

HERITAGE IMPACT ASSESSMENT

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

**FOR THE PROPOSED MARETLWANA TRIBUTARY REHABILITATION PROJECT AT
MARIKANA OPERATIONS, NORTH WEST PROVINCE.**

Type of development:

Tributary Rehabilitation

Client:

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Applicant:

Sibanye-Stillwater

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APPROVAL PAGE

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Authority Reference Number	TBC
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Applicant Name	Sibanye-Stillwater

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REPORT OUTLINE

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

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae.	Section a
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority.	<i>Declaration of Independence</i>
(c) Indication of the scope of, and the purpose for which, the report was prepared.	Section 1
(cA) An indication of the quality and age of base data used for the specialist report.	Section 3.4.
(cB) A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Section 9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used.	Section 3
(f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives.	Section 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
(l) Description of any assumptions made and any uncertainties or gaps in knowledge.	Section 3.7
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities.	Section 1.3
(k) Mitigation measures for inclusion in the EMPr.	Section 10.1 and 10.5
(l) Conditions for inclusion in the environmental authorisation.	Section 10. 1 and 10.5
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation.	Section 10. 4.
(n) Reasoned opinion - (i) As to whether the proposed activity, activities or portions thereof should be authorised; (iA) Regarding the acceptability of the proposed activity or activities; and (ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan.	Section 10.2
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report.	Section 5
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto.	Refer to the Basic Assessment report
(q) Any other information requested by the competent authority.	No other information requested at this time

Executive Summary

The Sibanye-Stillwater Marikana Operations is divided into Western Platinum Limited (WPL) and Eastern Platinum Limited (EPL) sections. On the 25th of February 2018 a tailings pipeline spill occurred that affected approximately 2 km stretch of the secondary tributary of the Maretswana River. Sibanye-Stillwater is proposing the rehabilitation of the secondary tributary of the Maretswana River. Sibanye-Stillwater appointed Alta van Dyk Environmental Consultants cc as the independent environmental assessment practitioner (EAP) to apply for Environmental Authorization for the Project. Alta van Dyk Environmental Consultants cc in turn, appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed through a desktop assessment and by a non-intrusive pedestrian field survey. Key findings of the assessment include:


- The archaeological record of the region is well documented and many LIA sites including large stone wall complexes are on record within the vicinity of the current Project (e.g., Pistorius 2000; 2002a; 2002b; 2002c, Huffman 2005a; 2005b, Küsel 2007) One of these previously identified LIA sites (see Pistorius 2002a) is situated near the northern banks of the tributary but will not be impacted on by the project;
- According to the South African Heritage Resource Authority (SAHRA) Paleontological sensitivity map the study area is of insignificant sensitivity and no further studies are required for this aspect;
- During the site visit no sites of significance were recorded within the Project footprint.

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

Recommendations:

- Monitoring of the project area by the Environmental Control Officer (ECO) during pre-construction and construction phases for heritage chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:</p> <ul style="list-style-type: none"> • I act as an independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 49 A of the Act.
Signature	
Date	27/07/2023

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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ABBREVIATIONS

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

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

GLOSSARY

Archaeological site	Remains of human activity over 100 years old
Early Stone Age	~ 2.6 million to 250 000 years ago
Middle Stone Age	~ 250 000 to 40-25 000 years ago
Later Stone Age	~ 40-25 000, to the historic period
The Iron Age	~ AD 400 to 1840
Historic	~ AD 1840 to 1950
Historic building	Over 60 years old

1 Introduction

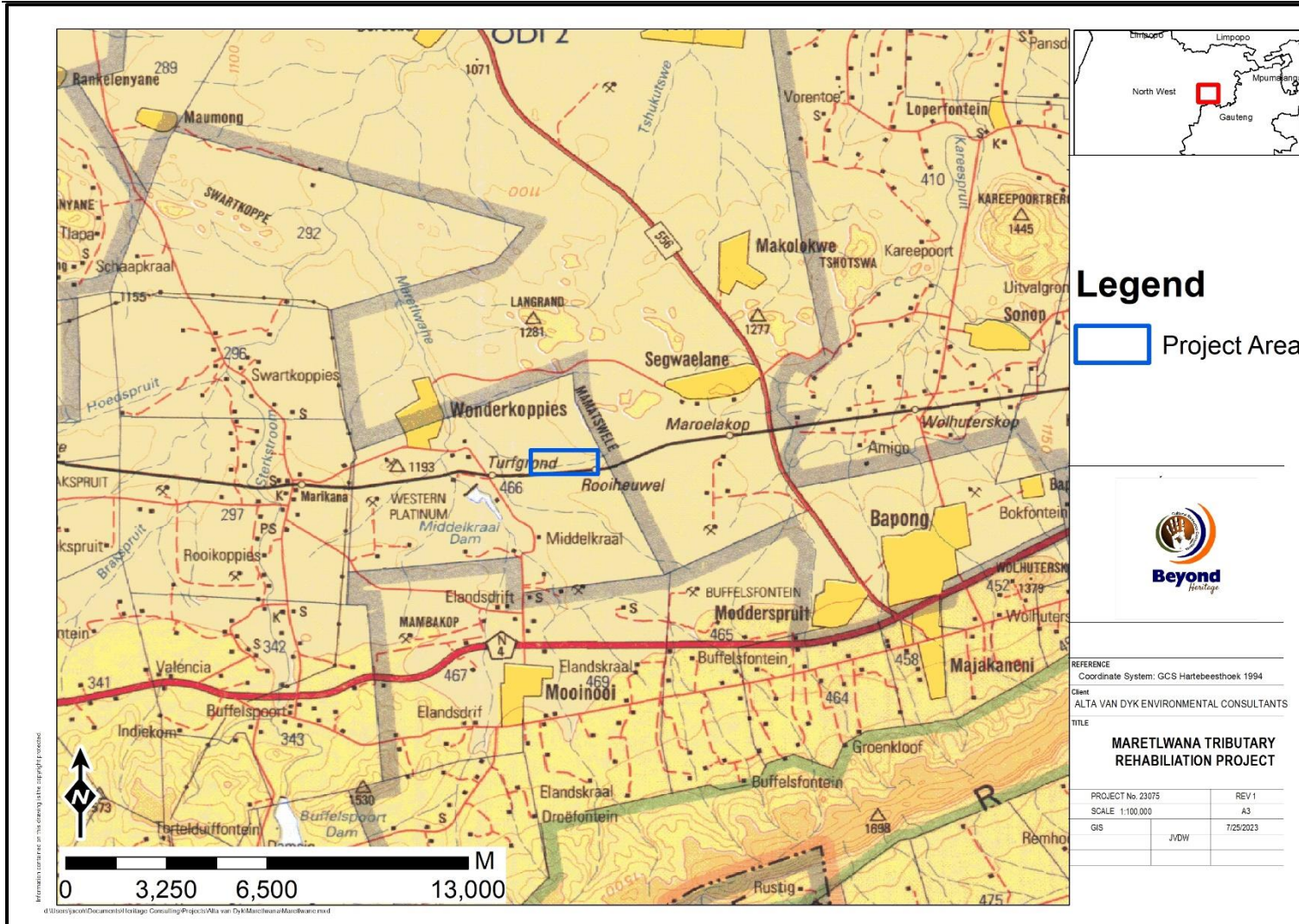
Alta van Dyk Environmental Consultants appointed Beyond Heritage to conduct a Heritage Impact Assessment (HIA) for Sibanye-Stillwater Maretswana Tributary Rehabilitation Project at Marikana Operations. Sibanye-Stillwater Marikana Operations is located in the Marikana district, 40km east of the town of Rustenburg in the North West province of South Africa. The mining area covers approximately 214 km and stretches more than 30km from east to west and 15km from north to south. This operation is located on the Western Limb of the Bushveld Igneous complex. This project will take place on Portion 44 and 51 of the Farm Middelkraal 466 JQ (Figures 1.1 to 1.3). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the development.

The aim of the study was to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It served to assess the impact of the proposed project on non-renewable heritage resources. The study will submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. Recommendations are included to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999) (NHRA).

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

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

During the survey, no heritage resources were recorded in the study area. General site conditions and features in the study area were recorded by means of photographs, GPS locations and descriptions. Possible impacts were identified and mitigation measures are proposed in this report.



