



# PGS HERITAGE

## KUDUMANE MANGANESE RESOURCES EXPANSION PROJECT

**Proposed Amendment of Existing Mining Activities for Kudumane Mine situated near Hotazel, Northern Cape.**

Phase 1 - Heritage Impact Assessment

**Issue Date:** 14 September 2021

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## Declaration of Independence

I, Polke Birkholtz, declare that –

- General declaration:
- I act as the independent heritage practitioner 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 heritage impact assessments, 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 will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- 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;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

## Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

### **HERITAGE CONSULTANT:**

PGS Heritage (Pty) Ltd

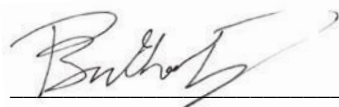
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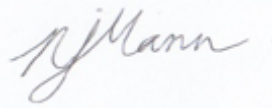
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## EXECUTIVE SUMMARY

### Introduction

PGS Heritage (Pty) Ltd (PGS) was appointed by SRK Consulting (South Africa) (Pty) Ltd (SRK) to undertake a Phase 1 Heritage Impact Assessment (HIA) for the proposed Kudumane Manganese Resources Expansion Project, located approximately 3 km southwest of the town of Hotazel, Northern Cape Province.

The study area is located on sections of the farms Devon 277, Gama 283, Hotazel 280, Klipling 271, Olive Pan 282, Telele 312, Umtu 281 and York 27, and is situated in the Joe Morolong Local Municipality and John Taolo Gaetsewe District Municipality.

### General Desktop Study

An archival and historical desktop study was undertaken to provide a historic framework for the project area and surrounding landscape. This was augmented by a study of available historical and archival maps and an assessment of previous archaeological and heritage studies completed for the area. The desktop study revealed that the surroundings of the study area are characterised by a long and significant history, whereas previous archaeological and heritage studies from this area have revealed several archaeological and heritage sites from the surroundings.

Several previous archaeological and heritage surveys were undertaken within the property of the Kudumane Mine. PGS compiled archaeological and heritage impact assessments for additional infrastructure and mining areas for the same mine in 2014, 2017 and 2019. The study areas for these previous heritage studies and the current report are in the same general area. These previous reports identified seven heritage sites in total. **A single recorded artefact (KMR 002) of low significance falls within the study area but the other sites identified at the time fall outside of the current development footprint. Even though site KMR 002 is located within the study area, its low significance means that it is not again included as a site in this report.**

In 2014, the fieldwork was conducted by Wouter Fourie, an archaeologist of PGS through controlled exclusive survey of the proposed new infrastructure footprint areas. During the fieldwork, one archaeological site (**KU001**) comprising a low-density scatter of stone tools, was identified on the eastern banks of the Ga-Mogara River (PGS, 2014). The site was given a low heritage significance and it was graded as Generally Protected (Grade 4B).

In 2017, the fieldwork was conducted by Marko Hutten, an archaeologist of PGS through controlled exclusive survey of the proposed new infrastructure footprint areas. During this fieldwork, three

archaeological sites (**KMR 002**, **KMR 003** and **KMR 005**) and two historical structures (**KMR 001** and **KMR 004**) were identified. The archaeological findspot of a single fragmented stone tool (**KMR 002**) did not constitute a site of heritage value or significance. Two sites which comprised low-density scatters of stone tools (**KMR 003** and **KMR 005**) were given a low heritage significance and it were graded as Generally Protected (Grade GP. B). The historical structure, **KMR 001**, required no mitigation due to low heritage significance but the historical structure, **KMR 004**, was given a medium heritage significance rating.

During the 2019 assessment, one additional site, a burial ground (**KMR 007**) was identified. The site has a heritage grading of Generally Protected A (GP. A).

### **Palaeontology**

Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. His report and findings are attached in full in **Appendix C**. Ms. Butler found that the study area is "...underlain by Quaternary aged sediments of the Kalahari Group as well Asbestos Hills Subgroup (Ghaap Group, Transvaal Supergroup). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalahari Group is low but locally high and that of the Griqualand West rocks of the Transvaal Supergroup is moderate. The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage. It is therefore considered that the development is will not lead to detrimental impacts on the palaeontological resources of the area."

Additionally, Ms. Butler recommends that if fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: [www.sahra.org.za](http://www.sahra.org.za)) so that correct mitigation can be carried out by a palaeontologist.

**It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.**

### **Fieldwork**

PGS was appointed in 2021 to undertake a Heritage Impact Assessment (HIA) for the Kudumane Manganese Resources Expansion Project. The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance. The fieldwork was undertaken by way of intensive walkthroughs of the proposed development footprint areas. The

walkthroughs were focused on those areas that are not disturbed, as the potential for identifying archaeological and heritage sites in the more undisturbed components of the study area are much higher. As a result, only limited fieldwork was undertaken in those components of the study area that are entirely disturbed.

The fieldwork was undertaken by two archaeologists (Nikki Mann and Wynand van Zyl) and was conducted from 13 to 17 July 2021. Throughout the fieldwork, hand-held GPS devices were used to record tracklogs showing the routes followed by the fieldwork team. All sites identified during the fieldwork were photographically and qualitatively recorded, and their respective localities documented using a hand-held GPS device.

It is important to note that although as intensive a fieldwork coverage as possible was undertaken, sections of the study area are in areas which are densely overgrown, which limited accessibility and visibility in those areas of the study area. Previous studies conducted in the larger Hotazel and Black Rock areas has shown that the archaeological record is temporally confined to the Middle and Later Stone Age, while spatially distribution of such sites is concentrated around the riverine edges due to the harsh climate of the area. Fieldwork has confirmed this, and five archaeological sites associated with the MSA and LSA were identified in the study area.

The recent fieldwork undertaken resulted in the identification of a total of eleven (11) sites. These sites comprised the following:

- Five Stone Age sites. See sites **KLIP-002, KLIP-004, KLIP-005, YORK-002 and YORK-003**.
- Three historic structures. See sites **KLIP-001, KLIP-003 and YORK-001**.
- Three sites containing burial grounds. See sites **TELELE-001, DEVON-001 and HOTAZEL-001**. It is important to note that site **HOTAZEL-001** identified during the field assessment is the same site as **KMR007** identified in the 2019 heritage assessment.

### **Impact Assessment and Mitigation**

An overlay of the identified heritage sites over the proposed development footprint areas was made, which was used to assess the impact of the proposed development on these identified heritage sites. Both pre-mitigation and post-mitigation impact assessments were undertaken. Please refer to **Chapter 7** for the impact assessment calculations. A series of site-specific mitigation measures are outlined in **Chapter 8** of this report. The overlay and impact assessments, resulted in the following observations and mitigation measures:

- Structures **KLIP-001, KLIP-003 and YORK-001** are all perceived to be older than 60 years. All three these sites are provisionally rated as Generally Protected B (GP.B) or Medium

significance. The structure at **YORK-001** is located outside of the proposed development area and will not be impacted upon by the proposed development. **KLIP-001** and **KLIP-003** fall within the proposed development area and the impact assessment of the proposed development on these sites is rated as Moderate. The following mitigation measures are recommended:

- Long before construction commences, an architectural historian must be appointed to undertake an assessment of the two buildings.
  - Although the architectural historian will provide recommendations, these are expected to *inter alia* comprise the recording of the two structures by way of photographic recording, recording of measured drawings of the facades and layout plans of the buildings.
  - The results from the above-mentioned mitigation measures (drawings, photographs and descriptions of the two buildings) must accompany the permit application that will be submitted to the relevant heritage authority to allow for the destruction of the two buildings.
  - The two structures may only be destroyed once the relevant destruction permit has been issued by the relevant heritage authority.
- Stone Age sites **KLIP-002**, **KLIP-005**, **YORK-002** and **YORK-003** have a low heritage significance and no further mitigation is required. However, it is advised that should dense concentrations of stone artefacts be identified during vegetation clearing and subsequent earth-moving/construction activities, the archaeologist would need to make recommendations on the appropriate mitigation measures. An archaeological watching brief would therefore be required during construction activities at these four sites.
  - Stone Age site **KLIP-004** has a heritage significance rating of Medium and the impact assessment of the proposed development on the site is rated as Moderate. The site is also located within the proposed development footprints. The following mitigation measures are recommended:
    - Vegetation clearing of the site should be undertaken under close supervision of an archaeologist.
    - Once vegetation clearing is complete, the site must be assessed in the field by a suitably qualified Stone Age specialist long before construction commences. This is to allow this specialist report, and any mitigation measures recommended by the specialist, to be undertaken before construction commences.
    - The recommendations made by the Stone Age specialist must be adhered to. Such recommendations may include the archaeological recording of a surface layout plan, surface collection of lithics, etc.

- One grave site, **DEVON-001**, is located approximately 130m outside of the proposed development footprint. Therefore, no direct impacts are foreseen on this site.
- Grave sites **TELELE-001** and **HOTAZEL-001**, are located less than 100m outside of the development footprint areas. The impact assessment of the proposed development on the sites is rated as Moderate.

As cemeteries and graves have Medium to High Heritage Significance, the preferred option is to change the development footprint to allow for the *in situ* preservation of these sites. The following mitigation measures would be required for this option:

- SAHRA's Burial Grounds and Graves Unit requires a buffer area of at least 100m between mining development and any burial grounds or graves that are to be preserved. As a result, and if at all possible, the proposed development footprints must be amended to allow for a 100m wide buffer area surrounding each of the two burial grounds that is kept clear of any construction or mining activities.
- Fences around the two burial grounds should be maintained.
- The two burial grounds should be cleaned on a yearly basis.
- A heritage monitoring process would also be required during all the project phases.
- A Grave Management Plan should be developed for the burial grounds that will be preserved *in situ*. This management plan must be approved by the SAHRA BGGU.

However, should it not be possible to preserve these sites *in situ*, the following mitigation measures are required:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.



- The process must be done by a reputable company well versed in the mitigation of graves.

### **General Recommendations**

The following general recommendations must be addressed:

- Sections of the proposed development footprints were not assessed during the fieldwork due to these sections located outside of KMR’s mining right. This means that access to these areas was not allowed. These last-mentioned areas include all the proposed development footprints located on the farms Umtu 281, Olive Pan 282 and Gama 283. Once access to these farms is possible, additional field assessments of the development footprints located on these properties is required. This must be undertaken long before construction activities start.
- It should be noted that during telecommunications with one of the farmers from the Telele farm portion, Mr Holmeyer, it was mentioned that there may be additional areas within the study area that contain graves. However, during the survey of this region, these forementioned graves were not discovered. It is anticipated that further communication may assist with obtaining the exact location of these graves and burial grounds. Long before construction commences, a site visit must be undertaken by an archaeological team accompanied by Mr Holmeyer. During the site visit, Mr Holmeyer will be requested to indicate the positions of the graves that he knows of within the proposed development footprint areas.
- A Chance Find Procedure (refer **Section 8**) must be implemented and adhered to.

### **Conclusions**

It is the considered opinion of the authors of this report that the overall post-mitigation impact of the proposed Kudumane Manganese Resources Expansion Project on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels, provided that the general recommendations and mitigation measures outlined in this report are implemented.

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## **TERMINOLOGY AND ABBREVIATIONS**

### **Archaeological resources**

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;

- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency, and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; and
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

### **Cultural significance**

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

### **Development**

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil.

### **Early Stone Age**

The archaeology of the Stone Age between 700 000 and 3 300 000 years ago.

### **Fossil**

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

### **Heritage**

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

### **Heritage resources**

This means any place or object of cultural significance and can include (but is not limited to) the following list as outlined under Section 3 of the National Heritage Resources Act (NHRA):

- places, buildings, structures, and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

### **Holocene**

The most recent geological time which commenced 10 000 years ago.

### **Late Stone Age**

The archaeology of the last 30 000 years associated with fully modern people.

### **Middle Stone Age**

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

### **Palaeontology**

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

*Table 1 – List of abbreviations used in this report*

<b>Abbreviations</b>	<b>Description</b>
<b>AIA</b>	Archaeological Impact Assessment
<b>ASAPA</b>	Association of South African Professional Archaeologists

<b>Abbreviations</b>	<b>Description</b>
<b>BMM</b>	Black Mountain Mine
<b>CRM</b>	Cultural Resource Management
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>EAP</b>	Environmental Assessment Practitioner
<b>ESA</b>	Earlier Stone Age
<b>GPS</b>	Global Positioning System
<b>HIA</b>	Heritage Impact Assessment
<b>I&amp;AP</b>	Interested & Affected Party
<b>LCTs</b>	Large Cutting Tools
<b>LSA</b>	Late Stone Age
<b>MPRDA</b>	Mineral and Petroleum Resources Development Act 28 of 2002
<b>MSA</b>	Middle Stone Age
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No 107 of 1998)
<b>NHRA</b>	National Heritage Resources Act, 1999 (Act No 25 of 1999)
<b>NCW</b>	Not Conservation Worthy
<b>PGS</b>	PGS Heritage (Pty) Ltd
<b>PHRA</b>	Provincial Heritage Resources Authority
<b>PIA</b>	Palaeontological Impact Assessment
<b>PSSA</b>	Palaeontological Society of South Africa
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SAHRIS</b>	South African Heritage Resources Information System
<b>SRK</b>	SRK Consulting (Pty) Ltd

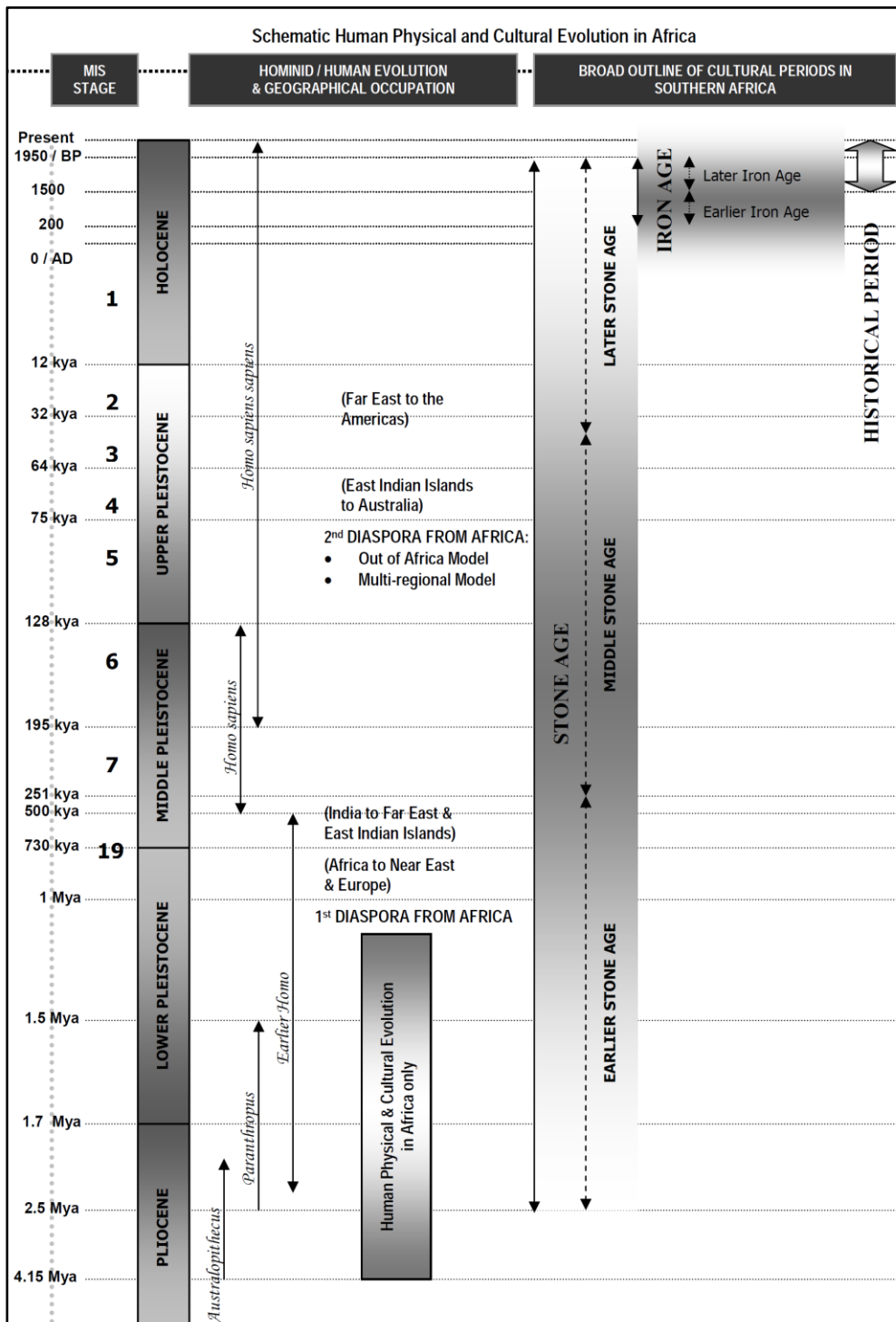


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008).

## **1 INTRODUCTION**

PGS Heritage (Pty) Ltd (PGS) was appointed by SRK Consulting (South Africa) (Pty) Ltd (SRK) to undertake a Phase 1 Heritage Impact Assessment (HIA) for the proposed Kudumane Manganese Resources (KMR) Expansion Project, located approximately 3 km southwest of the town of Hotazel, Northern Cape Province.

The study area is located on sections of the farms Devon 277, Gama 283, Hotazel 280, Klipling 271, Olive Pan 282, Telele 312, Umtu 281 and York 27, and is situated in the Joe Morolong Local Municipality and John Taolo Gaetsewe District Municipality.

### **1.1 Scope of the Study**

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed study area. The HIA aims to inform the Environmental Impact Assessment (EIA) to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

### **1.2 Specialist Qualifications**

This HIA was compiled by PGS. The staff at PGS has a combined experience of nearly 90 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. And will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

The following individuals were involved with this study:

- Polke Birkholtz, the project manager and co-author of this report, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited with the Cultural Resources Management (CRM) Section of ASAPA. He has 20 years of experience in the heritage assessment and management field and holds a B.A. (cum laude) from the University of Pretoria specialising in Archaeology, Anthropology and History as well as a B.A. (Hons.) in Archaeology (cum laude) from the same university.
- Nikki Mann, the author of this report, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA). She has 4 years of experience in the heritage assessment field and holds a Master's degree (MSc) in Archaeology from the University of Cape Town.

- Wynand van Zyl, field archaeologist who assisted with the fieldwork, holds a BA (Hons) in Archaeology.

### **1.3 Assumptions and Limitations**

The following assumptions and limitations regarding this study and report exist:

- Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is important to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. In fact, due to the dense vegetation cover and access constraints within the study area, it is highly likely that the presently identified heritage sites are not a complete record of all the archaeological and heritage resources located within the study area. Areas not assessed during the fieldwork comprise disturbed areas and the project's affected properties which do not fall within KMR's mining right which meant that access was not allowed. These last-mentioned areas include all the proposed development footprints located on the farms Umtu 281, Olive Pan 282 and Gama 283. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below. Additionally, once access to the farms Umtu 281, Olive Pan 282 and Gama 283 is possible, additional field assessment of those footprints is required. This must be undertaken long before construction activities start.
- The study area boundaries and development footprints depicted in this report were provided by the client. As a result, these were the areas assessed during the fieldwork. Should any additional development footprints located outside of these study area boundaries be required, such additional areas will have to be assessed in the field by an experienced archaeologist/heritage specialist long before construction starts.

### **1.4 Legislative Context**

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:



#### 1.4.1 Statutory Framework: *The National Heritage Resources (Act 25 of 1999)*

The NHRA has applicability as the study forms part of an overall HIA in terms of the provisions of Section 34, 35, 36 and 38 of the NHRA and forms part of a heritage scoping study that serves to identify key heritage resources, informants, and issues relating to the palaeontological, archaeological, built environment and cultural landscape, as well as the need to address such issues during the impact assessment phase of the HIA process.

The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources, and in the case of Cultural Resource Management (CRM), those resources specifically impacted by the development as stipulated in Section 38 of NHRA.

The National Heritage Resources Act (Act No 25 of 1999, Art 3) outlines the following types and ranges of heritage resources that qualify as part of the National Estate, namely:

- a) places, buildings structures and equipment of cultural significance;
- b) places to which oral traditions are attached or which are associated with living heritage;
- c) historical settlements and townscapes;
- d) landscapes and natural features of cultural significance;
- e) geological sites of scientific or cultural importance;
- f) archaeological and palaeontological sites;
- g) graves and burial grounds including-
  - (i) ancestral graves;
  - (ii) royal graves and graves of traditional leaders;
  - (iii) graves of victims of conflict;(iv) graves of individuals designated by the Minister by notice in the Gazette;
  - (iv) (v) historical graves and cemeteries; and
  - (v) (vi) other human remains which are not covered by in terms of the Human Tissues Act, 1983 (Act No 65 of 1983);
- h) sites of significance relating to the history of slavery in South Africa;
- i) movable objects, including -
- j) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
  - (i) objects to which oral traditions are attached or which are associated with living heritage;
  - (ii) ethnographic art and objects;
  - (iii) military objects;
  - (iv) objects of decorative or fine art;
  - (v) objects of scientific or technological interest; and
  - (vi) books, records, documents, photographs, positives and negatives, graphic, film or video material

- (vii) or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No 43 of 1996).

The NHRA (Act No 25 of 1999) also 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:

3) Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

- a) its importance in the community, or pattern of South Africa's history;
- b) its possession of uncommon, rare or endangered aspects of South Africa's
- c) natural or cultural heritage;
- d) its potential to yield information that will contribute to an understanding of
- e) South Africa's natural or cultural heritage;
- f) its importance in demonstrating the principal characteristics of a particular
- g) class of South Africa's natural or cultural places or objects;
- h) its importance in exhibiting particular aesthetic characteristics valued by a
- i) community or cultural group;
- j) its importance in demonstrating a high degree of creative or technical
- k) achievement at a particular period;
- l) its strong or special association with a particular community or cultural group
- m) for social, cultural or spiritual reasons;
- n) its strong or special association with the life or work of a person, group or
- o) organisation of importance in the history of South Africa; and
- p) sites of significance relating to the history of slavery in South Africa.

#### *1.4.2 Section 34 – Structures*

According to Section 34 of the NHRA, no person may alter, damage or destroy any structure that is older than 60 years, and which forms part of the built environment of the sites, without the necessary permits from the relevant provincial heritage authority.

#### *1.4.3 Section 35 – Archaeology, Palaeontology and Meteorites*

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the NHRA, PIAs and AIAs are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period.

#### 1.4.4 Section 36 – Burial Grounds & Graves

A Section 36 permit application is made to the SAHRA or the competent provincial heritage authority which protects burial grounds and graves that are older than 60 years and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the following conditions:

Permit applications for burial grounds and graves older than 60 years should be submitted to the South African Heritage Resources Agency:

- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of the conflict, or any burial ground or part thereof which contains such graves.
- b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
- d) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant.

#### 1.4.5 Section 38 - HIA as a Specialist Study within the EIA in Terms of Section 38(8)

A NHRA Section 38 (Heritage Impact Assessments) application is required when the proposed development triggers one or more of the following activities:

- a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of a site,
  - i. exceeding 5 000 m<sup>2</sup> in extent; or
  - ii. involving three or more existing erven or subdivisions thereof; or
  - iii. involving three or more erven or divisions thereof which have been consolidated within the past five years; or

- iv. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority

In this instance, the heritage assessment for the property is to be undertaken as a component of the EIA for the project. Provision is made for this in terms of Section 38(8) of the NHRA, which states that:

- An HIA report is required to identify, and assess archaeological resources as defined by the NHR Act, assess the impact of the proposal on the said archaeological resources, review alternatives and recommend mitigation (see methodology above).

Section 38 (3) Impact Assessments are required, in terms of the statutory framework, to conform to basic requirements as laid out in Section 38(3) of the NHRA. These are:

- The identification and mapping of heritage resources in the area affected;
- The assessment of the significance of such resources;
- The assessment of the impact of the development on the heritage resources;
- An evaluation of the impact on the heritage resources relative to sustainable socio/economic benefits;
- Consideration of alternatives if heritage resources are adversely impacted by the proposed development;
- Consideration of alternatives; and
- Plans for mitigation.

#### *1.4.6 National Environmental Management Act, 1998 (Act No. 107 of 1998)*

The cultural environment in South Africa is managed through Section 24 of the National Environmental Management Act (NEMA), No. 107 of 1998. The NEMA creates the legal framework by which cultural heritage can be managed.

Furthermore, under Section 2(4)(a) of the NEMA:

2 (4) (a) Sustainable development requires the consideration of all relevant factors including the following:

- (iii) the disturbance of landscapes and sites that constitute the nation's cultural heritage must be avoided, or where it cannot be altogether avoided, is minimised and remedied.

#### 1.4.7 Notice 648 of the Government Gazette 45421

Although minimum standards for archaeological (2007) and palaeontological (2012) assessments were published by SAHRA (2016), Government Notice (GN) 648 of 2019 requires sensitivity verification for a site selected on the national web-based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this GN are listed in **Table 2** and the applicable section in this report noted.

*Table 2 - Reporting requirements for GN 648 of 2019*

<b>GN 648</b>	<b>Relevant section in report</b>	<b>Where not applicable</b>
2.2 (a) a desktop analysis, using satellite imagery	Section 4 and 5	-
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	Section 4 and 5	-
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool	Section 1 and 5	-
2.3(b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity	Section 4 provides a description of the current use and confirms the status in the screening report	-

An assessment of the Environmental Screening tool provides the following sensitivity rating for archaeological and heritage resources that fall within the proposed area as low (**Figure 2**), while palaeontological resources are rated as Medium to High (**Figure 3**).

