HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED TOWNSHIP DEVELOPMENT ON PORTIONS 106, 107, 108, 109 ELANDSFONTEIN EXTENSION, LOCATED WITHIN THE MIDVAAL LOCAL MUNICIPALITY, GAUTENG PROVINCE.

Type of development:

Township Development

Client:

Vaalplan Town and Regional Planners

Developer:

TBC

Report prepared by:

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Project number 23019
Report date:
February 2023

APPROVAL PAGE

Project Name	Elandsfontein Extension Township Development Project.
Report Title	Heritage Impact Assessment For The Proposed Township Development On Portions 106, 107, 108, 109 Elandsfontein Extension, Located Within The Midvaal Local Municipality, Gauteng Province.
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	Vaalplan Town and Regional Planners

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	December 2022
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	December 2022
Archaeological support & reporting	Lara Kraljević – Archaeologist	MA Archaeology	February 2023

DOCUMENT PROGRESS

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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.

Table 1. Specialist Report Requirements.

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

Executive Summary

Vaalplan Town and Regional Planners was appointed as the Environmental Assessment Practitioner (EAP) to undertake the required Environmental Authorisation Process for the proposed development of a Residential Township. 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 study area is altered through limited cultivation and development of the study area from the 1950's. The site is generally flat without any focal points like pans or rocly outcrops that would have attracted human occupation in antiquity and the site is considered to be of low heritage potential;
- This was confirmed during the survey whereby heritage finds were limited to isolated Stone Age finds and various ruins and derelict structures;
- These features are too degraded to be of significance and none of the ruins present is older than 60 years and is therefore not considered heritage resources;
- The palaeontological sensitivity of the study area is high, and was subject to an independent assessment.

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;

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 49 A of the Act.of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	08/02/2023

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for 15 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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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DFFE: Department of Fisheries, Forestry and Environment,
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EAP Environmental Assessment Practitioner
EMPr: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA: Middle Stone Age
NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID Notification of Intent to Develop
NoK Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to recently, 100 years ago)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a HIA for the proposed Elandsfontein Township Development. The project area is situated on the northern edge of Kanana Park about 4km northwest of Walkerville and about 1.5km east of the N1 highway in Gauteng Province (Figure 1.1 to 1.3).

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 isolated Stone Age finds and ruins. 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 Environmental report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

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

Reporting

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

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

1.2 Project Description

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

Table 2: Project Description

Project area	The project site is on Portions 106, 107, 108, 109
Magisterial District	Midvaal Local Municipality
Central co-ordinate of the development	-26.3979885, 27.9153953
Topographic Map Number	2627BD

Table 3: Infrastructure and project activities

Type of development	Township Development
Size of development	
Project Components	TBC

1.3 Alternatives

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

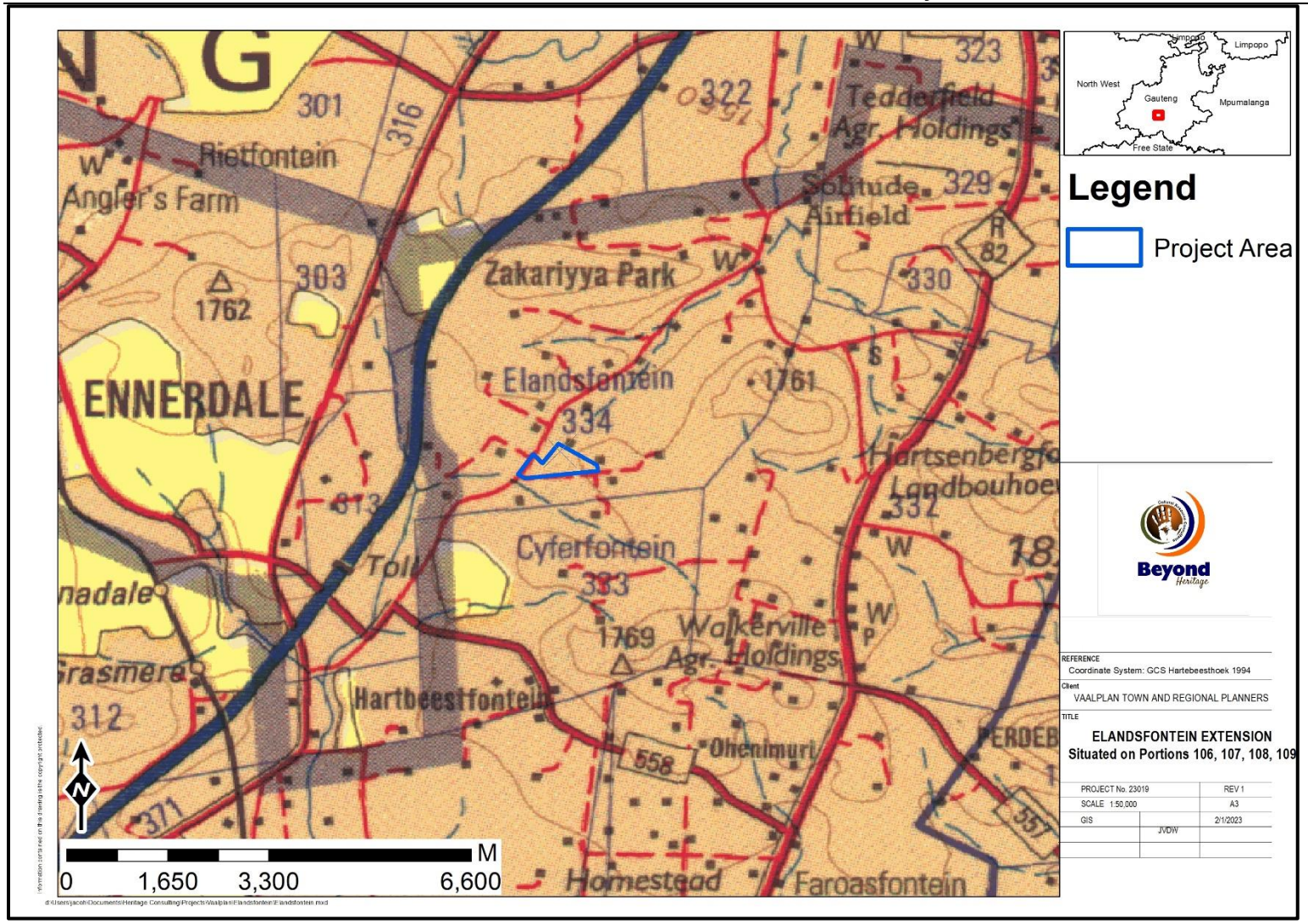


Figure 1-1. Regional setting of the project (1: 250 000 topographical map).

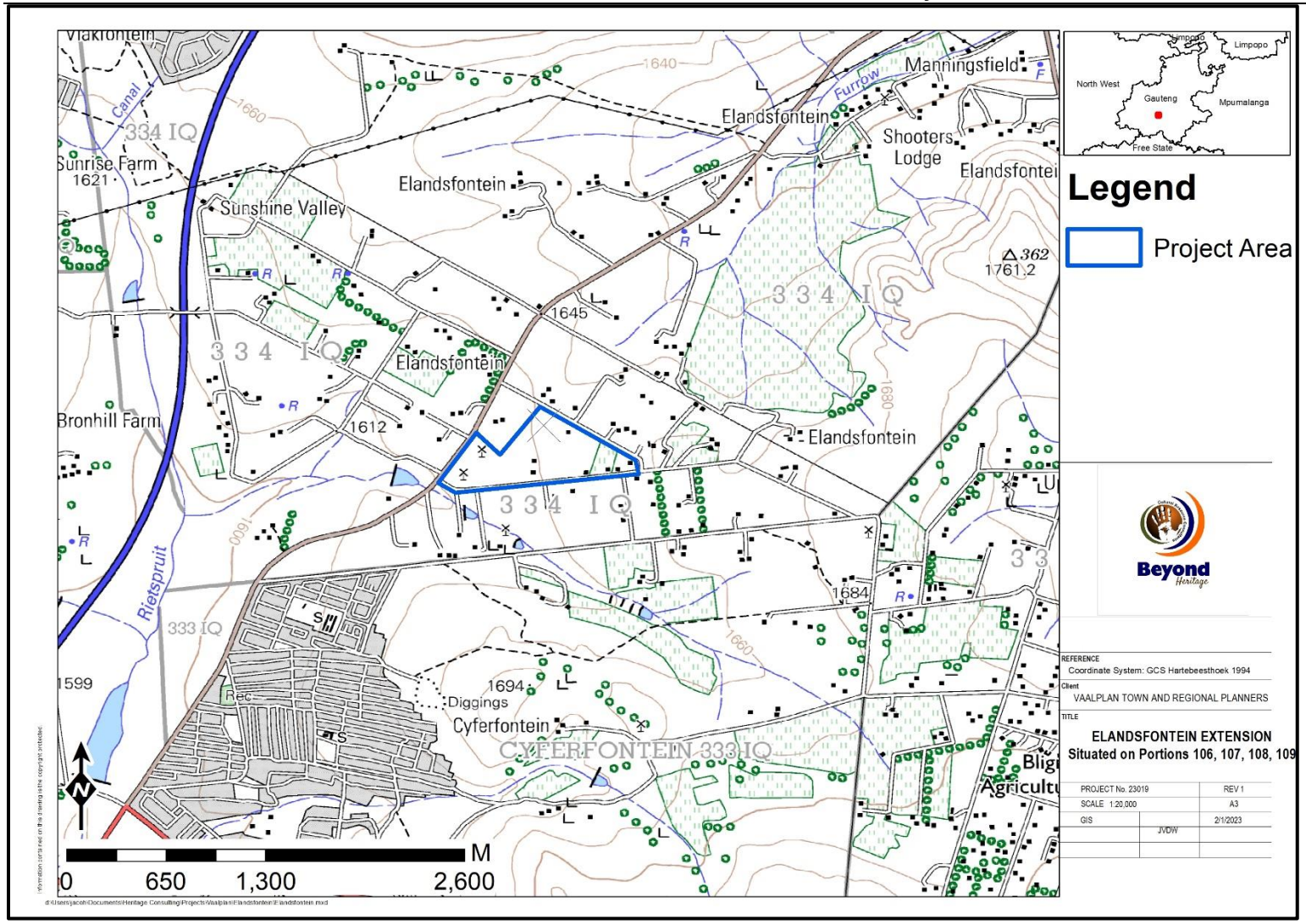


Figure 1-2. Local setting of the project (1: 50 000 topographical map).

