HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED NEW KHULU TAILINGS STORAGE FACILITY AND ASSOCIATED INFRASTRUCTURE PROJECT, DWARSRIVIER CHROME MINE, LIMPOPO PROVINCE

Type of development:

Mining Development

Client:

Envirogistics (Pty) Ltd

Client information:

Tanja Bekker

Developer:

- Dwarsrivier Chrome Mine

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 2169
Report date:
September 2021

APPROVAL PAGE

Project Name	Khulu Tailings Storage facility and associated infrastructure project, Limpopo Province
Report Title	Heritage Impact Assessment for the proposed new Khulu Tailings Storage facility and associated infrastructure project, Limpopo Province.
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	Dwarsrivier Chrome Mine

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	August 2021

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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 Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	*Declaration of Independence*
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA)an indication of the quality and age of base data used for the specialist report	Section 3.4 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 1.3
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(I) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EIA report
(q) Any other information requested by the competent authority	N.A

Executive Summary

Envirogistics (Pty) Ltd was appointed as the Environmental Assessment Practitioner (EAP) by Dwarsrivier Chrome Mine to undertake the required Environmental Authorisation Process for the proposed Khulu Tailings Storage Facility (TSF) and associated infrastructure located at the Dwarsrivier Mine, Steelpoort, Limpopo Province. As part of this process Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed on desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The study area is characterised by extensive mining activities;
- The survey recorded two areas with historical/recent residential elements (Feature 4 and 6), the remains of Iron Age sites (Feature 2,3, and 5) marked by a scatter of ceramics, and a stone cairn (Feature 1) of unknown purpose that although unlikely could possibly indicate a grave site;
- The study area is of insignificant and low paleontological sensitivity and no further studies are required for this aspect.

The potential impact of the project on the recorded heritage resources is high prior to mitigation but can be mitigated to an acceptable level. The project can commence provided that the recommendations in this report are adhered to, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- The stone cairn of unknown purpose at Feature 1 should be avoided with a 30 m buffer, if this is not possible it should be confirmed whether this is a grave through stakeholder consultation/ Ground Penetrating Radar/ Test Excavations and if confirmed to be a grave it should be relocated as per all the relevant legal requirements;
- Feature 2,3 and 5 should be shovel pit tested (with the required mitigation permit) to determine the presence of subsurface deposit after which a destruction permit can be applied for.
- The lack of graves at Feature 4 and 6 should be confirmed prior to construction by the social team and monitored during construction;
- Implementation of a chance find procedure for the project (as outlined in Section 10.2).

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 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I: • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	16/09/2021

a) Expertise of the specialist

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

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

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ABBREVIATIONS

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

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

GLOSSARY

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

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a HIA for the Khulu TSF located at the Dwarsrivier Mine, Steelpoort, Limpopo Province (Figure 1-1 to 1-4). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPr) for the development.

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

During the survey, an area with historical/recent residential elements as well as indications of an Iron Age site consisting of ceramics, rubbing stones and a possible grave were identified. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

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

Reporting

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

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

1.2 Project Description

Project components and the location of the Khulu Tailings Storage Facility (TSF) and other projects is outlined under Table 2 and 3.

Table 2: Project Description

Project area	The mine currently holds the mining rights for Portion 1 (Remaining Extent) and Portion 0 (Remaining Extent) of the farm and surface rights for the said portions, as well as Portion 4 portion of Portion 3 of the farm de Grootteboom 373KT.
Magisterial District	Greater Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality
Central co-ordinate of the development	Dwarsrivier mine is located at 24°56'4.36"S & 30° 7'22.08"E
Topographic Map Number	2430 CC

Table 3: Infrastructure and project activities

Type of development	Mining Development
Size of development	Indicated per project below
Project Components	**Project 1 – Khulu TSF** Farm Dwarsrivier 372KT RE (TSF and ancillary infrastructure): • TSF Option B: 24ha (preferred) • Proposed Return Water Dam (RWD) for Option B: 1.7ha **Project 2 – Diesel and Emulsion Batching** Farm Dwarsrivier 372KT Remainder of Portion 1: 1.6ha • Emulsion Batching: 0.9ha • Diesel Batching: 0.66ha (clearance of about 0.37ha) • Road: 80m at 6m width: 0.048ha (480m2) (clearance of about 288m2) **Project 3 – Extension of Main Parking Area** Farm Dwarsrivier 372KT Remainder of Portion 1: 0.5ha **Project 4 - Widening of Access Road between South Shaft/Main Offices and Plant** Mainly on Farm Dwarsrivier 372KT Remainder of Portion 1: 0.3ha **Project 5: Access Crossing between Plant and North Mine** Farm Dwarsrivier 372KT RE: 0.2ha.

1.3 Alternatives

The following alternatives were provided for the TSF and ancillary infrastructure.
Farm Dwarsrivier 372KT RE

- TSF Option B: 24ha (preferred)
- TSF Option D: 19ha

Farm Dwarsrivier 372KT Remainder of Portion 1:

- TSF Option C: 21ha
- TSF Option F: 17ha

A screening process was completed, but due to environmental sensitivities Option B was identified as the preferred option and is addressed in this report.

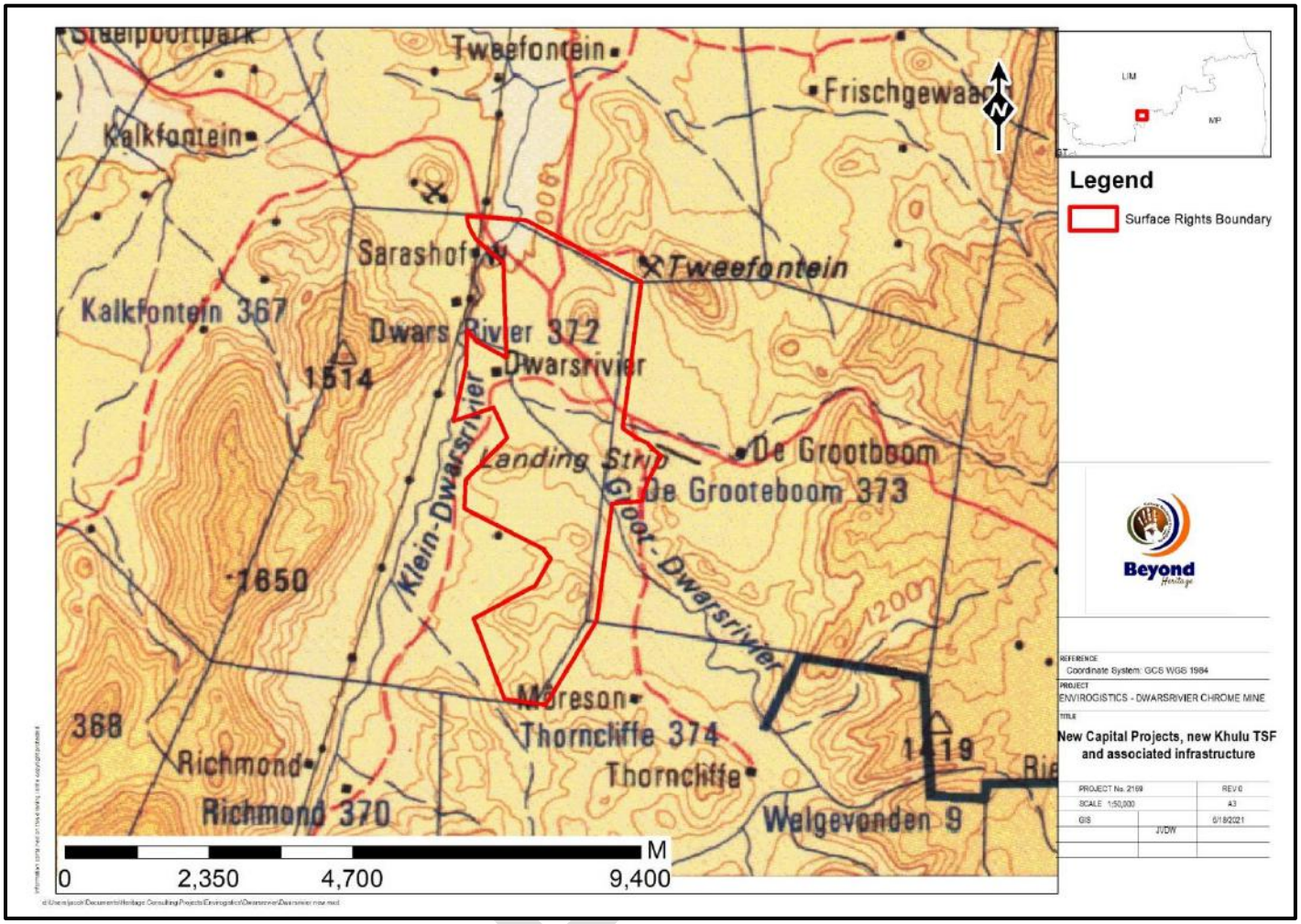


Figure 1.1. Regional setting (1: 250 000 topographical map) of Dwarsrivier Mine.

