

**PALAEONTOLOGICAL IMPACT ASSESSMENT (PHASE 2) FOR THE
PROPOSED ROAD UPGRADE OF THE DRAYCOTT ROAD (D2283, L1346, L1135
& D449) LOCATED NEAR ESTCOURT, uTHUKELA DISTRICT MUNICIPALITY,
KWAZULU-NATAL**

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Declaration of Consultants independence

I, Gary Trower, am an independent consultant and have no business, financial, personal or other interest in the proposed development project in respect of which I was appointed to do a palaeontological assessment other than fair remuneration for work performed. There are no circumstances whatsoever that compromise the objectivity of this specialist performing such work.

A handwritten signature in black ink, appearing to read 'G. Trower', with a large, sweeping flourish underneath the name.

Gary Trower

Introduction

In terms of the National Environmental Management Act 107 of 1998, Section 38 (8) of the National Heritage Resources Act 25 of 1999 (sections 34-36), and the KwaZulu-Natal Heritage Act 4 of 2008 (sections 33-36), all aspects of heritage are protected. Proposed developments that are likely to impact on heritage resources (i.e. historical, archaeological, palaeontological & cosmological) require a desktop and/or field assessment to gauge the importance of such resources (if present) in order to ensure (through detailed documentation; mitigation measures or rescue excavation) that such sites are not damaged or destroyed by the processes that threaten them.

The KwaZulu-Natal Department of Transport proposes to upgrade the District Roads D2283 and D449, and Local Roads L1346 and L1135 near Loskop. The footprint for the development consists of two interlinking dirt roads situated within a communal area of Zulu homesteads located in the foothills of the Central Drakensberg (Figure 1). The proposed road upgrades are situated within an area where the underlying geology is likely to yield palaeontological material, with some sections given the highest sensitivity ranking of red (according to the SAHRIS map, www.sahra.org.za/sahris/map/palaeo) and other parts given a moderate sensitivity rating of green (Figure 5). Therefore a ground survey was required to conduct a palaeontological assessment of possible fossil material within the boundaries of the proposed development.

Geology

In terms of the geology, certain sections of the site contain underlying bedrock belonging to the Beaufort Group, a deposit characterized by various lenses of sandstone and shale representing a fluvial palaeoenvironment (Figure 2). In this region the Beaufort is represented by the Adelaide Subgroup, which comprises grey and reddish-brown mudstone, dark grey

shale which is carbonaceous in places, siltstone and fine-grained sandstone. This depositional unit accumulated from the Middle Permian to the early part of the Middle Triassic in southern Gondwana and follows conformably after the Ecca Group. The Beaufort Group forms an important component and subdivision of the stratigraphy of the Karoo Supergroup of southern Africa, an extensive inland basin which preserves a rich array of tetrapod fauna which existed through the Permo-Triassic (Rubidge 2005, Smith *et al.* 1993).

In the Estcourt district most deposits of the Beaufort Group belong to the arenaceous Katberg Formation, with the exposed strata predominated by mudstones deposited in a braided fluvial system. However this zone also includes the argillaceous Palingkloof Member, uppermost unit of the Balfour Formation and the lower third of the Burgersdorp Formation (Groenewald & Kitching 1995). The Katberg and Burgersdorp Formation are considered to be one of the best records in the world of Lower to early Middle Triassic terrestrial faunas, containing palaeontological material falling within the *Lystrosaurus* and *Cynognathus* Assemblage Zones. These zones are named after the characteristic genera abundantly present in these horizons, and these mammal-like reptiles are the biostratigraphic markers or index fossils for the depositional structures preserved in these units.

Fossils found in the broader district include amphibians (e.g. *Lydekkerina*, *Micropholis*, *Broomistega*), therapsids (e.g. *Moschorhinus*, *Tetracynodon*, *Scaloposaurus*), gorgonopsians (*Cyonosaurus*), cynodonts (e.g. *Thrinaxodon*, *Glochinodontoides*), dicynodonts (e.g. *Lystrosaurus*, *Dicynodon*, *Oudenodon*), parareptilians (e.g. *Procolophon*), fish, insects and plants (ESI database, Ponomarenko & Mostovski 2005, Rubidge 2005, Seldon & Nudds 2011). Furthermore, the rocks from this assemblage zone have yielded the most diverse Mesozoic amphibian fauna in Africa (Schoch & Rubidge 2005).

