HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED BORROW PITS AND QUARRIES REQUIRED FOR THE SANRAL (TRAC N4) ROAD UPGRADE OF THE SCHOEMANSKLOOF (R539) ROUTE, MPUMALANGA.

Type of development:

Road Upgrade

Client:

Prism MS

Applicant:

SANRAL (TRAC N4)

Report Prepared by:

Beyond Heritage
Private Bag X 1049
Suite 34
Modimolle
0510
Tel: 082 373 8491
Fax: 086 691 6461
E-Mail: jaco@heritageconsultants.co.za

Report Author:
Mr. J. van der Walt
Project Reference:
Project number 22114
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APPROVAL PAGE

Project Name	Proposed borrow pits and quarries required for the road upgrade of the Schoemanskloof (R539) Route, Mpumalanga
Report Title	Heritage Impact Assessment for the proposed borrow pits and quarries required for the SANRAL (TRAC N4) road upgrade of the Schoemanskloof (R539) Route, Mpumalanga
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	SANRAL (TRAC 4)

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	August 2022
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	July 2022
Palaeontological Assessment	Prof Marion Bamford	PhD Paleo Botany	August 2022

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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 and 10.5
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1 and 10.5
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 4.
(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 10.2
(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 BA report
(q) Any other information requested by the competent authority	No other information requested at this time

Executive Summary

Prism EMS has been appointed as the independent environmental assessment practitioner (EAP) to apply for environmental authorization for proposed borrow pits and quarries required for the SANRAL (TRAC N4) road upgrade of the Schoemanskloof (R539) Route, Mpumalanga. Prism EMS appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed through a desktop assessment and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The areas assessed consist of three Borrow Pit (BP) clusters with laydown areas and are referred to as BP07, BP010 (that includes two quarries) and BP011;
- The larger area in which the borrow pits are located is characterised by Late Iron Age stone-walled features such as enclosures, terracing and extensive settlements that are commonly associated with Bakoni cultural groups among others and several sites related to this phase of Iron Age occupation in the Schoemanskloof valley is on record dating to the 18th century (Delius & Schoeman 2008);
- Many of these stone walled settlements have been impacted on by forestry, agriculture and infrastructure developments. Some important and well-preserved sites such as Blaauboschkraal which is a declared heritage site occur close to the study area;
- Similar Iron Age stone-walled settlements and features were recorded within the areas affected by BP 10 and 11;
- No heritage features were recorded in BP07 although stone cairns that could possibly be associated with agricultural activities are recorded on the periphery and outside of the impact area;
- According to the SAHRIS paleontological sensitivity map the area is of low to moderate and high paleontological sensitivity a. An independent study by Prof Marion Bamford concluded that it is extremely unlikely that any fossils would be preserved in the soils of the Quaternary that characterise the sites. There is a very small chance that trace fossils may occur in the dolomites or shales of the Malmani Subgroup or Pretoria Group, respectively, so a Fossil Chance Find Protocol should be added to the EMPr (Bamford 2022).

Ultimately the project will assist in improving traffic flow speeds and improve the safety of motorists in the area. The impacts to heritage resources prior to mitigation is high but can be mitigated to low with avoidance of the sites or medium with Phase 2 archaeological mitigation and with the implementation of the recommendations outlined below and detailed in Section 10.1, 10.2, 10.5 and 10.6 and Annexure A.

Recommendations:

- Implementation of a Chance Find Procedure for the project;
- *In situ* preservation of recorded heritage features is the preferred course of action. This can be achieved through smaller impact footprints to exclude recorded heritage sites with a 30 m buffer;
- If avoidance of the features is not possible extensive archaeological mitigation of the sites will be required prior to construction. It will include test excavations and detailed recordings of the sites.
- Monitoring of the area during initial clearing and mining activities by the ECO...

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 49 A of the Act.
Signature	
Date	19/08/2022

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (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 the Association of South African Professional Archaeologists (ASAPA) (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, Kwa Zulu Natal (KZN) as well as the Northern and Eastern Cape Provinces in South Africa.

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

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ABBREVIATIONS

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

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

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to the historic period)
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 borrow pits and quarries required for the SANRAL (TRAC N4) road upgrade of the Schoemanskloof (R539) Route, Mpumalanga (Figure 1.1). The report forms part of the Basic Assessment (BA) and Environmental Management Programme (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, Iron Age stone walled settlment were recorded. 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. The South African Heritage Resources Agency (SAHRA) as a commenting authority under section 38(8) of NHRA 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 quarries and borrow pits are outlined under Table 2 and 3.

Table 2: Project Description

Farm and Magisterial District	The borrow pits are located along the R539.
Central co-ordinate of the development	BP07: 25° 26' 24.2698" S, 30° 27' 49.0664" E BP010: 25° 27' 32.1366" S, 30° 41' 21.4740" E BP11: 25° 36' 10.5133" S, 30° 16' 56.6786" E
Topographic Map Number	2530 CB

Table 3: Infrastructure and project activities

Type of development	Road Upgrades
Project Details The Project consist of three Borrow Pit (BP) clusters with laydown areas and are referred to as BP07, BP010 (that includes two quarries) and BP011.	

1.3 Alternatives

Several alternatives were assessed during the environmental process but were eliminated due to environmental sensitivities which resulted in the above sites as the only viable alternatives. The extent of the area assessed allows for siting of the development within these areas to minimize impacts to heritage resources.

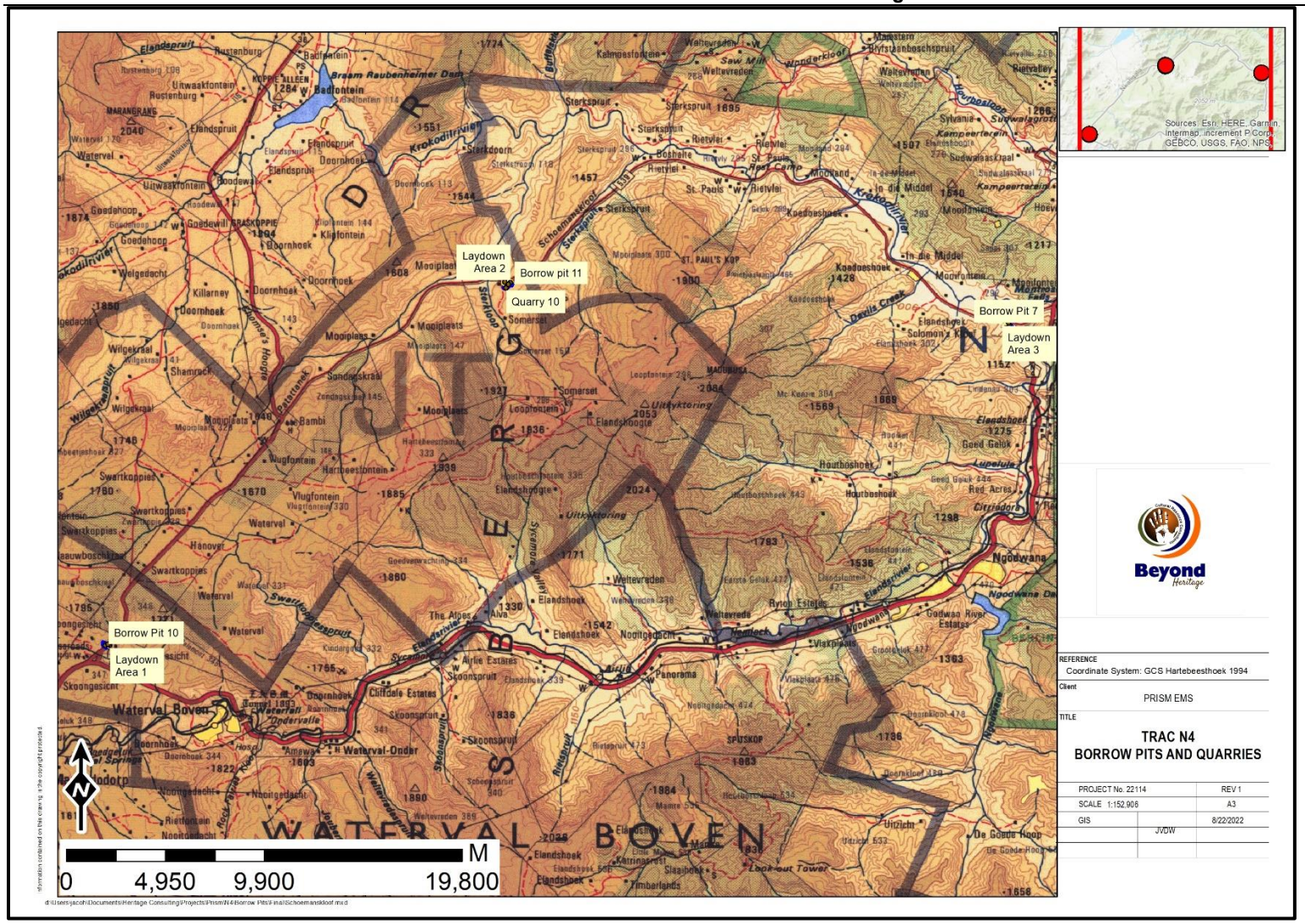


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the 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 BA 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 undertaken by the EAP 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	The proposed borrow pits was surveyed during November 2021, then in January 2022 and again on the 3rd of August 2022. The time of year and season did influence the survey as dense vegetation hindered visibility and accessibility during the pedestrian survey. The Project areas were sufficiently covered to understand the heritage character of the area (Figure 3.1 to 3.3).

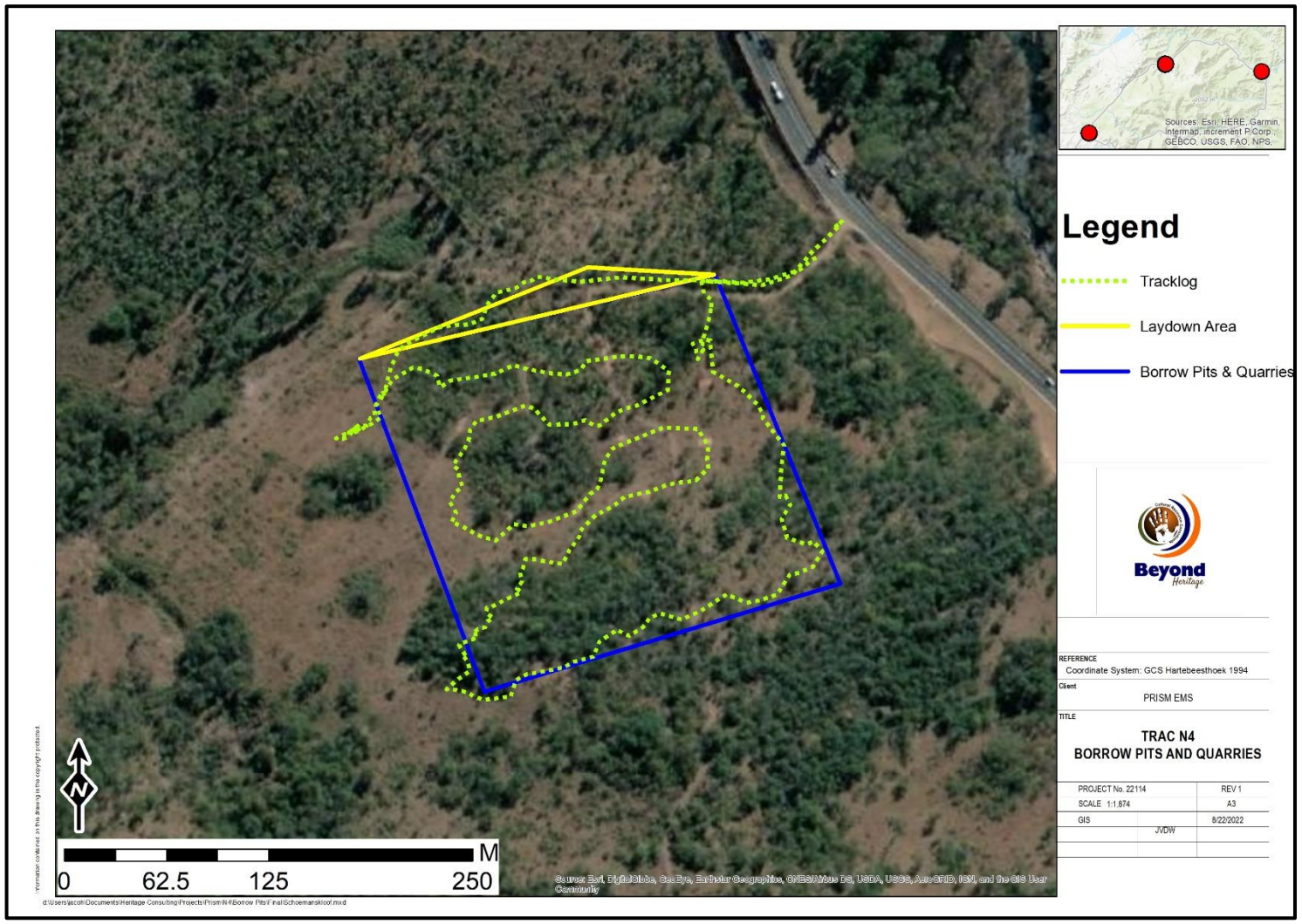


Figure 3.1. Tracklog of the survey path in green for BP 07. Note the clusters of dense vegetation that hindered accessibility.

