

UNIVERSITY OF THE
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DESKTOP PALAEOONTOLOGICAL IMPACT ASSESSMENT

DMI Minerals South Africa (Pty) Ltd Mine Expansion Development

Specialist report by:

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EXECUTIVE SUMMARY

Bruce Rubidge was appointed by Shangoni Management Services (Pty) Ltd on instruction from DMI Minerals South Africa (Pty) Ltd (“DMI Minerals”) to undertake a desktop palaeontological impact assessment for the proposed expansion of mining activities on their existing diamond mine situated next to Venetia Mine on portions of the farms Krone 66MS and Endora 104MS in Musina Local Municipality of Vhembe District, Limpopo Province in the Limpopo Province, South Africa.

The entire study area is deeply underlain by rocks of the Precambrian Mount Dowe and Malala Drift groups of the Beit Bridge Complex which are part of the Limpopo Mobile Belt. These rocks are in turn overlain by Quaternary alluvial deposits in places and, for a small area toward the west, by rocks of the Carboniferous-Permian Tshidzi, Madzaringwe and Mkambeni formations of the Karoo Supergroup (equivalents of the Dwyka and Ecca groups in the main Karoo Basin) .

There is no possibility that the Precambrian rocks of the Limpopo Mobile Belt will host fossils but there is a very slight possibility that overlying Quaternary alluvial sediments and Karoo supergroup rocks could contain fossils. It is highly unlikely that palaeontological heritage will be affected by the proposed development.

If in the unlikely event that fossils are discovered in the Karoo Supergroup rocks or Quaternary sediments in the course of the proposed development, a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented (See Appendix A – CFP).

TABLE OF CONTENTS

1. Introduction and brief	4
2. Legislative Framework	5
3. Details of the study area	5
4. Geological Setting	6
5. Palaeontological Heritage	7
6. Methodology	7
7. Recommendations	7
8. Conclusion	8
9. Bibliography	8
10. Chance find protocol	10

Introduction and Brief

A Palaeontological Impact Assessment was requested by Renate Steffens of Shangoni Management Services (Pty) Ltd on behalf of DMI Minerals South Africa (Pty) Ltd (“DMI Minerals”) for the expansion of their Krone-Endora Diamond Mine. The proposed expansion will take place on a portion of the farm Krone 66MS and a portion of the farm Endora 104MS in the Musina Local Municipality of Vhembe District in Limpopo Province (Figure 1). The -mining right area comprises a total area of about 666 hectares, but less than half of this have been impacted and less than 120 hectares within the first ten years. The area under investigation falls on the perimeter of the Mapungubwe World Heritage Site and Cultural Landscape. This report is part of a Heritage Impact Assessment to determine the effect that the proposed mining expansion will have on palaeontological heritage.

