

REF: 438HIA

12 December 2019

**Att: Ms Natasha Higgitt**

Archaeological Heritage Impact Assessor  
South African Heritage Resources Agency  
PO Box 4637  
Cape Town  
8000

**By email: [nhiggitt@sahra.org.za](mailto:nhiggitt@sahra.org.za)**

*Dear Ms Higgitt,*

**REQUEST FOR EXEMPTION FROM A HERITAGE IMPACT STUDY: NEW DEVELOPMENTS AT SISHEN MINE, SOUTHWEST OF KATHU, GAMAGARA MUNICIPALITY, JOHN TAOLO GAETSEWE DISTRICT, NORTHERN CAPE PROVINCE.**

**1 INTRODUCTION**

This letter constitutes a notification of intention for the optimization of the Sishen mines tailings storage facility (TSF) and the installation of new electrical lines associated with their trolley assist infrastructure, south west of Kathu in the Northern Cape Province.

PGS Heritage has been contacted to evaluate the possible impacts on heritage resources by Sishen mines through the optimisation of TSF and the installation of new electrical lines associated with their trolley assist infrastructure.

**2 PROJECT DESCRIPTION**

The optimization project consists of the following components:

## 2.1 Upgrade of the Tailings Storage Facility

Sishen is in the process of optimising the use of the existing facility to improve operational efficiency and increase the life of the current facility (Figure 1). Since the project involves optimisation no additional permanent employment positions will be created. The project will involve a capital investment of approximately R 300 million. The project is however expected to create 125 to 150 construction jobs during a period of 24 to 30 months

### 2.1.1 Rezoning of Compartments

The current TSF has a surface area of approximately 270 ha and is used for the storage of slimes emanating from the beneficiation process. The TSF is currently operated with slimes originating from the DMS plant deposited into four compartments and slimes from the Jig plant deposited into four legs between the four DMS compartments (see **Figure 1** and **Figure 2**).

