

## RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

### PROPOSED AGGREGATE MINE ON PORTION 7 OF FARM ROODEPOORT 435 NEAR ERMELO, MPUMALANGA

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#### 1. OUTLINE OF PROPOSED DEVELOPMENT

The company B&E International Pty Ltd is applying for a permit for the mining of aggregate on a portion of Portion 7 (remaining extent) of the Farm De Roodepoort 435, situated about 4 km west of the edge of the town of Ermelo, Mpumalanga (Reference: MP30/5/1/3/2/10399 MP) (Fig. 1). The proposed mining area is 1.5 ha in extent and the mineable material occurs at an average depth of 30 metres. Material from the mine is used in the construction of the roads and other construction activities in the surrounding area.

Mining will make use of blasting by means of explosives in order to loosen the hard rock and the material will then be loaded and hauled out of the excavation and loaded onto a mobile crusher plant in the mining area. The aggregate will then be stockpiled and transported to clients using trucks and trailers. The existing access road to the site will be used and no new roads will be needed for this project.

The mining activities will consist of the following:

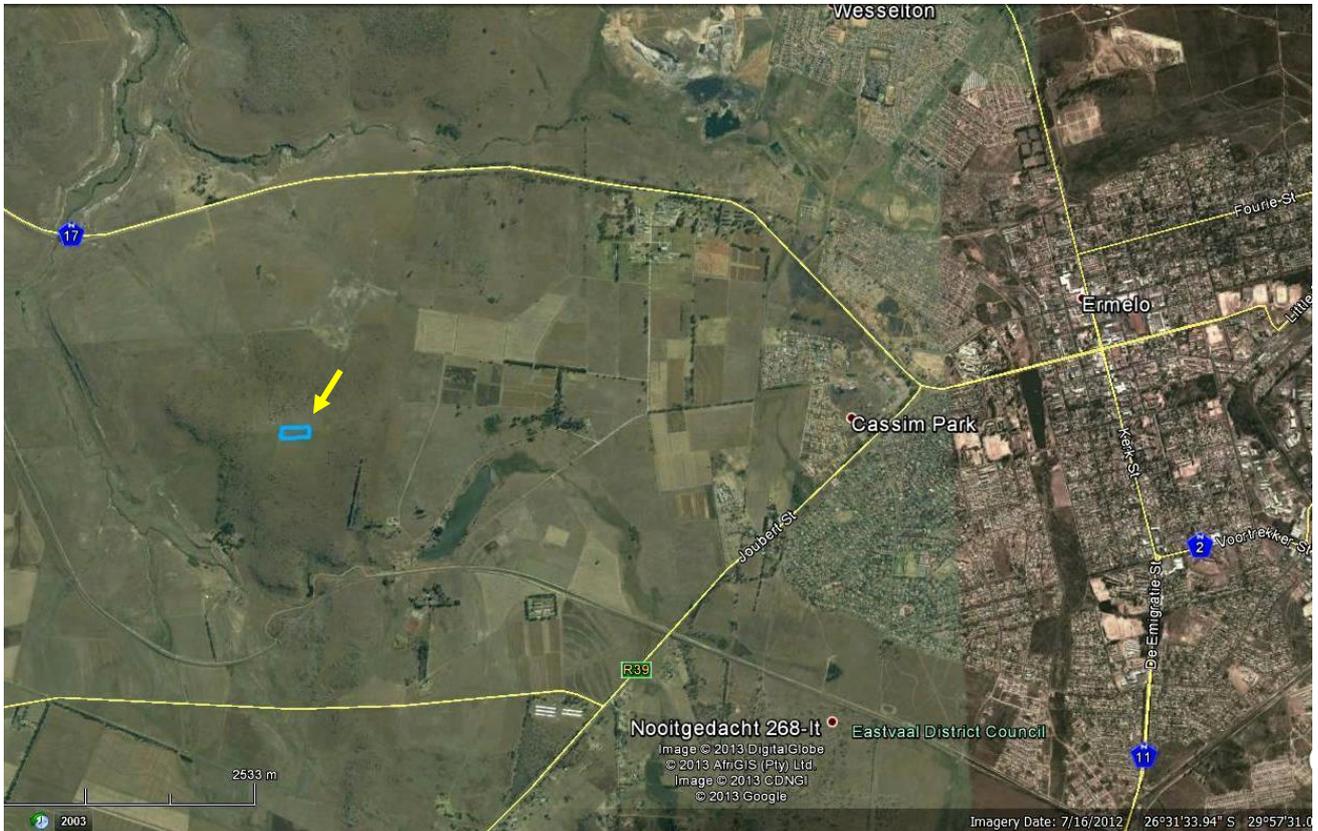
- Site establishment
- Stripping and stockpiling of topsoil
- Blasting
- Excavating
- Stockpiling and transporting
- Sloping and landscaping
- Replacing the topsoil and vegetating the disturbed area