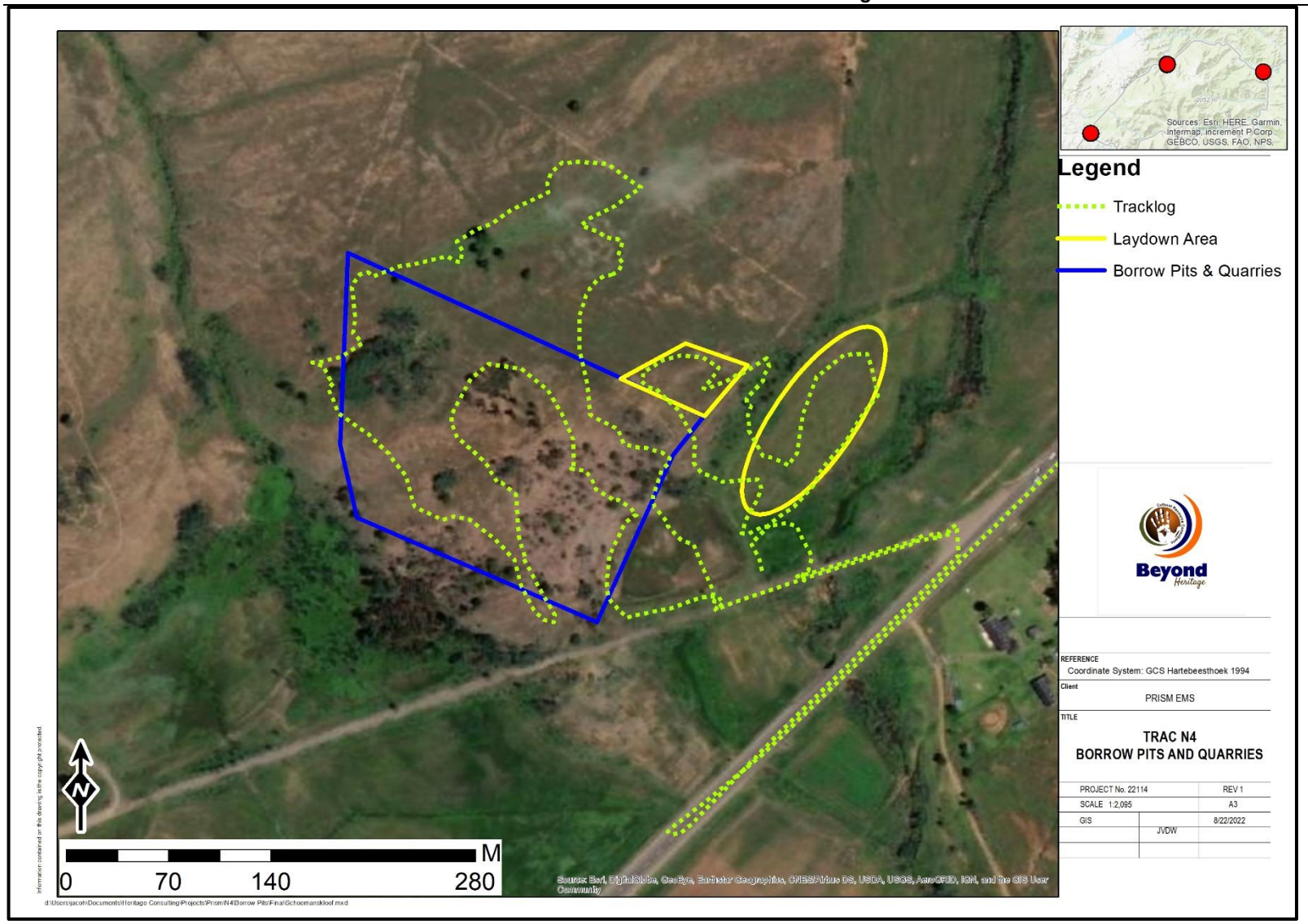


Figure 3.2. Tracklog of the survey path in green for BP 10.

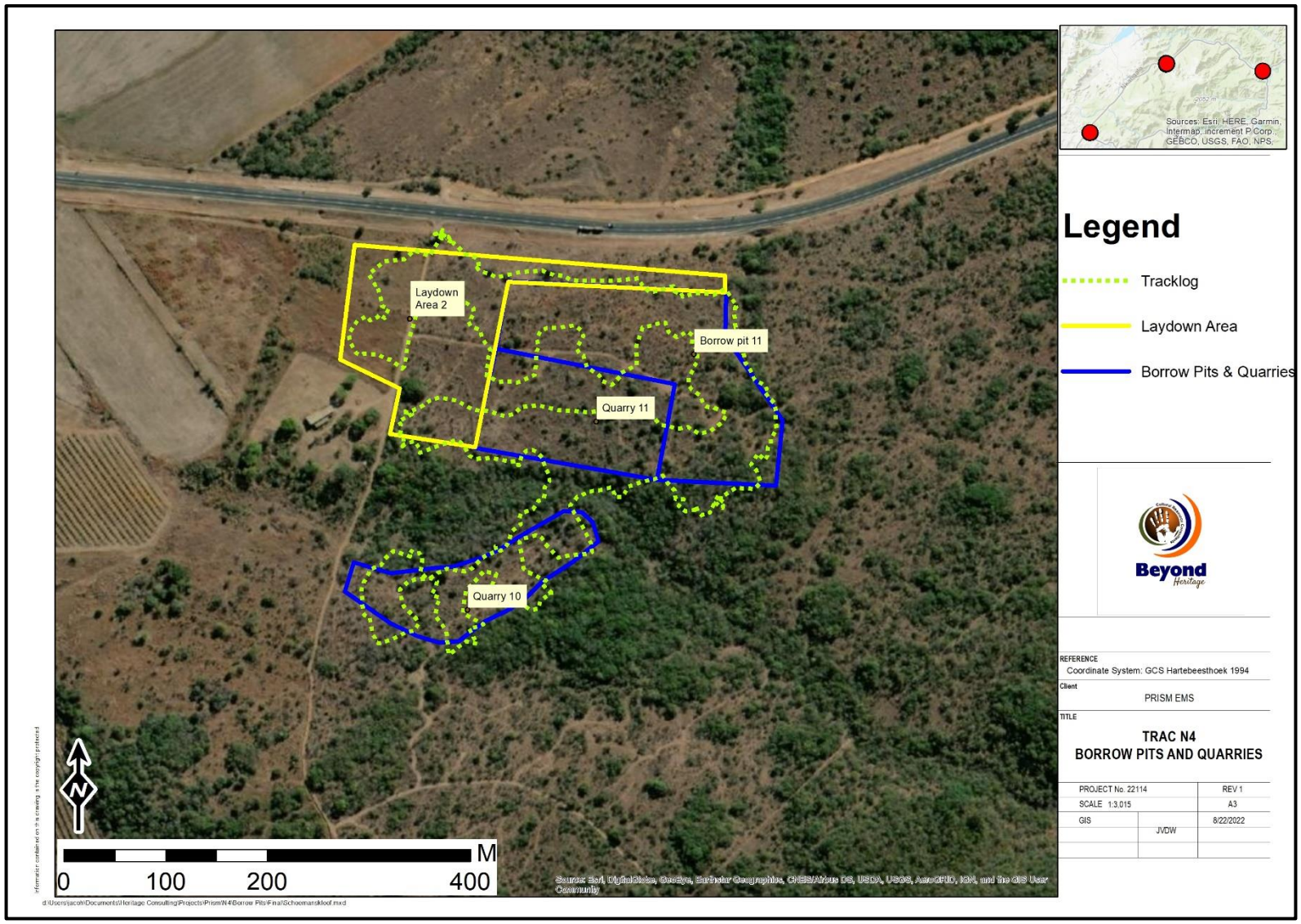


Figure 3.3. Tracklog of the survey path in green for BP 11. Note the dense vegetation that limited accessibility along the drainage lines.

3.5 Site Significance and Field Rating

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

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

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

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

In addition to this criteria field ratings prescribed by SAHRA (2007), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

Table 5: Heritage significance and field ratings

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

3.6 Impact Assessment Methodology

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

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

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

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

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

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the 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

Mpumalanga has a youthful population with approximately 64% of the population consisting of economically active people (15 to 34 years of age). This provides significant human resources for future economic growth and sustainability. The project will promote infrastructure and create employment opportunities.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

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

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

Various sites are known for the area consisting mostly of Iron Age settlements, structures and cemeteries. The following assessments were consulted for this report (Table 6).

Table 6. Selected heritage studies consulted for the project.

Author	Year	Project	Findings
Coetzee, T.	2005	Archaeological Investigation of the Proposed Black Eagle Valley - Residential Estate, Waterval Boven, Mpumalanga	Iron Age Stone Walled Settlements, farming structures and 2 cemeteries.
Van Schalkwyk, J.A.	2007	Heritage Impact Scoping Report for The Planned Hendrina-Marathon Powerline, Mpumalanga Province	Sites range from settlements to initiation sites, industrial and farming related sites as well as cemeteries
Van Wyk Rowe, C.	2014	Phase 1 Archaeological / Heritage Impact Assessment for The Development Of A Footbridge Across The Elands River, Elandshoek, Mpumalanga	Historical structures
Van der Walt, J.	2015	Archaeological Impact Assessment for the proposed widening of the N4 National Road, Section 6E, Near Waterval-Onder, Mpumalanga Province	Stone Cairn and two stonewalled sites
Celliers, JP	2018	Phase 1 Archaeological and Heritage Impact Assessment on the farm Mooifontein 292 JT in respect of proposed agricultural development, Mpumalanga Province	Stone enclosure
Celliers, J.P.	2019	Archaeological Mitigation Report: The Archaeological documentation of a Late Iron Age stonewalled complex located on the farm Bruintjieslaagte 465 JT, Mpumalanga.	Iron Age settlements
Van der Walt, J.	2020	Heritage Impact Assessment for the N4 Interchange, Mpumalanga Province	Stone enclosures
Van der Walt, J.	2022	Heritage Impact Assessment for the Schoemanskloof Route R539 Improvements Project, Mpumalanga	Iron Age Sites and Graves.

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

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

6.2 Archaeological Background

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

6.2.1 Stone Age

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

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

Very few Early Stone Age (ESA) sites are on record for Mpumalanga. An example where ESA tools have been discovered located outside of the study area is at Maleoskop (Bergh 1999) on the farm Rietkloof, which is one of only a handful of such sites in Mpumalanga. Another example also outside of the study area is at Bushman Rock Shelter (Mason 1969, Wadley 1987), a well-known site in the Ohrigstad district. This cave was excavated twice in the 1960s by Louw and later by Eloff. The MSA layers show that the cave was repeatedly frequented over a long period. Lower layers have been dated to over 40 000 Before Present (BP), while the top layers date to approximately 27 000 BP (Esterhuysen and Smith in Delius, 2007). MSA material is found widely across South Africa and some MSA manifestations can be expected in the study area.

