# S. BOTHMA AND SON TRANSPORT (PTY) LTD SAND WORKS

# PROPOSED TRANSPORT SAND MINING/ INTEGRATED WATER USE LICENCE APPLICATION ON THE REMAINDER PORTION OF THE FARM BOSCHBANK 12, NEAR SASOLBURG, METSIMAHOLO LOCAL MUNICIPALITY, FEZILE DABI DISTRICT MUNICIPALITY, FREE STATE PROVINCE

**HERITAGE ASSESSMENT**

**Issue Date:** 02 October2017

**Revision No.:** 1.0

**Project No**.: 266HIA

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Reg No 2003/008940/07

## 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 (delete whichever is not applicable)*

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

**HERITAGE CONSULTANT:** PGS Heritage (Pty) Ltd

**CONTACT PERSON:** Wouter Fourie

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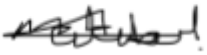
**SIGNATURE:** _____

| | | | |
|---|---|---|---|
| **Report Title** | Heritage Impact Assessment for the Proposed Integrated Water Use Licence Application on the Remainder Portion of the farm Kwaggafontein 8 IT, near Vereeniging, Metsimaholo Local Municipality, Fezile Dabi District Municipality, Free State Province. | | |
| **Control** | **Name** | **Signature** | **Designation** |
| **Author** | **I Smeyatsky** |  | **Archaeologist** |
| | **A Matabane** |  | **Archaeologist** |
| **Reviewed** | **W Fourie** |  | **Heritage Specialist/Project Sponsor** |

**ACKNOWLEDGEMENT OF RECEIPT**

**CLIENT:** S. Bothma and Son Sand Transport Mine (Pty) Ltd

**CONTACT PERSON:** Allie Harmse

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**SIGNATURE:** _____

**EXECUTIVE SUMMARY**

PGS Heritage (Pty) Ltd was appointed by S. Bothma and Son Transport Sand Mine to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment of the proposed Integrated Water Use Licence (IWUL) for sand mining activities on the remaining portion of farm Boschbank 12, Fezile Dabi district Municipality, Free-State Province.

The HIA of the proposed Integrated Water Use Licence (IWUL) sand mining activities on the remaining portion of the farm Boschbank 12 has presented that the impacts for heritage will be low. The mitigation measures to follow need to be implemented where the graves should be demarcated with an immediately adjacent barricade, and 20m buffered sand berm. No further mitigation measures are recommended.

The impacts of the mining on palaeontology is also low with recommended mitigation measures stating that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required for the commencement of the mining, pending the discovery or exposure of any fossil remains during the mining phase.

However, if mining should excavate below the alluvial deposits on the property, it is recommended that a professional palaeontologist survey the area and assess any potential exposure of fossil deposits from the underlying substrate. Further, if any fossil deposits are discovered during any phase of mining, the managing body responsible for mining should alert SAHRA (South African Heritage Research Agency) immediately so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

It is my considered opinion, that the absence of heritage resources within the proposed and existing opencast foot print. Along with the judged low negative impact on palaeontological resources as analysed in the palaeontological impact assessment (Baker, 2017) show that the project can continue with the recommended heritage management measures.

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**Terminology and Abbreviations**

*Archaeological resources*

This includes:

i. 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;
ii. 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;
iii. 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:

i. mining, alteration, demolition, removal or change in use of a place or a structure at a place;
ii. carrying out any works on or over or under a place;
iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
iv. constructing or putting up for display signs or boards;

v. any change to the natural or existing condition or topography of land; and

vi. 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

*Holocene*

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

*Late Stone Age*

The archaeology of the last 20 000 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 20 000-300 000 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.

| ABBREVIATIONS | DESCRIPTION |
|---|---|
| **ASAPA** | Association of South African Professional Archaeologists |
| **DEA** | Department of Environmental Affairs |
| **DWS** | Department of Water and Sanitation |
| **EAP** | Environmental Impact Assessment Practitioner |
| **EIA** | Environmental Impact Assessment |
| **ESA** | Early Stone Age |
| **HIA** | Heritage Impact Assessment |
| **I&AP** | Interested & Affected Party |
| **IWUL** | Integrated Water Use Licence |
| **Myr** | Million Years |
| **NEMA** | National Environmental Management Act |
| **NHRA** | National Heritage Resources Act |
| **PGS** | PGS Heritage (Pty) Ltd |
| **SADC** | Southern African Development Community |
| **SAHRA** | South African Heritage Resources Agency |