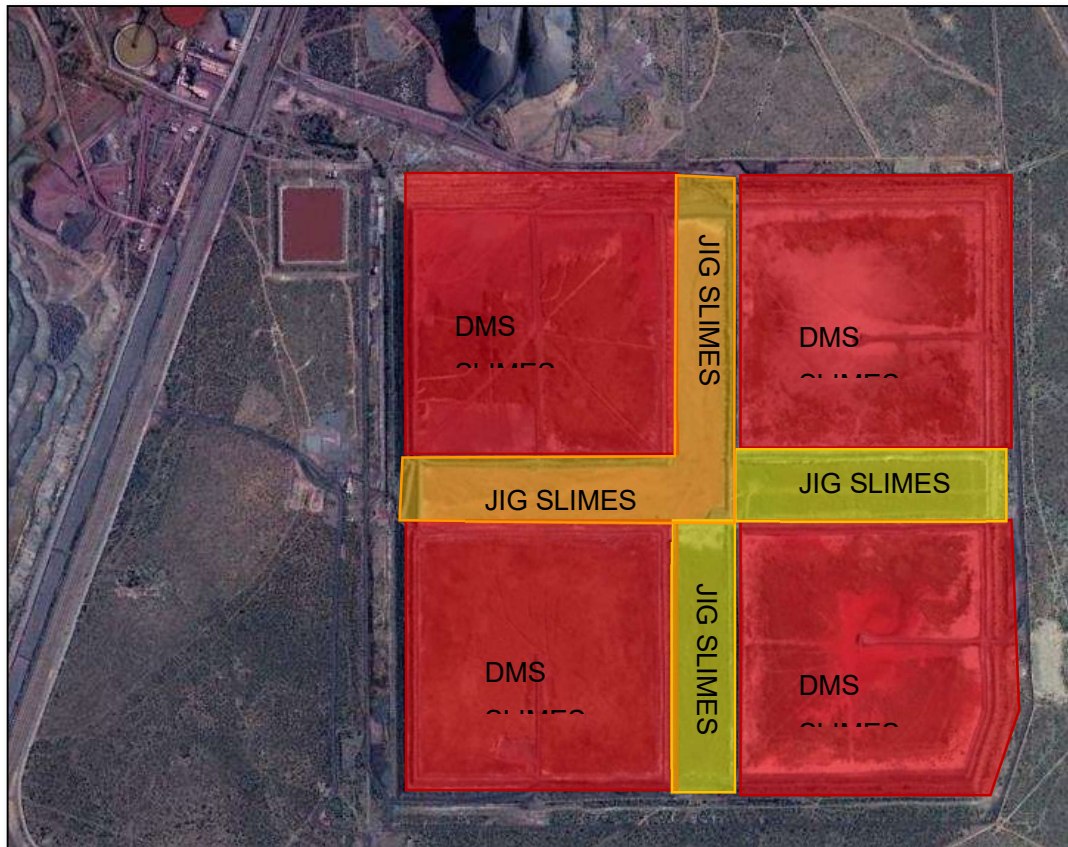


Figure 1: Current operational layout of the TSF facility



Figure 2: Aerial view of Current TSF

In future the slimes from the DMS and Jig will be mixed and disposed of in 4 compartments (see **Figure 3**). Two compartments will be in operation at any one time.

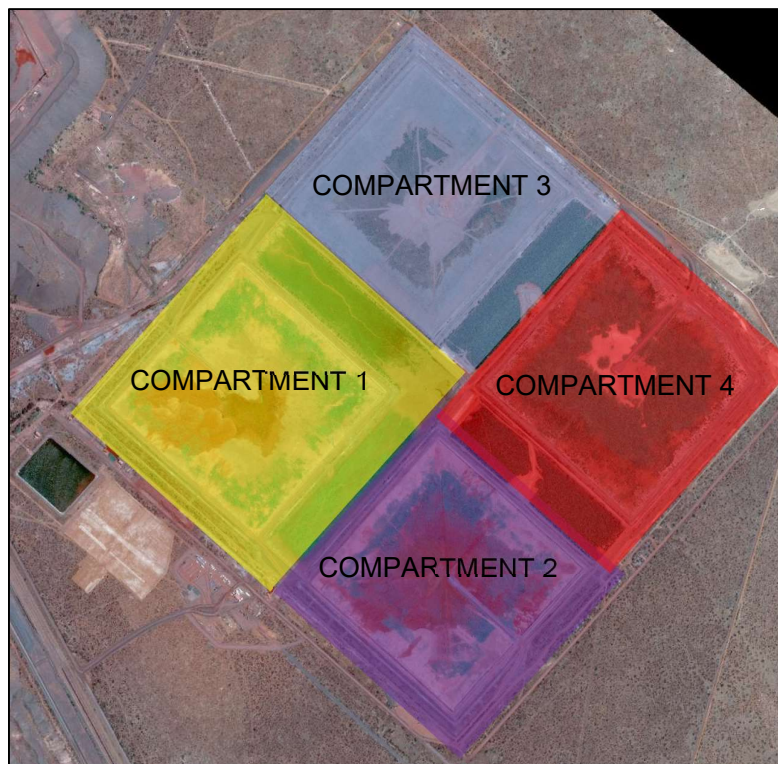


Figure 3: future operational layout of the TSF facility

### 2.1.2 Revised Return Water System

The current four penstocks will be sealed and four new elevated and a two new 600 mm diameter return water pipes put in place at the base of each of the compartments. The return water will be taken via four new 600 mm pipelines via a new silt trap to the existing return water dam which supplies water to the process water dam. The existing 600 m return water pipes at the base of the compartments will be decommissioned (**Figure 4**).

