

**FIELD-WORK PALAEOLOGY REPORT:  
PALAEOLOGICAL IMPACT ASSESSMENT**

**PERSBERG DAM ON PERSBERG FARM (PORTION  
LINDE NO 4733). HELPMEKAAR, KWAZULU-NATAL**

**FOR**

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**REPORT STATUS: FINAL**

## **EXECUTIVE SUMMARY**

A palaeontological field assessment was conducted on 18 August, 2019 at the Persberg Dam site. This confirmed that the underlying geology is weathered Karoo Dolerite. Dolerite is an igneous intrusive rock and not fossiliferous. There is no palaeontological material on this site.

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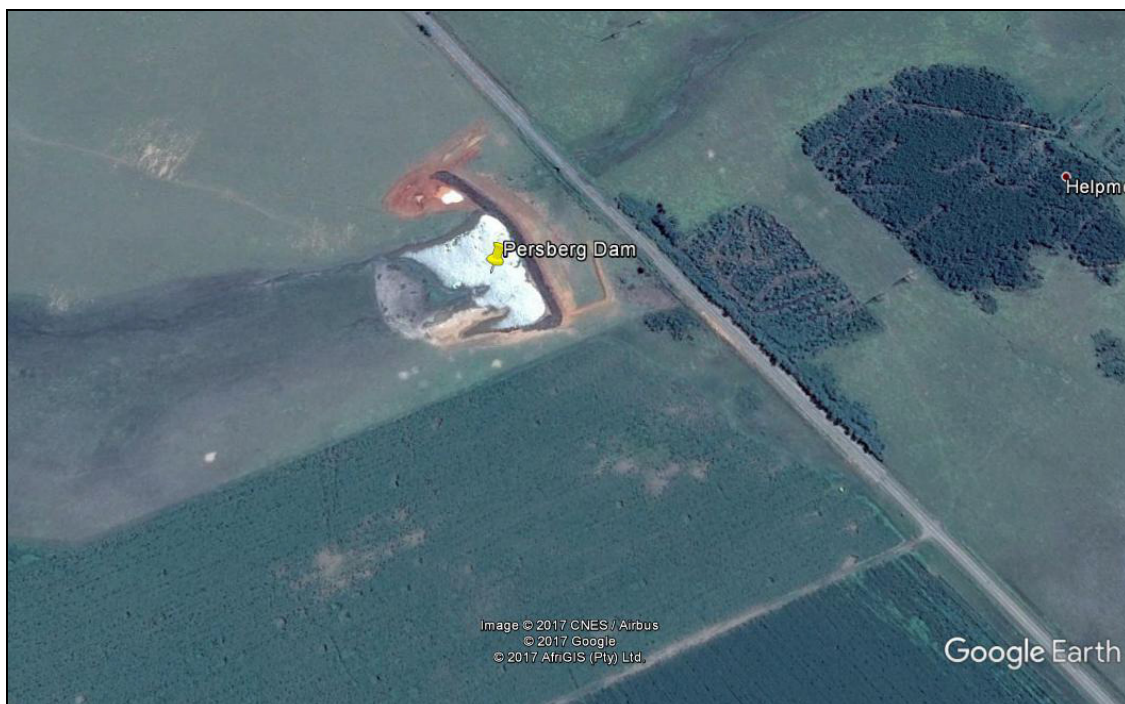
## 1. BACKGROUND AND PROPOSED PROJECT

Request was made by Afzelia Environmental consultants for an on-site field survey for potential palaeontological material at Persberg Dam, further to a request by SAHRIS based on the “very high” sensitivity rating of the area from their PalaeoSensitivity Map.

The Persberg Dam is situated within the Helpmekaar area, Msinga local municipality, within the Umzinyathi district municipality, KwaZulu-Natal (KZN). The closest town of Pomeroy is approximately 16 km south of the project site. Access to the site is via the R33.

The original dam was built by the Roads Department, Natal Provincial Administration (NPA) in 1960. The NPA had excavated a quarry to build the tar road and in exchange the NPA built a dam for the farmer. The original dam covered an area of 1.2 hectares with a dam wall height of 3.5 m. The capacity of the original dam was measured to be between 25 000 to 32 500 cubic metres of water.

