

Palaeontological Assessment proposed Project on Drennan (3225BC Mortimer)

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Archaeozoology, Stone Age Archaeology and Quaternary Palaeontology

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Executive Summary

Graham Avery was commissioned by Tim Hart, ACO-Associates cc on behalf of their client to conduct a field and desk top survey of the palaeontological potential of the proposed Drennan Project (herein referred to as the Drennan Site).

Applicant: ACO-Associates cc on behalf of their client
Proposed activity: Development of Wind Farm
Location: 32°26'41.42" S; 25°43' 54.89" E (centre point)

The proposed site is located in a palaeontologically-sensitive region with a hard rock base of the potentially fossiliferous Permian (circa 250 Ma (million years old) Balfour Formation and more recent (circa 20 Ma to the present) alluvial sediments, which may also contain fossil and sub-fossil remains. Any excavation for foundations and/or infrastructure that penetrates into underlying older rocks or sediments may encounter fossils. Fossil finds would be significant and would require careful recording and possible systematic excavation. Excavations into sediments not normally accessible to palaeontologists should be seen as providing opportunities to recover potentially-important fossil material that enable observations to be made about our past biodiversity and environments.

Collaboration between the contractor and a suitably-qualified palaeontologist will be required prior to and during construction excavations so that palaeontological information and/or material can be recorded. Mitigation may extend beyond monitoring if warranted.

Provided that the recommendations of this assessment are complied with, there is no palaeontological reason why the proposed development should not proceed.

Location of the Proposed Sites

The proposed area falls on 1:50 000 topographical map 3225BC Mortimer, 32°26'41.42" S; 25°43' 54.89" E (centre point). Detail is shown on Figures 1, 2.

