

HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED UPGRADE OF NATIONAL ROAD SANRAL R101 SECTION 8 FROM BELA BELA (KM 0.0) TO MODIMOLLE (KM 26.8) IN SUPPORT OF THE BASIC ASSESSMENT AND WATER USE AUTHORISATION PROCESSES

Type of development:

Road Upgrade

Client:

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APPROVAL PAGE

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Report Title	Heritage Impact Assessment for the Proposed Upgrade of National Road SANRAL R101 Section 8 From Bela Bela (KM 0.0) To Modimolle (KM 26.8) In Support of The Basic Assessment and Water Use Authorisation Processes
Authority Reference Number	TBC
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Applicant Name	South African National Roads Agency SOC Ltd (SANRAL)

	Name	Qualifications and Certifications	Date
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REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	<i>Declaration of Independence</i>
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA) an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(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 9
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to BAR report
(q) Any other information requested by the competent authority	Section 13

Executive Summary

GA Environment (Pty) Ltd was appointed by BVi Consulting Engineers Western Capet (Pty) on behalf of SANRAL as the Environmental Assessment Practitioner (EAP) to undertake the Environmental Authorisation (EA) and Water Use Authorisation Processes for the proposed upgrade of National Road R101 at Section 8 from Bela Bela to Modimolle. The proposed upgrade will entail road realignment at three areas and widening of the existing road. HCAC was appointed to conduct a Heritage Impact Assessment (HIA) for the project to assess possible impacts to heritage resources by the proposed upgrade and the study area was assessed on desktop level and by a non-intrusive field survey. Key findings of the assessment include:


- According to the pavement management system (PMS) information, the road was known as the National Road N1 joining Pretoria and Polokwane. The N1 was however realigned during 1995/1996 under a concession contract at which time this section was renumbered as R101 and serves as an alternative route to the N1 toll route
- The road between Bela Bela and Modimolle was in use prior to 1939. The road as we know it today were constructed/upgraded in 1965 (PMS).
- The existing road servitude and associated construction activities of the national road would have impacted on surface evidence of heritage features if any ever existed in the servitude.
- Two bridges (Bridge 375 and Bridge 447) will be impacted on by the road upgrade, both which are younger than 60 years and of no heritage significance.
- Heritage resources within the larger area consist of Stone Age finds, Later Iron Age settlements, graves and structures older than 60 years, some which dates to the Anglo Boer War. Find affected by the proposed project are limited to a memorial site and concentration camp cemetery located just outside of the proposed road widening in Modimolle.
- Based on the South African Heritage Resources Information Services (SAHRIS) Palaeontological map the area is of moderate to high paleontological sensitivity and an independent study was conducted for this aspect (Bamford 2021). The study concluded that a Fossil Chance Find Protocol should form part of the EMP for the project.

The potential impacts to heritage resources are generally considered to be of low significance after mitigation and no fatal flaws are expected and the project will result in a socio-economic benefit. It is recommended that the project can commence based on the implementation of the recommendations in this report and the approval of SAHRA.

Recommendations:

- Identified features should be indicated on development plans and avoided,
- Implementation of a chance find procedure for the project.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I:</p> <ul style="list-style-type: none"> • I act as the 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	20/05/2021

a) Expertise of the specialist

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

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia 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
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DFFE: Department of Forestry, Fisheries and Environment
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact 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:

HCAC was appointed by GA Environment (Pty) Ltd on behalf of BVi Consulting Engineers Western Cape (Pty) Ltd to conduct a HIA for the proposed Upgrade to the R101 Section 8. The project is situated within two Local Municipalities (Bela Bela and Modimolle Mookgophong), both of which fall under the Waterberg District Municipality in the Limpopo Province. The project extends from Bela Bela at the intersection with Voortrekker Road (km 0.0) to Modimolle at the intersection with Road R33 (km 26.8). (Figure 1.1 to 1.4). The report forms part of Basic Assessment (BA) and Environmental Management Programme Report (EMPr) for the development and also part of the Water Use Authorisation Process.

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, no heritage resources were recorded that will be directly impacted on by the proposed project. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

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

Reporting

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

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

1.2 Project Description

The project consists of a proposed road upgrade as described in Table 2 and 3.

Table 2: Project Description

Location information	The project extends from Bela Bela at the intersection with Voortrekker Road (km 0.0) to Modimolle at the intersection with Road R33 (km 26.8).
Magisterial District	National Road R101 Section 8 is situated within two Local Municipalities (Bela Bela and Modimolle Mookgophong), both of which fall under the Waterberg District Municipality in the Limpopo Province
Central co-ordinate of the development	Bounds of the study area (28.2986300000, -24.8852590000, 28.4063670000, -24.6996130000)

Table 3: Infrastructure and project activities

Type of development	Road Upgrade
Size of development	26 km road upgrade
Project Components	<p>The general objective of this project is to successfully and optimally complete improvement of the road section. The aim of this improvement is to:</p> <ul style="list-style-type: none"> • Relieve traffic congestion to acceptable level of service by providing suitable cross sections; • Improve road geometry (alignment) to provide better road safety; • Provide non-motorised transport (NMT) and pedestrian facilities; • Provide adequate pavement capacity for a 20-year design period; and • Replacement of bridges and other structures where required for hydraulic and traffic capacity. <p>Road R101-8 consists of a two lane, single carriageway road with gravel shoulders along most of the route. The road has an average surfaced width of 7.0 m. Climbing/passing lanes are provided from km 6.2 to km 7.5 (LHS) and km 14.4 to km 15.7 (RHS). Road R101-8 has an average road reserve width of approximately 35 meters. In both Bela Bela (km 0.00 to km 0.10) and Modimolle (km 26.40 to km 26.80), the road widens to a four lane undivided single carriageway. A section in Modimolle (km 25.20 to km 26.40) consists of 3 lanes. Road R101-8 is defined as a mobility road, connecting development centres over long distances. It also connects other collector roads and can therefore be classified as a Class 2 rural major arterial in accordance with TRH 26 (COTO, 2012).</p>

1.3 Alternatives

There are two main alternatives one for the bridges and one for the realignment areas.

Bridge alternatives are:

1. Rehabilitation.
2. New Deck.
3. Raise the deck / additional spans.
4. Replace the entire bridge (preferred).

Route Alternatives for the reassignment are:

1. 100km/hr design (preferred),
2. 90km/hr design.
3. 80km/hr design.

From a heritage point of view the alternatives are acceptable, based on adherence to the recommendations in this report.