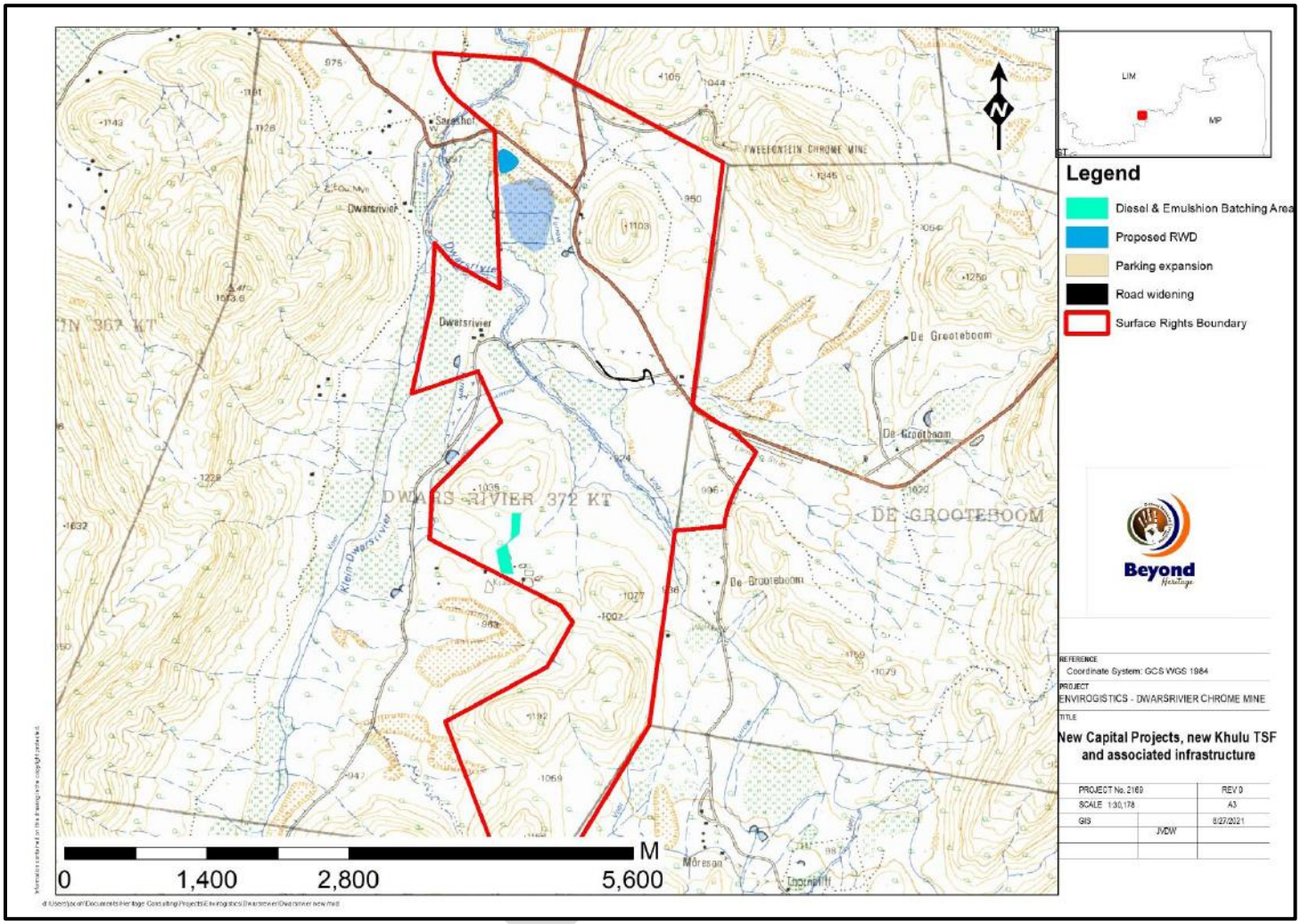


Figure 1.2. Local setting indicating project components.

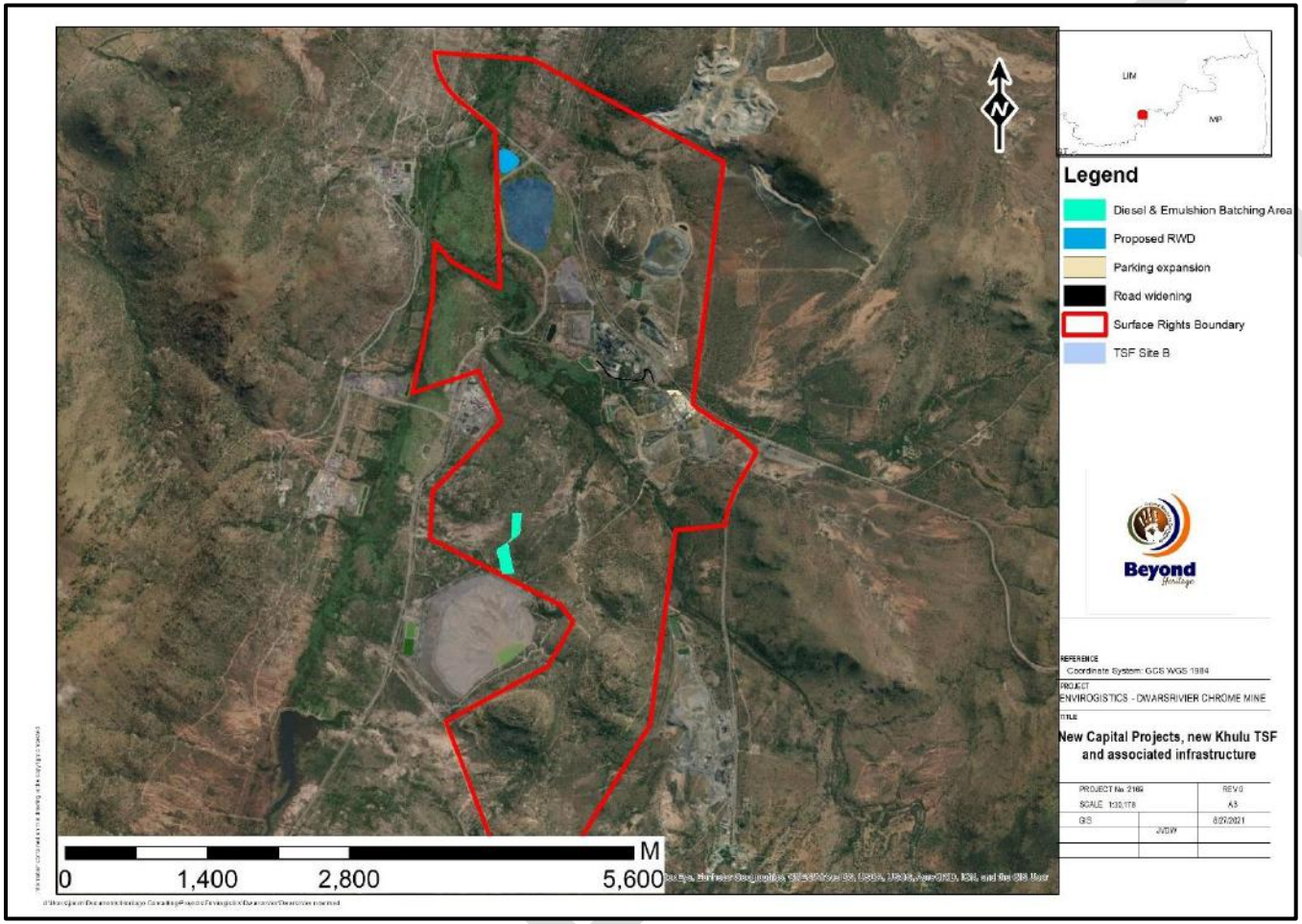


Figure 1.3. Aerial image of the project components.

2 Legislative Requirements

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

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

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

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

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

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

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

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

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

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

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

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

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

3 METHODOLOGY

3.1 Literature Review

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

3.2 Genealogical Society and Google Earth Monuments

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

3.3 Public Consultation and Stakeholder Engagement:

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

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

3.4 Site Investigation

The aim of the site visit was to:

a) survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest;

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

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

Table 4: Site Investigation Details

	Site Investigation
Date	5 August 2021
Season	Winter – Archaeological visibility was hampered by high grass cover. The project area was however sufficiently covered to understand the heritage character of the area (Figure 3-1).

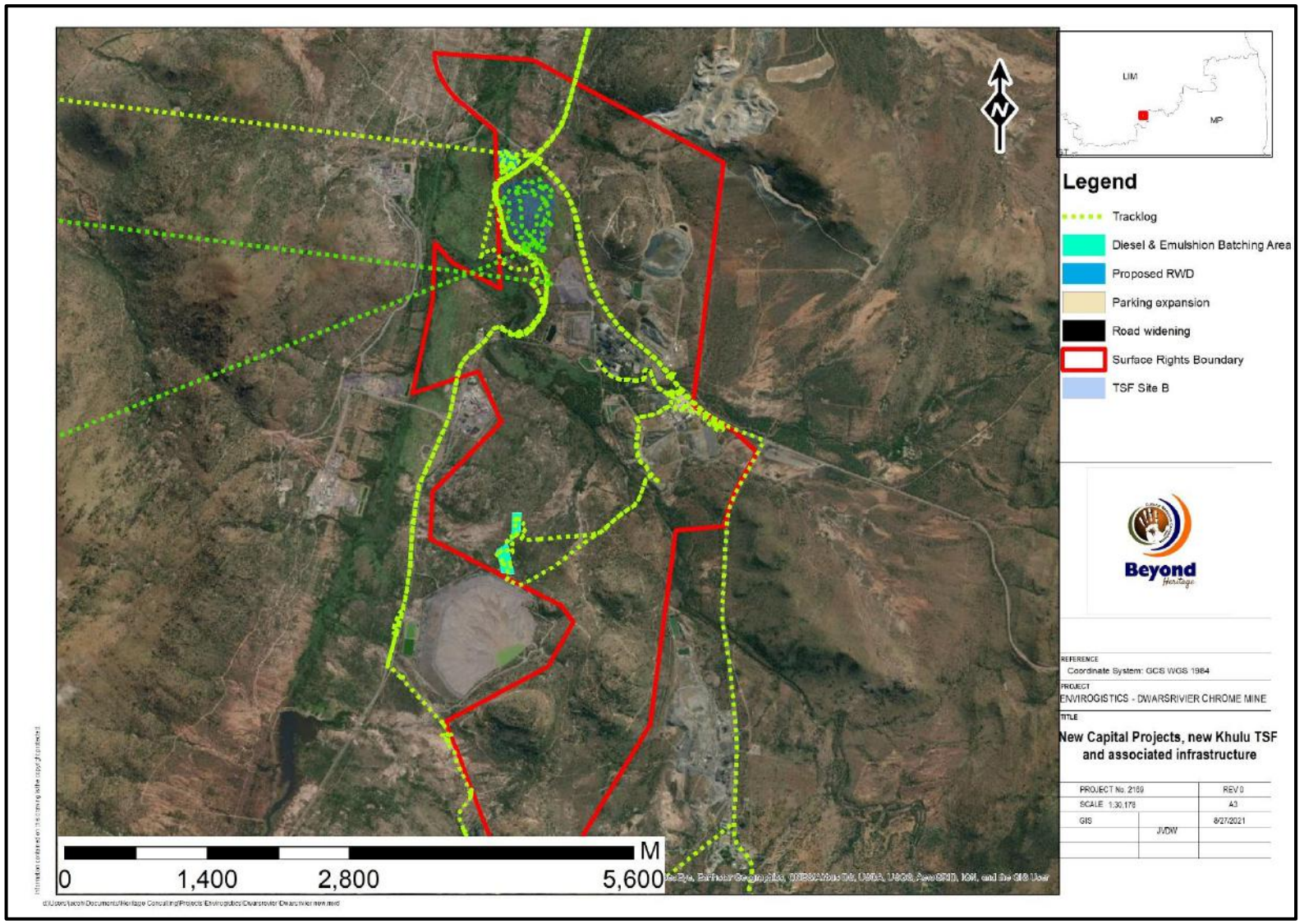


Figure 3.1: Tracklog of the survey in green.

