

N. DE HOOP VLEI GORGE

Field note N3. Geology

The De Hoop Vlei Gorge is situated in the middle of the Study Area. It contains the De Hoop Vlei, which has no outlet to the sea, from which it is separated by a ~2.5 km wide field of shifting dunes (Figure 1).



Figure 1. Satellite image of the De Hoop Vlei area. Arrow points to sand dunes.

Similarly to the Salt River Gorge, the De Hoop Vlei Gorge cuts into most of the geological formations, which are present in the Study Area: from the basement rocks of the Bokkeveld and Enon Formations, to the two lower formations of the Bredasdorp Group – the De Hoop Vlei and the Wankoe Formations.

The geology of the gorges has been studied by J Malan as part of his MSc Thesis (1990). Other sources of information are his geology field sheet at 1:50,000 (1984), and the 1:250,000 Riversdale geology sheet (1993).

This field note describes the formations, which are present around the De Hoop Vlei Gorge, from old to young.

The oldest formations around the gorge are the Bokkeveld and the Enon Formations (see Chapters C and M). They outcrop in the northern section of the gorge (Figures 2 to 6).

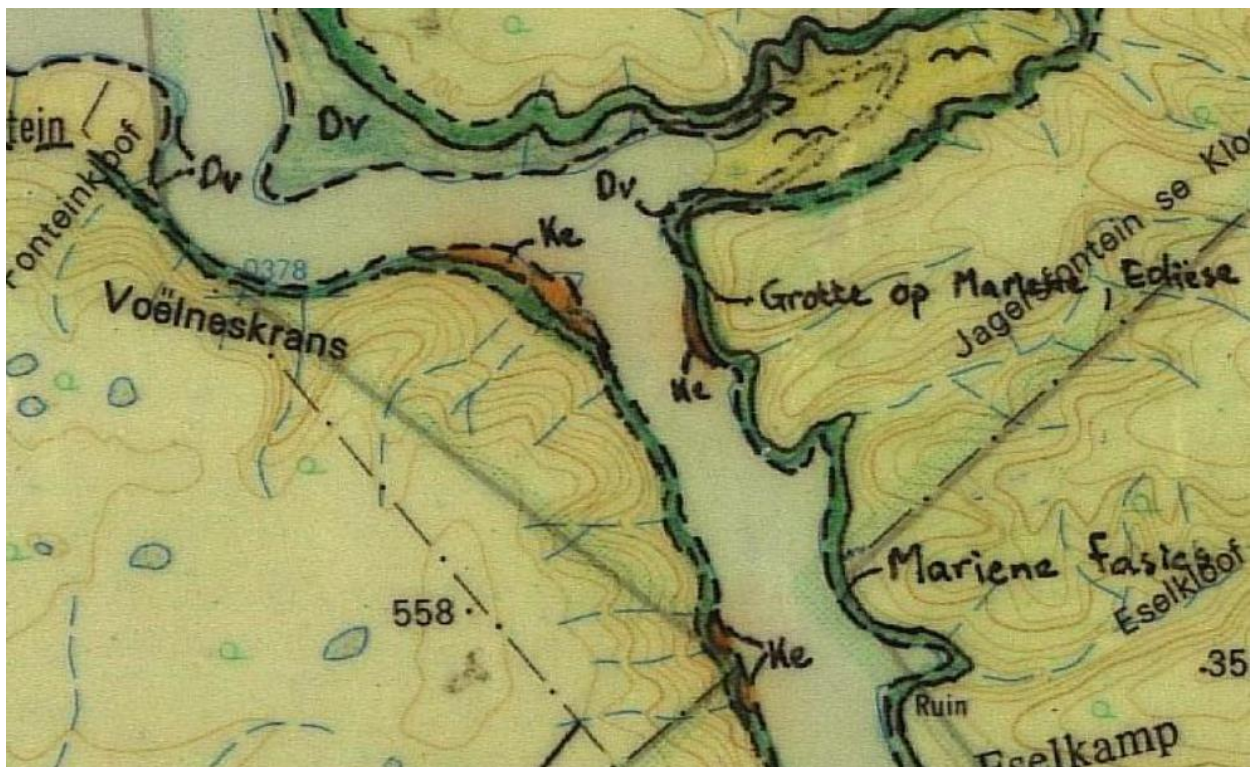
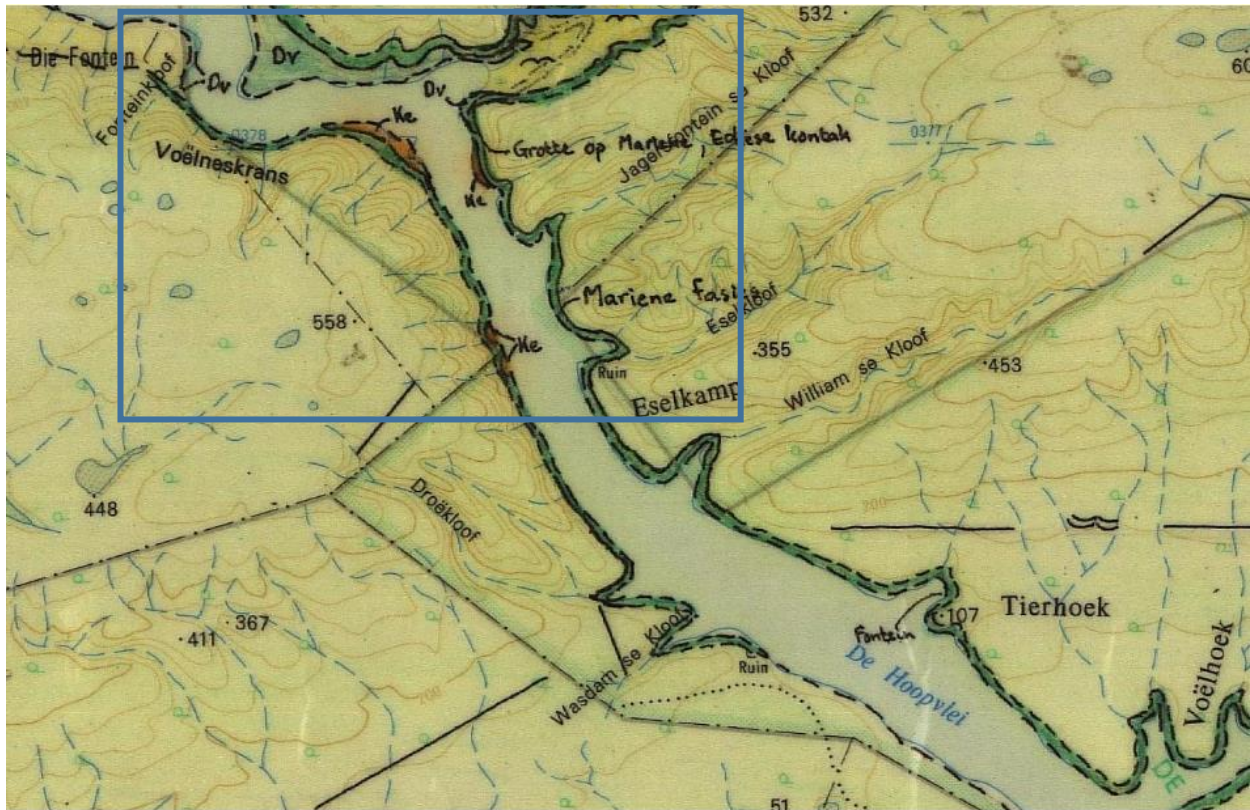


