

PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED
MELKVLEI, LONGLANDS 231, FRANCES BAARD DISTRICT, NORTHERN
CAPE PROVINCE

Prepared for:

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EXECUTIVE SUMMARY

A solar farm is planned on the farm Longlands 231 (Melkvlei Solar Farm) in the Northern Cape Province. Due to the National Heritage Resources Act, a palaeontological impact assessment is required to detect the presence of fossil material at the proposed development. The development will affect Quaternary deposits only, which are generally not particularly fossiliferous. Fossils in these deposits are found only in gulleys and river beds, and due to the absence of such features in these areas, the impact on the palaeontology at these sites is negligible. Thus, subject to approval from the relevant authorities, the establishment of the proposed solar farm should proceed.

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1. INTRODUCTION

Solar development is proposed on the farm Longlands 231 (Melkveei) in the Northern Cape Province. This development will involve excavating and will thus modify the existing topography. As palaeontological material is unique and non-renewable, it is protected by the National Heritage Resources Act (Act No. 25 of 1999, section 35). A Palaeontological Impact Assessment (PIA) of the proposed development is thus necessary to ensure that palaeontological material is either removed, or is not present.

1.1 Objective

To conduct a desktop study on the farm Longlands 231 (Frances Baard District, Dikgatlong Local Municipality, Northern Cape Province) to determine the impact on potential palaeontological material at these sites.

2. BACKGROUND TO THE GEOLOGICAL AND PALAEOLOGICAL HISTORY

Melkveei Solar Farm, Longlands 231, Northern Cape

The geology of the farm Longlands 231 contains superficial deposits, which are Late Cenozoic (Quaternary [2.6 million years ago] to Recent) in age (Walker and Geiss, 2009). Those on Longlands 231 contain Quaternary Calcrete and Quaternary aeolian sand. These deposits contain taxa from the Florisian Mammal Age. Most species of this time have modern counterparts, but there are some extinct animals such as the giant long-horned buffalo *Pelorovis* and the giant hartebeest, *Megalotragus*. The Florisian Mammal fauna includes mostly mammals such as lagomorphs, rodents, carnivores, perissodactyls, numerous artiodactyls and bovids. Amphibians, reptiles and birds are rarely found in Florisian deposits (Brink, 1987).

A small portion of the southernmost part of Longlands 231 contains rocks of the Allanridge Formation, Platberg Group of the Ventersdorp Supergroup, which is Randian (Precambrian [2 700 million years ago]) in age. It consists of andesite to basaltic andesite, deposited by lava flows (Bruyn et al., 2002).

3. NAME AND GEOGRAPHICAL LOCATION OF THE SITES

Melkveei Solar Farm: Longlands 231, Frances Baard District, Dikgatlong Local Municipality, Northern Cape (28° 25' 13.76" S, 24° 21' 52.59" E).