3.5 Site Significance and Field Rating

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

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

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

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

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

Table 5. Heritage significance and field ratings

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

3.6 Impact Assessment Methodology

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

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

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

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

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

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of unrecorded graves and other cultural material cannot be excluded. Similarly, the depth of cultural deposits and the extent of heritage sites cannot be accurately determined due its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to StatsSA the population of the Greater Tubatse Municipality is 335 676. The population in the municipality is constituted by 97,8% black African, 1,6% white people, with other population groups making up the remaining 0,7. The sex ratio in the municipality is 88, meaning that for every 100 women there are 88 men. Languages spoken in the municipality include Sepedi (78,6%), Tsonga (6,9%), isiNdebele (3,8%), isiZulu (2,1%) and other languages make up 8,6%. Of those aged 20 years and older, 22,6% have completed matric and 6,6% have some form of higher education. The municipality has a weak economic base and high poverty levels. The Burgersfort town in the municipality has been identified as a growth point in the province because of its mining activities. A potential to grow the economic base in the municipality, through tourism, has been brought by the availability of natural resources. Poverty alleviation projects implemented by the municipality have improved the socio-economic conditions.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the EIA process. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located.

In anticipation of other mining activities in the greater study area, archaeologists have completed numerous heritage surveys including Huffman & Schoeman 2001, 2002 a and b; van Schalkwyk 2005; Roodt 2003a, 2003b, 2003c, 2005, 2008a, 2008b; Van der Walt & Fourie 2006; Van der Walt & Celliers 2009; Van der Walt 2009; 2016 and Pistorius 2007, 2010, 2011 for various Environmental Impact Assessment Reports (EIAs) and Environmental Management Programmes (EMPs). These studies provide a good understanding of the archaeology of the area and use of the wider landscape. Since 2001, heritage surveys have recorded more than 240 sites in the greater study area, ranging from the Middle Stone Age (MSA) to the recent households of farm labourers. The following Cultural Resource Management (CRM) studies (Table 6) were conducted in the immediate area and were consulted for this report:

Table 6. Heritage Reports conducted close to the study area.

Author	Year	Project	Findings
Huffman, T. N. and Schoeman, A.	2002	Archaeological Assessment of The Der Brochen Project, Mpumalanga	25 sites or occurrences, ranging from the Middle Stone Age to the Iron Age and Historic Pedi.
Roodt, F.	2003	Phase 1 Heritage Impact Assessment Der Brochen Tailings Dams Farms: Helena and St. George Mpumalanga Province	39 sites were recorded ranging from the Iron age to burial sites.
Van der Walt, J. and Fourie, W.	2007	Mining development for Mareesburg 8JT Mpumalanga, Archaeological Impact Assessment	3 Iron Age sites
Matoho, E.	2012	Preliminary Report of The Investigation of The Late Iron Age Stone Wall Enclosure Site Identified On The Farm Schaapkraal 42jt, Mpumalanga Province	Iron Age features and burial sites.
Du Piesanie, J and Higgitt, N.	2012	Heritage Impact Assessment for the Everest North Mining 2530 AA, Vygenhoek 10JT, Mpumalanga.	50 Sites recorded ranging from Stone Age, Iron Age and burial sites as well as historical features.
Coetzee, T.	2018	Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd for the Construction of the Mareesburg Haul Road near Boschfontein, Mpumalanga	Seven historical sites consisting of angular stone walling, as well as buildings constructed from bricks and cement; 10 LIA / Farmer sites consisting of linear stone walling and stone-walled enclosures; six stone cairns that might be grave sites; two formal graveyards and two modern sites.
Van der Walt, J.	2018	Heritage Impact Assessment for the establishment of various projects and the expansion of the exploration programme at Dwarsrivier Chrome Mine, Steelpoort, Limpopo Province	Graves, Iron Age Sites, and structural remains.
Van der Walt, J.	2021	Heritage Impact Assessment for the proposed pipeline (SE2) between Spitskop Pump Station and Mototolo Mine, located near Steelpoort, Limpopo Province	Three burial sites and an Iron Age site.

6.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

6.2. Background to the general area

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 (Lombard 2012). The three main phases can be divided as follows:

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

Very few Early Stone Age sites are on record for Mpumalanga and no *in situ* sites dating to this period are expected for the study area. An example in Mpumalanga is Maleoskop on the farm Rietkloof where ESA tools have been found. This is one of only a handful of such sites in Mpumalanga.

Middle Stone Age isolated artefacts are known to occur in the general area. Finds typically include radial cores, triangular points and flakes. These artefacts are usually scattered too sparsely to be of any significance (Van der Walt 2016). Evidence of this period has been excavated at Bushman Rock Shelter, a well-known site on the farm Klipfonteinhoek in the Ohrigstad district located about 70 km from the project area. This cave was excavated twice in the 1960s by Louw and later by Eloff. The MSA layers show that the cave was repeatedly visited over a long period. Lower layers have been dated to over 40 000 BP (Before Present) while the top layers date to approximately 27 000 BP (Esterhuizen & Smith in Delius, 2007; Bergh, 1998). At Bushman Rock Shelter the MSA is also represented and starts at around 12 000 BP but only lasted for some 3 000 years.

The LSA is of importance in geological terms as it marks the transition from the Pleistocene to the Holocene which was accompanied by a gradual shift from cooler to warmer temperatures. This change had its greatest influence on the higher lying areas of South Africa. Both Bushman Rock Shelter and another site, Heuningneskrans, have revealed a greater use in plant foods and fruit during this period (Esterhuizen & Smith in Delius, 2007; Bergh, 1998).

Faunal evidence suggests that LSA hunter-gatherers trapped and hunted zebra, warthog and bovids of various sizes. They also diversified their protein diet by gathering tortoises and land snails (Achatina) in large quantities.

Ostrich eggshell beads were found in most of the levels at these two sites. It appears that there is a gap of approximately 4 000 years in the Mpumalanga LSA record between 9 000 BP and 5 000 BP. This may be a result of generally little Stone Age research being conducted in the province. It is, however, also a period known for rapid warming and major climate fluctuation which may have led people to seek out protected environments in this area. The Mpumalanga Stone Age sequence is visible again during the mid-Holocene at the farm Honingklip near Badplaas in the Carolina district (Esterhuizen & Smith in Delius, 2007; Bergh, 1998).

The LSA period is also associated with rock engravings and rock paintings. Approximately 400 rock art sites are distributed throughout Mpumalanga and can be divided into San rock art, herder or Khoe Khoe (Khoi Khoi) paintings (thin scattering from the Limpopo Valley) through the Lydenburg district into the Nelspruit area) and localised late white farmer paintings. Farmer paintings can be divided into Sotho-Tswana finger paintings and Nguni engravings (Only 20 engravings occur at Boomplaats, north-west of Lydenburg). Farmer paintings are more localised than San or herder paintings and were mainly used by the painters for instructional purposes (Smith & Zubieta 2007).

A rock engraving which date from the more recent past were recorded against the eastern slope of the Groot Dwars River Valley (Huffman & Schoeman 2001, 2002[a], 2002[b] & 2002[c]**)** and it is possible that more engravings may exist in this valley.

6.2 The Iron Age

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

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

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. Most of the decorated pottery found in the study area belongs to the stylistic facies known as *Eiland*. This style dates to between 1550 AD and 1750 AD and was made by Sotho-Tswana people (Huffman 2007: 186-189). These Middle Iron Age Sites do not have any stone walling associated with them and is found close to cultivatable soil. Some stylistic *Marateng* pottery were also recorded presumably in association with Late Iron Age stone walled settlements. *Marateng* pottery dates to between 1650 AD and 1840 AD (Huffman 2007: 207). Also refer to Section 6.7 for a discussion on the Iron Age Cultural Landscape.

6.3 Historical Information

European occupation began in 1845 when trekkers established Ohrigstad and then Lydenburg a few years later. Originally, the trekkers were interested in ivory, but they also needed land and labour for agriculture. Tensions with African communities over these needs rose to such a point that the Trekkers attacked the Pedi capital in 1852. They failed, however, to destroy Pedi authority. Somewhat later, they negotiated a peace with Sekwati and traded cattle for land. Boers then started to establish farms in the region. GS Maree, for example, settled on Mareesburg in 1871. Tensions over land and labour increased again until the ZAR attacked the Pedi capital in 1876: this battle also failed to break Pedi resistance.

This brief historical outline helps to date some other sites in the study area. In particular, a number of settlements located around high meadows probably date from 1860 to 1880, when tensions were high but before major European occupation of local farms.

6.4 Anglo-Boer War Sites

The Anglo-Boer War was the greatest conflict that had taken place in South Africa up to date. No sites relating to the war are known to occur in the study area.

