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WITWATERSRAND,  
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## DESKTOP PALAEOONTOLOGICAL IMPACT ASSESSMENT

**Bosveld Phosphates (Pty) Ltd**  
**Development of Waste Disposal Facility and Associated PCD**

*Specialist report by:*

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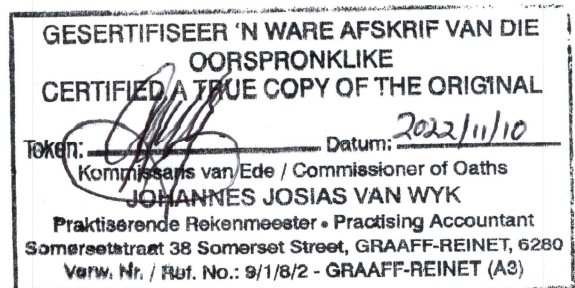
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## **EXECUTIVE SUMMARY**

Bruce Rubidge was appointed by JMA Consulting on behalf of Bosveld Phosphates (Pty) Ltd to undertake a desktop Palaeontological Impact Assessment for the proposed development of a waste disposal facility and associated PCD at the existing industrial Phosphoric Acid Plant, situated just outside the town of Phalaborwa, in what is called the Phalaborwa Mining and Industrial Complex (PMIC), within the Limpopo Province of South Africa. The proposed waste disposal facility will ensure that the waste produced from the copper extraction process can be disposed and stored for future use.

The entire study area is underlain by Swazian igneous and metamorphic rocks of the Makhutswi Gneiss and a few outcrops of the Mokolian Phalaborwa Complex. As these igneous rocks are of Archaean age the proposed development will not affect palaeontological heritage.

However, as the area is covered by Quaternary alluvium, if fossils are uncovered in alluvial deposits during the development process, a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented.

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## Introduction and Brief

A Palaeontological Impact Assessment was requested by JMA Consulting on behalf of Bosveld Phosphates (Pty) Ltd (here after referred to as Bosveld Phosphates) to undertake a desktop Palaeontological Impact Assessment for the proposed development of a waste disposal facility and associated PCD at the existing industrial Phosphoric Acid Plant, situated just outside the town of Phalaborwa, in what is called the Phalaborwa Mining and Industrial Complex (PMIC), within the Limpopo Province of South Africa. The proposed waste disposal facility will ensure that the waste produced from the copper extraction process can be disposed and stored for future use. The site is situated on the Farm Wegsteek 30, Registration Division L.U. outside the town of Phalaborwa within the Limpopo Province of South Africa (Figure 1). This report is part of a Heritage Impact Assessment to determine the effect that the proposed waste disposal facility will have on palaeontological heritage.

The study was commissioned by JMA Consulting and I was asked to provide a desktop assessment of the effect that the proposed development will have on the palaeontological heritage.

