RECOMMENDED EXEMPTION FROM FURTHER PALAEONTOLOGICAL STUDIES:

PROPOSED BOSJESMANSBERG PV SOLAR ENERGY FACILITY NEAR COPPERTON, SIYATHEMBA LOCAL MUNICIPALITY, NORTHERN CAPE

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1. OUTLINE OF PROPOSED DEVELOPMENT

The company Networx Renewables (Pty) Ltd is proposing to develop a commercial photovoltaic solar energy facility with a total export capacity of up to 300 MW as well as associated infrastructure on a site located approximately 15 km east of Copperton in the Northern Cape Province (Fig. 1). The proposed Bosjesmansberg Solar Energy Facility would be situated on Portion 1 of the farm Bosjesmansberg 67, Siyathemba Local Municipality, Northern Cape Province.

The main infrastructural components of the solar energy facility are:

- Arrays of PV panels with a total export capacity of up to 300 MW;
- Appropriate mounting structures;
- Cabling between the project components, to be lain underground where practical;
- An on-site substation and overhead power line to facilitate the connection between the solar energy facility and the Eskom grid via one of the following options:
    (1) A loop in/loop out of the Cuprum-Burchell 132kV power line which traverses the site;
    (2) Construction of an overhead distribution power line of approximately 15-20 km in length either to Kronos Substation or to Cuprum Substation.
- Internal access roads and fencing;
- A workshop area for maintenance, storage, and offices.

This palaeontological heritage assessment comment was commissioned as a component of a comprehensive scoping study and EIA for the proposed solar energy facility (DEA application reference number 14/12/16/3/3/2/579) by Heritage Contracts and Archaeological Consulting CC (HCAC) (Contact details: Mnr Jaco van der Walt. Postnet Suite No. 426, Private Bag X4, Wierda Park, 0149. E-mail: contracts.heritage@gmail.com. Fax: 086 691 6461).

