

PALAEONTOLOGICAL HERITAGE COMMENT:**KAKAMAS WASTE WATERTREATMENT WORKS, ERF 236, KAKAMAS, KAI! GARIB MUNICIPALITY, NORTHERN CAPE**

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

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EXECUTIVE SUMMARY

The overall palaeontological heritage impact significance of the proposed waste water treatment development on Erf 236, Kakamas, Northern Cape, is considered to be VERY LOW because most of the development footprint is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses, migmatites etc) of Precambrian age or mantled by superficial sediments of low palaeontological sensitivity, while parts of the area are already highly disturbed. Significant impacts on potentially fossiliferous older (Tertiary / Quaternary) Orange River alluvial sediments are not anticipated. It is therefore recommended that, pending the exposure of significant new fossils during development, exemption from further specialist palaeontological studies and mitigation be granted for this development.

Any substantial unmapped areas or good sections through alluvial gravels or well-consolidated finer alluvial sediments encountered during the archaeological field survey for this project should be reported to SAHRA since these may contain fossil bones and teeth of mammals – including hominids (*cf* Orange River Man skull).

1. PROJECT OUTLINE

The proposed waste water treatment development on Erf 236 near Kakamas, Northern Cape involves the following infrastructural components (CTS Heritage 2017; Fig. 1):

- Upgrading of the existing sewer pump stations and rising mains;
- New Wastewater Treatment Works (WWTW) on Erf 236 (Capacity \pm 7 Ml/d);
- New sewer rising main (Approximately 6km, 400mm diameter) from the Hospital Pump Station to the proposed WWTW;
- Possibility of an additional booster pump station.

2. GEOLOGICAL CONTEXT

The footprint of the proposed waste water treatment development is situated in arid, gravelly terrain on the southwestern outskirts of the town of Kakamas, 2.7 km or more to the south of the Orange River (Fig. 1). The area is traversed by several non-perennial, shallow, dendritic stream systems that ultimately drain into the Orange River.

The geology of the study area near Kakamas 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 proposed waste water development is

underlain by ancient Precambrian basement rocks – notably the **Riemvasmaak Granite-gneiss (Mrm)** and the **Kenhardt Migmatite (Mke)** – that belong to the **Namaqua-Natal Province** of Mid Proterozoic (Mokolian) age (Cornell *et al.* 2006, Moen 2007). These high grade metamorphic basement rocks are approximately two to one billion years old and entirely unfossiliferous (Almond & Pether 2008).

The Precambrian basement rocks within the study area are mantled with a spectrum of coarse to fine-grained Late Caenozoic **superficial deposits** such as rocky soils, downwasted surface gravels, colluvium (slope deposits), sheet wash, calcrete hardpans and alluvium of intermittently-flowing streams. These deposits are generally young (Quaternary to Recent) and largely unfossiliferous.

The study area lies over 2.5 km away from the present course of the Orange River and elevated perhaps 20 m or more higher than this above mean sea level. According to Moen (2007) ancient river terrace gravels occur “all along the river” within 2 km of the present banks and at elevations of up to 45 m (rarely as high as 85m) above the present flood plain. It is considered unlikely that significant deposits of Late Tertiary to Quaternary **Orange River alluvial gravels** are present within the study area, and none are mapped here on the 1: 250 000 Upington geology sheet.

