

## APPENDIX K: HERITAGE IMPACT ASSESSMENT

# HERITAGE IMPACT ASSESSMENT

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

## FOR THE PROPOSED CHANGES TO SURFACE INFRASTRUCTURE AT THE MOKALA MINE, NORTHERN CAPE PROVINCE

**Type of development:**

Mining Development

**Client:**

SLR

**Environmental Impact Practitioner information:**

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Project Reference:

HCAC Project number 2060

Report date:

June 2021

**APPROVAL PAGE**

<b>Project Name</b>	<b>Mokala Mine</b>
<b>Report Title</b>	Heritage Impact Assessment for the Proposed Changes to Surface Infrastructure at the Mokala Mine, Northern Cape Province
<b>Authority Reference Number</b>	TBC
<b>Report Status</b>	Final Report
<b>Applicant Name</b>	Mokala Manganese (Pty) Ltd

	<b>Name</b>	<b>Qualifications and Certifications</b>	<b>Date</b>
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**DOCUMENT PROGRESS****Distribution List**

Date	Report Reference Number	Document Distribution	Number of Copies
June 2021	2060	SLR	Electronic Copy

**Amendments on Document**

Date	Report Reference Number	Description of Amendment
6 August 2021	2060	Technical revisions and update of maps.

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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 and 7.1.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity <b>including identified alternatives on the environment</b> or activities;	Section 9
(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 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to BAR report
(q) Any other information requested by the competent authority	Section 13

## Executive Summary

Mokala Manganese (Pty) Ltd (Mokala) appointed SLR Consulting (South Africa) (Pty) Ltd (SLR), as the Environmental Assessment Practitioner (EAP) to conduct a Scoping and EIA Process. The Scoping and EIA Process is conducted to obtain Environmental Authorisation (EA) for the proposed changes to surface infrastructure at the Mokala Mine located close to Hotazel in the Northern Cape. HCAC was appointed to conduct a Heritage Impact Assessment (HIA) for the project to assess possible impacts to heritage resources by the development and the study area was assessed on desktop level and by a non-intrusive field survey. Key findings of the assessment include:


- Large portions of the study area have been disturbed by previous mining activities and this would have impacted on surface indicators of heritage sites if any ever existed in these areas,
- In anticipation of these activities the study area was subjected to two previous HIA's in 2013 and 2015 and recorded five Stone Age sites within the general area. None of these sites will be affected by the current expansion,
- A visual and physical inspection of the impact areas recorded no structures older than 60 years but recorded Stone Age artefacts outside of the study area in an area where the topsoil has been removed,
- Based on the South African Heritage Resources Information Services (SAHRIS) Palaeontological map the area is of moderate paleontological sensitivity and an independent study was conducted for this aspect. Bamford (2021) concluded that it is extremely unlikely that any fossils occur in the aeolian sands, calcretes or surface limestone of the Quaternary. There is a very small chance that fossils may occur in palaeo-pans but no such feature is visible; and
- Due to the arid nature of the study area focal points for human occupation in antiquity would have been concentrated close to water sources and elevated areas. Therefore, the undisturbed areas around the Ga-Mogara River are considered heritage sensitive and these areas should be monitored during construction.

No significant heritage resources will be affected by the development and the impact of the project on heritage resources is considered to be low. The project can commence based on the implementation of the recommendations in this report and the approval of the South African Heritage Resource Authority (SAHRA).

## Recommendations:

- Implementation of a chance find procedure for the project.
- Monitoring of heritage sensitive areas next to the Ga-Mogara River.

**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 (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I:</p> <ul style="list-style-type: none"> <li>• I act as the 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 24F of the Act.</li> </ul>
<b>Signature</b>	
<b>Date</b>	23/06/2021

**a) Expertise of the specialist**

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

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



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**ABBREVIATIONS**

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

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

**GLOSSARY**

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

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

## 1 Introduction and Terms of Reference:

HCAC was appointed to conduct a HIA for the proposed changes to surface infrastructure at the Mokala Mine, Northern Cape Province (Figure 1-1 to 1-4). The report forms part of an EIA and Environmental Management Programme Report (EMPr) for the development.

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

During the survey, a scatter of Middle Stone Age artefacts was recorded. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in 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 (SAHRA Case ID:16262) 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

The project comprises proposed changes to surface infrastructure at the Mokala Mine as described in Table 2 and 3.

**Table 2: Project Description**

<b>Farm and portions</b>	The remaining extent and portion 1 of the farm Gloria 266, the farm Kipling 271 and the farm Umtu 281
<b>Magisterial District</b>	Joe Morolong Local Municipality
<b>Central co-ordinate of the development</b>	27°11'18.90"S 22°54'12.34"E

**Table 3: Infrastructure and project activities**

<b>Type of development</b>	Mine
<b>Size of development</b>	Less than 100 hectares
<b>Project Components</b>	<p>The Mokala Mine is an open cast manganese mine with approved infrastructure components comprised of a dry crushing and screening plant; WRDs, Run-of- Mine (ROM) stockpiles; topsoil stockpiles; water storage facilities; stormwater management infrastructure and mine-related support facilities such as workshops, stores, and offices. Additional approved activities include:</p> <ul style="list-style-type: none"> <li>• the realignment of the R380 road on the farm Kipling 271 and across the remaining extent of the farm of Gloria 266;</li> <li>• upgrading of the intersection to the mine on portion 1 of the farm Gloria 266 also serving the existing Gloria Mine;</li> <li>• the realignment of a section of the Ga-Mogara drainage channel within the existing river channel. This realignment extends onto the farm Umtu 281.</li> </ul> <p>The Mokala Mine is currently in the construction and operational phase of the project. In this regard, temporary infrastructure in support of the construction phase is currently on site. Construction facilities will either be removed at the end of the construction phase or incorporated into the layout of the operational mine. The mine has also begun with their open cast strip mining activities.</p> <p>Mokala is now proposing to amend the approved mine layout to optimize their mining operations. Changes to the approved infrastructure layout that have already taken place include:</p> <ul style="list-style-type: none"> <li>• the reconfiguration of the plant area, ROM, and high-grade product stockpiles to accommodate the expansion of the open pit;</li> <li>• the relocation of the low-grade product stockpile;</li> <li>• the relocation of support infrastructure (water storage facilities (potable and process water), workshops and washbay, change houses, sewage treatment plant, water treatment plant, fuel storage, Administrative block (offices, kitchen, canteen, training centre, mustering centre, clinic), stores and waste storage);</li> <li>• relocation of transportation related facilities/infrastructure (internal haul road, weighbridges, parking areas, truck loading and staging facility);</li> <li>• the relocation of the approved WRD to accommodate the expansion of the open pit; and</li> </ul>

	<ul style="list-style-type: none"><li>• the relocation of the approved topsoil stockpiles.</li></ul> <p>Proposed activity/infrastructure changes to the approved surface layout include:</p> <ul style="list-style-type: none"><li>• the proposed expansion of the open pit;</li><li>• the proposed increase in the capacity of the approved Waste Rock Dump (WRD) and the establishment of an additional WRD;</li><li>• the proposed establishment of addition topsoil stockpiles;</li><li>• the proposed relocation of stormwater management infrastructure.</li><li>• the proposed increase in the capacity of product stockpiles ROM, Low Grade and High Grade); and</li><li>• the proposed mining of the barrier pillar between the Kalagadi Mine and Mokala Mine.</li></ul> <p>No changes are anticipated to the realignment of the R380, the realignment of the Ga-Mogara drainage channel and the intersection to the entrance of the mine.</p>
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### 1.3 Alternatives

No alternatives were provided to be assessed although the extent of the area assessed allows for siting of the development to minimise impacts to heritage resources.