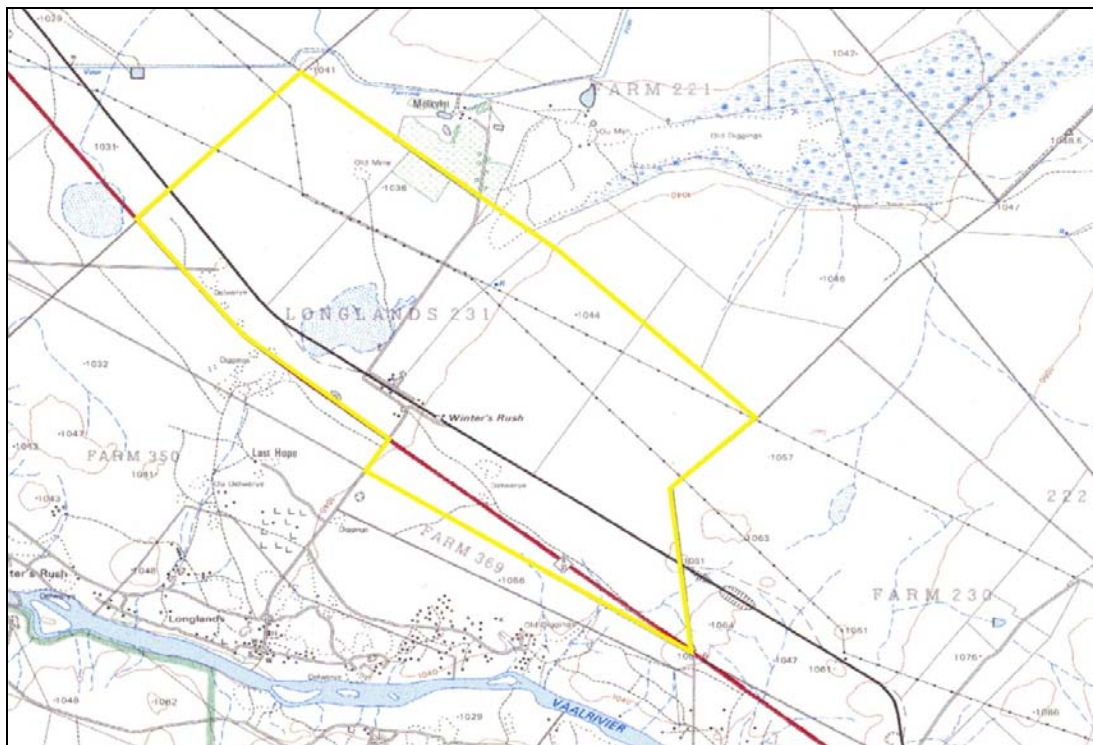


Figure 1. Proposed Melkvelei Solar Farm on Longlands 231, Northern Cape (1: 50 000 map of Delportshoop 2824AD, 1986).

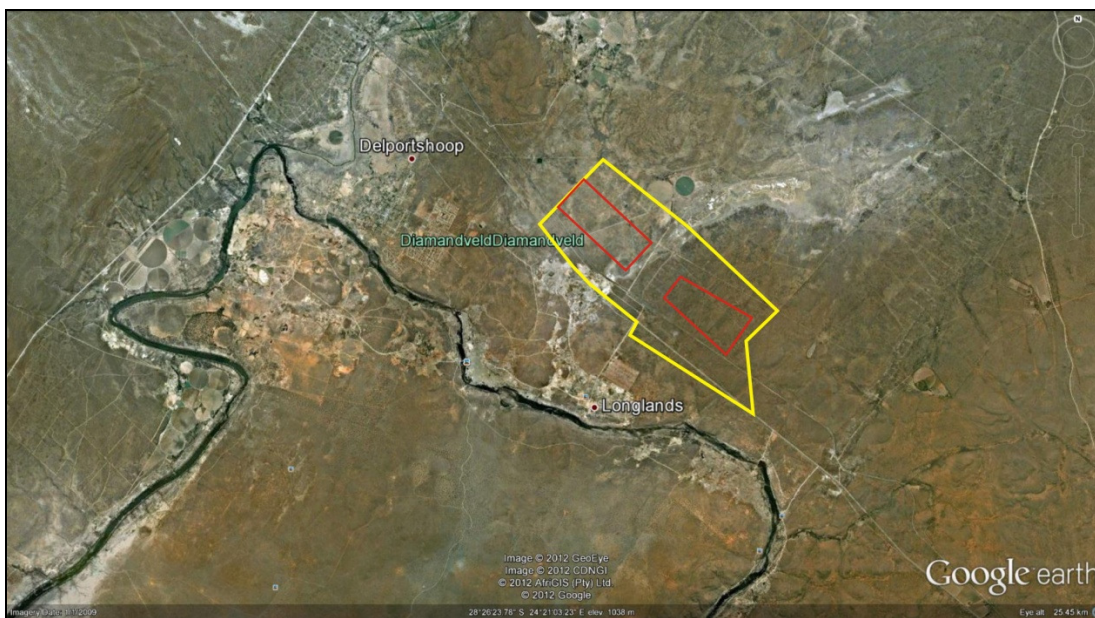


Figure 2. Google Earth satellite image of Melkvelei Solar Farm (bordered in red) on Longlands 231 (bordered in yellow), Northern Cape, showing the low relief and semi-arid environment.

