

HERITAGE IMPACT ASSESSMENT

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

FOR NEW SURFACE INFRASTRUCTURE AT UNITED MANGANESE KALAHARI, HOTAZEL, NORTHERN CAPE PROVINCE

Type of development:

Mining Amendment

Client:

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Project Reference:

HCAC Project number 2060

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APPROVAL PAGE

Project Name	The proposed expansion at United Manganese Kalahari, south of Hotazel, Northern Cape Province
Report Title	Heritage Impact Assessment for new surface infrastructure at United Manganese Kalahari, Hotazel, Northern Cape Province
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	United Manganese of the Kalahari (UMK)

	Name	Qualifications and Certifications	Date
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Amendments on Document

Date	Report Reference Number	Description of Amendment
6 August 2021	2060	Revised lay out and amendments to project description
20 August 2021	2060	Technical revision

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REPORT OUTLINE

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

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	<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 including identified alternatives on the environment or activities;	Section 9
(k) Mitigation measures for inclusion in the EMPr	Section 10
(l) Conditions for inclusion in the environmental authorisation	Section 10
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10
(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 6
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EIA report
(q) Any other information requested by the competent authority	Section 11

Executive Summary

SLR Consulting was appointed to conduct full Scoping and Environmental Impact Assessment (EIA) process in support of an Environmental Management Programme (EMPr) amendment application for the UMK Mine consisting of proposed changes to the approved surface layout for the mine to optimize their mining operations. HCAC was subsequently appointed to conduct a Heritage Impact Assessment (HIA) for the amendment application. The project areas were assessed both on desktop level and by a non-intrusive pedestrian field survey. Key Findings of the assessment include:


- The project area is covered in thick aeolian sand with no features (such as water sources or rocky outcrops) that would have been focal points in antiquity;
- Current mining operations have impacted on the area and previous studies for these operations (Pistorius 2006 and Fourie 2017) indicated a low incidence of heritage resources;
- The current assessment recorded three isolated Stone Age Find Spots where calcrete protrude through the aeolian sand;
- The project area is indicated as of moderate palaeontological sensitivity on the South African Heritage Resource Information System (SAHRIS) and an independent Palaeontological Impact Assessment was conducted by Prof Marion Bamford. The study concluded that the mining site lies on the aeolian sands of the Kalahari Group (Quaternary Age). Rocks bearing iron and manganese are below the surface and they do not preserve any fossils. Aeolian sands do not preserve fossils as they are windblown. Rarely the sands will entrap more robust fossils, such as fragments of bones or wood, but these are not *in situ* and there is an extremely small chance that fossils might occur on the land surface.

The impact of the project on heritage resources is considered to be low and it is recommended that the project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from the South African Heritage Resource Agency (SAHRA):

Recommendations:

- Implementation of a chance find procedure for both the archaeological and paleontological components.
- Excavations through aeolian sands to the calcrete layer especially in the pit should be monitored by an archaeologist or by an EO trained by an archaeologist.

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 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I:</p> <ul style="list-style-type: none"> • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	06/08/2021

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

AIA: Archaeological Impact Assessment
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
DFFE: Department Forestry Fisheries and the Environment
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
EMP: 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
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 is contracted by SLR Consulting to conduct a HIA of the proposed changes to the approved surface layout for the mine to optimize their mining operations at the UMK Mine near Hotazel in the Northern Cape Province (Figure 1.1 – 1.3). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPr) for the development.

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

During the survey three Stone Age find spots were 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. As such the EIA Report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

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

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of the Association of Southern African Professional Archaeologists (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 components and location are outlined under Table 2 and 3.

Table 2: Project Description

Farm and portions	Farms Botha 313, the remaining extent (RE) of the farm Smartt 314, and portion 1 and RE of the farm Rissik 330 in the John Taolo Gaetsewe District Municipality in the Northern Cape
Magisterial District	John Taolo Gaetsewe District Municipality
Co-ordinate of the development	27°19'59.72"S and 22°57'19.52"E

Table 3: Infrastructure and project activities

Type of development	Mining and associated infrastructure
Size of development	800 hectares
Project Components	<p>United Manganese of Kalahari (Pty) Ltd (UMK) is applying for an Environmental Authorisation for new listed activities on the farm Botha 313, the RE of the farm Smartt 314, and portions 1, 2 and 3 (a portion of the RE) of the farm Rissik 330. The UMK Mine is an opencast manganese mine located ~13 km to the south of the town of Hotazel in the Joe Morolong Local Municipality and the John Taolo Gaetsewe District Municipality in the Northern Cape Province. The manganese mine lies directly adjacent and to the west of the R380 provincial road.</p> <p>UMK currently holds the following authorisations:</p> <ul style="list-style-type: none"> • A mining right (30/5/1/2/3/2/1(113) MR) issued by the Department of Mineral Resources (DMR) now known as the Department of Mineral Resources and Energy (DMRE); • An Environmental Management Programme Report (EMPr) approved by DMRE; • An Environmental Authorisations (NC/KGA/HOT7/15/2006 & NC 30/5/1/2/2/113 MR) issued by the Department of Environment and Nature Conservation (DENC) and the DMRE respectively; and • A Water Use License (IWUL) (10/D41K/ABEGJ/2814) issued by the Department of Water and Sanitation (DWS) now known as the Department of Human Settlements, Water and Sanitation (DHSWS). <p>UMK is proposing to change the approved surface layout for the mine to optimize their mining operations. The activities below will be included within the application for authorisation by the DMRE.</p> <p>Proposed new surface infrastructure at the mine:</p> <ul style="list-style-type: none"> • New parking area (0.52 Ha); • Solar equipped boreholes and associated storage tanks; • Tyre fitting bay, workshop/ tyre centre and oil storage (7 Ha); • Waste rock and sand stockpiles: <ul style="list-style-type: none"> o Central West Waste Rock Dump (WRD) (84 Ha) o Central West Sand Stockpile (40.9 Ha)

	<ul style="list-style-type: none"> o J Block West WRD (133 Ha) o J Block West Sand Stockpile (46.5 Ha) o J Block East WRD (63.5 Ha) o J Block East Sand Stockpile (16.5 Ha) o Powerline West WRD (196 ha) o Powerline West Sand Stockpile (35,9 Ha) o A Block West WRD (145 Ha) <ul style="list-style-type: none"> • Product stockpile area within the approved sinter plant area (21.4 Ha); • Truck staging area (20.4 ha); • Hard park areas (Phase 1 and 3) (14.3 Ha); • Barlow's Store (1 Ha); • TUP stockpile (12.4 Ha); • Explosive depo and associated service road (13.1 Ha); and • Engineering salvage yard (temporal and permanent) (2.43 Ha). <p>Upgrade of existing approved infrastructure:</p> <ul style="list-style-type: none"> • Prentec Sewage Plant; and • Existing weigh bridge and associated access road. <p>Expansion of existing approved infrastructure</p> <ul style="list-style-type: none"> • Product stockpile (53.6 Ha); • Modular crushing plant (34.6 Ha); • Fuel storage farm (0.45 Ha); • EME workshop for major repair and maintenance (3.6 Ha); • Road truck staging area (1.6 Ha); and • Offices (19.1 Ha). <p>Relocation of the following surface infrastructure at the mine:</p> <ul style="list-style-type: none"> • Approved dirty water dams/pollution control ponds; and • 132 KV powerline from current location to its old location.
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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.

