

# HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED K4 WASTE ROCK DUMP AND POLLUTION CONTROL DAM AT THE  
MARIKANA OPERATIONS NEAR MARIKANA, NORTH WEST PROVINCE.

**Type of development:**

Waste rock dump and Pollution Control Dam

**Client:**

Alta van Dyk Environmental

**Developer:**

Western Platinum (Pty) Ltd

**Report prepared by:**



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Project Reference:

Project number 23070

Report date:

12 July 2023

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**APPROVAL PAGE**

<b>Project Name</b>	K4 WRD and PCD Development.
<b>Report Title</b>	Heritage Impact Assessment for the Proposed K4 Waste Rock Dump and Pollution Control Dam at the Marikana Operations Near Marikana, North West Province
<b>Authority Reference Number</b>	To be confirmed
<b>Report Status</b>	Draft Report
<b>Applicant Name</b>	Western Platinum (Pty) Ltd

<b>Responsibility</b>	<b>Name</b>	<b>Qualifications and Certifications</b>	<b>Date</b>
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Date	Report Reference Number	Description of Amendment

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## REPORT OUTLINE

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

**Table 1. Specialist Report Requirements.**

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	<i>Declaration of Independence</i>
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA) an indication of the quality and age of base data used for the specialist report	Section 3.4, 7 and 8.
(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
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 5
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EIA report
(q) Any other information requested by the competent authority	N.A

**Declaration of Independence**

<b>Specialist Name</b>	Jaco van der Walt
<b>Declaration of Independence</b>	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (NEMA) (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"> <li>• I act as an independent specialist in this application;</li> <li>• 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;</li> <li>• I declare that there are no circumstances that may compromise my objectivity in performing such work;</li> <li>• 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;</li> <li>• I will comply with the Act, Regulations, and all other applicable legislation;</li> <li>• I have no, and will not engage in, conflicting interests in the undertaking of the activity;</li> <li>• 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;</li> <li>• All the particulars furnished by me in this form are true and correct; and</li> <li>• 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. of regulation 48 and is punishable in terms of section 24F of the Act.</li> </ul>
<b>Signature</b>	
<b>Date</b>	10/07/2023

**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 have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, Kwa Zulu Natal (KZN) as well as the Northern and Eastern Cape Provinces in South Africa.

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

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## Executive Summary

Alta van Dyk Environmental (AvdE) was appointed as the Environmental Assessment Practitioner (EAP) by Western Platinum (Pty) Ltd to undertake the required Environmental Authorisation Process for the proposed waste rock dump and pollution control dam at the K4 Shaft that forms part of the Marikana Operations located near Marikana town, North West Province. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed on a desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The project area is highly disturbed through mining areas which include sections within the plant and a large mine dump situated in the middle of the Project area. Other areas are disturbed through past agricultural activities dating to the 1960's;
- During the survey, heritage finds were limited to broken down foundations and a series of circular packed stone lines that predate 1968 and are assumed to be older than 60 years;
- The palaeontological sensitivity of the Project area is indicated as insignificant/zero and no palaeontological studies are required.

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

## Recommendations:

Avoidance of recorded heritage observations is the preferred course of action; if this is not possible the following apply:

- The ruins at K001, K002 and K003 should be recorded and mapped prior to development, after which a destruction permit can be applied for;
- Through stakeholder engagement the possible presence of graves in the study area should be confirmed prior to development;
- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage resources (outlined in Section 10.2) in case heritage resources are uncovered during construction.

## ABBREVIATIONS

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

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

## GLOSSARY

Archaeological site (remains of human activity over 100 years old)

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 recently, ~ 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

## 1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the proposed Waste Rock Dump and Pollution Control Dam Development. The site is at the K4 Shaft that forms part of the Marikana Operations, North West Province (Figure 1.1 to 1.3). The report forms part of the Environmental Impact Assessment (EIA) process and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to understand the cultural layering of the Project area. 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 finds were limited to broken down foundations and a series of circular packed stone lines. 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 proposed Project are outlined under Table 2 and 3.

**Table 2: Project Description**

<b>Project area</b>	The proposed Project is situated on a Portion of the Farms Zwartkoppies 296JQ and Rooikoppies 297JQ
<b>Magisterial District</b>	Rustenburg Local Municipality
<b>Central co-ordinate of the development</b>	-25.6696574, 27.4720818
<b>Topographic Map Number</b>	2527CB

**Table 3: Infrastructure and project activities**

<b>Type of development</b>	Waste Rock Dump and Pollution Control Dam
<b>Size of development</b>	203 830 m <sup>2</sup>
<b>Project Components</b>	Additional infrastructure that needs to be implemented include the construction of: <ul style="list-style-type: none"> <li>• A V-drain around the current waste rock dump. The V-drain is considered as catchment berms on either side of the waste rock dump and is located on a ridge.</li> <li>• A Pollution Control Dam (PCD) that will be lined and completed with a recovery sump for the recycling of stormwater runoff for the mining operations.</li> <li>• A pipeline from the K4 Shaft to the PCD.</li> <li>• An emergency spillway to manage the overflow.</li> </ul>
<b>Waste rock dump, berm and channels:</b>	The total final waste rock dump footprint area will be 203 830 m <sup>2</sup> and this footprint has already been authorised in the WPL EMPR. The berm will be 1353 meters in length and 10,83 meters wide. Catchment 203830 m <sup>2</sup> 10 years – phase 1 only. Berm length West 550 m, Berm Length East 600 m. Average width 10.83 m
<b>Pollution control dam</b>	The PCD will have a capacity of 35 203 m <sup>3</sup> and will have a maximum height of 3 m from the floor of the dam. The V-drain will discharge via 2 legs into the PCD. The trapezoidal channels will have a max flow of 6452 l/s from the East leg ( a 1:100 year storm estimate flow is 2500 l/s/ leg)
<b>Pipelines</b>	The pipeline will be installed to transfer water from the PDC to the K4 Shaft for re-use. The pipeline will be 500m in length with a total pump capacity of 60m <sup>3</sup> /hour., The pipeline will be a 110 OD HDPE line, sized to empty the dam for a 1:20 year ARI over 14 days continuous operation.

## 1.3 Alternatives

No alternatives were provided, but the area assessed allows for siting of the development to avoid impacts to heritage resources.

