



PGS HERITAGE

Mn48 - CONSOLIDATION OF THE LEHATING AND KHWARA MINING RIGHT AREAS AND CHANGES TO THE APPROVED SURFACE LAYOUT – NEAR HOTAZEL, NORTHERN CAPE PROVINCE

Phase 1 – Heritage Impact Assessment

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Declaration of Independence

- I, Wouter Fourie, 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;

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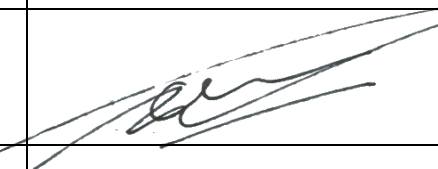
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EXECUTIVE SUMMARY

Lehating Mining (Pty) Ltd (Lehating) holds a mining right and approved Environmental Management Programme report (EMPr) for the development of a new underground manganese mining operation near Black Rock in the Joe Morolong Local Municipality, located in the John Taolo Gaetsewe District Municipality, Northern Cape Province. The approved mine will be located on a portion of Portion 1 of the farm Lehating 741. Lehating recently changed its name to Mn48 (Pty) Ltd (Mn48) and all references to the company name will hereafter be to Mn48. References to the farm name and name of the mine will however remain Lehating.

PGS Heritage (Pty) Ltd (PGS) was appointed by SLR Consulting (South Africa) (Pty) Ltd (SLR) to undertake the consolidation of the two Heritage Impact Assessments (HIA) completed previously by PGS in support of the environmental assessment for the consolidation of the mining rights areas.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. The study has shown that the area is rich in heritage resources that include archaeological, historical, cemeteries and palaeontological heritage resources. This Heritage Impact assessment and the Palaeontological Desktop Assessment (PDA) completed for the project found the following related to heritage resources.

PALAEONTOLOGY

The PDA completed by Banzai Environmental (Butler, 2020) found that the Mn48 mine area is completely underlain by the Cenozoic Kalahari Group as well underlying Griqualand West Basin rocks, Transvaal Supergroup. According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Kalahari Group is moderate while that of the Griqualand West rocks of the Transvaal Supergroup is moderate.

The report however found that project impact on possible palaeontological heritage resources will be **Very Low** with the implementation of the recommended management measures. Finds can be managed through a chance finds procedure as described in the PDA if discovered during construction activities.

Mitigation

The PDA recommends that:

If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected and the ECO 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) so that mitigation can be carry 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.

ARCHAEOLOGY

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.

Field work has confirmed the presence of 13 archaeological site associated with Middle Stone Age (MSA) as well as Later Stone Age (LSA) site linked with hunter gatherer communities. These heritage resources are protected under Section 35 of the National Heritage Resources Act (NHRA).

The sites identified to be associated with LSA communities are of great significance as very few studies conducted in the Hotazel and Blackrock areas have previously identified LSA concentrations associated with other artefacts such as bone, pottery and ostrich eggshell fragments.

The report however found that project impact on the know archaeological heritage resources will be **Very Low** with the implementation of the recommended management measures and unknow archaeological resources can be managed through a chance finds procedure if discovered during construction activities.

Mitigation

- Demarcate as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO.
- If at any stage the site is disturbed a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- If it is found that mining activity cannot be altered to avoid the site, a destruction permit will be required from SAHRA, backed by a mitigation report that must include documentation of the site layout, analysis of the material and compiled as a final report on the archaeological site.
- Implement a phase 2 archaeological investigation for all activities within 100m from the Kuruman river centreline as per SAHRA requirements for the area

HISTORICAL STRUCTURES

The archival research has shown that the area was settled 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 at places with names such as Boerdraai (just north of the study area), Wessels 227 (1917), Dibiaghomo 226 (1914, but already settled by 1899) and Dikgathlong 268 (as early as 1894), is an indication that farmsteads and structures of significance can be present in the study area.

Two farmsteads were identified in the study area, both dating from the early part of the 20th century and thus protected under Section 34 of the NHRA.

The report however found that project impact on the known historic heritage resources will be **Very Low** with the implementation of the recommended management measures and unknown historic heritage resources can be managed through a chance finds procedure if discovered during construction activities.

Mitigation

- Demarcate as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO.
- If at any stage the site is disturbed a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- If at any stage the site cannot be excluded from the mining activities a destruction permits required from the Northern Cape provincial Heritage Authority. This will require that all structures on site be documented by photographs and drawings, before it can be demolished. In addition, any of these structures that are farmworker dwellings must be evaluated for the possible presence of infant burials through social consultation.

CEMETERIES AND GRAVES

Three cemeteries were also identified and documented. These cemeteries are associated with the farmstead and in most cases date from the early 1930. These heritage resources are protected under Section 36 of the National Heritage Resources Act (NHRA).

The report however found that project impact on the known cemeteries and graves will be **Very Low** with the implementation of the recommended management measures and unknown cemeteries and graves can be managed through a chance finds procedure if discovered during construction activities.

Mitigation

- Demarcate as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO.
- If at any stage the site is disturbed a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- In the event that the sites cannot be excluded from the development footprint, a grave relocation process needs to be implemented.

CONCLUSION

It is our considered opinion that the changes to infrastructure and activities will not have any impact on heritage resources. Any chance finds during the life of mine will be handled through the proposed chance finds procedures and management guidelines as provided in **section 7** of this report.

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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 2 500 000 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 not limited to) as stated under Section 3 of the 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 period which commenced 10 000 years ago.

Late Stone Age

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

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

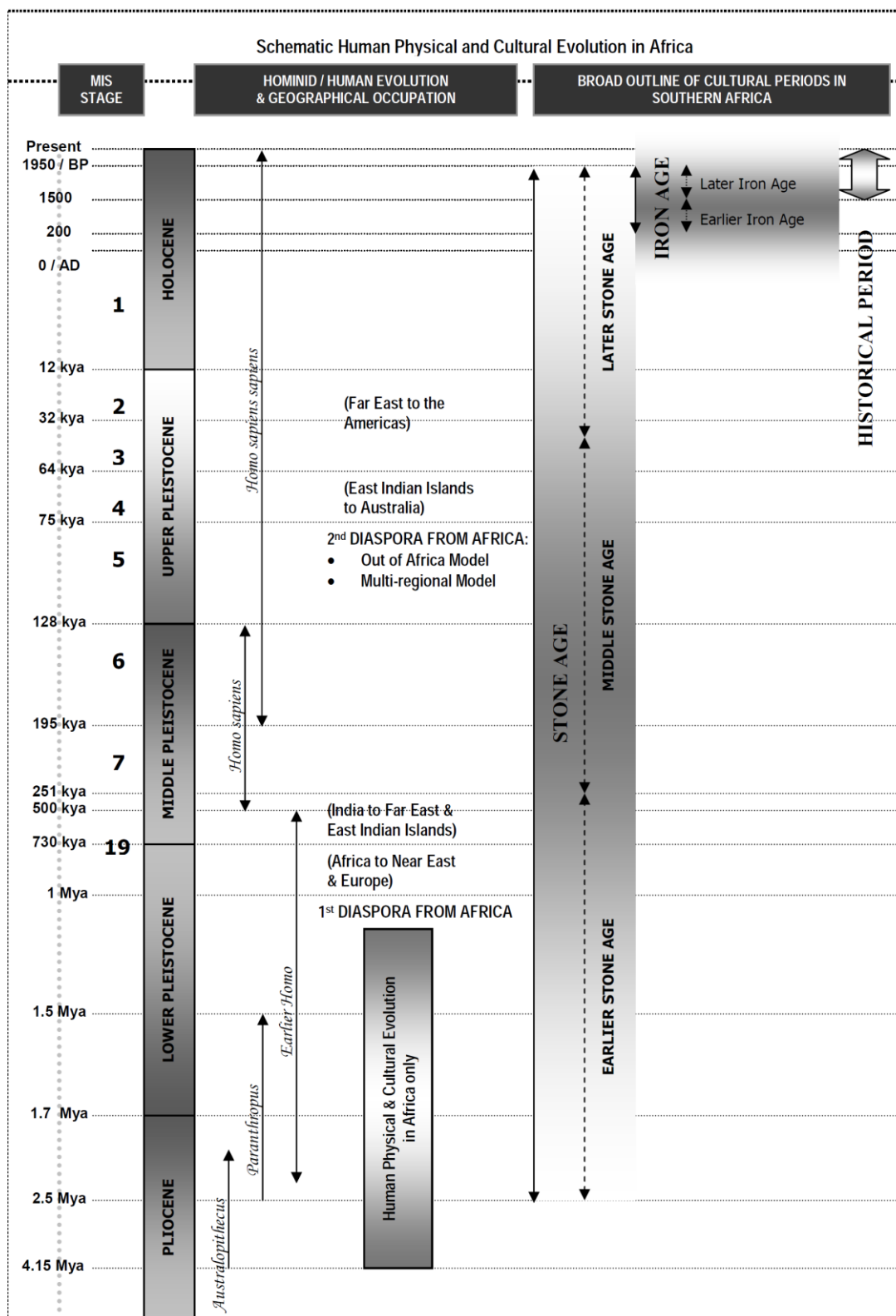
The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

Palaeontological resources

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

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CCS	Crypto Crystalline Silicate
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr / EMP	Environmental Management program
ESA	Early Stone Age
GN	Government notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PGS	PGS Heritage Pty Ltd
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Agency
SLR	SLR Consulting (South Africa) (Pty) Ltd



1 INTRODUCTION

Mn48 holds approved EMPr's for the development of a new underground manganese mining operation located on Portion 2 of the farm Wessels 227 and the Remaining Extent and Portions 3 and 4 of the farm Dibiaghomo 226. While early works site clearing activities have taken place to date, surface infrastructure has not been established on this farm.

PGS Heritage (Pty) Ltd (PGS) was appointed by SLR Consulting (South Africa) (Pty) Ltd (SLR) to undertake the consolidation of the two Heritage Impact Assessments (HIA) completed previously by PGS (Fourie, 2013; Fourie, 2013a) in support of the environmental assessment for the consolidation of the mining rights areas.

1.1 Scope of the Study

The aim of the study was to identify heritage resources that could potentially be affected by the proposed consolidation and layout changes for the MN48 mine and provide mitigation and management guidelines within the ambit of the National Heritage Resources Act (125 of 199) (NHRA).

1.2 Specialist Qualifications

This HIA Report 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. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP). A copy of my Curriculum Vitae is attached in **Appendix B**.

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites. 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.