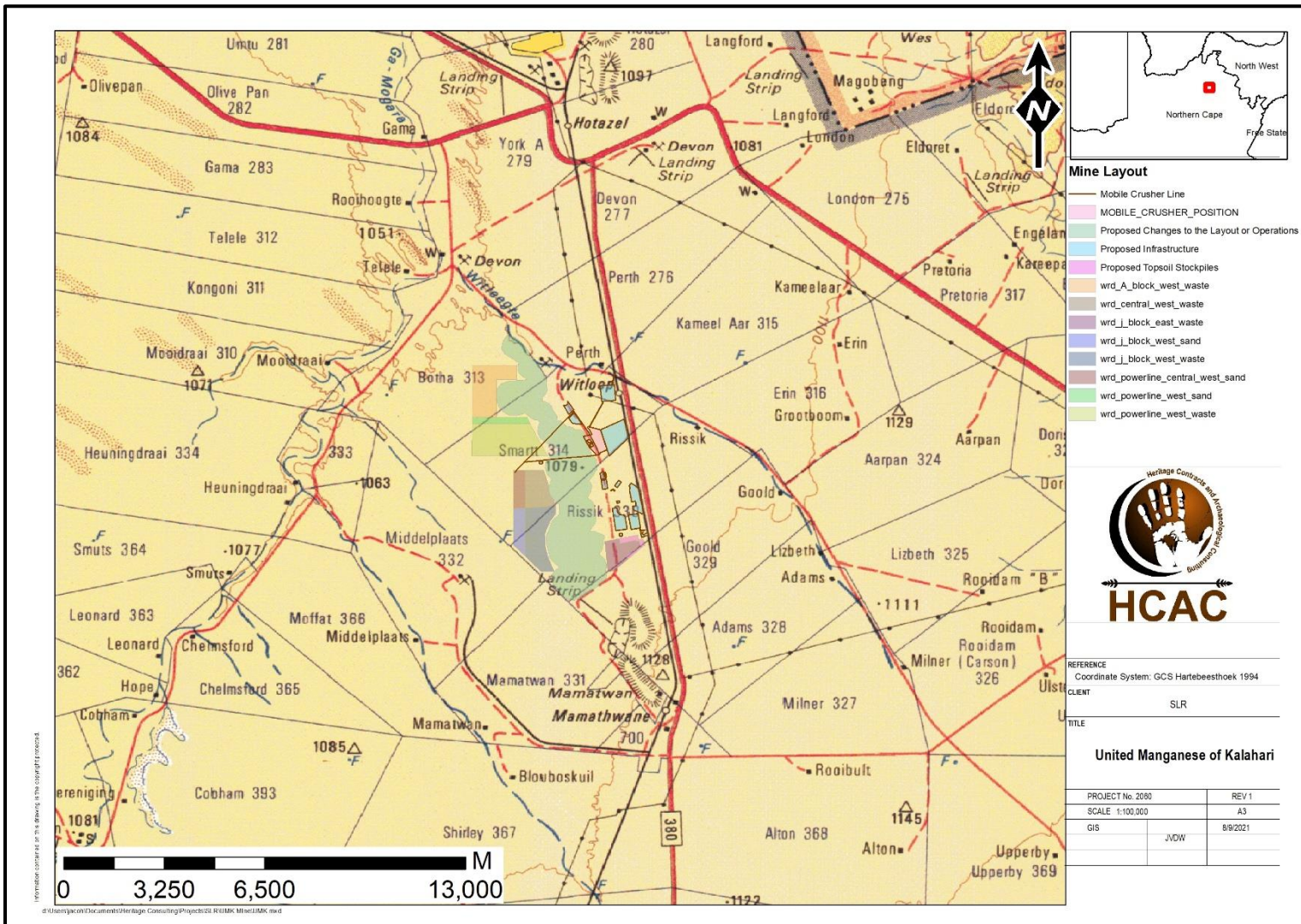


Figure 1.1. Regional setting of the project components (1: 250 000 topographical map).