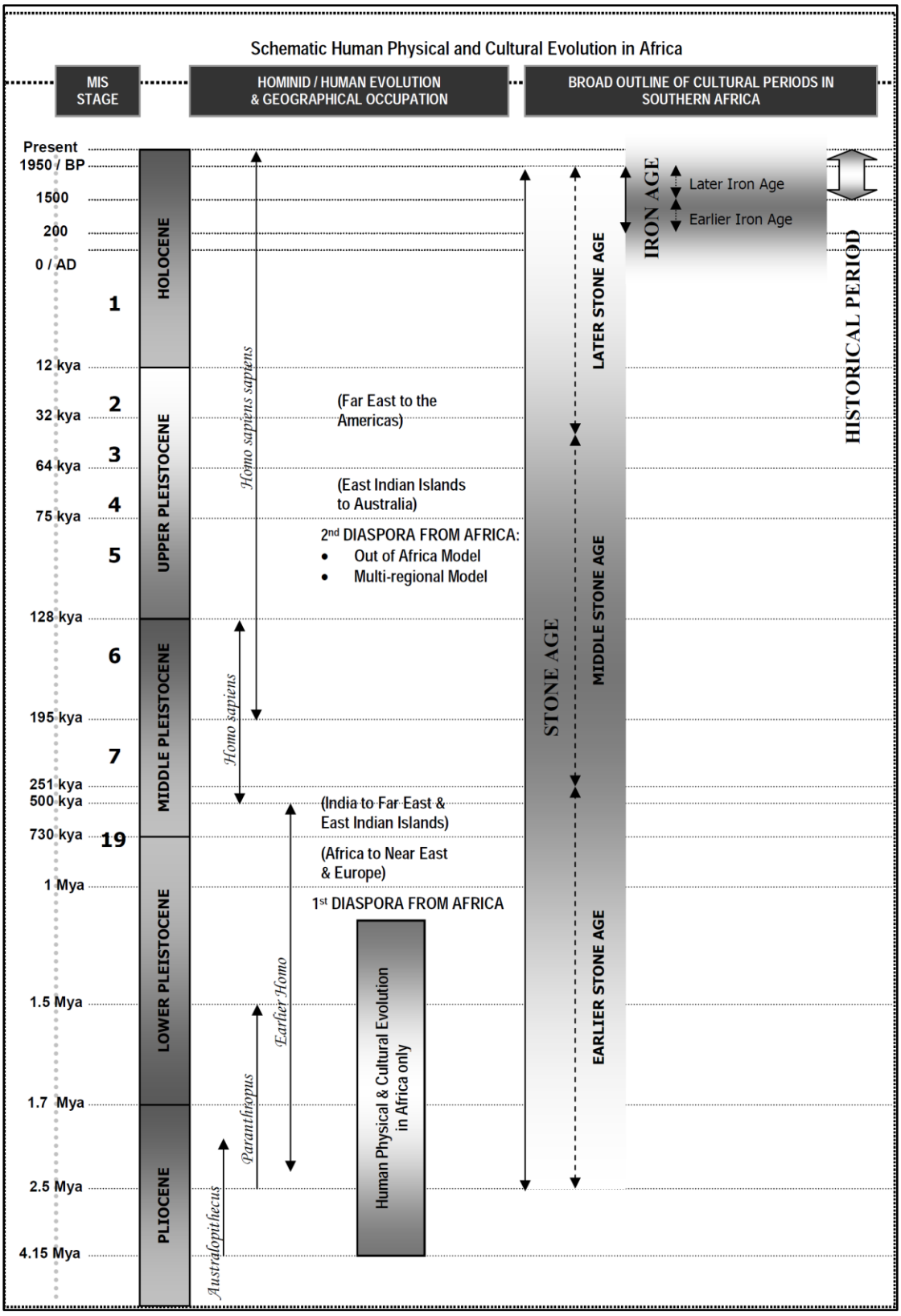


*Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)*

# 1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by S. Bothma and Son Transport Sand Mine, to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) as part of the proposed Integrated Water Use Licence (IWUL) activities on the remainder portion of farm Boschbank 12, near Sasolburg, Metsimaholo Local Municipality, Fezile Dabi District Municipality, Free State Province.

## **1.1** Scope of the Study

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

## **1.2** Specialist Qualifications

This HIA was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 50 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.

Ilan Smeyatsky, holds an MSc in Archaeology and is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA).

Annlin Matabane, holds a BA Honours degree in Archaeology and is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA).

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

Data for the specific area of the Boschbank farm's S. Bothma and Son Transport Sand mine operation is limited and this report has incorporated information from a variety of sources including previous studies undertaken.

The area is heavily degraded and disturbed by current sand mining activities. Although the study area was extensively surveyed by a team of archaeologists, the possibility of subsurface heritage resources cannot be excluded.

### **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:

i. National Environmental Management Act (NEMA), Act 107 of 1998
ii. National Heritage Resources Act (NHRA), Act 25 of 1999
iii. Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

i. National Environmental Management Act (NEMA) Act 107 of 1998
    a. Basic Environmental Assessment (BEA) – Section (23) (2)(d)
    b. Environmental Scoping Report (ESR) – Section (29) (1)(d)
    c. Environmental Impact Assessment (EIA) – Section (32) (2)(d)
    d. Environmental Management Plan (EMP) – Section (34) (b)
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
    a. Protection of Heritage Resources – Sections 34 to 36; and
    b. Heritage Resources Management – Section 38
iii. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002

a. Section 39(3)

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, "no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…" The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA legislation. In the latter cases, the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie W. , 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, "…*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

A study of subsections (23) (2)(d), (29) (1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie W. , 2008).

## 2 TECHNICAL DETAILS OF THE PROJECT

### 2.1 Site Location and Description

| | |
|---|---|
| Location | The S. Bothma and Son Transport Sand Mining Operations are located on the remaining portion of the farm, Boschbank 12. It is situated north of the R59 on the Free-State side of the banks of the Marlbank and Vaal Rivers, just North-West of Sasolburg. Entrances to the mine can be found off of DF Malan Road and Minnar Street. The western border of the farm Boshbank 12, lies on the banks of the non-perennial Leeuspruit river (a Vaal River tributary) (**Figure 2**) |
| Extent of Area | The site is approximately 141 hectares covering an area of 172.86386m$^2$. The site coordinates: 26°47'39.67"S and 27°47'46.55"E. |

