

RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES & MITIGATION:

PROPOSED DANIËLSKUIL ROMA ENERGY SOLAR PLANT, KGATELOPELE LOCAL MUNICIPALITY, NORTHERN CAPE

John E. Almond PhD (Cantab.)
Natura Viva cc,
PO Box 12410 Mill Street,
Cape Town 8010, RSA
naturaviva@universe.co.za

March 2012

1. OUTLINE OF DEVELOPMENT

Roma Energy Daniëlskuil (Pty) Ltd is proposing to construct a 10 MW Concentrating Photovoltaic (CPV) Energy Generation Facility on Daniëlskuil Erf 753. The study site is situated on the eastern side of the R31 tar road from Daniëlskuil to Douglas and directly east of the existing Idwala limestone mine on the southern outskirts of Daniëlskuil, Kgatelopele Local Municipality, Northern Cape (Fig. 2). The landowner is Idwala Industrial Holdings (Pty) Ltd, Daniëlskuil.

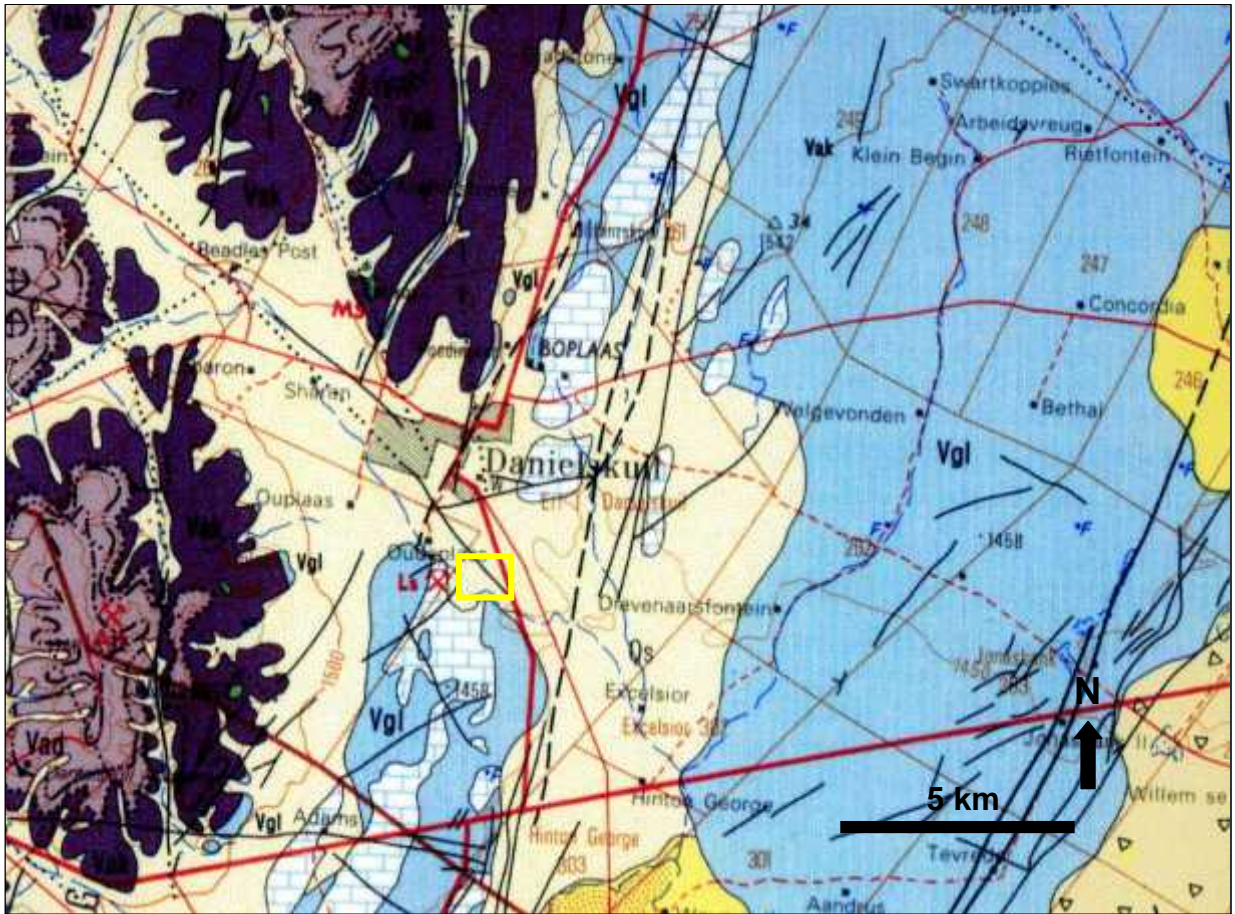
The proposed activity entails the construction of about 140 CPV solar panels with a footprint of about 20 ha. The CPV panels will be mounted on pedestals drilled and set into the ground. Extensive bedrock excavations are not envisaged, but some vegetation will need to be cleared from the site. Associated infrastructure includes a perimeter access road, single track internal access roads, trenches for underground cables, 2 to 4 transformer pads, a switching station, a maintenance shed, and a temporary construction camp. The Ouplaas 132/22kV substation is situated on site.

