

HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED CHANGES TO THE MINING RIGHT AT THE NEW CONSORT MINE OF
BARBERTON MINES, MPUMALANGA PROVINCE

Type of development:

Mining

Client:

Shango Solutions

Applicant:

Barberton Mines (Pty) Ltd

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APPROVAL PAGE

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Report Title	Heritage Impact Assessment for the proposed changes to the Mining at New Consort Mine of Barberton Mines, Mpumalanga Province
Authority Reference Number	MP 30/5/1/2/2/10220 MR (190 MR)
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Applicant Name	Barberton Mines (Pty) Ltd

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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.	<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.
(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 7, 8 and 9
(g) Identification of any areas to be avoided, including buffers.	Section 7,8 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
(l) 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 9.1 and 9.5
(l) Conditions for inclusion in the environmental authorisation.	Section 9. 1 and 9.5
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation.	Section 9.6
(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 9.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report.	Section 5
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto.	Refer to the EIA report
(q) Any other information requested by the competent authority.	No other information requested at this time

Executive Summary

Barberton Mines (Pty) Ltd is proposing to make changes to the mining right (MP 30/5/1/2/2/10220 MR (190 MR)). The updated Regulation 2(2) Plan (to be provided) refers to the application area as;

- i. A portion of the Farm 652 JU (formerly Mundts Concession Section C Kaap Block)
- ii. A portion of the Farm 934 JU (formerly Mundts Concession Section C Kaap Block)
- iii. A portion of the Remainder of Portion 8 of the Farm Riverside 245 JU (formerly Riverside 245 JU)
- iv. A portion of the Farm Barberton Nature Reserve 954 JU (formerly Mundts Concession Section C Kaap Block).

The application area is situated near the town of Barberton, City of Mbombela Local Municipality within the Ehlanzeni District Municipality of the Mpumalanga Province. Barberton Mines (Pty) Ltd, appointed Shango Solutions as the independent environmental assessment practitioner (EAP) to apply for Environmental Authorization for the Project. Shango Solutions, in turn, 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 application area is situated in a landscape which is dominated by mountainous terrain and overgrown vegetation which limited archaeological visibility. The application area consists of impenetrable wooded vegetation, existing townships and large historical mining areas along the Noordkaap River;
- During the survey, various ruins (Ruin 1, Ruin 2, Ruin 3) and a Historical homestead were recorded in the western portion of the Application area .
- Ruin 1 and Ruin 2 are degraded and hold no heritage significance and impact to these two sites will be low. Ruin 3 is made of masoned stone and the site is of medium significance and will need to be mapped prior to applying for a destruction permit. The Historic homestead comprises of a few structures which are degraded but still hold some heritage significance. These structures at the homestead also need to be mapped prior to applying for a destruction permit for the homestead;
- According to the South African Heritage Resource Authority (SAHRA) Paleontological sensitivity map the study area is of moderate, low, and insignificant/zero sensitivity and an independent study was conducted for this aspect (Bamford 2023). The study concluded that the proposed site lies on the ancient rocks of the Barberton Greenstone Belt and on ancient granite of the Nelspruit Suite. The latter is volcanic and has no life forms and has zero palaeo sensitivity. The Barberton Greenstone Belt rocks have very low palaeo sensitivity and only invisible microbes might be present. A Fossil Chance Find Protocol should be added to the EMPr and monitoring.


The impact on heritage resources is low, and the application can be authorised provided that the recommendations in this report are adhered to and based on the SAHRA's approval.

Recommendations:

The following recommendations for Environmental Authorisation apply and the application may only proceed after receiving comment from SAHRA:

- Monitoring of the application area by the ECO during pre-construction and construction phases for heritage and palaeontology chance finds, if chance finds are encountered to implement the Chance Find Procedure for the Project as outlined in Section 9.

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 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:</p> <ul style="list-style-type: none"> • 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	18/12/2023

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for 15 years. Jaco is an accredited member of the Association of South African Professional Archaeologists (ASAPA) (#159) and APHP #114 and has 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
CoGHSTA	Co-operative Governance, Human Settlements and Traditional Affairs
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
NCHM	National Cultural History Museum
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
Earlier Stone Age	~ 2.6 million to 250 000 years ago
Middle Stone Age	~ 250 000 to 40-25 000 years ago
Later Stone Age	~ 40-25 000, to the historic period
The Iron Age	~ AD 400 to 1840
Historic	~ AD 1840 to 1950
Historic building	Over 60 years old

1 Introduction

Shango Solutions appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) to make changes to the mining right by adding the adding the farm properties Barberton Nature Reserve 954 JU (formerly Mundts Concession Section C Kaap Block) and Riverside 245 JU to the New Consort Mine near the town of Barberton. The Application area is situated within the City of Mbombela Local Municipality within the Ehlanzeni District Municipality, in the Mpumalanga Province of South Africa (Figure 1.1 to 1.3). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the development and informs the EIA phase of this process.

The aim of the study was to survey the proposed development footprint to understand the cultural layering of the area, and if heritage features are found, to assess their importance within local, provincial, and national context. It further served to assess the impact of the proposed Project on non-renewable heritage resources. The study will 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. Recommendations are included to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999) (NHRA).

The report outlines the approach and methodology utilized before and during the survey, which includes:

- Phase 1, review of relevant literature;
- Phase 2, the physical surveying of the area on foot and by vehicle;
- Phase 3, reporting the outcome of the study.

During the survey, ruins and a Historic homestead were recorded in the study area. General site conditions and features in the study area were recorded by means of photographs, GPS locations and descriptions. Possible impacts were identified, and mitigation measures are proposed in this report.