Sites dating to the LSA are found in numerous rock shelters throughout Eastern Mpumalanga, where some of their rock art is still visible. A number of these shelters have been documented throughout the Province (Schoonraad in Barnard, 1975; Bornman, 1995 and Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad.

At Honingklip near Badplaas in the Carolina District, two LSA rock shelters with four panels of rock art was excavated. The site was used between 4870 BP and as recently as 200 BP. Stone walls at both sites date to the last 250 years of hunter-gatherer occupation and they may have served as protection against intruders and predators. Pieces of clay ceramic and iron beads found at the site indicates that there was early social interaction between the hunter-gatherer (San) communities and the first farmers who moved into this area at around 500 AD.

6.2.2 Iron Age and historical period

Bantu-speaking people moved into Eastern and Southern Africa about 2,000 years ago (Mitchell, 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. The Iron Age as a whole represents the spread of Bantu speaking people and includes both the Pre-Historic and Historic periods. It can be divided into three distinct periods:

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

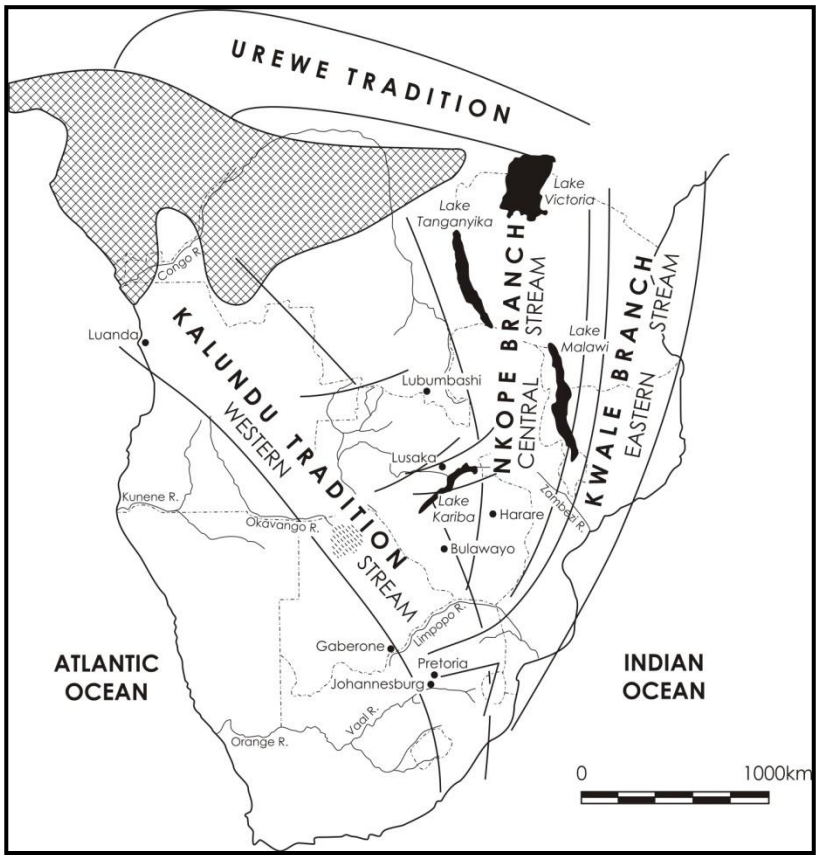


Figure 6.1:Movement of Bantu speaking farmers (Huffman 2007).

The later phases of the Iron Age (AD 1600-1800's) are represented by various tribes including Ndebele, Swazi, BaKoni, and Pedi, marked by extensive stonewalled settlements found throughout the escarpment and particularly around Machadodorp, Lydenburg, Badfontein, Sekhukuneland, Roossenekal and Steelpoort. The BaKoni were the architects of a unique archaeological stone building complex who by the 19th century spoke seKoni which was similar to Sepedi. The core elements of this tradition are stone-walled enclosures, roads and terraces. These settlement complexes may be divided into three basic features: homesteads, terraces and cattle tracks.

Researchers such as Mike Evers (1975) and David Collett (1982) identified three basic settlement layouts in this area. These sites can be divided into simple and complex ruins. Simple ruins are normally small in relation to more complex sites and have smaller central cattle byres and fewer huts. Complex ruins consist of a central cattle byre, which has two opposing entrances and several semi-circular enclosures surrounding it. The perimeter wall of these sites is sometimes poorly visible. Huts are built between the central enclosure and the perimeter wall. These are all connected by trackways referred to as cattle tracks. These tracks are

made by building stone walls, which forms a walkway for cattle to the centrally located cattle byres. A combination of these features occurs on a few dispersed sites to the northwest of the study area (Celliers 2019).

Individual sites range from simple enclosures, which consist of single or two concentric stonewalled circles found in small, isolated settlements, to complex sites with large central enclosures which have smaller enclosures attached to their outer walls. The walls are built with undressed, locally occurring, stone. Walls on average are 0.5 to approximately 1 meter high, although often only the foundation stones are left.The provincial heritage site at Blaauboschkraal (BBK) close to the study area is a preserved site relating to the Khoni occupation in the region.

6.2.3 Cultural Landscape

The area is characterized by the development of the R539/Schoemanskloof road, surrounding agricultural activity and is rural in character. The cultural landscape is layered by an extensive Iron Age stone walled component dating to the Bakoni period followed by a historical layer of early western farmers.

6.2.4 Graves and Burial Sites

No known graves are indicated on databases consulted but graves and cemeteries are widely distributed across the landscape and can be expected anywhere.

7 Description of the Physical Environment

The study area is situated along the R539/ Schoemanskloof road. The vegetation in the study area although transformed in some area's forms part of the Savanna Biome and classed as Legogote Sour Bushveld and the landscape is characterised by gently to moderately upper pediment slopes with dense woodland including many medium to large shrubs, with short thicket occurring on less rocky sites (Mucina and Rutherford, 2009). The study area concurs with this and is characterised by rocky areas and woodland vegetation. Some area are also characterised by Aloes, a pioneer indicator of possible previous disturbance (Figure 7.1 to 7.4).

Figure 7.1. Elevated rocky area with dense vegetation at BP 7.

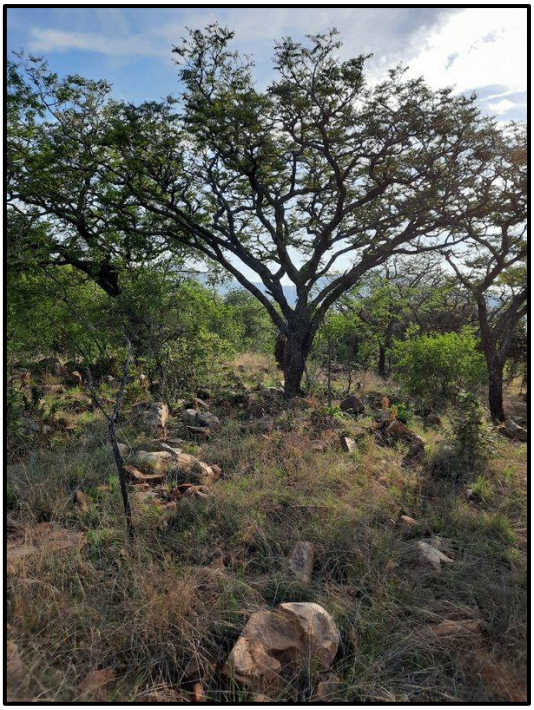


Figure 7.2. General vegetation cover at BP 11.

Figure 7.3. General site conditions at BP 10.

Figure 7.4. Large quantities of aloes in the study area mark stone walled settlements.

8 Findings of the Survey

8.1 Heritage Resources

The landscape in which the project is located is characterised by LIA stone walled features such as enclosures, terracing and extensive settlements that is commonly associated with Bakoni cultural groups and several sites related to this phase of Iron Age occupation in the Schoemanskloof valley is on recorded dating to the 18th century (Delius & Schoeman 2008). Many of the stone walled settlements in the area were lost to forestry, agriculture, and infrastructure development although sites such as Blaauboschkraal that is a declared heritage site, is preserved and located to the northeast of BP 10.

During the survey Bokoni settlements were recorded at BP10 and ephemeral low packed stone wall terraces and well-defined stone packed walls were recorded in highly overgrown areas where site-layout and site extent were not discernible at BP 11, Quarry 10 & 11. It is unclear if these features are all dating to the Iron Age period or if there is a historical component to them. These features are likely associated with the later phases of the Iron Age (AD 1600-1800's) and made by Ndebele, Swazi, or Pedi groups.

A few historical/ recent features were also recorded like a bridge/culvert and remains of dirt roads also in BP11. No sites of significance were recorded at BP7 although some areas were inaccessible due to dense vegetation.

The location of the recorded heritage features is spatially illustrated in Figure 8.1 to 8.3 for each borrow pit and briefly described in Table 7. Field notes that include descriptions and photographs of the features are included in Annexure A.

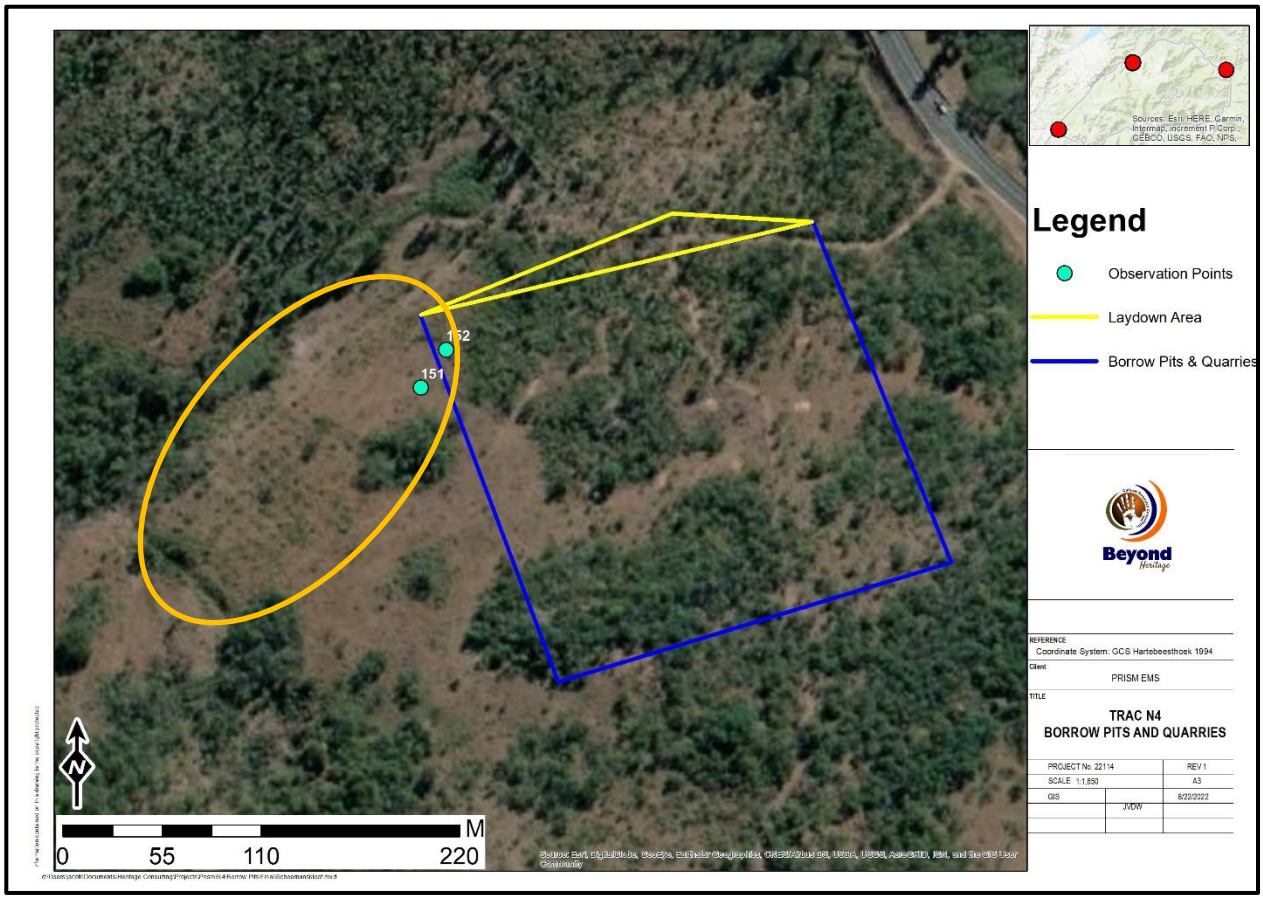


Figure 8.1. Site distribution in the footprint of BP07. Note the extent of the stone cairns (orange polygon)

