



PGS HERITAGE

MAMATWAN MINE SECTION 24G RECTIFICATION APPLICATION, NEAR HOTAZEL, NORTHERN CAPE PROVINCE

Phase 1 – Heritage Impact Assessment

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Declaration of Independence

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- 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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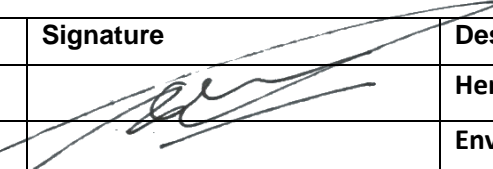
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The heritage impact assessment report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
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 D
(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 3.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5.1
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.1
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3.1 and Appendix B
(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 4.1
(g) An identification of any areas to be avoided, including buffers	Section 4
(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;	Section 4.1
(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 4.1 and 5
(k) Any mitigation measures for inclusion in the EMPr	Interim Section 6
(l) Any conditions for inclusion in the environmental authorisation	Interim Section 6
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Interim Section 6
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Interim Section 6
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Interim Section 6
(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.	No protocols or minimum standards for HIAs or PIAs promulgated through a governmental notice.
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EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by SLR Consulting (South Africa) (Pty) Ltd (SLR) to undertake a Heritage Impact Assessment (HIA) that forms part of a Section 24 application under the National Environmental Management Act No. 107 of 1998 (NEMA and NEM:WA), for the opencast manganese Mamatwan Mine (MMT) (forms part of the legal entity Hotazel Manganese Mines (Pty) Ltd) located approximately 25km to the south of Hotazel in the John Taolo Gaetsewe District Municipality and Joe Morolong Local Municipality of the Northern Cape Province of South Africa

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. This report focusses expressly on the facilities included under the S24G application (disposal of general waste (old and used conveyors and metal) and the storage of Sinter de-dust stored in de-dust bags from the Sinter plant into the existing Adams Pit and the establishment of the north eastern topsoil stockpile - **Figure 3**). Other management measures as listed and required in other HIA's conducted for the MMT project must still be implemented for other heritage features identified in the larger mining area.

Palaeontology

In Palaeontological terms the significance is rated as low negative. The waste disposal and establishment of the north eastern topsoil stockpile that have occurred and being addressed with the 24G rectification application was thus unlikely to pose a substantial threat to local fossil heritage.

Conclusion

It is our considered opinion that the disposal of general waste (old and used conveyors and metal) and the storage of Sinter de-dust stored in de-dust bags from the Sinter plant into the existing Adams pit and establishment of the north eastern topsoil stockpile had no impact on heritage resources.

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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;
- 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.