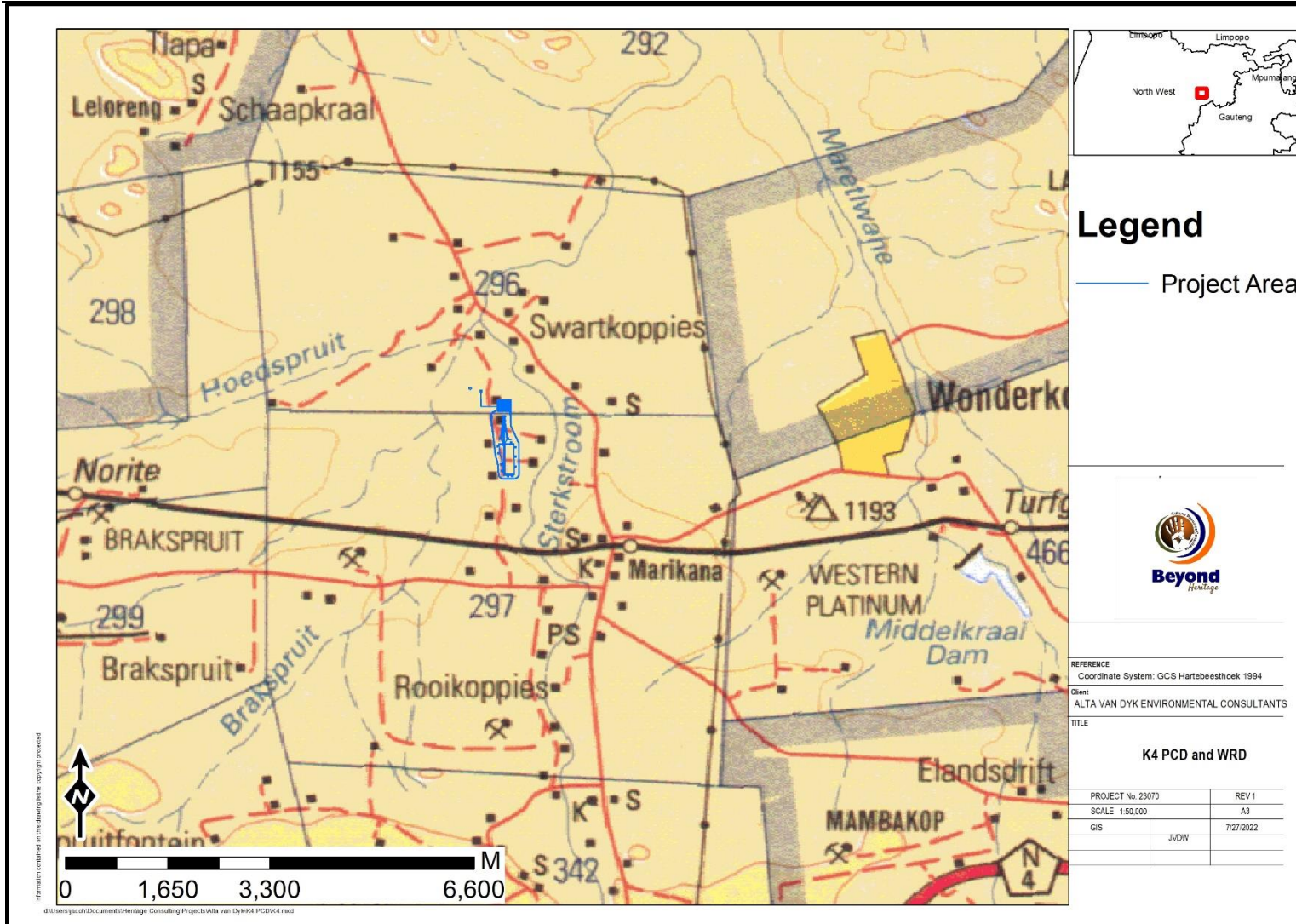


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).



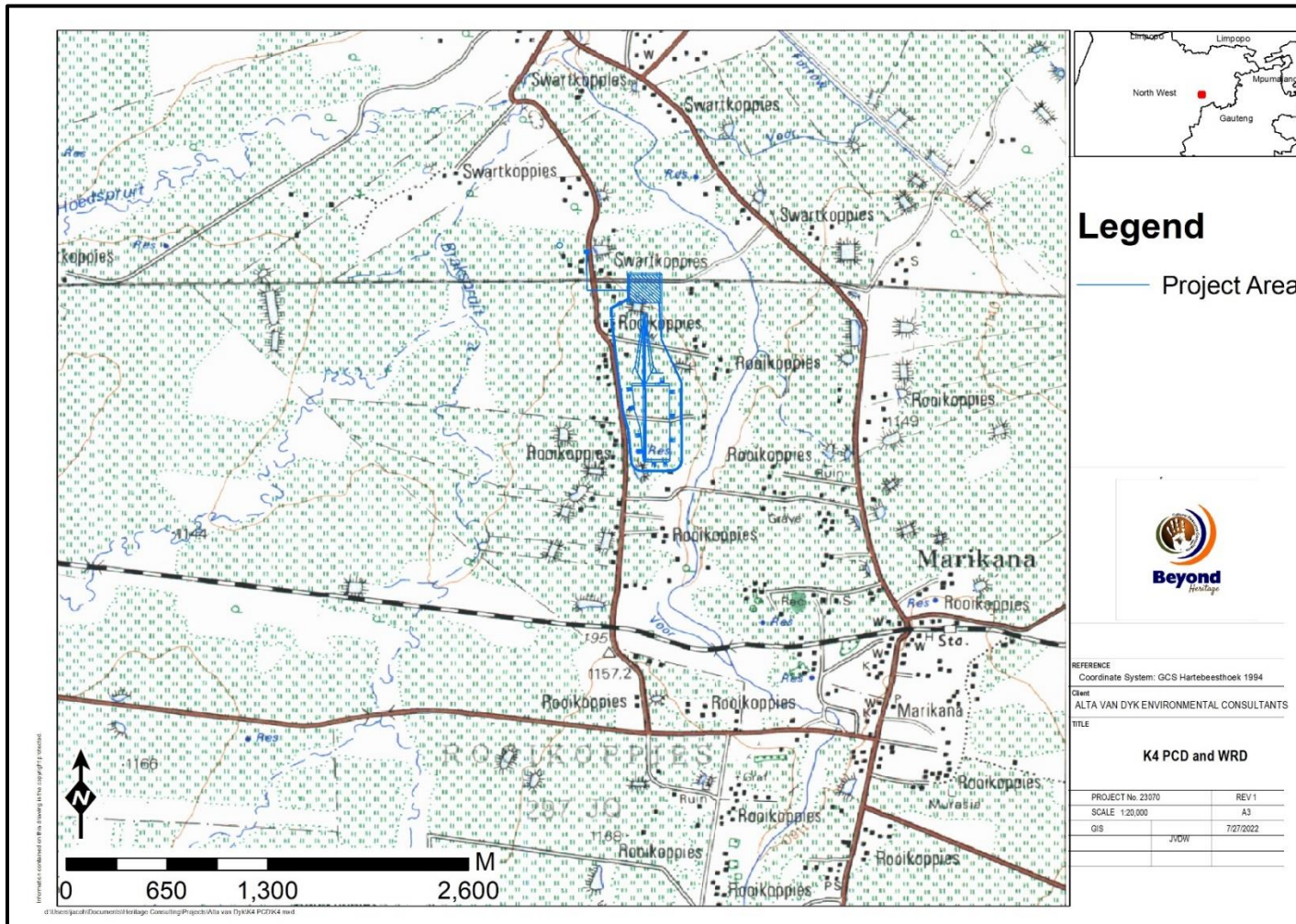


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).



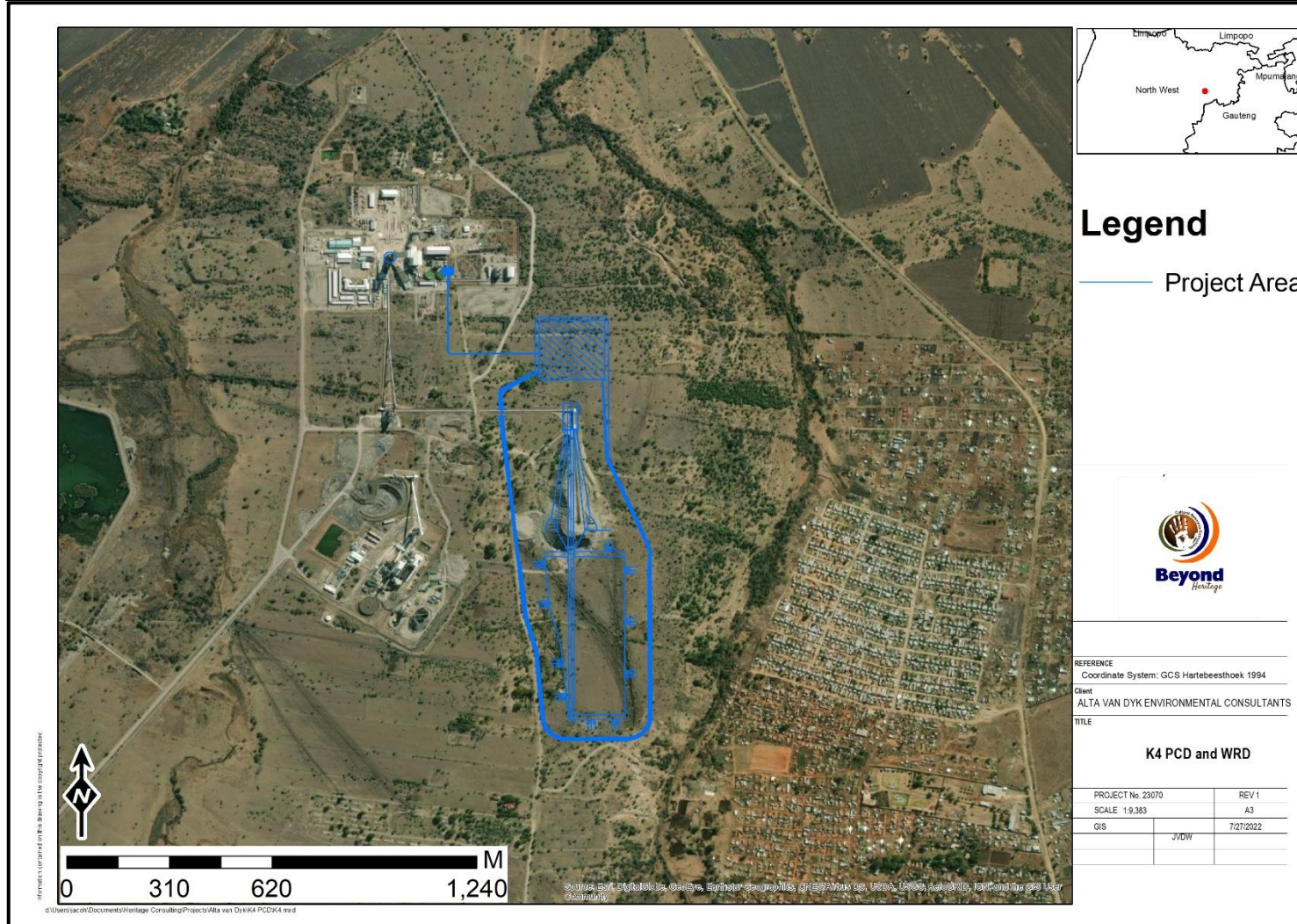


Figure 1.3. Aerial image of the study area and Project components.



