

## RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

# PROPOSED STEYNSRUS PHOTOVOLTAIC SOLAR ENERGY FACILITY NEAR KROONSTADT, MOQKAKA LOCAL MUNICIPALITY, FREE STATE PROVINCE

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## 1. OUTLINE OF PROPOSED DEVELOPMENT

The company SunCorp (Pty) Ltd is proposing to develop a commercial photovoltaic solar energy facility as well as associated infrastructure on a site located between the R76 road and the railway line approximately 5 km northwest of Steynsrus and 40 km southeast of Kroonstad, Free State Province (Fig. 1). The facility, to be known as the **Steynsrus Solar Energy Facility** will have a total generating capacity of *approximately* 19.5 MW.

The facility development footprint will be less than 20 ha within which the following infrastructure will be established:

- » Photovoltaic (PV) panels up to 5m high (fixed or tracking) with a capacity of up to 19.5MW.
- » An on-site substation as part of the PV plant, and overhead power line that will tie into the existing power line on site (including the associated switching station), or alternatively, construct a new power line (approximately 150m) to connect to the existing Steynsrus Rural 132 kV Substation.
- » Extension/upgrade of the existing Steynsrus Rural 132kV substation and associated connection infrastructure associated with the substation and PV plant.
- » Cabling between the project components, to be laid underground where practical.
- » Mounting structures (either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels).
- » Internal access roads.
- » Fencing.
- » Workshop area for maintenance, storage, offices and small modular water filtration or di- ionisation unit.
- » Parking and water storage tanks.

This palaeontological heritage assessment comment was commissioned as a component of a comprehensive EIA for the proposed solar energy facility by Heritage Contracts and Archaeological Consulting CC (HCAC) (Contact details: Mr Jaco van der Walt. Postnet Suite No. 426, Private Bag X4, Wierda Park, 0149. E-mail: contracts.heritage@gmail.com. Fax: 086 691 6461).

## 2. GEOLOGICAL BACKGROUND

The Steynsrus Solar Energy Facility study area is situated on very flat-lying agricultural land at c. 1530 m amsl. The terrain is fairly featureless, although there are several small dams and pans nearby. Satellite images suggest that bedrock exposure here is negligible.

The geology of the study area near Steynsrus is shown on 1: 250 000 geological map 2426 Kroonstad, with a brief sheet explanation by Schutte (1993). As seen here (Fig. 2) the study area is entirely underlain by igneous bedrocks, namely a dolerite intrusion of the Karoo Dolerite Suite (Jd, pink on map). The Karoo Dolerite Suite is an extensive network of basic igneous bodies (dykes, sills) that were intruded into sediments of the Main Karoo Basin in the Early Jurassic Period, about 183 million years ago (Duncan & Marsh 2006). In the region to the northwest of Steynsrus – but outside the study area – the dolerites intrude Permian continental sediments of the Adelaide Subgroup (= Lower Beaufort Group, Karoo Supergroup) (Pa, pale blue on map). However, there is no indication of Lower Beaufort sediments within the study area itself. The dolerite bedrocks are undoubtedly overlain here by various superficial sediments such as alluvium, downwasted gravels, ferruginous soils and (probably) calcrete (*cf* Schutte 1993, p. 36).



**Figure 1: Google earth© satellite image showing the boundaries of the study area for the proposed Steynsrus Solar Energy Facility situated c. 5 km northwest of Steynsrus, Free State (white polygon).**

### **3. PALAEOLOGICAL HERITAGE**

The dolerite bedrocks in the Steynsrus study area are in themselves of no palaeontological significance. These are high temperature igneous rocks emplaced at depth within the Earth's crust so they do not contain fossils. As a consequence of their proximity to large dolerite intrusions, some of the Lower Beaufort Group sediments in the broader region will have been thermally metamorphosed or "baked" (*ie.* recrystallised, impregnated with secondary minerals). Embedded fossil material of phosphatic composition, such as bones and teeth, is frequently altered by baking – bones may become blackened, for example - and can be very difficult to extract from the hard matrix by mechanical preparation. Thermal metamorphism

by dolerite intrusions therefore tends to *reduce* the palaeontological heritage potential of Beaufort Group sediments.

