PALAEONTOLOGICAL HERITAGE COMMENT:

ROOIFONTEIN BULK WATER SUPPLY ON THE REMAINDER OF LELIEFONTEIN 614, KAMIESBERG MUNICIPALITY, NORTHERN CAPE

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EXECUTIVE SUMMARY

The overall palaeontological impact significance of the proposed Bulk Water Supply System development on the Remainder of Leliefontein 614 near Rooifontein, Namaqualand *klipkoppe* region of the Northern Cape, is considered to be 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 (*e.g.* alluvium of the Buffelsrivier), 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.

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 might contain fossil bones and teeth of mammals.

1. PROJECT OUTLINE

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

- Equipment for existing boreholes;
- Equipment for additional boreholes;
- Construction of a 190 kl steel panel reservoir;
- Installation of approximately 6km 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*. 770 m asl on the northern side of the Buffelsrivier and *c*. 1 km to the northeast of the small village of Rooifontein which is located in the Namaqualand *klipkoppe* region, some 40 km NE of Kamieskroon, Namaqualand, Northern Cape (Fig. 1).

The geology of the area to the northeast 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 gneisses of the **Little Namaqualand Suite (Nme, Mesklip Gniess** and / or **Nlek**, **Lekkerdrink Gneiss**)– 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 1.2 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. Satellite images (Fig. 1) show that the basement rocks in the present study area are mantled by **sandy to gravelly alluvium** of the nearby Buffelsrivier drainage system. The alluvial deposits are likely to be thin but may include older, semi-consolidated alluvial sands and gravels, especially at depth and / or away from the present riverbed.

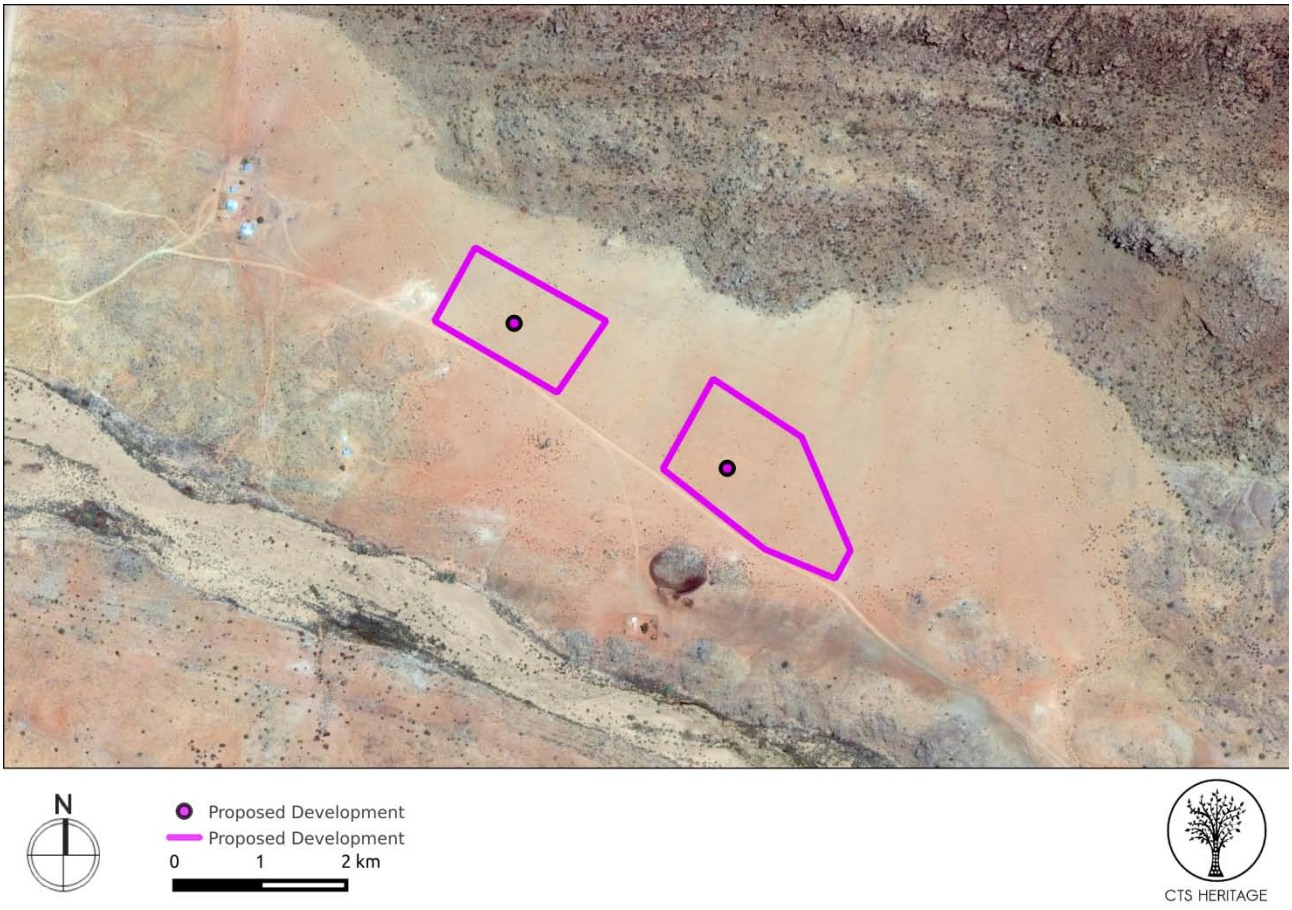

Figure 1: Satellite image of the study area on the northern side of the Buffelsrivier, approximately 1 km to the northeast of Rooifontein village, Namaqualand, Northern Cape, showing the footprint of the proposed Bulk Water Supply System development on the Remainder of Leliefontein 614 (Image abstracted from Heritage Screener by CTS Heritage 2017). Note that the basement rocks here are mantled by sandy to gravelly alluvial sediments (low relief, pale orange – brown areas) associated with the Buffelsrivier.

