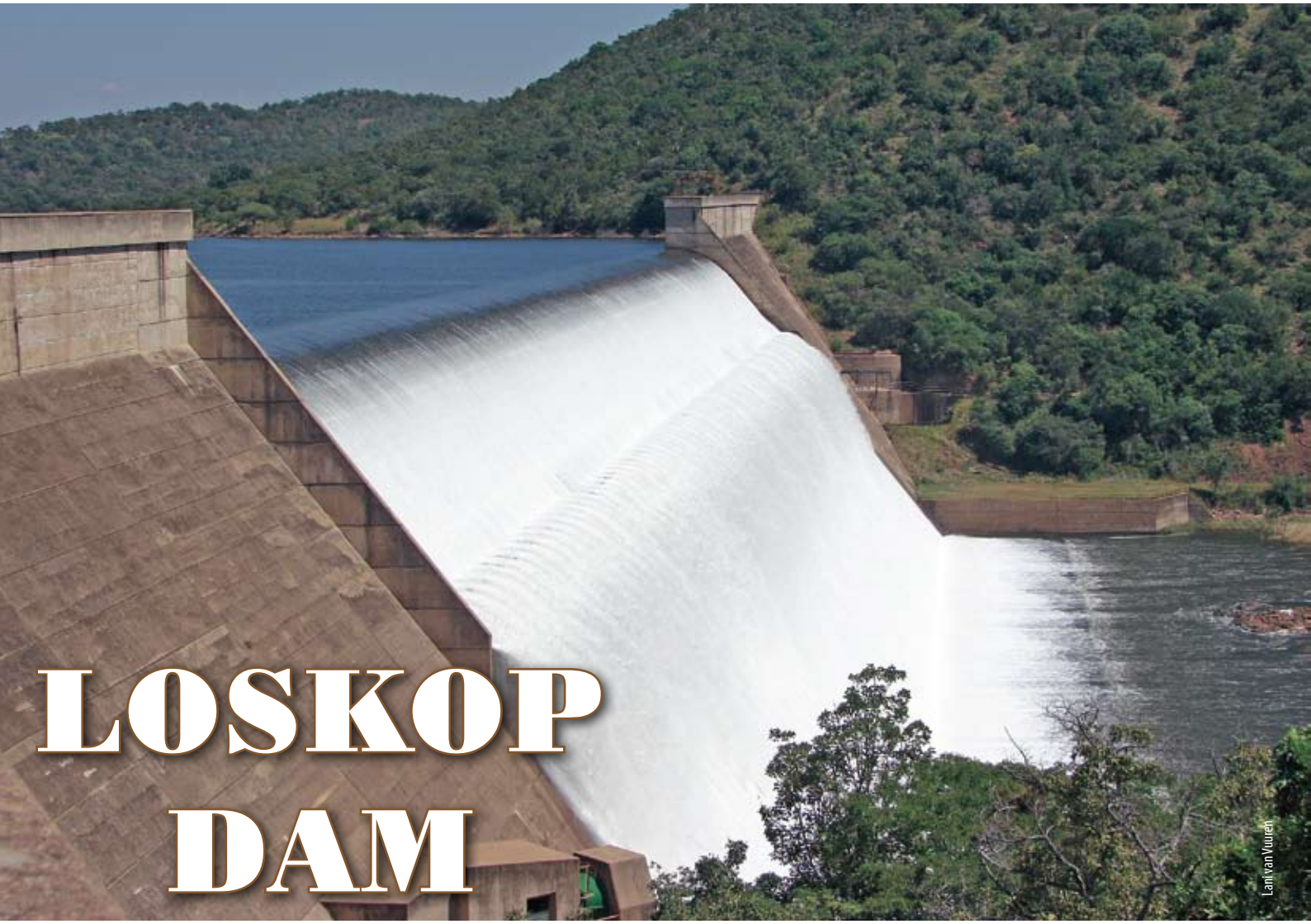

LOSKOP DAM

– Early Local Engineering Ingenuity

Despite being constructed more than 70 years ago, the Loskop Dam, situated across a gorge on the Olifants River, about 32 km south of Groblersdal, in Mpumalanga, remains one of the largest dams in South Africa. Lani van Vuuren reports.

The history of the Loskop Dam can be traced back to the 1840s when the Voortrekkers settled in the Kruis River valley not far from the present dam site. The first farms in the Olifants River valley, including Lagersdrift and Kalkfontein, were pegged out as long ago as 1886. Back then, the farmers cultivated mainly wheat under dry-land conditions.

Notwithstanding the establishment of these farms, due to malaria and cattle diseases like East Coast fever, initial development was slow until the turn of the nineteenth century. In the early twentieth century, many farmers trekked with their cattle from the Highveld to the Olifants River valley during the winter. Each winter they stayed a little longer until they eventually

settled in the area in greater numbers. This was particularly during the years between 1917 and 1924.