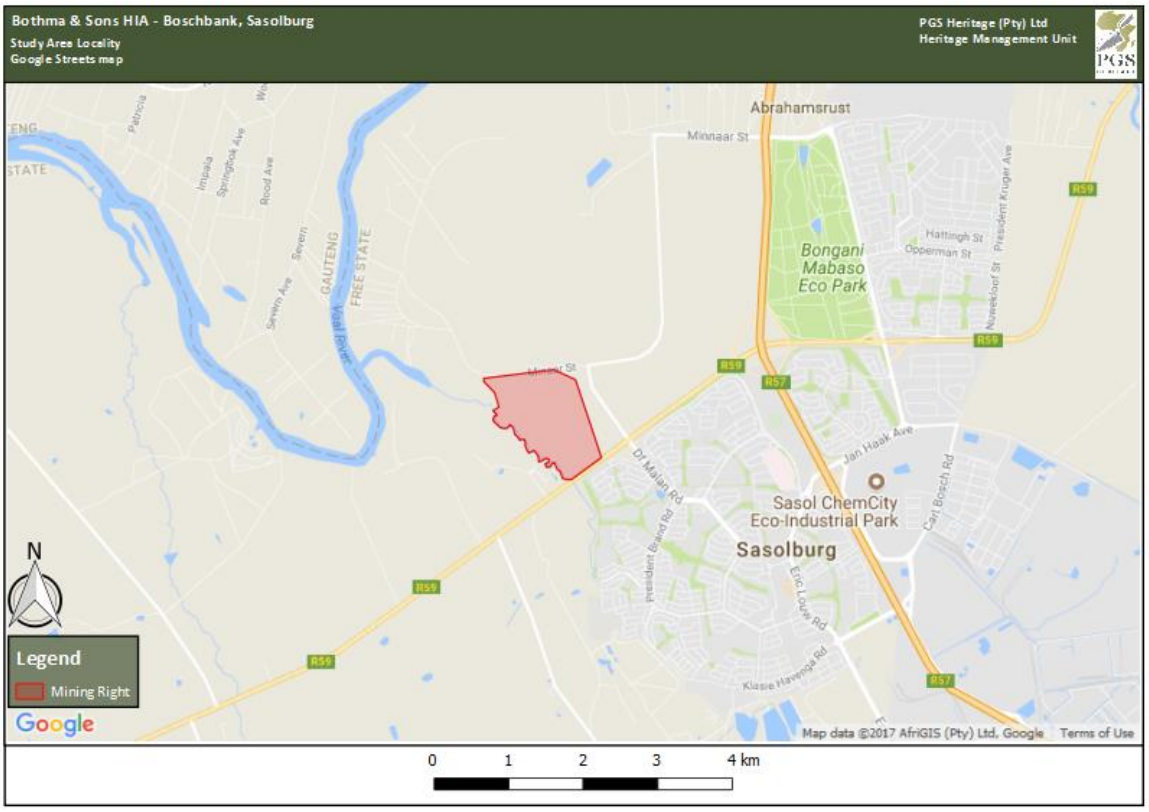


*Figure 2 -Site location of the S. Bothma and Son Transport Sand Mine*

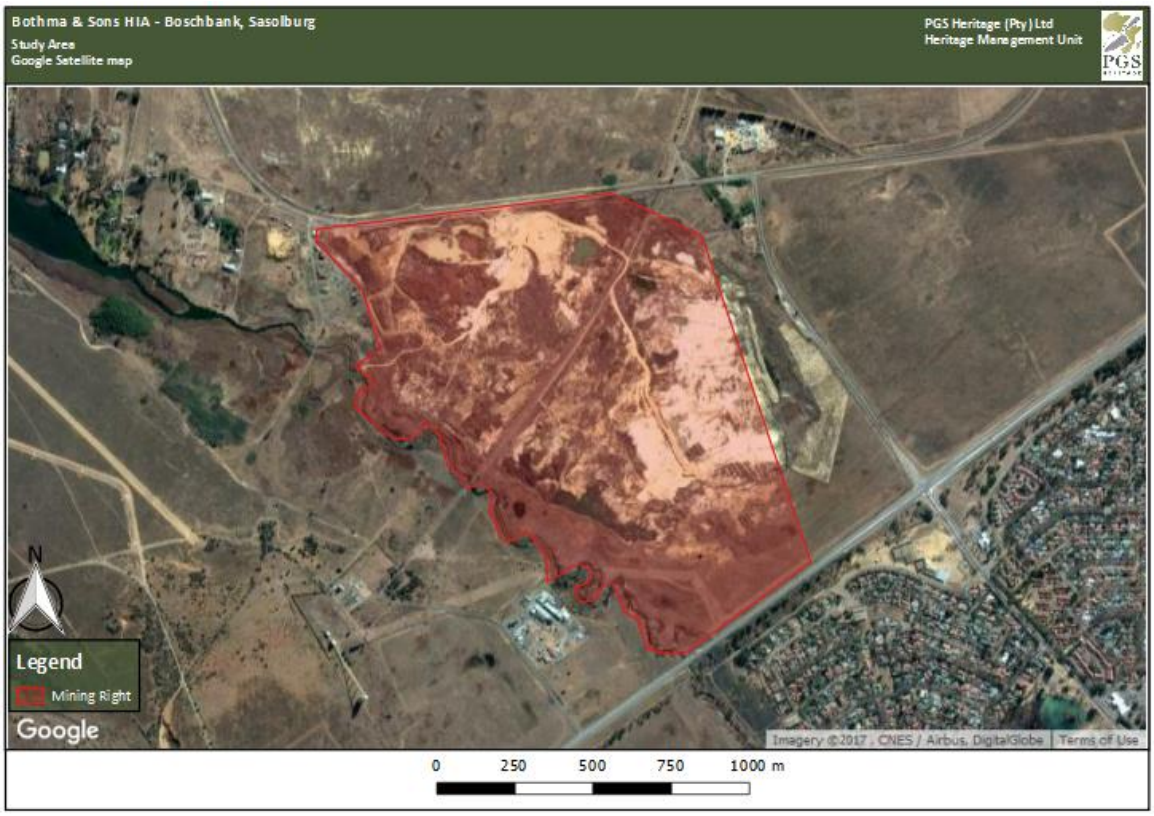


*Figure 3 – Site location*

## **2.2** Technical Project Description

### *2.2.1 Project Background*

PGS was appointed by S. Bothma and Son Transport Sand Mine (Pty) Ltd, who has applied for an Integrated Water Use Licence Application (IWULA). Water will be transported and processed according to the existing mines current infrastructure.

S. Bothma and Son Transport Sand Mine (Pty) Ltd is in possession of two Mining Rights (reference numbers: FS 30/5/1/2/2/ 161 (10014) MR and FS 30/5/1/2/2/239 MR) issued by the Department of Minerals Resources (DMR) under the provisions of the Minerals and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002). These Mining Rights are currently pending a Section 102 application for consolidation thereof. It is understood that the Department of Water and Sanitation (DWS), following a site inspection carried out on the Applicants property, identified that certain water use activities (as per Section 21 of the NWA) were being engaged on the site/ operations and consequently required a Water Use Licence (WUL).

The extension of the proposed mining operations on RE of Boschbank 12, will allow the continued contribution of the mine to favourable economic impacts on both the local and regional economies (EIMS, 2017).

S. Bothma and Son Transport Sand Mine (Pty) Ltd is currently applying to the Department of Water and Sanitation (DWS) for an Integrated Water Use Licence (IWUL), to resume sand mining operations, in accordance with Part 7 of the National Water Act (Act No. 36 of 1998) (NWA) for the following water uses:

- Section 21(a): Taking water from a water resource.
- Section 21(b): Storing water. This refers to the storage of clean / uncontaminated water.
- Section 21(c): Impeding or diverting the flow of water in a watercourse.
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.
- Section 21(i): Altering the bed, banks, course or characteristics of a watercourse. An Integrated Water and Waste Management Plan (IWWMP) will be compiled as supporting documentation to the Integrated Water Use Licence Application (IWULA).

### *2.2.2 Need for the project*

The proposed project entails an Integrated Water Use License for the S. Bothma and Son Transport Sand Mine, located on the Remainder of the Farm Boschbank 12, located near (approximately 5km northwest) the town of Sasolburg in the Fezile Dabi District Municipality area of the Free State Province.

An Integrated Water Use License for the sand mining operations is legally required prior to project continuation. The mining operation on Re of Boschbank is opencast mining (shovel and load), as well as supporting core transportation business with onsite technical support.

The operations will include taking water from a water resource, storage of clean / uncontaminated water, impeding or diverting the flow of water in a watercourse, disposing of waste in a manner which may detrimentally impact on a water resource, and altering the bed, banks, course or characteristics of a watercourse.

Mining operations at the sand mine are conducted by means of sand quarrying strip mining method that makes use of mechanical means of shovel (front end loader and excavator) and load

(conventional truck) operations. The Applicant has been mining sand for more than forty years and on this particular area since the late 1990's on the old mining right order as well as the new order mining right.

In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to any activities it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological (Phase 1) and palaeontological component. Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or view-scapes must also be assessed.

This HIA will identify any heritage resources, assess their significance and make recommendations on their management.

## 3 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

### **3.1** Methodology for Assessing Heritage Site significance

This HIA report was compiled by PGS for the S. Bothma and Son Transport Sand mine, on remainder of Portion farm Boschbank 12. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (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 on foot through the proposed project area by three qualified archaeologists (8 September 2017), aimed at locating and documenting sites falling within and adjacent to the proposed mining footprint.

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

The significance of heritage sites was based on 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 mining activity position;

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

E - Preserve site.

Impacts on these sites by the mining will be evaluated as follows:

### *3.1.1 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 1**).

*Table 1: 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 |

## **3.2** Methodology for Impact Assessment

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations (2010). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/likelihood (P) of the impact occurring. This determines the environmental risk. In addition other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). Please note that the impact assessment must apply to the identified Sub Station alternatives as well as the identified Transmission line routes.

### *3.2.1 Determination of Environmental Risk:*

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R)}{4} \times N$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in **Table 2**.

*Table 2: Criteria for Determining Impact Consequence*

| Aspect | Score | Definition |
|---|---|---|
| Nature | - 1 | Likely to result in a negative/ detrimental impact |
| | +1 | Likely to result in a positive/ beneficial impact |
| Extent | 1 | Activity (i.e. limited to the area applicable to the specific activity) |
| | 2 | Site (i.e. within the mining property boundary), |
| | 3 | Local (i.e. the area within 5 km of the site), |
| | 4 | Regional (i.e. extends between 5 and 50 km from the site |
| | 5 | Provincial / National (i.e. extends beyond 50 km from the site) |
| Duration | 1 | Immediate (<1 year) |
| | 2 | Short term (1-5 years), |
| | 3 | Medium term (6-15 years), |
| | 4 | Long term (the impact will cease after the operational life span of the project), |
| | 5 | Permanent (no mitigation measure of natural process will reduce the impact after mining). |
| Magnitude/ Intensity | 1 | Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected), |
| | 2 | Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected), |
| | 3 | Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way), |
| | 4 | High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or |
| | 5 | Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease). |
| Reversibility | 1 | Impact is reversible without any time and cost. |
| | 2 | Impact is reversible without incurring significant time and cost. |
| | 3 | Impact is reversible only by incurring significant time and cost. |
| | 4 | Impact is reversible only by incurring prohibitively high time and cost. |
| | 5 | Irreversible Impact |

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/scored as per **Table 3**.

