RECOMMENDED EXEMPTION FROM FURTHER PALAEONTOLOGICAL STUDIES & MITIGATION:

PROPOSED WHITEBANK KEREN SOLAR PLANT NEAR KURUMAN, GA-SEGONYANA LOCAL MUNICIPALITY, NORTHERN CAPE

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1. OUTLINE OF DEVELOPMENT

Keren Energy Whitebank (Pty) Ltd is proposing to construct a 10 MW Concentrating Photovoltaic (CPV) Energy Generation Facility on a site (Whitebank, remainder Farm no 379 Kuruman) situated 13.2 km WNW of Kuruman, Ga-segonyana Local Municipality, Northern Cape (Fig. 2). The land is currently zoned for agriculture and is owned by the Nico Fourie trust TT63/2007

The proposed activity entails the construction of about 140 CPV solar panels with a footprint of about 20 ha. The CPV panels will be mounted on pedestals drilled and set into the ground. Extensive bedrock excavations are not envisaged, but some vegetation will need to be cleared from the site. Associated infrastructure includes a perimeter access road, single track internal access roads, trenches for underground cables, 2 to 4 transformer pads, a switching station, a maintenance shed, and a temporary construction camp. Connection with the grid will be *via* the adjacent Asbes 66/11kV substation.

The present palaeontological heritage comment has been commissioned by EnviroAfrica cc, Somerset West as part of a comprehensive Heritage Impact Assessment of the proposed development (Contact details: Mr Bernard de Witt, EnviroAfrica cc, P. O. Box 5367, Helderberg, 7135; 29 St James St, Somerset West; mobile: +27 82 4489991; tel: +27 21 851 1616; fax: 086203308).

2. GEOLOGICAL BACKGROUND

The proposed Whitebank Keren solar plant study area (27˚ 28' S, 23˚ 18' E) is situated in on flat terrain at c. 1400 m amsl on the floor of a shallow, N-S trending valley within the northern portion of the Kurumanheuwels WNW of Kuruman. The site (Whitebank, remainder Farm no 379 Kuruman) lies on the west side of dust road connecting to the N14 Kuruman – Olifantshoek tar road situated 5.3 km to the south.

The geology of the study area near Kuruman is shown on the 1: 250 000 geology map 2722 Kuruman (Council for Geoscience, Pretoria; Fig. 1 herein). A very short sheet explanation is printed on the map. The proposed Whitebank Solar Plant is underlain by ancient Precambrian sediments of the **Asbestos Hills Subgroup** (also referred to in the older literature as the Asbesheuwels Subgroup). This succession forms the upper part of the Late Archaean to Early Proterozoic **Ghaap Group** (**Transvaal Supergroup**) of the Griqualand West Basin (Ghaap Plateau Sub-basin). Useful reviews of the stratigraphy and sedimentology of these Transvaal

Supergroup rocks have been given by Moore *et al.* (2001) and Eriksson *et al.* (2006). The Ghaap Group represents some 200 Ma of chemical sedimentation - notably iron and manganese ores, cherts and carbonates - within the Griqualand West Basin that was situated towards the western edge of the Kaapvaal Craton.

The Precambrian sediments present at depth beneath the Whitebank study site probably belong to the iron–rich succession of the **Daniëlskuil Formation** (**Vad** in Fig. 1). This unit is up to 200m-thick and is interpreted as a current- or wave-reworked banded iron formation (BIF), as suggested by the abundance of BIF intraclasts and sedimentary structures (Beukes 1983, Klein & Beukes 1989, Beukes & Klein 1990). The base of the Danielskuil Formation has been radiometrically dated to 2.43-2.49 Ga, *i.e.* Early Proterozoic (Eriksson *et al.* 2006). BIF rocks generally consist of rhythmically bedded, thinly composition- and colour-banded cycles of fine-grained mudrock, chert and iron minerals (siderite, magnetite, haematite) that were deposited in an offshore, intermittently anoxic basin. BIF deposition characterizes the Late Archaean – Early Proterozoic interval (2600-2400 Ma) before the onset of well-oxygenated atmosphere and seas. There are a number of asbestos mines in the region, including one 1.4 km southeast of the study site and another 2.2 km to the north.

