

## **RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:**

### **PROPOSED CONSTRUCTION OF DYASONSKLIP SOLAR ENERGY FACILITY 1 ON THE REMAINDER OF THE FARM DYASONSKLIP 454, UPINGTON, NORTHERN CAPE**

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**November 2014**

#### **1. OUTLINE OF THE PROPOSED DEVELOPMENT**

Dyasonsklip Solar Energy Facility 1 (Pty) Ltd is proposing to develop a PV solar energy facility of 75 MW total generation capacity - Dyasonsklip Solar Energy Facility 1 - on the Remainder of the Farm Dyasonsklip 454, situated c. 22 km WSW of Upington and c. 20 km NE of Keimoes in the ZF Mgcawu District of the Northern Cape (Figure 2). Electricity generated will be supplied to the national Eskom grid *via* the authorised new Eskom MTS substation. The proposed study site is approximately 500 ha in area (The total development footprint will not exceed 240ha) and will include the following main infrastructural components:

- Solar photovoltaic panels with a generation capacity of 75 MW;
- On-site substation;
- Auxiliary buildings (administration / security, workshop, storage and ablution);
- Inverter-stations, transformers and internal electrical reticulation (underground cabling);
- Access and internal road network;
- Laydown area;
- Overhead electrical transmission line / grid connection to the authorised new Eskom MTS substation;
- Rainwater tanks; and
- Perimeter fencing.

Various alternatives, in terms of technology of the solar arrays, as well as layout for the solar arrays and associated infrastructure on the development site, will be considered and be informed by the environmental constraints identified and assessment by the various specialists as part of the on-going environmental assessment process.

An Environmental Impact Assessment for the solar energy project is being conducted by Cape Environmental Assessment Practitioners (Pty) Ltd, George for Dyasonsklip Solar Energy Facility 1 (Contact details: First Floor, Eagles View Building, 5 Progress Street, George. PO Box 2070, George, 6530. Telephone: (044) 874 0365 Facsimile: (044) 874 0432. Web: [www.cape-eaprac.co.za](http://www.cape-eaprac.co.za)). The present palaeontological heritage comment for the solar facility development has been commissioned by Mr Stefan de Kock of PERCEPTION Planning, George (Contact details: PO Box 9995, George 6530, Western Cape, South Africa. Fax: +27(0)86 510 8357. Mobile: +27(0)82 568 4719).

## 2. GEOLOGICAL BACKGROUND

The Dyasonsklip study area features fairly flat-lying, arid terrain at 830 to 845 m amsl on the northern side of, and c. 10 km from, the Gariep River. It is traversed by several shallow ephemeral water courses trending roughly north-south (Fig. 2). The geology of the study area near Upington is shown on the 1: 250 000 geology map 2820 Upington (Council for Geoscience, Pretoria; Fig. 1). A comprehensive sheet explanation for this map has been published by Moen (2007). The study area is underlain at depth by a range of ancient Precambrian basement rocks – largely high grade metamorphic rocks (*e.g.* gneisses, metapelites) and intrusive granitoids – that belong to the **Namaqua-Natal Province** of Mid Proterozoic (Mokolian) age (Cornell *et al.* 2006, Moen 2007) such as the **Dyason's Klip Gneiss**. These basement rocks are approximately two to one billion years old and entirely unfossiliferous (Almond & Pether 2008). They only crop out as small, isolated patches of basement rocks or low *Inselberge*. Most of the study area is covered by fine-grained aeolian (wind-blown) sands of the **Gordonia Formation (Qg)**, pale yellow in Fig. 1), the youngest, Pleistocene to Recent, subunit of the **Kalahari Group**. Prominent NW-SE trending linear dunes of orange-hued sands are clearly visible on satellite images of the region to the west of the study area. The geology of the Late Cretaceous to Recent Kalahari Group is reviewed by Thomas (1981), Dingle *et al.* (1983), Thomas & Shaw 1991, Haddon (2000) and Partridge *et al.* (2006). The Gordonia dune sands are considered to range in age from the Late Pliocene / Early Pleistocene to Recent, dated in part from enclosed Middle to Later Stone Age stone tools (Dingle *et al.*, 1983, p. 291).

## 3. PALAEOLOGICAL HERITAGE

The fossil heritage associated with each of the rock units represented in the Dyasonsklip study area has been previously outlined by Almond (2014).

The igneous and metamorphic **basement rocks** are entirely unfossiliferous. The fossil record of the **Kalahari Group** is generally sparse and low in diversity. The **Gordonia Formation** dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. Porous dune sands are not generally conducive to fossil preservation. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from the underlying bedrocks (including, for example, dolerite) may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (*e.g.* *Hodotermes*, the harvester termite), ostrich egg shells (*Struthio*) and shells of land snails (*e.g.* *Trigonephrus*) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (*e.g.* *Corbula*, *Unio*) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands. These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low. Underlying calcretes of the **Mokolanen Formation** might also contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways.

#### 4. CONCLUSIONS & RECOMMENDATIONS

The igneous and metamorphic Precambrian basement rocks underlying the Dyasonsklip study area at depth are entirely unfossiliferous. The overlying aeolian sands and stream gravels of the Kalahari Group mantling the older bedrocks are generally of low palaeontological sensitivity.

