

Glam dams

Major dam builds in southern Africa were critical to the continued growth of the region. *Hillary Erasmus* reviews some of those featured in this magazine over the past decade.



Christine Jordan

10 year review

In celebration of 30 years in print, *Water Sewage & Effluent* reviews the dams which have featured over the past decade on its pages – but we question whether dam build will be as rife in the decade to come.



Water Sewage and Effluent May 2011

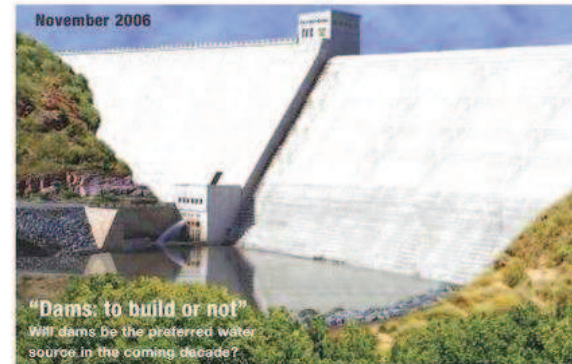
WATER SEWAGE & EFFLUENT
01 May 2011, p.32

Dams have guaranteed security of supply for many a country and *Water Sewage & Effluent* has featured the construction of many of these dams in its 30 years in print. Looking back over the past decade, it seems these bulk water storage systems are, however, not without their detractors. In **November 2006**, in the midst of a decade of features on dam building, the article **"Dams: to build or not?"** challenges this method of water storage and supply. The article questioned whether dams, traditionally regarded as essential in the provision of water, remain the best and most sustainable water source?

Gauteng is the economic engine of South Africa – and it would certainly be challenged in continuing in this role had it not been for the massive supply of water to the area from Lesotho Highlands. Phase 1A of the Lesotho Highlands Water Project included the construction of the Katse Dam, completed in 1998.

In **March 2003**, we read in **"Dam completion marks end of an era"**, that the Mohale Dam – part of Phase 1B – had been impounded in November 2002 and was half full by January 2003 at a depth of 105-million m³. Phase 1A and 1B would yield about 27 m³/second. In January 2003, 2,76-billion m³ of water had been delivered to South Africa which had payed Lesotho about R1-billion in royalties.

In **"Lesotho Highlands Progress"**, **May 2007**, we cited figures from three years' worth of financial statements which showed that royalties made up 2,12% in 2004/2005, 2,17% in 2005/2006 and 2,01% in 2006/2007 of the gross national income of Lesotho. Three years after Lesotho started gleaning money from the royalties of the Lesotho Highlands Water Scheme, Namibia and Angola were at loggerheads about the site for the proposed Epupa Dam on the Kunene River. In **November 2007 – "Dam stalled"** – Erkki Nghimtina is quoted as saying that questions about the stalling of the project were "no longer relevant for



Mohale Dam	
Reason for build:	To provide additional raw water to Gauteng, Mpumalanga, Free State and the North West.
Storage capacity:	958-million m ³
Maximum dam wall height:	145 m
Timeline:	1998 to 2003
Contractors:	Mohale Dam Contractors – a JV between Hochtief, Impregilo and Concor

"Dam completion marks end of an era"

The Mohale Dam was more than half full and supplying water to South Africa as part of Phase 1B of the Lesotho Highlands Water Project. South Africa was paying royalty.

answering", Angola's preferred location for the dam was the Baynes Hills, 40 km downstream of Namibia's favourite spot – close to the Epupa falls. This location is controversial in that while cheaper, it would destroy the environment and require relocation of the Himba people,

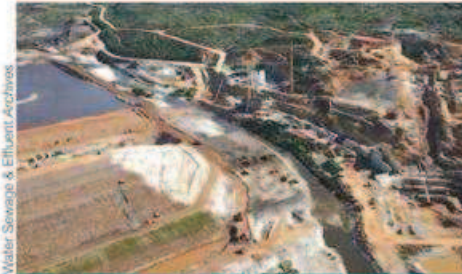
Six years after the completion of Mohale Dam in Lesotho, the joint venture of Gibb and Consolidated Consultants for Engineering & Environment was awarded the USS4,3-million contract as project managers of the Metolong Dam – **November 2009**, **"Dam contract awarded"**. The dam



is part of the Lesotho lowlands scheme which will supply water to Maseru and four neighbouring towns by 2013.

One dam that received extensive coverage throughout the past decade was the Berg River Project. "**Maguga team wins Berg River Dam contract**" was the title of the article in **July 2004** which heralded the selection of the construction team for the Western Cape dam. The Berg River Project Joint Venture, selected in June 2004, was almost identical to the JV which built the Maguga Dam close to Pigg's Peak in Swaziland which had been completed only two years prior.