Palaeontology

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

Table 1 – List of abbreviations used in this report

Abbreviations	Description
AIA	Archaeological Impact Assessment

ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

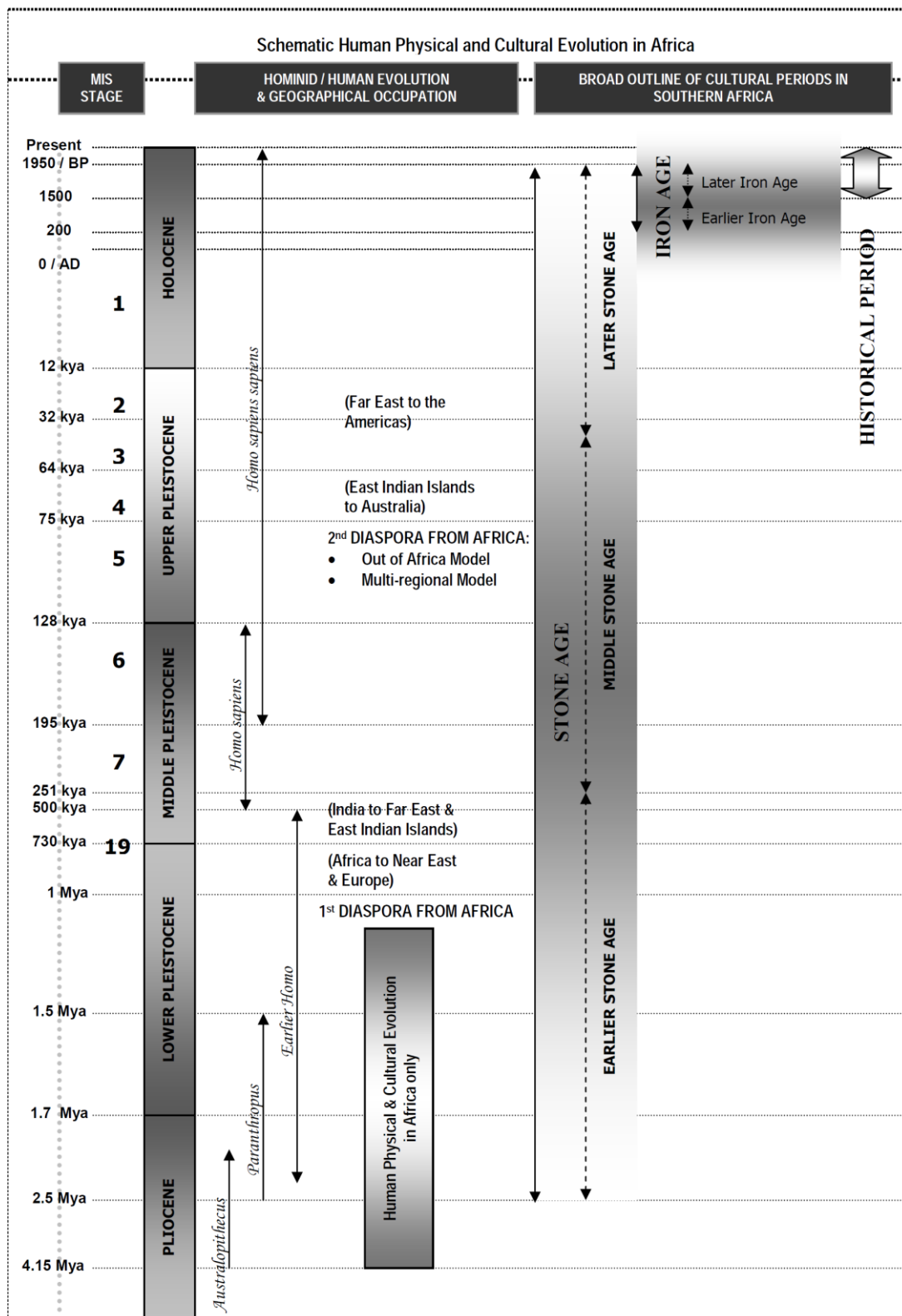


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by SLR Consulting (South Africa) (Pty) Ltd (SLR) to undertake a Heritage Impact Assessment (HIA) for a Section 24G rectification application under the National Environmental Management Act No. 107 of 1998 (NEMA), for the unauthorised activities that took place at the Mamatwan Mine (MMT) (forms part of the legal entity Hotazel Manganese Mines (Pty) Ltd). The MMT is located approximately 25km to the south of Hotazel in the John Taolo Gaetsewe District Municipality and Joe Morolong Local Municipality of the Northern Cape Province of South Africa

1.1 Scope of the Study

The aim of the study was to identify the potential impact on heritage resources from the establishment of north eastern topsoil stockpile and the use of Adams pit for the disposal of general waste (old and used conveyors and metal) and the storage of Sinter de-dust stored in de-dust bags from the Sinter plant that has already commenced.

1.2 Specialist Qualifications

This HIA Report was compiled by PGS.

The staff at PGS has a combined experience of nearly 40 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).

1.3 Assumptions and Limitations

The findings are based on the fact that the 24G rectification application addressed already disturbed areas. Assumptions are based on the knowledge and background information related to the larger area of Hotazel.