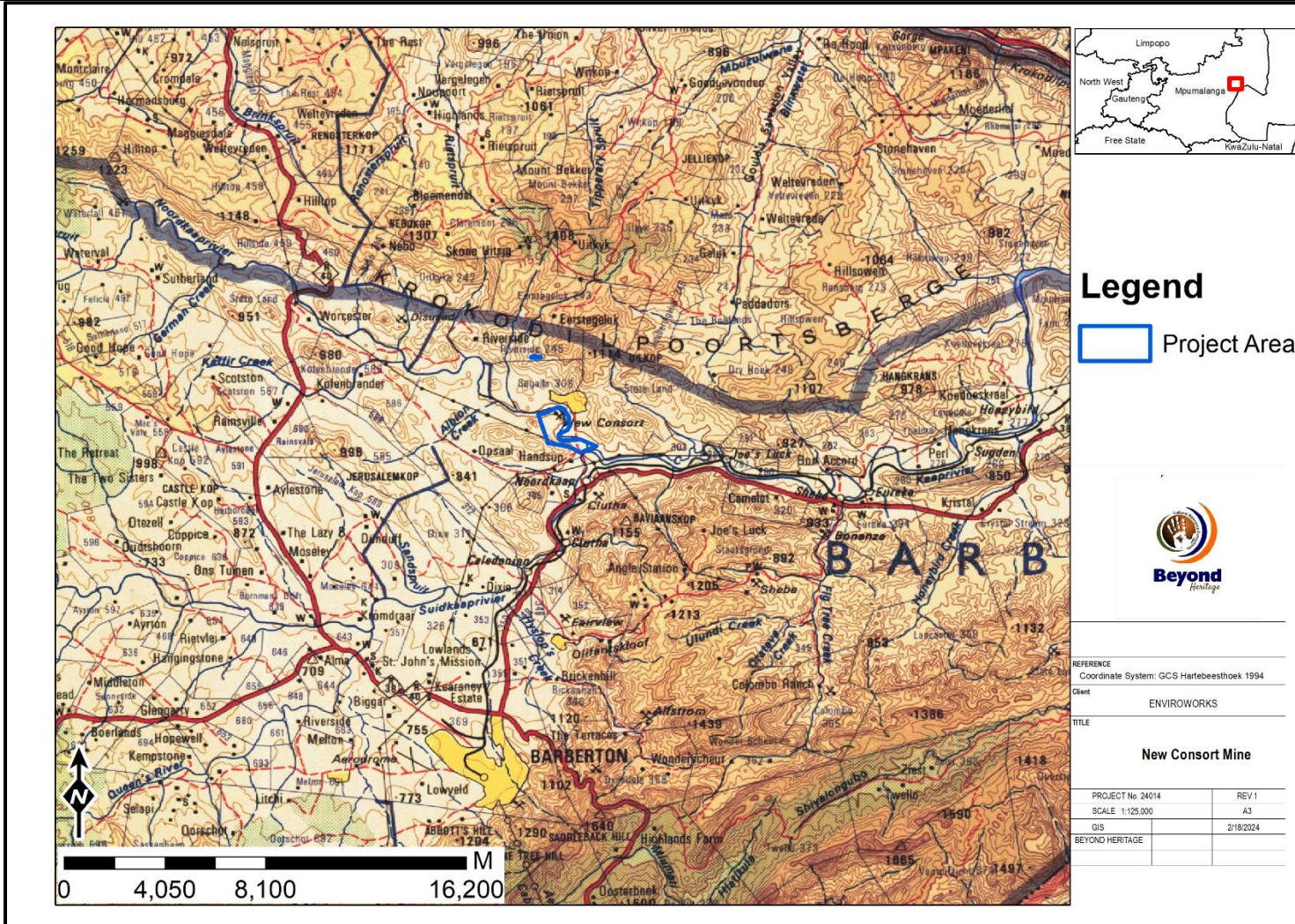


Figure 1.1. Regional setting of the application area (Extract of the 2531 1: 250 000 topographical map).

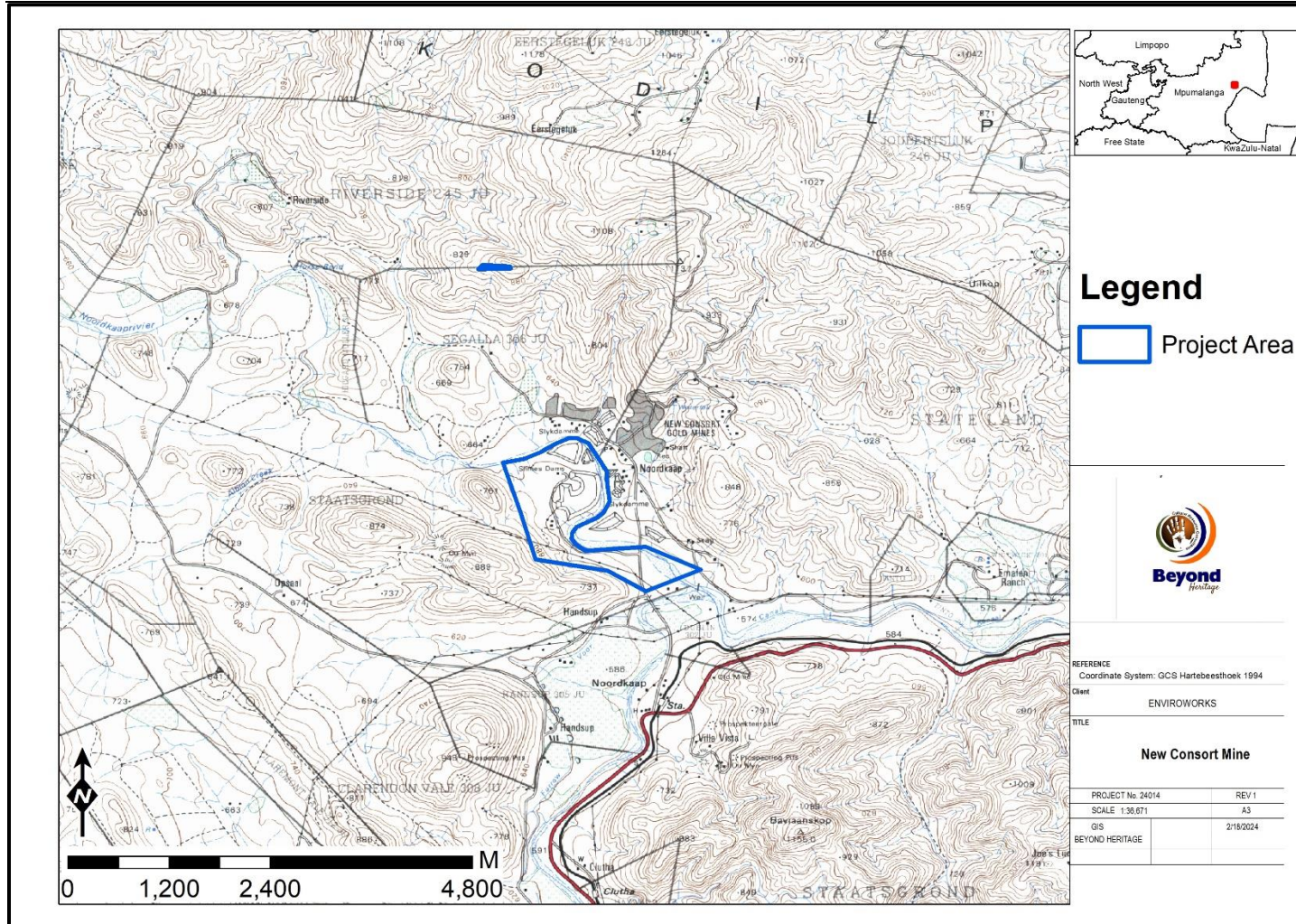


Figure 1.2. Local setting of the application area (Extract from 1:50 000 topographic map sheets 2531 CA).

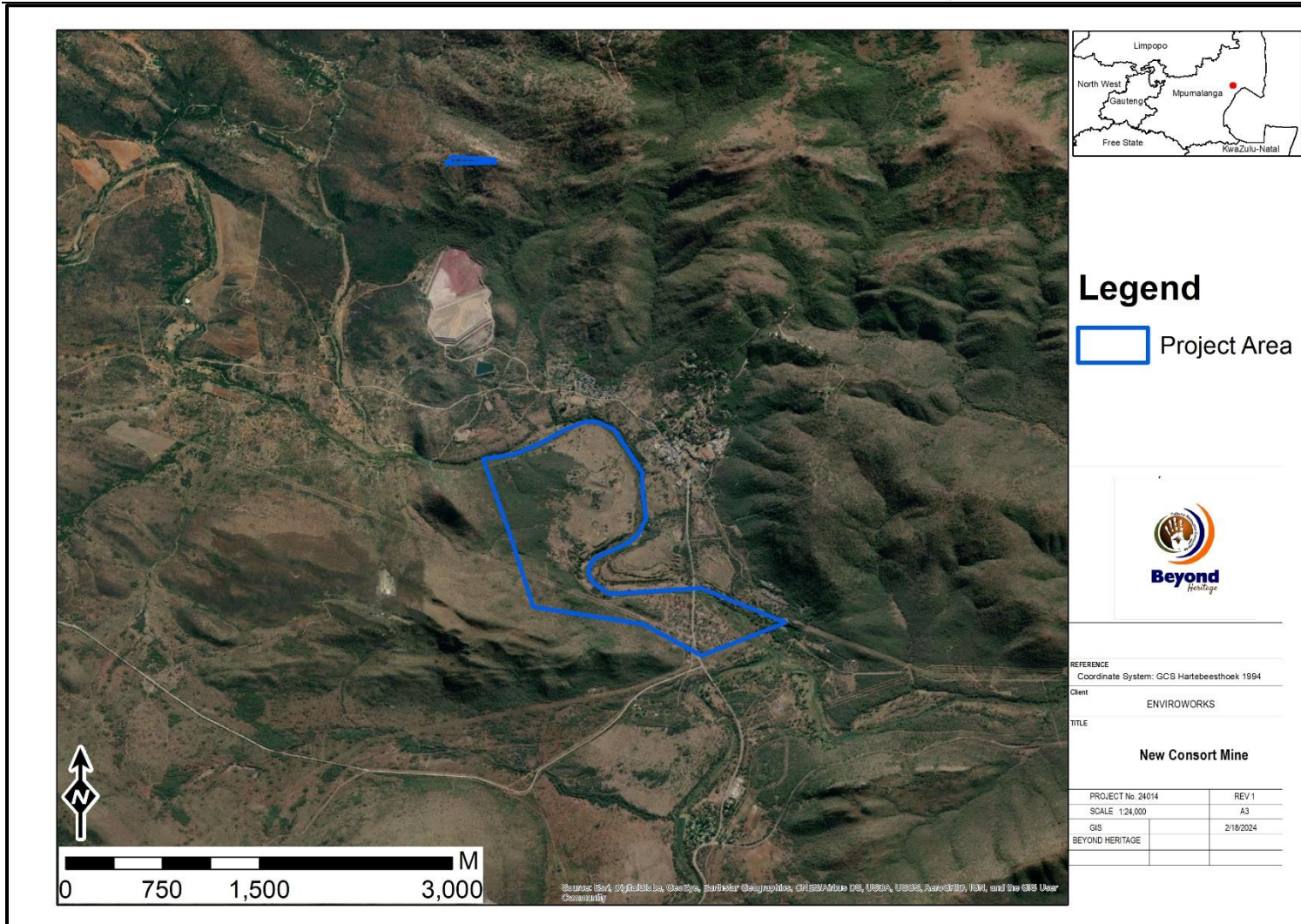


Figure 1.3. Aerial image of the Application area and surrounds.