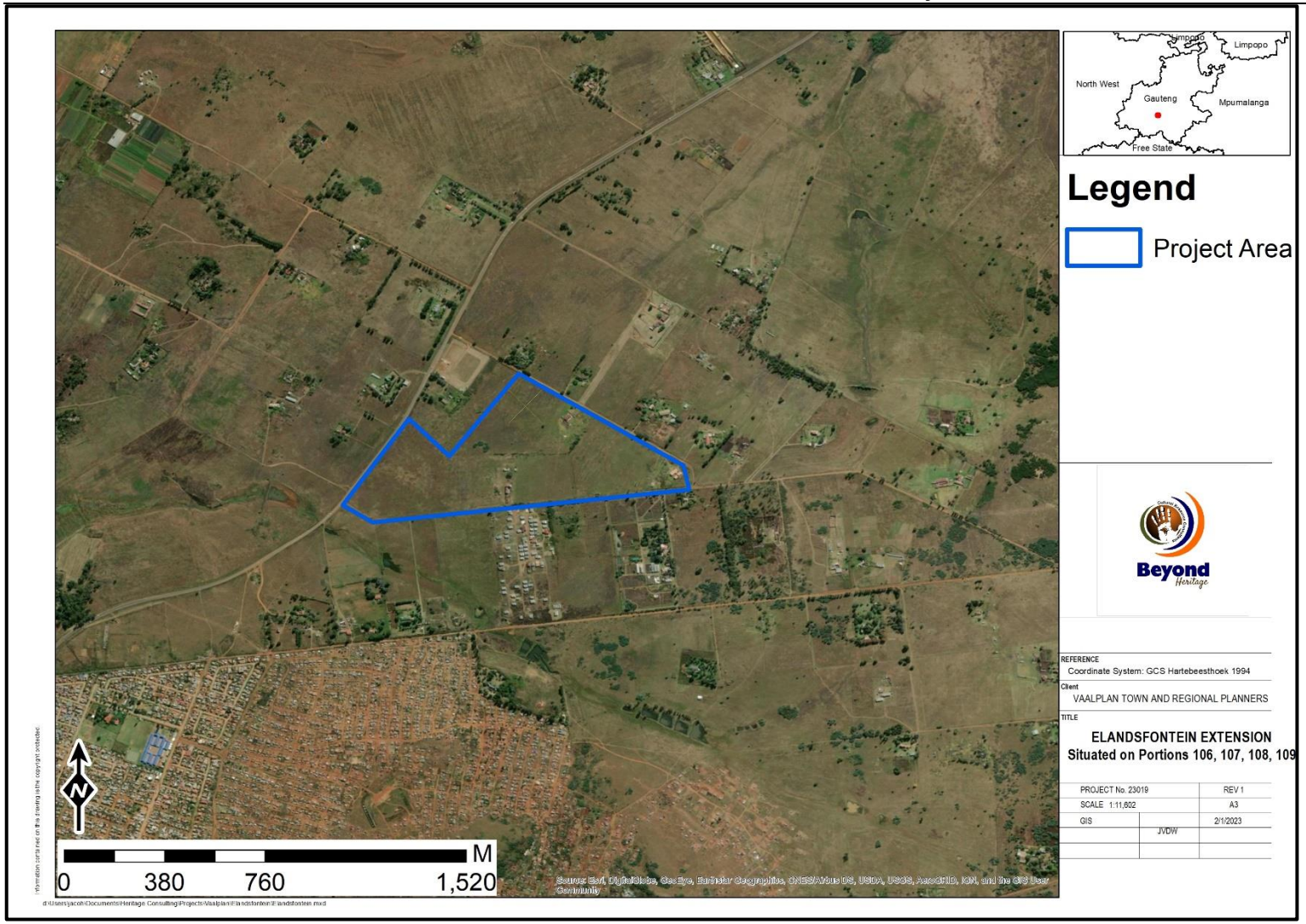


Figure 1-3. Aerial image of the study area.

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 post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the Southern African Development Community (SADC) region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 HIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and 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.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (NHRA), as well as the National Health Act of 2003 and are under the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

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

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation (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;

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	9 December 2022
Season	Summer – The time of year did influence the survey since the area is characterised by dense grass cover after the summer rains. The development footprint was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

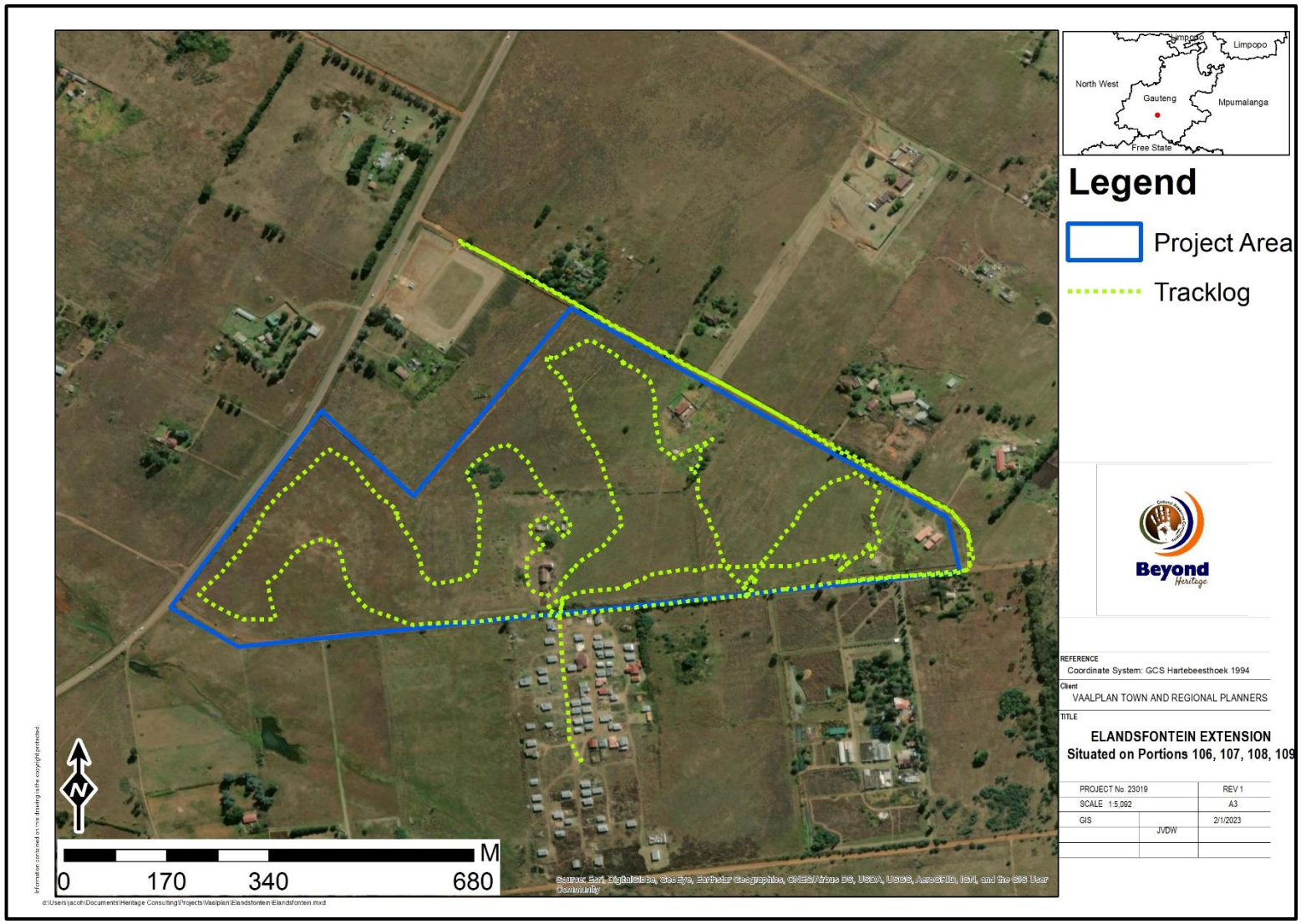


Figure 3-1. Tracklog of the survey path in green.

