

RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

Proposed Brakpoort Karoo photo-voltaic solar power plant on Portion 6 of the Farm Kraanvogelvlei No. 174, Victoria West, Northern Cape Province

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

November 2011

1. OUTLINE OF DEVELOPMENT

It is proposed to construct a 10 MW photovoltaic solar power plant on an area of less than 20 hectares on Portion 6 of the Farm Kraanvogelvlei No. 174. This farm is situated approximately 30 km northeast of Victoria West and traversed by the railway line between Hutchinson and De Aar. Two alternative sites are under consideration (Fig. 1). Electricity will be transmitted from the PV plant *via* a new step-up substation (also to be located on Portion 6 of the Farm Kraanvogelvlei No. 174) and new overhead power lines some 250m long to the existing 132 KV power line, which is located directly north and west of Portion 6 of the Farm Kraanvogelvlei No. 174. The connection to the existing 132 KV power line will be on the neighbouring Farm Davidskraal No. 116, Victoria West.

Since it overlies potentially fossiliferous bedrocks of the Abrahamskraal Formation (Beaufort Group, Karoo Supergroup), specialist comment on the potential impacts of the proposed development has been requested by SAHRA. The present study has according been commissioned on behalf of the client by Withers Environmental Consultants (Pty) Ltd., P.O.Box 6118, Uniedal 7612.

2. GEOLOGICAL BACKGROUND

The geology of the study area is shown on 1: 250 000 sheet 3122 Victoria West (Fig. 3; Le Roux & Keyser 1988). The area is largely underlain at depth by fluvial sediments of the Mid to Late Permian **Abrahamskraal Formation** (Lower Beaufort Group, Karoo Supergroup) that are extensively intruded here by dykes of the Early Jurassic **Karoo Dolerite Suite** (Johnson *et al.* 2006, Duncan & Marsh 2006). Satellite images (Fig. 2) and field photographs show that the Beaufort Group bedrocks are largely mantled by dolerite scree, down-wasted gravels and silty alluvium of probable Late Quaternary to Recent age, with very little surface exposure of Beaufort sandstones and mudrocks.