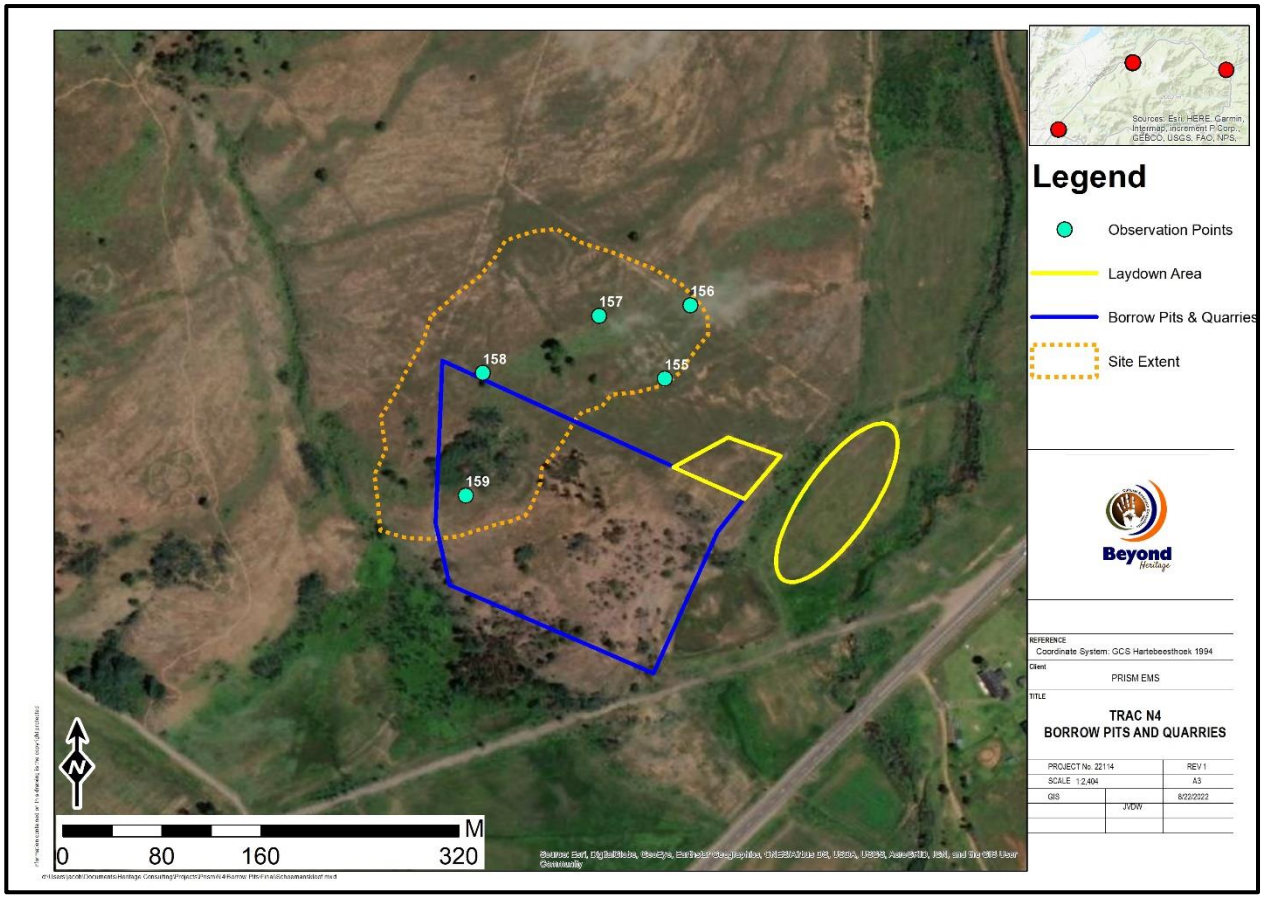


Figure 8.2. Site distribution and sensitive area marking the Bakoni settlement in the footprint of BP10.

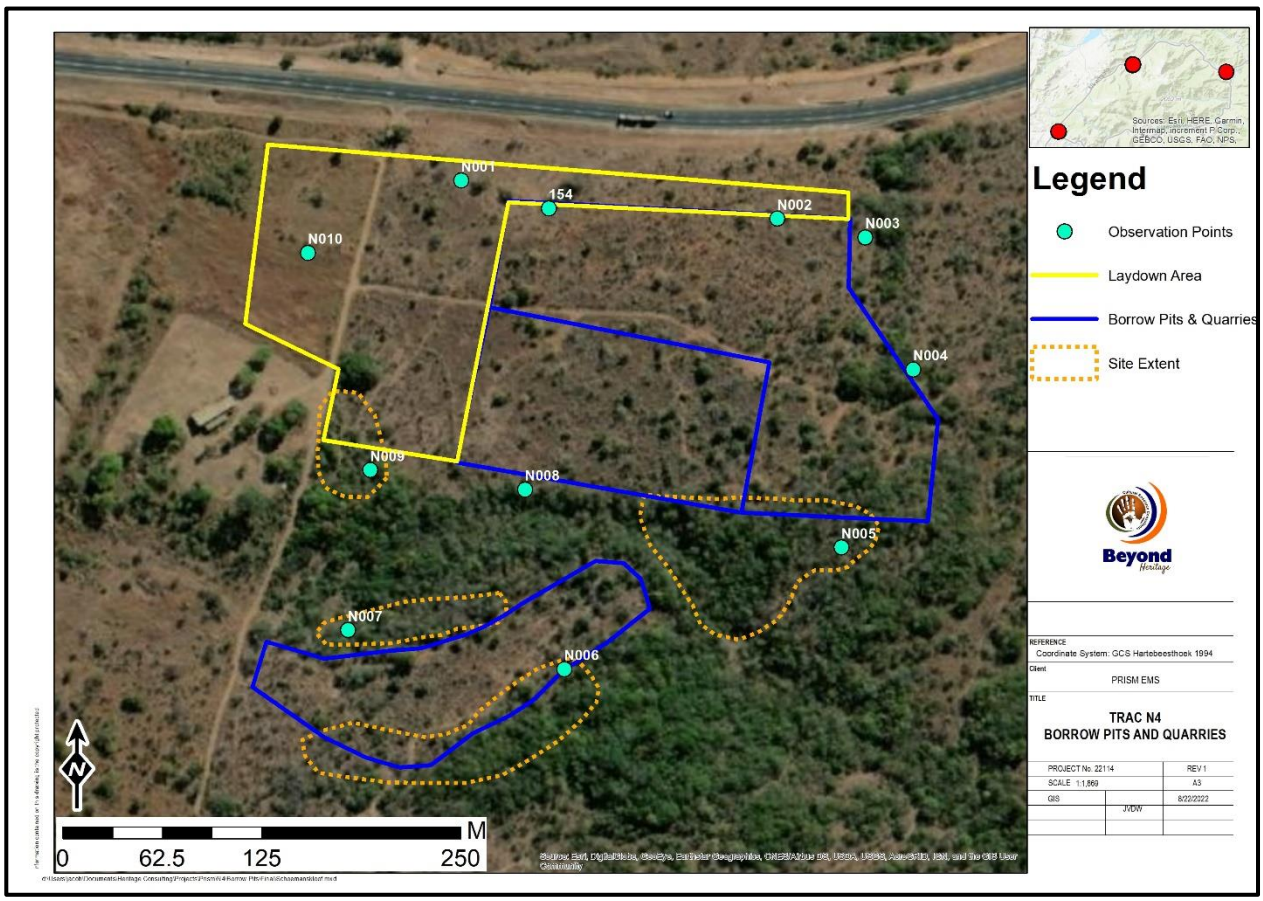


Figure 8.3. Site distribution and approximate extent in relation to the footprint of BP11.

Table 7. Recorded features in the study areas.

Label	Longitude	Latitude	Description	Significance	Impact Footprint
151	30° 41' 16.9656" E	25° 27' 31.3777" S	Stone cairns remnants of agricultural activities	Low	BP 7
152	30° 41' 17.4228" E	25° 27' 30.6972" S	Stone cairns remnants of agricultural activities	Low	BP 7
154	30° 27' 48.6541" E	25° 26' 21.9372" S	Old Road	Low	Laydown Area 2 BP 11
155	30° 16' 59.4696" E	25° 36' 07.0091" S	Bokoni Type Stone Walled settlement with various enclosures (Waypoint 155 to 159) forming part of an aerially extensive site	Medium	BP 10
156	30° 17' 00.1501" E	25° 36' 05.0867" S	Bokoni Type Stone Walled settlement with various enclosures (Waypoint 155 to 159) forming part of an aerially extensive site	Medium	BP 10
157	30° 16' 57.7524" E	25° 36' 05.3676" S	Bokoni Type Stone Walled settlement with various enclosures (Waypoint 155 to 159) forming part of an aerially extensive site	Medium	BP 10
158	30° 16' 54.7141" E	25° 36' 06.8616" S	Bokoni Type Stone Walled settlement with various enclosures (Waypoint 155 to 159) forming part of an aerially extensive site	Medium	BP 10
159	30° 16' 54.2662" E	25° 36' 10.0684" S	Bokoni Type Stone Walled settlement with various enclosures (Waypoint 155 to 159) forming part of an aerially extensive site	Medium	BP 10
N001	30° 27' 46.8720" E	25° 26' 21.3720" S	Old Road	Low	Laydown Area 2 BP 11
N002	30° 27' 53.3052" E	25° 26' 22.1496" S	Ephemeral remains of destroyed Iron Age stone walling possibly forming part of N3	Low	Laydown Area 2 BP 11
N003	30° 27' 55.0943" E	25° 26' 22.5277" S	Ephemeral remains of destroyed Iron Age stone walling forming part of larger settlment possibly forming part of N003	Low Medium	BP 11
N004	30° 27' 56.0699" E	25° 26' 25.2169" S	Section of Iron Age stone walling of unknown purpose located on the periphery of the study area. The feature forms part of the larger Iron Age settlement in the area	Medium	BP 11
N005	30° 27' 54.6157" E	25° 26' 28.8421" S	Highly Overgrown Iron Age stone-walled settlement with various enclosures and possible terracing	Medium	BP 11
N006	30° 27' 48.9709" E	25° 26' 31.3188" S	Highly Overgrown stone-walled settlement with various enclosures and possible terracing. Forming part of settlement at Waypoint N007	Medium	Quarry 11
N007	30° 27' 44.5717" E	25° 26' 30.5231" S	Highly Overgrown stone-walled settlement with various enclosures and possible terracing forming part of settlement at Waypoint N006.	Medium	Quarry 11
N008	30° 27' 48.1752" E	25° 26' 27.6613" S	Possible terracing in an overgrown area next to a small stream. In all likelihood forming part of the terracing/walls at N009 or N005	Low to medium	Quarry 11
N009	30° 27' 45.0216" E	25° 26' 27.2651" S	Possible terracing and remains of Iron Age stone packed walls	Low to medium	Laydown Area 2 BP 11
N010	30° 27' 43.7543" E	25° 26' 22.8445" S	Small cement bridge or culvert over a drainage line marking an old road	Low to medium	Laydown Area 2 BP 11

8.2 Cultural Landscape

The area is characterized by the development of the R539/ Schoemanskloof road, surrounding agricultural activity and is rural in character. The cultural landscape is layered by an extensive Iron Age stone walled component most notably dating to the Bakoni period followed by a historical layer of early western farmers. Historical maps for each borrow pit and associated impact areas indicate little development in the affected areas (Figures 8.4 to 8.9).