## 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))

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

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

The HIA should be submitted, as part of the impact assessment report or EMP, to the Provincial Heritage Resource Agency (PHRA) 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 EMP, 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 Southern African Development Community (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 include (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 (NHRA), as well as the National Health Act of 2003 and are under 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 of 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**

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 (conducted by the EAP) process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings.

### 3.4 Site Investigation

The aim of the site visit was to:

- a) survey the proposed Project area to understand the heritage character of the development footprint (focussing on the current layout);
- 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	07 June 2023
Season	Winter – The time of year did influence the survey as the Project area was overgrown after the rainy season that limited heritage visibility. The development footprint was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

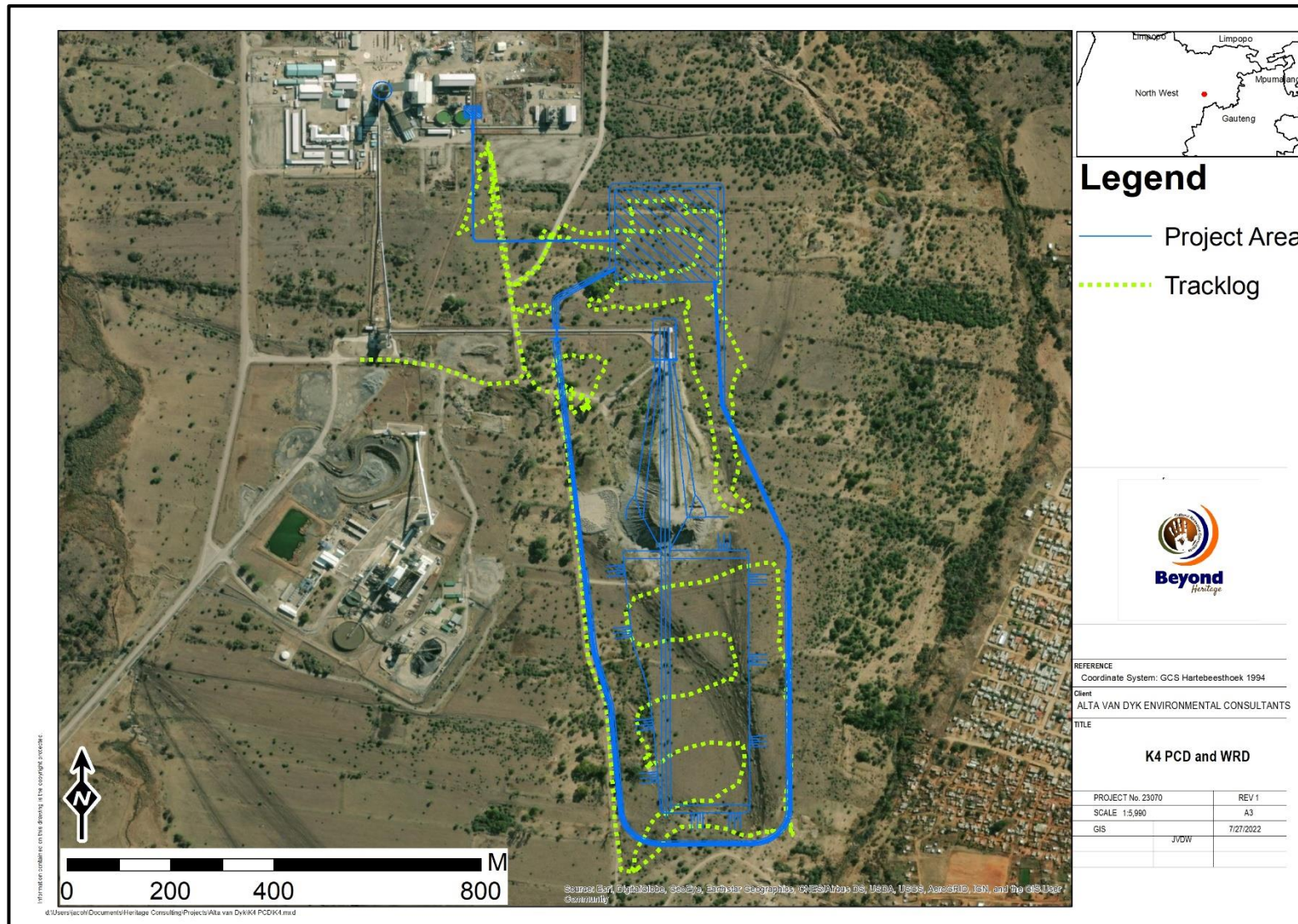


Figure 3.1. Tracklog of the survey path in green.

### 3.5 Site Significance and Field Rating

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

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

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

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

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

**Table 5: Heritage significance and field ratings**

<b><i>FIELD RATING</i></b>	<b><i>GRADE</i></b>	<b><i>SIGNIFICANCE</i></b>	<b><i>RECOMMENDED MITIGATION</i></b>
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 Alta van Dyk Environmental.

The significance of the identified impacts will be determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and will be assessed according to methodology prescribed in the following section.

**Table 6. Scale utilised for the evaluation of the Environmental Risk Ratings**

Evaluation Component	Rating	Scale	Description / criteria
<b>MAGNITUDE of negative impact</b> (at the indicated spatial scale)	10	Very high	Bio-physical and/or social functions and/or processes might be <i>severely</i> altered.
	8	High	Bio-physical and/or social functions and/or processes might be <i>considerably</i> altered.
	6	Medium	Bio-physical and/or social functions and/or processes might be <i>notably</i> altered.
	4	Low	Bio-physical and/or social functions and/or processes might be <i>slightly</i> altered.
	2	Very low	Bio-physical and/or social functions and/or processes might be <i>negligibly</i> altered.
	0	Zero	Bio-physical and/or social functions and/or processes will remain <i>unaltered</i> .
<b>MAGNITUDE of POSITIVE IMPACT</b> (at the indicated spatial scale)	10	Very high	Positive: Bio-physical and/or social functions and/or processes might be <i>substantially</i> enhanced.
	8	High	<b>Positive:</b> Bio-physical and/or social functions and/or processes might be <i>considerably</i> enhanced.
	6	Medium	<b>Positive:</b> Bio-physical and/or social functions and/or processes might be <i>notably</i> enhanced.
	4	Low	<b>Positive:</b> Bio-physical and/or social functions and/or processes might be <i>slightly</i> enhanced.
	2	Very low	<b>Positive:</b> Bio-physical and/or social functions and/or processes might be <i>negligibly</i> enhanced.
	0	Zero	<b>Positive:</b> Bio-physical and/or social functions and/or processes will remain <i>unaltered</i> .
<b>DURATION</b>	5	Permanent	<b>Impact in perpetuity. –</b>
	4	Long term	Impact ceases after operational phase/life of the activity > 60 years.
	3	Medium term	Impact might occur during the operational phase/life of the activity – 60 years.
	2	Short term	Impact might occur during the construction phase - < 3 years.
	1	Immediate	<b>Instant impact.</b>
<b>EXTENT</b> (or spatial scale/influence of impact)	5	International	<b>Beyond the National boundaries.</b>
	4	National	Beyond provincial boundaries, but within National boundaries.
	3	Regional	Beyond 5 km of the site and within the provincial boundaries.
	2	Local	Within a 5 km radius of the site
	1	Site-specific	<b>On site or within 100 meters of the site boundaries.</b>
	0	None	<b>Zero extent.</b>
<b>IRREPLACEABLE</b> loss of resources	5	Definite	<b>Definite</b> loss of irreplaceable resources.
	4	High potential	<b>High</b> potential for loss of irreplaceable resources.
	3	Moderate potential	<b>Moderate</b> potential for loss of irreplaceable resources.
	2	Low potential	<b>Low</b> potential for loss of irreplaceable resources.
	1	Very low potential	<b>Very low</b> potential for loss of irreplaceable resources.
	0	None	<b>Zero potential.</b>
<b>REVERSIBILITY</b> of impact	5	Irreversible	Impact <b>cannot</b> be reversed.
	4	Low irreversibility	<b>Low</b> potential that impact might be reversed.
	3	Moderate reversibility	<b>Moderate</b> potential that impact might be reversed.
	2	High reversibility	<b>High</b> potential that impact might be reversed.
	1	Reversible	Impact <b>will be</b> reversible.
	0	No impact	No impact.
<b>PROBABILITY</b> (of occurrence)	5	Definite	>95% chance of the potential impact occurring.
	4	High probability	75% - 95% chance of the potential impact occurring.
	3	Medium probability	25% - 75% chance of the potential impact occurring
	2	Low probability	5% - 25% chance of the potential impact occurring.