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

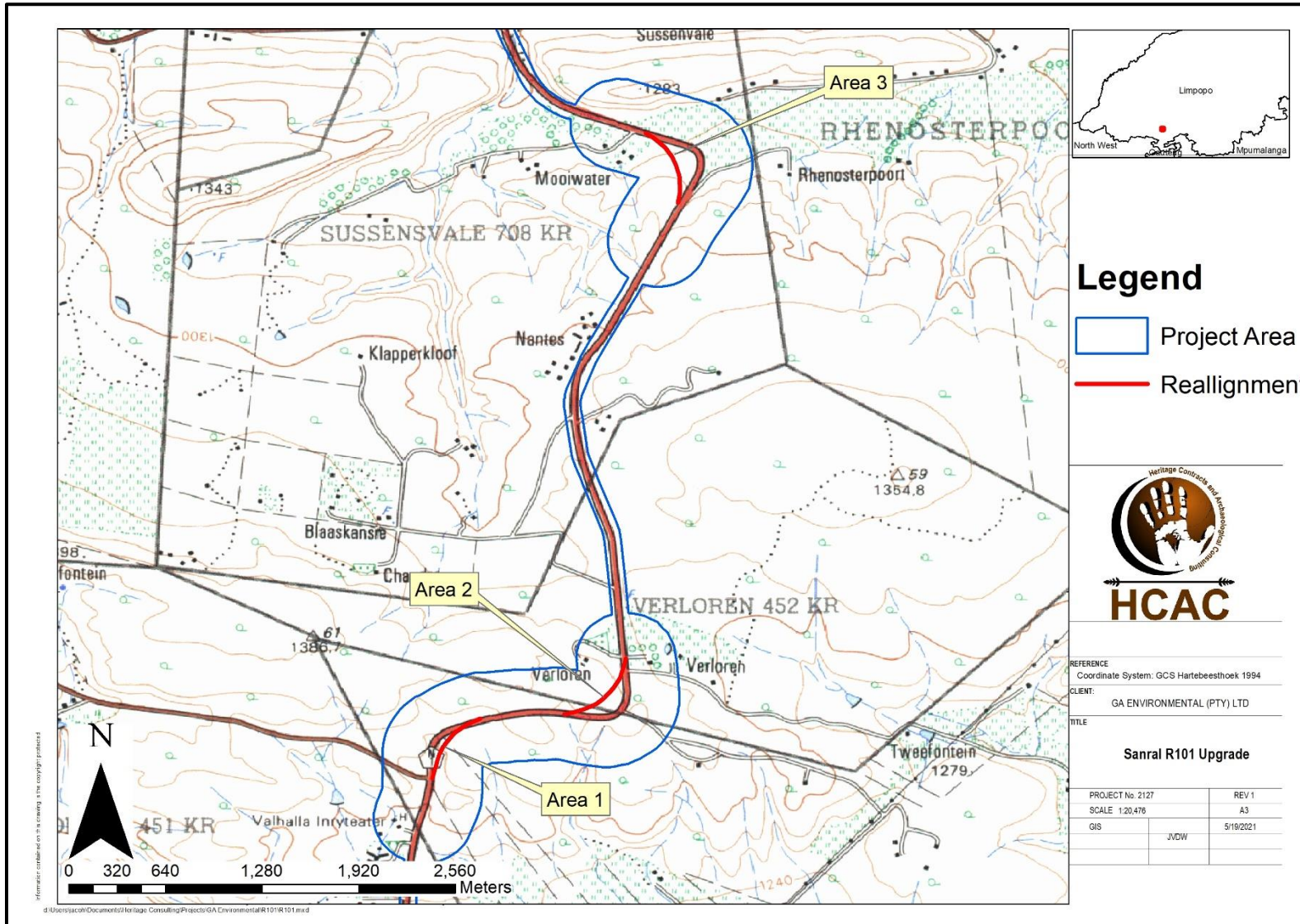


Figure 1.2: Local setting (1:50 000 topographical map) indicating the three realignment areas.

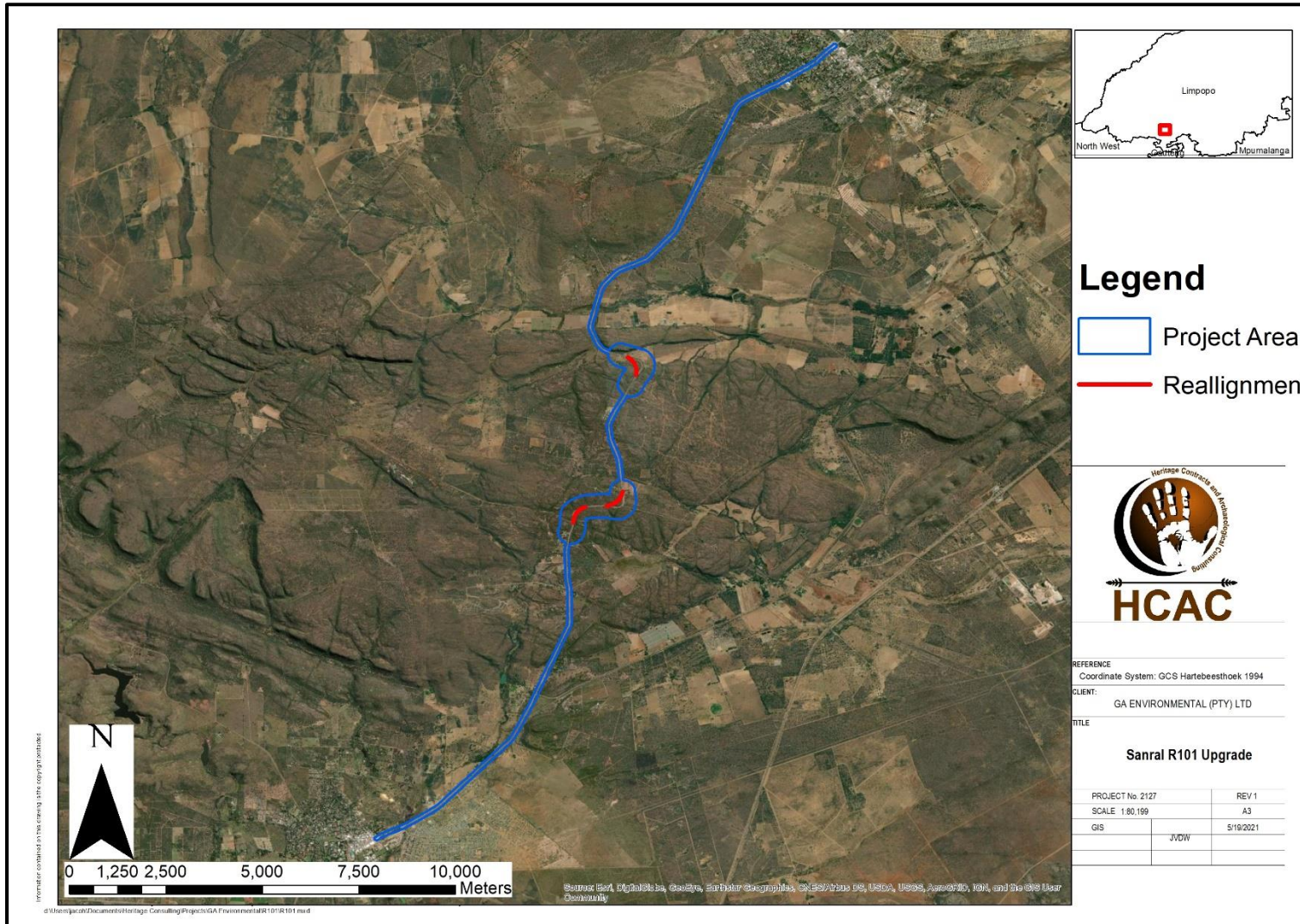


Figure 1.3. Aerial image of the development footprint highlighting the rocky terrain.

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)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

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 EIA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of Basic Assessment Report (BAR).

3.4 Site Investigation

The aim of the site survey was to:

- a) survey the proposed project area to 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 recorded in the project area.

Table 4: Site Investigation Details

	Site Investigation
Date	18 and 19 May 2021
Season	Autumn. Vegetation cover in the three realignment areas is high and the seasonal cutting of grass in the road servitude resulted in a thick layer of grass limiting archaeological visibility. The area was sufficiently covered to understand the heritage character of the study area (Figure 3.1).

