HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED GEM VALLEY EXTENSION 17- EXTENSTION 27, CITY OF TSHWANE METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

Type of development:

Township Development

Applicant:

Cosmopolitan Projects Tshwane (Pty) Ltd

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Project Reference:
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November 2022

APPROVAL PAGE

Project Name	Gem Valley.
Report Title	Heritage Impact Assessment for the proposed "Gem Valley X17-X27" within the jurisdiction of City of Tshwane Metropolitan Municipality, Gauteng Province.
Authority Reference Number	TBC
Report Status	Draft Impact Assessment Report
Applicant Name	Cosmopolitan Projects Tshwane (Pty) Ltd

	Name	Qualifications and Certifications	Date
Report compilation, fieldwork and project Management	Jaco van der Walt	MA Archaeology PhD Candidate ASAPA #159 APHP # 114	November 2022
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Paleontological Report	Prof Marion Bamford	PhD Palaeobotany	November 2022

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 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
(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
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 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 the EIA report
(q) Any other information requested by the competent authority	No other information is requested at this time

Executive Summary

Cosmopolitan Projects Tshwane (Pty) Ltd (the applicant) appointed Isquare Information Systems CC as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the proposed township development, Gem Valley X17-X27. 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 characterised by an open area that has been fallow for a number of years marked by illegal dumping and waste rock material of a small mining operation. Sections of the Project are also used to be cultivated in the past;
- Several heritage features were recorded, ranging from an Iron Age stone walled settlement, a cemetery dating from prior to 1965.The sites will require mitigation prior to construction;
- An assessment of the paleontological significance of the area (Bamford 2022) concluded that the impact on palaeontological resources is low and the project should be authorised from a paleontological point of view.

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

Recommendations:

- GV001 is located outside of the impact area and should be indicated on development plans and avoided;
- GV005 and GV009 should be avoided, but if this is not possible the features must be mapped and recorded prior to an application for a destruction permit.
- The cemetery at GV004 should be avoided with an access gate and a 30 m buffer zone. If not feasible these features can be relocated adhering to the relevant legislation;
- GV002, GV003, GV006, GV007 should be monitored during construction and clearing activities;
- A heritage site management plan should be compiled for the development;
- Implementation of a Chance Find Procedure for the project..

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 (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	
Date	19/11/2022

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and has conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as the Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Guinea, Afghanistan, Nigeria and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DFFE: Department of Fisheries, Forestry and Environment,
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EAP: Environmental Assessment Practitioner
EO: Environmental Officer
EPC: Engineering Procurement and Construction
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 Heritage Impact Assessment (HIA) for the proposed township development referred to as Gem Valley X17-X27 in the Gauteng Province (Figure 1.1 to 1.3). The report forms part of the Environmental Impact Assessment (EIA) Report and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey, ruins, stone packed features, a cemetery, and an initiation site were recorded in the study area. 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 this report. SAHRA 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).

1.2 Project Description

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

Table 2: Project Description

Applicant	Cosmopolitan Projects Tshwane (Pty) Ltd
Location	Part of Re/Portion 7 and Part of Portion 128 of the farm Leeuwfontein 299-JR and Part of Portion 74, Part of Portion 75, Portions 76-77, Re/Portion 80, Part of Re/Portion 83, Part of Re/Portion 84 and Part of Re/Portion 86 of the farm Franspoort 332-JR within the jurisdiction of City of Tshwane Metropolitan Municipality, Gauteng Province
Central co-ordinate of the development	25°41'4.02"S of 28°23'48.99"E
Topographic Map Number	2528CB

Table 3: Infrastructure and project activities

Type of development	Township Development
Size of development	189 hectares
Project Components	The proposed development is a residential township and associated infrastructure.

1.3 Alternatives

No alternatives were provided for assessment. The extent of the area assessed allows for siting of the development to minimize impacts to heritage resources.