*Table 3: Probability Scoring*

| | | |
|---|---|---|
| **Probability** | 1 | Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%), |
| | 2 | Low probability (there is a possibility that the impact will occur; >25% and <50%), |
| | 3 | Medium probability (the impact may occur; >50% and <75%), |
| | 4 | High probability (it is most likely that the impact will occur- > 75% probability), or |
| | 5 | Definite (the impact will occur), |

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

**ER= C x P**

*Table 4: Determination of Environmental Risk*

| | | | | | | |
|---|---|---|---|---|---|---|
| **Consequence** | 5 | 5 | 10 | 15 | 20 | 25 |
| | 4 | 4 | 8 | 12 | 16 | 20 |
| | 3 | 3 | 6 | 9 | 12 | 15 |
| | 2 | 2 | 4 | 6 | 8 | 10 |
| | 1 | 1 | 2 | 3 | 4 | 5 |
| | | 1 | 2 | 3 | 4 | 5 |
| | | **Probability** | | | | |

*The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 5.*

*Table 5: Significance Classes*

| **Environmental Risk Score** | |
|---|---|
| **Value** | **Description** |
| < 9 | Low (i.e. where this impact is unlikely to be a significant environmental risk), |
| ≥9; <17 | Medium (i.e. where the impact could have a significant environmental risk), |
| ≥ 17 | High (i.e. where the impact will have a significant environmental risk). |

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

### *3.2.2 Impact Prioritisation*

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented in the Section above it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective mining and consequent potential impacts is considered in the decision making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

*Table 6: Criteria for Determining Prioritisation*

| | | |
|---|---|---|
| **Public response (PR)** | Low (1) | Issue not raised in public response. |
| | Medium (2) | Issue has received a meaningful and justifiable public response. |
| | High (3) | Issue has received an intense meaningful and justifiable public response. |
| **Cumulative Impact (CI)** | Low (1) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change. |
| | Medium (2) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change. |
| | High (3) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change. |

| | | |
|---|---|---|
| **Irreplaceable loss of resources (LR)** | Low (1) | Where the impact is unlikely to result in irreplaceable loss of resources. |
| | Medium (2) | Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited. |
| | High (3) | Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions). |

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 11. The impact priority is therefore determined as follows:

**Priority = PR + CI + LR**

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (Refer to **Table 7**).

*Table 7: Determination of Prioritisation Factor*

| Priority | Ranking | Prioritisation Factor |
|---|---|---|
| 3 | Low | 1 |
| 4 | Medium | 1.17 |
| 5 | Medium | 1.33 |
| 6 | Medium | 1.5 |
| 7 | Medium | 1.67 |
| 8 | Medium | 1.83 |
| 9 | High | 2 |

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but

there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

*Table 8: Final Environmental Significance Rating*

| Environmental Significance Rating | |
|---|---|
| **Value** | **Description** |
| < 10 | Low (i.e. where this impact would not have a direct influence on the decision to develop in the area), |
| ≥10 <20 | Medium (i.e. where the impact could influence the decision to develop in the area), |
| ≥ 20 | High (i.e. where the impact must have an influence on the decision process to develop in the area). |

# 4 BACKGROUND STUDY

## 4.1 Archival findings

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

### *4.1.1 Archival/historical maps*

Historical topographic maps were available for utilisation in the study:

- Topographical map 2627DD – First edition 1948. The aerial photography on which the map was based dates to 1948 and its survey work was undertaken in 1948. It was drawn in 1953 by the Trigonometrical Survey Office.

### *4.1.2 Topographical Maps 2627DD (First Edition)*

The maps were utilised to identify structures that could possibly be older than 60 years and thus protected under Section 34 and 35 of the NHRA. No structures are identified in this area.

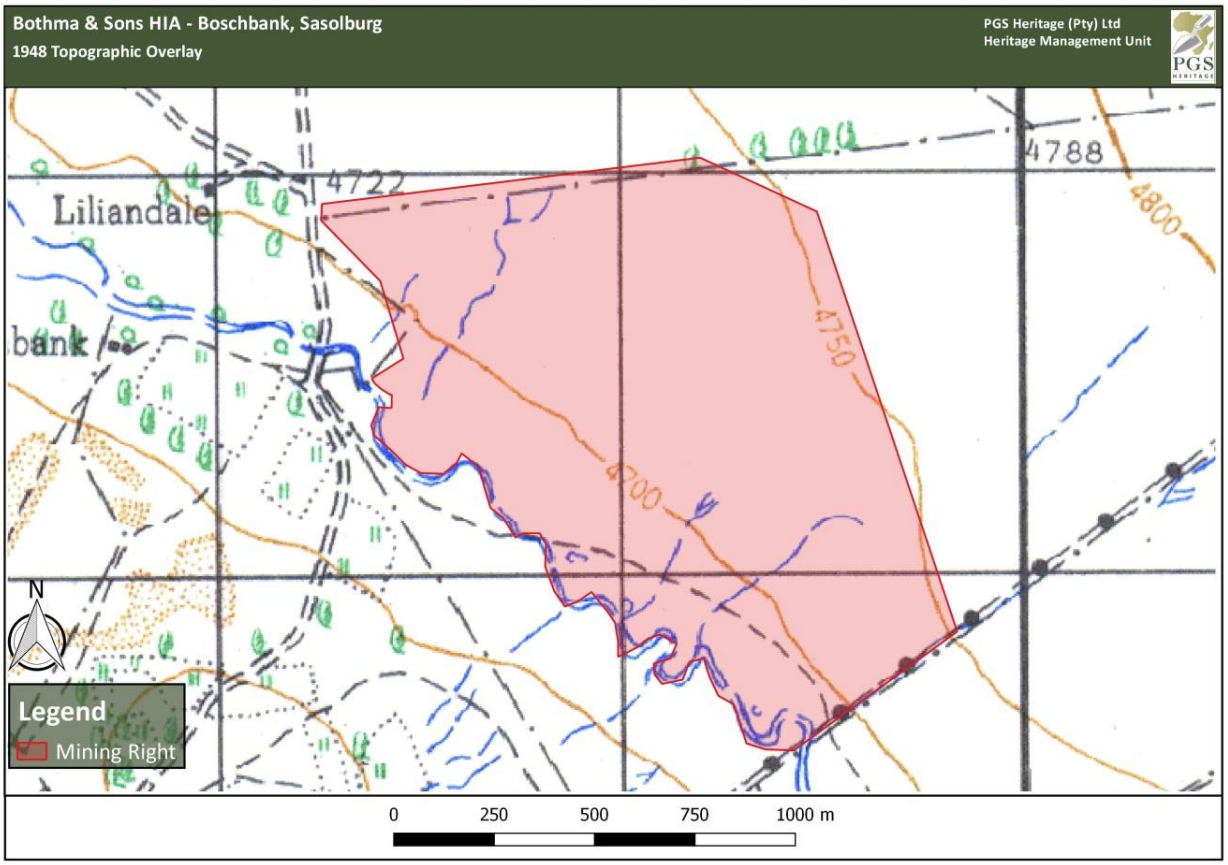


*Figure 4 – 1948 Topographic Map showing no heritage features present within the study area*

## **4.2** Aspects of the area's history

### *4.2.1 Previous Studies*

A search on the South African Heritage Resources Information System (SAHRIS) (**http://www.sahra.org.za/sahris**), has identified Heritage Impact Assessments conducted in and around the study area, as well as several other previous archaeological or historical studies had been performed within the wider vicinity of the study area. A selection of previous studies for the area in the APM Report Mapping Project are listed in chronological order:

- Nel, J. 2013. Heritage Statement Report for the SASOL Mining Sigma Colliery Ash Backfilling Project, Sasolburg, Free State Province, Digby Wells and Associates Pty (Ltd).

