

# RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

## PROPOSED BULK WATER SUPPLY LINE FOR THE DEO GLORIA OLIVE ESTATE NEAR UPINGTON, NORTHERN CAPE

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### 1. OUTLINE OF PROPOSED DEVELOPMENT

Deo Gloria Olive Estate (Pty) Ltd are proposing to construct a new bulk water supply line of c. 4 km length between a new pump station at the Orange River and a new reservoir on the farm Vaalkoppies No. 40, situated to the south of the N10 tar road about 12 km east of Upington, Northern Cape (Fig. 1). Land parcels concerned are parcels 175, 206 at Vaalkoppies Settlement as well as portion 68 and remainder of the farm Vaalkoppies No. 40. The pipeline will provide water for intensive agriculture and the infrastructural developments proposed comprise:

- A pump station with pump to pump water directly from the Orange River;
- A pump and filter station;
- A pipeline that would possibly consist of two 500 mm pipes with valves;
- A 45 000 m<sup>3</sup> reservoir.

This palaeontological heritage assessment comment was commissioned as a component of an EIA for the proposed pipeline by Van Zyl Environmental Consultants cc (Contact details: Irmé van Zyl. PO Box 567, Upington 8800. Telephone: 054 338 0722. Mobile: 072 222 6194. Email: ibvanzyl@telkomsa.net).

### 2. GEOLOGICAL BACKGROUND

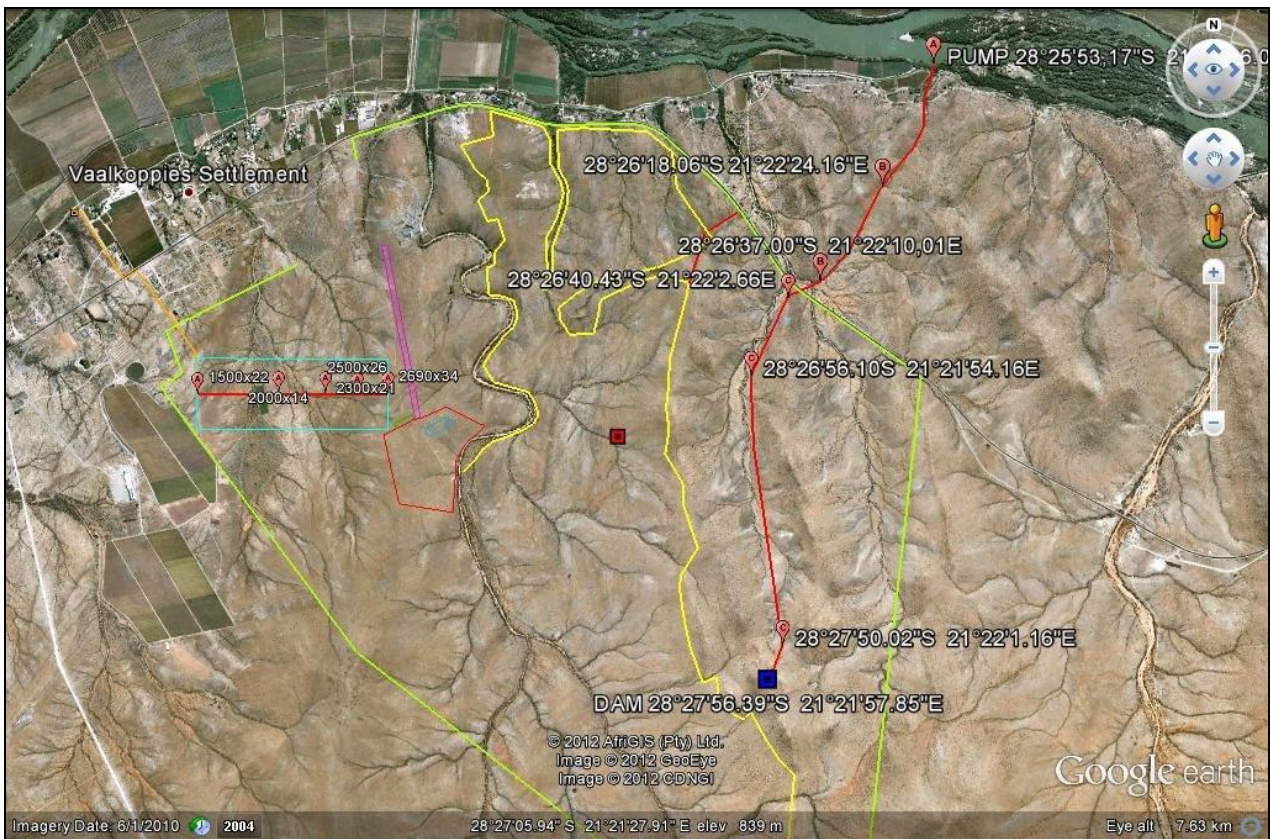
The study area comprises arid, hilly terrain on the southern side of the River Orange that is highly dissected by small, dendritic water courses of intermittent flowing streams, south bank tributaries of the Orange (Fig. 1). The terrain slopes broadly northwards from c. 900m amsl at the proposed reservoir site to c. 800 m at the Orange. Bedrock exposure levels are generally high, but coarse, poorly-sorted alluvial and colluvial gravels are expected along much of the pipeline route.

