

UNIVERSITY OF THE  
WITWATERSRAND,  
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## DESKTOP PALAEOONTOLOGICAL IMPACT ASSESSMENT

**Residential and industrial Development Rooitop Ontwikkeling (Pty) Ltd,  
Northern Cape Province**

*Specialist report by:*

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## **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 46 of the farm Vluytjeskraal 272, close to Orania, Northern Cape Province.

The entire study area is deeply underlain by dolerite of the Karoo Supergroup and more superficially by Quaternary calcrete and alluvial deposits.

The Karoo dolerite is volcanic and will not host fossils. This is overlain by heavily vegetated unconsolidated Quaternary sediments and it is very unlikely that any fossils will be present.

This desktop study has indicated that no fossils are exposed in the heavily vegetated Quaternary overburden which is in turn underlain by dolerite which is a volcanic rock and will not host fossils. It is thus recommended that, on palaeontological grounds, the development should proceed. If in the unlikely event that fossils are exposed in the 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).

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## Introduction and Brief

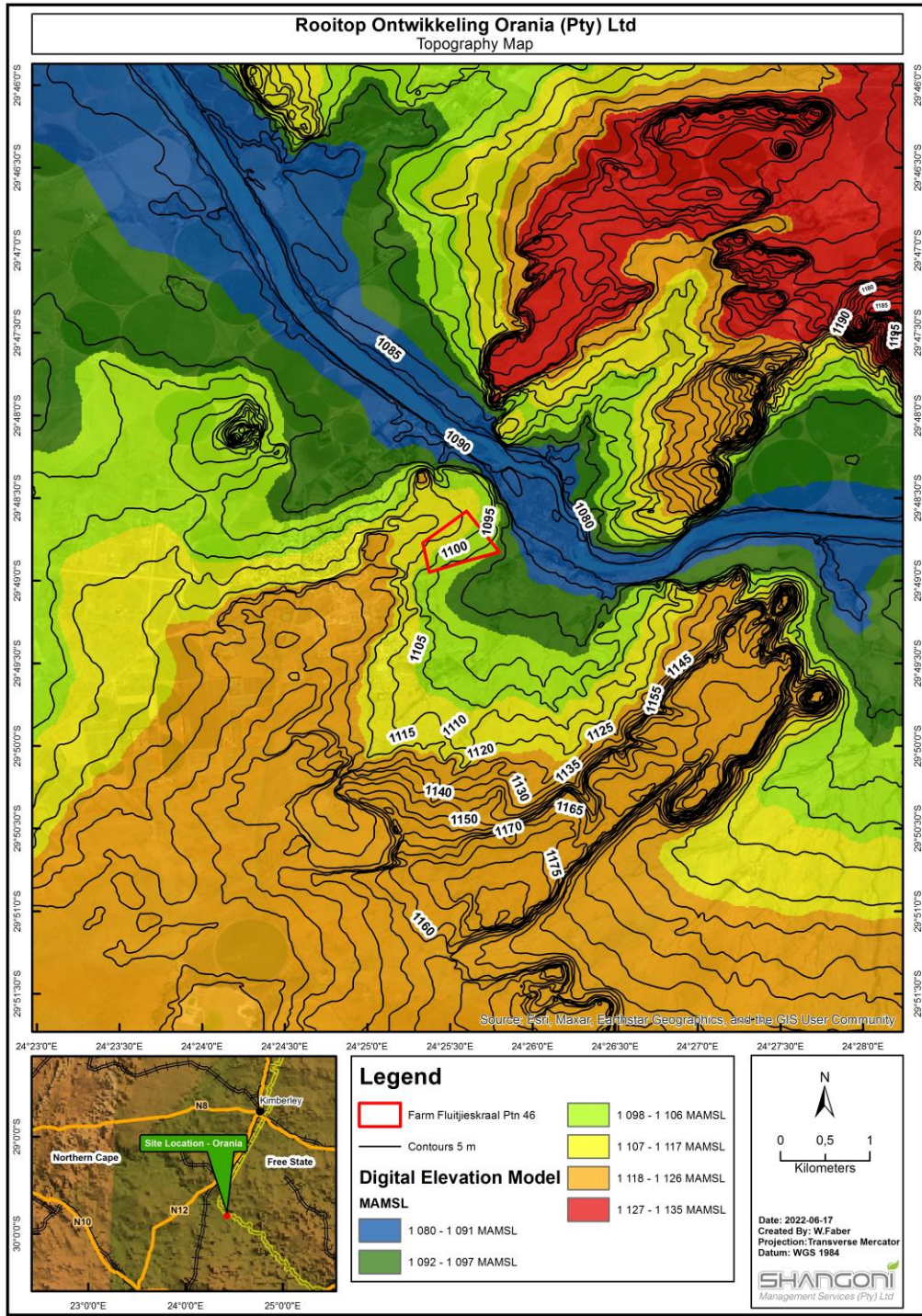


Figure 1: Topographic map (2924 CD) showing the position (area outlined in red) of the proposed development of residential and light industrial units on Portion 46 of the farm Vluytjeskraal 272.

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 46 of the farm Vluytjeskraal 272, Orania, Northern Cape Province (Figure 1). The areas around the stream will not be developed and have been zoned as Open Spaces. Internal roads will be constructed to provide access to the units. Potable water and electricity (from existing bulk services) will be provided to each unit, with such located next to the internal roads (road reserve). Sewage lines from each unit will be installed. These will be connected to an existing bulk sewerage line that will convey sewage to the current sewage treatment plant. The proposed development comprises a total area of about 19.9 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 46 of the farm Vluytjeskraal 272, close to 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 19.9 hectares.