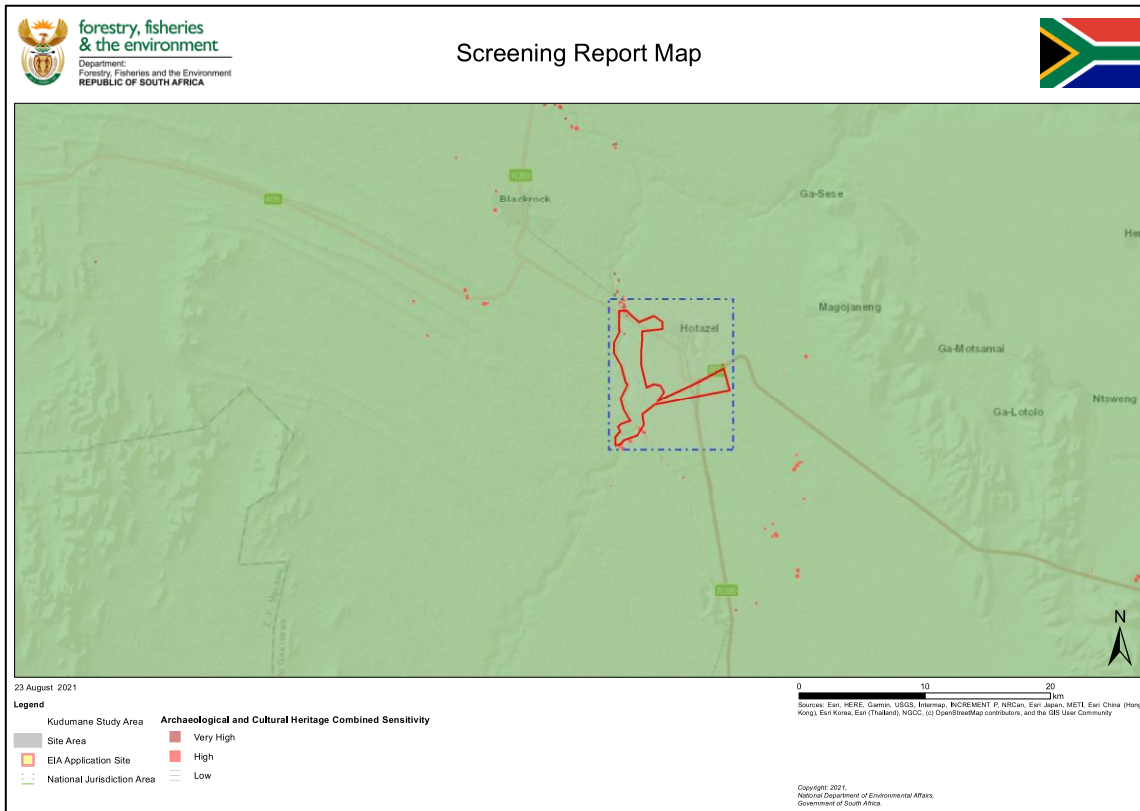


Figure 2 – Environmental screening tool's depiction of the archaeological and heritage sensitivity of the study area and surroundings.

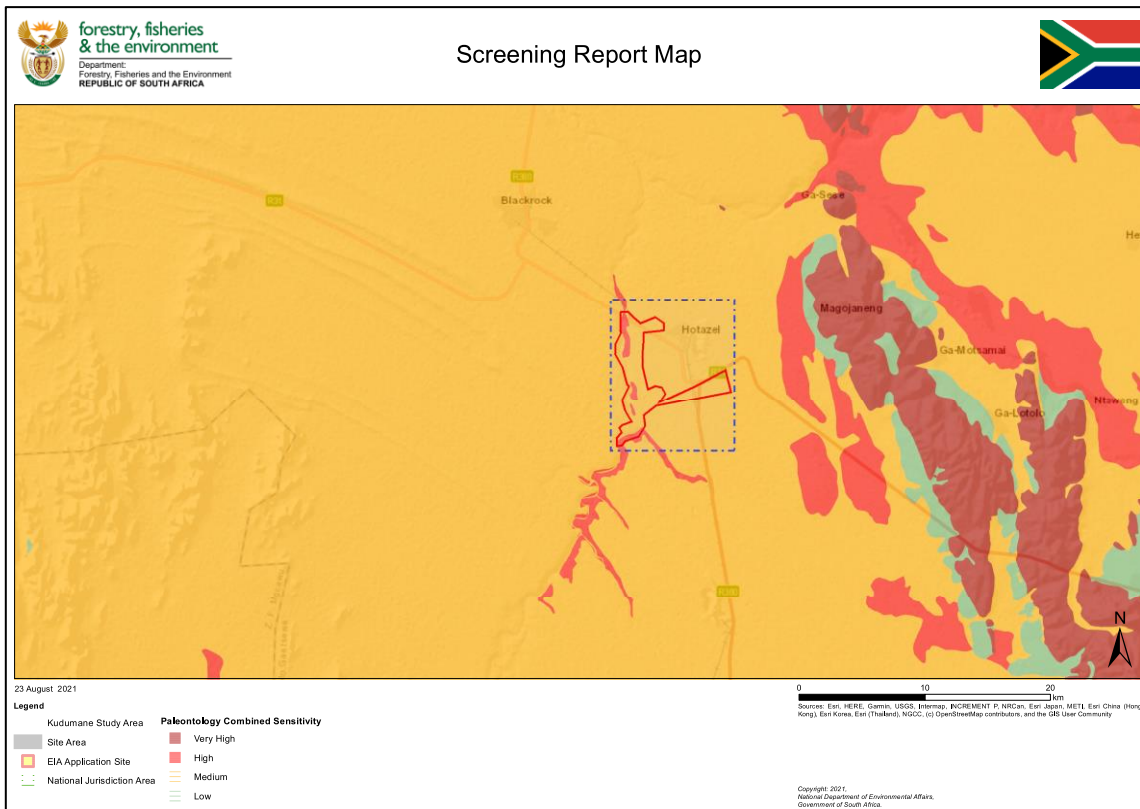


Figure 3 - Environmental screening tool's depiction of the palaeontological sensitivity of the study area and surroundings.

#### 1.4.8 NEMA – Appendix 6 requirements

The HIA report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations (2014, and as amended in 2017). **Table 3** below sets out the relevant sections as listed in Appendix 6 of the EIA Regulations (2017), which describes the requirements for specialist reports. For ease of reference, **Table 3** provides cross-references to the report sections where these requirements have been addressed. It is important to note that where something is not applicable to this HIA, this has been indicated in the table below.

*Table 3 – Reporting requirements as per NEMA, as amended, Appendix 6 for specialist reports.*

<b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>	<b>Relevant section in report</b>	<b>Comment where not applicable</b>
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii of Report – Contact details and company	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1 – refer to <b>Appendix B</b>	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1 and 2	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 3	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6 and 7	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3	-
(e) a 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 a site plan identifying site alternatives;	Sections 3, 5 and <b>Appendix C</b>	-
(g) An identification of any areas to be avoided, including buffers	Executive Summary, Sections 8 and 9	-
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 39 to 42 and Section 5	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1	-
(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	Executive Summary, Sections 6, 7, 8 and 9	-

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable
(k) Any mitigation measures for inclusion in the EMPr	Executive Summary, Sections 8 and 9	-
(l) Any conditions for inclusion in the environmental authorisation	Executive Summary, Sections 8 and 9	-
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Executive Summary, Sections 8 and 9	-
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Executive Summary and Section 9	-
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		-
(n)(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	Executive summary, Sections 8 and 9	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study		Not applicable. A public consultation process was handled as part of the environmental process.
(p) A summary and copies if any comments that were received during any consultation process		Not applicable. To date no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.		Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	NEMA Appendix 6 and GN648 SAHRA guidelines on HIAs, PIAs and AIAs	

#### 1.4.9 MPRDA 2002 (Act No. 28 OF 2002)

As per the NEMA no 107 of 1998, and the NEMA EIA Regulations, any activity requiring a prospecting right, mining right, mining permit, production right or exploration right, triggers the Mineral and Petroleum Resources Development Act, 28 of 2002 (MPRDA). The MPRDA Act 28 of 2002 intends to make provision for sustainable development of South Africa's mineral and petroleum resources.



Under Section 5(4) no person may prospect for or remove, mine, conduct technical co-operation operations, reconnaissance operations, explore for and produce any mineral or petroleum or commence with any work incidental thereto on any area without

- (a) an approved environmental management programme or approved environmental management plan, as the case may be.

Furthermore, Chapter 8 of the MPRDA, as amended in 2015, states that the principles of the NEMA No. 107 of 1998 apply to all mining-related activities. It also serves as guidelines for the interpretation, administration and implementation of all the needed environmental requirements and authorizations of the MPRDA. In conjunction with the NEMA, the MPRDA makes provision that mining companies need to comply with other South African legislation regulating the impacts of mining-related projects on the natural and cultural environment, including the National Environmental Management Protected Areas Act (No. 57 of 2003) and the NHRA No. 25 of 1999.

Section 86 for EIA of the Regulations for Petroleum Exploration and Production (2015) of the MPRDA states that:

- (1) The exploration and production activities related to petroleum are subject to the requirements of the NEMA and any relevant specific environmental management Act;
- (2) Before exploration and production activities related to petroleum may commence, the holder must be in possession of an Environmental Authorisation (EA) issued in terms of the EIA Regulations, 2014.
- (3) When submitting an application in terms of the EIA Regulations an applicant must comply with the minimum information requirement, guidance document or decision support tool as identified by the competent authority.
- (4) The designated agency, the Council of Geosciences and the Council for Scientific Research must be identified as interested and affected parties for the purposes of the public participation to be undertaken as part of the EIA process

## 2 TECHNICAL DETAILS OF THE PROJECT

### 2.1 Locality

<b>Coordinates for Study Area</b>	Northernmost point: S 27.190814 E 22.921745	Easternmost point: S 27.237566 E 22.995844
	Southernmost point: S 27.272227 E 22.916708	Westernmost point: S 27.270738 E 22.916048
<b>Location</b>	Approximately 3 km southwest of the town of Hotazel, Joe Morolong Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape Province.	
<b>Property</b>	On sections of the farms Devon 277, Gama 283, Hotazel 280, Klipling 271, Olive Pan 282, Telele 312, Umtu 281 and York 27.	
<b>Topographical Map</b>	2722BB and 2722BD	

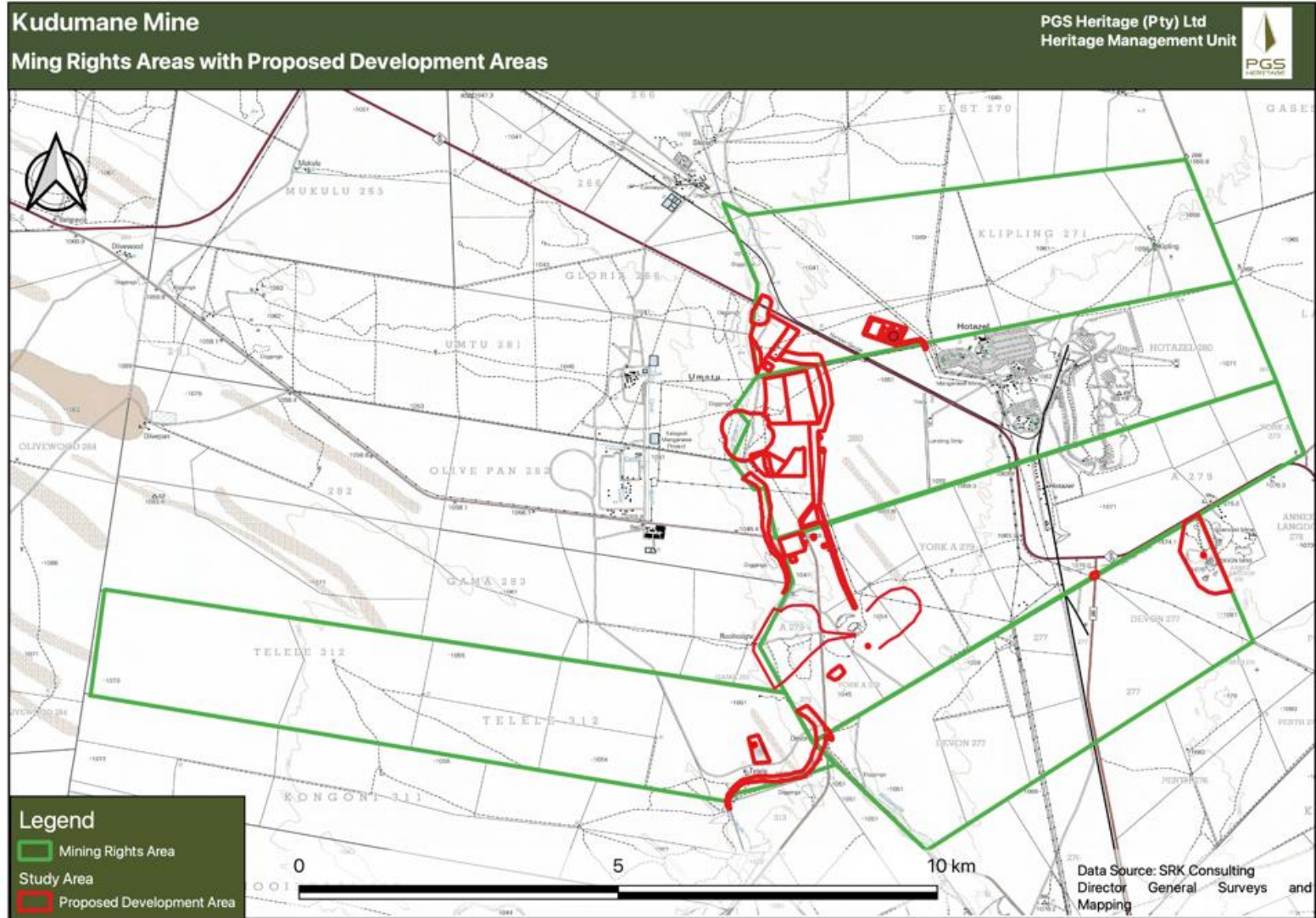


Figure 4 – Locality of Kudumane Manganese Resources Expansion Project. This map depicts the mining rights areas as green polygons with the proposed development areas shown in red.

## 2.2 Technical Project Description

The following brief project description for the project has been supplied by SRK. See **Table 4** for the overview of the proposed development.

Kudumane Manganese Resources (Pty) Ltd is an established opencast manganese mine. KMR holds two mining rights; one in respect of the farms York 279 (York) and Telele 312 (Telele; Mining Right Ref: NC/30/5/1/2/2/0268 MR) and one over the farms Devon 277 (Devon), Hotazel 280 (Hotazel), Klipling 271 (Klipling; Mining Right NC/30/5/1/2/2/10053 MR).

The mine is operated under two Environmental Management Programmes (EMPrs), a Water Use Licence (WUL) issued in 2016 and amended WUL authorised in 2018.

KMR intends to expand its existing operations and construct additional infrastructure, in order extend the life of its operation and improve production capacity, through the inclusion of the following key mining related activities and infrastructure within their approved mining right areas:

- Extension of the existing York and Hotazel Pits;
- Development of two in-stream attenuation dams within the Ga-Mogara River to allow for the expansion of the York and Hotazel Pits; and
- Development of new opencast pits on the farm Kipling 271.

The expansion project will also require the following **secondary infrastructure and activities**:

- Expansion of waste rock dumps;
- Expansion of ore stockpiles;
- Development of new roads and expansion of existing roads;
- Relocation of Pollution Control Dams (PCDs);
- Storage and reticulation of water via tanks and pipelines;
- Development and expansion of sewerage treatment plants;
- Development of supporting infrastructure such as admin offices ancillary infrastructure;
- Waste and fuel storage areas;
- Development of a contractor's camp; and
- Extension of existing powerlines.

In addition, the mine will also **consolidate and amend their approved EMPrs** during this project process.

Table 4 – Overview of the Kudumane Manganese Resources Expansion Project

<p><b>Farm name:</b> York A 279  <b>Portion:</b> Portion 11/279 &amp; 2/279  <b>Surface rights owner:</b> KMR</p>	<ul style="list-style-type: none"> <li>• Expansion of the York Pit</li> <li>• Expansion of the rail loop (approx. 2.5 km)</li> <li>• Expansion of waste rock area</li> <li>• Widening of the existing haul road</li> <li>• Establishment of Truck Parking Area</li> <li>• Relocation of access control building</li> <li>• Mine clinic</li> <li>• Expand the parking area for staff and visitors</li> <li>• Office Block (relocated)</li> <li>• Potable water pipeline from York to Hotazel</li> <li>• General and hazardous waste storage area</li> <li>• Salvage yards</li> <li>• Upgrade of sewage treatment plant</li> <li>• Relocation of Pollution Control Dam (PCD)</li> <li>• Manganese stockpile</li> <li>• Attenuation dam within the Ga-Mogara River to allow for the expansion of the York Pit</li> </ul>
<p><b>Farm name:</b> Telele 312  <b>Portion:</b> Portion 1/312 &amp; RE/312  <b>Surface rights owner:</b> Assmang &amp; KMR</p>	<ul style="list-style-type: none"> <li>• Establishment of abstraction boreholes</li> <li>• Establishment of a water pipeline</li> </ul>
<p><b>Farm name:</b> Kipling 271  <b>Portion:</b> Portion RE/271  <b>Surface rights owner:</b> Assmang</p>	<ul style="list-style-type: none"> <li>• Opencast Pits</li> <li>• Waste rock dump</li> <li>• RoM Stockpiles</li> <li>• Haul road (approx. 1.2km)</li> <li>• Sewerage Treatment Facility</li> <li>• Potable water tank</li> <li>• Admin Offices</li> <li>• Diesel bay and fuel storage</li> <li>• Temporary waste storage</li> <li>• Crushing facility</li> <li>• Pollution control dam</li> <li>• Ancillary infrastructure (e.g. Weighbridge)</li> <li>• Construction and upgrading of access gravel road to Kipling offices</li> <li>• Diversion of a 1.2km section of the tarred provincial road (R380)</li> </ul>

	<ul style="list-style-type: none"> <li>• Bridge associated with diversion of road over the river</li> <li>• Powerlines and associated infrastructure</li> </ul>
<p><b>Farm name:</b> Devon 277  <b>Portion:</b> Portion RE/277  <b>Surface rights owner:</b> KMR</p>	<ul style="list-style-type: none"> <li>• Rehabilitation activities at the pit</li> <li>• Establishment of monitoring boreholes</li> </ul>
<p><b>Farm name:</b> Hotazel 280  <b>Portion:</b> Portion 2/280  <b>Surface rights owner:</b> Telkom</p>	<ul style="list-style-type: none"> <li>• Expansion of the Hotazel Pit</li> <li>• Run of Mine Stockpile</li> <li>• Waste Rock Dump North, South and East</li> <li>• Attenuation dam within the Ga-Mogara River to allow for the expansion of the Hotazel Pit</li> <li>• Potable water tank</li> <li>• Sewage Treatment Plant Lilliput style</li> <li>• Rehabilitation of road due to construction of New Waste Rock Dump</li> <li>• Relocation of Admin offices and security building.</li> </ul>

### 3 ASSESSMENT METHODOLOGY

#### 3.1 Methodology for Assessing Heritage Site Significance

This report was compiled by PGS for the proposed Kudumane Manganese Resources expansion project, near Hotazel, Northern Cape Province. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999) and the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Desktop Study: A detailed archaeological and historical overview of the study area and surroundings was undertaken. This work was augmented by an assessment of reports and data contained on the South African Heritage Resources Information System (SAHRIS). Additionally, an assessment was made of the available historic topographic maps. All these desktop study components were undertaken to support the fieldwork.

Step II – Field Survey: The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance. The fieldwork was undertaken by way of intensive walkthroughs of the proposed development footprint areas. The walkthroughs were focussed on those areas that are not disturbed.

The fieldwork was undertaken by two archaeologists (Nikki Mann and Wynand van Zy) from 13 to 17 July 2021. Throughout the fieldwork, hand-held GPS devices were used to record the track logs showing the routes followed by the fieldwork team. All sites identified during the fieldwork were photographically and qualitatively recorded, and their respective localities documented using a hand-held GPS device.

Step III – Report: The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on five main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
  - Low - <10/50m<sup>2</sup>
  - Medium - 10-50/50m<sup>2</sup>
  - High - >50/50m<sup>2</sup>
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

- A - No further action necessary;
- B - Mapping of the site and controlled sampling required;
- C - No-go or relocate development activity position;
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site.

### 3.1.1 Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report (**Table 5**).

*Table 5 – Site significance classification as prescribed by SAHRA.*

<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	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium	Recording before destruction
Generally Protected C (GP.C)	Grade 4D	Low	Destruction

## 3.2 Methodology for Impact Assessment

As part of the integrated environmental authorisation process, various specialist studies will need to be undertaken in support of the Environmental Impact Assessment (EIA) and the development of the Environmental Management Programme (EMPr).



All specialists are required to assess each proposed activity/aspect of the Kudumane Mine Expansion Project in relation to the construction, operational, closure and decommissioning phases in order to identify the potential impacts that may be associated with such activity and to develop appropriate mitigation measures that can be implemented to reduce or eliminate the potential impacts identified.

The specialist will assess the potential impact identified according to the Impact Assessment Methodology described below. This Impact Assessment Methodology has been formalised by SRK to comply with the EIA Regulations of 2014 (as amended) promulgated under NEMA, which states the following:

*An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision, and must include – an assessment of each identified potentially significant impact, including –*

- (i) cumulative impacts;*
- (ii) the nature, significance and consequence of the impact and risk;*
- (iii) the extent and duration of the impact and risk;*
- (iv) the probability of the impact and risk occurring;*
- (v) the degree to which the impact and risk can be reversed;*
- (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and*
- (vii) the degree to which the impact and risk can be mitigated.*

Based on the above, the Impact Assessment Methodology requires that each potential impact identified is clearly described (providing the nature of the impact) and be assessed in terms of the following factors:

- **extend** (spatial scale) - will the impact affect the national, regional or local environment, or only that of the site?;
- **duration** (temporal scale) - how long will the impact last?;
- **magnitude** (severity) - will the impact be of high, moderate or low severity?; and
- **probability** (likelihood of occurring) - how likely is it that the impact may occur?.

To enable a scientific approach for the determination of the environmental significance (importance) of each identified potential impact, a numerical value has been linked to each factor.

	<b>Duration:</b>	<b>Probability:</b>
	5 - Permanent	5 – Definite/don't know

	4 – Long-term (ceases with the operational life)	4 – Highly probable
	3 – Medium-term (5-15 years)	3 – Medium probability
	2 - Short-term (0-5 years)	2 – Low probability
	1 – Immediate	1 – Improbable
		0 – None
Severity	Extent/scale:	Magnitude:
	5 – International	10 - Very high/uncertain
	4 – National	8 – High
	3 – Regional	6 – Moderate
	2 – Local	4 – Low
	1 – Site only	2 – Minor
	0 – None	

Once the above factors had been ranked for each identified potential impact, the environmental significance of each impact can be calculated using the following formula:

$$\text{Significance} = (\text{duration} + \text{extend} + \text{magnitude}) \times \text{probability}$$

The maximum value that can be calculated for the environmental significance of any impact is 100.

The environmental significance of any identified potential impact is then rated as either: high, moderate or low on the following basis:

- More than 60 significance value indicates a high (H) environmental significance impact;
- Between 30 and 60 significance value indicates a moderate (M) environmental significance impact; and
- Less than 30 significance value indicates a low (L) environmental significance impact.

In order to assess the degree to which the potential impact can be reversed and be mitigated, each identified potential impact will need to be assessed twice.

- Firstly, the potential impact will be assessed and rated **prior** to implementing any mitigation and management measures; and
- Secondly, the potential impact will be assessed and rated **after** the proposed mitigation and management measures have been implemented.

The purpose of this dual rating of the impact before and after mitigation is to indicate that the significance rating of the initial impact is and should be higher in relation to the significance of the impact after mitigation measures have been implemented.

In order to assess the degree to which the potential impact can cause irreplaceable loss of resources, the following classes (%) will be used and will need to be selected based on the specialist informed decision and discretion:

- 5      100% - Permanent loss
- 4      75% - 99% - significant loss
- 3      50% - 74% - moderate loss
- 2      25% - 49% - minor loss
- 1      0% - 24% - limited loss

Please note that the Loss of Resources aspect will not affect the overall significance rating of the impact.

In terms of assessing the cumulative impacts, specialists are required to address this in a sentence/paragraph fashion as the spatial extent of the cumulative impacts will vary from project to project. Cumulative impact, in relation to an activity, means the impact of an activity that in itself may not be significant, but may become significant when added to the existing or potential impacts eventuating from similar or diverse activities or undertakings in the area.

## 4 CURRENT STATUS QUO

### 4.1 Site Description

A site visit was conducted by two archaeologists from PGS from 13 to 17 July 2021. For the most part, the archaeological visibility of the area was not ideal for surveying due to the dense thorn scrub and grass cover in the region.

The study area is located approximately 3km south-west of Hotazel, within a semi-arid, flat-lying terrain (1010-1060asml) with the lowest elevation rising from the Ga-Mogara River on the western boundary to the east.