The mining site will contain the following:

- Drilling Equipment
- Excavating Equipment
- Earth Moving Equipment
- Mobile Crushing and Screening Plants
- Temporary Office
- Fuel storage areas
- Demarcated bunded storage area for oil
- Site toilet with septic tank (which will be serviced by a contractor)
- Generator on bunded area
- Vehicle service area for minor services
- Wash bay with oil separator
- Weigh Bridge
- Salvage yard for unused equipment

- Hazardous waste storage area

This palaeontological heritage assessment comment for the mining project was commissioned by Heritage Contracts and Archaeological Consulting CC (HCAC) (Contact details: Mnr Jaco van der Walt. Postnet Suite No. 426, Private Bag X4, Wierda Park, 0149. E-mail: contracts.heritage@gmail.com. Tel: 012 771 3137. Fax: 086 691 6461).



**Figure 1: Google earth© satellite image showing the location of the proposed aggregate mine on Portion 7 (remaining extent) of the Farm De Roodepoort 435, situated about 4 km west of the edge of the town of Ermelo, Mpumalanga Farm (blue rectangle, arrowed).**

## 2. GEOLOGICAL BACKGROUND

The aggregate mine study area west of Ermelo lies on a low rocky hill at c. 1740 m amsl. Bedrock exposure is low due to soil and vegetation cover. However, the rusty brown hues seen in satellite images are typical of dolerite country (Fig. 1). The site lies c. 1.8 km South of the N17 Ermelo to Standerton tar road, 1.5 km north of the railway line while the Kaffersspruit stream flows c. 2 km to the northwest.

The geology of the study area near Ermelo is shown on 1: 250 000 geological map 2628 East Rand (Council for Geoscience, Pretoria), for which a sheet explanation has yet to be published (Fig. 2). The study area is underlain by Early Jurassic dolerites of the **Karoo Dolerite Suite** (pink, Jd in Fig. 2) which is the material to be exploited for aggregate (Duncan & Marsh 2006). The Karoo dolerites extensively intrude Middle Permian sedimentary rocks of the **Vryheid Formation** (Ecca Group, Karoo Supergroup) (Pv, buff in Fig. 2) in the Ermelo area (Johnson *et al.* 2006). The country rocks adjacent to the dolerite intrusions will have been thermally metamorphosed or baked to hornfels and quartzites.

### 3. PALAEOLOGICAL HERITAGE

The Vryheid Formation of the Main Karoo Basin is well known for its rich plant fossil assemblages of Early / Middle Permian age (Anderson & Anderson 1985, MacRae 1999, Johnson *et al.* 2006) but these fossiliferous rocks will not be directly affected by the proposed dolerite quarry development while their fossil content may well have been compromised by dolerite intrusion.

The Karoo dolerite outcrops in the Mpumalanga study area are in themselves of no palaeontological significance since these are high temperature igneous rocks emplaced at depth within the Earth's crust (Duncan & Marsh 2006). As a consequence of their proximity to large dolerite intrusions, the surrounding, potentially fossiliferous Ecca Group sediments in this area have probably been thermally metamorphosed or "baked" (*i.e.* 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). However, it should be noted that fossil vertebrate remains within the Vryheid Formation are exceedingly scarce (*e.g.* fish scales).

