**PALAEONTOLOGICAL HERITAGE COMMENT:**

# PAULSHOEK BULK WATER SUPPLY ON FARM REMAINDER OF LELIEFONTEIN 614, KAMIESBERG MUNICIPALITY, NORTHERN CAPE

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**January 2018**

## EXECUTIVE SUMMARY

The overall palaeontological impact significance of the proposed Bulk Water Supply System development on the Remainder of Leliefontein 614 near Paulshoek, Namaqualand region of the Northern Cape, is considered to be VERY LOW. This is because the study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses *etc*) and / or mantled by superficial sediments of low palaeontological sensitivity while the development footprint is very small. 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.

## 1. PROJECT OUTLINE

The proposed Bulk Water Supply System development on the Remainder of Leliefontein 614 near Paulshoek, Kamiesberg Municipality, Northern Cape involves the following infrastructural components (CTS Heritage 2017; Fig. 1):

- Equipment for existing boreholes;
- Construction of a 228 kl steel panel reservoir;
- Installation of approximately 3.5 km of pipelines;
- construction of a Water Treatment Works (desalination plant) and associated evaporation ponds (waste brine).

## 2. GEOLOGICAL CONTEXT

The footprint of the proposed Bulk Water Supply System development is situated at *c*. 1100-1130 m asl in semi-arid, rocky terrain on the southwestern outskirts of the small village of Paulshoek, located some 34 km east of the N7 and 36 km SE of Kamieskroon, Namaqualand, Northern Cape (Fig. 1).

The geology of the Namaqua *klipkoppe* study area to the southeast of Kamieskroon is shown on the 1: 250 000 geology map 3018 Loeriesfontein (Council for Geoscience, Pretoria; Fig. 2 herein). A comprehensive sheet explanation for this map has been published by Macey *et al.* (2011). The proposed development footprint is underlain by Precambrian basement rocks – notably grey gneisses of the **Kamiesberg Group**– that belong to the **Namaqua-Natal Province** of Mid Proterozoic (Mokolian) age (Cornell *et al.* 2006, Macey *et al.* 2011). These high grade metamorphic basement rocks are approximately 1 to 2 Ga (billion years old) and entirely unfossiliferous (Almond & Pether 2008).

The Precambrian basement rocks within the Namaqualand *klipkoppe* study region 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. Substantial alluvial deposits are not mapped in the present study area near Paulshoek where much thin surface sands and downwasted surface or colluvial gravels are likely to predominate.