In terms of vegetation, the study area is located within the Kathu Bushveld (Mucina & Rutherford, 2006). This vegetation type is characterised by medium to tall thorn tree savanna and shrubs (**Figure 5**). The grass cover varies across the region and in general is tall and dense (**Figure 6**). In the northern part of the study area, there are areas of calcrete development that occur with stunted grass growth (**Figure 7**). The ridges adjacent to the rivers are characterised by a mix of exposed calcretes and pebble-gravel layers (**Figure 8**).

In terms of geology and soils, the area is primarily underlain by the Quaternary age sediments of the Kalahari Group as well as surface limestone and alluvium. Rock types encountered include jasper and cryptocrystalline silica (ccs). The red soils are often bioturbated (**Figure 13**) and are predominately sandy with gravel and small rock fragments (**Figure 9**). The flat plains are cut by ephemeral streams (**Figure 10**).

Sections of the proposed development footprints located around previous or existing mining development and infrastructure are already disturbed. These disturbed areas are primarily in the northern parts of the study area (**Figure 14**).

The study area is serviced by the R380 and R31 roads, graded roads and farm tracks. Existing infrastructure includes mine infrastructure (**Figure 11**), fences (**Figure 12**), farmsteads, power lines and railway lines.



*Figure 5 – General view of wooded grassland area.*



*Figure 6 – Dense grass growth in riverine area within the western part of the study area.*



*Figure 7 – Calcrete fragments visible on the surface of a section of the study area.*



*Figure 8 – Calcrete ridge within riverine area in the northern part of the study area.*



*Figure 9 – Deflated soil with ironstone fragments.*



*Figure 10 – Erosional gully.*



*Figure 11 – Designated rehabilitation area within the Devon study area.*



*Figure 12 – Fence demarcating the mine property.*





*Figure 13 – Land surface disturbed by burrowing activity in the northern part of the study area.*



*Figure 14 – Area disturbed by mine-related activities in the northern part of the study area.*

## 5 DESKTOP STUDY FINDINGS

### 5.1 Archaeological overview of the Study Area and Surrounding Landscape

#### 5.1.1 *A review of the archaeological context of the Northern Cape (Van der Ryst 2015)*

The Northern Cape is an arid region with limited surface water so that archaeological remains are often found near water (Mitchell 2002) and sources of lithics that have been used to produce stone tools. Palaeo- and current river systems, springs and pans and dominant geographical landscape features such as hills or shelters are important locales within any landscape.

The region abounds with the remains of prehistoric hunting and gathering groups. Numerous archaeological sites have been recorded, researched and published through archaeological impact and heritage assessments. Stone tools mostly mark areas of prehistoric occupations, and these suggest a widespread presence for tool-producing Plio-Pleistocene hominins in southern Africa (Barham and Mitchell 2008). This important part of the prehistory of southern Africa, known as the Stone Age, is chronologically divided into the Earlier, Middle and Later Stone Ages (ESA, MSA and LSA). The ESA is characterized by the use of large stone cutting tools (LCT's) (McNabb et al. 2004), in particular hand axes, but also cleavers and tool types such as scrapers. Following on the ESA, the MSA typologies represent greater specialization in the production of stone tools, in particular flake, blade and scraper tools and also in a more extended range of specialized, formal tools. Regional lithic style, evidence for symbolic signalling, polished bone tools, portable art and decorative items are apparent during the MSA. ESA and MSA lithics occur widespread around water sources and previously favourable land settings that are now buried. During the LSA small (microlithic) tools, bone tools and weapon armatures and a range of decorative items as well as rock art were produced. Ceramics were used and/or manufactured by hunters and Khoekhoe herders towards the terminal phases of the LSA over a period of around 2000 year. The more recent occupations of LSA groups are abundant as surface finds and in sealed deposits in shelters (Beaumont et al. 1995).

Differences in stone artefact assemblages have been used in attempts to discern between late-Holocene hunter-gatherer and herder sites (Parsons (2003, 2004, 2007, 2008); Lombard and Parsons 2008) but this distinction is not generally accepted. Hunter-gatherer assemblages termed Swartkop may contain grass-tempered ceramics (Beaumont and Vogel 1989). Sites with engravings, are often situated close to water sources. The Doornfontein herder sites contain ceramics that occasionally have lugs and/or spouts. Differences in the geographical spread indicate a preference for pastoral Doornfontein sites along rivers while Swartkop sites are usually found further from the river (Fauvelle-Aymar 2004). Substantial herder encampments were located along the Orange River floodplain. Hendrik Jacob Wikar during his travels in 1778 recorded the names of the various herder groups who had settlements on both sides of the river (Mossop 1935).

#### 5.1.2 *Early Stone Age (400 000 – 2 million years Before Present/BP)*

The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and here it comprises two technological phases. The earliest of these, known only from sites outside of southern Africa, is the Lomekwian industry (3.2 Myr) and is associated with percussive tools and large flakes. Occurring in South Africa is the Oldowan industry (2.6 – 1.5 Myr), characterised by expedient, yet organised flaking systems with primarily core- and flake-based assemblages. Finally, the Acheulian industry (1.7 Myr – 250 kyr) is the last ESA industry to develop, comprised by Large Cutting Tools (i.e. handaxes and cleavers) and organised core reduction (i.e. Levallois).

A number of important ESA sites are known from the general vicinity, including the very significant ESA Kathu Complex and Wonderwerk Cave.

### *The Kathu Complex*

The present study is located approximately 50km to the north of the Kathu Complex sites. The Kathu Complex sites contain important ESA Acheulian and transitional ESA/MSA Fauresmith assemblages (Beaumont, 1990, 2004, 2013; Herries, 2011; Chazan et al, 2012; Wilkins & Chazan, 2012, Walker et al, 2014). The presently identified sites making up the Kathu Archaeological Complex include the Kathu Pan Sites, Kathu Cemetery, Bestwood and Kathu Townlands. Research at Kathu Townlands was first undertaken by P.B. Beaumont (1990, 2004). The locality has a remarkable high lithic density containing millions of ESA artefacts (Mitchell, 2002; Walker et al, 2013 Walker et al. 2014). Moreover, the interface between the ESA and MSA is also represented at Kathu Pan by the transitional lithic industry of the Fauresmith (Porat et al 2010).

Walker et al (2014) suggest that the intensive occupation of the Kathu region can be linked to the availability of water resources. Current research projects are yielding important data on typologies, lithic technologies, technological innovations, complex spatial organization and also dates for the ESA Acheulian and for the MSA assemblages. Research at Kathu Pan 1 established a date of 500 000 years for a Fauresmith blade assemblage where blades were systematically removed from prepared cores (Wilkins & Chazan, 2012). It is argued that some of these were used as spear tips (Rots et al, 2014; Wilkins et al, 2015).

The Kathu Pan is an exceptionally significant landscape, one of the reasons being that the archaeological deposits contain both ESA artefacts and associated fauna in near primary context (Walker et al 2013). This is unusual as only seven southern African sites contain ESA artefacts and bones in primary context (Cave of Hearths, Wonderwerk, Pomongwe, and the open air sites of Elandsfontain, Mwanganda, Namib IV and Kathu Pan) (Volman, 1984).

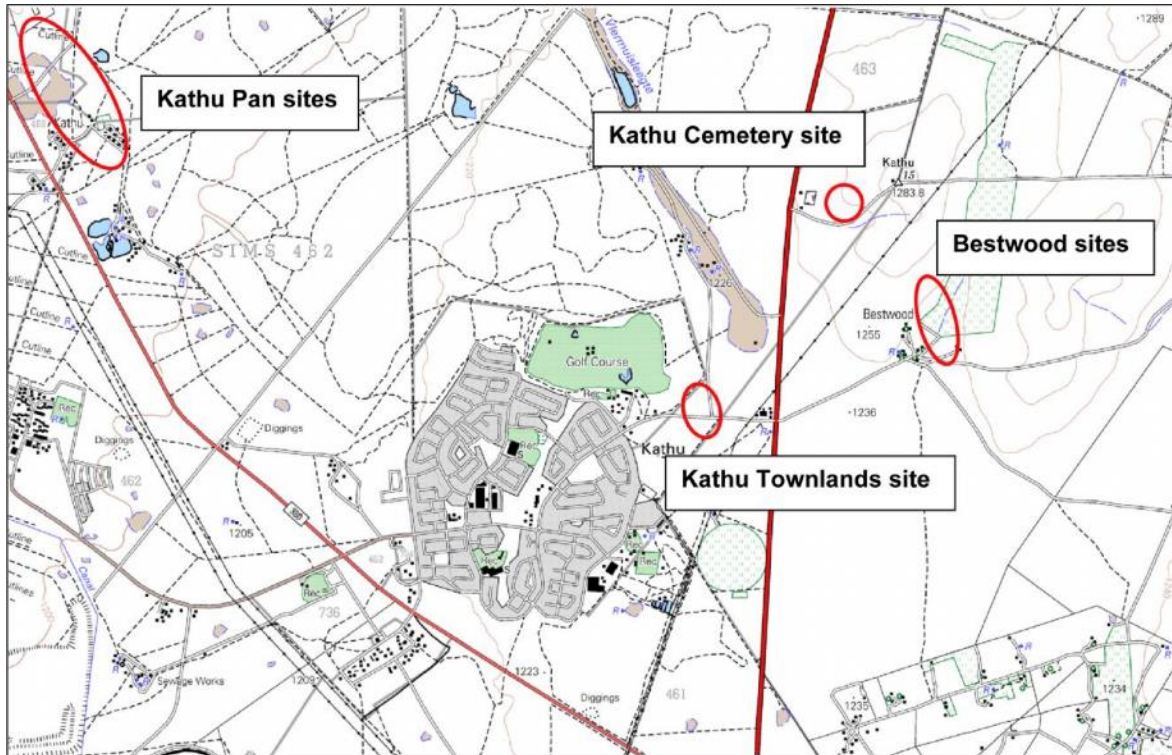


Figure 15 – This map depicts the positions of the sites collectively known as the Kathu Archaeological Complex. The present study is located approximately 50km to the north of the depicted area.

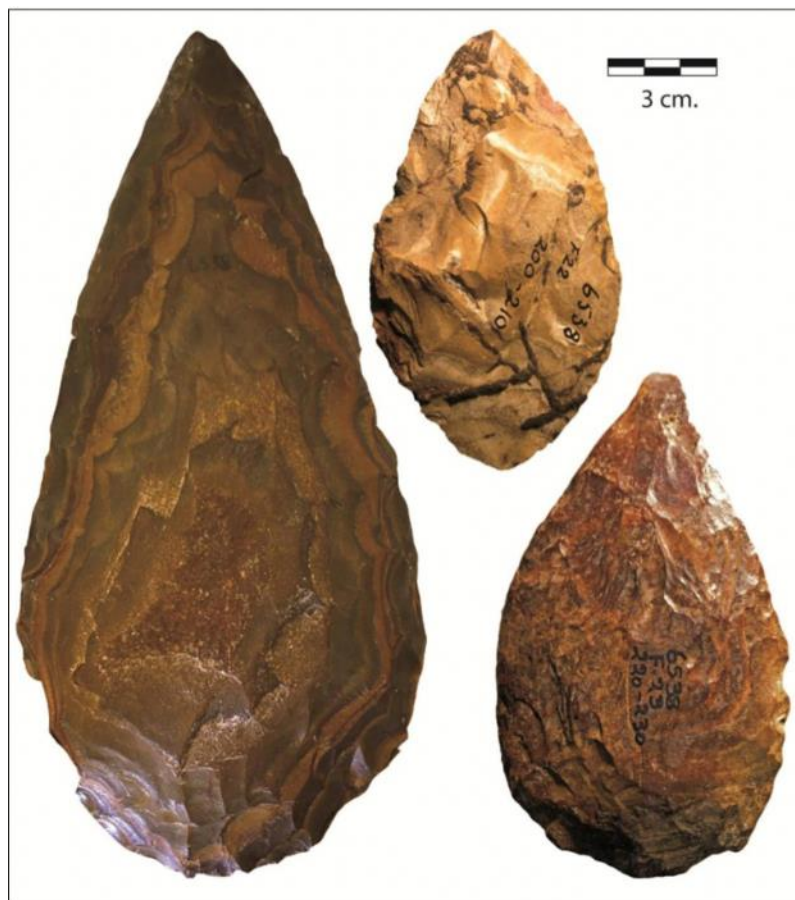


Figure 16 – Three handaxes recovered from the Kathu Pan sites (Walker et al. 2013:15).

## *Wonderwerk Cave*

Wonderwerk Cave is located approximately 90 km to the south-east. The Early Stone Age (ESA) levels at Wonderwerk Cave date to approximately 780 000 years old and are characterised by Acheulean stone tools such as prepared cores, bifacial cleavers and refined hand axes. A few pieces of haematite were also found in the uppermost MSA layers. Bedding material recovered indicates that the site was used as a home base by the end of the ESA. A few small irregular flakes and cores may belong to the older Oldowan era, but the dating of this material is uncertain (Beaumont & Vogel 2006).

### *5.1.3 Middle Stone Age (30 000 – 300 000 BP)*

Middle Stone Age (MSA) artefacts belonging to the Fauresmith industry are also found in the region. The Fauresmith is characterised by prepared cores, long, narrow flake blades, convergent points and small, broad hand axes (Mitchell 2002). MSA sites and occurrences have been identified in the Kathu area, including the Kathy Pan localities (Wilkens & Chazen, 2012). The Kathu Pan includes stratified deposits from the MSA. Walker et al (2013) point out that generally most MSA sites are located along the coast and in caves or shelters, whereas there are MSA deposits in an open-air setting in the interior at Kathu.

Wonderwerk cave also has layers with Fauresmith tools were dated to 276 00 – 510 000 BP. Associated with the MSA materials were several incised stone slabs, most with curved parallel lines. Pieces of haematite were also found. The cave was abandoned between 70 000 and 12 500 BP due to significantly drier conditions. During this time, much of the region was abandoned and settlement only occurred at a few sites near permanent water sources (Beaumont & Vogel 2006).

### *5.1.4 Later Stone Age (30 000 BP – recent times)*

The earlier LSA industry of the region forms part of the Oakhurst industry (some have labelled this local variant the Kuruman), characterised by rare, retouched artefacts, most of which are large scrapers that are oblong with retouch on the side. The predominant raw materials are banded ironstone and dolomite. Very few adzes and blades are found, while backed artefacts and bone tools are absent. Ostrich eggshell beads and fragments are found (Humphreys & Thackeray 1983). At Wonderwerk, Oakhurst assemblages were dated to 8000 – 10 500 BP (Beaumont & Vogel 2006).

This was followed by the Wilton industry, characterised by the use of various raw materials including banded ironstone, chert, chalcedony, jasper and quartz. The main retouched tools are elongated scrapers with retouch on the end and backed artefacts such as segments and blades. Other retouched tools include adzes, unifacial points, borers and notched artefacts. At other sites, bifacial points and bifacial tanged and barbed arrowheads are found. At Wonderwerk, a few bone points have been found. Ostrich eggshell beads, pendants and decorated fragments, as well as stone rings were found

(Humphreys & Thackeray 1983). Wilton layers at Wonderwerk have been dated to 2000 – 8000 BP. Associated with the LSA materials were 20 fine-line incised engraved stone slabs, most with schematic motifs. One example of a mammal depiction has been found. Pieces of haematite and specularite were also found in these layers (Beaumont & Vogel 2006).

Pottery made its appearance in the region by approximately 1400 BP and at Wonderwerk, Ceramic Later Stone Age layers have been dated to 900 – 2000 BP (Humphreys & Thackeray 1983; Beaumont & Vogel 2006). Two discrete, contemporary stone tool industries are associated with pottery remains in the Northern Cape: Swartkop and Doornfontein (Beaumont et al.1995). Swartkop is a Wilton industry characterised by circular blades, a high proportion of backed blades, coarse undecorated pottery sherds that commonly contain grass temper, and a few iron items. It seems scrapers were favoured over blades on the Ghaap plateau (Humphreys & Thackeray 1983). These sites are usually found near water sources, such as pans and springs, or on the sides of low hills. Stone circles and ovals are sometimes also found and may represent the bases of dwellings. A late phase of this industry can be linked with the /Xam San who lived in the Karoo.

#### *5.1.5 Rock Art*

Rock engravings are principally found in the interior of South Africa and are plentiful in the Northern Cape. Engravings are found on rocky outcrops, river beds and boulders. They are made by pecking away the surface of the rock with another rock, incising it with a sharp stone or scraping it off with another stone. Unfortunately, there are no scientific methods for securely dating engravings and research into this is still at an experimental stage.

Most engravings were made by the San and were associated with their religious beliefs and rituals. San shamans went into trance to perform certain tasks such as controlling game, protecting the group and rainmaking. Certain animals were believed to hold supernatural power and thus many of the engraved animals can be seen as both sources and symbols of supernatural power. The places where engravings were made were also sources of supernatural power, especially in rainmaking rituals. Certain geometrics such as zigzags and dots are likely to have been associated with forms called entoptics seen whilst in trance (Dowson 1992).

Some engravings—particularly those featuring non-entoptic geometrics and aprons—were probably made by Khoekhoen people. Similar motifs are found in finger painted Khoekhoen rock art sites in certain regions of the Northern Cape, especially in the Vaal-Harts region to the east. Khoekhoen rock art is typified by finger paintings and roughly pecked engravings of geometrics that are located near water sources (Smith & Ouzman 2004). A number of LSA sites are known from the direct vicinity of the existing Kathu area. According to Beaumont (2000) pecked engravings, originally from the farms Sishen 543 and Bruce 544, were donated to the McGregor Museum with some engravings located on the

grounds of the Sishen Iron Ore Mine as well. These farms are located 50km north of the present study area.

The rock paintings found in the Kuruman hills (Morris 1988) are probably of Khoekhoen authorship. Korana rock art—mostly painted—has also been identified in the Vaal-Harts region but may stretch into the Daniëlskuil region (Ouzman 2005). These depictions are characterised by finger painted and rough brush painted horses, human figures, geometrics, aprons, guns and finger dots. They are painted in shelters that are either hidden or not easily accessible. The complex issues of ethnicity and authorship of rock art—especially engravings—are still being researched.

## **5.2 Historical overview of the Study Area and Surroundings**

The archival and desktop research of the history of the study area and surrounding landscape identified a number of historical aspects which can be associated with the study area as well as its immediate surroundings. These historical facets will be discussed in more detail and in chronological sequence below.

### *5.2.1 Settlement during the Later Stone Age*

A number of Stone Age sites are known for the area surrounding Kuruman as well as along the Kuruman River (Humphreys & Thackeray, 1983; Beaumont & Morris, 1990; Parsons, 2003). Some of these sites contain rock engravings as well, such as Nchwaneng and Tsineng (Beaumont & Morris, 1990; Morris, 1988, 2002, 2003).

As the wider landscape became increasingly inhabited, the San were forced to move further west and north-west to remain in the vicinity of wild game (Snyman, 1992).

### *5.2.2 Early Black Settlement during the Late Iron Age and Historic Period*

The Tlharo seems to have been the first Tswana group to enter the Kuruman area. They originated from the Hurutshe group further to the north-east, and after splitting from this group during the end of the 17th century, moved in a southern direction down the Molopo River. Their early settlements included Khuis, Madibeng, Heuningvlei, Langeberg and Tsineng (Snyman, 1992). As mentioned earlier, the town of Tsineng (Tsenin) is located in the general vicinity of the present study area.

The second important Tswana group from the wider area is the Tlhaping. They originated from the Rolong group and during the mid-1700s moved southward along the Harts and Vaal Rivers to the vicinity of Campbell, from where they travelled westwards into the area falling between Tsantsabane and Majeng on the edge of the Kalahari Desert. The Tlhaping established a capital on a perennial river

known as Nokaneng. Their ruler during this time was King Maswe. Although the exact locality of Nokaneng is not known, one possibility is that the present non-perennial river Ga-Mogara used to be the Nokaneng River. This possibility was supported by the missionary John Campbell, who in 1820 referred to the Ga-Mogara River as the Nokaneng (Campbell, 1922: Vol II:125; Snyman, 1992).



Figure 17 - "Tharo of the Kalahari Desert" A sketch that appeared in Dr Andrew Smith's travel journal (Lye, 1975:171).

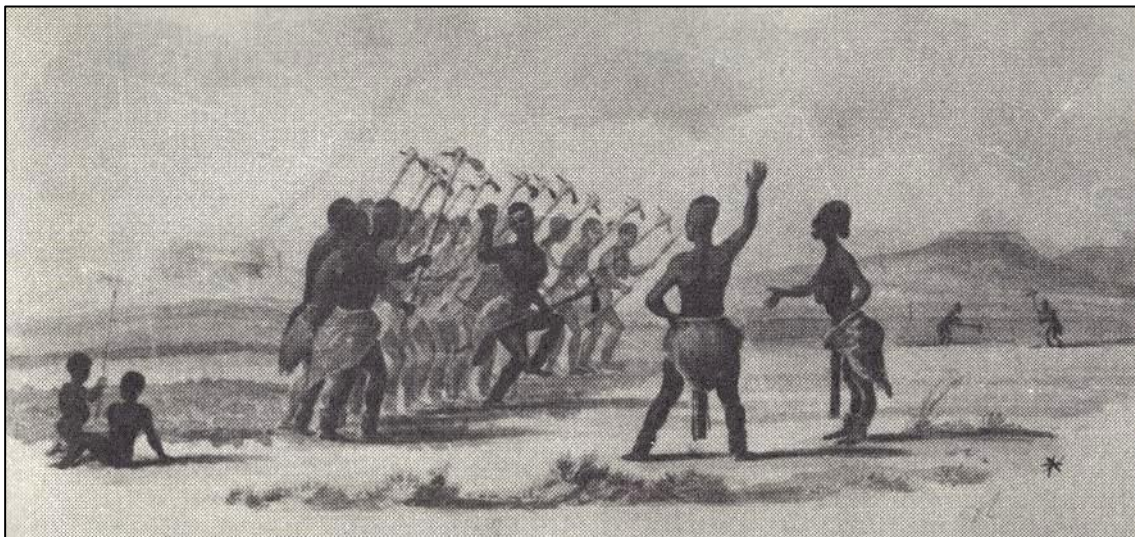


Figure 18 - "Thaping women cultivating gardens and singing" One of the sketches appearing in Dr. Andrew Smith's journal (Lye, 1975:171).



### 5.2.3 European Explorers and Visitors

Two of the better known early European explorers to the wider surroundings of the study area were Dr. Hinrich Lichtenstein in 1805 and Dr. Andrew Smith in 1835.

#### The journey of Lichtenstein (1805)

After crossing the Orange River in the vicinity of present-day Prieska, Lichtenstein's party visited present-day Daniëlskuil, and by June 1805 they were at Blinkklipkop (Postmasburg), a well-known source for obtaining specular haematite. Archaeological investigations at Blinkklipkop (also known as Nauga) established a date of AD 800 for the utilization of this particular rich source (Thackeray, et al 1983; Beaumont & Morris, 1990). From here they travelled further north and reached the Kuruman River where they met Tswana-speaking people. They followed the river downstream for three days, after which they followed a tributary to reach Lattakoe. From here they turned south and reached the Orange River on 11 July 1805.

While on their way to the Kuruman River (and to the south thereof), Lichtenstein and his fellow travellers visited a small settlement consisting of "...about thirty flat spherical huts." Although the people who stayed here were herdsmen who looked after the cattle of richer people living on the Kuruman River, they indicated that San (Bushmen) were also present in the area.

Lichtenstein's party subsequently travelled further north to visit the capital of King Mulihawang located on a plain in the vicinity of the Kuruman River. He described the town as consisting of six hundred houses with 5 000 inhabitants. The individual dwellings were described as follows: "*The houses were all of a circular form, with the roof running up to a point; the roof rests on a circle of poles, which are united together below by thin walls of loam; above, for a little way below the roof, they are left open to admit light and air*" (Lichtenstein, 1930:373). Lichtenstein also indicated that hedges were used as cattle enclosures.

#### Andrew Smith's journey (1835)

Dr. Andrew Smith's expedition into the interior of Southern Africa can be seen as one of the highlights of the era of exploration and travel into these regions of Africa. After some travelling, which included a visit to King Moshoeshoe, Smith's party crossed over the Vaal River and after reaching this river's confluence with the Harts, followed it to Boetsap and subsequently reached Kuruman (Bergh, 1999).

Smith met Robert Moffatt at Kuruman, and during this time made a journey all along the Kuruman River to Tsineng from where he travelled south to the Langeberg. Returning to Tsineng, Smith travelled north to Heuningvlei before returning back to Kuruman (Bergh, 1999).

For the aims of the present study, it is especially Smith's journey from Tsineng to the Langeberg and back which is most interesting. The route followed by Smith seems to have been the Ga-Mogara River, and as such his route crossed over portions of the present study area.

In the vicinity of Tsineng, Smith found a number of springs which the local people called Malichana. He observed a small group of Tswanas (*Bituanas*) as well as a Griqua family staying near the springs, and indicated that the Tswana group conducted agricultural activities in gardens laid out near the springs.

From Tsineng Smith's party travelled all along the bank of the Kuruman River, presumably to the confluence of the Ga-Mogara River. On this stretch of the journey Smith observed "...a number of almost naked natives in the distance carrying ostrich shells and something resembling leather sacks upon their shoulders..." (Lye, 1975:181). These people were on their way to a water hole, which had been excavated some seven meters deep. Anyone wishing to obtain water had to climb down the hole making use of footholds along the sides.