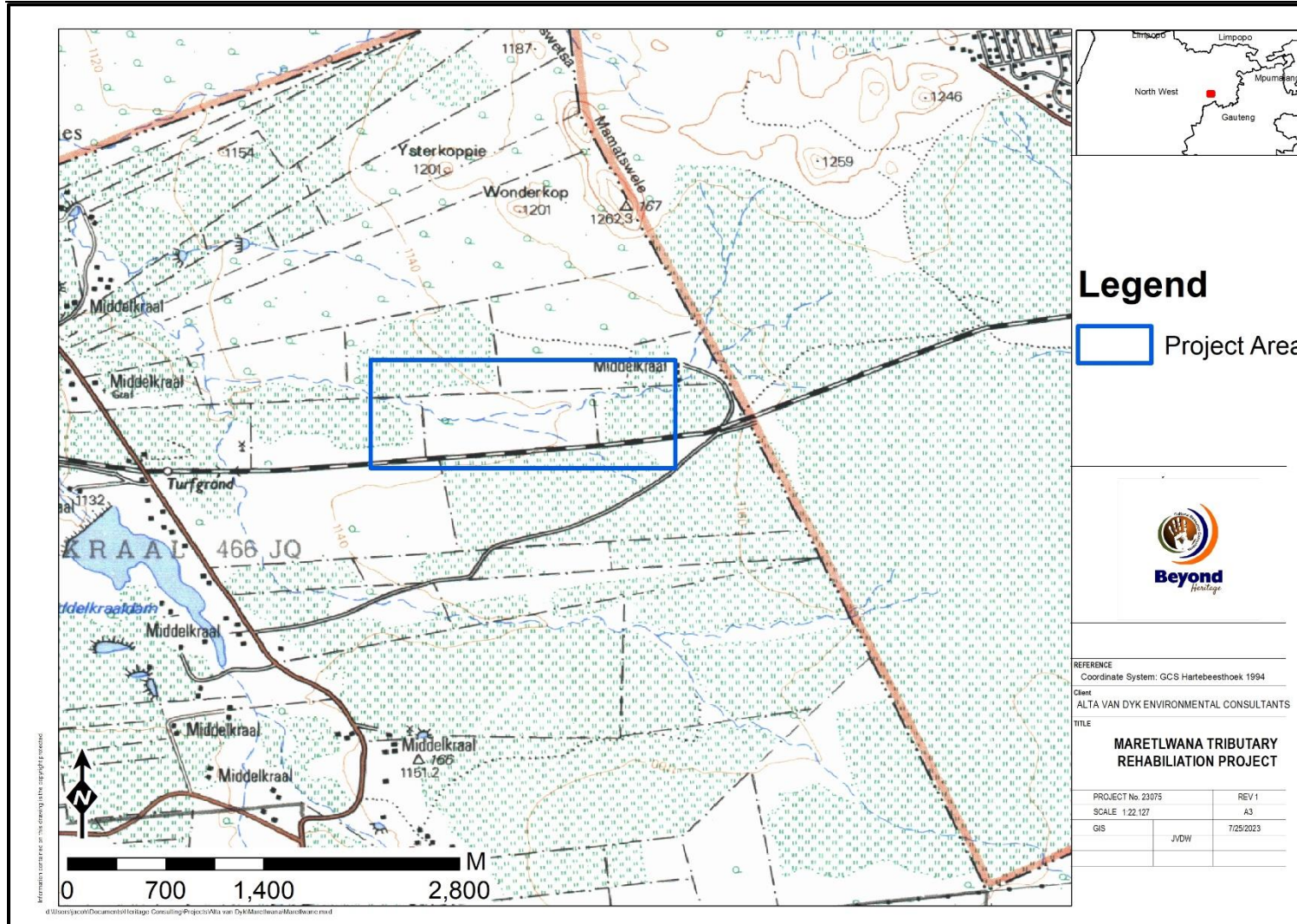


Figure 1-2. Local setting of the Project (2527 DA 1: 50 000 topographical map).

1.1 Terms of Reference

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

Field study

Conduct a field study to: (a) understand the cultural layering of the Project footprint; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

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

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

1.2 Project Description

Project components and the location of Maretswana Tributary Rehabilitation Project are outlined in Tables 2 and 3.

Table 2: Project Description

Magisterial District	Madibeng Local Municipality within the Bojanala Platinum District Municipality
Central co-ordinate of the development	-25.6873434, 27.5641917
1:50 000 Topographic Map Number	2527 DA

Table 3: Infrastructure and project activities

Type of development	Tributary Rehabilitation
<p>Project Details:</p> <p>On 25 February 2018 a tailings pipeline spill occurred that affected approximately 2 km stretch of the secondary tributary of the Maretswana River. This resulted in significant alterations to the stream's physical, chemical and ecological characteristics. Clean-up of the spilt tailings started during May 2018 and was completed during March 2019. During the clean-up process, unavoidable damage was caused to the riparian vegetation in certain areas. Nearly all of the spilt tailings were removed from the stream, and the flow path of the stream was predominantly reinstated. Some minor alterations to the initial flow path the tributary were made to prevent/limit the remobilisation of some of the invariably remaining tailings in the future.</p> <p>It was clear that stream clean-up on its own would not suffice as adequate stream reinstatement and additional rehabilitation measures will be required. Dedicated engineering measures and instream prevention measures to streambed scouring/erosion will be required. The engineering measures include various forms of instream and out of stream weirs. These weirs vary from low level Dongalock structures in the channels feeding into the tributary and instream intermediate height Dongalock as well as larger gabions structures, the latter with Dongalock wing walls.</p> <p>It is the intention of Sibanye-Stillwater to rehabilitate the stream as to improve the Present Ecological State (PES) and Importance and Sensitivity (IS) of the water resource. A wetland delineation assessment is being undertaken in support of the proposed project.</p>	