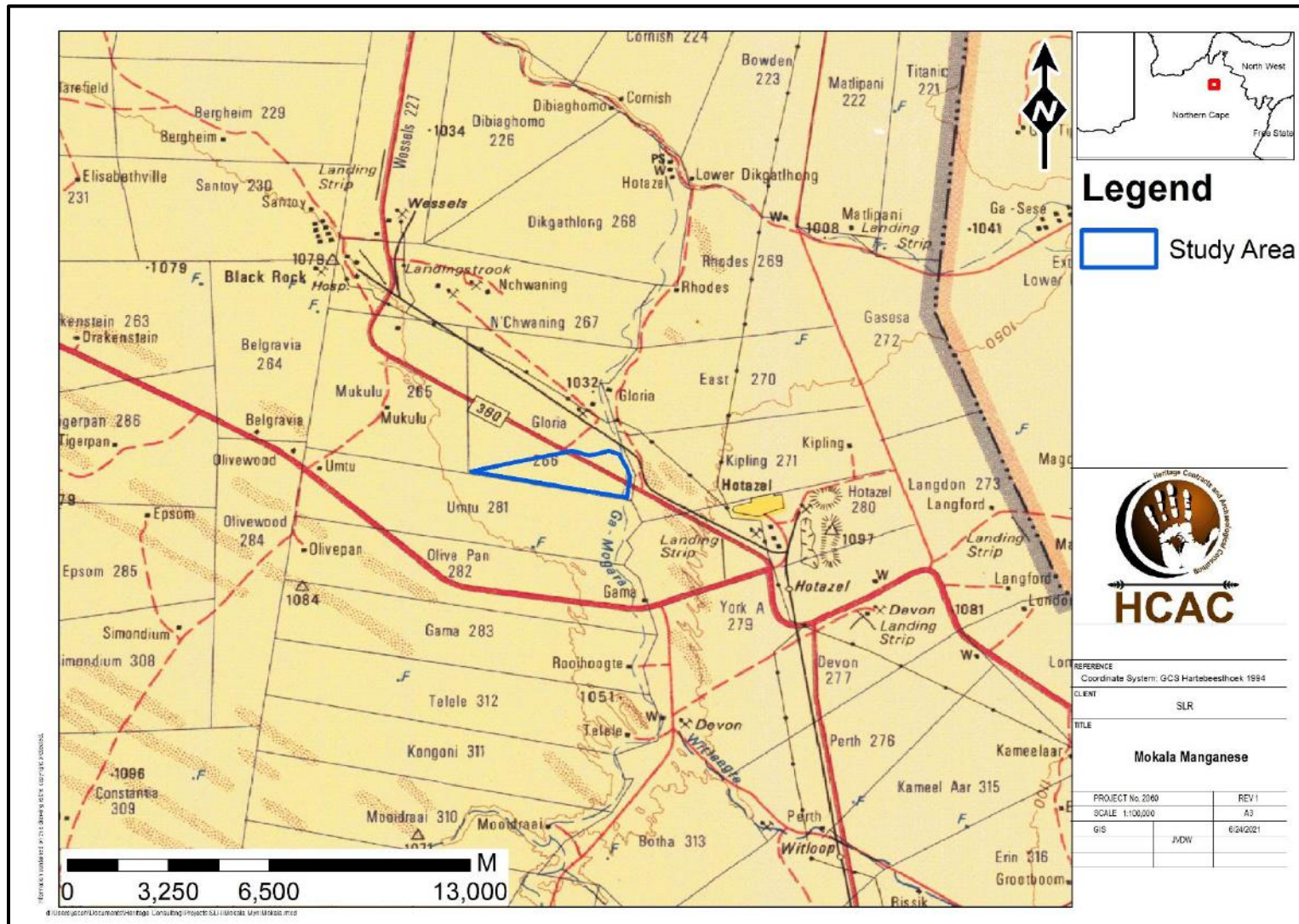


Figure 1.1. Regional setting (1:250 000 topographical map.)

