

RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

PROPOSED UPGRADE & REPAIR OF WATER SUPPLY INFRASTRUCTURE, EKSTEENSKUIL, SOVERBY & CURRIESCAMP NEAR KEIMOOES, NORTHERN CAPE

John E. Almond PhD (Cantab.)
Natura Viva cc,
PO Box 12410 Mill Street,
Cape Town 8010, RSA
naturaviva@universe.co.za

August 2013

1. OUTLINE OF PROPOSED DEVELOPMENT

An application for Environmental Authorisation is underway for the proposed upgrade and repair of water supply infrastructure near Eksteenskuil, Soverby and Curriescamp near Keimoes, Northern Cape, that was damaged by flooding in 2011.

The main infrastructure components of relevance to the present palaeontological heritage assessment include:

- Replacing of the existing canals in the Curriescamp and Soverby area with c. 25 km of concrete pipeline (300 to 450 mm diameter);
- Repair and upgrading of c. 12 km of drainage canal and a 50 m long diversion weir;
- Repair of c. 25 bridges;
- Exploitation of gravel for filling and construction purposes from three nearby borrow pits.

The locations of the proposed borrow pits – the main focus of this fossil heritage study - are shown in Fig. 1 below (kindly provided by NSTV consultants).

This palaeontological heritage assessment comment was commissioned by NSTV Consultants (Contact: Lorato Tigedi. PO Box 42452, Heuwelsig, 9332. 54 Kenneth Kaunda Road, Bayswater, 9301. Tel: 051-436 1698/3; Cell: 082-784 8259; e-mail Lorato@nstv.co.za).



Fig. 1. Google earth satellite image of the Eksteenskuil / Soverby / Curries Camp study area, some 5-7 km to the east of Keimoes on the River Orange, Northern Cape, showing the location of the proposed borrow pits (Image kindly provided by NSTV consultants).

2. GEOLOGICAL BACKGROUND

The study area to the east of Keimoes, Northern Cape, largely comprises (a) arid, hilly terrain on the northern side of the River Orange, highly dissected by small, dendritic water courses of intermittent flowing streams, as well as (2) alluvial islands, banks and basement rock outcrops associated with the Orange River itself (Figs. 1). Bedrock exposure levels away from the river are generally high, but coarse, poorly-sorted alluvial and colluvial gravels are expected mantling the hill slopes and stream valleys.

The geology of the study area is shown on the 1: 250 000 geology map 2820 Upington (Council for Geoscience, Pretoria; Fig. 2 herein). A comprehensive sheet explanation for this map has been published by Moen (2007). The study site is underlain by ancient Precambrian metamorphic rocks that belong to the **Namaqua-Natal Province** of Mid Proterozoic (Mokolian) age, notably the **Vaalputs Granite** (Mv, purple), **Puntsit Formation**, **Biesje Poort Group** (Mpu, green), and the **Goedehoop Formation** (Mgo, brown) (Cornell *et al.* 2006, Moen 2007). These basement rocks comprise granites *plus* highly deformed and metamorphosed schists, quartzites, calc-silicate and other metasediments that are approximately two to one billion years old.

The Precambrian basement rocks within the study area are mantled with a spectrum of other coarse to fine-grained **superficial deposits** such as rocky soils, downwasted surface gravels, colluvium (slope deposits), sheet wash, calcrete hardpans and alluvium of intermittently flowing streams. These younger deposits, which may also include patches of aeolian sands of the **Gordonia Formation (Kalahari Group; Qg, pale yellow)** in the broader study region, are generally young (Quaternary to Recent) and are largely unfossiliferous. Some of the older **calcretes** (T, middle yellow) may be equated with the Mokalanen Formation of the Kalahari Group (Almond 2012). Thick silty to gravelly **alluvial deposits**, mostly of Late Caenozoic age, are associated with the present Orange River water course (pale yellow with “flying bird” symbol).

According to Moen (2007) **older river terrace gravels** of possible Late Tertiary to Pleistocene age occur “all along the river” within 2 km of the present banks and at elevations of up to 45 m (rarely as high as 85 m) above the present flood plain. Tertiary terrace gravels (indicated on the Upington 1: 250 000 geology sheet with a double “flying bird”) symbol are not mapped along the banks of the River Orange within the Keimoes study area, however.

The proposed borrow pits (Fig. 1) will largely impact sandy and gravelly superficial deposits of Late Caenozoic age overlying basement rocks. The drainage canal system is largely underlain by Late Caenozoic alluvial deposits.

4. CONCLUSIONS & RECOMMENDATIONS

The study area for the proposed water supply infrastructure developments near Keimoes, Northern Cape, is underlain by unfossiliferous metamorphic rocks of ancient Precambrian age as well as by various superficial Late Cenozoic deposits of low to very low palaeontological sensitivity (colluvium, alluvium, sandy soils *etc*). The impact significance of the proposed development on local fossil heritage resources is considered to be LOW.

It is therefore recommended that exemption from further specialist palaeontological studies is granted for the proposed water supply infrastructure developments near Keimoes.

Any substantial fossil remains (*e.g.* fossil shells, petrified wood or plant remains, vertebrate bones, teeth) encountered during excavation should be reported to SAHRA (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za) for possible mitigation by a professional palaeontologist.

5. REFERENCES

ALMOND, J.E. 2009. Contributions to the palaeontology and stratigraphy of the Alexander Bay sheet area (1: 250 000 geological sheet 2816), 117 pp. Unpublished report for the Council for Geoscience. Natura Viva cc, Cape Town.

ALMOND, J.E. & PETHER, J. 2008. Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc, Cape Town.

CORNELL, D.H. et al. 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp 325-379. Geological Society of South Africa, Johannesburg & Council for Geoscience, Pretoria.

HENDEY, Q.B. 1984. Southern African late Tertiary vertebrates. In: Klein, R.G. (Ed.) Southern African prehistory and paleoenvironments, pp 81-106. Balkema, Rotterdam.

MOEN, H.F.G. 2007. The geology of the Upington area. Explanation to 1: 250 000 geology Sheet 2820 Upington, 160 pp. Council for Geoscience, Pretoria.

MOEN, H.F.G. & TOOGOOD, D.J. 2007. The geology of the Onseepkans area. Explanation to 1: 250 000 geology Sheet 2818, 101 pp. Council for Geoscience, Pretoria.

PARTRIDGE, T.C., BOTHA, G.A. & HADDON, I.G. 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 585-604. Geological Society of South Africa, Marshalltown.

SCHNEIDER, G. & MARAIS, C. 2004. Passage through time – the fossils of Namibia. 159 pp. Gamsberg MacMillan, Windhoek.

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 APHAP (Association of Professional Heritage Assessment 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.



Dr John E. Almond
Palaeontologist
***Natura Viva* cc**