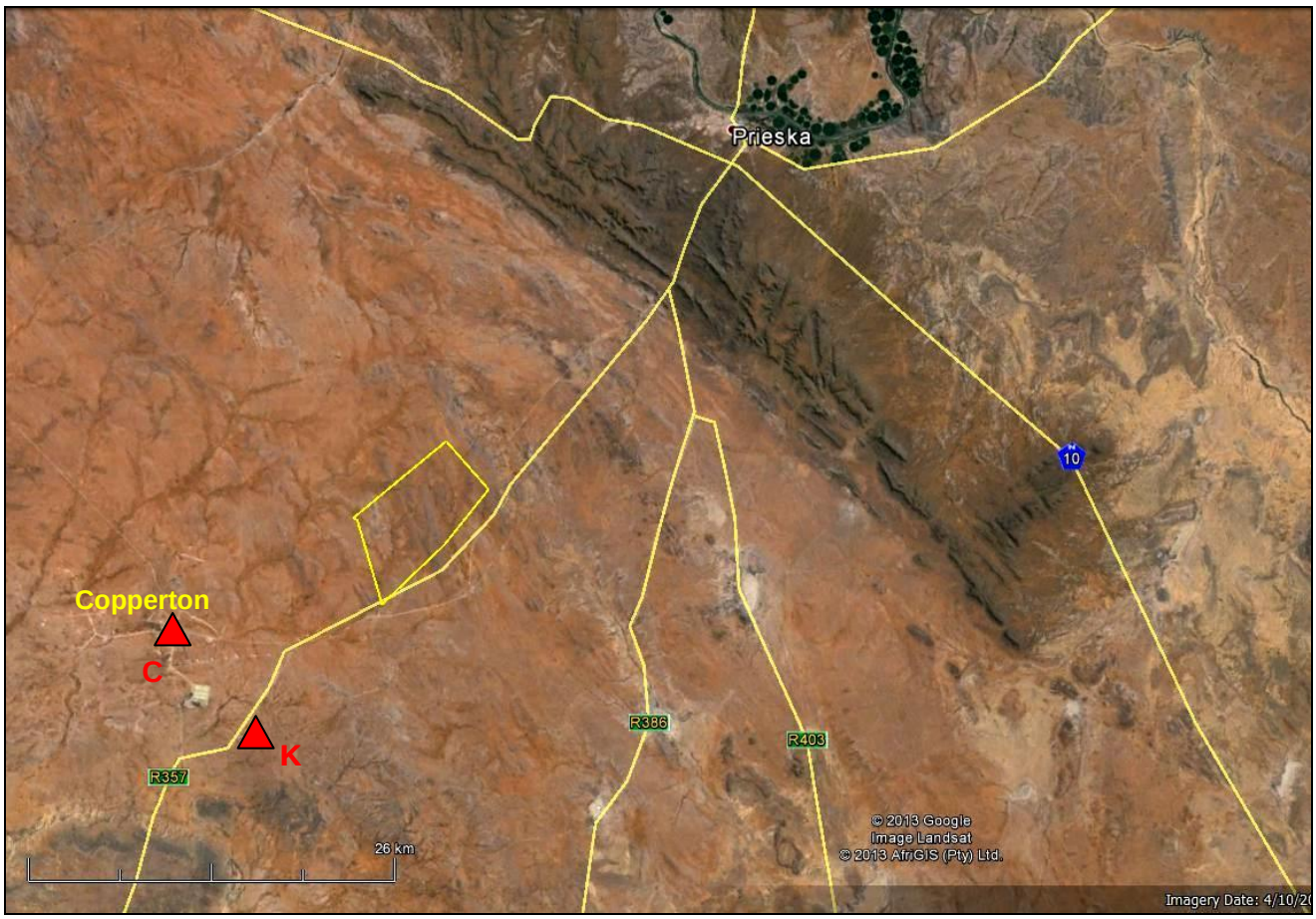

Figure 1: Google earth© satellite image showing the boundaries of the study area for the proposed Bosjesmansberg Solar Energy Facility situated *c.* 15 km east of Copperton, Northern Cape (yellow polygon). The approximate locations of the existing Cuprum (C) and Kronos (K) Substations are indicated by red triangles.

2. GEOLOGICAL BACKGROUND

The Bosjesmansberg Solar Energy Facility study area is situated in flat to gently hilly, semi-arid terrain on the south-western side of the Doringberge Mountain Range and just north of the R357 tar road between Copperton and Prieska (Fig. 1). The area lies at c. 1100-1200 m amsl and is traversed by several shallow ephemeral streams. Bedrock exposure is patchy due to the extensive cover by superficial sediments.

The geology of the study area near Copperton is shown on 1: 250 000 geological map 2922 Prieska, for which a sheet explanation has yet to be published (Fig. 2). The area is largely underlain near-surface by unconsolidated aeolian (*i.e.* wind-blown) sands of the Quaternary **Gordonia Formation** (**Kalahari Group**) (**Qg**) whose thickness in the study region is uncertain. 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 Formation dune sands are considered to range in age from the Late Pliocene / Early Pleistocene, dated in part from enclosed Middle to Late Stone Age stone tools (Dingle *et al*., 1983, p. 291). In addition to aeolian sands, the superficial sediments in the study area also include stream alluvium, colluvial deposits (*e.g.* scree) and downwasted surface gravels.

A narrow N-S trending inlier of Permocarboniferous glacial sediments of the **Dwyka Group** (**C-Pd, Karoo Supergroup**) is mapped in the NW corner of the study area and similar rocks

probably underlie the thin, superficial cover of Gordonia sands elsewhere within the study area. Dwyka rocks may therefore be intersected by deeper excavations during development. The geology of the Dwyka Group has been summarized by Visser (1989), Visser *et al.* (1990) and Johnson *et al.* (2006), among others.

Numerous small inliers of ancient **Precambrian basement rocks** with a predominantly N-S trend also emerge through the cover of Kalahari sands in the Copperton study area. Metasedimentary basement rocks to the northeast of the NW-SE striking Brakbosch fault line running past Copperton are assigned to the **Uitdraai Formation** of the **Brulpan Group** (**Mu**). They consist mainly of metamorphosed sediments (quartzites, schists) and form part of the *circa* one billion year old Namaqua-Natal Province (Prinsloo 1989, Cornell *et al.* 2006).

The corridors for (1) the existing 132 kV transmission line from Cuprum Substation (at Copperton) that traverses the Bosjesmansberg Solar Facility study area, (2) the possible new transmission line to Cuprum Substation and (3) the possible new line to Kronos Substation (*c*. 12 km SSE of Copperton) all traverse very similar geology, *viz.* small inliers of Precambrian basement rocks and Dwyka glacial sediments mantled by superficial sediments including aeolian sands, calcrete hardpans, stream alluvium and downwasted surface gravels (*cf* Almond 2013a, 2013b).

3. PALAEONTOLOGICAL HERITAGE

Although they may originally have contained microfossils (*e.g.* ancient bacteria) the ancient basement metasedimentary rocks have been too intensely metamorphosed to contain fossils.

Several recent field studies in the Copperton area (*e.g.* Almond 2013a, 2013b) have shown that the Dwyka Group bedrocks in this region are generally deeply-weathered and calcretised near-surface and largely comprise unfossiliferous glacial tillites. The only fossils recorded are occasional glacial erratics of stromatolitic carbonates (limestone, dolomite) from the Transvaal Supergroup.

The overlying Caenozoic superficial sediments, including dune sands of the Gordonia Formation, are likewise of low to very low palaeontological sensitivity.

The Bosjesmansberg Solar Energy Facility study area is generally of LOW palaeontological sensitivity. There are no preferences on fossil heritage grounds for any particular one of the proposed transmission line route options.

