

RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

Proposed new dolerite quarry near Mount Frere, Alfred Nzo District Municipality, Eastern Cape

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March 2012

1. OUTLINE OF DEVELOPMENT

The Umso Construction (Pty) Ltd is proposing to develop a small new quarry for road and building material in the vicinity of Cabasi Village and about 7.5 km NNE of Mount Frere, Alfred Nzo District Municipality, in the Eastern Cape Province (30° 49' 29.9", 28° 59' 54.7") (Fig. 1). The new quarry site lies in hilly terrain at c. 1000m amsl on the eastern side of a minor unpaved road (T17) and 4.4 km due NW of the N2 trunk road. The total footprint of the proposed quarry, associated buildings and stockpile areas is approximately 1.5 hectares.

A permit for the development is required from the Department of Mineral Resources (DMR) according to the Minerals and Petroleum Resources Development Act, Act No 28 of 2002. A letter of exemption from further palaeontological studies has been requested for this development by Terreco Environmental cc, East London (Contact: Duncan Scott, Terreco Environmental cc, P O Box 19829, TECOMA, East London 5214; tel: 043-721 1502).

2. GEOLOGICAL BACKGROUND

The geology of the study area is shown on 1: 250 000 sheet 3028 Kokstad (Fig. 3; De Decker 1981). The region to the NNE of Mount Frere is largely underlain by fluvial sediments of the Mid Late Permian **Adelaide Subgroup** (Lower Beaufort Group, Karoo Supergroup) (Johnson *et al.* 2006). The Beaufort Group sediments have here been extensively intruded and baked by dolerite sills in the Early Jurassic Period (183 Ma; **Karoo Dolerite Suite (Jd)** (Duncan & Marsh 2006). Major dolerite intrusions are likely to have thermally metamorphosed the adjacent country rock for a considerable distance on either side of their edges.

The quarry in question is to be excavated into a major NW-SE trending dolerite intrusion that crops out extensively at surface as rusty-brown weathering, massive but well-jointed igneous rock (Fig. 2).

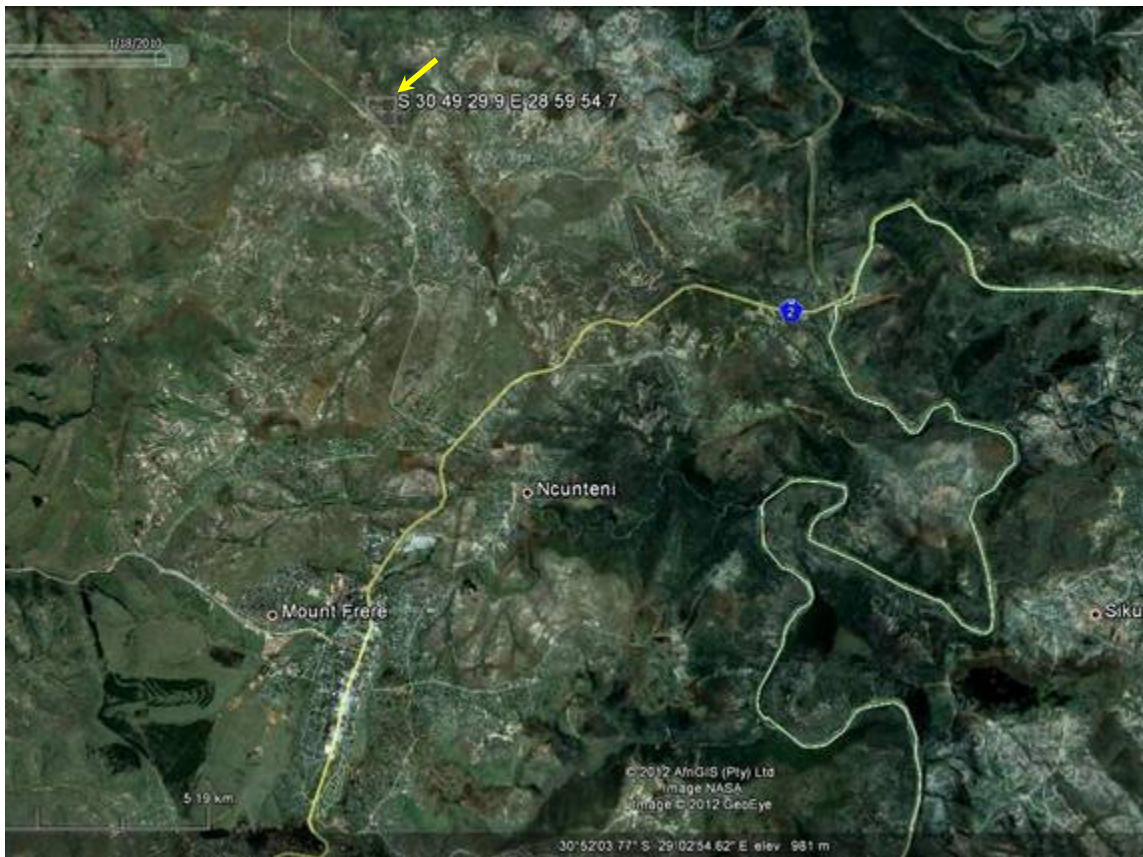


Fig. 1. Google earth© satellite image of the Mount Frere area, Eastern Cape, showing the location of the dolerite borrow pit (yellow arrow) 7.5 km NE of Mount Frere.