- Van der Walt, J. 2009. Archaeological Impact Assessment (AIA) on a portion of the Farm Boschbank 12, Sasolburg, Free State Province, WITS Commercial Enterprises (Pty) Ltd.

- van Schalkwyk, I., Naude M., Smith S. 1996. A survey report on the cultural resources in the proposed Sigma Colliery North West Stripmine, Sasolburg District, Free State Province. National Cultural History Museum of South Africa.

### *4.2.2 Archaeological Literature*

The Free State province is known to be rich in archaeological sites that tell the story of humans and their predecessors in the region going back some 1,7 million years (Delius & Hay, 2009). The pre-colonial period is divided broadly into the Stone Age and the Iron Age (**Figure 1**).

The Stone Age refers to the earliest people of South Africa who relied mainly on stone for their tools and were hunter-gatherers. This period is divided into the Early, Middle and Later Stone Age:

- *Early Stone Age:* The period from ± 2.5 million yrs. - ± 250 000 yrs. ago. Acheulean stone tools are dominant.
- *Middle Stone Age*: Various stone tool industries in SA dating from ± 250 000 yrs. – 40 000 yrs. before present.
- *Later Stone Age:* The period from ± 40 000 yrs. before present to the period of contact with either Iron Age farmers or European colonists. (Delius & Hay, 2009; Morris, 2008)

The Iron Age as a whole represents the spread of Bantu speaking people whose way of life was pastoral-agricultural and includes both the Pre-Historic and Historic periods. As indicated by the name, this period is distinguished by the knowledge of extraction and use of various metals, mainly iron. Similarly, to the Stone Age, it can also be divided into three periods:

- *The Early Iron Age:* Most of the first millennium AD.
- *The Middle Iron Age*: 10th to 13th centuries AD
- *The Late Iron Age:* 14th century to colonial period. (Delius & Hay, 2009; Morris, 2008)

*Table 9 -Archaeological & Historical Sequence*

| DATE | DESCRIPTION |
|---|---|
| ~3.2 million to 250 000 years ago | The Earlier Stone Age (ESA) is the oldest techno-complex identified in the African archaeological record, which is comprised of three industries: 1) Lomekwian, 2) Oldowan and 3) Acheulean. The Lomekwian industry (3.2 Myr) is associated with percussive tools and large flakes although it is only found at a single site in West Turkana, Kenya. The Oldowan industry (2.6 – 1.5 Myr) is found in East and South Africa and characterised by expedient yet organised flaking systems, with primarily core- and flake-based assemblages. Finally, the Acheulian industry (1.7 Myr – 250 kyr) is the last ESA industry to develop, comprised by Large Cutting Tools (i.e. handaxes and cleavers) and organised core reduction (i.e. Levallois). |

| | |
|---|---|
| | Several Acheulean-bearing sites have been identified from the area around Meyerton, mostly concentrated towards Vereeniging, (Fourie W. , 2017), none were identified on the property. |
| >250 000 to 40 000 years ago | The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley 2013).<br>No MSA stone tools were identified on the property. |
| ~40 000 years ago to 2 000 | The Later Stone Age (LSA) is associated with an abundance of very small stone tools known as microliths.<br>One identified LSA site has been found in the region of Meyerton (Huffman, 2008), although no archaeological work has been carried out in this area. |
| ~2 000 years ago to 1800's | The Iron Age is the archaeology of the last 2000 years up to the 1800s, associated with ironworking and farming activities such as herding and agriculture.<br>Several Iron Age sites have been identified in the Meyerton region (Huffman, 2008), although no archaeological research has been conducted on these localities. |

### *4.2.3 Surveys/ Assessments*

The archaeological literature does not contain much information on the Stone Age archaeology of this area, since this period has not been researched extensively in the Free-State (Esterhuysen & Smith, 2007). However, it is clear from the general archaeological record that the larger Free-State region has been inhabited by humans since Earlier Stone Age (ESA) times. Although no Stone Age sites are known from the immediate vicinity of the study area, there are some sites recorded in the greater region (Fourie W. , 2017).

The report by (Fourie W. , 2017) on the surrounding region, identified several sites near Vereeniging and Meyerton, that largely deals with preserved Large Cutting tools (LCTs) from the Acheulean Industry. Fieldwork findings included major stone tool materials utilized in Acheulean assemblages. Characteristic Acheulean LCTs were discovered, including hand axes and cleavers, yet detailed descriptions of this assemblage have not been provided. Most of the Acheulean implements are rolled, although the Fauresmith, MSA and LSA assemblages are in a relatively un-weathered condition (van der Elst 1950).

In 1996 van Schalkwyk, *et al*. conducted a survey to locate, identify, evaluate and document sites, objects and structures of archaeological, historical and cultural importance within the boundaries of the proposed mining area. Along with two Iron Age stone walled settlement sites identified in the area; a number of quartzite MSA tools were found. However, in all cases the artefacts were disturbed and completely out of context due to agricultural and road mining activities. Two cemeteries, containing approximately 120 graves in total, with no identifiable headstones, were also noted.

Recommendations included the three archaeological sites being assessed to be of little significance and did not prevent the mining operation from continuing, or require modification of the project design. The two cemeteries, were effectively relocated. Although the greater region may have high archaeological significance, the surrounding area's historical significance is arguably mentionable.

### *4.2.4 Surrounding Area's history*

The 'Vaal-triangle' towns include Vanderbijlpark, Vereeniging and Sasolburg. The study area is located 14km south-west of Vereeniging and 12km south of Vanderbijlpark, on the Free State side of the Vaal river (**Figure 3**).

#### *4.2.4.1* **Political History of Sasolburg**

Sasolburg attained official town status in 1967 and owes its name to being established as a state-owned company, "Suid-afrikaanse steenkool-, olie- en gasmaatskappy" or the "South African coal, oil and gas company/corporation" SASOL, in 1950.

Sasolburg was the subject of an attack by Umkhonto weSizwe (MK) – the African National Congress's military wing, on 2 June 1980. (*Source: SAHistoryOnline-Accessed:2017*) The MK bombed two strategically important SASOL (oil-from-coal) plants and an oil refinery. The attacks were largely ineffectual in terms of sabotaging the manufacturing processes of the Sasol plants. Other attacks were organised by Solomon Mahlangu of the Umkhonto weSizwe Special Operations, 'Catch a fire' movie was made recently about these events (*Source: SAHistoryOnline-Accessed:2017*).

### *4.2.5 Palaeontological Background*

The area outside the Boschbank Farm is dominated by sandstone, with interbedded coal deposits of the Vryheid Formation of the Ecca Group in the Karoo Supergroup (Johnson et al., 2006). The Ecca Formation is under- and overlain by the Pietermaritzburg and Volksrust Formations respectively, both of which are argillaceous (comprised of clays) and interdigitate into the Vryheid (**Figure 5**). The Ecca Group Formation is Permian (~300 – 260Ma) in age and has preserved important trace fossils including *Diplocraterion parallelum, Skolithos, Monocraterwn, Scalaruuba*, *Siphonichnus eccaensis* and *Glossopteris* flora (see Anderson and McLauchlan, 1976; Bamford, 2004). The Upper Ecca (which includes the Vryheid) Formation only preserves one of the two large

leaf form taxa for *Glossopteris*, namely *Gangamopteris*. A further extensive review of the plant fossils can be read in Bamford (2004).