	1	<b>Improbable</b>	<5% chance of the potential impact occurring.
	0	<b>No probability</b>	<b>Zero probability.</b>
<b>Evaluation Component</b>	<b>Rating scale and description / criteria</b>		
<b>CUMULATIVE impacts</b>	<p><b>High:</b> The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p><b>Medium:</b> The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p><b>Low:</b> The activity is localised and might have a negligible cumulative impact.</p> <p><b>None:</b> No cumulative impact on the environment.</p>		

Once the Environmental Risk Ratings have been evaluated for each potential environmental impact, the Significance Score of each potential environmental impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact as per Table 7 below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.



**Table 7. Scale used for the evaluation of the Environmental Significance Ratings**

Significance Score	Environmental Significance	Description / criteria
125 – 150	Very high (VH)	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	High (H)	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	Medium-high (MH)	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked at.
40 – 74	Medium (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	Low (L)	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

### 3.7 Assumptions, 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 subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. Some areas within the Project area could not be accessed due to existing mining activities such as the large mine dump. The general archaeological visibility across the landscape was also extremely low due to the past agricultural activities as well as current mining activities that have led to a high level of surface disturbances. These limitations are successfully mitigated with the implementation of a chance find procedure and monitoring of the study area by the ECO. This report only deals with the current layout of the proposed development and consisted of non-intrusive surface surveys that focussed on tangible resources. 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.

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. 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, Rustenburg Local Municipality has a total population of 549 575 people, of whom 88,5% are black African, 9,4% are white, with the other population groups make up the remaining 2,1%. Of those aged 20 years and older, 5,4% have completed primary school, 36,2% have some secondary education, 31,1% have completed matric, and 8,9% have some form of higher education, while 5,4% of those aged 20 years and older have no form of schooling. 266 471 people are economically active (employed or unemployed but looking for work), and of these, 26,4% are unemployed. 34,7% of the 142 219 economically active youth (15 – 34 years) in the municipality are unemployed (stats.gov.za).

## 5 Results of Public Consultation and Stakeholder Engagement:

### 5.1.1 Stakeholder Identification

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

## 6 Contextualising the study area:

### 6.1 Literature Review (SAHRIS)

Many sites are known in the region and consists of multiple Later Iron Age stone walled sites and complexes with associated artefacts, Middle Stone Age scatters, multiple Historical ruins and homesteads, an Early Stone Age quarry, graveyards and graves, and Historical stone walling. A previous survey (see Pistorius 2002a) surveyed a section of the southern part of the current Project area. The following Cultural Resource Management (CRM) assessments (Table 6) were conducted in the larger area and consulted for this report:

**Table 6. CRM reports consulted for the study.**

Author	Year	Project	Findings
Pistorius, J.C.C.	2000	A Phase 1 Archaeological Survey of Portions 11777, 1178, 1179, 1180, 1181, 1182 of the Farm Hartebeespoort B 410 JQ in the Brits District of the North West: Addendum to the Environmental Management Programme Done for Eagle Quarries.	Stone walling sites, a lower grinding stone, potsherds.
Pistorius, J.C.C.	2002a	A Cultural Heritage Impact Assessment for Eskom's Power Supply for the Anglo Platinum Western Limb Tailings Retreatment Project Between the Bighorn Power Station and the Turf Shaft Substation in the Rustenburg District of the North West.	Multiple LIA sites, a village, a cemetery.
Pistorius, J.C.C.	2002b	A Heritage Impact Assessment for Eskom's New Proposed 88 kV Powerline From the Middelkraal Substation to the Big Horn/Wonderkoppies Power Stations on the Farm Elandsdrif 467 JQ and Middelkraal 466 JQ Near Marikana and Mooinooi in the North West Province of South Africa.	Two LIA sites, scattered potsherds, a graveyard,
Pelser, A.J.	2019	A Phase 1 HIA Report for Propose Development of Affordable Housing & Related Activities on Various Portions of the Farm Rooikoppies 297JQ in Marikana, Northwest Province.	Graves, ruins of recent farming structures,
Pelser, A.J.	2020	A Phase 1 HIA Report on Portions 36 & 83 of the Farm Zwartkoppies 296JQ North of Marikana, Bonjanala District Municipality Northwest Province.	Graves
Matenga, E.	2022	Phase I Heritage Impact Assessment for the Proposed Mixed Residential Development on Several Portions of the Farm Rooikoppies 297 JQ in Marikana, in the Rustenburg Local Municipality, Northwest Province.	A burial ground, recent farming structures.
Van Schalkwyk, J.A., Pelser, A.J.	1999	A Survey of Cultural Resources on the Farms Spruitfontein 341 JQ and Kafferskraal 342 JQ, Rustenberg District	Two Iron Age sites consisting of potsherds, grinding and hammer stones, cattle kraals, terraces, and stone built structures, an old mud-brick and cement structure, two unmarked graves and three cemeteries.
Huffman, T.N.	2005a	The Archaeology of the Anglo Platinum Lease Area, Rustenburg: A Consolidated Report for Anglo Platinum	MSA scatters, Iron Age sites, potsherd scatters, stonewalling sites, multiple stonewalling complexes, ESA quarry, historical homesteads.
Huffman, T.N.	2005b	Leeuwkop Archaeological Assessment: A combined Phase 1 Report Prepared for Knight Piésold Consulting.	Scattered potsherds, multiple large Iron Age stonewalling sites, multiple Historical stonewalling sites, Historical settlements remains, a graveyard, Historical homesteads, Historical artefacts.

Küsel, U.	2007	Cultural Heritage Resources Impact Assessment of Proposed Mining Area on the Farm Leeuwkop 402 JQ North West Province.	Multiple LIA Stonewalling complexes and sites.
Pelser, A.J., van Vollenhoven, A.C.	2008a	A Report on a Cultural Heritage Impact Assessment for the Proposed Elandsdrift EMPR, near Mooinooi, Northwest Province.	A large Iron Age complex, two old farm buildings, foundations of labourer houses, foundations of former workers dwellings, a graveyard.
Pelser, A.J., van Vollenhoven, A.C.	2008b	A Report on a Heritage Impact Assessment for the Buffelsfontein East & West Expansion Project on the Farm Buffelsfontein 465 JQ, near Mooinooi, North West Province.	Foundation of a rectangular structure, LIA potsherd, an extensive LIA stone walled complex.
Birkholtz, P., van Rooyen, A.	2003	Cultural Heritage Assessment as Part of the Environmental Management Programme Report for the Proposed Mining of Granite on Portion 1219 of the Farm Hartebeespoort "B" 410 JQ in North West Province, South Africa	LIA stonewalling with associated artefacts.

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

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

## 6.2 Archaeological Background

The archaeology of the area spans across the Stone Age, Iron Age, and Historical period.

### 6.2.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, 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 Jubilee shelter, approximately 28km north of the Project area has been excavated and provides a record from the Late Pleistocene to the 7th Century AD (Turner 1986), an extended cultural sequence with assemblages' characteristic of the Middle Stone Age, Early Later Stone Age and Later Stone Age including assemblages from the Oakhurst and Wilton industries (Wadley 1986). The Jubilee shelter provides evidence of hunter–gatherer occupation during three phases of agro pastoralist contact, beginning in 225 AD and characterised by cooperative contact, prior to the hunter-gatherers being either assimilated or dispersed to other areas (Wadley 1996). Extensive research has also been conducted on LSA sites situated along the Magaliesberg Mountains with many Stone Age scatters being identified throughout the mountain range (Carruthers 2007). Rock art sites are also common within the Rustenburg region dating to the LSA. In a survey conducted by Huffman (2005a) approximately 16km west of the Project area, identified an ESA quarry indicating local production of ESA tools during that time period.

### 6.2.2 Iron Age

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

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

The greater region saw expansive Iron Age occupation as early as AD150 at Jubilee Shelter where Bambata ceramics were identified with the ceramics facies dating to around AD150 to AD750 (Wadley 1996). Another prominent EIA site situated approximately 43km southeast of the Project area,

Broederstroom was identified as an EIA site with Mzonjani ceramics found at the site. The site dates to around AD450 to AD750 (Huffman 2007). The Broederstroom Iron Age site was declared a Provincial Heritage Site in 1980 as it was the one of the earliest known Iron Age sites south of the Limpopo and consists of around 250 years of occupation by iron and copper producers (Mason 1981).