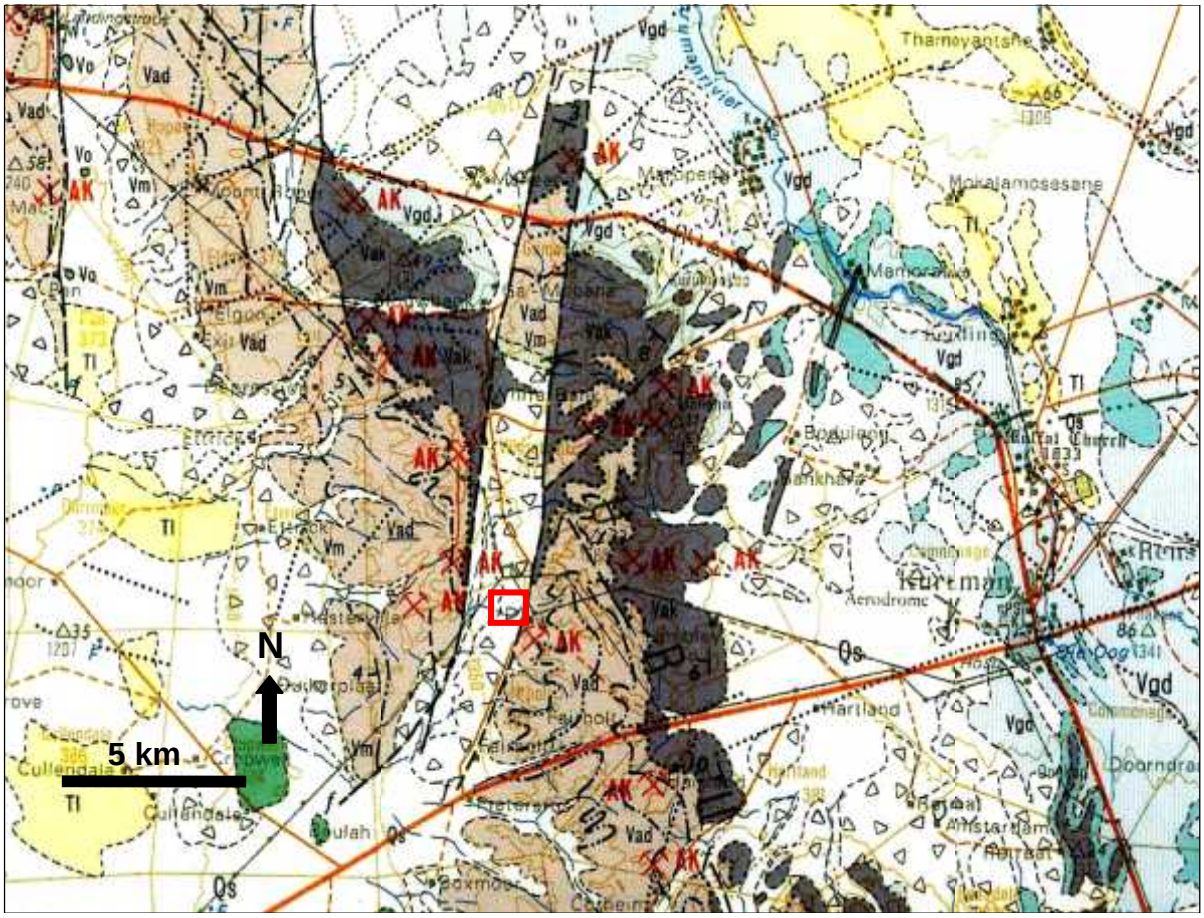


Fig. 1. Extract from 1: 250 000 geological map 2722 Kuruman (Council for Geoscience, Pretoria) showing approximate location of proposed Whitebank Keren Solar Plant study area within a valley eroded into the northern Kurumanheuwels WNW of Kuruman, Northern Cape Province (small red rectangle). The study area is underlain at depth by Precambrian (Early Proterozoic) sedimentary rocks of the Daniëlskuil Formation (Asbestos Hills Subgroup, Ghaap Group, Transvaal Supergroup) (Vad). The Precambrian bedrocks of the floor of the valley are blanketed with colluvial and alluvial rock rubble (triangular symbols). The mining symbol marked AK refers to crocidolite (asbestos) mines in the region.