1.3 Alternatives

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

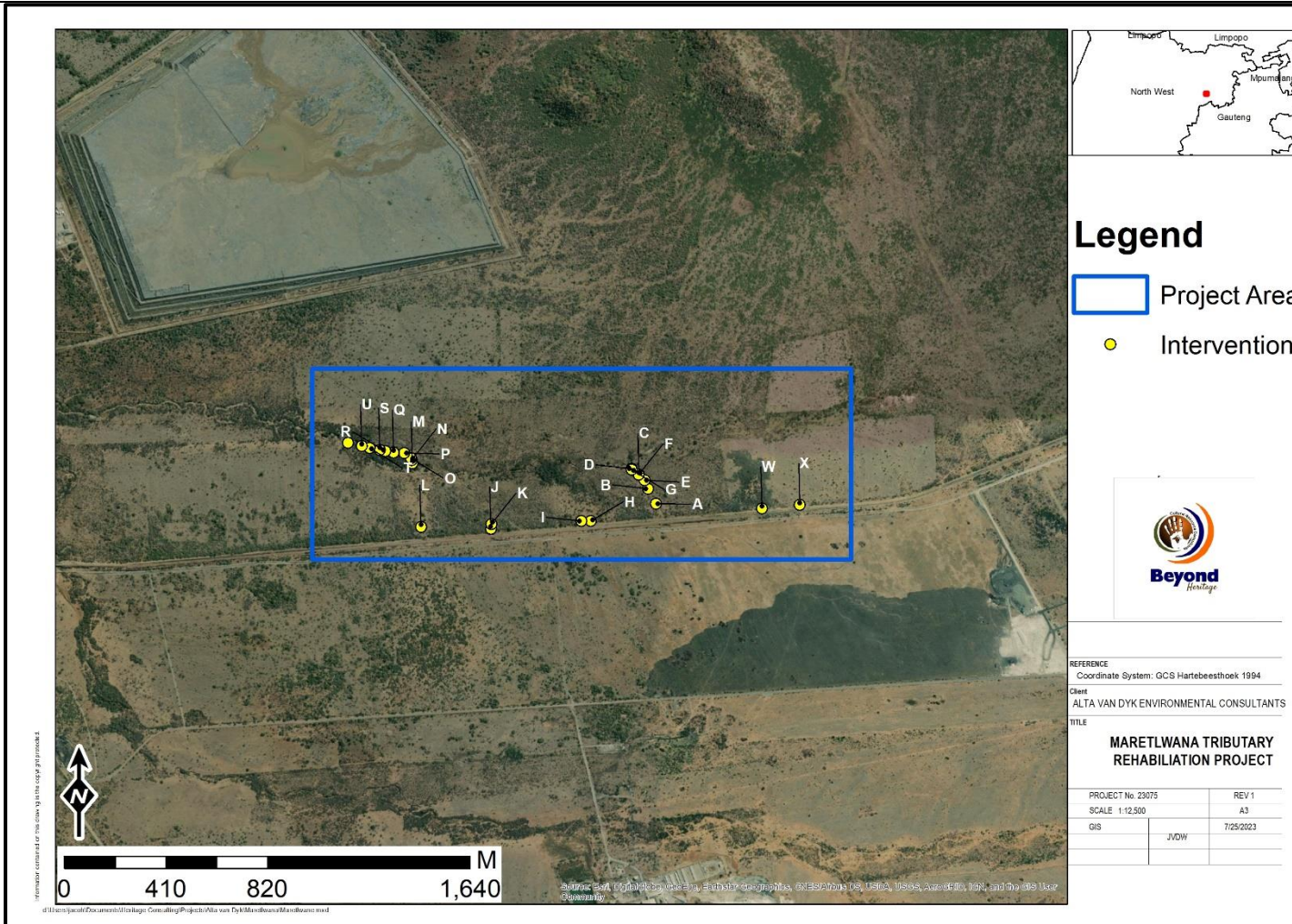


Figure 1-3. Aerial image of the Project area

2 Legislative Requirements

The HIA, as a specialist study to the EIA, is required under the following legislation:

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

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

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the Provincial Heritage Resource Agency (PHRA) - (Limpopo Heritage Resource Authority (LiRHA)) or to The South African Heritage Resources Agency (SAHRA). SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work

SAHRA as a commenting authority under section 38(8) of the NHRA require all environmental documents, compiled in support of an EA application as defined by the National Environmental Management Act (NEMA) (Act No 107 of 1998) to be submitted to SAHRA for commenting. Environmental Impact Assessment (EIA) Regulations section 40 (1) and (2). The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended) Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

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

Phase 1 HIAs are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance (refer to Section 3.5). Relevant conservation or mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

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

- Its importance in/to the community, or pattern of South Africa's history;

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

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

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

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement. After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 of the National Heritage Resources Act (NHRA), as well as the National Health Act of 2003 and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925) re-instituted by Proclamation 109 of 17 June 1994 and implemented by CoGHSTA as well as the National Health Act 2003 and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. Authorisation for exhumation and reinterment 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). Findings are included in Section 6.2.

3.2 Genealogical Society and Google Earth Monuments

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

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EIA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process undertaken by the EAP was to capture and address any issues raised by community members and other stakeholders. Results are included in Section 5 and the Stakeholder Engagement report.

3.4 Site Investigation

The aim of the site visit was to:

- a) survey the proposed project area to understand the heritage character of the area and to record, photograph and describe sites of archaeological, historical or cultural interest;
- b) record GPS points of sites/areas identified as significant areas;
- c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 4: Site Investigation Details

	Site Investigation
Date	21 July 2023
Season	Winter – The time of year did influence the survey as the landscape is covered in a dense layer of grass after the rainy season that limited archaeological visibility. The Project area was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

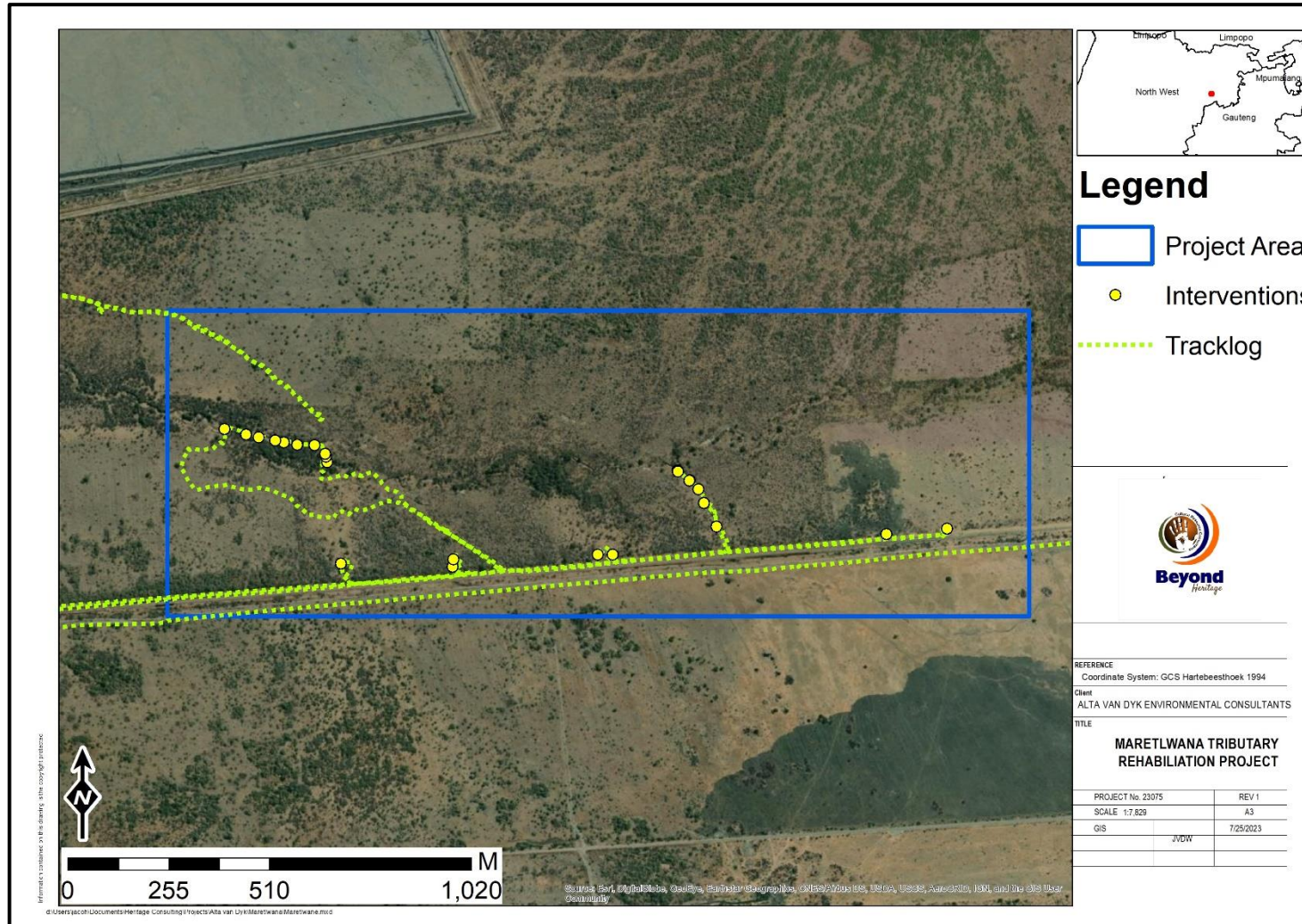


Figure 3-1. Tracklog of the survey path in green.

3.5 Site Significance and Field Rating

The presence and distribution of heritage resources define a ‘heritage landscape’. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate 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 to Heritage Resources is assigned based on the guidelines provided by the SAHRA Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999) (2016). The Field-Rating of a feature is a product of the Cultural Significance and Integrity of the feature. Where Cultural Significance is based on the rating from criteria in section 3 of the NHRA and the integrity of the resource is discussed in terms of preservation issues, weathering, erosion etc.

Field Ratings for the resources(s) are included to comply with section 7(2) and 38(3)b of the NHRA, as detailed in the described below and indicated in Table 5:

a. **Proposed Field Rating I National Resource:** This resource is considered to be of Field Rating I (mention must be made of any relevant international ranking), a protected buffer zone must be proposed/noted (if not in place already), these resources must be maintained *in situ* and a CMP must be recommended for the *in situ* conservation of the site;

b. **Proposed Field Rating II:** This resource is considered to be of Field Rating II, a protected buffer zone must be considered, these resources must be maintained *in situ* and a CMP must be recommended for the *in situ* conservation of the resource;

Proposed Field Rating IIIA Local Resource: The resource must be retained as part of the heritage register (High significance) and so mitigation as part of the development process is not advised, a protected buffer zone must be considered, these resources must be maintained *in situ* and a CMP must be recommended for the *in situ* conservation of the resource;

d. **Proposed Field Rating IIIB Local Resource:** This resource could be mitigated and (partly) retained as part of the heritage register (High/Medium significance), Mitigation of these resources must be subject to a formal permit application process lodged with the relevant heritage resources authority;

e. **Proposed Field Rating IIIC Local Resource:** These are resources that have been assigned a Low-Medium/Low field rating which, once adequately described, may be granted authorisation for destruction outside of the formal permitting process at the discretion of the relevant heritage authority, (*with regard to section 38(8) cases, this will be subject to the granting of the Environmental Authorisation*).