4. CONCLUSIONS & RECOMMENDATIONS

The study area of the proposed Bosjesmansberg Solar Energy Facility near Copperton, Northern Cape, is underlain at depth by unfossiliferous Precambrian metasediments as well as by glacial sediments of the Dwyka Group that contain very few fossils (mainly reworked blocks of stromatolitic carbonate). The overlying superficial sediments (alluvium, gravels, aeolian sands, soils *etc*) are of low to very low palaeontological sensitivity. The impact significance of the solar facility development, *including* the various transmission line options, 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 Bosjesmansberg 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.

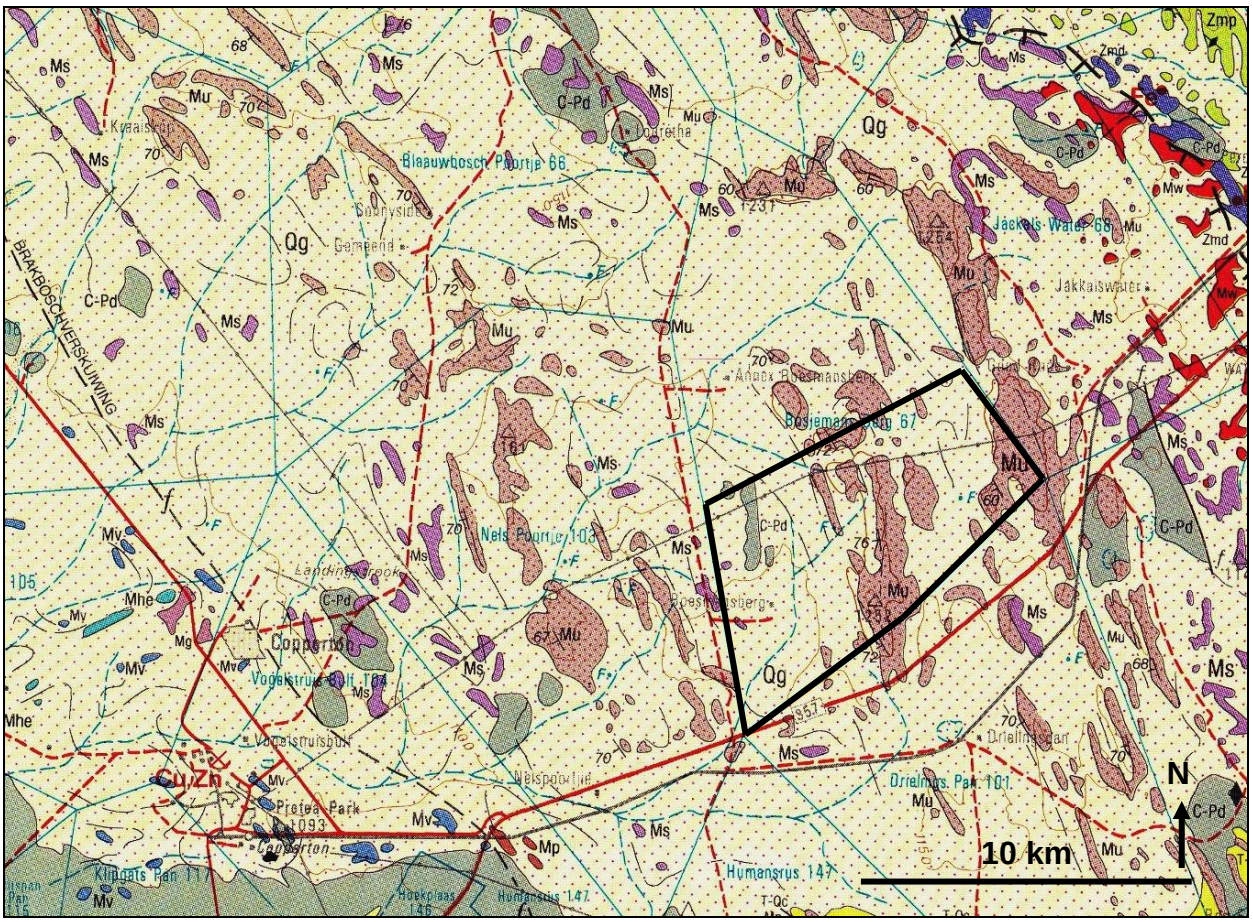

Fig. 2. Extract from 1: 250 000 geology map 2922 Prieska (Council for Geoscience, Pretoria) showing approximate outline of the proposed Bosjesmansberg Solar Energy Facility near Copperton (black polygon).

The main geological units mapped within the study region are:

1. Precambrian basement rocks (igneous / metamorphic): Reddish-brown with dots (Mu) = Uitdraai Formation (Brulpan Group)

2. Karoo Supergroup sediments: Grey (C-Pd) = Mbizane Formation (Dwyka Group)

3. Late Caenozoic (Quaternary to Recent) superficial deposits: Pale yellow (Qg) = Gordonia Formation (Kalahari Group)

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 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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