Figure 2. Top - geology field sheet of the northern part of the gorge; bottom – enlargement of the boxed area. Formations: red – Enon Fm; light green – Bokkeveld (Voorstehoek Fm); dark green – De Hoop Vlei Fm; light yellow - Bredasdorp Group (in this area – the Wankoe Fm).



Figure 3. Bokkeveld shales of the Voorstehoek Formation outcrop on the shore of the gorge.



Figure 4. Bokkeveld shales of the Voorstehoek Formation outcrop on the shore of the gorge.



Figure 5. Outcrop of Enon Formation red soil on the west bank of the gorge.



Figure 6. Small outcrop of Enon Formation red soil (arrow) on the west bank of the gorge.

The geology of the middle and south parts of the De Hoop Vlei Gorge poses many questions. There are discrepancies between the sources and between maps about the description and distribution of the various formations of the Bredasdorp group (see Chapter W). The geology of the area is not so simple and tectonic processes, which were not considered before, may give indication on the formation of some features. (See Field Note N6).

The southern part of the De Hoop Vlei Gorge is where the stratigraphy of the De Hoop Vlei Formation, the lowest formation of the Bredasdorp Group, was studied and described in detail (Figure 7). This formation is overlain by the Wankoe Formation (see Chapters C and M for more on these two formations).