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.

Table 5: Heritage significance and field ratings

FIELD RATING	***GRADE***	***SIGNIFICANCE***	***RECOMMENDED MITIGATION***
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP. A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP. B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

3.6 Impact Assessment Methodology

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

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

The **significance** is calculated by combining the criteria in the following formula:
S= (E+D+M) P
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

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

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. Also, dense grass cover hampered ground visibility and although unlikely informal graves 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 footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to Census 2011, Midvaal Local Municipality has a total population of 95 305, of which 58,4% are black African, 38,7% are white, 1,6% are coloured, and 0,6% are Indian/Asian. Of those aged 20 years and older, 3,6% have completed primary schooling, 34,4% have some secondary education, 32,3% have completed matric, and 15,3% have some form of higher education. A total of 45 956 people are economically active (employed or unemployed but looking for work), and of these, 18,8% are unemployed. Of the 21 439 economically active youth (15–34 years) in the area, 25,4% 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. No heritage concerns have been raised thus far.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

Few sites are known for the greater region and consist of historic homestead remains, a feature belonging to the Apostolic Church, and an LSA site. 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.

Author	Year	Project	Findings
Van Schalkwyk, J.	2015	Heritage Impact Assessment for the Proposed Installation of Storm Water Management Systems in Kanana Township, Southwest of Johannesburg, City of Johannesburg District Municipality, Gauteng Province.	No Sites
Murimbika, M., & Tomose, N.	2012	Proposed Kanana Park Extension 6 Township, Gauteng Province: Archaeological and Heritage Impact Assessment Report.	Historic homestead remains
Marais-Botes, L.	2017	Proposed Establishment of a Mixed Land Use Development on Holding 47 and 49, Unaville Agricultural Holdings (Proposed Unaville Extension 11), Within the Jurisdiction of the City of Johannesburg Metropolitan Municipality, Gauteng Province.	No Sites
Seliane, M.	2014	Finetown Proper & Ennerdale South Phase I Cultural Heritage Impact Assessment.	A feature belonging to the Apostolic Church
Fourie, W.	2007	Walkerville Ext 1: Proposed Residential Development on Holding 16 Walkerville AH, Johannesburg, Gauteng Province	No Sites
Huffman, T.N.	2008	Lenasia South Extension, Gauteng Archaeological and Heritage Impact Assessment. A Phase I Report prepared for Seaton Thompson & Associates.	LSA site

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 three main periods namely the Stone Age, Iron 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.

Various Stone Age sites are on record for the larger region, indicating early human occupation and movement throughout the landscape throughout the span of the Stone Age. The study area is located roughly 25 km south of the Melville Koppies, which is a prominent Middle Stone Age site in the landscape (Bergh 1999: 4). Early and Middle Stone Age tools have also been found near Klipriviersberg but no definitive sites were identified in Klipriviersberg. Other Stone Age sites in the region are generally found near watercourses or rocky outcrop and are generally isolated to artefact scatters (Schoeman and van Doornum 2001). Early and Middle Stone Age tools have also been found at Henley-On-Klip, situated around 30km from the study area.

An LSA associated site containing rock engravings has been identified in Redan, approximately 25km south of the project area. Around 244 rock engravings of animals, San weapons, circles, and symbols have been identified at the Redan site. During an archaeological survey, Huffman (2008), identified an LSA site situated on a flat plateau above a ridge. Quartzite cores and quartz flakes were found scattered throughout the 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.

The Melville Koppies area shows the earliest Iron Age occupation within the landscape and was an important site to Iron Age communities, since these people had smelted and worked iron ore at the Melville Koppies site since the year AD 1060, by approximation (Bergh 1999: 7, 87). The site was excavated by Professor Mason from the Department of Archaeology of WITS in the 1980's.

Extensive Stone walled sites were also recorded approximately 13km northeast of the project area at Klipriviersberg Nature reserve belonging to the Late Iron Age period. A large body of research is available on this area. These sites (Taylor's Type N, Mason's Class 2 & 5) are now collectively referred to as Klipriviersberg (Huffman 2007). These settlements are complex in that aggregated settlements are common, the outer wall sometimes includes scallops to mark back courtyards, there are more small stock kraals, and straight walls separate households in the residential zone. These sites date to the 18th and 19th centuries and was built by people in the Fokeng cluster. Pottery found at Klipriviersberg is a combination of *Ntsuanatsatsi* and *Olifantspoort* indicating interaction amongst groups (Huffman 2007). In this area, the Klipriviersberg walling would have ended at about AD 1823, when Mzilikazi entered the area (Rasmussen 1978).

There are three known capitals of the Tswana namely Molokwane, Kaditshwene, and Kweneng. The capital of Kweneng is located around 30km east of the study area, in the Suikerbosrand Nature Reserve. Kweneng is considerably larger than the other capitals and is about 4,5km long and 2,7km wide. The occupation of Kweneng ended in the early 19th century during the turbulent time of the Mfecane which caused social unrest as conflict broke out within the Highveld and bordering areas (Sadr 2019).

The Difaqane (Sotho), or Mfekane ("the crushing" in Nguni) was a time of bloody upheavals in Natal and on the Highveld, which occurred around the early 1820's until the late 1830's (Bergh 1999: 10). It came about in response to heightened competition for land and trade, and caused population groups like gun-carrying Griquas and Shaka's Zulus to attack other tribes (Bergh 1999: 14; 116-119). It seems that, in 1827, Mzilikazi's Ndebele started moving through the area where Johannesburg is located today. This group went on raids to various other areas in order to expand their area of influence (Bergh 1999: 11).

6.2.3. Historical Period

By 1939 to 1940, farm boundaries were drawn up in an area that includes the present-day Johannesburg and Krugersdorp. (Bergh 1999: 15). The discovery of the Johannesburg Main Reef of gold in the 1880s resulted in an influx of people into the Johannesburg area and the subsequent establishment of mining related infrastructure.

7 Description of the Physical Environment

The vegetation and landscape are described by Mucina and Rutherford (2006) as Gauteng Shale Mountain Bushveld. It is characterised as low, broken ridges varying in steepness and with high surface rock cover. Vegetation is a short (3–6 m tall), semi-open thicket dominated by a variety of woody species including *Acacia caffra*, *Rhus leptodictya*, *R. magalismontana*, *Cussonia spicata*, *Ehretia rigida*, *Maytenus heterophylla*, *Euclea crispa*, *Zanthoxylum capense*, *Dombeya rotundifolia*, *Protea caffra*, *Celtis africana*, *Ziziphus mucronata*, *Vangueria infausta*, *Canthium gilfillanii*, *Englerophytum magalismontanum*, *Combretum molle*, *Ancylobotrys capensis*, *Olea europaea* subsp*. africana* and *Grewia occidentalis*. The area is dominated by a variety of grasses.

The project area is bordered by three unnamed gravel roads that border the study area. Some features within the project area suggest that the site was used for past agricultural activities. Large metal pipes are buried near the southern boundary of the project area, these may have been used for agricultural irrigation systems. General site conditions are illustrated in Figure 7.1 and 7.8.

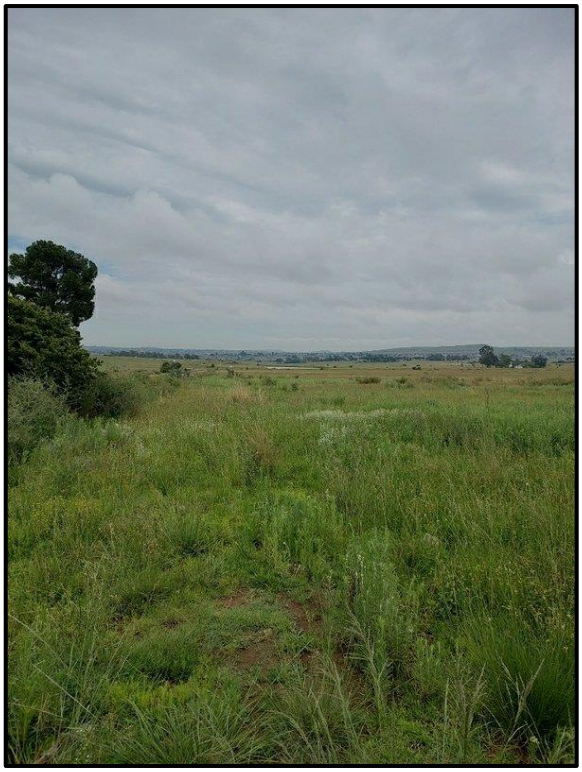


Figure 7-1. General site conditions as seen from the southern edge of the proposed project area.

Figure 7-2. Image showing the overgrown ground vegetation scattered across the proposed project area.

Figure 7-3. Various degraded structures are scattered across the proposed project area.