6.5 Cultural Landscape

The cultural landscape of the region is characterised by a rural area that is extensively disturbed by mining activities and in the past by agricultural activities. From the archaeological database of the general area archaeological settlements show different land use patterns. Many agriculturally orientated societies (making Eiland, Leolo and Marateng pottery) built their villages in the valleys near cultivatable alluvium.

Others (probably Ndebele) built terraced settlements on basal slopes of the valley edge, while farm labourers usually lived in the valleys as well. During the 19th Century, farmers lived around the edge of high meadows as a measure of protection. A few Middle Iron Age Eiland sites were also cited in this plateau environment.

6.6 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 approximately 60km northwest of Lydenburg, 25km south of Steelpoort and 63km northeast of Roossenekal in the Limpopo Province. The study area forms part of the Dwarsrivier Valley part of the Bushveld Igneous Complex. The greater area has been transformed over the years firstly by agricultural fields and more recently by mining related activities like roads water pipelines and power lines (Figure 7.1 – 7.3).

Figure 7.1. General site conditions note the high grass cover.

Figure 7.2. General site conditions – impenetrable bush.

Figure 7.3. Powerline in the RWD area.

8 Findings of the Survey

The study area is characterised by high grass cover as well as impenetrable bush in the Diesel and Emulsion batching areas. Previous disturbances relating to mining activities are evident, but even so the survey recorded two areas with historical/recent residential elements (Feature 4 and 6), the remains of an Iron Age site marked by a scatter of ceramics and ephemeral stone walling (Feature 2,3, and 5) and a stone cairn (Feature 1) in the proposed RWD of unknown purpose that could possibly indicate a grave. The recorded features are indicated in Figure 8.1 and discussed further in this chapter within the different impact areas namely RWD and TSF as well as the Diesel and Emulsion Batching area.

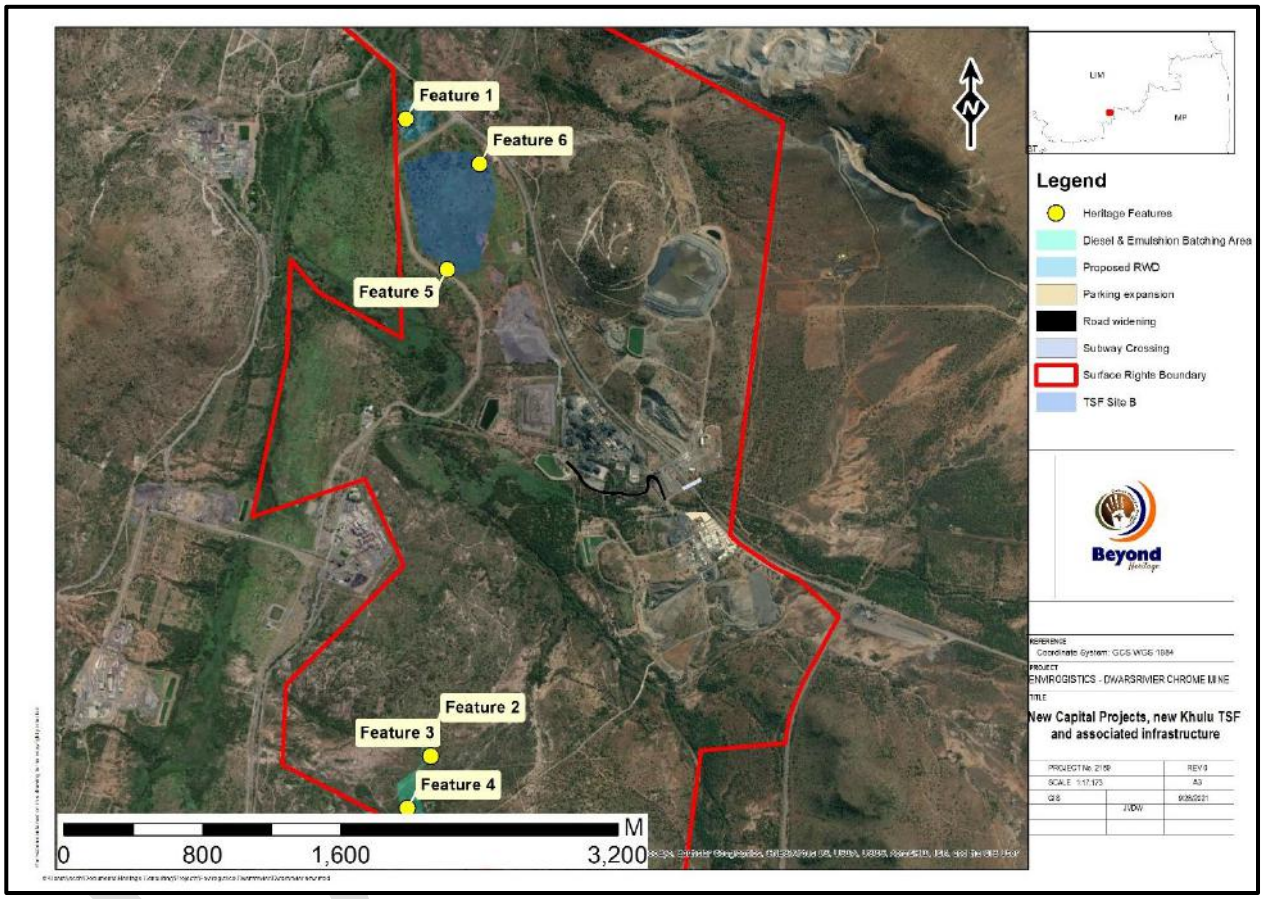


Figure 8.1. Site distribution map.

8.1 Project 1 RWD and TSF

Three features were identified within the impact areas of the RWD and TSF and are described in Table 7. The features were plotted in relation to the proposed impact areas on historical topographic maps and to contextualise the study area and identified features in relation to development over the years (Figure 8.2 to 8.4) and recorded feature are indicated in Figure 8.5 to 8.9.

Table 7. Findings of the survey within the impact areas of the RWD and TSF

Label	Longitude	Latitude	Description	Significance	Mitigation	Impact area
Feature 1	30° 06' 29.0132" E	24° 54' 47.7510" S	Stone cairn next to survey beacon, the purpose of the feature is unknown, but the feature is located in a sandy area where stones do not occur naturally and were carried in. The feature should be regarded as a possible grave.	High social significance and GP A.	Graves should be avoided with a 30 m buffer or relocated as per all the relevant legal requirements.	RWD and TSF
Feature 5	30° 06' 36.7524" E	24° 55' 15.8592" S	Large area with scattered ceramics. Possible EIA site.	Generally Protected B (GP. B) - Medium significance	Recording before destruction, monitoring during construction.	RWD and TSF
Feature 6	30° 06' 42.7789" E	24° 54' 56.1167" S	Square stone packed foundations of a structure measuring approximately 4x4 meters, possibly farm labourer dwelling.	Low significance GP C Unless graves are present, then High social significance and GP A.	The presence of graves or lack thereof should be confirmed prior to construction by the social team. The site should be monitored during construction	RWD and TSF

Based on historical topographic maps Feature 1 and 6 are indicated to be located within an excavated area from the 1960's until 1976 (Figure 8.2 and 8.3). By 2002 Feature 1 is still indicated within an excavated area and Features 6 and 7 are indicated to be located within a cultivated area (Figure 8.4). Due to the extensive disturbance of the excavation and cultivation activities the sites would have been disturbed and the context of the sites would have been impacted on, but the presence of subsurface deposit cannot be excluded.

