HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED WOODLAND HILLS SOLAR FARM.

Type of development:

Photovoltaic PV Solar Plant

Client: Setala Environmental

Developer:

Woodland Hills Solar Farm (Pty) Ltd

Report prepared by:



Beyond Heritage

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APPROVAL PAGE

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Report Title	Heritage Impact Assessment for the Proposed Woodland Hills Solar Farm.
Authority Reference Number	ТВС
Report Status	Draft Report
Applicant Name	Woodland Hills Solar Farm (Pty) Ltd

Responsibility	Name	Qualifications and	Date
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Archaeological support	, ,		



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Amendments on Document

Date	Report Reference Number	Description of Amendment



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REPORT OUTLINE

Appendix 6 of the GNR 326 Environmental Impact Assessment (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.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of -	Section a
(i) the specialist who prepared the report; and	Section 12
(ii) the expertise of that specialist to compile a specialist report including a	
curriculum vitae	
(b) Declaration that the specialist is independent in a form as may be specified by the	Declaration of
competent authority	Independence
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA)an indication of the quality and age of base data used for the specialist report	Section 3.4, 7and 8.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed	9
development and levels of acceptable change;	
(d) Duration, Date and season of the site investigation and the relevance of the season	Section 3.4
to the outcome of the assessment	
(e) Description of the methodology adopted in preparing the report or carrying out the	Section 3
specialised process inclusive of equipment and modelling used	
(f) details of an assessment of the specific identified sensitivity of the site related to	Section 8 and 9
the proposed activity or activities and its associated structures and infrastructure,	
inclusive of site plan identifying site alternatives;	
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and	Section 8
infrastructure on the environmental sensitivities of the site including areas to be	
avoided, including buffers	
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact	Section 1.3
of the proposed activity including identified alternatives on the environment or	
activities;	
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(I) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion -	Section 10.3
(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	
(o) Description of any consultation process that was undertaken during the course of	Section 5
preparing the specialist report	
(p) A summary and copies of any comments received during any consultation process	Refer to BAR report
and where applicable all responses thereto; and	
(q) Any other information requested by the competent authority	N.A



Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	 I declare, as a specialist appointed in terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I: 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 24F of the Act.
Signature	furt.
Date	29/03/2023

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for 20 years. Jaco is an accredited member of the Association of South African Professional Archaeologists (ASAPA) (#159) and APHP #114 and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, Kwa Zulu Natal (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, Democratic Republic of the Congo (DRC) Zambia, Guinea, Afghanistan, Nigeria and Tanzania. Through this, he has a sound understanding of the International Finance Corporations (IFC) Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage



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Executive Summary

Setala Environmental was appointed as the Environmental Assessment Practitioner (EAP) by Woodland Hills Solar Farm (Pty) Ltd to undertake the required Environmental Authorisation Process for proposed development of solar energy facilities on Woodland Hills Wildlife Estate. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed on a desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The Project area is transformed through activities such as illegal dumping, excavations and small pathways and the project area is considered to be of low heritage significance;
- This was confirmed during the survey whereby finds were limited to a few isolated Middle Stone Age lithics of low significance;
- The palaeontological sensitivity of the study area is insignificant/zero but close to very highly sensitive (red) rocks of the Adelaide Subgroup and an independent assessment was conducted for this aspect. Bamford (2023) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary or in the dolerite. There is a very small chance that fossils may occur in the adjacent shales of the late Permian Adelaide Subgroup (Normandien or Balfour Formations, Beaufort Group) so a Fossil Chance Find Protocol should be added to the EMPr

The impact on heritage resources is low, and the project can commence provided that the recommendations in this report are adhered to, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

• Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction.