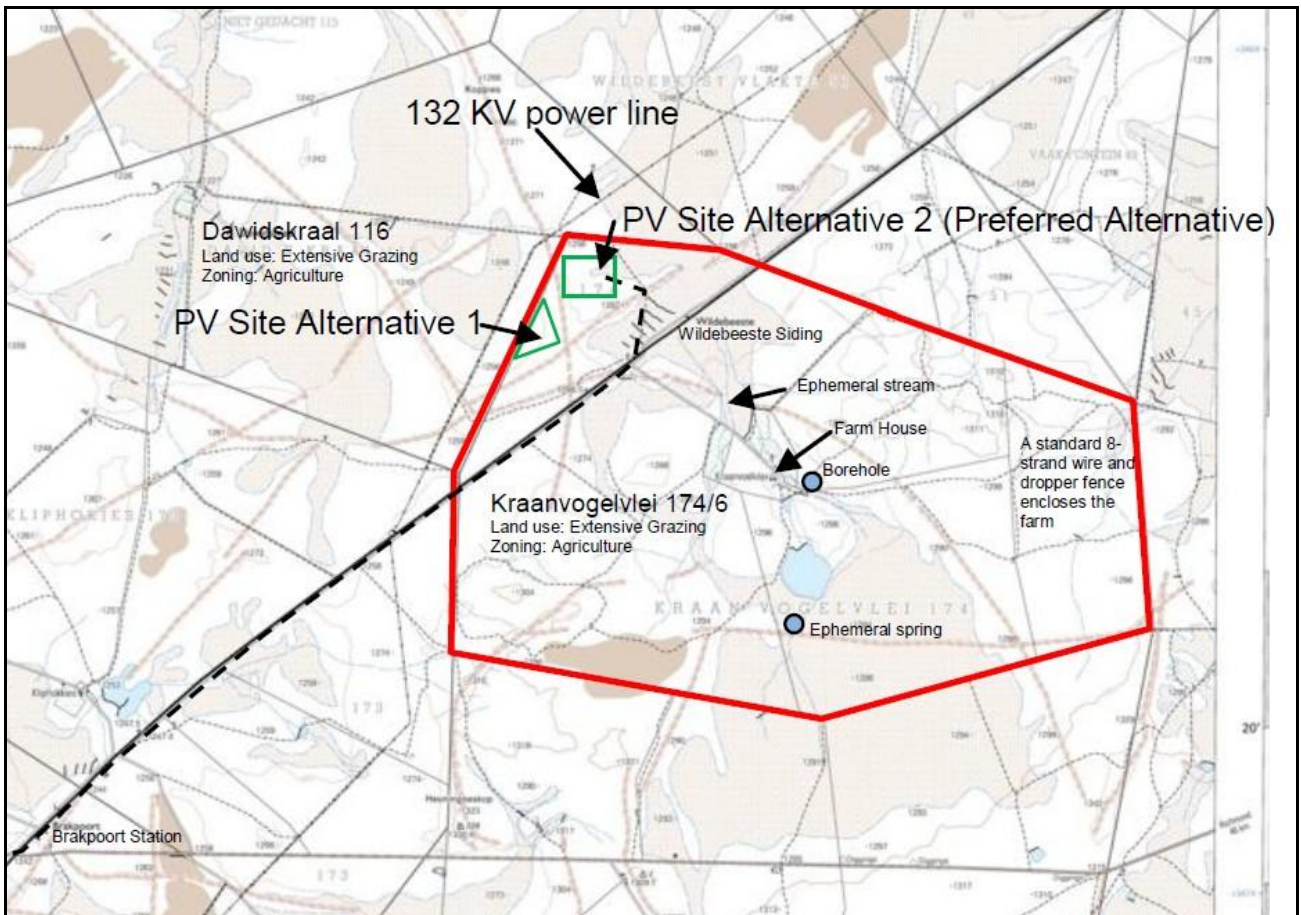


Fig. 1. Extract from 1: 50 000 map 3123AD Brakpoort showing location of two alternative sites for the proposed PV solar power plant on Farm Kraanvogelvllei 174, c. 30 km northeast of Victoria West, Northern Cape Province (Image kindly supplied by Withers Environmental Consultants (Pty) Ltd).



Fig. 2. Google Earth© satellite image of the broader study area on the northwestern side of the railway line on Farm Kraanvogelvlei. The region is criss-crossed by dolerite dykes while Beaufort Group bedrocks are largely mantled by dolerite colluvium (scree, gravels) and superficial sediments.