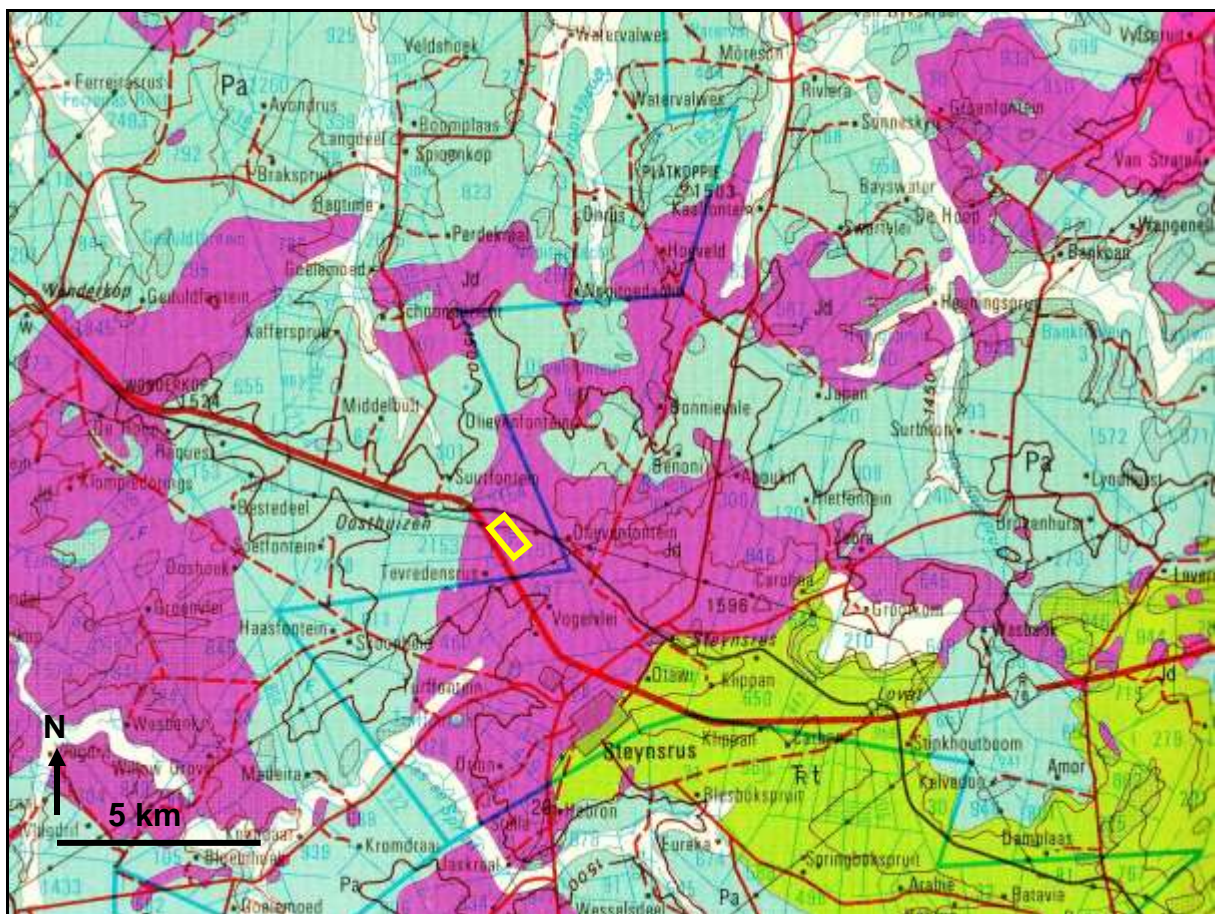
The overlying Caenozoic superficial sediments are likewise of low to very low palaeontological sensitivity. Fossiliferous Lower Beaufort sediments will not be directly impacted by the proposed development.

#### 4. CONCLUSIONS & RECOMMENDATIONS

The proposed Steynsrus Solar Energy Facility near Steynsrus, Free State, is underlain entirely by Early Jurassic intrusive igneous rocks of the Karoo Dolerite Suite that are entirely unfossiliferous. The overlying superficial sediments (alluvium, gravels, soils etc) are of low to very low palaeontological sensitivity. The impact significance of the solar facility development on local fossil heritage resources is considered to be VERY LOW.

**It is therefore recommended that, pending the discovery of substantial new fossil remains during construction, exemption from further specialist palaeontological studies is granted for the proposed Steynsrus Solar Energy Facility.**

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: Ms. Colette Scheermeyer, South African Heritage Resources Agency, 111 Harrington Street. P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) for possible mitigation by a professional palaeontologist at the developers expense.



**Fig. 2. Extract from 1: 250 000 geological map 2426 Kroonstad (Council for Geoscience, Pretoria) showing the approximate location of the proposed Steynsrus Solar Energy Facility study area (yellow rectangle) located c. 5 km northwest of**

**Steynsrus in the Free State. The area is entirely underlain by a dolerite intrusion of the Karoo Dolerite Suite (Jd, pink) that in this region intrude Permian continents of the Adelaide Subgroup (Pa, pale blue).**

## **5. KEY REFERENCES**

DUNCAN, A.R. & MARSH, J.S. 2006. The Karoo Igneous Province. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 501-520. Geological Society of South Africa, Marshalltown.

SCHUTTE, I.C. 1993. Die geologie van die gebied Kroonstad. Explanation to 1: 250 000 geology sheet 2726 Kroonstad, 84 pp. Council for Geoscience, Pretoria.

## **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 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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