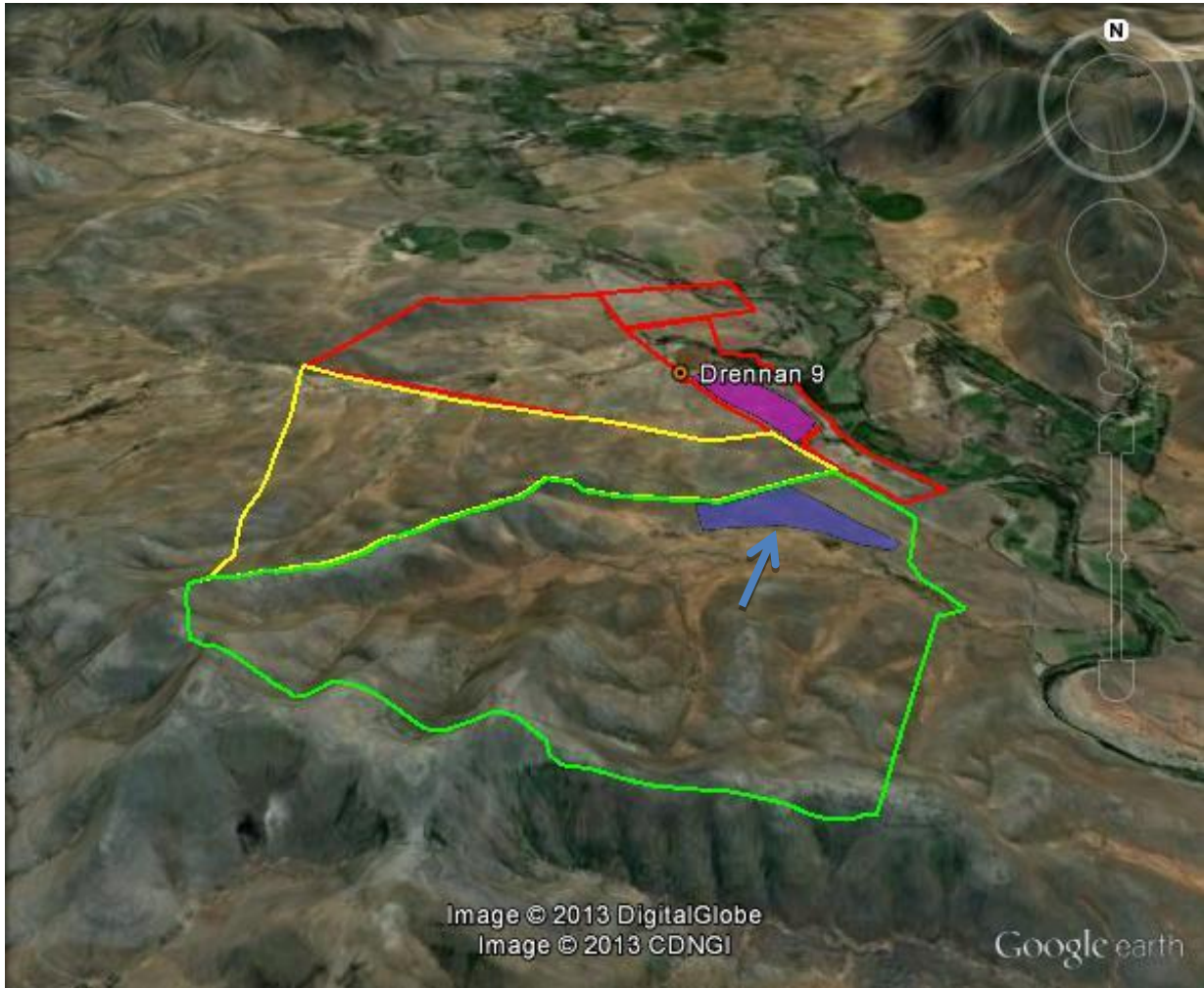


Figure 1. Google earth view showing the outlines of alternative options. The blue area (arrowed) is the subject of this study.