This report is based on extensive fieldwork conducted for the Lehating mine as well as the prospecting activities on the Khwara mining area.

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:

- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified
- National Environmental Management Act (NEMA), Act 107 of 1998 – Appendix 6
- National Heritage Resources Act (NHRA), Act 25 of 1999

1.4.1 Notice 648 of the Government Gazette 45421

Although minimum standard for archaeological (2007) and palaeontological (2012) assessments were published by SAHRA, GN.648 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 is listed in **Table 2** and the applicable section in this report noted.

Table 2 - Reporting requirements for GN648

GN 648	Relevant section in report
2.2 (a) a desk top analysis, using satellite imagery;	Section 4
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 4.6
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 4.6
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 4.6

1.4.2 NEMA – Appendix 6 requirements

The HIA report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below. For ease of reference the table below 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 Appendix 6 for specialist reports

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
1.(1) (a) (i) Details of the specialist who prepared the report	Page 2 of Report – Contact details and company	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 – refer to Appendix 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 1.1	-
(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	-
(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 and Appendix A	-
(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;	Section 4.6	-
(g) An identification of any areas to be avoided, including buffers	Section 4.6 and 7	-
(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;	Figure 14	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3	-
(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	Section 4.6 and 6	
(k) Any mitigation measures for inclusion in the EMP	Section 7	
(l) Any conditions for inclusion in the environmental authorisation		Non required
(m) Any monitoring requirements for inclusion in the EMP or environmental authorisation	Section 7	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 8	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
(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	Section 8	-
(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 EIA and EMP 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	

1.4.3 The National Heritage resources Act

- National Heritage Resources Act (NHRA) Act 25 of 1999
 - Protection of Heritage Resources – Sections 34 to 36; and
 - Heritage Resources Management – Section 38

The NHRA is utilized 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 on by development as stipulated in Section 38 of NHRA. This study falls under s38(8) and requires comment from the relevant heritage resources authority.

2 TECHNICAL PROJECT DESCRIPTION

Khwara holds an approved EMPr for underground mining of manganese on Portion 2 of the farm Wessels 227 and the Remaining Extent and Portion 3 and 4 of the farm Dibiaghomo 226. The Khwara underground resource will be accessed via/through the Lehating mine, using Mn48's approved surface infrastructure. In this regard, no surface infrastructure will be established as part of the Khwara Mine (**Figure 1**).

Khwara and Mn48 have entered into an amalgamation agreement which will merge the two companies into a single company known as Mn48 (Pty) Ltd. Mn48 is now proposing to consolidate the Mn48 and Khwara mining right areas and associated EMPRs (**Figure 2**). In addition, Mn48 is

proposing to amend the approved surface infrastructure layout following the outcome of a Bankable Feasibility Study. The main features of the proposed amendment include:

- Relocation of the primary crushing facilities from underground to surface;
- Extension of the footprint and capacity of the approved WRD;
- The addition of a second PCD, and relocation of footprint for the already approved PCD (note that the previously approved emergency control dam will no longer be required);
- General re-configuration of approved surface infrastructure on the farm Lehating 741;
- The revision of the site SWMP due to the changes of the surface infrastructure layout to accommodate the changes to the surface infrastructure layout; and
- The establishment of proposed new support infrastructure such as a helicopter pad and weighbridge **(Figure 3)**.

In addition to the above, the approved EMPr for the farm Lehating, specifies the need for a Tailings Storage Facility (TSF). This will no longer be required. The project has made a fundamental change to the mineral processing methodology whereby a dry screening process will be used, instead of a wet screening process which would produce tailings.

The Lehating Mine development will commence in 2022. The underground Khwara resource will be mined from the north (i.e. from the Lehating side) and the planned Life of Mine (LOM) with both the Khwara and Mn48 resources combined will be approximately 28 years.