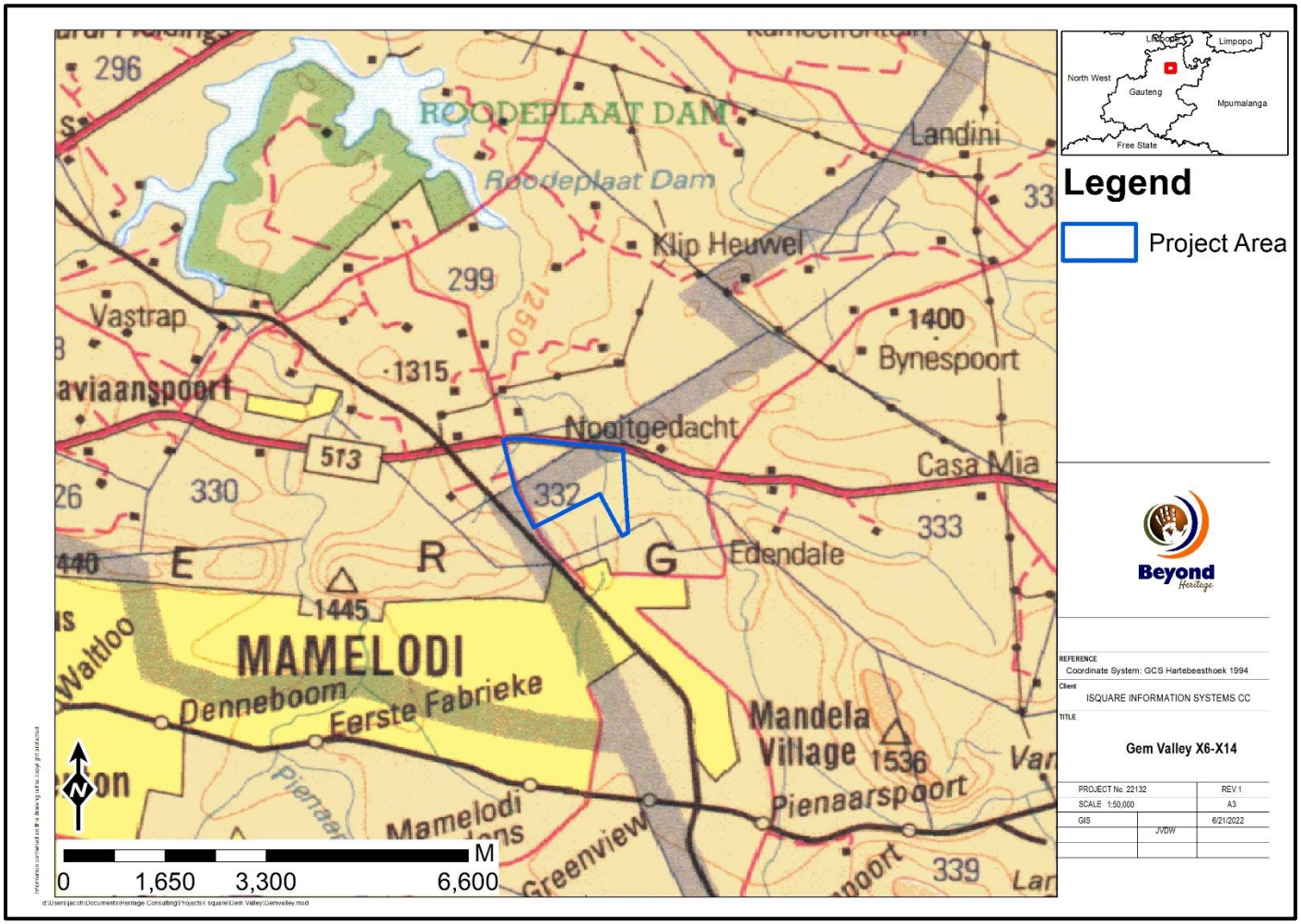


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

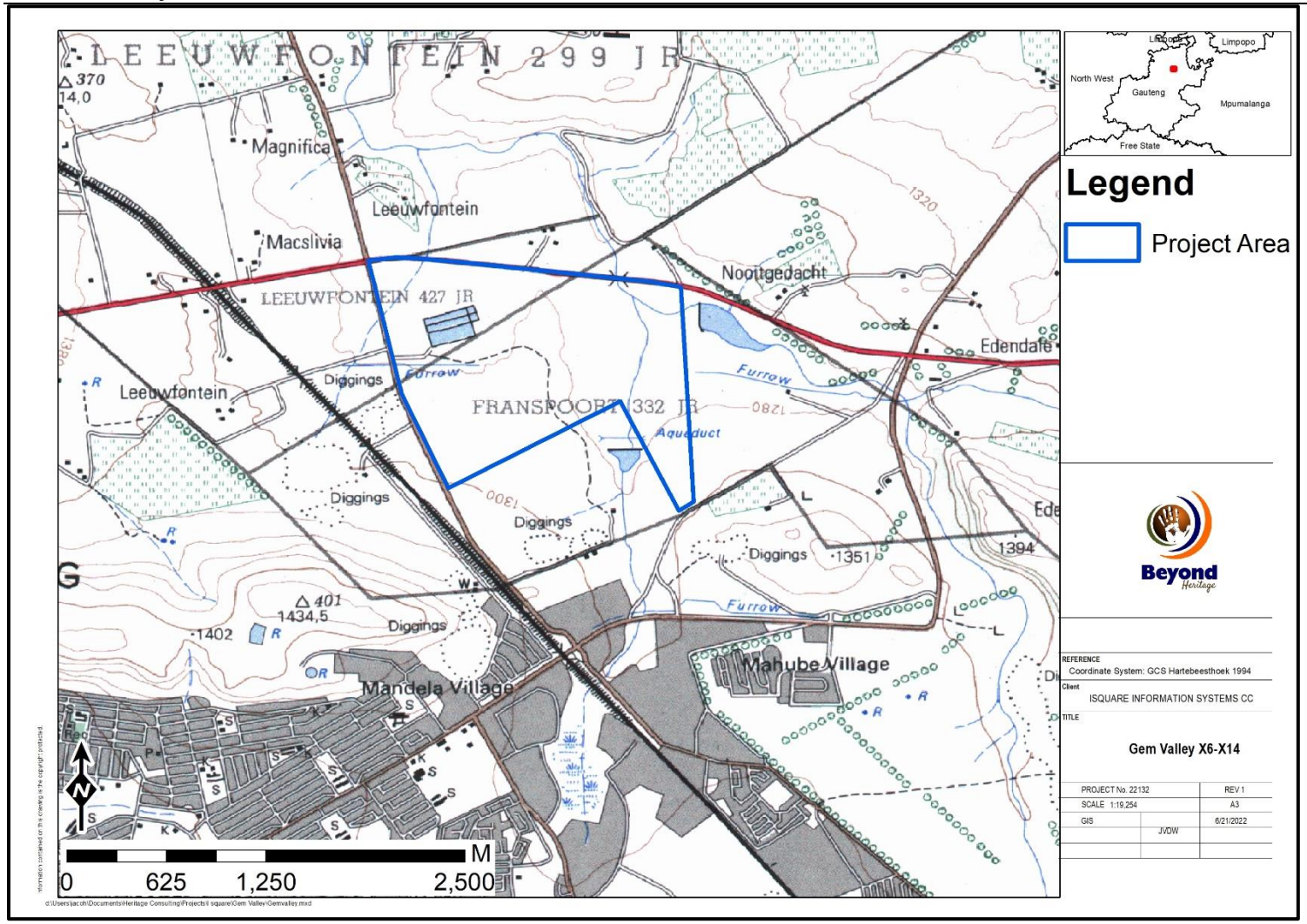


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

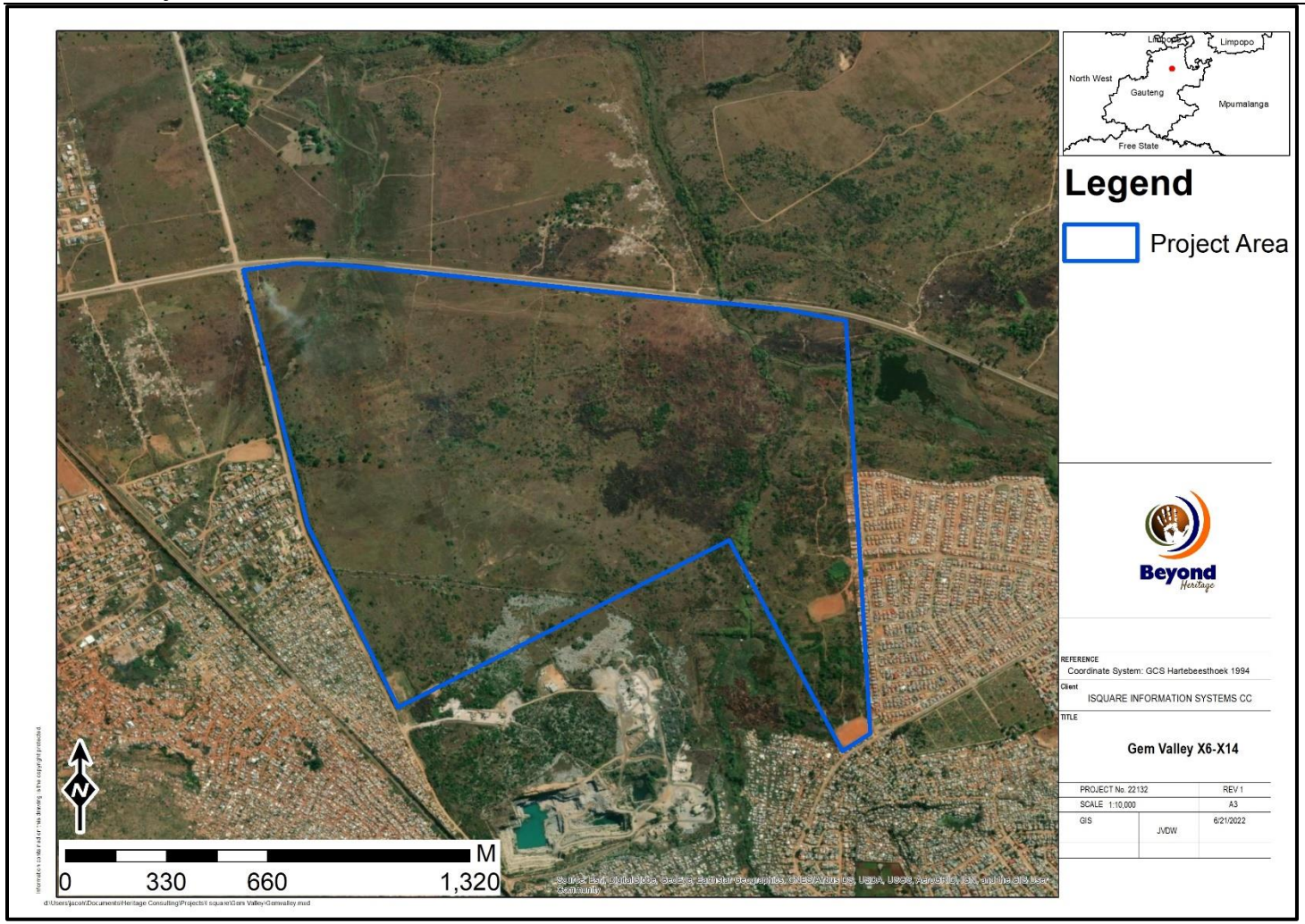


Figure 1.3. Aerial image of the development footprint and surrounds.

2 Legislative Requirements

The HIA, as a specialist sub-section of the 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 of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

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

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

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act)..

3 METHODOLOGY

3.1 Literature Review

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

3.2 Genealogical Society and Google Earth Monuments

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

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any Environmental Assessment (EA) process, it involves stakeholders interested in, or affected by the proposed development. The Public Participation Process is undertaken by the Environmental Assessment Practitioner (EAP). Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders.

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 area and to record, photograph and describe sites of archaeological, historical or cultural interest;

b) record GPS points of sites/areas identified as significant areas;

c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 4: Site Investigation Details

	Site Investigation
Date	13 September 2022
Season	Spring– The time of the year and season influenced the survey. Archaeological visibility was low due to dense grass cover and the disturbed nature of the site. The development footprint was sufficiently covered during the field survey to understand the heritage character of the area and the range of heritage resources expected (Figure 3.1).