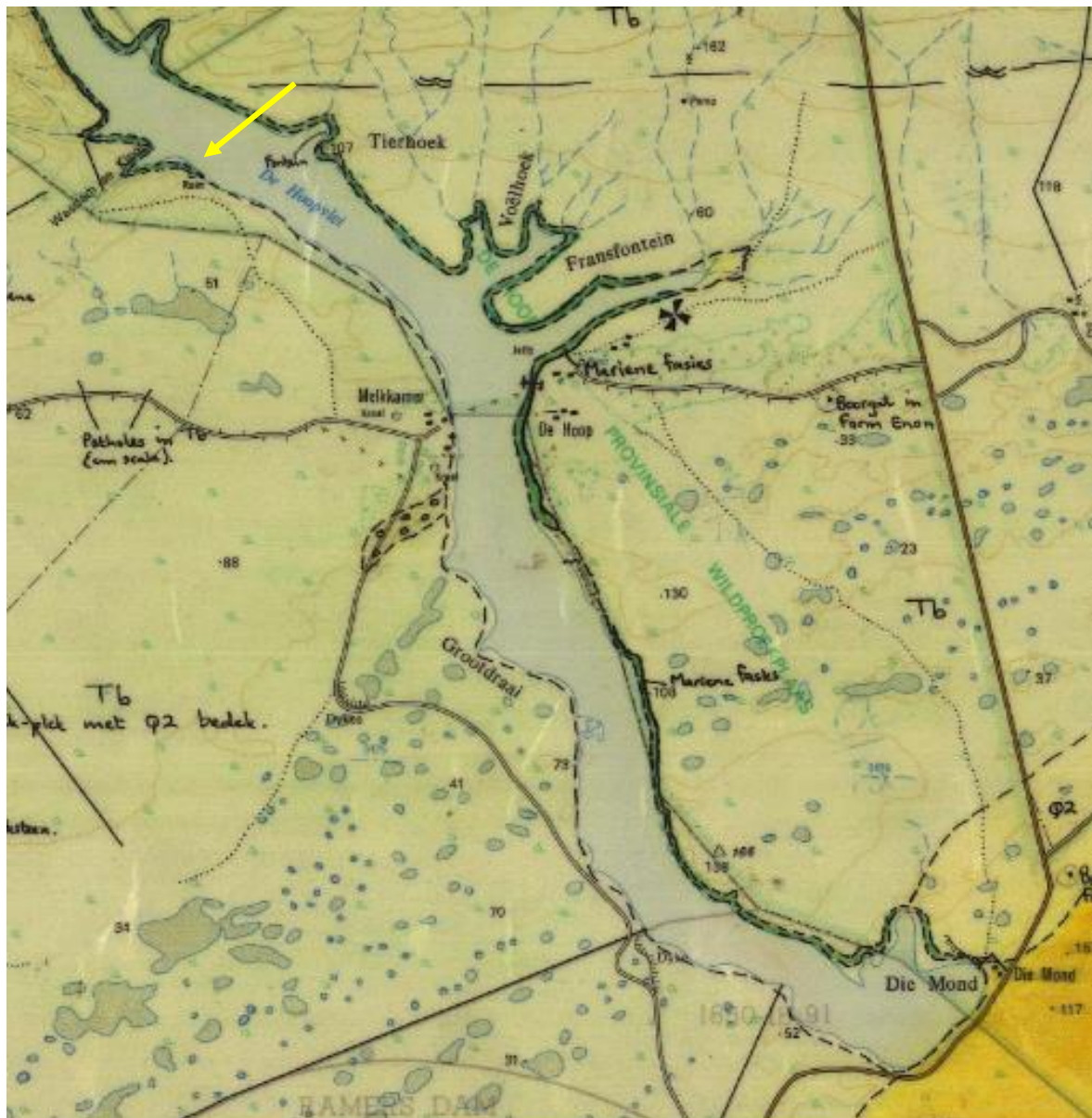


Figure 7. Top - geology field sheet (1984) of the middle and southern parts of the gorge. Formations: dark green – De Hoop Vlei Formation (note that this formation is not present on the west side of the gorge from Wasdam se Kloof (arrow) southwards); light yellow - Bredasdorp Group; yellow – sand dunes of the Strandveld Formation.

The stratotypes* of the De Hoop Vlei formation were studied near the hotel and between the resort and Die Mond on the east bank of the gorge (Figures 8 to 20). This formation attains a maximum thickness of 18.9 m on the cliffs of the resort – the thickest in the entire area. The formation becomes thinner north of the resort and south of it. The De Hoop Formation is not present on the west side of the gorge from Wasdam se Kloof southwards.

[* A **stratotype** or type section is a term that names the physical location or outcrop of a particular reference exposure of a stratigraphic sequence or stratigraphic boundary].