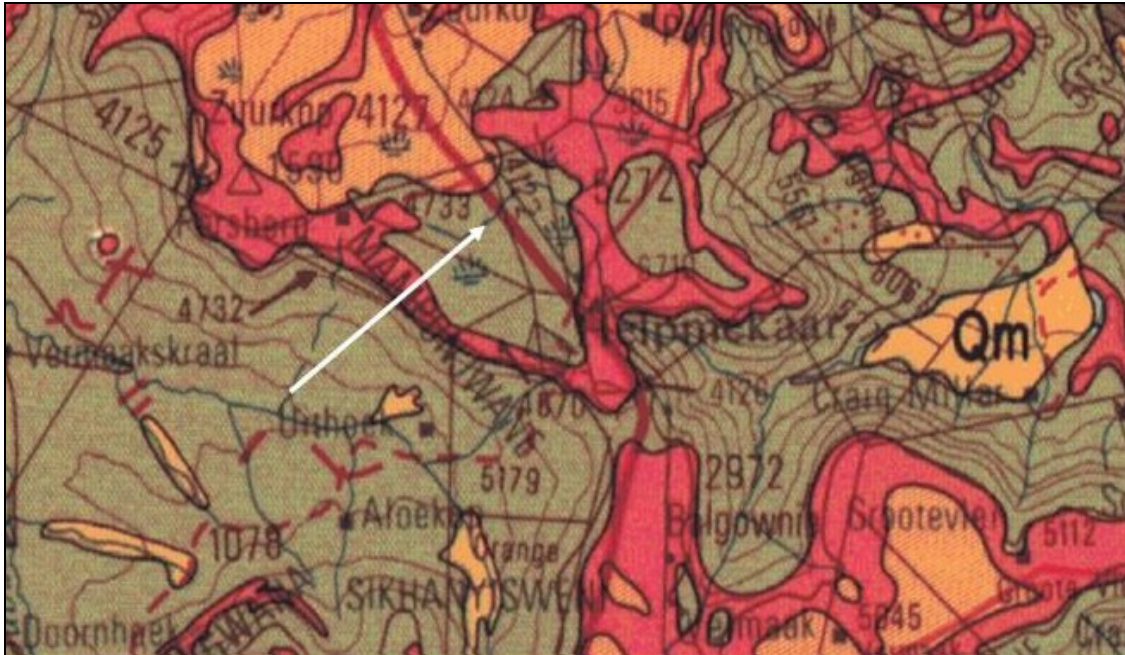
According to information supplied, the dam has been raised to a height of 8.5 m and covers an area of 8.4 hectares and is estimated to hold 152 000 m<sup>3</sup> (cubic meters) of water when full (Fig. 1). The dam was raised to increase the water holding capacity of the existing dam for planned irrigation purposes for the existing farm and adjacent farmers. It is therefore considered imperative that the raised dam will increase surety of irrigation water supply and increase the existing irrigation area.