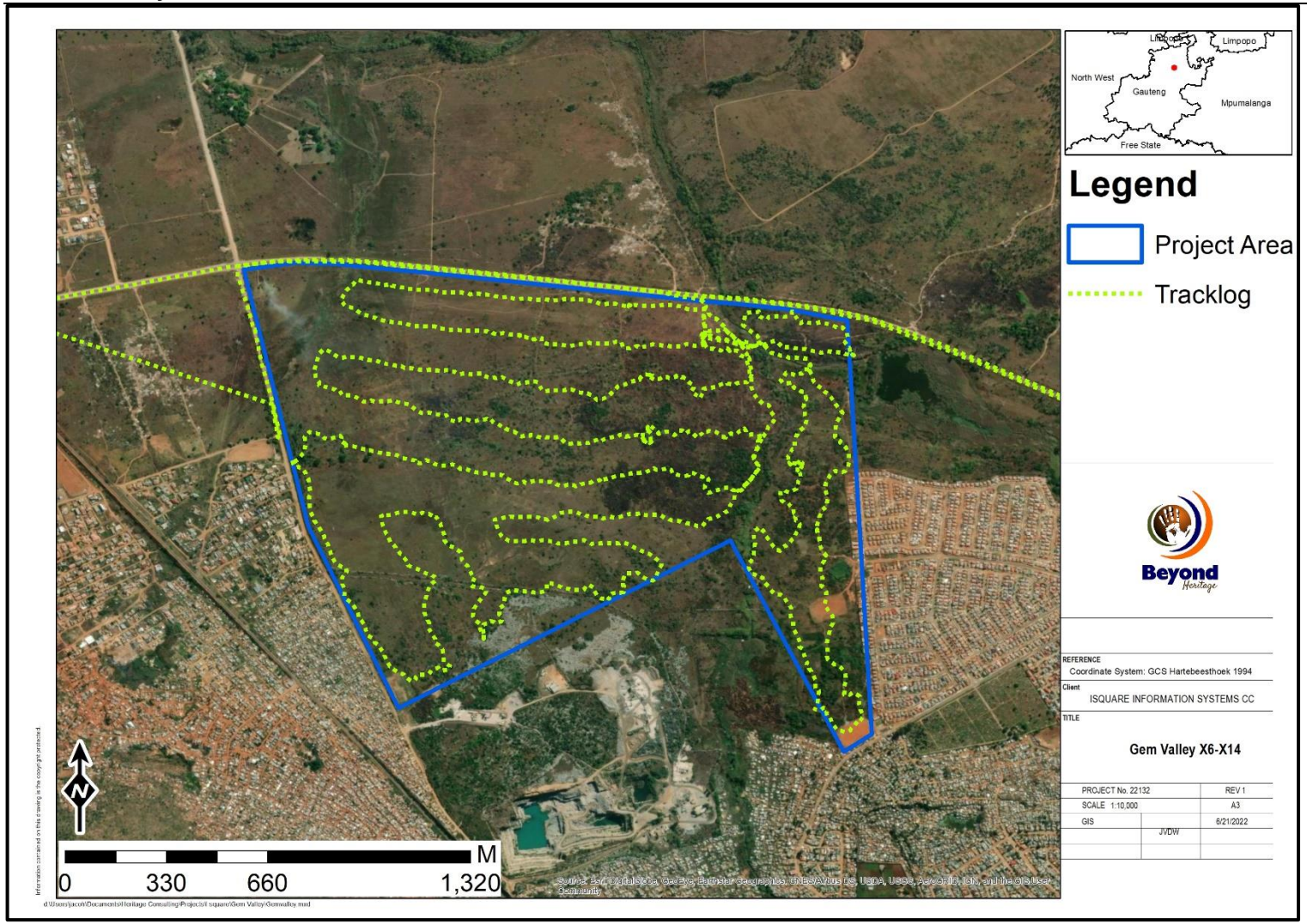


Figure 3.1. Tracklog of the survey path in green.

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 heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

Table 5. Heritage significance and field ratings

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

3.6 Impact Assessment Methodology

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

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

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

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

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

3.7. Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a Chance Find Procedure and monitoring of the study area by the Environmental Control Officer (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 will be highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

The Tshwane IDP (2006 – 2011) indicated that: "*From a socio-economic demographic perspective Tshwane has seen some improvements, despite the fact that it continues to face serious challenges. The City's population has grown slower than the national average, and in 2004 was estimated to be around 2,2 million people, of which 40,6% of the population fell within the 15-34-year age bracket. Compared to the national average, the City's residents are better skilled, reflect high levels of literacy, the City provides employment for a larger percentage of its residents, its human development ranking is high and it has a per capita income above the national average. These figures have resulted in employment, and wage per capita value-added improvements, although, poverty and unemployment remain problematic. In 2003 Tshwane's Economically Active Population (EAP) amounted to 48% of the total population which was higher than the national but lower than the provincial average. While this is positive, employment opportunities were lagging behind, which led to a high level of unemployment. Many people were absorbed into the informal market, but the latter is believed to have levelled off since 2001. Statistics have further shown that 15,3% of households had no income in 2001 (a doubling from 1996), the number of people living in poverty has increased and the group hardest hit in respect of unemployment are the youth (20-24 years).*" Priorities of the IDP included economic development and job creation.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the EIA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process. No heritage concerns have been raised thus far.

6 Historical context of the area

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).

6.1 Literature Review (SAHRIS)

The area under investigation was not previously covered by heritage surveys and few HIA's was conducted in the immediate area. Studies conducted in the general area that were consulted is listed in Table 6.

Table 6. Heritage reports conducted in the greater study area

Author	Year	Project	Findings
Birkholtz, P.	2007	Phase 1 Heritage Impact Assessment Proposed Mining Activities On Portion 47 (A Portion Of Portion 45) Of The Farm Nooitgedacht 333 JR Cullinan Magisterial District, Gauteng.	Five sites were located which can be classified into three different types, namely two cemeteries, two historic military sites and one Late Iron Age site.
Van Schalkwyk, J. A.	2012	Heritage Impact Assessment For The Proposed Upgrade Of A Section Of The R513 (P2-5), Cullinan Region, Gauteng Province.	No sites, features or objects of cultural heritage significance were found in the study area
Muhomba, C. J.	2015	Heritage Impact Assessment For The Proposed Poultry Breeder In Portion 6 Of The Farm Kafferskraal 475 JR In Cullinan, Gauteng Province (GDARD REF: 002/14-15/0239)	Graves
Van der Walt, J.	2022	Heritage Impact Assessment for the proposed township development, Leeuwfontein Extension 29, Gauteng Province	Ruins and potential burial sites

6.2 Background to the study area.

The archaeological record for the greater study area consists of the Stone Age and Iron Age (Figure 6.1).

South Africa: A short chronology

Early Stone Age: 2 million - 250 000 BP. Hominins producing core and pebble tools, later stages includes handaxes and blades.

Middle Stone Age: 250 000 - 40 000 / 25 000 BP. *Homo Sapiens.* Prepared core techniques, formal tools, points, scrapers and backed artefacts. Occasionally includes bone points and ostrich eggshell fragments and grindstones.

Later Stone Age: 40 000 - 100 BP. Wide range of formal microlithic tools. Ostrich eggshell fragments, beads, rock art.

Ceramic Final Later Stone Age: 2000 BP. Wide range of formal microlithic tools, with thin-walled pottery, with some sites having faunal remains of ovicaprids.

Early Iron Age: 200 - 900 CE. Arrival of Bantu-speaking farmers who lived in sedentary settlements often located next to rivers. They kept livestock, cultivated sorghum, beans and cowpeas. Introduced metallurgy to the region and manufactured thick-walled pottery.

Middle Iron Age: 900 - 1300 CE. Confined to the modern-day Limpopo Province, and associated with early state formation, such as Mapungubwe and associated sites.

Late Iron Age: 1300 - 1840 CE. Marks the arrival of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities. Settlements are often located on or near hilltops for defensive purposes. The Iron Age as an archaeological period ends with the Mfecane, 1820s to 1840s CE. An event that caused major socio-political upheavel.

Historic events

1652: Dutch East India Company establishes refreshment station at modern-day Cape Town.

1658: First slave ships arrive at Table Bay.

1660 - 1793: Various armed conflicts between Khoisan and Europeans, several frontier wars between Europeans, Khoisan and Xhosa communities.

1795 - 1807: First British occupation of the Cape, the Dutch East India Company collapses, and slave trade is abolished.

1808 - 1820: Several frontier wars and first British Settlers arrive.

1820 - 1840: Onset of the Mfecane, abolishment of slavery and slaves are freed at the Cape. Dutch farmers started to migrate towards the interior of South Africa, what will become known as the 'Great Trek'.

1860 - 1880: Discovery of mineral wealth, diamons and gold. Establishment of the Zuid-Afrikaansche Republiek (ZAR).

1899 - 1902: The South African War.

1910 - 1945: Unifaction of South Africa, formation of the ANC, World War I and World War II.

BP - Before Present
CE - Common Era

Figure 6.1.Summary of archaeological and historical events in South Africa.

6.2.1 Archaeological background applicable to the study area

A single Later Stone Age site is on record in the greater study area (called Ford Troye) (Bergh 1999). No other significant Stone Age sites are known for the direct area of influence.

