

## M. SALT RIVER GORGE

### Field Note M3. Geology

[This note describes the various formations present in the Salt River Gorge. For the lithology and stratigraphy of these formations the reader is referred to Chapter C].

The Salt River Gorge (Figure 1) is the only site in the Study Area where the three main geological formations (Bokkeveld, Enon and Bredasdorp) are visibly present one on top the other (Figures 2, 3 and 4).

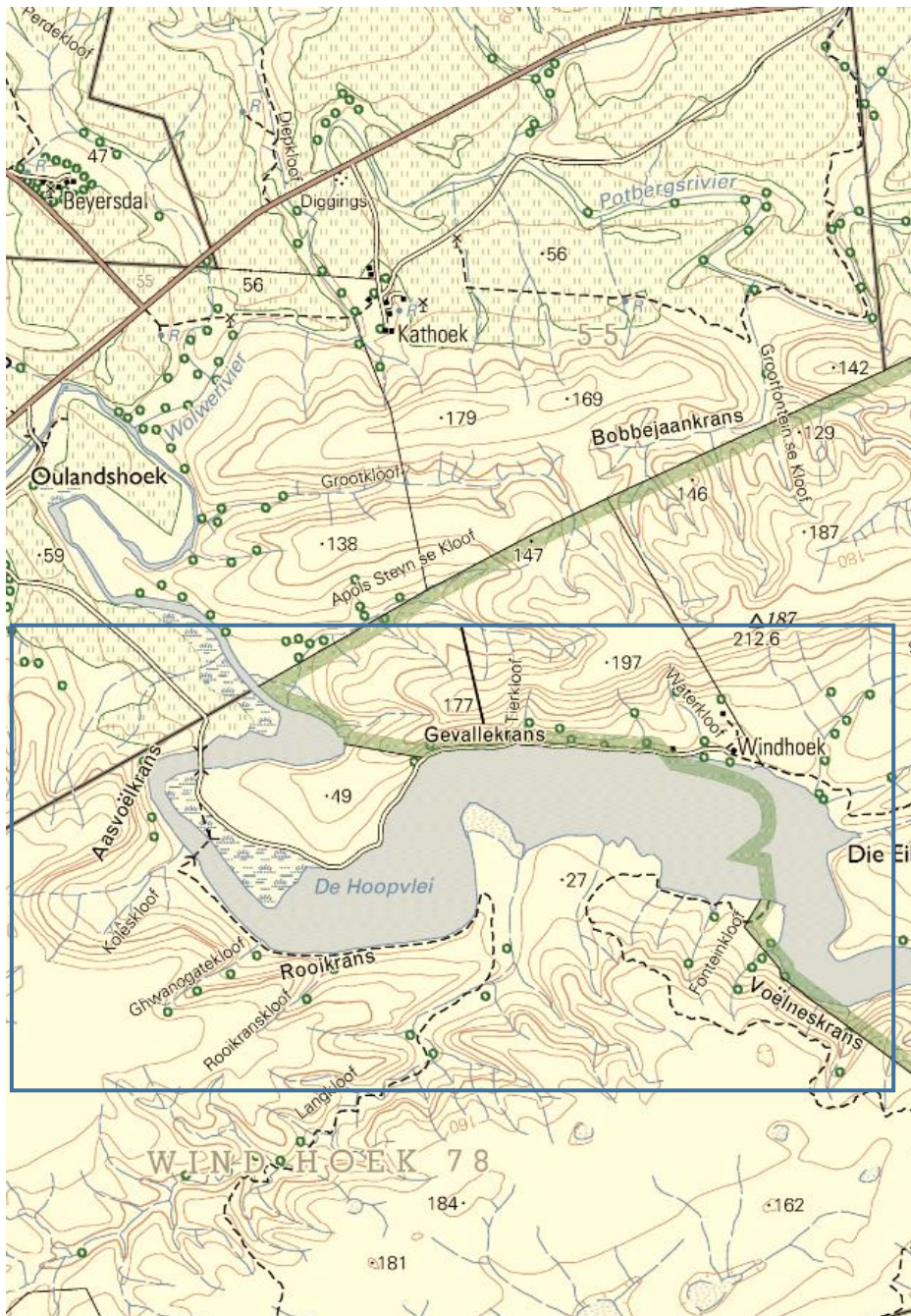
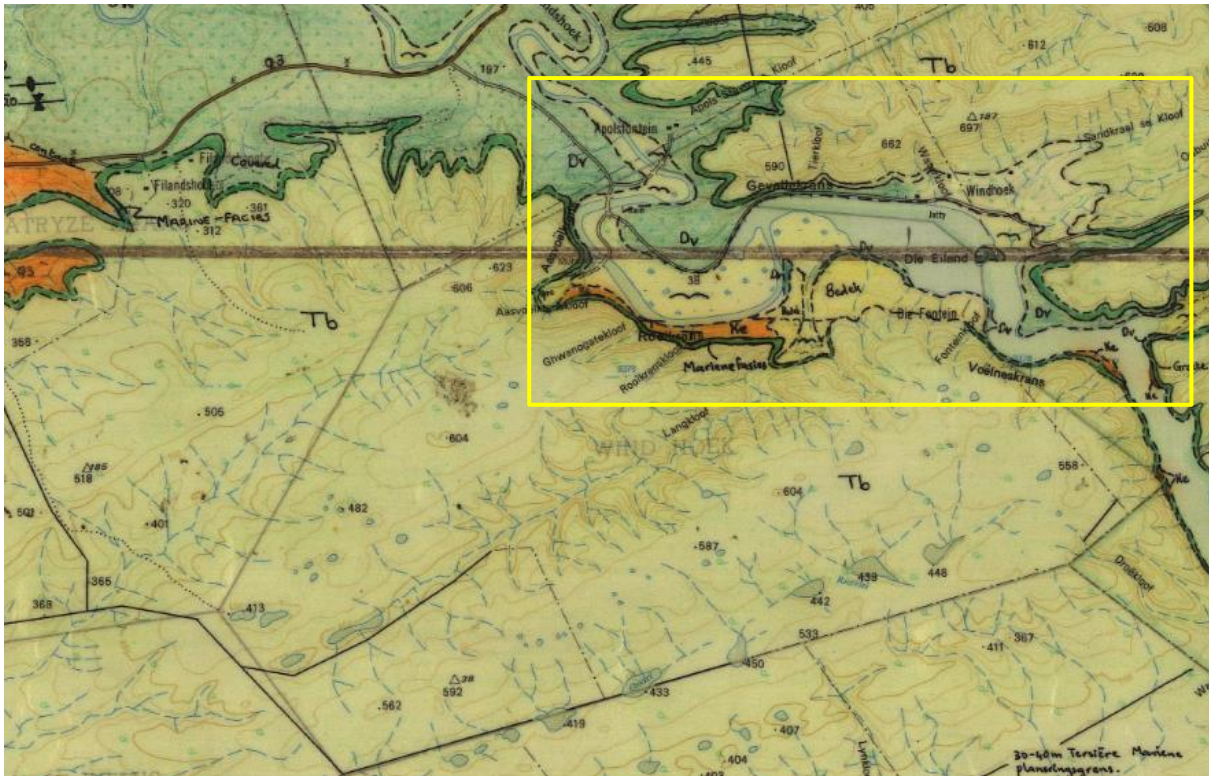


