## U. SHORES

### Field Note U8a. Arniston shores – Geology - Overview

**Cross-bedded Waenhuiskrans Formation cliff capped with calcrete in Arniston.**



 

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## Field Note U8a. Arniston shores – Geology – Overview

Four geological formations underlie the Arniston area. They are (from old to young): the Rietvlei Formation (of the Table Mountain Group) and the upper three formations of the Bredasdorp Group – Klein Brak, Waenhuiskrans and Strandveld. See Chapter C. The calcrete capping of the Waenhuikrans Formation and the myriads of boulders and pebbles along the shores are inseparable parts of the local geology.

The three existing geological maps of the area (JA Malan, 1984; MAG Andreoli, 1989, both in 1;50,000 scale and the Riversdale sheet by the Geological Survey, 1993, in 1:250,000 scale) are inaccurate and misleading.

This Field Note is a brief description of these Formations and their related features. For ease of reference, a map of Arniston shores is given below (Figure 1).

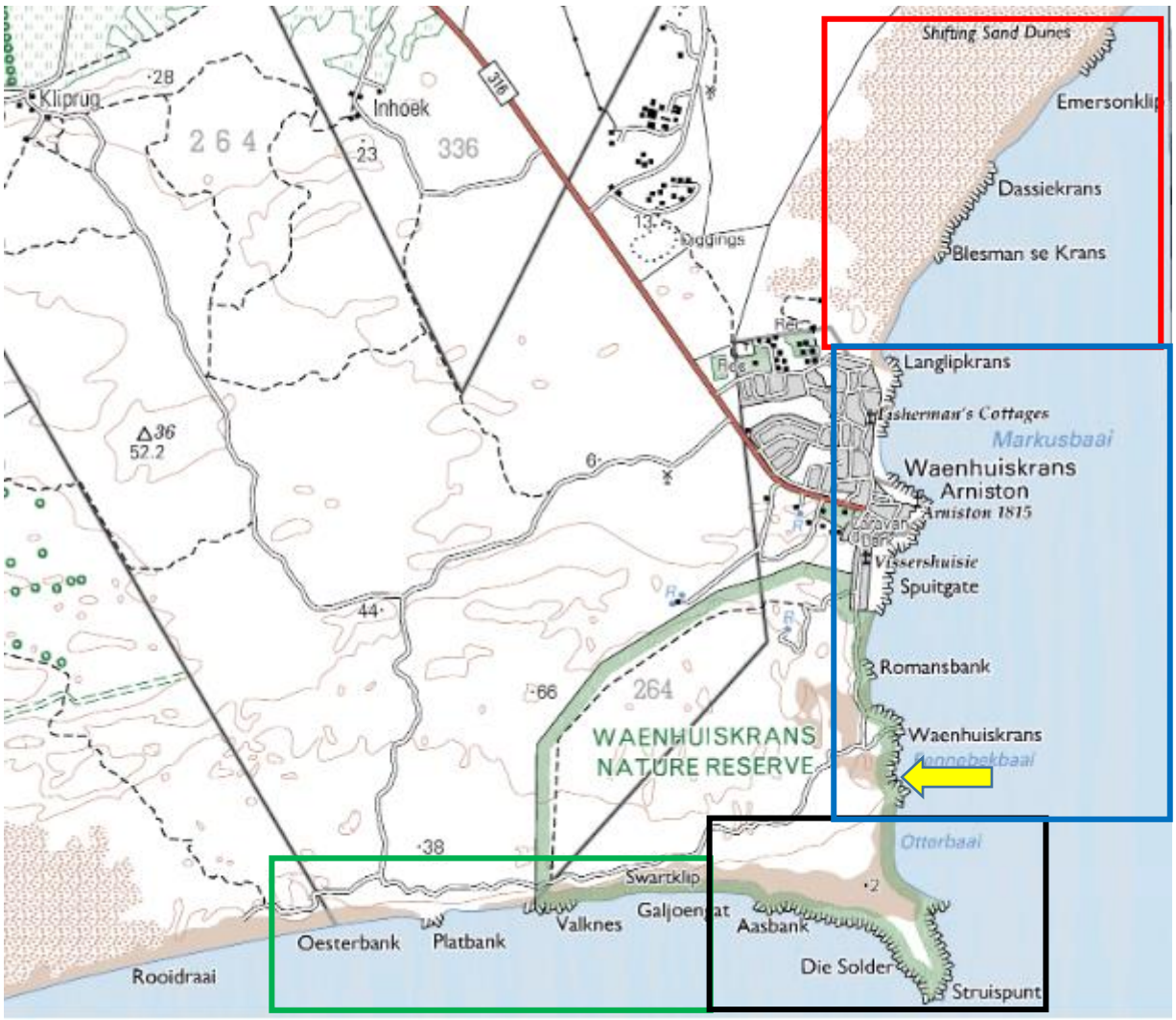


**Figure 1. Topography map of Arniston shores. Boxes: green – South Shore; black – Struis Point; blue - East Shore; red – North Shore. Yellow arrow points to the location of the Waenhuiskrans Cave.**



 

***Rietvlei Formation***

This formation, of the Devon age, is composed of light-grey feldspathic sandstone with occasional thin siltstone and shale beds. The Rietvlei Formation in the Arniston area crops out in Struis Point (Figure 2).

**Figure 2. Struis Point rocks (top) extends about 1 km to the west (bottom).**



 

***Klein Brak Formation***

The Klein Brak Formation, of late Pleistocene age, was deposited on a wave-cut terrace. It underlies the Waenhuikrans Formation and consists of different lithologies: conglomerate, sand, sandstone, limestone, siltstone and peat. This Formation has never been subdivided into members