Towards Pretoria is the well-known Early Iron Age Site of Derdepoort where a small collection of ceramics was uncovered dating back to the 4th to 7th century AD (Nienaber *et al* 1997). In the greater Tshwane area, many Late Iron Age settlements are on record (Bergh 1999: 4, 7) and stone walled settlements occur around the study area. These sites are mostly associated with the Southern Ndebele and are found in the area between Wallmannsthal and Roodeplaat Dam and also along the Pienaars River to the south of the N4 Highway (Birkholtz 2009). According to Birkholtz (2009) the Manala Ndebele moved from Ezotshaneni to a place known as Embilaneni in 1717. The new settlement spread over the Bronberg mountains east of Pretoria. The Embilaneni settlement was occupied over a period of 30 years between 1717 and 1747.

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. 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. At the beginning of the nineteenth century, the predominant black tribe in the area north of Pretoria was the Manala-Ndebele. The Kgatla were also present to the north of where Pretoria is located today. It seems that, in 1832, Shaka's Zulu tribe passed by the south of Pretoria from the southeast in a westerly direction. This was in order to attack Mzilikazi's Ndebele.

6.2.2 Historical context

The village of Cullinan was named after Sir Thomas Cullinan. The village is known as of being the site of discovery of the world's largest diamond.

Premier Mine was originally part of the farm owned by Cornelis Minnaar, namely Elandsfontein no. 85. It was registered on the 7th of November 1859. A portion of the farm was sold to his brother Roelof Minnaar in 1861, who in turn sold the northern part of the farm to Willem Prinsloo for £570 on the 7th December 1896 (http://www.cullinan-conservancy.org/cultural-heritage.php).

Thomas Major Cullinan, a building contractor wanted to obtain an option on the Prinsloo farm but could not. When Willem Prinsloo died in 1898, Maria Prinsloo became the new owner just before the Anglo Boer War (1898-1902) broke out. After the war Maria Prinsloo's brothers returned to the farm. The Prinsloo family were in need of money. When Thomas Cullinan started new negotiations with the family, they agreed to the sale of the farm for the sum £52,000 .

'Rayton Junction', as it was first known, started out as a tin shack mining town on the farm Elandshoek. During its boom days the town served the needs of thousands of diggers and prospectors working for the Schiller, Montrose and Dunmore mining companies. The original Rayton Junction was laid out along a spur of the main NZASM railway line, which was completed in 1895 to connect the Republic of Transvaal's capital, Pretoria to the port in Delagoabay, Mozambique. Officials in the Montrose Diamond Mining Company did the town planning and named the hamlet after Lady Rachel Ray Williston, wife of the company's first manager, Colonel Balliston.

The town's first—and then only—brick building was the original magistrate's office, which dates from this early time. Between 1900 and 1910 a railroad was constructed between Rayton and Cullinan. Thomas Cullinan's company was initially registered as the Premier Syndicate on November 6, 1902. They reregistered on 1 December 1902 as The Premier (Transvaal) Diamond Mining Company LTD (http://www.cullinan-conservancy.org/cultural-heritage.php).

Prospecting started immediately. In April 1903 William McHardy became the first general manager. Production began on 24th April 1903. By 1904 the mine already employed more than 2000 people. On

the 25th January 1905 a diamond with the mass of 3,106 carats in its uncut state was found in the side-wall of the open pit. The Cullinan Diamond is still the largest gemstone ever found. Two of the stones cut from the Cullinan Diamond are now found in the British Crown Jewels; the 530-carat "Star of Africa", which is set in the septre and the 317-carat "Lesser Star of Africa" which is set in the Imperial State Crown (http://www.cullinan-conservancy.org/cultural-heritage.php).

1914 proved to be the start of difficult times. Three hundred and eighty one European employees were discharged for provoking industrial disturbances at the mine. During the outbreak of World War 1 in Europe in August 1914, diamond prices tumbled and subsequently all operations at the Premier mine were suspended.

Premier Mine resumed production on the 16th January 1916. The De Beers Consolidated Mines acquired a controlling interest in the mine in 1917. In 1918 almost every family in the Cullinan community lost a member to the flu epidemic (http://www.cullinan-conservancy.org/cultural-heritage.php).

The great depression in 1929 affected the rest of the world and in 1932 operations at the Premier mine were suspended again. By 1933 deprivation and hunger were experienced not only in Cullinan in the entire country. The retrenched employees were permitted to remain in occupation of the company's houses rent free. They were also provided with water, lights, sanitary and medical services free of charge. The nearby Zonderwater farm came to the rescue by providing soup kitchens for the hungry children. By the time World War 2 started in 1939, the village was nearly deserted.

From 1941 to 1945 the biggest concentration of Italian Prisoners of War (over 90 000), who were captured in North Africa, were housed in South Africa at Zonderwater Prison. During this period the army took over the village, even the golf course was used to pitch tents on.

Among these prisoners of war were musicians, craftsman and artists who painted eight murals in 1942 in the old Recreation Club Hall. The 3 m x 4 m mural paintings depicted historical scenes from South Africa and Britain. The paintings were probably copied from photographs or post cards, as most are copies of well-known artists like Erich Mayer and W.H. Coetzer (http://www.cullinan-conservancy.org/cultural-heritage.php).

During 1948 the Recreational Hall was converted into a cinema. Unfortunately most of the murals were damaged when boards were placed over them to improve the acoustics. The pressed steel ceiling, which dated back from 1912 - when the Recreational Hall was rebuilt after a fire - was also covered by a false acoustic ceiling. Nearly fifty years later in 1993 the hidden murals were again uncovered. Great effort was made to restore the murals and this was completed in 1998.

After the end of the war in 1945, numerous prisoners chose to remain in South Africa. Only 30,000 were permitted to remain. Around 264 prisoners were buried in the Italian military cemetery just outside Cullinan. Many descendants of the Italian POW's have been making an annual pilgrimage to the Italian War Cemetery ever since.

In 1945 all the rain water that accumulated during the twelve years the mine had been closed, was pumped out of the big hole and the mine resumed production. The mine is still producing some of the world's finest diamonds today (http://www.cullinan-conservancy.org/cultural-heritage.php).

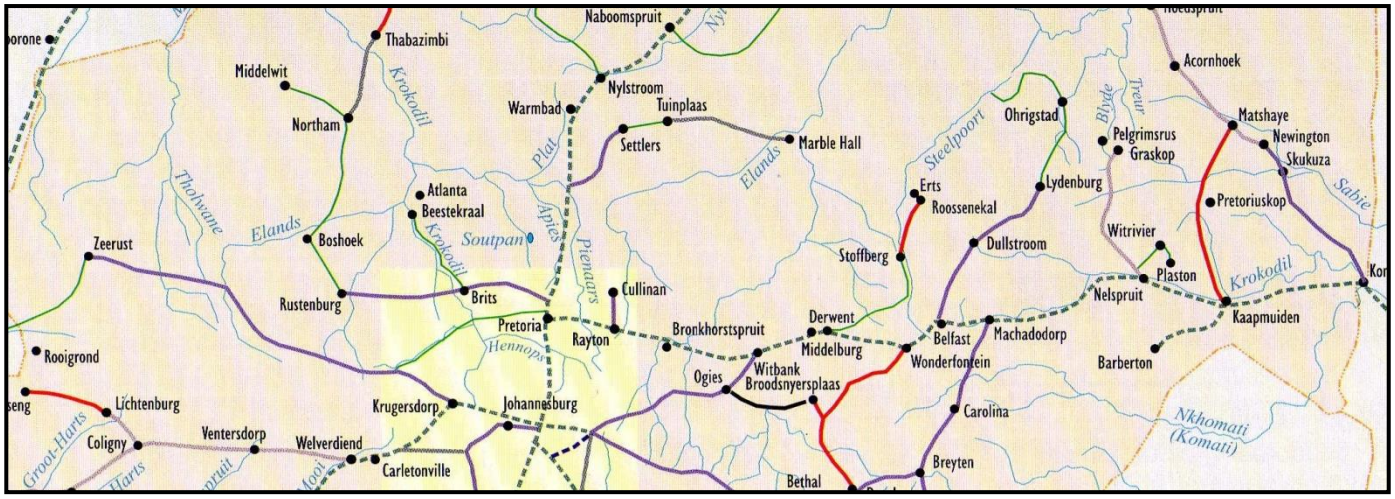


Figure 6.2:Enlarged section of the railroad development map from Bergh 1999.