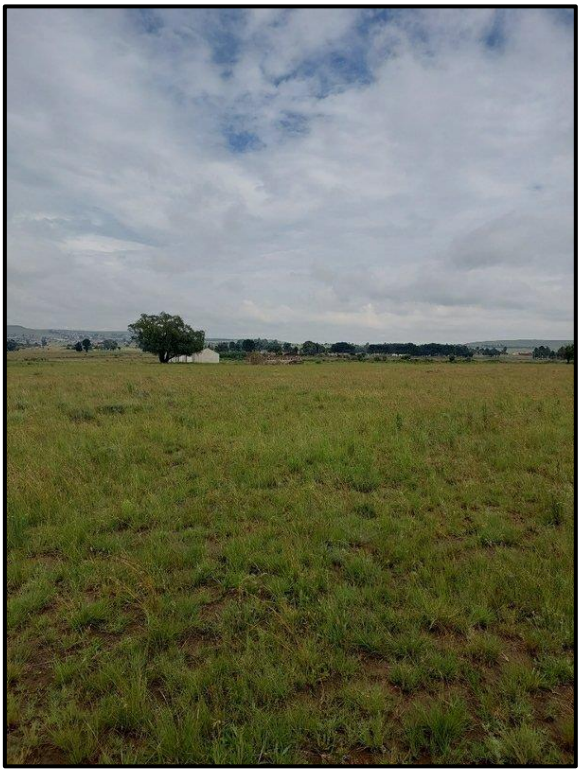


Figure 7-4. General site conditions - Image facing the eastern half of the proposed project area.

Figure 7-5. Agricultural elements situated along the southern edge of the proposed project area.

Figure 7-6. Gravel roads encircle the proposed project area.

Figure 7-7. Existing household situated near the northern edge of the proposed project area.

Figure 7-8. General site conditions as seen from the eastern portions of the proposed project area - Image facing west.

8 Findings of the Survey

8.1 Heritage Resources

Heritage observations within the study area are limited to isolated Stone Age artefacts (dating to the ESA and possibly the MSA) and degraded structure. The lithics are all from the same raw material (possibly metamorphic). These observations were recorded with the prefix EF and numbered numerically. General site conditions and site distribution of the recorded observations are illustrated in Figure 8.1 and briefly described in Table 7. Recorded features in relation to the study area are illustrated in Figure 8.2 to 8.39.

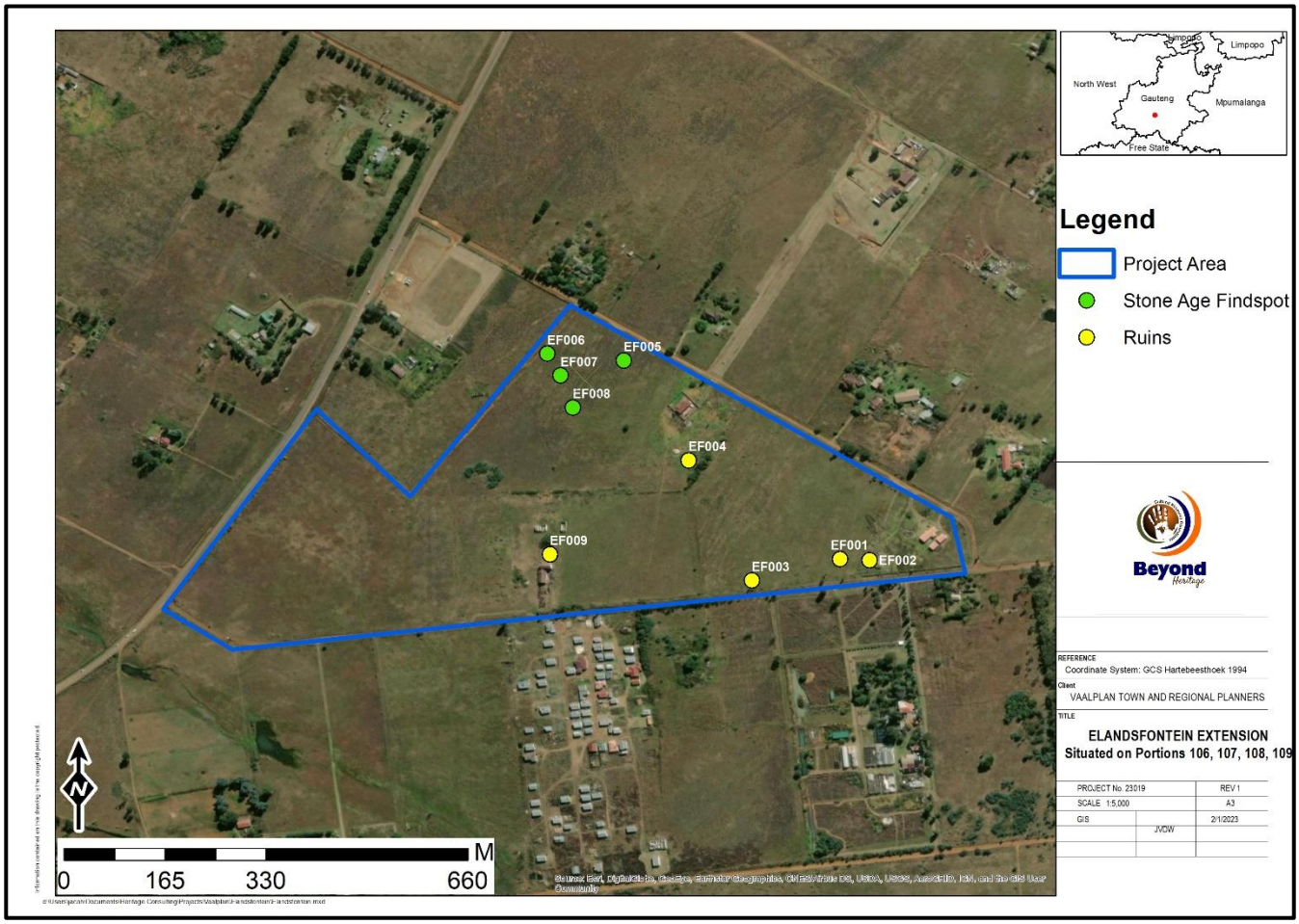


Figure 8-1. Site distribution map.

Table 7. Recorded finds in the study area.

Label	Description	Longitude	Latitude	Significance/ Field Rating
EF001	The degraded structure is situated on the eastern end of the proposed project area. The feature is a multi-roomed structure that resembles worker's housing. The structure is still fairly intact with degrading walls and a missing roof. The site holds no historical value.	27° 55' 10.3945" E	26° 23' 49.5923" S	Low Significance GP C
EF002	The site is 20 x 30m in size and consists of a series of degraded foundations situated around an active yard and household along the eastern edge of the proposed project area. The features seem to have been part of a larger construction site that has since been demolished. The surrounding environment consists of fairly overgrown vegetation and is highly disturbed due to past development activities. The features hold no historical value.	27° 55' 11.9719" E	26° 23' 49.6468" S	Low Significance GP C
EF003	The site is 3x2m in size and consists of a degraded structure situated along the southern edge of the proposed project area consists of a fairly disturbed environment with overgrown ground vegetation. The structure is a small multi-roomed structure that resembles worker's housing.	27° 55' 05.7252" E	26° 23' 50.7299" S	Low Significance GP C
EF004	The site is 40x20m in size and consists of a series of degraded and mostly demolished structures and foundations situated near an existing yard and household on the north eastern edge of the proposed project area. The site consists of mostly building rubble and some foundations still visible through the overgrown vegetation. The structures seem to have been demolished in an effort to re-use the cement bricks from the site. The features may possibly have been part of an agricultural site or part of the original agricultural infrastructure within the area. These include a degraded	27° 55' 02.3732" E	26° 23' 44.3704" S	Low Significance GP C

	water reservoir as well as a small row of trees that may indicate an overgrown road.			
EF005	An isolated ESA/MSA flake was identified along the northern edge of the proposed project area.	27° 54' 58.9392" E	26° 23' 39.0803" S	Low Significance GP C
EF006	An isolated ESA bifacial artefact was discovered along the northern edge of the proposed project area.	27° 54' 54.8855" E	26° 23' 38.7203" S	Low Significance GP C
EF007	A large core is situated near the northern edge of the proposed project area.	27° 54' 55.6019" E	26° 23' 39.8724" S	Low Significance GP C
EF008	Two flakes (possibly MSA) were identified near the northern edge of the proposed project area.	27° 54' 56.2573" E	26° 23' 41.5715" S	Low Significance GP C
EF009	The site is 10x10m in size and consists of a degraded house or structure situated near the southern edge of the proposed project area. The site includes the large main structure as well as two smaller structures situated directly towards the north. The main house is still fairly intact with only portions of the structure having been broken down to be re-used by local community members. The structure is a large multi-storeyed and multi-roomed house that may have been used as the main farmhouse for the area. The two smaller structures are also in a fair condition with their roofs missing and their walls are degrading. One of these structures seems to have been a secondary house and the other seems to have been a garage type building.	27° 54' 55.0375" E	26° 23' 49.3455" S	Low Significance GP C

Figure 8-2. West facing wall of the degrading structure at EF001.

Figure 8-3. North facing wall of the structure at EF001.

Figure 8-4. East facing wall of the structure at EF001.

Figure 8-5. South facing wall of the structure at EF001.