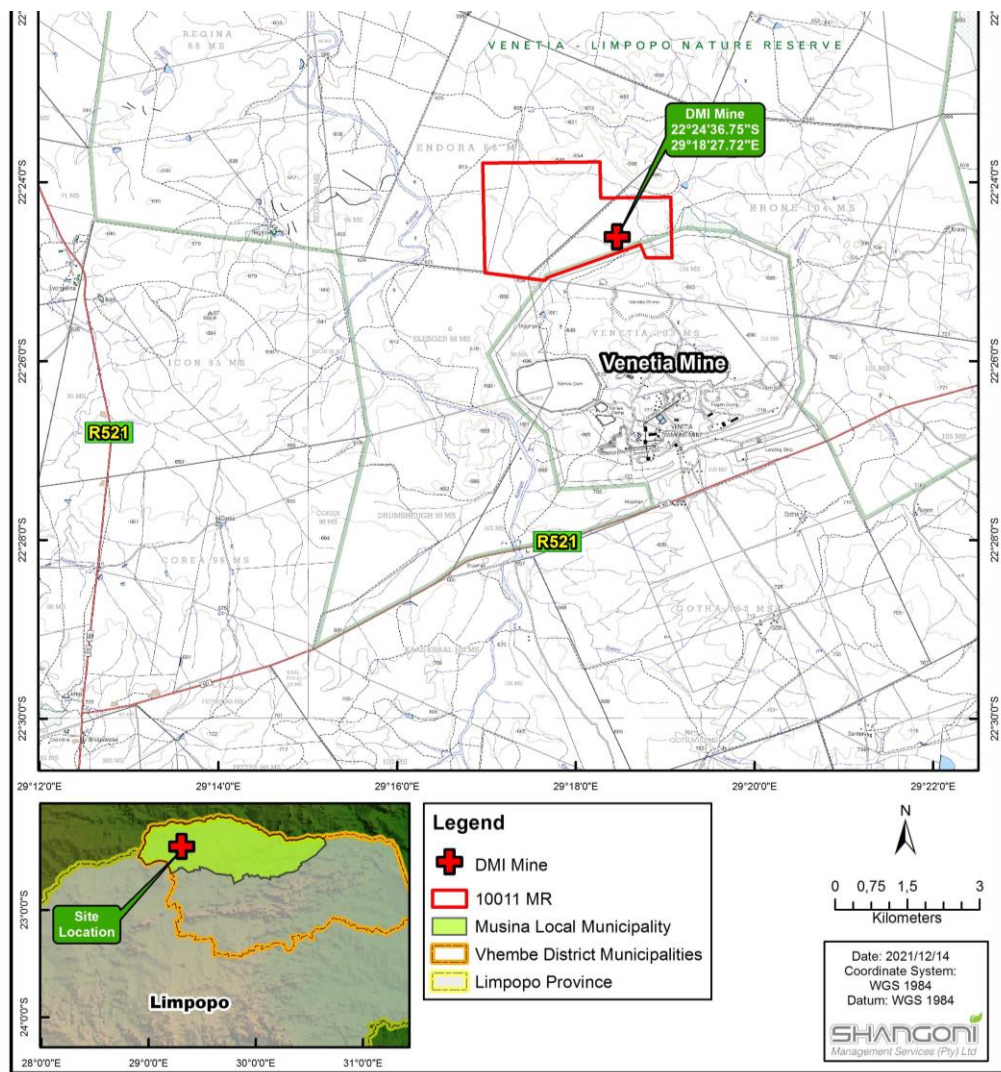


Figure 1: Topographic map (2229AD) showing the position of the mining area (red outline) on a portion of the farm Krone 66MS and a portion of the farm Endora 104MS.

Legislative framework

The Department of Environment, Forestry and Fisheries (DEFF) 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.

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 mining development is located on an existing diamond mine on a portion of the farm Krone 66MS and a portion of the farm Endora 104MS in the Musina Local Municipality of Vhembe District in the Limpopo Province, South Africa. The mine is situated approximately 75km from the town of Musina, 40km from the town of Alldays and 24km from the Zimbabwean border with South Africa. The mine workings are located roughly 500m from the Venetia Diamond Mine (De Beers) workings. The study area is covered by the 1:50 000 topographic map 2229AD (Figure 1). The proposed development comprises a total area of about 666 hectares, but less than this would be impacted and less than 120 hectares within the first ten years. The mine is situated to the east of the R521 highway from Alldays to Pontdrift, and south of the R572 highway between Musina and Pontdrift..