6.2.1 Battles close to the study area

The Battle of Diamond Hill (or the Battle of Donkerhoek) was fought in the greater study area on 11 June 1900. The Boers under leadership of General Louis Botha suffered a loss of around 30 men, of whom 11 were killed in this battle. The battle took place after Lord Roberts occupied Pretoria and the Boers moved their capital to Machadodorp. General Botha established a line of defence about 30 kilometres east of Pretoria on both sides of the railway line to prevent the British army moving east towards Machadodorp. The frontline stretched over 40 km (Bergh 1999). The British advanced against the Boers to clear the Boers from the areas close to Pretoria. The British suffered 180 casualties in the battle and on the 12th of June Botha led his men into the cover of darkness with a sense of victory. This battle boosted the Boers morale and the war continued for two more years (Von der Heyde 2013).

6.2.2 Graves and Burial sites

No graves are indicated by the Genealogical Society of the South Africa for the study area. The Leeuwfontein 299 cemetery is located at 25°39'32.83"S and 28°23'3.29"E. The cemetery is located away (2,3 km to the north) from the study area and no impact is expected.

7 Description of the Physical Environment

The Project area is situated about 11 km west of Cullinan along the R513. The project area is a fallow field marked by tall grass cover and thickets of overgrown weeds and small trees that hindered accessibility. The project area is bordered by Leeuwfontein road and the R513.

The R513 forms the northern boundary of the Project area. The area is a fallow piece of land surrounded by the larger Mamelodi township marked by open fields with scattered thickets of trees and shrubs. The area is disturbed with various areas showing signs of features interpreted as possible informal stands. Illegal dumping occur throughout the site and a small mine is located towards the southern boundary of the Project area. This area is marked by waste rock material scattered across the southern boundary. Two streams traverse the area one of these can be crossed by a small bridge that holds a degraded sewage pipeline. This pipeline and bridge forms part of a network of sewage pipelines that is found through the Project area. A large powerline is located on the northern boundary of the site. The eastern section of the Project area extends towards the existing township in the south-eastern portions eventually following an existing fence-line that forms part of a previous housing development. General site conditions are illustrated in Figures 7.1 to 7.4.

Figure 7.1. General site conditions - Disturbed landscape with various small footpaths Traversing the Project area.

Figure 7.2. General site conditions in the north-eastern portion of the Project area.

Figure 7.3. Large portions of the Project area is highly disturbed due to past activities such as the dumping of building rubble, waste rock material and the construction of illegal stands.

Figure 7.4. Overgrown vegetation covers large portions of the Project area.

8 Findings of the Survey

8.1 Heritage Resources

This assessment focussed on tangible heritage resources within the proposed township development and fieldwork were conducted through a pedestrian survey over one day with a security team. Heritage finds included a large cemetery, stone packed archaeological sites, ephemeral remains of stone packed features, cement foundations and an initiation site. The sites are listed in Table 7 and general site conditions are described and illustrated in Annexure A

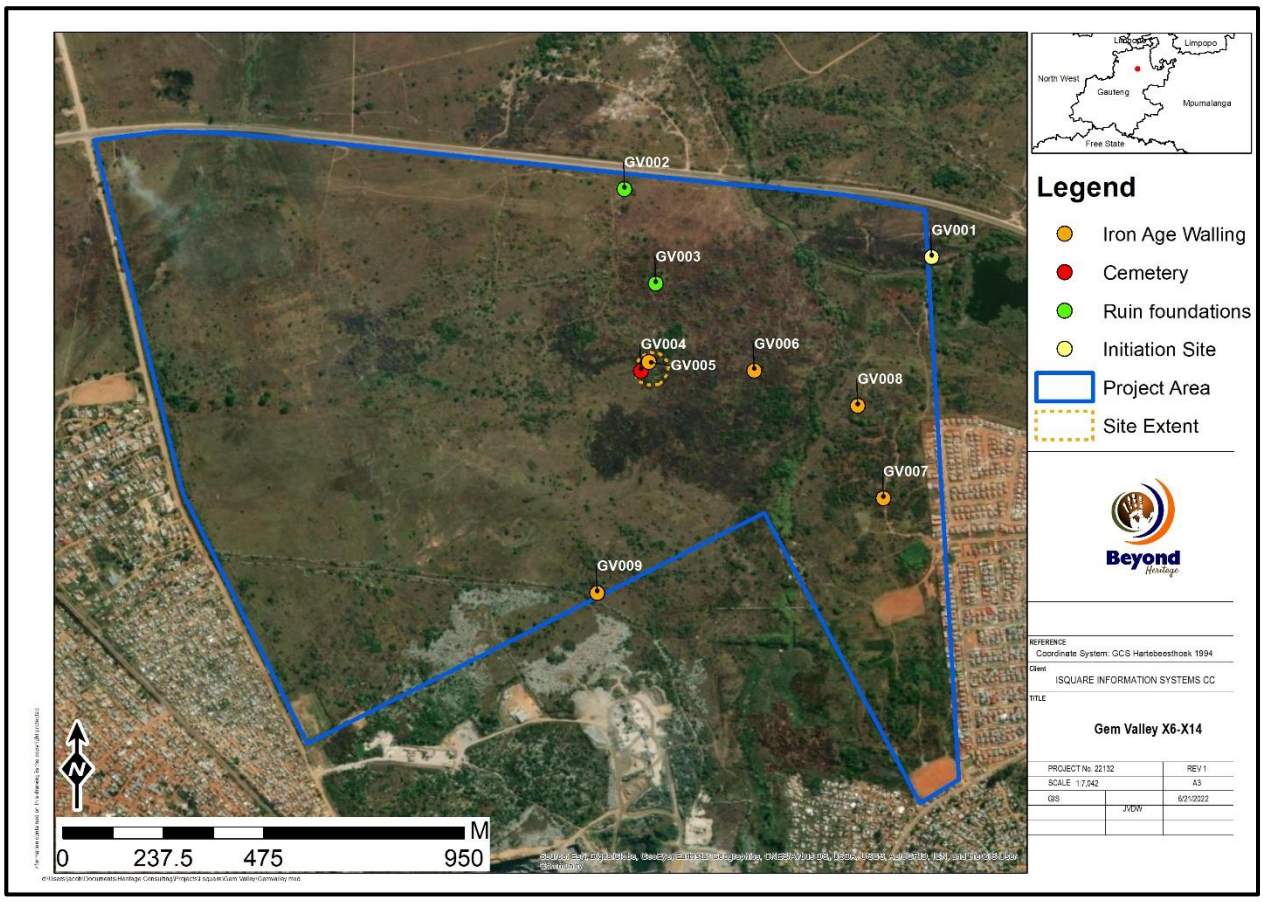


Figure 8.1. Observation points in relation the project area.

Table 7. Recorded observations in the Project area.

Label	Location	Type site	Heritage Rating	Mitigation
GV001	-25.6796357, 28.4055459	Possible Initiation School	GP B Medium Significance	The site is outside of the impact area and should be avoided.
GV002	-25.6912975, 28.4141877	Small degraded packed stone feature. The feature resembles a possible square packed foundation.	GP C Low Significance	Monitoring during construction
GV003	-25.6805576, 28.3996766	The foundation may possibly be part of a historical farmhouse or farm structure. The feature is mostly demolished and degraded	GP C Low Significance	Monitoring during construction
GV004	-25.6823725, 28.3993064	Large Cemetery	GP A High Significance	Avoid with a 30 m buffer
GV005	-25.6822578, 28.3995669	A series of ephemeral circular stone features along with some packed stone lines built from single rows of packed stone. The remnants of circular packed stone features seem to be much older than the other features possibly indicating an Iron Age occupation. The packed rows of single stones may indicate a later occupation of the site by informal settlements	GP B Medium Significance	Avoidance, if not possible recording and mapping before applying for a destruction permit.
GV006	-25.6822436, 28.399941	Small section of possible packed stone walling visible in an open area. The feature only contains a small section of packed stone walling that is still visible. T	GP C Low Significance	Monitoring during construction.
GV007	-25.6851381, 28.4045612	Small section of possible packed stone walling or foundation that has been exposed by the small footpath running through the area. The section of walling or foundation is degraded and difficult to define	GP C Low Significance	Monitoring during construction.
GV008	-25.6831324, 28.4039865	Sections of packed stone walling situated in a fairly overgrown area. The sections are degraded and difficult to define with only small sections of the packed stone wall still visible. I	GP C Low Significance	Monitoring during construction.
GV009	-25.6871195, 28.3982744	Series of ephemeral stone-walled foundations that could be part of an Iron Age settlement but also have rectangular foundations that are then historical. The area is fairly overgrown making it difficult to assess the features. Some remnants of upright walling are still visible. The site is situated in the southern edge of the proposed project area.	GP B Medium Significance	Avoidance, if not possible recording and mapping before applying for a destruction permit.