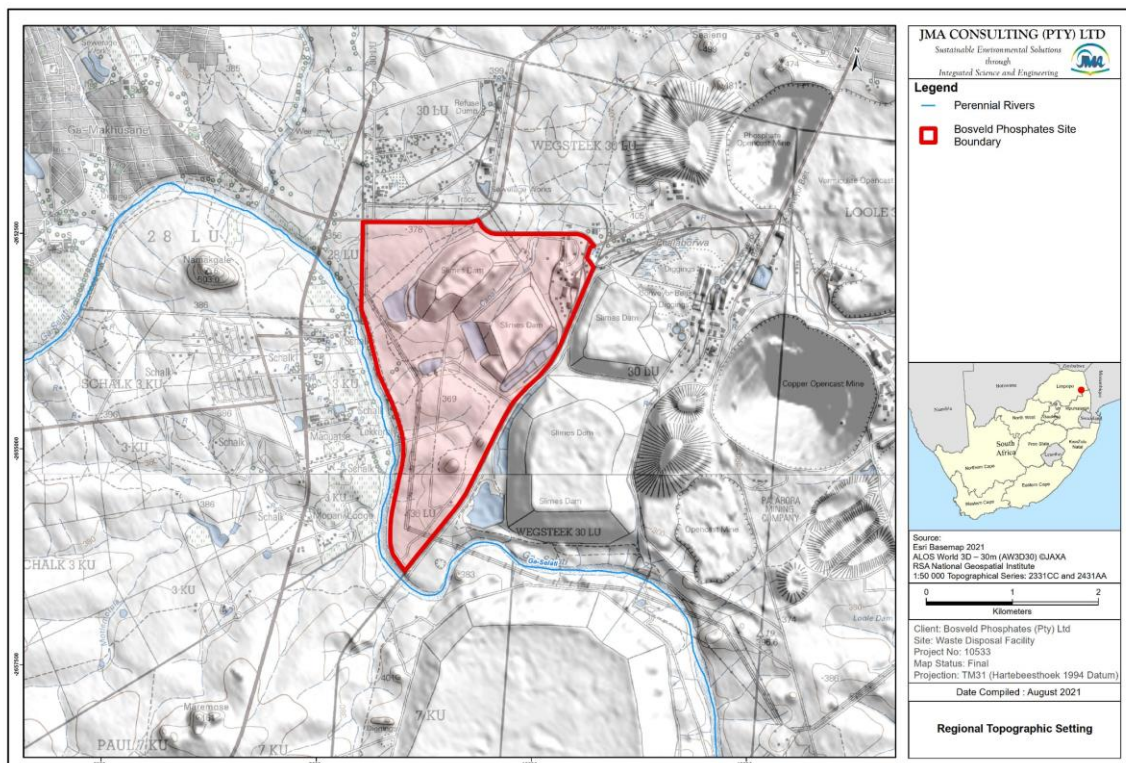


Figure 1: 1:50 000 topographic map showing the position (in red) of the Bosveld Phosphates site, situated just outside the town of Phalaborwa on the Farm Wegsteek 30, Registration Division L.U (Map Sheets 2331CC and 2431AA).

## **Legislative framework**

The Department of Environmental Affairs (DEA) through the National Environmental Management Act (NEMA Act 107 of 1998) requires that developers apply to the competent authority for Environmental Authorization of the proposed development as more than 1 hectare or more than 300m<sup>2</sup> in protected environments of indigenous vegetation is to be removed (Listing Notice 1 and 3 of the EIA regulations, 2014, as amended).

National Heritage is protected by the South African Heritage Resources Act (Act No 25) of 1999. Developers are required to submit development plans to SAHRA for approval. These plans must include documentation detailing the expected impact that the development will have on national heritage.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act include:

- Geological sites of scientific or cultural significance.
- Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, material, meteorites and rare geological specimens.
- Objects with the potential to contribute to understanding South Africa's natural or cultural heritage.

Accordingly, a Heritage Impact Assessment (HIA) is required to assess the possible impacts of a proposed development on archaeological and palaeontological heritage. This report addresses the palaeontological aspects of the HIA as part of the Environmental Management Plan (EMP).

## **Details of the study area**

The study area of the proposed development is situated on the Farm Wegsteek 30, Registration Division L.U outside the town of Phalaborwa within the Ba-Phalaborwa Local Municipality which is located within the Mopani District Municipality of the Limpopo Province of the Republic of South Africa This is situated east of the R530 highway close to Phalaborwa. The study area is covered by the 1:50 000 topographical maps 2331CC and 2431AA (Figure 1). The Bosveld Phosphates site covers an area of 616 ha.

## **Geological Setting**

Following the 1:250 000 geological map (2330 Tzaneen and 2430 Pilgrims Rest) published by the Council for Geosciences (1985 and 1986 respectively), the underlying geology of the entire study area comprises Swazian igneous and metamorphic rocks of the Makhutswi Gneiss and Mokolian Phalaborwa Complex, and is crossed by Jurassic

dolerite dykes (Figure 2). The entire study area is in turn overlain by alluvial deposits (Figure 3).