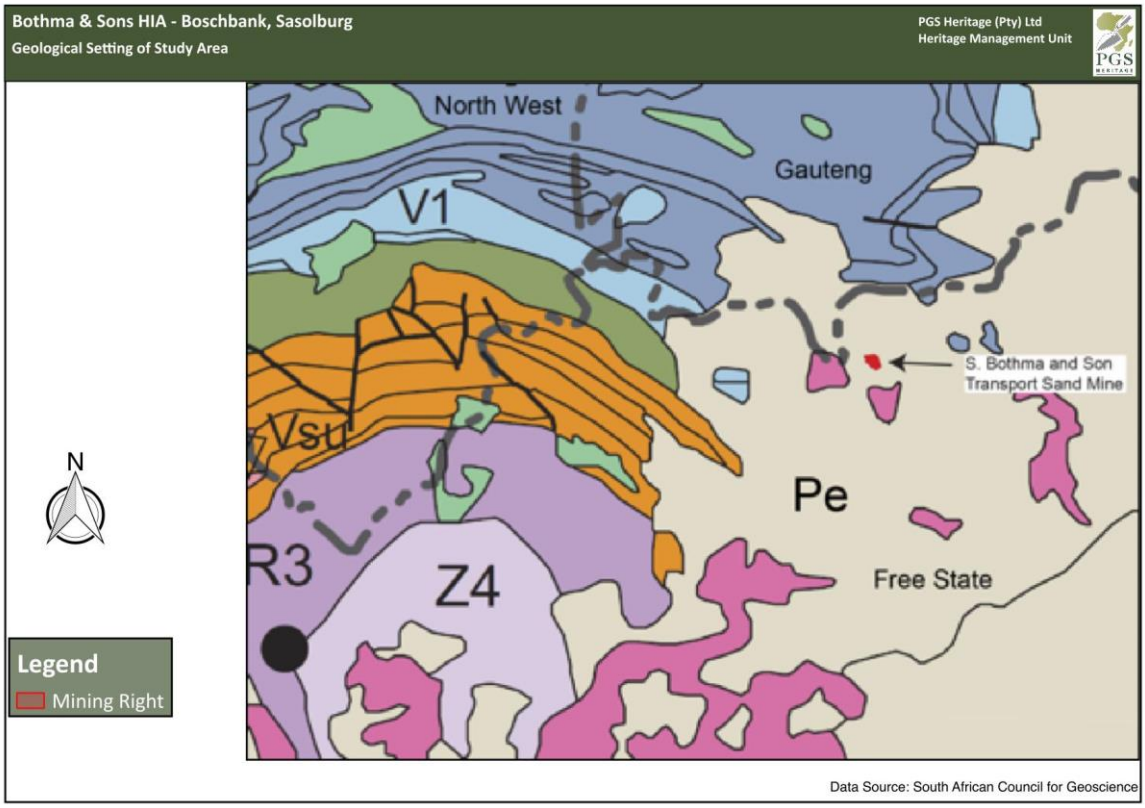


*Figure 5- Geological setting of study area (From Baker, 2017)*

## **4.3** Findings of the Heritage background study

The archival research, topographic maps and site survey yielded no heritage features. A search of the SAHRIS (SA Heritage Resources Information System) database identified the following Heritage Impact Assessment (HIA) and Archaeological Impact Assessment (PIA) reports for the study area and general surrounding region:

1. In 2009 van der Walt, J compiled an assessment of the study area for a proposed subdivision on the farm Boschbank 12, District Parys, Sasolburg, Free State, and found the following:
    - The area is characterised by undermining and several existing houses next to the river. The study area of approximately 37 ha was surveyed over a period of one day, by means of vehicle and extensive surveys on foot.

- Although a large burial ground was identified as the only heritage site on a portion of the farm Boschbank No. 12, this burial site was not fond upon survey of the study area. This assessment located no heritage features.
- A Mr. Kerneels Rossouw was consulted about the history of the farm. The property belonged to the Rossouw family since 1942 when his family bought the property from the African European Investment Company who were mining there at the time. Mr. Rossouw is not aware of any historical features or events on the property except for an informal cemetery of farm labourers. What is interesting is that he knew of a slate headstone with the inscriptions of a British soldier who was buried there in the early 1900's.

A search of the battlefield and skirmish databases was conducted and found that:

- no known battles occurred on the farm Boschbank 12.
- Several Early Stone Age sites are located in the general area towards the towns Vanderbijlpark and Vereeniging. Rock engraving sites are also recorded to the west of the study area next to the Klipriver and again around the towns of Vanderbijlpark and Vereeniging.
- The Late Iron Age sequence around Parys is well recorded and approximately 567 sites are located in the Parys area +/- 40km west of Sasolburg.

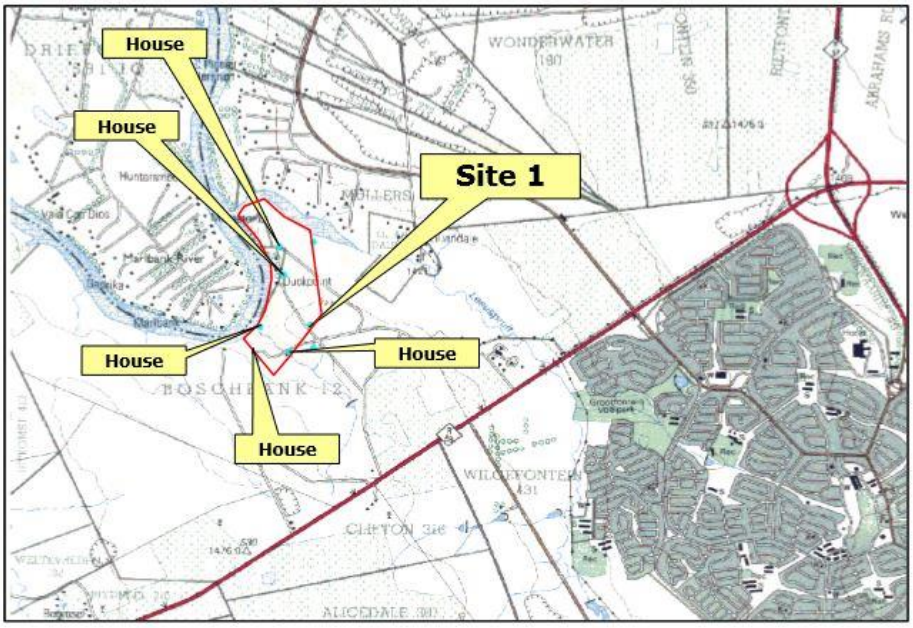


*Figure 6 – Site map indicating the study area for the aforementioned AIA (Vaalplan Town and Regional Planners (Pty), 2009)*

2. In 2013, Nel, J compiled a Heritage Statement Report for the SASOL Mining Sigma Colliery Ash Backfilling Project, Sasolburg, Free State Province; and his findings included:
    - A review of heritage reports relevant to the Sigma Colliery project area indicated that typical heritage resources occurring in the region are historical structures and burial grounds with relatively low significance. There are exceptions such as the Leeuwkuil engraving site and Iron Age stonewalled settlements.