Figure 1. Topographic map of the Salt River Gorge (boxed) and its environs.



**Figure 2. Geology of the area (map of 1984 by J Malan; the Salt River Gorge (yellow box) is enlarged in Figure 3). These are the formations which dominate the area, from old to young:**

**The green colour and the symbol Dv represent the Devonian Voorstehoek Formation of shales and the associated quartz veins.**

**The orange colour and the symbol Ke represent the late Jurassic / early Cretaceous conglomerates of the Enon Formation.**

**The pale green colour and the symbol Tb represent the Tertiary Bredasdorp Group Formations, mainly the calcrete-capped Wankoe Formation.**

**The dark green band, with the note '*mariene fasies*' or '*marine facies*', is the relatively thin De Hoopvlei basal formation, the oldest formation of the Tertiary Bredasdorp Group, which was deposited over the eroded Voorstehoek and Enon Formations.**

**The yellow areas are of two entirely different nature: a. the alluvium in the Salt River Marsh, and b. areas partially capped with calcrete with the note '*bedek*' (covered).**





Figure 3. Geology map (J Malan, 1984) of the Salt River Gorge (box in Figure 2). The dark green colour represents the De Hoop Formation (see Figures 4 and 19).

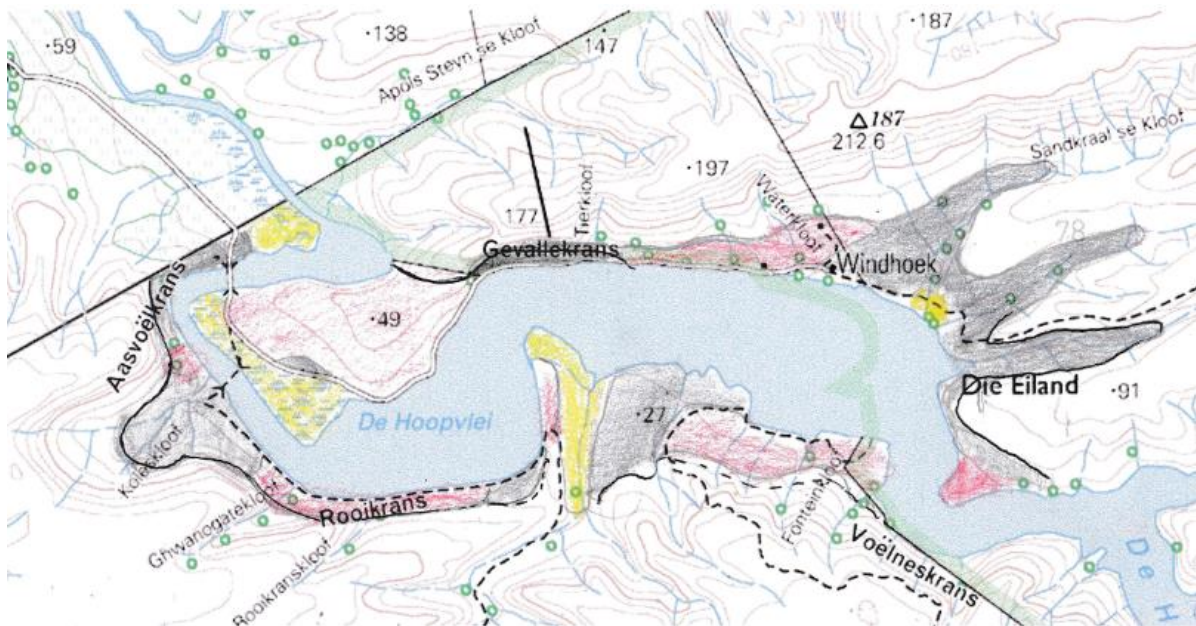


Figure 4. The 2020 (this study) provisional geology map of the Salt River Gorge. In many places the contacts between formations are approximate as they are covered by soil and thick vegetation. Colours of formations: red – Enon; grey – Voorstehoek (Bokkeveld Group); black line – De Hoop Vlei Formation; yellow – alluvium; all other areas are rocks of the Wankoe Formation, capped with calcrete.



***The Voorstehoek Formation (Bokkeveld Group)***

Shales of the Voorstehoek Formation are found on either side of the gorge (Figures 5 to 8).



**Figure 5. Voorstehoek Formation shales outcrop at the entrance to the gorge. View from the concrete causeway to the west-southwest.**



**Figure 6. The Voorstehoek Formation outcrops below the Aasvoëlkrans, west of the concrete causeway. View to the west-southwest. On either side, the shales are covered by the talus of the collapsed blocks and debris of the overlying Wankoe Formation.**