On Arniston shores the Klein Brak sediments situated in the intertidal zone and comprise most of the abrasion table strip. They have many different compositions and appearances, along the East and North Shores (Figure 3). The presence of this formation was mentioned by J Malan in his MSC Thesis (1990), but it was never investigated or mapped around Arniston. Also, the presence of certain boulders, not seen along other shores, and which have never been reported, add to the many unknowns of the Arniston shores.


**Figure 3. Satellite image of the East and North Shores (in the yellow box).**



 

Some of the many different habits of this formation are shown below (Figures 4 to 13).

**Figure 4. Various habits: nearly horizontal surface: top - cross bedded; bottom – fluted.**



 

**Figure 5. Various habits: top – white, smooth, nearly flat with no marine growth; bottom – white, smooth, low relief with marine growth.**



 

**Figure 6. Various habits: top and bottom – rugged.**



 

**Figure 7. Various habits: top and bottom – layered sandstone with shells.**



 

**Figure 8. Various habits: top and bottom – sandstone slabs, without shells, only observed on the North Shore.**



 

**Figure 9. Various habits: top and bottom – conglomerate.**



 

**Figure 10. Various habits: top and bottom – conglomerate deposited on the white rocks.**



 

**Figure 11. Various habits: top and bottom – abraded conglomerate underlie the thinly-laminated Waenhuiskrans Formation rocks, only observed in the north part of the East Shore.**



 

Two types of loose, small, flat boulders, which have not been originated from the Rietvlei or the Waenhuiskrans Formations, and which could be the disintegration products of the Klein Brak Formation, are confined to certain sections of Arniston shores (Figure 12).

**Figure 12. Various habits: flat boulders. Top – white, of sandstone; light brown, of siltstone.**



 