#### 5.2.4 Historic Black Settlement

##### Situation at the beginning of the 19th century

When Reverend Robert Moffatt first arrived in the Kuruman area in 1819, he found the Tlhaping settled at Maropin in the Kuruman Valley under their ruler Mothibi. They subsequently moved upstream to the vicinity of present-day Kuruman. During the same time Moffatt found the BaTlharo established at Tsening.

In a document written by the Superintendent of Natives on 3 November 1921, it is indicated that before the farms to the west of the Lower Kuruman Native Reserve were surveyed and ceded to different white farmers, the black people of the area "...had the run of the whole country to the Moshewing River on the one side and the Gamagara River on the other..." and grazed their livestock and conducted agricultural activities over these vast tracts of land. In an associated petition document drawn up by the Tlharo people of Batlaros, they indicated that their agricultural lands and cattle posts used to stretch in a westward direction all the way to the "*Dibeng*" River, which appears to be the present-day Ga-Mogara River (NTS, 7752, 22/335).

#### 5.2.5 British Protectorate

On 23 March 1885, Britain declared a Protectorate over Bechuanaland and the Kalahari. On 30 September of the same year, the Protectorate was divided into two parts. The area north of the Molopo River remained the Bechuanaland Protectorate and up to 1895 was administered from Vryburg, after which the capital was moved to Mafeking. The area south of the Molopo became the Crown Colony of British Bechuanaland with its capital at Vryburg (Tlou & Campbell, 1997). This area included the present study area as well as Kuruman.

In accordance to Act 31 of 1895 the area south of the Molopo River, namely British Bechuanaland, was included in the Cape Colony. This took place during November 1895 (Smit, 1966).

### 5.2.6 Lower Kuruman Native Reserve

On 4 May 1895 the Lower Kuruman Native Reserve and a number of other so-called native reserves were established by virtue of Bechuanaland Proclamation No. 220 of 1895. These reserves were demarcated as part of a commission which investigated land claims and land settlement in British Bechuanaland. A subsequent report titled “*Report of the Commissioners appointed to determine land claims and to the effect of a land settlement in British Bechuanaland*” and published in 1896, contained all the findings of the commission (Breutz, 1963).

At the time of its establishment, the Lower Kuruman Native Reserve had a population of 5,425, and being 225 square miles in extent, had a population density of 26.5 acres per individual. With time, the population density increased. Livestock numbers also increased drastically. As a result of these pressures, the size of the reserve was subsequently extended.

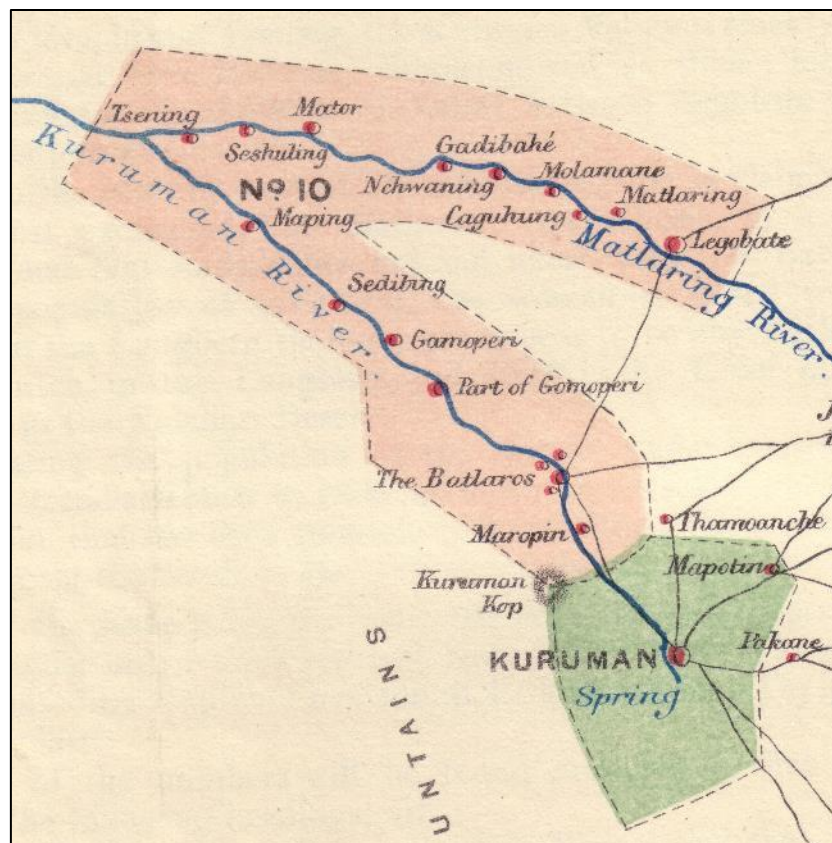


Figure 19 - Map showing the original demarcation of the Lower Kuruman Native Reserve.

During negotiations and discussions on the proposed expansion of the reserve, it was indicated that a number of black people were residing outside the boundaries of the reserve. In a police report dated 22 January 1908, a list is provided of all the people, white and black, residing “...on the banks of the

*Kuruman River north of the surveyed farms in the Sishen Valley.*” This document provides an indication of human habitation in the direct vicinity of the study area during the early 1900s. One interesting observation to be made from the document is that some of the persons who acted as borehole watchmen were black. For example, Hans Gaboerkwe, had been living at Dibiachomo since 1899 and was tasked with keeping the well open (NTS, 7752, 22/335).

### 5.2.7 The Langeberg Rebellion

During 1897 conflict broke out between the authorities and a Thlaping leader from Taung, Galeshewe. The conflict arose after some of Galeshewe’s cattle that were infected by Rinderpest had to be destroyed. After killing an officer, Galishewe fled to the Thlaro leader, Toto, of the Langeberg. Subsequently, a full-scale rebellion broke out that was eventually suppressed (Breutz, 1963).



*Figure 20 – Photograph of Galeshewe (National Archives, TAB, 36277).*

Although most of the activities associated with the rebellion took place away from the study area and surrounding region, it is evident from the historical records documenting the rebellion that some activities did take place in the vicinity. On 13 June 1897, for example, a battle took place between Inspector Berrangé’s Cape Police and a large force under Galishewe at Tsineng (Dalgerty, 1898).

Another incident which took place in the area was the killing of J.P. and Edward Drotskie in the vicinity of Boeredraai (Snyman, 1992).

It can be expected that the movement of military units must have taken place a number of times in the area as well. From the British records, for example, it is known that military patrols traversed the area

between Kuruman and Tsineng, as well as along the Ga-Mogara river. Furthermore, on 20 June 1897, a large force of "rebel reinforcements" were observed between Upper and Lower Dikgathlong on their way to the Langeberg.

### 5.2.8 Settlement of White Farmers

#### Background information on the settlement of white farmers in the area

According to Smit (1966), the surroundings of Hotazel was historically always viewed as situated on the edge of the real desert. Although some white farmers did travel down the Kuruman River to settle in the vicinity of the study area during the latter part of the nineteenth century, by 1897 most of them had moved away again.

Schedule of persons living on banks of the Kuruman River north of surveyed farms in Sishen Valley.

Name of spot	Name of occupier	Nation-ality	Resident since what date	Authority
Casese	F. von Kradenberg	E	Sept. 1907	Grazing licence
"	J. Thomas	E	Sept. 1907	"
"	J. Drotaki	E	March 1904	"
Ruchean	E.L. Drotaki	E	1898	"
Upper Dikgathlong	Z.P. le Roux	E	March 1905	"
"	J. le Roux	E	Aug. 1906	"
"	E. Korsens	E	Aug. 1907	"
"	P. Jacobs	E	Dec. 1907	In charge of Z.P. le Roux's stock, Z.P. le Roux (Grazing licensee) absent temporarily
"	40 Natives		1894	Occupying 10 huts. Pay hut tax.
Dibeakgomo	Hans Gaborikwe	N	1899	Permission to live there to keep wells open.
Boerdraai	Hans Goliath	N	May 1906	
Muphepha	Poleal and 59 others	N	1894	Permission to live there to keep water open
Lower Dikgathlong (Lathakane)	Kanyan and 69 others	N	1894	Permission to reside there pending the surveying of a Native Reserve. Pay hut tax.
Matlapaning	30 persons	N		Squat there during rainy season, 3 to 4 months in each year. Pay hut tax.

Figure 21 - Police document listing all the people who resided on the banks of the Kuruman River in 1908. The list includes the names of several early white pioneers in the area.

The first white people to settle on a permanent basis in the area were the Le Roux family who established themselves at Dikgathlong. More families followed and subsequently also settled in the area. During a period of great drought between 1907 and 1908, many farmers of the then Cape Colony moved into these areas along the edge of the Kalahari Desert in search of better grazing for their cattle (Smit, 1966).

When the First World War (1914-1918) broke out, and the South African Union Government decided to attack German South West Africa, their planned lines of advance would have passed the wider surroundings of the study area. The Union troops needed water to sustain them along the way, and as a result, a number of boreholes were dug all along the banks of the Kuruman River. These boreholes were drilled at places such as Eensaam, Kameelrus, Murray, Springputs and Van Zylsrus (Smit, 1966; Van der Merwe, 1949).

After the war, farmers established themselves at these localities as borehole watchmen, and in exchange for these duties were allowed free grazing rights on the surrounding land. Subsequently, even more boreholes were sunk by the Department of Lands (Smit, 1966; Van der Merwe, 1949).

Since the formulation of the Land Settlement Act No. 12 of 1912 as amended by Act No. 23 of 1917, numerous farms in the vicinity of the study area had been allocated to white farmers. By 1921, almost all of the land surrounding the *Lower Kuruman Native Reserve* had become occupied by white people.

At the end of the First World War the Department of Lands started distributing the farms on application under very lenient conditions. Many of the people who was already established as borehole watchmen and tenants were given first choice to apply for the farms on which they were residing (Smit, 1966).

Many farms were distributed during this time, so much so that by 1929 all the farms up to Vanzylsrust were already handed out (Smit, 1966).

#### 5.2.9 Farm Surveys

During the 1910s a full scale survey of large portions of the region was undertaken by Dirk Roos and Hendrik Wessels. While Wessels was concerned with surveying the farms from Dingle and Sishen up to Cobham and Shirley, Dirk Roos was responsible for the surveying of the farms from Mamatwan in the south to areas further north of the Kuruman River (Samangan, 1977).

Many stories are told about these two pioneering characters. As they were allowed to name the farms they surveyed, most of the farm names appearing on maps of the area were created by them. The farm Wessels, for example, was named by Dirk Roos in honour of his colleague Hendrik Wessels. Mamatwan, another farm forming part of this study, was derived from the Tswana name for a bat.

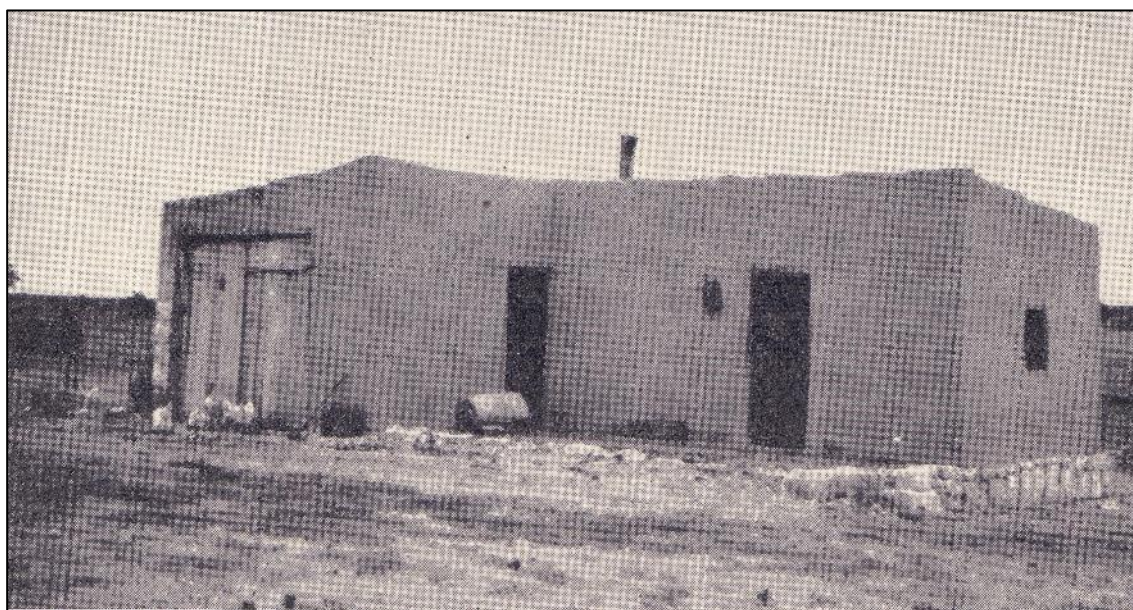
One of the more well-known stories relates to the naming of the farm Hotazel. Dirk Roos was assisted at the time by Veldcornet J.U. Waldeck. One evening, after a long day's work in the hot Kalahari sun Roos sat down at the camp and remarked: "*What about a name for the farm? Phew! What a day! What a place! Hot as hell.*" Waldeck replied with the words "*That's it. The perfect name for it – hot as hell*" (Samangan, 1977:19 & 20). The wording was slightly changed to "*Hotazel*" and this version was used as the farm name on the survey diagram.

The table below provides the dates that some of the farms from within the study area were surveyed and registered in.

FARM NAME	DATE
Hotazel 280	1914
Middelplaats 730	1929
York 279	1914

### 5.2.10 Old Farm Buildings

As mentioned elsewhere, a number of old houses are shown on the old survey diagrams for the farms Wessels and Middelplaats. These houses represent some of the earliest white settlement in the area and as such are of historic significance. Any remaining houses should therefore be documented and mitigated (refer to Küsel, 2009 and Matakoma, 2005).



*Figure 22 - Historic photograph of an early farmer's dwelling along the Kuruman River (Van der Merwe, 1949).*

It should also be noted that many of the archival maps show an old road following the Ga-Mogara River. This road seems to at least have existed during the 1890s. It is possible that the old road transects some of the properties included in this study.

### 5.3 Previous Heritage Impact Assessment Reports from the Study Area and Surroundings

A search of the South African Heritage Resources Information System (SAHRIS) database revealed that a number of previous archaeological and heritage impact assessments had been undertaken within the surroundings of the study area. These previous studies are listed below:

:

- KAPLAN, J. 2010. Archaeological Impact Assessment for the proposed 132 kV UMK loop-in powerline near Hotazel, Northern Cape. **No heritage resources were identified.**
- MATAKOMA HERITAGE CONSULTANTS. 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 Goid 329 and Mamatwan 331, Heritage Assessment. **No heritage resources were identified.**
- MATAKOMA HERITAGE CONSULTANTS. 2006. Kalahari Manganese Mines, Heritage Assessment, on Umtu 281, Olive Pan 282 and Gama 283. **The fieldwork identified one cemetery and a low density of lithics.**
- PISTORIUS, J.C.C. 2008. A phase 1 heritage impact assessment (HIA) study for a proposed new powerline for the United Manganese of Kalahari (UMK) mine near Hotazel in the Northern Cape Province of South Africa. **No heritage resources were identified.**
- PGS HERITAGE. 2009. Heritage Impact Assessment for Ntsimbintle Mining (Pty) Ltd on Portions 1, 2, 3 and 8 of the farm Mamatwan 331 and the farm Moab 700 in the Kgalagadi District Municipality of the Northern Cape Province. **No heritage resources were identified.**
- PGS HERITAGE. 2010a. Heritage Impact Assessment for the Amari Kongoni Manganese Mine on Portion 1 and a section of the Remainder of the farm Kongoni 311 in the Kgalagadi District Municipality of the Northern Cape Province. **The fieldwork identified one grave, a site consisting of historic structural remains and a low density lithic scatter.**
- PGS HERITAGE. 2010b. Heritage Impact Assessment for the Proposed Lehating Mining (Pty) Ltd underground manganese mine on Portions of the Farm Lehating 714, approximately 20km northwest of Hotazel, Northern Cape Province. **A very low-density scatter of lithic artefacts was identified.**
- PELSER, A. 2012a. A report on a Heritage Impact Assessment (AIA) for the proposed photovoltaic solar power generation plant on the Farm Adams 328 near Hotazel in the Northern Cape. Archaeos CC. **No significant heritage resources were identified.**
- VAN VOLLENHOVEN, A. 2012b. A Report on a Heritage Impact Assessment for the Proposed Main Street 778 (Pty) Ltd Mining Right Application close to Hotazel, Northern Cape Province. **Eleven sites of cultural heritage significance were identified. These all date to the recent historical past.**



- PGS HERITAGE. 2013a. Prospecting activities on the farm Gloria 266, near Hotazel in the Northern Cape Province. Heritage Impact Assessment. **Two low density scatters of lithic artefacts were identified.**
- PGS HERITAGE. 2013b. Prospecting activities on the farm Wessels, near Hotazel in the Northern Cape Province. Heritage Impact Assessment.

#### **5.4 Previous Archaeological and Heritage Studies from within the Kudumane Mine Property**

Several previous archaeological and heritage surveys were undertaken within the property of the Kudumane Mine. PGS compiled archaeological and heritage impact assessments for additional infrastructure and mining areas for the same mine in 2014, 2017 and 2019. The study areas for these previous heritage studies and the current report are in the same general area. These previous reports identified seven heritage sites in total. **A single recorded artefact (KMR 002) of low significance falls within the study area but the other sites identified at the time fall outside of the current development footprint.**

In 2014, the fieldwork was conducted by Wouter Fourie, an archaeologist of PGS through controlled exclusive survey of the proposed new infrastructure footprint areas. During the fieldwork, one archaeological site (**KU001**) comprising a low-density scatter of stone tools, was identified on the eastern banks of the Ga-Mogara River (PGS, 2014). The site was given a low heritage significance and it was graded as Generally Protected (Grade 4B).

In 2017, the fieldwork was conducted by Marko Hutten, an archaeologist of PGS through controlled exclusive survey of the proposed new infrastructure footprint areas. During this fieldwork, three archaeological sites (**KMR 002**, **KMR 003** and **KMR 005**) and two historical structures (**KMR 001** and **KMR 004**) were identified. The archaeological findspot of a single fragmented stone tool (**KMR 002**) did not constitute a site of heritage value or significance. Two sites which comprised low-density scatters of stone tools (**KMR 003** and **KMR 005**) were given a low heritage significance and it were graded as Generally Protected (Grade GP. B). The historical structure, **KMR 001**, required no mitigation due to low heritage significance but the historical structure, **KMR 004**, was given a medium heritage significance rating.

During the 2019 assessment, one additional site, a burial ground (**KMR 007**) was identified. The site has a heritage grading of Generally Protected A (GP. A). Refer **Figures 23** and **42** below.



Figure 23 – Map of identified heritage finds from previous heritage impact assessments undertaken by PGS (PGS Heritage 2019).

## 5.5 Archival and Historical Maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

### 5.5.1 Merensky Map, 1887

(National Archives, Maps, 3/302)

The map depicted in **Figure 24** below is titled “*Original Map of South Africa*”. It was compiled by Reverend A. Merensky and dates from 1887. The map does not appear to be entirely accurate, but it provides an idea of the characteristics of the study area at the time.

It is evident from the enlarged map component below that many of the settlements in the general vicinity of the study area were located on the existing rivers. See for example 'Ga Maperi', 'Batlaros', 'Old Lattaku' and so forth.

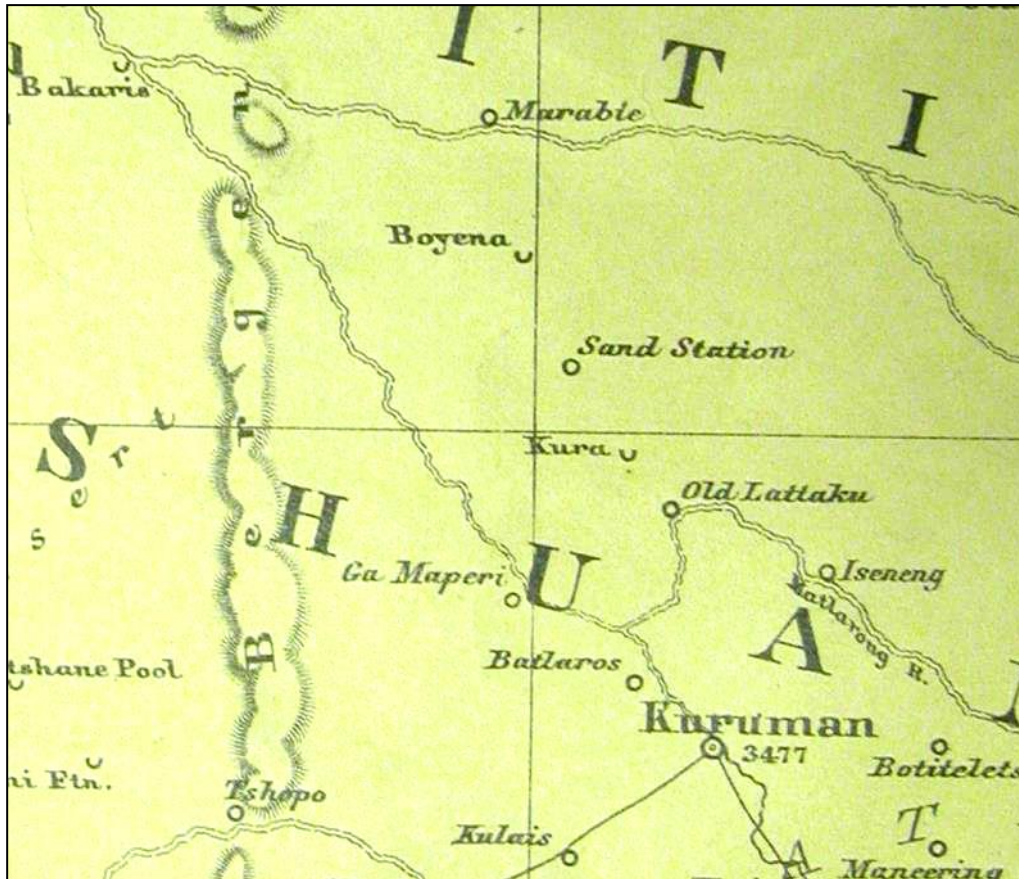


Figure 24 - Map depicting the study area and surrounding region. Note that almost all the towns are situated on or near the main rivers (National Archives, Maps, 3/302).

#### 5.5.2 "Kuruman", Undated

(National Archives, Maps, 3/533)

This map is simply titled "Kuruman" and contains no other information on its date or compiler (**Figure 25**).

An important observation made from this map, and which is supported by the other data, is that the proclaimed farms at the time extended only to the vicinity of the Kuruman River, with no proclaimed farms to the west of it. Although settlements are shown to the west of the said river, these are all located on the banks of rivers (**Figure 26**).



“Map of the Surveyed Portion of British Bechuanaland” was compiled by the Surveyor-General’s Office in Vryburg. It is a relatively accurate map and, importantly, indicates the extent to which farms in the area have been proclaimed and demarcated. Note that the entire section in which the study area is located was still unsurveyed at the time with no farm boundaries shown.

No settlement features or human activity centres are shown for the areas in which the farms under discussion are located. Almost all the settlements shown on this map are located on or near the rivers.

#### 5.5.4 Geological Map, 1925

(National Archives, Maps, 2/304)

This map was made in 1925 and is titled the “Geological Map of the Union of South Africa”. It was produced by the Geological Survey of the Department of Mines and Industries (**Figure 27**).

No settlement features or human activity centres are shown for the areas in which the farms under discussion are located. Note that all the indicated settlements in the wider region are located adjacent to rivers. These include settlements such as Dikgatlhong, Batlaros and Gamopedi. Also note the demarcation of the Lower Kuruman Native Reserve on this map.

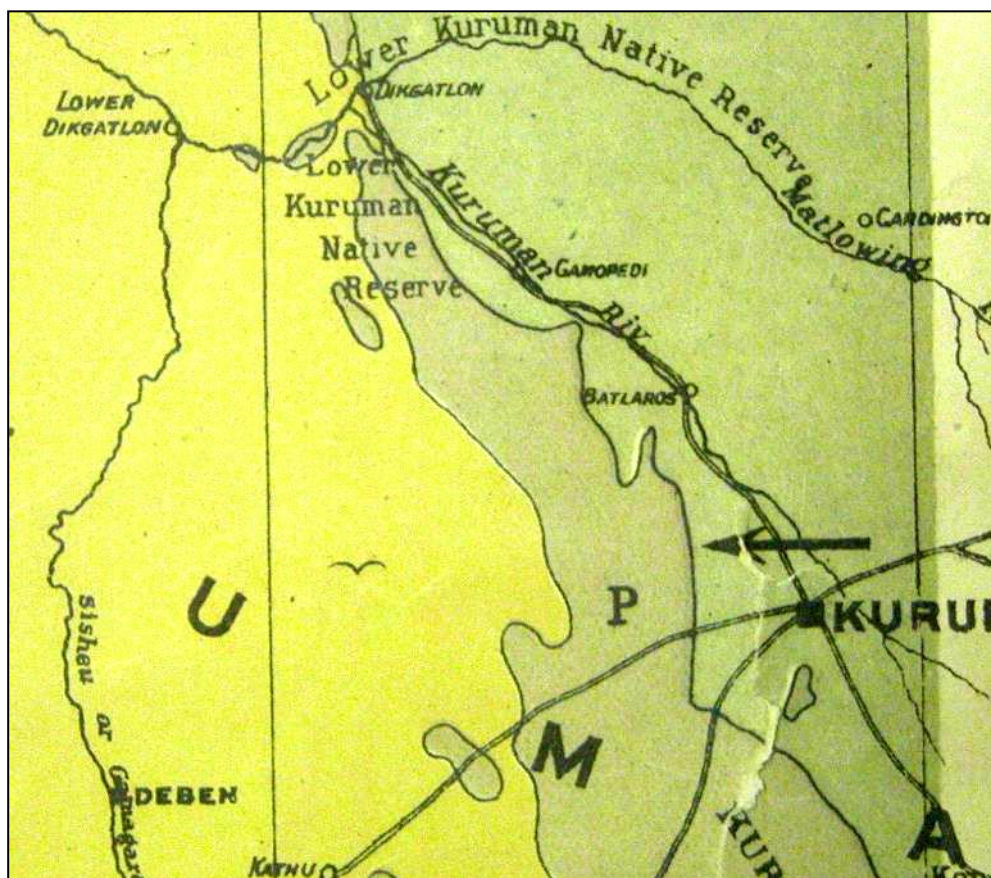


Figure 27 - Geological map of the study area and surroundings (National Archives, Maps, 2/304).