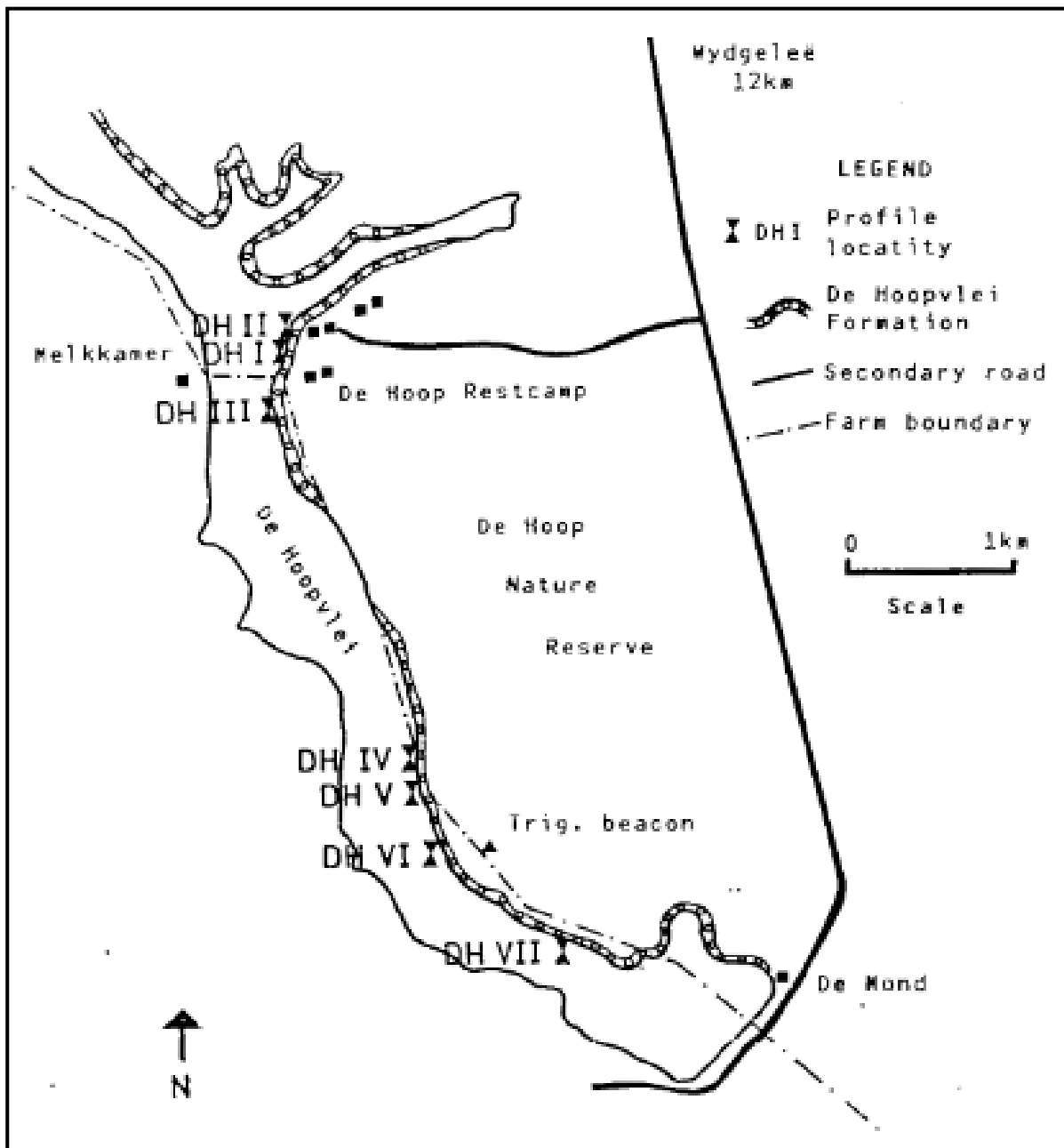


Figure 8. Geology map of the De Hoop Vlei Formation, indicating the sites (stratotypes) where the stratigraphy of this formation was studied by J Malan.

Source: J Malan, MSc Thesis, 1990.