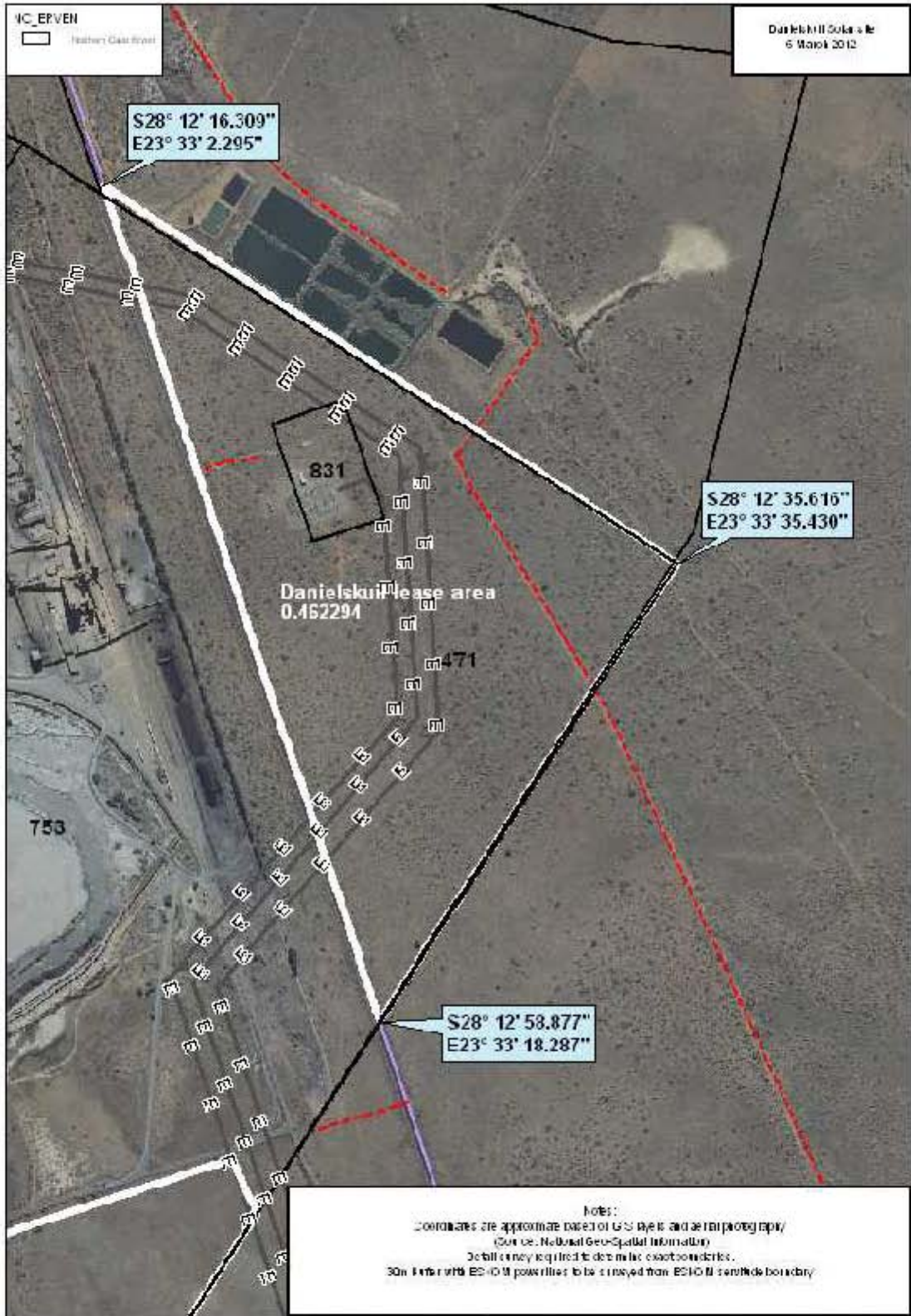
The present palaeontological heritage comment has been commissioned by EnviroAfrica cc, Somerset West as part of a comprehensive Heritage Impact Assessment of the proposed development (Contact details: Mr Bernard de Witt, EnviroAfrica cc, P. O. Box 5367, Helderberg, 7135; 29 St James St, Somerset West; mobile: +27 82 4489991; tel: +27 21 851 1616; fax: 086203308).