The Makhutswi Gneiss has a tonalitic to granodioritic composition and is older than 3200 million years. The Syenite conical hill of the Phalaborwa Complex is dated at between 2200 and 2100 million years.

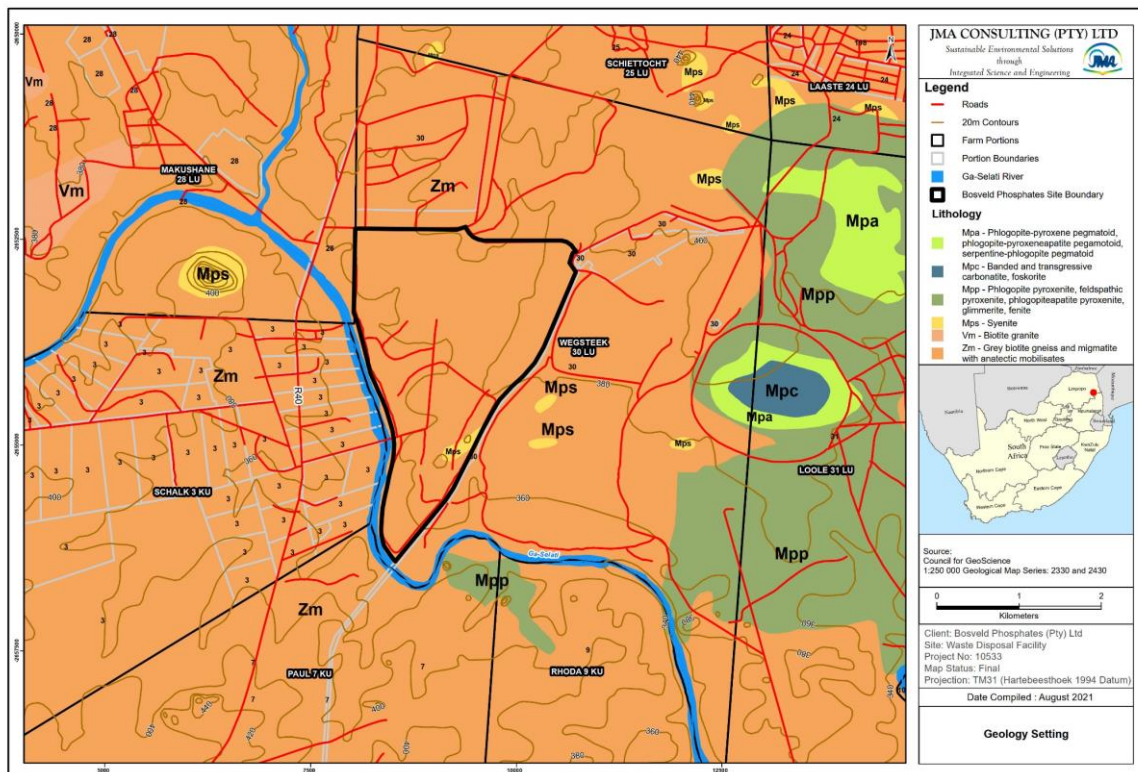


Figure 2: Geology of the study area (1:250 000 Geological Map Series of the Republic of South Africa, (Sheets 2430 Pilgrims Rest and 2330 Tzaneen). Black triangle shows the extent of the Bosveld Phosphates site. Zm - Makhutswi Gneiss; Mps - Phalaborwa Complex.

### Palaeontological Heritage

The Makhutswi Gneiss and Phalaborwa Complex are of igneous origin and are Archaean in age and will thus not host fossils. These rocks are, in places, overlain by Quaternary alluvial deposits which could possibly host fossils but this is unlikely (Figure 3).