Just west of the Project area are a range of granite hills which form part of the Thaba-ea-Maralla range of mountains. These granite hills are abundantly scattered with Iron Age settlements including many stonewalling sites (Pistorius 2002a). No stonewalling was identified within the Project area.

The hills as well as the larger area was occupied by predecessors of the Tswana people from around the 17<sup>th</sup> century. These include the Fokeng, Bapo ba Mōgale and Bakwena ba Mogōpa, with the Fokeng largely occupying current day Rustenburg. Around AD1650 the Bakwena ba Mogōpa moved into the larger region and settled north-east of present-day Brits. Their influence stretched across parts of the Crocodile, Apies, Pienaars, and Hennops Rivers. Around AD1750, they then moved east of the Apies River, only to return a few years later (Breutz 1953).

Around this time, the Bapo ba Mōgale also entered and settled within the larger region and this period is marked by great wealth and large cattle herds for them. One of their capitals was established at Wolhuterskop, approximately 23km southeast of the Project area.

Between AD1817 to AD1823, the Pedi, under the rule of Maleleku were invading and attacking settlements around the Magaliesberg Mountains. The Pedi went on to attack the Bapo ba Mōgale after they were unsuccessful in their attack of the Bakwena ba Mogōpa near the Apies River (Breutz 1953). The Pedi had been defeated in both attacks but did claim large herds of cattle as well as women and children from both groups. During the battle, Mogale Mogale, the heir to the Bapo throne was hidden in a kloof as he was only a child. The origins of the name of the Magaliesberg Mountains are believed to have originated to Mogale Mogale (Carruthers 2007).

### **6.2.3. Historical Period**

During the mid-17<sup>th</sup> century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. A period that is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Giliomee & Mbenga 2007). The Matabele led by Mzilikazi left their settlements along the Vaal River in the late 1820s and entered the region surrounding the study area. They went on to attack the Bakwena ba Mogōpa around present day Zilkaatsnek, further east of the Project area. Three separate battles took place which ended with the surrendering of the Bakwena ba Mogōpa whereby they were forced to join the Matabele and those that refused were slaughtered (Carruthers 2007). Mzilikazi then went on to attack the Bapo ba Mōgale in present day Wolhuterskop, and west of Zilkaatsnek. Their attack was successful and Mzilikazi and his Matabele then established three royal residencies across the northern foot of the Magaliesberg Mountains at Kungwini, Hlahlandlela, and Dinaneni. They would then remain settled along the Magaliesberg for five years. The remaining Bakwena ba Mogōpa and Bapo ba Mōgale who survived the attacks managed to flee and disperse across the greater landscape. Around 1850, both groups then moved and settled in present day Lesotho (Carruthers 2007).

After the Matabele were driven out of the Magaliesberg Mountains by the Voortrekkers, the first Voortrekker to settle in the larger region, Albert Venter settled on the farm De Kroon in 1840, near present day Brits. Another Voortrekker, P.J Fourie also settled in the area. Marikana was first laid out in the farm Rooikoppies in the 1870s when farmers began occupying Marikana and Mooinooi. In the 1960s there was a surge of tobacco and citrus farming in Marikana with other crops following which further grew Marikana (Pistorius 2002a). Mining of platinum and chrome led to further developments within the region following the discovery of the Merensky Platinum Reef which was discovered in 1929.

#### 6.2.4. Battlefields

The larger region of the Magaliesberg was the backdrop to multiple skirmishes and battles between the British and the Boers. In December 1880, during the First Boer War, a Boer Commando of around 600 men stormed Rustenburg and demanded they surrender the fort. The refusal of the British garrison led the Boers to dig multiple trenches to reach closer to the fort ([sahistory.co.za](http://sahistory.co.za)). After a few months, the British garrison surrendered to the Boers in March of 1881.

During the Anglo-Boer War (1899- 1902), British troops had built blockhouses along the Magaliesberg Mountain, many of these are situated in the vicinity of the study area near Kommandonek and Pampoennek.

The first Battle of Silkaatsnek took place on 11 July 1900 when 600 Boers led by General De la Rey attacked the 240 British led by Colonel H.R Roberts who had been camping at Silkaatsnek. The Boers were attacking from the top of the Magaliesberg and were too high for the British to defend themselves and the British had surrendered by nightfall. The Second Battle of Silkaatsnek took place on 2 August 1900 whereby the British troops led by General Ian Hamilton was successful in forcing the Boers out of Silkaatsnek.

Another battle, the Battle of Dwarsvlei occurred in the larger region on 11 July 1900 when General Sarel Oosthuizen led the Boer troop to ambush the British troop led by General Horace Smith-Dorrien who were on route to Rustenburg. The Boers had killed many of the British and by sunset, General Oosthuizen led a charge which would fatally wound him and lead to his death in the following weeks.

Below the Nooitgedacht cliffs, the British troop of 1500 men led by Major-General Ralph Clements were camping on the 8th December 1900 (Pretorius 2000). Early on the 13th December, 2500 Boers led by Generals De la Rey, Smuts, and Beyers attacked the British troops. With General Beyers situated on the Magaliesberg summit and General De la Rey at the base, the Boers were able to overtake the British troops in what is now called the Battle of Nooitgedacht and this was a significant win for the Boers ([magaliesbergheritage.co.za](http://magaliesbergheritage.co.za)).

## 7 Description of the Physical Environment

The Project area is situated about 7 km north of the N4 highway next to the Sibanye Lonmin Karee K4 mine. The Project area consists of highly disturbed areas through mining activities which include sections within the plant and a large mine dump situated in the middle of the Project area. The surrounding landscape consists of open fields with a flat topography that has been fallow for a number of years and is now overgrown with vegetation. The study area is characterised by vertic soils and evidence of past agricultural activities are visible in and around the Project area. A small stream runs along the eastern boundary of the Project area. Local communities use the open field for grazing livestock. Existing infrastructure within the Project area include mining infrastructure such as powerlines, pipelines, a large conveyer system running to the mine dump and various small gravel roads. General site conditions are illustrated in Figures 7.1 to 7.12.





Figure 7.1. General site conditions - Northern boundary of the Project area.



Figure 7.2. General view of the Mine.



Figure 7.3. General view of the mine situated on the northern boundary of the Project area.



Figure 7.4. General site conditions.



Figure 7.5. General view of the open area situated north of the large mine dump - The area is highly disturbed.



Figure 7.6. General view of the existing gravel roads that traverse the Project area.





Figure 7.7. View of the old mine dump and associated infrastructure - Image taken north of the dump facing south.



Figure 7.8. General view of the large open fields that are used for grazing by the local communities.



Figure 7.9. Image showing the large open fields - Image taken from the southern boundary facing north.



Figure 7.10. General view of the disturbed areas around the mining dump.



Figure 7.11. View of the degraded water canal along the western boundary of the Project area.



Figure 7.12. General site conditions.



## 8 Findings of the Survey

### 8.1 Heritage Resources

Heritage observations within the study area include broken down foundations and a series of circular packed stone foundations or lines and were recorded as Waypoints. Based on Topographic maps (Figure 8.16) the features were constructed before 1968 and it could be older than 60 years. The features have been demolished to the extent that their potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and it is therefore of low heritage significance (GP C), but it is protected on account of its age. General site conditions and site distribution of the recorded observations are illustrated in Figure 8.1 and briefly described in Table 9. Recorded features in relation to the study area are illustrated in Figure 8.2 to 8.15.