2. GEOLOGICAL BACKGROUND

The proposed Daniëlskuil Roma Solar Plant study area (28° 13' S, 23° 33' E) on Daniëlskuil Erf 753 is situated on the southern outskirts of the town of Daniëlskuil, Kgatelopele Local Municipality, Northern Cape. The site lies on the eastern side of the R31 tar road to Douglas and directly east of the Idwala limestone mine on the far side of the road. The area is flat-lying and situated at around 1460m amsl. Shallow water courses run to the southwest and 1.3 km to the east, but outside the area. Satellite images as well as field photographs kindly provided by Jonathan Kaplan of ACRM, Cape Town, indicate that levels of bedrock exposure are low in this region, with occasional exposures of karst-weathered limestone in higher lying areas.

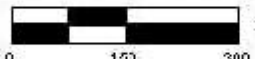
The geology of the study area near Daniëlskuil is shown on the 1: 250 000 geology map 2822 POstmasburg (Council for Geoscience, Pretoria; Fig. 1 herein). A very brief sheet explanation only is printed on the map itself. The proposed solar plant is underlain by Precambrian (Early Proterozoic) carbonate rocks of the **Campbell Rand Subgroup** (Ghaap Subgroup, Transvaal Supergroup) and in particular the **Kogelbeen Formation (Vgl)** which is exploited at the Idwala





Prepared by: Geostratics
 March 2012
www.geostratics.co.za


 MN (20.0° W)


 Data Zoom 14-J

3. PALAEOLOGICAL HERITAGE

The fossil record of the Precambrian sediments of the Northern Cape has been briefly reviewed by Almond & Pether (2008). The shallow shelf and intertidal sediments of the carbonate-dominated lower part of the **Ghaap Group**, including the **Campbell Rand Subgroups**, are famous for their rich fossil biota of *stromatolites* or microbially-generated, finely laminated mounds and branching structures. Some stromatolite occurrences on the Ghaap Plateau of the Northern Cape are spectacularly well-preserved (e.g. Boetsap locality figured by McCarthy & Rubidge 2005, Eriksson *et al.* 2006). Detailed studies of these 2.6-2.5Ga (billion year old) carbonate sediments and their stromatolitic biotas have been presented by Young (1932), Beukes (1980, 1983), Eriksson & Truswell (1974), Eriksson & Altermann (1998), Eriksson *et al.* (2006), Altermann and Herbig (1991), Altermann and Wotherspoon (1995). The older Archaean stromatolite occurrences from the Ghaap Group have been reviewed by Schopf (2006, with full references therein).

The **Kogelbeen Formation** features cyclical arrays of domal as well as columnar stromatolites as well as high-energy oolites and flat microbial laminites Eriksson *et al.* 2006). An important fossil stromatolite site in the Lime Acres Member towards the top of the Kogelbeen succession occurs at Lime Acres situated only some 15 km south-southwest of the Daniëlskuil study area (Altermann & Wotherspoon 1995). Some of the oldest known (2.6 Ga) fossil microbial assemblages with filaments and coccoids have been recorded from stromatolitic cherty limestones of the Lime Acres Member, Kogelbeen Formation at Lime Acres (Altermann & Schopf 1995).

The **wind-blown sands** mantling the Precambrian carbonates in the study area are of low palaeontological sensitivity.