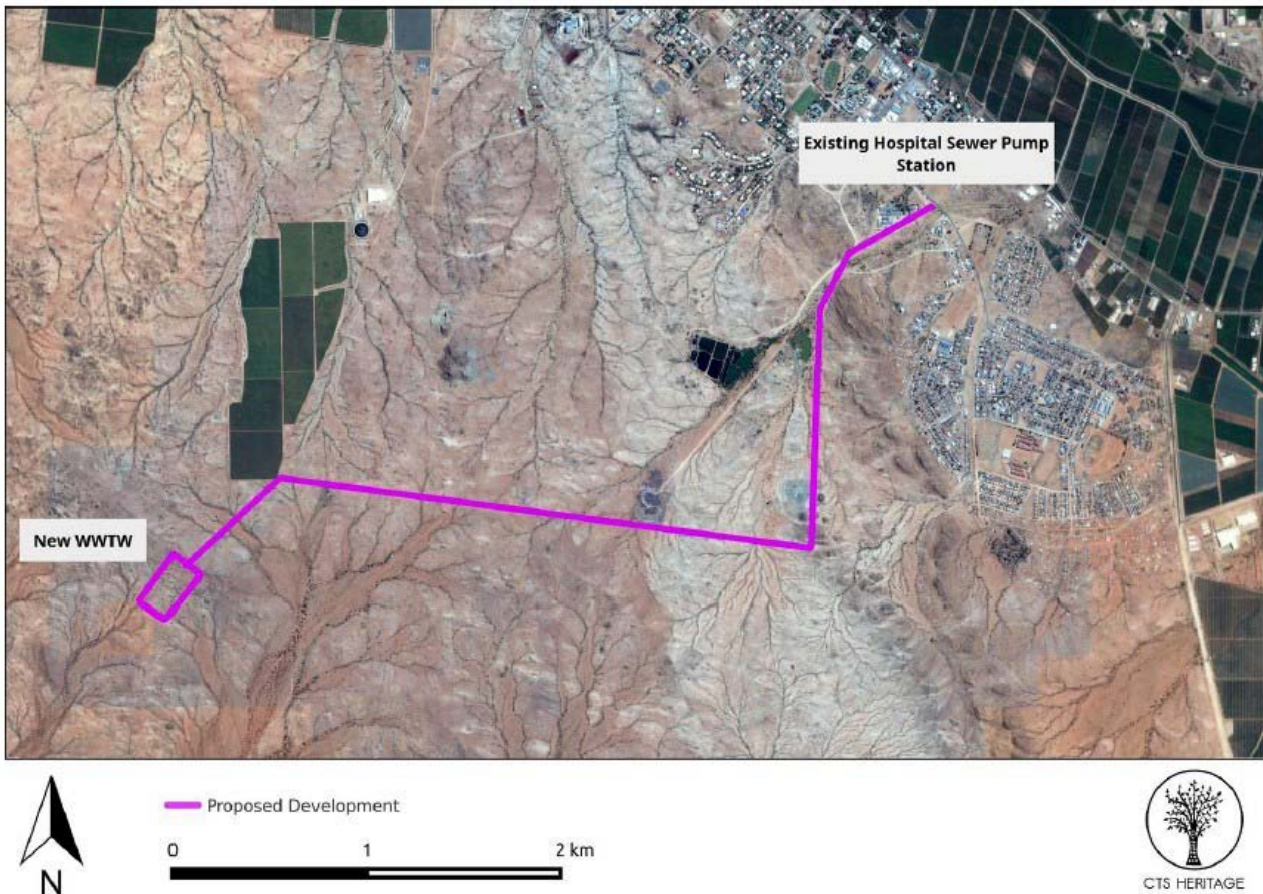


Figure 1: Satellite image of the area to the southwest of Kakamas, Northern Cape, showing the footprint of the proposed waste water treatment development on Erf 236 (Image abstracted from Heritage Screener by CTS Heritage 2017).