The Precambrian basement rocks within the study area are mantled with coarse-grained **superficial deposits** that are mapped as rubble (triangular symbols in Fig. 1) and probably consist of an admixture of colluvium, downwasted surface gravels and coarse alluvium of intermittently flowing streams. These deposits are mainly of local origin and are generally young (Quaternary to Recent).

3. PALAEONTOLOGICAL HERITAGE

The deep water BIF facies of the Asbestos Hills Subgroup (Kuruman and Daniëlskuil Formations) are not known to contain macroscopic fossils. They have not yielded stromatolites which are normally restricted to the shallow water photic zone since they are constructed primarily by photosynthetic microbes. However, there are several reports of microfossils from cherty sediments within the Kuruman Formation, just below the Daniëlskuil Formation, according to MacRae (1999) and Tankard *et al.* (1982 – see refs. therein by Fockema 1967, Cloud & Licari 1968, La Berge 1973. N.B. the stratigraphic position of these older records may require confirmation). It is likely that cherts within the Daniëlskuil Formation also contain scientifically interesting Early Proterozoic microfossil assemblages.

The superficial rock rubble mantling the Precambrian bedrocks is unlikely to be fossiliferous.

The palaeontological sensitivity of the Whitebank Solar Plant study area is accordingly assessed as LOW.

4. CONCLUSIONS & RECOMMENDATIONS

The overall fossil heritage impact significance of the proposed Whitebank Keren Solar Plant development is considered to be LOW because:

- The study area is underlain by Precambrian banded iron formations of low palaeontological sensitivity (microfossils only);
- The Precambrian rocks are deeply buried beneath unfossiliferous rock rubble;
- Extensive, deep bedrock excavations are unlikely to be involved in this sort of solar park project.

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

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

ALMOND, J.E. 2010. Prospecting application for iron ore and manganese between Sishen and Postmasburg, Northern Cape Province: farms Jenkins 562, Marokwa 672, Thaakwaneng 675, Driehoekspan 435, Doringpan 445 and Macarthy 559. Palaeontological impact assessment: desktop study, 20 pp. Natura Viva cc, Cape Town.

BEUKES, N.J. 1983. Palaeoenvironmental setting of iron formations in the depositional basin of the Transvaal Supergroup, South Africa. In: Trendall, A.F. & Morris, R.C. (Eds.) Iron-formation: facts and problems, 131-210. Elsevier, Amsterdam.

BEUKES, N.J. 1986. The Transvaal Sequence in Griqualand West. In: Anhaeusser, C.R. & Maske, S. (Eds.) Mineral deposits of Southern Africa, Volume 1, pp. 819-828. Geological Society of South Africa.

BEUKES, N.J. & KLEIN, C. 1990. Geochemistry and sedimentology of facies transition from the microbanded to granular iron-formation in the Early Proterozoic Transvaal Supergroup, South Africa. Precambrian Research 47, 99-139.

