Sherd: ceramic fragment.

Significance grading: Grading of sites or artefacts according to their historical, cultural or scientific value.

Site: a spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

Site Recoding Template: Site recording form.

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10. DETAILS OF SPECIALIST

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(ii) Academic qualifications

1990 - 1993: MPhil in Archaeology (Uppsala University, Sweden) with a published Thesis

2009 – 2011: Ph.D. in Archaeology & Heritage (Uppsala University, Sweden) with a published Thesis

2002: Certificate in the Integrated Conservation of Territories and Landscapes of Heritage Value
(ICCROM, Rome)

(iii) Professional experience

1988-1993: Curator of Archaeology, Museum of Human Sciences, Harare

1994-1997: Senior Curator / Conservator, Great Zimbabwe World Heritage Site

1997-2004: Director, Great Zimbabwe World Heritage Site

2005 – 2016: Heritage Management Consultant (associateship with various other specialists), South Africa

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iv) Membership in professional bodies/associations

ASAPA – Association of Southern African Professional Archaeologists

ICOMOS – International Council of Monuments and Sites

WAC – World Archaeological Congress

(iv) Heritage Impact Assessments &

Edward Matenga has undertaken more than 100 heritage impact assessments and written as many reports as possible. He has a footprint in the Northern Cape and Limpopo Provinces. Matenga has also been involved in the preparation of Heritage Management Plans for sites otherwise known as Conservation Management Plans. He has undertaken exhumations and relocations and has gained considerable experience in handling community issues relating to the treatment of human remains. Over the last 2 decades UNESCO and its affiliated bodies (ICOMOS and ICCROM) sent Matenga on World Heritage advisory missions to Cameroon (2002), Kenya (2006), Mauritius (2007), Ghana (2008) and Ethiopia (2010).