8.2 Cultural Landscape

The study area is in a rural setting and have been fallow for a number of years. Limited development are indicated in the study area on historical maps, the most significant feature is a cemetery dating to prior 1965 (Figure 8.2 to 8.5).

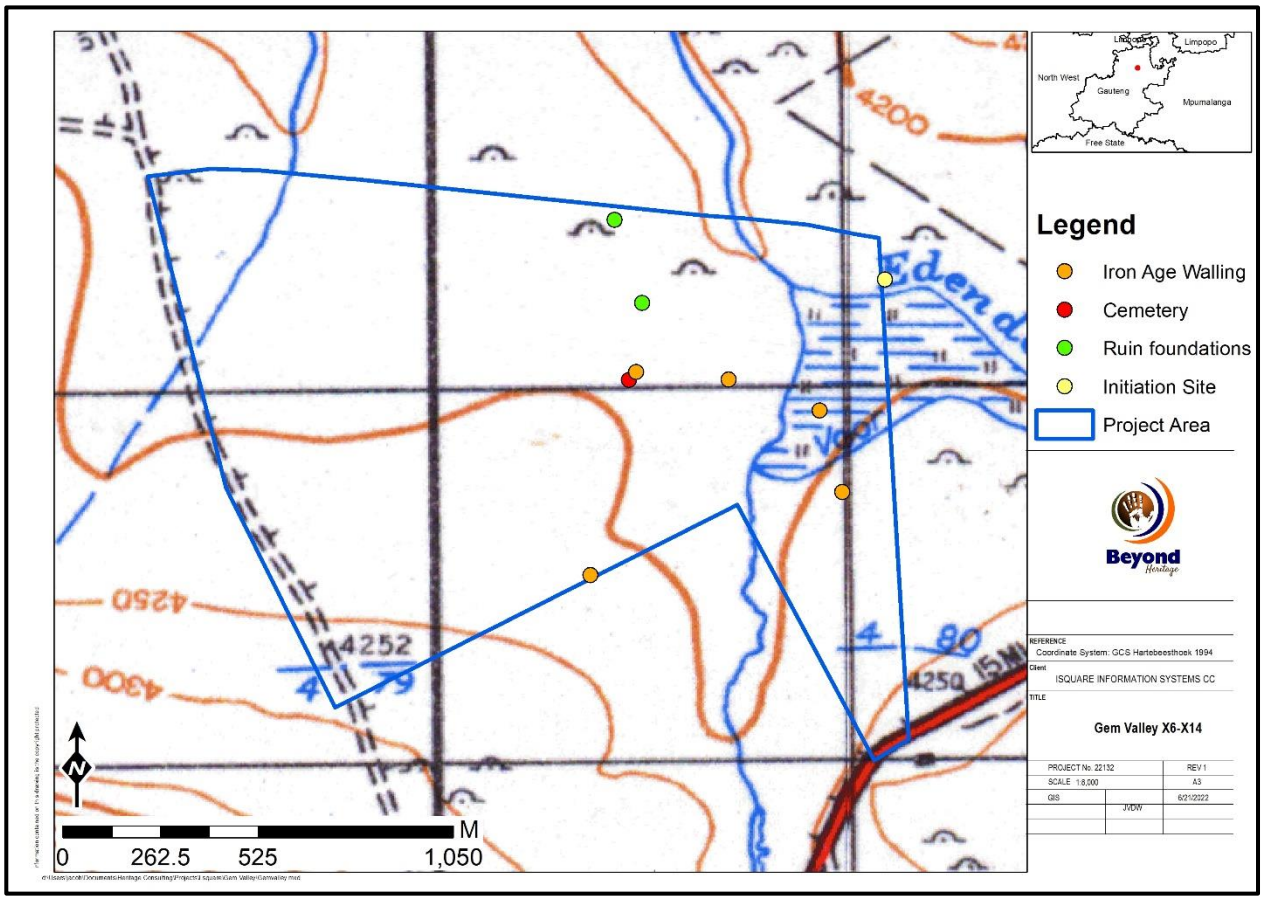


Figure 8.2. 1943 Topographic map of the study area. Huts are indicated in the north-eastern portion of the study area.

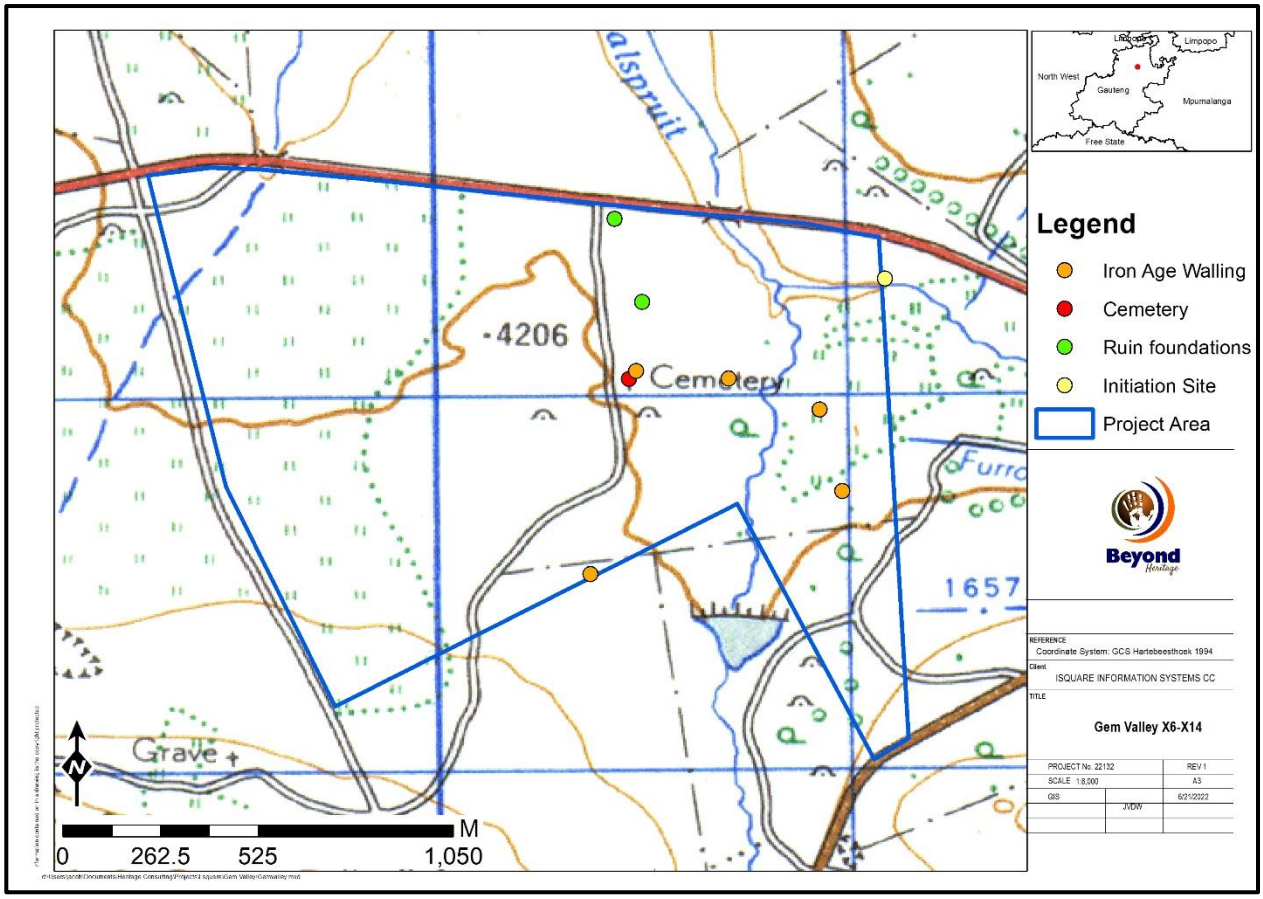


Figure 8.3. 1965 Topographic map of the study area indicating a cemetery and a hut within the study area with limited cultivation.