Table 5. Field Rating and Significance

Field Rating	Integrity	No information yield, completely degraded	- Degraded to the extent that little meaning can be derived	Preserved to some extent	Well preserved	Excellent preservation
Cultural Significance	Negligible	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource
	Low	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource
	Low – Medium	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource	IIIC Local Resource
	Medium	Rating IIIB Local Resource	Rating IIIB Local Resource	Rating IIIB Local Resource	Rating IIIB Local Resource	Rating IIIB Local Resource
	Medium High	Rating IIIB Local Resource	Rating IIIB Local Resource	Rating IIIB Local Resource	Rating IIIB Local Resource	Rating IIIB Local Resource
	High	Rating IIIB Local Resource	Rating IIIB Local Resource	IIIA Local Resource	IIIA Local Resource	IIIA Local Resource

3.6 Impact Assessment Methodology

The Impact Assessment Methodology was provided by Alta van Dyk Environmental Consultants cc.

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.

Scale utilised for the evaluation of the Environmental Risk Ratings

Evaluation Component	Rating	Scale	Description / criteria
MAGNITUDE of negative impact (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> .
MAGNITUDE of POSITIVE IMPACT (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	Positive: Bio-physical and/or social functions and/or processes might be <i>considerably</i> enhanced.
	6	Medium	Positive: Bio-physical and/or social functions and/or processes might be <i>notably</i> enhanced.

	4	Low	Positive: Bio-physical and/or social functions and/or processes might be <i>slightly</i> enhanced.
	2	Very low	Positive: Bio-physical and/or social functions and/or processes might be <i>negligibly</i> enhanced.
	0	Zero	Positive: Bio-physical and/or social functions and/or processes will remain <i>unaltered</i> .
DURATION	5	Permanent	Impact in perpetuity. –
	4	Long term	Impact ceases after operational phase/life of the activity >40 years.
	3	Medium term	Impact might occur during the operational phase/life of the activity – 40 years.
	2	Short term	Impact might occur during the construction phase - < 2 years.
	1	Immediate	Instant impact.
EXTENT (or spatial scale/influence of impact)	5	International	Beyond the National boundaries.
	4	National	Beyond provincial boundaries, but within National boundaries.
	3	Regional	Beyond 5 km of the Landfill site and within the provincial boundaries.
	2	Local	Within a 5 km radius of the Landfill site.
	1	Site-specific	On site or within 100 meters of the site boundaries.
	0	None	Zero extent.
IRREPLACEABLE loss of resources	5	Definite	Definite loss of irreplaceable resources.
	4	High potential	High potential for loss of irreplaceable resources.
	3	Moderate potential	Moderate potential for loss of irreplaceable resources.
	2	Low potential	Low potential for loss of irreplaceable resources.
	1	Very low potential	Very low potential for loss of irreplaceable resources.
	0	None	Zero potential.
REVERSIBILITY of impact	5	Irreversible	Impact cannot be reversed.
	4	Low irreversibility	Low potential that impact might be reversed.
	3	Moderate reversibility	Moderate potential that impact might be reversed.
	2	High reversibility	High potential that impact might be reversed.
	1	Reversible	Impact will be reversible.
	0	No impact	No impact.
PROBABILITY (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	Improbable	<5% chance of the potential impact occurring.
	0	No probability	Zero probability.
Evaluation Component	Rating scale and description / criteria		
CUMULATIVE impacts	<p>High: 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>Medium: 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>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: 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 the Table below. The Environmental Significance rating process is completed for all identified potential environmental impacts both before and after implementation of the recommended mitigation measures.

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 and limitations of the study

- The authors acknowledge that the brief literature review is not exhaustive of the literature of the area.
- Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a Chance Find Procedure (CFP) and monitoring of the study area by the Environmental Control Officer (ECO).
- This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys.
- This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components will be highlighted through the public consultation process if relevant. This process is facilitated by the EAP if not done this can be considered a significant limitation and as a potential project risk. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to StatsSA “The Local Municipality of Madibeng has a total population of 477 381, making it the second most populous municipality in the Bojanala District Municipality after Rustenburg. It is highly rural, with 57% of its population residing in rural areas (tribal or traditional areas), about 28% residing in urban areas and about 15% residing in farming areas. Black Africans are the majority, with an 89% share of the Madibeng Municipality’s population. The most commonly spoken language is Setwana.

More than half of the population is male (53%), with 47% constituting females. At age 85 and older, there were more than twice as many women as men. People under 20 years of age made up over a quarter of the population (33,5%), and people aged 65 and older made up 5% of the population.

The municipality is characterised by high levels of unemployment. In Madibeng, the unemployment rate for those aged 15 to 24 is 38,2%, which is almost 10% more than the overall unemployment rate.”

5 Results of Public Consultation and Stakeholder Engagement:

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

6 Contextualising the study area

6.1 Description of the Physical Environment

The vegetation type and landscape features of the area form part of the Marikana Thornveld. It is described as open *Acacia karroo* woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are more dense along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire. (Mucina & Rutherford, 2006).

The project area is situated about 3km east of Marikana along a tributary of the Marelwana River. The project consists of multiple interventions within and along the tributary. The project area also includes two access routes into the area as well as a laydown area for the construction project. The tributary traverses a highly disturbed landscape that is dominated by large scale mining activities. Existing infrastructure throughout the project area include various above ground pipelines, gravel roads, railway lines, powerlines and large tailings facilities and dumps. The surrounding environment is characterised by vertic soils that was not favoured for settlement in antiquity with very few hills throughout the area. The surrounding landscape is covered in a thick layer of grass and scattered thickets of trees. The surrounding environment is impacted on by pipelines and used for the grazing of community cattle. General site conditions are indicated in (Figure 6.1 to 6.6). Images of intervention points can be found in Appendix A.



Figure 6-1. General view of the surrounding environment along the tributary.



Figure 6-2. General view of the surrounding environment surrounding the tributary.



Figure 6-3. General view of the Southern proposed access route.



Figure 6-4. General view of the laydown area.



Figure 6-5. General view of the northern access route into the study area.



Figure 6-6. General view of the southern access route.

6.2 Literature Review (SAHRIS)

Several Cultural Resource Management (CRM) surveys are on record for the area e.g., Pistorius (2000; 2002a; 2002b; 2002c; 2022), Prins (2008), Küsel (2007), Huffman (2005a; 2005b), the relevant results of these studies are discussed below and outlined in Table 6.

A survey conducted by Pistorius (2002a), for a new power line corridor between Middelkraal Substation and the Big Horn/Wonderkoppies Power Station, covered a large region including the current project area. Finds included two LIA sites, scattered potsherds and a graveyard. One of the high significance LIA sites are situated near the northern banks of the tributary of the Marelwana River. The site does not however fall within the current project area and will not be impacted by this project. It was recommended that pylons be strategically placed as to not impact the site. The LIA site consists of two stone structures forming a semi-circular enclosure which were built with large upright stone.

In the area directly east of the project area's boundary, thirteen historical residential homes were identified (Prins 2008). These homes are mostly old farm homes and the building style is characteristic of homes which were built between 1940 and 1955. All thirteen structures were of local significance due to their signature building style of the old Transvaal.

Approximately 6km northeast of the project area are an abundance of Late Iron Age extensive stonewalling sites associated with early Tswana settlement (Küsel 2007). The sites show large cattle kraal enclosures surrounded by scalloped stone walling for living spaces. Küsel (2007) notes that the more central settlements have higher walling than those on outer edges, showing a higher social status of the inner settlements compared to those of the outer settlements which would be more so associated with commoners of a community. Many of the sites have been extensively damaged by granite mining as well as later Tswana settlements from 1900 which altered the original structures.