1.1 Terms of Reference

The following Terms of Reference were adhered to in conducting this HIA.

Field study

Conduct a field study to: (a) survey the development footprint to understand the heritage character of the impact area; 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 Association of South African Professional Archaeologists (ASAPA).

Recommendations are provided 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 New Consort Mine Project are outlined in Tables 2 and 3.

Table 2: Project Description

Magisterial District	City of Mbombela Local Municipality within the Ehlanzeni District Municipality
Central co-ordinate of the development	25°39'27.86"S 31° 4'9.97"E
1:50 000 Topographic Map Number	2531 CA

Table 3: Infrastructure and project activities

Type of development	Mining
Project Details:	
<p>Barberton Mines wish to make changes to the mining right by adding the farm properties:</p> <ul style="list-style-type: none"> • A portion of the Farm 652 JU (formerly Mundts Concession Section C Kaap Block) • A portion of the Farm 934 JU (formerly Mundts Concession Section C Kaap Block) • A portion of the Remainder of Portion 8 of the Farm Riverside 245 JU (formerly Riverside 245 JU) • A portion of the Farm Barberton Nature Reserve 954 JU (formerly Mundts Concession Section C Kaap Block) <p>The amendment application is required to address an administrative error that occurred at the time of execution of the right. The properties were omitted in Annexure "A" to the mining right. However, they are included in the Regulation 42 Plan of the mining right. In addition, they also formed part of the initial environment impact assessment process. It is anticipated that the proposed additions will not result in a change of scope to the mining work programme. Therefore, the inclusion of these properties into the mining right will allow for the continuation of current and scheduled mining operations.</p>	

1.3 Alternatives

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

2 Legislative Requirements

The HIA, as a specialist study to 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;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the Provincial Heritage Resource Agency (PHRA) or to The South African Heritage Resources Agency (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.

SAHRA as a commenting authority under section 38(8) of the NHRA require all environmental documents, compiled in support of an EA application as defined by the National Environmental Management Act (NEMA) (Act No 107 of 1998) to be submitted to SAHRA for commenting. Environmental Impact Assessment (EIA) Regulations section 40 (1) and (2). The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended) 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).

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 HIAs 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 (refer to Section 3.5). Relevant conservation or mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

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

Conservation or 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 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 of the National Heritage Resources Act (NHRA), as well as the National Health Act of 2003 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) re-instituted by Proclamation 109 of 17 June 1994 and implemented by CoGHSTA as well as the National Health Act 2003 and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under the National Health Act of 2003

3 METHODOLOGY

3.1 Literature Review and background study

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). Findings are included in Section 6.1 and 6.2.

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 topographic maps of the area were utilised to identify possible places of heritage sensitivity might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society of South Africa (GSSA) was consulted to collect data on any known graves in the area. Results are included in Section 6.3.

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 undertaken by the EAP was to capture and address any issues raised by community members and other stakeholders. Results are included in Section 5 and the final EIA report.

3.4 Site Investigation

The aim of the site visit was to:

- a) survey the proposed Application 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 Application area .

Table 4: Site Investigation Details

	Site Investigation
Date	27 November 2023
Season	Spring – The time of year and season had some effect on the results of the survey as the impenetrable vegetation that covers the majority of the mountainous terrain of the application area. Large sections of the application area were also inaccessible due to the extreme terrain. The sections of the application area situated within the informal settlement was not accessed. The Application area was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

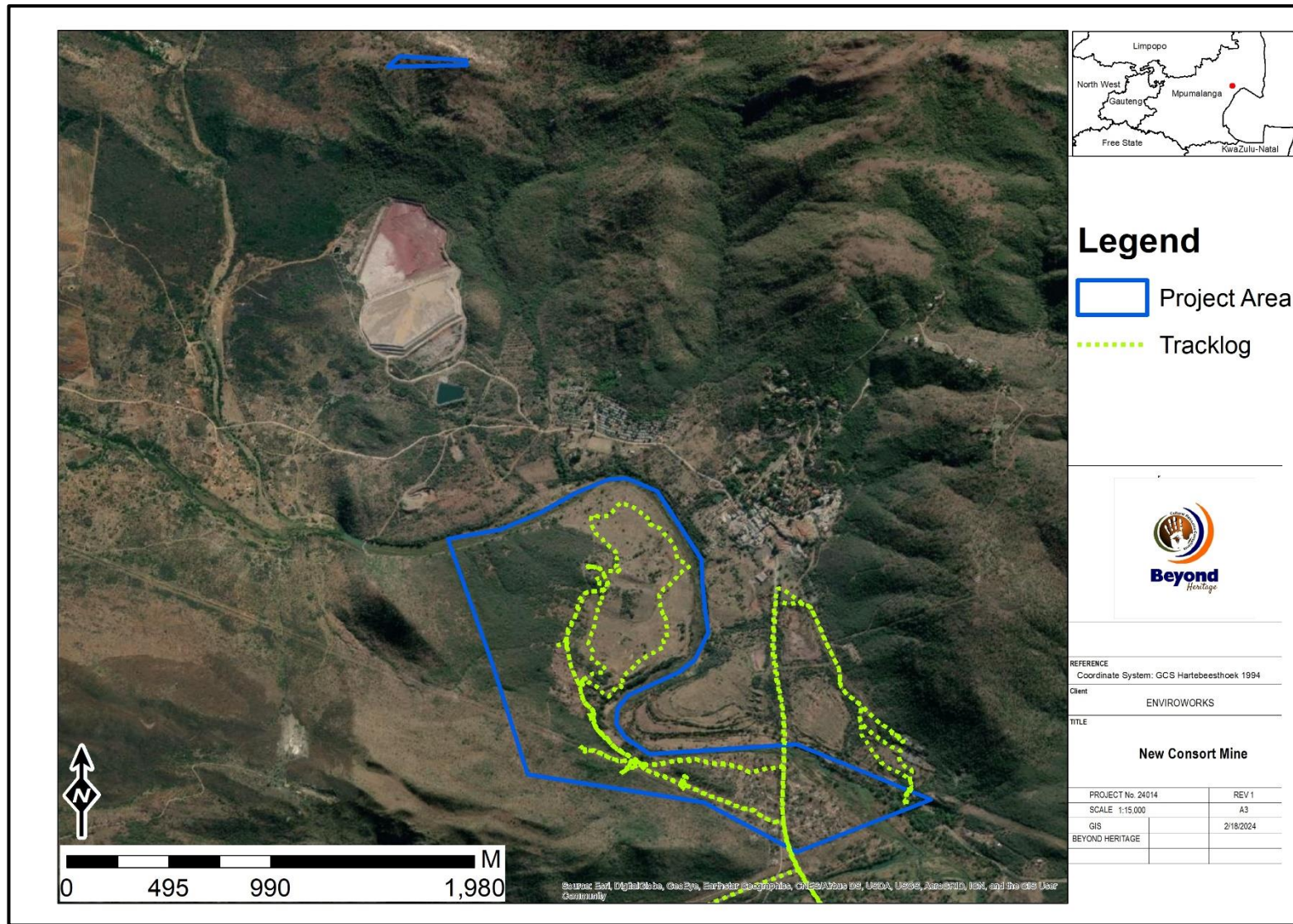


Figure 3.1. Tracklog of the survey path in green.