The Quaternary-aged deposits which occur within the study area comprise the Masotcheni Formation. These strata consist of partly consolidated fine-grained sediments with silcrete nodules, laterite and clay. These deposits are several metres thick and capped by a layer of topsoil (see Figures 6-8). This stratigraphic unit therefore acts a kind of buffer protecting sensitive bedrock from developments close to the surface. However, where Beaufort bedrock approaches the surface it is only capped by a thin layer of topsoil. Within watercourses the bedrock can be completely exposed (Figure 3) and this is especially evident along the drainage line within the big loop indicated with the yellow arrow in Figure 4.

Site observations

Large sections of this development occur in a highly sensitive region in terms of palaeontological resources (Figure 5). However the survey of the exposed geology within the study area (Figure 3 & Figures 6-8) revealed no fossil material. Furthermore, no trace fossils in the form of footprints, invertebrate trails or coprolites were observed during the survey. The deep Quaternary sediment package covers large portions of the fossiliferous bedrock, protecting it from exposure to the elements and from anthropogenic activities at the surface. Even though no palaeontological material was observed, due to the fact that the rocks of this region are highly fossiliferous it is probable that fossil material may be located somewhere within the study area but was not observed because it was either buried or not immediately visible.

Recommendations

Although several fossil and archaeological sites are known within the broader district, none were recorded during the ground survey and the proposed road upgrades will likely have zero impact on palaeontological resources. The thick sediment package making up the Quaternary

deposits acts as a buffer to protect fossiliferous bedrock from potential damage caused by construction activities above.

Based on the assessment from the field survey, my recommendation is that the road upgrades can proceed. Whilst it is probable that fossils may lay buried somewhere in the vicinity of the proposed development (based on the SAHRA sensitivity map), the new roads will be built on existing dirt roads where the landscape is already disturbed as a result of the levelling out and overall construction process. The depth required for the foundations of the new roads is also insufficient to reach bedrock, thereby reducing the chances that sensitive strata will be encountered. However, infrastructure upgrades should proceed with caution and in a sensitive manner as heavy machinery may expose fossils not visible during the ground survey. If further excavation and disturbance of the surface should reveal palaeontological material, construction would need to halt immediately. The relevant heritage resources agency (Amafa or SAHRA) would need to be informed and a field palaeontologist would be required to visit the site to evaluate such fossil discoveries.

Assumptions and limitations

According to the amended 2017 EIA regulations, various assumptions and limitations need to be stated when reporting on proposed developments. The professional opinion given in this PIA report is based on the results of a field survey which was used to gauge the fossiliferous potential of the bedrock likely to be exposed during the proposed development. As a general rule, field observations are based on recording palaeontological and/or archaeological material which is eroding out or visible on the surface. As many developments require a degree of digging down into the soil and/or underlying stratigraphy, heritage objects will only be exposed once they have been disturbed from their original positions. Therefore such objects would have been hidden from the assessor during the fieldwork survey.

In addition, the results reported herein are based upon a thorough field survey and careful scrutiny of the best available maps and data sets and all attempts were made to take a holistic, informed decision. Yet in spite of this, it is possible that fossils may be present somewhere along the route of the proposed development but are hidden from view due to their buried nature. Moreover, certain predictions about the likelihood of encountering fossils was based on all available evidence and may prove to be less or more likely than anticipated .

Furthermore, it is assumed that the developers will respect the guidelines set out in the laws of South Africa with regards to good environmental management practices and policies, and will immediately cease all construction if any fossiliferous material is discovered. It is also assumed that developers will practice integrity and embrace an unwavering mind-set with regards to respecting and protecting all aspects of heritage, including due consideration for the fact that such objects cannot simply be sacrificed to meet project deadlines.

Conclusion

During the site survey no fossil localities were recorded. The development is likely to have minimal to zero impact on palaeontological resources and the likelihood of encountering fossil material is also very low. Due to the fact that most locations within the survey area have a buffering layer of Quaternary deposits before bedrock is reached and that foundations of the road will not reach a considerable depth, the probability of encountering palaeontological material is greatly reduced. Should such material be unearthed construction would need to cease immediately for a further field assessment to be conducted. Lastly, the people living within the study area will benefit from this development as the upgraded roads will make the area more accessible and will improve transportation networks in and out of the area.

