DESKTOP PALAEONTOLOGICAL IMPACT ASSESSMENT

Venetia Mine - Water Management Development

Specialist report by:

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EXECUTIVE SUMMARY

Bruce Rubidge was appointed by Shangoni Management Services (Pty) Ltd on instruction from De Beers Consolidated Mine (Pty) Ltd.: Venetia Mine to undertake the palaeontological impact assessment process for the proposed upgrading and improvement of management of storm-water and water extracted from newly developed underground mine on portions of the Farm Venetia 103 MS in Musina Local Municipality of Vhembe District, Limpopo Province.

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.

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 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 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).

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Introduction and Brief

A Palaeontological Impact Assessment was requested by Ashley Miller of Shangoni Management Services (Pty) Ltd on behalf of Venetia Mine. The proposed upgrading and extension of facilities to manage water responsibly within the framework of the National Environmental Management Act (NEMA), Act no 107 of 1998 and the National Water Act (NWA), Act no 36 of 1998 will take place at Venetia Mine on portions of the farm Venetia 103 MS in the Musina Local Municipality of Vhembe District, west of Musina town (Figure 1). The proposed development comprises a total area of about 96.6 hectares. This report is part of a Heritage Impact Assessment to determine the effect that the proposed Storm Water Management Project will have on palaeontological heritage.

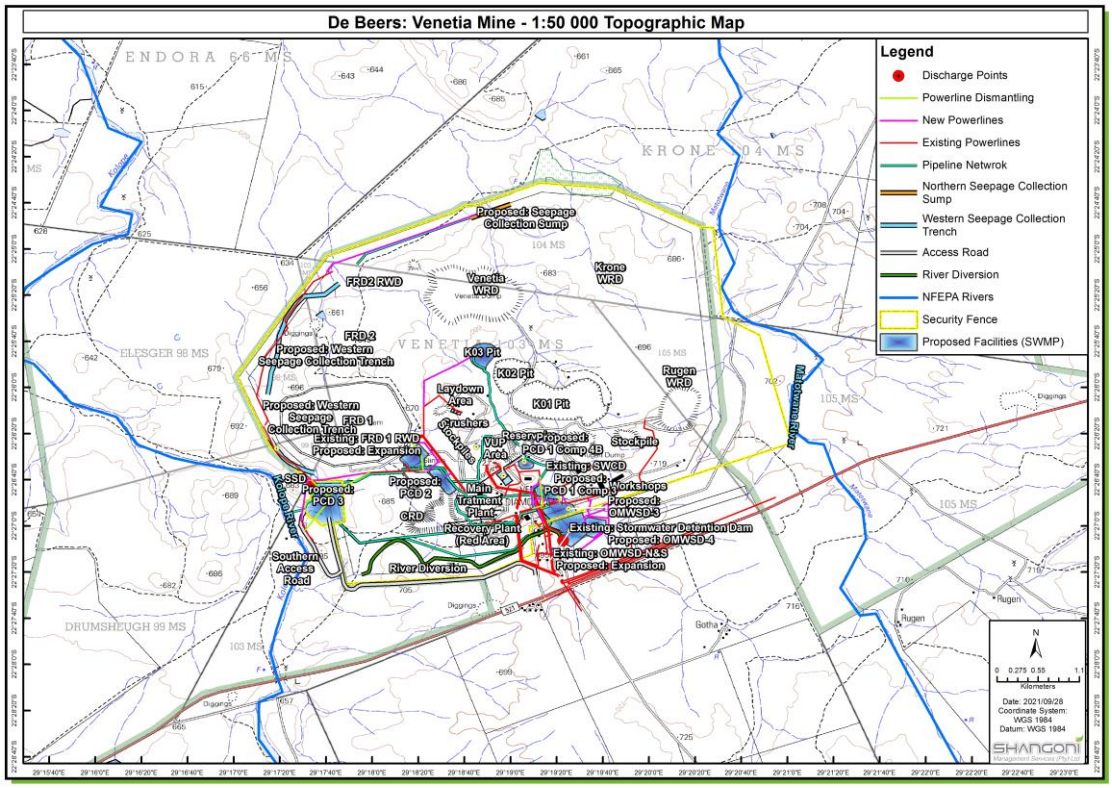

Figure 1: Topographic map (2229AD) showing the position of the proposed water management facilities at Venetia Mine on the farm Venetia 103 MS.

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).