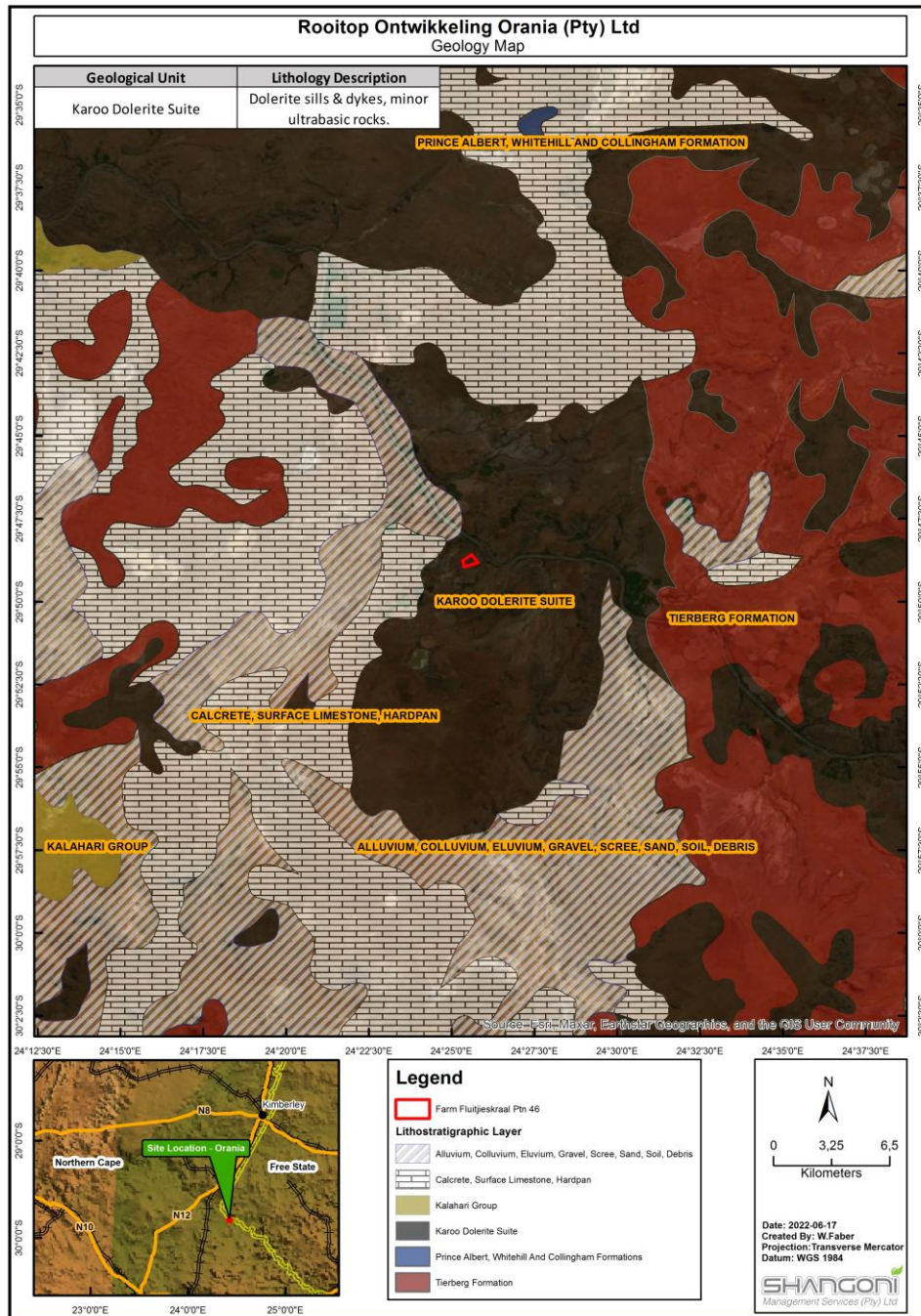


Figure 2: Geological map (2924 Koffiefontein) showing the position of the study locality (area outlined in red) in relation to the regional geology.

## **Geological Setting**

Based on the 1:250 00 geological sheet, 2924 Koffiefontein (Figure 2), the study area is deeply underlain by Karoo dolerite which in turn is overlain by Quaternary calcrete and alluvial sediments (Figure 2 & 3).

## **Palaeontological Heritage**

Karoo dolerite is a magmatic igneous rock and will not host fossils. The overlying Quaternary deposits could potentially host fossils but this is extremely unlikely. It is thus extremely unlikely that fossils will be found in the study area.

## **Methodology**

Inspection of the geological map (2924 Koffiefontein) indicates that the entire study area is underlain by igneous Karoo dolerite. This in turn is overlain by unconsolidated Quaternary sediments and are thus not exposed (Figure 3). Because these 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 Karoo dolerite 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 are heavily vegetated.*

## **Recommendations**

Because the Karoo dolerite, which underlies the entire study area, is of igneous origin and is completely covered by Quaternary calcrete and alluvial sediment, which is heavily vegetated, it is highly unlikely that fossils will be preserved in the study area.