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

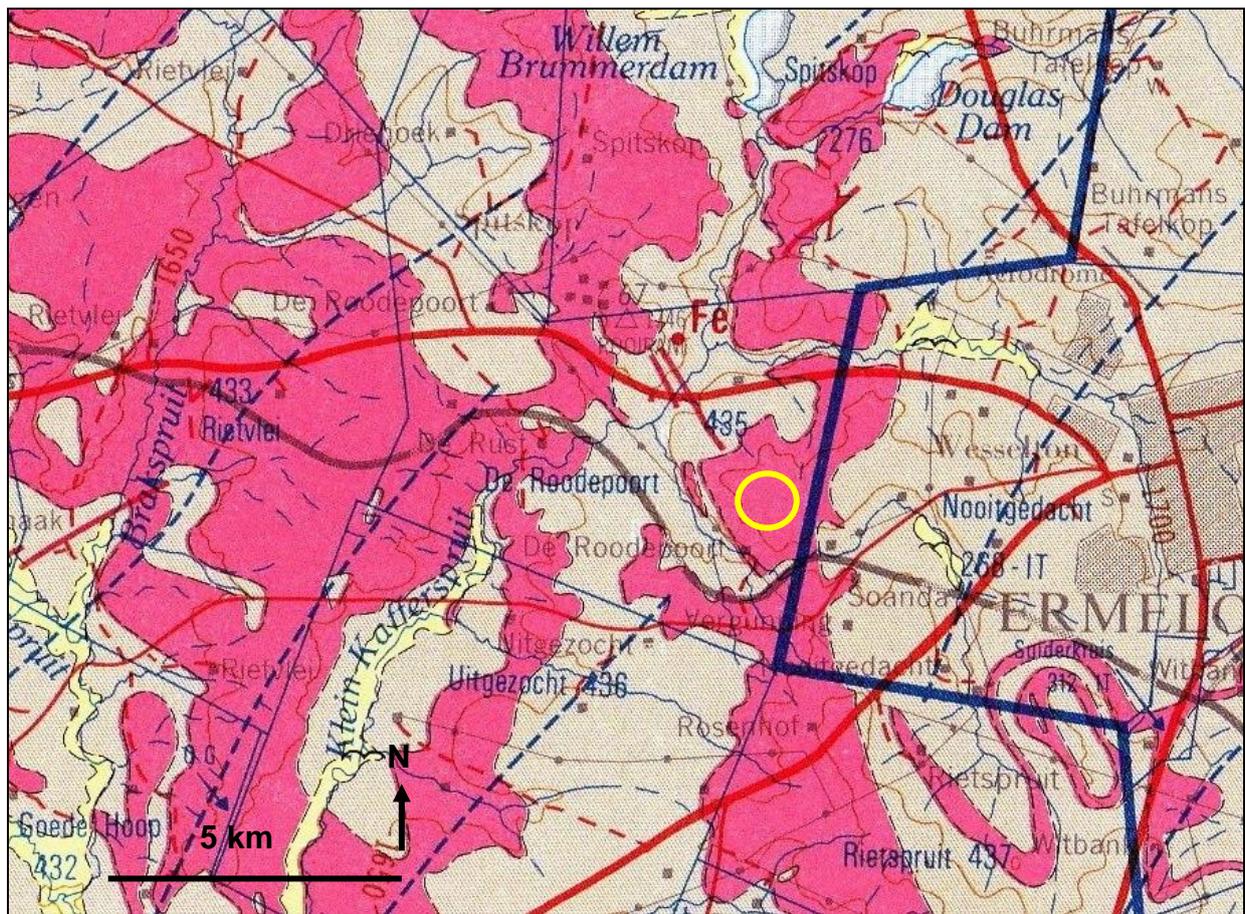
The aggregate quarry study area near Ermelo is generally of VERY LOW palaeontological sensitivity.

### 4. CONCLUSIONS & RECOMMENDATIONS

In contrast to the nearby coal mining operations, the development of the proposed new dolerite quarry near Emelo, Mpumalanga, is of no significance in terms of local palaeontological heritage since these igneous rocks are entirely unfossiliferous, and any fossils preserved within the adjacent Ecca Group (Vryheid Formation) country rocks are likely to have been baked, perhaps even destroyed, during intrusion of hot dolerite magmas.

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

Should any substantial fossil remains (*e.g.* vertebrate bones and teeth, petrified wood, plant fossil assemblages) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist at the developers expense (SAHRA contact details: Ms. Colette Scheermeyer, South African Heritage Resources Agency, 111 Harrington Street. P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za. Fax: +27 (0)21 462 4509. Web:www.sahra.org.za).



**Fig. 2. Extract from 1: 250 000 geology map 2628 East Rand (Council for Geoscience, Pretoria) showing the approximate location of the proposed aggregate mine c. 4 km west of Ermelo, Mpumalanga (yellow circle). The mine will be excavated into dolerites of the Karoo Dolerite Suite (Jd, pink) that here intrude sediments of the Permian Vryheid Formation (Ecca Group) (Pv, buff).**

## 5. KEY 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 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 development 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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