The geology of the Vaalkoppies study area on the southern side of the River Orange to the east of Upington 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, viz. the **Dagbreek Formation** of the **Vaalkoppies Group** (Cornell *et al.* 2006, Moen 2007). These basement rocks comprise highly deformed and metamorphosed schists, quartzites, gneisses, migmatites and amphibolites 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)** in the broader Vaalkoppies study region, are generally young (Quaternary to Recent) and are largely unfossiliferous. Some of the older calcretes may be equated with the Mokalanen Formation of the Kalahari Group (Almond 2012).

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 85m) above the present flood plain. Small patches of Tertiary terrace gravels are mapped along the eastern banks of the River Orange some 40 km to the east of the Vaalkoppies study area, but are not mapped along the southern banks of the river where the proposed pump station is to be located.



**Figure 1: Route of the proposed new bulk water supply line (red line) and reservoir (dam, blue square) for the Deo Gloria Olive Estate near Vaalkoppies Settlement, c. 12 km east of Upington, Northern Cape (Image kindly provided by Van Zyl Environmental Consultants cc, Upington).**

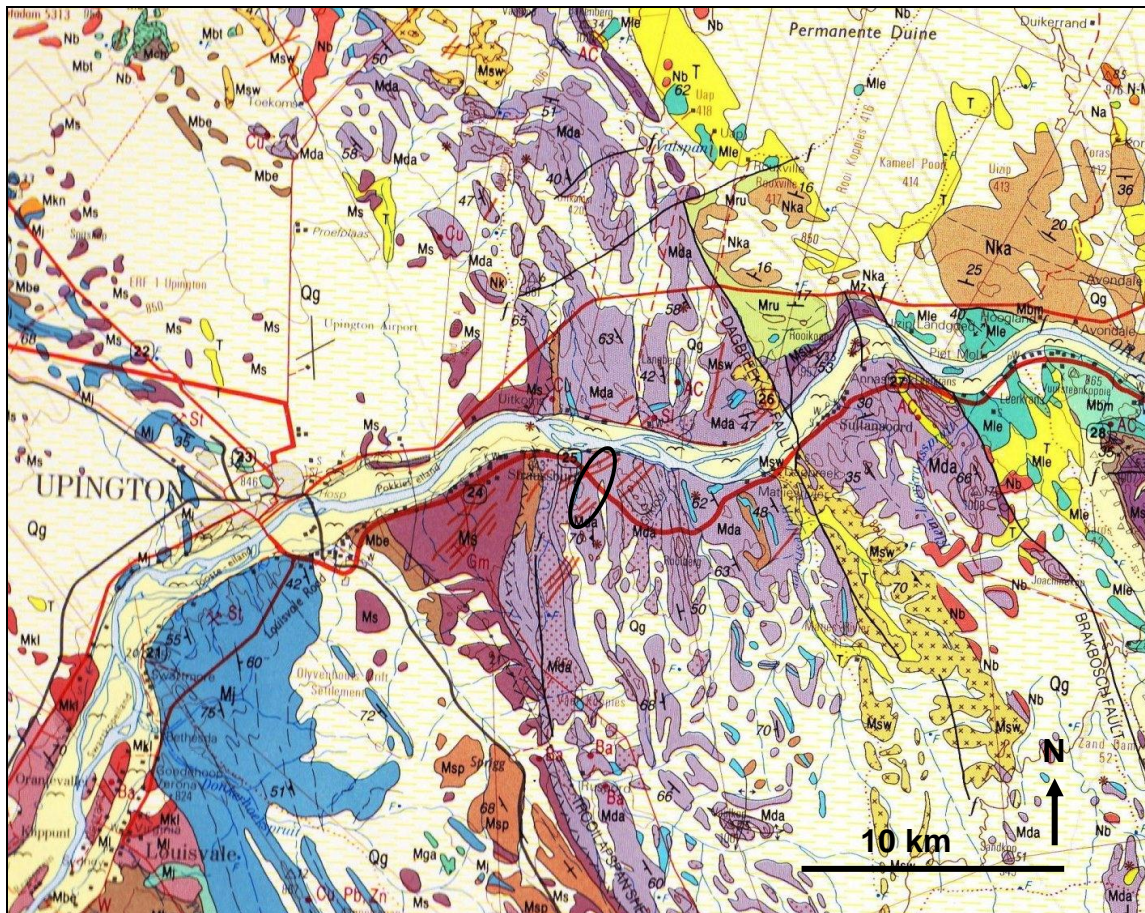


Fig. 2. Extract from 1: 250 000 geological map 2820 Upington (Council for Geoscience, Pretoria) showing the location of the pipeline study area between the Orange River and farm Vaalkoppies No. 40, c. 11 km east of Upington, Northern Cape (black ellipse). The study area is entirely underlain by unfossiliferous Precambrian (Middle Proterozoic / Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province (Mda, purple = Dagbreek Formation of the Vaalkoppies Group). Superficial sediments of Late Caenozoic age in the region include reddish aeolian sands of the Gordonia Formation, Kalahari Group (Qg, pale yellow), and alluvium of the Orange River (pale yellow with “flying bird” symbol). Note that older terrace gravels of Tertiary age are not mapped along the Orange River banks in the study area.