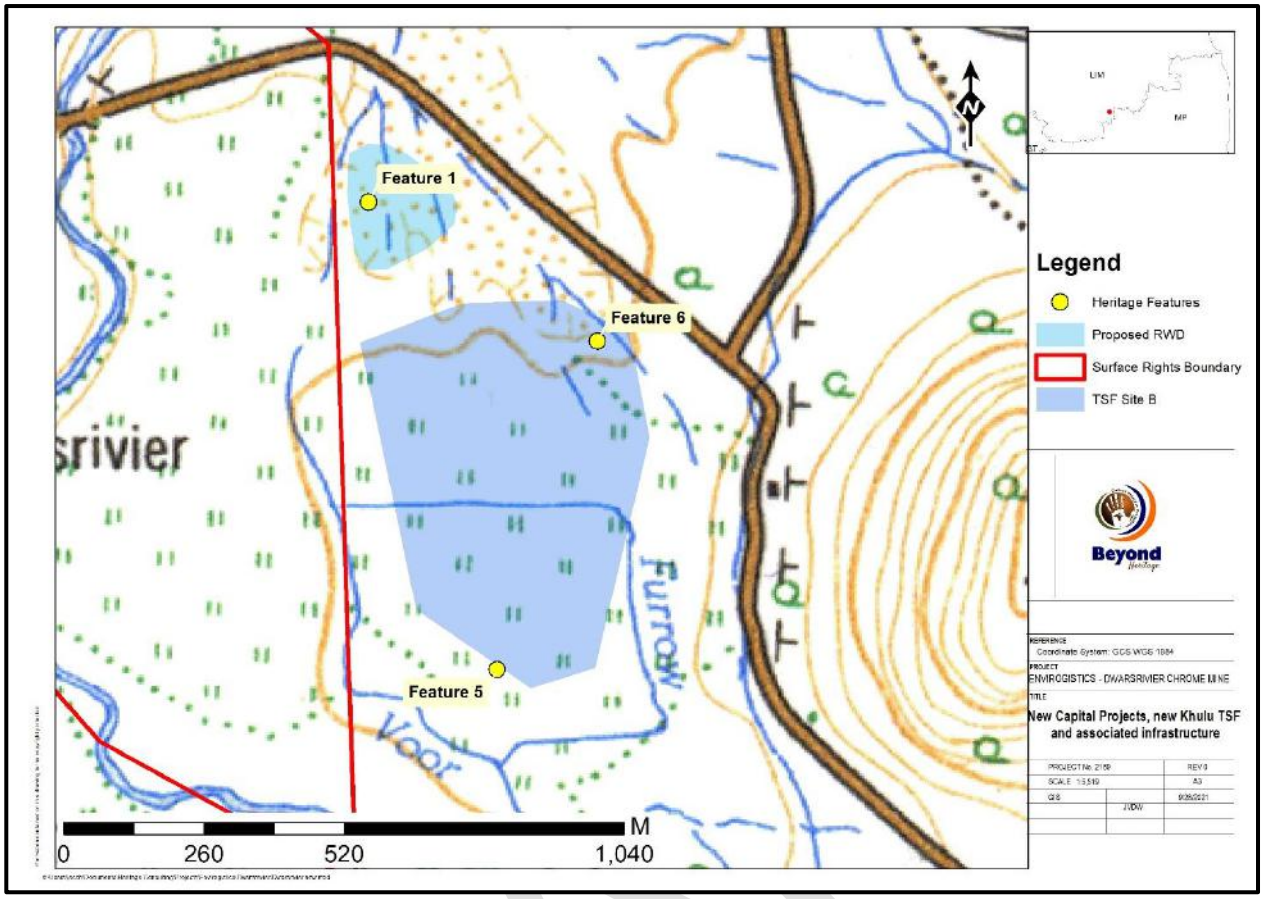


Figure 8.2. 1963 Topographic map of the TSF and WRD areas indicating the location of features recorded in this survey in relation to project components. Feature 1 is indicated within an excavation and Feature 5 in a cultivated area.

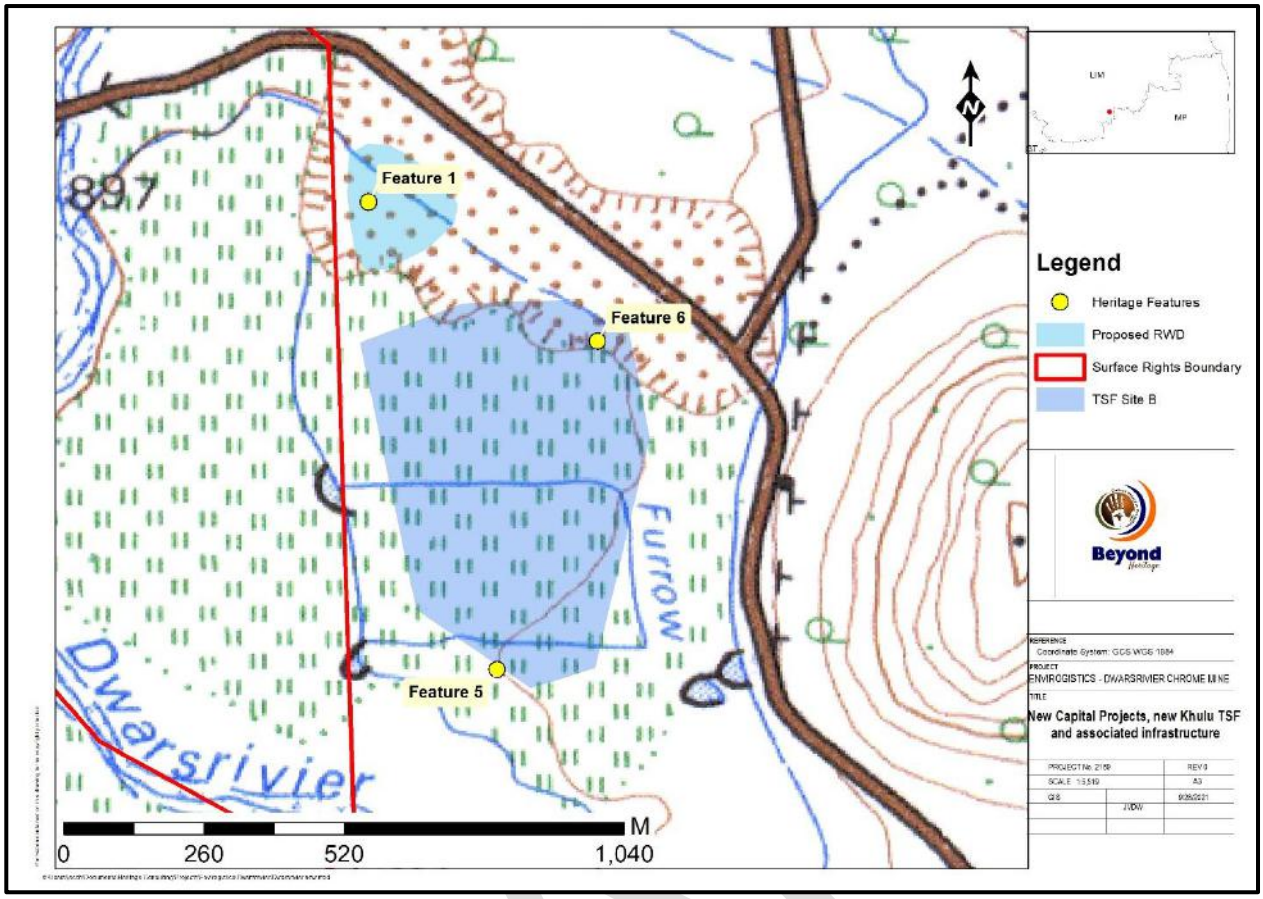


Figure 8.3. 1976 Topographic map indicating the area of the TSF and RWD. Excavations are indicated where Features 1 and 6 are located. Feature 5 is located within an area with intensive cultivation.

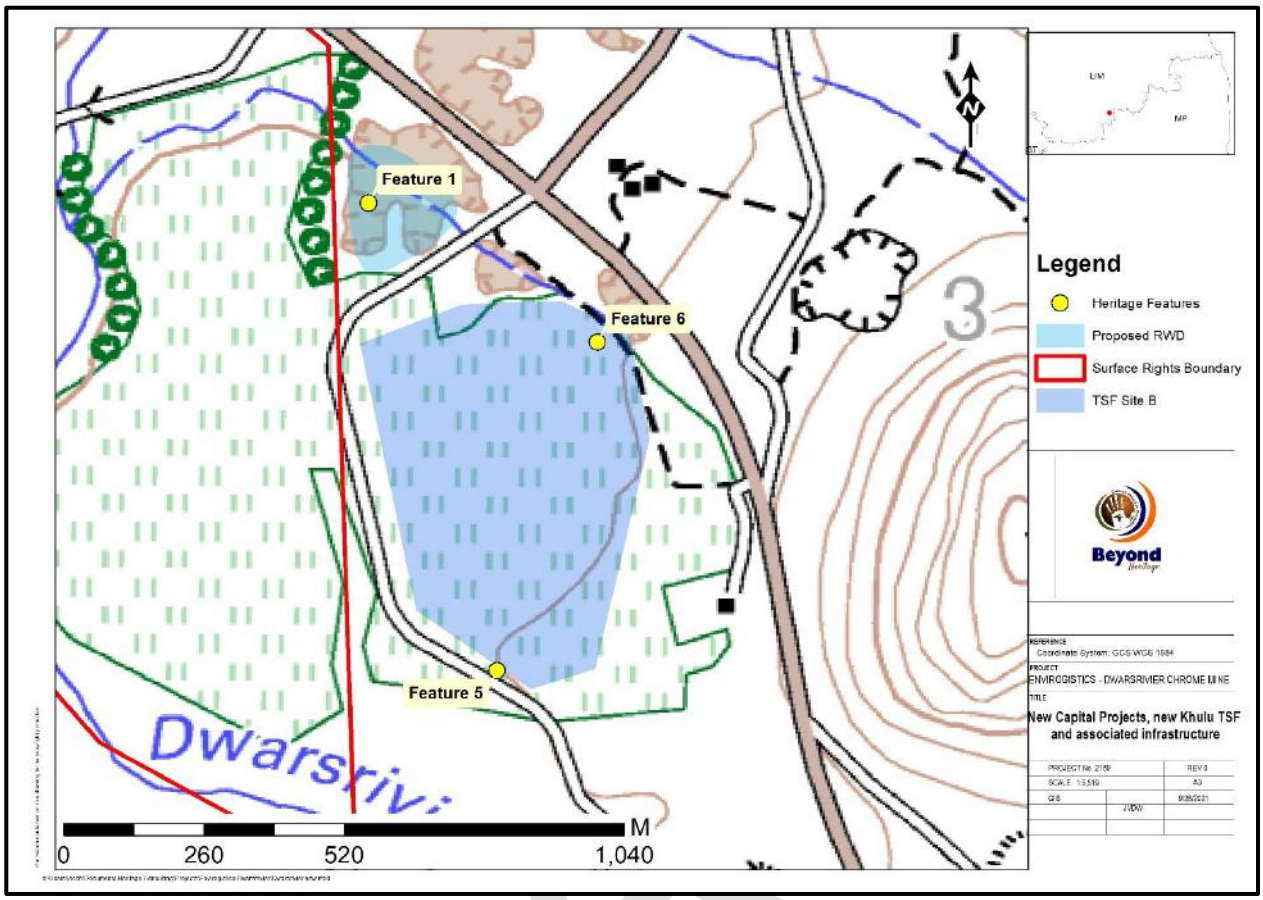


Figure 8.4. 2002 Topographic map indicating the impact areas of the TSF and WRD. Feature 1 is indicated within an excavated area and Feature 5 and 6 in areas that are cultivated.

Figure 8.5. Stone cairn next to survey beacon at Feature 1.

Figure 8.6. Ceramics at Feature 5.

Figure 8.7. General site conditions at Feature 5.

Figure 8.8. Site conditions at Feature 6.

Figure 8.9. Site conditions at Feature 6.