Multiple surveys around the study area also documented LIA stone walling sites (see Huffman 2005a; 2005b, Pistorius 2002b; 2002c). Stone walling sites are abundant in this region as it was highly populated during the Later Iron Age and many stone walling complexes are still well intact. The proposed project will not impact on any LIA sites in the area as the tributary does not run through any LIA sites on record nor were any documented during the survey.

Table 6. Selected studies consulted for this project.

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 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.	Two LIA sites, scattered potsherds, a graveyard,
Pistorius, J.C.C.	2002b	A Cultural Heritage Impact Assessment for the Proposed New Smelter for Transvaal Ferrochrome Ltd on the Farm Buffelsfontein 465 JQ.	An LIA complex and three graves.
Pistorius, J.C.C.	2002c	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.	2022	A Phase I Heritage Impact Assessment (HIA) Study for Sibanye Stillwater's Proposed Meccano Tailings Retreatment Project Near Marikana in the North-West.	A large graveyard
Prins, F.	2008	Cultural Heritage Impact Assessment of the Pandora EMPR Project.	Thirteen Historical residential homes.
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, MSA tools.
Küsel, U.	2007	Cultural Heritage Resources Impact Assessment of Proposed Mining Area on the Farm Leeuwkop 402 JQ North West Province.	Extensive LIA stonewalling complexes and sites.

6.3 Google Earth and the Genealogical Society of South Africa (Graves and Burial Sites)

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

6.4 Archaeological Background

6.4.1 Stone Age

The Stone Age of southern Africa starts when hominins (ancestral to modern-day humans) first started to produce crude tools made with stone. The Earlier Stone Age (ESA) (2 million – 200 000 years ago) is associated with hominins such as *Homo habilis* and *Homo erectus* (Dusseldorp et al 2013). The ESA is represented in the region by the Wonderboom site on the southern slopes of the Magaliesberg north of Pretoria. This site is characterised by numerous cleavers, hand axes, cores and flakes (Mason, 1958). The Jubilee shelter, approximately 29km 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). In a survey conducted by Huffman (2005a) approximately 25km west of the project area, identified an ESA quarry indicating local production of ESA tools during that time period.

Middle Stone Age (MSA) artefacts represents archaic and modern humans that occupied the landscape between 300 000 to 40 000 before present. MSA sites are less common in the region. Huffman (2005b), did document MSA tools which were present across the landscape but did not present specific clustered scatters.

Later Stone Age (LSA) occupational sequences reflect San and Khoi communities from 40 000 years ago until recently (Dusseldorp et al 2013). During the LSA, people started to occupy sites on a recurring basis often in rock shelters and caves and often left panels of rock art in these shelters.

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.

6.4.2 Iron Age

The archaeology of farming communities of southern Africa encompasses three phases. The EIA (200-900 CE) represents the arrival of Bantu-speaking farmers in southern Africa. Living in sedentary settlements often located next to rivers, these farmers cultivated sorghum, beans, cowpeas, and kept livestock. The Middle Iron Age (MIA) (900-1300 CE) is mostly confined to the Limpopo Valley in southern Africa. The Late Iron Age (LIA) (1300-1840s CE) marks the arrival and spread of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities into southern Africa. The location of LIA settlements is usually on or near hilltops for defensive purposes. The LIA as an archaeological period ended by 1840 CE, when the Mfecane caused major socio-political disruptions in southern Africa (Huffman 2007).

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 32km 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).

Roughly 10km west of the project area are a range of granite hills which form part of the Thaba-ee-Maralla range of mountains. These granite hills are abundantly scattered with Iron Age settlements including many stonewalling sites (Pistorius 2002c). 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 17th 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 14km 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).

6.4.3 Historical Period

During the mid-17th 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. This period was also marked by the first contact between the white and black settlers. The initial interactions were agreeable but later tensions rose in the region around Rustenburg between the Bafokeng and the Voortrekkers as they were removed from their farms which were previously laid out for the ownership of the Bafokeng. This led to the establishment of individual farms and farmsteads.

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 2002c). 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.

6.4.4 Anglo-Boer War

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). 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).

7 Heritage Baseline

7.1 Heritage Resources

The tributary traverses a highly disturbed landscape which has been transformed and disturbed through mining activities and infrastructure such as above ground pipelines, gravel roads, railway lines, powerlines and large tailings facilities and dumps. No heritage resources were recorded within the study area.

7.2 Cultural Landscape

The cultural landscape of the area was historically characterised by limited development and more recently has developed an industrial character with mining activities and associated developments altering the sense of place (Figure 7.1 to 7.5).

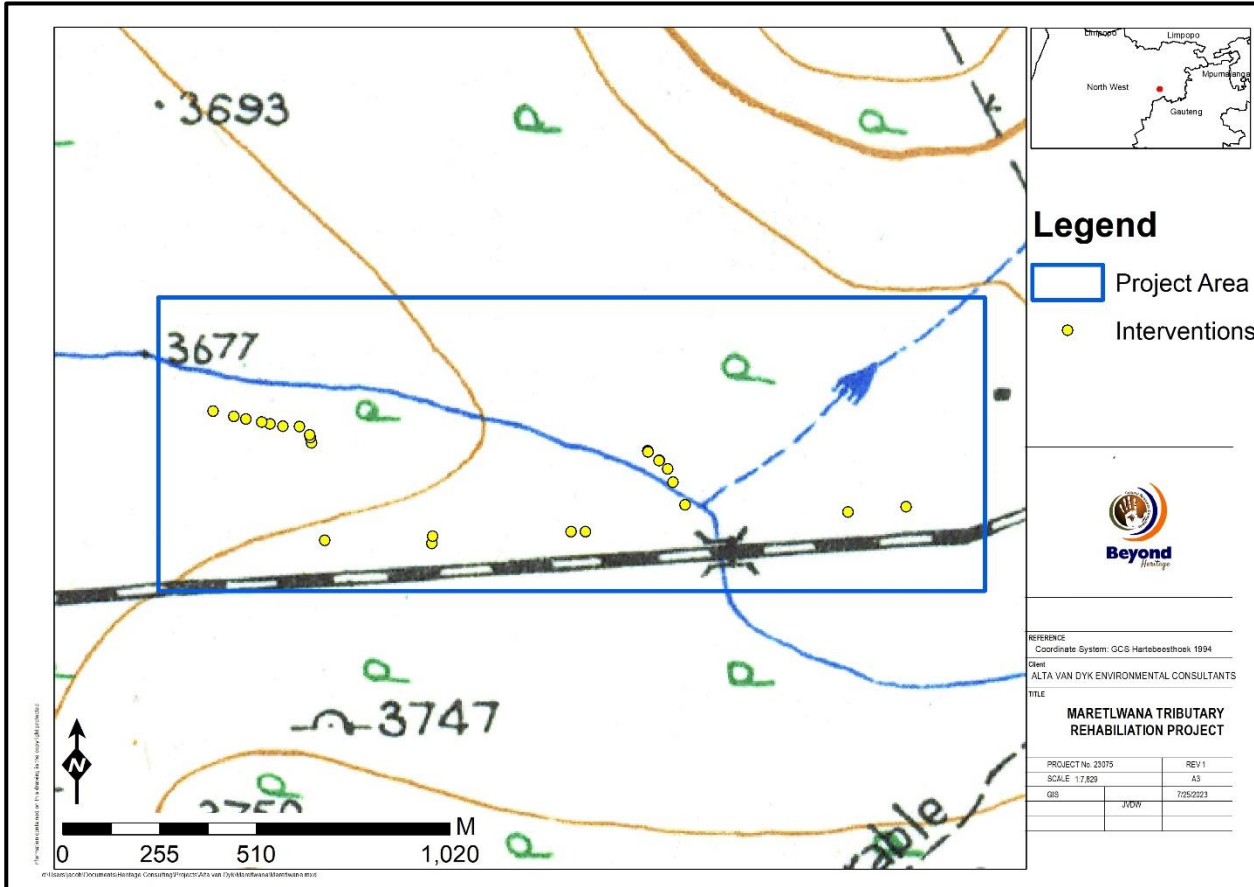


Figure 7-1. Extract of the 1943 1: 50 000 Topographic map indicating a stream and railway line running through the Project area. A hut is also indicated south of the project area.