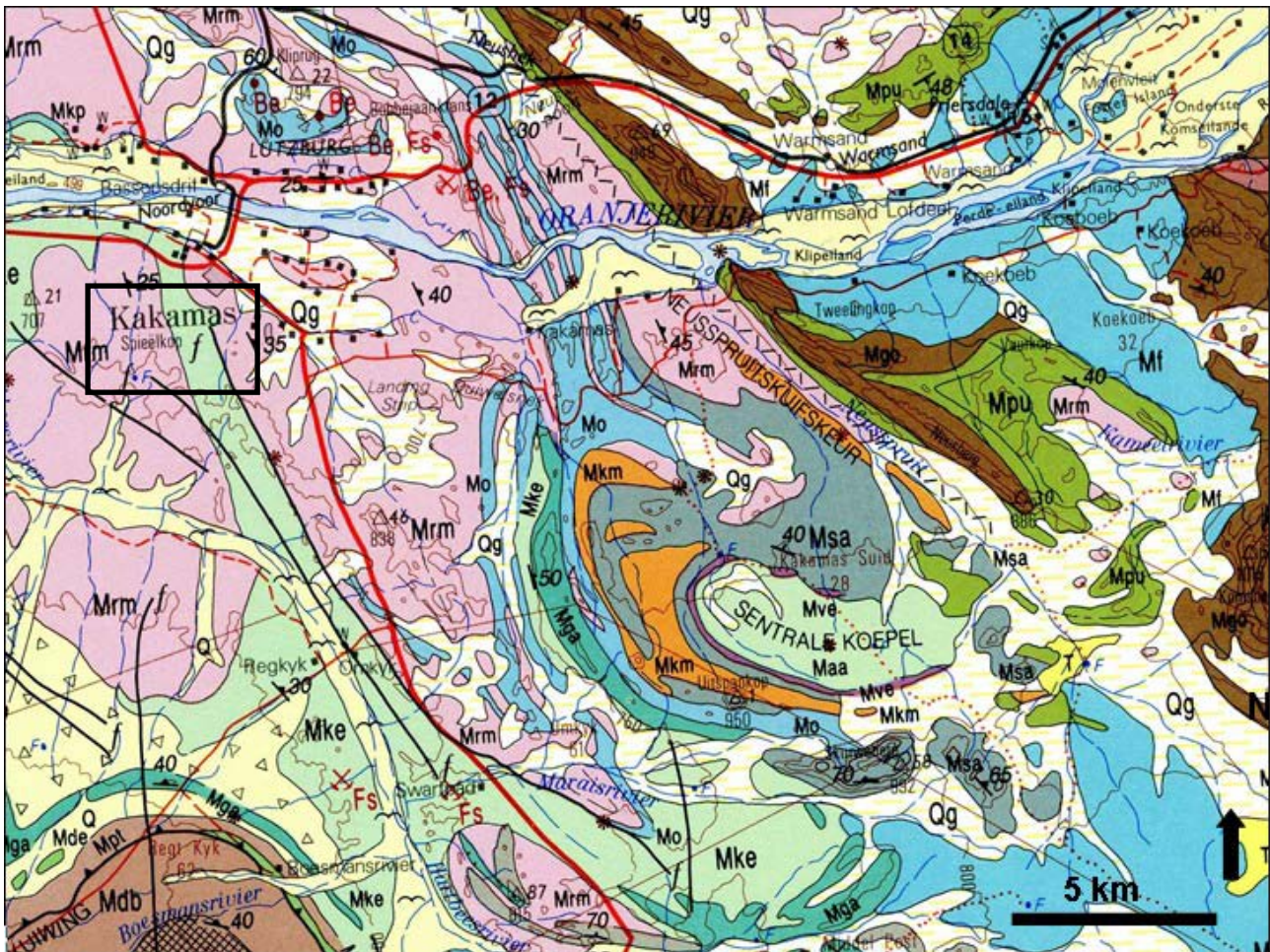


Figure 2: Extract from 1: 250 000 geological map 2820 Upington (Council for Geoscience, Pretoria) showing approximate location of proposed waste water treatment development on the south-western outskirts of Kakamas, Northern Cape Province (small black rectangle). The study area is underlain by unfossiliferous Precambrian (Middle Proterozoic / Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province, principally the Riemvasmaak Granite-gneiss (Mrm, pink) and the Kenhardt Migmatite (Mke, pale green). Substantial alluvial deposits of the Orange River (medium yellow with flying bird symbol) are *not* mapped within the development footprint.

3. PALAEOANTHOLOGICAL HERITAGE

The **Precambrian metamorphic and igneous basement rocks** of the Namaqua-Natal Metamorphic Province in the study area are entirely unfossiliferous (Almond & Pether 2008).

Alluvial gravels of the Orange River of Miocene and younger age are locally highly fossiliferous (e.g. Hendy 1984, Schneider & Marias 2004, Almond 2009 and extensive references therein) but, as argued above, these are *not* mapped within the study area and are unlikely to occur here. Any substantial unmapped areas or good sections through alluvial gravels or well-consolidated finer alluvial sediments encountered during the archaeological field survey should be reported to SAHRA since these may contain fossil bones and teeth of mammals – including hominids (cf Orange River Man skull recorded by Senutet *et al.* 2000).

The palaeontological sensitivity of the Kakamas waste water development study area is assessed as VERY LOW.

4. CONCLUSIONS & RECOMMENDATIONS

The overall palaeontological impact significance of the proposed waste water treatment development on Erf 236, Kakamas is considered to be VERY LOW because:

- Most of the study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses, migmatites etc) or mantled by superficial sediments of low palaeontological sensitivity;
- Significant impacts on potentially fossiliferous Orange River alluvial sediments are not anticipated;
- Parts of the area are already highly disturbed.

It is therefore recommended that, pending the exposure of significant new fossils during development, exemption from further specialist palaeontological studies and mitigation be granted for this development.

There are no objections on palaeontological heritage grounds to authorisation of the proposed waste water treatment development. Should any substantial fossil remains (e.g. vertebrate bones and teeth, shells, calcretised burrows) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist (Contact details: Dr Ragna Redelstorff, SAHRA, P.O. Box 4637, Cape Town 8000. Tel: 021 202 8651. Email: rredelstorff@sahra.org.za). The archaeologist carrying out the field assessment of the study area should report to SAHRA any substantial unmapped areas of alluvial gravels or well-consolidated finer alluvial sediments encountered, since these may contain fossil bones and teeth of mammals – including hominids (*cf* Orange River Man skull; Senut *et al.* 2000).

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, Limpopo, Gauteng, KwaZulu-Natal, Mpumalanga, Northwest and Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has been 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 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**