ABBREVIATIONS

BGG Burial Ground and Graves CFPs: Chance Find Procedures CMP: Conservation Management Plan CRR: Comments and Response Report CRM: Cultural Resource Management
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CMP: Conservation Management Plan CRR: Comments and Response Report CRM: Cultural Resource Management
CRR: Comments and Response Report CRM: Cultural Resource Management
CRM: Cultural Resource Management
FFE: Department of Fisheries, Forestry and Environment,
A: Environmental Authorisation
AP: Environmental Assessment Practitioner
CO: Environmental Control Officer
IA: Environmental Impact Assessment*
IA: Early Iron Age*
AP Environmental Assessment Practitioner
MPr: Environmental Management Programme
SA: Early Stone Age
SIA: Environmental and Social Impact Assessment
SIS Geographical Information System
SPS: Global Positioning System
SRP Grave Relocation Plan
IIA: Heritage Impact Assessment
IA: Late Iron Age
SA: Late Stone Age
IEC: Member of the Executive Council
/IA: Middle Iron Age
/IPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28
of 2002)
/ISA: Middle Stone Age
IEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
IHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
ID 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) Earlier Stone Age (~ 2.6 million to 250 000 years ago) Middle Stone Age (~ 250 000 to 40-25 000 years ago) Later Stone Age (~ 40-25 000, to recently, ~ 100 years ago) The Iron Age (~ AD 400 to 1840) Historic (~ AD 1840 to 1950) Historic building (over 60 years old)



1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a HIA for the proposed development of the Woodland Hills Solar Farm on approximately 5 006 hectares. The project site is located on Woodland Hills Wildlife Estate in Bloemfontein within the Mangaung Metropolitan Municipality in the Free State Province (Figure 1.1 to 1.3). The report forms part of the Basic Assessment (BA) 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, finds were limited to a low density MSA scatter. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).



Project components and the location of the proposed project are outlined under Table 2 and 3.

Tahla	2.	Proid	oct D	oscriu	otion
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Project area	The project site is on Farm Hillandale 2960
Magisterial District	Mangaung Metropolitan Municipality
Central co-ordinate of the	-29.044646, 26.20529
development	
Topographic Map Number	2926AA

Table 3: Infrastructure and project activities

Type of development	Photovoltaic PV Solar Plant
Size of development	~ 5hectares
Project Components	 The current Application is for the construction of the following: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the output is 2.7 megawatts, and the total extent of the facility covers an area of ± 5 hectares; Construct a Ring Main Unit Board for each of the facilities to export the PV power. Clear an area of approximately 5 hectares for the solar site. Clear more than 300 square metres of indigenous vegetation for the site. Develop access roads of 4 metres width within the solar plant.

1.3 Alternatives

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





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

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Figure 1-2. Local setting of the Project (1: 50 000 topographical map).

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North West Northern Cape Free State KwaZulu-Nat Eastern Cap Legend Project Area Beyond EFERENCE Coordinate System: GCS Hartebeesthoek 1994 SETALA ENVIRONMENTAL CONSULTANTS Woodland Hills Solar Plant PROJECT No. 23034 REV 1 SCALE 1:3,654 A3 GIS 6/21/2022 D/DIA 120 240 480

Figure 1-3. Aerial image of the study area and Project components.

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HIA – Woodland Hills Solar Plant



March 2023

March 2023

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 EMPr, 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 EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years postuniversity 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 include (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.

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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.

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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 (conducted by the EAP) 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 heritage character of the development footprint (focussing on the current layout);

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	16 February 2023
Season	Summer – The time of year did influence the survey since dense vegetation after the summer rains limited archaeological vicibility. The development footprint 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.

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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 (2007), 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.

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.	-	High/medium	Mitigation before destruction
A)		significance	
Generally Protected B (GP.	-	Medium significance	Recording before destruction
B)		-	-
Generally Protected C (GP.C)	-	Low significance	Destruction

Table 5: Heritage significance and field ratings

3.6 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

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

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M) P

- S = Significance weighting
- E = Extent
- D = Duration
- M = Magnitude
- P = Probability

The significance weightings for each potential impact are as follows:

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

3.7 Assumptions, 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 subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. Also, overgrown vegetation and previous disturbances hampered the survey and informal graves and other cultural resources could have been undetected during the field survey. This limitation is successfully mitigated with the implementation of a chance find procedure and monitoring of the study area by the ECO. This report only deals with the current layout of the proposed development and consisted of non-intrusive surface surveys that focussed on tangible resources. 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.