Appendix



Figure 1: Satellite image showing the layout of the proposed roads to be upgraded. The study area occurs within a sensitive region as the geology is a known fossil-bearing unit. (Modified Google Earth image, DigitalGlobe 2018)

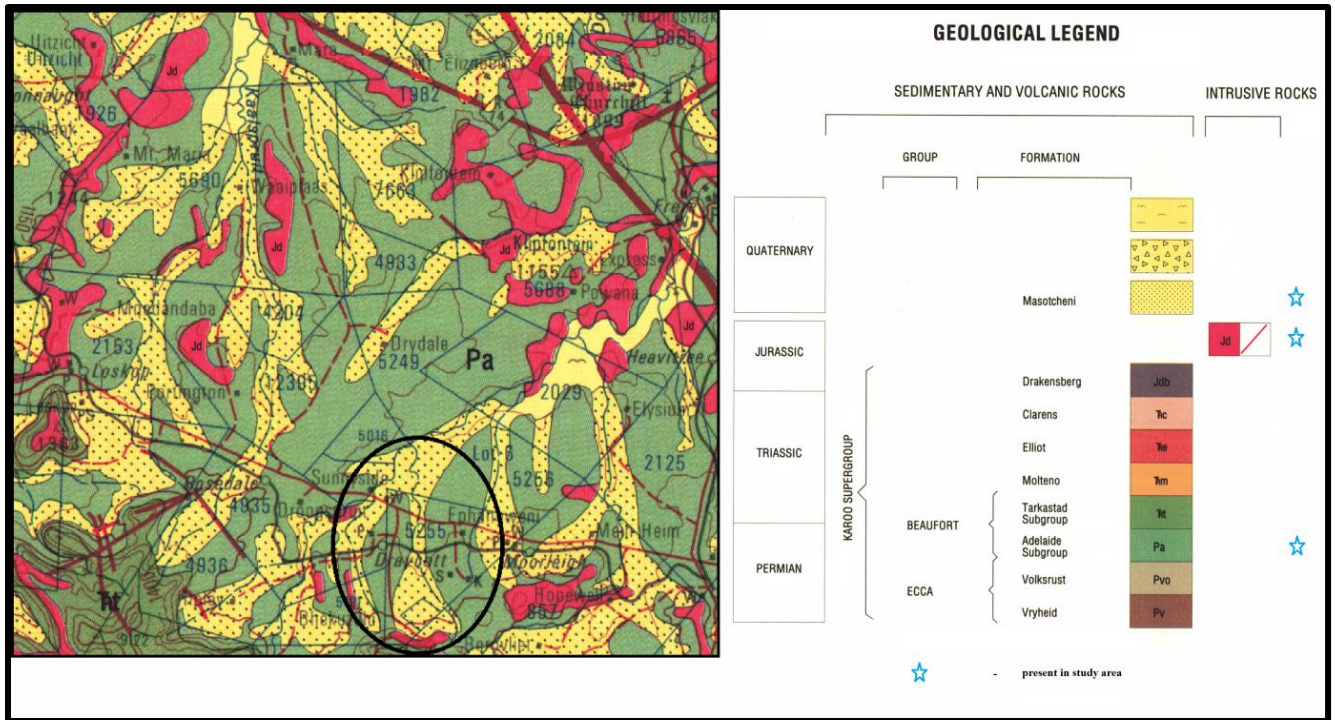


Figure 2: Map showing geology of the region, an area dominated by Triassic-aged sediments. The study area is indicated with a black circle and rock types which occur within the site footprint are indicated with blue stars. Most of the proposed development will take place on top of the Beaufort Group (**Pa**) with components of Quaternary-aged deposits (Masotcheni, dotted yellow) and small scattered patches of Jurassic-aged dolerite (**Jd**). (Modified from 2828 Harrismith, 1:250 000 Geological Series, Council for Geoscience, 1998)



Figure 3: Although most of the sensitive bedrock was covered by a layer of Quaternary deposits, along the river it was widely exposed. A search of the rocks located 50m on either side of the road revealed no fossil material



Figure 4: Along a section of the proposed upgrade the road makes a giant loop. The yellow arrow points to an area where the Adelaide Subgroup bedrock is completely exposed within the riverbed. Although this development will not impact on these exposed rocks they were still examined for traces of fossil but none could be located