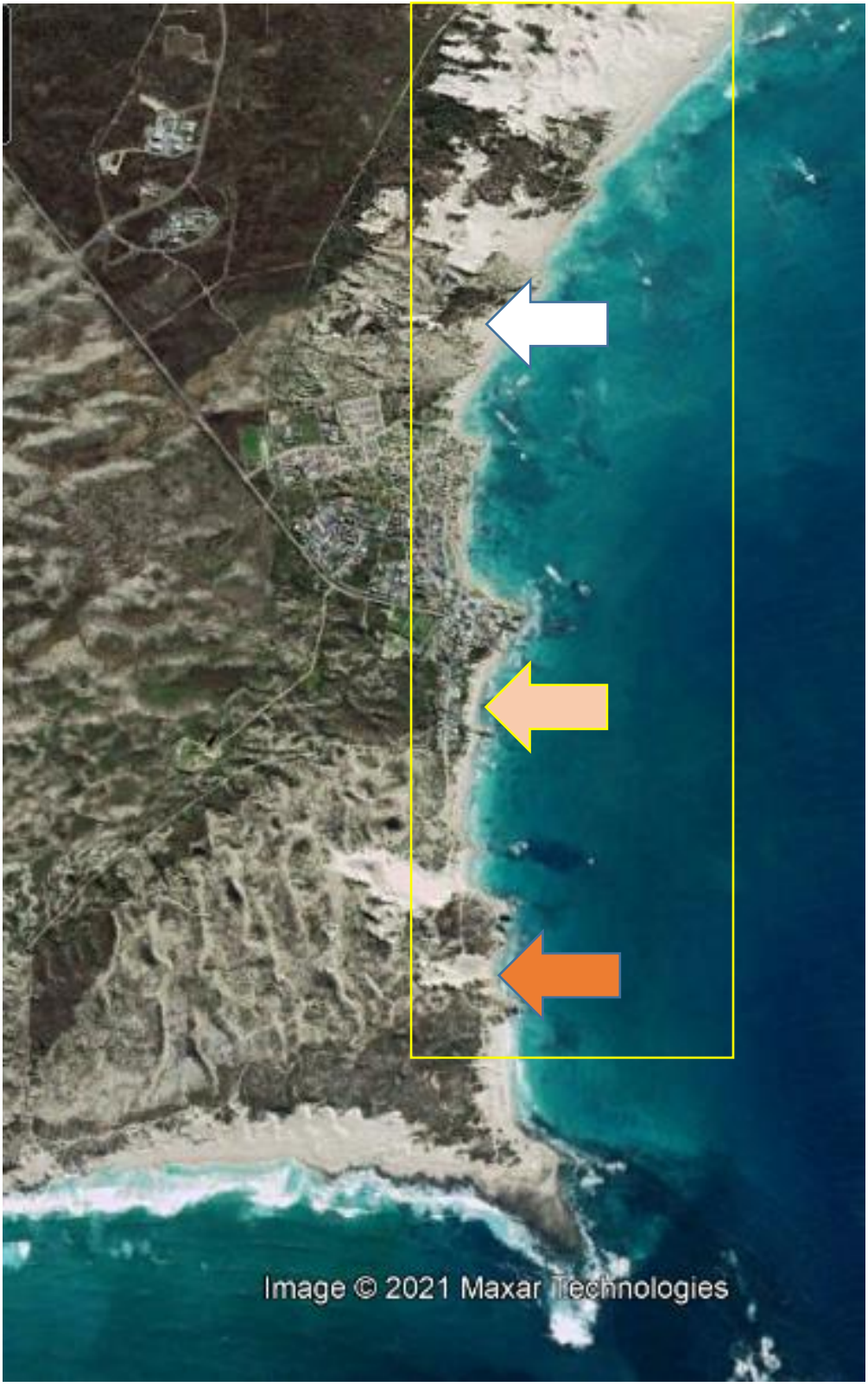


**Figure 13. Satellite image of the East and North Shores (in the yellow box), showing the locations of sandstone slabs (white arrow) and siltstone slabs (brown arrow). The red arrow shows the location of red boulders (see below).**



Until geotechnical, geochemical and palaeontological research takes place, the question marks about this formation in Arniston will not be lifted.

 

***Boulders and pebbles***

Boulders and pebbles along the Arniston shores originated from the Rietvlei Formation in Struis Point (Figures 14 and 15).

**Figure 14. Sandstone boulders and pebbles of the Rietvlei Formation near Struis Point. Top – on the north side. Bottom – on the west side, partly covered with sand.**



 

The size of the boulders and the pebbles decreases with distance from Struis Point (Figure 15).

**Figure 15. Top and bottom – sandstone boulders and pebbles of the Rietvlei Formation along the East Shore.**



 

Loose, large and small red boulders (the origin of which is still to be studied) are only present near the Waenhuiskrans Cave (Figure 16).

**Figure 16. Top and bottom – red boulders near the Waenhuikrans Cave on the East Shore. Klein Brak conglomerates are also present. See Figure for location.**



 

***Waenhuiskrans Formation***

The outcrops of this formation form a nearly continuous strip which follows the current shoreline. They are well cemented and show very little pertrographic or mineralogical variations. The formation, which comprises calcified aeolianites of late Pleistocene age, overlies the Klein Brak Formation.

JA Malan described the Waenhuiskrans Formation in his MSc Thesis. One of the stratotype points was next to the Waenhuiskrans Cave (Figure 17).