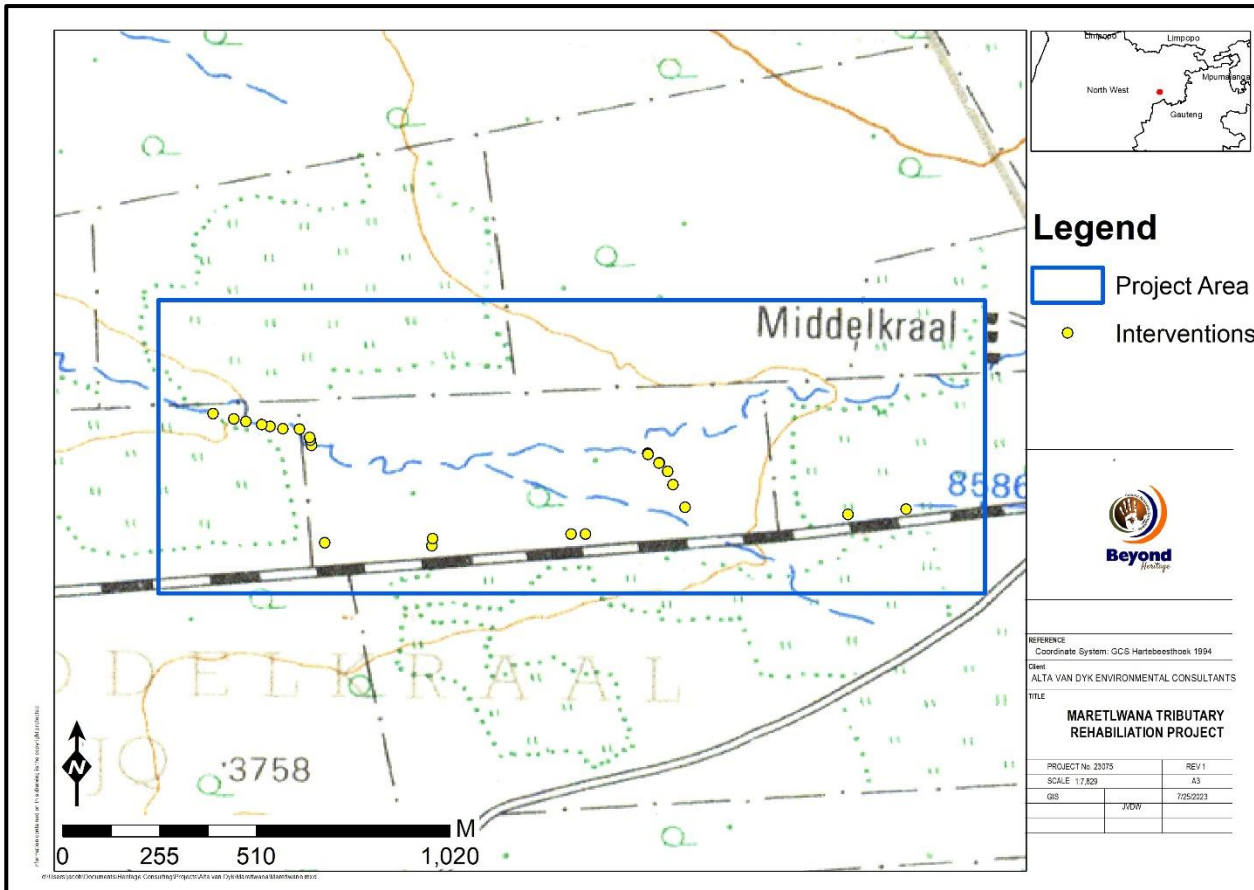


Figure 7-2. Extract of the 1968 1: 50 000 Topographic map of the Project area indicating areas of cultivation.

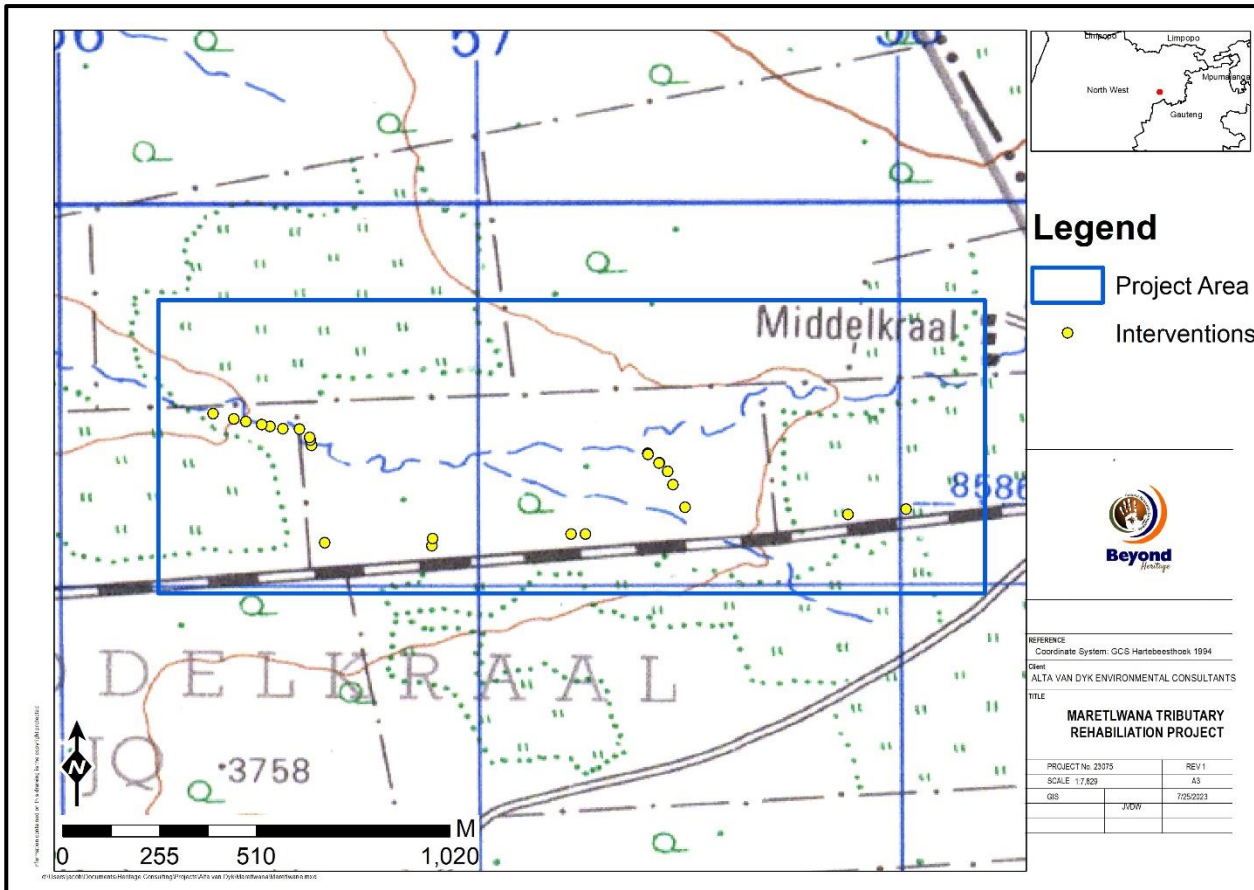


Figure 7-3. Extract of the 1979 1: 50 000 Topographic map indicating three structures along the eastern boundary of the Project area.