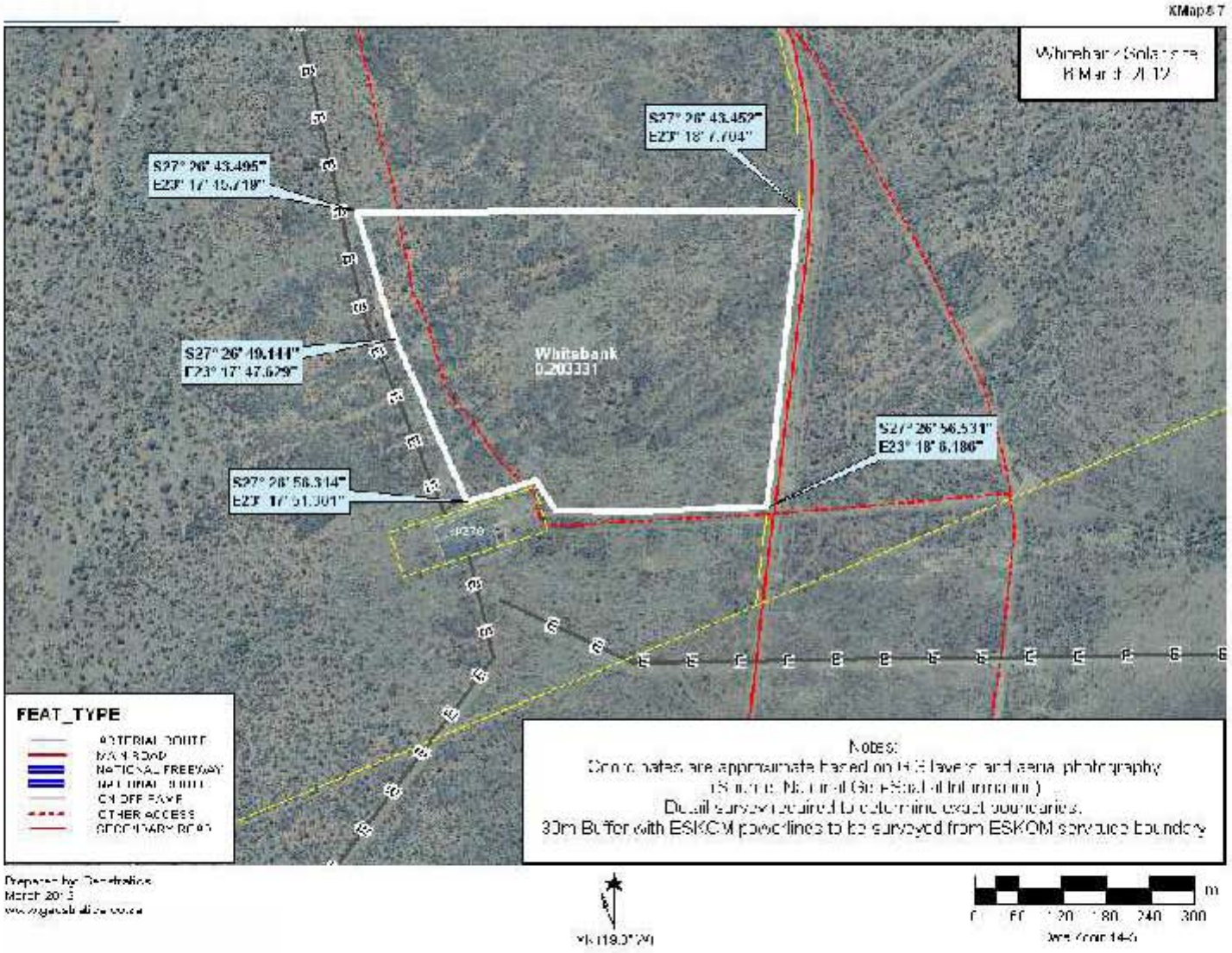
ERIKSSON, P.G., ALTERMANN, W. & HARTZER, F.J. 2006. The Transvaal Supergroup and its precursors. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 237-260. Geological Society of South Africa, Marshalltown.

KLEIN, C. & BEUKES, N.J. 1989. Geochemistry and sedimentology of a facies transition from limestone to iron formation deposition in the early Proterozoic Transvaal Supergroup, South Africa. Economic Geology 84, 1733-1774.

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

MOORE, J.M., TSIKOS, H. & POLTEAU, S. 2001. Deconstructing the Transvaal Supergroup, South Africa: implications for Palaeoproterozoic palaeoclimate models. African Earth Sciences 33, 437-444.

TANKARD, A.J., JACKSON, M.P.A., ERIKSSON, K.A., HOBDAY, D.K., HUNTER, D.R. & MINTER, W.E.L. 1982. Crustal evolution of southern Africa – 3.8 billion years of earth history, xv + 523pp. Springer Verlag, New York.


KMap 6.7
S27° 26' 43.452"
E23° 18' 7.704"
S27° 26' 43.495"
S27° 26' 49.444"
E23° 17' 47.629"
Whitebank
0_203331
S27° 26' 56.531"
E23° 18' 6.180"
S27° 26' 56.314"
FEAT_TYPE
NATIONAL FREEWAY
Notes:
Coordinates are approximate based on GIS layers and aerial photography
Detail survey required to determine exact boundaries.
30m Buffer with ESKOM powerlines to be surveyed from ESKOM servitude boundary
m
0
60
120
180
240
300

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