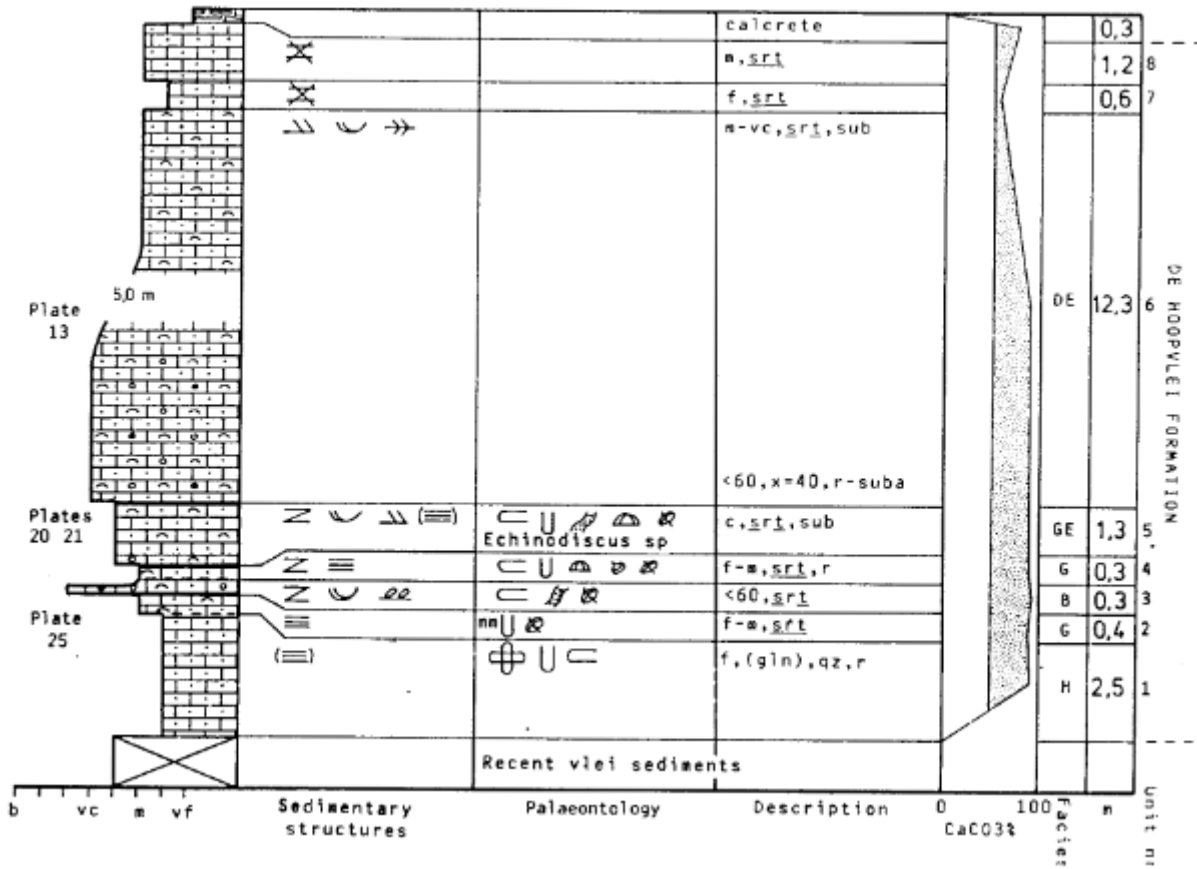


Figure 9. Profile DH II (see location in Figure 8) is the northernmost profiles of the seven profiles in this part. The thickness of the De Hoop Vlei Formation is 18.9 m. For stratigraphic legend, see the end of this field note.
Source: J Malan, MSc Thesis, 1990.



Figure 10. Approximate site of Profile DH I near the resort (see Figure 8 for the profile location).