1.4 Legislative Context

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

South32 operates the opencast manganese Mamatwan Mine (MMT) (forms part of the legal entity Hotazel Manganese Mines (Pty) Ltd) located approximately 25km to the south of Hotazel in the John Taolo Gaetsewe District Municipality and Joe Morolong Local Municipality of the Northern Cape Province of South Africa (**Figure 2**). MMT holds the following environmental permits and authorisations:

- A Mining right (Reference number: NC 256 MR) issued and approved by the former Department of Minerals and Energy (DME) (currently the Department of Mineral Resources (DMR)) in May 2006;
- An Environmental Management Programme (EMP) (Reference number: NC 6/2/2/118) issued and approved by the former DME (currently the DMR) in November 2005;
- An Air Emissions Licence (AEL) (Licence number: NC/AEL/NDM/ZRH01/2014) issued by the Northern Cape Department of Environment and Nature Conservation (DENC) in March 2015;
- An amended Integrated Water Use Licence (IWUL) (License number: 10/D41K/KAGJ/1537) issued by the Department of Water and Sanitation (DWS) in January 2012;
- A Waste Permit (Permit number: B33/2/441/21/P157) for the development and operation of a decommissioned general waste disposal site issued by the former Department of Water Affairs and Forestry (currently DWS) in February 1995; and
- An Environmental Authorisation (Reference number: NC/KGA/HOT3/07) for bulk fuel storage issued by former Department of Tourism, Environment and Conservation (currently DENC) in July 2007.