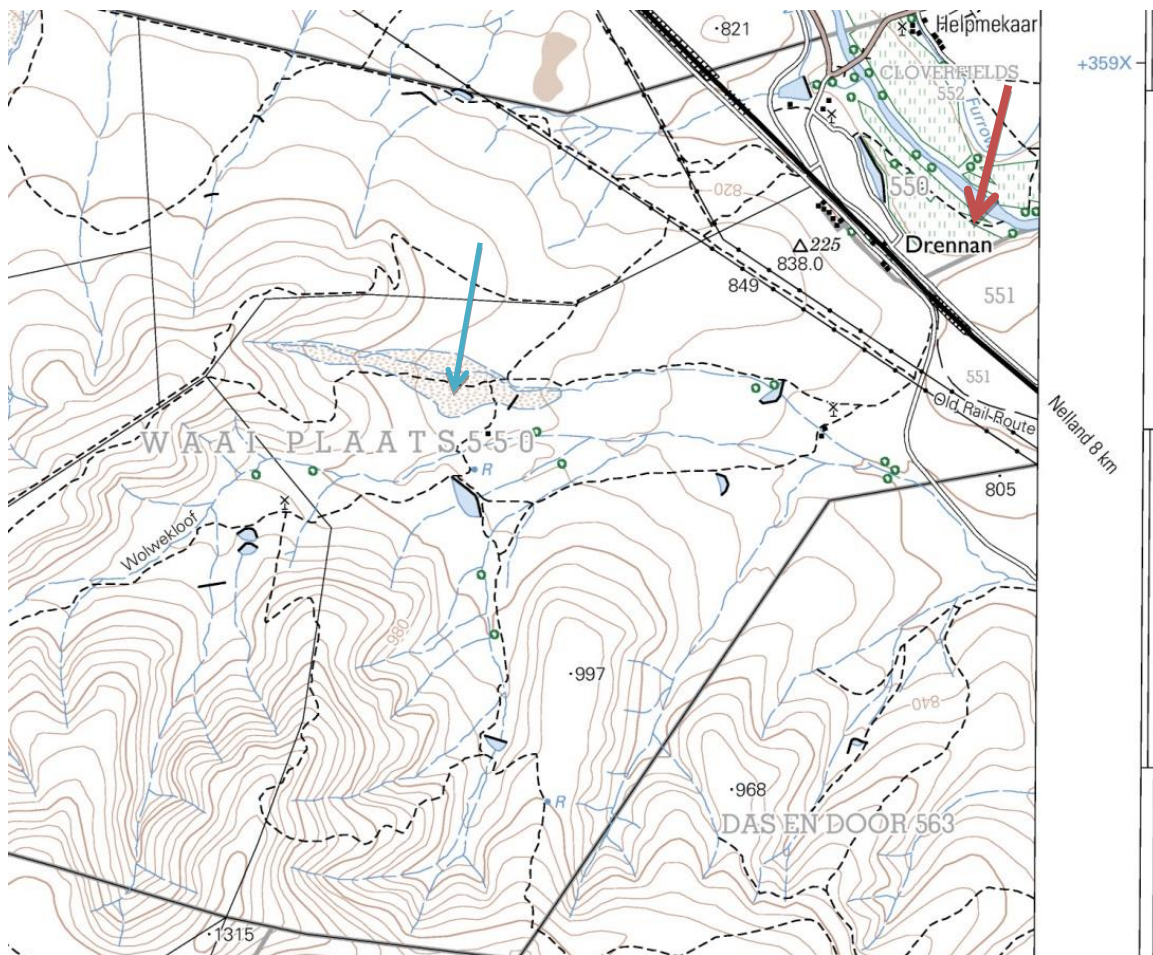


Figure 2. Location of Drennan (red arrow) and proposed site area (blue arrow).

Method

As requested, a desk top study of the proposed Drennan site area was conducted by Dr G. Avery Archaeozoologist (Figures 1, 2). The 1:250 00 Geological Series 3318 Cape Town map was consulted for background information (Figure 3).

The focus here has been to illustrate the potential of sub-surface sediments through the geological context and observations in the general vicinity.

Results of the Study

Geology and lithology

The geology of the area is shown on Figure 3, which describes the ancient hard rocks of the Karoo Group Balfour Formation (250 Ma (million years old) and more recent alluvial sediments of Late Tertiary Neogene Period (Miocene, Pliocene Epochs (20 to 2.6 Ma) to Quaternary Period (Pleistocene to Holocene Epochs (2.6 Ma to Present).