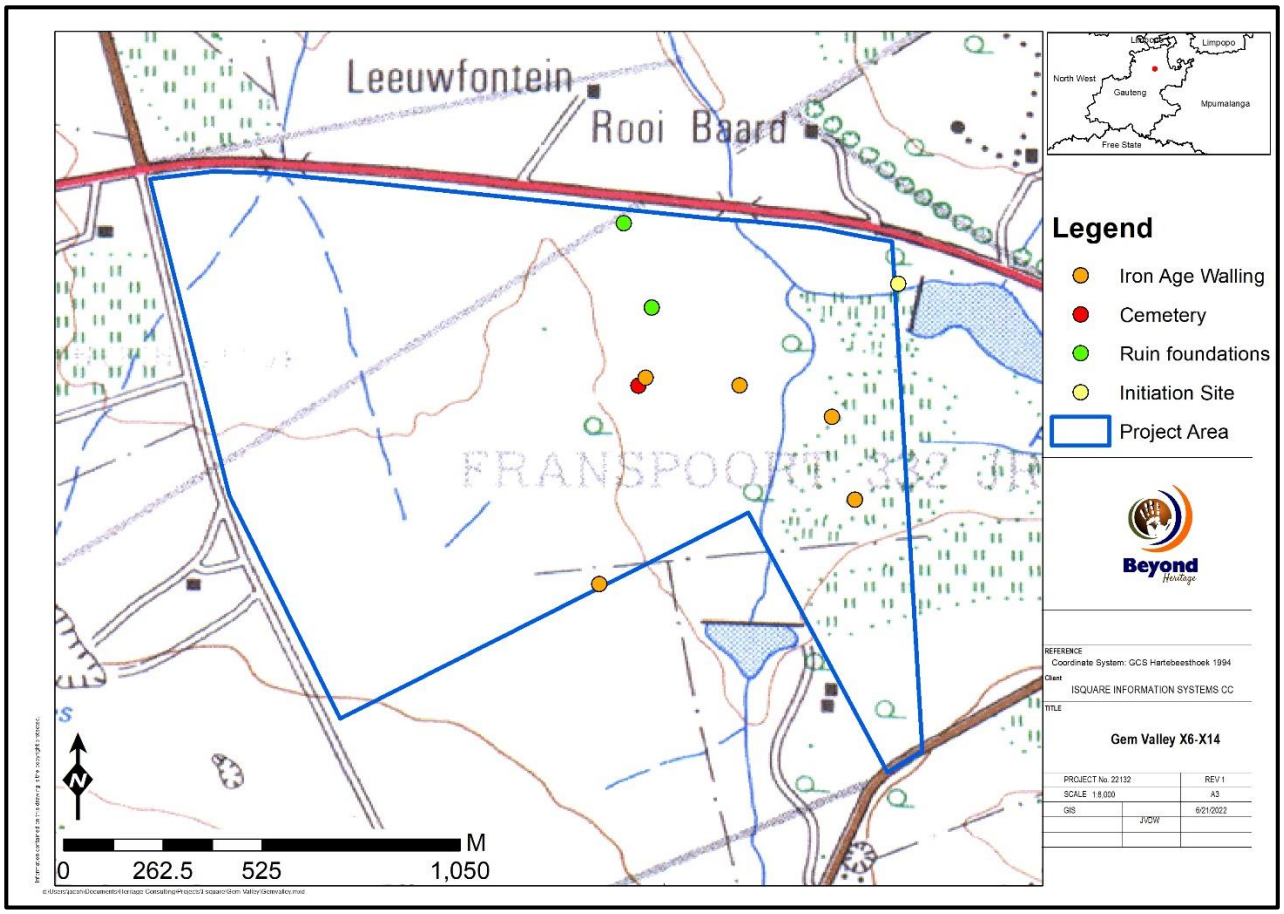


Figure 8.4. 1975 Topographic map of the study area indicating limited cultivation in the study area.

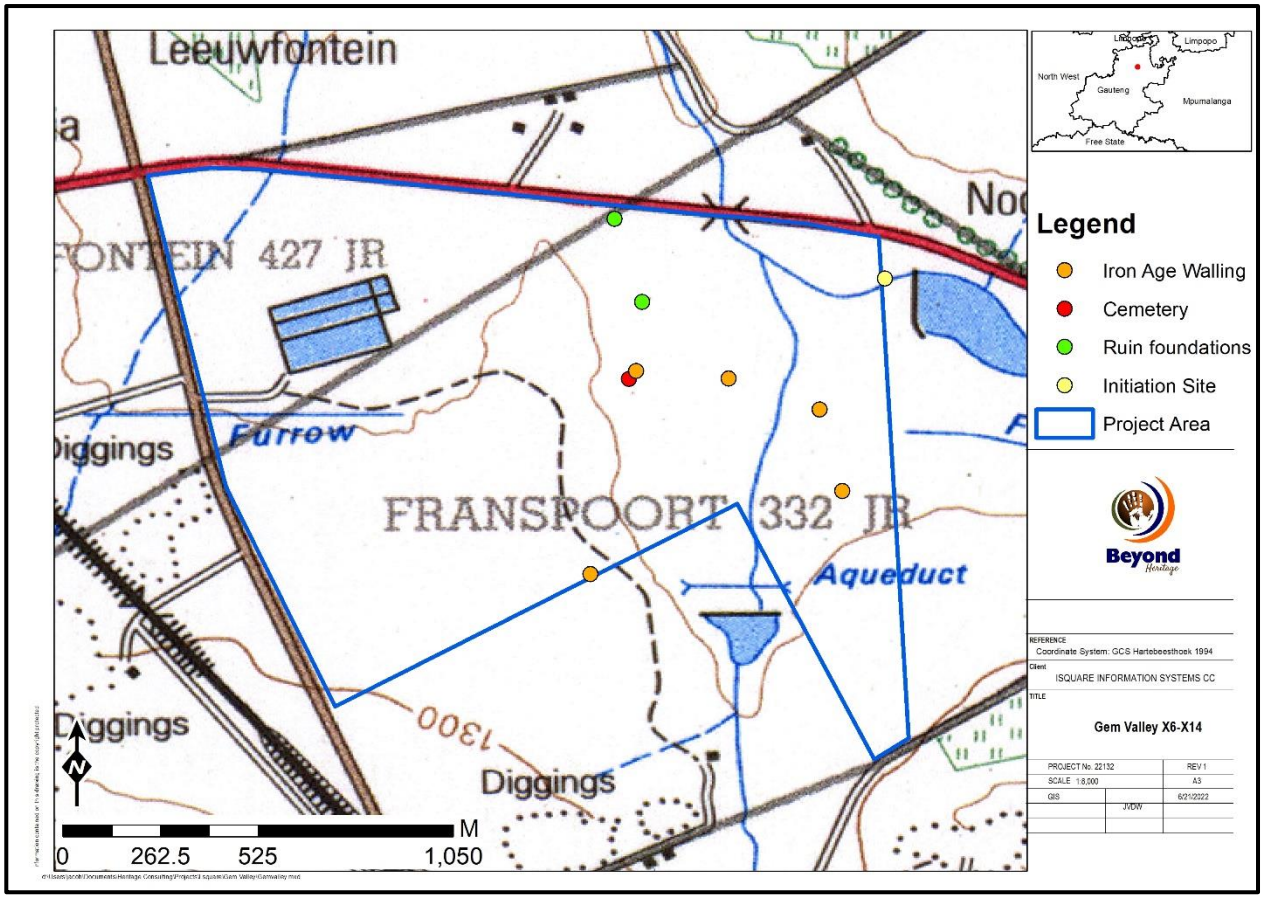
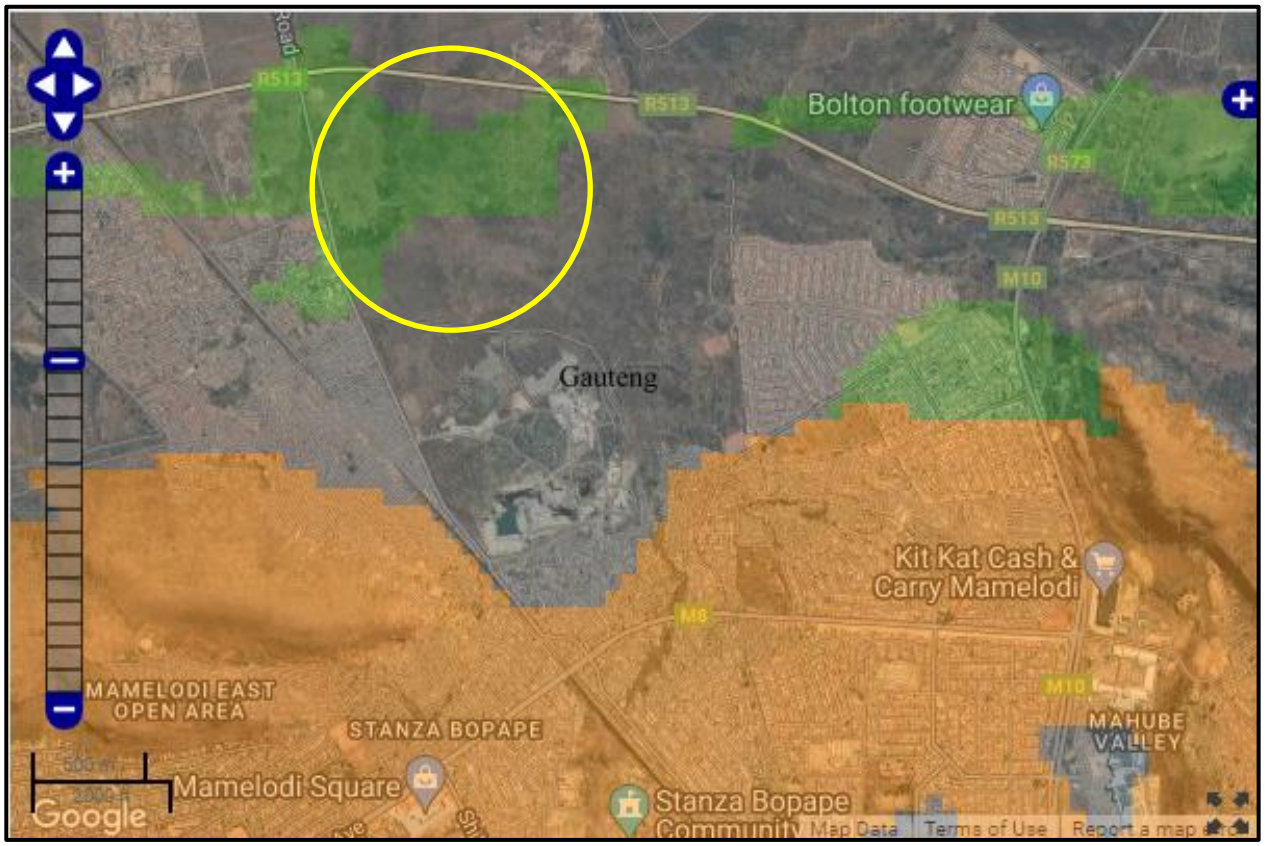