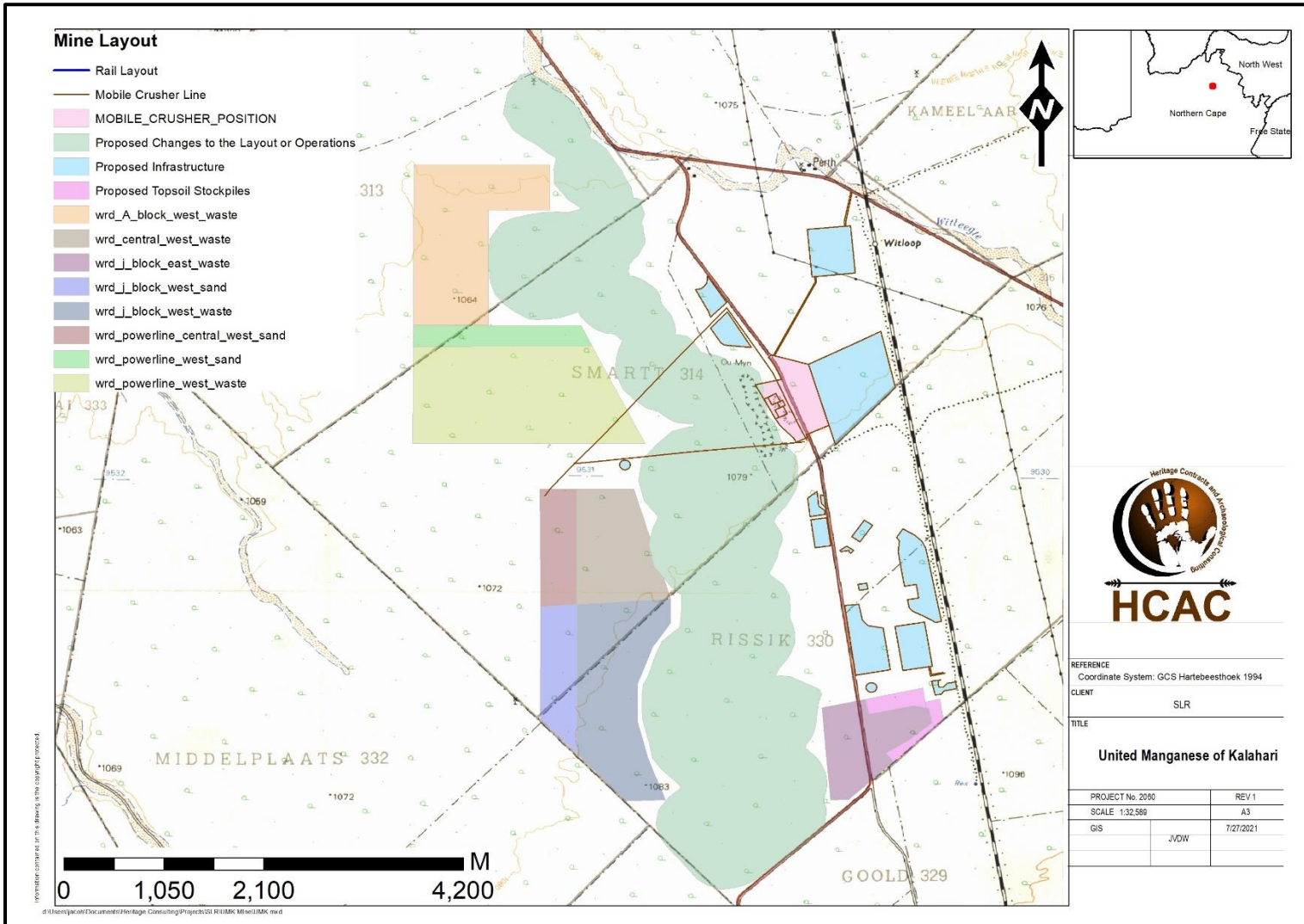


Figure 1.2. Local setting of the UMK amendments.



Figure 1.3. Aerial image of the proposed UMK amendments.

2 Legislative Requirements

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

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

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

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

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA 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 AIA 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 AIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

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

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

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

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

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

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

3 METHODOLOGY

3.1 Literature Review

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

3.2 Genealogical Society and Google Earth Monuments

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

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any 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
- The compilation of an EIA Report.

3.4 Site Investigation

Conduct a field study to: a) systematically 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	The week of 16 November 2020 and again the week of 28 July 2021
Season	The first visit was in summer and the second in winter - visibility was generally high and the area was sufficiently covered to determine the heritage character of the area (Figure 3.1). Approved mining operations occurred in the area not yet visible on satellite imagery but account for the areas where no tracklogs occur as well as areas where previous assessments were conducted.

HIA –UMK Mine

August 2021

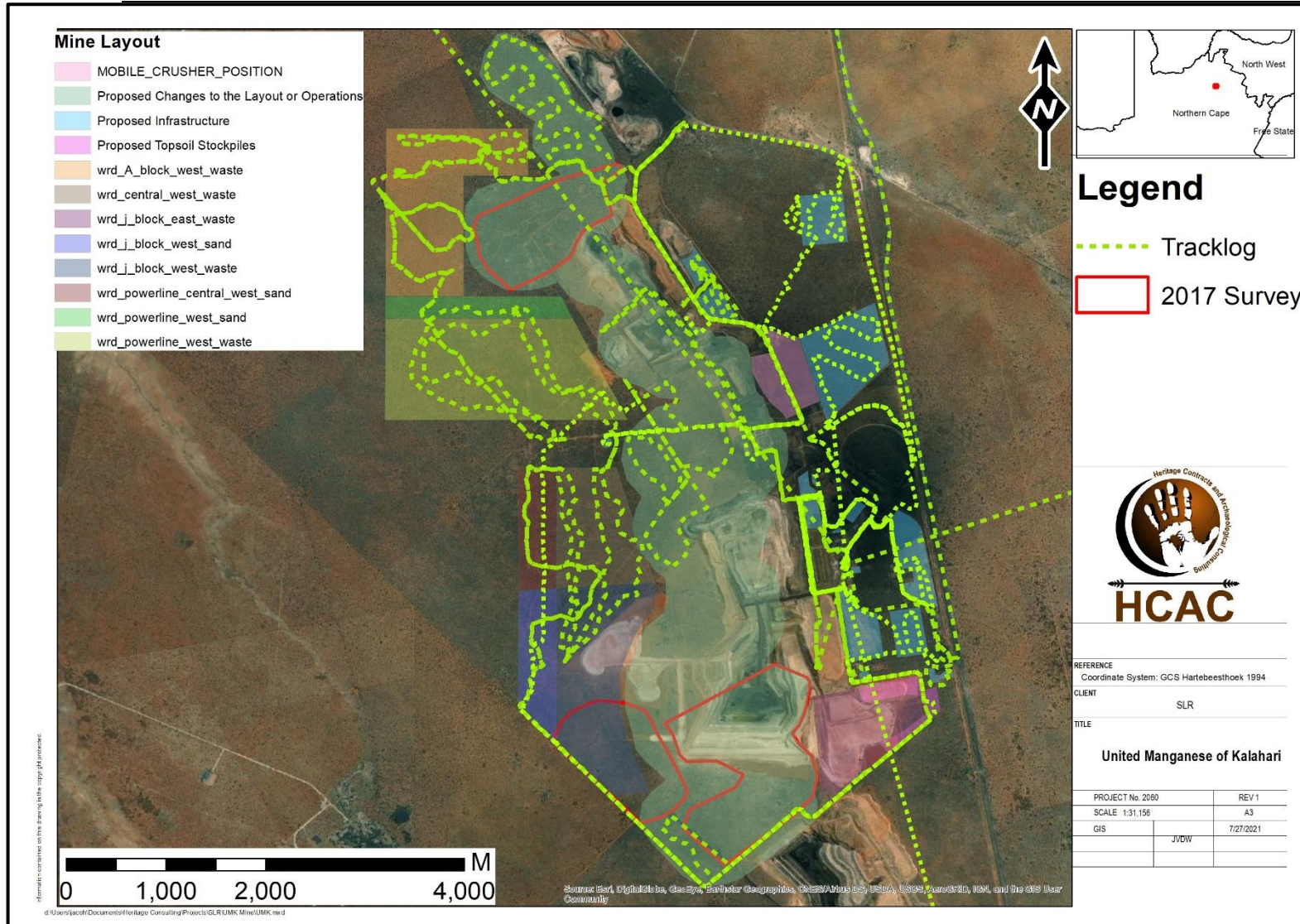


Figure 3.1: Tracklog of the survey in green also indicating areas previously assessed.