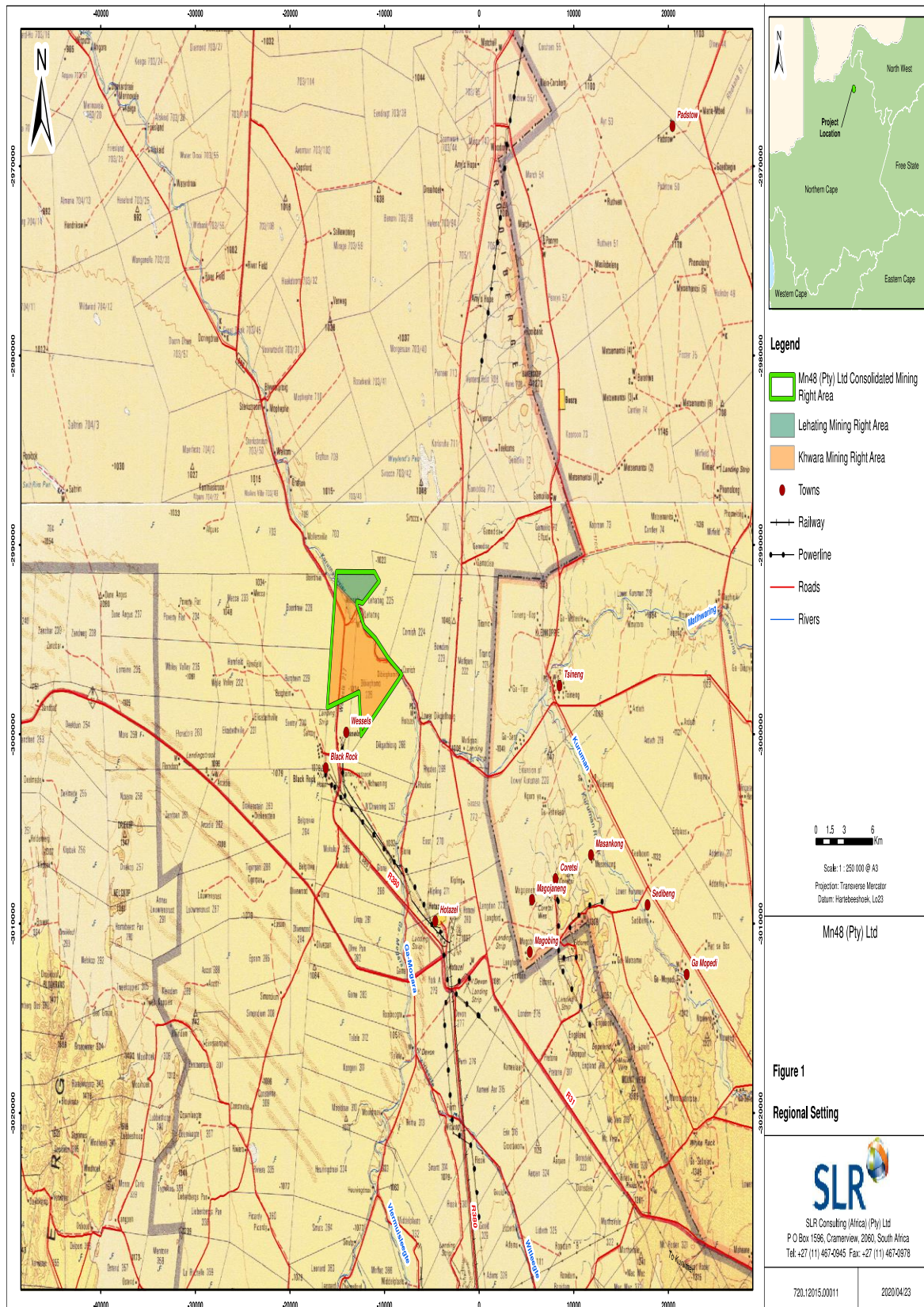


Figure 1 – Regional setting of study area

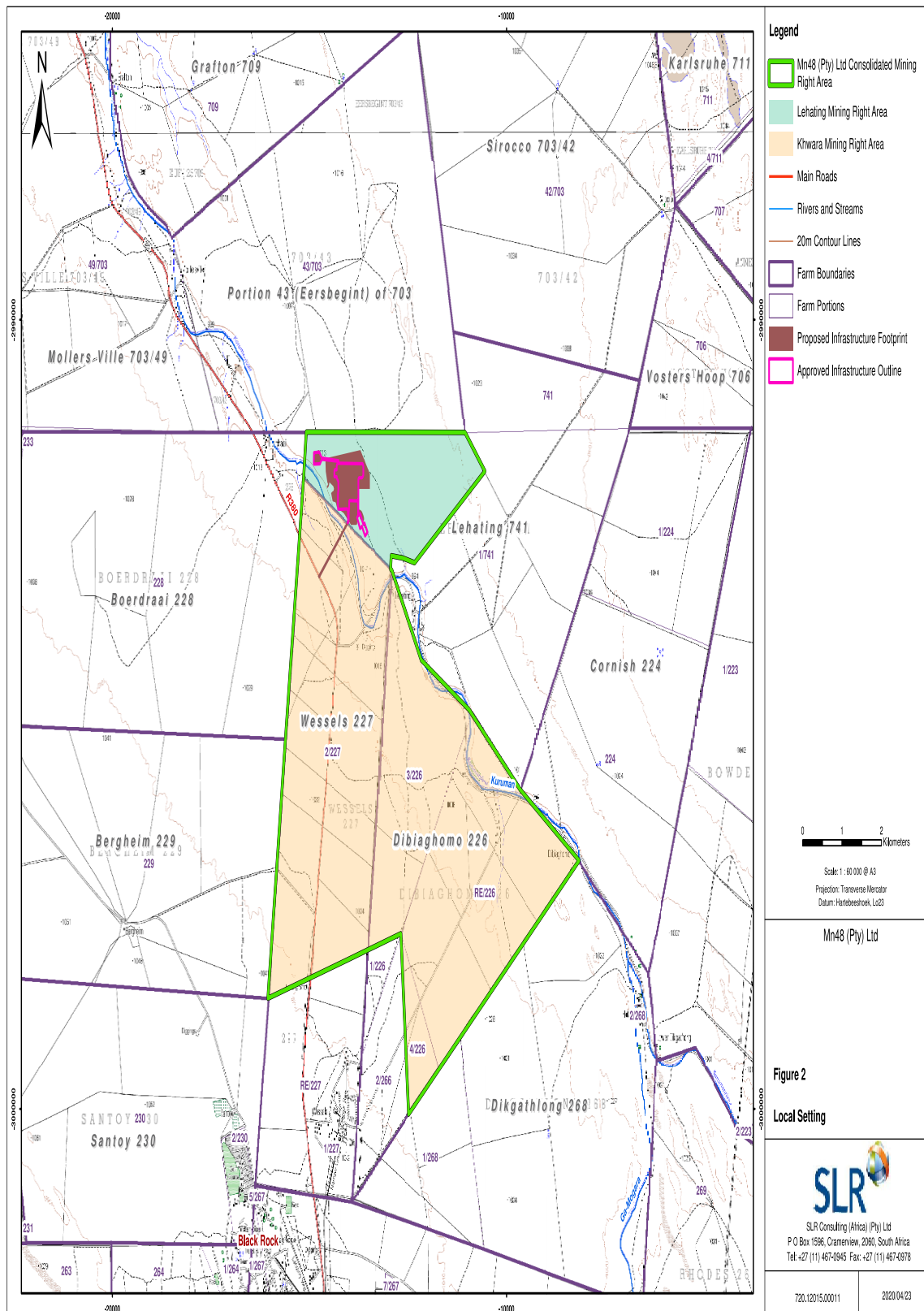


Figure 2 – Locality setting

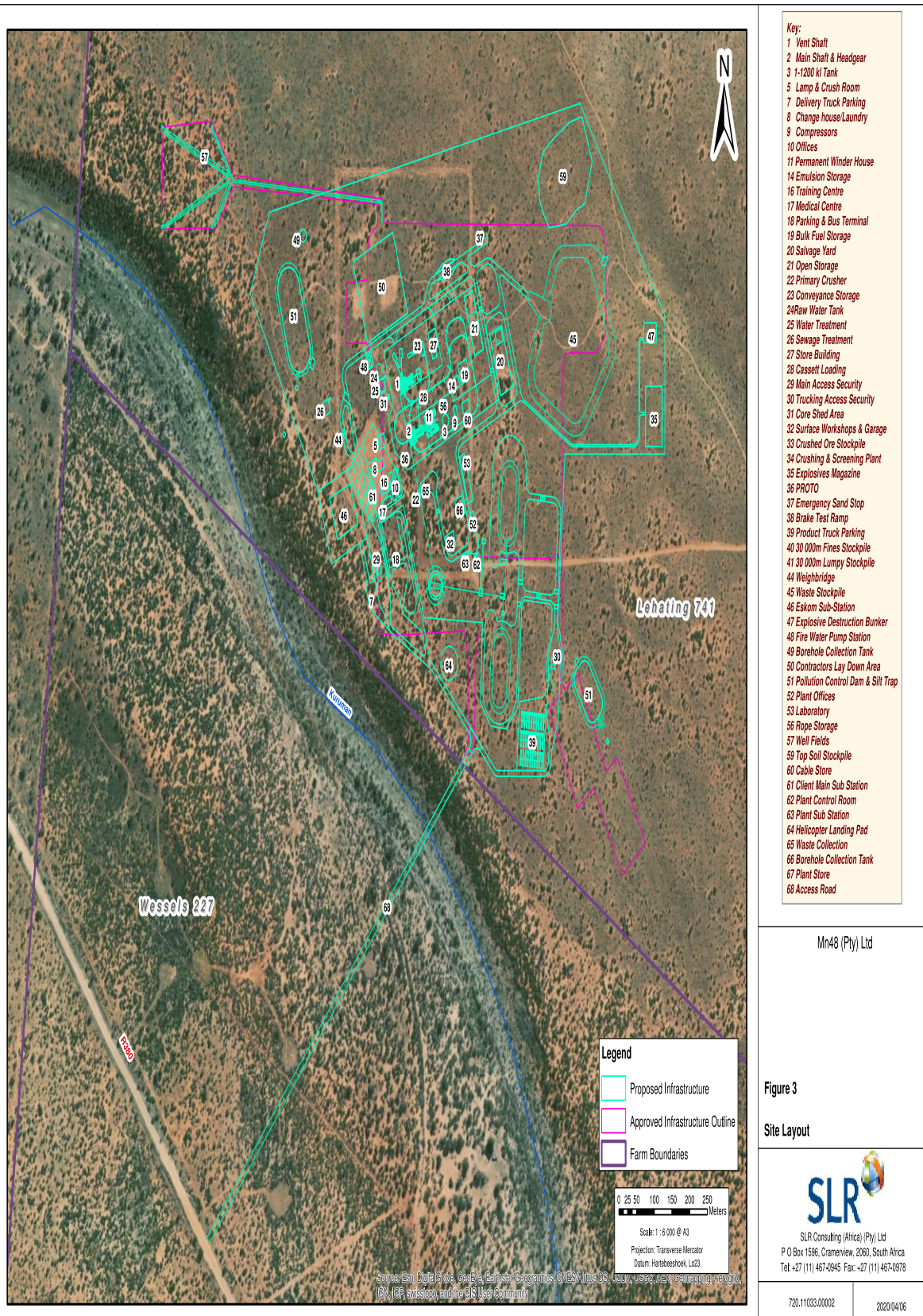


Figure 3 – Site layout

2.1 Description of the area

The study area is located in very flat-lying terrain at 1020-1040m amsl, rising from the Kuruman River on the eastern boundary westwards. The general condition of the property ranges from wooded grass land to sandy riverine areas (**Figure 4**).



Figure 4 – General view of wooded grass land

3 METHODOLOGY

The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review and sensitivity analysis¹: The background information to the field survey relies greatly on previous studies completed for the project to determine known sensitivities, as well as the heritage background research completed for this report.

Step II – Physical Survey: A physical survey was conducted by vehicle through the proposed project area by a qualified heritage specialist. The surveys were conducted in 2010, 2013 and August

¹ According to Notice 648 of the Government Gazette 45421

2020, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – 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.

3.1 Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 4** and **Table 5**).

Table 4 - Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 5 - Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by HWC.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
		alterations should not necessarily be regulated.	
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

4 SENSITIVITY ASSESSMENT

4.1 Previous studies conducted in and around the study area

As part of the study, the review of available literature was undertaken in order to source base data. In this regard, various heritage and palaeontological studies in the region were reviewed. The review of this data provides a base case from 2005 to 2019.

The following studies were reviewed: .:

- Fourie, W. & van der Walt, J. 2005. Hotazel Manganese Mines: Wessels Mine on Section of the Farms Wessels 227, Dibiaghomo 226 and Dikgathlong 268 Mamatwan Mine on Section of the Farms Goold 329 and Mamatwan 331, Heritage Assessment. *Matakoma Heritage Consultants (Pty) Ltd.*
- Dreyer, C. 2009. First Phase Archaeological and Cultural Heritage Assessment of the Ntsimbintle Mining Activities at Mamatwane Near Hotazel, Kuruman District, Northern Cape
- Steyn, H.S. 2009. Heritage Impact Assessment: 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.
- Fourie, W. 2013. Heritage Impact Assessment: Prospecting on Remaining extent of the farm Wessels 227 and Portions 1 and 2 and the remaining extent of the farm Dibiaghomo 226, near Black Rock in the Northern Cape Province
- Fourie, W. 2013. Heritage Impact Assessment: Proposed Lehating Mining (Pty) Ltd underground manganese mine on Portions 1 of the Farm Lehating 714 and Portion 2 of the farm Wessels 227, approximately 20km northwest of Hotazel, Northern Cape Province.
- Butler, E. 2017 (Updated 2019). Palaeontological Desktop Assessment for the Establishment of a Diesel Farm and a Haul Road for the Tshipi Borwa Mine Near Hotazel, in the John Toalo Gaetsewe District Municipality in the Northern Cape Province

- Butler, E. 2017. Palaeontological Desktop Assessment for the proposed changes to operations at the UMK Mine Near Hotazel, in the John Toalo Gaetsewe District Municipality in the Northern Cape Province.
- Fourie, W. 2017. Heritage Impact Assessment for the proposed new infrastructure for United Manganese of Kalahari (Pty) Ltd (UMK), farms Botha 313, the remaining extent (RE) of the farm Smartt 314, and portion 1 and RE of the farm Rissik 330 located approximately 10 km south of the town of Hotazel in the John Taolo Gaetsewe District Municipality in the Northern Cape.
- Smeyatsky, I. 2018. Heritage Impact Assessment for the proposed waste rock dump project at the Tshipi Borwa Mine, near Hotazel, Northern Cape Province.
- Fourie, W. 2019. Recommendation for the exemption from heritage and Palaeontological impact studies: Environmental Authorisation (EA) and closure and rehabilitation optimisation project at the Tshipi Borwa Mine, near Hotazel, Northern Cape Province. Case ID: 13996
- Fourie, W and Bulter, E. 2019. Exemption Letter and reply. An 18m wide (on surface) boundary is located between the MMT and the Tshipi Borwa Mine. Tshipi and MMT have approval to mine the 18m wide boundary pillar. Additional capacity is required to store waste rock generated as part of mining the boundary pillar. To cater for the additional storage, it is proposed that the Mamatwan Sinterfontein and the Tshipi Eastern waste rock dumps are merged to fill the void between the two dumps. MMT is proposing on amending their approved EMP to cater for the merging of the waste rock dumps - Case id: 13652

All of these studies formed part of environmental assessment processes in support of various projects within and surrounding the project site and were therefore subjected to review by the South African Heritage Resources Agency. The above listed studies were deemed acceptable by the SAHRA. It follows that the quality of data is deemed acceptable.

4.2 Archival findings

The archival research focused on available information sources that were used to compile a background history of the study area and surrounds.

4.2.1 South African Heritage Resources Information System (SAHRIS)

A scan of SAHRIS has revealed the following studies conducted in and around the study area of this report:

- BECKER, E. 2013. Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura. *Hatch*. – The report covered a very large area, however only uncovering

a few historic structures and stone walling sites. Nothing within the vicinity of the study area itself.