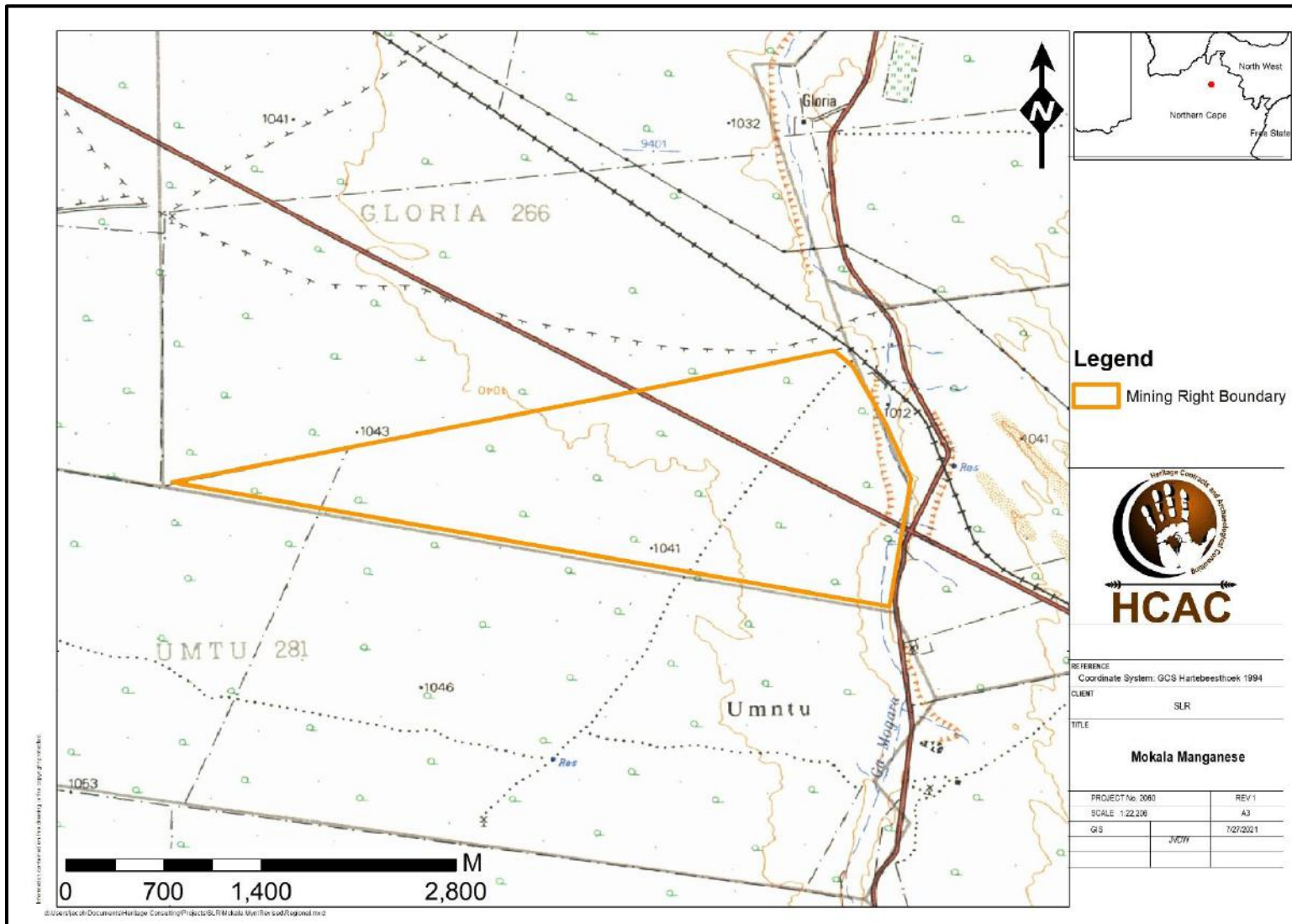


Figure 1.2: Local setting (1:50 000 topographical map).



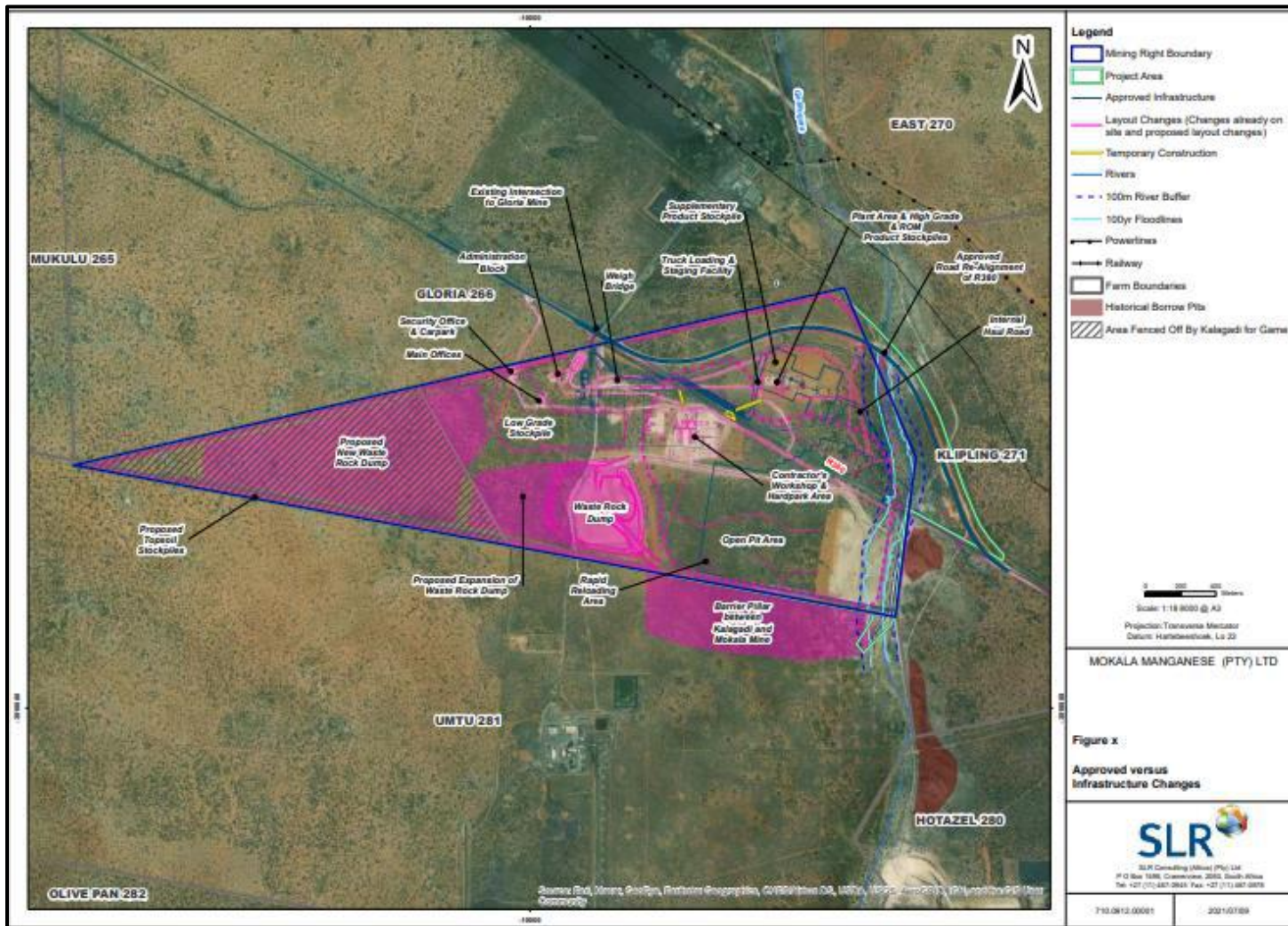


Figure 1.3. Aerial image of the development footprint.

## 2 Legislative Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

### **3 METHODOLOGY**

#### **3.1 Literature Review**

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

#### **3.2 Genealogical Society and Google Earth Monuments**

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

#### **3.3 Public Consultation and Stakeholder Engagement:**

Stakeholder engagement is a key component of any 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 was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

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

### 3.4 Site Investigation

The aim of the site survey was to:

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

**Table 4: Site Investigation Details**

	Site Investigation
Date	27 and 28 May 2021 by two professional archaeologists.
Season	Autumn – Archaeological visibility was hampered by high grass cover and shrubs in certain sections while other sections are extensively disturbed and in the process of being developed. The project footprint was however sufficiently covered to understand the heritage character of the study area (Figure 3.1).