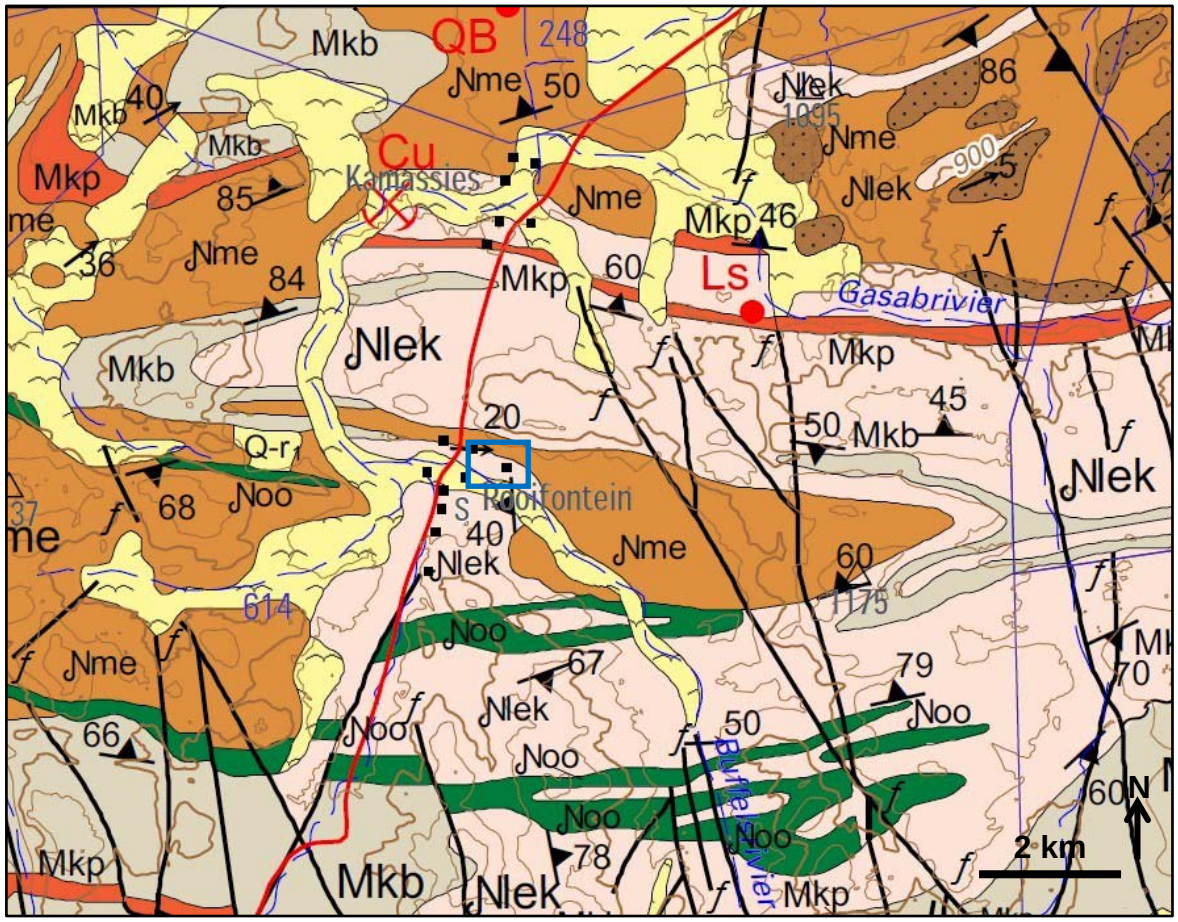

Figure 2: Extract from 1: 250 000 geological map 3018 Loeriesfontein (Council for Geoscience, Pretoria) showing the approximate location of proposed Bulk Water Supply System development to the northeast of Rooifontein, Northern Cape Province (small dark blue rectangle). The study area is underlain by unfossiliferous Precambrian (Middle Proterozoic / Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province, principally the Mesklip Gneiss (Nme, orange) and / or the Lekkerdrink Gneiss (Nlek, pink) of the Little Namaqualand Suite. Pleistocene to Holocene alluvial sediments (pale yellow with flying bird symbol) are mapped along the Buffelsrivier and mantle the basement rocks in the study area (See Fig. 1).

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 in the Namqualand *klipkoppe* region are generally of very low palaeontological sensitivity. However, any substantial unmapped areas or good sections through older, semi-consolidated alluvial gravels or finer alluvial sediments encountered during the archaeological field survey should be reported to SAHRA since these might contain fossil bones and teeth of mammals (*cf* Hendey 1984, Klein 1984, Almond *in* Macey *et al*. 2011).

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

4. CONCLUSIONS & RECOMMENDATIONS

The overall palaeontological impact significance of the proposed Bulk Water Supply System development on Farm RE/614 near Rooifontein is considered to be 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).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 might contain fossil bones and teeth of mammals.

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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