



KNELLPOORT DAM

COORDINATES (degrees, minutes, seconds)

LATITUDE	LONGITUDE
29° 46' 45" S	26° 53' 22" E

LOCATION

Knellpoort Dam is situated on the Rietspruit River near Wepener in the Free State, South Africa, in quaternary D23H.

DESCRIPTION

Knellpoort Dam was the first arch gravity roller compacted concrete (RCC) dam in the world, and consists of almost 64,600 m³ rollcrete and 14,200 m³ concrete. It is an off-channel storage dam with a relatively small catchment area of only 798 km² and corresponding mean annual runoff (MAR) of approximately 20 million m³/a. The dam has a full supply level of 1,452.1 m, with a dead storage level of 1,428.6 m and reservoir bottom at 1,412.0 m.

PURPOSE

Welbedacht Dam had been the primary source of supply for the city of Mangaung, but due to siltation, it was no longer able to meet the demands at an acceptable assurance of supply. Knellpoort Dam was therefore constructed to augment supply to Bloemfontein via the Caledon–Bloemfontein pipeline. The Tienfontein Pumping Station and Canal are equipped with a silt trap to reduce siltation in the reservoir. However, the Bloemfontein demand is ever-increasing, and the pipeline is of limited capacity. This scheme, therefore, will be further augmented by a direct transfer from Knellpoort to the Modder River (Rustfontein Dam catchment) via the Novo Transfer Scheme, which is expected to have a maximum capacity of 150 million m³/a by the year 2030.

Water from the Caledon River is pumped to Knellpoort Dam from the Tienfontein Pumping Station via a 2-km-long canal which is equipped with a silt trap to reduce siltation in the main reservoir. The maximum capacity of this tunnel is 75.74 million m³/a.

The Novo Transfer Scheme will be developed in stages, according to Bloemfontein's increasing demands, and is expected to reach a maximum transfer capacity of 150 million m³/a by the year 2030.



Knellpoort Dam (© UNOPS/Leonie Marinovich)



KNELLPOORT DAM

PHYSICAL INFORMATION

Dam name	River	Quaternary catchment	FSC* (million m ³)	FSA (km ²)	Owner	DWA code	Wall height (m)	Wall length (m)
Knellpoort	Rietspruit	D23H	136.15	9.80	DWA	D2R006	50	200

* Live full supply capacity (SANCOLD, 2009)

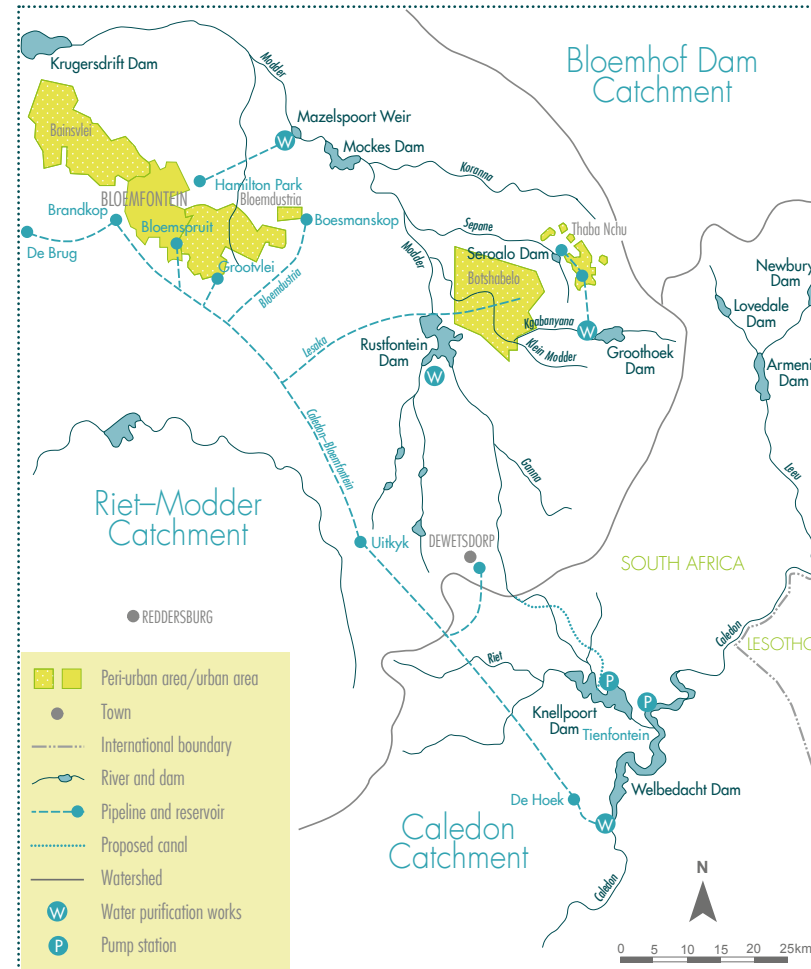
Year of completion	Demands/abstractions (million m ³ /a)			1:50 yield (million m ³ /a)	Maximum spillway capacity (m ³ /s)
	Domestic	Irrigation	Other		
1988	Unknown	0.53	Unknown	Unknown	1,070

AREA-CAPACITY RELATIONSHIP

Elevation (m)	Storage (million m ³)	Surface area (km ²)
1,454.5	163.00	11.70
1,453.4	150.00	10.79
1,452.1	136.90	9.76
1,451.4	130.40	9.41
1,446.7	91.39	7.43
1,444.0	71.85	6.57
1,439.5	45.85	5.11
1,432.6	17.24	3.17
1,428.6	6.75	1.99
1,412.0	0.00	0.00

OPERATING RULE

Knellpoort Dam (along with Welbedacht Dam) supports the Modder system when there is insufficient water in the system, via the Caledon-Modder Transfer.



Caledon-Bloemfontein Government Water Scheme (adapted from ORASECOM, 2007a)