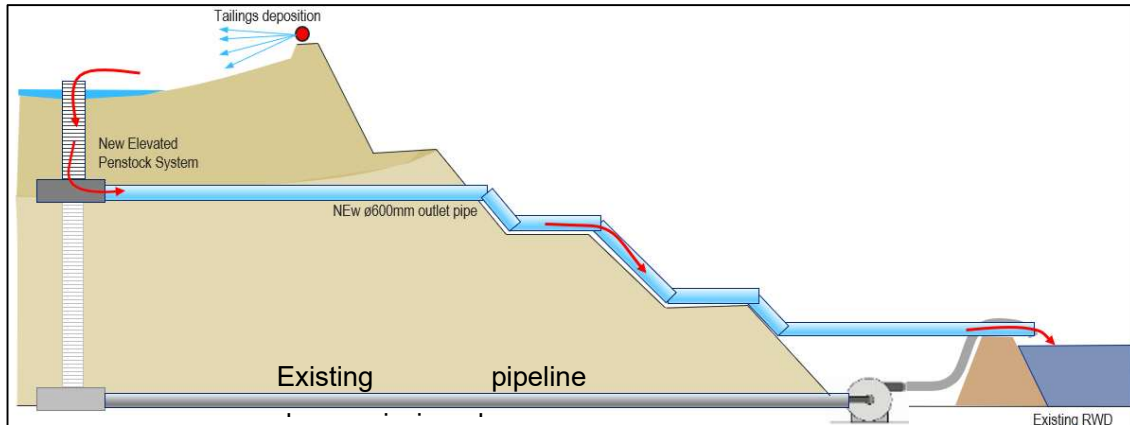


Figure 4: new return water system

### 2.1.3 Upgraded Perimeter Water Management

The current solution trench which is in place to collect seepage at the toe of the tailings dams is non-functional (see **Figure 5** and **Figure 6**)



Figure 5: Existing asbestos-lined solution trench at the toe of the tailings dams



**Figure 6: Existing solution trench overgrown with vegetation and filled with sediment**

The solution trench will be reinstated and upgraded for the management of seepage and stormwater. The existing asbestos lining (consisting of a 600 mm diameter half-pipe) shown in Plate 4-3 has already been removed. The remaining concreted-lined trench will be upgraded to manage seepage water (should it ever occur) as well as stormwater run-off from the sides of the tailings dams. The drainage outlet pipes at the base of the tailings dams will be extended in order to carry seepage water (should it occur) to the solution trench. Water will be carried to the existing sediment trap, where it is pumped to the return water dam for use in the process. Any water that cannot be managed in the system e.g. during major storm events, will overflow and be captured by the upgraded Sishen stormwater management system, entering the Eastern Stormwater Canal and the Eastern G80 Sump.

#### *2.1.4 Slimes Mixing and Pump Station*

A new mixing tank (200 m<sup>3</sup>) and pump station will be put in place for the purpose of combining the slimes from the Jig plant and the DMS plant. Three new pipelines (350 mm in diameter) will be put in place to carry the combined slimes to the TSF (**Figure 7**). The existing pipelines from the DMS and the Jig plant will be decommissioned.

