

# **Palaeontological Impact Assessment for three proposed Photovoltaic Solar facilities for Harmony Gold Mining Company, Odendaalsrus, Free State Province**

**Desktop Study**

**For  
Savannah Environmental (Pty) Ltd**

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## **Background**

The purpose of the proposed project is to generate electricity for exclusive use by the Harmony Gold Mining Company Ltd. BBEntropie (Pty) Ltd propose to develop and operate the PV plants for Harmony Gold. The facilities will supply power to the substations on the Mine's property located at the Tshepong Shaft, the Nyala Shaft and the Eland Shaft. The construction of the PV facilities aim to reduce the Harmony Gold Mining Company's dependency on direct supply from Eskom's National grid for operation activities, while simultaneously decreasing their carbon footprint.

SAHRA has requested a desktop Palaeontological Impact Assessment for the three sites:

1. Harmony Eland PV Solar Facility project entails the construction of a small-scale photovoltaic (PV) facility an associated infrastructure on the Farms Farm Rietpan RE/17, Tochgekregen RE/99 and Wesselia 101 near Odendaalsrus, Free State Province. Case Id: 7955; Fig 1.
2. Harmony Nyala PV Solar Facility project entails the construction of a small-scale photovoltaic (PV) facility and associated infrastructure on the Farms Rietpan RE/17 and Rheederpark 443 near Odendaalsrus, Free State Province. Case id: 7956; Fig 2.
3. Harmony Tshepong PV Solar Facility project entails the construction of a small-scale photovoltaic (PV) facility and associated infrastructure on the Farm Free State Geduld 448 near Odendaalsrus, Free State Province. Case Id: 7954; Fig 3.

Note: Figures 1, 2 and 3 represent the alternative site layouts. Where the yellow block is considered as the preferred site layout and the red block is considered as the alternative site layout.

## **Methods and Terms of Reference**

1. In order to determine the likelihood of fossils occurring in the affected area geological maps, literature, palaeontological databases and published and unpublished records must be consulted.
2. If fossils are likely to occur then a site visit must be made by a qualified palaeontologist to locate and assess the fossils and their importance.
3. Unique or rare fossils should either be collected (with the relevant SAHRA permit) and removed to a suitable storage and curation facility, for example a Museum or University palaeontology department or protected on site.
4. Common fossils can be sacrificed if they are of minimal or no scientific importance but a representative collection could be made if deemed necessary.

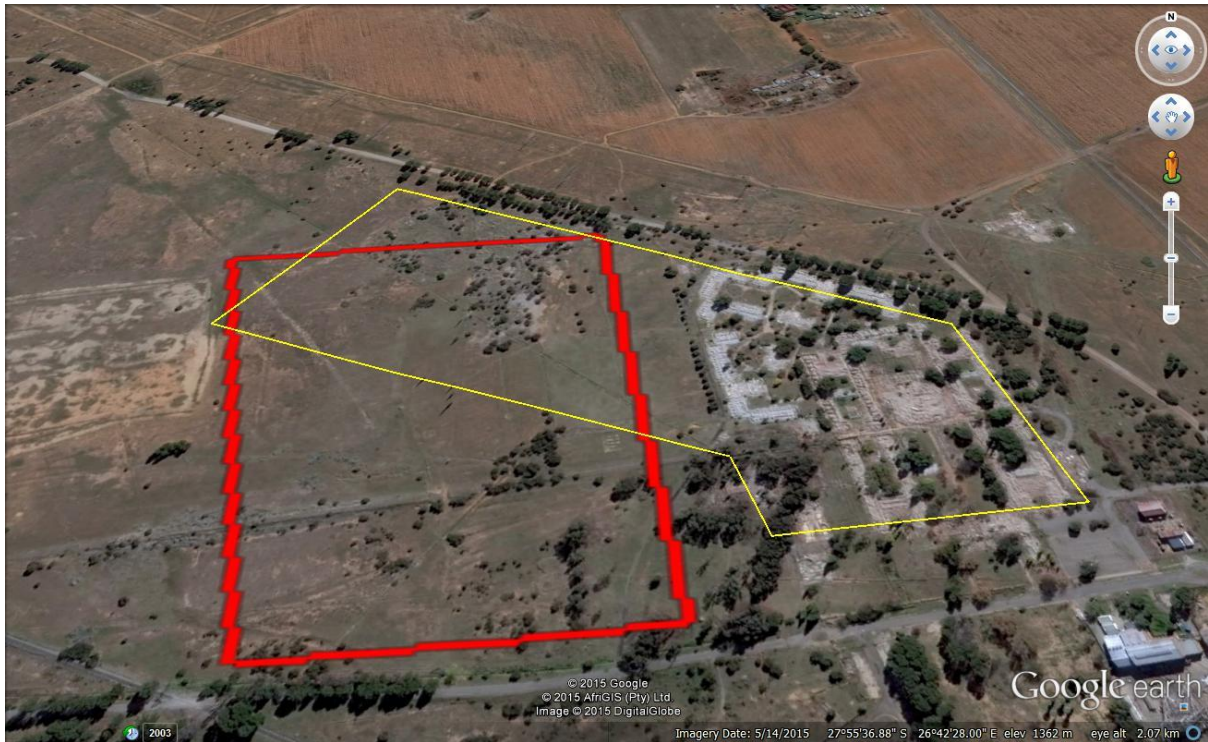


Figure 1: Google Earth map of the proposed Eland PV Solar facility. (Map supplied by Savannah Environmental (Pty) Ltd.