Figure 8.5. 1995 Topographic map indicating a furrow and possibly a warter purification site as well as a dirt road.

8.3 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of zero to moderate paleontological significance (Figure 8.6) and an independent study was conducted for this aspect. Bamford (2022) concluded it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Vryheid Formation (Ecca Group, Karoo Supergroup) so a Fossil Chance Find Protocol should be added to the EMPr.



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 8.6. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

Based on the current layout, GV001 (the possible initiation site) is located outside of the impact area and should be indicated on development plans and avoided, no direct impact is expected to the site. Degraded stone packed features of unknown purpose were identified at GV002, GV003, GV006, GV007 and the impact on these features is expected to be low. The impact on the extensive stone packed Iron Age sites at GV005 and GV009 will be medium, and mitigation is required prior to construction. Graves are always of high social significance and the if impacted on the impact will be high. After mitigation the impacts on the recorded features and graves will be low. Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the construction phase.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a Chance Find Procedure. All known sites should be avoided and additional recommendations in this report should be implemented during all phases of the project. With the implementation of the recommended mitigation measures impacts of the project on heritage resources is acceptable (Table 8 to 11).

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

9.1.1 Construction Phase

It is assumed that the 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. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Operation Phase

No impacts are expected during the operation phase.

9.1.3 Impact Assessment for the Project

Table 8. Impact assessment of the proposed project on GV001 (Possible Initiation Site)

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	Moderate (4)	Moderate (4)
Probability	Improbable (2)	Improbable (2)
Significance	**22 (Low)**	**22 (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: • GV001 is located outside of the impact area and should be indicated on development plans and avoided; • A heritage site management plan should be compiled for the development; • Implementation of a Chance Find Procedure for the project..		
Cumulative impacts: The proposed project will have a medium cumulative impact, but with the implementation of the recommendations in this report this can be mitigated to an acceptable level.		
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 of the proposed project on the ephemeral stone packed features at GV002, GV003, GV006, GV007

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	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**27 (Low)**	**27 (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: • GV002, GV003, GV006, GV007 should be monitored during construction and clearing activities; • A heritage site management plan should be compiled for the development; • Implementation of a Chance Find Procedure for the project..		
Cumulative impacts: The proposed project will have a medium cumulative impact, but with the implementation of the recommendations in this report this can be mitigated to an acceptable level.		
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 10. Impact of the proposed project on the Cemetery at GV004

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	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Improbable (2)
Significance	**65 (High)**	**26 (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: • The cemetery at GV004 should be avoided with an access gate and a 30 m buffer zone. If not feasible these features can be relocated adhering to the relevant legislation; • A heritage site management plan should be compiled for the development; • Implementation of a Chance Find Procedure for the project..		
Cumulative impacts: The proposed project will have a medium cumulative impact, but with the implementation of the recommendations in this report this can be mitigated to an acceptable level.		
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 11. Impact of the proposed project on the archaeological sites at GV005 and GV009

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	Moderate (6)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**39 (Medium)**	**27 (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: • GV005 and GV009 should be avoided, but if this is not possible the features must be mapped and recorded prior to an application for a destruction permit. • A heritage site management plan should be compiled for the development; • Implementation of a Chance Find Procedure for the project		
Cumulative impacts: The proposed project will have a medium cumulative impact, but with the implementation of the recommendations in this report this can be mitigated to an acceptable level.		
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 undulating area that has been fallow for a number of years marked by illegal dumping and pioneer plant species that highlights the disturbed character of the study area. Finds of the survey include various degraded stone packed features including ruins/ foundations as well as extensive Iron Age sites and a cemetery as well as an initiation site outside of the impact area. The impact of the project on the recorded heritage resources is therefore medium but can be mitigated to an acceptable level.

According to the SAHRA Paleontological sensitivity map the study area is of zero to moderate paleontological significance (Figure 8.6) and an independent study was conducted for this aspect. Bamford (2022) concluded that the impact on palaeontological resources is low, and the project should be authorised from a paleontological point of view with the implementation of a Fossil Chance Find Protocol.

The impacts to heritage resources by the project can be mitigated to an acceptable level with the implementation of the recommendations in this report as part of the EMPr, based on the South African Heritage Resource Authority (SAHRA) 's approval.

10.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and must be included in the EMPR and the project may only proceed based on approval from SAHRA:

Recommendations:

- GV001 is located outside of the impact area and should be indicated on development plans and avoided;
- The archaeological sites GV005 and GV009 should be avoided, but if this is not possible the features must be mapped and recorded prior to an application for a destruction permit.
- The cemetery at GV004 should be avoided with an access gate and a 30 m buffer zone. If not feasible these features can be relocated adhering to the relevant legislation;
- GV002, GV003, GV006, GV007 should be monitored during construction and clearing activities;
- A heritage site management plan should be compiled for the development;
- Implementation of a Chance Find Procedure for the project.

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 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 Paleontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the contractor/s to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. 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 contractor/s /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. If required 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 medium but can be mitigated to an acceptable level. Residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves and subsurface cultural material are the highest risk). 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 contractor/ECO 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 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 12. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Cultural Heritage Resources chance finds	Entire project area with a specific focus on recorded sites.	ECO	Weekly (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 or similar; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 13. 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 Procedure in case possible heritage finds are uncovered	Pre Construction and Construction	Throughout the construction phase	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General project area	Monitoring by the ECO.	Pre Construction and Construction	Throughout the construction phase	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
GV001	Avoidance of the feature by the development	Pre Construction and Construction	Throughout the construction phase	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
GV005 and GV009	Avoidance, but if this is not possible the features must be mapped and recorded prior to an application for a destruction permit	Pre Construction and Construction	Throughout the construction phase	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Checklist/Report
GV002, GV003, GV006, GV007 and GV008	Monitoring by the ECO.	Pre Construction and Construction	Throughout the construction phase	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Checklist/Report

GV004	Avoid the cemetery with a 30m buffer zone, fence the cemetery with access for family or relocate adhering to all the relevant legislation.	Pre Construction and Construction	Throughout the life of the project.	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Checklist/Report
GV004	Compile a Heritage Site Management Plan.	Pre Construction and Construction	Throughout the life of the project.	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Checklist/Report

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