Fig. 2. Field photograph of rusty-brown weathering dolerite exposures at the Mount Frere study site (Image kindly provided by Terreco Environmental cc).

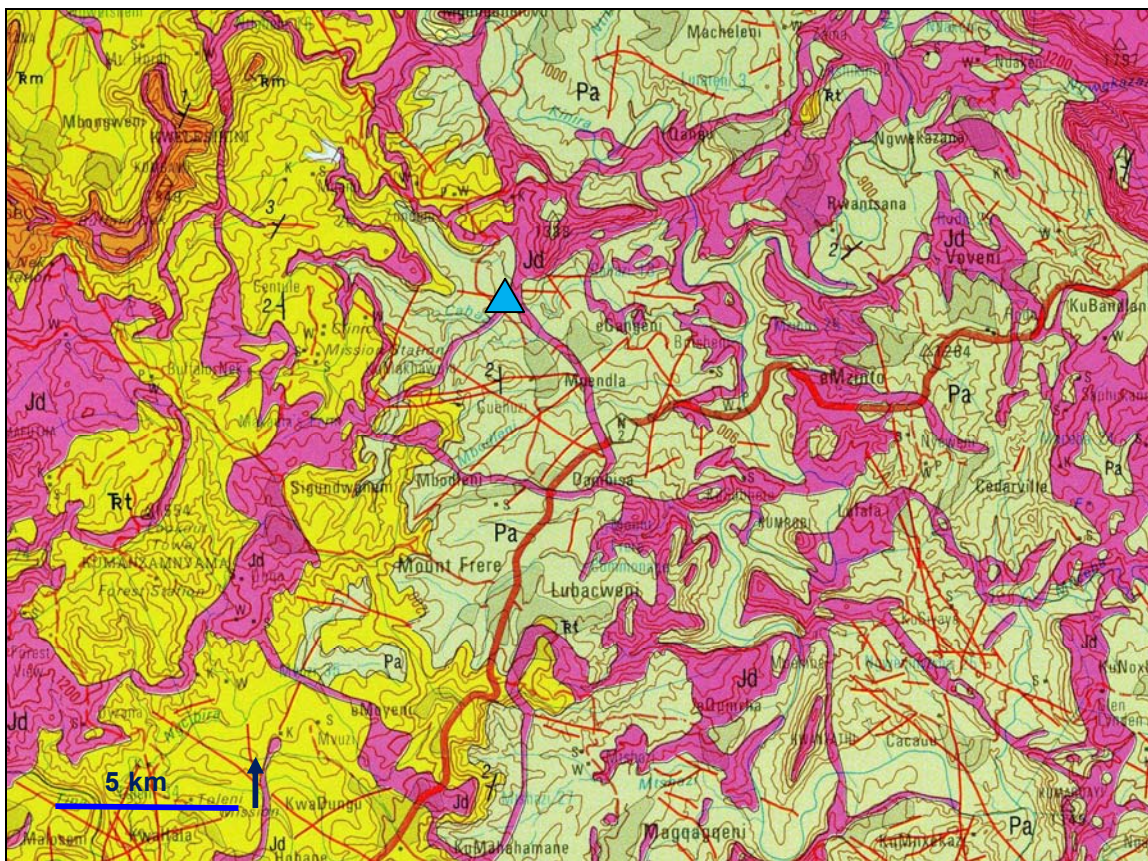


Fig. 3. Extract from 1: 250 000 geological map 3028 Kokstad (Council for Geoscience, Pretoria) showing approximate location (blue triangle) of the study area c. 7.5 km NNE of Mount Frere, Eastern Cape. Geological units represented in this region are the Adelaide Subgroup (Lower Beaufort Group; Pa pale grey-green) and intrusive dykes and sills of the Karoo Dolerite Suite (Jd, pink).

3. PALAEOONTOLOGICAL HERITAGE

The dolerite outcrops in the Eastern Cape study region are in themselves of no palaeontological significance since these are high temperature igneous rocks emplaced at depth within the Earth's crust (Almond *et al.* 2008). As a consequence of their proximity to large dolerite, the surrounding, potentially fossiliferous Beaufort Group sediments in this area have probably been thermally metamorphosed or "baked" (*ie.* recrystallised, impregnated with secondary minerals). Embedded fossil material of phosphatic composition within the sedimentary country rocks, such as bones and teeth, is frequently altered by baking - bones in the East London area, for example, are typically black - and may be very difficult to extract from the hard matrix by mechanical preparation (Smith & Keyser, p. 23 *in* Rubidge 1995). Thermal metamorphism by dolerite intrusions therefore tends to *reduce* the palaeontological heritage potential of Beaufort Group sediments.

Superficial sediments (*e.g.* colluvium, alluvium, soils) mantling the Beaufort Group and Karoo dolerite bedrocks are generally only very sparsely fossiliferous.

4. CONCLUSIONS & RECOMMENDATIONS

The development of the proposed new dolerite quarry NNE of Mount Frere is of no significance in terms of local palaeontological heritage since these igneous rocks are entirely unfossiliferous, and any fossils preserved within the adjacent country rocks are likely to have been baked, perhaps destroyed, during intrusion of hot dolerite magmas. Furthermore, the footprint of the proposed development is small.

It is therefore recommended that exemption from further specialist palaeontological studies and mitigation be granted for this quarry development.

Should any substantial fossil remains (e.g. vertebrate bones and teeth, petrified wood) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist.

5. REFERENCES

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6. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company *Natura Viva* cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape as well as Limpopo, Free State and Gauteng for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



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