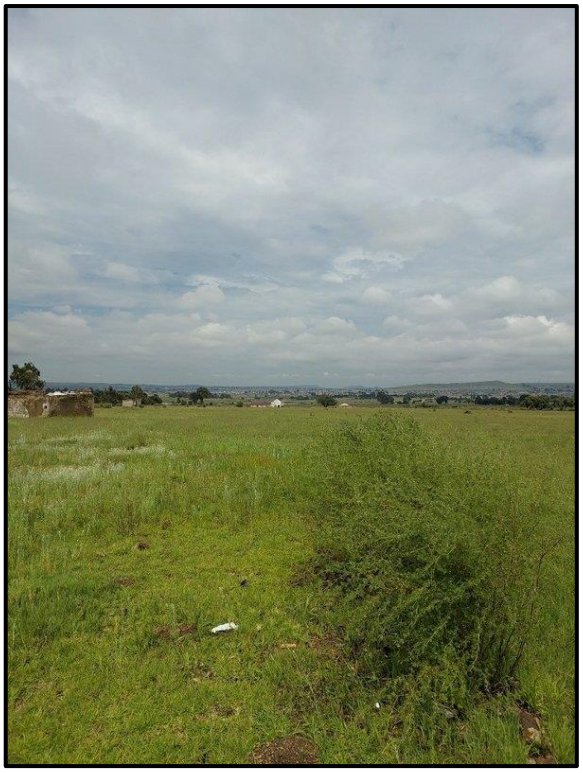


Figure 8-6. General view of the surrounding environment at EF001.

Figure 8-7. General view of the active household and yard situated on the eastern edge of the proposed project area at EF002.

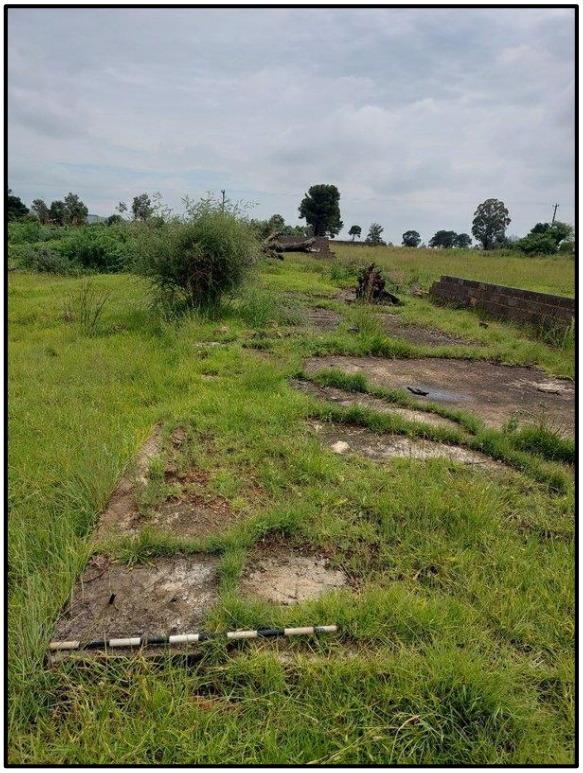


Figure 8-8. Series of degraded and partially overgrown foundations at EF002.

Figure 8-9. The foundations are situated along an existing wall at EF002.

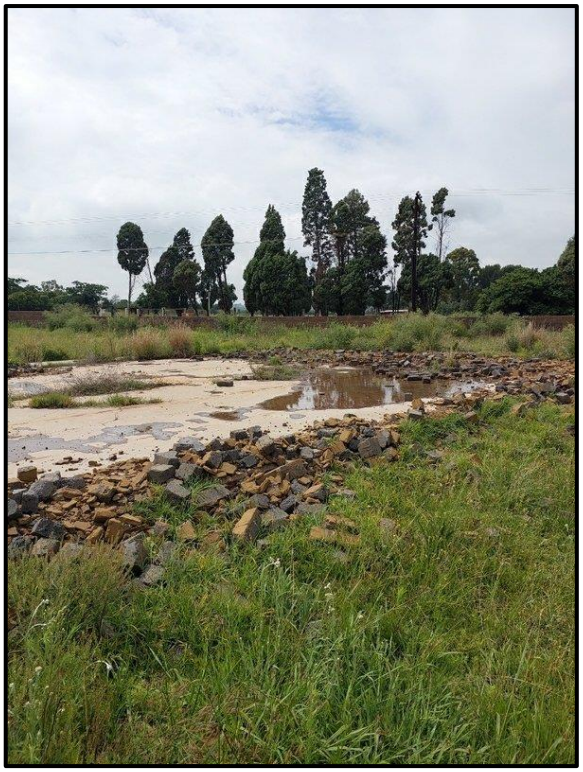


Figure 8-10. Large partially demolished foundations situated within the walled off area at EF002.

Figure 8-11. Outer wall running around the active household at EF002.

Figure 8-12. North facing wall of the structure at EF003.

Figure 8-13. East facing wall of the structure at EF003.

Figure 8-14. West facing wall of the structure at EF003.

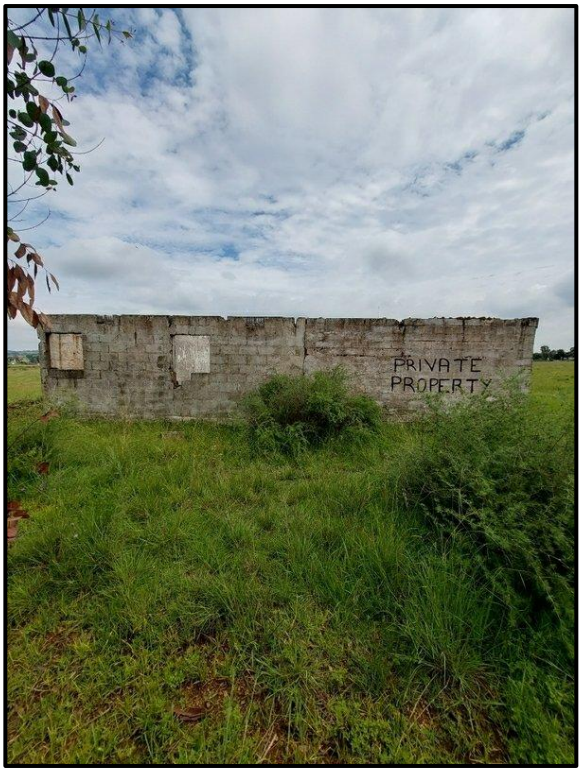


Figure 8-15. South facing wall of the structure at EF003.

Figure 8-16. Series of broken down foundations or structures built from cement bricks at EF004.

Figure 8-17. Alternate view of the demolished structures showing a row of trees running along the edge of the site at EF004.

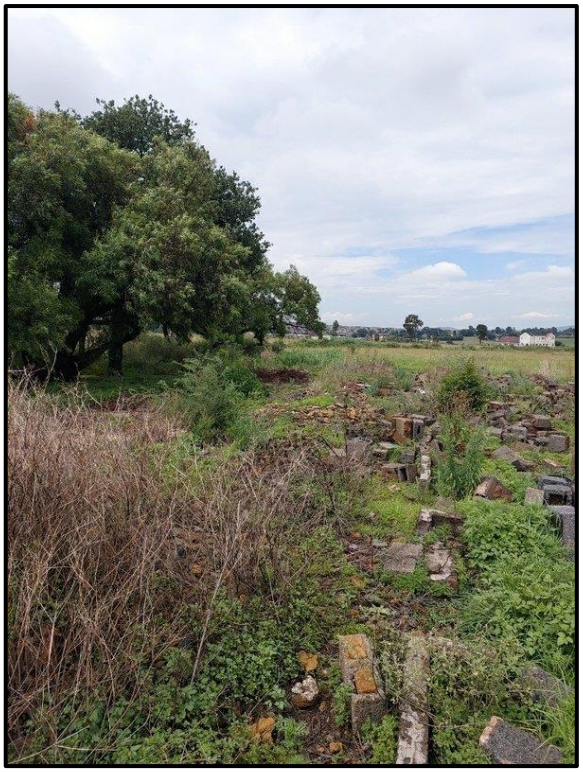


Figure 8-18. View of the foundations and various cement bricks that seem to have been recovered Image facing west at EF004

Figure 8-19. Existing degraded water reservoir situated near the foundations at EF004.

Figure 8-20. View of the existing household situated near the site at EF004.

Figure 8-21. Large flake identified along the northern boundary of the project area at EF005.

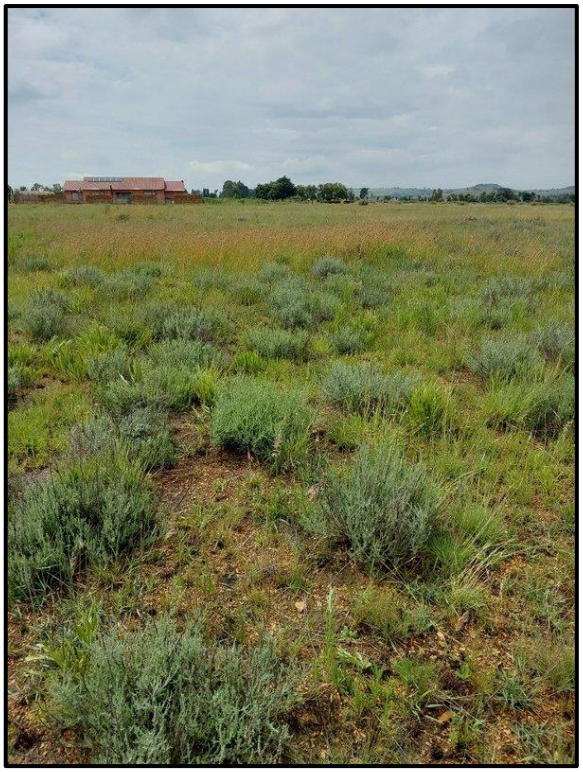


Figure 8-22. General site conditions around the area where the artefact was discovered at EF005.

