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DESKTOP PALAEOONTOLOGICAL IMPACT ASSESSMENT

Mixed Use Development Middelburg, Eastern Cape Province

Specialist report by:

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EXECUTIVE SUMMARY

Bruce Rubidge was appointed by AB Enviro Consult on behalf of De Heus (Pty) Ltd., to undertake a desktop Palaeontological Impact Assessment for the proposed De Heus Mixed Use Development on Portion 15 of Portion 1 of the farm Bultfontyn 128, close to the town of Middelburg in the Eastern Cape Province

The entire study area is underlain by mudrocks of the Permian Balfour Formation of the Adelaide Subgroup of the Beaufort Group of the Karoo Supergroup and more superficially by Quaternary calcrete and alluvial deposits. The rocks of the Beaufort Group are renowned for their wealth of fossil tetrapods, and there is a slight, but unlikely, possibility that the overlying alluvial deposits could contain fossils.

As the Permian Beaufort Group are overlain by Quaternary 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 expose fossil vertebrates, and plants in the rocks of the Beaufort 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 Beaufort Group or 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.

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Introduction and Brief

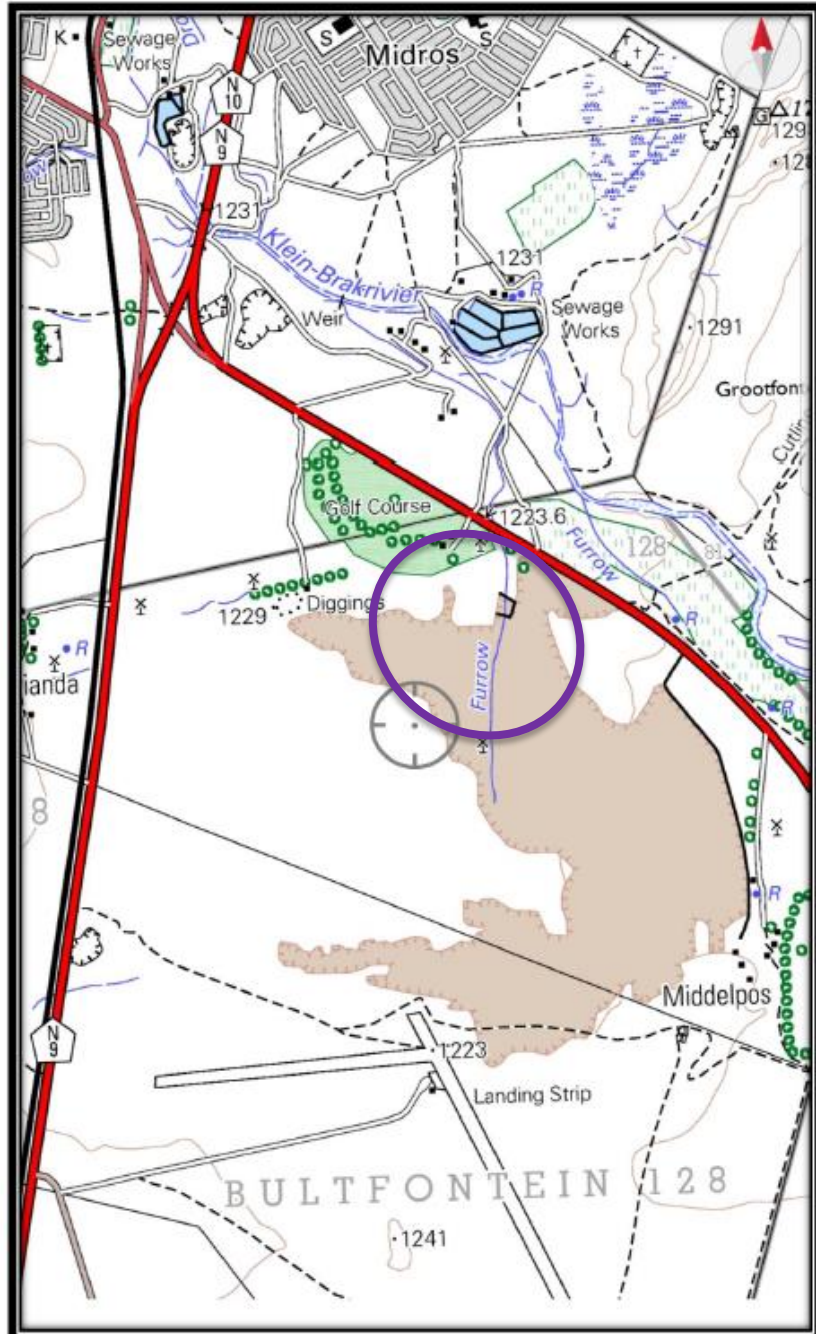


Figure 1. 1:10 000 topographic map (3125CA Middelburg) showing the site (purple outline) for the proposed De Heus Mixed Use Development is on Portion 15 of Portion 1 of the farm Bultfontyn 128, close to the town of Middelburg.

A Palaeontological Impact Assessment was requested by JP de Villiers of AB Enviro Consult on behalf of De Heus (Pty) Ltd., to undertake a desktop palaeontological impact assessment in the Middelburg area of the Eastern Cape Province. The proposed De Heus Mixed Use Development is on Portion 15 of Portion 1 of the farm Bultfontyn 128, close to the town of Middelburg. The proposed development comprises a total area of 40,5 hectares.



Figure 2. Google Earth image of the study area (outlined in red) for the proposed De Heus Mixed Use Development is on Portion 15 of Portion 1 of the farm Bultfontyn 128, close to the town of Middelburg, Eastern Cape Province.

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 approval of the proposed development as more than 1 hectare of indigenous vegetation is to be removed (Listing Notice 1 of the EIA regulations).