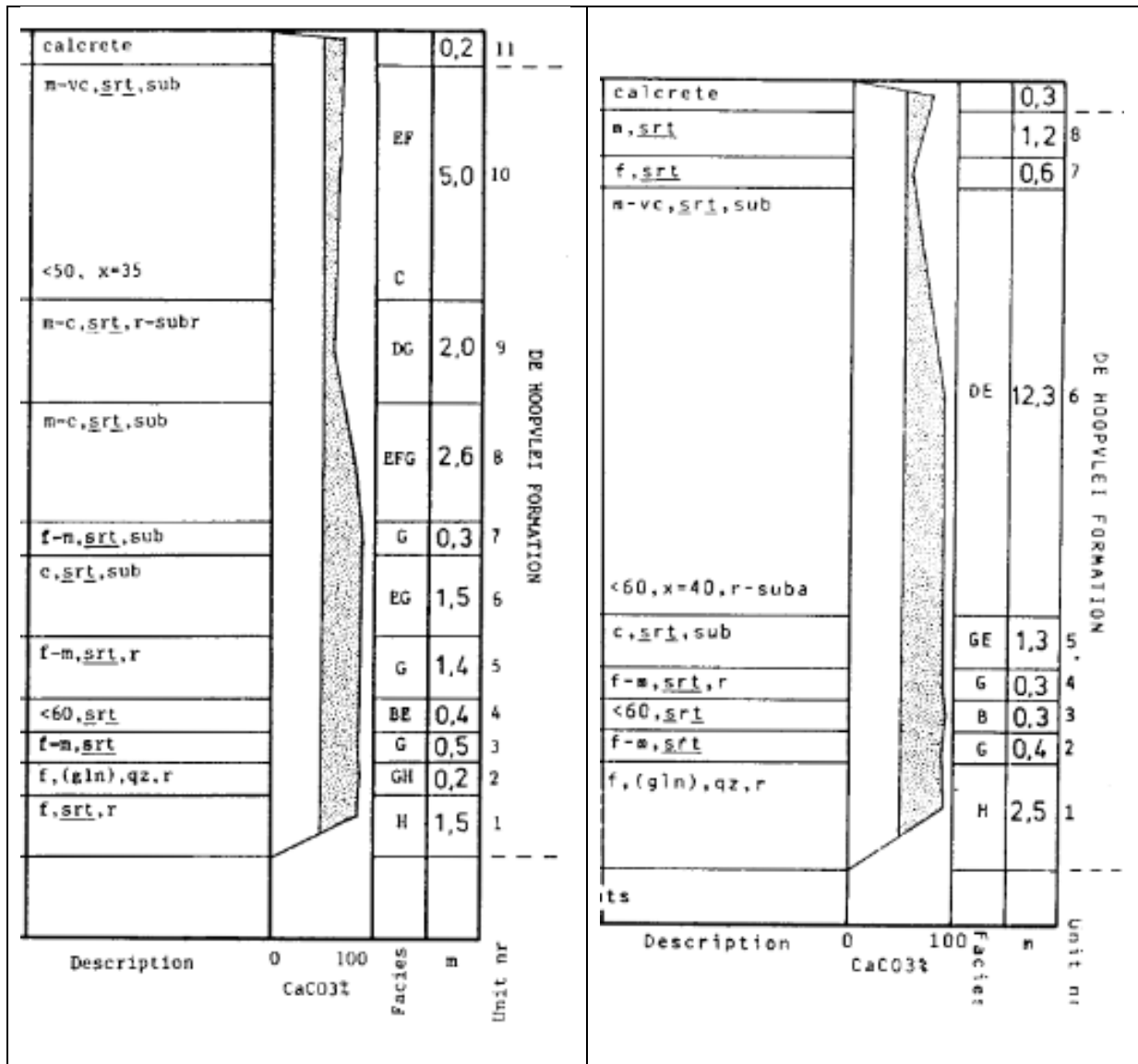


Figure 11. The right-hand columns of the stratigraphy of Profiles DH I (left) and DH II (right) (see profile locations in Figure 8), shown here to demonstrate the lateral changes of the strata within this formation over a short distance (100-200 m). The thickness of the formation in Profile DH I is 16.4 m, and in Profile DH II it is 18.9 m. For stratigraphic legend, see the last two pages of this field note.

Modified from: J Malan MSc Thesis, 1990.



Figure 12. Part of the De Hoop Vlei Formation near Profiles DH I and DH II. Note the shells.



Figure 13. Part of the De Hoop Vlei Formation near Profiles DH I and DH II.



Figure 14. Part of the De Hoop Vlei Formation near Profiles DH I and DH II.

