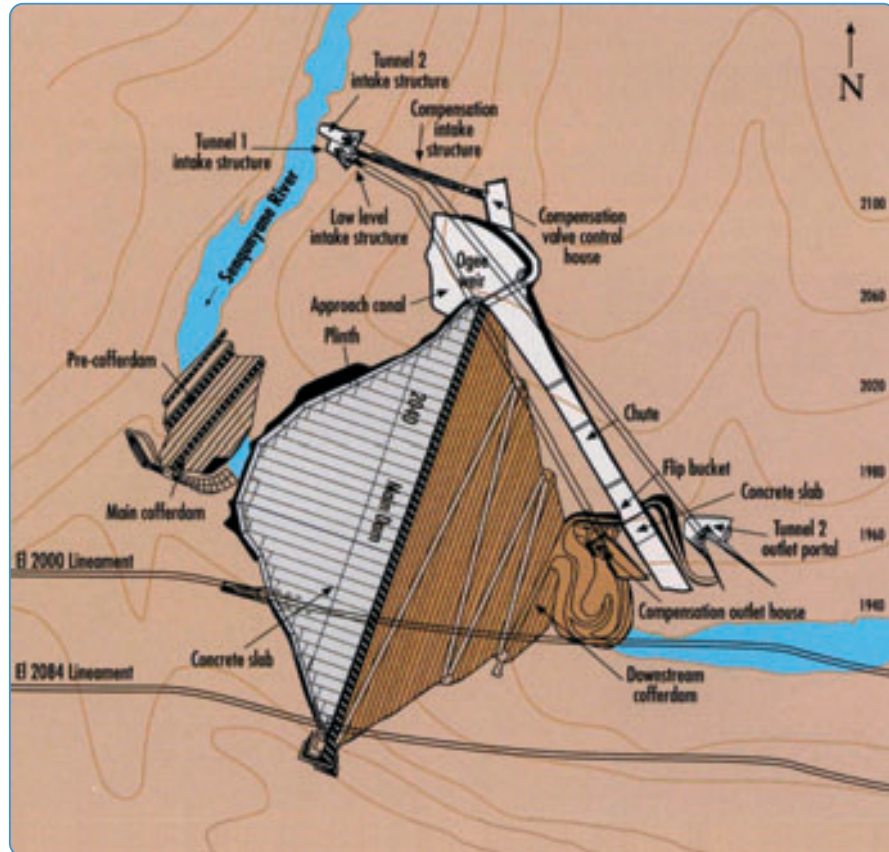


# Mohale Dam



## Project data

<b>Client:</b>	Lesotho Highland Development Authority
<b>Contractors:</b>	HOCHTIEF Concor, South Africa Impregilo, Italy
<b>Type of dam:</b>	Concrete-faced rockfill
<b>Height of dam:</b>	145 m
<b>Crest length:</b>	620 m
<b>Volume:</b>	7.5 million m <sup>3</sup>
<b>Contract value:</b>	EUR 74 million
<b>Construction phase:</b>	1998 – 2002



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The Mohale Dam created to divert water from rain-rich Lesotho to the industrial region of Johannesburg in South Africa, forms a key element in Phase 1B of the Lesotho Highlands Water Project. This structure, the highest concrete-faced rockfill dam

in Africa, provided an opportunity for HOCHTIEF – as the leader of an international joint venture which also included its South African associated company Concor – to demonstrate its great engineering

pro prowess. The prime objective was to achieve early impoundment, and with the completion of the Mohale tunnel having the water flowing to where it is needed the most.

# Optimizing operations.



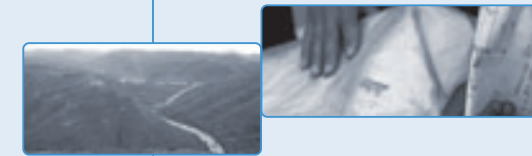
Upstream view.

The Mohale Dam is situated on the Senqunyane River, just downstream of the confluence with the Jordane River. Since two fault zones cross the dam's foundation on the right bank, the first essential step was to grout and cover these zones and also construct a gallery from the downstream side to the two zones to ensure that grouting works could also be carried out after the completion of the dam.

In order to minimize construction time, the fill material for the upstream part of the dam body was placed up to about 75 percent of the final height. The rockfill material for the downstream part of the dam was placed simultaneously with the construction of the concrete surface. Once sealing was finished, rockfill for the rest of the dam body was placed to enable the face slab to be executed up to the crest.

The main elements of the surface sealing system are a plinth and a concrete face slab, with the plinth connecting the face slab to the rock below and serving as a working deck for grouting. The concrete slab, which varies in thickness from 71 cm at the bottom to 30 cm at the top, covers an area of 81,000 m<sup>2</sup> and has a volume of 34,000 m<sup>3</sup>. It was slipformed in 15 m wide strips.

Since work on the slab was divided into two phases, a horizontal construction joint was required at a level of 100 m above the deepest foundation.



## Coordination, **cooperation** and control.



Mohale Dam during construction.

In constructing the face slab, HOCHTIEF Construction also drew on the resources of another associated company, Thiess of Australia, when it opted to use Thiess equipment that had already proved its capabilities in similar projects and had been improved continuously in the process.



The concreting works were carried out with a slipform pulled up the dam slope by two 10 t winches. On average, a placement rate of 10 m<sup>3</sup>/h was achieved. Concreting the longest slabs, with a length of 170 m, took up to four days. 24 hours or so after one concreting slab was completed, the slipform was lowered down the hardened concrete on wheels. Once at the bottom, it was pulled sideways onto the starter slab of the next strip, enabling slipforming of the next strip to start a maximum of four shifts later.

The spillway consists of a laterally positioned three-element weir with a fixed crest and a total length of 50 m. The attached structure channels the water to a 25 m chute with double ventilation. The discharged water is directed via a flip bucket into the natural river bed. The spillway is designed for a PMF of 2600 m<sup>3</sup>/s.

Other associated structures are two diversion tunnels, 650 m and 560 m long, and upstream and downstream cofferdams with a total volume of about 150,000 m<sup>3</sup>.

The reservoir created by the Mohale Dam has a volume of around one billion m<sup>3</sup>.

Together with the other projects in Phase 1B, the dam increases the diversion flow to South Africa by 12 m<sup>3</sup>/s.