DESKTOP PALAEONTOLOGICAL IMPACT ASSESSMENT

Residential and industrial Development Orania Aandeleblok (RF)(Pty) Ltd, Northern Cape Province

Specialist report by:

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DATE: 15 June 2022

EXECUTIVE SUMMARY

Bruce Rubidge was appointed by Shangoni Management Services (Pty) Ltd to undertake the palaeontological impact assessment process for the proposed development of residential and light industrial units on Portion 43 and Portion 45 of the farm Vluytjeskraal 272, Orania, Northern Cape Province.

The entire study area is deeply underlain by mudrocks of the Permian Tierberg Formation of the Ecca Group, and Karoo dolerites of the Karoo Supergroup and more superficially by Quaternary calcrete and alluvial deposits.

As the Permian Ecca Group rocks are overlain by thick calcrete and alluvial deposits and are not exposed in the study area it is highly unlikely that palaeontological heritage will be affected by the proposed development. The overlying Quaternary sediments are not consolidated and it is very unlikely that any fossils will be present.

This desktop study has indicated that no fossils are exposed, and if deep excavations are undertaken as a result of development it could possibly expose fossil plants and possibly fish in the rocks of the Ecca Group and could create an opportunity for further study. It is thus recommended that, if in the unlikely event that fossils are exposed in the Permian Ecca Group or overlying Quaternary sediments, during 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