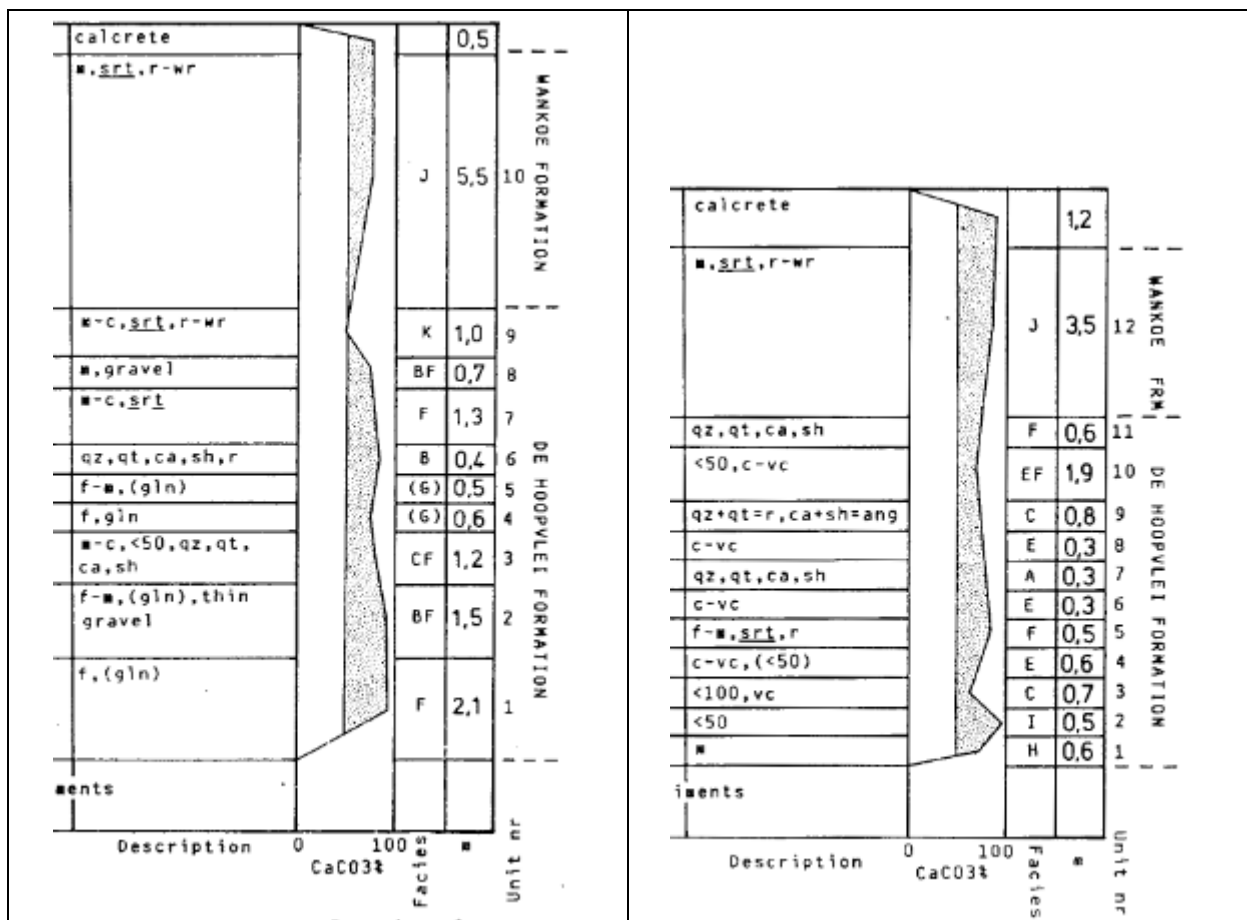


Figure 15. The right-hand columns of the stratigraphy of Profiles DH IV (left) and DH VII (right) (see profile locations in Figure 8), shown here to demonstrate the lateral changes of the strata within this formation, over a distance of about 1.5 km. The thickness of the formation in Profile DH IV is 9.3 m and in Profile DH VII it is 7.1 m. For stratigraphic legend, see the last two pages of this field note.

Modified from: J Malan MSc Thesis, 1990.



Figure 16. Approximate site of profile DH IV south of the resort (see Figure 8 for the location).



Figure 17. Part of the De Hoop Vlei Formation south of Profile DH VII.



Figure 18. Part of the De Hoop Vlei Formation south of Profile DH VII.



Figure 19. Part of the De Hoop Vlei Formation at Die Mond.



Figure 20. The De Hoop Vlei Formation is thinning out on the north shore of Die Mond. Note the shells.

The De Hoop Vlei Formation in the northern part of the gorge was not studied in detail by J Malan, thus there are no profiles from that part. Photographs of this formation in that part of the gorge are given below (Figures 21 to 23).



Figure 21. Part of the De Hoop Vlei Formation (coquina – a layer consisting of shells only) on the west bank of the gorge.



Figure 22. The De Hoop Vlei Formation at the outlet of Droëkloof, on the west bank of the gorge. View to the west.