- KRUGER, N. 2015. Archaeological Impact Assessment (AIA) for the Proposed East 132 Kv Double Circuit Power Line Connection for the East Solar Park to the Eskom Hotazel or UMTU Substances Development, Joe Morolong Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape Province. *Exigo3 Sustainability*. – A low-density, Middle Stone Age site was uncovered.
- PELSER, A. 2012. 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. *Archaeon CC*. – Historical structural remains and a single, Middle Stone Age tool was uncovered.
- VAN RYNEVELD, K. 2012. The Black Rock Powerline Project, Black Rock near Hotazel in the Northern Cape, South Africa. – Absence of any findings.
- PISTORIUS, J.C.C. 2008. A Phase I Heritage Impact Assessment (HIA) Study for a Proposed New Power Line for the United Manganese of Kalahari (UMK) Mine near Hotazel in the Northern Cape Province of South Africa. – Absence of any findings.
- FOURIE, W. & VAN DER WALT, J. 2005. Hotazel Manganese Mines: Wessels Mine on Section of the Farms Wessels 227, Dibiaghomo 226 and Dikgathlong 268 Mamatwan Mine on Section of the Farms Goold 329 and Mamatwan 331, Heritage Assessment. *Matakoma Heritage Consultants (Pty) Ltd*. – Absence of any findings
- DREYER, C. 2014. First Phase Archaeological & Heritage Assessment of the Proposed Vaal-Gamagara Water Pipeline project, Northern Cape: Hotazel Alternative Water Pipeline. – Absence of any findings.
- FOURIE, W. 2013. Lehating Heritage Impact Assessment Proposed Lehating Mining (Pty) Ltd underground manganese mine on Portions 1 of the Farm Lehating 714 and Portion 2 of the farm Wessels 227, approximately 20km northwest of Hotazel, Northern Cape Province. *PGS Heritage and Grave Relocation Consultants*. – An isolated occurrence of Later Stone Age implements.
- VAN SCHALKWYK, J. 2016. Cultural Heritage Impact Assessment Report for the Development of the Proposed Lehating 132Kv Power Line and Substation, North West of Hotazel, Northern Cape Province. – Several stone tool sites, historical structures and burial sites were uncovered.
- FOURIE, W. 2015. Mokala Re-alignment of the R380 and a Portion of the Ga-mogara River on a Portion of the Farm Kipling 271, Near Hotazel in the Northern Cape, *PGS heritage and Grave Relocation Consultants*. – Three archaeological sites associated with the MSA were identified in the area.
- ROSSOUW, L. 2015. Phase 1 HIA of two proposed new power lines at Witloop and Vlermuislaagte, Hotazel, NC. *Palaeo Field Services*. – Some scattered Stone Age implements were uncovered.

- DE JONG, R. 2010. HIA Proposed Land Use Change to Provide for the Extension of the Town of Hotazel Phase III. *Cultmatrix* CC. – Nothing of notable heritage value was uncovered.

4.3 Archaeological background

Most archaeological material in the Northern Cape is found near water sources such as rivers, pans and springs, as well as on hills and in rock shelters. Sites usually comprise of open sites where the majority of evidence of human occupation is scatters of stone tools (Parsons 2003).

4.3.1 Early Stone Age (400 000 – 3.3 million years Before Present/BP)

An important archaeological site in the region is the Wonderwerk Cave, located approximately 100 km away. 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).

4.3.2 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). Also at Wonderwerk, 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).

4.3.3 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. Doornfontein is characterised by the predominance of coarse irregular flakes, frequent use of quartz as a raw material, and very little retouch. Many ceramics are found, which are amphora-like in shape with grit temper and decoration on the necks and rims. Later sites contain some large ostrich eggshell beads, iron objects, and coarser sherds with grass temper. These sites are found along the Orange River and nearby permanent water sources. This tradition is probably associated with Khoekhoen groups (Beaumont *et al.* 1995).

Two prehistoric specularite mines have been excavated near Postmasburg–Doornfontein (Beaumont & Boshier 1974) and Blinklipkop (Thackeray *et al.* 1983). These sites show that specularite mining started before 1200 BP. This substance was prized as a cosmetic by hunter-gatherers, Khoekhoen pastoralists and Iron Age peoples, making it an important trade item. At Blinklipkop, there is evidence of either trade with or occupation by Iron Age peoples by the seventeenth century. Historical sources indicate that Thlaping Sotho-Tswana peoples occupied the mine in 1801 (Thackeray *et al.* 1983).

4.3.4 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 nonentoptic 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). 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.

4.4 Aspects of the area's history as revealed by the archival/desktop study

4.4.1 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 northwest to remain in the vicinity of wild game (Snyman, 1992).

4.4.2 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.



Figure 5 - "Tlharo of the Kalahari Desert" A sketch that appeared in Dr. Andrew Smith's travel journal (Lye, 1975:171).

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). Interestingly, Robert Moffatt indicated Nokaneng to have been situated to the east of the Langeberg, but see also map accompanying Campbell (1922:Vol. II). This said, it is important to note that Breutz (1992) stresses the point that the actual capital Nokaneng was in fact located in the direct vicinity of Postmasburg.

During the reign of Molehabangwe, who had succeeded his father Maswe in 1775, a confederation was formed which consisted of a stratified society comprised of the Tlhaping, Rolong, Tlharo, Kgalagadi and San groups. While the Tlhaping was seen as the ruler class, the Kgalagadi and San were viewed as vassals (Snyman, 1992).

The Tlhaping conducted extensive trading activities with the Korana to the south and the Tswana to the north. During 1770 some of the Korana groups crossed the Orange River and came to the land of the Tlhaping. Although the initial contact was peaceful, conflict soon erupted. The better-armed Korana managed to force the Tlhaping out of the area in approximately 1790. This move was further augmented by the fact that the Nokaneng River had dried up. Campbell (1922: Vol. II:125) on his visit in 1820 also remarked that both the Nokaneng and Kuruman Rivers then had dried up, but that deep wells dug into the river beds supplied water. The Tlhaping first moved to Kathu and then to Ga-Mopedi on the Kuruman River. The Tlhaping eventually established themselves at Dithakong on the Moshaweng River (Snyman, 1992).

4.4.3 European Explorers and Visitors

Two of the more well-known early European explorers to these areas were Dr. Hinrich Lichtenstein in 1805 and Dr. Andrew Smith during 1835.

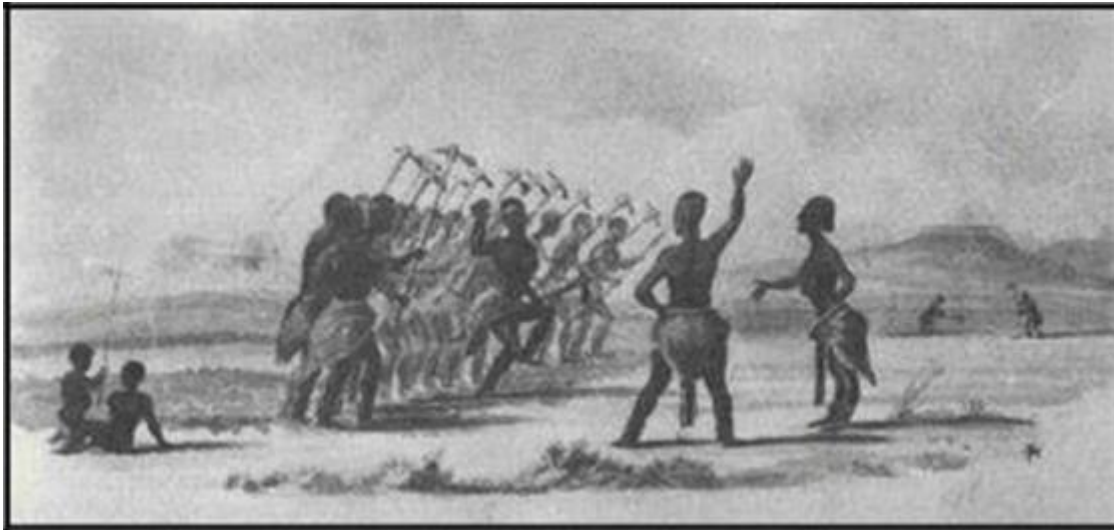


Figure 6 – “Tlhaping women cultivating gardens and singing” One of the sketches appearing in Dr. Andrew Smith’s journal (Lye, 1975:171).

4.4.4 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 Blinkklip (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.

4.4.5 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 Mosjesj, 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.

4.4.6 *British Protectorate*

On 23 March 1885 Britain declared a Protectorate over Bechuanaland and the Kalahari. On 30 September 1885 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).

4.4.7 *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 Bathlaros, 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).

4.4.8 *Lower Kuruman Native Reserve*

On 4 May 1895 the Lower Kuruman Native Reserves well as 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 5425, 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.

During negotiations and discussions on such an 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).

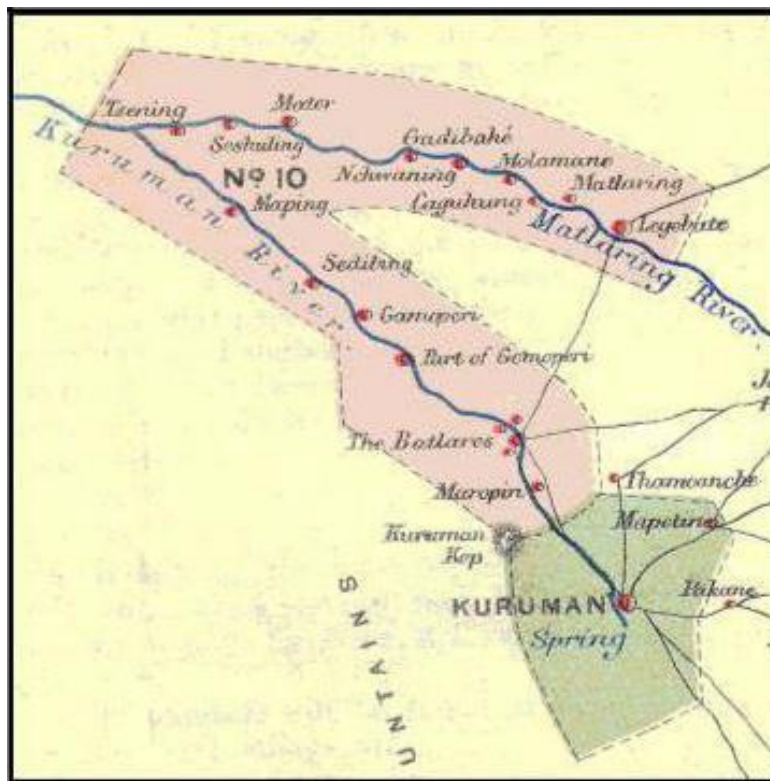


Figure 7 - Map showing the original demarcation of the Lower Kuruman Native Reserve

4.4.9 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 8 - 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.

4.4.10 Mining

The study area and surrounding region is today well known for its manganese mines. The importance of manganese lies in the fact that it is used in the manufacture of carbon steel.

The history of modern manganese mining in the area can be traced back to Dr. A.W. Rogers who published a record of the geology of present-day Botswana and Griqualand West as part of the annual report of the Geological Commission of the Cape Colony in 1906. What is significant about his publication is that Rogers found that the well-known hill from the area known as Black Rock consisted largely of manganese, a mineral ore previously undiscovered in the Cape Colony.