3.5 Site Significance and Field Rating

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

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

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

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

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

Table 5. Heritage significance and field ratings

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

3.6 Impact Assessment Methodology

The method used for the assessment of environmental issues is set out below. This assessment methodology enables the assessment of environmental issues including cumulative impacts, the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

3.6.1 Criteria for Impact Assessment

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.

PART A: DEFINITIONS AND CRITERIA*		
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
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High

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	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High

VL	L	M	H	VH
A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
EXTENT				

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Medium	Medium	High	Very High	Very High
	Probable	H	Low	Medium	Medium	High	Very High
	Possible/ frequent	M	Low	Low	Medium	Medium	High
	Conceivable	L	Very Low	Low	Low	Medium	Medium
	Unlikely/ improbable	VL	Negligible	Very Low	Low	Low	Medium
	VL	L	M	H	VH		
CONSEQUENCE							

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.
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*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, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey and the possible occurrence of graves/burials and other cultural material cannot be excluded. Similarly, the depth of the deposit 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, 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).

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

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

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

The following studies were conducted in the greater area and were consulted for this report (Table 6).

Table 6. CRM studies consulted for the report.

Author	Year	Project	Findings
Huffman, T. N.	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"> • Two ephemeral and isolated scatters of Middle Stone Age material on Erin; • Two 20th century graves (one farm owner and one farm worker) on Erin; • A possible hand-excavated well on Erin; • Farm buildings including a shed, workers cottages, a dam, kraals and boreholes on Erin dating to the 20th century; • Two graves (one farm owner, the other unknown) on Adams;

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			<ul style="list-style-type: none"> • A 20th century worker's cottage on Adams; • One hand-excavated well on Adams; • A water trough and limestone dam on Adams; • A small scatter of MSA/LSA stone artifacts next to the well on Adams; • Some rectangular limestone blocks, an ash heap, iron and glass rubbish suggesting an early 20th century settlement near the well.
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
Anderson, G.	2016	Desktop heritage survey of the proposed Mamatwan Manganese Mine Slimes Dam	No features
Fourie, W.	2017	United Manganese of Kalahari (Pty) Ltd HIA	No features
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

6.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the project 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 GaMohaana (in the Kuruman Hills north west 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 project 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 GaMohaana (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. Cultural Landscape

The project is located in an arid area characterized by wind-blown aeolian sands and historically very limited human occupation. The immediate project area has been subjected to extensive mining activities in the last two decades (Figure 6-1 and 6-2).

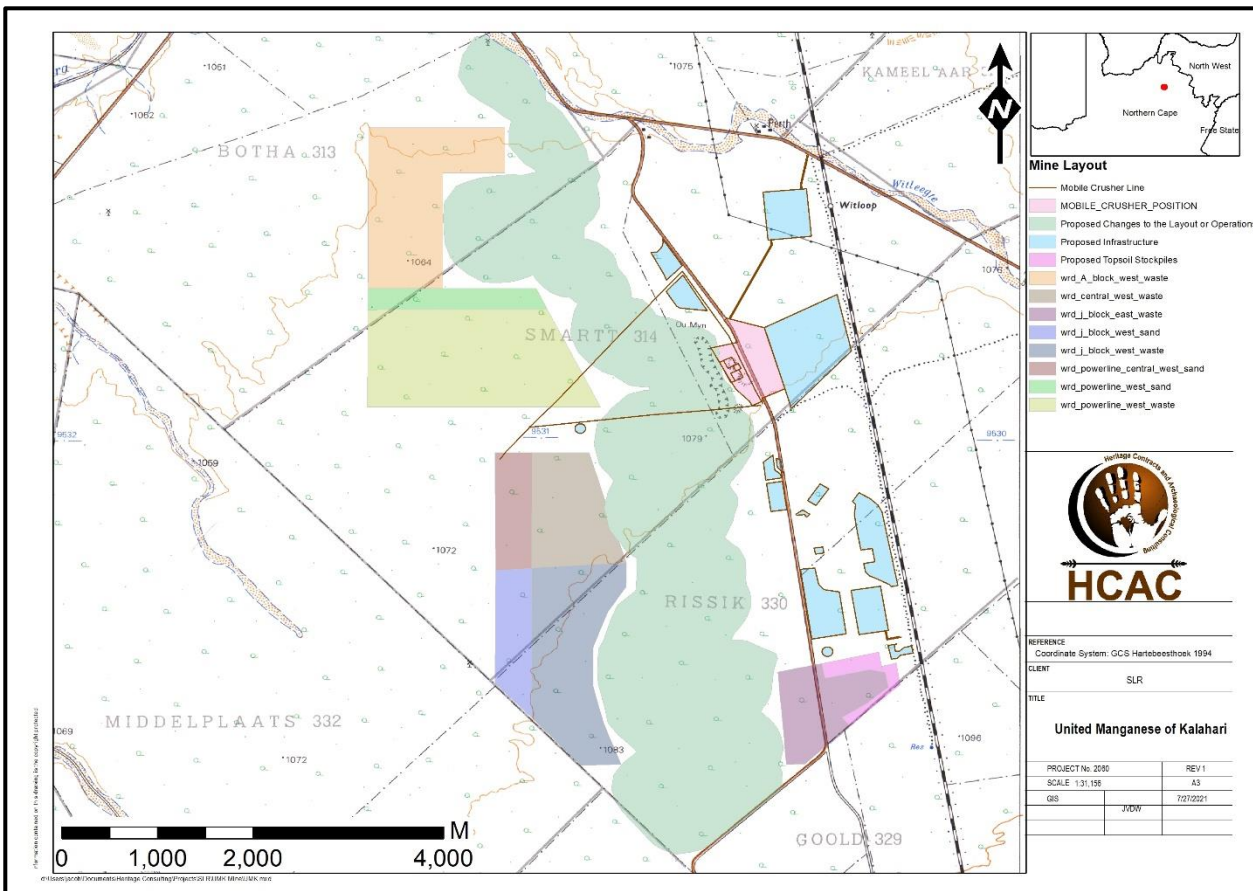


Figure 6.1. 1973 Topographic map of the project area. The area is fallow apart from small scale mining operations on the farm Smartt 314.