THE RISE OF SMALL IRRIGATION SCHEMES

It was in 1917 that the first private dam in the area was completed on the farm Rooikraal with government assistance. Thanks to irrigation, the wheat crop on this farm increased from 150 to 8 000 bags a year. Around 1925, other small irrigation schemes were completed involving both weirs and pumping water from the river. This led to the establishment of the Hereford Irrigation Board to serve an area of about 2 140 ha which was situated about 10 km downstream of the present Loskop Dam.

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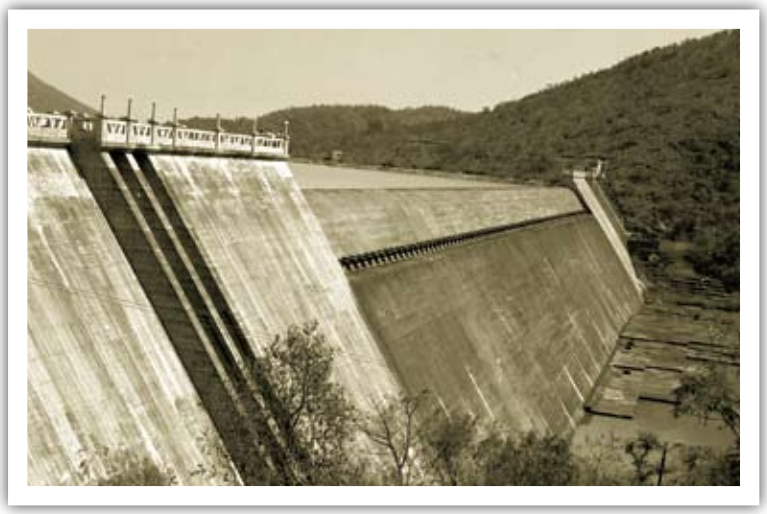
The proposed Hereford Scheme included an improvement of the diversion weir at Kameeldoring, and a 41 km-long canal extending as far as the Moses River. After a loan of R70 000 was granted by the Land Bank, work started during 1928 under the supervision of the Department of Irrigation. The various contracts were completed in 1930.

The early success of this scheme gave rise to a petition by farmers for the establishment of the Loskop Irrigation District. The old Transvaal Irrigation Department had undertaken a reconnaissance survey of such an irrigation scheme on the Olifants River between 1905 and 1907. However, back then it was recommended that an irrigation scheme should not be implemented until the valley was more densely populated, and not before there

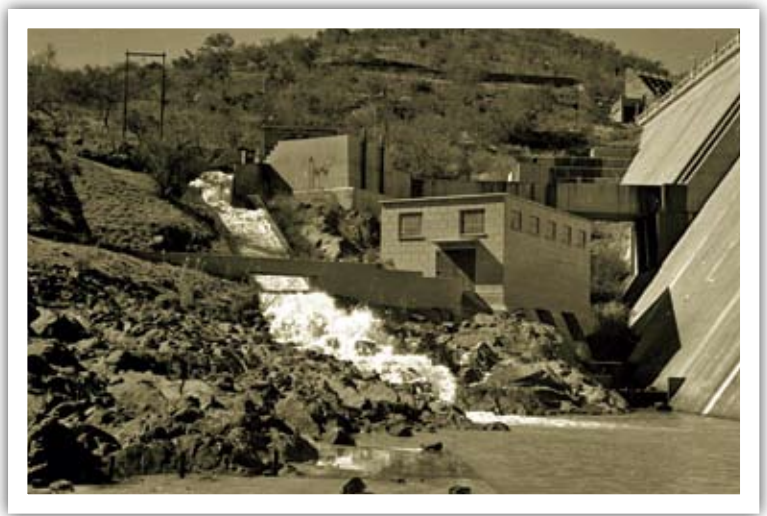


DWAF/eWISA

The original dam wall of the Loskop Dam, completed in 1938, was 45 m high.

DWAF/eWISA

A historical downstream view of the original Loskop Dam prior to the raising of the wall.



DWAF/eWISA

A historical photograph of the main canal flowing from the Loskop Dam. The total length of the canals from the Loskop Irrigation Scheme is 480 km.

was the prospect of a railway service to the area.

IRRIGATION SCHEME INVESTIGATED

In 1929, the Minister of Irrigation instructed the Irrigation Commission to investigate the possibility of the Loskop Irrigation Scheme. After studying the position, the Commission recommended that the Hereford Scheme, which was then under construction, be studied further together with other private schemes, which were developing, before approval was given to a larger scheme at Loskop.