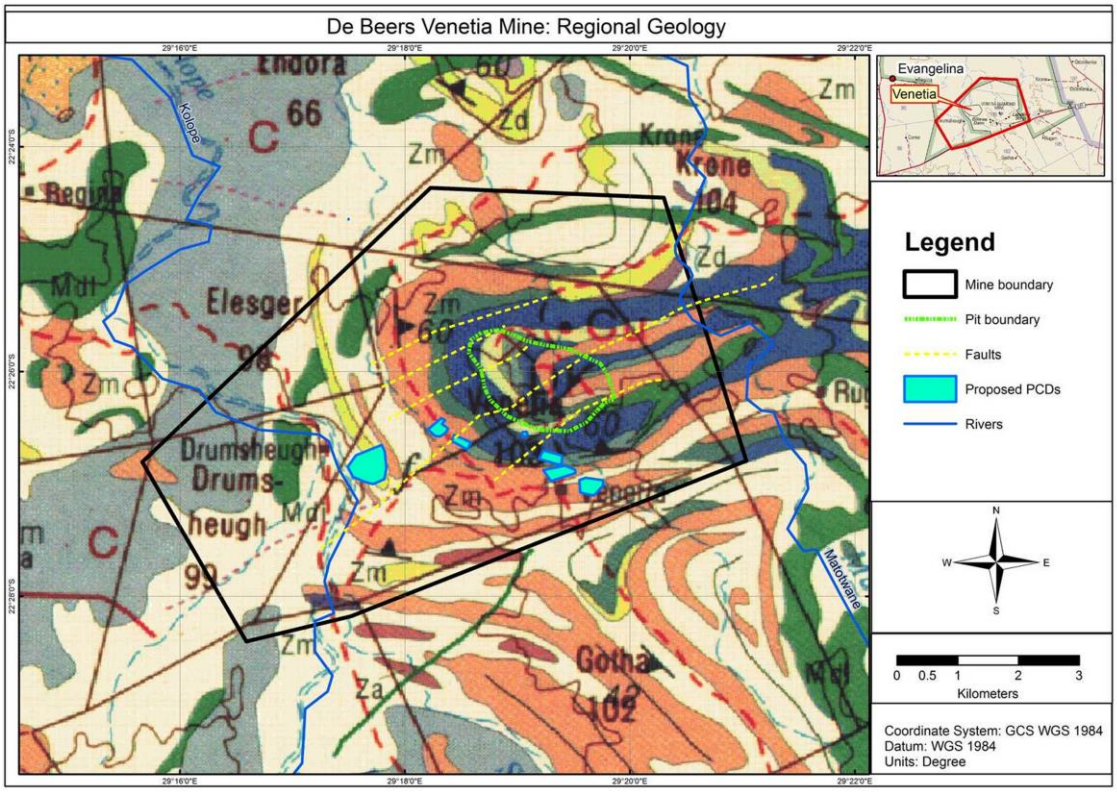

Figure 2: Geological map (2229 AD) showing the position of the study locality (blue ovoid area) in relation to the regional geology. Zd – Mount Dowe Group;Zm – Malala Drift Group; Qs – Quaternary alluvial deposits..

Details of the study area

The study area of the proposed Storm Water Management Project is located at Venetia Mine on portions of the farm Venetia 103 MS in the Musina Local Municipality of Vhembe District, about 80 km west of Musina town (Figures 1 & 2) in the Musina Local Municipality of Vhembe District, Limpopo Province. The site is situated on the 521 National Road about 80 kilometres west of Musina Town. The study area is covered by the 1:50 000 topographic maps 2229AD (Figure 1). The proposed development area covers about 96 ha.

Geological Setting

Based on the 1:250 00 geological sheet, 2229 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 Permian Rocks of the Ecca Group and Quaternary alluvial sediments (Figure 2&3).

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 rocks of the Ecca group are known to host fossil glossopterid plants but these fall outside the limits of the study area It is thus extremely unlikely that fossils will be found in the study area.

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.

