

PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED KOKERBOOM PV SOLAR
POWER FACILITY PROJECT, NORTHERN CAPE PROVINCE

Prepared for:

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EXECUTIVE SUMMARY

A solar power facility is proposed by BQR South Africa Limited 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 Kokerboom PV Solar Power Facility will affect areas on Farm 218 (Biesjesfontein) that contain metamorphic and igneous rocks that are all non-fossiliferous. It will also affect a tiny portion of Quaternary surface sand and scree, which also do not contain fossils. There is no possibility of palaeontological material being present at this site and thus the impact on palaeontological heritage is non-existent. Thus, subject to approval from the relevant authorities, the establishment of the proposed solar facility should proceed.

1. INTRODUCTION

A solar power facility is proposed on Farm 218 (Biesjesfontein) in the Northern Cape Province. This development will involve the installation of photovoltaic solar panels, concrete foundations, a generator transformer, switching station and workshop area, laying down roads, and placing underground cabling. All these excavations will 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 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 Farm 218 (Biesjesfontein), Namakwa District Municipality, Nama Khoi Local Municipality, Northern Cape Province to determine the potential impact of the proposed project by assessing the sensitivity and significance of the palaeontological heritage at the site, evaluating the potential impact of the construction of the site on the palaeontological heritage and recommending mitigation measures to reduce any negative impacts on the palaeontological heritage at the site.

2. BACKGROUND TO THE GEOLOGICAL AND PALAEOLOGICAL HISTORY

Farm 218 is an area of low relief with no steep river gulleys or outcrops (Figures 1 and 2). The farm is situated within the Namaqualand Metamorphic Complex, which includes metasedimentary, metavolcanic and intrusive rocks, which are mainly gneiss in nature (Kent, 1980).

The Namaquan orogenic belt in north-western South Africa (and southern Namibia) is comprised of several terranes which themselves are divided into three sub-provinces; the Gordonia, Richtersveld and Bushmanland subprovinces. The Bushmanland sub-province includes the O'okiep and Garies terranes. The O'okiep District or terrane is underlain by granite gneiss and granite with remnants of metamorphosed supracrustal rocks, which are approximately late Mesoproterozoic in age (1210 to 1035 million years old). This assemblage was later intruded by the copper-bearing Koperberg Suite. The Namaquan Orogeny in the O'okiep District is characterised by two major tectono-magmatic episodes: (1) the O'okiepian Episode (between 1210 and 1180 million years ago), which is represented by regional granite plutonism (Nababeep [Nnb, Figure 3] and Modderfontein Granite Gneisses [Nmd, Figure 3]), and the Concordia (Ncc, Figure 3) and Kweekfontein Granites (Nkf, Figure 3), which accompanied and outlasted regional tectonism and (2) the Klondikean Episode (1040 to 1020 million years ago), which includes the intrusion of the Rietberg Granite and Koperberg Suite (Clifford et al., 2004; Duchesne et al., 2007).

The site to be developed for the Kokerboom PV Solar Power Energy Facility contains metamorphic rocks of the Brandewynsbank Gneiss Formation, Metamorphic Suite (Kbw,

Figures 3 and 4) and igneous rocks of the Modderfontein Gneiss (Nmd, Figures 3 and 4), as well as a tiny portion of surface deposits of Quaternary sand, scree, rubble and sandy soil (Q-s2, Figure 3 and 4).

3. NAME AND GEOGRAPHICAL LOCATION OF THE SITE

Kokerboom PV Solar Power Facility Project: Farm 218 (Biesjesfontein), Namakwa District Municipality, Nama Khoi Local Municipality, Northern Cape (29° 45' 13.84" S, 17° 51' 02.53" E), 10 km South of Spingbok.