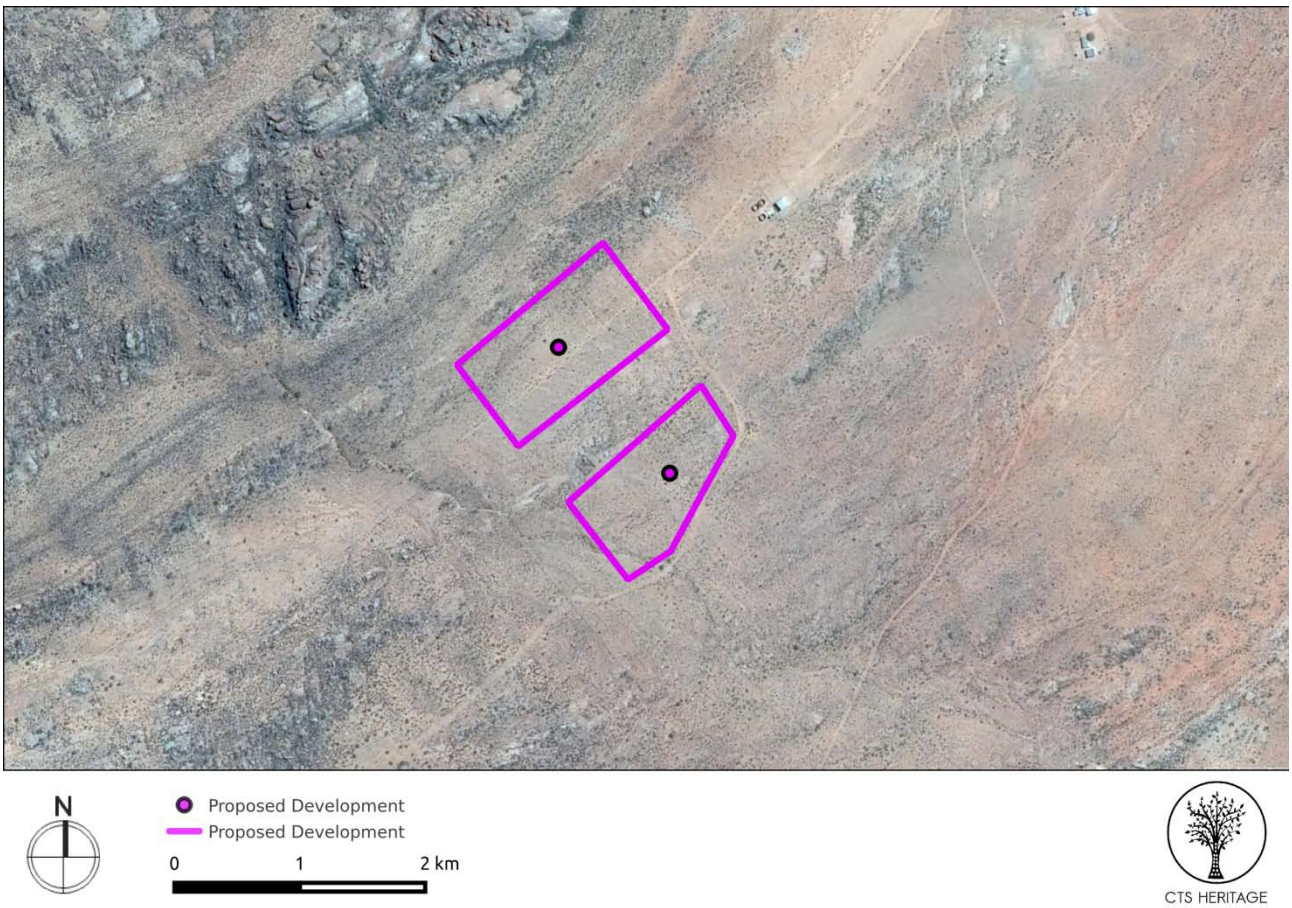


**Figure 1: Satellite image of the study area near Paulshoek village, Northern Cape, showing the footprint of the proposed Bulk Water Supply System development on the Remainder of Leliefontein 614 (Image abstracted from Heritage Screener by CTS Heritage 2017).**