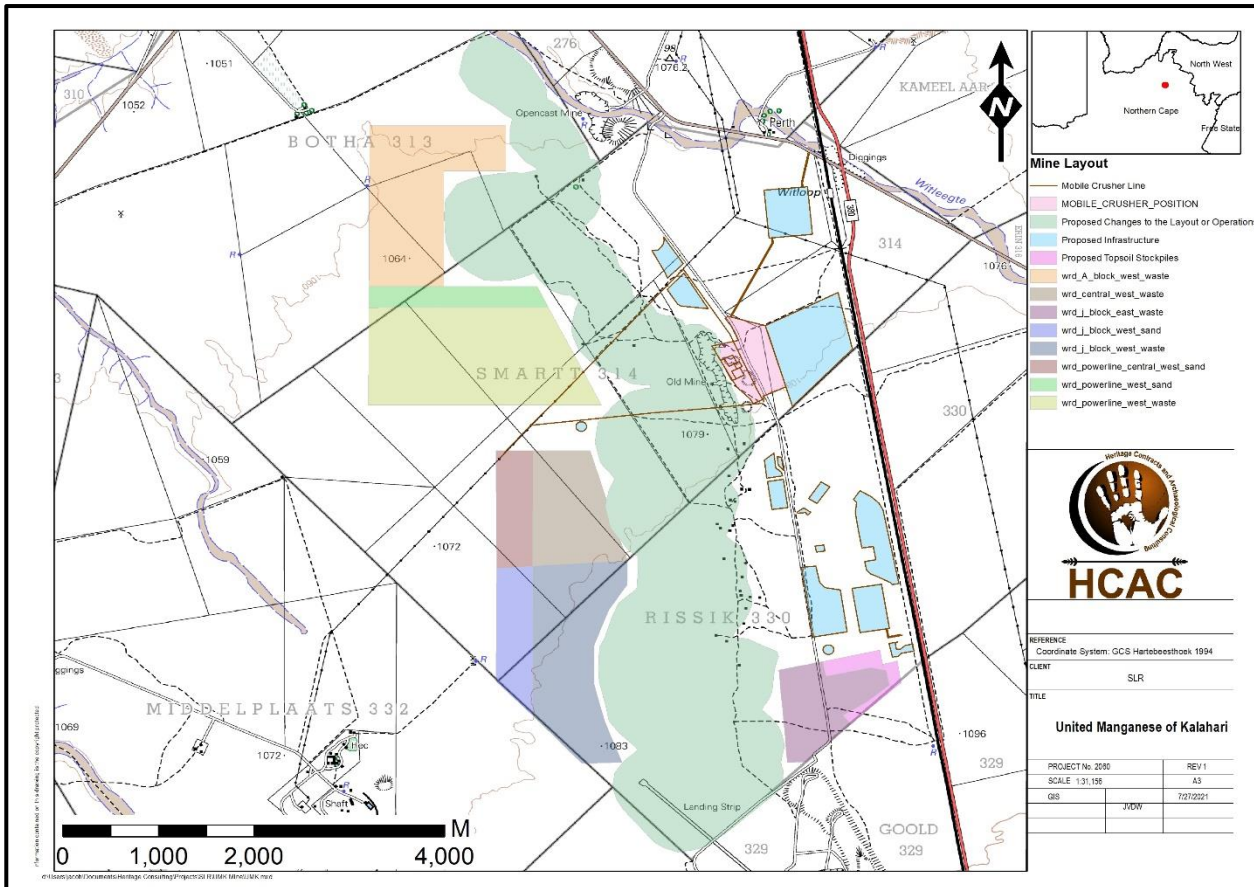


Figure 6.2. 2001 Topographic map of the project area, various developments occur in the project area including a landing strip, various roads, and mining activities.

7 Description of the Physical Environment

The project is located to the south of the town of Hotazel in the Northern Cape Province and lies directly adjacent and to the west of the R380 provincial road. The project area is relatively flat with gentle slopes towards the Northwest. The UMK Mine falls in the Kalahari Manganese Field and the project area is covered by a thick mantel of Kalahari sands (Figure 7-1), calcrete, clays & gravel beds of the Kalahari Group. Various mining related activities is visible throughout the project area (Figure 7-2 & 7-3).

The UMK Mine site consists of several vegetation types, namely the *Vachellia haematoxylon* Savannah, *Senegalia mellifera* Mixed Woodland, *Vachellia erioloba* Savannah, *Schmidtia kalihariensis* – *Prosopis glandulosa* Shrubland, *Tarchonanthus camphoratus* – *Vachellia karroo* Scrub and the *Tarchonanthus camphoratus* – *Schmidtia pappophoroides* Scrub (BID 2020).



Figure 7.1. General site conditions – Aeolian sands and vegetation.



Figure 7.2. Earth moving activities exposing thick blanket of Quaternary windblown sands.



Figure 7.3. Panoramic view of existing mine pit.

8 Findings of the Survey

It is important to note that the survey only focused on the impact areas as indicated in Figure 1-1 to 1-3 and was conducted during the week of 17 November 2020 and again in the week of 28 July 2021 by two archaeologists. Portions of the project area has been extensively disturbed by mining activities (Figure 8-1) not yet visible on areal images of the project area. The entire project area is characterised by a thick layer of Aeolian sands possibly masking subsurface finds. Three isolated Stone Age find spots (Find Spot 1 to 3) were recorded (Figure 8.2) where calcrete protrudes through the Quaternary windblown sands (Figure 8-3 & 8-7) that could allude to site formation processes and the possibility exist that Stone Age artefacts could occur below the Aeolian sand similar to observations made by Webley & Halket (2008) in the area.

The find spots were recorded at the following coordinates: Find spot one 27° 17' 49.0165" S, 22° 56' 21.3505" E & find spot two 27° 17' 22.8805" S, 22° 57' 16.3873" E, here pebbles have been flaked and some could have retouch or use wear. Findspot 3 was recorded at 27° 17' 47.1731" S, 22° 58' 44.5441" E. Few formal tools were recorded apart from a possible spoke stave, but some flakes have faceted platforms, and these appear to be of MSA origin. The ephemeral occurrences of artefacts (Figure 8.4, 8.6) at these find spots are isolated, out of context and of no significance apart from mentioning their presence in this

report. The proposed development will have a low impact on the surrounding cultural landscape and is in line with surrounding and existing land use. Visual impacts to scenic routes and sense of place are also considered to be low due to the existing mining developments.

