

PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED O'KIEP 3 PV SOLAR
ENERGY FACILITY PROJECT, NORTHERN CAPE PROVINCE

Prepared for:
Savannah Environmental (Pty) Ltd

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EXECUTIVE SUMMARY

A solar power facility is proposed by Ilio Energy Ltd 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 O’Kiep 3 PV Solar Energy Facility will affect areas on Farm Brakfontein 133 in O’Kiep that contain non-fossiliferous igneous rocks and superficial scree. 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 energy facility is proposed on the farm Brakfontein 133 in O’Kiep, Northern Cape Province by Ilio Energy (Pty) Ltd. This development will involve the installation of photovoltaic solar panels, concrete foundations, laying down roads, placing underground cabling, and building a switching station and workshop area. 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 the Farm Brakfontein 133 in O’Kiep, 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

The site to be developed on Farm Brakfontein 133 is an area of low relief with no steep river gulleys or outcrops, apart from one prominent outcrop in the southernmost portion of the site (Figures 1 and 2). The site is situated on the O’Kiep Copper Mine and includes a highly disturbed area (a slimes dam). Farm Brakfontein 133 is located 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 subprovinces; the Gordonia, Richtersveld and Bushmanland subprovinces. The Bushmanland subprovince 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, 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 O’Kiep 3 PV Solar Power Energy Facility contains igneous non-fossiliferous Modderfontein Gneiss and Nababeep Gneiss.

There is also a small portion of the site that contains Quaternary sand, scree, rubble and sandy soil (Q-s2, Figure 3), which are surface, non-fossiliferous deposits.

3. NAME AND GEOGRAPHICAL LOCATION OF THE SITE

O’Kiep 3 PV Solar Energy Facility Project: Farm Brakfontein 133, Namakwa District Municipality, Nama Khoi Local Municipality, Northern Cape (29° 35’ 45.94” S, 17° 52’ 48.63” E), 9 km North of Springbok on the copper mine owned by O’Kiep Copper Co Ltd.

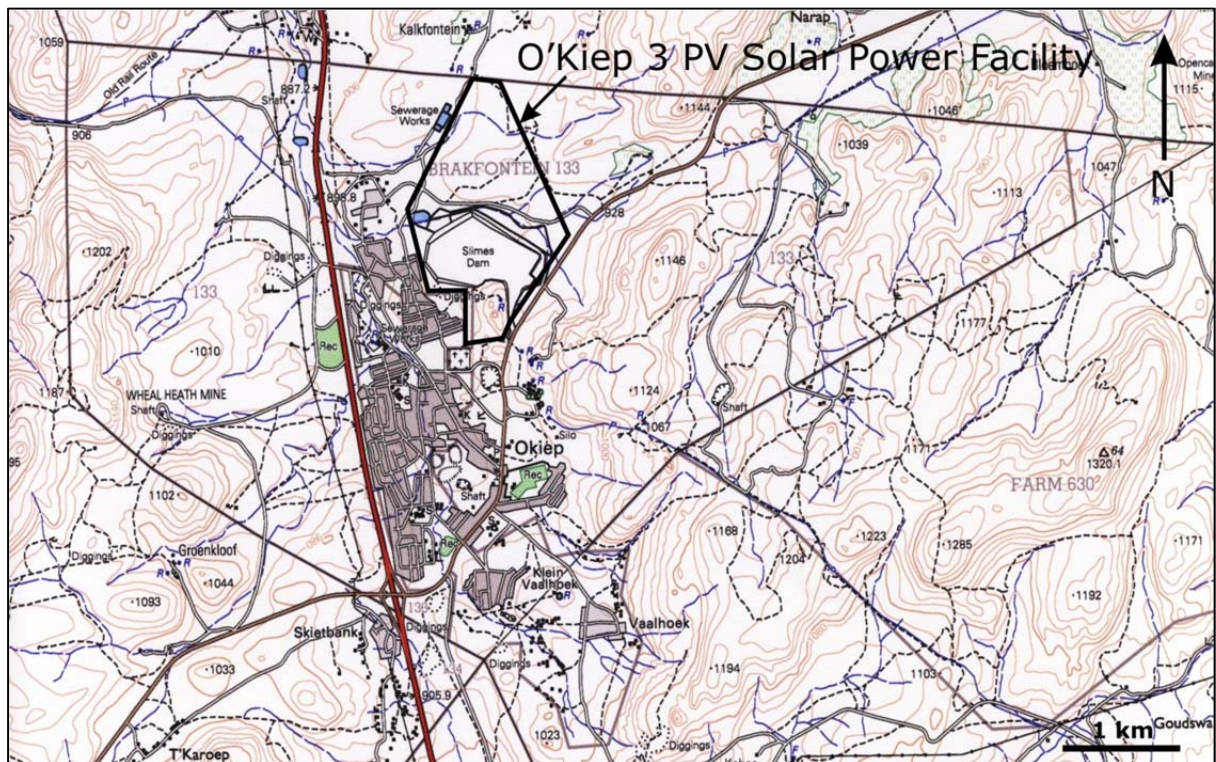


Figure 1. Topographical map of the proposed O’Kiep 3 PV Solar Energy Facility (bordered in black) on O’Kiep’s Copper mine on what is left of Farm Brakfontein 133, Northern Cape Province (1: 50 000 map of 2917DB Springbok, Data source: Council for Geoscience, Pretoria).