It is concluded that the proposed Dyasonsklip Solar Energy Facility 1 near Upington, including the associated short transmission line, is unlikely to have significant impacts on local palaeontological heritage resources.

**It is therefore recommended that, pending the discovery of significant new fossils remains before or during construction, exemption from further specialist palaeontological studies and mitigation be granted for the proposed Dyasonsklip Solar Energy Facility 1 on Farm Dyasonsklip 454 near Upington, Northern Cape.**

Should any substantial fossil remains (*e.g.* mammalian bones and teeth) be encountered during excavation, however, these should be safeguarded, preferably *in situ*, and reported by the ECO to SAHRA, *i.e.* The South African Heritage Resources Authority, as soon as possible (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the developer's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (*e.g.* stratigraphy, sedimentology, taphonomy) by a professional palaeontologist.

#### 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 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 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 development 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,**





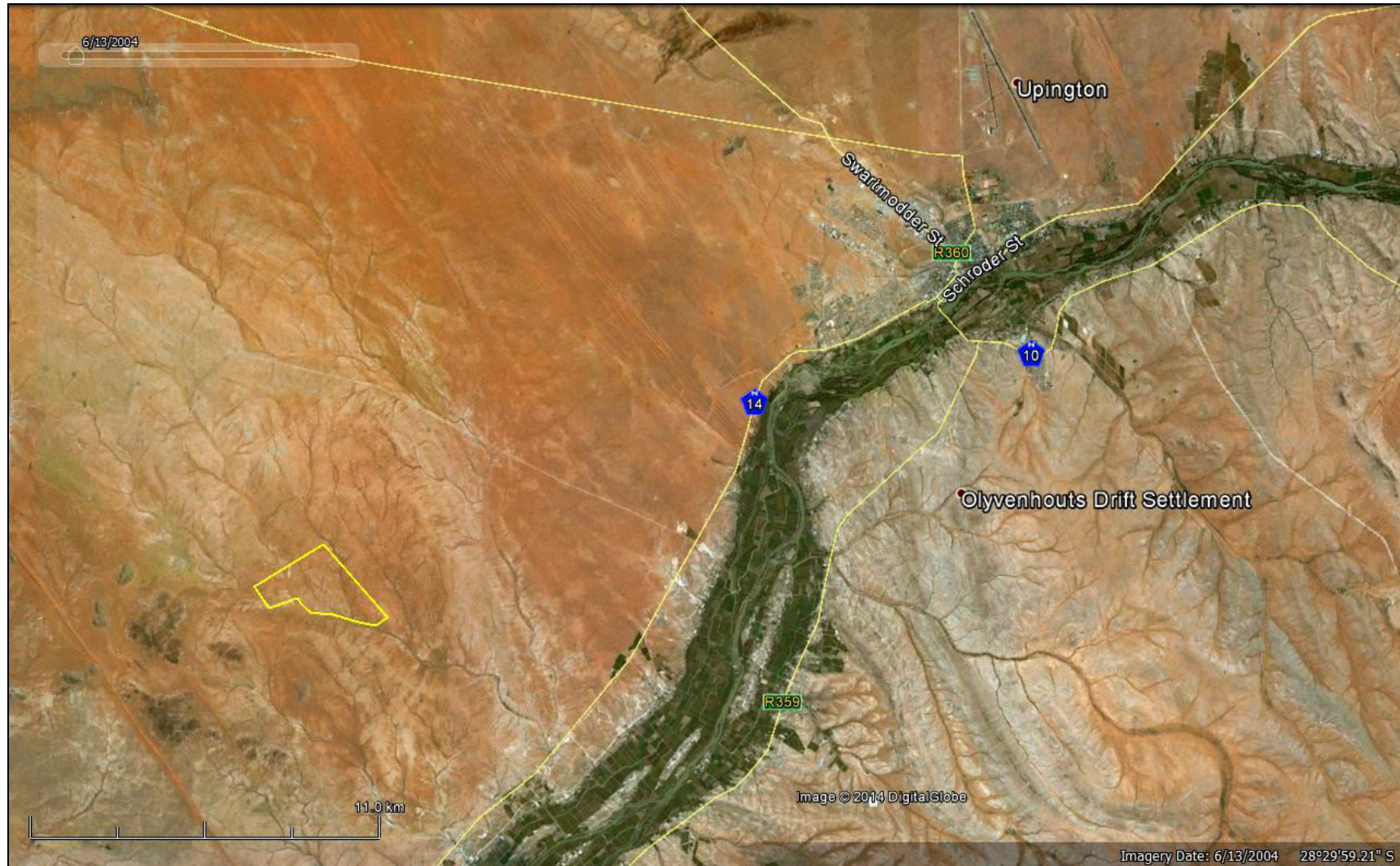


Figure 2: Google earth© satellite image showing the location of the study area for the RE Capital 11 PV solar facility on the Remainder of Farm 454, Dyasonsklip near Upington, ZF Mgcawu District, Northern Cape (yellow polygon). The Gariep River flows some 10 km to the southeast of the study area.