8.2 Project 2 Diesel and Emulsion Batching area

The findings in the Diesel and Emulsion Batching area include Iron Age features and the remains of a structure as described in Table 8. The area has been for the most part undeveloped (Figure 8.10 to 8.12) except for huts and kraals indicated on the 1976 topographic map around Feature 4 (Figure 8.11). The feature is probably related to these structures, but not older than 60 years, and therefore not protected by the NHRA. It should be noted that features such as these are often associated with graves, and the lack of graves in these areas should be confirmed through the stakeholder process. By 2002 no structures are indicated (Figure 8.12). Identified features are illustrated in Figure 8.13 to 8.17.

Table 8. Findings of the survey within the Diesel and Emulsion batching area.

Label	Longitude	Latitude	Description	Significance	Mitigation	Impact area
Feature 2	30° 06' 33.8436" E	24° 56' 42.0144" S	Low density scatter of ceramics. No other features are present. Decorated ceramics are typological like the Eiland *facies* dating to 1000 – 1300 AD (Huffman 2007)	Generally Protected B (GP. B) - Medium significance	Recording before destruction, monitoring during construction.	Diesel and Emulsion Batching area
Feature 3	30° 06' 33.6492" E	24° 56' 46.6945" S	Decorated Eiland Ceramics next to small hill. Some evidence of ephemeral walling also present but is too overgrown to be sure.	Generally Protected B (GP. B) - Medium significance	Recording before destruction, monitoring during construction.	Diesel and Emulsion Batching area
Feature 4	30° 06' 29.2679" E	24° 56' 56.4612" S	Glass, Metal, Wire in an open area in the vegetation. Could have been old labourer housing. Potentially graves in the area	Low significance GP C Unless graves are present, then High social significance and GP A.	The presence of graves or lack thereof should be confirmed prior to construction by the social team. The site should be monitored during construction.	Diesel and Emulsion Batching area.

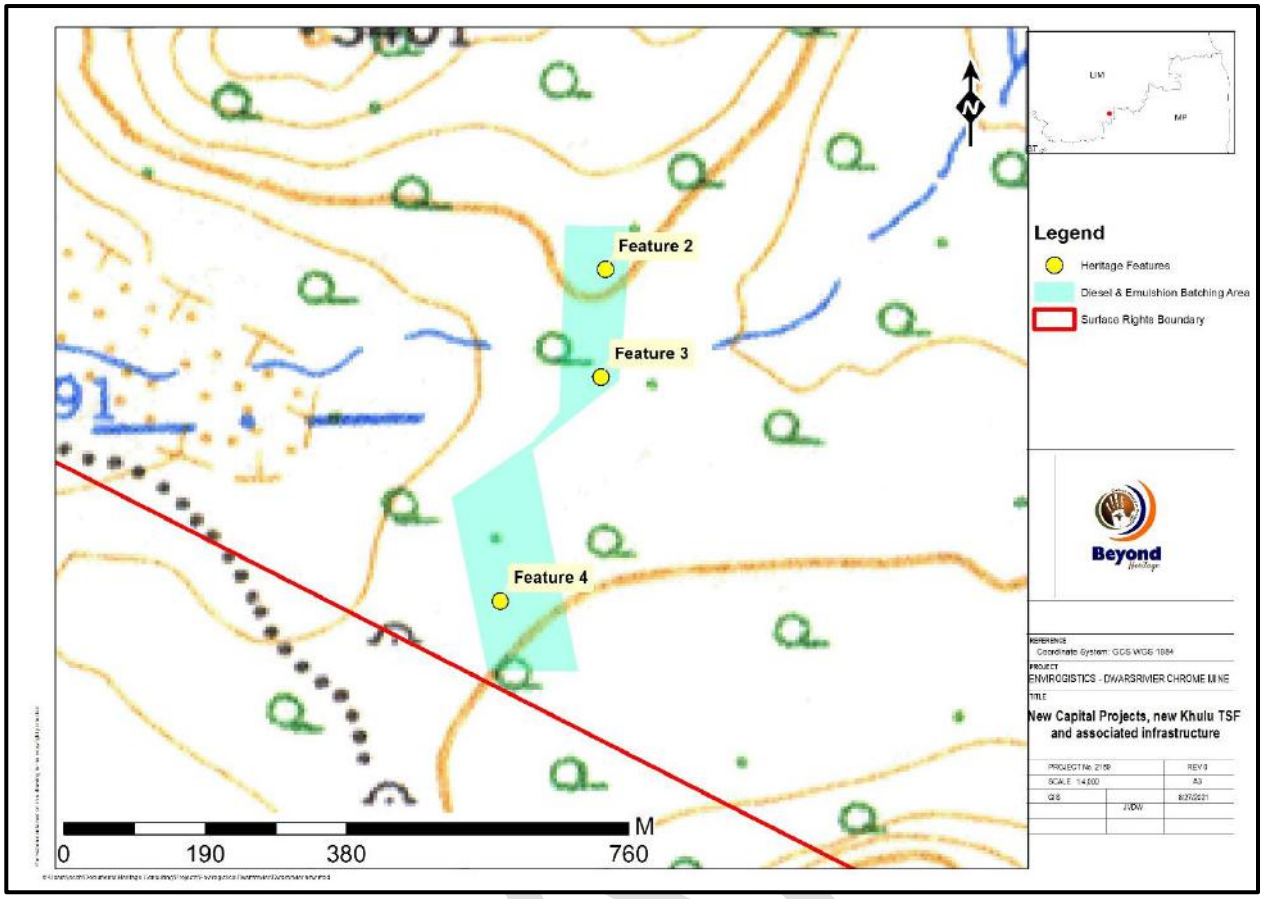


Figure 8.10. 1963 Topographic map of the Batching area indicating the location of features recorded in this survey in relation to project components. No features are visible on the map.

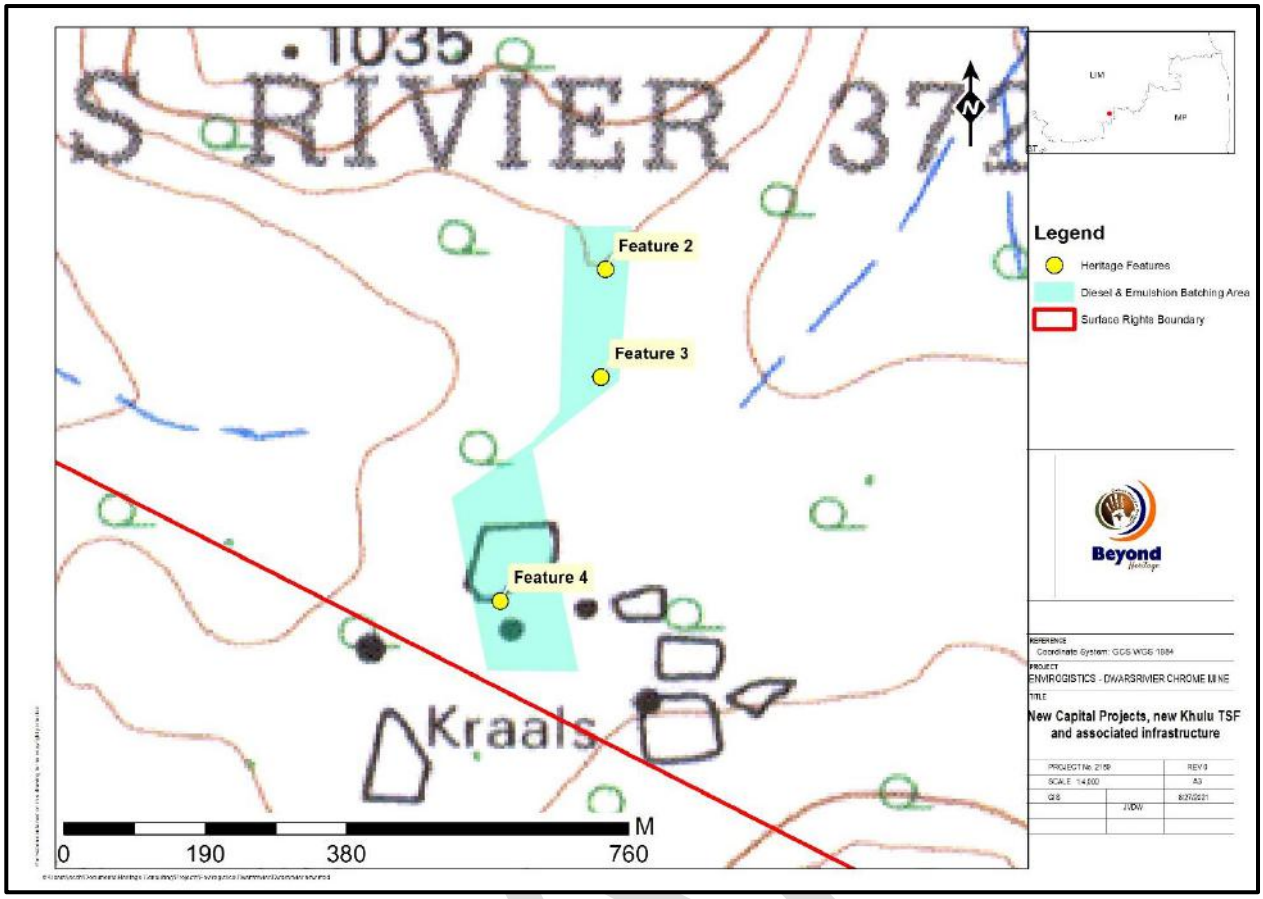


Figure 8.11. 1976 Topographic map of the Batching area. Kraals and huts are indicated in the same location as Feature 4.