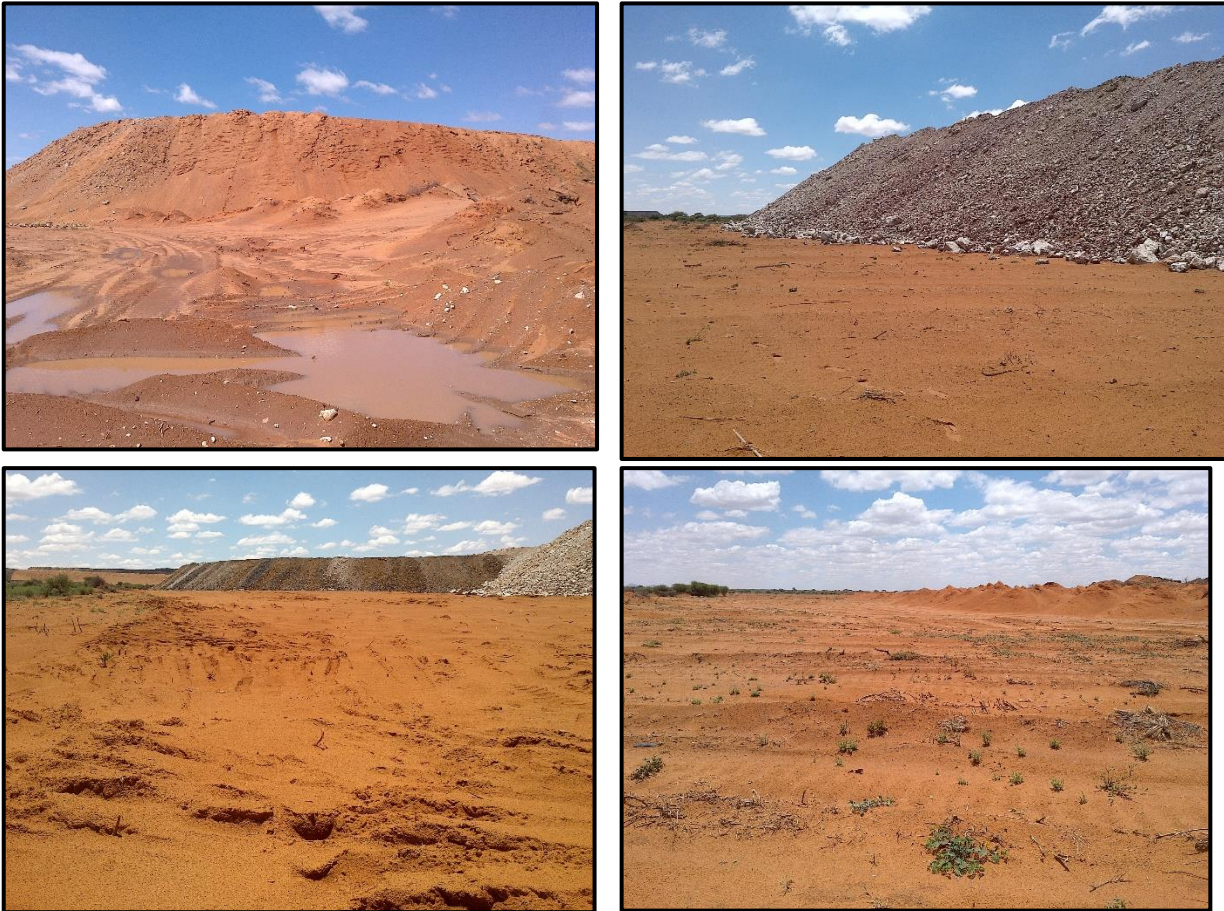


Figure 8.1: Mining related activities within the project area highlighting the thick layer of sand in the project area.

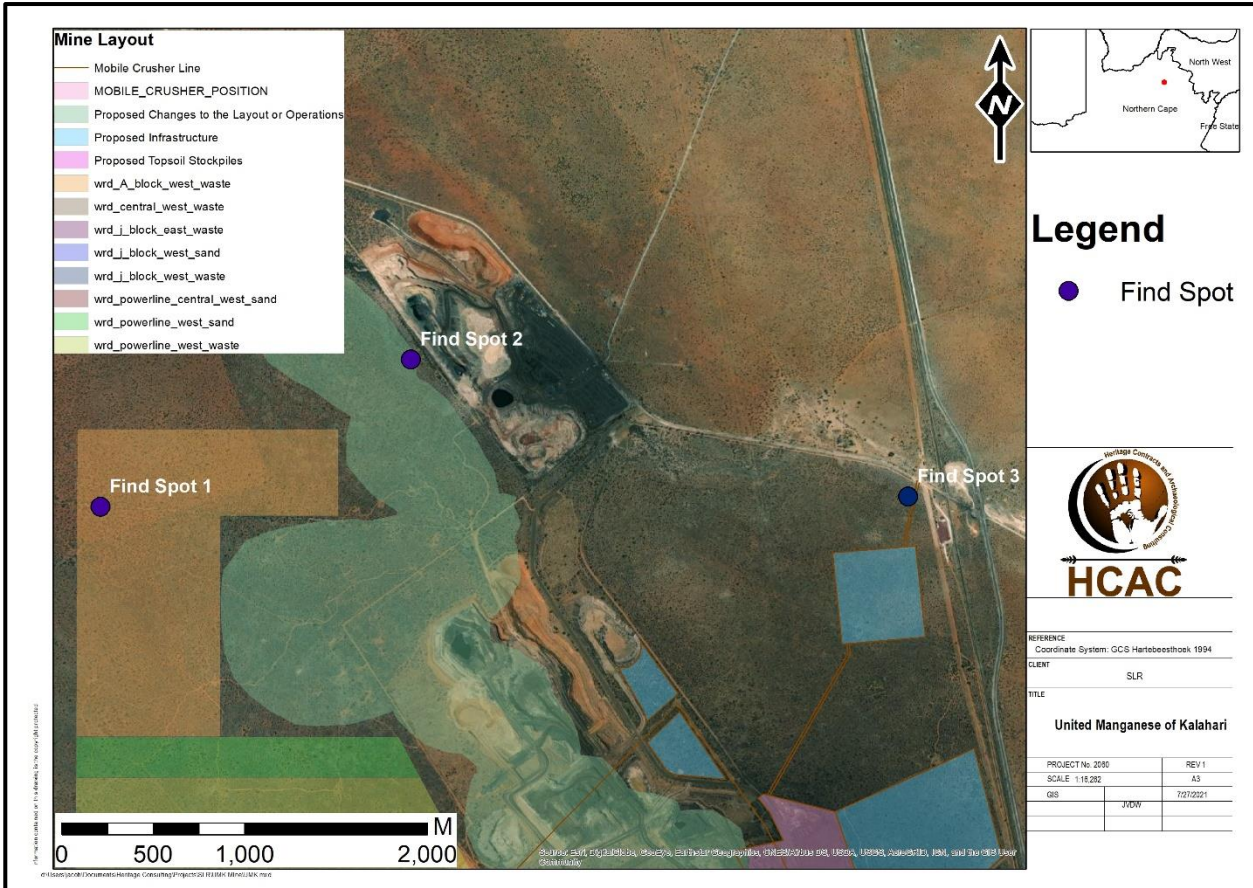


Figure 8.2. Identified find spots in relation to the project area.