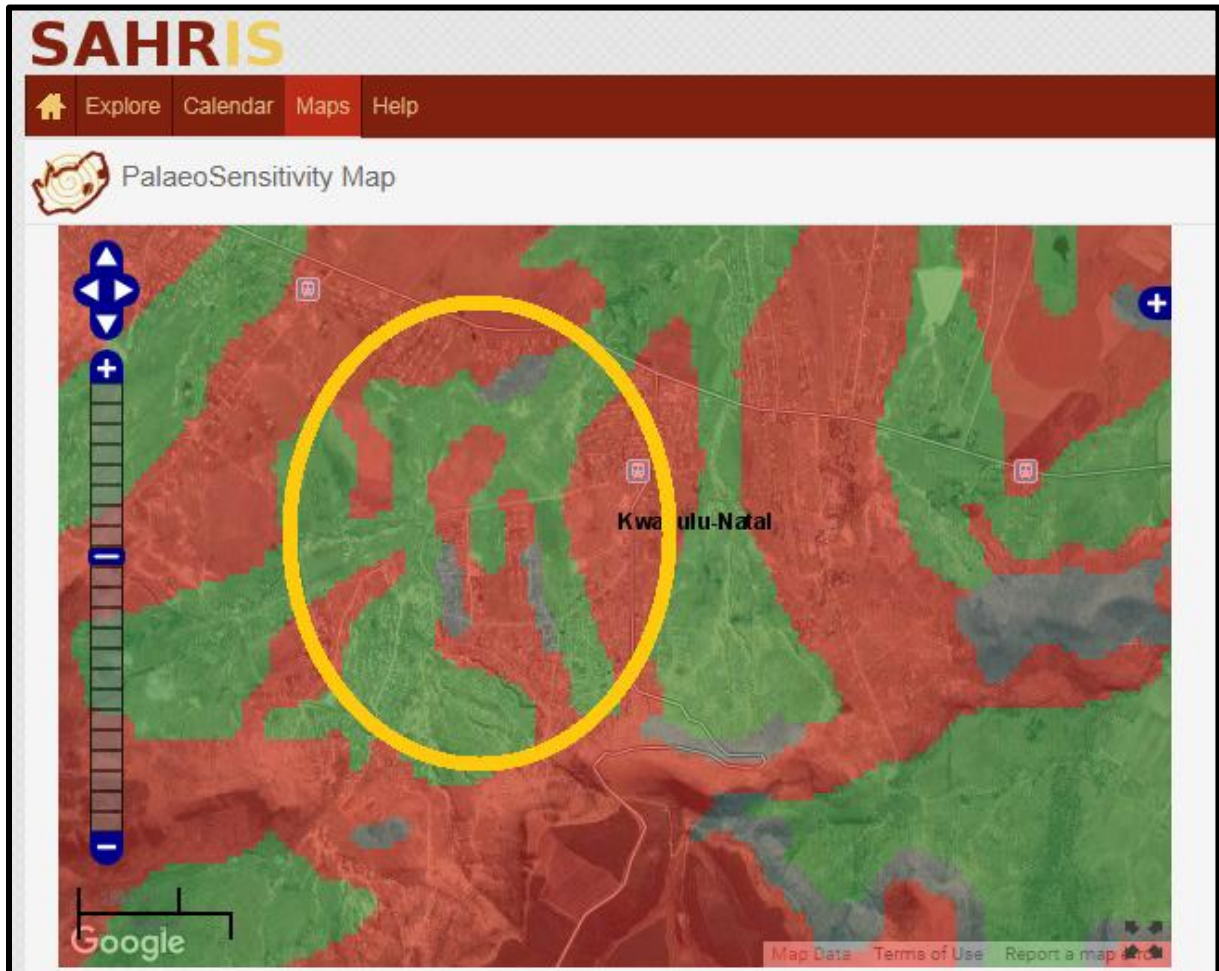


Figure 5: SAHRIS PalaeoSensitivity Map showing the study area within the yellow circle. Sections of the study area have the highest ranking (red) for potential fossil occurrences, corresponding to the Adelaide Subgroup, with Quaternary deposits given a green rating and having a moderate potential for the presence of fossils. Although Quaternary deposits may contain archaeology, in this region they appear to be devoid of both archaeological and fossil material. The grey patches represent dolerite, a geological unit which by its nature is devoid of fossil material (modified from www.sahra.org.za/sahris/map/palaeo)



Figure 6-8: Photographs indicating the thick sediment package making up the Quaternary deposits in the area. Due to the fact that this stratigraphic unit is several metres thick, it protects sensitive bedrock from exposure to the elements and acts as a buffer against potentially destructive human activities which often occur closer to the surface.

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