Field data were recorded by handheld GPS and Mobile GPS applications. It must be noted that during the process of converting spatial data to final drawings and maps the accuracy of spatial data may be compromised. Printing or other forms of reproduction might also distort the spatial distribution in maps. Due care have been taken to preserve accuracy. 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 the Mangaung Metropolitan Municipality has a population of 747 431, of which 83,3% are black African, 11,0% are white, 5,0% are coloured, with other population groups making up the remaining 0,7%. Of those aged 20 years and older, 4,7% have completed primary education, 33,2% have some secondary education, 30,3% have completed matric and 14,2% have some form of higher education. 4,3% of this group have no formal schooling. Of the 292 971 economically active (employed or unemployed but looking or work) people in Mangaung, 27,7% are unemployed. 37,2% of the 150 128 economically active youth (15 – 34 years) in the area are unemployed (statssa.gov.za).

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the BA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process.

6 Contextualising the study area:

6.1 Literature Review (SAHRIS)

Few sites are known for the greater region and consist of historical structures, potential Anglo-Boer War associated structures and artefacts, and graveyards. The following Cultural Resource Management (CRM) assessments (Table 6) were conducted in the area and consulted for this report:

Table 6. (CRM reports	consulted	for the	study.
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Author	Year	Project	Findings
Dreyer, C.	2004a	First Phase Heritage/Archaeological Assessment of the Proposed Residential Development at Hillandale, Bloemfontein.	Stone tools, elaborate stonewalls, circular stone structures.
Dreyer, C.	2004b	First Phase Heritage/Archaeological Assessment of the Proposed Residential Development at Tredenham, Bloemfontein.	Historical building, cowshed and storerooms.
Dreyer, C.	2004c	Archaeological and Historical Investigation of the Proposed Developments at the Remainder of the Farm Boven Tempe 203, Bloemfontein	Stone base and paving of houses, stone wall, old low-water causeway, old labourer houses, ash heaps associated with remains of labourer houses, an old farm house, cow shed, two graves, two reservoir dams, a water well potentially from the Anglo-Boer War, historical houses.
Dreyer, C.	2006	First Phase Archaeological and Cultural Heritage Assessment of the Phase II Residential Developments of Woodland Hills Wildlife Estate, Hillandale 2960 (249) Bloemfontein.	Potential Anglo-Boer War associated circular stone structures, and historical artefacts.
Dreyer, C.	2007	First Phase Archaeological and Cultural Heritage Investigation of the Proposed Residential Developments on the Annex of Wildealskloof 2607, Bloemfontein.	No sites
Dreyer, C.	2012	First Phase Archaeological and Historical Investigation of the proposed commercial developments on Portion 10, Bergendal 1706 & Erf 26360, Bloemfontein.	A circular stone walled structure.
Beater, J.	2011	Cultural Heritage Assessment of the Proposed Establishment of Photo Voltaic (Solar Power) Panels on Woodland Hills Estate, Bloemfontein.	No sites
Rossouw, L.	2018	Phase 1 Heritage Impact Assessment with regard to planned Phase 1 Township development on the Farm Bergendal 1706, Bloemfontein, Free State Province	An informal graveyard.

6.1.1 Google Earth and The Genealogical Society of South Africa (Graves and burial sites)

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located. The database of the Genealogical Society of South Africa indicated no known grave sites within the study area.

6.2 Archaeological Background

The archaeology of the area can be divided in two main periods namely the Stone Age and Historical period.