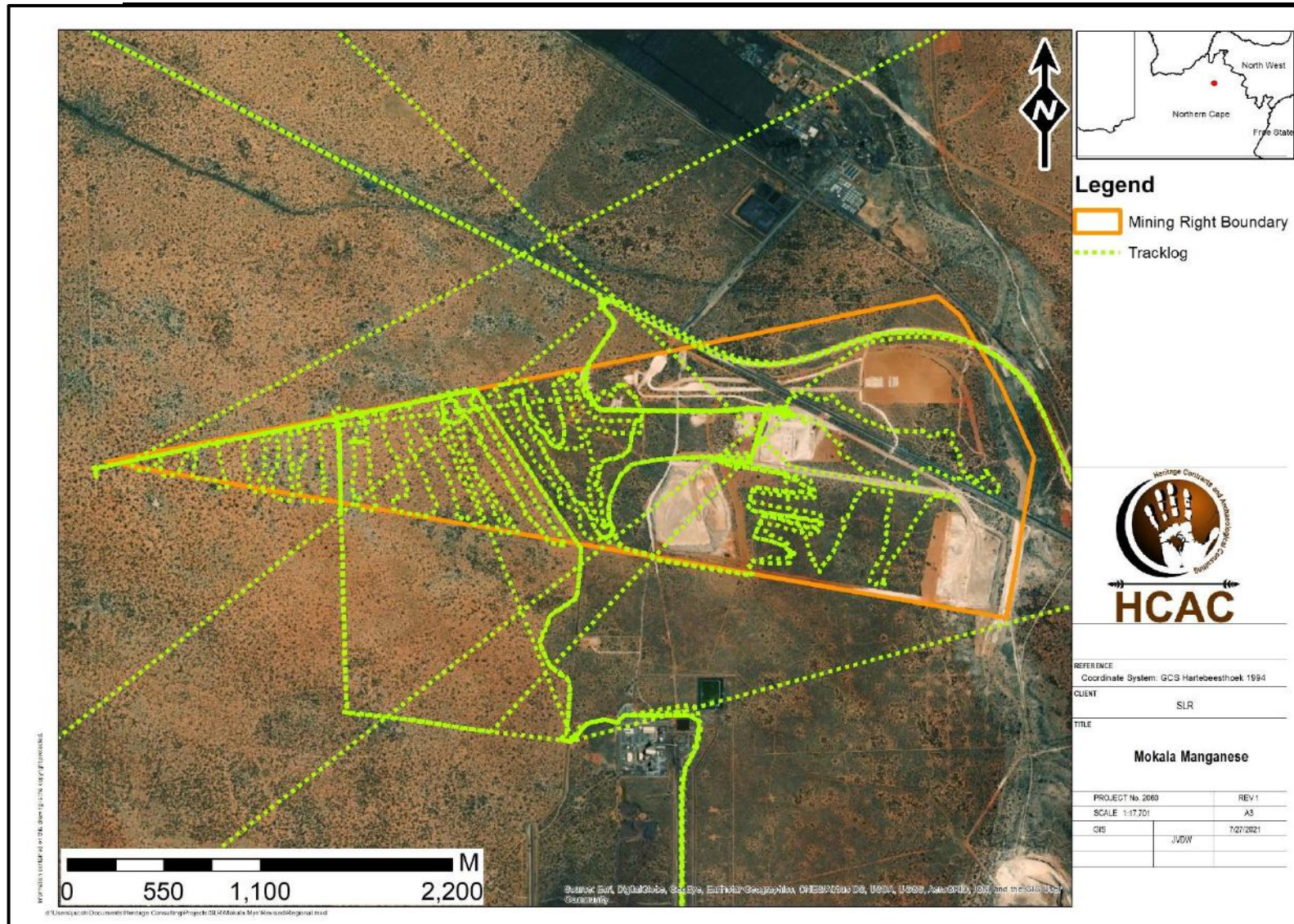


Figure 3.1: Tracklog of the survey in green.

### **3.5 Site Significance and Field Rating**

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

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

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

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

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

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

<b>FIELD RATING</b>	<b>GRADE</b>	<b>SIGNIFICANCE</b>	<b>RECOMMENDED MITIGATION</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

*Note: Part A provides the definition for determining impact consequence (combining intensity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.*

<b>PART A: DEFINITIONS AND CRITERIA*</b>		
Definition of SIGNIFICANCE	of	Significance = consequence x probability
Definition of CONSEQUENCE	of	Consequence is a function of intensity, spatial extent and duration
Criteria for ranking of the INTENSITY of environmental impacts	VH	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.

	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	VL	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years (likely to cease at the end of the operational life of activity).
	VH	Very long, permanent, +20 years (Irreversible, Beyond closure).
Criteria for ranking the EXTENT of impacts	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours.
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

PART B: DETERMINING CONSEQUENCE							
INTENSITY = VL							
DURATION	Very long	VH	Low	Low	Medium	Medium	High
	Long term	H	Low	Low	Low	Medium	Medium
	Medium term	M	Very Low	Low	Low	Low	Medium
	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium





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PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Negligible	Inconsequential, not requiring any consideration.

\*VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact

### **3.7 Limitations and Constraints of the study**

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

## **4 Description of Socio-Economic Environment**

According to the 2011 Census, the Joe Morolong Local Municipality has a total population of 89 530 people. Most of the population in the municipality are black African (96,4%), 2,0% are coloured, with the other population groups making up the remaining 1,6%.

Of those aged 20 years and older, 5,2% have completed primary school, 27,8% have some secondary education, 13,4% have completed matric and 4,1% have some form of higher education. Of the mentioned age group, 22,9% have no form of schooling. There are 12 740 people that are economically active (employed or unemployed but looking for work), and of these, 38,6% are unemployed. Of the 6 323 economically active youth (15–34 years) in the area, 49,5% are unemployed ([www.statssa.gov.za](http://www.statssa.gov.za)).

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## 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 Scoping phase. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process.

## 6 Literature / Background Study:

### 6.1 Literature Review (SAHRIS)

CRM studies conducted in the general vicinity of the study area that were consulted for this report is listed below, two studies were conducted on the current study area marked by a \*:

Author	Year	Project	Findings
Huffman, T. N. and	2001	Draft archaeological survey of the Smartt/Rissik mine, Northern cape	One isolated MSA artefact.
Van der Walt, J & Fourie, W.	2005	Hotazel Manganese Mines Wessels Mine on section of the farms Wessels 227, Dibiaghomo 226 and Dikgathlong 268 Mamatwan Mine on section of the farms Goold 329 and Mamatwan 331 Heritage Assessment	No sites
Van der Walt, J & Fourie, W.	2006	Kalahari Manganese Mines Heritage Assessment On Umtu 281 Olive Pan 282 Gama 283	Graves and Stone Age artefacts
Pistorius, JCC.	2006	A Phase I Heritage Impact Assessment (HIA) Study for The Proposed New United Manganese Of Kalahari (UMK) Mine On The Farms Botha 313, Smartt 314 And Rissik 330 Near Hotazel In The Northern Cape Province Of South Africa	Stone Age Occurrences and historic mining structures.
Pistorius, J.C.C.	2008	A Phase I Heritage Impact Assessment (HIA) Study for a proposed new power line for the United Manganese of Kalahari (UMK) Mine near Hotazel in the Northern Cape Province of South Africa	No sites
Beaumont, P.	2008	Phase 1 Archaeological Impact Assessment Report on Areas At Hotazel Mine On The Farm Hotazel 280, Kgalagadi District Municipality, Northern Cape Province.	No sites
Webley, L. & Halkett, D	2008	Phase 1 Heritage Impact Assessment: Proposed Prospecting On The Farms Adams 328 And Erin 316, Kuruman, Ga-Segonyana Municipality In The Northern Cape.	<ul style="list-style-type: none"> <li>• Two ephemeral and isolated scatters of Middle Stone Age material on Erin;</li> <li>• Two 20th century graves (one farm owner and one farm worker) on Erin;</li> <li>• A possible hand-excavated well on Erin;</li> <li>• Farm buildings including a shed, workers cottages, a dam, kraals and boreholes on Erin dating to the 20th century;</li> <li>• Two graves (one farm owner, the other unknown) on Adams;</li> <li>• A 20th century worker's cottage on Adams;</li> <li>• One hand-excavated well on Adams;</li> <li>• A water trough and limestone dam on Adams;</li> </ul>