**Figure 1: Location map of Persberg Dam (Image source Persberg Dam BIF & Google Earth).**

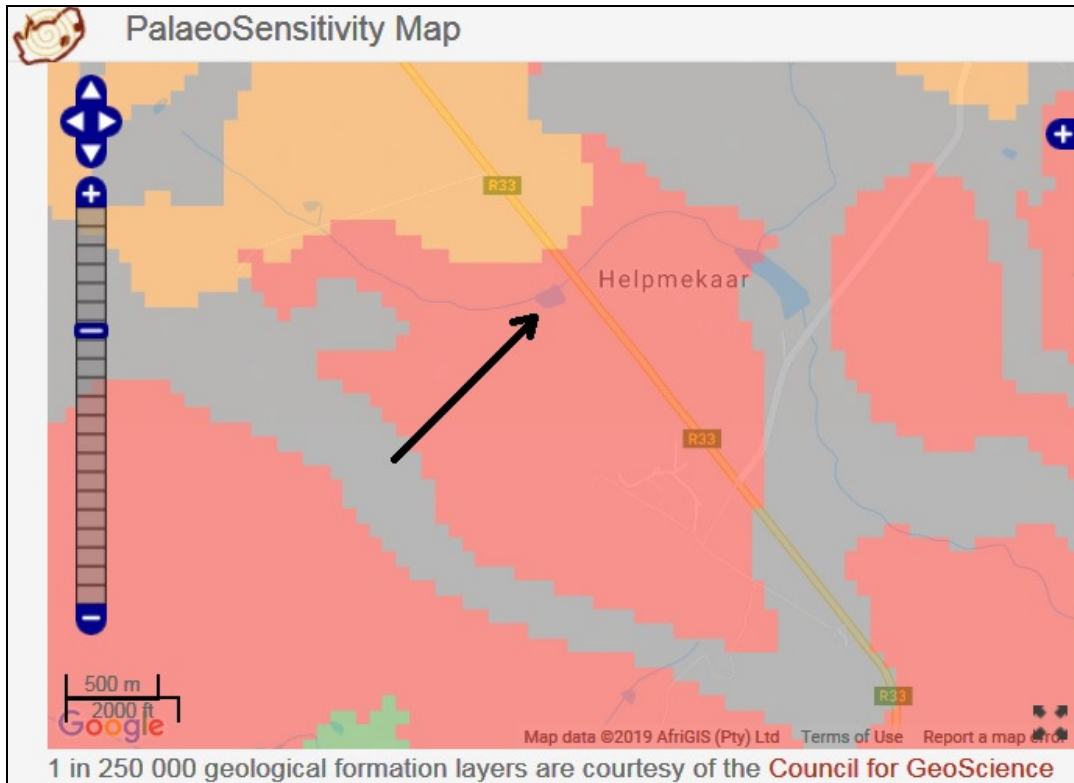
## 2. GEOLOGY

Perusal of the 2831Dundee 1: 250 000 geological map (Fig. 2) indicated that there should be Vryheid Formation sandstone at this locality.



*Figure 2: Extract from the Dundee 2830 1: 250 000 scale Geological Map. Red is dolerite, grey is Vryheid Formation, orange is Masotcheni Formation. The Persberg Dam location on Portion Linde No 4733 is indicated by the white arrow.*

The SAHRIS PalaeoSensitivity Map of the area (Fig. 3), which is based on the same SA Council for Geosciences 1:250 000 map, indicated a “very high” sensitivity rating (red), owing to the fact that the Vryheid Fm is identified on site, thus requiring a field assessment and protocol for finds. There is, as expected, good agreement between the SAHRIS map and geological map, on which the SAHRIS map is based.



*Figure 3: Extract from SAHRIS PalaeoSensitivity Map showing a zoomed-in section of the Persberg Dam area at Helpmekaar (<https://sahris.sahra.org.za/map/palaeo>). The Persberg Dam location is indicated by the black arrow. Areas shaded red are assigned a “very high” sensitivity rating (in this case due to the geological map indicating Vryheid Fm), orange is “high” (in this case Quaternary Masotcheni Fm), while grey is “insignificant/zero (in this case dolerite),*

### 3. RESULTS

Fieldwork was conducted on site on Sunday 18 August. Reasonably fresh Dolerite was located on the left side (according to water flow direction) of the Persberg Dam (Fig. 4). Elsewhere on the Persberg Dam site evidence of only highly weathered dolerite was observed (Fig. 5).



*Figure 4: Dolerite outcrop on the left (north) bank of Persberg Dam.*



*Figure 5: Very weathered dolerite exposed on the right (south) bank highwater slipway.*

Between the Persberg Dam wall and the R33 roadway the dolerite is so weathered that it has become clay. This material is almost black, indicating a high water table (Fig. 6).



*Figure 6: Downstream of the dam wall and upstream of the R33 roadway. This is highly weathered dolerite which has become mud.*

The Persberg Dam is located within Karoo Dolerite and not Vryheid Formation sandstone, as indicated on the Dundee 2830 geological map. This Dolerite is part of an intrusive Jurassic sill which was emplaced 184 million years ago (Hastie et al, 2014).

#### **4. PALAEOLOGY**

The Karoo Dolerite is an igneous intrusive rock and by definition cannot be fossiliferous. There is thus no palaeontological material on the Persberg Dam site.

## 5. CONCLUSIONS & RECOMMENDATIONS

The Persberg dam is constructed on Dolerite. Dolerite is an igneous intrusive rock and is not fossiliferous; thus there is no palaeontological material on this site.

It is recommended that the Council for Geosciences and SAHRIS update their map accordingly for this area. Observations of this area and surrounds and perusal of the corresponding geological mapping suggests that there are potentially more geological mapping errors in this area that require ground truthing, verification and rectification.

## 6. REFERENCES

Dundee2830 1: 250 000 Geological Map, Council for Geosciences, Pretoria.

Hastie, WW; Watkeys, MK; Aubourg, C (2014). Magma flow in dyke swarms of the Karoo LIP: Implications for the mantle plume hypothesis. *Gondwana Research* 25 (2014) 736–755.

<https://sahris.sahra.org.za/map/palaeo>

## 7. DETAILS OF SPECIALIST

### Dr Alan Smith

Private Consultant: *Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban, 4091*

&

Honorary Research Fellow: *Discipline of Geology, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Durban.*

**Role:** Specialist Palaeontological Report production

### **Expertise of the specialist:**

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).



- Alan has published in both national and international, peer-reviewed journals. He has published more than 50 journal articles with 360 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhekuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropro.
- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.
- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Rooilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.