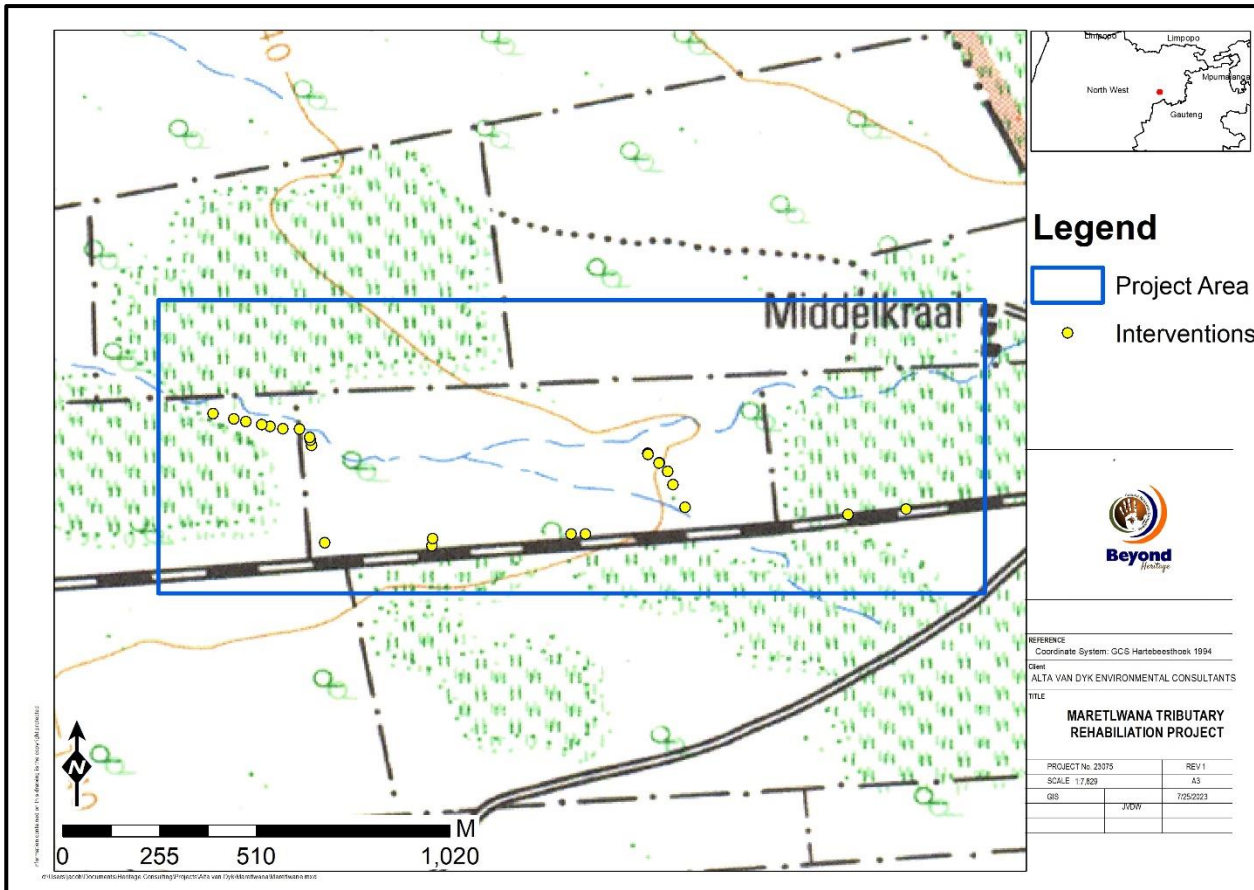


Figure 7-4.1980 Topographic map of the Project area. No new developments are indicated in the study areas.

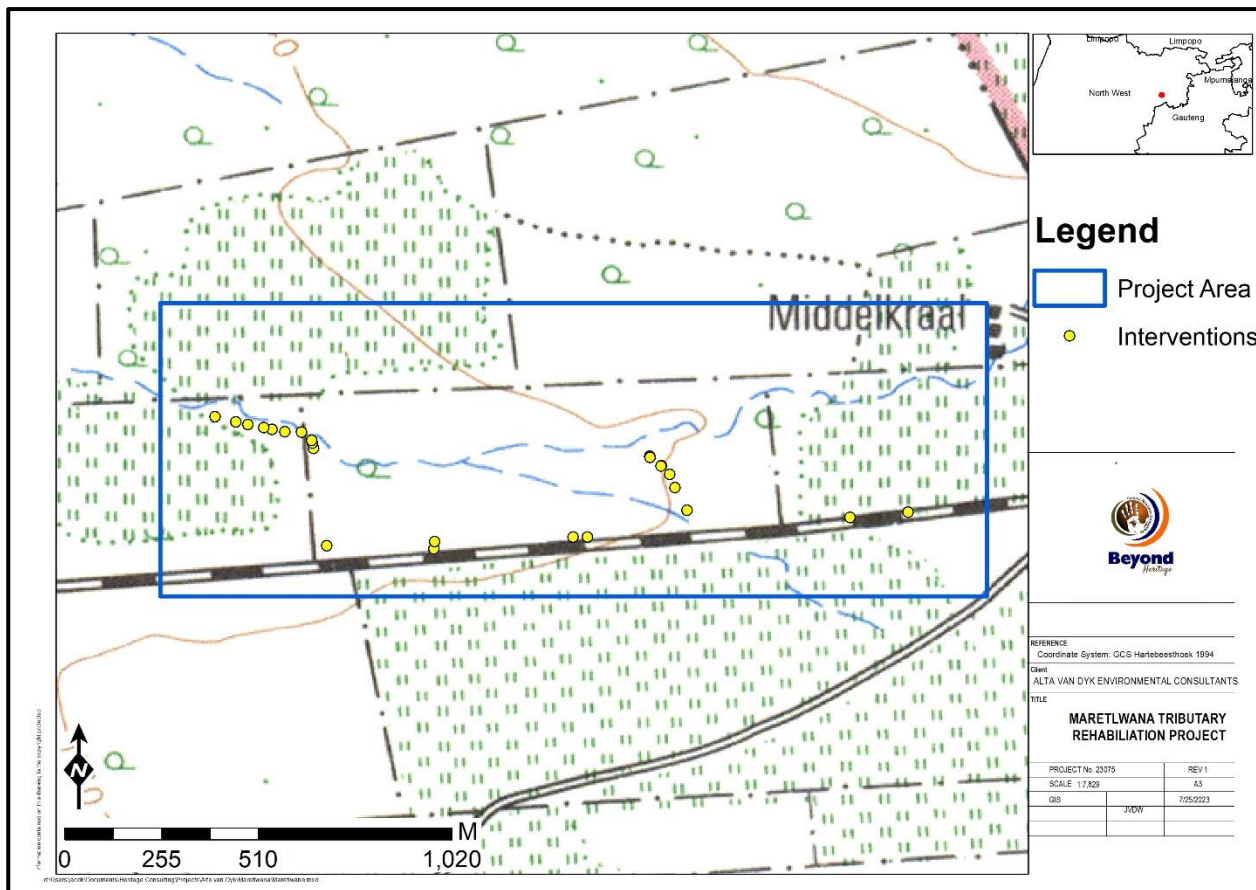
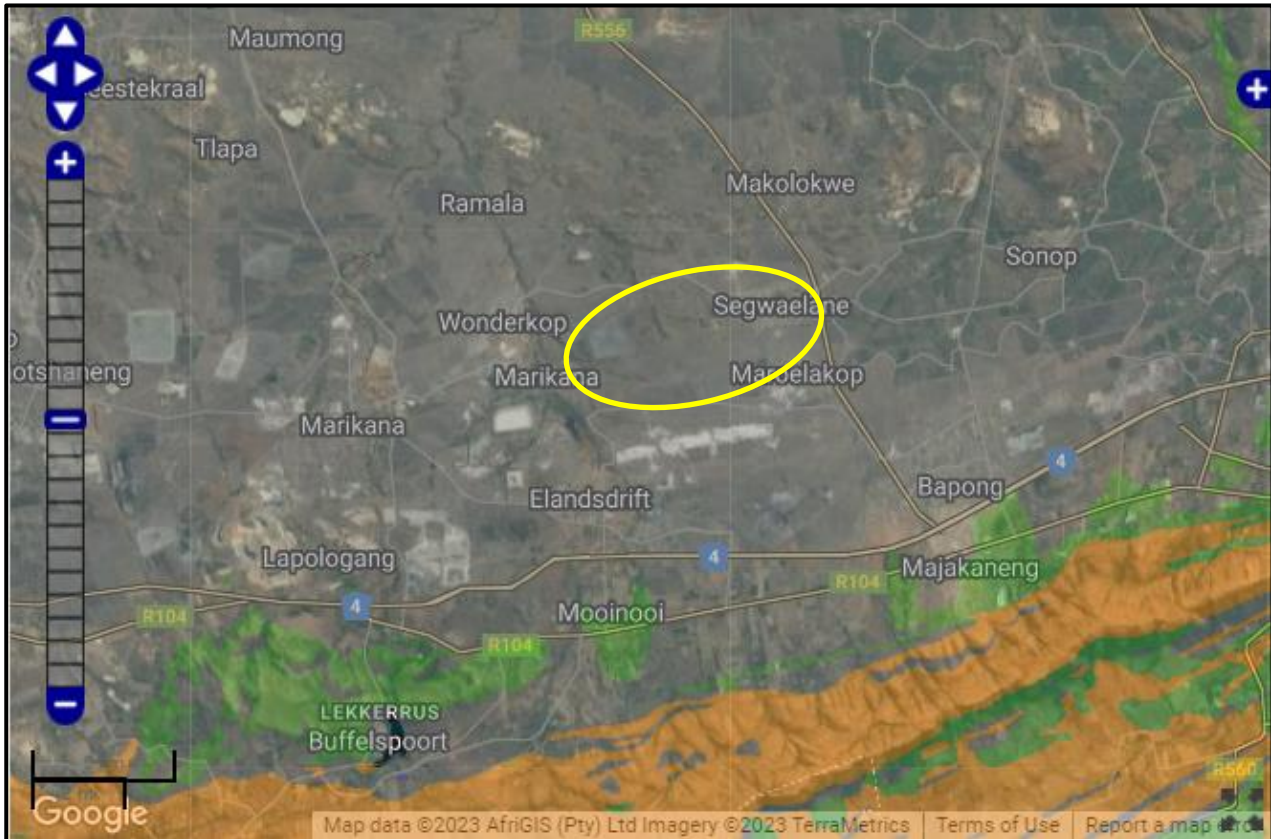