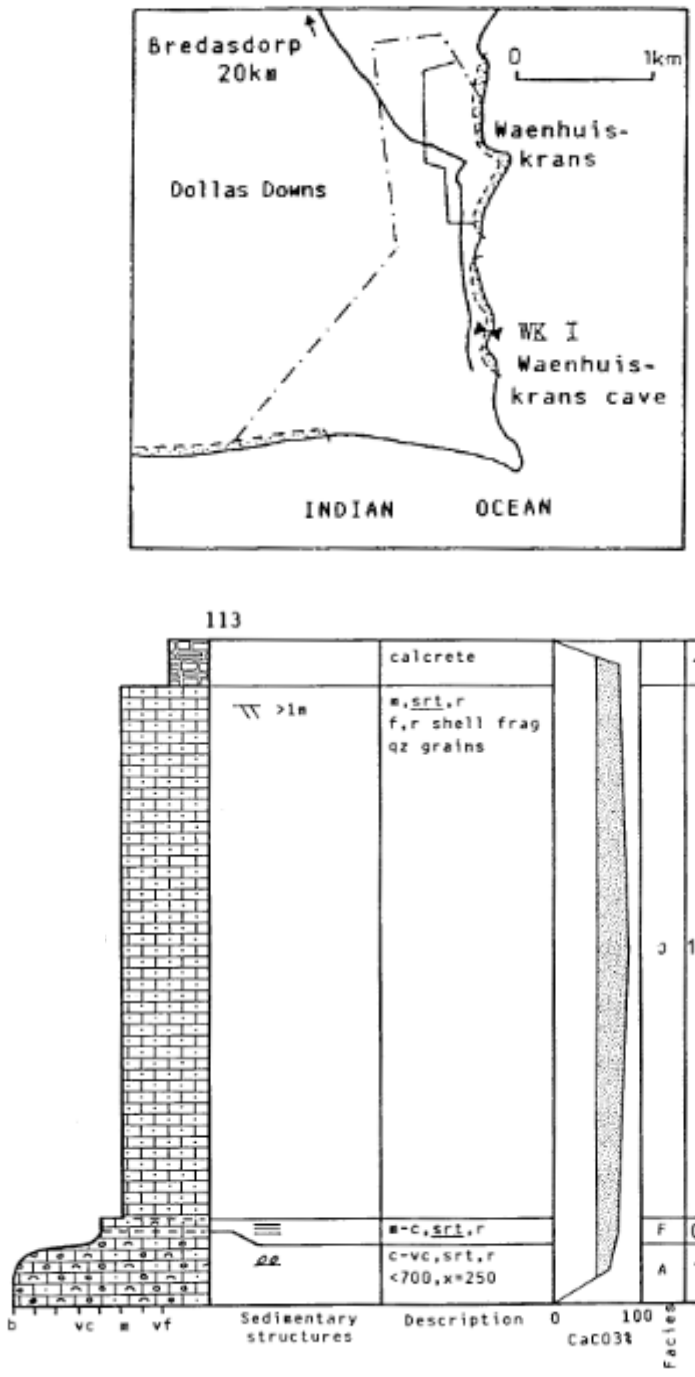


**Figure 17. Description of the Waenhuiskrans Formation by JA Malan, 1990. Top – location of profile; bottom – stratigraphy.**



 

The aeolian nature of the Waenhuiskrans Formation is displayed by crossbedding (Figure 18).

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**Figure 18. Top and bottom: crossbedding in the Waenhuiskrans Formation.**



 

In places, the Waenhuiskrans rocks does not show crossbedding (Figure 19).

**Figure 19. Top and bottom – 'flame-like', Waenhuiskrans rocks, exhibiting no crossbedding.**



 

***Calcrete crust***

Calcrete, over 1.5 m thick in places, covers the Waenhuiskrans Formation (Figures 20 to 22).

**Figure 20. Top and bottom - Calcrete crust caps the Waenhuiskrans rocks on the South Shore.**



 

**Figure 21. Top and bottom - Calcrete crust on the Waenhuiskrans Formation rocks on the East Shore.**



 

**Figure 22. Top and bottom - Calcrete crust on the Waenhuiskrans Formation rocks on the North Shore.**



 

***Strandveld Formation***

Sand of this formation, the youngest (Holocene age) of the formations in the Study Area, was deposited on the calcrete crust (Figures 23 and 24).

**Figure 23. Top and bottom – sand dunes partially cover the Waenhuiskrans rocks.**



 


**Figure 24. Satellite image, showing shifting dunes (white) cover the calcrete crust (brown patches) which caps the Waenhuiskrans rocks. The North Shore.**



 