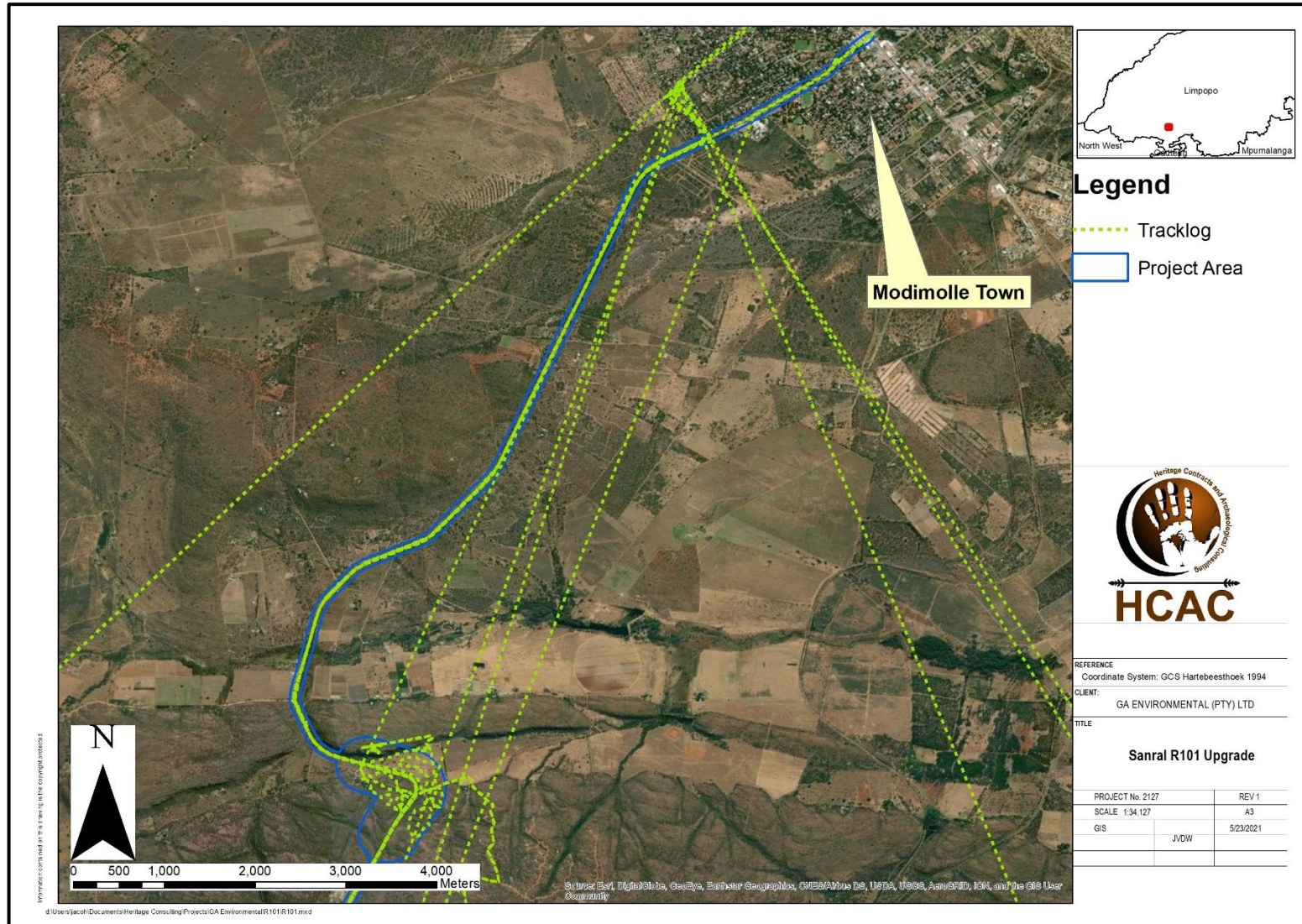


Figure 3.1: Tracklog of the survey of the northern portion in green.

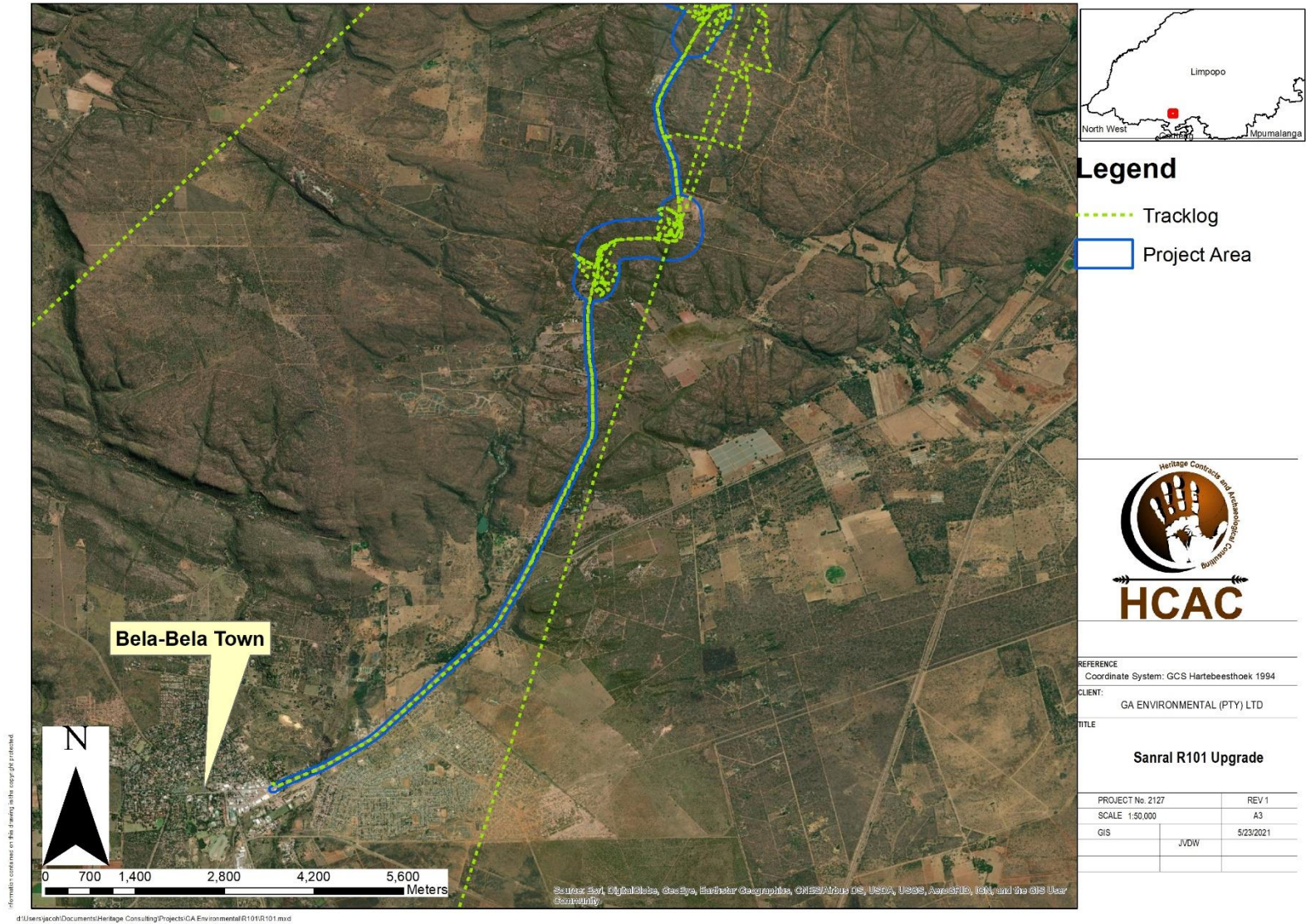


Figure 3.2: Tracklog of the survey of the southern portion in green.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

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

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

Table 5. Heritage significance and field ratings

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

3.6 Impact Assessment Methodology

The 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. Similarly, the depth of cultural deposits and the extent of heritage sites cannot be accurately determined due its subsurface nature. 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 the Integrated Development Plan (IDP) for the Waterberg District Municipality is home to 757 000 people which is 1.3% of South Africa's total population. Between 2008 and 2018, the population growth averaged 1.27% per annum, which was just below the growth rate of the province and South Africa at 1.3% and 1.57%, respectively. Lephalale LM experienced the largest increase in population in the district, with an average annual growth rate of 2.87% between 2008 and 2018, while Modimolle/Mookgopong LM experienced an average annual decline of 0.38% in the same period. The high population growth rates in Lephalale can be attributed to the growth of the mining and energy sectors, whereas decline in the Modimolle/Mookgopong can be attributed to the dearth in opportunities as result of lesser traffic on the R101. Total employment data is a key element in the estimation of unemployment. In addition, trends in employment within different sectors and industries normally indicate significant structural changes in the economy. In 2018, Waterberg employed 201 000 people which is 15.19% of the total employment in Limpopo Province (1.32 million) and 1.25% of total employment in South Africa (16.1 million). Employment within Waterberg increased annually at an average rate of 3.22% from 2008 to 2018. The Waterberg District Municipality average annual employment growth rate of 3.22% exceeds the average annual labour force growth rate of 2.66%, resulting in unemployment decreasing from 25.61% in 2008 to 17.54% in 2018 in the district municipality.

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. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

The following CRM reports were consulted for this report as outlined in Table 6. Indicating the range of heritage resources that occur in the region.

Table 6. Studies consulted for the project

Author	Year	Project	Findings
Roodt, F.	2007	Phase 1 Heritage Resources Impact Assessment of Valencia 449 LS Portion 1	No sites
Roodt, F.	2002	HIA For the Vodacom Mast At Laerskool Eenheid, Nylstroom. Limpopo Province	No Sites
Kruger, N.	2018	Memo on site status and heritage management procedures for a human burial site occurring on Erf 365 of the Negester Klein-Kariba development, farm Valentia 449KR, Limpopo Province.	Human burials and midden deposit and structural remains.
Hutten, M.	2009	Heritage Impact Assessment for the Proposed Klein Kariba Retirement Resort north-east of Bela-Bela, Limpopo Province	Homestead and three grave yards
Roodt, F.	2008	Phase 1 heritage resources scoping report MTN telecommunication mast Buyskop Bela Bela (Warmbad), Limpopo	Stonewalled archaeological site with cupules.
Van Vollenhoven, A. C.	2016	A report on a walk down heritage impact assessment for the proposed Phagameng 11kv Line, Limpopo Province	No sites
Van der Walt, J.	2007	Heritage Scoping Report Proposed new residential development on portions 94 of the farm Buiskop 464 KR, Bela Bela, Northern Province	Large Iron Age settlement of high significance was identified as well as an informal cemetery. Several historical dwelling foundations were also identified

6.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

6.2 Background to the general area

6.2.1 Archaeology of the area

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

6.2.1.1 Stone Age

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

Earlier Stone Age: The period from ± 2.5 million yrs. - $\pm 250\ 000$ yrs. ago. Acheulean stone tools are dominant. No Acheulean sites are on record near the study area, but isolated finds may be possible, however, isolated finds have little value. Therefore, the project is unlikely to disturb a site of significance.