6.2.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable. The three main phases can be divided as follows;

- » Later Stone Age (LSA); associated with Khoi and San societies and their immediate predecessors. - Recently to ~30 thousand years ago.
- » Middle Stone Age (MSA); associated with Homo sapiens and archaic modern human . 30-300 thousand years ago.
- » Earlier Stone Age (ESA); associated with early Homo groups such as Homo habilis and Homo erectus. 400 000-> 2 million years ago.

The region surrounding the project area lacks any significant Stone Age sites and is limited to artefact scatters. These scatters are commonly associated with the MSA and LSA showing earliest human occupation in the region dating from the Middle Stone Age (Mitchell 2002). These scatters are generally low density and low significance scatters as they are not formative of a distinctive Stone Age site.

Further away, approximately 30km northeast of the project area, the famous Florisbad skull of an archaic human was discovered by T.F Dreyer. During excavations in 1932, fragments of the archaic Homo sapien cranium were discovered (Kuman and Clarke 1986). An expansive MSA stone tool assemblage was also discovered at the site with many artefacts showing signs of being retouched after initial production. In 1997, the site was declared as a Provincial Heritage Site.

6.2.2 Iron Age

Bantu-speaking people moved into Eastern and Southern Africa about 2,000 years ago (Mitchell 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. 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 (EIA): Most of the first millennium AD.
- » The Middle Iron Age (MIA): 10th to 13th centuries AD.
- » The Late Iron Age (LSA): 14th century to colonial period.

This region of the Free State surrounding Bloemfontein does not have record of Iron Age sites. Iron Age sites with stonewalled structures are more commonly found on hills or higher grounds further away from the study area in other parts of the province (Maggs 1976, Dreyer 1996). The Free State province is well known for its expansive Iron Age stonewalled complexes but the project area lies outside of the peripheral

of high volume Iron Age sites. These Late Iron Age sites associated with Bantu speaking agro pastoralists can be found spread along the northern and eastern regions of the Free State (Maggs 1976).

6.2.3. Historical Period

Bloemfontein was established in 1846 on the farm Bloemfontein by Major H.D Warden (Raper 2004). The name derived from the Dutch word 'bloem' meaning flower, which were found growing near a fountain. In 1854, Bloemfontein became the capital of the Orange Free State, which was a Boer republic that had been established in the region. The city played an important role in the Second Boer War, with British forces occupying the city in 1900 after a lengthy siege. By 1880, Bloemfontein acquired Municipal status. In 1910, Bloemfontein became the judicial capital of the Union of South Africa after the end of the Anglo-Boer War. After the end of apartheid in 1994, Bloemfontein became a symbol of reconciliation and unity for South Africa, and it was the site of the signing of the country's new constitution in 1996.

6.2.4. Anglo-Boer War

The Anglo-Boer War had a significant impact on Bloemfontein, which served as the capital of the Orange Free State at the time. In March 1900, British forces led by Lord Roberts captured the city and established it as the base of their military operations in the region. The occupation of Bloemfontein marked a turning point in the war, as it allowed the British to secure a foothold in the Orange Free State and helped them to advance further into Boer territory. During the British occupation of Bloemfontein, the city was used as a staging ground for further military operations against the Boers. The British built a large military camp in the city, which housed tens of thousands of soldiers and support personnel. The British also established a civil administration in the city, which was led by Lord Milner. The end of the war in 1902 brought an end to the British occupation of Bloemfontein, and the city was returned to Boer control as part of the newly-formed Union of South Africa (sahistory.org.za).

7 Description of the Physical Environment

The project area is a small 5ha property situated within the Woodland Hills Wildlife Estate on the northern edge of Bloemfontein about 700m west of the N1. The vegetation and landscape are described by Mucina and Rutherford (2006) as Winburg Grassy Shrubland. The vegetation and landscape of Winburg Grassy Shrubland are described as Solitary hills, slopes and escarpments of mesas creating a mosaic of habitats ranging from open grassland to shrubland. Tall shrubs and sometimes small trees are sheltered against frequent periods of frost during the winter months and regular veld fires in late winter to early spring. The medium-height evergreen shrublands are dominated by a combination of *Olea europaea* subsp. *africana*, *Euclea crispa* subsp. *crispa*, *Gymnosporia buxifolia*, *Diospyros lycioides*, *Rhus burchellii*, *R. ciliata*, *R. erosa* (mainly in the south), *Clutia pulchella* and *Grewia occidentalis*. Trees such as *R. lancea*, *Celtis africana* and *Ziziphus mucronata* are found in more deeply incised drainage lines.