### 5.5.5 Orange River Sheet 3, 1945

(National Archives, Maps, 2/1085)

This map is titled “Orange River Sheet 3” and dates from 1945. It was produced by the Union Defence Force (U.D.F.), and although this edition is dated 1945, it appears to have been drawn during 1942. The map provides a general view on the study area and the surrounding region (**Figure 28**).

No settlement features or human activity centres are shown for the areas in which the farms under discussion are located. Note the way in which the secondary road (thin brown line) follows the rivers. Only the smaller roads (brown stippled line) cross over the waterless areas. Furthermore, three Post Offices are shown, all located on the rivers. Although three mines are indicated, these are all situated closer to Kuruman. No mines are shown for the areas under discussion.

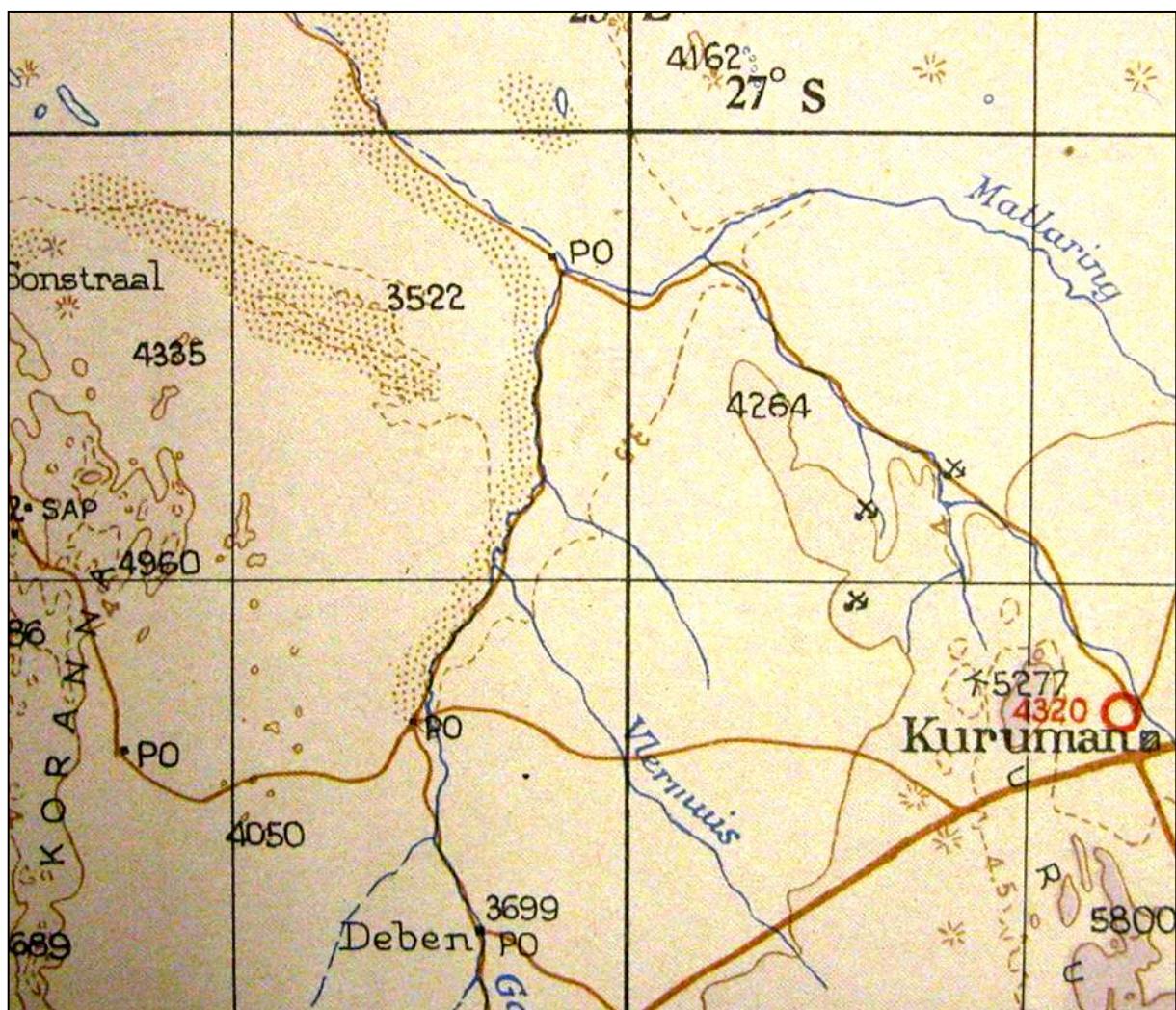


Figure 28 - Map depicting the study area and surrounding region (National Archives, Maps, 2/1085).

#### 5.5.6 First Edition of the 2722BB Topographical Map dated to 1973

The 2722BB map sheet was based on aerial photography undertaken in 1972, was surveyed in 1973 and was drawn in 1974 by the Director – General of Surveys. This particular map sheet shows several structures in the study area. If these structures still exist today, they would be at least 48 years old.

Overlays of the study area components over this map sheet are provided in **Figure 29**, **Figure 30** and **Figure 31**. Any observations that can be made from these map depictions, are individually discussed below.

##### *Waste Rock Dump - Farm Klipling (see **Figure 29**)*

- One ruin is depicted within the proposed waste dump area. The ruin was not identified during the fieldwork.

##### *North Waste Rock Dump - Farm Hotazel (see **Figure 29**)*

- One structure is depicted within the north waste dump area. The structure was not identified during the fieldwork.

##### *Dam - Farm Hotazel (see **Figure 30**)*

- One kraal is depicted within the proposed dam area and one structure was adjacent to the proposed dam area. The structure (**KMR5**) was assessed in a previous archaeological assessment (PGS Heritage, 2019). The kraal was not assessed during the fieldwork due to access constraints (adjacent mine's property).

##### *York Pit Expansion area (see **Figure 30**)*

- One structure is depicted north of the pit expansion area and one structure was depicted within the pit expansion area. The structure (**YORK-001**) was identified during the fieldwork in the same area as the structure depicted north of the pit expansion. The structure depicted within the proposed pit expansion area was not assessed during the fieldwork due to access constraints (adjacent mine's property).

##### *Rehabilitation area - Farm Devon (see **Figure 31**)*

- Two structures are depicted within the proposed rehabilitation area. The structures were not observed during the fieldwork.

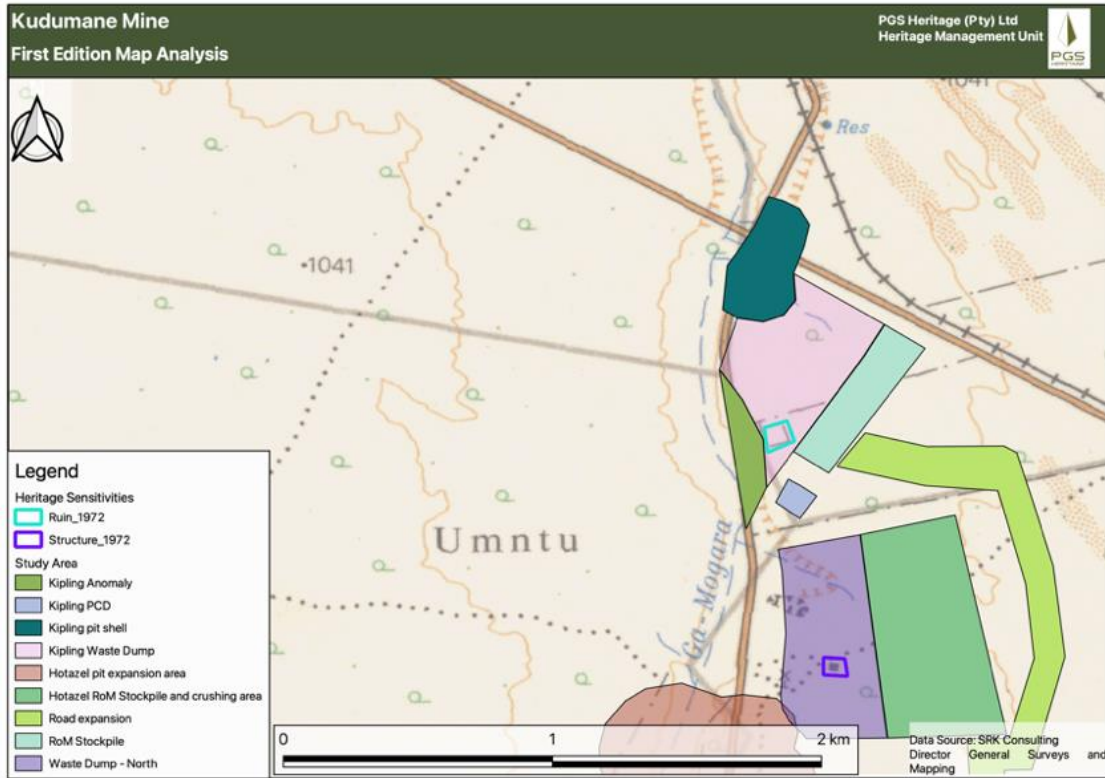


Figure 29 - Section of First Edition of the 2722BB Topographical Map, showing several heritage features. These comprise a structure (purple polygons) and a ruin (cyan polygon) located within the vicinity of the proposed development areas on the farms Kipling and Hotazel.

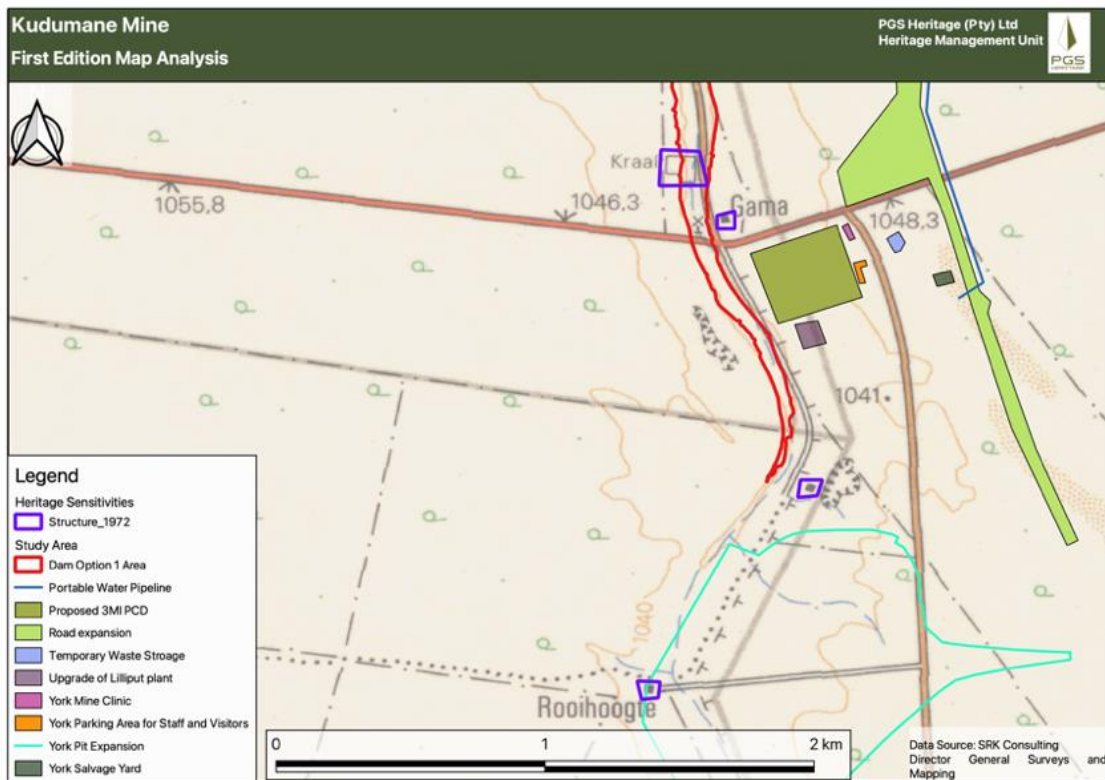


Figure 30 - Section of the First Edition of the 2722BB Topographical Sheet, showing structures (purple polygons) located within the vicinity of the proposed development areas on the farms Hotazel and York.



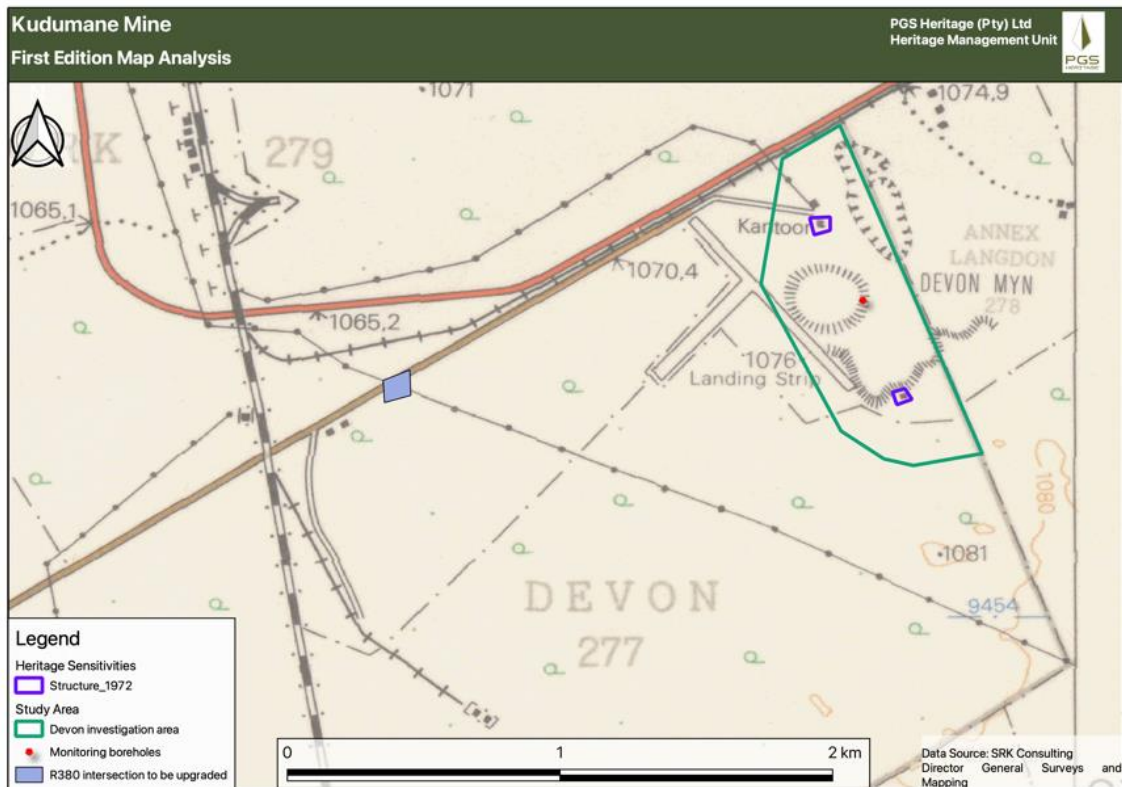


Figure 31 - Section of the First Edition of the 2722BB Topographical Map, showing structures (purple polygons) located within the vicinity of the proposed assessment area on the farm Devon.

#### 5.5.7 First Edition of the 2722BD Topographical Map dated to 1973

The 2722BD map sheet was based on aerial photography undertaken in 1972, was surveyed in 1973 and was drawn in 1974 by the Director - General of Surveys. This particular map sheet shows several structures in the surroundings of the study area. If these structures still exist today, they would be at least 48 years old.

Overlays of the study area components over this map sheet are provided in **Figure 32**. Any observations that can be made from these map depictions, are individually discussed below.

#### Dam - Farm Tele (see **Figure 32**)

- Several structures are depicted adjacent to the proposed dam area. These structures were not assessed during the fieldwork as they do not fall within the proposed development area.

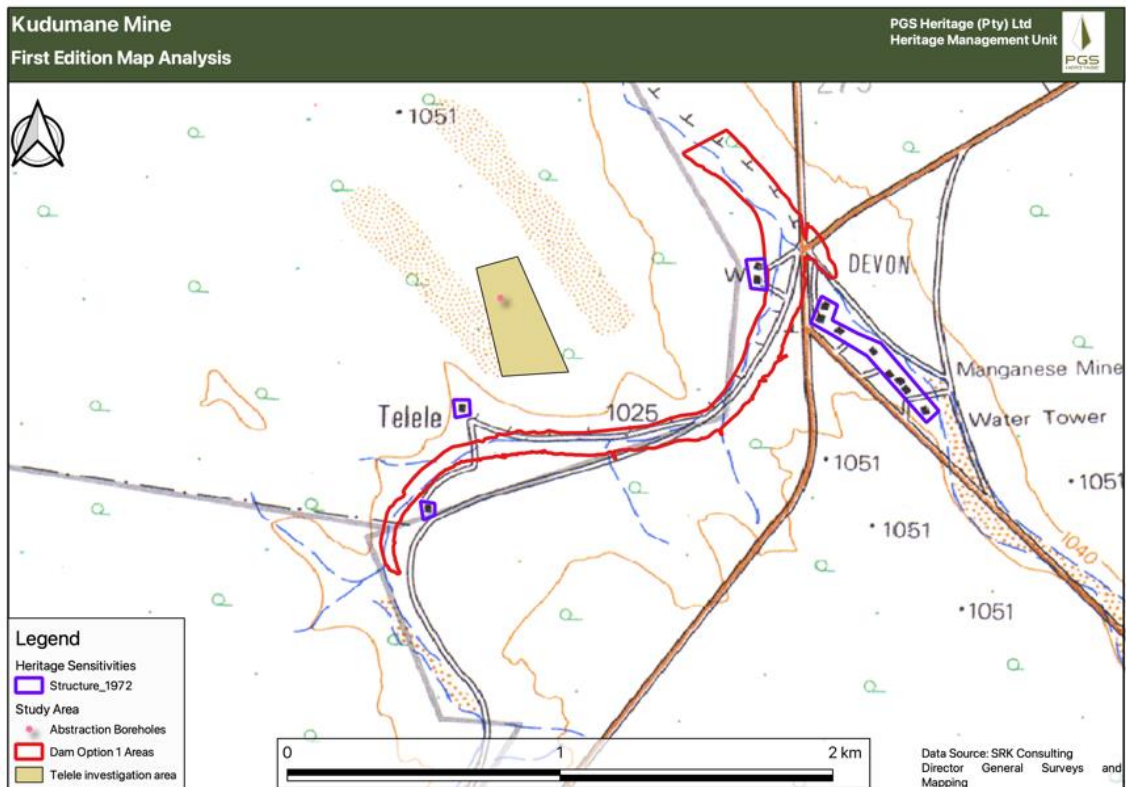


Figure 32 - Section of the First Edition of the 2722BD Topographical Map, showing structures (purple polygons) located within the vicinity of the proposed development area on the farm Telele.

## 5.6 Findings of the historical desktop study

This archival and historical desktop study has revealed important aspects about the history of the area. Some of the key aspects emanating from this study include the relative low human presence for the dry regions surrounding the study area and a tendency for human settlements in these areas to be located on or near the water courses.

The findings of the historical desktop study can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (refer **Figure 33**, **Figure 34**, **Figure 35** and **Figure 36**).

### 5.6.1 Archaeology

Previous studies conducted in the larger Hotazel and Black Rock areas have shown that the archaeological record is temporally confined to the Middle and Later Stone Age, while spatially distribution of such sites are concentrated around the riverine edges due to the harsh climate of the area.

Impacts on archaeological sites can be expected if areas closer to the low-lying riverine areas are to be

disturbed during mining development. Küsel (2009) recommended a 100m buffer from the river centre line where archaeological monitoring will be required if any development should take place.

### 5.6.2 Historical

The archival and historical research has shown that the area was settled during the historic period as early as the late 1700's, with activity and settlements increasing into the mid-1800's with the establishment of the Lower Kuruman Native Reserve with its northern most limits less than 15 kilometres to the south of the study area. Furthermore, the settlement of white farmers from around 1897 to the early 1920 on the Kuruman River indicates that farmsteads and structures older than 60 years, and in some cases older than 100 years, can be present in the study area.

### 5.6.3 Heritage Screening

A heritage screening report was compiled by the Department of Environmental Affairs National Web-based Environmental Screening Tool as required by Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended. According to the heritage screening report, the project area has a Low Heritage Sensitivity (**Figure 2**).

### 5.6.4 Heritage Sensitivity

Analysis of maps and satellite imagery enabled the identification of possible heritage sensitive areas. By superimposition and analysis, it was possible to rate these structures according to age and thus their level of protection under NHRA. **Table 6** lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

*Table 6 - Tangible heritage site in the study area.*

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA Sections 3 and 35
Structures	Possibly older than 60 years	NHRA Sections 3 and 34
Burial grounds	Graves	NHRA Sections 3 and 36 and MP Graves Act

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix (**Table 7**).

*Table 7 - Landform type to heritage find matrix*

LANDFORM TYPE	HERITAGE TYPE
---------------	---------------

Crest and foot hill	LSA and MSA scatters, LIA settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Water holes/pans/rivers	ESA, MSA and LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements
Dune areas	LSA and MSA scatters

The heritage sensitivity maps (**Figure 33, Figure 34, Figure 35, Figure 36**) were used during the fieldwork to assist in identifying and assessing heritage resources in the landscape. With reference to **Figure 33, Figure 34, Figure 35** and **Figure 36**, these sensitive areas include drainage and riverine areas as most archaeological material in the Northern Cape is found near water sources such as rivers, pans and springs.



Figure 33 – Heritage Sensitivity Map indicating possible sensitive areas within and around the proposed development areas on the farm Kipling.

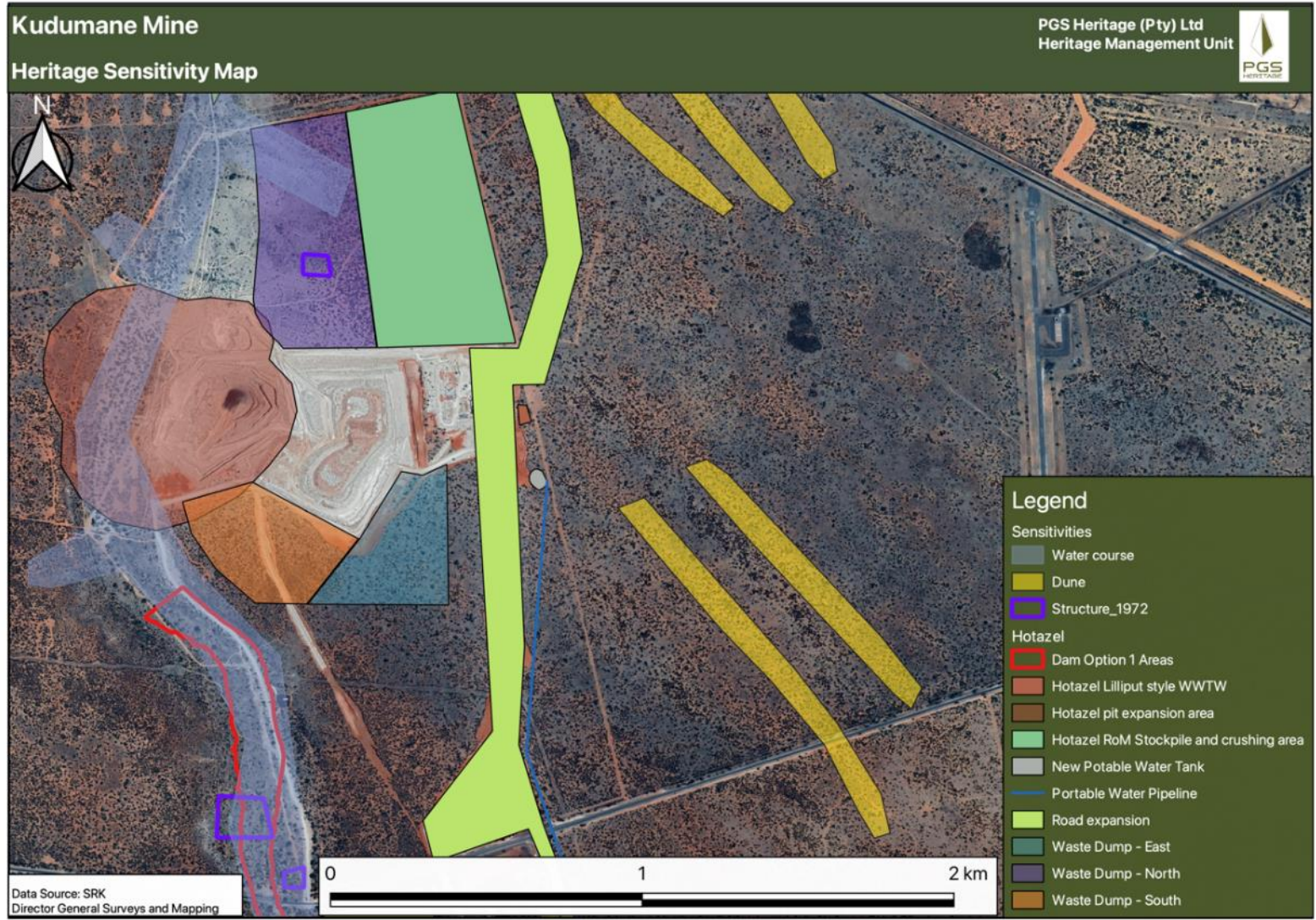


Figure 34 - Heritage Sensitivity Map indicating possible sensitive areas within and around the proposed development areas on the farm Hotazel.