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 De Heus Mixed Use Development is located on Portion 15 of Portion 1 of the farm Bultfontyn 128, 3.8km southwest of the town of Middelburg in the Eastern Cape Province and south of the N10 highway (Figure 1 & 2). The study area is covered by the 1:50 000 topographical map Sheet 3125CA.

The topography of the study area is flat with no rocky outcrops parts of the area have been disturbed by previous golf course and cricket oval development and trenching for a water canal.

The proposed development will comprise conventional road and parking area construction. Structures will comprise conventional shallow reinforced concrete footings for buildings, except for the Bunker Storage System which will be founded about 4 m below current ground level. The development will comprise:

- Access roads and parking areas
- Truck wash bay
- Weigh Bridge
- Final product store
- Production area
- Overhead bulk bins
- Bunker system
- Lucerne milling building and store

With regard to services infrastructure, the proposed township area will be supplied with potable water.

Geological Setting

Referral to the geological map (1992 sheet 3124 Middelburg; 1:250 000 series) indicates that the entire area is underlain by rocks of the Karoo Supergroup comprising sedimentary rocks of the Permian Balfour Formation of the Adelaide Subgroup of the Beaufort Group which comprises mainly mudrock and sandstone (Figure 3) and in turn are overlain by Quaternary calcrete and alluvial sediments.

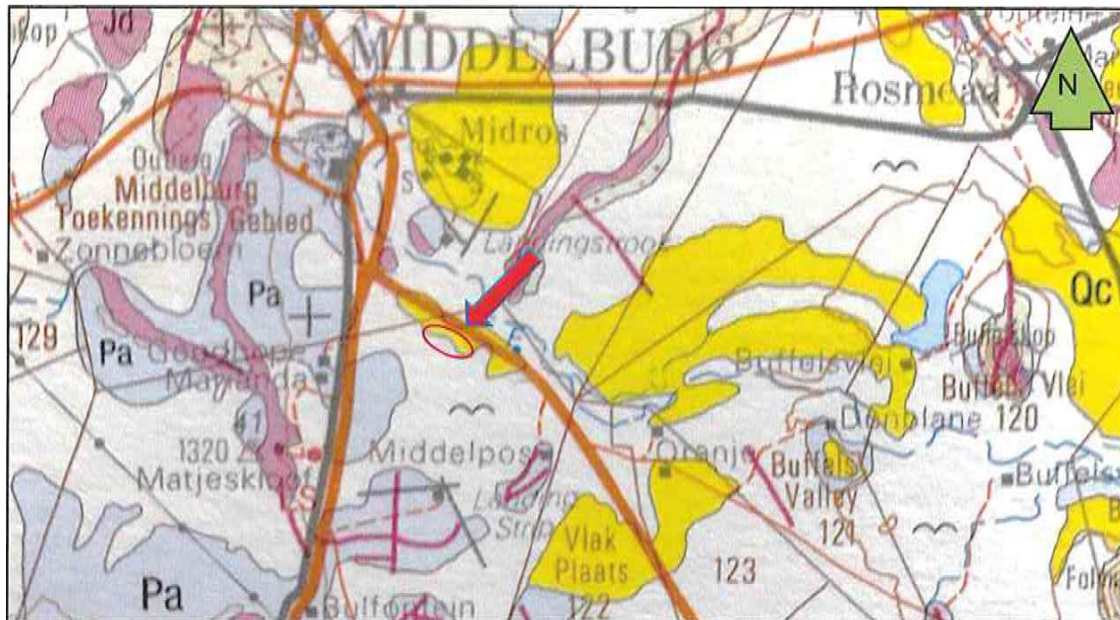


Figure 3: 1: 250 000 scale geological map (3124 Middelburg) showing the position of the proposed De Heus Mixed Use Development development (purple ovoid) on Portion 15 of the farm Bultfontyn 128, southeast of the town of Middelburg in the Eastern Cape Province. Pa – Adelaide Subgroup of the Beaufort Group; Jd – Dolerite (pink); Qc –Quaternary calcrete deposits (dark yellow); Quaternary alluvial deposits (white).

Palaeontological Heritage

The sedimentary rocks of the Permian Beaufort Group, which are not exposed in the study area, are renowned for their wealth of fossil tetrapods, particularly therapsids, and also plants of the *Glossopteris* flora. These rocks of the Karoo Supergroup are completely covered by unconsolidated Quaternary sediments. The Quaternary deposits could host much younger fossils but this is extremely unlikely.

Collections of fossils from the Beaufort Group are present in the collections of the Evolutionary Studies Institute (ESI), at the University of the Witwatersrand, the Council for Geoscience in Pretoria, National Museum in Bloemfontein, Ditsong Museum in Pretoria, and Iziko Museum in Cape Town.



Figure 4: Photographs of the study area to show the covering of Quaternary Kalahari Group (From Pelsler 2021)

Methodology

The study area is deeply underlain by Permian rocks of the Karoo Supergroup which are considered to be of high palaeontological sensitivity because of the possibility of finding fossil vertebrates and plants. However, because these Permian rocks are overlain by thick Quaternary sediments in the study area and are thus not exposed (Figure 4), 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.

Recommendations

From the documentation supplied regarding the development, it is extremely unlikely that the proposed development will affect palaeontological heritage. The underlying Permian rocks of the Karoo Supergroup are not exposed in the study area and it is unlikely that fossils will be preserved in the overlying Quaternary calcrete and alluvial deposits.

It is thus recommended that, in the unlikely event that 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 De Heus Mixed Use Development near Middelburg is underlain by Permian aged rocks 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 (Appendix A).

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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 proposed development. The following procedure is required if fossils are exposed by excavations.

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