8.2.1 BP 07

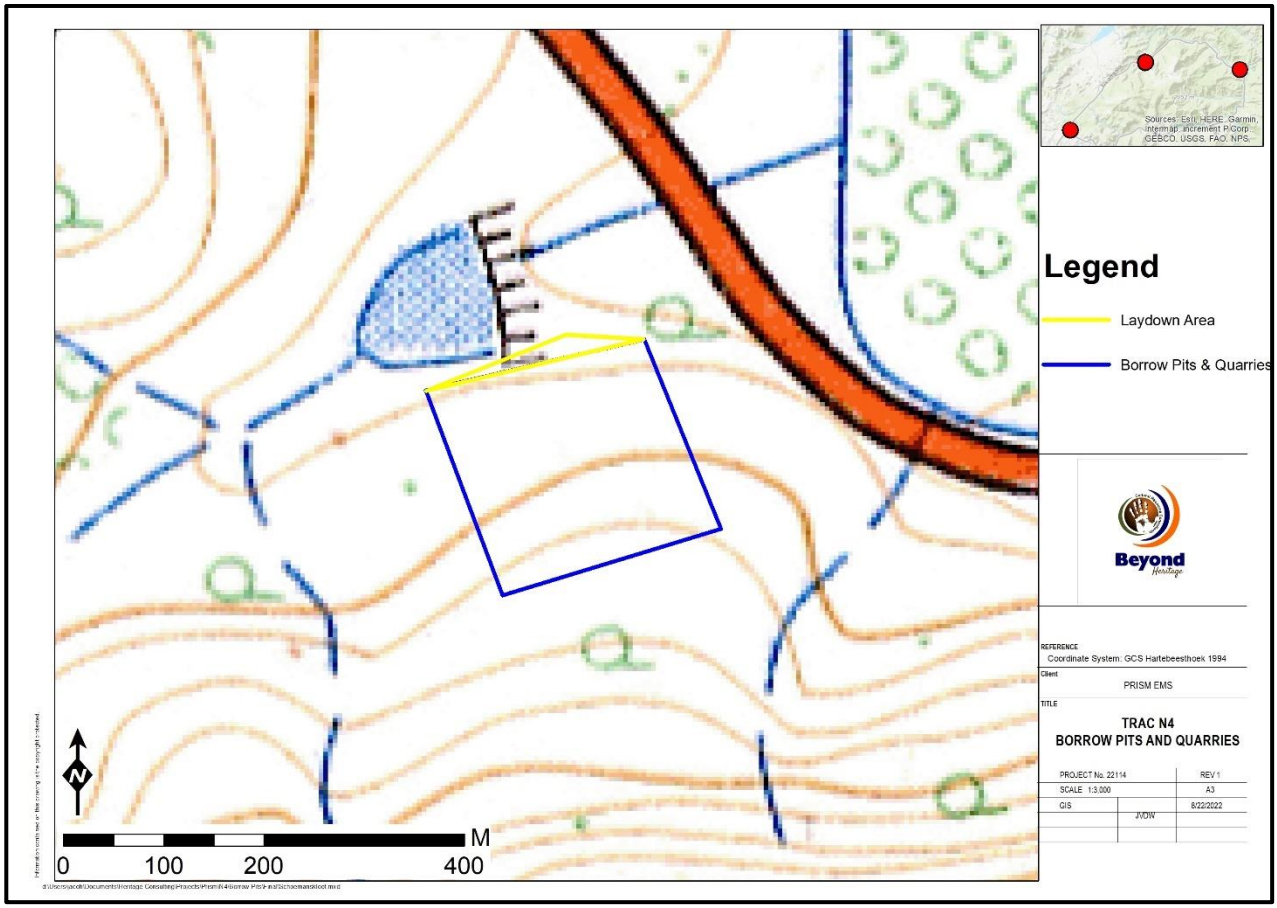


Figure 8.4. 1969Topographic map of the BP 07 area showing indicating a dam to the north but no developments in the study area.

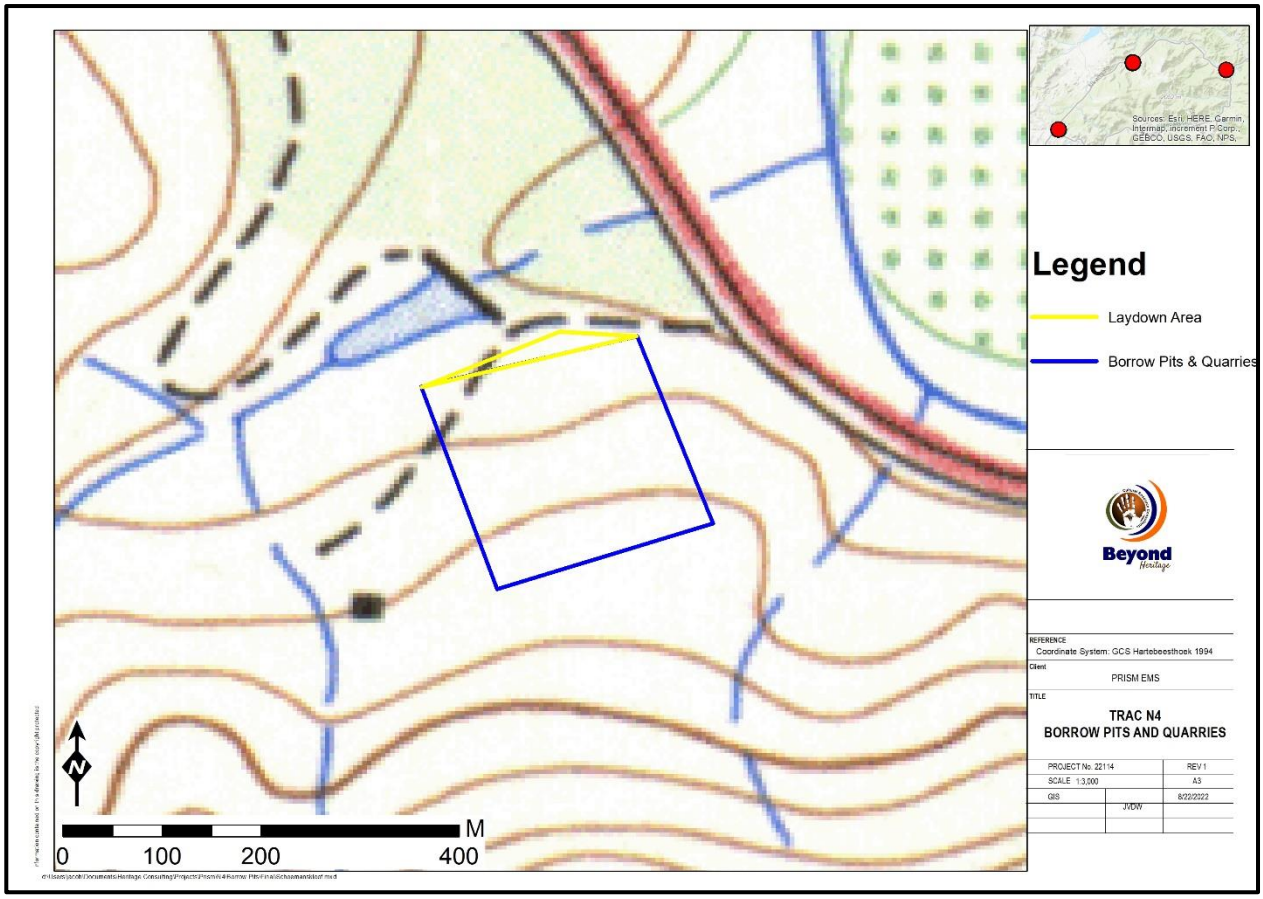


Figure 8.5.1984 Topographic map showing no developments in the study area.

8.2.2 BP10

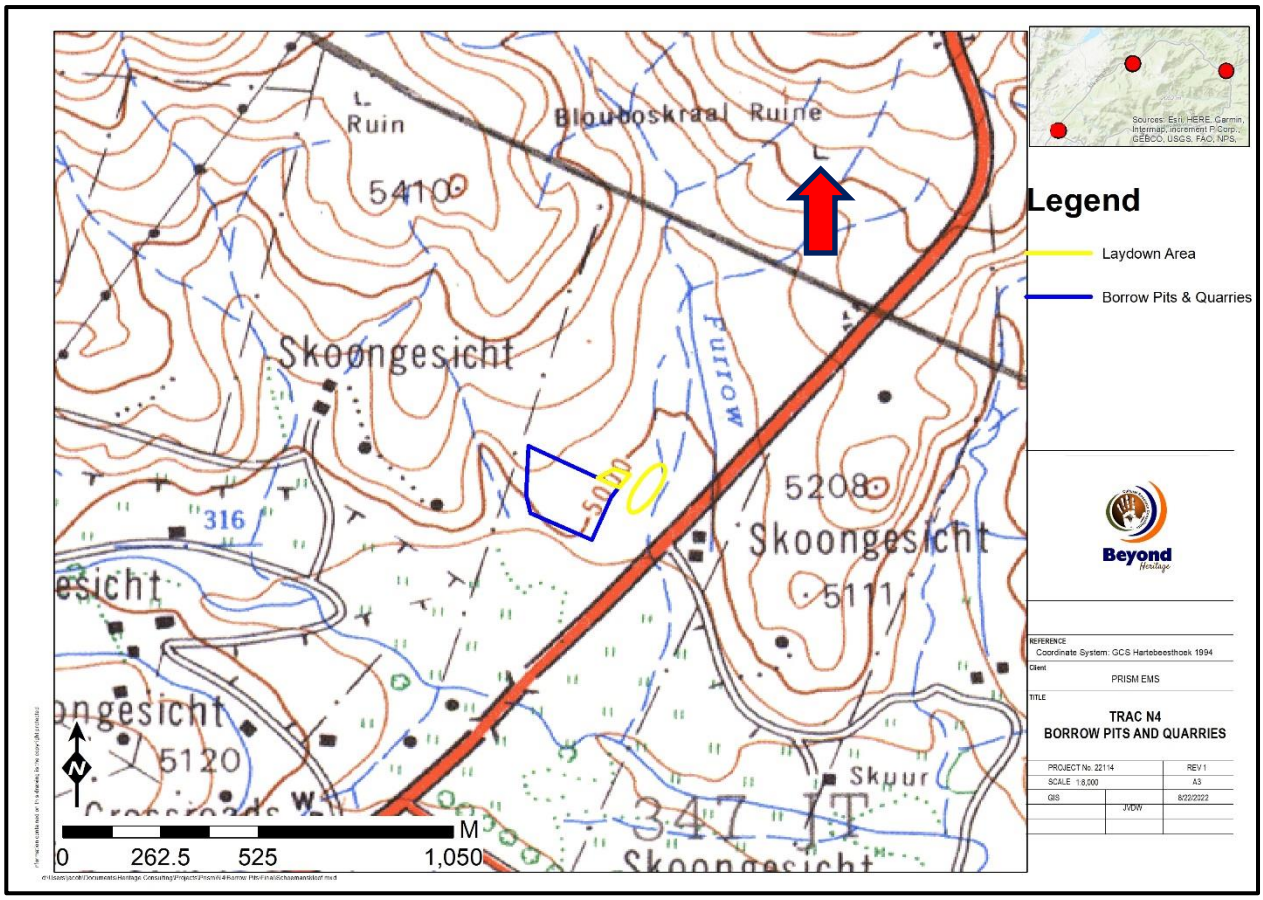


Figure 8.6. 1969 Topographic map of the study area indicating no developments. Note the location of the BBK site to the northeast.