			<ul style="list-style-type: none"> <li>• A small scatter of MSA/LSA stone artifacts next to the well on Adams;</li> <li>• Some rectangular limestone blocks, an ash heap, iron and glass rubbish suggesting an early 20th century settlement near the well.</li> </ul>
Pelser, A. J. and Van Vollenhoven, A.C.	2011	A report on a heritage impact assessment (HIA) for a proposed new rail crossing over the Gamagara River for the Gloria Mine operations, Assmang Black Rock, on Gloria 266, North of Hotazel, Northern Cape	Stone Age sites
Coetzee, T.	2012	Archaeological scoping report for the proposed prospecting for iron ore and manganese ore for Amari Manganese (Pty) Ltd on the farms Constantia 309, Simondium 308 and Portions 1, 2, 3 and 8 Of The Farm Goold 329 in the vicinity of District Municipality: Kgalagadi Northern Cape Province	Graves, homesteads as well as several Stone Age artefacts.
Coetzee, T. and George, L	2013	Archaeological Impact Assessment on Mamantwan, Northern Cape Province.	5 marked graves, a historical homestead and vineyard as well as a Stone Age scatter.
Dreyer, C.	2014	First phase archaeological & heritage assessment of the proposed Vaal-Gamagara Water Pipeline Project, Northern Cape Hotazel Alternative Water Pipeline	No sites
*Birkholtz, P	2013	Heritage Impact Assessment of the farm Gloria 266, near Hotazel town in the John Toalo Gaetsewe District Municipality in the Northern Cape Province	Stone Age sites
*Fourie, W*.	2015	Re-alignment of the R380 and a portion of the Ga-mogara River on a portion of the Farm Kipling 271, near Hotazel in the Northern Cape Province	Stone Age sites
Anderson, G.	2016	Desktop heritage survey of the proposed Mamatwan Manganese Mine Slimes Dam	No sites
Fourie, W.	2017	United Manganese of Kalahari (Pty) Ltd HIA	No sites
Fourie, W.	2019	Recommendation for Exemption from Heritage and Palaeontological Impact studies: Environmental Authorisation (EA) and closure and rehabilitation optimisation project at the Tshipi Borwa Mine, near Hotazel, Northern Cape Province -	No sites
Van der Walt, J. & Van der Merwe, R.	2020	Heritage Impact Assessment for new surface infrastructure at United Manganese Kalahari, Hotazel, Northern Cape Province	Isolated Stone Age Find Spots

#### 6.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

## **6.2 Background to the general area**

### **6.2.1 Archaeology of the area**

Southern African archaeology is broadly divided into the Early, Middle and Later Stone Ages; Early, Middle and Later Iron Ages; and Historical or Colonial Periods.

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 Cultural Resources Management (CRM) purposes it is often only expected / possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows;

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

The Northern Cape has a wealth of heritage sites (Beaumont & Morris 1990; Morris & Beaumont 2004). Archaeological sites include the world renowned Wonderwerk Cave and the major Tswana town and the LIA stone-walled settlements at Dithakong 40 km north of Kuruman (De Jong 2010). Research at Wonderwerk cave provided insight into settlement from the Early to Late Stone Age. In the greater region settlement only occurred at a few sites near permanent water sources (Beaumont & Vogel 2006).

Other important sites in the larger area include Tsantsabane, an ancient specularite working site on the eastern side of Postmasburg and Doornfontein, another specularite working site north of Beeshoek. Closer to Kuruman two shelters on the northern and southern faces of GaMohaani (in the Kuruman Hills northwest of the town) contain Later Stone Age remains and rock paintings. Rock art is known to occur at Danielskuil to the north and on Carter Block (Morris 2008). Middle Stone Age material is on record around the study area (Huffman 2001 and Tobias and George 2013). Although it should be noted that finds are mostly limited to isolated artifacts and scatters.

Sotho-Tswana and Nguni societies, the descendants of the LIA mixed farming communities, found the region already sparsely inhabited by the Late Stone Age (LSA) Khoisan groups, the so-called 'first people'. Most of them were eventually assimilated by LIA communities and only a few managed to survive, such as the Korana and Griqua. This period of contact is referred to as the Ceramic Late Stone Age (De Jong 2010) and is represented by the Blinkklipkop specularite mine near Postmasburg and a cluster of important finds at Kathu Pan. Additional specularite workings with associated Ceramic Later Stone Age material and older Fauresmith sites (early Middle Stone Age) are known from Lylyfeld, Demaneng, Mashwening, King, Rust & Vrede, Paling, Gloucester and Mount Huxley. Rock engraving sites are known from Beeshoek and Bruce (Morris 2005: 3).

More locally, the two shelters on the northern and southern faces of GaMohaani (in the Kuruman Hills north west of the town) contain Later Stone Age remains and rock paintings.

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites, as these areas were utilized

for settlement or base camps close to water. Studies in the larger area collaborate this e.g., Webley and Halkett 2008 and Fourie 2017.

The Difaqane coincided with the penetration of the interior of South Africa by white traders, hunters, explorers and missionaries. The first was PJ Truter's and William Somerville's journey of 1801, which reached Dithakong at Kuruman. They were followed by Cowan, Donovan, Burchell and Campbell and resulted in the establishment of a London Mission Society station near Kuruman in 1817 by James Read. Robert Moffat and his wife Mary came to Kuruman in 1820 and the mission has been known as The Moffat Mission Station ever since.

#### **6.2.2 Graves and Burial Sites**

Graves and cemeteries are widely distributed across the landscape and can be expected anywhere.

### 6.2.3 Cultural Landscape

The project is in an arid area characterized by wind-blown aeolian sands and historically very scarce human occupation. The immediate project area has been subjected to extensive mining activities in the last two decades.

## 7 Description of the Physical Environment

The study area is situated in the Mokala mine about 5km West of Hotazel. The study area consists of multiple small areas of new mine expansions within the existing mine. A large portion of the study area is located in previously disturbed areas.

The areas within the mine that have not been disturbed are characterised by thick grass cover over the red Aeolian sand within the area. No rocky outcrops or ridgelines were identified on the landscape making the area fairly flat apart from the natural low dune formations as well as the large-scale mining activities. Various new haul roads, temporary site offices and new construction sites are scattered across the rest of the study area making a thorough walkthrough of the study area difficult. The existing mine dump covers a large portion of the study area.

An undisturbed area situated on the western section of the study area gave a good estimation of what the natural environment would have looked like before the mine expansion. This area is dominated by a thick upper layer of sand with dense grass cover with shrubs and trees characteristic of the area.

The Mokala Mine site falls within the Kathu Bushveld and the Gordonia Duneveld. The Kathu Bushveld can be described as an open savannah which consists of prominent trees species such as *Vachellia erioloba* (Camel Thorn) and *Boscia albitrunca* (Shepards Tree). The shrub layer is dominated by *Senegalia mellifera* (Black thorn), formerly known as *Acacia mellifera*, *Diospyros lycioides* (Blue bush) and *Lycium hirsutum* (River Honey-thorn). The Gordonia Duneveld consists of undulating dunes which is characterised by open shrubland with grasslands on the dune ridges. *Vachellia haematoxylon* (Grey camel thorn) are predominately located on the dune slopes while *Senegalia mellifera* (Black thorn) is prominent on the lower slopes. *Rhigozum trichotomum* (Tree thorn) is found in the inter dunes. General site conditions are shown in Figure 7.1 to 7.6.