**Figure 7. The Voorstehoek Formation (black arrow) forms the western tip of The Island. View to the east.**



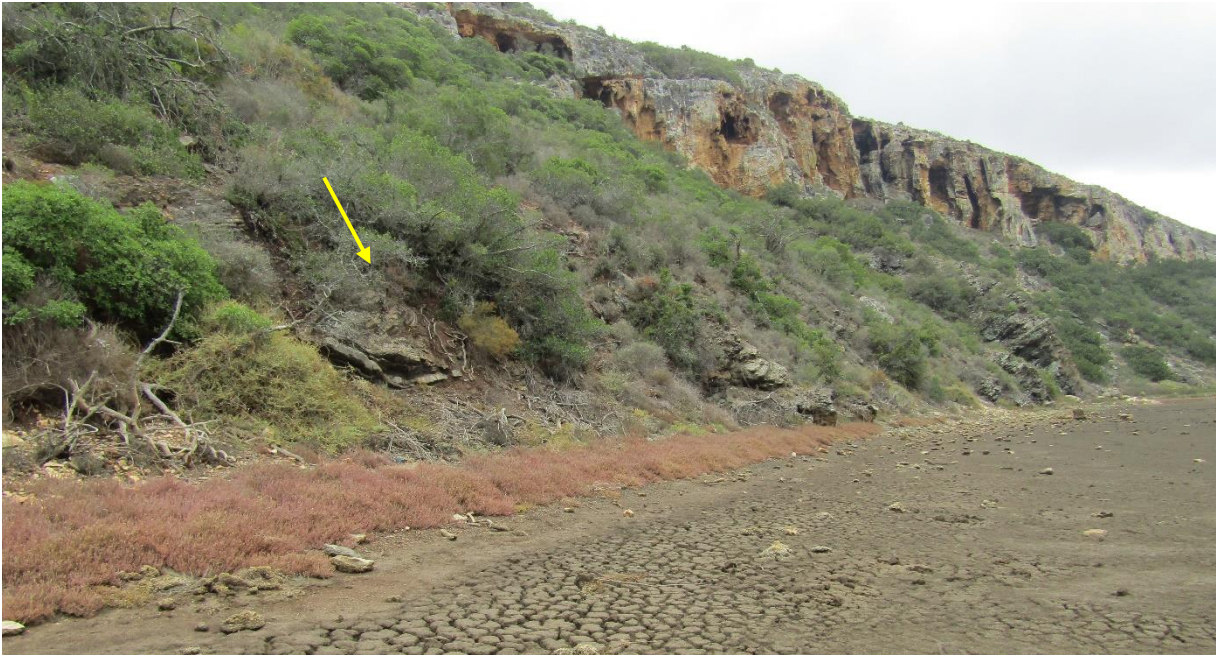
**Figure 8. Voorstehoek Formation shales outcrop in a river cut, on the nearly vertical west slope of Riverbend Hill.**



An interesting feature is situated below Aasvoëlkrans, on the south shore of the gorge.



**Figure 9. Small-scale tightly over-folded and contorted thin quartzitic sandstone beds (definition suggested by J Malan) within the shales of the Voorstehoek Formation, below Aasvoëlkrans.**

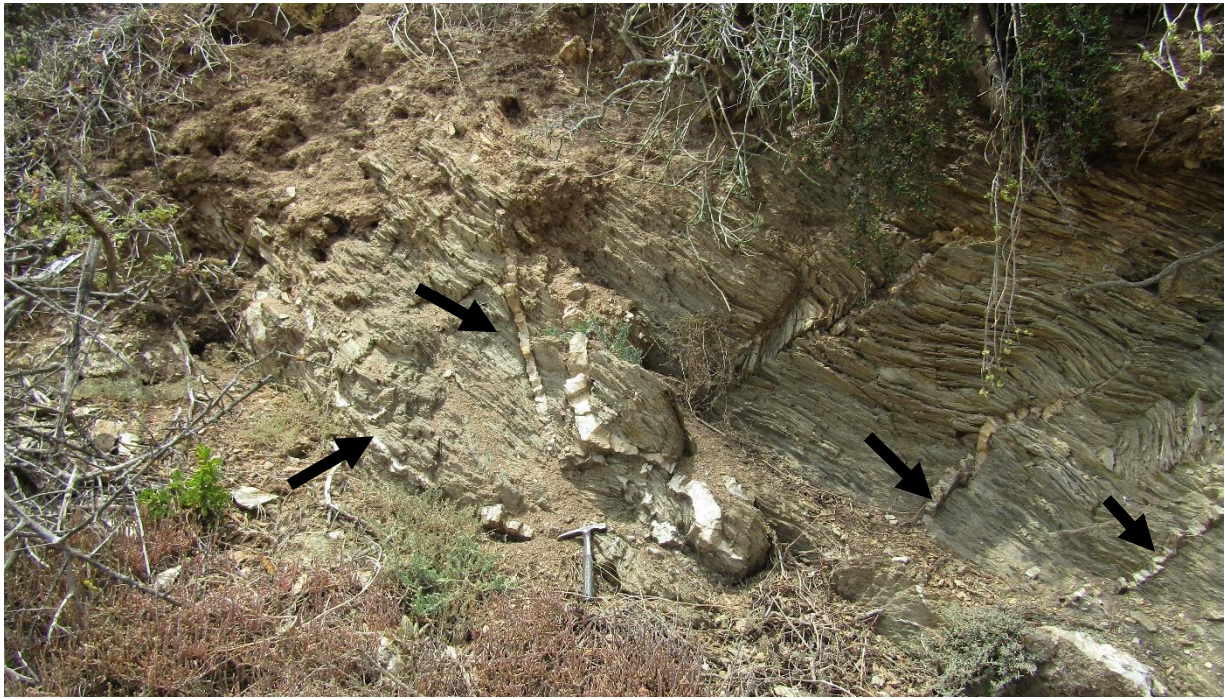


**Figure 10. Arrow points to the feature shown in Figure 9.**



### Quartz veins

Quartz veins are abundant in the Bokkeveld formations north of the 'Hard Dunes'. They can also be found in the gorge (Figures 11 and 12).