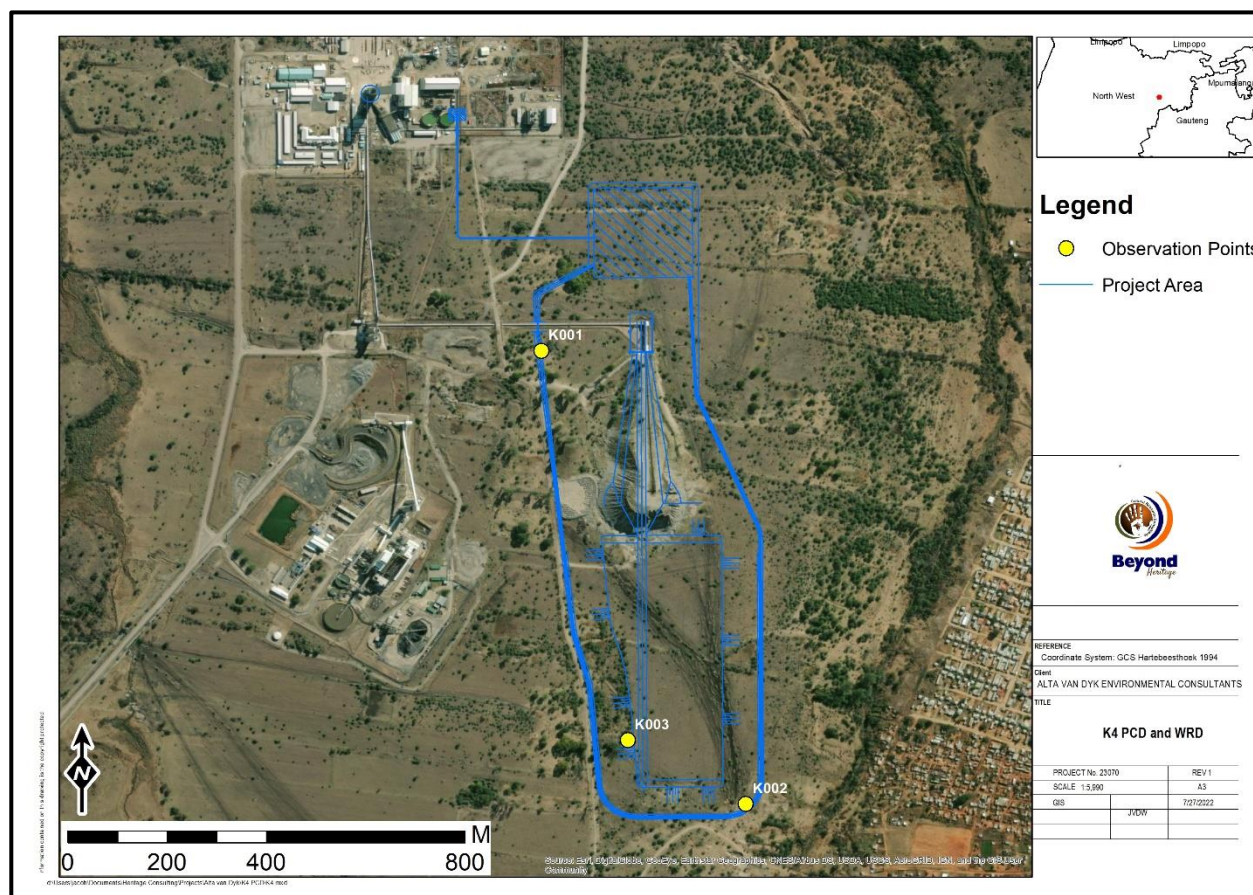


Figure 8.1. Site distribution map.

**Table 8. Recorded finds in the study area**

<b>Label</b>	<b>Description</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Significance/ Field Rating</b>
K001	The site is 50 x 50m in size and consists of a series of broken-down foundations situated within a small thicket of trees within the northern sections of the Project area near the mine. These features may possibly have been mining infrastructure that has since been demolished.	27°28'24.09"E	25°40'23.54"S	Low Significance GP C
K002	The site is 10 x 10m in size and consists of a series of circular packed stone foundations. These features could resemble the border around gardens or hut foundations. Some building rubble and a disused water reservoir is located close to these features.	27°28'37.42"E	25°40'53.15"S	Low Significance GP C
K003	The site is 10 x 10m in size and consists of a large broken-down structure or foundation. The feature seems to have been broken down recently. Some built stone features are situated nearby on an outcropping of stone. These seem to have been part of a garden. The surrounding area shows a high amount of surface disturbances.	27°28'29.72"E	25°40'48.98"S	Low Significance GP C





Figure 8.2. Series of broken-down foundations at K001.



Figure 8.3. Broken down foundation at K001.



Figure 8.4. Small thicket of trees at K001.



Figure 8.5. Foundations at K001.



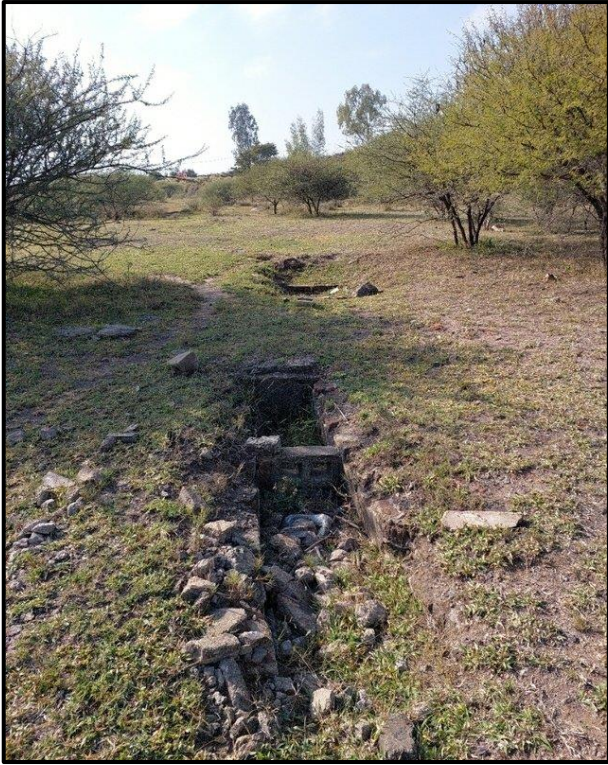


Figure 8.6. Degraded cement trough at K001



Figure 8.7. General view of circular packed stones at K002.



Figure 8.8. View of a circular packed stone line at K002.



Figure 8.9. General site view of K002.





Figure 8.10. Water reservoir no longer in use at K002.



Figure 8.11. View of a large stone packed circle at K002



Figure 8.12. Building rubble present at K002.

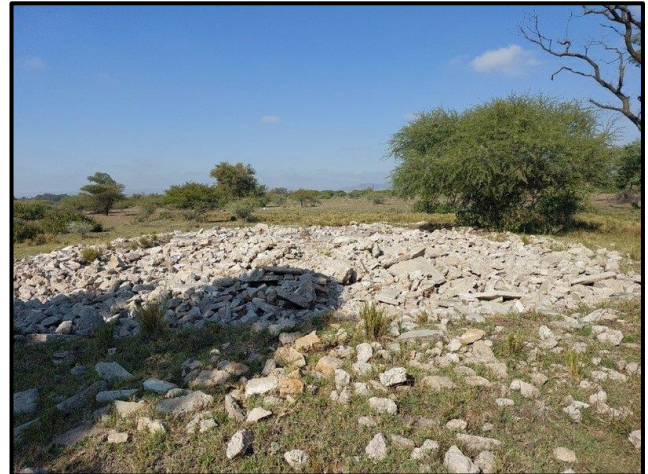


Figure 8.13. General view of the broken-down structure or foundation at K003.

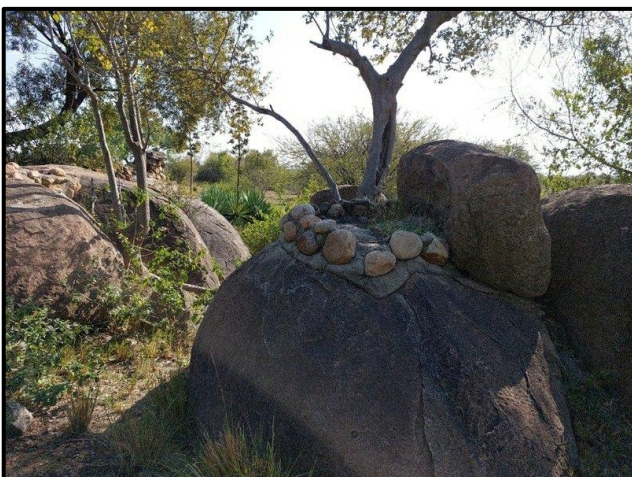


Figure 8.14. Stone features on an outcropping of stone at K003.



Figure 8.15. General site conditions at K003.



### 8.2 Cultural Landscape

The project is in a rural setting with a cultural layering from the Stone and Iron Age and is characterised by large scale agricultural activities including tobacco and citrus farming as well as cattle farming. More recently the area has developed, and now includes an industrial element. The area includes largescale ongoing mining activities throughout the region.