Figure 8-23. Large ESA artefact identified on the northern edge of the proposed project area at EF006.

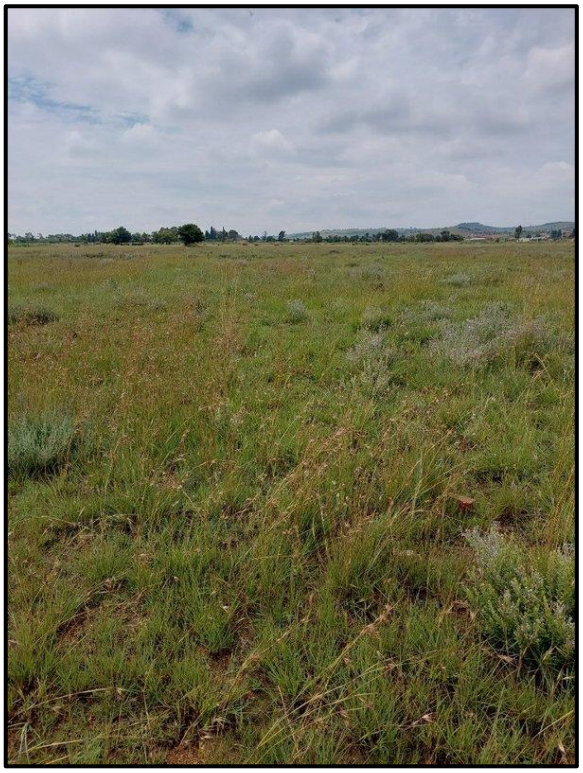


Figure 8-24. General site conditions around the area where the artefact was discovered at EF006.

Figure 8-25. Large core identified along the northern boundary of the project area at EF007.

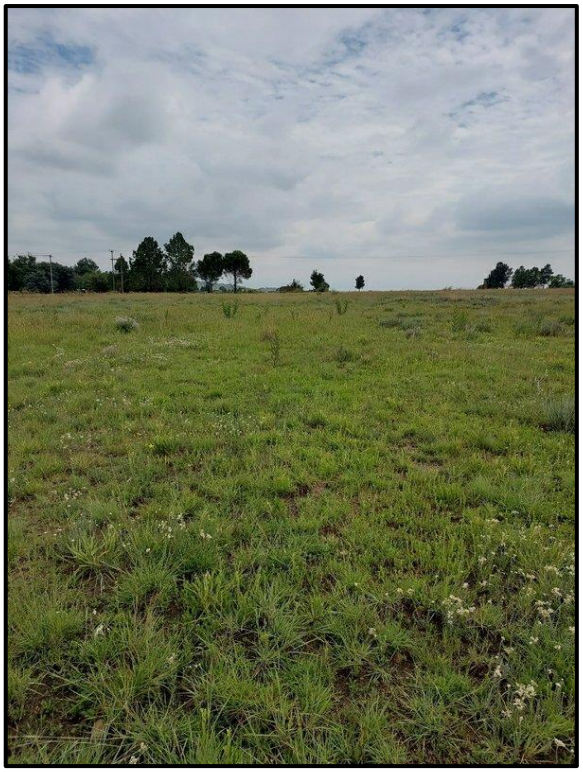


Figure 8-26. General view of the area where the artefact was identified at EF007.

Figure 8-27. Two isolated flakes identified among dense grass cover near the northern boundary of the project area at EF008.

Figure 8-28. General view of the area where the artefacts were identified at EF008.

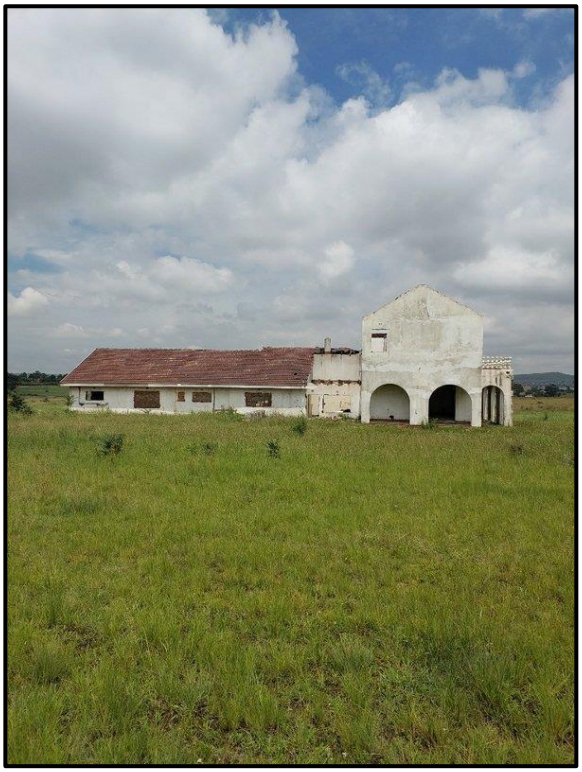


Figure 8-29. East facing wall of the main structure at EF009.

Figure 8-30. South facing wall of the main structure at EF009.

Figure 8-31. Small foundation situated on the western edge of the main structure at EF009.

Figure 8-32. West facing wall of the main structure at EF009.

Figure 8-33. North facing wall of the main structure at EF009.

Figure 8-34. South facing wall of the secondary house at EF009.

Figure 8-35. West facing wall of the secondary house at EF009.

Figure 8-36. West facing wall of the garage structure at EF009.

Figure 8-37. North facing wall of the garage structure at EF009.

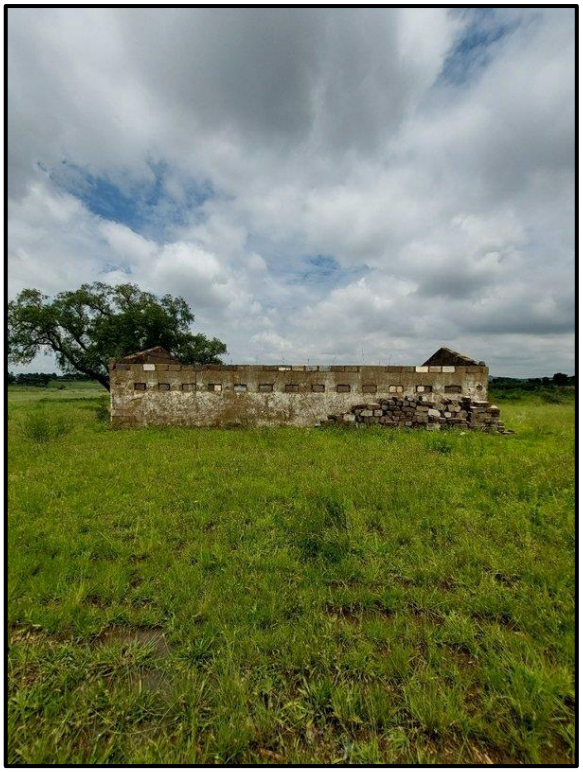


Figure 8-38. East facing wall of the garage structure at EF009.

Figure 8-39. South facing wall of the garage structure at EF009.

8.2 Cultural Landscape

The study area is marked by areas of cultivation and various structures which have been developed and subsequently demolished. These structural remains are not older than 60 years and are therefore of no heritage significance. (Figure 8.40 to 8.43).