Figure 8.3. Calcrete protruding through the Kalahari sand at Find spot 1.



Figure 8.4. Isolated artefacts noted at Find Spot 1.



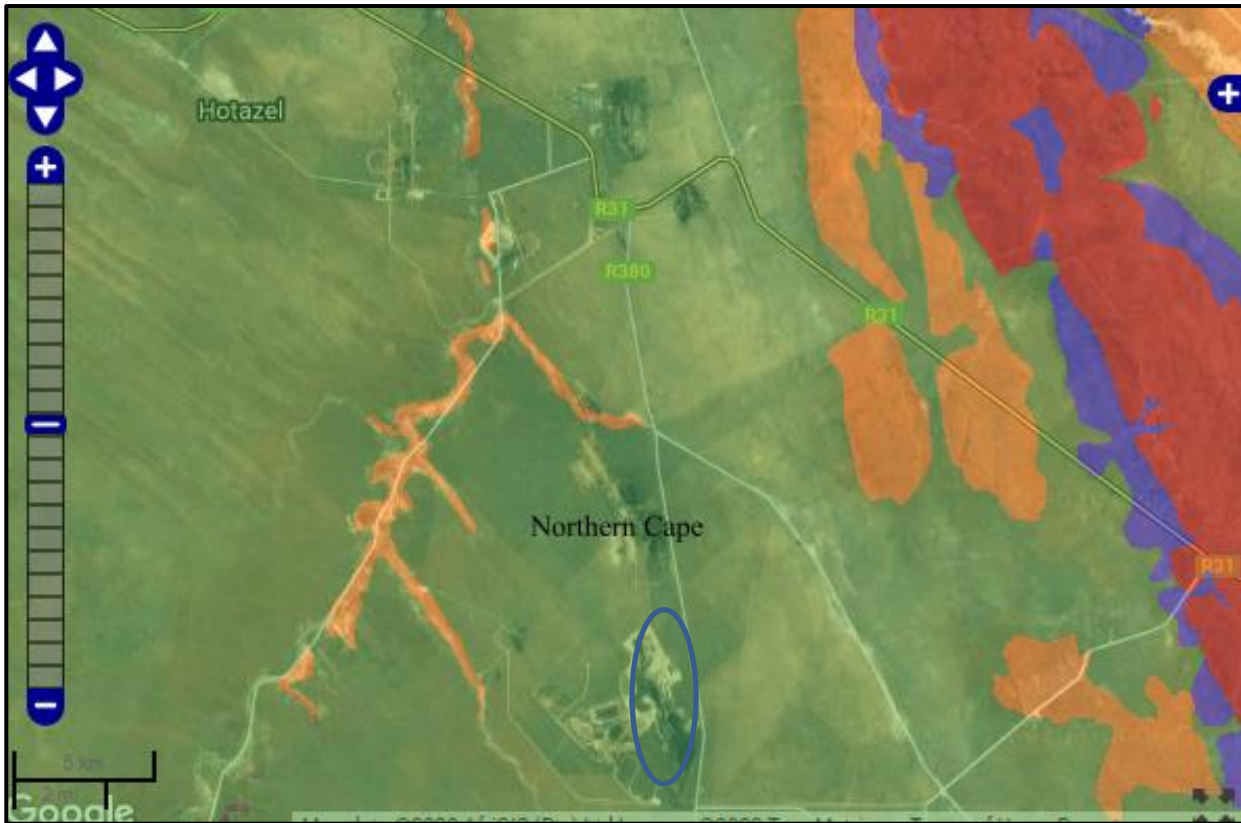
Figure 8.5. General site conditions at Find spot 2.



Figure 8.6. Dorsal view of artefacts at Find Spot 2.

8.1 Paleontological Findings

Based on the SAHRA Paleontological sensitivity map the area is of moderate paleontological sensitivity (Figure 8.7) and an independent Palaeontological Impact Assessment was conducted by Prof Marion Bamford. The study determined that the mining site lies on the aeolian sands of the Kalahari Group (Quaternary age). Rocks bearing iron and manganese are below the surface and they do not preserve any fossils. Aeolian sands do not preserve fossils as they are windblown. Rarely the sands will entrap more robust fossils, such as fragments of bones or wood, but these are not in situ. If palaeopans or palaeosprings are in the area they might preserve fossils but no such feature is evident from the Google Earth imagery. There is an extremely small chance that fossils occur on the land surface, nonetheless a Fossil Chance Find Protocol should be added to the EMP.



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 8.7. Paleontological sensitivity of the approximate project area and surrounds as indicated on SAHRIS.

9 Potential Impact

The low-density scatter of lithics at Findspot 1 – 3 is in a deflated context of no significance apart from mentioning it in this report. Therefore, no adverse impact to heritage resources is expected. Destruction of heritage resources is a direct and permanent impact, but due to the lack of significant heritage resources intensity and extent is expected to be low and the impact of the project on heritage resources will remain low (Table 7).

Mitigation measures as recommended in this report should be implemented during all phases of the project as there is a chance that *in situ* collections of ESA, MSA and LSA material could be buried beneath the soil surface but this cannot be quantified at present.

9.1 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 sites. Impacts include destruction or partial destruction of non-renewable heritage resources, if any occur.

9.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.3 Operation Phase

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

9.4 Decommissioning phase

No additional impacts are expected during decommissioning and closure

9.5 Impact Rating for the project

- Intensity

The identified heritage resources are of no significance and the intensity of impacts are expected to be very low.

- Duration

Impacts to heritage resources is permanent and irreversible and therefore based on the impact assessment methodology it will be a long-term impact in both the unmitigated and mitigated scenarios.

- Spatial scale / extent

The extent of the impact is very low as it is limited to a part of the project area.

- Consequence

Impacts on heritage resources is expected to be low as the heritage resources are of no cultural significance.

- Probability

The heritage resources will possibly be destroyed during the project, although this is a permanent and destructive impact the resources have been recorded in this report and no further mitigation is required, therefore the rating for the probability of impacts on heritage resources is medium.

- Significance

The significance of the impacts on heritage resources is low.

Table 7. Impact of the proposed project on heritage resources (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

UMK is an opencast manganese mine located to the south of the town of Hotazel in the Northern Cape Province and lies directly adjacent and to the west of the R380 provincial road. The mine consists of open-pit mining sections, crushing and screening operations, run of mine, stockpiles, waste rock and product stockpile dumps, and associated support and administrative infrastructure. HCAC assessed the proposed changes to the approved surface layout for the mine to optimize their mining operations.