3.5 Site Significance and Field Rating

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 the entire Application 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

<i>FIELD RATING</i>	<i>GRADE</i>	<i>SIGNIFICANCE</i>	<i>RECOMMENDED MITIGATION</i>
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 Impact Assessment Methodology was provided by Shango Solutions

Method of Assessing Impacts

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations (2014). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S).

Determination of Environmental Risk

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the nature (N), extent (E), duration (D), magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = (E+D+M+R) \times N$$

4

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 6.

Table 6. Criteria for determining impact consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary)
	3	Local (i.e. the area within 5 km of the site)
	4	Regional (i.e. extends between 5 and 50 km from the site)
	5	Provincial / National (i.e. extends beyond 50 km from the site)

Duration	1	Immediate (<1 year)
	2	Short term (1-5 years)
	3	Medium term (6-15 years)
	4	Long term (the impact will cease after the operational life span of the project)
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction)
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease)
	5	Very high/don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease)
Reversibility	1	Impact is reversible without any time and cost
	2	Impact is reversible without incurring significant time and cost
	3	Impact is reversible only by incurring significant time and cost
	4	Impact is reversible only by incurring prohibitively high time and cost
	5	Irreversible Impact

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/scored as per Table 7.

Table 7. Probability scoring.

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%)
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%)
	3	Medium probability (the impact may occur; >50% and <75%)
	4	High probability (it is most likely that the impact will occur- > 75% probability)
	5	Definite (the impact will occur)

The result is a qualitative representation of relative ER associated with the impact (Table 8). ER is therefore calculated as follows:

$$ER = C \times P$$

Table 8. Determination of environmental risk.

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		Probability				

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 9.

Table 9. Significance classes.

Environmental Risk Score	
Value	Description
< 9	Low (i.e. where this impact is unlikely to be a significant environmental risk)
≥9 and <17	Medium (i.e. where the impact could have a significant environmental risk)

≥ 17	High (i.e. where the impact will have a significant environmental risk)
------	---

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

Impact Prioritisation

In accordance with Appendix 1 of the NEMA 2014 EIA Regulations (GN R.982, as amended), and further to the assessment criteria presented in the Section above it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts
- The degree to which the impact may cause irreplaceable loss of resources

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented (Table 10).

Table 10. Criteria for determining prioritisation.

Public response (PR)	Low (1)	Issue not raised in public response
	Medium (2)	Issue has received a meaningful and justifiable public response
	High (3)	Issue has received an intense meaningful and justifiable public response
Cumulative impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change

Irreplaceable loss of resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions)

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 10.

The impact priority is therefore determined as follows:

$$\text{Priority} = \text{PR} + \text{CI} + \text{LR}$$

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (Table 11).

Table 11. Determination of prioritisation factor.

Priority	Ranking	Prioritisation Factor
3	Low	1
4	Medium	1.17
5	Medium	1.33
6	Medium	1.5
7	Medium	1.67
8	Medium	1.83
9	High	2

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative

impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance (Table 12).

Table 12. Final environmental significance rating.

Environmental Significance Rating	
Value	Description
< -10	Low Negative (i.e. where this impact would not have a direct influence on the decision to develop in the area)
≥ -10 and < -20	Medium Negative (i.e. where the impact could influence the decision to develop in the area)
≥ -20	High Negative (i.e. where the impact must have an influence on the decision process to develop in the area)
< 10	Low Positive (i.e. where this impact would not have a direct influence on the decision to develop in the area)
≥ 10 and < 20	Medium Positive (i.e. where the impact could influence the decision to develop in the area)
≥ 20	High Positive (i.e. where the impact must have an influence on the decision process to develop in the area)

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

3.7 Assumptions and limitations of the study

- The authors acknowledge that the brief literature review is not exhaustive of 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 (CFP) 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.
- Field data were recorded by handheld GPS and Mobile GPS applications. It must be noted that during the process of converting spatial data to final drawings and maps the accuracy of spatial data may be compromised. Printing or other forms of reproduction might also distort the spatial distribution in maps. Due care has been taken to preserve accuracy.
- The study area is characterised by impenetrable vegetation that covers most of the mountainous terrain of the application area. Some sections of the application area were also inaccessible due to the extreme terrain and inhospitable areas. The sections of the application area situated within the informal settlement were not accessed.
- 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. This process is facilitated by the EAP and if not done this can be considered a significant limitation and as a potential Project risk. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to Census 2011 the municipality has a total population estimated at 588 794. 89,4% of the population are black African, 8,7 % are white people, with other population groups making up the remaining 1,9%. Of those aged 20 years and older, 3,6% have completed primary school, 28,7% have some secondary education, 33,4% have completed matric, 12,7% have some form of higher education. Of the 228 237 economically active (employed or unemployed but looking for work) people in the municipality, 28,1% are unemployed. 37,6% of the 122 237 economically active youth (15 – 34 years) in the area are unemployed (statssa.gov.za).

5 Results of Public Consultation and Stakeholder Engagement:

In line with the NHRA, stakeholder engagement is a key component of any EA process, it involves stakeholders interested in, or affected by the proposed development. At the time of writing no heritage concerns have been raised.

6 Contextualising the study area

6.1 Archaeological Background

6.1.1 Stone Age

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

subsistence practices, as represented by the sub-phases or industrial complexes, is achievable. The three main phases can be divided as follows;

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

The Barberton region is represented through artefacts spanning across the entire Stone Age. ESA material has mostly been identified near watercourses. Van Niekerk (1984) discussed Stone Age material in Barberton which were found in deep dongas. Artefacts from the Earlier Stone Age were revealed at different depths within the deep dongas. Middle Stone Age materials were identified in the ferricrete layer above the subsoil, while artifacts from the Later Stone Age were located where surface erosion exposed them (Van Niekerk 1984: 69).

Further from the Application area , ochre mining took place during the MSA at Dumaneni between 46 000 and 28 500 years ago. It is also believed that this ochre was also later used in rock paintings of the area during the LSA.

Test excavations conducted in 2012 at Fairview Mine recorded 37 stone tools excavated under a stone cairn. This consisted of ESA cleavers, handaxes, and choppers made from quartzite, chert and other material which showed signs of reworking. Other tools included MSA and LSA flakes, cores, scrapers, and blades.

LSA sites are more abundant than ESA and MSA in the region of Barberton with many sites including rock art sites which are on record in the greater region as well as into Eswatini (Bergh 1999, Mitchell 2002). This includes Bornmansdrif, Sweet Home and Kearnsney Estates (Bergh 1999: 5). Over 100 rock art sites have also been identified north of Barberton around Bongani Mountain Lodge.

6.1.2 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 closest EIA site to the Application area is the Plaston site which is situated near White River north of Mbombela (Bergh 1999). EIA ceramics have also been recorded scattered through the landscape, including ceramics belonging to the Kwale Branch of the Urewe Tradition near the Nelspruit River and Crocodile River confluence (Huffman 1998). Barberton was extensively occupied from the Late Iron Age with the widespread occupation of Sotho speakers, specifically the Koni in the Lowveld of Mpumalanga around the 1600s (Bergh 1999).

During the 19th century, the Swazi people initiated raids and subsequently migrated northward into the area. This movement either displaced the early inhabitants or integrated them into the Swazi community. This movement occurred during the period known as the "difaqane" roughly spanning from the early 1820s to the late 1830s. The difaqane was a time of significant upheaval when numerous tribes were displaced across South Africa (Bergh 1999). By the late 1890s, Swazi settlements expanded beyond the Eswatini border, stretching northward and westward along the Crocodile River. However, certain lower areas, particularly the flats in the Komati Ward, remained sparsely inhabited due to the presence of tsetse flies and trypanosomiasis. The primary villages were concentrated along the river valleys of the De Kaap, Queens, Crocodile, Komati, and Lomati Rivers, where access to water and alluvial soils was available.