Figure 7-5. 1980 Topographic map of the Project area. Cultivation has expanded south of the project area.

7.3 Paleontological Heritage

According to the SAHRA palaeontological sensitivity map, the study area is indicated insignificant palaeontological sensitivity and no further studies are required (Figure 7.6).



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map

Figure 7-6. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

8 Assessment of impacts

8.1 Impacts on heritage

Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the pre-construction and construction activities. It is assumed that the pre-construction and construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can impact on heritage features and impacts include destruction or partial destruction of non-renewable heritage resources. Impacts during the operation phase is considered to affect the cultural landscape and sense of place.

The main cause of impacts to archaeological resources is physical disturbance of the material itself and its context during removal of topsoil and vegetation as well as the excavations associated with the establishment of infrastructure.

The tributary traverses a highly disturbed landscape that is dominated by large scale mining activities. The study area has been disturbed and no heritage resources have been identified in the study area. The overall impact of the project is low as indicated in Table 7,8 and 9.

8.1.1 Cumulative impacts

The proposed project will have a low cumulative impact as no significant heritage resources will be adversely affected.

8.2 Impact Assessment Tables

Table 7. Impact assessment for the construction phase of 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		
Loss of heritage features	Rehabilitation of Tributary	1	3	1	1	5	2	22	L	None	Negative	Implementation of Chance Find Procedure	1	3	1	1	2	1	8	L		

Table 8. Impact assessment for the operational phase of 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		
Loss of heritage features	Maintenance of infrastructure	1	3	1	1	5	1	11	L	None	Negative	Implementation of Chance Find Procedure	1	3	1	1	2	1	8	L		

Table 9. Impact assessment for the closure phase of 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		
Loss of heritage features	Closure activities – removal of infrastructure	1	3	1	1	5	1	11	L	None	Negative	Implementation of Chance Find Procedure	1	3	1	1	2	1	8	L		

9 Conclusion and recommendations

The general area in which the Project is located is characterised by extensive mining activities. Infrastructure such as above ground pipelines, gravel roads, railway lines, powerlines and tailings dams are present within the larger project area which have also affected the Project area. The Project area was further affected in 2018 by a tailings pipeline spill that affected approximately 2 km stretch of the secondary tributary of the Maretlwana River. This resulted in significant alterations to the stream's physical, chemical and ecological characteristics. During the clean-up process, damage was caused to the riparian vegetation in certain areas.

The larger area has an extensive record of LIA sites which include stone walling complexes of high archaeological significance (e.g., Pistorius 2000; 2002a; 2002b; 2002c, Huffman 2005a; 2005b, Küsel 2007 and Pistorius 2002a) but none of these sites will be impacted on by the current Project. The Project is located away from hills and buildable material used to construct these settlements in are located in a stream bed marked by vertic soils that was avoided for settlement by LIA groups.

The low heritage potential of the study area was confirmed during the survey and no heritage resources were recorded. According to the SAHRA Paleontological sensitivity map the study area is of insignificant paleontological significance and no further studies are required for this aspect.

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

9.1 Recommendations for condition of authorisation

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

- Monitoring of the project area by the ECO during pre-construction and construction phases for heritage chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project as outlined in Appendix B;

9.2 Reasoned Opinion

The overall impact of the project with the recommended mitigation measures 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.

9.3 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves, intangible heritage features and subsurface cultural material are the highest risk). The stakeholder engagement process will assess intangible heritage resources further. This can cause delays during construction, as well as additional costs involved in mitigation and possible layout changes.

9.4 Monitoring Requirements

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

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

Table 10. Monitoring requirements for the project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Cultural Heritage Resource Chance Find	Entire project area	ECO	Weekly (Pre construction and construction phase)	Proactively	<ul style="list-style-type: none"> • Refer to Appendix A.

9.5 Management Measures for inclusion in the EMP

Table 11. Heritage Management Plan for EMP implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	Monitoring of the project area by the ECO during pre-construction and construction phases for chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project	Pre-Construction & Construction	Weekly	Applicant Construction Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

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11 Appendix A – Tributary Interventions



Intervention L



Intervention L



Intervention L



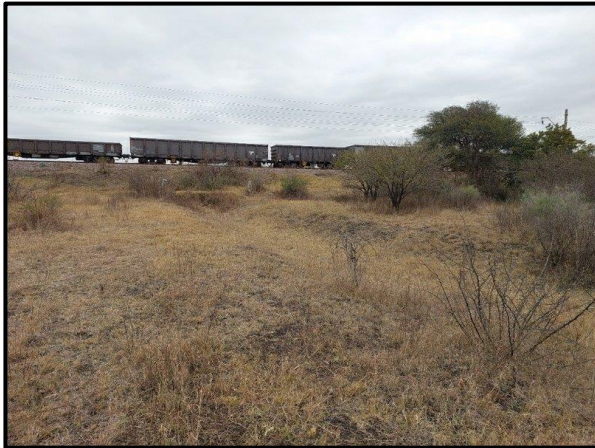
Intervention J



Intervention K



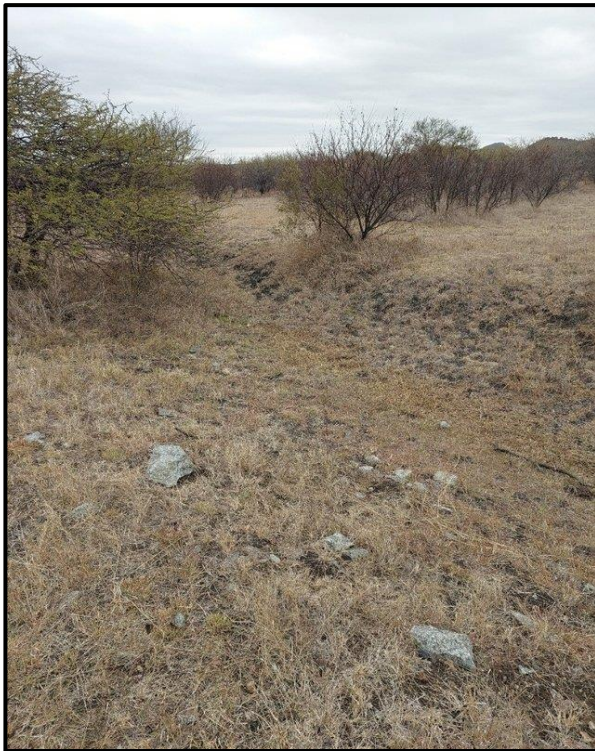
Intervention H



Intervention I



Intervention X



Intervention W



Intervention A



Intervention B



Intervention E



Intervention F and C



Intervention G and D



Intervention M



Intervention N



Intervention O



Intervention P



Intervention Q



Intervention R



Intervention S



Intervention T



Intervention U



Intervention V

12 Appendix B –Chance Find Procedure

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