Figure 35- Heritage Sensitivity Map indicating possible sensitive areas within and around the proposed development area on the farm York.



Figure 36 - Heritage Sensitivity Map indicating possible sensitive areas within and around the proposed development area on the farm Telele.



## 6 FIELDWORK AND FINDINGS

### 6.1 Introduction

The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance.

The fieldwork was conducted by two archaeologists from PGS (Nikki Mann and Wynand van Zyl) from 13 to 17 July 2021. The fieldwork comprised a controlled exclusive survey of the proposed development footprint areas. The fieldwork team recorded track logs with their hand-held GPS devices. These track logs are depicted in yellow in **Figure 37** and show the areas assessed by the archaeologists during the fieldwork. These tracklogs were also combined with previous survey tracklogs from previous fieldwork undertaken by PGS on the farms Hotazel and York to illustrate the entire coverage of the proposed development footprint areas (**Figure 38**).

For the most part, the archaeological visibility of the area was not ideal for surveying due to the dense thorn scrub and grass cover in the region. The project affected properties which do not fall within KMR's mining right are Umtu 281, Olive Pan 282 and Gama 283, and are currently part of the Kalagadi Mining Right. These areas of the proposed development were not surveyed due to access restrictions.

A background scatter of MSA and LSA stone tools was observed throughout the area. All sites and structures identified were logged with handheld GPS and documented with digital camera. During the fieldwork, five Stone Age sites (**KLIP-002, KLIP-004, KLIP-005, YORK-002** and **YORK-003**) were identified. Three historic structures (**KLIP-001, KLIP-003** and **YORK-001**) and three burial grounds (**TELELE-001, DEVON-001** and **HOTAZEL-001**) were also identified. It is important to note that site **HOTAZEL-001** identified during the current field assessment is the same site as KMR007 identified in the 2019 heritage assessment by PGS.

The position and distribution of the sites are illustrated in **Figure 39, Figure 40** and **Figure 41**. The most recently identified sites were also combined with the previously identified sites (PGS Heritage, 2019) on the farms Klipling and Hotazel (**Figure 42**). In terms of these previously identified heritage sites, a single recorded artefact (**KMR 002**) falls within the study area, but the other sites fall outside of the current development footprint (**Figure 42**).

Further information regarding the identified heritage sites is provided below.

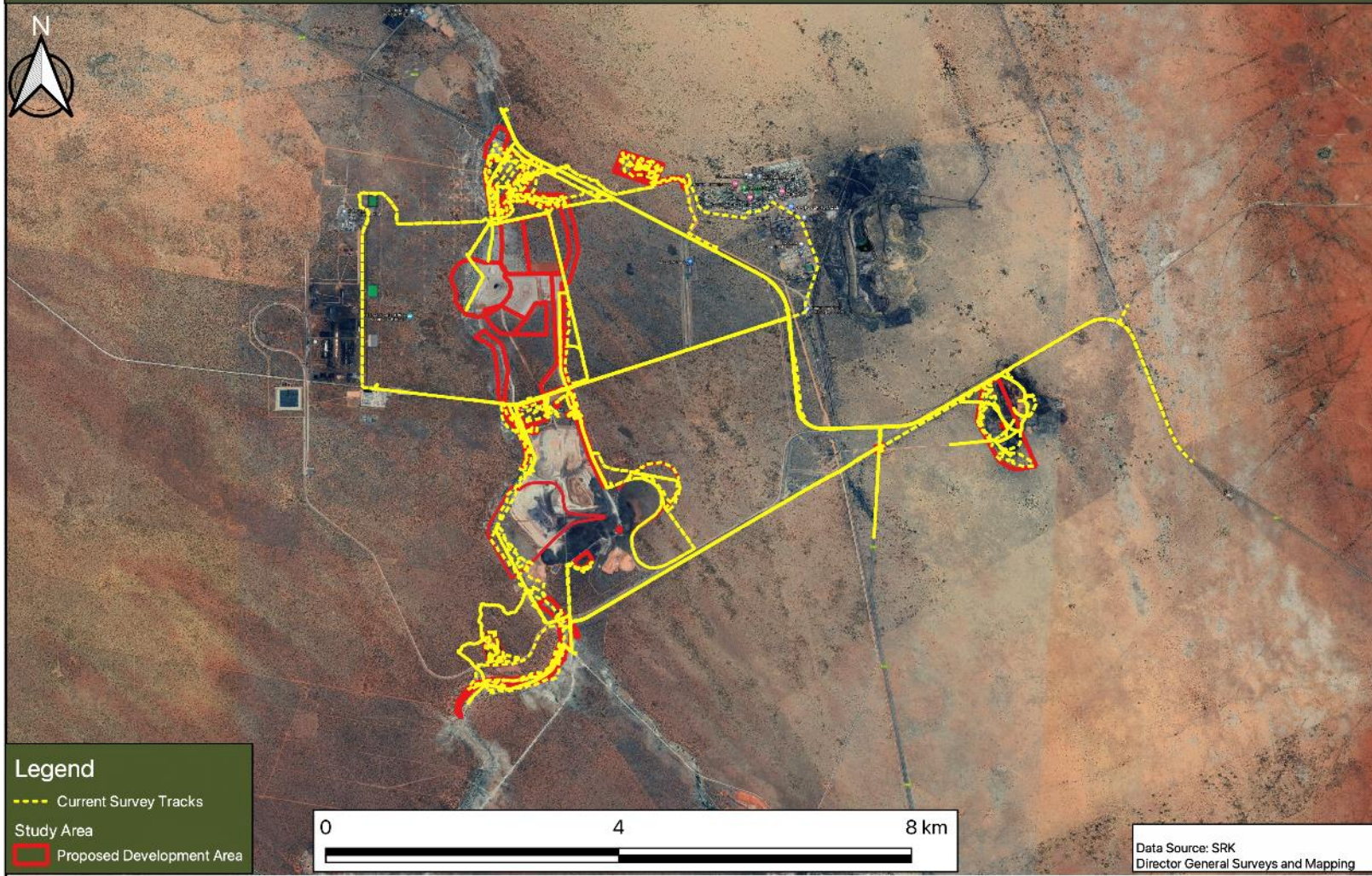


Figure 37 – Map depicting the track logs (yellow lines) recorded during the current fieldwork at the Kudumane Mine.

Kudumane Mine  
Combined Survey Tracklogs

PGS Heritage (Pty) Ltd  
Heritage Management Unit

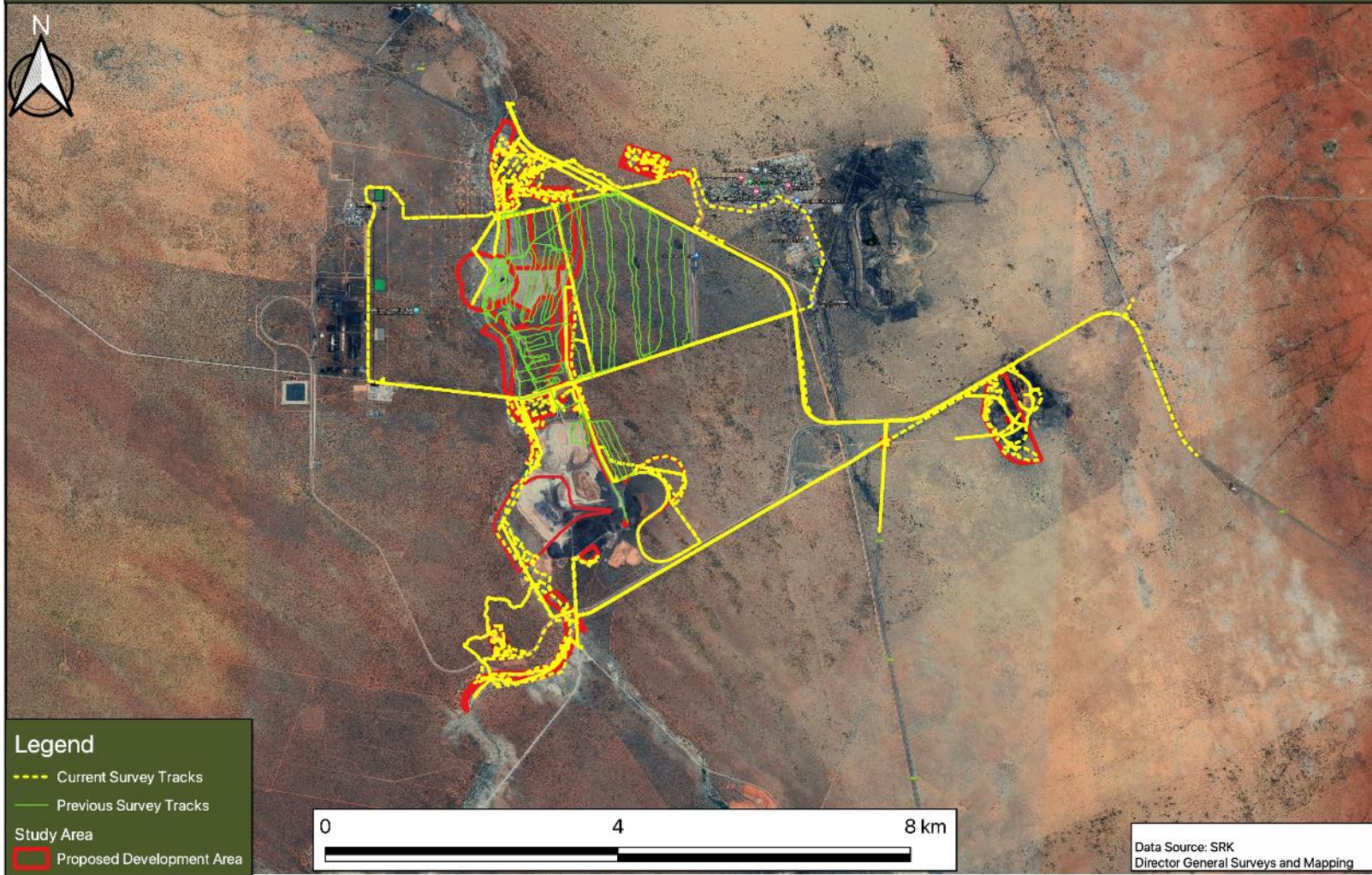


Figure 38 – Combined survey track log recordings for the proposed development areas.

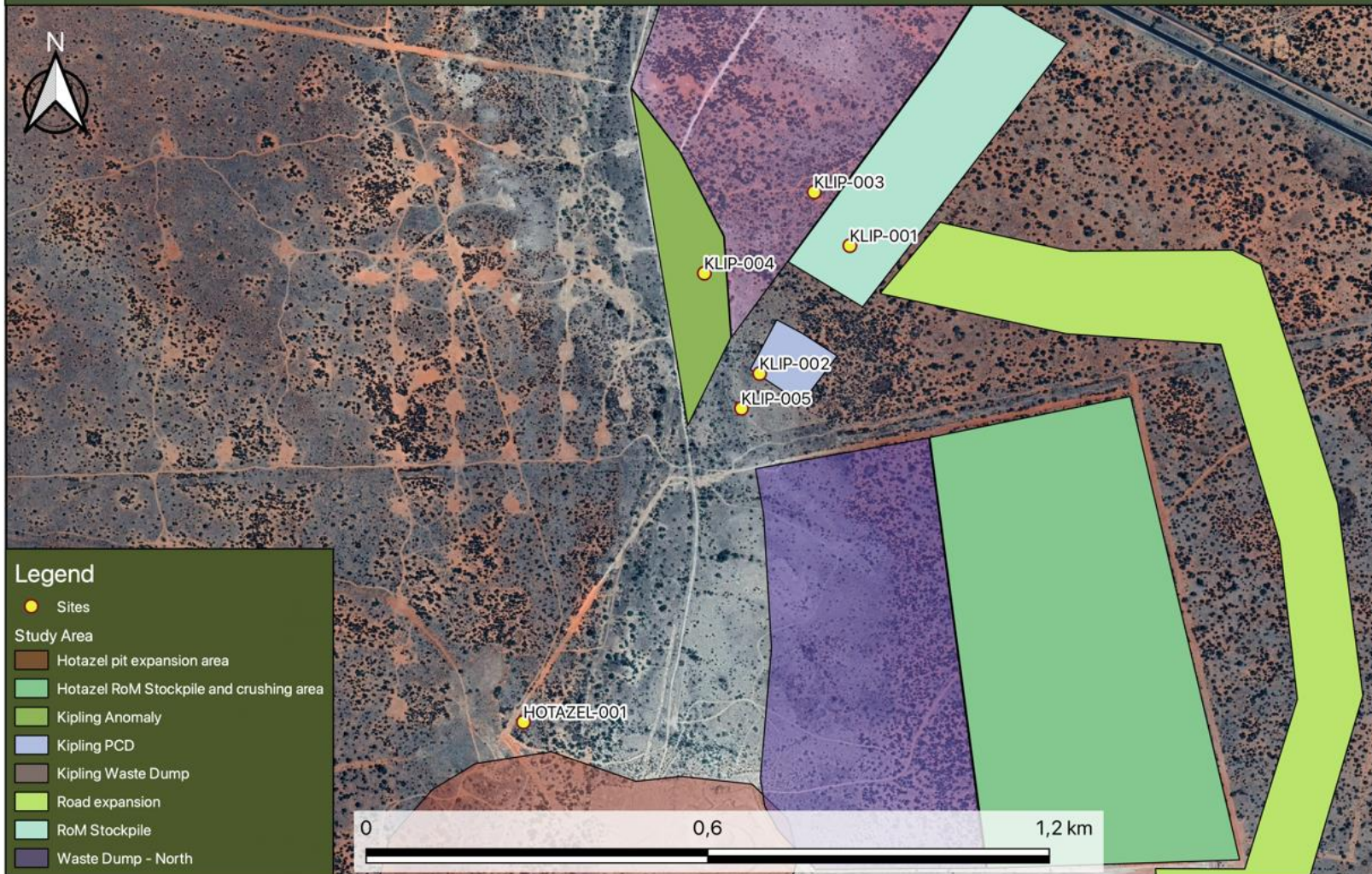


Figure 39 – Map depicting the sites identified on the farms Kipling and Hotazel during the fieldwork.



Figure 40 - Map depicting the sites identified on the farm York during the fieldwork.

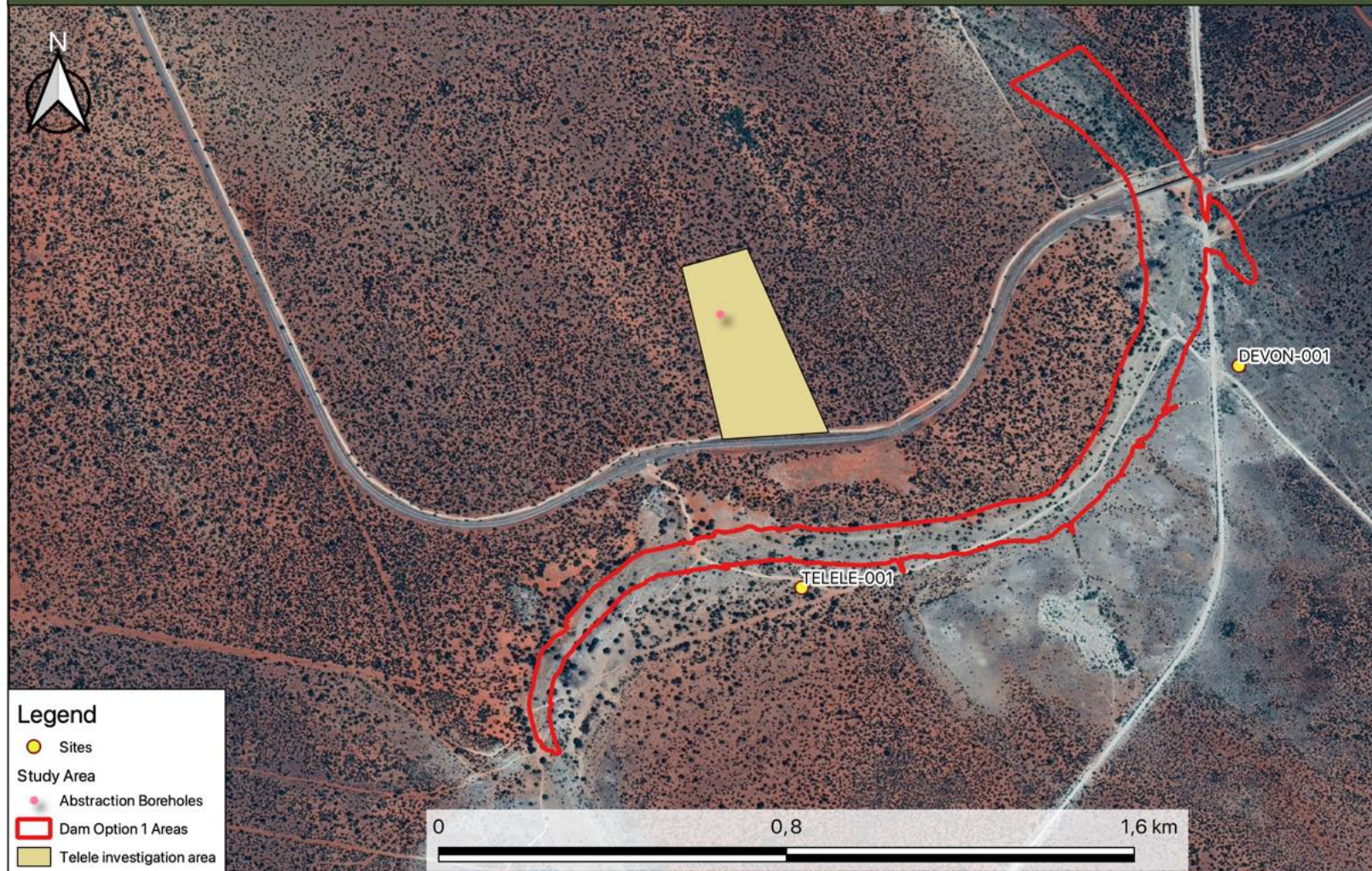


Figure 41 - Map depicting the sites identified on the farm Telele during the fieldwork.



Figure 42 – Map depicting all the sites identified during the current and previous field assessments by PGS within the proposed development areas on the farm Hotazel. Please note that site **HOTAZEL\_001** had been recorded in a previous survey as **KMR007**.

## 6.2 Heritage Sites identified during the fieldwork

### 6.2.1 DEVON-001

#### GPS Coordinates:

S 27.26313

E 22.93252

**Type:** Burial Ground

#### Description:

The site comprises one grave that is overgrown and not maintained (refer **Figure 44** and **Figure 43**). It is located approximately 130m east of the nearest proposed development footprint area. The grave is enclosed by a fence. Its dressing is rectangular and has an ornate cast iron fence enclosing the grave. The headstone is of marble and comprises three stacked foundation blocks which originally had a cross erected on top. The cross has since broken off and is now lying flat on the dressing. The epitaph of the grave appears on the three foundation blocks, and reads as follows:

HIER RUS  
ONS  
LIEFSTE DOGERTJIE  
EN SUSTERTJIE  
SUSANNA P. DU TOIT  
GEB. 21-3-1946  
OORL. 26-11-1950  
U WIL GESKIED

#### Extent:

The site is approximately 5m by 5m in extent.

#### Significance:

All graves have high levels of emotional, religious and in some cases historical significance. As such the site is of **Generally Protected A (GP. A)** or **High/Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation. Refer **Chapter 8**.





Figure 43 – General view of the grave identified at site DEVON-001.



Figure 44 – Closer view of the headstone and grave dressing.

## 6.2.2 HOTAZEL-001

### GPS Coordinates:

S 27.208445

E 22.917942

**Type:** Burial Ground

### Description:

A burial ground comprising two graves was identified approximately 70m north of the proposed expansion pit area on the farm Hotazel. The one grave is that of an adult and has a rectangular granite-lined dressing with an inscribed granite headstone. The epitaph identifies the deceased as Winnie Boshoff. The second grave, which is buried south of the first, is that of a child and has a rectangular dressing with an inscribed headstone. The epitaph identifies the deceased as Cliffie Boshoff. Refer **Figure 45, Figure 46 and** Error! Reference source not found.. The epitaphs appearing on the two graves, read as follows:

IN	IN
LOVING MEMORY	LOVING MEMORY
OF OUR LOVED ONE	OF
MY WIFE OUR MOTHER	OUR DEAR SON
WINNIE	CLIFFIE BOSHOFF
WHO PASSED AWAY 25.8.46	DIED 8.10.1938
FOR YOUR BEAUTIFUL PAST	AGED 22 MONTHS
OUR LAST AND EVERLASTING HOMAGE	SAFE IN THE ARMS OF JESUS
ERECTED BY CHILDREN AND BILL	
BOSHOFF	

### Extent:

The site is approximately 5m by 5m in extent.

### Significance:

All graves have high levels of emotional, religious and in some cases historical significance. As such the site is of **Generally Protected A (GP. A)** or **High/Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation. Refer **Chapter 8**.



Figure 45 – General view of the burial ground at site **HOTAZEL-001**.



Figure 46 & Figure 47 – Detail views of the headstones on the two graves.

### 6.2.3 KLIP-001

#### GPS Coordinates:

S 27.19999

E 22.92373

**Type:** Structure

#### Description:

The site comprises an abandoned single-roomed building with a steel-framed door and two steel-framed windows (refer **Figure 48** and **Figure 49**).

The walls of the structure appear to have been built of three different stone types and colours, which may indicate that it was renovated over time. The building is in a dilapidated state. A few metal artefacts such as wire and cans were observed around the structure.

The site is located approximately 400m east of the Ga-Mogara River.

#### Extent:

The structure is approximately 5m by 4m in extent.

#### Significance:

Referring to nearby farms where a number of old houses were shown on old survey diagrams, Matakoma (2005) and Küsel (2009) indicate that these houses represent some of the earliest white settlement in the area and as such are of historic significance. It is therefore recommended by these references that these remaining historic houses should be documented and mitigated.

The structure at site KLIP-001 may not be depicted at this locality on the 2722BB topographical sheet dating to 1972 or 2001, but it is possible that it may be older than these map depictions.

As no early survey maps or additional information are currently available to assist with the dating, the site is provisionally dated at older than 60 years and as a result rated as **Generally Protected B (GP.B)** or **Medium significance**. This indicates that the site may not be impacted upon without prior mitigation. Refer **Chapter 8**.



*Figure 48 - View of the structure at site KLIP-001. The scale is in 10cm increments.*



*Figure 49 - Another view of the structure at site KLIP-001.*

#### **6.2.4 KLIP-002**

##### **GPS Coordinates:**

S 27.20226

E 22.92213

**Type:** MSA and LSA Stone Tool Scatter

##### **Description:**

The site comprises a low-density surface scatter of stone tools identified on the eastern banks of the Ga-Mogara River, approximately 140m from the river.

The lithics were located within a sparsely vegetated area on a rocky ridge that gently slopes towards the west (refer **Figure 50** and **Figure 51**). The highest lithic density observed at the site is three lithics per square meter.

Mostly MSA and LSA artefacts were observed at KLIP-002. Cores, flakes, scrapers and debitage were observed and were mostly manufactured from jasper and ccs (refer **Figure 52** and **Figure 53**). This is consistent with previous studies (Matakoma 2005; Küsel 2008; PGS Heritage 2009, 2012 & 2013).

##### **Extent:**

The site is approximately 40m by 20m in extent.

##### **Significance:**

The site has a relatively low lithic density and is deemed to be of **Generally Protected C (GP. C)** or **Low Significance**. No further mitigation is therefore required.

