

RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

PROPOSED HIBERNIA PV SOLAR ENERGY FACILITY NEAR LICHTENBURG, DITSBOTLA LOCAL MUNICIPALITY, NORTH WEST PROVINCE

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1. OUTLINE OF PROPOSED DEVELOPMENT

Megawatt One Photovoltaic (Pty) Ltd, Durban, is proposing to develop a photovoltaic solar energy facility of up to 5 MW generation capacity on Farm Hibernia 52 (Portion 9 and Portion 31), situated some 15 km WSW of the town of Lichtenburg, Ditsobotla Local Municipality, North West Province (Fig. 1).

Two alternative locations for the proposed Hibernia solar energy facility have been proposed on Portion 31 of the Farm Hibernia 52. The first and preferred site is located north of the line of trees on Portion 31 of the Farm Hibernia Farm 52. The second and alternative site is also located on Portion 31 of the Farm Hibernia 52, adjacent to the existing Hibernia Rural Substation.

The Hibernia solar energy facility will have a development footprint of c. 10 hectares and comprise the following main infrastructural components:

- Arrays of photovoltaic (PV) panels with a total combined capacity of up to 5 MW.
- Mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
- Cabling between the project components, to be laid underground.
- Inverters/Transformer enclosures.
- An on-site 11 kV switching station.
- An 11 kV overhead power line of up to c. 1000 m length to connect into Eskom's existing Hibernia Rural Substation (which is located on Portion 9 of the Farm Hibernia 52).
- Internal access roads.
- Fencing.
- Workshop area for maintenance, storage and an on-site office.

This palaeontological heritage assessment comment was commissioned as a component of a pre-feasibility study for the proposed solar energy facility 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. Tel: 012 771 3137. Fax: 086 691 6461).



Figure 1: Google earth© satellite image showing the location of the Hibernia PV solar study area situated c. 15 km WSW of Lichtenburg, North West Province (blue rectangle, arrowed). Note scars due to extensive surface limestone mining just to the northwest (pale area).

2. GEOLOGICAL BACKGROUND

The Hibernia Solar Project study area is situated in very flat terrain at c. 1475 m amsl, c. 15 km WSW of Lichtenburg and 7 km northeast of the R52 between Lichtenburg and Sannieshof. Satellite images show that there is little or no bedrock exposure on site. Pale surface limestones (calcrete) is exposed in series of small, shallow quarries 1.45 km or more to the northwest of the study area (Fig. 1).

The geology of the study area near Lichtenburg is shown on 1: 250 000 geological map 2626 West Rand (Council for Geoscience, Pretoria), for which a sheet explanation has yet to be published (Fig. 2). The study area is underlain by **calcretes** of probable Quaternary age (Qc, pale yellow with blue stipple) that themselves overlie Precambrian marine carbonates of the Oaktree Formation (Malmani Subgroup, Chuniespoort Group, Transvaal Supergroup) (Vo, blue). The extensive blanket of surface calcrete in the region is likely to be thick (several meters or more), as is typical in many areas overlying Transvaal Supergroup carbonate bedrocks.

The underlying Precambrian dolomites and associated marine sedimentary rocks are assigned to the **Oaktree Formation** (Vo), the basal subunit of the **Malmani Subgroup** (**Chuniespoort Group**) within the **Transvaal Supergroup** (Eriksson *et al.* 2006). The c. 2 km-thick Malmani Subgroup succession consists of a series of formations of stromatolitic and oolitic carbonates (limestones and dolomites), cherts and black carbonaceous shales. These marine sediments were laid down in a range of supratidal, intertidal and subtidal settings over a major epicontinental carbonate platform in Late Archaean to Early Proterozoic times, roughly 2.55 to 2.50 Ga (billion years ago). Key references among a very extensive literature on the "Transvaal Dolomites" include papers by Button (1973, 1986), Eriksson *et al.* (1993), Eriksson

et al. (1995), Eriksson & Altermann (1998), Catuneanu & Eriksson (1999), Moore *et al.* (2001), Eriksson *et al.* (2006), as well as Sumner & Beukes (2006).

Given the anticipated thickness of the superficial calcrete cover, significant direct impacts on the underlying Malmani dolomite bedrocks are not anticipated during construction of the proposed solar energy facility.

3. PALAEOONTOLOGICAL HERITAGE

The **Malmani Subgroup** platform carbonates of the Transvaal Basin host a variety of stromatolites (microbial laminites), ranging from supratidal mats to intertidal columns and large subtidal domes. These biogenic structures are of biostratigraphic as well as palaeoecological interest; for example, the successive Malmani dolomite formations are in part differentiated by their stromatolite biotas (Eriksson *et al.* 2006). There is an extensive literature dealing with the Malmani stromatolites, including articles by Button (1973), Truswell and Eriksson (1972, 1973, 1975), Eriksson and MacGregor (1981), Eriksson and Altermann (1998), Sumner (2000), Schopf (2006), among others. Microbial filaments and unicells have been reported from stromatolites of the Transvaal Supergroup (Eriksson & MacGregor 1981, MacGregor 2002 and refs. therein).