A topographical and soil survey of the dam basin was undertaken during 1933. Eventually the Department of Irrigation and the Irrigation Commission brought out various reports on the success of agricultural crops under the Hereford Scheme and a special sub-committee of Cabinet decided to recommend the scheme to Parliament.

Interestingly, the scheme was placed on the government's Loan Estimates for the year 1934-35, without any recommendations of the Commission having been obtained as to whether it should be constructed or not. The estimate cost of the entire project was £1,5-million.

CONSTRUCTION OF THE DAM

Construction of the Loskop Dam on the farms Loskop and Vergelegen started in 1934. As was the case with many other government projects at the time only white labour was used. Initially only married white men were employed on the Loskop Dam construction site. They were paid five shillings a day and provided with free accommodation, food and medical attention.

The number of labourers employed at the end of March 1935 was 460 men. Throughout 1935 and 1936 the Director of Irrigation noted in his report that there was a shortage of labour, especially concerning the construction of the Loskop Dam. The department then asked the Department of Labour to allow it to employ single white men on the project as well.

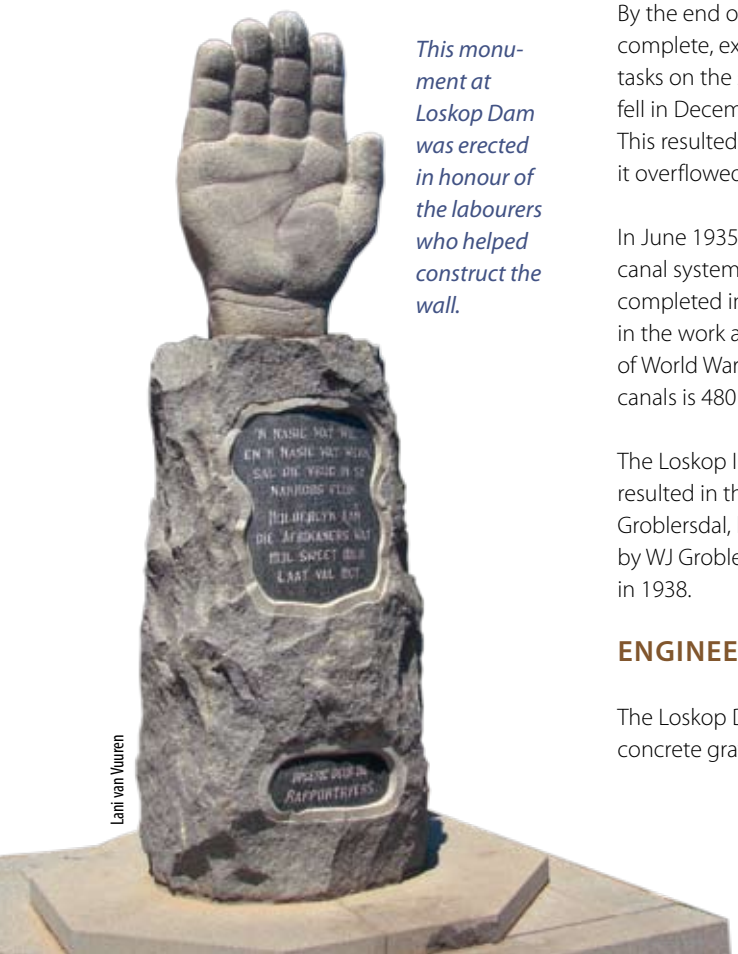
By the end of 1937 the dam was nearly complete, except for a number of minor tasks on the superstructure. Good rains fell in December 1937 and January 1938. This resulted in the dam being filled and it overflowed in January 1938.

In June 1935, a start was made on the canal system, which was eventually completed in 1948, after an interruption in the work as a result of the outbreak of World War II. The total length of the canals is 480 km.

The Loskop Irrigation Scheme also resulted in the establishment of a town, Groblersdal, laid out on a farm owned by WJ Grobler. The town was proclaimed in 1938.