The project area is marked by dumping of building rubble, excavations as a result of the general development within the surrounding environment as well as the presence of small tracks or pathways that may have been part of a hiking trail or cycling route. A small stream runs along the north western boundary of the project area and is marked by dense vegetation cover. An access route through the estate runs along the south eastern boundary of the project area. General site conditions are illustrated in Figures 7.1 to 7.10.



Figure 7-1. Small stream that runs along the north western boundary of the project area.



Figure 7-3. General site conditions.



Figure 7-2. Small pathways through the study area.



Figure 7-4. General site conditions.



Figure 7-5. General site conditions showings dense ground cover.



Figure 7-7. Building rubble dumped in parts of the project area.



Figure 7-6. Vegetation cover in the study area.



Figure 7-8. Northern view of the project area. Image taken from the centre of the project area.



Figure 7-9. Southern view of the project area. Image taken from the centre of the project area.



Figure 7-10. Western view of the project area. Image taken from the centre of the project area.

8 Findings of the Survey

8.1 Heritage Resources

Heritage observations within the study were limited to a low density lithic scatter with diagnostic MSA pointed flakes with faceted platforms. Some miscellaneous pieces also occur that could date to the LSA. The recorded observations were numbered sequentially with the prefix WH for Woodland Hills. General site conditions and site distribution of the recorded observations are illustrated in Figure 8.1 and briefly described in Table 7. Recorded features are illustrated in Figure 8.2 to 8.3.



Figure 8-1. Site distribution map.

Table 7. Sites recorded in the study are
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Label	Description	Longitude	Latitude	Significance/ Field Rating
	A low density scatter of less than 2 artefacts per			y
	washing out of an erosion gully were recorded			
	here. The artefacts are scattered near the			
	mostly on igneous material and consist of			
	diagnostic MSA blades and irregular cores. Some			
	potentially date to the LSA based on the size of			Low
	the artefacts but a larger sample is needed to	26° 12'	29° 2'	Significance
WH001	confirm this.	5.3994"E	36.4488"S	GP C





Figure 8-3. MSA artefact scatter at WH001.

Figure 8-2. General site conditions at WH001.

8.2 Cultural Landscape

The project area is generally flat with a small stream that runs along the north western edge. The project area itself is undeveloped but is situated within a developed estate. The cultural layering of the area dates from the Stone Age followed by the historical period and especially the Anglo-Boer War.

8.3 Paleontological Heritage

The study area is indicated as of insignificant/zero palaeontological significance on the SAHRA Paleontological map but is adjacent to an area of very high significance and an independent study was conducted for this aspect (Figure 8.4).Bamford (2023) found that based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the right age to contain fossils but not the right type as dolerite is predominant. Furthermore, the material to be excavated is soil and this does not preserve fossils. Since there is an extremely small chance that fossils from the nearby Adelaide Subgroup may be disturbed a Fossil Chance Find Protocol has been added to this report in Section 10.



Figure 8-4. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

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;
- Excavation and levelling of the PV facility footprint;
- Trenches for cables and erection of powerlines;
- Influx of people into the area that could desecrate heritage resources sites;
- Excavations during construction of the sub stations.

Recorded isolated Stone Age scatters (WH001) are out of context and scattered too sparsely to be of significance apart from mentioning them in this report. Impact will be low as no sites of significance were identified during the survey. Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures as recommended in this report should be implemented during all phases of the project. Impacts of the project on heritage resources is expected to be low during all phases of the development if mitigation measures are followed (Table 8).