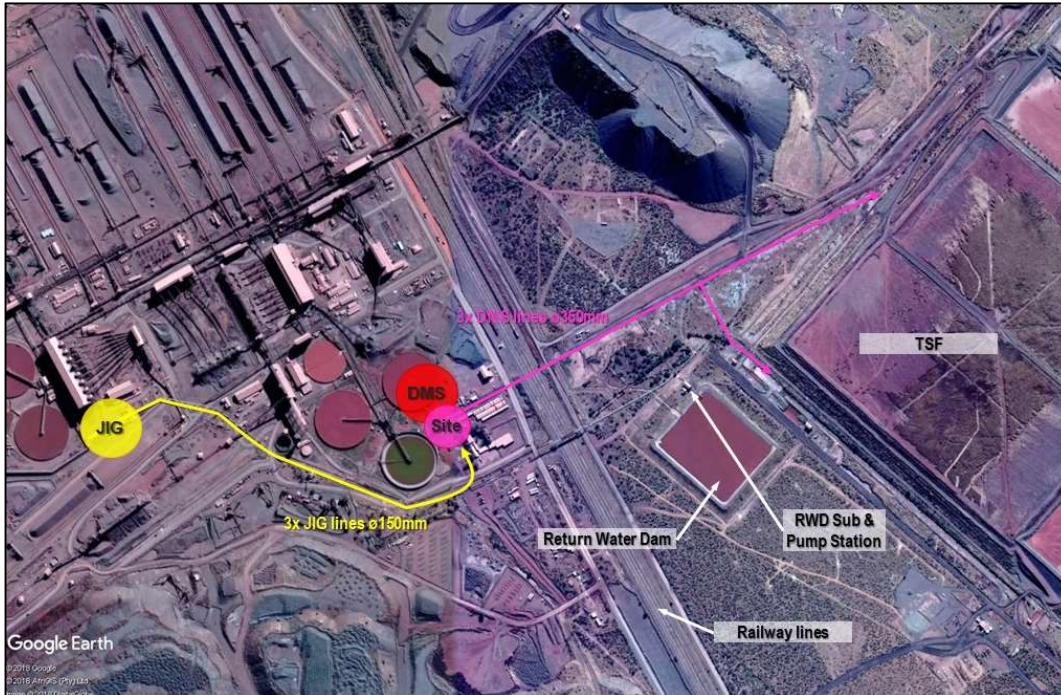


Figure 7: Proposed slimes mixing tank and pipelines

### 2.1.5 Upgrade of perimeter service road

The perimeter service road at the TSF will be upgraded involving (**Figure 8**):

- Road widenings;
- New service roads, typically 4-7m wide; and
- Re-routing of the security fence road, typically 4m wide.

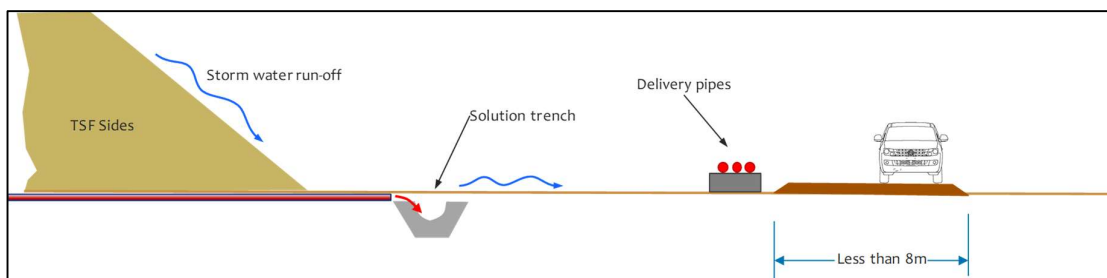


Figure 8: Revised TSF perimeter layout

## 2.2 Trolley assist electrical lines

New electrical lines will be developed as a ring feed to the Trolley Assist infrastructure to be developed along some of the haul road ramps at Sishen Mine. The Trolley Assist Infrastructure will be established on the Western WRD, the Vliegveld WRD and the Southern Pushback within the pit (see **Figure 10**). The Trolley Assist infrastructure will be constructed in a phased manner as required by the mining operations.

The trolley assist system will require the following infrastructure.