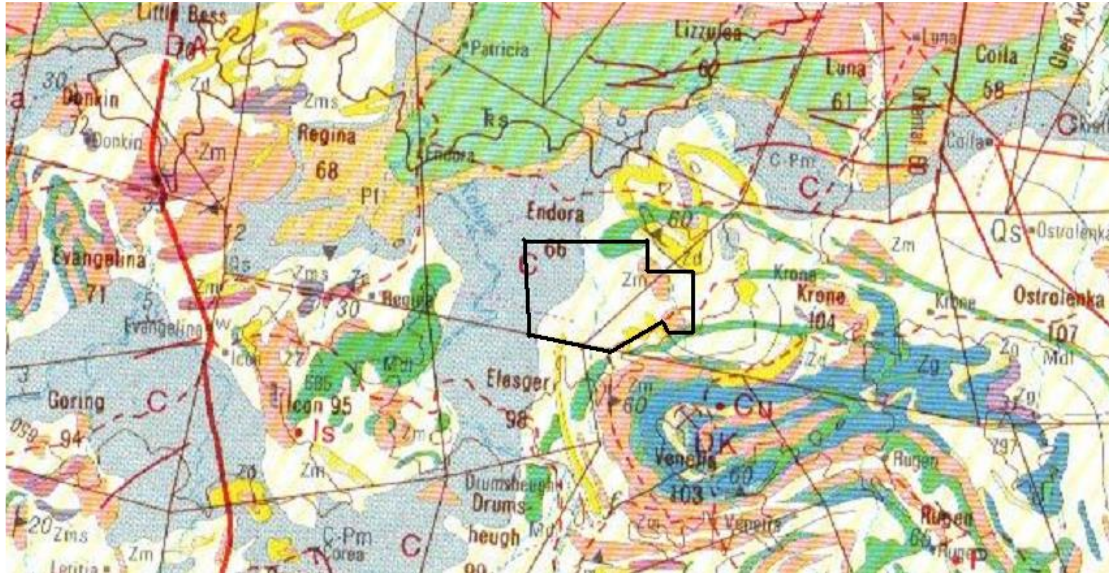


Figure 2: Geological map (2229 AD Alldays) showing the position of the study locality (black outline) in relation to the regional geology. Zd – Mount Dowe Group; Zm – Malala Drift Group; C-Pm - Tshidzi, Madzaringwe and Mikambeni formations of the Karoo Supergroup; Qs – Quaternary alluvial deposits..

Geological Setting

Based on the 1:25000 geological sheet, 2228 Alldays (Figure 2), the study area is deeply underlain by gneisses, metasediments and metavolcanics of the Mount Dowe Group and Malala Drift Groups of the Beit Bridge Complex which is part of the Limpopo Mobile Belt separating the Kaapvaal and Rhodesian Cratons (Figure 2). These Precambrian rocks of the Limpopo Mobile Belt are, to the west of the study area, overlain by the undifferentiated Carboniferous-Permian Tshidzi, Madzaringwe and Mikambeni formations of the Karoo Supergroup (equivalents of the Dwyka and Ecca groups in the main Karoo Basin), as well as Quaternary alluvial sediments (Figure 2&3). The landscape is gently undulating and is covered to a large extent by Quaternary alluvial deposits. Thus, exposures of the underlying Karoo strata are scanty and mainly in gullies and river-banks.



Figure 3: Photographs of the western side of the study area showing the flat nature of the landscape and the lack of rock outcrop.

Palaeontological Heritage

The underlying Precambrian rocks of the Beit Bridge Complex do not host fossils and no fossils have been reported from the overlying Quaternary sediments. The mudrocks of the Madzaringwe and Mikambeni formations of the Eccca Group are known to host impressions of fossil plants of the famous glossopterid flora. Available literature shows that there are several palaeontological sites in the Tuli Basin in South Africa and Zimbabwe as well as the Tshipise Basin. There is thus potential that the Madzaringwe and Mikambeni formations could host fossils, but Karoo rock exposures in the study area are rare.

Methodology

Because the study area is underlain by Precambrian rocks of the Limpopo Mobile Belt which is of low palaeontological sensitivity, a desktop Palaeontological Impact Assessment was undertaken to identify possible sensitive fossil occurrences, assess possible fossil occurrences, comment on the impact of the proposed development, and to make mitigating recommendations. A Chance Find Protocol (CFP) is presented in Appendix A.

Recommendations

Because rock successions underlying the area for the proposed development are of igneous or metamorphic origin and are Precambrian in age there is very little chance that the proposed development will have any effect on palaeontological heritage. In addition, a portion of the area of the proposed development has already been disturbed by past mining activities.

In the study area there is always the slight possibility that the Karoo and Quaternary deposits could contain fossils. In the unlikely event that fossils are exposed in these younger deposits it will create a unique opportunity to explore the area for fossils. It is thus recommended that if fossils are exposed as a result of mining 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 mine expansion at Krone-Endora Diamond Mine on portions of the farms Krone 66MS and Endora 104MS in Musina Local Municipality of Vhembe District, will extend over Precambrian igneous and metamorphic rocks of the Limpopo Mobile Belt which in turn are overlain by poorly exposed Carboniferous-Permian Karoo sedimentary rocks and Quaternary alluvial deposits to the west of the study area. It is extremely unlikely that the development will expose fossils and thus it is considered that, from a palaeontological perspective, the proposed development should proceed. In the unlikely event that fossils are uncovered in Karoo or superficial Quaternary deposits during mining activities, the developer must immediately contact a qualified palaeontologist to assess the situation and, if necessary, undertake excavation of the fossils (See Appendix A – Chance Find Protocol).

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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 diesel depot developments. The following procedure is required if fossils are exposed by excavations.

1. If fossils are exposed by excavation in the rocks of the Karoo Supergroup or unconsolidated Quaternary deposits they must be inspected by the environmental officer or designated person.
2. If fossils are noted in the Karoo Supergroup rocks and unconsolidated Quaternary sands (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.