Middle Stone Age: The Middle Stone Age includes various lithic industries in SA dating from $\pm 250\ 000$ yrs. – 25 000 yrs. before present. This period is first associated with archaic *Homo sapiens* and later *Homo sapiens sapiens*. Material culture includes stone tools with prepared platforms and stone tools attached to handles.

Later Stone Age: The period from $\pm 25\ 000$ -yrs before present to the period of contact with either Iron Age farmers or European colonists. This period is associated with *Homo sapiens sapiens*. Material culture from this period includes: microlithic stone tools; ostrich eggshell beads and rock art. Sites located in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters.

A Single ESA site is on record near the project area at the Wits archaeological database, and isolated finds are possible. However, isolated finds have little value. Therefore, the project is unlikely to disturb a significant site. Important LSA deposits have been excavated in Oliboompoot Cave (Mason, 1962) and other sites in the Waterberg to the north (Van der Ryst, 1998). Sites in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters.

6.2.1.2 *The Iron Age*

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

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

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. No Sites dating to the Iron Age have been recorded for the study area.

According to the most recent archaeological cultural distribution sequences by Huffman (2007), the study area falls within the distribution area of various cultural groupings originating out of both the Urewe Tradition (eastern stream of migration) and the Kalundu Tradition (western stream of migration). The facies that may be present are:

- Urewe Tradition: Moloko Branch – Icon facies AD 1300 - 1500 (Late Iron Age)
- Madikwe facies AD 1500-1700 (Late Iron Age)
- Blackburn Branch- Uitkomst facies AD 1650-1820 (Late Iron Age)
- Rooiberg facies AD 1650-1750 (Late Iron Age)
- Kwale branch- Mzonjani facies AD 450 – 750 (Early Iron Age)
- Kalunda Tradition: Benfica sub-branch – Bambata facies AD 150-650 (Early Iron Age)
- Happy Rest sub-branch – Diamant facies AD 750-1000 (Early Iron Age)
- Eiland facies AD 1000-1300 (Middle Iron Age)

6.2.2 **Historical Information**

Warmbaths / Bela-Bela - has strong mineral springs that flows out of the Earth at a rate of 22 000 liters of water per hour with a temperature of 52°C. This water gave rise to the eventual establishment of the town of Warmbaths. The water from these springs is rich in sodium chloride, calcium carbonate and other salts that are highly beneficial to those suffering from rheumatic ailments. Carl Van Heerden, a Voortrekker, established the first farm in this area at the Mineral Springs and called it Het Bad, at this time the area in and around the mineral springs was a marshland where great numbers of wild animals were trapped and died in the mud. After the marshes were drained, the skeletons of numerous animals including elephants were found.

In 1873, President Burger of the then South African Republic (ZAR) saw the tourism and recreational opportunities that Het Bad had to offer. He proposed the purchase of the farm to the ZAR. At first they refused the proposal but when President Burger wanted to purchase Het Bad from his own funds they accepted the proposal Although Hartingsburg was the authorized name - named after Pieter Harting (Dutch Biologist & Naturalist, 1812-1885) who conducted extensive groundwater research in effort to improve quality of water for public health – the place was commonly called “Warmbaths“. Hartingsburg and Nylstroom remained declared townships in the district of Waterberg and the magisterial headquarters were where the Government deemed it most necessary. This however fell to the lot of Nylstroom, for although Erven were sold at Hartingsburg, hardly a soul lived there. The fresh water supply was poor - the place was visited by sick persons during 5 months of the year only and in addition Nylstroom did everything to maintain itself. In 1903 the British government changed the name of the Post Office to Warm Baths (Tvl. Government Gazette. Vol. V111 - 1905, pp. 108-109).

In 1920 Warm Baths was reproclaimed a town and it was not until the 1st July 1950, that it had a magisterial district of its own. In 1932 Warmbaths attained village town status and town council status in 1960. Since then the community has advanced with great strides.

New suburban areas sprang up, modern commercial concerns were established and superb schools and hotels made their arrival.

In the year 2002 Warmbaths was officially renamed Bela-Bela (which means the pot that boils in Tswana) and the Northern Province has been renamed the Limpopo Province.

Another important landmark in the general area is Buiskop located close to the study area.

6.2.2.1 Buiskop

Buiskop was used as a halfway house during the Republican days for the mail coach that travelled between Pretoria and Pietersburg, fresh horses were provided here. The mountain was also found to contain a sandstone formation and this stone was used for the erection of a portion of Pretoria's Union Buildings.

This mountain has an interesting history and owes its name to a Coenraad De Buys who was forced to flee the Cape Colony at the beginning of the 19th Century. He fled North and with his two sons Machiel and Gabriel and several bodyguards.

Coenraad de Buys was besieged on top of the hill known as Buiskop by local black groups. This is confirmed by T.V. Bulpin's *Lost Trails of the Transvaal*. According to Bulpin (1989) De Buys went to the top of the hill and offered their last water container to the besiegers.

A person was sent up to receive the gift of water, upon which De Buys threw the water container at him. This suggestion by De Buys that they still had enough water to drink forced the besiegers to abandon the siege.

However, according to Dr. J.B. de Vaal (1990) Coenraad de Buys had disappeared during c.1821 after the death of his wife Elizabeth, the sister of Mzilikazi. Two of Coenraad and Elizabeth's sons, Doris and Gabriël, later resided in the Soutpansberg. After they had trouble with the Venda, both sons fled to present-day Bela-Bela and established themselves at Buiskop.

This appears to have been during c. 1836. According to De Vaal they were besieged by the AmaNdebele. During the siege it was Gabriël de Buys who took their last water container, shouted at the besiegers that they still had lots of water and emptied the container onto the rocks.

6.2.3. Anglo-Boer War

During the Anglo-Boer war the British annexed the small hut that still stood and called it Warm Baths. The British also erected a blockhouse to protect the railway line to Pietersburg and it still stands today. Major Jackson Map, June 1902 (National Archives, Maps, 3/1895)

As seen on the "Hartingsburg (Warmbaths)" sheet of the Major Jackson Series. The series was compiled, surveyed and printed during the South African War of 1899 to 1902 (National Archives, Maps, 3/1895). This sheet was first compiled and drawn during June 1900 and lithographed during September 1900.

It was revised during May 1902 as well as during June 1902. This map shows the railway line between Pretoria and present-day crossing over the study area. This line was officially opened during 1899.

Christina Pretorius, wife of the well-known General Andries Pretorius passed away after a bout of flu and was buried in Warmbaths, she was brought to Warmbaths in the hope that the mineral waters would restore her health.

6.2.3 Cultural Landscape

Historical maps and aerial photography were sourced and examined to determine how the landscape changed over time. The maps and photographs are available from the 1930's to the 1960's. The road was developed by 1939 and the surrounding area was rural in character, mostly undeveloped apart from Modimolle town in the northern section of the study area (Figure 6.1 & 6.3). The same are applicable to the three realignment alignment areas (Figure 6.2 & 6.4). Developments in the area are sparse and limited to residential dwellings, fences, and roads.



Figure 6.1. 1939 Aerial image of Nylstroom with the road indicated.