Introduction and Brief

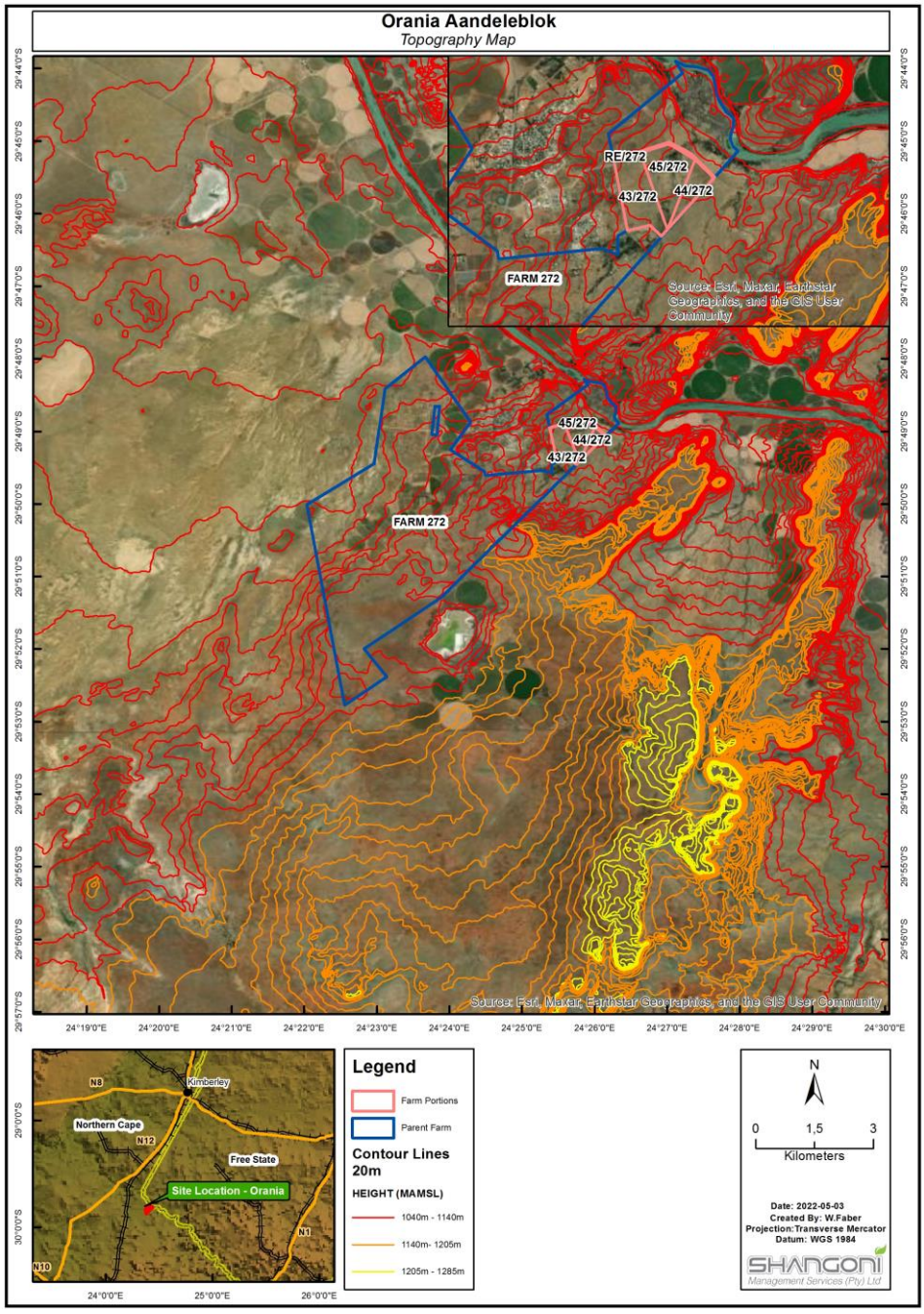

Figure 1: Topographic map (2924 CD) showing the position (areas outlined in blue) of the proposed development of residential and light industrial units on Portion 43 and Portion 45 of the farm Vluytjeskraal 272.

A Palaeontological Impact Assessment was requested by Nico Brits of Shangoni Management Services (Pty) Ltd. The proposed development of residential and light

industrial units will take place on Portion 43 and Portion 45 of the farm Vluytjeskraal 272, Oranje, Northern Cape Province (Figure 1). The proposed development comprises a total area of about 30 hectares. This report is part of a Heritage Impact Assessment to determine the effect that the proposed residential and light industrial development project will have on palaeontological heritage.

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 development of residential and light industrial units will take place on Portion 43 and Portion 45 of the farm Vluytjeskraal 272, Orania, Northern Cape Province (Figures 1 & 2). The site is situated close to the R369 provincial road between Petrusville and Hopetown. The study area is covered by the 1:50 000 topographic map 2924 CD (Figure 1). The proposed development area covers about 30 ha.

Geological Setting

Based on the 1:250 00 geological sheet, 2924 Koffiefontein (Figure 2), the study area is deeply underlain by mudrocks of the Tierberg Formation of the Ecca Group and by Karoo dolerite which is part of the Karoo Supergroup. These Permian Rocks of the Ecca Group are in turn overlain by Quaternary calcrete and alluvial sediments (Figure 2&3).