An Iron Age stone walled site was identified by van Schalkwyk (2011) by the Fairview Mine and subsequently was further inspected by Pelsler (2012). The site consisted of multiple stone kraal enclosures and also showed signs of agricultural practices through evidence of grinding stones and possible granary stands.

6.1.3 Historical Background

In 1873, gold was uncovered in Pilgrims Rest, located 100 kilometres north of Barberton, attracting numerous prospectors to the region. By 1884, gold had been found near Barberton (Bornman 1995). This led the Barber brothers, accompanied by their cousin Graham H. Barber, as well as Edward White and Holden Bowker, to venture to the area to test their luck. Hal Barber made the initial discovery, though it was of a low-grade reef. Soon after, Fred Barber discovered a substantial reef, which he marked at the base of a hillside. The location where the Barbers established their base camp in the valley eventually became the town of Barberton. Shortly afterward, prospectors flooded into the region in pursuit of gold. Canteens, shops, restaurants, and a post office emerged in the area known as Barber's Camp. The Transvaal Mining Commissioner and Landdrost of Duivels Kantoor, a figure named Wilson, arrived to institute a form of government control, and collect licenses in the camp. In 1884, a meeting of the inhabitants was convened, during which a diggers' committee was elected, with Fred and Hal Barber as members. It was at this meeting that the camp was officially named Barberton. Around 1885 Barberton was proclaimed and became a municipality by 1904 (Raper 2004). In 1887, The Fairview Mine was established as the Kidson Ref Gold Mining Company and would go on to acquire smaller mines to further expand on.

The rinderpest outbreak in the 1890s, which significantly reduced the population of wild animals and curtailed the distribution of tsetse flies. Additionally, the introduction of railways, planned land settlement for white farmers, agricultural development, and the establishment of nature conservation areas collectively altered the conditions. These changes led to a growing number of colonists settling in the lowveld region.

In 1949, the Nkosi of Mhola held a prominent position as the predominant tribe in the district west of Sheba Siding. This area encompassed government grounds, privately owned white farms, Barberton town lands, mine properties, and company-owned land. Most of the tribe consisted of Swazi speakers, and Mhola Mvulo Nkosi served as its chief. Born around 1898, Nkosi assumed his chief duties around 1923. Myburgh (1949), notes that, although officially recognized for administrative purposes only, Nkosi was the most influential chief in the district and an educated man. By 1949, the tribe's strength was estimated to be nearly 11,000. The ruling family of the tribe were the descendants of the Swazi king Mswati II, with their headquarters situated at eMjindini Village, Moodies (Myburgh 1949: 31-32).

6.1.4 Anglo-Boer War

At the onset of the war, the Boers established a significant camp in Barberton, initially accommodating Boer women and children. However, in September 1900, British forces occupied the town, transforming the citizen camp into a large concentration camp (Bergh 1999: 51, 54). The British erected five blockhouses in the vicinity of Barberton to protect the town against potential Boer attacks. Presently, only one of these structures remains, situated near Rimer's Creek.

6.2 Literature Review (SAHRIS)

Several Cultural Resource Management (CRM) surveys are on record for the general area and the relevant results of these studies are briefly discussed below and outlined in Table 13.

Table 13. Studies consulted for the project.

Author	Year	Project	Findings
Pelser, A.J.	2012	A Report on a 2nd Opinion on Possible Graves Found During a HIA done for the Fairview Mine Tailings Dam Reworking Project, near Barberton, Mpumalanga.	Graves
Pelser, A.J.	2018	Phase 1 HIA Report for the Barberton Mine: Sheba East Collar Prospecting Rights Application Located on the Farm Sheba Siding 939JU Near Barberton, Mpumalanga.	Possible graves, old prospecting trenches.
Pistorius, J.C.C.	2006	A Phase 1 Heritage Impact Assessment (HIA) Study for a Proposed New Development near Barberton in the Mpumalanga Province of South Africa.	Historical ruins, gold mine shaft, graves and graveyards. informal villages.
Pistorius, J.C.C.	2008	A Phase 1 Heritage Impact Assessment Study for the Upgrading of Eskom's Hilltop Substation on the Farm Hilltop 458 near Nelspruit in the Mpumalanga Province.	Recent past remains, a possible grave.
Celliers, J.	2004	Report on Archaeological Survey on Portion of the Farm Fairview 542 JU, Portion 2 of Bickenhall 346 JU and a Portion of Portion 14 of Barberton Townlands 369 JU	Stone walled enclosures, Historic sites.
Celliers, J.	2019	Phase 1 Archaeological and Heritage Impact Assessment on the farm Hilversum 696 JT, in respect of proposed agricultural development, Umjindi Local Municipality, Barberton, Mpumalanga Province.	Farmstead ruins
Van Schalkwyk, J.A.	2002a	Archaeological Survey of a Section of the Secunda-Mozambique Gas Pipeline, Barberton.	Gaves, rectangular stone structure, old prospecting shafts, old farm labourer homestead, LIA site.
Van Schalkwyk, J.A.	2002b	Archaeological Survey of a Section of the Secunda-Mozambique Gas Pipeline, Barberton.	Stone walled sites, graves, stone cairn, old farm labourer homestead, cemetery, old cattle kraal, EIA ceramic scatter.
Van Schalkwyk, J.A.	2002c	Archaeological Survey of a Section of the Secunda-Mozambique Gas Pipeline, Barberton.	Graves, rectangular stone structure, old water furrow, cemetery, old prospecting hole.
Van Vollenhoven, A.C.	2015	A Report on a Heritage Impact Assessment for the Proposed Upgrading of the Rimer's Creek WTW, Barberton, Ehlanzeni District Municipality, Mpumalanga Province.	No sites were identified.

6.3 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.

7 Heritage Baseline

7.1 Description of the Physical Environment

The vegetation of the Application area belongs to the Granite Lowveld and the Barberton Serpentine Sourveld of the Savanna Biome. The Granite Lowveld is described as tall shrubland with few trees to moderately dense low woodland on the deep dandy uplands with *Terminalia sericea*, *Combretum zeyheri* and *C. apiculatum* and ground layer including *Pogonarthria squarrosa*, *Tricholaena monachne* and *Eragrostis rigidior*. Dense thicket to open savanna in the bottomlands with *Acacia nigrescens*, *Dichrostachys cinerea*, *Grewia bicolor* in the woody layer. The dense herbaceous layer contains the dominant *Digitaria eriantha*, *Panicum maximum* and *Aristida congesta* on fine-textured soils, while brackish bottomlands support *Sporobolus nitens*, *Urochloa mosambicensis* and *Chloris virgata*. At seep lines, where convex topography changes to concave, a dense fringe of *Terminalia sericea* occurs, with *Eragrostis gummiflua* in the undergrowth. The Barberton Serpentine Sourveld is described as often hilly, but very varied terrain. The southern ultramafic outcrops support herbaceous grasslands with stunted woody vegetation with more woody vegetation apparent within the lower-lying Noordkaap area towards Malelane. (Mucina and Rutherford 2006).

The application area is situated about 14km north of Barberton along Consort Mine Road about 1.5km north of the Diggers retreat guesthouse. The 145ha application area consists of impenetrable wooded vegetation, existing townships, and large historical mining areas along the Noordkaap River.

The application area is located on a landscape dominated by mountainous terrain and overgrown vegetation. Portions of the application area could not be accessed due to the extreme and inhospitable terrain. The western boundary of the application area is along a very high mountainous region that was accessed via an overgrown servitude road along an existing powerline that traverses the Application area from east to west. The southeastern corner of the application area consists of a large, existing township with Consort mine road running through the centre of the settlement. The northeastern corner of the application area is characterised by a large, disturbed area because of past mining activities. Various ruins are scattered across this area near the edge of the impenetrable vegetation towards the western portions of the application area. This entire area resembles a waste rock dump or past tailings facility against a small hill towards the centre of the application area. General site conditions are indicated in (Figure 7.1 to 7.4).



Figure 7.1. Image showing the dense wooded vegetation.



Figure 7.2. General view of the mountainous terrain along the southern edge of the application area.



Figure 7.3. General view of the environment around the historical mining area.



