DESKTOP PALAEONTOLOGICAL IMPACT ASSESSMENT

Proposed Hopetown (Goutrou) Township development,

Thembelihle Local Municipality, Hopetown, Northern Cape Province

Specialist report by:

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DATE: 24 March 2021

EXECUTIVE SUMMARY

Bruce Rubidge was appointed by Maxim Planning Solutions (Pty) Ltd on behalf of Thembelihle Local Municipality to undertake a desktop Palaeontological Impact Assessment for the proposed Hopetown (Goutrou) township on a Portion of the Remaining Extent of Erf 1 and Erf 624, Hopetown in the Thembelihle Local Municipality in Hopetown in the Northern Cape Province.

The entire study area is underlain by mudrocks of the Permian Tierberg and Whitlehill formations of Ecca Group of the Karoo Supergroup and more superficially by Quaternary wind-blown sand and calcrete of the Kalahari Group. The mudrocks of the Ecca Group are known to contain sporadic fossil vertebrates and plants, and there is a slight, but unlikely, possibility that the calcretes and sands of the Quaternary Kalahari Formation could contain fossils.

As the Permian Ecca Group rocks are overlain by Quaternary sands and calcrete and are not exposed in the study area it is highly unlikely that palaeontological heritage will be affected by the proposed township development. The overlying Caenozoic 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, crustaceans and plants 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 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

A Palaeontological Impact Assessment was requested by Koot Raubenheimer of Maxim Planning Solutions (Pty) Ltd on behalf of the Thembelihle Local Municipality in Hopetown in the Northern Cape Province. The proposed township development is on a Portion of the Remaining Extent of Erf 1 and Erf 624, Hopetown in the Thembelihle Local Municipality in Hopetown in the Northern Cape Province (Figure 1). The project is conducted under instruction from Barzani Development (Pty) Ltd., and the proposed development comprises a total area of 102,3871 hectares.

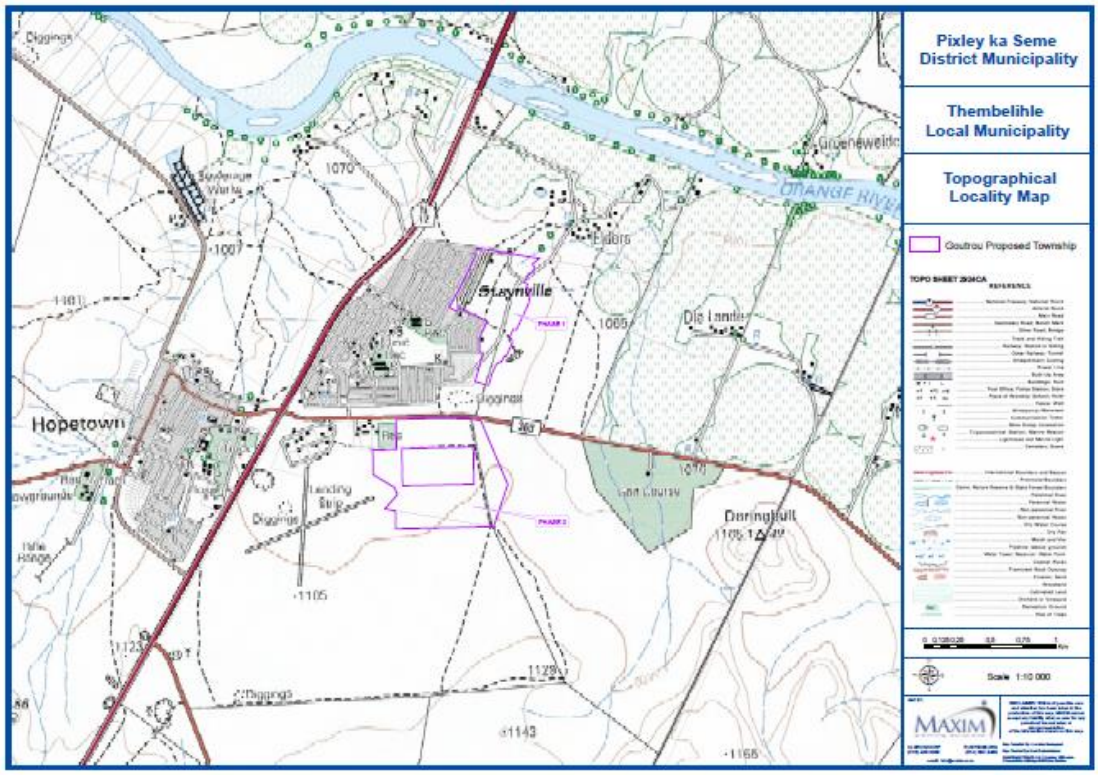

Figure 1. 1:10 000 topographic map (2924CA Hope Town) showing the site (purple outline) for the proposed township development on a Portion of the Remaining Extent of Erf 1 and Erf 624, Hopetown in the Thembelihle Local Municipality.