Figure 2. Google Earth satellite image of O'Kiep 3 PV Solar Energy Facility (section bordered in black) on O'Kiep's copper mine on Farm Brakfontein 133, Northern Cape Province, showing the low relief of the area and disturbed nature of the site (e.g. slimes dam).

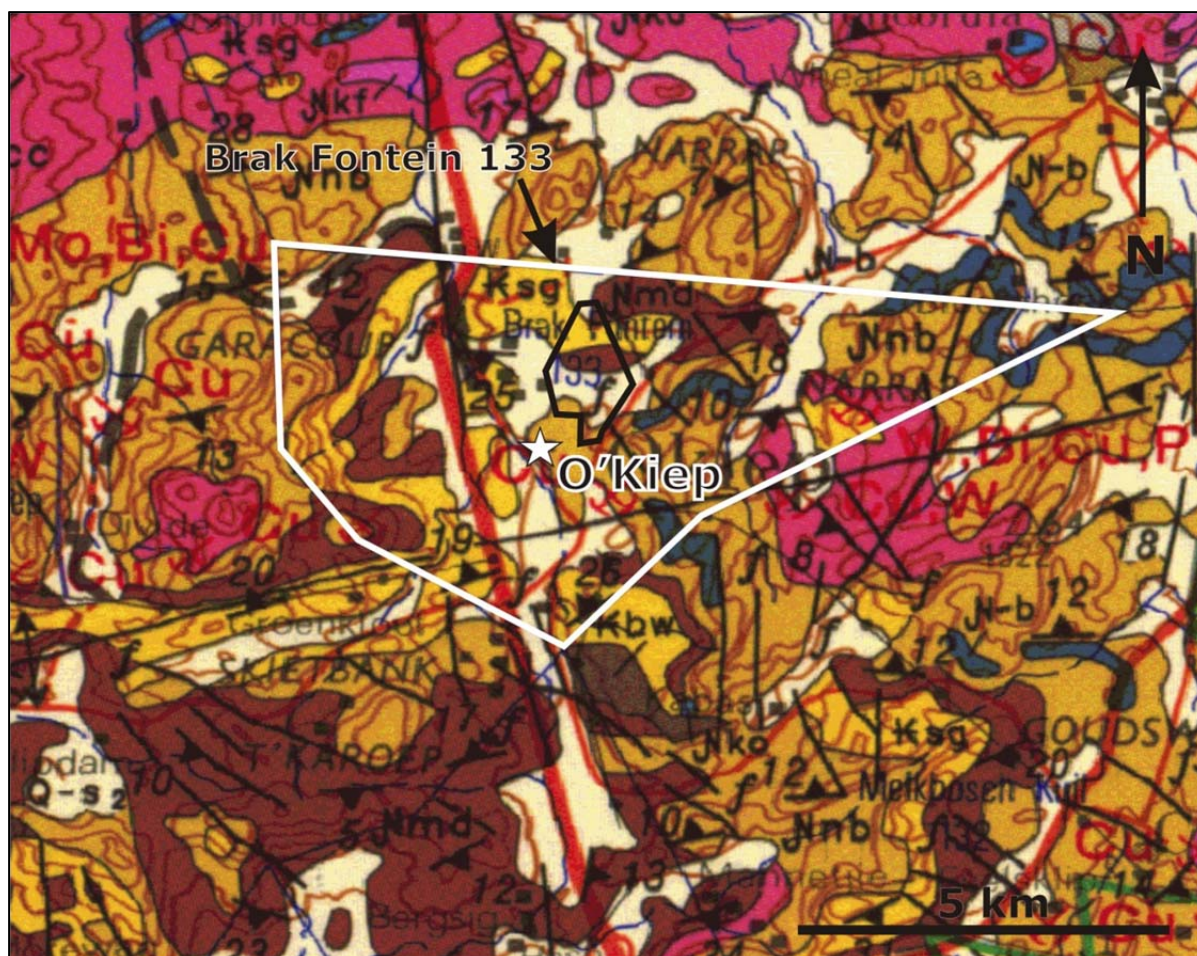


Figure 3. Extract from geological map 1: 250 000 Springbok 2916, showing the geology of Farm Brak Fontein 133 (bordered in white), the O'Kiep copper mine (star) and the site to be developed (bordered in black). Ncc (pink) Concordia Granite, non-fossiliferous igneous rocks of the Spektakel Suite; Nmd (brown) Modderfontein Gneiss; Nnb (mustard yellow) Nababeep Gneiss, non-fossiliferous igneous rock of the Little Namaqualand Suite; 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).

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 O’Kiep 3 PV Solar Energy Facility will affect areas on Farm Brakfontein 133 in O’Kiep that contain non-fossiliferous igneous rocks and superficial scree. There is no possibility of palaeontological material being present at this site as fossils are only located in sedimentary rock. Thus the impact on palaeontological heritage is non-existent and 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 'JB-Brink', written in a cursive style.

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) Platjiesfontein 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).