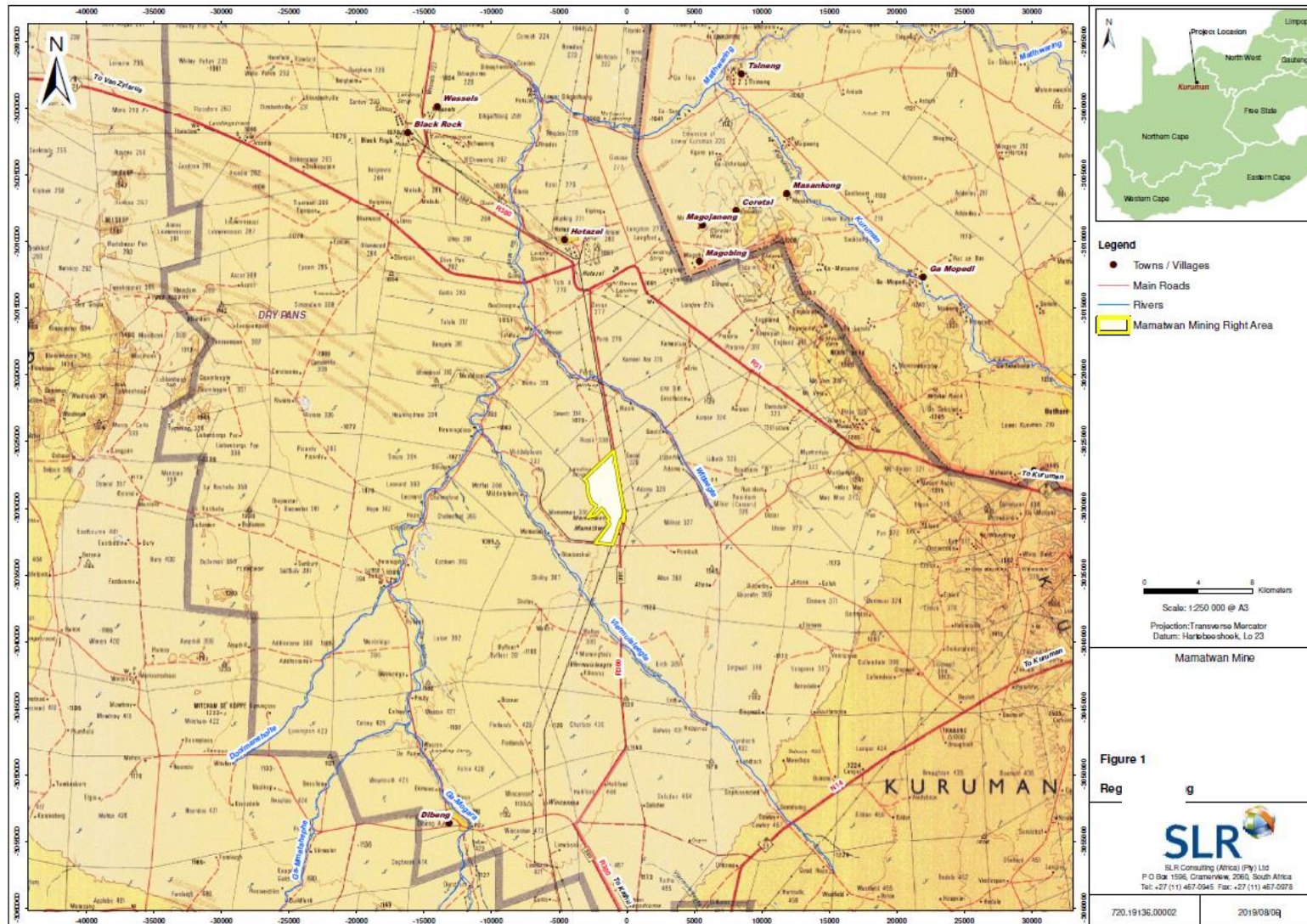


Figure 2 – Regional setting of study area

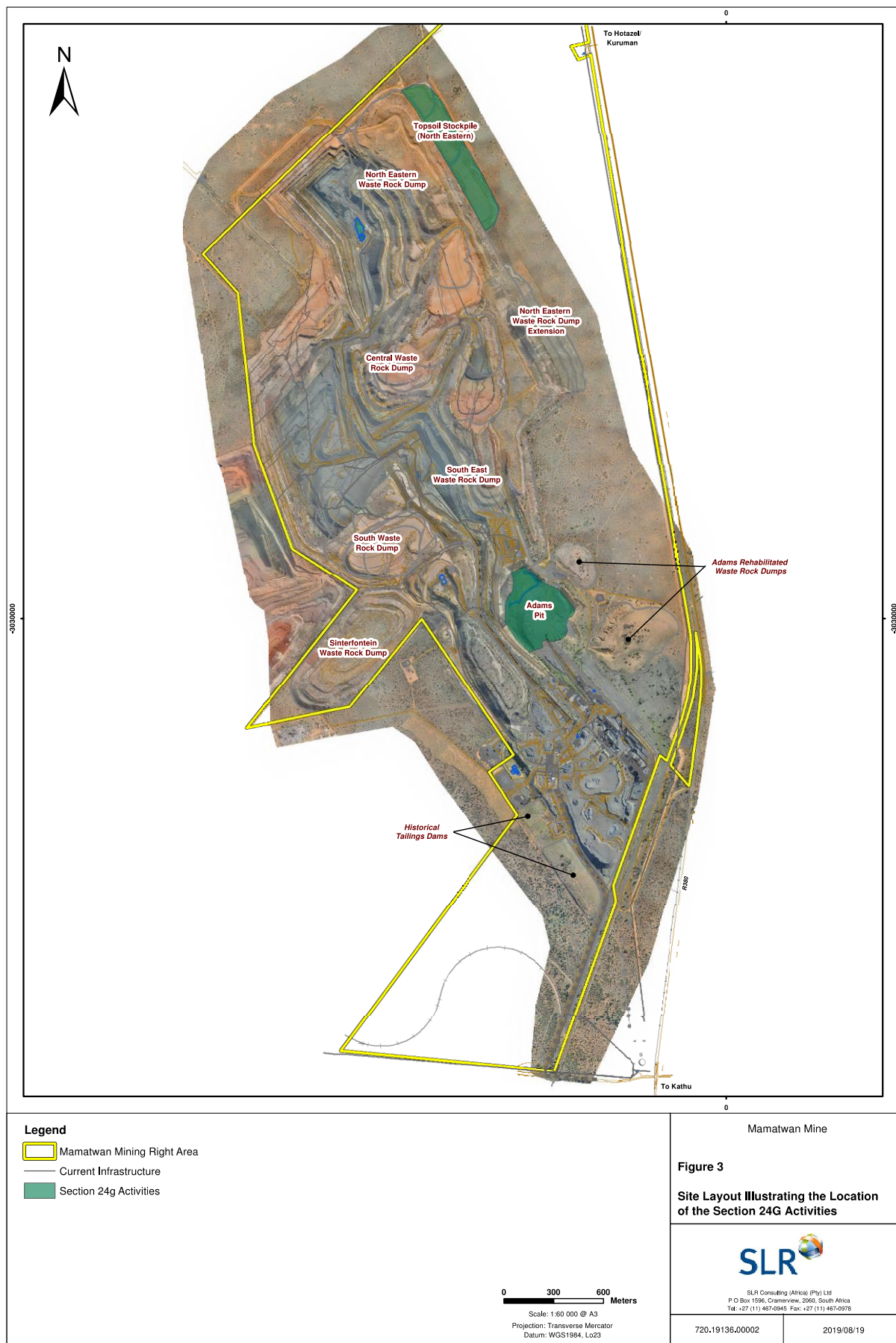


Figure 3 – Section 24G activities

2.1.1 Adams Pit

Adams pit was/is currently utilised for the following:

- Disposal of general waste, which included old and used conveyors and metal – This forms part of current mine practices; and
- Storage of Sinter de-dust stored in de-dust bags from the Sinter plant – This forms part of current mine practices.

It is estimated that the use of Adams pit for the storage of Sinter de-dust commenced in 2010. It is unclear as to when the disposal of general waste commenced.

2.1.2 The establishment of a north eastern topsoil stockpile

The approved 2005 EMPr makes provision for the storage of topsoil on a topsoil stockpile. The approved 2005 EMPr however does not make provision for the establishment of a north eastern topsoil stockpile on the east of the north eastern waste rock dump. The establishment of the north eastern topsoil stockpile commenced in May 2015 and required the clearing of indigenous vegetation.

2.1.3 In summary

The establishment of the north eastern topsoil stockpile and the use of Adams pit for the disposal of general waste and storage of Sinter de-dust commenced without authorisation in terms of the National Environmental Management Act No. 107 of 1998 (NEMA). Under the NEMA the unlawful commencement of an activity may be authorised through an application for rectification made in terms of Section 24G of the NEMA.

3 CURRENT STATUS QUO

3.1 Previous studies

Various heritage and palaeontological studies have been done since 2005 on the original Mamatwan mine as well as all the expansions since.

- 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: Ntsimbinthle 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.
- 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

The MMT is an operational mine and has been for the past 60 years. Mining has transformed the landscape (**Figure 4 & Figure 5**). The Adams pits and new north eastern topsoil stockpile are part of the existing mine infrastructure footprint and was established on a previously undisturbed areas.



Figure 4 – View of developed nature of parts of the site

Figure 5 – View of existing overburden dumps

3.2 Archival findings

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

3.2.1 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 Gool 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 Vlermuistlaagte, 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.**

3.3 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).

3.3.1 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).

3.3.2 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).

3.3.3 *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 Tlhaping Sotho-Tswana peoples occupied the mine in 1801 (Thackeray *et al.* 1983).

3.3.4 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.

3.4 Aspects of the area’s history as revealed by the archival/desktop study

3.4.1 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).

3.4.2 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 6 - "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 Moffat 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).

3.4.3 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 7 – “Tlhaping women cultivating gardens and singing” One of the sketches appearing in Dr. Andrew Smith’s journal (Lye, 1975:171).

3.4.4 *The Journey of Lichtenstein (1805)*

After crossing the Orange River in the vicinity of present-day Prieska, Lichtenstein's party visited present-day Danielskuil, 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 herdsman 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 Muliawang 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.

3.4.5 *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 Moffat 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.

3.4.6 *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).

3.4.7 *Situation at the beginning of the 19th century*

When Reverend Robert Moffat 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 Moffat 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).

3.4.8 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).