### 3. PALAEOLOGICAL HERITAGE

The highly metamorphosed bedrocks of the Precambrian Vaalkoppies Group, Namaqua Natal Province are entirely unfossiliferous (Almond & Pether 2008).

Close to the Orange River alluvial gravels of Miocene and younger Late Tertiary / Neogene age are locally highly fossiliferous (e.g. Hendy 1984, Schneider & Marias 2004, Almond 2008, 2009 and extensive references therein) but, as argued above, these are *not* mapped within the Vaalkoppies study area. Younger silty alluvial deposits may contain a range of terrestrial and freshwater fossils and subfossils. Freshwater snails are mentioned in particular by Moen (2007, p. 150). Possible relict patches of Quaternary aeolian sands of the Gordonia Formation (Kalahari Group) are of low palaeontological sensitivity.

#### 4. CONCLUSIONS & RECOMMENDATIONS

The proposed bulk water supply line for the Deo Gloria Olive Estate near Upington is underlain by unfossiliferous Precambrian basement rocks (Vaalkoppies Group) and well as locally by thin superficial sediments (geologically young stream and river alluvium, surface gravels, aeolian sands) of low palaeontological sensitivity. Potentially fossiliferous Tertiary river gravels are not mapped in this area. The impact significance of the proposed water pipeline 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 Deo Gloria bulk water supply line project near Upington.**

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: South African Heritage Resources Agency, 111 Harrington Street, PO Box 4637, Cape Town 8000, South Africa. Email: ksmuts@sahra.org.za. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509 Web: www.sahra.org.za) for possible mitigation by a professional palaeontologist.

#### 5. REFERENCES

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## 8. 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.



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