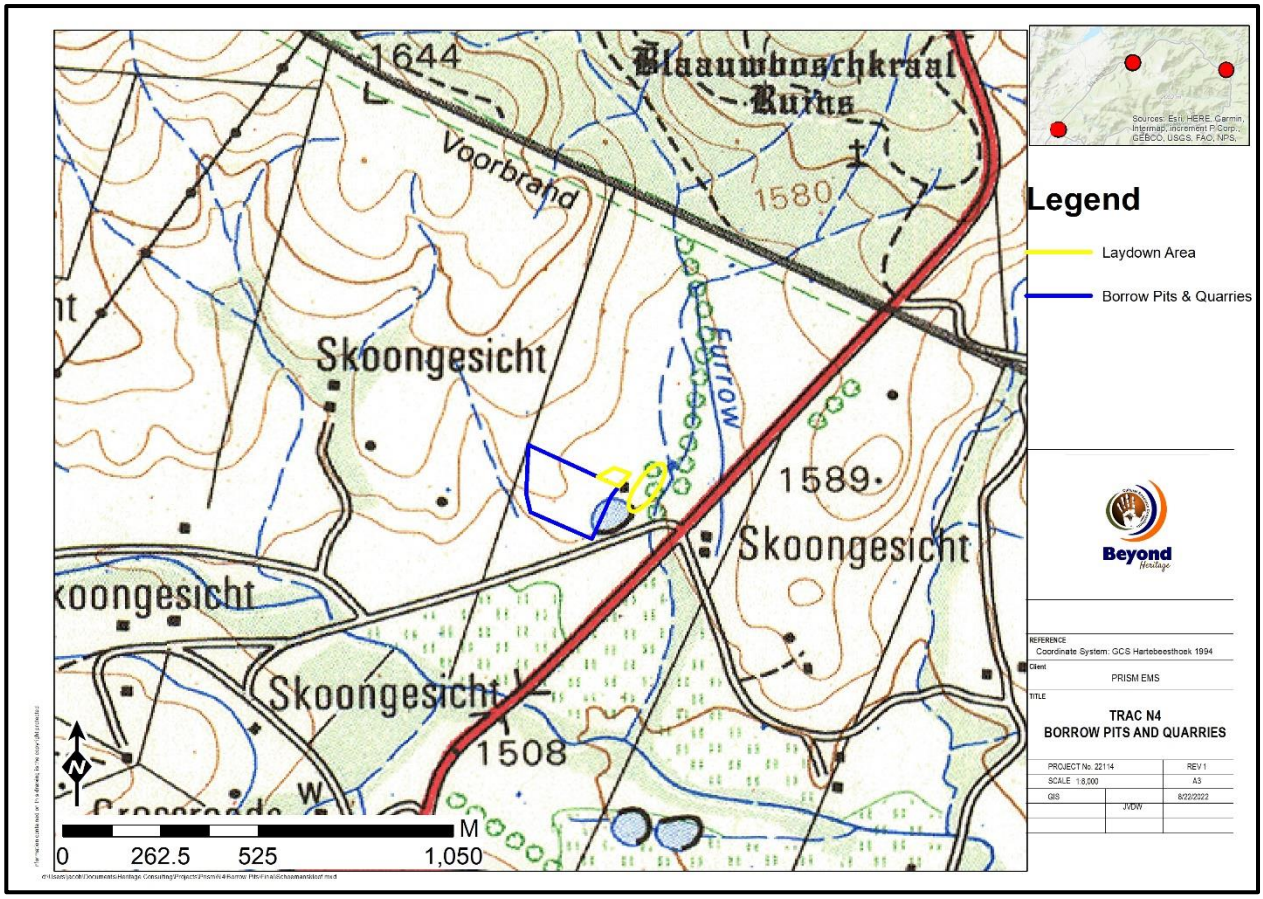


Figure 8.7.1988 Topographic map of the study area indicating a existing quarry that filled with water adjacent to the study area and surrounding road developments.

8.2.3 BP011

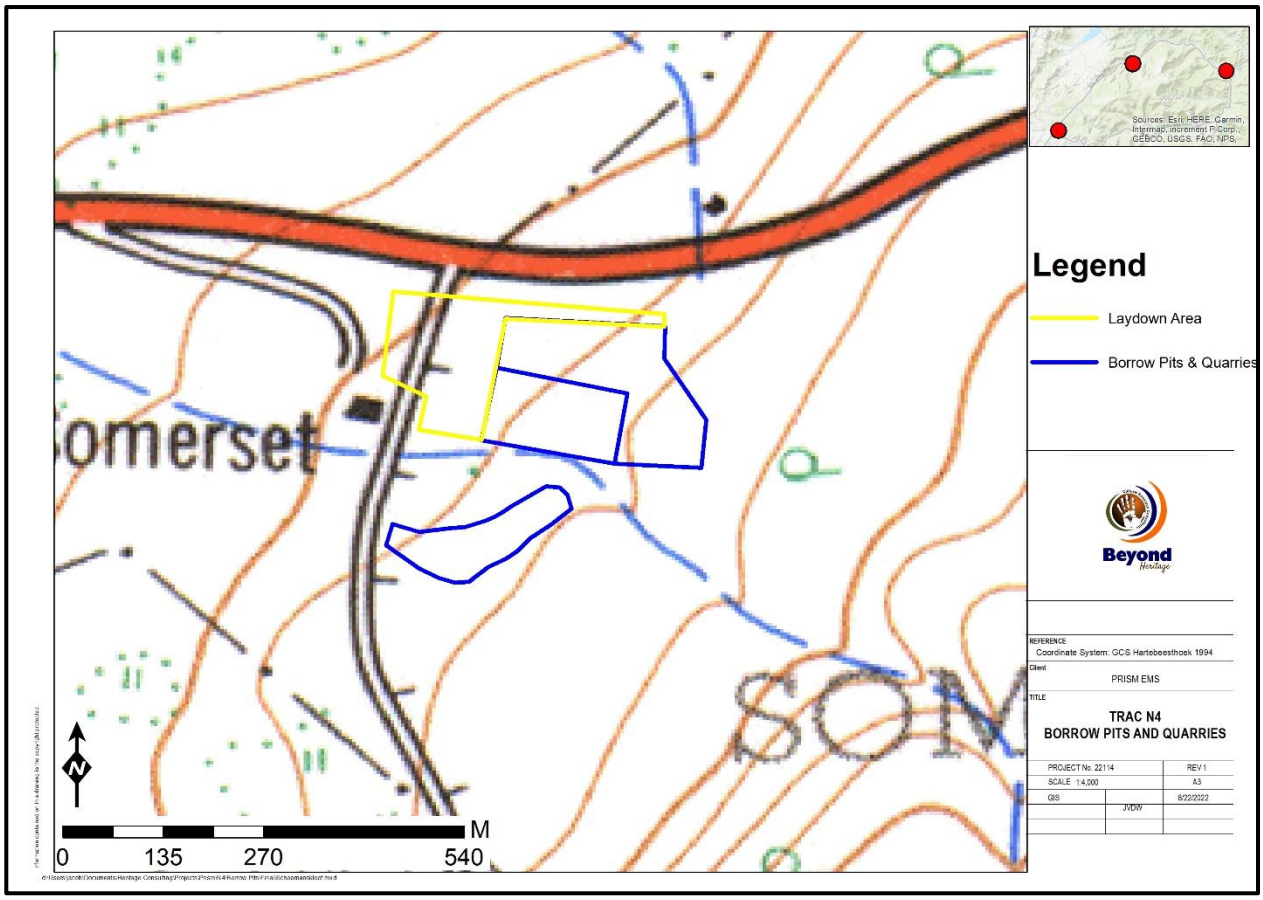


Figure 8.8. 1969 Topographic map of the study area indicating surrounding road developments.

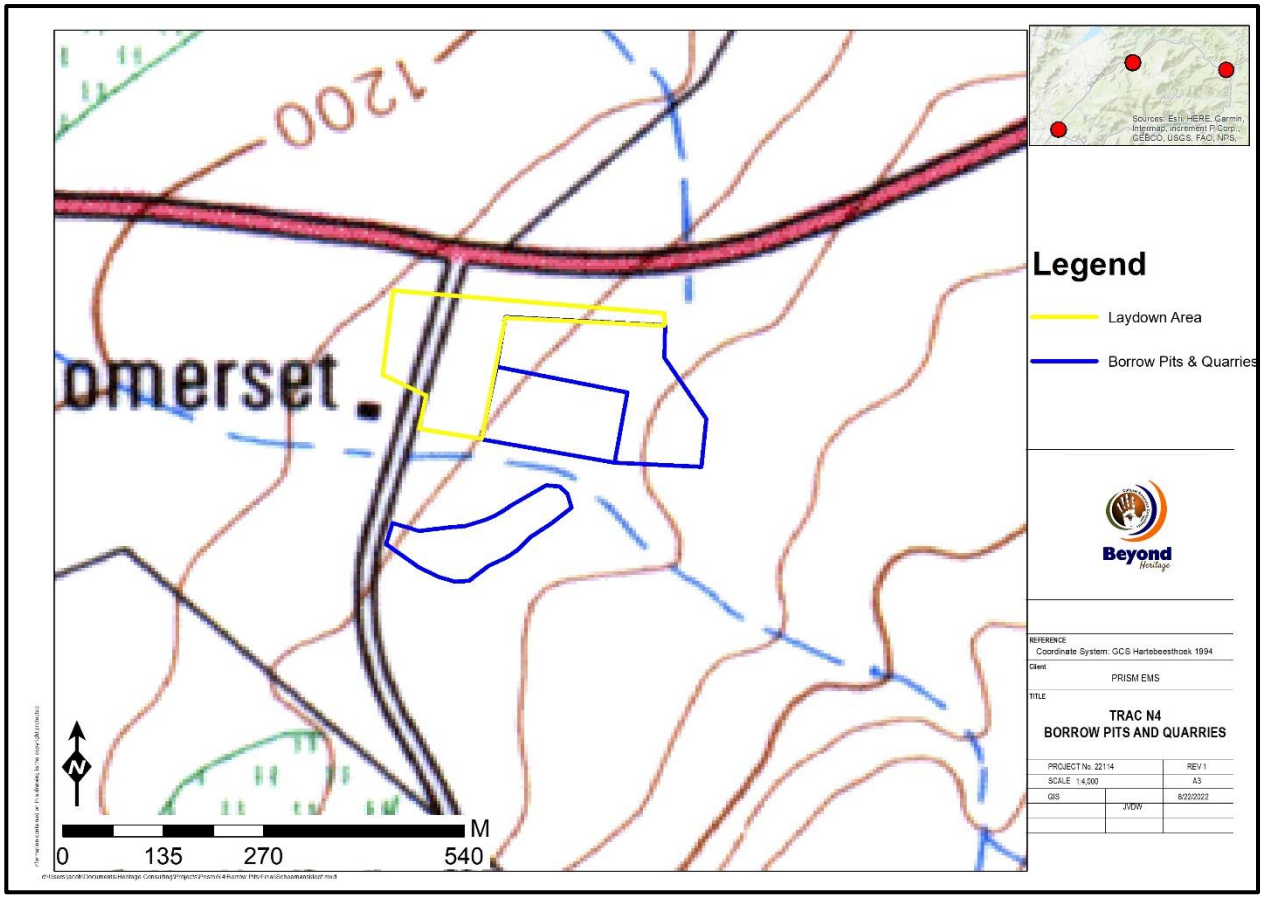
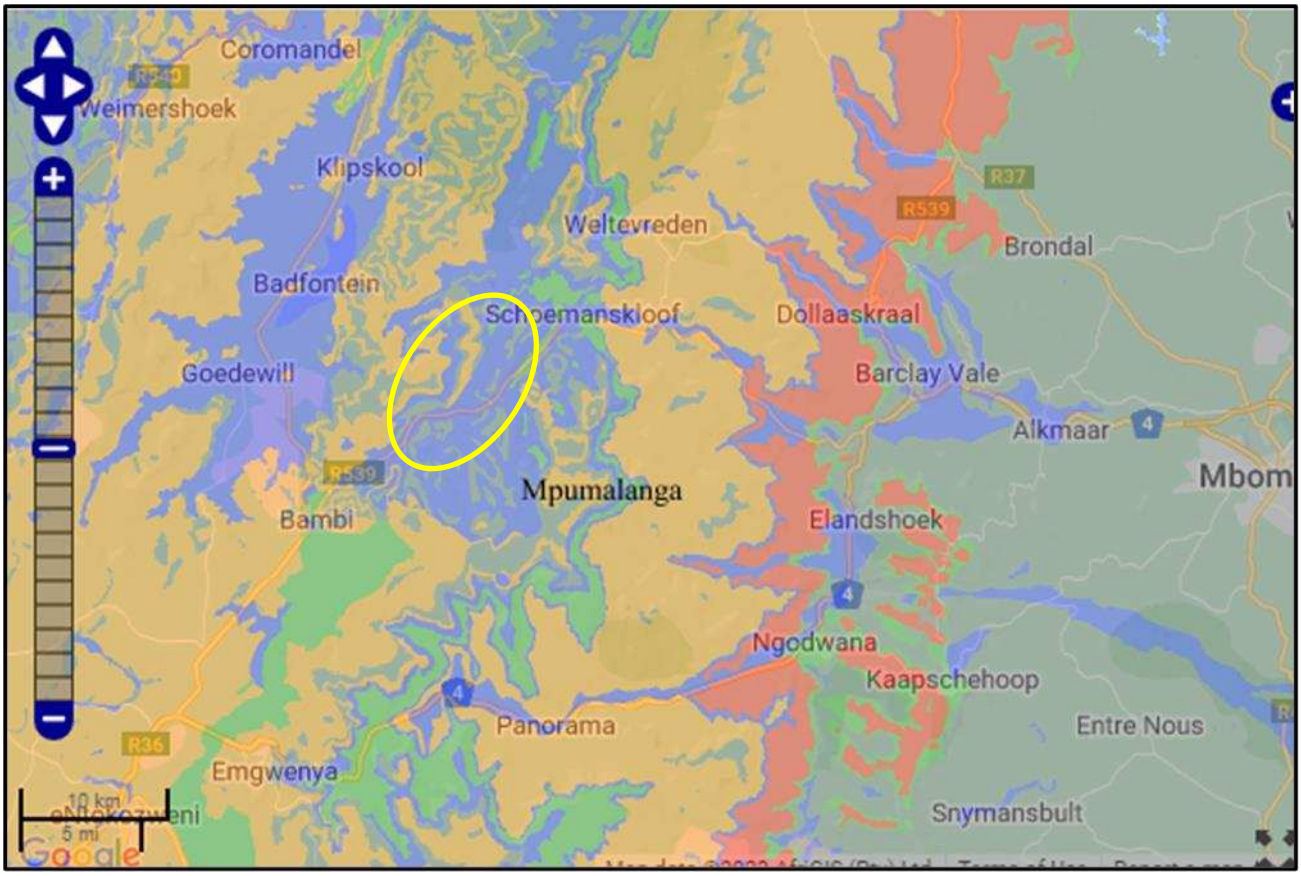