Figure 7.4. General site conditions along the powerline servitude

7.2 Heritage Resources

Heritage observations within the study area include ruins and a Historical homestead and were recorded as waypoints. General site distribution of the recorded observations in relation to the Project layout is spatially illustrated in Figure 7.5 and briefly described in Table 14. Selected features are illustrated in Figure 7.6 to 7.11.

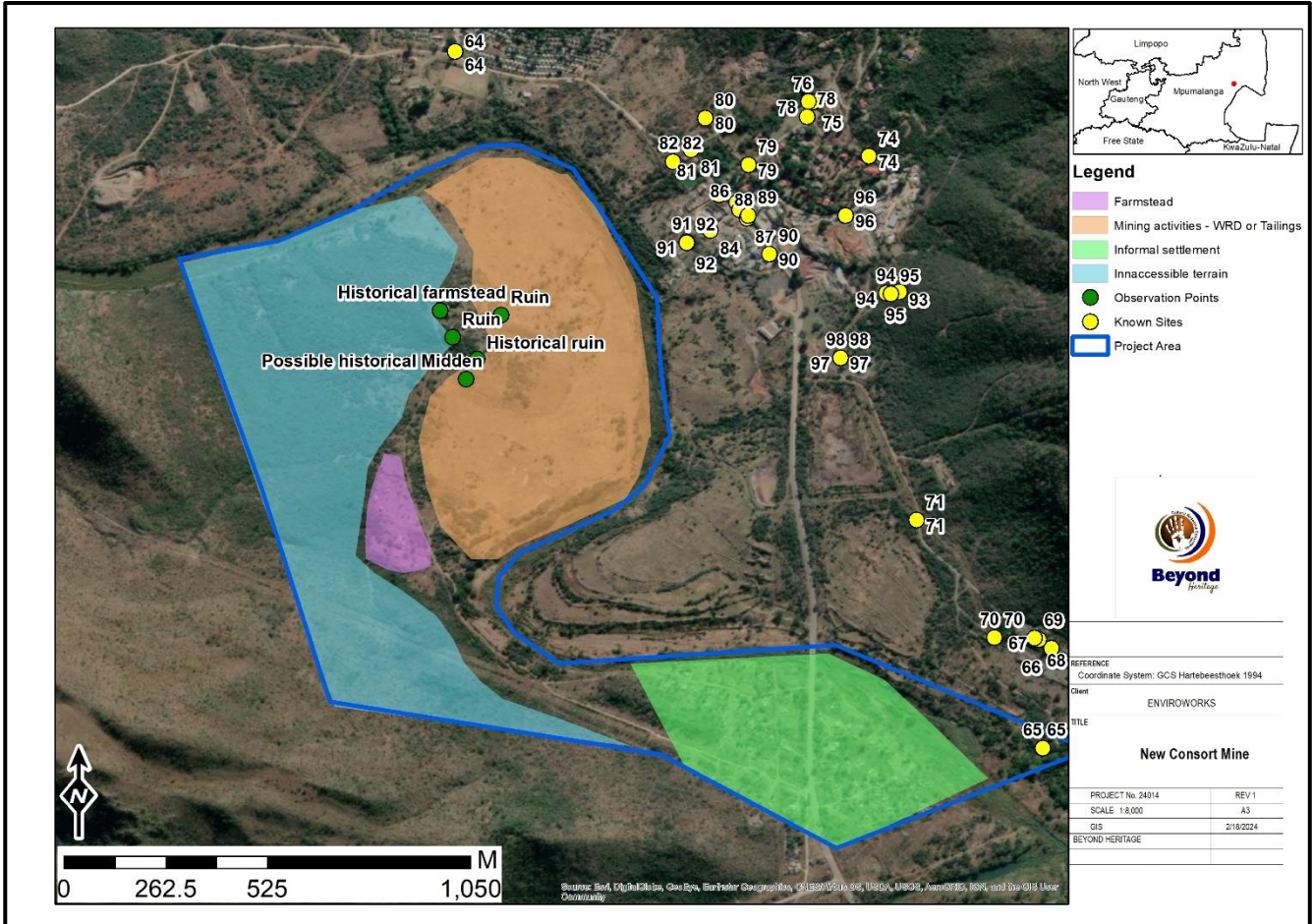


Figure 7.5. Site distribution map

Table 14. Sites recorded in the study area.

Label	Longitude	Latitude	Description	Significance
Ruin 1	31° 4'16.65"E	25°39'14.07"S	Broken down brick and cement structure situated at the top of the possible waste rock dump. The structure is completely degraded.	Low Significance GP C
Ruin 2	31° 4'12.60"E	25°39'15.90"S	Partially broken-down structure situated in a thickly wooded area. The structure was built with cement bricks. Possibly part of past mining infrastructure.	Low Significance GP C
Ruin 3	31° 4'14.65"E	25°39'17.74"S	Historical structure built with masoned stone situated on the edge of the small hill situated towards the centre of the application area.	Low Significance GP C
Large Historical homestead	31° 4'11.54"E	25°39'13.68"S	The farmstead is degraded and situated on top of the small hill nearby the centre of the application area. Multiple structures are scattered across the farmstead including the main farmhouse and a large stone-built terrace. The structures are mostly broken down and degraded. A small section of the main house is being used as an informal dwelling.	Low Significance GP C



Figure 7.6. Ruin 1 - Broken down brick and cement structure situated at the top of the possible waste rock dump. The structure is completely broken down.



Figure 7.7. Ruin 2 - Partially broken-down structure situated in a thickly wooded area. The structure was built with cement bricks. Possibly part of past mining infrastructure.



Figure 7.8. Ruin 3 - Structure built with masoned stone situated on the edge of the small hill situated towards the centre of the application area.



Figure 7.9. Ruin 3 - The structure is mostly still intact with the doors, windows and roof having been removed.



Figure 7.10. Historical Farmstead - General view of the large historical farmstead situated at the top of the small hill at the centre of the application area



Figure 7.11. Historical Farmstead - Main house partially broken down with walls remaining.

7.3 Cultural Landscape

The Application area is situated within a mountainous landscape which is extensively mined.