The next important person to appear on the scene was Dr. L.G. Boardman. While employed by the Government Geological Survey as a geologist, Dr. Boardman investigated the manganese deposits at Black Rock during or directly after 1940. He was very excited by the extent of the manganese and published his findings in a paper he wrote for the Geological Society of South Africa.

Even before the visit by Dr. Boardman, a prospector by the name of A.T. Fincham had felt that the area surrounding the Black Rock outcrop may also contain manganese. As a result, he obtained options on a number of farms surrounding Black Rock. He approached the mining company S.A. Manganese with these farm options, but they felt that the Black Rock area was too isolated at the time. Fincham approached Ammosal as well, who took over his options on three farms and after a further assessment by geophysicist Oscar Weiss, decided to mine the Black Rock area during mid-1940.

During 1950 S.A. Manganese was again approached by Fincham regarding new options on farms surrounding Black Rock. Although the mining company was not interested Dr. Boardman, who had joined their ranks earlier, convinced the board to at least investigate the Black Rock area. Boardman subsequently surveyed a large tract of land, including the farms Wessels, Mamatwan, Dikgathlong and Dibiaghomo. He found very promising results over large sections of land, and a drilling rig soon arrived. The first borehole was drilled on Wessels, and after disappointing results it was moved to Dibiaghomo. Here, at a depth of 280 meters, ore containing a very high manganese percentage was reached. Other boreholes in the area found similar results and the freehold to a number of farms was obtained. When information about these discoveries leaked out and reached Ammosal, a tussle broke out between the two companies to obtain freeholds to as many farms in the mineral-rich area as possible.

Although mining operations started in earnest on Smartt, S.A. Manganese's attention was soon drawn to the farm Hotazel where very promising results were also found. A whole village was constructed on the farm, and the Hotazel mine was officially opened on 19 November 1959.

During the early 1960s S.A. Manganese Limited (Samangan) at the time had options on 18 farms, including the farms Mamatwan and Goold on the southern edge of the ore body. Although Mamatawan had been prospected only low-grade manganese ore could be found. However, the ratio between iron and manganese from Mamatwan was believed to be excellent. During this time

Ammosal had started mining on the adjacent farms of Devon and Adams, and it was not long before the decision was made to commence mining operations on Mamatwan as well.

After a crushing and screening plant was erected at Mamatwan the mine began producing in November 1963. During the 1970s the mine reached a production output of more than one million tons a year (Samangan, 1977).



Figure 9 - "A view of the huge open-cast manganese ore mine of Samancor at Mamatwan..." The photograph was taken during August 1982 (National Archives, TAB, 16396).

Although the mining rights of the farm Wessels had been acquired by S.A. Manganese in 1952, and even though some prospecting work had taken place, it was not until 1965 that the farm was again investigated.

By January 1969 20 boreholes had been sunk on the farm Wessels, Dibiaghomo and Dikgathlong, which revealed three bands of manganese ore, of which the top and bottom bands were considered mineable.

The official opening of Wessels mine took place on 2 May 1973. By 1976 the mine was annually producing 750 000 tons of ore a year (Samangan, 1977).

4.5 Sensitivity assessment outcome

Based on the background research and desktop assessment of previous studies done for the study area, only archaeological finds were considered to have a possibility of occurring in the largely disturbed study area. These archaeological finds would be protected through Section 35 of the NHRA.

4.5.1 Environmental screening tool

An assessment of the Environmental Screening tool provides the following sensitivity ratings for archaeological and heritage resources (**Figure 10**) as high within the buffered area of the Kuruman River and the general palaeontological sensitivity as medium (**Figure 11**) in the study area.

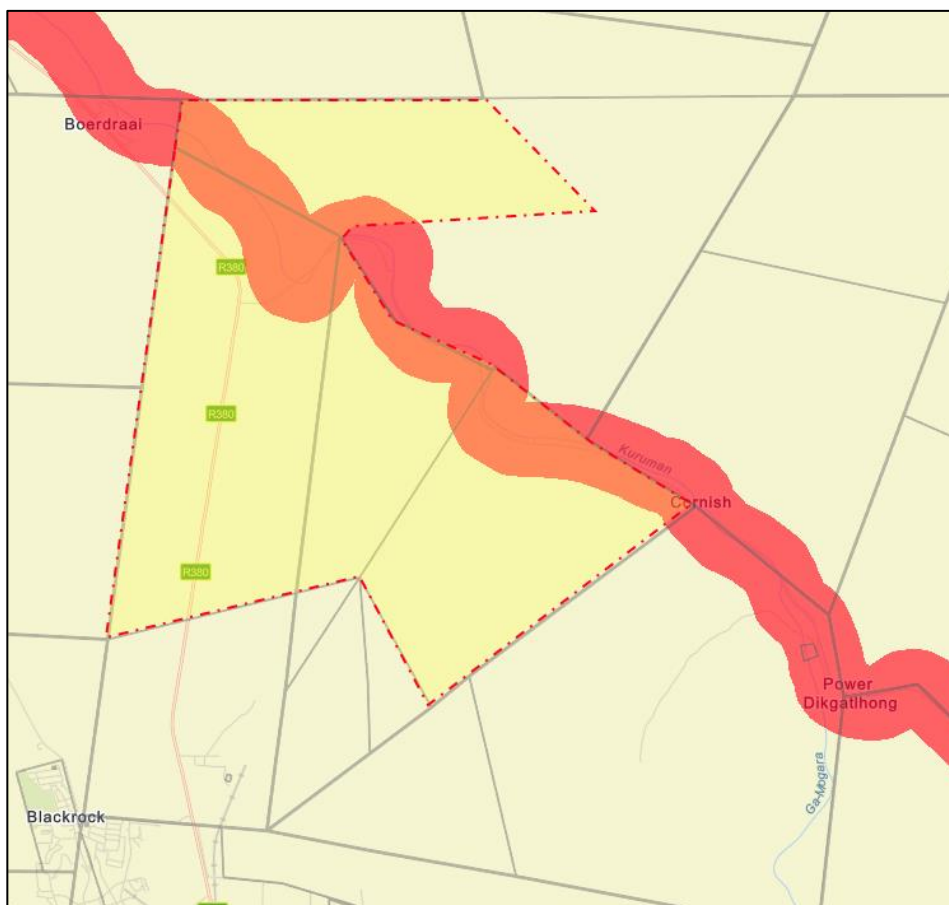


Figure 10 - Environmental screening tool - archaeological and heritage sensitivity (red = high/yellow = study area)

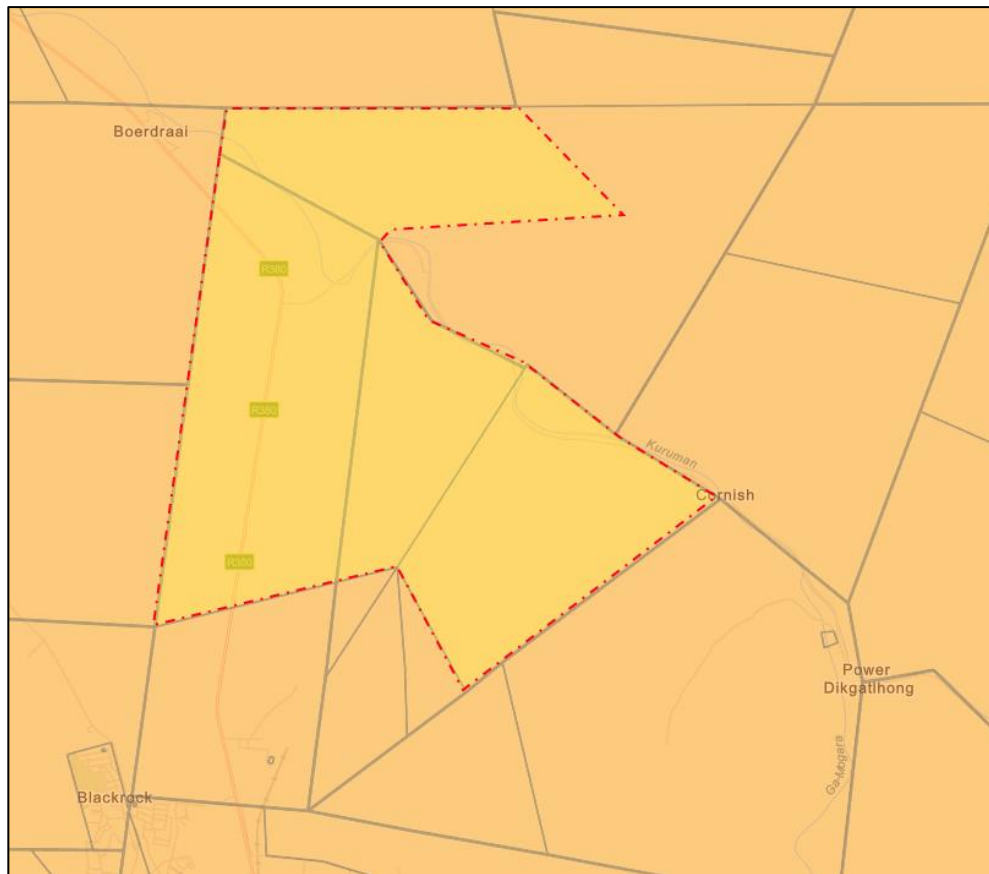


Figure 11 - Environmental screening tool - palaeontological sensitivity (orange = medium/yellow=study area))

4.5.2 Map analysis and findings for archival work on sensitive areas

This archival study has revealed important aspects about the history of the area. Certainly, some of the key aspects emanating from this study are firstly, the relatively low human presence for the dry regions surrounding the study area and, secondly, a tendency for human settlements in these areas to be located on or near the water courses.

The findings can be compiled as follow and have been combined to produce a heritage sensitivity map for the project:

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 site can be expected if areas closer to the low-lying riverine areas are to be disturbed during mining.

Historical

The archival research has shown that the area was settled 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 1920s on the Kuruman River at places with names such as Boerdraai (17km north of the study area), Wessels 227 (1917), Dibiaghomo 226 (1914, but already settled by 1899) and Dikgathlong 268 (as early as 1894), is an indication that farmsteads and structures of significance can be present in the study area.

Analysis of maps and satellite imagery enabled the development of a heritage sensitivity map (**Figure 12**) that assisted the fieldwork during the HIA to identify and assess heritage resources in the landscape.