Figure 8.9. 1988 topographic map of the study area indicating road developments.

8.3 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of low and high paleontological significance (Figure 8.10) and an independent study was conducted for this aspect. Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the soils, sands and alluvium of the Quaternary. There is a very small chance that fossils may occur below the ground surface so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for foundations and amenities have commenced then they should be rescued, and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low, therefore as far as the palaeontology is concerned, the project should be authorised.



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

9 Potential Impact

Based on the current lay-out numerous heritage resources will be impacted on by the proposed borrow pits and associated impact areas. Destruction of heritage resources is a direct and permanent impact and irreversible. Site-specific impacts will differ due to the extent and intensity of impact on resources with different levels of cultural significance. Potential impacts are outlined in Table 8 -12. The recorded heritage sites are indicated in relation to the project impact areas in Figures 9.1 to 9.3. The biggest impact will be on Iron Age sites that are associated with the declared Blaauboschkraal heritage site (at BP 10) and the Bakoni cultural landscape that will be directly affected by the Project. The anticipated impact of the project therefore is high prior to mitigation. By avoiding the recorded heritage sites in BP10 and BP 11 with a 30 m buffer the impact can be mitigated to low (Table 9 and 11). However, if this is not possible, extensive Phase Heritage mitigation will be required and this will mitigate the impact to medium (Table 10 and 12). Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure.

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, cumulative impacts to physical heritage are high prior to mitigation. 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 or through application of a destruction permit after mitigation of these sites. Contemporaneous LIA stone walled sites are preserved at Blaauboschkraal that further mitigates the cumulative impacts of the current project.

9.1.1 Mining activities

The removal of topsoil and vegetation as well as the establishment of infrastructure can have a negative and irreversible impact on heritage features. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Impact Assessment for the Project

Potential impacts are outlined for each BP cluster below. Due to different mitigation options separate impact tables are included for each mitigation option for BP 10 and 11 and the subsequent ratings are illustrated in Table 8 -12

9.1.2.1 BP 07

Table 8. Impact assessment for the project.

Nature: During the clearing and mining 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 (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**33 (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: • Implementation of a Chance Find Procedure for the project; • Monitoring of the area during initial activities by the ECO.		
Cumulative impacts: Other authorised projects (e.g., road developments) in the area could have a cumulative impact on the heritage landscape. The impact on physical heritage for BP07 is low as no sites of significance are expected to be impacted on by the Project.		
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.		

9.1.2.2 BP 10

Table 9. Impact assessment of the project if the recorded features can be avoided.

Nature: During the clearing and mining 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 (4)
Probability	Highly Probable (4)	Improbable (2)
Significance	**52 (High)**	**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: o Implementation of a Chance Find Procedure for the project; o *In situ* preservation of recorded heritage features is the preferred course of action. This can be achieved through smaller impact footprints to exclude recorded heritage sites with a 30 m buffer; o Monitoring of the area during initial clearing and mining activities by the ECO...		
Cumulative impacts: Other projects (e.g., road, forestry, and agricultural developments) in the area have impacted on the heritage landscape and destroyed several Iron Age settlements. With the additional impact of the BP and potential destruction of recorded heritage sites the cumulative impact is high. The preservation of the declared Blaauboschkraal site reduces the cumulative impact and can be further reduced by avoiding the sites.		
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 assessment of the project if the recorded heritage features will be mitigated.

Nature: During the clearing and mining 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 (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**52 (High)**	**33 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: o Implementation of a Chance Find Procedure for the project; o If avoidance of the features is not possible extensive archaeological mitigation of the sites will be required prior to construction. It will include test excavations and detailed recordings of the sites. o Monitoring of the area during initial clearing and mining activities by the ECO...		
Cumulative impacts: Other projects (e.g., road, forestry, and agricultural developments) in the area have impacted on the heritage landscape and destroyed several Iron Age settlements. With the additional impact of the BP and potential destruction of recorded heritage sites the cumulative impact is high. The preservation of the declared Blaauboschkraal site reduces the cumulative impact and can be further reduced by avoiding the sites.		
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.		

9.1.2.3 BP011

Table 11. Impact assessment of the project if the recorded heritage features can be avoided.

Nature: During the clearing and mining 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 (4)
Probability	Highly Probable (4)	Improbable (2)
Significance	**52 (High)**	**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: o Implementation of a Chance Find Procedure for the project; o *In situ* preservation of recorded heritage features is the preferred course of action. This can be achieved through smaller impact footprints to exclude recorded heritage sites with a 30 m buffer; • Monitoring of the area during initial clearing and mining activities by the ECO...		
Cumulative impacts: Other projects (e.g., road, forestry, and agricultural developments) in the area have impacted on the heritage landscape and destroyed several Iron Age settlements. With the additional impact of the BP and potential destruction of recorded heritage sites the cumulative impact is high. The impact can be mitigated by avoiding the sites.		
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 12. Impact assessment of the project if the recorded heritage features will be mitigated.

Nature: During the clearing and mining 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 (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**52 (High)**	**33 (Medium)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: o Implementation of a Chance Find Procedure for the project; o If avoidance of the features is not possible extensive archaeological mitigation of the sites will be required prior to construction. It will include test excavations and detailed recordings of the sites. • Monitoring of the area during initial clearing and mining activities by the ECO...		
Cumulative impacts: Other projects (e.g., road, forestry, and agricultural developments) in the area have impacted on the heritage landscape and destroyed several Iron Age settlements. With the additional impact of the BP and potential destruction of recorded heritage sites the cumulative impact is high. The impact can be mitigated by avoiding the sites.		
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 landscape in which the project is located is characterised by LIA stone walled features such as enclosures, terracing and extensive settlements that is commonly associated with Bakoni cultural groups and several sites related to this phase of Iron Age occupation in the Schoemanskloof valley is on record dating to the 18th century (Delius & Schoeman 2008). Many of the stone walled settlements in the area were lost to forestry, agriculture, and infrastructure development although sites such as Blaauboschkraal that is a declared heritage site, is preserved and located to the northeast of BP 10.

During the heritage field survey Bokoni stone walled settlements were recorded at BP10 and ephemeral low packed stone wall terraces and well-defined stone packed walls were recorded in highly overgrown areas where site-layout and site extent were not discernible at BP 11, Quarry 10 & 11. It is unclear if these features are all dating to the Iron Age period or if there is a historical component to them. These features are likely associated with the later phases of the Iron Age (AD 1600-1800's) and constructed by Ndebele, Swazi, or Pedi groups. None of these sites seem to have substantial anthropogenic deposit conforming to similar results from mitigation project on these sites (e.g., Celliers 2019).

A few historical/ recent features were also recorded like a bridge/culvert and remains of dirt roads also in BP11. No sites of significance were recorded at BP7 although some areas were inaccessible due to dense vegetation.

According to the SAHRIS paleontological sensitivity map the area is of low to high paleontological sensitivity and an independent study by Prof Marion Bamford concluded that it is extremely unlikely that any fossils would be preserved in the soils of the Quaternary. There is a very small chance that trace fossils may occur in the dolomites or shales of the Malmani Subgroup or Pretoria Group, respectively, so a Fossil Chance Find Protocol should be added to the EMPr (Bamford 2022).

The anticipated impact of the project is high prior to mitigation. With the implementation of the site-specific mitigation measures as indicated in Table 8 to 12, and the general recommendations below the impact can be mitigated to low to medium. It is recommended that the proposed project is approved on the condition that the recommendations outlined under in Section 10.1, 10.2, 10.5 & 10.6 and Annexure A are implemented as part of the EMPr and based on approval from SAHRA.

10.1 Recommendations for condition of authorisation

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

Recommendations:

- Implementation of a Chance Find Procedure for the project;
- *In situ* preservation of recorded heritage features is the preferred course of action. This can be achieved through smaller impact footprints to exclude recorded heritage sites with a 30 m buffer;
- If avoidance of the features is not possible extensive archaeological mitigation of the sites will be required prior to construction. It will include test excavations and detailed recordings of the sites.
- Monitoring of the area during initial clearing and mining activities by the ECO...

10.2 Chance Find Procedures

10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during mining 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. Crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the clearing, mining, 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 Program 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 developer 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 developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

10.3 Reasoned Opinion

The overall impact of the project is considered to be high prior to mitigation. Residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits 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 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 clearing and mining activities. The ECO should monitor all such activities. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 13. 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	EO & ECO	Weekly (during clearing and mining)	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 Site Manager 3. EPC (Engineering Procurement and Construction) Contractor to contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to SAHRA; as advised by specialist and 5. Employ site specific mitigation measures recommended by the specialist after assessment in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.
Heritage resources BP 10 and BP 11	Recorded resources and a 30m buffer	EO and ECO	During initial delineation of quarry footprints	Pro Active	• Monitor all activities to ensure that no heritage resources will be impacted on by the project.

10.6 Management Measures for inclusion in the EMPr

Table 14. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	All phases	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
BP10 and BP11	*In situ* preservation of recorded heritage features is the preferred course of action. This can be achieved through smaller impact footprints to exclude recorded heritage sites with a 30 m buffer; If avoidance of the features is not possible extensive archaeological mitigation of the sites will be required prior to construction. It will include test excavations and detailed recordings of the sites.	All Phases	Throughout the project	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 (BP7, 10 and 11)	Monitoring of the area during initial clearing and mining activities by the ECO...	All phases	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
Heritage resources BP 10 and BP 11	During initial delineation of quarry footprints	Prior to development	Prior to development	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

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12 Annexure A

N4 Schoemanskloof

Created	2021-10-18 09:27:31 UTC by Jaco van der Walt
Updated	2021-10-25 06:41:49 UTC by Jaco van der Walt
Location	-25.4586372, 30.6876508

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	151 - 152
Site Type	Archaeological - Iron Age
Broad age category - Iron Age	Later Iron Age
Topographic Location	Hill, Ridge top, Rocky Outcrop

Site Description

Site Dimensions	30 x 60
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Sheet erosion
Environment Surrounding Site	Degraded
Notes	Series if possible packed stone features. Situated in an open area on the side of a slope.