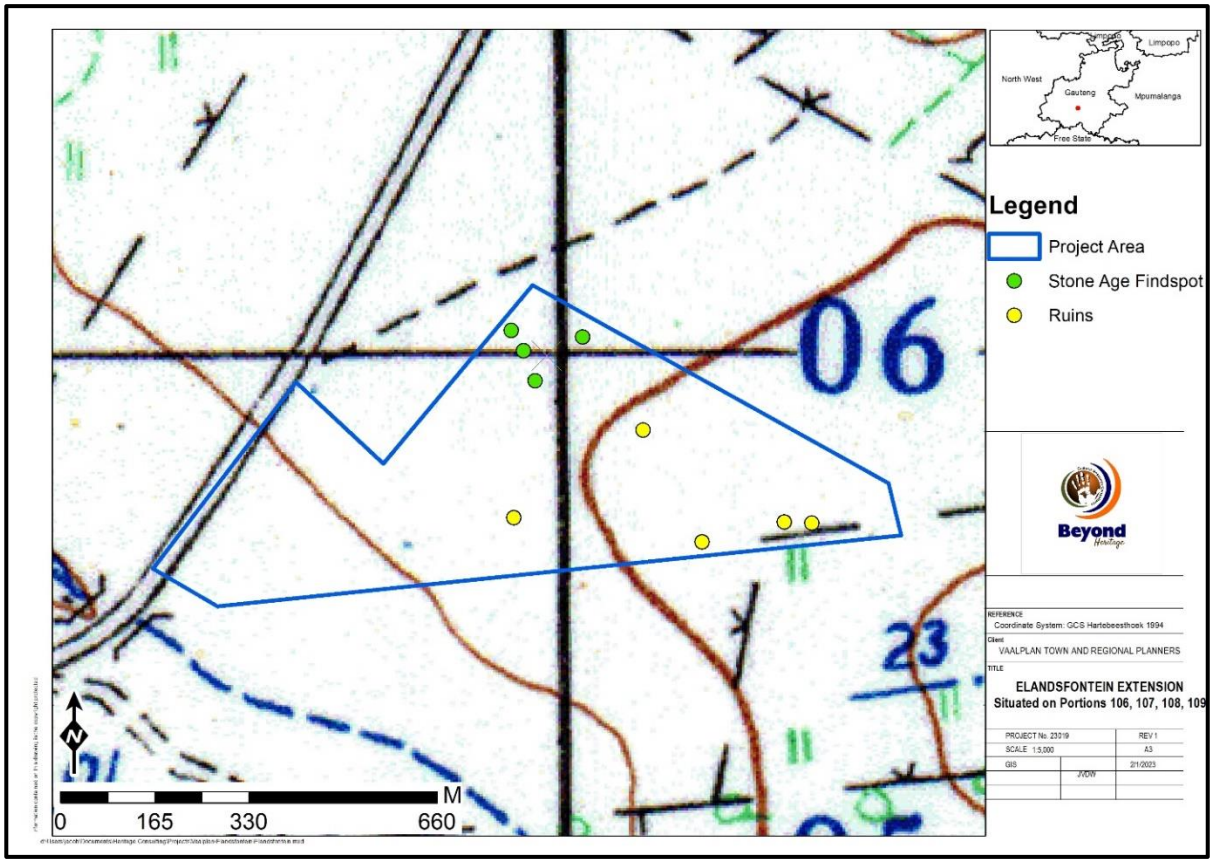


Figure 8-40. 1944 Topographic map of the project area indicating no developments in the study area.

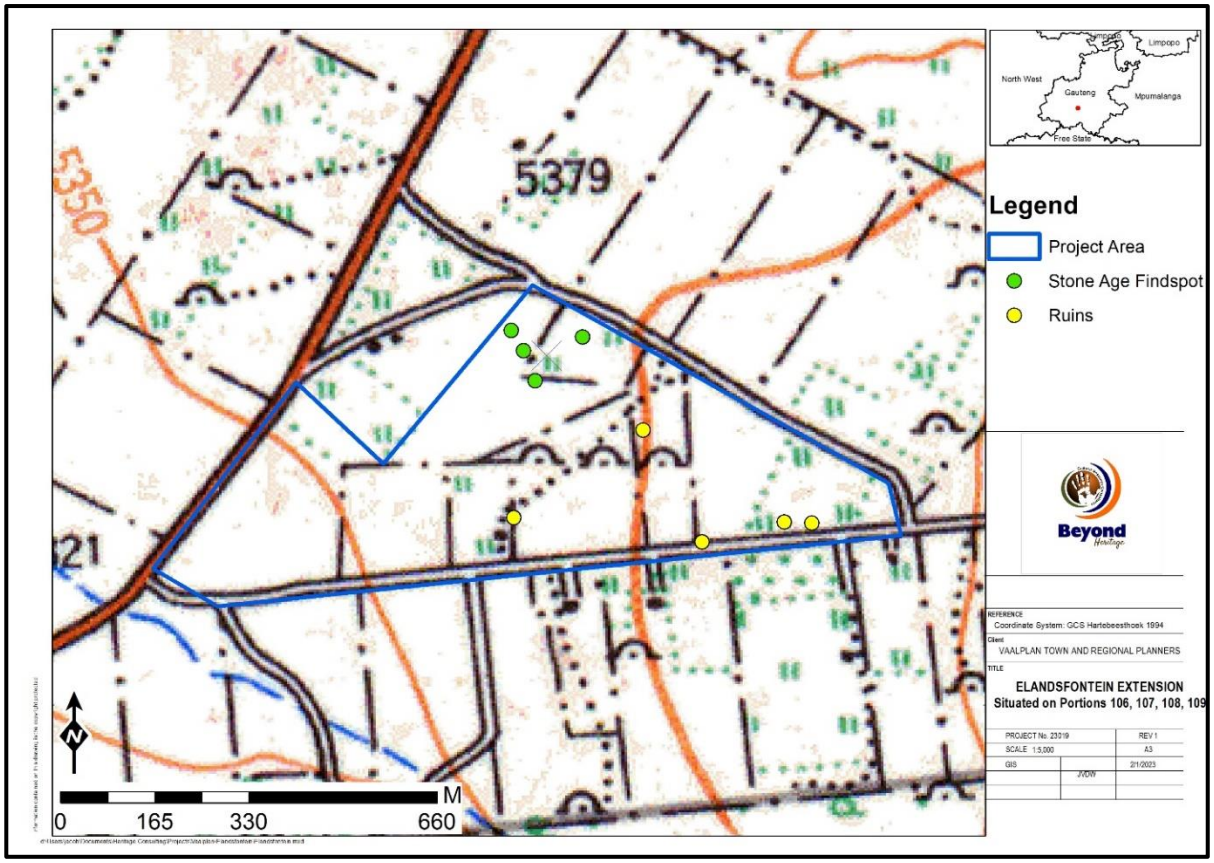


Figure 8-41. 1956 Topographic map of the project area indicating huts and areas of cultivation within the study area as well as roads along the borders of the study area.

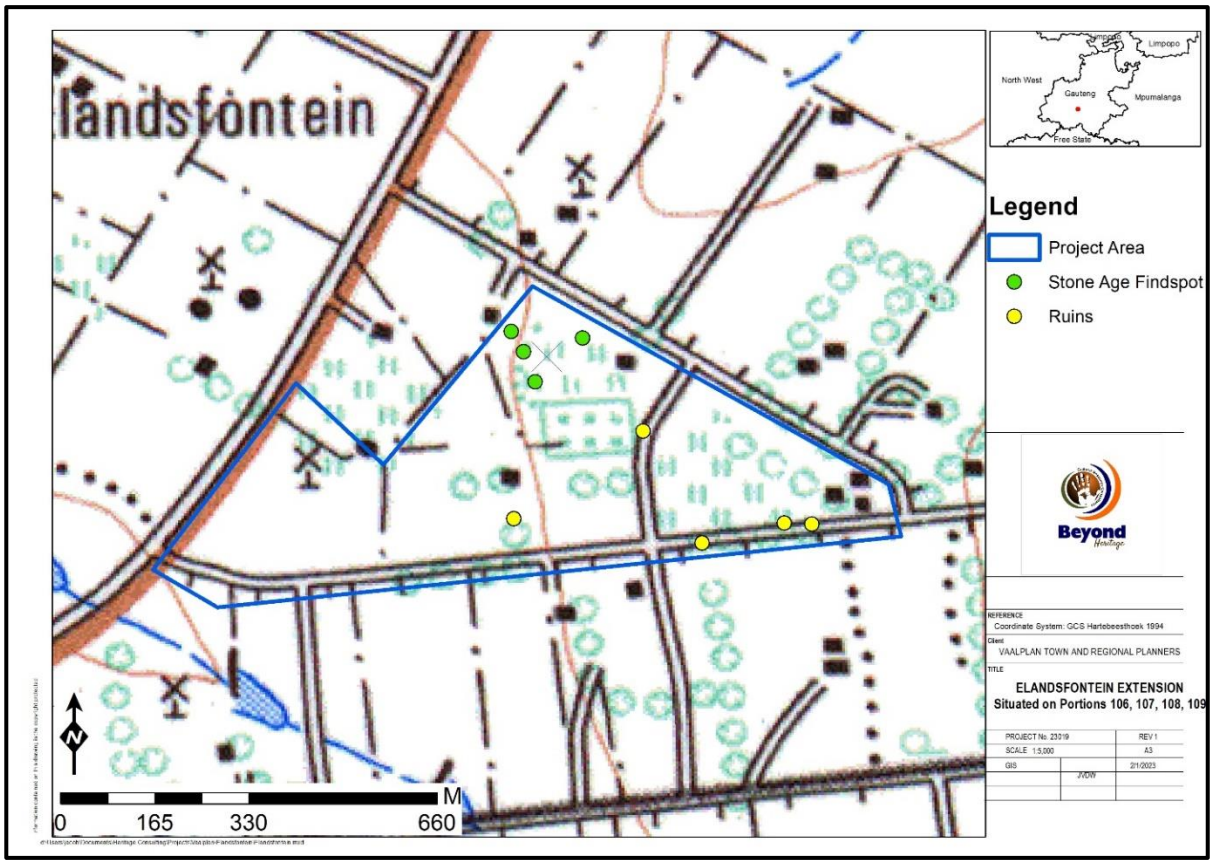


Figure 8-42. 1976 Topographic map indicating development of multiple structures, a windmill, and orchards within the study area.