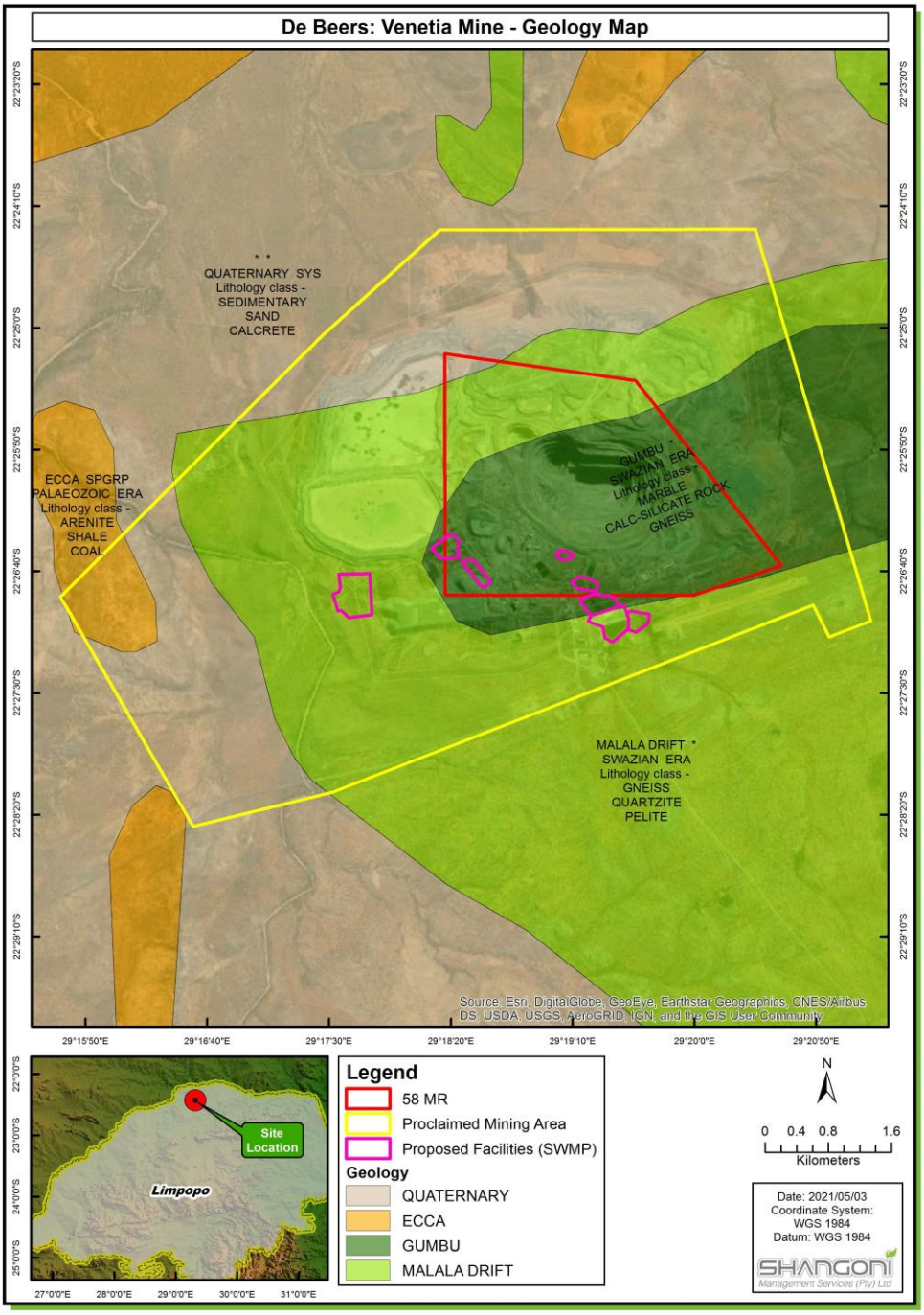

Figure 3: Simplified geological map of the study area showing the proposed water control facilities.

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 the area of the proposed development has already been disturbed by mining activities over the past 30 years.

In any development there is always the slight possibility that isolated overlying younger deposits could contain fossils. In the unlikely event that fossils are exposed in alluvial Quaternary 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 construction 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 Storm Water Management Project at Venetia Mine on portions of the farm Venetia 103 MS in the 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 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 superficial Quaternary deposits during construction 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).

Bibliography

Barker, OB, Brandl, G, Callaghan, CC, Eriksson, PG and van der Neut, M. The Soutpansberg and Waterberg groups and the Blouberg Formation. *In*: Johnson MR, Anhaeusser and Thomas RJ (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria. 301-318.

Johnson, MR, Visser, JNJ, Cole, DI, Wickens, H de V, Christie, ADM, Roberts, DL, and Brandl, G. 2006. Sedimentary rocks of the Karoo Supergroup. *In*: Johnson MR, Anhaeusser and Thomas RJ (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria. 461-499.

Kramers J.D., McCourt S. and van Reenan D.D. 2006. The Limpopo Belt. *In*: Johnson MR, Anhaeusser and Thomas RJ (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria. pp. 209-236.

Mac Rae C. 1999. *Life etched in stone: fossils of South Africa*. The Geological Society of South Africa, Johannesburg, pp 305.

Mc Carthy, T.S. and Rubidge, B.S. 2005. *The story of Earth and Life – a southern African perspective on the 4.6 billion year journey*. Struik Publishers, Cape Town. pp 333.

Partridge TC, Botha GA, and Haddon IG. 2006. Cenozoic deposits of the interior. *In*: Johnson MR, Anhaeusser and Thomas RJ (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria. pp. 585-604.

SAHRA. 2013. Minimum standards: palaeontological component of heritage impact assessment reports. South African Heritage Resources Agency, Cape Town. pp15.

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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 unconsolidated Quaternary deposits they must be inspected by the environmental officer or designated person.
2. If fossils are noted in the 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.