Figure 7.1. Undisturbed area.



Figure 7.2. Active mining area.



Figure 7.3. Existing haul roads.



Figure 7.4. Existing mine dump.



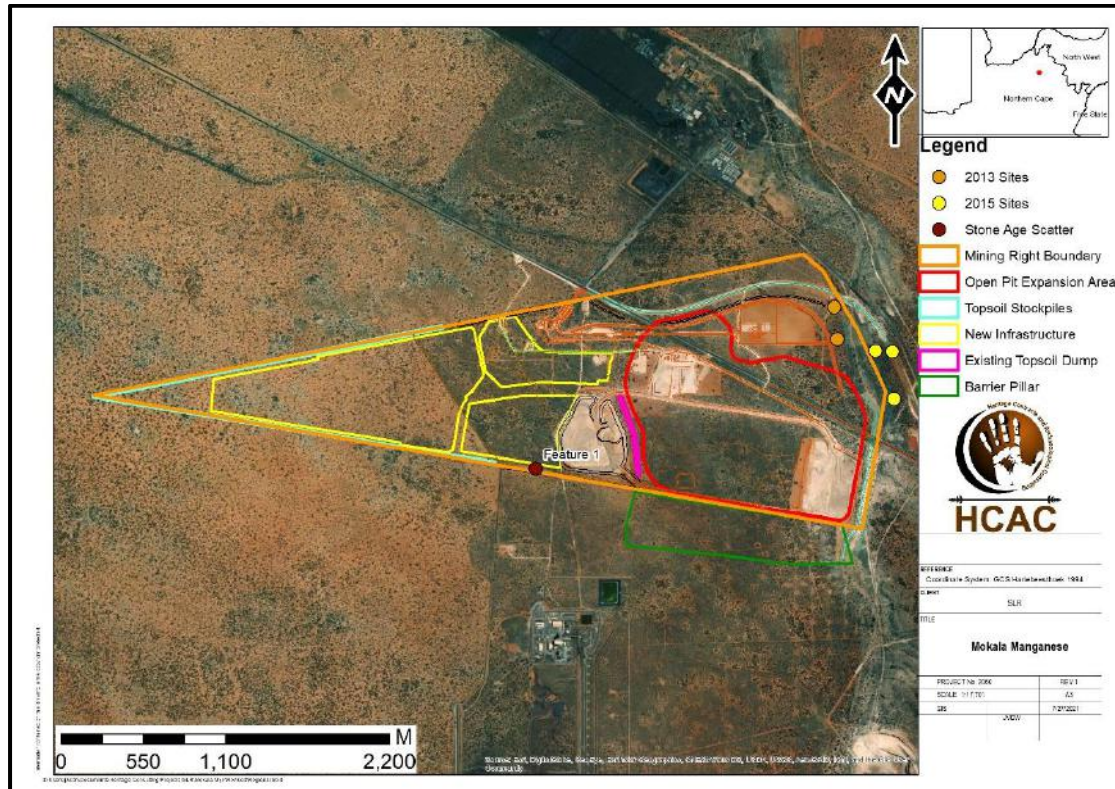
Figure 7.5. Construction/ temporary site offices.



Figure 7.6. Dense grass cover in the study area.

## 8 Findings of the Survey

It is important to note that only the development footprint of the project was surveyed over two days by two professional archaeologists. Large portions of the study area have been subjected to mining activities that would have impacted on surface indicators of heritage resources. The study area was however subjected to two previous HIA's in 2013 and 2015 in anticipation of these activities and recorded five Stone Age sites within the general area, close to the Ga-Mogara River (Figure 8-1). This conforms to the landscape use of the area during Stone Age times when Middle and Later Stone Age sites were concentrated around water sources.



**Figure 8.1.** Known sites and newly recorded feature in relation to the current activities.

In addition to these known sites the current assessment recorded an area within the Mokala mine expansion area where the topsoil has been removed from a small portion of the site where a low density of MSA lithic artefacts were identified in the spoil heaps mapped as Feature 1 (Figure 8-1). The artefacts are made on banded iron stone and jaspilite, typologically conforming to the MSA. The occurrence of lithics here, re-enforces the theory of a much larger general scatter of lithic artefacts across this landscape away from the GaMogara River, now covered by windblown sand. The artefacts are out of context and are scattered too sparsely to be of significance apart from mentioning them in this report. Artefacts and general site conditions are indicated in Figure 8.2 to 8.5.





Figure 8.2. Dorsal and ventral views of Artefacts at Feature 1.



Figure 8.3. Cores, a blade and a flake recorded at Feature 1.



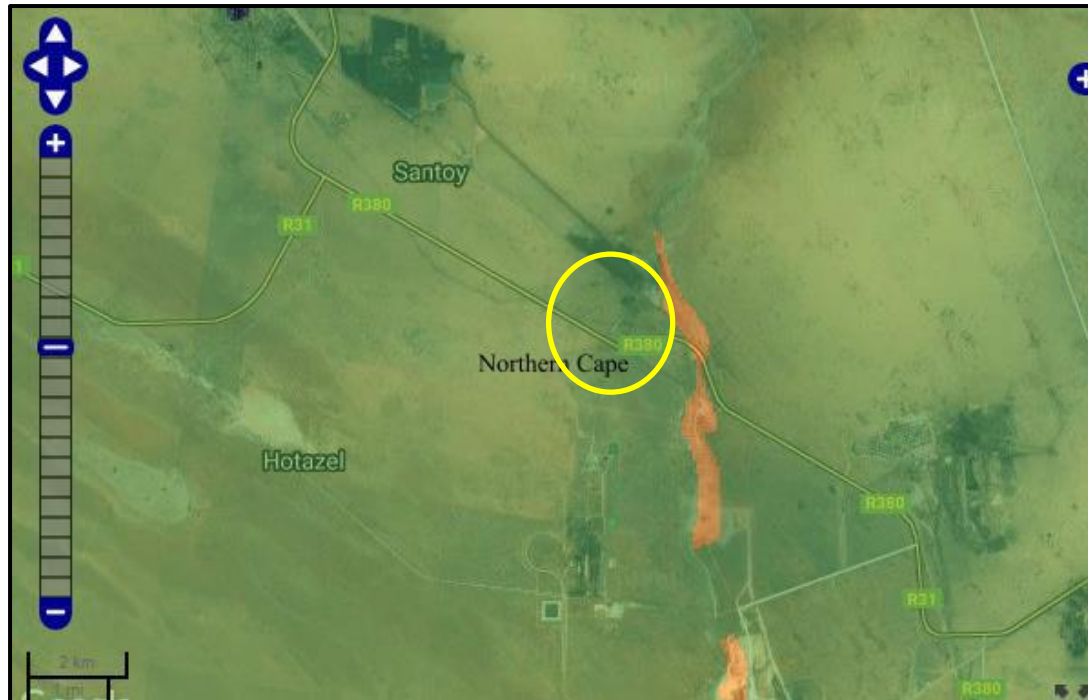
Figure 8.4. Spoil heaps where artefacts were recorded.