Calcrete hardpans may contain trace fossils such as rhizoliths, termite nests and other insect burrows, or even mammalian trackways. Solution hollows within well-developed calcrete horizons may have acted as fossil traps in the past, as seen in Late Caenozoic limestones near the coast and Precambrian carbonate successions of the Southern African interior. Dense concentrations of vertebrate remains (*e.g.* small mammals, reptiles) or terrestrial molluscs, for example, are a possibility here. However, in general these surface limestones are of low palaeontological sensitivity.

The Hibernia Solar Project study area near Lichtenburg is generally of LOW palaeontological sensitivity.

4. CONCLUSIONS & RECOMMENDATIONS

The study area of the proposed Hibernia Solar Project near Lichtenburg, North West Province, is underlain at depth by marine carbonate rocks of the Malmani Subgroup (Oaktree Formation) that are of Precambrian age and may contain fossil stromatolites (microbial mounds) and organic-walled microfossils. However, these bedrocks are unlikely to be directly impacted by the solar energy development since they are mantled by a thick blanket - probably several meters or more- of calcrete ("surface limestone") of low palaeontological sensitivity.

The impact significance of the solar project development on local fossil heritage resources is considered to be 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 Hibernia Solar Project.

Any substantial fossil remains (*e.g.* stromatolites, 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.

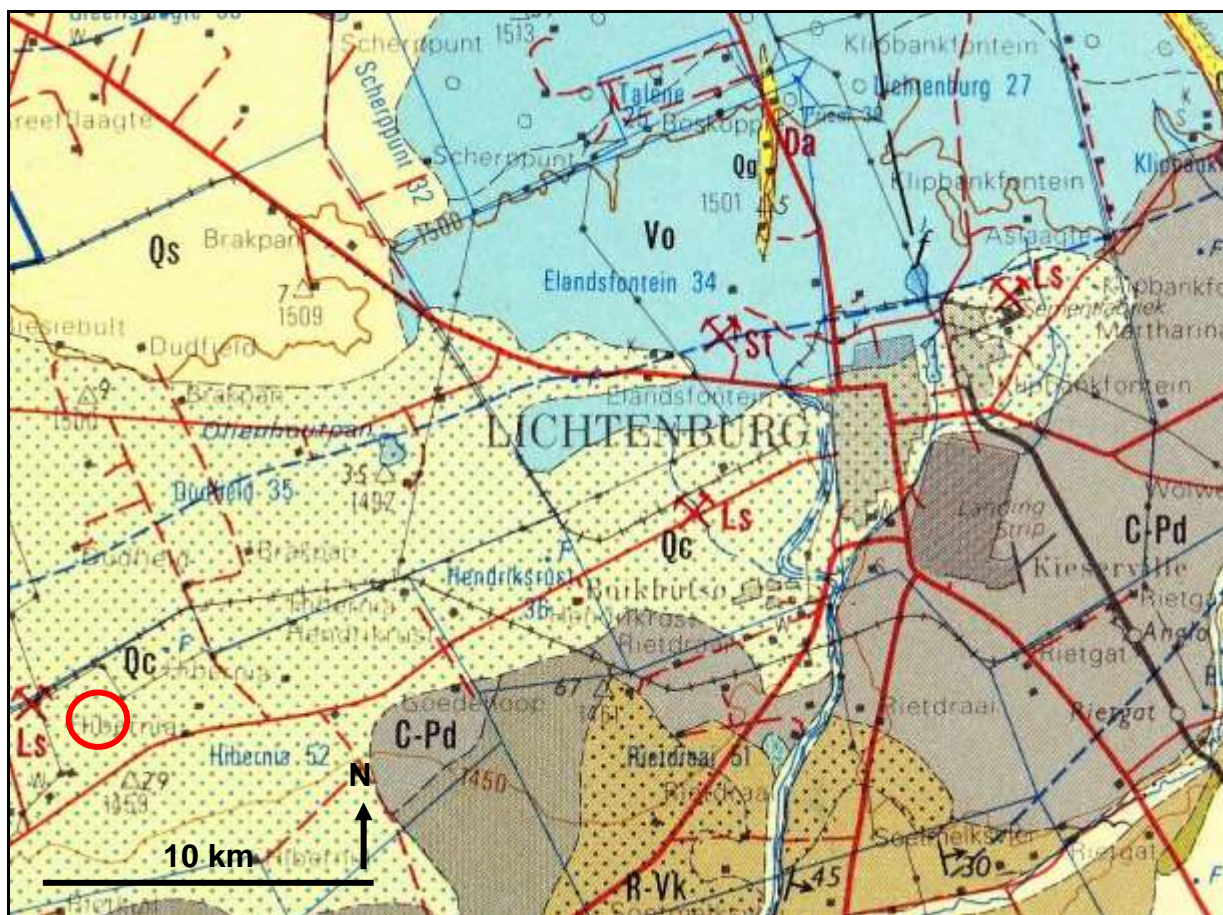


Fig. 2. Extract from 1: 250 000 geology map 2626 West Rand (Council for Geoscience, Pretoria) showing the approximate location of the proposed Hibernia Solar Project near Lichtenburg, North West Province (red circle). The study area is underlain by calcretes of probable Quaternary age (Qc, pale yellow with blue stipple) that themselves overlies Precambrian marine carbonates of the Oaktree Formation (Malmani Subgroup, Chuniespoort Group, Transvaal Supergroup) (Vo, blue).

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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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