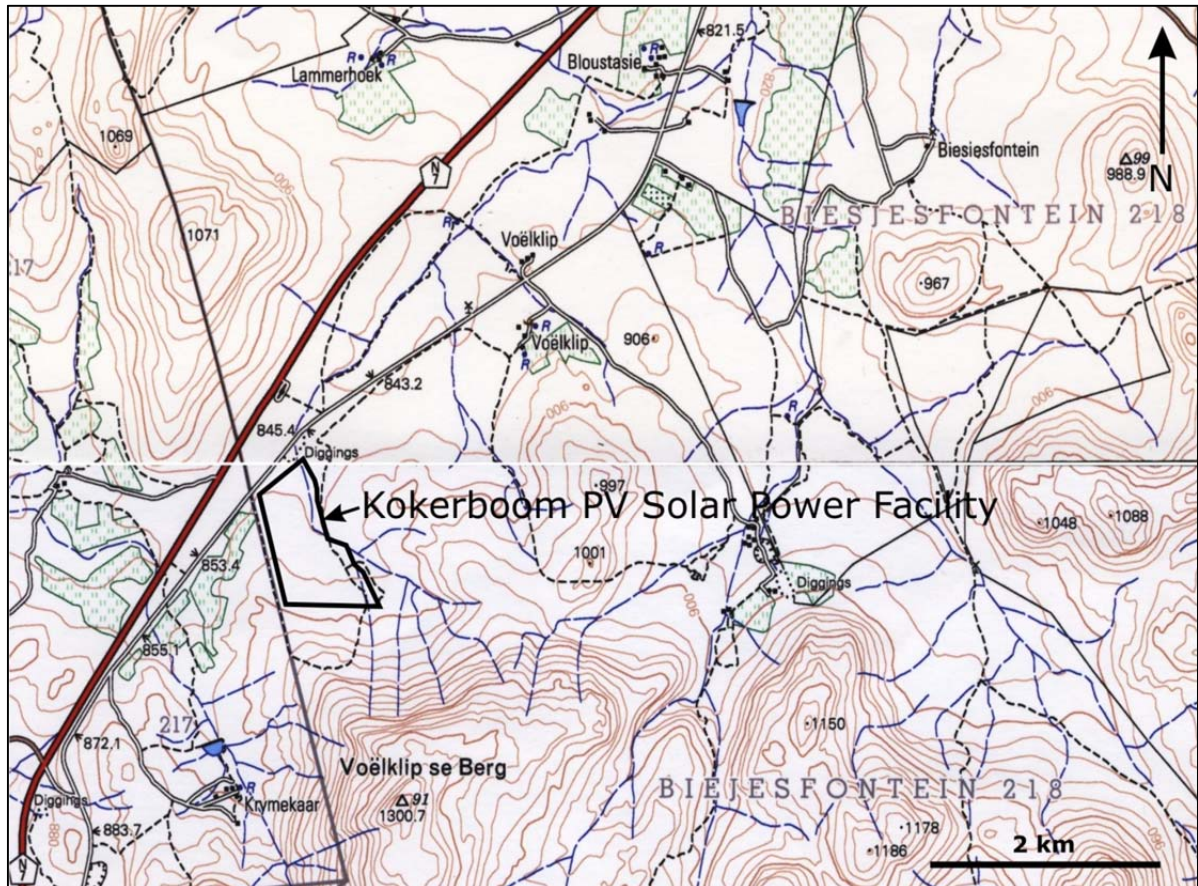


Figure 1. Topographical map of the proposed Kokerboom PV solar power facility on Farm 218 (Biesjesfontein), Northern Cape (1: 50 000 maps of 2917DB Springbok and 2917DD Mesklip, Data source: Council for Geoscience, Pretoria).



Figure 2. Google Earth satellite image of Kokerboom PV Solar Power Facility (section bordered in white) on Farm 218 (Biesjesfontein), Northern Cape Province, showing the low relief of the area.



Figure 3. Extract from geological map 1: 250 000 Springbok 2916, showing the geology of Farm 218, Biesjesfontein (bordered in white) and the site of the proposed Kokerboom PV Solar Power Facility (white star). Kbw (dark brown) Brandewynsbank Gneiss Formation, non-fossiliferous metamorphic rocks of the Metamorphic Suite; Ncc (purple pink) Concordia Granite, non-fossiliferous igneous rocks of the Spektakel Suite; Nkf (bright pink) Kweekfontein Granite, non-fossiliferous igneous rocks of the Korridor Suite; Nmd (brown) Modderfontein Gneiss; Nnb (mustard yellow) Nababees Gneiss, non-fossiliferous igneous rock of the Little Namaqualand Suite; Q-s2 (pale cream) Quaternary sand, scree, rubble and sandy soil. (Data Source: Council for Geoscience, Pretoria) (for a larger extract of the geology of the area, see Appendix 1).