Figure 8.5. Cleared area at Feature 1.

**Heritage Significance: Low**  
**Field Rating: GP C**

Based on the SAHRA Paleontological map (Figure 8.6) the area is of moderate paleontological sensitivity and an independent study was conducted for this aspect. The study by Bamford 2021 found that the proposed changes to the mine and infrastructure, on Farm Gloria 266, and borders of Farms Kipling 271 and Umtu 281, all lie on the Quaternary Kalahari Group aeolian sands, alluvium and calcrete and a small portion of surface limestone. There is a very small chance that fossils may occur in palaeo-pans or palaeo-springs but no such feature is visible. The area is already highly disturbed from current mining operations.



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 8.6. Paleontological sensitivity of the study area (yellow polygon).

## **9 Potential Impact**

The low density scatter of lithics at Feature 1 is out of context and recorded outside of the current study areas (Figure 9-1) and will not be directly impacted on. No significant resources were noted in the project area and no adverse impact to heritage resources is expected. Impact to heritage resources is low prior to mitigation and zero post mitigation (Table 6). Due to the arid nature of the study area focal points for human occupation in antiquity would have been concentrated close to water sources and elevated areas. Therefore, the area around the Ga-Mogara River is considered to be heritage sensitive (Figure 9.2) and this area should be monitored during the expansion of the open cast pit and barrier pillar mining. This concurs with other studies in the Black Rock and Hotazel area (Fourie 2015). 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.

### **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 needed for the construction phase. 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**

Impacts and effects during open pit mining operations include excavations. Potential impacts include destruction or partial destruction of non-renewable heritage resources.

### **9.1.4. Decommissioning phase**

No additional impacts are expected during decommissioning and closure.

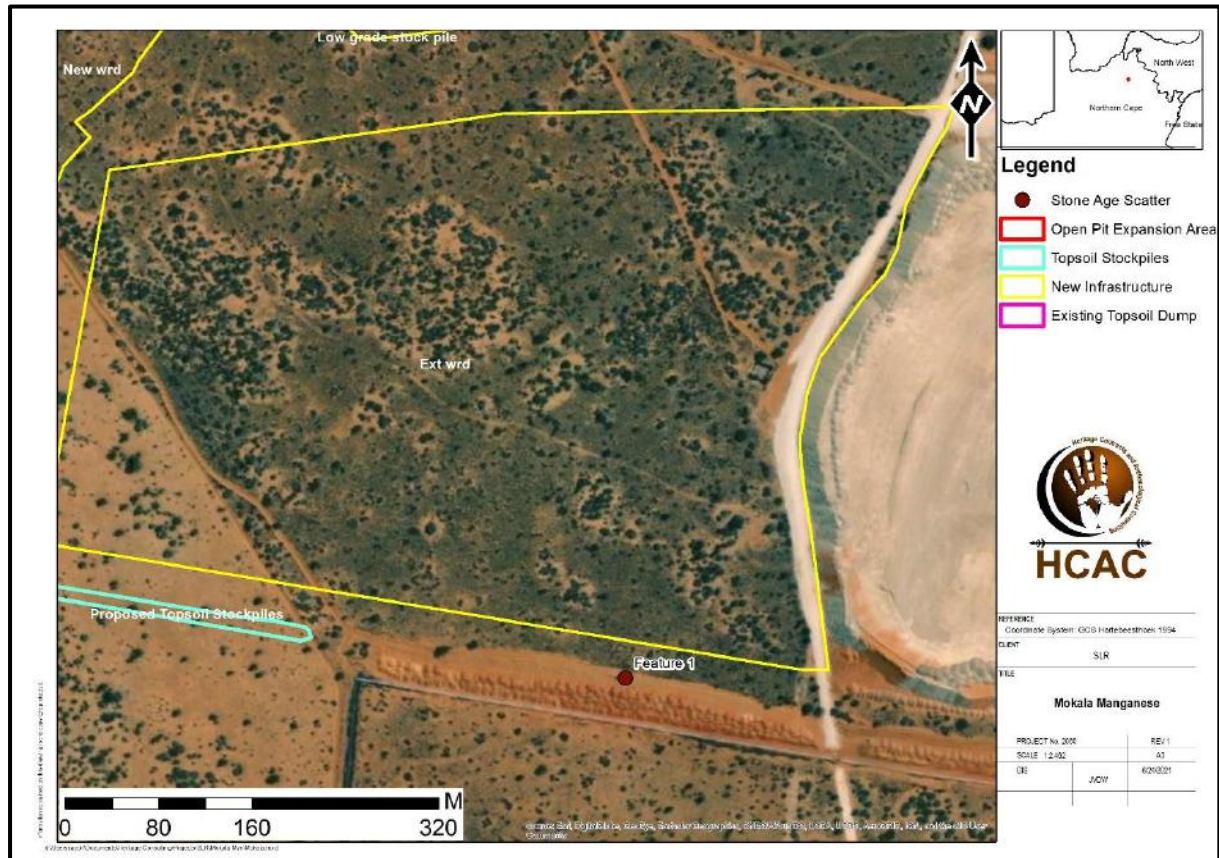


Figure 9.1. New infrastructure in relation to Feature 1.