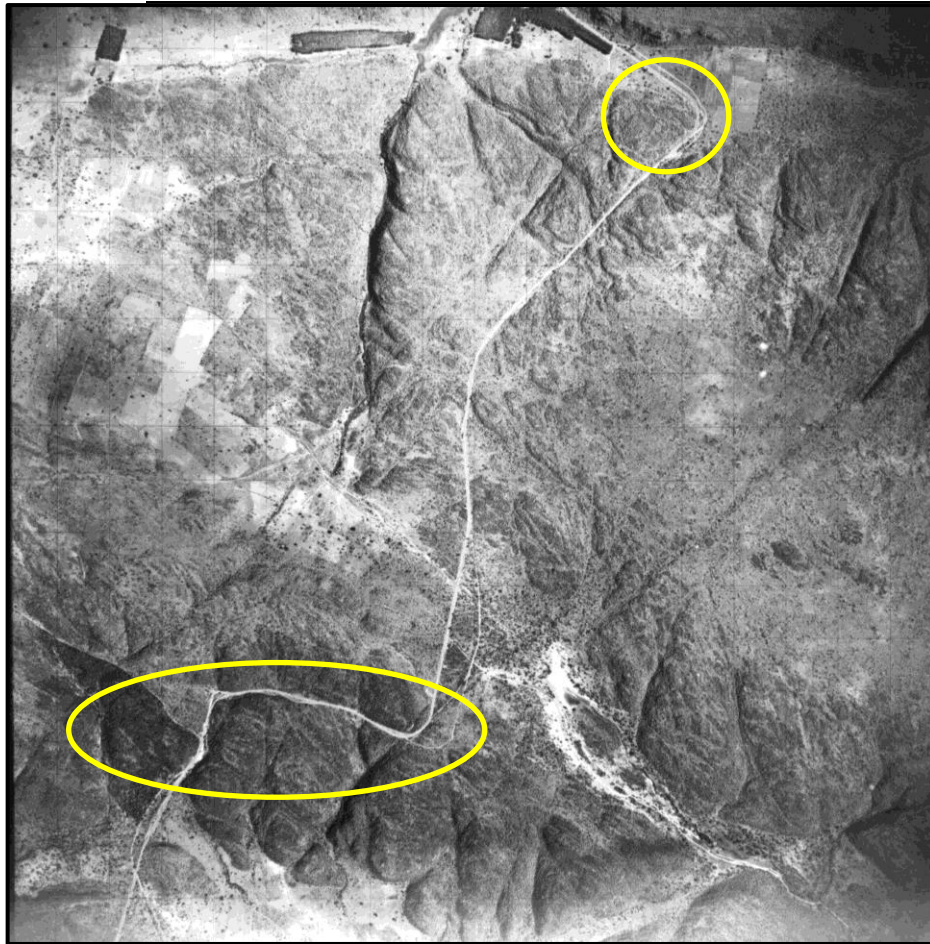


Figure 6.2. 1939 Aerial image of the realignment areas.

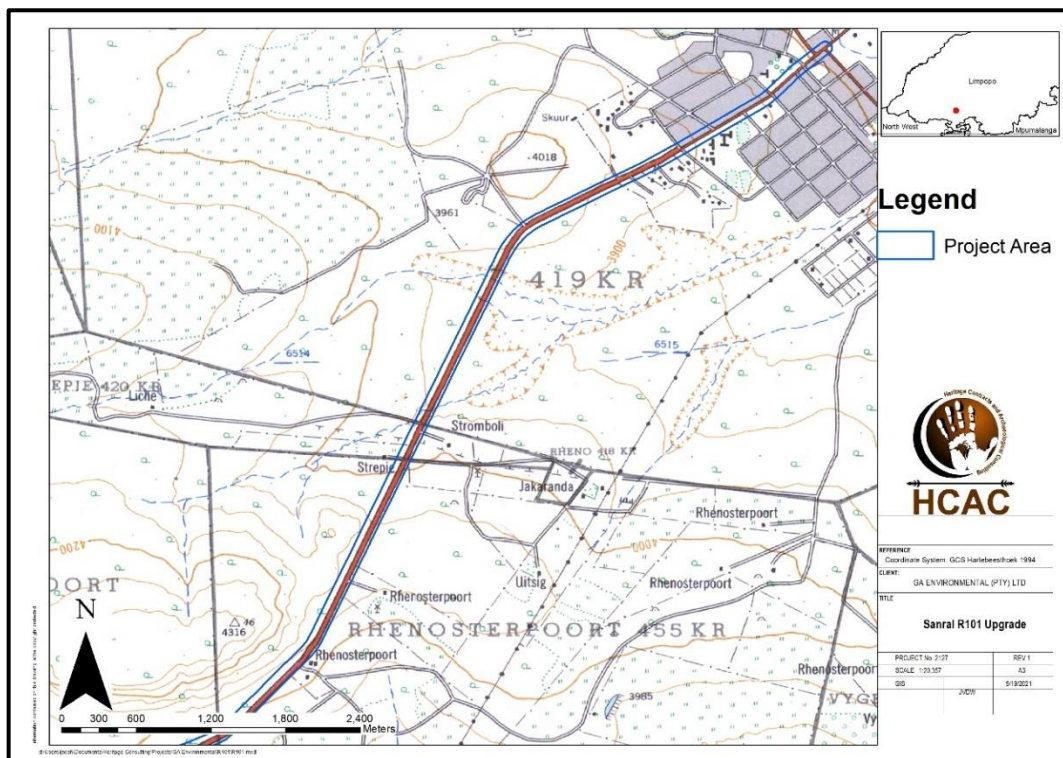


Figure 6.3. 1965 Topographic map showing the area to be the same as in the 1930's.

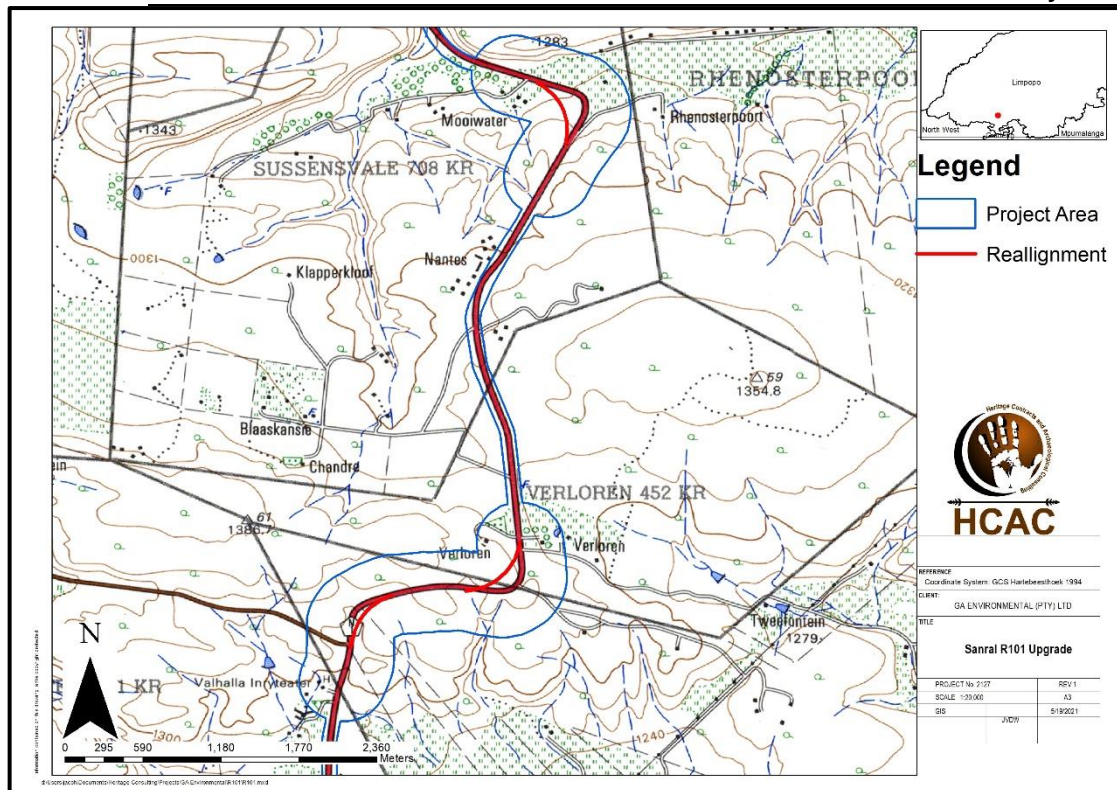


Figure 6.4. 1983 Topographic map showing the three realignment areas to be the same as in the 1930's with several new developments in the surrounding area.

6.3 Graves and Burial Sites

Graves and cemeteries are widely distributed across the landscape and can be expected anywhere. Based on the Genealogical Society of South Africa (GSSA) there are numerous graveyards in the greater area (Table 7 and Figure 6.5):

Table 7: Known cemeteries.