General Site Photos

Packed stone features scattered across a wide area.

Packed stone features - General view

General site

Packed stone features - Alternate view

General site - Fairly overgrown

Significance Rating

Statement of Significance	Low
Field Rating	Generally Protected C (GP.C) - Low significance Destruction
Significance Rational	No archaeological features identified.
Recommendations	Demolish

N4 Schoemanskloof

Created	2021-10-18 12:43:46 UTC by Jaco van der Walt
Updated	2022-08-25 10:42:37 UTC by Jaco van der Walt
Location	-25.602163, 30.281997

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	155 - 159
Site Type	Archaeological - Iron Age
Broad age category - Iron Age	Later Iron Age
Topographic Location	Hill, Rocky Outcrop, Slightly Elevated

Site Description

Site Dimensions	~100 x 100m
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Eroded, Mined, Road, Sheet erosion
Environment Surrounding Site	Degraded, Grass Land
Notes	Extensive series of packed stone wall settlements spread over a wide area. In layout, these features conform to the Bokoni sites found in significant numbers in the area. The Blouwboch Kraal site which is a declared heritage site is situated to the northeast of the site. The general area shows evidence of a past quarry where large amounts of rock and gravel was mined in close proximity to the ancient stone walling sites.
General Site Photos	

Small intact section of packed stone walling.

Sections of foundations still present of the past stone walled features.

Stone walled features extend eastwards toward the BBK archaeological site.

Section of foundations still visible.

Degraded stone walled features.

Ancient ruins - Large degraded stone walled enclosure/settlement.

Ancient Ruins - Degraded stone walled enclosures/settlement.

Ancient ruins - Visible foundations

Small sections of intact walling

Ancient Ruins - Foundations still visible.

Small series of fairly intact stone walled features visible from across a small valley.

Large amounts of visible packed stone foundations.

Significance Rating

Statement of Significance	Medium
Field Rating	Generally Protected B (GP. B) - Medium significance Recording before destruction
Significance Rational	Aerially extensive site
Recommendations	Mapping, Test excavations.

N4 Schoemanskloof

Created	2022-08-09 07:05:49 UTC by Jaco van der Walt
Updated	2022-08-25 09:29:07 UTC by Jaco van der Walt
Location	-25.43925, 30.463015

Identification and Location

Project Name	N4 Schoemanskloof
Field Number	N001 & WPT 154
Site Type	Historical, Recent Past/Modern
Description	Row of Packed stones near the R539, Possibly part of an older gravel road or agricultural activities within the area. The feature consists of a single row of packed stones.
Photos	 Small section of packed stones.

Significance Rating

Statement of Significance - Field rating	Low - Generally protected C (CP.C)
Significance Rational	Degraded to the point that it holds no historical value.

N4 Schoemanskloof

Created	2022-08-09 07:12:52 UTC by Jaco van der Walt
Updated	2022-08-09 07:12:52 UTC by Jaco van der Walt
Location	-25.439428, 30.464819

Identification and Location

Project Name	N4 Schoemanskloof
Field Number	N002
Site Type	Archaeological - Iron Age
Description	Section of packed stone walling. Possibly part of a previously disturbed or demolished series of enclosures. This feature is situated near a disused historical gravel road.
Photos	 Small section of packed stone walling situated near a disused historical gravel road.

Significance Rating

Statement of Significance - Field rating	Low - Generally protected C (CP.C)
Significance Rational	The feature is degraded to the point that it holds no historical value.

N4 Schoemanskloof

Created	2022-08-03 09:07:53 UTC by Jaco van der Walt
Updated	2022-08-09 07:31:34 UTC by Jaco van der Walt
Location	-25.4395035, 30.4649436

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	N003
Site Type	Archaeological - Iron Age
Broad age category - Iron Age	Later Iron Age
Topographic Location	Base of Hill, Hill, Rocky Outcrop, Slightly Elevated

Site Description

Site Dimensions	4m length of packed stone walling.
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Eroded, Sheet erosion
Environment Surrounding Site	Agriculture, Degraded, Grass Land, Grazing
Notes	Section of packed stone walling situated on the side of a rocky slope running up the hill. The feature is degraded to the extent that it is difficult to define. The feature seems to be a part of a larger series of packed stone enclosures.

General Site Photos

General site conditions - Section of packed stone walling.

Degraded section of packed stone walling.

Degraded section of packed stone walling.

Significance Rating

Statement of Significance	Medium
Field Rating	Generally Protected B (GP. B) - Medium significance Recording before destruction
Significance Rational	Aerially extensive site

N4 Schoemanskloof

Created	2022-08-03 09:19:10 UTC by Jaco van der Walt
Updated	2022-08-09 07:39:37 UTC by Jaco van der Walt
Location	-25.4413583, 30.4651727

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	N005
Site Type	Archaeological - Iron Age
Broad age category - Iron Age	Later Iron Age
Topographic Location	Hill, Rocky Outcrop, Slightly Elevated, Stream/River bank

Site Description

Site Dimensions	Series of packed stone features along 130m section of a small rocky stream.
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Eroded, Sheet erosion
Environment Surrounding Site	Degraded, Thickly wooded vegetation.
Notes	Series of packed stone walled enclosures, walling and terraces situated along a 130m section of a small stream running through the proposed project area. The various features seem to form part of a larger series of packed stone features that extent across the larger area. The packed stone features are mainly concentrated within thickly wooded vegetation. Some of the packed stone feature resemble circular enclosures.
General Site Photos	

Section of packed stone walling.

General site conditions.

Section of packed stone walling that forms a large terrace running up the hill.

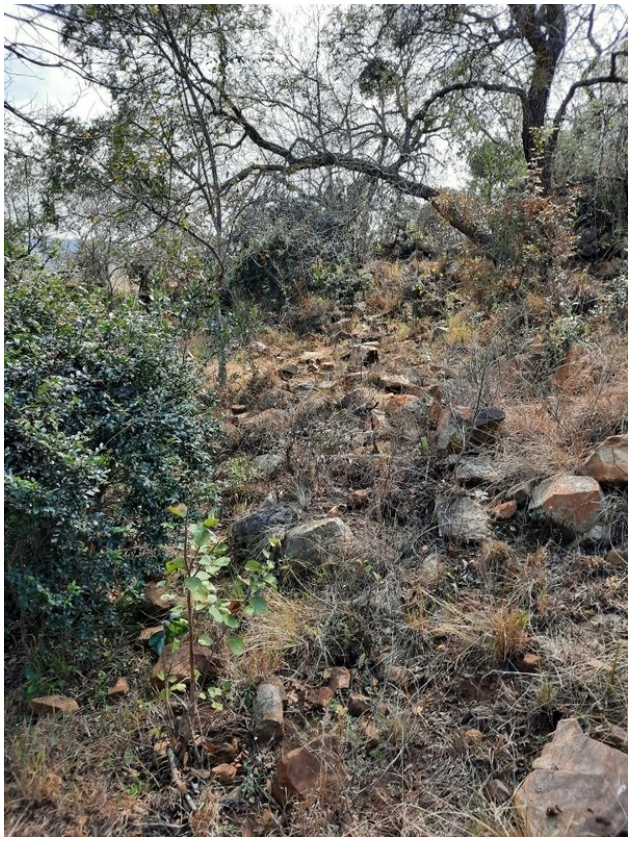
General site conditions - Thickly wooded vegetation.

Section of packed stone walling.

Section of a circular packed stone feature that is fairly degraded.

Section of a circular packed stone enclosure.

Section of a circular packed stone enclosure.



General site conditions.

Significance Rating

Statement of Significance	Medium High
Field Rating	Generally Protected A (GP. A) - High/medium significance Mitigation before destruction
Significance Rational	Aerially extensive site
Recommendations	Avoidance, Phase 2 Mitigation

N4 Schoemanskloof

Created	2022-08-03 09:34:38 UTC by Jaco van der Walt
Updated	2022-08-25 09:02:35 UTC by Jaco van der Walt
Location	-25.4420044, 30.4635729

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	N006
Site Type	Archaeological - Iron Age
Broad age category - Iron Age	Later Iron Age
Topographic Location	Base of Hill, Hill, Rocky Outcrop

Site Description

Site Dimensions	~200 x 40m, Situated within a thicket of wooded vegetation.
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Eroded, Sheet erosion
Environment Surrounding Site	Grass Land, Grazing
Notes	Iron Age settlement marked by packed stone features that include enclosures, terracing and walling. The series of packed stone features are situated within a thickly wooded area on the side of a rocky slope. The site forms part of a larger settlement in the area.
General Site Photos	

General site conditions - Degraded section of packed stone walling.

Section of packed stone walling - Possibly part of a small terrace.

Section of degraded packed stone walling.

Section of degraded packed stone walling.

Section of a large packed stone terrace.

Section of a large packed stone terrace.

General site conditions.

General site conditions - overgrown features.

Section of packed stone walling.

Significance Rating

Statement of Significance	Medium
Field Rating	Generally Protected B (GP. B) - Medium significance Recording before destruction
Significance Rational	Aerially extensive site
Recommendations	Phase 2 Mitigation, Mapping

N4 Schoemanskloof

Created	2022-08-03 09:50:31 UTC by Jaco van der Walt
Updated	2022-08-25 08:53:59 UTC by Jaco van der Walt
Location	-25.442028, 30.4628498

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	N007
Site Type	Archaeological - Iron Age
Broad age category - Iron Age	Later Iron Age
Topographic Location	Stream/River bank

Site Description

Site Dimensions	Packed stone features are situated along ~80m of a small stream running through the proposed project area.
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Eroded, Sheet erosion
Environment Surrounding Site	Grass Land, Grazing
Notes	Late Iron Age stone-walled settlement that is highly overgrown The features resemble large packed stone enclosures and terracing forming part of a larger site along the small stream.
General Site Photos	 Large section of packed stone walling.

Large section of packed stone walling.

General site conditions.

Significance Rating

Statement of Significance	Medium
Field Rating	Generally Protected B (GP. B) - Medium significance Recording before destruction
Significance Rational	Aerially extensive site
Recommendations	Phase 2 Mitigation, Mapping

N4 Schoemanskloof

Created	2022-08-03 10:02:01 UTC by Jaco van der Walt
Updated	2022-08-09 07:54:51 UTC by Jaco van der Walt
Location	-25.4418062, 30.4630628

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	N009
Site Type	Historical, Historical Built Environment
Topographic Location	Rocky Outcrop, Stream/River bank

Site Description

Site Dimensions	60 x 30m
Stratified?	No
Summary of Artifacts/Features	Stone Walling
Site Condition Assessment	Fair = significant disturbance, some remains in-situ
Impact Agent(s)	Eroded, Sheet erosion
Environment Surrounding Site	Degraded, Grass Land, Grazing
Notes	Series of packed stone terracing running down the hill towards the road. The terraces are shallow and built from single rows of packed stones. Possibly part of historical agricultural activities. The single rows of packed stone may also form part of a possible packed stone foundation.

General Site Photos

Section of packed stone terracing.

General site conditions.

Single rows of packed stones, possibly a packed stone foundation of terrace.

General site conditions - Wooded vegetation.

Significance Rating

Statement of Significance	Medium
Field Rating	Generally Protected B (GP. B) - Medium significance Recording before destruction
Significance Rational	Aerially extensive site
Recommendations	Mapping

N4 Schoemanskloof

Created	2022-08-03 10:30:31 UTC by Jaco van der Walt
Updated	2022-08-09 07:27:09 UTC by Jaco van der Walt
Location	-25.4396709, 30.4621077

Identification and Location

Project Name	N4 Schoemanskloof
Site Number	N010
Building Type	Historical road infrastructure
Present Use	Historic
Occupied	No
Condition	Fair

Site Description

Site Dimensions	2 x 2m
Environment Surrounding Site	Agriculture, Grass Land, Grazing
Alterations	Degraded, Disused
Site Features	Small cement bridge built for drainage of water under an historical road. This feature is situated in line with an historical road running through the proposed project area. Possibly an access road for agricultural activities.

Photos

Small cement drainage bridge.

Small cement drainage bridge.

Significance Rating

Statement of Significance	Medium
Field Rating	Generally Protected B (GP. B) - Medium significance Recording before destruction
Recommendations	Mapping