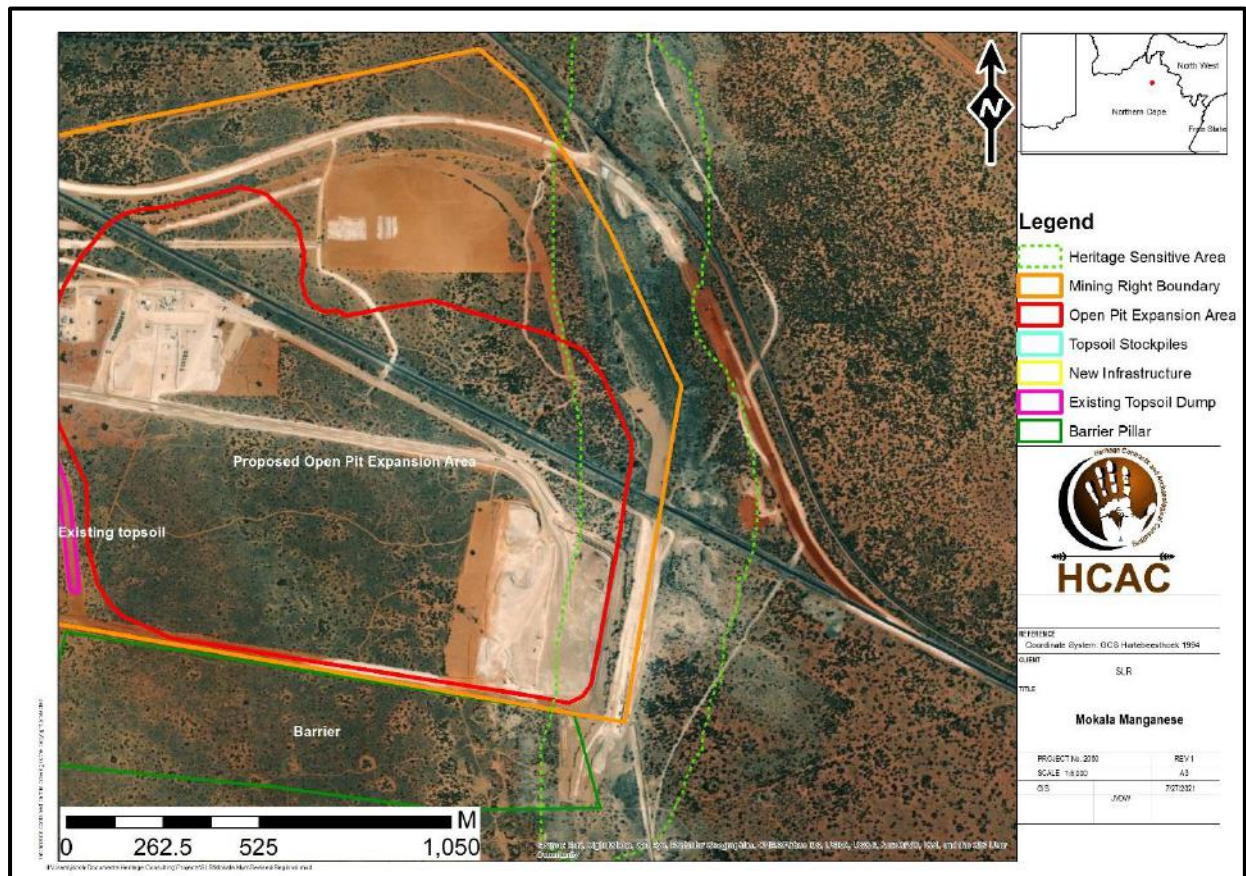


Figure 9.2. Impact of the project in relation to the heritage sensitive area.

Table 6. Impact assessment of the project (all phases)

Issue: Destruction of heritage resources		
Pre-Construction; Construction and operation phases.		
Criteria	Without Mitigation	With Mitigation
Severity	Very Low	Very Low
Duration	High	High
Extent	Very Low	Very low
Consequence	Low	Low
Probability	Medium	Medium
Significance	Low	Low
Nature of cumulative impacts	Cumulative impacts are low as the recorded heritage features have very low cultural significance.	
Degree to which impact can be reversed	Irreversible.	
Degree to which impact can be avoided	Low.	
Degree to which impact may cause irreplaceable loss	Impacts to heritage resources are permanent, but due to the low significance of the recorded resources this is not considered an irreplaceable loss to the archaeological record of the area.	
Degree to which impact can be mitigated	The recorded resources have been sufficiently mitigated by recording the features in this report.	

## **10. Conclusion and recommendations**

Large portions of the study area have been subjected to mining activities that would have impacted on surface indicators of heritage resources. The study area was however subjected to two previous HIA's in 2013 and 2015 in anticipation of these activities and recorded five Stone Age sites within the general area, close to the Ga-Mogara River. This conforms to the landscape use of the area during Stone Age times when Middle and Later Stone Age sites were concentrated around water sources (Fourie 2015). None of these sites will be affected by the proposed project.

In addition to these known sites, the current assessment recorded an area away from the river where the topsoil has been removed and a low density of MSA lithic artefacts were identified in the spoil heaps (Feature 1). The site is located over three km from the river, typologically the artefacts date to the MSA. The occurrence of lithics here, re-enforces the theory of a much larger general scatter of lithic artefacts across this landscape away from the Ga-Mogara River, now covered by windblown sand. The artefacts at Feature 1 are out of context and are scattered too sparsely to be of significance apart from mentioning them in this report.

Based on the SAHRA Paleontological map the area is of moderate paleontological sensitivity and Bamford (2021) concluded that it is extremely unlikely that any fossils occur in the aeolian sands, calcretes or surface limestone of the Quaternary. There is a very small chance that fossils may occur in palaeo-pans but no such feature is visible and a Fossil Chance Find Protocol (included in Section 10.2) is recommended as part of the EMP.

No significant heritage resources will be affected by the development and therefore the impact of the project on heritage resources is low and the project can commence based on the implementation of the recommendations in this report and the approval of SAHRA.

### **10.1. Recommendations for condition of authorisation**

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

- Implementation of a chance find procedure for the project (as outlined below).
- Due to the arid nature of the study area focal points for human occupation in antiquity would have been concentrated close to water sources and elevated areas. Therefore, the area around the river and barrier pillar mining area are considered heritage sensitive and this area should be monitored during construction.

### **10.2. Chance Find Procedures**

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

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



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

**Programme for Palaeontology – to commence once the area is surveyed by the surveyor or environmental officer. Planning/pre-construction phase**

1. The following procedure is only required if fossils are seen on the surface when surveyed and any palaeo-pan or palaeo-spring feature is recognised.
2. If any fossiliferous material (plants, insects, bone) is seen it should be put aside in a suitably protected place. This way the construction activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any scientifically important fossil material as assessed from the submitted photographs, then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the site and excavate (having obtained a SAHRA permit).
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study.
7. Annual reports must be submitted to SAHRA as required by the relevant permits.
8. If no good fossil material is recovered then the site inspection by the palaeontologist will not be necessary.
9. If no fossils are found during the survey then no further palaeontological impact assessment is required.

### **10.3. Reasoned Opinion**

The overall impact of the project on heritage resources is low, based on the adherence to the recommendations in this report and approval from SAHRA prior to development.

### **10.4. Potential risk**

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

Risks can be mitigated with the implementation of a chance find procedure (in Section 10.2) as well as monitoring.

## 10.5. Monitoring Requirements

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

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

Table 7. Monitoring requirements for the project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Clearing activities and Excavations	Entire project area	EO	Weekly – during 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>

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Clearing and excavations	Heritage Sensitive area close to the river	ECO (Taking photographs of profiles and stone accumulations weekly and sending this to the archaeologist)	Weekly – during construction phase	Pro active	<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>Cease all works immediately;</li> <li>Report incident to the manager and archaeologist who will evaluate the find and if necessary, recommend the following steps:                   <ul style="list-style-type: none"> <li>Report incident to the competent authority; and</li> <li>Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities.</li> </ul> </li> </ol> </li> <li>Only recommence operations once impacts have been mitigated.</li> </ul>

#### 10.6. Management Measures for inclusion in the EMPr

The following management measures must be included in the EMPr to ensure the protection of non-renewable heritage resources.

**Table 8. Management measure for inclusion in the EMPR.**

ACTIVITIES	PHASE	SIZE AND SCALE	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
Construction and Excavation Activities	Pre-Construction, Construction, Operational phase	Entire site	Chance Find Procedure	Heritage Act NHRA Act 25 of 1999	Construction phase
Construction and Excavation Activities	Pre-Construction and Construction	Heritage Sensitive area close to the river	Monitoring	Heritage Act NHRA Act 25 of 1999	Construction phase
All Activities	Life of project	Entire area	Palaeontological Chance find protocol	Heritage Act NHRA Act 25 of 1999	Pre-Construction to operation phase.

#### **10.7. Knowledge Gaps**

Due to the subsurface nature of heritage resources and limited archaeological visibility due to sand and high vegetation cover, the possibility of discovery of heritage resources during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure.

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