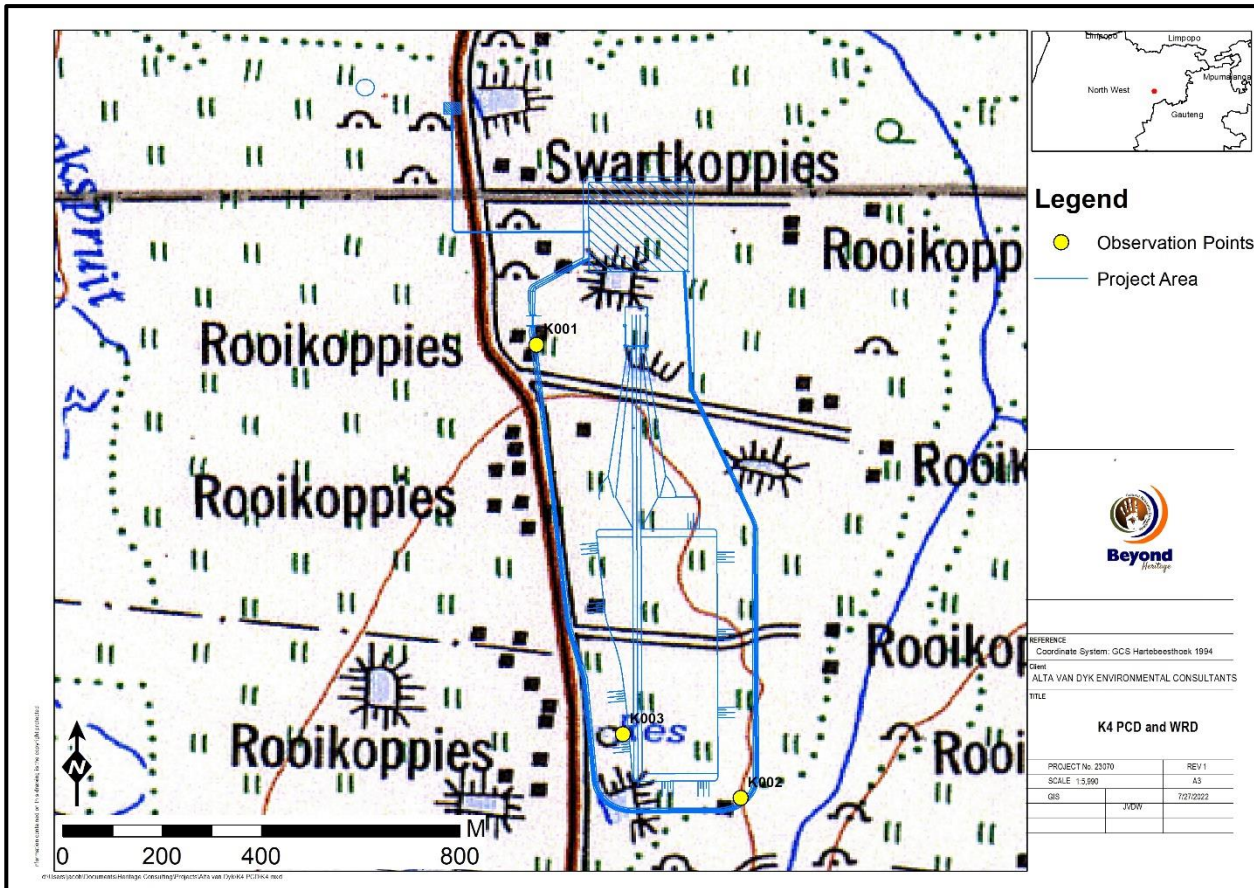


Figure 8.16. 1968 Topographic map indicating structures at K001 and K002 as well as a Reservoir at K003.

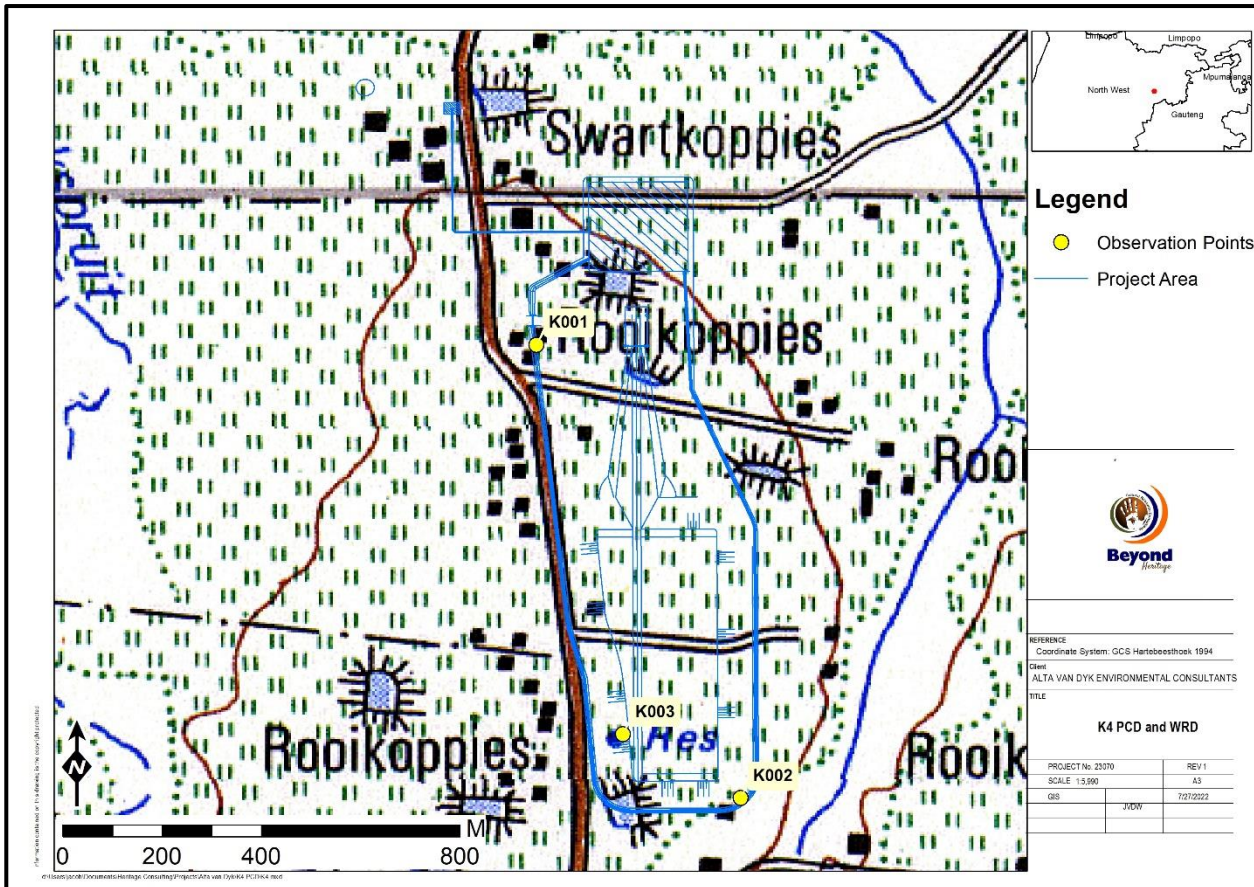


Figure 8.17. 1982 Topographic map indicating structures at K001 and K002. The reservoir is still indicated at K003. The study area is indicated as cultivated.