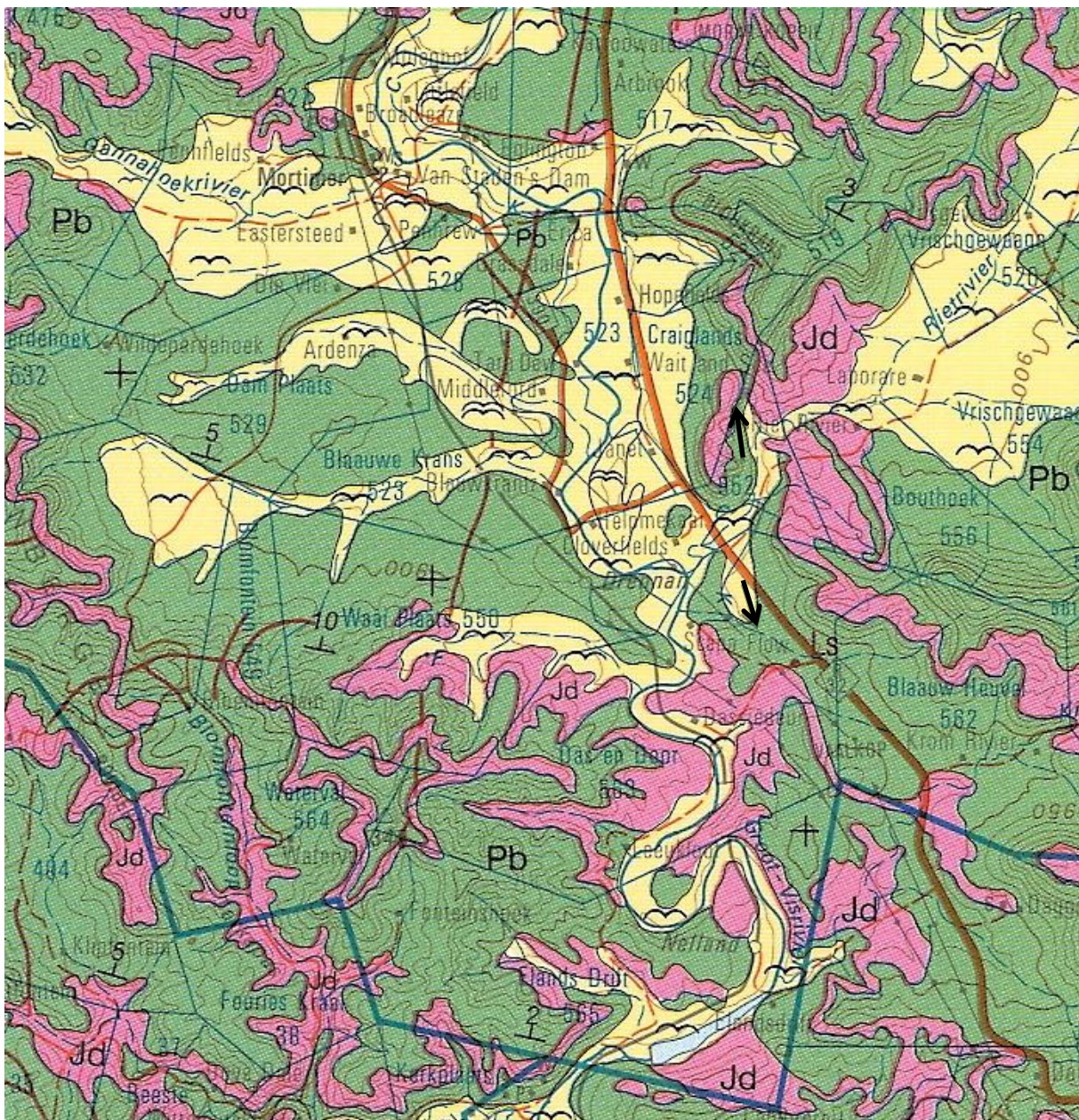


Figure 3. Surface geology excerpted from 1:250 000 Geological Series 3224 Graaf Reinet. The approximate location of the Site is arrowed. Pb (mudstone, greenish, grey, red in places; sandstone, occasional thin cherty bands = fossiliferous Balfour Formation of the Adelaide Subgroup, Permian/Triassic Epoch Beaufort Group of the Karoo Supergroup; Jd (dolerite) = later, non-fossiliferous intrusions during the Jurassic Epoch; Yellow areas are Late Tertiary to Quaternary alluvium, which is potentially fossiliferous.

Description of proposed site

The Drennan study area is generally flat, with a grass-and scattered small bush-covered rocky surface (Figures 4-6).



Figure 4. Example of the landscape on the proposed Drennan Site (Photo: T. Hart).



Figure 5. View from the proposed Drennan Site towards the Great Fish River Valley (Photo: T. Hart).



Figure 6. Close up view of the rocky surface of the proposed Drennan Site (Photo: T. Hart).

Palaeontological Potential

The Drennan Site is situated in a palaeontologically sensitive and important area of the ancient Karoo Basin (Johnson, et al. 2009; Rubidge, et al. 1995; Smith 1990).

“The Karoo Supergroup covers almost two thirds of the present land surface of southern Africa. Its strata record an almost continuous sequence of continental sedimentation that began in the Permo-Carboniferous (280 Ma) and terminated in the early Jurassic 100 million years later. The glacio-marine to terrestrial sequences accumulated in a variety of tectonically controlled depositories under progressively more arid climatic conditions. Numerous vertebrate fossils are preserved in these rocks, including fish, amphibians, primitive aquatic reptiles, primitive land reptiles, more advanced mammal-like reptiles, dinosaurs and even the earliest mammals” (Smith 1990).

Fossilized plant remains are common in parts. Iziko South African Museum’s Karoo Palaeontology section holds Balfour and Katberg Formation vertebrate and plant fossils from the Cradock area in its collection (S. Kaal, Iziko Museums of South Africa, pers. comm.).

Thus, excavations into sediments not normally accessible to palaeontologists should be seen as providing opportunities to recover potentially-important fossil material that enable observations otherwise impossible to be made.