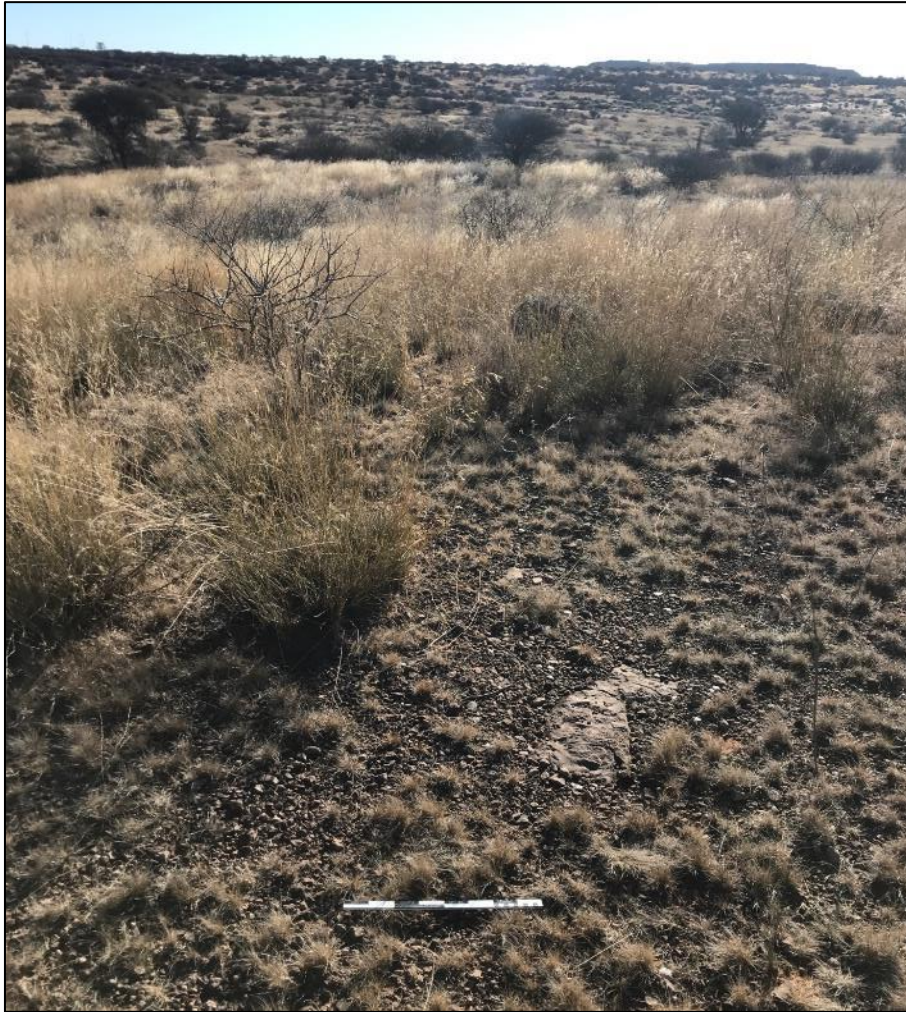


Figure 50 – General view of site KLIP-002 located on top of rocky ridge. Image taken facing west.



Figure 51 – View of stunted grass growth at site KLIP-002.



*Figure 52 - Sample of artefacts observed at KLIP-002. The scale is in 1cm, 5cm and 10cm increments.*



*Figure 53 – Another sample of flakes and worked tools found at KLIP-002. The scale is in 1cm, 5cm and 10cm increments.*



### 6.2.5 KLIP-003

#### GPS Coordinates:

S 27.1990398

E 22.9230983

**Type:** Structure

#### Description:

The site comprises an abandoned one-roomed structure situated approximately 390m east of the Ga-Mogara River. It was constructed with stones and mud and has a concrete floor (refer **Figure 55** and **Figure 56**). The structure's door and window frames are made of wood.

The base of what may have been a donkey cart was observed near the structure (**Figure 57**). Additionally, an associated rubbish midden was also observed in association with the structure. It seems likely for the structure to be older than 60 years old.

#### Extent:

The structure is approximately 5m by 4m in extent.

#### Significance:

Referring to nearby farms where a number of old houses were shown on old survey diagrams, Matakoma (2005) and Küsel (2009) indicate that these houses represent some of the earliest white settlement in the area and as such are of historic significance. It is therefore recommended by these references that these remaining historic houses should be documented and mitigated.

The structure at site KLIP-003 is not depicted at this locality on the 2722BB topographical sheet dating to 1972 but it is depicted on the topographical sheet dating to 2001 (**Figure 54**).

The site is provisionally dated at older than 60 years and as a result rated as **Generally Protected B (GP.B)** or **Medium significance**. This indicates that the site may not be impacted upon without prior mitigation. Refer **Chapter 8**.



*Figure 54 – Depiction of the structure at site KLIP-003 as depiction on the 2722BB topographical sheet surveyed in 2001.*



*Figure 55 – View of the structure at site KLIP-003.*



*Figure 56 – Closer view of the door and interior of structure at KLIP-003.*



*Figure 57 – What appears to be the remains of a donkey cart were observed at KLIP-003.*

## 6.2.6 KLIP-004

### GPS Coordinates:

S 27.20048

E 22.92115

**Type:** MSA and LSA Stone Tool Scatter

### Description:

The site comprises a medium-density surface scatter of stone tools situated on the eastern banks of the Ga-Mogara River, approximately 130m from the river (refer **Figure 58**). The tools were located within a moderate to sparsely vegetated area on a rocky ridge that gently slopes towards the west (**Figure 59**). The highest lithic density observed at the site is six lithics per square meter, with a large number of lithics found across the site surface.

The site includes stone tools which are cemented in calcrete (refer **Figure 61**) and some of the lithics are exposed on an eroded surface. Mostly MSA and LSA artefacts were observed at KLIP-004. Cores, flakes, scrapers, blades and debitage were observed and were manufactured from jasper and ccs (**Figure 60**). This is consistent with previous studies (Matakoma, 2005; Küsel, 2008; PGS Heritage, 2009, 2012, 2013). With lithics at the site found in exposed circumstance caused by erosion, it can be surmised that artefacts will also occur in subterranean contexts wider than the site's extent indicated below.

### Extent:

The site is approximately 100m by 80m in extent.

### Significance:

The site has a medium lithic density and is comprised of a relatively large number of lithics. The site is deemed to be of **Generally Protected B (GP.B)** or **Medium Significance**. Mitigation would be required. Refer **Chapter 8**.



Figure 58 – General view of site KLIP-004 taken facing south towards mine-related infrastructure.



Figure 59 – View of calcrete ridge at KLIP-004.



Figure 60 – Sample of stone tools observed at KLIP-004. Scale is in 1cm, 5cm and 10cm increments.



Figure 61 – Stone tools cemented in calcrete. Scale is in 1cm, 5cm and 10cm increments.

### 6.2.7 KLIP-005

#### GPS Coordinates:

S 27.202879

E 22.921808

**Type:** MSA and LSA Stone Tool Scatter

#### Description:

The site comprises a low-density surface scatter of stone tools identified on the eastern banks of the Ga-Mogara River (refer **Figure 62**).

The tools are located on a gentle slope approximately 120m from the river. The highest lithic density observed at the site is two lithics per square meter. The stone tools consisted mainly of MSA and LSA lithics manufactured from jasper and ccs (refer **Figure 63**). This is consistent with previous studies (Matakoma, 2005; Küsel, 2008; PGS Heritage, 2009, 2012, 2013).

#### Extent:

The site is approximately 50m by 40m in extent.

#### Significance:

The site has a relatively low lithic density. The site is deemed to be of **Generally Protected C (GP. C)** or **Low Significance**. No further mitigation is therefore required.



*Figure 62 - General view of site KLIP-005.*



*Figure 63 – Sample of lithics from the surface of site KLIP-005. Scale is in 1mm and 1cm increments.*



### 6.2.8 YORK-001

#### GPS Coordinates:

S 27.23812

E 22.92665

**Type:** Structure

#### Description:

The site comprises an abandoned four-roomed structure identified approximately 130m east of the Ga-Mogara River. The building was skilfully constructed, and its main walls comprise neatly cut stone masonry walling with plaster on the interior. The building had a gable which appears to have been built using cement bricks. This site is located approximately 40m east of the proposed dam area and less than 50m from current mine infrastructure.

Refer **Figure 65**, **Figure 66** and **Figure 67**.

#### Extent:

The site is approximately 11m by 11m in extent.

#### Significance:

Referring to nearby farms where a number of old houses were shown on old survey diagrams, Matakoma (2005) and Küsel (2009) indicate that these houses represent some of the earliest white settlement in the area and as such are of historic significance. It is therefore recommended by these references that these remaining historic houses should be documented and mitigated.

The structure at site YORK-001 is depicted at this locality on the 2722BB topographical sheet dating to 1973 (refer **Figure 64**). The site is therefore at least 48 years old. It seems possible for the site to be older than 60 years as well.

The site is provisionally rated as **Generally Protected B (GP.B)** or **Medium significance**. Mitigation would be required. Refer **Chapter 8**.



*Figure 64 – Site YORK-001 is depicted on the First Edition of the 2722BB topographical sheet that was surveyed in 1973. This site is at least 48 years old.*



*Figure 65 – General view of the structure at site YORK-001. Note the walls of neatly cut stone masonry with gables likely constructed of cement bricks.*



*Figure 66 – Another view of the structure at site YORK-001. Note the cut stone walling with gable likely constructed of cement bricks.*



*Figure 67 – Interior view of the structure at site YORK-001. The interior walling shown here is not plastered. Scale in 10cm increments.*

### 6.2.9 YORK-002

#### GPS Coordinates:

S 27.2324633

E 22.9263330

**Type:** MSA and LSA Stone Tool Scatter

#### Description:

The site comprises a low to medium density surface scatter of stone tools identified on the eastern banks of the Ga-Mogara River, approximately 150m from the river (refer **Figure 68**).

The tools were identified in a rocky area that slopes towards the west. Frequent natural gullies also occur within the area. As a result, the lithics are unlikely in their original context due to the disturbance. The highest lithic density observed at the site is four lithics per square meter.

Mostly MSA and LSA artefacts were observed at site YORK-002. Cores, flakes, scrapers and debitage were observed and were mostly manufactured from jasper and ccs (**Figure 69**). This is consistent with previous studies (Matakoma, 2005; Küsel, 2008; PGS Heritage, 2009, 2012, 2013).

#### Extent:

The site is approximately 50m by 40m in extent.

#### Significance:

The site has a relatively low lithic density in a disturbed context. As a result, the site is deemed to be of **Generally Protected C (GP. C)** or **Low Significance**. No further mitigation is therefore required.



*Figure 68 – General view of YORK-002.*



*Figure 69 – Sample of lithics observed on surface of site. The scale is in 1mm and 1cm increments.*

### 6.2.10 YORK-003

#### GPS Coordinates:

S 27.254347

E 22.926699

**Type:** MSA and LSA Stone Tool Scatter

#### Description:

The site comprises a low-density surface scatter of stone tools situated on the eastern banks of the Ga-Mogara River (**Figure 70**). It is situated approximately 20m from the river and 130m north of a proposed dam area. The highest lithic density observed at the site is two lithics per square meter.

Mostly MSA and LSA artefacts were observed at YORK-003. The site includes stone tools which are cemented in calcrete and some of the tools are exposed on an eroded surface. The stone tools consist mainly of MSA and LSA lithics manufactured from jasper and ccs (**Figure 71** and Error! Reference source not found.). This is consistent with previous studies (Matakoma, 2005; Küsel, 2008; PGS Heritage, 2009, 2012, 2013).

#### Extent:

The site is approximately 40m by 30m in extent.

#### Significance:

The site has a relatively low lithic density. The site is deemed to be of **Generally Protected C (GP. C)** or **Low Significance**. No further mitigation is therefore required.



*Figure 70 – General view of site YORK-003.*



*Figure 71 – Examples of stone tools identified at YORK-003. Note how the lithics shown here are still cemented in the calcrete. The scale is in 1mm and 1cm increments.*

### 6.2.11 TELELE-001

#### GPS Coordinates:

S 27.26829

E 22.92236

**Type:** Burial Ground

#### Description:

The site comprises one grave, which is overgrown (**Figure 72**). This site is located approximately 60m south of the proposed dam development area.

The grave dressing is rectangular and has an ornate formal headstone. The epitaph of the grave appears on the headstone, and reads as follows:

TER GEDAGTENIS  
AAN  
ONSE BEMINDE EGGENOOT  
EN VADER  
JOHANNES STEFANUS ABRAHAM  
JACOBS GEB. 28 AUG. 1870  
OORL. 25 NOV. 1933  
EK IS DIE OPSTANDING  
EN DIE LEWE. WIE IN MY GLO SAL LEWE,  
AL HET HY OOK GESTERWE.  
JOH. 11 25

#### Significance:

All graves have high levels of emotional, religious and in some cases historical significance. As such the site is of **Generally Protected A (GP. A)** or **High/Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation. Refer **Chapter 8**.





Figure 72 – View of the grave at site TELELE-001. Scale is in 10cm increments.

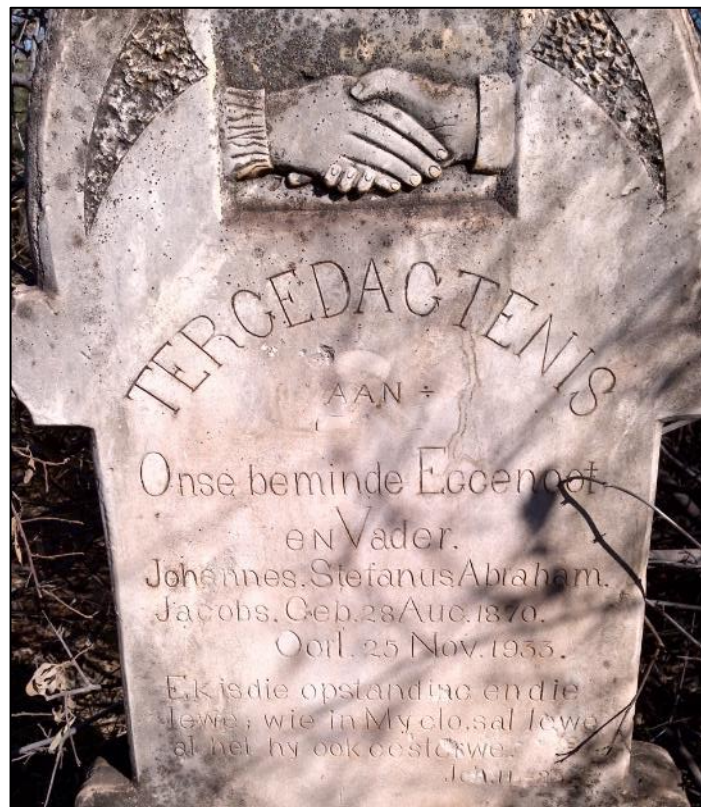


Figure 73 – Closer view of the headstone at site TELELE-001.

## 7 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE SITES

### 7.1 General Observations

In this section, an assessment will be made of the impact of the proposed development on the identified heritage sites.

An overlay of all the identified heritage sites over the proposed development footprint areas was made to assess the impact of the proposed development on these identified heritage sites. In the list below, observations as a result of this overlay as well as general observations will be made.

- The impact assessment methodology utilised in this report was provided by the client, namely SRK Consulting (see **Section 3.2**).
- The previously identified sites (**KMR 001, KMR003 - KMR 005**) are all located outside of the development footprint areas with only a single artefact (**KMR 002**) located within the current study area footprints. This site (**KMR 002**) is of low heritage significance, which means no impact assessment will be undertaken for it. As the other previously identified sites mentioned above are located outside of the proposed development footprint area, no impact assessment would be required for them as well. Please note that the previous identified site, **KMR 007**, which comprises a burial ground, is included in this report as site **HOTAZEL-001** and is discussed below.
- Heritage sites assessed to have a low heritage significance are not included in these impact risk assessment calculations. The reason for this is that sites of low significance will not require mitigation. These sites are **KLIP-002, KLIP-005, YORK-002** and **YORK-003**.
- One structure, **YORK-001** which was provisionally assessed to have a medium heritage significance, is not located within the proposed development area. As a result, no impact is expected from the proposed development on the site. This means that no impact assessment will be undertaken for this site.
- The gravesite **DEVON-001** is located approximately 130m outside of the development footprint areas. As a result, no impact is expected from the proposed development on the site. This means that no impact assessment will be undertaken for the site.
- Two historical structures **KLIP-001** and **KLIP-003**, which were provisionally assessed to have a medium heritage significance, are located within the proposed development area. As a result, an impact is expected from the proposed development and an impact assessment would be required.
- The Stone Age site **KLIP-004**, which is assessed to have a medium heritage significance, is located within the proposed development area. As a result, an impact is expected from the proposed development and an impact assessment would be required.

- The burial grounds **HOTAZEL-001** (previously recorded as **KMR 007**) and **TELELE-001** are located less than 100m outside of the development footprint areas. As a result, an impact is expected from the proposed development and an impact assessment would be required.
- Four project phases have been identified by SRK Consulting, namely the Pre-Construction Phase, Construction Phase, Operational Phase and the Decommissioning and Rehabilitation Phase. As site clearing activities of all the development footprint areas are grouped under the Pre-Construction Phase, the highest level of impact on the identified heritage sites is expected during this phase. All the identified heritage sites located within the proposed development footprints are expected to be completely destroyed in terms of the pre-mitigation impact assessments undertaken below. Of course, sites located outside of the proposed development footprints, but still close enough to the proposed development footprints (less than 100m for gravesites and less than 30m for other sites), may be undergo pre-mitigation impacts during subsequent project phases such as the Construction Phase, Operational Phase and Decommissioning and Rehabilitation Phase as well.

## 7.2 Assessment of Pre-Mitigation Impact on the Identified Heritage Sites

### 7.2.1 Assessment of the pre-mitigation impact on sites **TELELE-001** and **HOTAZEL-001**

In this section, the unmitigated impact of the proposed development on sites **TELELE-001** and **HOTAZEL-001** will be assessed. The two sites are grouped together in this impact assessment as they are confirmed graves and burial grounds and are both located outside of the proposed development footprints but within the 100m buffer area required around gravesites. Site **Hotazel-001** is located 70m north of the proposed mining pit on the farm Hotazel whereas site **Telele-001** is located 60m south of a proposed dam development. In terms of the project phases, and without mitigation undertaken, the two sites are expected to be impacted upon during all the project phases. This said, the highest, though of relatively equal impacts, are expected during the Construction and Operational Phases. In the table below, an assessment of the pre-mitigation impacts is undertaken and calculated.

Table 8 – Assessment of Pre-Mitigation Impact on sites **TELELE-001** and **HOTAZEL-001**

Nature of the impact	Significance of potential impact <b>BEFORE</b> mitigation						Significance	
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
<b>Pre-Construction Phase</b>								
<i>No impact expected</i>	0	0	0	0	0	0	0	None
<b>Construction Phase</b>								
<i>Impacts to two sites containing graves</i>	0	3	5	3	8	4	48	Moderate
<b>Operational Phase</b>								

<i>Impacts to two sites containing graves</i>	0	3	5	3	8	4	48	Moderate
<b>Closure/Rehabilitation Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
<b>Post-Closure Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on the burial grounds located within the development footprints is expected to be of **Moderate Significance**. The result of this impact assessment calculation means that mitigation measures would be required for these sites. See **Section 8** for required mitigation measures.

#### 7.2.2 Assessment of the pre-mitigation impact on site **KLIP-004**

In this section, the unmitigated impact of the proposed development on site **KLIP-004** will be assessed. The site is a medium-density Stone Age surface scatter and was assessed to have a Medium Significance. The site is located within the proposed development footprints. In terms of the project phases, and without mitigation undertaken, the site is expected to be completely destroyed during the Pre-Construction Phase. With their destruction completed during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases. In the table below, an assessment of the pre-mitigation impacts is undertaken and calculated.

*Table 9 - Assessment of Pre-Mitigation Impact of Proposed Development on site KLIP-004*

Nature of the impact	Significance of potential impact <b>BEFORE</b> mitigation						Significance	
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
<b>Pre-Construction Phase</b>								
<i>Complete destruction of Stone Age site KLIP-004</i>	-	5	5	2	4	4	55	Moderate
<b>Construction Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
<b>Operational Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
<b>Closure/Rehabilitation Phase</b>								

No further impacts expected	0	0	0	0	0	0	0	None
<b>Post-Closure Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on the Stone Age site, has revealed that the impact significance on this site is expected to be of **Moderate Significance**. The result of this impact assessment calculation means that mitigation measures would be required. See **Section 8** for required mitigation measures.

### 7.2.3 Assessment of the pre-mitigation impact on sites **KLIP-001** and **KLIP-003**

In this section, the unmitigated impact of the proposed development on sites **KLIP-001** and **KLIP-003** will be assessed. The two sites are grouped together in this impact assessment as they are structures believed to be older than 60 years and both located within the proposed development footprints. In terms of the project phases, and without mitigation undertaken, the two sites are expected to be completely destroyed during the Pre-Construction Phase. With their destruction completed during the Pre-Construction Phase, no impacts are expected during the Construction, Operational and the Decommissioning and Rehabilitation Phases. In the table below, an assessment of the pre-mitigation impacts is undertaken and calculated.

Table 10 – Assessment of Pre-Mitigation Impact on sites **KLIP-001** and **KLIP-003**

Nature of the impact	Significance of potential impact <b>BEFORE</b> mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
<b>Pre-Construction Phase</b>								
Complete destruction of two historical structures	-	3	5	2	2	2	27	Low
<b>Construction Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Operational Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Closure/Rehabilitation Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Post-Closure Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None

The calculation of the assessment of the unmitigated impact of the proposed development on the historical structures located within the development footprints is expected to be of **Low Significance**. See **Section 8** for required mitigation measures.

### 7.3 Assessment of Post-Mitigation Impact on the Identified Heritage Sites

#### 7.3.1 Assessment of the post-mitigation impact on sites TELELE-001 and HOTAZEL-001

In this section, the post-mitigated impact of the proposed development on sites TELELE-001 and HOTAZEL-001 will be assessed. Please note, that the post-mitigation impact assessment calculations undertaken below are based on the understanding that it was not possible for the development footprints to be modified in such a way for one or more of these burial grounds to be preserved in situ. Although this is the preferred option, the impact assessment calculations undertaken below are based on the understanding that both these burial grounds have been successfully relocated. Should the proposed development footprints be altered in such a way that a buffer area of at least 100m is maintained between the development footprint areas the proposed development footprint areas, a similar impact as shown below can be expected. Please also note that the probability level used in this calculation, also takes cognisance of the level of probability for graves to be destroyed by the development once mitigation is complete. With the burial grounds fully relocated by the time that the Pre-Construction Phase commences, the post-mitigation impact will only be calculated for this project phase. In the table below, an assessment of the post-mitigation impacts is undertaken and calculated.

Table 11 – Assessment of Post-Mitigation Impact on TELELE-001 and HOTAZEL-001

Nature of the impact	Significance of potential impact <b>AFTER</b> mitigation							Significance
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
<b>Pre-Construction Phase</b>								
<i>Post-mitigated impact on burial grounds</i>	-	2	5	3	6	2	28	Low
<b>Construction Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
<b>Operational Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
<b>Closure/Rehabilitation Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None
<b>Post-Closure Phase</b>								
<i>No further impacts expected</i>	0	0	0	0	0	0	0	None

With the mitigation measures successfully completed, the significance of the potential impact of the proposed development on these sites are expected to be of **Low Significance**.

### 7.3.2 Assessment of the post-mitigation impact on site **KLIP-004**

In this section, the post-mitigated impact of the proposed development on site **KLIP-004** will be assessed. The Stone Age site is a medium-density MSA and LSA surface scatter, assessed during the fieldwork to have a Medium Significance. For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in **Section 8** have been successfully completed. Again, the only impacts are expected during the Pre-Construction Phase, based on the understanding that all development footprints areas will be cleared during this phase and any tangible remains left on site after mitigation will be completely destroyed during the Pre- Construction Phase. In the table below, an assessment of the post-mitigation impacts is undertaken and calculated.

Table 12 - Assessment of Post-Mitigation Impact of Proposed Development on site **KLIP-004**

Nature of the impact	Significance of potential impact <b>AFTER</b> mitigation						Significance	
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)			
<b>Pre-Construction Phase</b>								
Complete destruction of Stone Age site <b>KLIP-004</b>	-	3	5	2	2	2	27	Low
<b>Construction Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Operational Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Closure/Rehabilitation Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Post-Closure Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None

With the mitigation measures successfully completed, the significance of the potential impact of the proposed development on these sites, are expected to be of **Low Significance**.

### 7.3.3 Assessment of the post-mitigation impact on sites **KLIP-001** and **KLIP-003**

In this section, the post-mitigated impact of the proposed development on sites **KLIP-001** and **KLIP-003** will be assessed. Please note, that the post-mitigation impact assessment calculations undertaken below are based on the understanding that it was not possible for the development footprints to be modified in such a way for the structures to be preserved in situ. For the impact assessment calculations included in this section, it is assumed that all the mitigation measures as outlined in **Section 8** have been successfully completed. Again, the only impacts are expected during the Pre-Construction Phase, based on the understanding that all development footprints areas will be cleared during this phase and any tangible remains left on site after mitigation will be completely destroyed during the Pre-

Construction Phase. In the table below, an assessment of the post-mitigation impacts is undertaken and calculated.

Table 13 – Assessment of Post-Mitigation Impact of on KLIP-001 and KLIP-003

Nature of the impact	Significance of potential impact <b>AFTER</b> mitigation							
	Probability	Duration	Extent	Magnitude	Loss of Resources (%)	Significance		
<b>Pre-Construction Phase</b>								
Post-mitigated impact on burial grounds	-	3	5	2	2	2	27	Low
<b>Construction Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Operational Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Closure/Rehabilitation Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None
<b>Post-Closure Phase</b>								
No further impacts expected	0	0	0	0	0	0	0	None

With the mitigation measures successfully completed, the significance of the potential impact of the proposed development on these sites are expected to be of **Low Significance**.