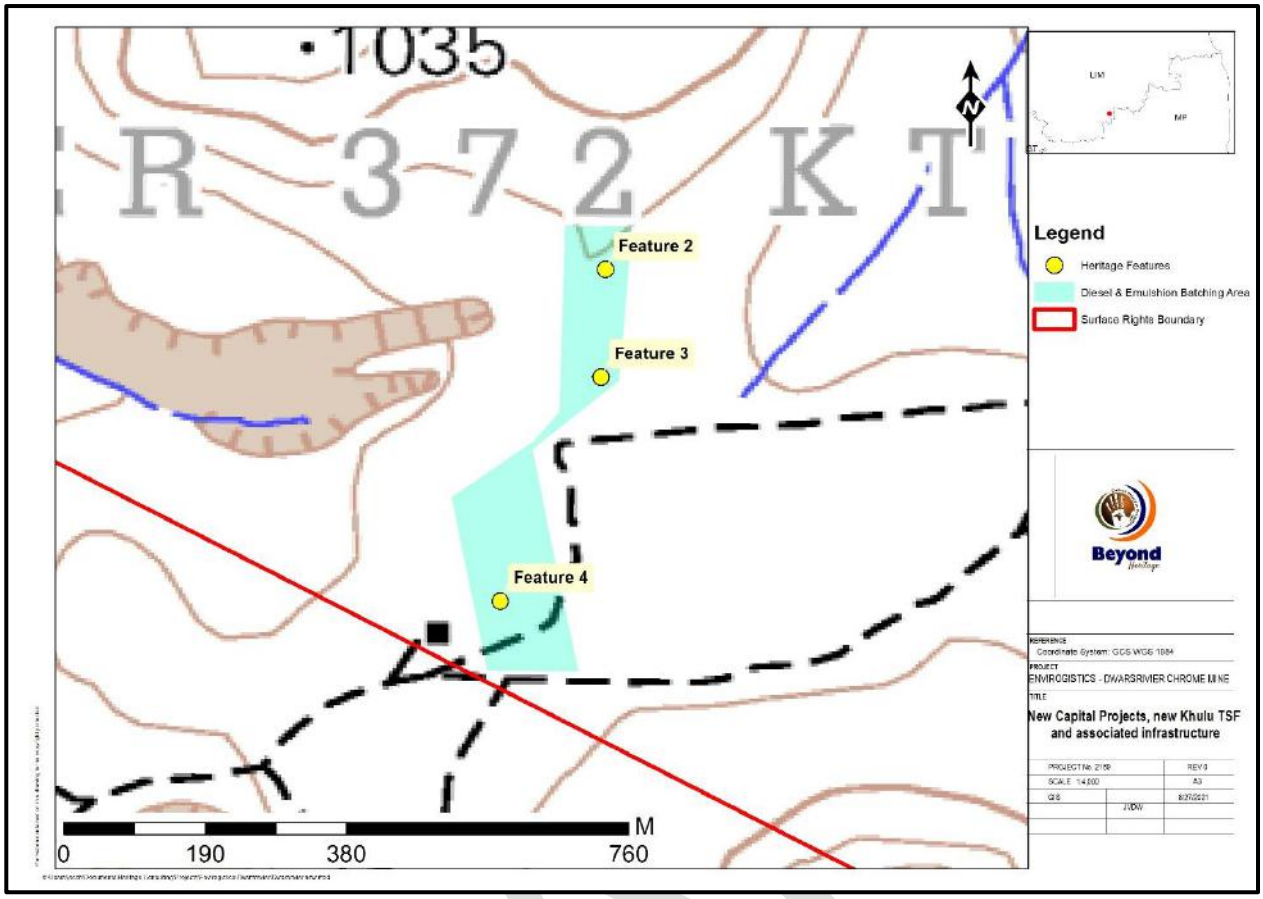


Figure 8.12. 2002 Topographic map indicating the batching area. A road and structure are indicated close to Feature 4.

Figure 8.13. Rubbing stone at Feature 2.

Figure 8.14. General site conditions at Feature 2 and 3.

Figure 8.15. Ceramics at Feature 2 and 3.

Figure 8.16. General site conditions at Feature 4.

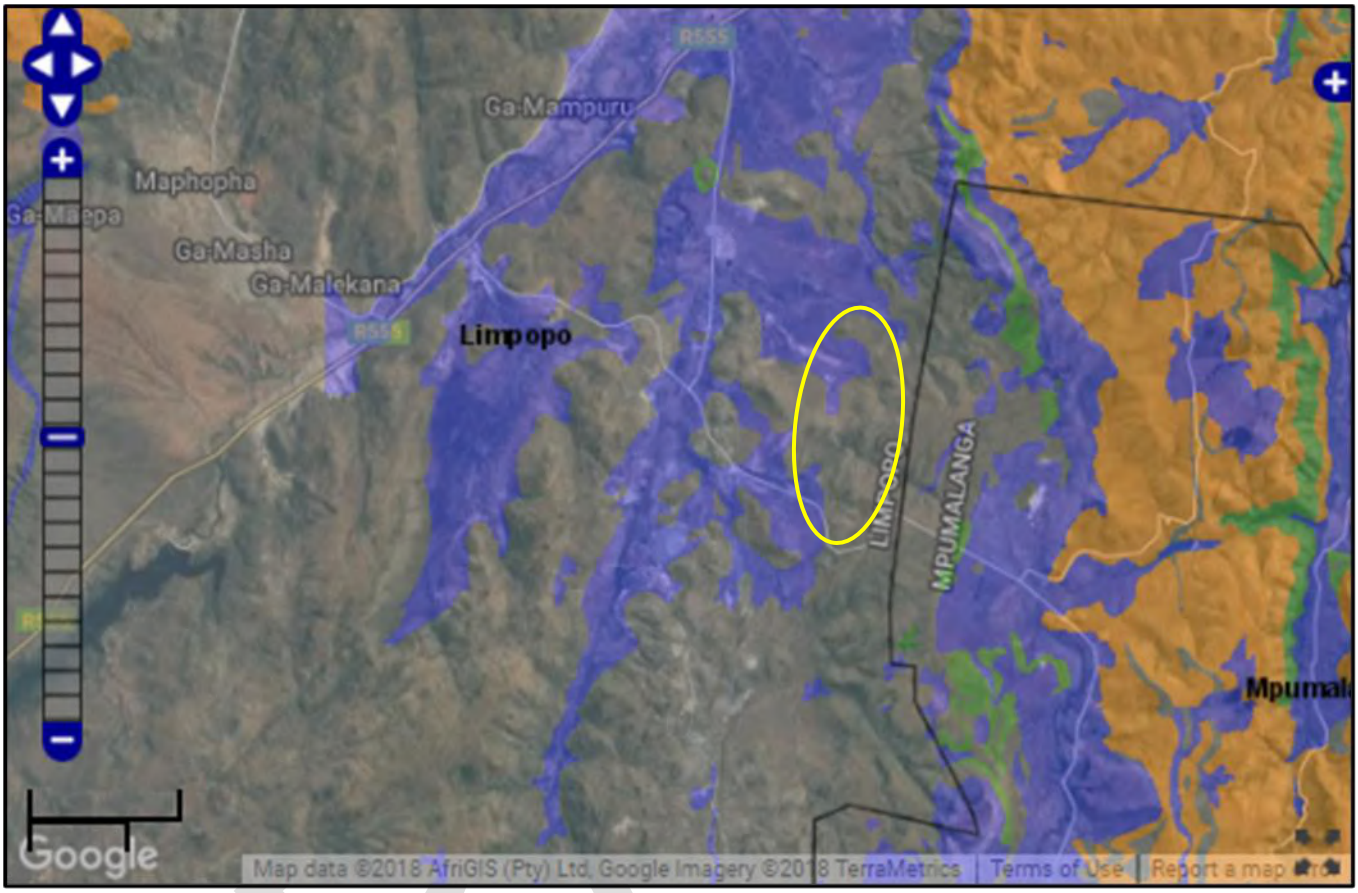
Figure 8.17. Metal implements at Feature 4.

8.3 Project 3 Extension of Main Parking Area, Project 4 Widening of Access Road between South Shaft/Main Offices and Plant and Project 5: Access Crossing between Plant and North Mine

No features were identified in these areas.

8.4 Paleontological Heritage of the project

According to the paleontological sensitivity of the study area indicated as insignificant and low on the SAHRA Paleontological map (Figure 8.18) and no further studies are required in this regard.



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 8.18. Paleontological sensitivity of the study area as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

Impacts to heritage resources are permanent and irreversible. Based on the high significance of burial sites (Feature 1) the impact will be high if it is confirmed to be a grave. If the feature is not a grave it is of no heritage significance. Feature 4 and 6 (possible labourer dwelling and structural remains) is of low heritage significance (unless proven that there are graves) and the impact will be low, unless the presence of graves is confirmed, if this is the case the graves will be of high social significance. Feature 2, 3 and 5 is of medium significance and with no mitigation measures the impact will be medium to high. With the implementation of the correct mitigation measures at each feature the impact can be mitigated to an acceptable level (Table 8,9 and 10 and Figure 9.1 and 9.2)