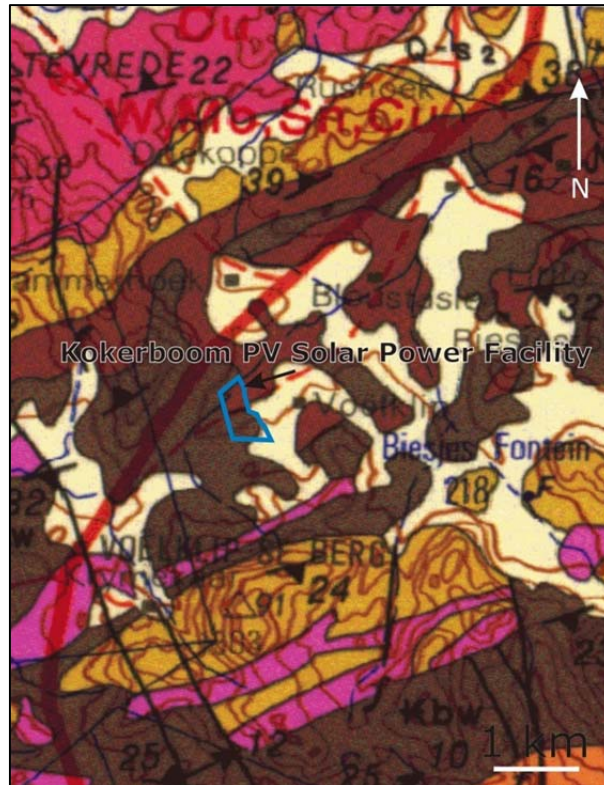


Figure 4. The Kokerboom PV Solar Power Energy Facility (bordered in blue), containing metamorphic non-fossiliferous rocks of the Brandewynsbank Gneiss Formation, Metamorphic Suite (Kbw), igneous non-fossiliferous of the Modderfontein Gneiss (Nmd) and a tiny portion of non-fossiliferous surfaces deposits of Quaternary sand, scree, rubble and sandy soil (Q-s2).

4. METHODS

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

4.1 Assumptions and Limitations

The accuracy of desktop 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

The Kokerboom PV Solar Power Facility will affect areas on Farm 218 (Biesjesfontein) that contain metamorphic and igneous rocks that are all non-fossiliferous. It will also affect a tiny portion of Quaternary surface sand and scree, which also do not contain fossils. There is no possibility of palaeontological material being present at this site and thus the impact on palaeontological heritage is non-existent. Thus, no further specialist studies are considered to be necessary.

6 REFERENCES

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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,

A handwritten signature in black ink, appearing to read 'J. Botha-Brink'. The signature is written in a cursive style with a large initial 'J'.

Dr Jennifer Botha-Brink

Palaeontologist

Appendix 1. Geology of the Springbok area. Knn (lavender) Noenoemasberg Gneiss, Metamorphic Suite; Ksg (bright yellow) Springbok Formation, Khurisberg Subgroup, Bushmanland Group, non-fossiliferous metamorphic rock; Ncc (pink) Concordia Granite, non-fossiliferous igneous rocks of the Spektakel Suite; Nmd (brown) Modderfontein Gneiss; Nnb (mustard yellow) Nababeep Gneiss, non-fossiliferous igneous rock of the Little Namaqualand Suite; Nng (speckled light brown) Nigramoep Member, Dabis Formation, Kubis Subgroup, Nama Group; Npl (light brown) Plaatjesfontein Member, Dabis Formation, Kubis Subgroup, Nama Group; Nri (dark purple) Rietberg Granite, Spektakel Suite; Q-s2 (pale cream) Quaternary sand, scree, rubble and sandy soil. (Data Source: Council for Geoscience, Pretoria).