*Figure 3: Note the vegetation and covering of alluvial deposits in the study area.*

### **Methodology**

As the entire study area is underlain by Archaean igneous and metamorphic rocks of low palaeontological sensitivity, a desktop Palaeontological Impact Assessment was undertaken using Google Earth imagery in combination with the published 1:250 000 geological maps (2330 Tzaneen and 2430 Pilgrims Rest) of the Council for Geoscience to assess the possibility of damage to fossil heritage which could result from the proposed development.

### **Recommendations**

It is extremely unlikely that the proposed waste disposal facility and associated PCD at the existing industrial Phosphoric Acid Plant development will have any effect on palaeontological heritage. However, because the overlying Quaternary alluvial deposits are of sedimentary origin there is an unlikely possibility that these deposits could host fossils. If fossils are uncovered in the alluvial deposits during the course of development it will create a unique opportunity to explore the area for fossils.

It is thus recommended that if fossils are exposed in the alluvial deposits as a result of development activities, a qualified palaeontologist must be contacted to assess the exposure for fossils before further development takes place so that the necessary rescue operations are implemented. Depending on the nature of the fossils discovered this could entail excavation and removal to a registered palaeontological museum collection. A list of professional palaeontologists is available from South African Heritage Resources Agency (SAHRA).

### **Conclusion**

The proposed waste disposal facility and associated PCD at the existing industrial Phosphoric Acid Plant situated just outside the town of Phalaborwa, within the Limpopo Province of South Africa, will not affect palaeontological heritage as the entire study area is underlain by Archaean igneous and metamorphic rocks of the

Makhutswi Gneiss and syenites of the Phalaborwa Complex. There is an unlikely possibility that the superficial Quaternary alluvial deposits could host fossils.

It is considered that, from a palaeontological perspective, the proposed waste disposal facility development should proceed. If fossils are uncovered in the Quaternary alluvial deposits in the course of construction activities, the developer must immediately call in a qualified palaeontologist to assess the situation and, if necessary, undertake excavation of the fossils.

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15 October 2021



## **APPENDIX A – CHANCE FIND PROTOCOL (CFP)**

It is noted that following the findings of this desktop Palaeontological Impact Assessment it is unlikely that fossils will be recovered as a result of the proposed waste disposal facility development. The following procedure is required if fossils are exposed by development excavations.

1. If fossils are exposed by excavation in the Tertiary – Quaternary sedimentary deposits they must be inspected by the environmental officer or designated person.
2. If fossils are noted in the unconsolidated Tertiary - Quaternary sediments (includes bones, insects or plants) a suitably qualified palaeontologist must be approached for a verdict.
3. Fossil material displaced by excavation should be placed in a protected area, in this way development activities will not be held up.
4. Appropriate photographs of the fossils which have been noted should be sent to a qualified palaeontologist for a verdict on how to proceed. This may require a site inspection and excavation by the palaeontologist.
5. Fossils that are deemed to be of good quality or of scientific importance by the palaeontologist must be removed and curated in a recognised palaeontological museum collection where they can be made available for further study.
6. Before fossils are removed from the site a collecting permit must be obtained from SAHRA, and the required permitting procedures and requirements must be followed.
7. If the fossil material is deemed by the registered palaeontologist (as a result of photographic evidence or a site visit) to not be worthy of excavation and curation in a museum collection, the material will not be removed.
8. Mitigation will involve an attempt to capture all rare fossils and systematic collection of all fossils discovered by a registered palaeontologist. This will require routine collecting protocols involving descriptive, diagrammatic and photographic recording of fossils and exposures. The fossils and appropriate contextual samples will be processed to create an archive collection.
9. Should a major *in situ* occurrence be exposed, excavation will immediately cease in that area so that the discovery is not disturbed or altered in any way until the appointed palaeontologist has investigated the find.
10. Should no fossils be discovered in the process of development and excavations have been completed, no further monitoring will be required.
11. Any site visits by a registered palaeontologist and/or excavation of fossil material required, will be undertaken at the cost of the developer.