Source	Cemetery Location	Number of graves	Approximate distance from the project
GSSA	Bela Bela Main Cemetery Headstones 24°53'32.18"S 28°18'10.98"E	2583	926 m
GSSA	Het Bad - Town Council Offices 24°53'2.05"S 28°17'27.64"E	60	926 m
GSSA	Modderpoort 454 KR 24°45'58.27"S 28°20'15.44"E	3	1148 m
GSSA	Modderpoort 454 KR	3	1341m

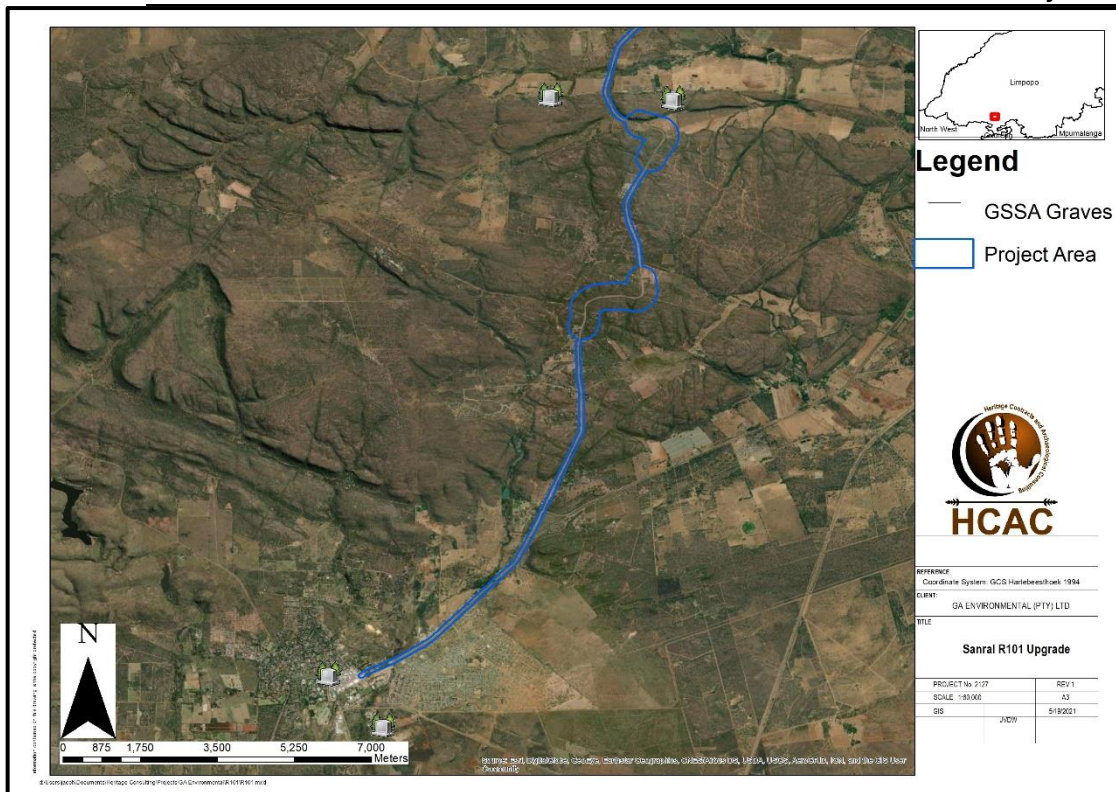


Figure 6.5: Site distribution of known cemeteries (excluding the cemetery in Modimolle).

7 Description of the Physical Environment

The project extends from Bela Bela at the intersection with Voortrekker Road (km 0.0) to Modimolle at the intersection with Road R33 (km 26.8). Road R101-8 consists of a two lane, single carriageway road with gravel shoulders along most of the route. The road has an average surfaced width of 7.0 m. Road R101-8 has an average road reserve width of approximately 35 meters. The study area falls within the bioregion described by Mucina *et al* (2006) as the Central Bushveld Bioregion with the vegetation described as Springbokvlakte thornveld. The existing road route lies on the Alma and Swaershoek Formations (Nylstroom Subgroup, Waterberg Group) in the northern and central sections from Modimolle southwards in the south the route passes over the Clarens Formation (Stormberg Group, Karoo Supergroup). The topography is undulating and very rocky. Land use in the general area is characterized by agriculture, dominated by game farming. Figures 7.1 to 7.4 illustrate the general site conditions.



Figure 7.1. Thick vegetation in the study area.



Figure 7.2. Mountainous terrain that characterises the study area.



Figure 7.3. Thick vegetation in the study area.



Figure 7.4. Mountainous terrain where the realignment area two is proposed.



Figure 7.5: Mountainous terrain that characterises the study area.

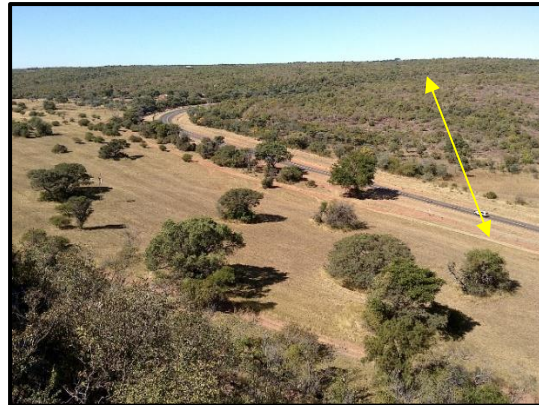


Figure 7.6: Mountainous terrain where the realignment area three is proposed.



Figure 7.7: Conditions along the road widening sections.



Figure 7.8: Conditions along the road widening sections.



Figure 7.9: Conditions along the road widening sections.



Figure 7.10: Mountainous terrain where the realignment area one is proposed

8 Findings of the Survey

It is important to note that only the development footprint of the project was surveyed over 2 days. Iron Age sites, MSA artefacts, as well as bridges and structures were identified within the larger geographical area (Figure 8.1 to 8.5). These features are located away from the study area (Figure 8.6) and no impact is expected on these features but provides context to the cultural landscape in which the project is located. In Modimolle a large Anglo Boer war concentration camp cemetery and memorial (Figure 8.9 to 8.12) are located adjacent to the proposed project and will require management measures to be safeguarded during the development Phase of the project. Two bridges (Bridge 375 and Bridge 447) south of Modimolle will be altered during the project. These bridges date to 1965 and 1966 (Figure 8.13 to Figure 8.16) respectively based on inscription on the bridges corroborated by engineering reports (Annexure A and B) these bridges are therefore not older than 60 years and not protected by NHRA (Figure 8.3).

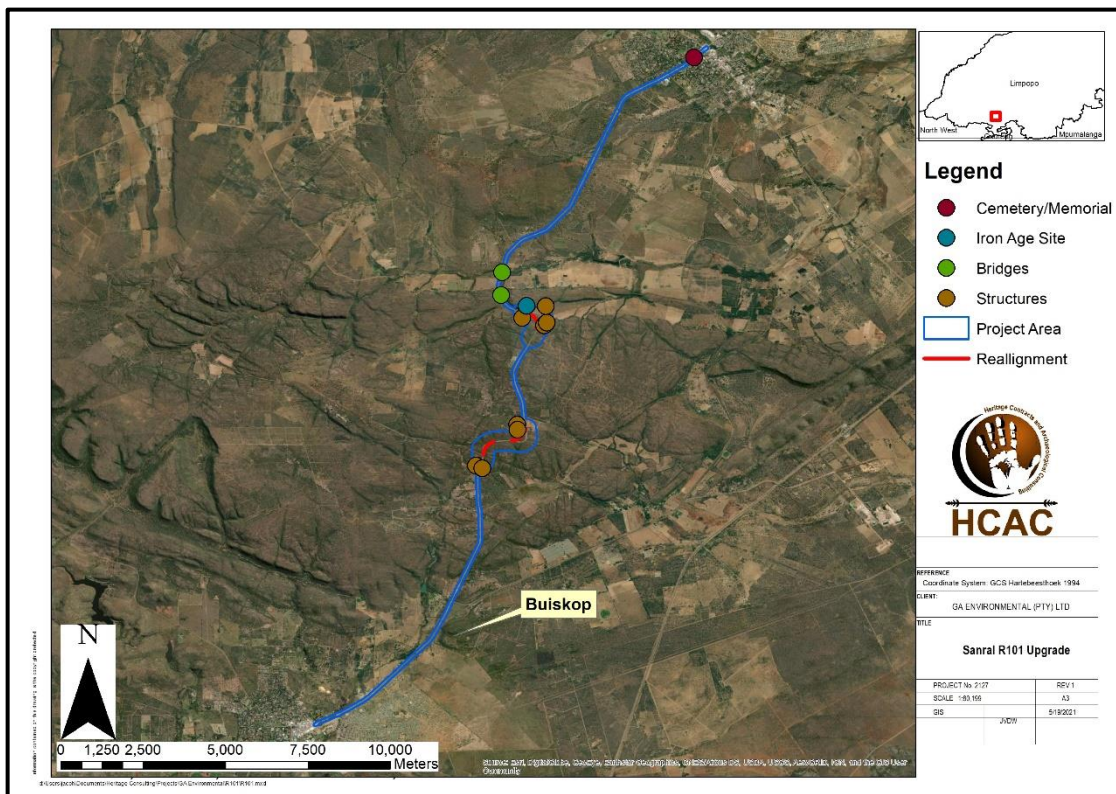


Figure 8.1. Site distribution map.