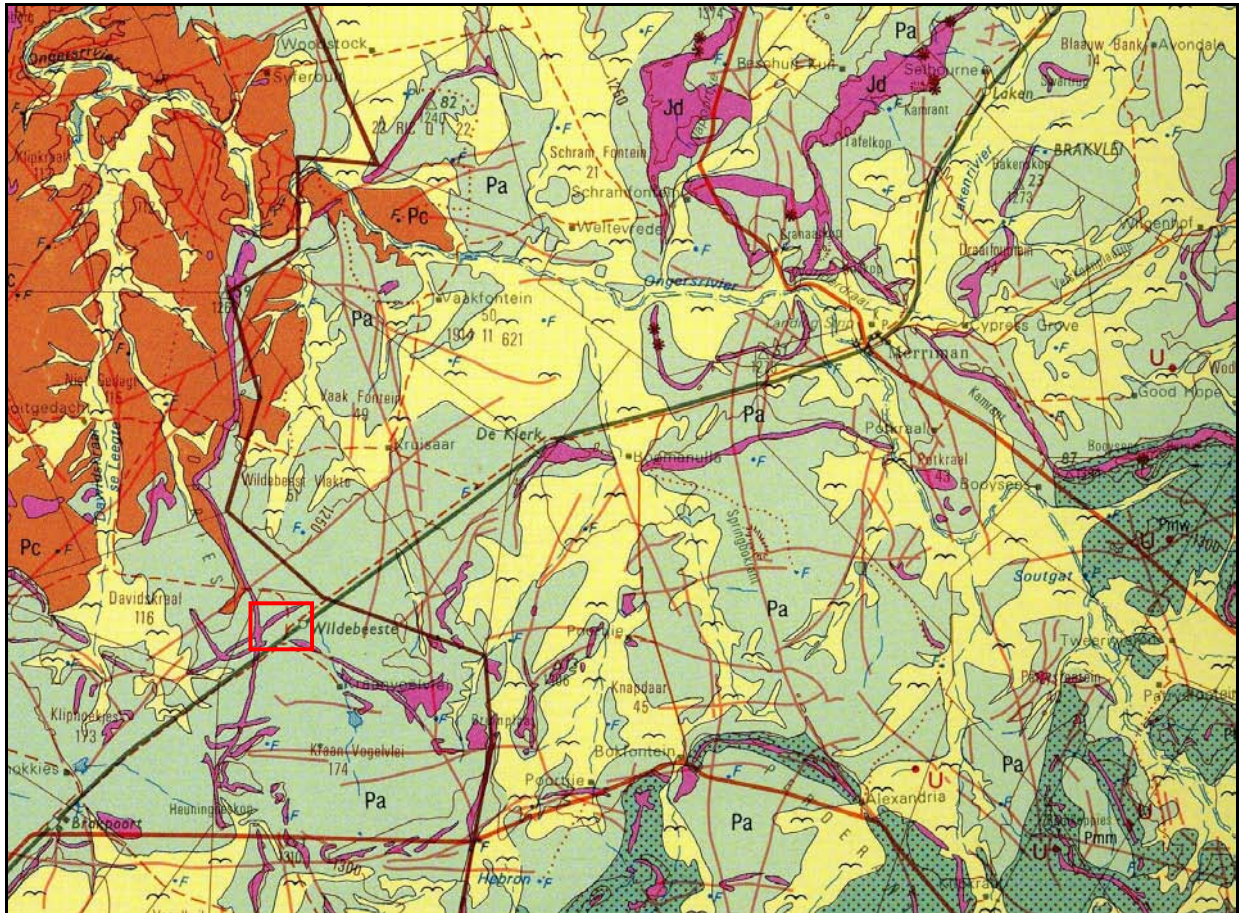


Fig. 3. Extract from 1: 250 000 geological map 3122 Victoria West (Council for Geoscience, Pretoria) showing approximate location of the study area on Farm Kraanvolgelvlei 174 (red rectangle), close to the Hutchinson – De Aar railway line. Geological units represented in this area are the Abrahamskraal Formation (Pa pale green) and intrusive dykes of the Karoo Dolerite Suite (Jd, pink).

3. PALAEOONTOLOGICAL HERITAGE

The overall palaeontological sensitivity of the Beaufort Group sediments in general is high to very high (Almond & Pether 2008). These continental sediments have yielded one of the richest fossil records of land-dwelling plants and animals of Permo-Triassic age anywhere in the world (e.g. MacRae 1999, Rubidge 2005, McCarthy & Rubidge 2005). Any Abrahamskraal Formation fossil assemblages in the broader study region northeast of Victoria West probably belong to the Late Permian *Pristerognathus* Assemblage Zone (Smith & Keyser 1995).

The Karoo Dolerite Suite intrusions are unfossiliferous, and the superficial sediments mantling the bedrocks are very sparsely fossiliferous.

4. CONCLUSIONS & RECOMMENDATIONS

The construction of the proposed PV solar power plant is not considered to pose a serious threat to local fossil heritage because:

- Substantial bedrock excavations are not envisaged during the construction phase
- The alternative sites under consideration are very small (< 20 ha)

- There is minimal bedrock exposure in the study area

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

Should any substantial fossil remains (e.g. vertebrate bones and teeth, 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 Western Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc., Cape Town.

DUNCAN & MARSH 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.

LE ROUX, F.G. & KEYSER, A.W. 1988. Die geologie van die gebied Victoria-Wes. Explanation to 1: 250 000 geology Sheet 3122, 31 pp. Council for Geoscience, Pretoria.

MACRAE, C. 1999. Life etched in stone. Fossils of South Africa, 305 pp. The Geological Society of South Africa, Johannesburg.

MCCARTHY, T. & RUBIDGE, B. 2005. The story of Earth and life: a southern African perspective on a 4.6-billion-year journey. 334pp. Struik, Cape Town.

JOHNSON, M.R., VAN VUUREN, C.J., VISSER, J.N.J., COLE, D.I., WICKENS, H. DE V., CHRISTIE, A.D.M., ROBERTS, D.L. & BRANDL, G. 2006. Sedimentary rocks of the Karoo Supergroup. Pp. 461- 499 in Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds.) The geology of South Africa. Geological Society of South Africa, Johannesburg & the Council for Geoscience, Pretoria.

RUBIDGE, B.S. 2005. Re-uniting lost continents – fossil reptiles from the ancient Karoo and their wanderlust. 27th Du Toit Memorial Lecture. South African Journal of Geology 108, 135-172.

SMITH, R.M.H. & KEYSER, A.W. 1995. Biostratigraphy of the *Priesterognathus* Assemblage Zone. Pp. 13-17 in Rubidge, B.S. (ed.) Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Stratigraphy, Biostratigraphic Series No. 1. 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 as well as Limpopo, Free State and Gauteng 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.



Dr John E. Almond
Palaeontologist
***Natura Viva* cc**