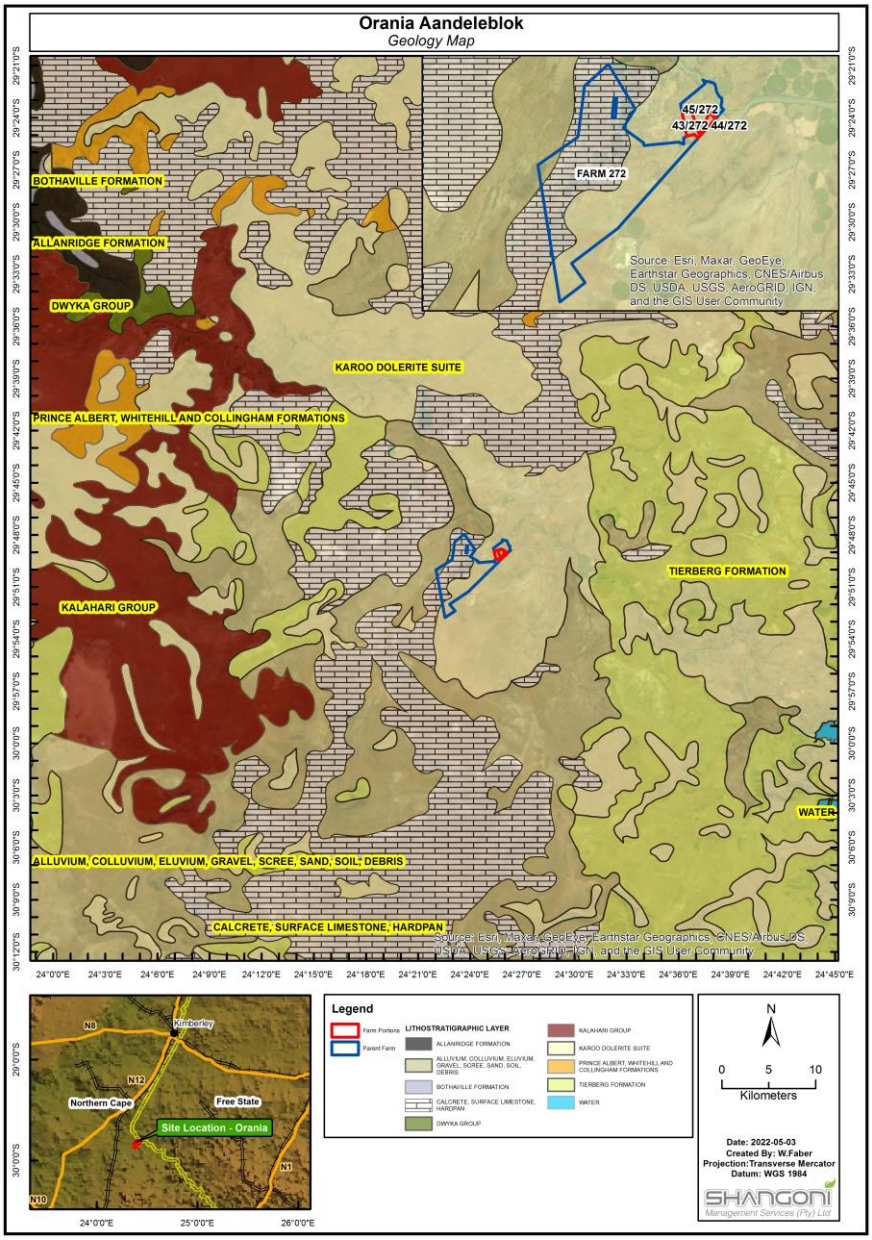

Figure 2: Geological map (2924 Koffiefontein) showing the position of the study locality (blue outlined areas) in relation to the regional geology.

Palaeontological Heritage

The sedimentary rocks of the Permian Tierberg Formation, which are not exposed in the study area as they are overlain by unconsolidated Quaternary sediments, were deposited in a subaqueous prodelta environment and are not known to contain fossils apart from possible fossil glossopterid plants and trace fossils. The overlying Quaternary deposits could host much younger fossils but this is extremely unlikely. It is thus extremely unlikely that fossils will be found in the study area.

Methodology

The study area is deeply underlain by Permian rocks of the Tierberg Formation of the Ecca Group. These in turn are overlain by thick Quaternary sediments and are thus not exposed (Figure 3). Because these rocks and sediments are not known to contain fossils a desktop Palaeontological Impact Assessment was undertaken to identify possible sensitive fossil occurrences, assess the significance of possible fossil occurrences, comment on the impact of the proposed development, and to make mitigating recommendations. The thick Quaternary sediment covering over the entire study area and overlying the rocks of the Karoo Supergroup means that a field study will not yield anything of palaeontological significance.

A Chance Find Protocol (CFP) is presented in Appendix A.

Figure 3: Photographs of the study area to show the covering of Quaternary sediments which in turn are heavily vegetated.

Recommendations

Because the Karoo rock successions comprise either the argillaceous Tierberg Formation of the Ecca Group or Karoo dolerite which is of igneous origin. These rocks in turn are completely covered by Quaternary calcreete and alluvial sediments

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 or in the underlying mudrocks of the Ecca Group 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 development of residential and light industrial units will take place on Portion 43 and Portion 45 of the farm Vluytjeskraal 272 near Orania in Northern Cape Province. The area is underlain by Permian aged rocks of the Ecca Group of the Karoo Supergroup which in turn are overlain by unconsolidated Quaternary aged alluvial deposits. It is extremely unlikely that fossils will be exposed as a result of the development. From a palaeontological perspective, the proposed development should proceed but, if fossils in the sedimentary rocks of the Karoo Supergroup are uncovered 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 (See Appendix A – Chance Find Protocol).

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15 June 2022

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 residential and light industrial units development. The following procedure is required if fossils are exposed by excavations.

1. If fossils are exposed by excavation in unconsolidated Quaternary deposits or in the mudrocks of the underlying Ecca Group they must be inspected by the environmental officer or designated person.
2. If fossils are noted in the unconsolidated Quaternary sands or in the mudrocks of the underlying Ecca Group (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.