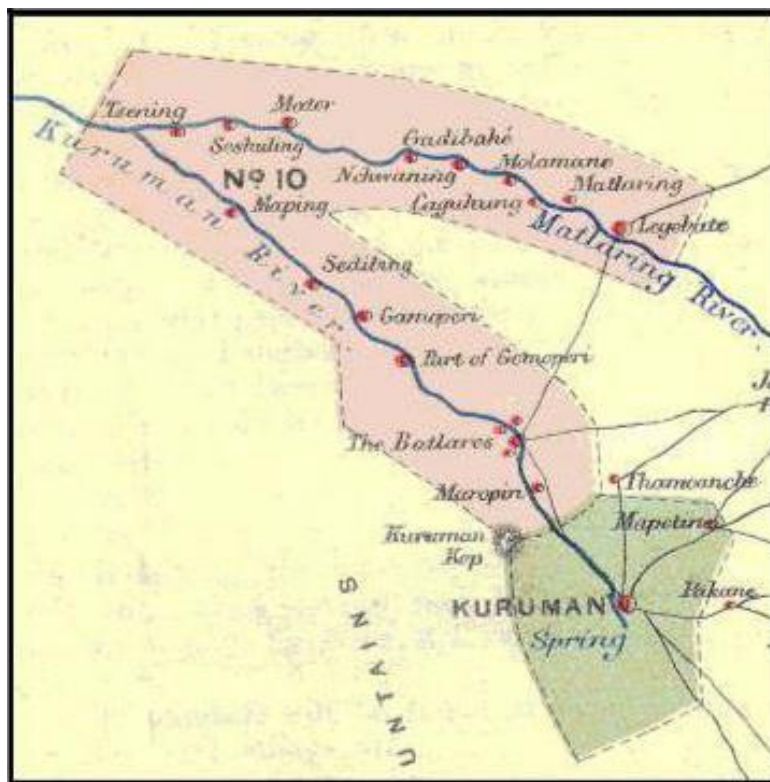


Figure 8 - Map showing the original demarcation of the Lower Kuruman Native Reserve

3.4.9 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 9 - 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.

3.4.10 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 10 - "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 PALAEOLOGY

Previous studies completed by palaeontologist Elize Butler (2017 and 2019) found that, the mine is completely underlain by the Late Caenozoic Kalahari Formation (**Figure 11**). The site is completely underlain by claystone, calcrete and dune sand of the Cretaceous to Tertiary Kalahari Formation. In the literature no literature record could be found of fossils from the Kalahari Formation close to Hotazel. Palaeontological evidence is thus restricted to a few pseudo-bone structures that are preserved in the limestone (Groenewald, 2010) and no evidence of any fossil material was collected from the rest of the Kalahari Formation.