**Figure 11. Small-width quartz veins (arrows) within folded shales.**



**Figure 12. Blocks of a wide (more than half a metre) quartz vein (arrow) exposed at the southern tip of The Island. The vein in the photograph is the easternmost quartz vein which this study mapped so far in the Study Area.**



***The Enon Formation***

The Enon Formation deposits are mostly on the south side of the gorge (Figures 13-17).



**Figure 13. Unconsolidated soil of the Enon Formation is present along some sections of the south shore of the Salt River Gorge.**



**Figure 14. Consolidated Enon Formation conglomerate of small and medium clasts on the west side of The Island.**



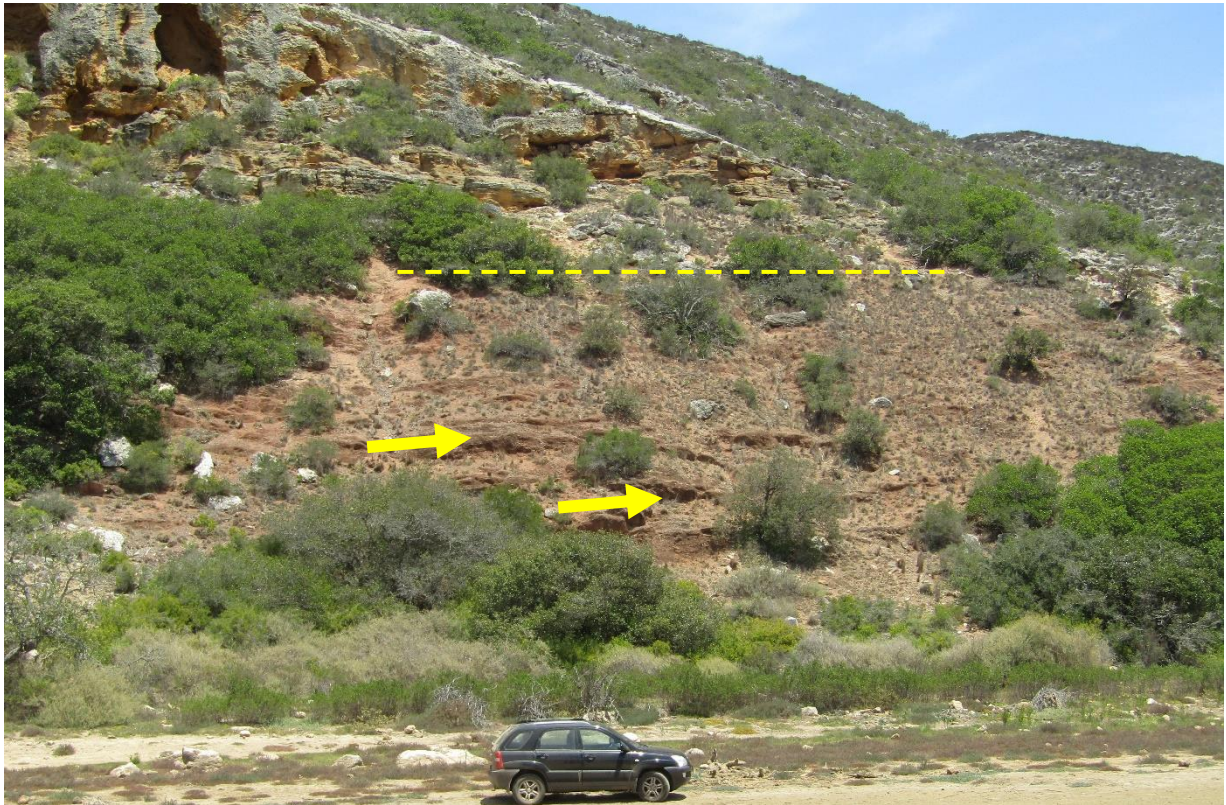


**Figure 15. Consolidated conglomerate of the Enon Formation (red arrow) is deposited on the shales of the Voorstehoek Formation (yellow arrow) at the north tip of The Island. Dashed yellow line marks the contact between the formations.**



**Figure 16. Enon Formation conglomerate with a high content of angular shale fragments.**





**Figure 17.** The Enon Formation below the Rooikrans. The yellow, dashed line marks the contact between the Enon and the Bredasdorp Formations. Yellow arrows indicate layers of shale conglomerate.