9.1.1 Pre-Construction phase

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

9.1.2 Construction Phase

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

9.1.3 Operation Phase

No impacts are expected during the operation phase.

9.1.4 Impact Assessment for the Project

Table 8. Impact assessment on MSA scatter at WH001

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

	Without mitigation	With mitigation (Preservation/
		excavation of site)
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	18 (Low)	18 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of	Yes	Yes
resources?		
Can impacts be mitigated?	NA	NA

Mitigation:

Implementation of a chance find procedure for the project;

Cumulative impacts:

The proposed project will have a low cumulative impact as no known heritage resources will be adversely affected.

Residual Impacts:

Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.

10 Conclusion and recommendations

The study area is generally flat and marked by dense vegetation with a small stream along the north western boundary of the Project Area. The study area is transformed through dumping of building rubble, excavations and small bike tracks that is clearly visible from aerial imagery and the project area is considered to be of low heritage significance. This was confirmed during the survey whereby finds were limited to a few isolated Middle Stone Age lithics attributed to background scatter of low significance.

Heritage observations within the study area were limited to a low density MSA scatter. The artefact scatter is of low significance as it does not represent a distinct archaeological site and impact will therefore be low. The feature requires no mitigation apart from mentioning it in this report.

The palaeontological sensitivity of the study area is insignificant/zero but close to very highly sensitive (red) rocks of the Adelaide Subgroup and an independent assessment was conducted for this aspect. Bamford (2023) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary or in the dolerite. There is a very small chance that fossils may occur in the adjacent shales of the late Permian Adelaide Subgroup (Normandien or Balfour Formations, Beaufort Group) so a Fossil Chance Find Protocol should be added to the EMPr

It is recommended that the project can commence on the condition that the following recommendations (Section 10) are implemented as part of the EMPr and based on approval from SAHRA.

10.1 Recommendations for condition of authorisation

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

Recommendations:

Avoidance of recorded heritage observations is the preferred course of action; if this is not possible the following apply:

• Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction.

10.2 Chance Find Procedures

10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines applicable to the Chance Find procedure is discussed below and monitoring guidelines for this procedure are provided in Section 10.5.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any
 person employed by the developer, one of its subsidiaries, contractors and subcontractors, or
 service provider, finds any artefact of cultural significance or heritage site, this person must cease
 work at the site of the find and report this find to their immediate supervisor, and through their
 supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2.2 Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

- 1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
- 2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or trace fossils) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
- 3. Photographs of similar fossils must be provided to the developer to assist in recognizing the trace fossils such as stromatolites in the dolomites or the Quaternary bones, rhizoliths, traces. This information will be built into the EMP's training and awareness plan and procedures.
- 4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
- 5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
- 6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
- 7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
- 8. If no fossils are found and the excavations have finished, then no further monitoring is required.

10.3 Reasoned Opinion

The overall impact of the project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features, unrecorded cultural material and burial sites. This can cause delays during construction, as well as additional costs involved in mitigation, as well as 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 9. Monitoring requirements for the project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
					 If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately:
Cultural Resources Chance Finds	Entire project area	Entire project area ECO Weekly (Pre construction and construction phase)	Proactively	 Report incident to the Sustainability Manager; Contact an archaeologist/ palaeontologist to 	
	C		construction phase)		inspect the site;
					 Report incident to the competent authority; and

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

10.6 Management Measures for inclusion in the EMPr

Table 10. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for	Target	Performance
				implementation		indicators
						(Monitoring tool)
General	Regular monitoring of the	Construction	Throughout the	Applicant	Ensure compliance with	ECO Checklist/Report
Project area	development footprint by the ECO		project	EAP	relevant legislation and	
	to implement the Chance Find				recommendations from	
	Procedure for heritage and				SAHRA under Section 35,	
	palaeontology resources (outlined				36 and 38 of NHRA	
	in Section 10.2) in case heritage					
	resources are uncovered during					
	construction;					

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