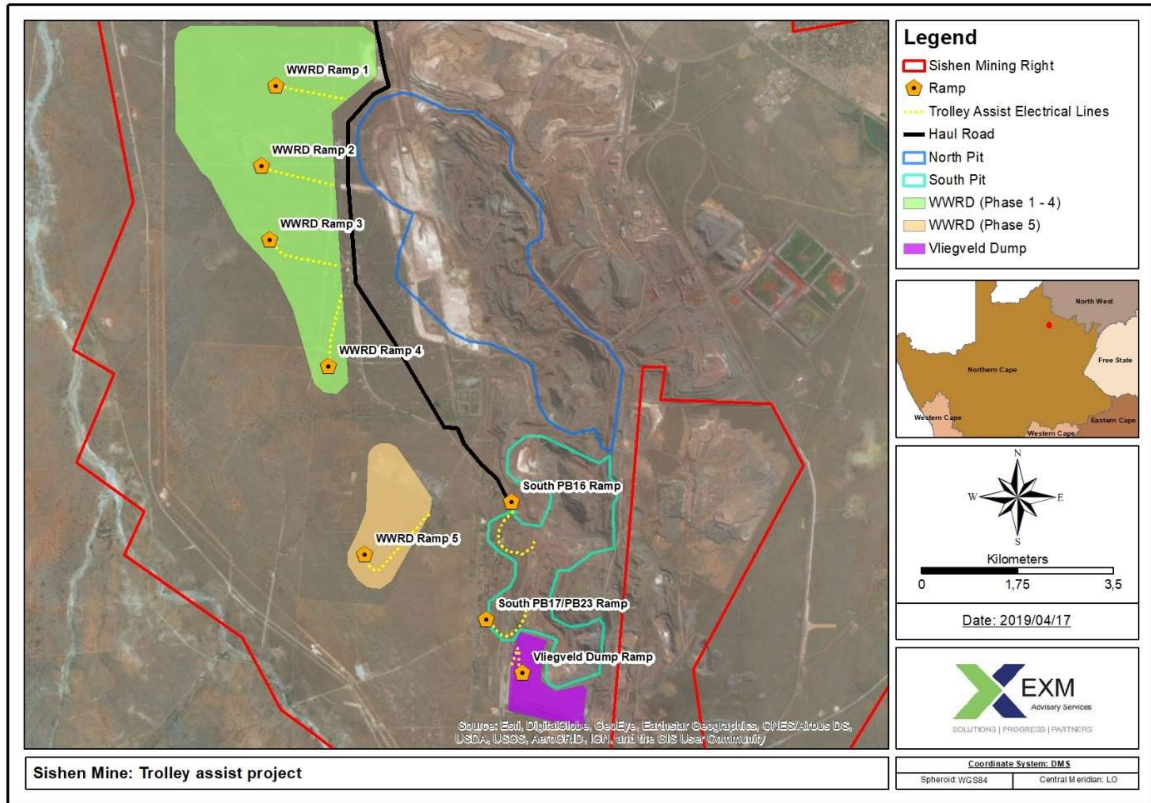
- 11 kV ring feed power lines.
- Trolley substations.
- Trolley overhead transmission lines.

The infrastructure required is illustrated in **Figure 9**.

A concept level estimate of R250 million capex is estimated for the implementation of the infrastructure.



**Figure 9: Trolley assist infrastructure**



**Figure 10: Proposed location of trolley assist infrastructure**

### 3 DESCRIPTION OF THE RECEIVING ENVIRONMENT

The proposed infrastructure is situated within the operational boundaries of the Sishen Mine Complex (**Figure 1** and **Figure 9**). The TSF area is totally disturbed and is a working industrial landscape consisting of the TSF infrastructure such as earth retaining walls, pipelines, solution trenches and services roads around the perimeter of the TSF (**Figure 11**).

The alignments of the proposed electrical lines for the trolley system follows existing haul roads and pit access ramps in the central mining areas of the Sishen Mine.