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 the 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 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 development of residential and light industrial units which will take place on Portion 46 of the farm Vluytjeskraal 272 near Orania in Northern Cape Province. The area is underlain Jurassic dolerite of the Karoo Supergroup which in turn is 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 are uncovered in the Quaternary overburden 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).

### **Bibliography**

Catuneanu O., Wopfner H., Eriksson P.G., Cairncross B & Rubidge B.S., Smith, R.M.H., and Hancox P.J. 2005. The Karoo basins of south-central Africa. *Journal of African Earth Sciences*, 43, 211-253.

Johnson M.R., van Vuuren C.J., Visser J.N.J., Cole, D.I., Wickens H.deV., Christie A.M., Roberts D.L. & 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. 361-500.

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

McCarthy TS., & Rubidge BS. 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., & 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.

Pelser A. 2021. Phase 1HIA report for the De Heus Mixed Use Development located on portion 15 of the farm Bultfontein 128. Unpublished report for AB Enviro Consult.

SAHRA. 2013. Minimum standards: palaeontological component of heritage impact



assessment reports. South African Heritage Resources Agency, Cape Town. pp15.

Smith, RMH., Rubidge, BS., Day, MO. & Botha, J. 2020 Introduction to the tetrapod biozonation of the Karoo Supergroup. *South African Journal of Geology*, 123, 131-140.



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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 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 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.