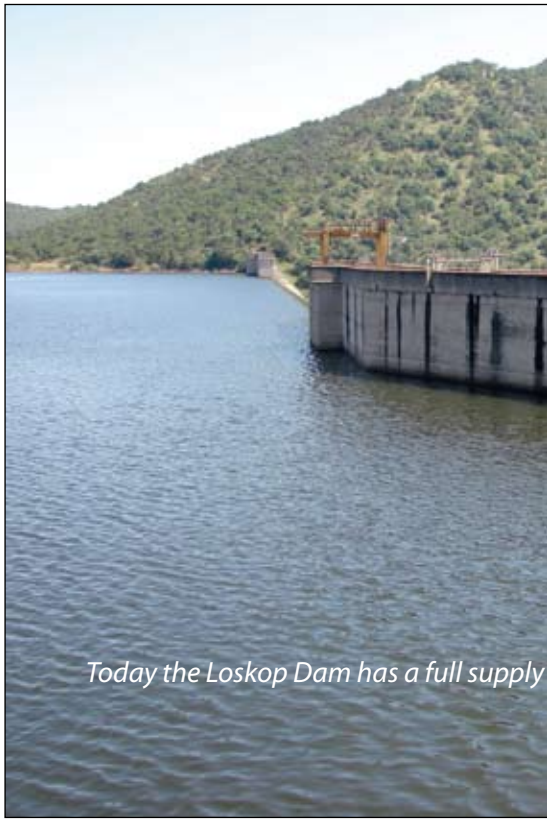
ENGINEERING INGENUITY

The Loskop Dam comprises a mass concrete gravity wall with an ogee crest spillway. The original wall was 45 m high. The dam is well known in engineering circles as the first dam where the so-called Roberts splitter system – an energy-dissipating step and splitter system devised by Lt Col DF Roberts – was used. Lt Col Roberts was the resident engineer at the Department of Irrigation's very first hydraulics laboratory near the dam site. His splitter system



Lani van Vuuren

This monument at Loskop Dam was erected in honour of the labourers who helped construct the wall.



Today the Loskop Dam has a full supply

LOSKOP DAM FACTS & FIGURES

Year of completion	
Purpose	
River	
Nearest town and province	
Type	
Net storage capacity	
Wall height above lowest foundation	
Crest length	
Material content of dam wall (original and raised)	
Type of spillway	
Capacity of spillway	
Surface area of dam at full supply level	
Owner, design and construction	

Source: Loskop Irrigation Board

capacity of 362 million m³.

Lani van Vuuren

	1938 (raised in 1979)
	Irrigation, domestic, industrial
	Olifants River
	Groblersdal, Mpumalanga
	Mass concrete
	348 million m³
	54 m
	506 m
	415 000 m³
	Uncontrolled
	7 750 m³/s
	2 350 ha
	DWAF

was used on the downstream face of the Loskop Dam wall to dissipate the kinetic energy of the overflowing water.

Following this successful application, this system has been widely adopted in South Africa, including on the Nagle and Gariep dams. It has also been applied abroad, for example, on the Victoria Dam in Sri Lanka.

RAISING OF THE DAM WALL

Development in the Witbank-Middelburg area necessitated the raising of the dam wall so that the portion of the assured yield which had in the meantime become affected as a result of the construction of upstream dams such as Rondebosch, Witbank and Doornpoort dams could be restored. By 1971, when the recommendation to raise the dam wall was made, the Loskop Dam system of canals served about 25 000 ha of farmlands.

Between 1974 and 1980 the dam wall was raised by nine metres to a height of 54 m above the lowest foundation level. The geographic formations found underneath the dam made for an interesting engineering project.

The dam is underlain by rhyolitic lava of the Rooiberg Group. Excavation to competent foundation rock was shallow on the left flank and in the river section. However, on the right flank close fracturing and deep weathering had necessitated deep excavation for the old right-flank section.

It was not until the investigation for the raising that the presence of a wide fault zone just downstream of the right flank was discovered. To ensure stability of the right flank, the raised wall was kinked in a downstream direction to cross the fault zone in the shortest possible way. Excavation in the fault zone was up to 16 m deep, but the longer, upper end of the wall could be founded on competent rock at shallow depth. Today, the dam has a total crest length (of which the spillway section is 244 m long) of 506 m.

In the design of the dam provision was made for crest gates in order to facilitate the raising of the dam wall by another four metres at a future stage. The full supply capacity of the dam is 362 million m³. The dam has been constructed to accommodate a design flood of 2 886 m³/s (a 1:200 year flood).

LOOSE HILL OR LOST HEAD?

Urban legends abound when it comes to where the Loskop Dam got its name. The conventional version is that the dam was named after one of the farms it inundated. It is said that 'Loskop' actually referrs to a lone hill in the veldt which was submerged under the dam's water. The story told by tourist guides, however, is that when resident engineer Lt Col DF Roberts died his head was buried on top of a man-made island on the far west side of the dam, and that that is where the dam actually got its name.

HOLY BURIAL GROUND

The ashes of Lt Col Robert were originally buried on an island in the dam. As the raising of the wall was to result in the inundation of the island, the ashes were removed and reentered in a niche on the left flank of the dam wall.

At present, the Loskop Water Scheme consists of 667 properties with an average scheduling of 25,7 ha each. Wheat, vegetables, tobacco, peanuts, cotton, and citrus fruit are cultivated. Furthermore, water from the dam supplies the Hereford Irrigation Board, the Olifants River Irrigation Board, as well as the Groblersdal and Marble Hall municipalities.

SOURCES

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