Figure 8.2: Middle Stone Age Core.



Figure 8.3: Ephemeral Iron Age walling outside of realignment area 3.



Figure 8.4: Historical house foundation outside realignment area 3

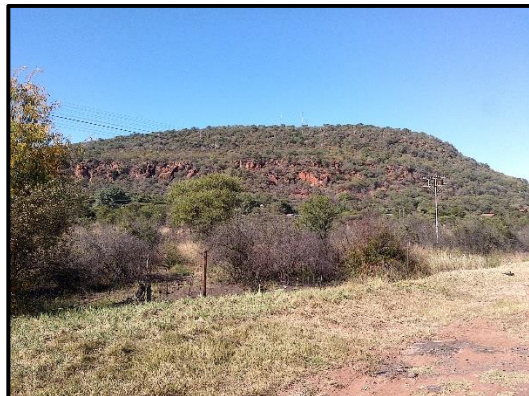


Figure 8.5: Buiskop close to Bela Bela discussed in Section 6.

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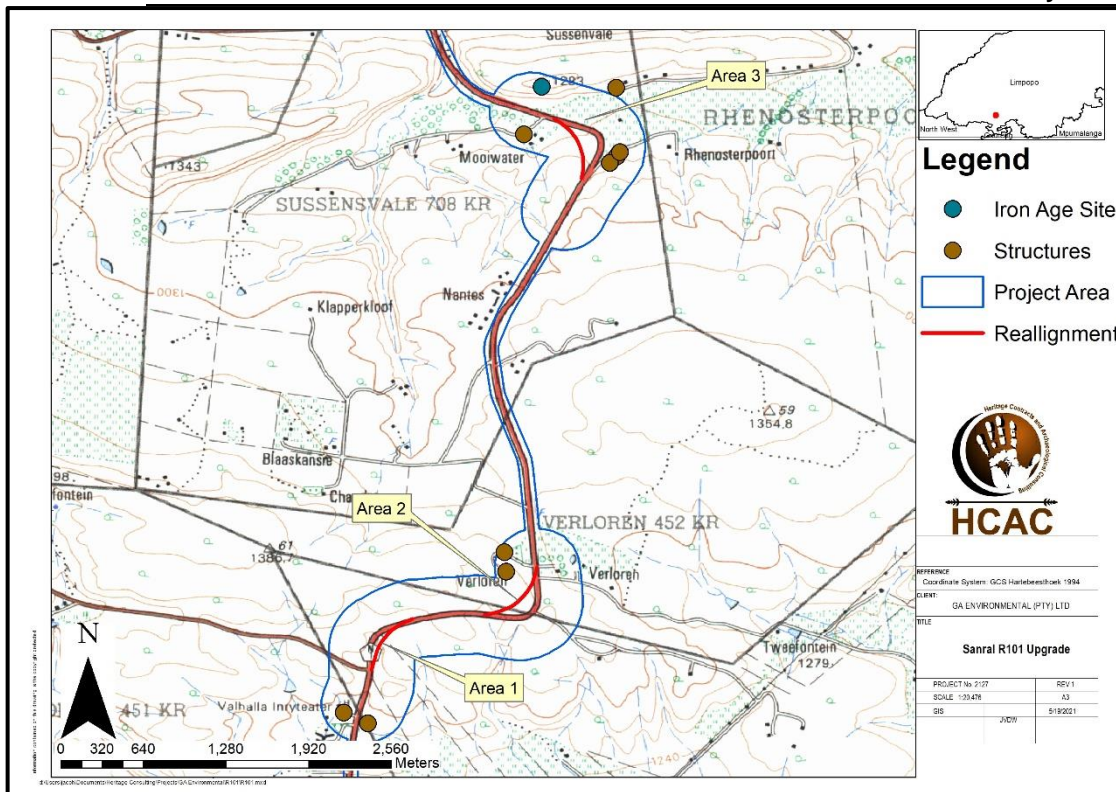


Figure 8.6. Features located in the realignment areas.

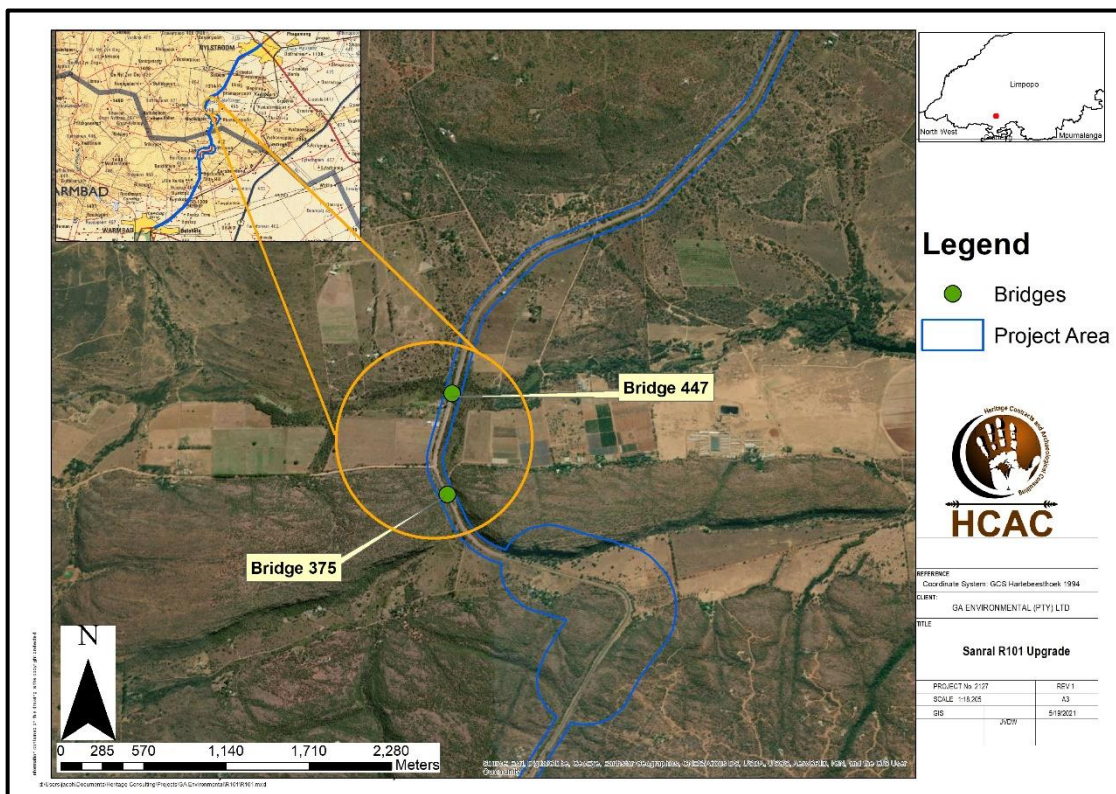
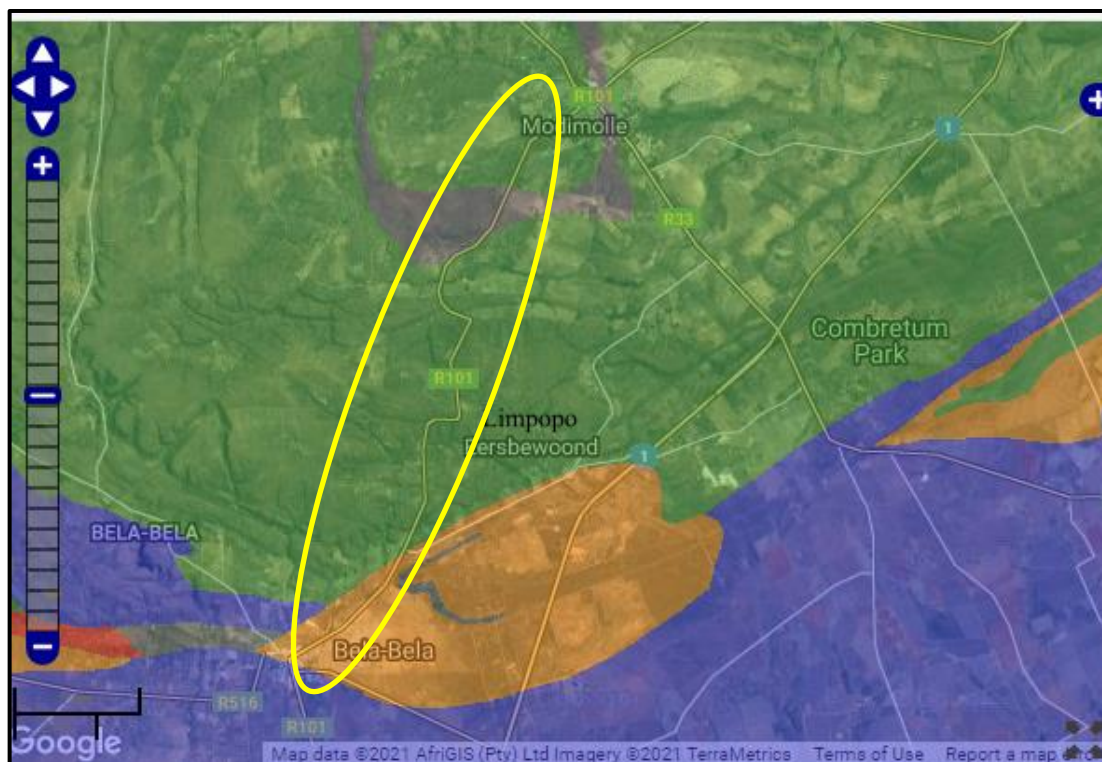