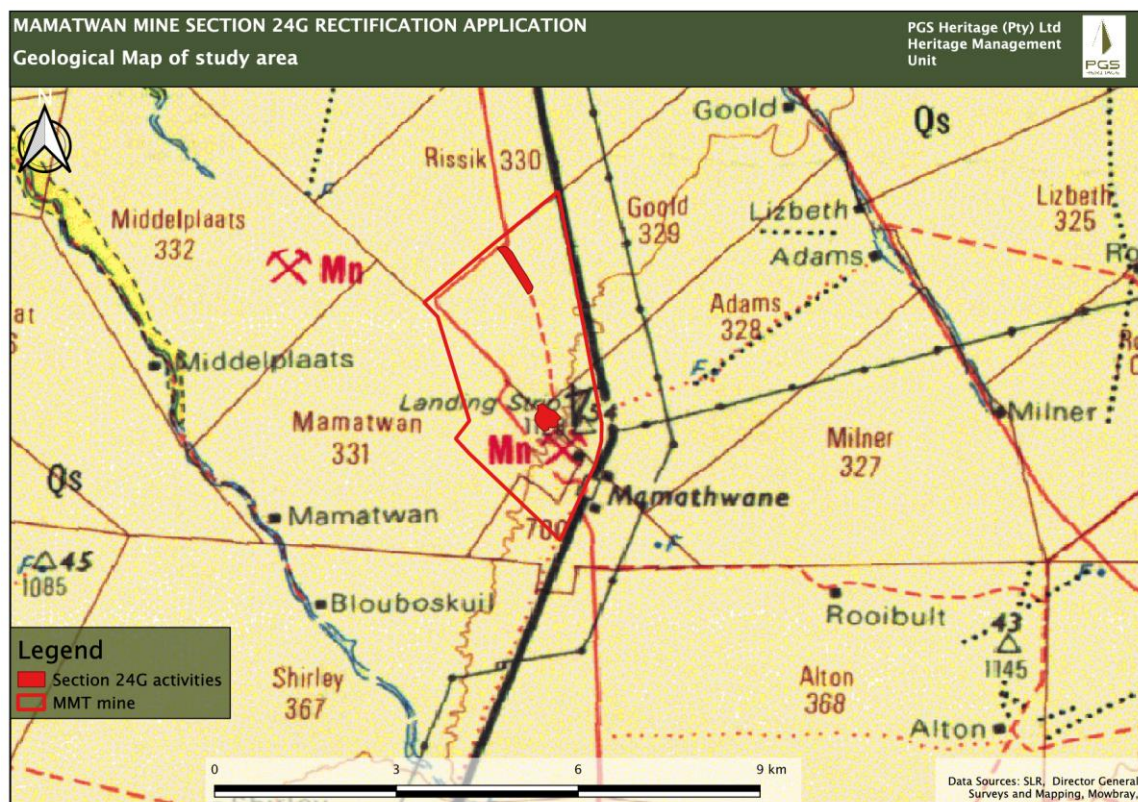


Figure 11 - Extract from the 1: 250 000 2722 Kuruman geological map (Council of Geoscience, Pretoria). The surface geology of the MMT mine.

Legend to Map and short explanation.

Qs – Red to flesh-coloured wind-blown sand (beige). Kalahari Group. Quaternary.

Mining Activities

AK – Crocodolite

Ki – Kieselguhr

Mn – Manganese

Thus, in Palaeontological terms the significance is rated as low negative. The waste disposal and establishment of the north eastern topsoil stockpile that have occurred and being addressed with the 24G rectification application was thus unlikely to pose a substantial threat to local fossil heritage.

5 IMPACT ASSESSMENT

The impact assessment rating is based on the rating scale as contained in **Appendix B and C**.

The assessment of the possibility of impacting on heritage resources by the disposal of waste in the existing Adams pit as well as the establishment of the north eastern topsoil stockpile was assessed. The baseline impacts are considered to be insignificant for heritage resources including palaeontological resources.

Impact	Intensity	Duration	Extent	Consequence	Probability	Significance
Impact on heritage resources	Negligible disturbance	Long term	Part of the property		Unlikely	
	Very low	Very high	Very low	Low	Very Low	Insignificant

6 CONCLUSIONS AND RECOMMENDATIONS

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. This report focusses expressly on the facilities included under the S24G application (disposal of general waste (old and used conveyors and metal) and the storage of Sinter de-dust stored in de-dust bags from the Sinter plant into the existing Adams Pit and the establishment of the north eastern topsoil stockpile - **Figure 3**). Other management measures as listed and required in other HIA's conducted for the MMT project must still be implemented for other heritage features identified in the larger mining area.

6.1 Palaeontology

In Palaeontological terms the significance is rated as low negative. The waste disposal and establishment of the north eastern topsoil stockpile that have occurred and being addressed with the 24G rectification application was thus unlikely to pose a substantial threat to local fossil heritage.

6.2 General

It is our considered opinion that the disposal of general waste (old and used conveyors and metal), the storage of Sinter de-dust stored in de-dust bags from the Sinter plant into the existing Adams pit and the establishment of the north eastern topsoil stockpile had no impact on heritage resources.

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Appendix A

Heritage Assessment Methodology

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

Step I – Literature Review - The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey - A physical survey was conducted predominantly by foot within the proposed areas by two qualified archaeologists, which 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.

The significance of identified heritage sites are based on four main criteria -

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
 - Low - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²
- Uniqueness; and
- Potential to answer present research questions.

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

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or relocate development activity position;

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site.

Impacts on these sites by the development will be evaluated as follows -

Site Significance

Site significance classification standards prescribed by the SAHRA (2006) and approved by the ASAPA for the Southern African Development Community (SADC) region, were used for the purpose of this report (**Table 2**).

Table 2 - Site significance classification standards as prescribed by SAHRA.

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

Appendix B

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	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours

EXTENT of impacts	H	Local area, extending far beyond site boundary.
	VH	Regional/National

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

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

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

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

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	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	VVH
CONSEQUENCE							

Appendix C
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 and the Democratic Republic of the Congo.