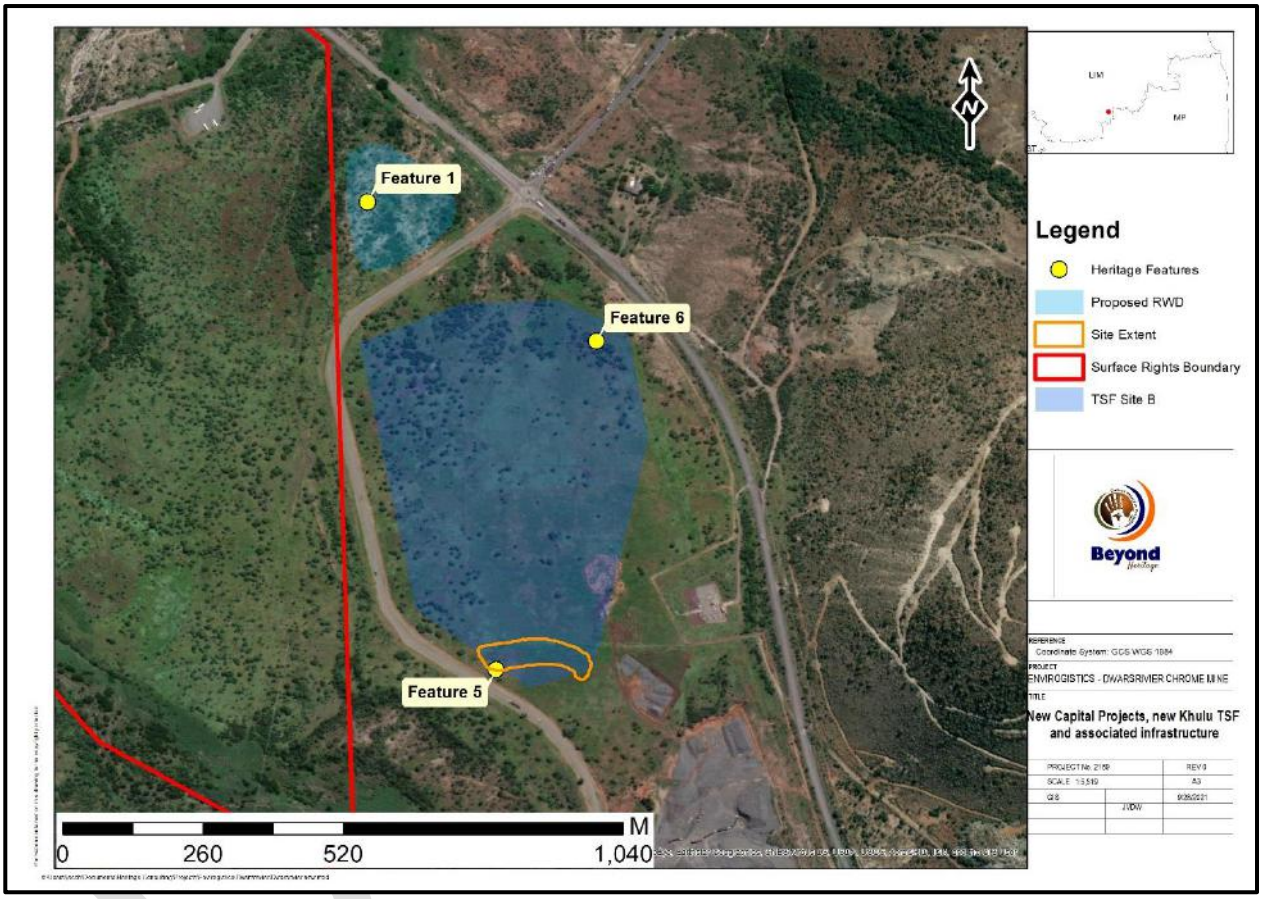


Figure 9.1. Feature 1, 5 and 6 in relation to the RWD and TSF.

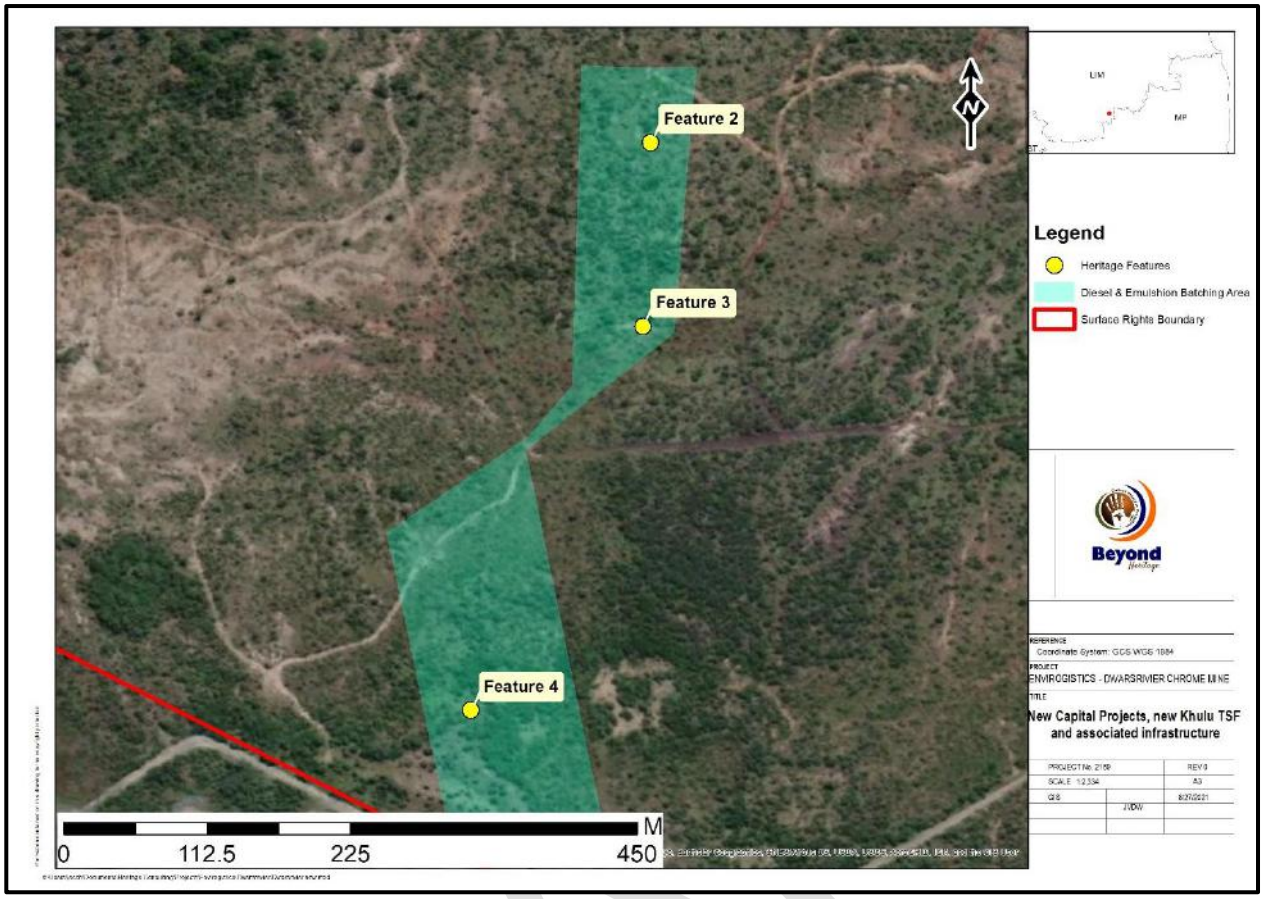


Figure 9.2. Feature 2, 3 and 4 in relation to the impact area of the Diesel and Emulsion Batching Area.

9.1.1 Pre-Construction phase

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

9.1.2 Construction Phase

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

9.1.3 Operation Phase

No impacts are expected after the construction phase.

9.1.4 Impact Assessment for the Project

Table 9. Impact assessment of the proposed project on Feature 1.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Regional (4)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (4)
Probability	Definite (5)	Improbable (2)
Significance	**75 (High)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: • Confirm whether the feature represents a grave, if so ○ Adjust layout to preserve the site *in-situ* with a 30 m buffer zone or relocation adhering to all relevant legal requirements.		
Cumulative impacts: Impacts to heritage resources can be mitigated to an acceptable level. With the implementation of the mitigation measures as proposed in this report the cumulative impact is low. .		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 10. Impact of the project to Feature 2,3 and 5.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**52 (Medium to high)**	**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: The sites should be test excavated, mapped and a destruction permit applied for. The features should be monitored during construction.		
Cumulative impacts: The proposed project will have a low cumulative impact.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 11. Impact assessment on Feature 4 and 6.

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**27 (Low)**	**27 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • The lack of graves should be confirmed prior to construction by the social team. The site should be monitored during construction (as sites such as these are known to contain stillborn graves). • Implementation of a chance find procedure for the project.		
Cumulative impacts: The proposed project will have a low cumulative impact.		
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 study area is altered due to the extensive past mining and extensive cultivation activities. During the site visit features including a two sites with the remains of structures, three Iron Age sites and possible grave were identified.

The impact of the proposed project on heritage resources can be mitigated to an acceptable level and it is recommended that the proposed project can commence on the condition that the following recommendations (Section 10.1) 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:

- The stone cairn of unknown purpose at Feature 1 should be avoided with a 30 m buffer, if this is not possible it should be confirmed whether this is a grave through stakeholder consultation/ Ground Penetrating Radar/ Test Excavations and if confirmed to be a grave it should be relocated as per all the relevant legal requirements;
- Feature 2,3 and 5 should be shovel pit tested (with the required mitigation permit) to determine the presence of subsurface deposit after which a destruction permit can be applied for.
- The lack of graves at Feature 4 and 6 should be confirmed prior to construction by the social team and monitored during construction;
- Implementation of a chance find procedure for the project (as outlined in Section 10.2).

10.2 Chance Find Procedures

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

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

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

10.3 Reasoned Opinion

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

10.4 Potential risk

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

10.5 Monitoring Requirements

Ideally, site monitoring should be conducted by an experienced archaeologist or heritage specialist. Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief*: As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are the initial soil removal and subsequent earthworks during construction. The ECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 12. Monitoring requirements for the project

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

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Feature 2,3,4,5,6	RWD, TSF and Diesel and Emulsion Batching Area	ECO	During Pre-construction and construction	Pro Active	If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: • Cease all works immediately; • Report incident to the Sustainability Manager; • Contact an archaeologist/ palaeontologist to inspect the site; • Report incident to the competent authority; and • Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 13. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Pre Construction and construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
Feature 1	Confirm whether the feature represents a grave. Avoid and demarcate with a 30 m bufferzone.	Throughout the project	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Checklist/Report
Feature 2, 3 and 5	Excavate, map and a destruction permit should be applied for prior to destruction. The site should be monitored during construction.	Pre Construction and construction	Pre Construction and construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA	ECO Checklist/Report
Feature 4 and 6	The lack of graves at Feature 4 and 5 should be confirmed prior to construction by the social team.	Pre Construction and construction	Pre Construction and construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under	ECO Checklist/Report

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
	The site should be monitored during construction				Section 35 and 38 of NHRA	

10.7 Knowledge Gaps

Due to the subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure.

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