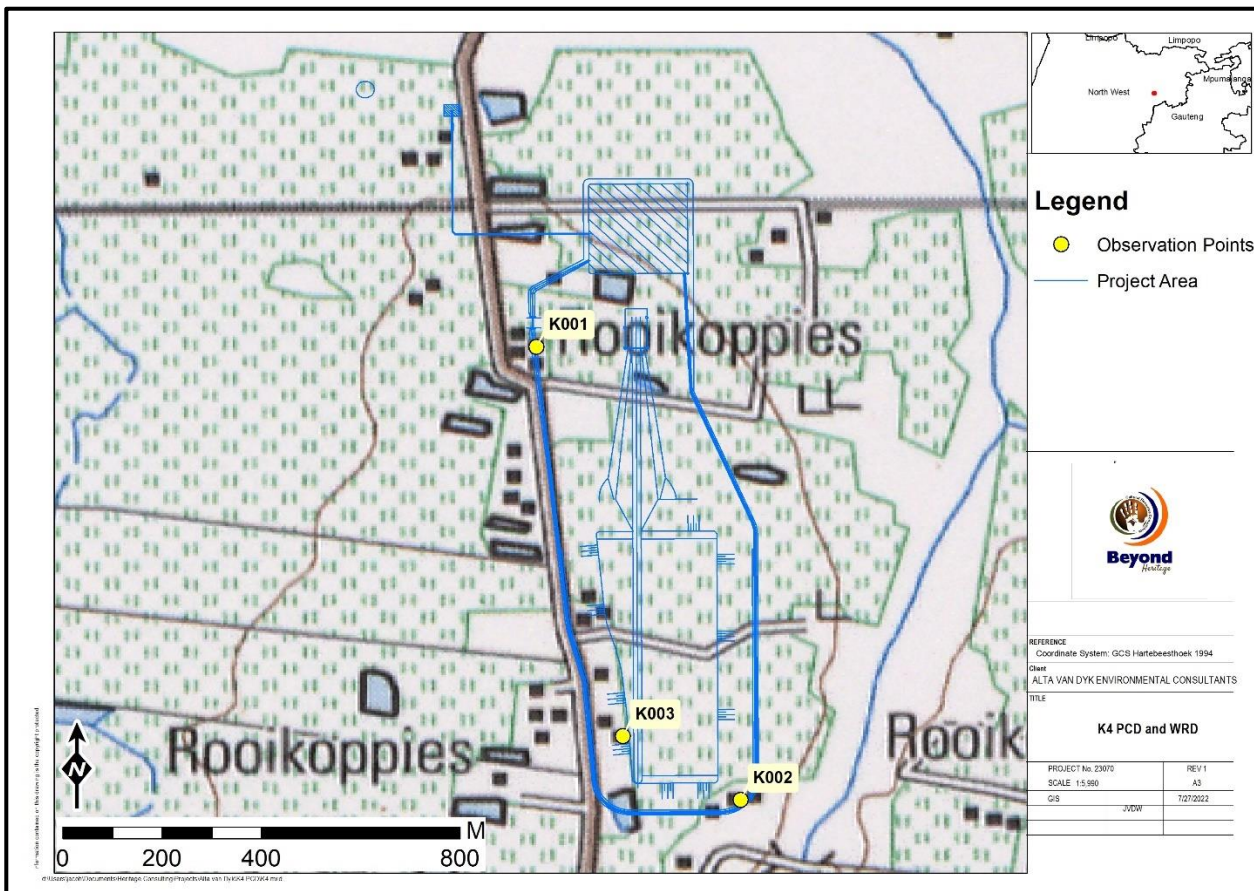
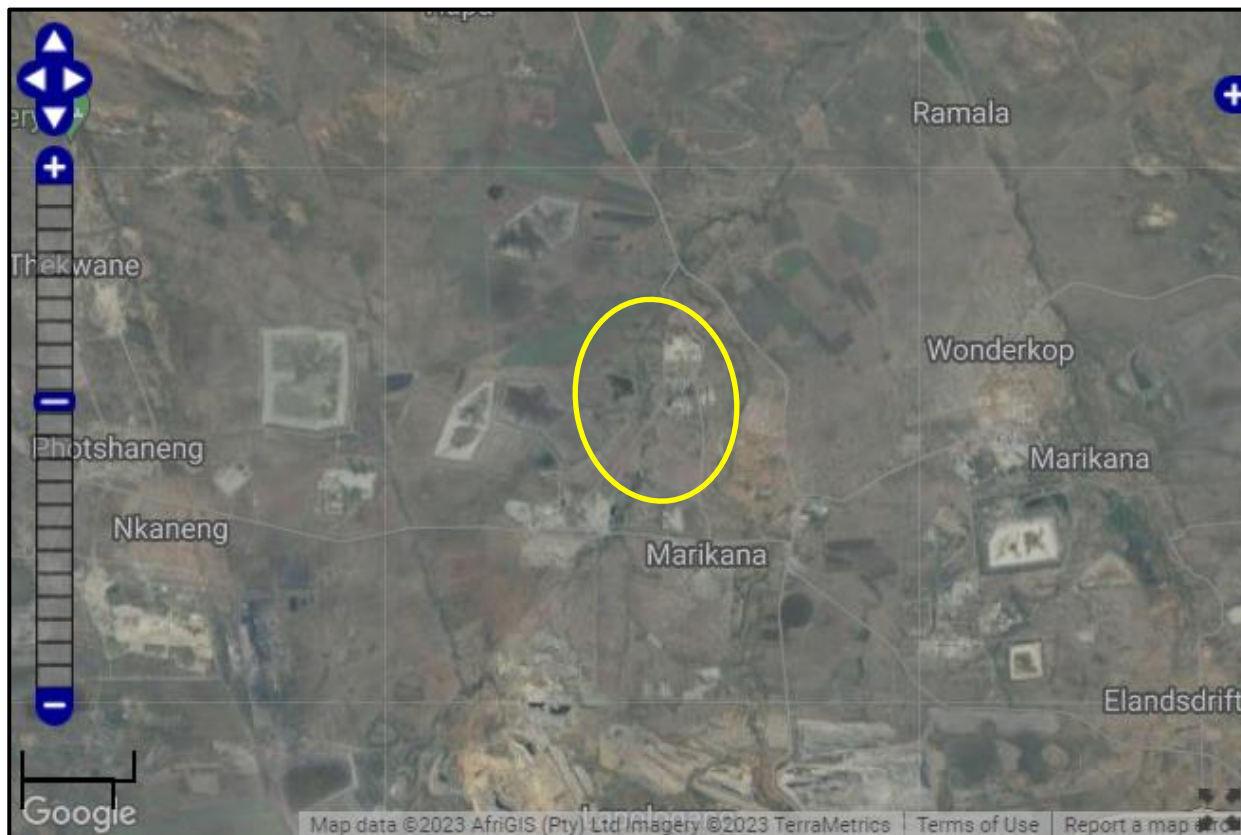


Figure 8.18. 1996 Topographic map of the study area indicating structures at K001, K002 and K003.

### 8.3 Paleontological Heritage

The study area is indicated as of insignificant/zero sensitivity on the SAHRA paleontological sensitivity map (Figure 8.19), and no palaeontological studies are required.



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

## **9 Potential Impact**

The recorded sites are indicated on a Topographic Map dating to 1968 and is assumed to be older than 60 years and therefore protected by the NHRA based on its age. The features have been demolished to the extent that it holds very little if any heritage value and the potential impact is low.

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. Impacts of the Project on heritage resources is expected to be low during all phases of the development if mitigation measures are followed (Table 10).

### **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 during the operation phase.

9.1.4 Impact Assessment for the Project

Table 9. Impact assessment on the project.

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								Cumulative	Status	RECOMMENDED MITIGATION MEASURES/REMARKS	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		M	D	S	I	R	P	TOTAL	SP				M	D	S	I	R	P	TOTAL	SP
Cultural Heritage Impact Assessment																				
Heritage Resources	Waste Dump and Pollution Control Dam Rock and Dam	2	5	3	5	5	2	40	L	Low	Negative	Implementation of a chance find procedure for the Project	2	5	3	0	0	2	20	L

## 10 Conclusion and recommendations

The Project area consists of highly disturbed areas through mining activities which include sections within the plant and a large mine dump situated in the middle of the Project area. The Project area used to be cultivated from the 1960 onwards and is considered to be of low heritage potential as a result of the continued disturbance of the Project Area.

This was confirmed during the survey and heritage observations were limited to the remains of demolished ruins (K001 and K003) as well as a series of circular packed stone foundations/lines (K002) that could resemble the border around gardens or hut foundations. These features are indicated on a Topographic Map dating to 1968 and is assumed to be older than 60 years. The features have been demolished to the extent that their potential to contribute to aesthetic, historic, scientific and social aspects are non-existent, and is therefore of low heritage significance.

The palaeontological sensitivity of the Project area is indicated as insignificant/zero and no palaeontological studies are required. It is recommended that the Project can commence on the condition that the following recommendations (Section 10) are implemented as part of the EMP 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 after receiving comments from SAHRA:

#### Recommendations:

- The structural remains at K001, K002 and K003 should be recorded and mapped prior to development, after which a destruction permit can be applied for;
- Through stakeholder engagement the possible presence of graves should be confirmed prior to development;
- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage resources (outlined in Section 10.2) in case heritage resources are uncovered during construction.

### 10.2 Chance Find Procedures

#### 10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefore 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 10.5.

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

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease

work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.

- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

### **10.3 Reasoned Opinion**

The overall impact of the Project is considered to be low 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.

### **10.4 Potential risk**

Potential risks to the proposed Project are the occurrence of intangible features, unrecorded cultural material and burial sites. This can cause delays during construction, as well as additional costs involved in mitigation, as well as possible layout changes.

**10.5 Monitoring Requirements**

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

- *Induction training:* Responsible staff identified by the 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 from pre-construction and construction activities. The ECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

**Table 10.** Monitoring requirements for the Project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Cultural Resources Chance Finds	Entire Project area	ECO	Weekly (Pre construction and construction phase)	Proactively	<ul style="list-style-type: none"> <li>• If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented:                             <ol style="list-style-type: none"> <li>1. Cease all works immediately;</li> <li>2. Report incident to the Sustainability Manager;</li> <li>3. Contact an archaeologist/ palaeontologist to inspect the site;</li> <li>4. Report incident to the competent authority; and</li> <li>5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.</li> </ol> </li> <li>• Only recommence operations once impacts have been mitigated.</li> </ul>



**10.6 Management Measures for inclusion in the EMPr**

Table 11. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General Project area	Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during construction;	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
K001, K002 and K003	The structural remains at K001, K002 and K003 should be recorded and mapped prior to development, after which a destruction permit can be applied for.	Preconstruction	Preconstruction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General Project Area	Through stakeholder engagement the possible presence of graves should be confirmed prior to development.	Preconstruction	Preconstruction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

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