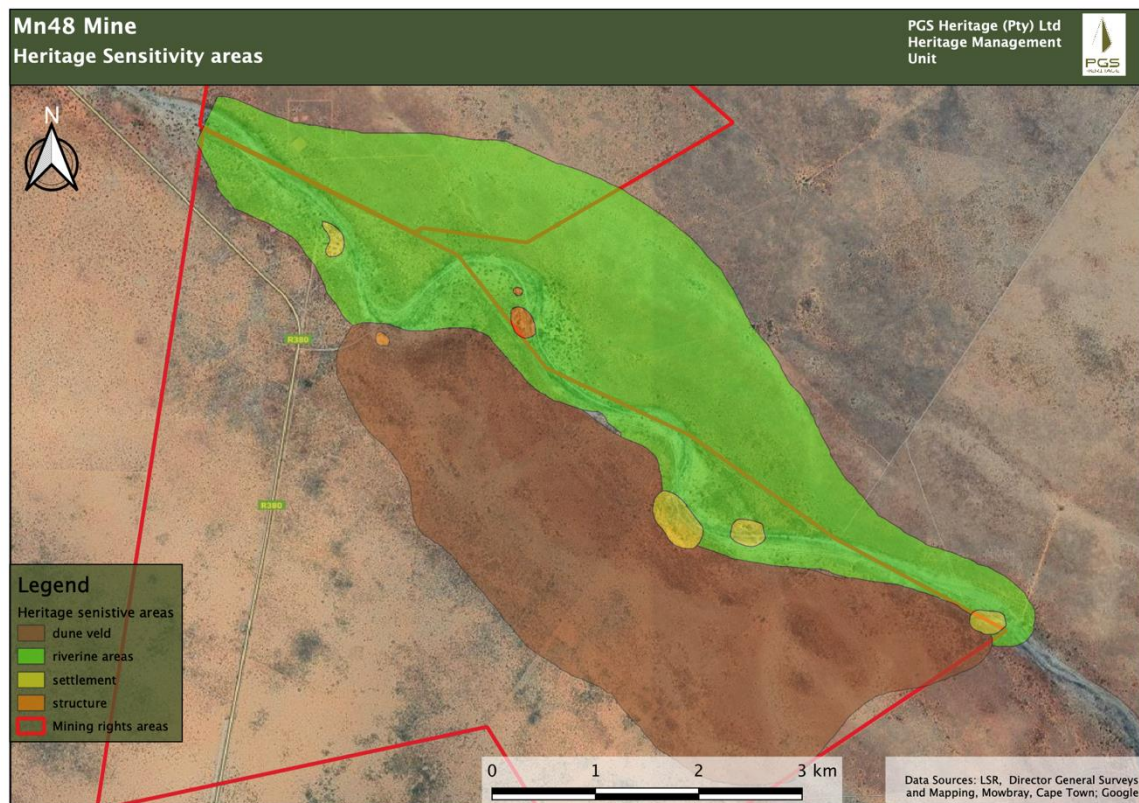


Figure 12 – Heritage Sensitivity Map (based on satellite imagery and topographical maps)

4.6 Site survey

The field work was conducted by archaeologists of PGS through controlled exclusive surveys of the study area on Portion 2 of the farm Wessels 227 and the Remaining Extent and Portions 3 and 4 of the farm Dibiaghomo 226, in 2010, 2013 and August 2020. Tracklogs of the fieldwork was logged and is depicted in **Figure 13**. **Figure 14** shows all the heritage resources (such as archaeological sites, burial ground and graves and architectural structures) identified during the field work.

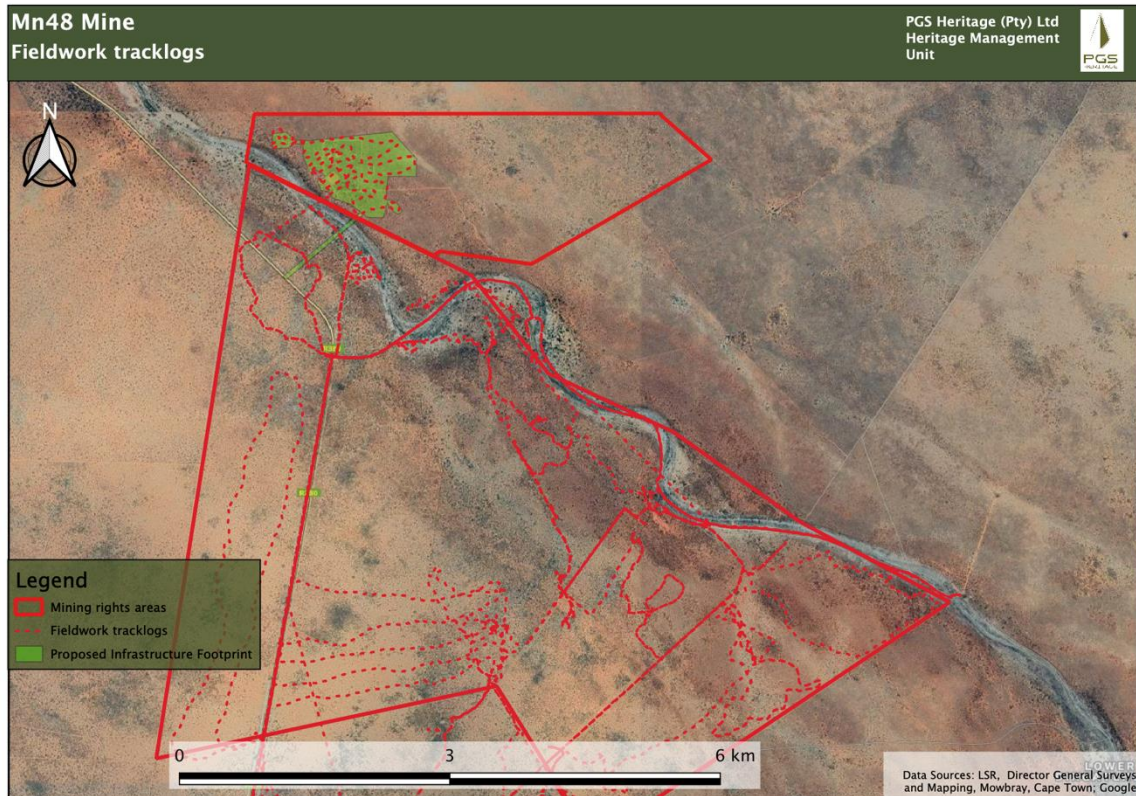


Figure 13 – Map with track logged survey

It was found that the archaeological sensitivity rating as indicated in the DEA screening tool is largely accurate and in line with the findings during the field work.

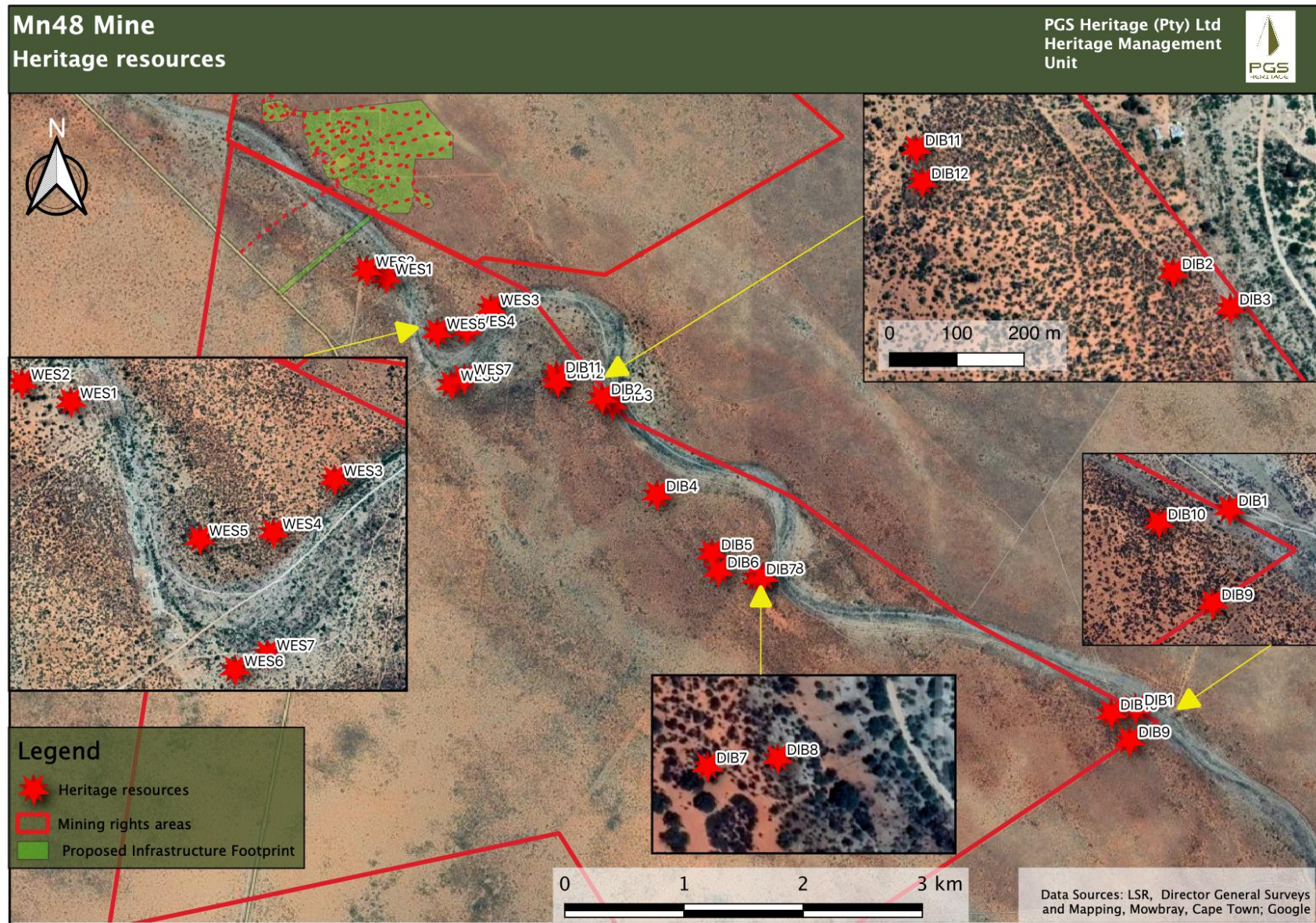




Figure 14 – Heritage resources identified during the fieldwork

4.7 Fieldwork findings

4.7.1 Archaeological heritage resources

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB3	S27.05916	E22.87626	<p>The sites consist of a medium to high density scatter of lithics are found at the base of a fluvial pebble bed and calcrete forming a small koppie towards Kuruman River. Artefacts include flakes, retouched flakes, blades and cores.</p> <p>Most of raw material found on site consisted of Crypto-Crystalline Silicate (ccs) and fine grained quartzites.</p> <p>The extent of the site is approximately 100 meters in from the DIB3 coordinate eastwards on the calcrete pebble contact zone.</p>	Medium	IIIB
 <p>Figure 15 – View site DIB3</p>			 <p>Figure 16 – MSA lithics from DIBB3</p>		

² Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.





Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB4 DIB5 DIB6	S27.06598 S27.07040 S27.07172	E22.87964 E22.88379 E22.88426	<p>The sites are situated in the northern most section of the study area, on a red Kalahari dune towering some 30 meters above a horseshoe bend in the Kuruman River. The sites consist of medium to high densities of LSA lithics and micro lithics scattered over an area of 50m² on average for all 3 sites.</p> <p>Other artefacts associated with the site are ostrich eggshell fragments, bone fragments and coarse ceramic shards. The composition of the artefacts on site indicates an association with hunter gatherer groups (Deacon, 1999 and Klein, 1984).</p> <p>Most of raw material found on site consisted of Crypto-Crystalline Silicate (ccs).</p>	Medium	IIIA




Figure 17 – View of site DIB4



Figure 20 – High density scatter of microlithics and debitage (DIB4)

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			 <p><i>Figure 18 – Coarse pottery at site DIB4</i></p>  <p><i>Figure 19 – Core and snapped blade at DIB5</i></p>	 <p><i>Figure 21 – View of site DIB5</i></p>  <p><i>Figure 22 – View of site DIB6</i></p>	

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					
			<p>Figure 23 – High density scatter of bone and ostrich egg fragments at DIB6</p>		



Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB9 DIB10	S27.08451 S27.08245	E22.91526 E22.91388	<p>The sites are situated in the eastern section of the study area, on a red Kalahari dune behind DB1 (situated on the farm Cornish). The sites consist of medium to high densities of LSA lithics and micro lithics scattered over an area of 50m² on average for both sites.</p> <p>DIB9 is disturbed by an old access road from the Cornish farmstead on to the Dibiaghomo farm.</p> <p>Other artefacts associated with site DIB10 are ostrich eggshell fragments, bone fragments and coarse ceramic shards.</p> <p>Most of raw material found on site consisted of Crypto-Crystalline Silicate (ccs).</p>	Medium	IIIB





Figure 24 – View of disturbed area DIB9



Figure 26 – Flakes and cores found on site (DIB9)

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB11 DIB12	S27.05703 S27.05747	E22.87206 E22.87214	 <p>Figure 25 – View of DIB10</p>	 <p>Figure 27 – Pottery and ostrich eggshell found at DIB10</p>	Medium
			The sites consist of a medium to high density scatter of lithics are found at the base of a fluvial pebble bed and calcrete forming a small koppie towards Kuruman River. Artefacts include flakes, retouched flakes and small cores.	IIIB	

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<p>Most of raw material found on site consisted of Crypto-Crystalline Silicate (ccs) and fine grained quartzites.</p> <p>The extent of the site is approximately 20 meters in diameter.</p>		
 <p><i>Figure 28 – View site DIB11</i></p>			 <p><i>Figure 29 – MSA lithics (DIB11)</i></p>		
WES3 WES4 WES5	S27.05196 S27.05355 S27.05375	E22.86712 E22.86529 E22.86308	The sites are situated in the northern most section of the study area, on a red Kalahari dune towering some 30 meters above a horseshoe bend in the Kuruman River. The sites consist of medium to high densities of LSA lithics and micro lithics scattered over an area of 50m ² on average for all 3 sites.	Medium	IIIB



Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<p>Other artefacts associated with the site are ostrich eggshell fragments, bone fragments and coarse ceramic shards. The composition of the artefacts on site indicates an association with hunter gatherer groups (Deacon, 1999 and Klein, 1984).</p> <p>Most of raw material found on site consisted of Crypto-Crystalline Silicate (ccs).</p>		





Figure 30 – View of Site WES3



Figure 33 – Lithics of WES3

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			 <p>Figure 31 – Site WES4 (exposed by wind erosion)</p>		
			 <p>Figure 34 – Microlithics and ostrich shell fragments at WES4</p>		

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			 <p><i>Figure 32 – WES4 material in situ at site</i></p>		
			 <p><i>Figure 35 – View of Site WES5</i></p>		

Site ² number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WES6 WES7	S27.05767 S27.05719	E22.86414 E22.86511	<p>The sites are situated at the base of a fluvial pebble bed and calcrete forming exposed during mining operations of a borrow pit. The medium density scatter of lithics includes MSA: flakes, retouched flakes and small cores.</p> <p>Most of raw material utilised on site consisted of Crypto-Crystalline Silicate (ccs) and fine grained quartzites.</p> <p>The extent of the site is approximately 30 meters in diameter.</p>	Medium	IIIB





Figure 36 – View of disturbed area at WES6



Figure 37 – MSA lithics (collected around the site) (WES7)

4.7.2 Historical heritage resources

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB1	S27.08210	22.91569	Farmstead on the farm Cornish outside the study area.		
DIB8 Homestead	S27.07262	E22.88821	<p>The farmstead consists of a main house, outbuilding and livestock enclosures. The main house is constructed from large calcrete block, finished with a corrugated iron roof.</p> <p>The extent of the site is approximately 1 hectare, while the cemetery covers an area of 10mx10m.</p>	High	IIIA
 <p>Figure 38 – View of house associated with DIB8</p>			 <p>Figure 39 – View of cemetery at DIB8</p>		

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WES1	S27.04963	E22.85921	<p>The site is the original farmstead of the farm Wessels and dates from around 1910 when the settlement of the farms along the Kuruman River started. The site consists of a main dwelling, outside buildings, livestock enclosures and farm workers houses covering an area of approximately 1 hectare.</p> <p>The main dwelling was constructed with plastered mud brick on a calcrete foundation and finished with a corrugated iron roof. It has a front and back porch typical of the architectural vernacular of the farmhouses dating from the period.</p> <p>The extent of the site is approximately 20 meters in diameter.</p>	Medium	IIIB


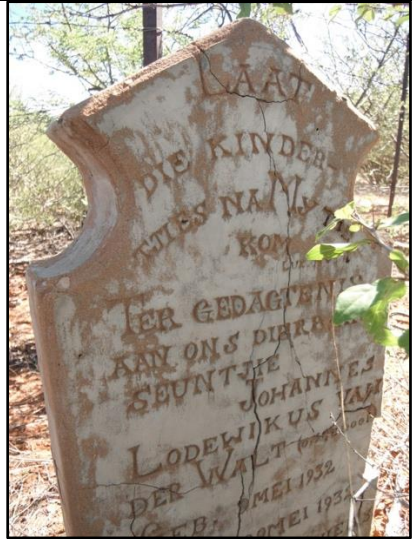


Figure 40 – Main house at WES1



Figure 41 – Foundation constructed from locally sourced calcrete (WES1)

4.7.3 Burial grounds and graves

Site ³ number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB2	S27.05868	E22.87549	<p>The site consists of 4 graves (at least 2 being that of children) all aligned east west and is situated some 200 meters to the east of the farmstead situated on the farm Lehating 225. The graves are that of the Van der Walt families dating from 1934 to 1941.</p> <p>The extent of the site is approximately 10x10m.</p>	High	IIIA
 <p>Figure 42 – Cemetery at DIB2</p>			 <p>Figure 43 – Headstone with inscription at DIB2</p>		

³ Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

Site ³ number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB7	S27.07223	E22.88718	<p>The site consists of 3 stone packed graves all aligned east west and is situated some 60 meters to the northwest of DIB8. The graves have no headstones or inscriptions.</p> <p>The extent of the site is approximately 10x10m.</p>	High	IIIA



Figure 44 – Cemetery at WES2

Site ³ number	Lat	Lon	Description	Heritage Significance	Heritage Rating
DIB8 Cemetery	S27.07218	E22.88765	<p>The site consists of 3 graves all aligned east west and is situated some 100 meters to the northwest of the homestead associated with the graves. The graves are that of the Grobbelaar families dating from 1932.</p> <p>The cemetery covers an area of 10mx10m.</p>	High	IIIA



Figure 45 – Inscription on headstone (DIB8)



Figure 46 – View of cemetery at DIB8

Site ³ number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WES2	S27.04907	E22.85774	<p>The site consists of 3 graves all aligned east west and is situated some 160 meters to the northwest of WES1. The graves are that of the Lombard and Wiid families dating from 1932. According to Mr Straus, the current tenant, the Lombard family was the original owners of the farm.</p> <p>The extent of the site is approximately 10x10m.</p>	High	IIIA



Figure 47 – Cemetery at WES2



Figure 48 – Head stone at WES2

5 PALAEOLOGY

The palaeontological desktop assessment completed by Elize Butler (2020) to assess the palaeontological heritage resources has shown that the mining rights area is completely underlain by the Cenozoic Kalahari Group as well underlying Griqualand West Basin rocks, Transvaal Supergroup.

5.1 The Kalahari deposits is approximately Ca 65 – 2.5 million years old (Ma).

The Cenozoic Kalahari Group is the most widespread body of terrestrial sediments in southern Africa. The Cenozoic sands and calcretes of the Kalahari Group range in thickness from a few meters to more than 180m (Partridge et al., 2006). The youngest formation of the Kalahari Group is the Gordonia Formation which is generally termed Kalahari sand and comprises of red aeolian sands that covers most of the Kalahari Group sediments. The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands, and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters. Quaternary alluvium, aeolian sands, surface limestone, silcrete, and terrace gravels are also included in the Kalahari Group (Kent 1980).

The fossil assemblages of the Kalahari are generally moderate in diversity and occur over a wide range and thus the palaeontological diversity of this Group is moderate. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils.

*Hotazel is in the **Griqualand West Basin**, Northern Cape Province which consists of clastic sediments as well as volcanic rocks, diamictites and banded iron formations. Manganese deposits is present in the Hotazel Formation, upper Postmasburg Group (approximately 2222 Ma). The Vryburg Formation is the basal unit and overlies unconformably the granite and rocks of the Ventersdorp Supergroup. The Campbell Group overlies the Vryburg Formation and consists of the Schmidtsdrif Formation and the upper Ghaap Plateau Formation. The Griquatown Group is divided into two formations namely the Asbestos Hills and Koegas Formations. The Gamagara Formation follows and is positioned on the Maremane Anticline and is overlain by the Makganyene Formation. The Cox Group comprises of the lower Ongeluk Formation and the upper Voëlwater Formation. The Ongeluk Formation was deposited under water and reaches a thickness of between 400 and 900 m. This Formation is basal and is mainly volcanic (Visser 1989). Manganese is present in the upper Voëlwater Formation (Snyman 1996). According to Kent (1980) and Snyman (1996) Griqualand West Basin attains a maximum thickness of 4500 m.*

Algal growth structures, also known as “stromatolites”, are fossil structures described from the dolomites of the Transvaal Supergroup. Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils (Figure 4). The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.