*Other Assessments*

The Vaal River basin is well-known for its river gravels which in some places produce ESA tools as well as faunal material but not much information is available with regards to the study area.

Due to the nature of cultural remains that occur, in most cases, below surface, the possibility remains that some cultural remains may not have been discovered during the survey. Medium ground visibility is present on the site but the possibility of the occurrence of other informal and unmarked graves cannot be excluded.

## 5 FIELDWORK FINDINGS

Due to the nature of the HIA being conducted on previously mined area, the probability of finding culturally significant material was very low. The fieldwork was conducted on the 8th of September 2017, using the Wonderfontein tarred road as an entrance to the mining area. The fieldwork tracks were logged with GPS receiver and all heritage features marked (**Figures 7 & 8**).

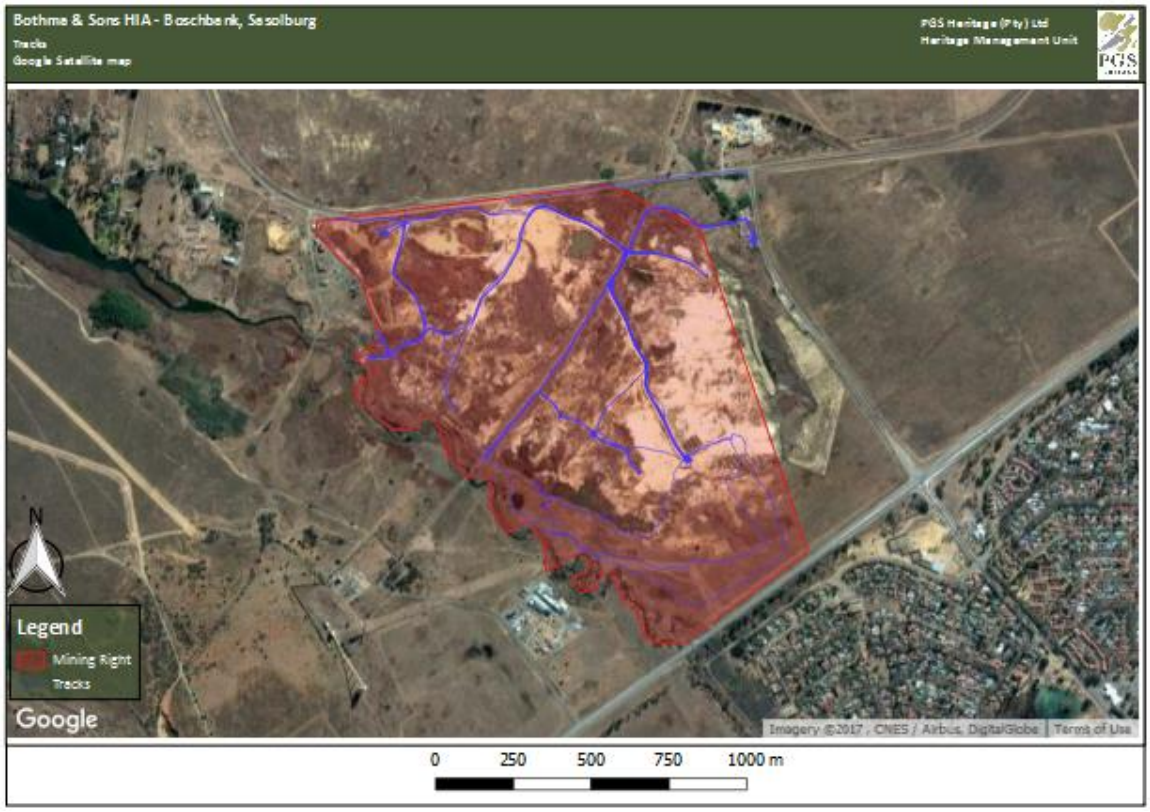


*Figure 7- Tracklog of field assessment*

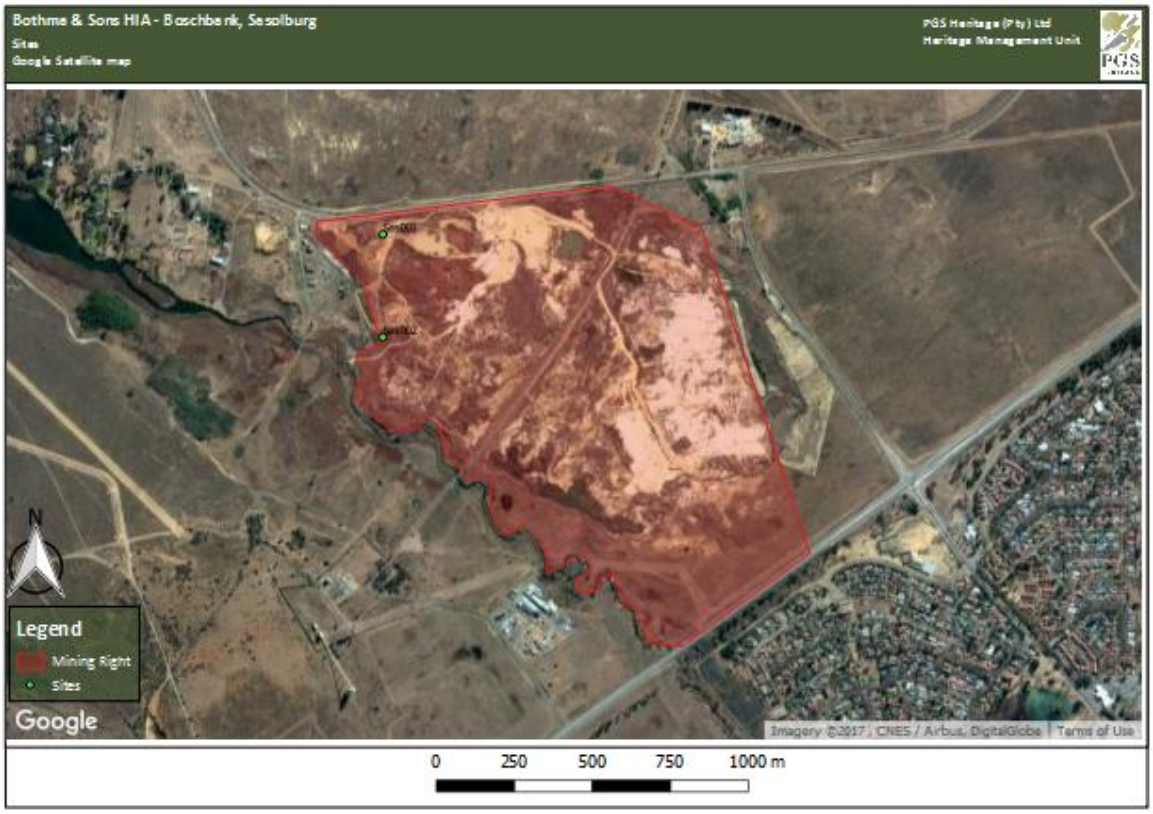


*Figure 8 – Locations of sites uncovered during field assessment*

A cattle fence has been established around the perimeter of the mining area. Almost the entire study area, save for the 100m wetland buffer East of the Leeuspruit river, has already been disturbed due to the opencast sand mining operation that is currently no longer active. Therefore, any possible heritage features that may have been in the area before the mining operation had commenced, would not have been detectable during the field assessment.