In **September 2002**, *Water Sewage & Effluent* ran news that **Maguga Dam Joint Venture** had won an award for technical excellence from the South African Association of Consulting Engineers (SAACE). The team had also clinched the South African Institution of Civil Engineering International Award for outstanding civil engineering project of the year. Uniquely, the Berg River Project was the first bulk water resource development in South Africa directly linked to water



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Maguga team wins Berg River Dam contract

The Berg River Project was approved on condition that the City of Cape Town implements a demand water strategy. In 2009, the Trans-Caledonian Tunnel Authority reported that corruption had been rife on the project.

Berg River project

Reason for build:	To overcome impending water shortages in Cape metropolitan area by contributing 81-million m ³ /year of water, increasing the system yield by 18%.
Cost:	R1,8-billion
Storage Capacity:	130,1-million m ³
Maximum dam wall height:	60 m
Surface area:	535 ha
Timeline:	42 months from June 2004 to February 2008
Consultants:	Berg River Consultants: a JV between Knight Piesold, Goba Mohahloti Kevé Steyn and Ninham Shand
Contractors:	Berg River Project Joint Venture: Grinaker-LTA, Group Five, WBHO and Western Cape Empowerment Contractors



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Maguga Dam Joint Venture

The Maguga Dam Joint Venture clinched two awards for the construction of the dam in Swaziland.

Maguga project

Reason for build:	To provide an additional raw water to Gauteng, Mpumalanga, Free State and the North West.
Storage capacity:	R958-million m ³
Maximum dam wall height:	145 m
Timeline:	1998 to 2003
Contractors:	Mohale Dam Contractors – a JV between Hochtief, Impregilo and Concor



WATER SEWAGE & EFFLUENT
01 May 2011, p.34

demand management. By February 2003, the City of Cape Town had reduced water demand 18% below the projected unconstrained demand.

Water restrictions, pressure management and water leaks projects contributed to reduced demand. The implementation of the water demand strategy was the condition for the approval of the Berg River Project.

The city was so successful in its water demand strategy that further water augmentation schemes would only be needed by 2012.

In **September 2005**, in "**Brokers in the water sector**", *Water Sewage & Effluent* announced that the Trans-Caledonian Tunnel Authority (TCTA) had been nominated by Berg River Consultants – a joint venture between Knight Piésold, Goba, Ninham Shand – as Visionary Client of the Year for the then SAACE Excellence Awards. The TCTA was commended for sustainability in project implementation

and as an overarching principle for the Berg River Project, as well as for the Vaal River Eastern Sub-system Augmentation Project. Although the initial timeline was set for 27 months, the dam eventually took 46 months to complete.

In **May 2007**, "**Impoundment imminent**" informed readers that the significant delay was mostly due to geotechnical conditions differing from those envisaged at the tender stage. Four months later, in **September 2007**, the official impoundment given was August 2 2007. Water storage had then begun.

A decidedly negative aspect of the dam build was the discovery by the TCTA that corruption was rife. "**Babes in the wood**", in the **July 2009** edition, Nigel Rossouw, head of environment for the TCTA, reveals the association's shock at the level of corruption and called for more to be done to

manage this risk on future infrastructure projects.

Two months after the announcement of the contractors for the Berg River Dam, *Water Sewage & Effluent* divulged that the estimated cost of a "**New dam investigated for island**" would equal that of the island's annual budget. The island in question was Rodrigues, 600 km east of Mauritius. By **September 2004**, Phase 2 of feasibility studies was being completed. The island relied on boreholes and springs for its water. A site in the Pistache Basin was proposed and rip-rap material would have to be specially selected to protect the dam wall from wave action during cyclonic activity. This is in addition to conventional rockfill on the downstream side of the dam.

When *Water Sewage & Effluent* published "**Dam on the Mooi River**" in **January 2007**, plans for Spring Grove Dam in KwaZulu-Natal were at an



WATER SEWAGE & EFFLUENT
01 May 2011, p.35

September 2004



Water Sewage & Effluent Archives

New dam investigated for Island

Dam design for the 110 km² Indian Ocean island of Rodrigues, built to support tourism, needs to take into account cyclonic activity.

advanced stage, but pending final approval. This was the first dam to be built in central and southern KwaZulu-Natal since Inanda Dam's completion 18 years prior. The dam site chosen was on the Modi River, which joins the Thukela River downstream from Greytown, rather than

the more costly alternative of damming the eMkhomazi River near Richmond. A second scheme, also more costly, was the construction of a large dam at Mearns Weir. Flow capacity of the river system above Midmar Dam would have been limited by environmental constraints.