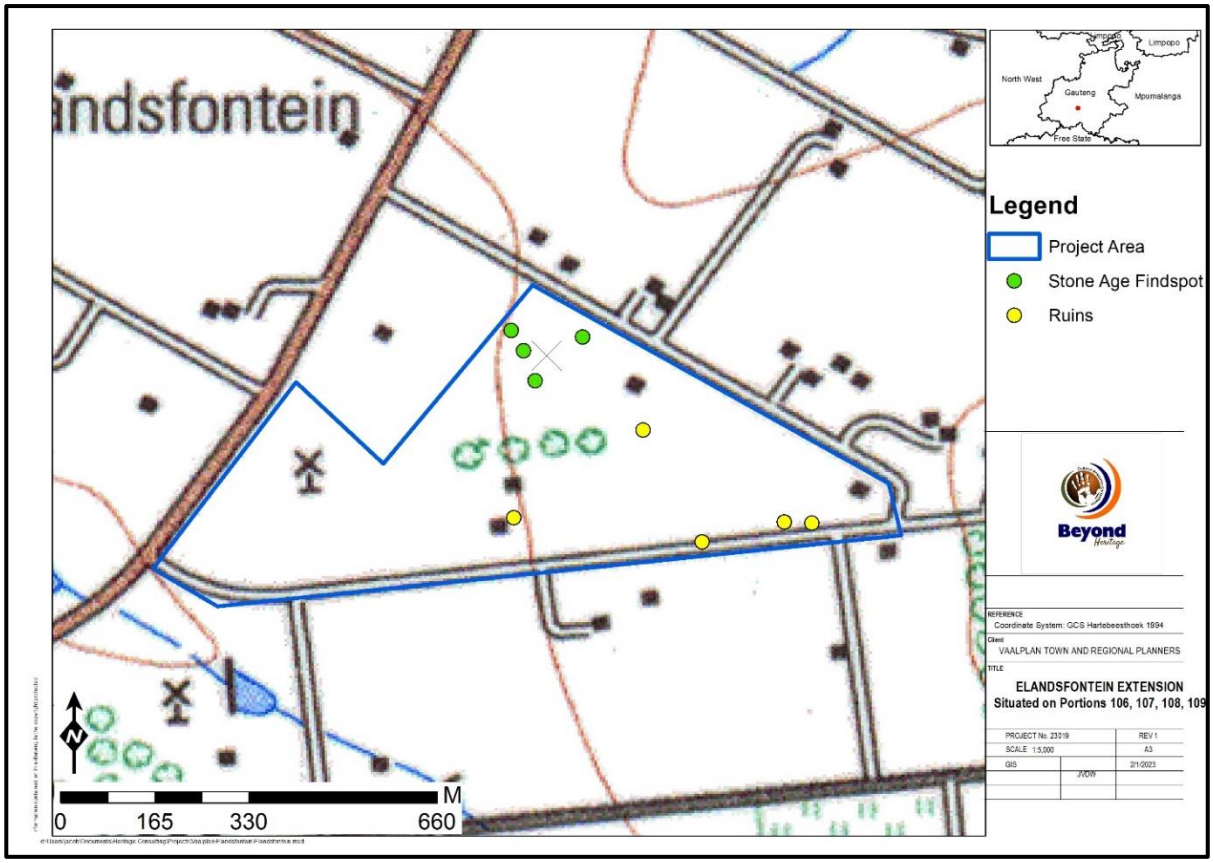
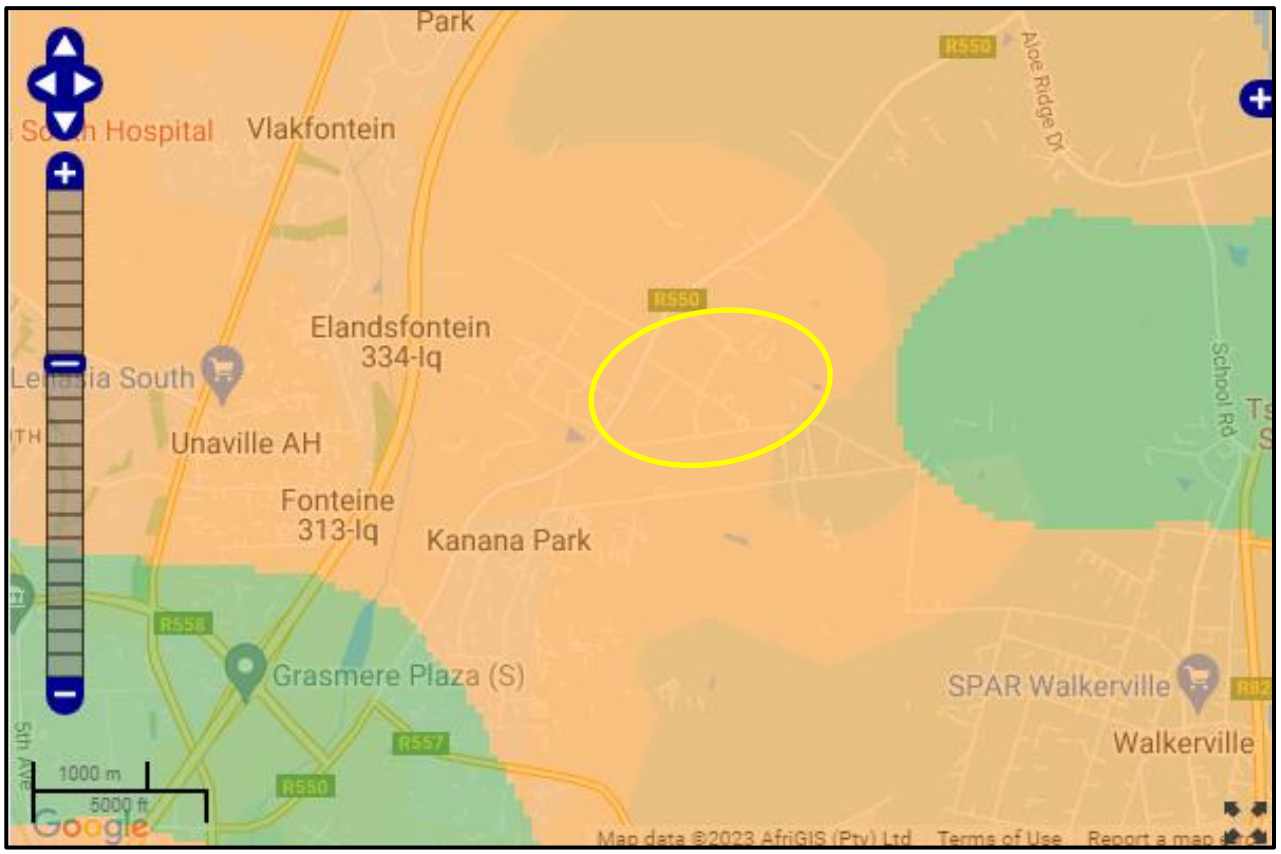


Figure 8-43. 1995 Topographic map of the project area indicating the removal of two structures in the eastern corner of the project area and the development of a new structure near the southern border of the project area. As illustrated, this newer structure was documented as waypoint EF009 but is not older than 60 years and is therefore not considered of heritage significance.

8.3 Paleontological Heritage

The study area is indicated as of high paleontological significance on the SAHRA Paleontological map (Figure 8.44) and was subject to an independent assessment.



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map

Figure 8-44. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

Isolated Stone Age finds (EF005, EF006, EF007, EF008) are out of context and scattered too sparsely to be of significance apart from mentioning them in this report. The ruins at EF001, EF002, EF003, EF004, and EF009 are all too degraded to be of significance. As illustrated on the topographic maps, the ruins are not older than 60 years and are therefore not considered as heritage resources. The cumulative impact on the project will therefore be low.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures as recommended in this report should be implemented during all phases of the project. Impacts of the project on heritage resources is expected to be low during all phases of the development (Table 8).

9.1.1 Pre-Construction phase

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

9.1.2 Construction Phase

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

9.1.3 Operation Phase

No impacts are expected during the operation phase.

9.1.4 Impact Assessment for the project

Table 8. Impact assessment of isolated Stone Age finds at EF005, EF006, EF007, EF008.

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 (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**16 (Low)**	**16 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • 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;		
Cumulative impacts: The proposed project will have a low cumulative impact as no significant 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.		

Table 9. Impact assessment of ruins at EF001, EF002, EF003, EF004, EF009.

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 (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**24 (Low)**	**16 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • 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;		
Cumulative impacts: The proposed project will have a low cumulative impact as no significant 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 project area is characterised by an open field that has been fallow for a number of years. The study area has been altered through previous agricultural activities and the construction and subsequent demolition of various structures. No major topographic features that would have been focal points for human activity occur in the study area and the site is considered to be of low heritage potential and heritage finds were limited to isolated Stone Age finds and multiple ruins of structures.

The isolated Stone Age finds (EF005, EF006, EF007, EF008) date to the ESA/MSA but are isolated finds and out of context and of no significance apart from mentioning them in this report. The structural remains recorded (EF001, EF002, EF003, EF004, and EF009) are not older than 60 years and are therefore of no heritage significance. The palaeontological sensitivity of the study area is high, and was subject to an independent assessment.

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

10.1 Recommendations for condition of authorisation

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

Recommendations:

- 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 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, sub surface cultural material and unrecorded 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 10. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Cultural Resources Chance Finds	Entire project area	ECO	Weekly (Pre construction and construction phase)	Proactively	• If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.

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 11. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General Project area	Regular monitoring of the development footprint by the ECO	Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

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