Existing power lines on mine sites or adjacent to mine sites will remain, as no new mining or relocation will take place and no permanent structures will be erected. The satellite imagery observed prior to the site visit suggests that there were no significant structures that could have been identified as heritage. This finding is corroborated by the 1948 Topographic overlay that also failed to show any structures in the study area, indicating that any structures found in the study would be younger than 60 years and therefore would not trigger the s34 of the NHRA.

### 5.1 Site Sas1

*Site Coordinates:* S 26º47'23.834" E 27º47'20.472"
*Site Type:* Grave or Burial Ground

*Site Description:*
The site comprises of a cemetery with approximately 5-6 visible graves. Their alignment is difficult to ascertain due to intense plant overgrowth and the overall disturbance at the site (**Figure 10**). There is evidence, by way of a single, rusted fence pole, that the graveyard had been fenced off at some point in the past. From what can be seen amongst the thick vegetation, it appears that at least some of the graves are stone lined while the rest must have been stone packed or stone lined as well (**Figure 11** and **Figure 12**). There were no inscribed headstones or grave markers at the site therefore we cannot ascribe ages to the graves or the identity of those buried. It is possible that the site may have been a farmworker cemetery.

The site has been heavily disturbed and it may be possible that more graves could be found at the site or graves could have been destroyed due to past mining activities.

*Site size*: Approximately 10x10m.

*Current Protection Status:*

Graves and burial grounds fall under various legislative protections, depending on factors such as where the graves are located as well as their age. Such legislation includes Section 36 of the NHRA, the National Health Act 61 of 2003 (No. R.363) as well as any local and regional provisions, laws and by-laws that may be in place.

*Site Significance:*

All graves have high levels of emotional, religious and in some cases historical significance. The site significance is **GP.A** - **Medium to High Significance**

*Figure 9 –General view of Sas1. The graves are located in the middle of mound pictured above*

*Figure 10 – The graves are located amongst these bushes*

*Figure 11 – A few stones demarcating one of the graves*

*Figure 12 – Relatively clear stone lining along the edge of the grave*

*Figure 13 – General view of study area*

*Figure 14 – Heavily mined part of study area*

**5.2** Site Sas2

*Site Coordinates:* S26º47'34.521" E 27º47'20.479"

*Site Type:* Built structure

*Site Description:*

The site consists of the remains of what was most likely a residential structure. The remains of said structure suggest that it is of modern origin and holds no significant heritage value. This perspective is corroborated by the 1948 Topographic overlay that also failed to show any structures in the study area, indicating that any structures found in the study would be younger than 60 years.

*Site size*: The total site extent is approximately 20x30m.

*Current Protection Status:*

Considering that this structure is likely to be less than 60 years old, would not fall under the protection of Section 34 of the NHRA.

*Site Significance:*

This site has no perceived heritage related significance.

*Figure 15- General view of the structure at Sas2*

*Figure 16- Inner view of the structure*

# 6 IMPACT ASSESSMENT

## 6.1 Cemeteries

The identified cemetery at *Sas1* is situated within the mining area and is not demarcated at all. It is envisaged that a low negative impact is possible with the implementation of the appropriate mitigation measures.

| **Impact Name** | **Destruction of graves** | | | | |
|---|---|---|---|---|---|
| **Alternative** | **All Alternatives** | | | | |
| **Phase** | **Mining** | | | | |
| **Environmental Risk** | | | | | |
| **Attribute** | **Pre-mitigation** | **Post-mitigation** | **Attribute** | **Pre-mitigation** | **Post-mitigation** |
| Nature of Impact | -1 | -1 | Magnitude of Impact | 5 | 2 |
| Extent of Impact | 1 | 1 | Reversibility of Impact | 4 | 1 |
| Duration of Impact | 2 | 1 | Probability | 3 | 1 |
| Environmental Risk (Pre-mitigation) | | | | | -3.00 |
| Mitigation Measures | | | | | |
| Barricade site and impose a 20meter buffer | | | | | |
| Environmental Risk (Post-mitigation) | | | | | -1.25 |
| Degree of confidence in impact prediction: | | | | | High |
| **Impact Prioritisation** | | | | | |
| Public Response | | | | | 1 |
| *Low: Issue not raised in public responses* | | | | | |

| | |
|---|---|
| Cumulative Impacts | 3 |
| *Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change.* | |
| Degree of potential irreplaceable loss of resources | 3 |
| *The impact may result in the irreplaceable loss of resources of high value (services and/or functions).* | |
| Prioritisation Factor | 1.67 |
| **Final Significance** | -1.67 |

## 6.2 Palaeontology

*Table 10: Palaeontological impact assessment for mining of the S. Bothma and Son Transport Sand Mine*

| **Impact Name** | **Palaeontological Resources** | | | | |
|---|---|---|---|---|---|
| **Alternative** | **All Alternatives** | | | | |
| **Phase** | **Operational** | | | | |
| **Environmental Risk** | | | | | |
| **Attribute** | **Pre-mitigation** | **Post-mitigation** | **Attribute** | **Pre-mitigation** | **Post-mitigation** |
| Nature of Impact | -1 | -1 | Magnitude of Impact | 1 | 1 |
| Extent of Impact | 1 | 1 | Reversibility of Impact | 1 | 1 |
| Duration of Impact | 1 | 1 | Probability | 1 | 1 |
| Environmental Risk (Pre-mitigation) | | | | | -1.00 |
| Mitigation Measures | | | | | |
| None | | | | | |
| Environmental Risk (Post-mitigation) | | | | | -1.00 |
| Degree of confidence in impact prediction: | | | | | High |
| **Impact Prioritisation** | | | | | |
| Public Response | | | | | 1 |
| *Low: Issue not raised in public responses* | | | | | |
| Cumulative Impacts | | | | | 1 |
| *Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.* | | | | | |
| Degree of potential irreplaceable loss of resources | | | | | 1 |
| *Low: It is unlikely that mining will reach below the alluvial sediments on the property* | | | | | |
| Prioritisation Factor | | | | | 1 |
| **Final Significance** | | | | | -1.00 |

**Table 10** suggests a low, negative impact on the S. Bothma and Son Transport Sand Mine from proposed mining under the application for an Integrated Water Use Licence the mine.

# 7 CONCLUSION

PGS was appointed the mine, to undertake an HIA that forms part of the Water Use Licence Application (IWUL) as part of the planning to implement the process of the proposed sand mining activities on Portion Re. of the farm Boschbank 12, Fezile Dabi district Municipality, Free State Province.

The HIA of the proposed opencast sand mining activities on the remainder of Boschbank 12 has presented that the impacts for heritage will be low. The mitigation measures to follow have yet to be put in place where the cemetery should be barricaded by some means and a 20m buffer and for the graves and a sand berm should be imposed. Thereafter, no further mitigation measures are recommended.

The impacts of the proposed mining on palaeontology is also low with recommended mitigation measures stating that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required for the commencement of mining, pending the discovery or exposure of any fossil remains during the mining phase.

However, if mining should excavate below the alluvial deposits on the property, it is recommended that a professional palaeontologist survey the area and assess any potential exposure of fossil deposits from the underlying substrate. Further, if any fossil deposits are discovered during any phase of mining, the managing body responsible for mining should alert SAHRA (South African Heritage Research Agency) immediately so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.

It is my considered opinion that the absence of heritage resources within the proposed and existing opencast foot print, along with the judged low negative impact on palaeontological resources as analysed in the palaeontological assessment (Baker, 2017) show that the project can continue with the recommended heritage management measures.

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