Figure 8.7. Bridges along the road upgrade.

Based on the SAHRA Paleontological map the area is of high paleontological sensitivity (Figure 8.8) and an independent assessment was conducted by Bamford (2021). The study concluded that it is extremely unlikely that any fossils would occur in the northern section, the Nylstroom Subgroup, and very unlikely be preserved in the sandstones of the Clarens Formation. Therefore, a Fossil Chance Find Protocol should be added to the EMP:



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 8.8. Paleontological sensitivity of the study area (yellow polygon).



Figure 8.9: Memorial Site.



Figure 8.10: Memorial Site.



Figure 8.11: Memorial Site.



Figure 8.12: Concentration camp cemetery.



Figure 8.13. Bridge 375 dating to 1965.



Figure 8.14: Eastern elevation of Bridge 375.



Figure 8.15: Bridge 447 dating to 1966.



Figure 8.16: Eastern elevation of Bridge 447.

9 Potential Impact

Based on the current lay-out and the lack of heritage resources in the study area no direct impact is expected on the cultural heritage resources of the area. The memorial site is located on the edge of the road upgrade in Modimolle town (Figure 9.1) and a secondary impact on the site is possible. None of the other features will be directly impacted on apart from the bridges that is not older than 60years and not under the ambit of the Act. Table 9 lists the sites mentioned in the text with coordinates.



Figure 9.1. Memorial in relation to the project.

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 needed for the construction phase. 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 Impact Assessment of the project.

The potential impact of the project on heritage resources is illustrated in Figure 9.1 and Table 8.

Table 8. Impact assessment of the project

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	With mitigation (Preservation/ excavation of site)
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	18 (Low)	18 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation:		
<ul style="list-style-type: none"> • Implementation of a chance find procedure for the project. • Demarcation of known sites on development plans • Monitoring of the memorial site during constructions by the ECO 		
Cumulative impacts:		
The proposed project will have a low cumulative impact as no known heritage resources will be adversely affected.		
Residual Impacts:		
Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 9: Recorded sites

LABEL	LONGITUDE	LATITUDE
Structures in realignment area 1	28° 20' 34.5543" E	24° 48' 50.7015" S
Structures in realignment area 2	28° 21' 14.9134" E	24° 48' 10.4102" S
Structures in realignment area 2	28° 21' 15.3864" E	24° 48' 15.2651" S
Structures in realignment area 3	28° 21' 43.1616" E	24° 46' 31.0824" S
Structures in realignment area 3	28° 21' 41.3770" E	24° 46' 32.6770" S
Structures in realignment area 3	28° 21' 43.9541" E	24° 46' 29.9714" S
Structures in realignment area 3	28° 20' 40.6532" E	24° 48' 53.3619" S
Iron Age Site	28° 21' 24.3036" E	24° 46' 13.5803" S
Historical foundations	28° 21' 42.9948" E	24° 46' 13.8289" S
Bridge 375	28° 20' 59.2799" E	24° 46' 03.2053" S
Bridge 447	28° 21' 00.3275" E	24° 45' 40.6369" S
Structures in realignment area 3	28° 21' 19.8648" E	24° 46' 25.5144" S
Memorial and concentration camp cemetery	28° 24' 08.9677" E	24° 42' 09.5795" S

10 Conclusion and recommendations

The study area is rural in character and sparsely developed, characterized by game farms and small commercial developments next to the road consisting of farm stalls and restaurants. Within Bela Bela and Modimolle residential and commercial developments occur. Due to the nature of the road upgrade that is limited to the road reserve it is assumed that these structures will not be impacted by the project. The road between Bela Bela and Modimolle was in use prior to 1939 known as the National Road N1 joining Pretoria and Polokwane. The N1 was however realigned during 1995/1996 under a concession contract at which time this section was renumbered as R101 and serves as an alternative route to the N1 toll route.

Iron Age sites, MSA artefacts, as well as bridges and structures were identified within the larger geographical area (Figure 8.1 to 8.5). These features are located away from the study area (Figure 8.6) and no impact is expected on these features but provides context to the cultural landscape in which the project is located. In Modimolle a large Anglo Boer war concentration camp cemetery and memorial (Figure 8.9 to 8.12) are located adjacent to the proposed project and will require management measures to be safeguarded during the development Phase of the project. Two bridges (Bridge 375 and Bridge 447) south of Modimolle will be altered during the project. These bridges date to 1965 and 1966 (Figure 8.13 to Figure 8.16) these bridges are therefore not older than 60 years and not protected by NHRA

Based on the South African Heritage Resources Information Services (SAHRIS) Palaeontological map the area is of high paleontological sensitivity and an independent study was conducted for this aspect (Bamford 2021). The study concluded that a Fossil Chance Find Protocol should form part of the EMP for the project.

With the implementation of the mitigation measures in this report no significant heritage resources will be affected by the development and therefore the impact of the project on heritage resources are low and the project can commence based on the approval of 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:

- Implementation of a chance find procedure for the project (as outlined below)
- Demarcation of known sites on development plans
- Monitoring of the memorial site during construction by the ECO.

10.2. Chance Find Procedures

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.

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.

Fossil Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations for foundations begin.

1. The following procedure is only required if fossils are seen on the surface and when 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 fossil, MISS, stromatolites) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
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/miners 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 not 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 on heritage resources is considered to be low, based on the adherence to the recommendations in this report and approval from SAHRA prior to development. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation, and possible layout changes.

10.5 Monitoring Requirements

Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief:* As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are the initial soil removal and subsequent earthworks during construction. The EO 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
Clearing activities and Excavations	Entire project area	ECO	Weekly – during construction phase	Proactively	<ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist 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

The following management measures must be included in the EMPr to ensure the protection of non-renewable heritage resources.

Table 11. Management measure for inclusion in the EMPr.

ACTIVITIES	PHASE	SIZE AND SCALE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
(Construction and Excavation Activities	Pre Construction and Construction	Entire site	<ul style="list-style-type: none"> • Demarcation of known sites on development plans • Monitoring of the memorial site during constructions by the ECO • Chance Find Procedure 	Heritage Act NHRA Act 25 of 1999	Construction phase

10.7 Knowledge Gaps

Due to the subsurface nature of heritage resources and limited archaeological visibility due to high vegetation cover, the possibility of discovery of heritage resources during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure.

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