Portions of these areas has been extensively disturbed by mining activities not yet visible on areal images of the project area. The entire project area is characterised by a thick layer of Aeolian sands and three isolated Stone Age find spots (Find Spot 1 to Find Spot 3) of low significance were recorded where calcrete protrudes through the Quaternary windblown sands, that could allude to site formation processes and the possibility exist that Stone Age artefacts could occur below the Aeolian sand similar to observations made by Webley & Halket (2008) in the area.

No structures older than 60 years or grave sites were noted during the field survey of the area. If any graves are identified in future, they should ideally be preserved *in-situ* or alternatively relocated according to existing legislation.

The area is indicated as of moderate palaeontological sensitivity on SAHRIS and an independent Paleontological Impact Assessment was conducted by Prof Marion Bamford. The study concluded that the mining site lies on the aeolian sands of the Kalahari Group (Quaternary age). Rocks bearing iron and manganese are below the surface and they do not preserve any fossils. Aeolian sands do not preserve fossils as they are windblown. Rarely the sands will entrap more robust fossils, such as fragments of bones or wood, but these are not *in-situ*. If palaeopans or palaeosprings are in the area they might preserve fossils but no such feature is evident from the Google Earth imagery.

The proposed development will have a low impact on the surrounding cultural landscape and is in line with surrounding land use. Visual impacts to scenic routes and sense of place are also considered to be low. The impact of the project on heritage resources is considered to be low and it is recommended that the proposed project can commence on the condition that the following recommendations are implemented as part of the EMPr and based on approval from SAHRA:

Recommendations:

- Implementation of a chance find procedure for both the archaeological and paleontological components as outlined below.
- Excavations through aeolian sands to the calcrete layer especially in the pit should be monitored by an archaeologist or by an EO trained by an archaeologist.

10.1 Chance Find Procedures

10.1.1 Heritage Resources

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

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

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

10.1.2 Paleontological resources

Monitoring Programme for Palaeontology - to commence once the excavations / drilling activities begin.

The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.

- When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (stromatolites, plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
- 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.
- Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
- If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
- Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
- If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
- If no fossils are found and the excavations have finished then no further monitoring is required.

10.2 Reasoned Opinion

The impact of the proposed project on heritage resources is low and any impact to accidental finds can be mitigated to an acceptable level and no further pre-construction mitigation is required based on approval from SAHRA. Furthermore, the socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures (i.e., chance find procedure) are implemented for the project.

10.3 Potential risk

Potential risks to the proposed project are the occurrence of unrecorded graves and Stone Age deposits below the surface. These risks can be managed by monitoring the area during construction and the implementation of a chance find procedure as outlined in Section 10.1. The presence of graves should also be confirmed during social consultation for the project.

10.4 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 8. 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"> If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> Cease all works immediately; Report incident to the Sustainability Manager; Contact an archaeologist/ palaeontologist to inspect the site; Report incident to the competent authority; and Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. Only recommence operations once impacts have been mitigated.
Clearing and excavations	Heritage Sensitive area close to the river	Project Archaeologist or EO trained by an archaeologist.	Weekly – during construction phase	Pro active	<ul style="list-style-type: none"> If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> Cease all works immediately; Report incident to the manager; Report incident to the competent authority; and Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. Only recommence operations once impacts have been mitigated.

10.5 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 9. 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 and Construction	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.

10.6. Knowledge Gaps

Based on the subsurface nature of heritage resources the possibility of discovering heritage finds during the construction phase cannot be excluded.

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12 Appendices:**Appendix A
Curriculum Vitae of Specialist**

Jaco van der Walt
Archaeologist

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Education:**Particulars of degrees/diplomas and/or other qualifications:**

Name of University or Institution: University of Pretoria
Degree obtained : BA Heritage Tourism & Archaeology
Year of graduation : 2001

Name of University or Institution: University of the Witwatersrand
Degree obtained : BA Hons Archaeology
Year of graduation : 2002

Name of University or Institution : University of the Witwatersrand
Degree Obtained : MA (Archaeology)
Year of Graduation : 2012

Name of University or Institution : University of Johannesburg
Degree : PhD
Year : Currently Enrolled

EMPLOYMENT HISTORY:

2011 – Present: **Owner – HCAC (Heritage Contracts and Archaeological Consulting CC).**
2007 – 2010 : **CRM Archaeologist**, Managed the Heritage Contracts Unit at the University of the Witwatersrand.
2005 - 2007: **CRM Archaeologist**, Director of Matakoma Heritage Consultants
2004: **Technical Assistant**, Department of Anatomy University of Pretoria
2003: **Archaeologist**, Mapungubwe World Heritage Site
2001 - 2002: **CRM Archaeologists**, For R & R Cultural Resource Consultants, Polokwane
2000: **Museum Assistant**, Fort Klapperkop.

Countries of work experience include:

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho and Zambia.

SELECTED PROJECTS INCLUDE:**Archaeological Impact Assessments (Phase 1)**

Heritage Impact Assessment Proposed Discharge Of Treated Mine Water Via The Wonderfontein Spruit Receiving Water Body Specialist as part of team conducting an Archaeological Assessment for the Mmamabula mining project and power supply, Botswana

Archaeological Impact Assessment Mmamethlake Landfill

Archaeological Impact Assessment Libangeni Landfill

Linear Developments

Archaeological Impact Assessment Link Northern Waterline Project At The Suikerbosrand Nature Reserve

Archaeological Impact Assessment Medupi – Spitskop Power Line,

Archaeological Impact Assessment Nelspruit Road Development

Renewable Energy developments

Archaeological Impact Assessment Karoshoek Solar Project

Grave Relocation Projects

Relocation of graves and site monitoring at Chlookop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.

Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.

Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal

Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booyendal Platinum Mine, Steelpoort, Limpopo Province. Principle investigator Prof. T. Huffman

Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.

Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.

Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159
Accreditation:
 - Field Director Iron Age Archaeology
 - Field Supervisor Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
 - J van der Walt, A Meyer, WC Nienaber
 - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
- 'n Reddingsondersoek na Anglo-Boereoorlog-ammunisie, gevind by Ifafi, Noordwes-Provinsie. South-African Journal for Cultural History 16(1) June 2002, with A. van Vollenhoven as co-writer.
- Fieldwork Report: Mapungubwe Stabilization Project.
 - WC Nienaber, M Hutten, S Gaigher, J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
 - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
 - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province .
 - J van der Walt, P Birkholtz, W. Fourie
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008
- Ceramic
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- J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008
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 - Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011
 - Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
 - Bantu-Speaker Rock engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga. J.P Celliers and J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
 - Pleistocene hominin land use on the western trans-Vaal Highveld ecoregion, South Africa, Jaco van der Walt.
 - J van der Walt. Poster presented at SAFA, Toulouse, France. Biennial Conference 2016

REFERENCES:

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