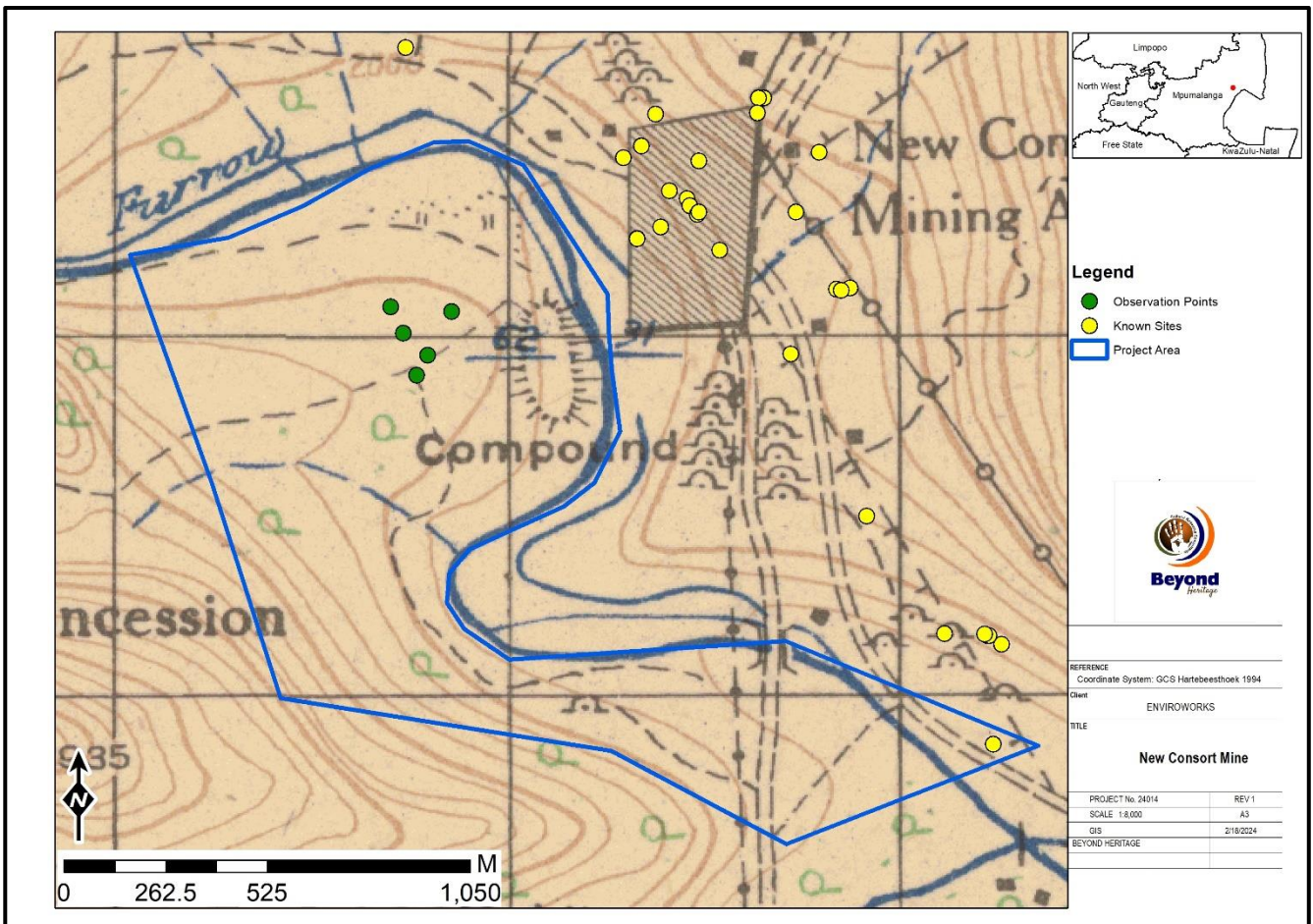


Figure 7.12. Extract of the 1943 Topographic map (1: 50 000) indicating excavations in the eastern portion of the study area and a hut to the south. Small tracks and a road also traverse the Application area. A large mine worker settlement is visible to the east of the Application area.

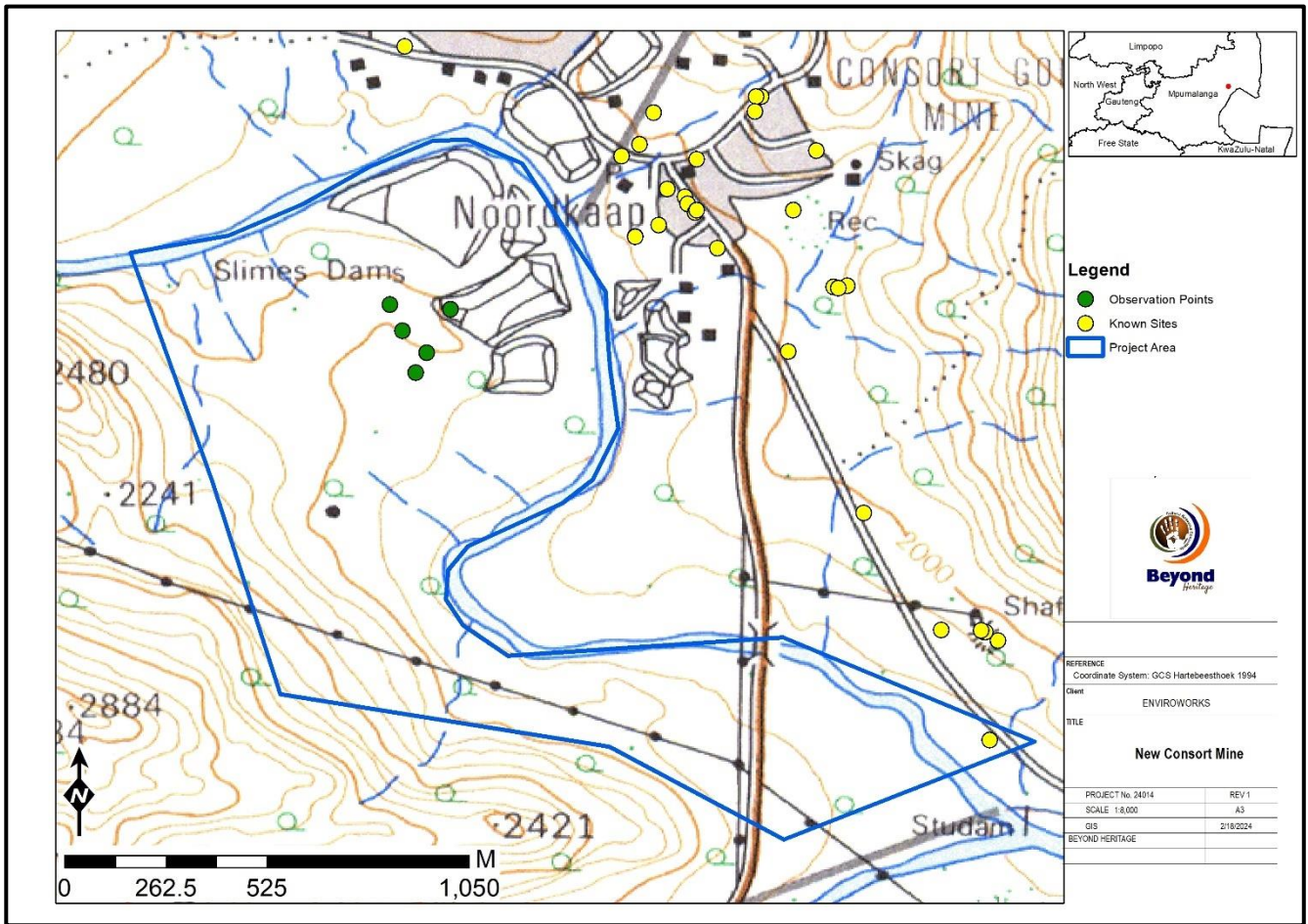


Figure 7.13. Extract of the 1968 Topographic map (1: 50 000) indicating slimes dams and a hut as well as a powerline in the southern section.