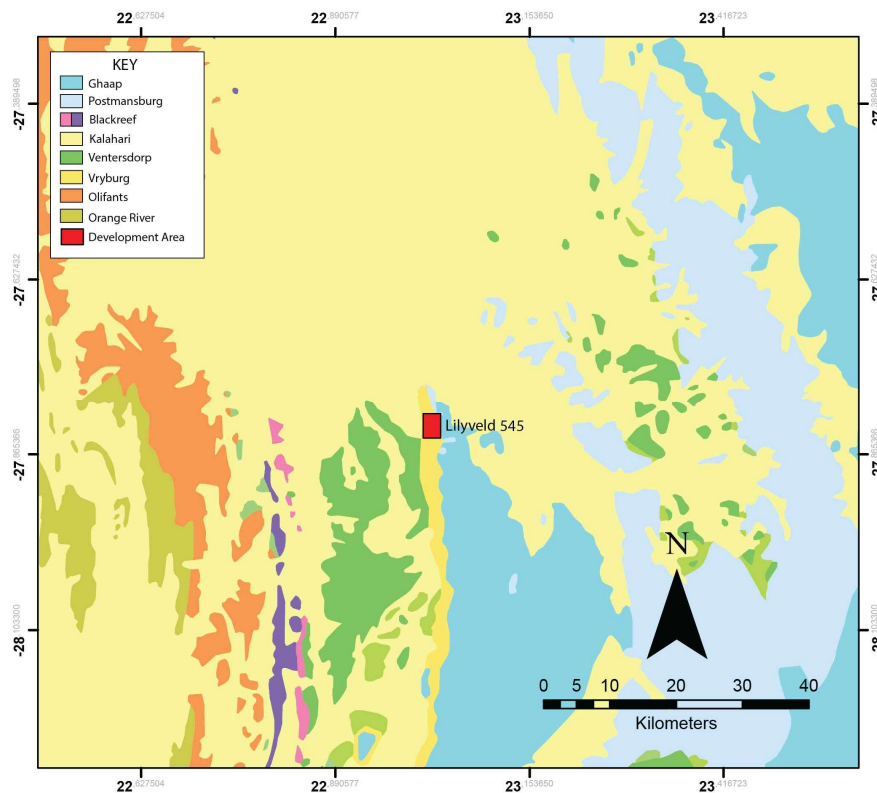




Figure 11: General view around TSF

#### 4 PALEONTOLOGY

The palaeontological desktop assessment completed for the Sishen Mine in 2017<sup>1</sup>, found that the geological formations in this area, the Ghaap Group (Transvaal Supergroup) and the Vryburg Formation (a sedimentary unit of the Ghaap Group) have not yielded valuable palaeontological finds within the area surround the study area. Further, the study area is overlain by the Quaternary Kalahari Group sands at extensive depth. Therefore, it is unlikely that alternation of the landscape encompassed within the boundaries of Farm Lilyveld 545 pose any major threat on palaeontological resources. Therefore, the study area is of low palaeontological significance (**Figure 12**). Possible impacts can be managed through the existing management measures as contained in the EMPr for the project.



**Figure 12: Geological Map of study area (1: 750 000). Red polygon denotes the Farm Lilyveld 545 encompassing the study area.**

<sup>1</sup> Caruana, M. 2017. *A Palaeontological Desktop Study for the expansion of mining activities and the widening of a haul road on Farm Lilyveld 545, Kathu, Northern Cape.*

## 5 HERITAGE POTENTIAL

A site visit to assess the TSF as well as trolley electrical lines alignments was conducted on 17 July 2019 (**Figure 13**). It was found that the study area was totally transformed. No heritage resources were identified during the site visit.



**Figure 13: Fieldwork tracks**

Based on the findings of the fieldwork and the study completed by PGS in 2019.<sup>2</sup> It is evident from the nature of the mining activity and the total transformed landscape that no heritage resources will be impacted by the proposed activities.

## 6 CONCLUSIONS AND RECOMMENDATIONS

With regard to the proposed process, the following recommendations are made:

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<sup>2</sup> Birkholtz, PD, Forssman, R, Lotter, M and Caruana, M. 2019. *Heritage Impact Assessment for the proposed Extension of Mining Activities and the Widening of a Haul Road on the Farm Lylyveld 545, near Kathu, Northern Cape Province.*

- No further heritage or palaeontological impact assessment of the study area is required.

## 6.1 Palaeontology

As per the palaeontological desktop assessment<sup>3</sup>, the proposed development is unlikely to pose any substantial threat to local fossil heritage and developments should go forward. However, should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

## 6.2 General

The following general recommendations are required:

- A Chance finds procedure must be developed that must include:
  - If a deposit is identified a controlled sampling of the material found should be done;
  - This work must be done in such a way as to augment the current research questions and field work such as the excavations at the Kathu Townlands Site and Kathu Pan;
  - These test excavations and sampling must be done after a permit has been granted under Section 35 of the NHRA (Act 25 of 1999) to a qualified and experienced Stone Age archaeologist;
  - A close out report must be submitted to SAHRA

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<sup>3</sup> Caruana, M. 2017.

- In the event that substantive material is uncovered, it is recommended that a display is considered in a convenient location;
- In the unlikely event of any unmarked human burials, burial pits, potsherds or stone tools being uncovered during earthworks for the proposed development, these must be reported immediately to the South African Heritage Resources Agency – Burials and Graves Unit (Mrs Thinghangwi Thivhase - 012 320 8490 / 4968).

Should you have any queries, please contact Wouter Fourie (email: [wouter@pgsheritage.com](mailto:wouter@pgsheritage.com) or Tel: (012) 332 5305).

Yours Sincerely



Wouter Fourie

**Director - PGS Heritage (Pty) Ltd**

*Accredited Professional Archaeologist (ASAPA)*

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