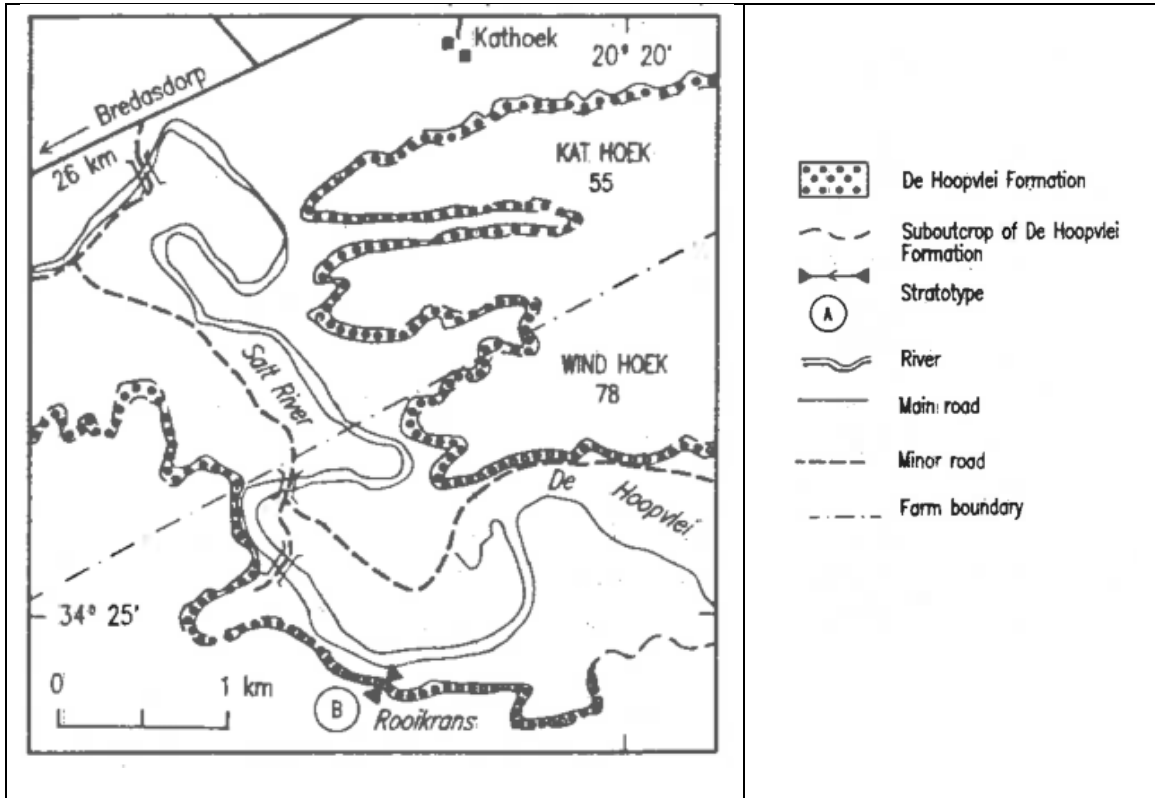


**Figure 18.** Big, rounded clasts of the Enon Formation on Riverbend Hill.



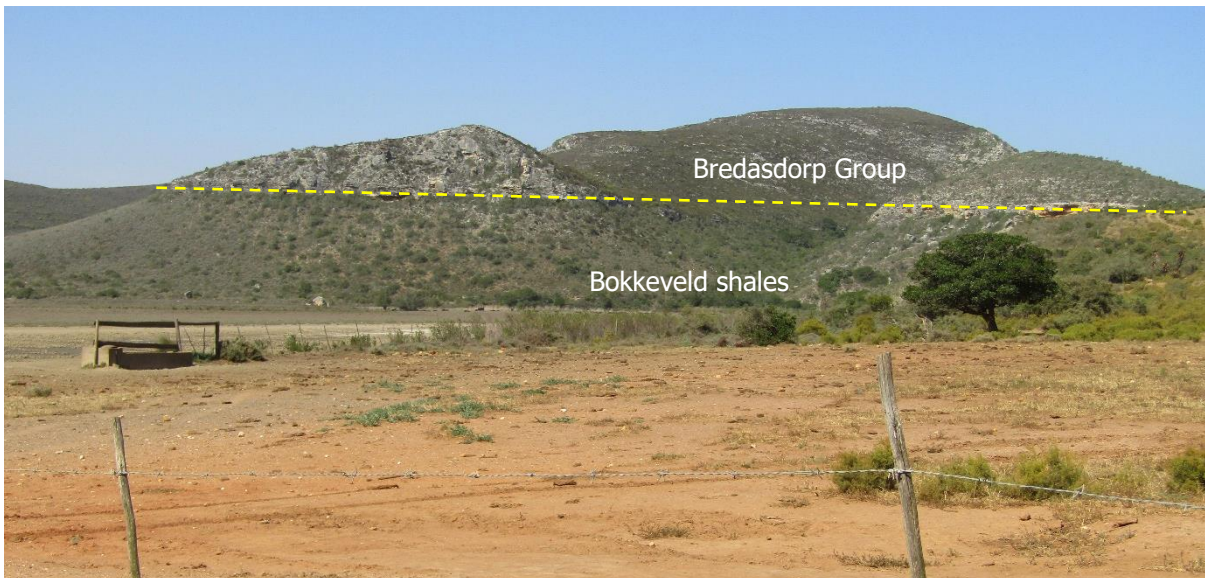
**The Bredasdorp Group: The De Hoop Vlei Formation**

The De Hoop Vlei Formation is found on either side of the gorge (Figures 19 to 26).



**Figure 19. Map of the entrance to, and western part of, the Salt River Gorge, showing the De Hoop Vlei Formation outcrops and the stratotype location (B) of this formation.**

Source: J Malan's MSc thesis, 1990.



**Figure 20. A view to the east-northeast on the north side of the Salt River Gorge. The Bredasdorp Group is overlying a wave-cut terrace (dashed yellow line, ~ 60 m above sealevel on the left and ~55 m above sealevel on the right), which is sloping very gently seawards (to the right).**





**Figure 21.** View to the south, on the south bank of the Salt River Gorge. Yellow arrow points to the Rooikrans. The pre-Cainozoic Formations were eroded and levelled by wave action (dashed yellow line, marks a Tertiary marine terrace ~ 36 m above sealevel at this point). The Bredasdorp Formations are above the line. Below the line is the Enon Formation. The formations and the contact between them are eroded or covered with calcrete to the east (to the left of the dashed line).



**Figure 22.