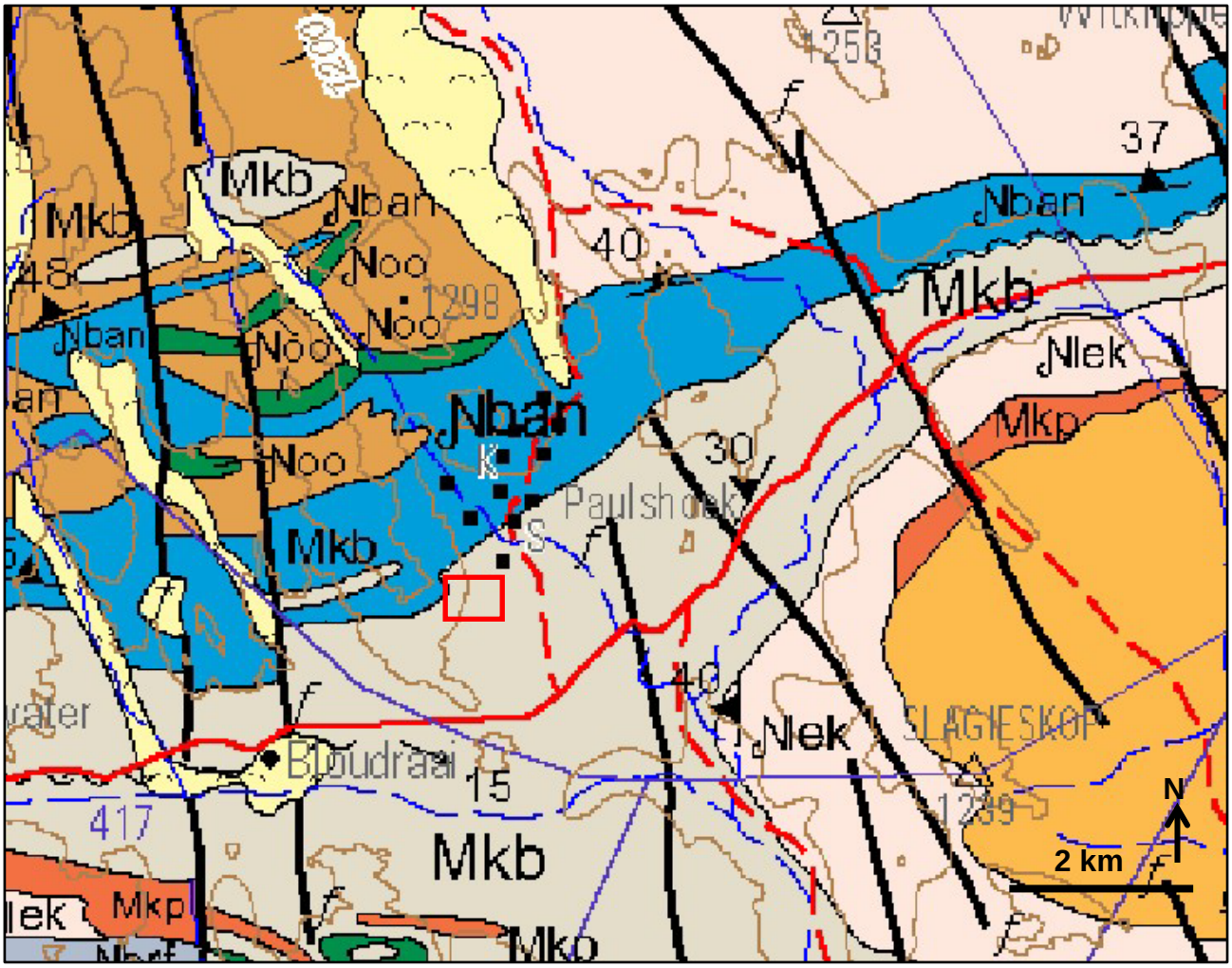


**Figure 2: Extract from 1: 250 000 geological map 3018 Loeriesfontein (Council for Geoscience, Pretoria) showing the approximate location of proposed Bulk Water Supply System development on the outskirts of Paulshoek, Northern Cape Province (small red rectangle). The study area is underlain by unfossiliferous Precambrian (Middle Proterozoic / Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province, principally grey gneisses of the Kamiesberg Group (Mkb, grey). Pleistocene to Holocene alluvial sediments (pale yellow) are *not* mapped in the study area.**

## 3. PALAEONTOLOGICAL HERITAGE

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

**Late Caenozoic superficial sands and gravels** overlying the basement rocks are of very low palaeontological sensitivity. Substantial alluvial sediments are not mapped here.

The palaeontological sensitivity of the Paulshoek Bulk Water Supply development study area is assessed as VERY LOW.

## 4. CONCLUSIONS & RECOMMENDATIONS

The overall palaeontological impact significance of the proposed Bulk Water Supply System development on the Remainder of Leliefontein 614 near Paulshoek is considered to be VERY LOW because:

- The study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses *etc*) and / or mantled by superficial sediments of low palaeontological sensitivity;

- The development footprint is very small;

**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 bulk water supply 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).

## 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.

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