Figure 49 – Example of an Archean Stromatolite

According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Kalahari Group is moderate while that of the Griqualand West rocks of the Transvaal Supergroup is moderate.

6 IMPACT ASSESSMENT

The fieldwork has shown that the mining rights area contain numerous archaeological and historical heritage resources that can potentially be impacted by the MN48 mining operations. The palaeontology of the area also notes the possibility of finding stromatolites in bedrock. **Table 6** provides a breakdown of the projected impacts pre and post mitigation.

The overall impact on heritage resources by the project is evaluated as having a very low significance. The management measure listed in section 7 of this report will safeguard and address the responsible management of heritage resources within the mining rights area of the Mn48 Mine.

Table 6 - Assessed impacts on heritage resources

IMPACT	UNMITIGATED						MITIGATED					
	INTENSITY	EXTENT	DURATION	CONSEQUENCE	PROBABILITY	SIGNIFICANCE	INTENSITY	EXTENT	DURATION	CONSEQUENCE	PROBABILITY	SIGNIFICANCE
Destruction of known archaeological heritage resources	High	Very low	Long term	Medium	Low	Very low	Low	Very low	Very High	Low	Low	Very low
Destruction of historical heritage resources	High	Very low	Long term	Medium	Low	Very low	Low	Very low	Very High	Low	Low	Very low
Destruction of cemeteries and graves	High	High	Long term	Very High	Low	High	Low	Very low	Very High	Low	Low	Very low
Impact on palaeontological resources	Moderate	Very low	Very long	Medium	Medium	Low	Moderate	Very low	Very long	Low	Medium	Very low
Destruction of unknown heritage resources (archaeological, historic, burial grounds and graves)	High	Very low	Very high	Low	Medium	Low	High	Very low	Very high	Low	Low	Very low

7 PROPOSED MANAGEMENT MEASURES

7.1 Construction phase

The project will encompass a range of activities during the construction phase, including vegetation clearance and the stockpiling of overburden.

It is possible that subsurface heritage resources will 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 infrastructure and construction of facilities results in significant disturbance, however foundation trench do offer 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.

During the construction phase, 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 is implemented.

7.2 Chance find procedure

In the event of a chance find, the following procedures need to be adhered to:

- A heritage practitioner 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 archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during any project phase, the area should be demarcated, and activities be halted.
- The qualified 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 impact on the heritage resource.
- Mn48 must have a contingency plan so that operations/activities could move elsewhere temporarily away from the activity area while the material and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the archaeologist.

7.3 Possible finds during construction

The study area occurs within a greater archaeological site as identified during the fieldwork and scoping phase. Clearing of vegetation can uncover the following:

- Stone artefact;
- Stone foundations;
- Ash middens associated with the farmsteads and homesteads that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, forks, and knives; and
- Possible burials.

7.4 Timeframes in the event of a chance find

It must be kept in mind that mitigation and monitoring of heritage resources discovered in the event of a chance find will require permitting for collection or excavation of heritage resources and lead times must therefore be taken into consideration. **Table 7** gives guidelines for lead times on permitting.

Table 7 - Lead times for permitting and mobilisation

ACTION	RESPONSIBILITY	TIMEFRAME
Preparation for field monitoring and finalisation of contracts	The contractor and service provide	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	1 month
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of burial ground or graves in the way of construction	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

7.5 Heritage Management Plan for EMP implementation

NO.	MITIGATION MEASURES	PHASE	TIMEFRAME	RESPONSIBLE PARTY FOR IMPLEMENTATION	MONITORING PARTY (FREQUENCY)	TARGET	PERFORMANCE INDICATORS (MONITORING TOOL)	COST
Possible finds								
A	Implement chance find procedures in case where possible heritage finds area made	Construction	As and when required	Mn48 Mine ECO Heritage Specialist	ECO (weekly)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Monthly Checklist/Report	R10 000
B	Demarcate heritage resources as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO during construction	Construction Operation	As and when required	Mn48 Mine ECO Heritage Specialist	ECO (weekly)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO yearly Checklist/Report	R10 000
C	Implement a phase 2 archaeological investigation for all activities within 100m from the Kuruman river centreline as per SAHRA requirements for the area. ⁴	Pre-Construction	Before construction	Mn48 Mine ECO Archaeologist	ECO Archaeologist	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, NHRA	ECO pre-construction	R100 000 depending on the size of the area

⁴ In the past three years a number of archaeological studies and resulting mitigation work on mines and infrastructure close to or within 100 meter from the centre line of the Ga-Mogara and Kuruman rivers has shown that the a (Kalahari sands) - and b (calcrete and pebble deposits) horizons associated with the river banks and flow plains contain significant archaeological deposits mainly associated with the earlier and middle Stone Age. The SAHRA has subsequently implemented a protocol that requires phase 2 mitigation measures that at a minimum include selective test pitting of area within infrastructure footprints within 100 meters from the river centre line. Examples include the AssMang Manganese and Mokala developments on the farm Gloria.

8 CONCLUSIONS AND RECOMMENDATIONS

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. The study has shown that the area is rich in heritage resources. HIA and PDA completed for the project found the following related to heritage resources.

8.1 Palaeontology

The PDA completed by Banzai Environmental (Butler, 2020) found that the Mn48 mine area is completely underlain by the Cenozoic Kalahari Group as well underlying Griqualand West Basin rocks, Transvaal Supergroup. According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Kalahari Group is moderate while that of the Griqualand West rocks of the Transvaal Supergroup is moderate.

The report however found that project impact on possible palaeontological heritage resources will be **Very Low** with the implementation of the recommended management measures. Finds can be managed through a chance finds procedure as described in the PDA if discovered during construction activities.

8.1.1 Mitigation

The PDA recommends that:

If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected and the ECO 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) so that mitigation can be carry 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.

8.2 Archaeology

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.

Field work has confirmed the presence of 13 archaeological site associated with Middle Stone Age (MSA) as well as Later Stone Age (LSA) site linked with hunter gatherer communities. These heritage resources are protected under Section 35 of the National Heritage Resources Act (NHRA).

The sites identified to be associated with LSA communities are of great significance as very few studies conducted in the Hotazel and Blackrock areas have previously identified LSA concentrations associated with other artefacts such as bone, pottery and ostrich eggshell fragments.

The report however found that project impact on the know archaeological heritage resources will be **Very Low** with the implementation of the recommended management measures and unknow archaeological resources can be managed through a chance finds procedure if discovered during construction activities.

8.2.1 Mitigation

- Demarcate as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO.
- If at any stage the site is disturbed a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- If it is found that mining activity cannot be altered to avoid the site, a destruction permit will be required from SAHRA, backed by a mitigation report that must include documentation of the site layout, analysis of the material and compiled as a final report on the archaeological site.
- Implement a phase 2 archaeological investigation for all activities within 100m from the Kuruman river centreline as per SAHRA requirements for the area

8.3 Historical structures

The archival research has shown that the area was settled 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 at places with names such as Boerdraai (just north of the study area), Wessels 227 (1917), Dibiaghomo 226 (1914, but already settled by 1899) and Dikgathlong 268 (as early as 1894), is an indication that farmsteads and structures of significance can be present in the study area.

Two farmsteads were identified in the study area, both dating from the early part of the 20th century and thus protected under Section 34 of the NHRA.

The report however found that project impact on the know historic heritage resources will be **Very Low** with the implementation of the recommended management measures and unknow historic heritage resources can be managed through a chance finds procedure if discovered during construction activities.

8.3.1 Mitigation

- Demarcate as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO.
- If at any stage the site is disturbed a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- If at any stage the site cannot be excluded from the mining activities a destruction permits required from the Northern Cape provincial Heritage Authority. This will require that all structures on site be documented by photographs and drawings, before it can be demolished. In addition, any of these structures that are farmworker dwellings must be evaluated for the possible presence of infant burials through social consultation.

8.4 Cemeteries and Graves

Three cemeteries were also identified and documented. These cemeteries are associated with the farmstead and in most cases date from the early 1930. These heritage resources are protected under Section 36 of the National Heritage Resources Act (NHRA).

The report however found that project impact on the know cemeteries and graves will be **Very Low** with the implementation of the recommended management measures and unknow cemeteries and graves can be managed through a chance finds procedure if discovered during construction activities.

8.4.1 Mitigation

- Demarcate as no-go area with a 30-meter buffer if activities are to be conducted closer than 100 meters from the site and monitor for disturbance by ECO.
- If at any stage the site is disturbed a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- In the event that the sites cannot be excluded from the development footprint, a grave relocation process needs to be implemented.

8.5 Conclusion

It is our considered opinion that the changes to infrastructure and activities will not have any impact on heritage resources. Any chance finds during the life of mine will be handled through the proposed chance finds procedures and management guidelines as provided in **section 7** of this report.

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Appendix A

The Significance Rating Scales for the Proposed Activities on Heritage Resources

PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE		Significance = consequence x probability
Definition of CONSEQUENCE		Consequence is a function of intensity, spatial extent and duration
Criteria for ranking of the INTENSITY of environmental impacts	VH	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	VL	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

PART B: DETERMINING CONSEQUENCE							
			EXTENT				
			A part of the site/property	Whole site	Beyond the site, affecting neighbours	Local area, extending far beyond site.	Regional/ National
			VL	L	M	H	VH
INTENSITY = VL							
DURATION	Very long	VH	Low	Low	Medium	Medium	High
	Long term	H	Low	Low	Low	Medium	Medium
	Medium term	M	Very Low	Low	Low	Low	Medium
	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High
PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High

to impacts)	Possible/frequent	M	Very Low	Very Low	Low	Medium	High
	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VH
CONSEQUENCE							

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

Appendix B
Project team CV's

WOUTER FOURIE

**Professional Heritage Specialist and Professional Archaeologist and Director PGS
Heritage**

Summary of Experience

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave "rescue" excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
 - Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
 - Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

Key Qualifications

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

Key Work Experience

2003- current - Director – PGS Heritage (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique, Mauritius, Malawi and the Democratic Republic of the Congo.