** The stratotype of the De Hoop Vlei Formation site at Rooikrans (between the two dashed yellow lines). It overlies the Bokkeveld shales, at an elevation of ~36 m and is overlain by the Wankoe Formation. (The elevation above sealevel is significant when studying the tectonics of the gorge).





**Figure 23. Shells comprise one of the layers of the De Hoop Vlei Formation (below Rooikrans).**



**Figure 24. Shells and small, rounded pebbles comprise another layer of the De Hoop Vlei Formation (below Rooikrans).**





**Figure 25. The de Hoop Vlei Formation outcrops (yellow arrow) over Bokkeveld shales (white arrow) on the Riverband Hill. View to the north.**



**Figure 26. The de Hoop Vlei Formation outcrops on the Riverband Hill.**



***The Bredasdorp Group: The Wankoe Formation***

Calcarenites of the Wankoe Formation are found mostly on the southern side of the gorge (Figures 27 to 30). The Wankoe formation is the host of most of the karst landforms.



**Figure 27. Steep slopes are typical of the Hard Dunes. View on Voëlneskrans. Dashed yellow line shows the obscured contact between the Voorstehoek Formation (shales) and the Bredasdorp Group, at ~22 m above sealevel (at this point). The contact cannot be detected farther southwards (to the left).**



**Figure 28. The Wankoe Formations cliffs at Gevallekrans, on the north side of the gorge.**





**Figure 29. The Wankoe Formation (at Aasvoëlkrans) showing planar cross-bedding (arrows).**



**Figure 30. Cross-bedding (arrow) in the Wankoe Formation (at Rooikrans).**