Figure 2: Google Earth map of the proposed Nyala PV Solar facility. (Map supplied by Savannah Environmental (Pty) Ltd.





Figure 3: Google Earth map of the proposed Tshepong PV Solar facility. (Map supplied by Savannah Environmental (Pty) Ltd.

The published geological and palaeontological literature, unpublished records and databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.

### **Geology and Palaeontology**

According to the geological map (Fig 4), the proposed sites for the PV solar facilities fall on rocks of the Permian Volksrust Formation which could contain coal deposits, and according to the SAHRIS palaeosensitivity map the area is coded green which means that a desktop study is recommended. More detailed information of the region in Snyman (1998) shows that Free State Coal Field, between the Vaal River in the north and Theunissen in the south contains a coal zone that is 25 to 50m thick. In the north the coal occurs 50-100m below the surface and in the south it occurs at 320-360m below the surface. At Odendaalsrus, therefore, the coal would be somewhere between 50 and 360m below the ground surface. The coals here are of poor quality and are no longer mined (Snyman, 1998). Coal is made of compressed and heat altered fossil plants and is of no palaeontological interest per se. However, good fossil plant material can occur in the shales and mudstones that occur within and between the coal seams (Cadle et al., 1993). There are no reports of fossils from this area in the published and unpublished (catalogues and field reports) of the Evolutionary Studies Institute,

University of the Witwatersrand. Fossil vertebrates do not occur in association with coal deposits.

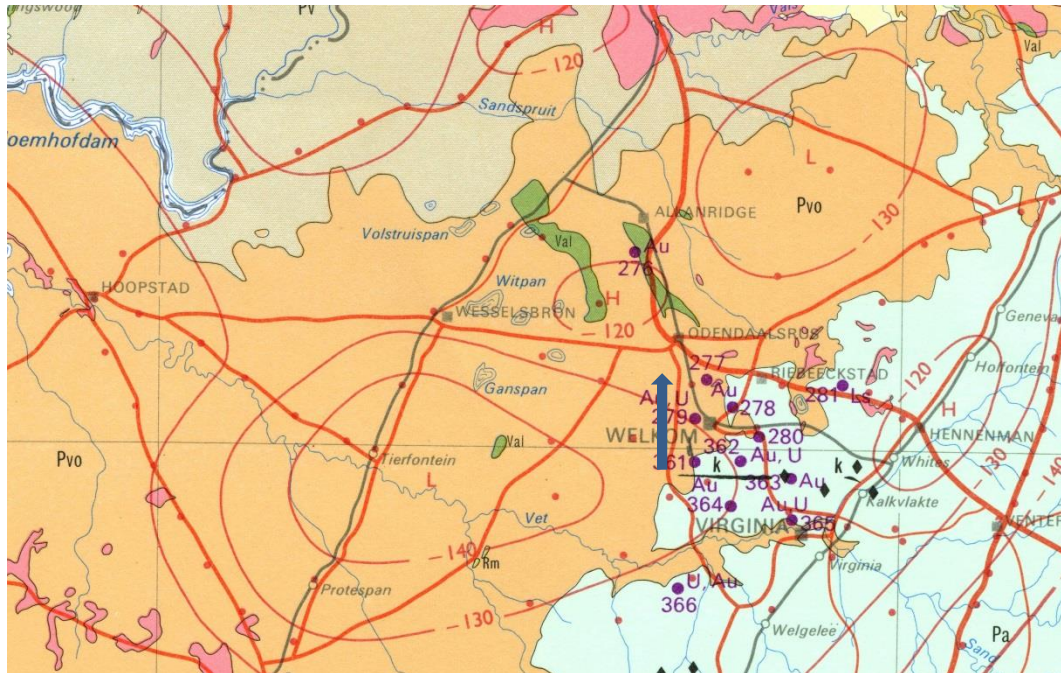


Figure 4. Geological map of the area around Odendaalsrus. The approximate location of the proposed PV Solar is indicated with the arrow; sites are just to the east and to the south of the town, in the orange area, Pvo. Abbreviations of the rock types are explained in Table 1. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Table 1: Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006; Johnson et al., 2006; Snyman, 1998).

Symbol	Group/Formation	Lithology	Approximate Age
Jd	Jurassic	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pvo	Volkstrust	shale	Middle Permian, Upper Ecca
Pv	Vryheid	Shales, sandstone, coal	Lower Permian, Middle Ecca,
Pa	Adelaide	Shales, sandstone, coal	Lower Permian, Lower Ecca
C-Pd	Dwyka	Tillite, sandstone, mudstone, shale	Upper Carboniferous to Lower Permian
Val	Allanridge subgroup	Dolomite, chert	Pretoria Group >2200Ma

## **Recommendation**

Since the poor quality coal deposits are well below the surface, and the proposed PV solar facilities will be on the ground surface, with foundations of a few meters depth only, the project will not impact on any palaeontological material.

If fossil plant material is discovered during the construction of the foundations, then it is strongly recommended that a professional palaeontologist be called to assess the importance and rescue them if necessary (with the relevant SAHRA permit).

As far as the palaeontology is concerned the proposed development can go ahead and no further palaeontological impact assessment is required.

## References

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