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).

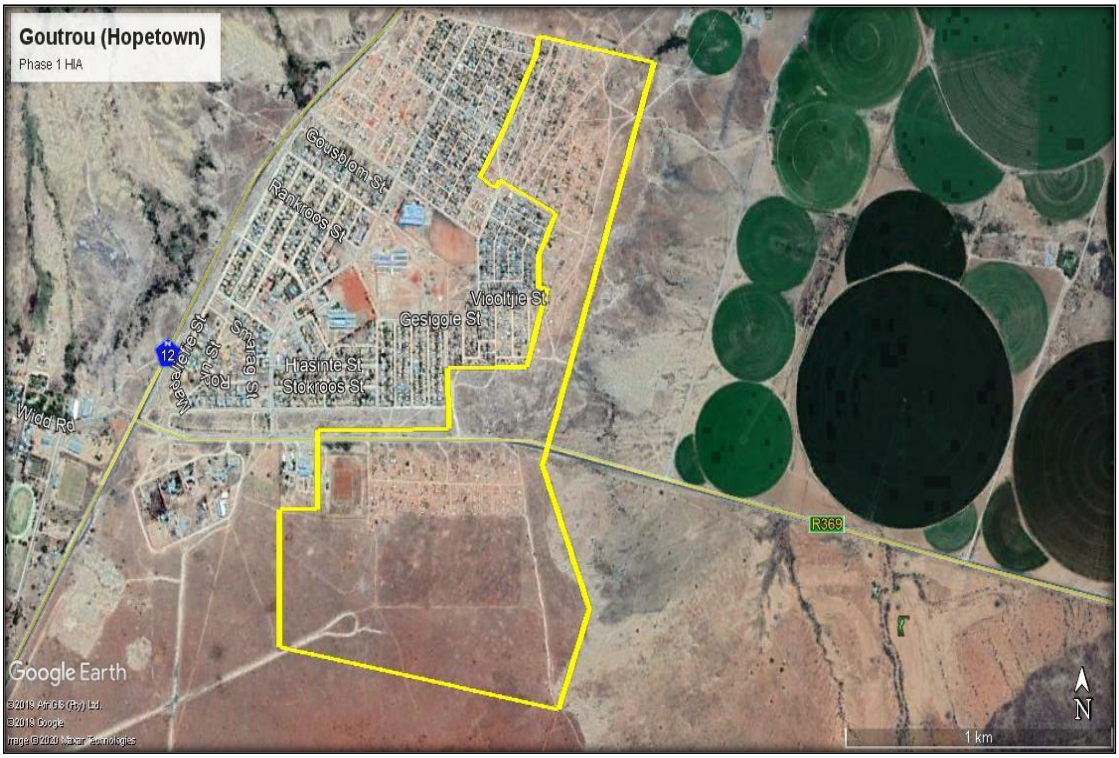

Figure 2. Google Earth image of the study area (outlined in yellow) for the proposed township township development is on a Portion of the Remaining Extent of Erf 1 and Erf 624, Hopetown in the Thembelihle Local Municipality.

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 township is located on a Portion of the Remaining Extent of Erf 1 and Erf 624, Hopetown in the Thembelihle Local Municipality in the Northern Cape Province, south east of the town of Hopetown and south of the R29 road (Figure 2). The study area is covered by the 1:50 000 topographical map Sheet 2924CA Hope Town (Figure 1).

The topography of the study area is flat with no rocky outcrops although there are some higher elevated sections. Parts of the area have been disturbed by informal housing as well as quarrying and trenching.