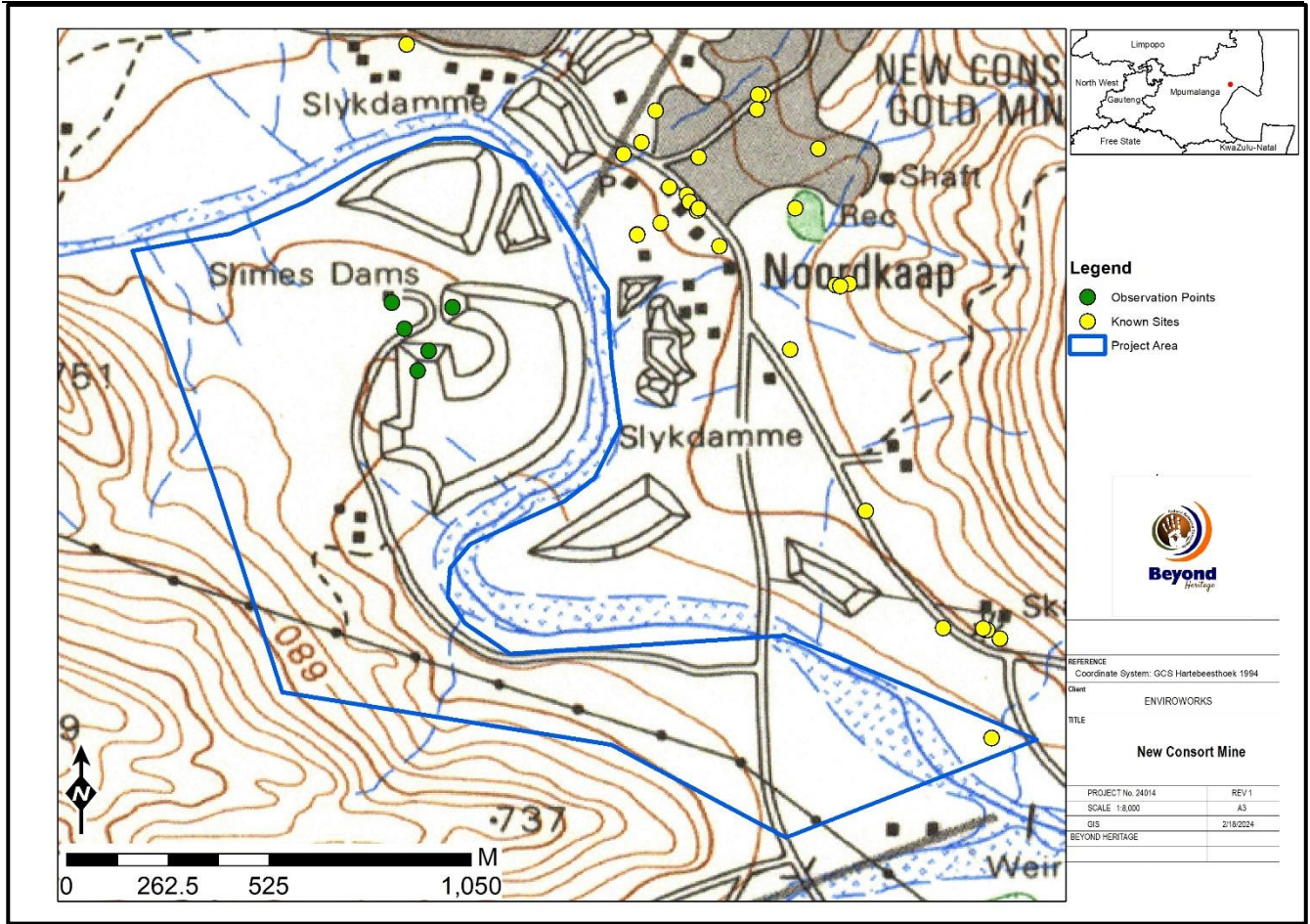


Figure 7.14. Extract of the 1984 Topographic map (1: 50 000) indicating mining infrastructure including slimes dams, roads, and some structures as well as and a powerline. The Farmstead that was recorded is also indicated on this map.

7.4 Paleontological Heritage

According to the SAHRA palaeontological sensitivity map, the study area is indicated as moderate, low, and insignificant/zero palaeontological sensitivity (Figure 7.15) and an independent study was conducted for this aspect (Bamford 2023). According to the South African Heritage Resource Authority (SAHRA) Paleontological sensitivity map the study area is of moderate, low, and insignificant/zero sensitivity and an independent study was conducted for this aspect (Bamford 2023). The study concluded that the proposed site lies on the ancient rocks of the Barberton Greenstone Belt and on ancient granite of the Nelspruit Suite. The latter is volcanic and has no life forms and has zero palaeo sensitivity. The Barberton Greenstone Belt rocks have very low palaeo sensitivity and only invisible microbes might be present. A Fossil Chance Find Protocol should be added to the EMP and monitoring.



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

8 Assessment of impacts

8.1 Impacts on tangible heritage resources.

All four recorded heritage resources will be impacted by the Project. Due to the degraded nature of Ruin 1 and Ruin 2, they are of low significance and impact to these sites will therefore be low. Ruin 3 and the Possible Historical homestead are more intact but postdate 1968 and are therefore not older than 60 years and not under the ambit of the NHRA.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures as recommended in this report should be implemented during all phases of the project.

8.1.1 Cumulative impacts

The cumulative impacts on the Application area can be mitigated to an acceptable level with adherence of the correct mitigation measures.

8.2 Impact Assessment Tables

Table 15. Impact assessment for low significance Ruin 1, Ruin 2, Ruin 3 and Farmstead.

Impact Name	Impact to Ruin 1 and Ruin 2				
Alternative	#N/A				
Phase	All Phases				
Environmental Risk					
Attribute	Pre-mitigation	Post-mitigation	Attribute	Pre-mitigation	Post-mitigation
Nature of Impact	-1	-1	Magnitude of Impact	1	1
Extent of Impact	2	2	Reversibility of Impact	5	5
Duration of Impact	5	5	Probability	1	1
Environmental Risk (Pre-mitigation)					-3.25
Mitigation Measures					
Implementation of a Chance Find Procedure					
Environmental Risk (Post-mitigation)					-3.25
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
<i>Low: Issue not raised in public responses</i>					
Cumulative Impacts					1
<i>Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.</i>					
Degree of potential irreplaceable loss of resources					1
<i>The impact is unlikely to result in irreplaceable loss of resources.</i>					
Prioritisation Factor					1.00
Final Significance					-3.25

9 Conclusion and recommendations

The Application area is situated in a landscape which is dominated by mountainous terrain and overgrown vegetation. The steep terrain made large portions of the Application area inaccessible. During the survey, various ruins (Ruin 1, Ruin 2, Ruin 3) and a farmstead were recorded in the western portion of the Application area.

Ruin 1 and Ruin 2 are very degraded and hold no heritage significance and impact to these two sites will be low. Ruin 3 is made of masoned stone and the Historic homestead comprises of a few structures which are degraded and post- date 1968. The features are thus not older than 60 years and are not protected by the NHRA.

According to the South African Heritage Resource Authority (SAHRA) Paleontological sensitivity map the study area is of moderate, low, and insignificant/zero sensitivity and an independent study was conducted for this aspect (Bamford 2023). The study concluded that the proposed site lies on the ancient rocks of the Barberton Greenstone Belt and on ancient granite of the Nelspruit Suite. The latter is volcanic and has no life forms and has zero palaeo sensitivity. The Barberton Greenstone Belt rocks have very low palaeo sensitivity and only invisible microbes might be present. A Fossil Chance Find Protocol should be added to the EMPr and monitoring.

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

9.1 Recommendations for condition of authorisation

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

- Monitoring of the Application area by the ECO during pre-construction and construction phases for heritage and palaeontology chance finds, if chance finds are encountered to implement the Chance Find Procedure for the Project as outlined in Section 9.

9.2 Chance Find Procedure

9.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines applicable to the Chance Find procedure is discussed below and monitoring guidelines for this procedure are provided in Section 9.5.

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

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

9.2.2 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 discard 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.

9.3 Reasoned Opinion

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

9.4 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. The stakeholder engagement process will assess intangible heritage resources further if this is listed as a concern.

9.5 Monitoring Requirements

Day to day monitoring can be conducted by the 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.
 - Staff should also receive training on the CFP.
- *Site monitoring and watching brief:* As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from pre-construction and construction activities. The ECO should monitor all such activities. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 16. Monitoring requirements for the Project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Cultural Heritage Resource Chance Find	Entire Application area	ECO	Weekly (Preconstruction and construction phase)	Proactively	<p>If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented:</p> <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. <p>Only recommence operations once impacts have been mitigated.</p>

9.6 Management Measures for inclusion in the EMPr

Table 17. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General Application area	Monitoring of the Application area by the ECO during pre-construction and construction phases for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project	Planning Construction Operation Decommissioning Rehab and closure	Weekly	Applicant Construction Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Checklist/Report
General Application area	Development activities must be confined to the approved development footprint only.	Construction	Construction	Applicant Construction Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

Table 18. Heritage Action Plan for the Project

ACTION PLAN				
Phase	Management Action	Timeframe for Implementation	Responsible party for Implementation (frequency)	Responsible party for Monitoring/Audit/Review (frequency)
Planning phase	Heritage Impact Assessment Heritage Walkdown of proposed surface infrastructure footprint.	Pre-Construction	Heritage specialist to be appointed	Once of Preconstruction
Construction	Monitoring of the Application area by the ECO during pre-construction and construction phases for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project	Throughout construction	Environmental Officer (weekly)	ECO (monthly audit)
			Heritage specialist to be appointed (as required)	Environmental Manager/ECO (audit and review as required)
Operation	Monitoring of the Application area by the ECO for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project	Throughout operation	Environmental Officer (weekly)	ECO (monthly audit)
Decommissioning	Monitoring of the Application area by the ECO for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project	Throughout decommissioning	Environmental Officer (weekly)	ECO (monthly audit)
Rehabilitation and Closure	Monitoring of the Application area by the ECO for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project	Throughout rehabilitation until closure	Environmental Officer (weekly)	ECO (monthly audit)

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