The overall palaeontological sensitivity of the Daniëlskuil Roma Solar Plant study area at Daniëlskuil is assessed as LOW (see discussion below).

4. CONCLUSIONS & RECOMMENDATIONS

Despite the known occurrence of stromatolites and other microbial fossils in Precambrian rocks underlying the study area, the impact of the proposed Daniëlskuil Roma solar plant development on local fossil heritage is considered to be LOW because:

- The fossiliferous Precambrian bedrocks are mantled here by superficial sediments (e.g. wind-blown sands) of low palaeontological sensitivity. Good surface exposures of stromatolitic limestone are not present here;
- The stromatolites within the Campbell Rand Subgroup are of widespread occurrence, and can be far better studied or sampled in large quarries near Daniëlskuil and at Lime Acres, some 15 km to the SSW;
- Extensive, deep excavations into bedrock are unlikely to be involved in this sort of solar park project.

It is therefore recommended that exemption from further specialist palaeontological studies and mitigation be granted for this solar plant development.

Should any substantial fossil remains (e.g. vertebrate bones and teeth, shells, petrified wood) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist.

5. REFERENCES

- ALMOND, J.E. & PETHER, J. 2008. Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc., Cape Town.
- ALTERMANN, J. & HERBIG 1991. Tidal flats deposits of the Lower Proterozoic Campbell Group along the southwestern margin of the Kaapvaal Craton, Northern Cape province, South Africa. *Journal of African Earth Science* 13: 415-435.
- ALTERMANN, W. & SCHOPF, J.W. 1995. Microfossils from the Neoarchaeon Campbell Group, Griqualand West Sequence of the Transvaal Supergroup, and their palaeoenvironmental and evolutionary implications. *Precambrian Research* 75, 65-90.
- ALTERMANN, W. & WOTHERSPOON, J. McD. 1995. The carbonates of the Transvaal and Griqualand West sequences of the Kaapvaal craton, with special reference to the Limje Acres limestone deposit. *Mineralium Deposita* 30, 124-134.
- BEUKES, N.J. 1980. Stratigraphie en litofasies van die Campbellrand-Subgroep van die Proterofitiese Ghaap-Group, Noord-Kaapland. *Transactions of the Geological Society of South Africa* 83, 141-170.
- BEUKES, N.J. 1983. Palaeoenvironmental setting of iron formations in the depositional basin of the Transvaal Supergroup, South Africa. In: Trendall, A.F. & Morris, R.C. (Eds.) *Iron-formation: facts and problems*, 131-210. Elsevier, Amsterdam.
- BEUKES, N.J. 1986. The Transvaal Sequence in Griqualand West. In: Anhaeusser, C.R. & Maske, S. (Eds.) *Mineral deposits of Southern Africa, Volume 1*, pp. 819-828. Geological Society of South Africa.
- ERIKSSON, P.G. & TRUSWELL, J.F. 1974. Tidal flat associations from a Lower Proterozoic carbonate sequence in South Africa. *Sedimentology* 21: 293-309.
- ERIKSSON, P.G. & ALTERMANN, W. 1998. An overview of the geology of the Transvaal Supergroup dolomites (South Africa). *Environmental Geology* 36, 179-188.
- ERIKSSON, P.G., ALTERMANN, W. & HARTZER, F.J. 2006. The Transvaal Supergroup and its precursors. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The geology of South Africa*, pp. 237-260. Geological Society of South Africa, Marshalltown.
- KLEIN, C., BEUKES, N.J. & SCHOPF, J.W. 1987. Filamentous microfossils in the early Proterozoic Transvaal Supergroup: their morphology, significance, and palaeoenvironmental setting. *Precambrian Research* 36, 81-94.
- PARTRIDGE, T.C., BOTHA, G.A. & HADDON, I.G. 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The geology of South Africa*, pp. 585-604. Geological Society of South Africa, Marshalltown.
- SCHOPF, J.W. 2006. Fossil evidence of Archaean life. *Philosophical Transactions of the Royal Society of London B* 361, 869-885.
- YOUNG, R.B. 1932. The occurrence of stromatolitic or algal limestones in the Campbell Rand Series, Griqualand West. *Transactions of the Geological Society of South Africa* 53: 29-36.

John E. Almond