## 8 REQUIRED MITIGATION MEASURES

### 8.1 Introduction

In this chapter, required mitigation measures for each of the sites affected by the proposed development are outlined. As shown in **Section 7**, mitigation measures are required for the following sites:

- Burial Grounds: **HOTAZEL-001** and **TELELE-001**
- Stone Age Site: **KLIP-004**
- Historical structures: **KLIP-001** and **KLIP-003**



## 8.2 Required Mitigation Measures

### 8.2.1 Required Mitigation for Burial Grounds

The impact significance calculations undertaken in **Chapter 7** have shown that the significance of the unmitigated impact of the proposed development on sites **HOTAZEL-001** and **TELELE-001** is estimated to be of Moderate Significance. As a result, mitigation measures are required for these sites.

As cemeteries and graves have Medium to High Heritage Significance, the preferred option is to change the development footprint to allow for the *in situ* preservation of these sites. The following mitigation measures would be required for this option:

- SAHRA's Burial Grounds and Graves Unit requires a buffer area of at least 100m between mining development and any burial grounds or graves that are to be preserved. As a result, and if at all possible, the proposed development footprints must be amended to allow for a 100m wide buffer area surrounding each of the two burial grounds that is kept clear of any construction or mining activities.
- Fences around the two burial grounds should be maintained.
- The two burial grounds should be cleaned on a yearly basis.
- A heritage monitoring process would also be required during all the project phases.

However, should it not be possible to preserve these sites *in situ*, the following mitigation measures are required:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

### 8.2.2 Required Mitigation for the Stone Age site

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on site **KLIP-004** is estimated to be of Moderate Significance. As a result, mitigation measures are required for the site.

The following mitigation measures are required for site **KLIP-004**:

- Vegetation clearing of the site should be undertaken under close supervision of an archaeologist.
- Once vegetation clearing is complete, the site must be assessed in the field by a suitably qualified Stone Age specialist long before construction commences. This is to allow this specialist report, and any mitigation measures recommended by the specialist, to be undertaken before construction commences.
- The recommendations made by the Stone Age specialist must be adhered to. Such recommendations may include the archaeological recording of a surface layout plan, surface collection of lithics, etc.

### 8.2.3 Required Mitigation for the Historical Structures

The impact significance calculations undertaken in **Chapter 7** have shown that the significance of the unmitigated impact of the proposed development on sites **KLIP-001** and **KLIP-003** is estimated to be of Moderate Significance. As a result, mitigation measures are required for these sites.

The following mitigation measures are required for the two sites:

- Long before construction commences, an architectural historian must be appointed to undertake an assessment of the two buildings.
- Although the architectural historian will provide recommendations, these are expected to *inter alia* comprise the recording of the two structures by way of photographic recording, recording of measured drawings of the facades and layout plans of the buildings.
- The results from the above-mentioned mitigation measures (drawings, photographs and descriptions of the two buildings) must accompany the permit application that will be submitted to the relevant heritage authority to allow for the destruction of the two buildings.
- The two structures may only be destroyed once the relevant destruction permit has been issued by the relevant heritage authority.

### **8.3 General Management Recommendations and Guidelines**

#### *8.3.1 Pre-Construction and Construction Phases*

The project will encompass a range of activities during the Pre-Construction and Construction Phases, including disturbance to the soil surface and development activities associated with the project.

It is always possible that cultural material may be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding mining and construction results in significant disturbance; however, any excavation work offers a window into the past, and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project, and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the Pre-Construction and Construction Phases, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

#### *8.3.2 Chance Find Procedure*

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts.
- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

### *8.3.3 Possible finds during Pre-Construction and Construction Phases*

The study area occurs within a greater historical and archaeological context as identified during the desktop and fieldwork phase. Soil clearance may uncover the following:

- High density concentrations of stone tools.
- Unmarked graves.
- Archaeological middens associated with very old farmsteads and structures.

## 9 CONCLUSIONS AND RECOMMENDATIONS

### 9.1 Introduction

PGS Heritage (Pty) Ltd (PGS) was appointed by SRK Consulting (South Africa) (Pty) Ltd (SRK) to undertake a Phase 1 Heritage Impact Assessment (HIA) for the proposed Kudumane Manganese Resources Expansion Project, located approximately 3 km southwest of the town of Hotazel, Northern Cape Province.

The study area is located on sections of the farms Devon 277, Gama 283, Hotazel 280, Klipling 271, Olive Pan 282, Telele 312, Umtu 281 and York 27, and is situated in the Joe Morolong Local Municipality and John Taolo Gaetsewe District Municipality.

### 9.2 General Desktop Study

An archival and historical desktop study was undertaken to provide a historic framework for the project area and surrounding landscape. This was augmented by a study of available historical and archival maps and an assessment of previous archaeological and heritage studies completed for the area. The desktop study revealed that the surroundings of the study area are characterised by a long and significant history, whereas previous archaeological and heritage studies from this area have revealed several archaeological and heritage sites from the surroundings.

Several previous archaeological and heritage surveys were undertaken within the property of the Kudumane Mine. PGS compiled archaeological and heritage impact assessments for additional infrastructure and mining areas for the same mine in 2014, 2017 and 2019. The study areas for these previous heritage studies and the current report are in the same general area. These previous reports identified seven heritage sites in total. **A single recorded artefact (KMR 002) of low significance falls within the study area but the other sites identified at the time fall outside of the current development footprint. Even though site KMR 002 is located within the study area, its low significance means that it is not again included as a site in this report.**

In 2014, the fieldwork was conducted by Wouter Fourie, an archaeologist of PGS through controlled exclusive survey of the proposed new infrastructure footprint areas. During the fieldwork, one archaeological site (**KU001**) comprising a low-density scatter of stone tools, was identified on the eastern banks of the Ga-Mogara River (PGS, 2014). The site was given a low heritage significance and it was graded as Generally Protected (Grade 4B).

In 2017, the fieldwork was conducted by Marko Hutten, an archaeologist of PGS through controlled exclusive survey of the proposed new infrastructure footprint areas. During this fieldwork, three archaeological sites (**KMR 002**, **KMR 003** and **KMR 005**) and two historical structures (**KMR 001** and

**KMR 004**) were identified. The archaeological findspot of a single fragmented stone tool (**KMR 002**) did not constitute a site of heritage value or significance. Two sites which comprised low-density scatters of stone tools (**KMR 003** and **KMR 005**) were given a low heritage significance and it were graded as Generally Protected (Grade GP. B). The historical structure, **KMR 001**, required no mitigation due to low heritage significance but the historical structure, **KMR 004**, was given a medium heritage significance rating.

During the 2019 assessment, one additional site, a burial ground (**KMR 007**) was identified. The site has a heritage grading of Generally Protected A (GP. A).

### 9.3 Palaeontology

Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. His report and findings are attached in full in **Appendix C**. Ms. Butler found that the study area is “...underlain by Quaternary aged sediments of the Kalahari Group as well Asbestos Hills Subgroup (Ghaap Group, Transvaal Supergroup). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalahari Group is low but locally high and that of the Griqualand West rocks of the Transvaal Supergroup is moderate. The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage. It is therefore considered that the development is will not lead to detrimental impacts on the palaeontological resources of the area.”.

Additionally, Ms. Butler recommends that if fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: [www.sahra.org.za](http://www.sahra.org.za)) so that correct mitigation can be carried out by a palaeontologist.

**It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.**

### 9.4 Fieldwork

PGS was appointed in 2021 to undertake a Heritage Impact Assessment (HIA) for the Kudumane Manganese Resources Expansion Project. The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance. The fieldwork was undertaken by way of intensive walkthroughs of the proposed development footprint areas. The walkthroughs were focused on those areas that are not disturbed, as the potential for identifying

archaeological and heritage sites in the more undisturbed components of the study area are much higher. As a result, only limited fieldwork was undertaken in those components of the study area that are entirely disturbed.

The fieldwork was undertaken by two archaeologists (Nikki Mann and Wynand van Zyl) and was conducted from 13 to 17 July 2021. Throughout the fieldwork, hand-held GPS devices were used to record tracklogs showing the routes followed by the fieldwork team. All sites identified during the fieldwork were photographically and qualitatively recorded, and their respective localities documented using a hand-held GPS device.

It is important to note that although as intensive a fieldwork coverage as possible was undertaken, sections of the study area are in areas which are densely overgrown, which limited accessibility and visibility in those areas of the study area. Previous studies conducted in the larger Hotazel and Black Rock areas has shown that the archaeological record is temporally confined to the Middle and Later Stone Age, while spatially distribution of such sites is concentrated around the riverine edges due to the harsh climate of the area. Fieldwork has confirmed this, and five archaeological sites associated with the MSA and LSA were identified in the study area.

The recent fieldwork undertaken resulted in the identification of a total of eleven (11) sites. These sites comprised the following:

- Five Stone Age sites. See sites **KLIP-002, KLIP-004, KLIP-005, YORK-002 and YORK-003**.
- Three historic structures. See sites **KLIP-001, KLIP-003 and YORK-001**.
- Three sites containing burial grounds. See sites **TELELE-001, DEVON-001 and HOTAZEL-001**. It is important to note that site **HOTAZEL-001** identified during the field assessment is the same site as **KMR007** identified in the 2019 heritage assessment.

## **9.5 Impact Assessment and Mitigation**

An overlay of the identified heritage sites over the proposed development footprint areas was made, which was used to assess the impact of the proposed development on these identified heritage sites. Both pre-mitigation and post-mitigation impact assessments were undertaken. Please refer to **Chapter 7** for the impact assessment calculations. A series of site-specific mitigation measures are outlined in **Chapter 8** of this report. The overlay and impact assessments, resulted in the following observations and mitigation measures:

- Structures **KLIP-001, KLIP-003 and YORK-001** are all perceived to be older than 60 years. All three these sites are provisionally rated as Generally Protected B (GP.B) or Medium significance. The structure at **YORK-001** is located outside of the proposed development area

and will not be impacted upon by the proposed development. **KLIP-001** and **KLIP-003** fall within the proposed development area and the impact assessment of the proposed development on the site is rated as Moderate. The following mitigation measures are recommended for these two sites:

- Long before construction commences, an architectural historian must be appointed to undertake an assessment of the two buildings.
  - Although the architectural historian will provide recommendations, these are expected to *inter alia* comprise the recording of the two structures by way of photographic recording, recording of measured drawings of the facades and layout plans of the buildings.
  - The results from the above-mentioned mitigation measures (drawings, photographs and descriptions of the two buildings) must accompany the permit application that will be submitted to the relevant heritage authority to allow for the destruction of the two buildings.
  - The two structures may only be destroyed once the relevant destruction permit has been issued by the relevant heritage authority.
- Stone Age sites **KLIP-002**, **KLIP-005**, **YORK-002** and **YORK-003** have a low heritage significance and no further mitigation is required. However, it is advised that should dense concentrations of stone artefacts be identified during vegetation clearing and subsequent earth-moving/construction activities, the archaeologist would need to make recommendations on the appropriate mitigation measures. An archaeological watching brief would therefore be required during construction activities at these four sites.
  - Stone Age site **KLIP-004** has a heritage significance rating of Medium and the impact assessment of the proposed development on the site is rated as Moderate. The site is also located within the proposed development footprints. The following mitigation measures are recommended:
    - Vegetation clearing of the site should be undertaken under close supervision of an archaeologist.
    - Once vegetation clearing is complete, the site must be assessed in the field by a suitably qualified Stone Age specialist long before construction commences. This is to allow this specialist report, and any mitigation measures recommended by the specialist, to be undertaken before construction commences.
    - The recommendations made by the Stone Age specialist must be adhered to. Such recommendations may include the archaeological recording of a surface layout plan, surface collection of lithics, etc.



- One grave site, **DEVON-001**, is located approximately 130m outside of the proposed development footprint. Therefore, no direct impacts are foreseen on this site.
- Grave sites **TELELE-001** and **HOTAZEL-001**, are located less than 100m outside of the development footprint areas. The impact assessment of the proposed development on the sites is rated as Moderate.

As cemeteries and graves have Medium to High Heritage Significance, the preferred option is to change the development footprint to allow for the *in situ* preservation of these sites. The following mitigation measures would be required for this option:

- SAHRA's Burial Grounds and Graves Unit requires a buffer area of at least 100m between mining development and any burial grounds or graves that are to be preserved. As a result, and if at all possible, the proposed development footprints must be amended to allow for a 100m wide buffer area surrounding each of the two burial grounds that is kept clear of any construction or mining activities.
- Fences around the two burial grounds should be maintained.
- The two burial grounds should be cleaned on a yearly basis.
- A heritage monitoring process would also be required during all the project phases.
- A Grave Management Plan should be developed for the burial grounds that will be preserved *in situ*. This management plan must be approved by the SAHRA BGGU.

However, should it not be possible to preserve these sites *in situ*, the following mitigation measures are required:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.

- The process must be done by a reputable company well versed in the mitigation of graves.

## 9.6 General Recommendations

The following general recommendations must be addressed:

- Sections of the proposed development footprints were not assessed during the fieldwork due to these sections located outside of KMR's mining right. This means that access to these areas was not allowed. These last-mentioned areas include all the proposed development footprints located on the farms Umtu 281, Olive Pan 282 and Gama 283. Once access to these farms is possible, additional field assessments of the development footprints located on these properties is required. This must be undertaken long before construction activities start.
- It should be noted that during telecommunications with one of the farmers from the Telele farm portion, Mr Holmeyer, it was mentioned that there may be additional areas within the study area that contain graves. However, during the survey of this region, these forementioned graves were not discovered. It is anticipated that further communication may assist with obtaining the exact location of these graves and burial grounds. Long before construction commences, a site visit must be undertaken by an archaeological team accompanied by Mr Holmeyer. During the site visit, Mr Holmeyer will be requested to indicate the positions of the graves that he knows of within the proposed development footprint areas.
- A Chance Find Procedure (refer **Section 8**) must be implemented and adhered to.

## 9.7 Conclusions

It is the considered opinion of the authors of this report that the overall post-mitigation impact of the proposed Kudumane Manganese Resources Expansion Project on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels, provided that the general recommendations and mitigation measures outlined in this report are implemented.

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## LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

### General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In the heritage legislation, permits are required to damage, destroy, alter, or disturb them. People who already possess such material are required to register it. The management of heritage resources is integrated with environmental resources and this means that, before development takes place heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves, which are older than 60 years and are not in a cemetery (such as ancestral graves in rural areas), are protected. The legislation protects the interests of communities that have an interest in the graves: they must be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle should be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resource authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;

- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 ( Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection to, all historic and pre-historic cultural remains, including graves and human remains.

### **Graves and cemeteries**

Graves younger than 60 years fall 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 National Health Act (Act 61 Of 2003) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. 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 reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order 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).

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 National Health Act (Act 61 Of 2003) and are the jurisdiction of the South African Heritage Resource Agency (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 the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above 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.

Appendix B  
**CURRICULUM VITAE**

**PROFESSIONAL CURRICULUM VITAE  
FOR POLKE DOUSSY BIRKHOLTZ**

**Name:** *Polke Doussy Birkholtz*

**Date & Place of Birth:** *9 February 1975 – Klerksdorp, North West Province, South Africa*

**Place of Tertiary Education & Dates Associated:**

Institution: University of Pretoria

Qualification: BA (Cum Laude) - Bachelor of Arts Specializing in Archaeology, History & Anthropology

Date: 1996

Institution: University of Pretoria

Qualification: BA Hons (Cum Laude) - Bachelor of Arts with Honours Degree Specializing in Archaeology

Date: 1997

**Qualifications:**

BA - Degree specialising in Archaeology, History and Anthropology

BA Hons - Professional Archaeologist

**Memberships:**

Association of Southern African Professional Archaeologists (ASAPA)

Professional Member of the CRM Section of ASAPA

**Overview of Post Graduate Experience:**

1997 – 2000 – Member/Archaeologist – Archaeo-Info

2001 – 2003 – Archaeologist/Heritage Specialist – Helio Alliance

2000 – 2008 – Member/Archaeologist/Heritage Specialist – Archaeology Africa

2003 - Present – Director / Archaeologist / Heritage Specialist – PGS Heritage

**Languages:** English: Speak, Read & Write & Afrikaans: Speak, Read & Write

**Total Years' Experience:** 20 Years

### **Experience Related to the Scope of Work:**

- Polke has worked as a **HERITAGE SPECIALIST / ARCHAEOLOGIST / HISTORIAN** on more than 300 projects and acted as **PROJECT MANAGER** on almost all of these projects. His experience includes the following:
  - Development of New Sedimentation and Flocculation Tanks at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Greenline*.
  - EThekweni Northern Aqueduct Project, Durban, KwaZulu-Natal. Heritage Impact Assessment for *Strategic Environmental Focus*.
  - Johannesburg Union Observatory, Johannesburg, Gauteng Province. Heritage Inventory for *Holm Jordaan*.
  - Development at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Aurecon*.
  - Comet Ext. 8 Development, Boksburg, Gauteng Province. Phase 2 Heritage Impact Assessment for *Urban Dynamics*.
  - Randjesfontein Homestead, Midrand, Gauteng Province. Baseline Heritage Assessment with Nkosinathi Tomose for Johannesburg City Parks.
  - Rand Leases Ext. 13 Development, Roodepoort, Gauteng Province. Heritage Impact Assessment for *Marsh*.
  - Proposed Relocation of the Hillendale Heavy Minerals Plant (HHMP) from Hillendale to Fairbreeze, KwaZulu-Natal. Heritage Impact Assessment for *Goslar Environmental*.
  - Portion 80 of the farm Eikenhof 323 IQ, Johannesburg, Gauteng Province. Heritage Inventory for *Khare Incorporated*.
  - Comet Ext. 14 Development, Boksburg, Gauteng Province. Heritage Impact Assessment for *Marsh*.
  - Rand Steam Laundries, Johannesburg, Gauteng Province. Archival and Historical Study for *Impendulo and Imperial Properties*.
  - Mine Waste Solutions, near Klerksdorp, North West Province. Heritage Inventory for *AngloGold Ashanti*.
  - Consolidated EIA and EMP for the Kroondal and Marikana Mining Right Areas, North West Province. Heritage Impact Assessment for *Aquarius Platinum*.
  - Wilkoppies Shopping Mall, Klerksdorp, North West Province. Heritage Impact Assessment for the *Center for Environmental Management*.
  - Proposed Vosloorus Ext. 24, Vosloorus Ext. 41 and Vosloorus Ext. 43 Developments, Ekurhuleni District Municipality, Gauteng Province. Heritage Impact Assessment for *Enkanyini Projects*.

- Proposed Development of Portions 3, 6, 7 and 9 of the farm Olievenhoutbosch 389 JR, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Development of Lotus Gardens Ext. 18 to 27, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Pierre Joubert*.
- Proposed Development of the site of the old Vereeniging Hospital, Vereeniging, Gauteng Province. Heritage Scoping Assessment for *Lekwa*.
- Proposed Demolition of an Old Building, Kroonstad, Free State Province. Phase 2 Heritage Impact Assessment for *De Beers Consolidated Mines*.
- Proposed Development at Westdene Dam, Johannesburg, Gauteng Province. Heritage Impact Assessment for *Newtown*.
- West End, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
- Kathu Supplier Park, Kathu, Northern Cape Province. Heritage Impact Assessment for *Synergistics*.
- Matlosana 132 kV Line and Substation, Stilfontein, North West Province. Heritage Impact Assessment for *Anglo Saxon Group* and *Eskom*.
- Marakele National Park, Thabazimbi, Limpopo Province. Cultural Resources Management Plan for *SANParks*.
- Cullinan Diamond Mine, Cullinan, Gauteng Province. Heritage Inventory for *Petra Diamonds*.
- Highveld Mushrooms Project, Pretoria, Gauteng Province. Heritage Impact Assessment for *Mills & Otten*.
- Development at the Reserve Bank Governor's Residence, Pretoria, Gauteng Province. Archaeological Excavations and Mitigation for the *South African Reserve Bank*.
- Proposed Stones & Stones Recycling Plant, Johannesburg, Gauteng Province. Heritage Scoping Report for *KV3*.
- South East Vertical Shaft Section of ERPM, Boksburg, Gauteng Province. Heritage Scoping Report for *East Rand Proprietary Mines*.
- Proposed Development of the Top Star Mine Dump, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
- Soshanguve Bulk Water Replacement Project, Soshanguve, Gauteng Province. Heritage Impact Assessment for *KWP*.
- Biodiversity, Conservation and Participatory Development Project, Swaziland. Archaeological Component for *Africon*.
- Camdeboo National Park, Graaff-Reinet, Eastern Cape Province. Cultural Resources Management Plan for *SANParks*.
- Main Place, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.

- Modderfontein Mine, Springs, Gauteng Province. Detailed Archival and Historical Study for *Consolidated Modderfontein Mines*.
  - Proposed New Head Office for the Department of Foreign Affairs, Pretoria, Gauteng Province. Heritage Impact Assessment for *Holm Jordaan Group*.
  - Proposed Modification of the Lukasrand Tower, Pretoria, Gauteng Province. Heritage Assessment for IEPM.
  - Proposed Road between the Noupoort CBD and Kwazamukolo, Northern Cape Province. Heritage Impact Assessment for *Gill & Associates*.
  - Proposed Development at the Johannesburg Zoological Gardens, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
- Polke's **KEY QUALIFICATIONS:**
    - Project Management
    - Archaeological and Heritage Management
    - Archaeological and Heritage Impact Assessment
    - Archaeological and Heritage Fieldwork
    - Archival and Historical Research
    - Report Writing
  - Polke's **INFORMATION TECHNOLOGY EXPERIENCE:**
    - *MS Office – Word, Excel, & Powerpoint*
    - *Google Earth*
    - *Garmin Mapsource*
    - *Adobe Photoshop*
    - *Corel Draw*

**PROFESSIONAL CURRICULUM VITAE FOR NIKKI MANN**  
**Professional Archaeologist for PGS Heritage**

<b>Name:</b>	Nikki Mann
<b>Profession:</b>	Archaeologist
<b>Date of birth:</b>	1992-10-13
<b>Parent Firm:</b>	PGS Heritage (Pty) Ltd
<b>Position at Firm:</b>	Archaeologist
<b>Years with firm:</b>	2
<b>Years of experience:</b>	7

**Nationality:** South African  
**HDI Status:** White

#### EDUCATION:

**Name of University or Institution** : University of Cape Town  
**Degree obtained** : BSc  
**Major subjects** : Archaeology, Environmental and Geographical Sciences  
**Year** : 2013

**Name of University or Institution** : University of Cape Town  
**Degree obtained** : BSc [Hons]  
**Major subjects** : Archaeology  
**Year** : 2014

**Name of University or Institution** : University of Cape Town  
**Certificate obtained** : MSc – Archaeology (phytolith analysis)  
**Year** : 2017

#### Professional Qualifications:

Professional Archaeologist - Association of Southern African Professional Archaeologists - Professional Member – No 472

#### Languages:

English  
French

#### KEY QUALIFICATIONS

- 3 years of work in the heritage consulting field;
- 7 years working experience in archaeological excavations;
- Proven experience in report writing and report deliverables;

#### HERITAGE IMPACT ASSESSMENTS

##### *South African*

10MW Chelsea Solar PV. Gqeberha, Eastern Cape. SLR. **Position:** Heritage Specialist.  
Koup 1 and Koup 2 WEF. Beaufort West, Western Cape. SiVEST. **Position:** Heritage Specialist.  
Victoria West Pipelines. Victoria West, Northern Cape. iXEng. – **Position:** Heritage Specialist.  
East Orchards Poultry Farm Project. Delmas, Mpumalanga. EcoSphere. – **Position:** Heritage Specialist.  
Gunstfontein WEF and OHL. Sutherland, Northern Cape. Savannah– **Position:** Heritage Specialist.  
Overhead power line for Oya PV Facility. Sutherland, Northern Cape. SiVEST– **Position:** Heritage Specialist.  
Infrastructure for Kudusberg WEF. Sutherland, Northern Cape. SiVEST– **Position:** Heritage Specialist.  
Proposed SKA fibre optic cable, between Beaufort West and Carnarvon, Northern and Western Cape. **Position:** Heritage Specialist.  
Proposed SANSA Space Operations. Matjiesfontein, Western Cape. **Position:** Heritage Specialist  
Pienaarspoort WEF 1 and 2. North-west of Matjiesfontein, Western Cape. Savannah- **Position:** Heritage Specialist.  
Swellendam WEF. Swellendam, Western Cape. – **Position:** Heritage Specialist.  
Matjiesfontein Road Extension Project. Matjiesfontein, Western Cape. **Position:** Heritage Specialist.

#### MITIGATION WORK

2020 – Coega Zone 10, Coega IDZ, Eastern Cape Province. Colonial Period Phase 2 Mitigation Archaeological Excavation. **Archaeologist.**

2019 – 2020 - **Lesotho Highland Development Authority – Polihali Dam Project - Heritage Management Plan development and Implementation.** Mokhotlong, Kingdom of Lesotho.  
**Archaeologist.**

2018- Proposed development of boreholes and associated pipelines for the Langebaan Aquifer within the Hopefield Private Nature Reserve, Hopefield, Western Cape. **Archaeologist.**

#### **POSITIONS HELD**

**2021 – current:** Archaeologist - PGS (Pty) Ltd

**2019 – 2020:** Archaeologist - PGS (Pty) Ltd Lesotho

**2018 – 2020:** Contract Archaeologist – CTS Heritage

#### **REFERENCES**

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Appendix C

#### **PALAEONTOLOGICAL DESKTOP ASSESSMENT**