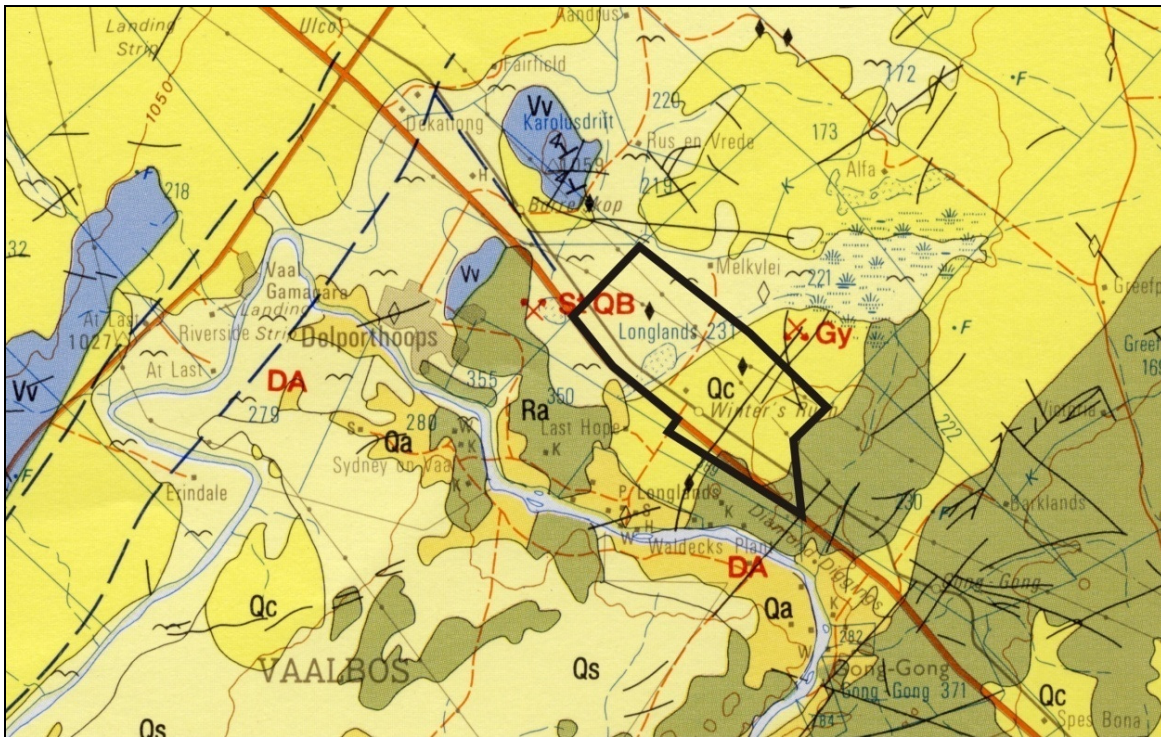


Figure 3. Geological map (1: 250 000, Kimberley 2824), showing the geology of Longlands 231 (bordered in black). Qc (bright yellow), Quaternary Calcrete; Qs (pale yellow), Quaternary aeolian sand; Ra (olive green), Allanridge Formation, Platberg Group.

4. METHODS

A desktop study was conducted to assess the potential risk to palaeontological material (fossils, trace fossils) in the proposed area of development. The author's experience, aerial photos (using Google, 2012), topographical and geological maps were used to assess the proposed areas of development. Where necessary experts in particular specialized palaeontological fields were also consulted.

4.1 Assumptions and Limitations

The accuracy of Palaeontological Impact Assessments may be limited by old fossil databases that have not been kept up-to-date or are not computerized and/or do not include pertinent locality or geological information, and the accuracy of geological maps where information may be based solely on aerial photographs and small areas of significant geology have been overlooked. Much of South Africa has not been studied palaeontologically due to there being so few palaeontologists in the field. As with most desktop studies, this PIA infers the presence of fossil heritage in the development area based on the presence of such heritage in the same rock units elsewhere.

5. FINDINGS AND RECOMMENDATIONS

Melkvei Solar Farm, Longlands 231, Northern Cape

Melkvei Solar Farm will affect areas on Longlands 231 that contain Quaternary deposits. The small portion that contains Precambrian deposits is non-fossiliferous and it also does not fall within the proposed area of construction. The low-lying relief and general absence of potentially fossiliferous gulleys also suggests that fossils are absent from this farm. Thus, considering the rarity of fossil-bearing sediments and lack of appropriate exposure (i.e. steep-sided gulleys) at the proposed site, the impact on palaeontological material at Longlands 231 is negligible (rated Low or negative).

Thus, pending the discovery of significant new fossil material at the sites, no further specialist studies are considered to be necessary.

It is recommended that:

The ECO responsible for the development must remain aware that all sedimentary deposits have the potential to contain fossils and he/she should thus monitor all substantial excavations into sedimentary bedrock for fossil remains;

In the case of any significant fossils (*e.g.* vertebrate teeth, bones, burrows, petrified wood) being found during construction, they must be safeguarded and the relevant heritage management authority (SAHRA) be informed so that a professional palaeontologist may be consulted in order to facilitate the necessary rescue operations.

5 ACKNOWLEDGEMENTS

Thank you to Dr Lloyd Rossouw, Head of the Archaeology Department at the National Museum, Bloemfontein for assisting with information on Quaternary Deposits.

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Jennifer Botha-Brink has an Honours Degree in Zoology and a PhD in Palaeontology from the University of Cape Town, South Africa. She has conducted extensive field work in South Africa for the past 14 years and currently holds the position of Head of the Karoo Palaeontology Department at the National Museum in Bloemfontein. Her current research interests comprise Permo-Triassic vertebrate palaeobiology, with a special focus on the end-Permian mass extinction. She is also trained in the specialized field of palaeohistology (the study of fossil bone microstructure). Dr Botha-Brink has published more than 30 scientific articles in both national and internationally accredited journals, has written several popular articles on palaeontology and is currently lecturing Zoology students in Vertebrate Evolution at the University of the Free State. Dr Botha-Brink began conducting palaeontological impact assessments for developments in 2011. She is currently the President of the Palaeontological Society of Southern Africa (PSSA) and is registered with the South African Heritage Resources Agency.

Declaration of Independence

I, Dr Jennifer Botha-Brink, 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 my objectivity in this work.

Sincerely,



Dr Jennifer Botha-Brink

Palaeontologist