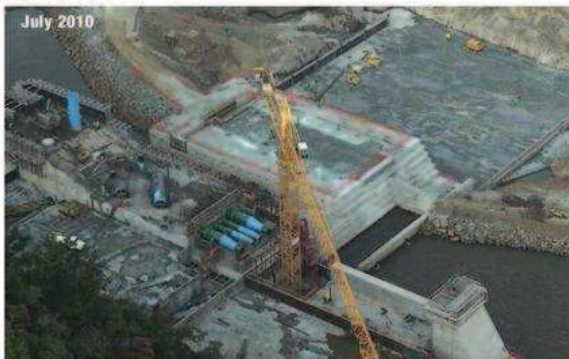
Island Dam

Reason for build:	To realise economic development through tourism by increased water storage capacity
Cost:	estimate: annual capital budget
Storage capacity:	3-million m ³
Maximum dam wall height:	42 m
Length:	280 m
Consultants:	Ninham Shand and Servansingh Jaday & Partners



Water Sewage and Effluent May 2011

WATER SEWAGE & EFFLUENT
01 May 2011, p.37



De Hoop Dam project

Reason for build:	To provide raw water to 22 mines in the Olifants and Steelpoort River catchment areas, as well as to seven towns and rural communities in four local municipalities in Limpopo.
Cost:	R3-billion
Storage capacity:	345-million m ³
Maximum dam wall height:	88 m
Surface area:	2 865 km ²

The Department of Water Affairs (DWA) operates 161 dams and in **September 2010**, in "R600-million for dams", Dr Cornelius Rutgers, deputy director-general: national water-resources infrastructure for the DWA, was quoted as saying that maintenance and improvement of the electrical and mechanical works would be undertaken on 14 high-priority dams by 2012.

This is part of a R600-million rehabilitation project on dam safety. Included in the project is the increased capacity of spillways and improved conditions of foundations and pipelines of dams in South Africa. Of the 42 high-priority dams, 28 have been completed. 40% of the work will go out on open tender and projects vary between R50-million and R200-million.

In **July 2010**, the "White Olifants" alerted readers that construction of the R3-billion De Hoop Dam was making good progress. The size of the dam is 2.5 times the mean annual run-off of the Steelpoort River on which it is located and it will receive a mean annual rainfall of 706 mm. In the same article, we divulged that despite the rosy outlook for the dam completion, the other part of Phase 2 of the Olifants River Water

Resources Development Project (ORWRDP) – the R14-billion bulk water-reticulation scheme – had not even been funded yet. The scheme would feed the water to mines, industry and consumers in the Olifants River catchment area. Far from forging ahead, the scheme was at a stalemate as the TCTA struggled to secure signatures for the "take and pay" agreements from 22 mines which would source water from the scheme.

These agreements were to be used by the TCTA as bankable documents to raise funds. Other mines in the area are already benefiting from the first phase of the ORWRDP – raising of the Flag Boshielo Dam by 5 m at a cost of R5-million.

The dilemma the TCTA is facing with the ORWRDP underscores the importance of supporting distribution schemes for dams. In "Solution for poor distribution", 2007, we reported that the Masvingo province of Zimbabwe had the highest concentration of dams in the country, yet it was suffering food shortages. This was the result of poor distribution lines and as a result, the Manyuchi Dam in the Mwenzi district had to be supplemented by a new irrigation system to provide water for about 600 ha of

'White Olifants'

Construction of the De Hoop Dam is under way, but with mines reluctant to sign "take and pay" agreements, not a metre of pipeline has been laid for Phase 2 of the Olifants River Water Resource Development Project.

workable land. The following year, in **January 2008**, in "Poor state of dams", Dr Abba Ruma, Minister of Agriculture & Water Resources of Nigeria, lamented that the degraded condition of dams in country was impacting negatively on water and food security, as well as on power supply.

While dams are clearly still very much on the agenda for bulk water supply, it will be interesting to see whether this trend will still be evident in the 40-year review of *Water Sewage & Effluent*. Or will Africa have augmented water and wastewater reclamation projects with an increase of desalination along its coastline? Whatever the solution to dwindling water resources, future water planning will be one aspect which governments and their citizens cannot afford to neglect – even if it means paying royalty. ■

Editor's note:

The figures and information supplied on Dikgathong Dam are those of 2008. For an up-to-date overview of the dam and two other dams being simultaneously constructed, read the January 2011 print edition of *Water Sewage & Effluent*.