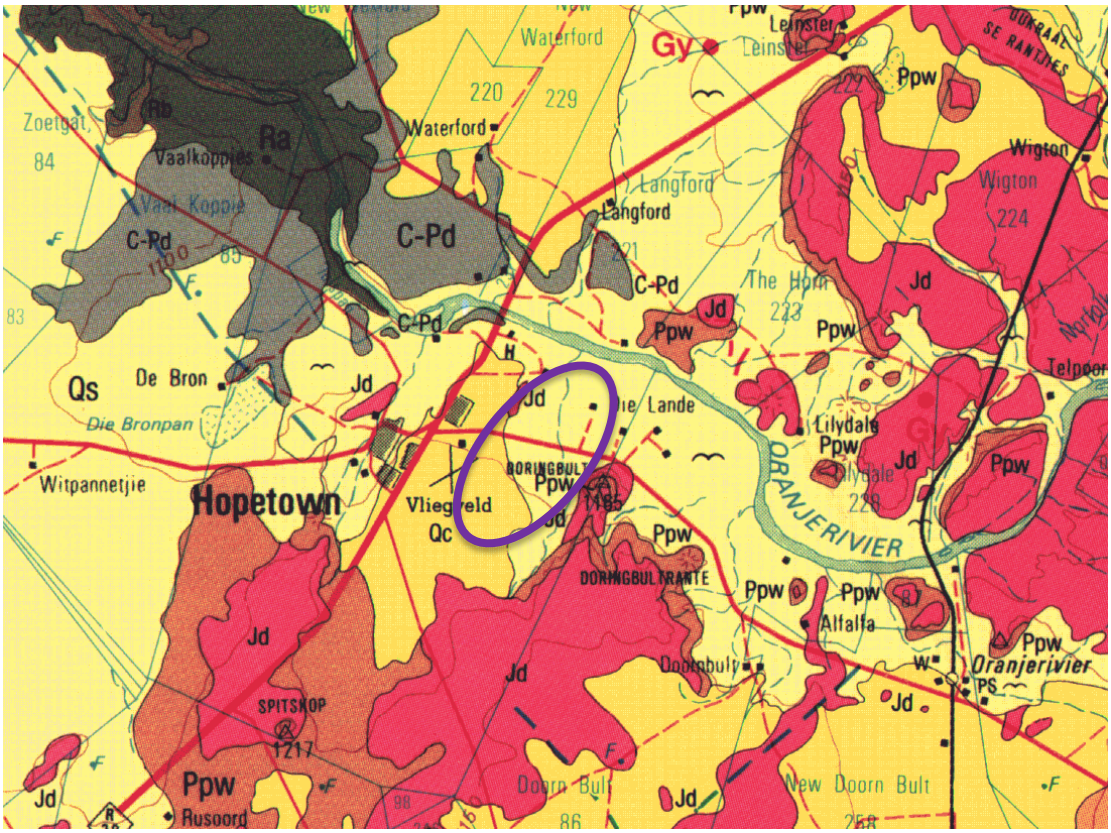

Figure 3: 1: 250 000 scale geological map (2722 Kuruman) showing the position of the proposed Hopetown (Goutrou) township development (purple ovoid) on a Portion of the Remaining Extent of Erf 1 and Erf 624, Hopetown in the Thembelihle Local Municipality in Hopetown in the Northern Cape Province. Ppw – Whitehill Formation (brown); Jd – Dolerite (pink); Qc –Quaternary calcrete deposits (dark yellow); Qs – Quaternary sand deposits (light yellow).

The main infrastructure expansion is associated with the layout of a new township which will be developed and will include Residential, Business, Institutional and Public

Open Space erven as well as streets. With regard to services infrastructure, the proposed township area will be supplied with potable water. All sewerage generated is from a full waterborne system.

Geological Setting

Referral to the geological map (1992 sheet Koffiefontein 2924; 1:250 000 series) indicates that the entire area is underlain by rocks of the Karoo Supergroup comprising sedimentary rocks of the Permian Ecca Group (Whitehill and Tierberg formations) which comprise mainly mudrocks (Figure 3) and in turn are overlain by calcrete and wind-blown sediments of the Quaternary Kalahari Group.

Figure 4: Photographs of the study area to show the covering of Quaternary Kalahari Group

Palaeontological Heritage

The mudrocks of the Permian Whitehill and Tierberg formations, which are not exposed in the study area, are known to host sporadic fossils of fish, crustaceans and plants Group. These rocks of the Karoo Supergroup are completely covered by sediments of the Kalahari Group. These largely wind-blown sands, which are also sedimentary of origin, could also host much younger fossils but this is extremely unlikely.

Collections of fossils from the Whitehill and Tierberg formations 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, and Iziko Museum in Cape Town.

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 invertebrates, vertebrates and plants. However, because these Permian rocks are overlain by thick sediments of the Kalahari Group 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 covering of Kalahari sand over the entire study area covering 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 have any affect on 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 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 township development near Hopetown is underlain by Permian aged rocks 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 township development should proceed but, if 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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24 March 2021

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

1. If fossils are exposed by excavation in the sands of the Kalahari Group or in the dolomites 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.