No reference to surface palaeontological material specifically on the Drennan Site was found, although fossils have been recorded in the Cradock area. Since the proposed Drennan Site has been disturbed, the surface potential of the proposed Drennan site may be minimal, although it is not possible to exclude the possibility that fossils do occur there. It is possible that fossils or sub-fossils of interest could be encountered during any excavation that cuts into underlying older hard rock and alluvial sediments.

In addition to the potential within the Balfour Formation rocks, small pockets of bone can occur, for instance, where bone accumulators like hyaenas, Jackals or porcupines used holes/burrows dug by aardvarks; older and younger younger sediments, too, may contain ancient wetland deposits and/or more-recent fossils. In addition to fossil bones and molluscs, there is the potential for encountering macro-plant remains and pollens of considerable age in wetland deposits. Thus, foundations excavated into rocks and sediments on the Drennan Site may intersect fossil-bearing deposits. If so, there is the potential to provide opportunities for observations not otherwise accessible to researchers.

Such probabilities could be better assessed if location of units and geotechnical information and details of the depth to which any excavations will extend, were available. They would greatly assist in assessing estimating whether and where monitoring may be necessary during construction.

Comments

Based on its geology and regional finds in Iziko Museums of South Africa, the Drennan site has palaeontological potential. However, with limited information available on the recorded occurrence of fossils on the proposed site, good communication with contractors and on-site monitoring during excavations will be required to minimise any potential loss.

More systematic mitigation may be required if the context of any fossil material encountered warrants more than just recording and collection.

Conclusion

While no direct fossil evidence was found for the Drennan site, this does not mean that potential is lacking. Excavations into sediments not normally accessible to palaeontologists should be seen as providing opportunities to recover potentially-important fossil material that enables observations to be made on geology, past sea levels, climates, environments and biodiversity, that would otherwise be impossible.

Palaeontological remains are often rare and, if encountered, must be recorded by an appropriately qualified person. As examples of potential, the richness of the globally important Langebaanweg (West Coast Fossil Park) fossil landscape (Hendey 1981) and the Swartklip hyaena accumulation (Klein 1975) and their important contributions to knowledge should not be lost sight of. It is further noted that a valley, to the west of the Drennan site, is named "Wolvekloof", which is suggestive of the historic (at least) presence of hyaenas and the potential that their bone accumulations might be found in the area.

Given the palaeontological potential of the area, mitigationary action, beyond simple recording and recovery during monitoring, including the possibility of systematic excavations, may be necessary.

Provided that the recommendations in this report are followed, current information indicates that the proposed development will not impact significantly on palaeontological remains. Appropriately conducted the development may provide opportunities to access rare fossil material and to better understand the local geological sequence.

Provided that the recommendations herein are adhered to the proposed development can be allowed to proceed from the palaeontological perspective.

Recommendations

Bulk earth works and excavation for foundations/infrastructure should be monitored by a palaeontologist. The frequency of this to be worked out *a priori* with the contractor to minimize time spent on site.

If possible, geotechnical information together with the proposed locations and depths of excavations for foundations and/or infrastructure should be provided prior to the commencement of construction. This may enable a better estimation of the time(s) when monitoring would be necessary.

Protocols for dealing with palaeontological/palynological (fossil pollens) monitoring and possible further mitigation must be included in the Environmental Management Plan (EMP).

Any material recovered will be lodged in the collections of Iziko South African Museum.

Funds must be available *a priori* to cover costs.

Heritage Permits Required

The primary heritage legislation that needs to be considered is The South African Heritage Resources Act 25 of 1999 and regulations (details at www.sahra.org.za). All heritage material, including human burials, is included.

Clearance in terms of the National Heritage Act of 1999 will be required before the development can proceed. Locally, a permit will be required from Heritage Western Cape; in the event of a burial being exposed; potential delays could be minimized by obtaining this before construction is initiated. If human remains are encountered, the South African Heritage resources Agency (SAHRA) must also be contacted, but no bones may be further moved until an archaeologist or palaeontologist has assessed them and permission of SAHRA is granted. SAHRA must be contacted immediately through the appointed palaeontologist or archaeologist and laid down procedures, including notification of the SAPS, must be followed.

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