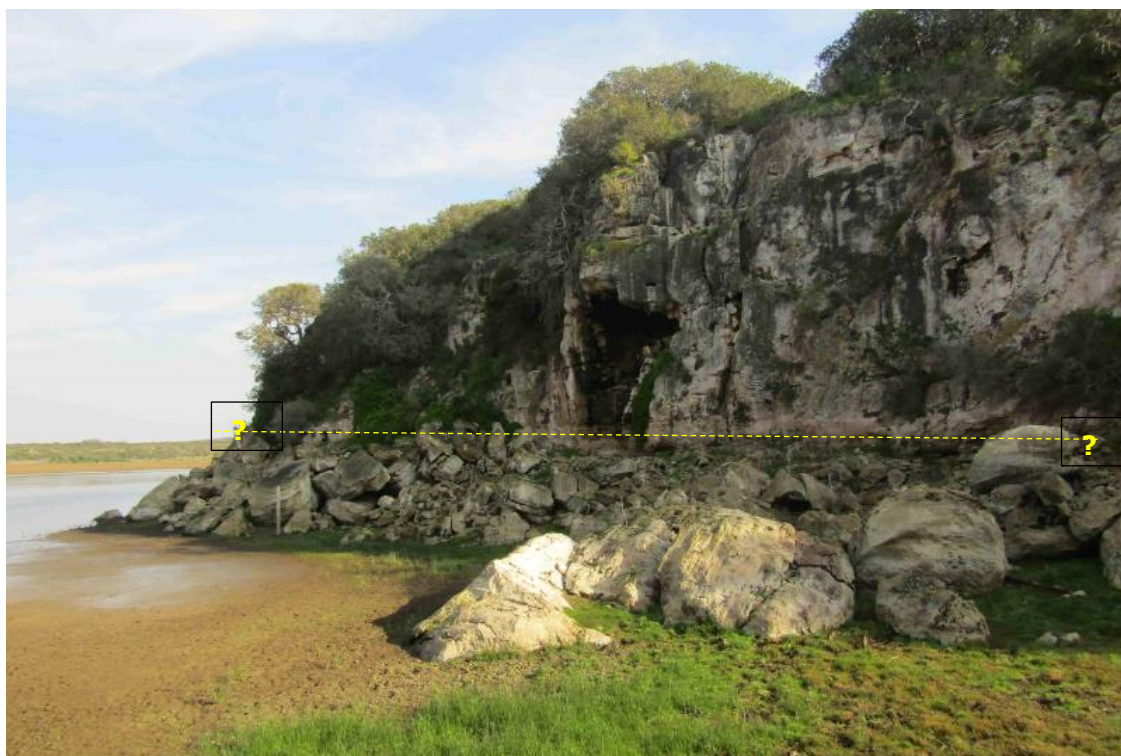






























Figure 23. The De Hoop Vlei Formation (below the dashed line?), mostly obscured by the talus accumulated at the base of the cliff, overlain by the Wankoe Formation on the east side of the gorge (the south Tierhoek Cove). View to the west.

At the time of the compilation of this note, the base of the cliffs from the resort southwards is still in water, which makes it impossible to study the De Hoop Vlei Formation in this section.

There are a few forms of calcrete around the gorge (Figure 24).


















Figure 24. Different forms of calcrete around Die Mond. Note the rounded clasts within the calcrete in the bottom photograph.

LITHOLOGY		SEDIMENTARY STRUCTURES	
	Siltstone		No visible structures
	Sandstone		Vague structures
			Massive
			Ripples
			Horizontal lamination
	Limestone		Graded bedding
			Micro crossbedding
			Inclined bedding
			Reactivation surfaces
	Conglomerate		Crossbedding (general)
			Planar crossbedding
			Trough crossbedding
	Calcrete		Herringbone crossbedding
	Peat		Imbrication
	Alternating lithologies		Palaeostream directions
	No outcrop		
CONTACTS		TEXTURE	
	Gradational contact	b	Boulder
	Sharp contact	p	Pebble
	Eroded contact	g	Gravel
BIOGENIC STRUCTURES		vc	Very coarse grained
	<u>Ophiomorpha</u>	c	Coarse grained
	<u>Skolithos</u>	m	Medium grained
	Bioturbation	f	Fine grained
U	Vertical burrows/tubes	vf	Very fine grained
C	Horizontal burrows/tubes	wr	Well rounded
∇	Plant roots	r	Rounded
		subr	Subrounded
		sub	Subrounded- Subangular
		suba	Subangular
		ang	Angular
		<u>srt</u>	Well sorted
		<u>srt</u>	Moderately sorted
		(srt)	poorly sorted

Lithological profile legend (page 1).

Source: J Malan, MSc Thesis, 1990.

ABBREVIATIONS	FOSSILS
X Mean size (mm)	 Fish remains
< Maximum size (mm)	 Shark's teeth
200 Size (mm)	 Bryozoa
200x100x50 Max. clast size (mm)	 Echinoidea
— Highly	 Bivalvia
— — Moderately	 Gastropoda
() Slightly	 Comminuted shells
gln Glauconite grains	 Foraminifera
qz Quartz grains/clasts	 Spines
qt Quartzite grains/clasts	 Terrestrial
ca Calcarenite clasts	 Algae
sh Shale clasts	
ssh Sandy shale clasts	
hm Heavy minerals	 Lenticular beds
m Thickness in metre	 Lenticular litho-units
mm Thickness in mm	
Nr Unit number	 Semi-consolidated
340/25 Dip and dip direction	 Unconsolidated
org Organic material	
t Terrestrial	
>1m Large-scale crossbedding	
GRP Group	
FRM Formation	
K Facies	

Lithological profile legend (page 2).

Source: J Malan, MSc Thesis, 1990.