

ment processes, including ozone and activated carbon systems, designed to handle a wide variety of raw water quality changes.

UW has consistently met the quality standards for potable water and is confident that it will continue to do so well into the future, including during the staging of the 2010 Soccer World Cup.

#### **Quantity of water**

Projections by UW for the five-year period 2008 to 2013 suggest that there is likely to be an overall annual increase in water demand by its customers of 3.1%. The expected increase is caused by various factors like economic growth, population increase and more consumers using larger volumes of water as their socio-economic conditions improve.

DWAF, as the government department responsible for planning and implementing augmentation schemes, supported by UW, has formulated plans to increase assurance of supply and meet future increased demands.

These plans include the construction of the Spring Grove Dam and the raising of the wall

of Hazelmere Dam by 7m. Both projects will be undertaken by DWAF at a total cost of R390-million. The Spring Grove Dam will be built on the Mooi River to augment water resources of the Mgeni system. The dam is due to be fully commissioned by the end of 2010 (phase 2a) and the additional pump station and pipeline are expected to be commissioned a year later (phase 2b). Work at the Hazelmere Dam is expected to begin later this year. Once completed, the Hazelmere Dam, with its increased storage capacity, will augment water resources within the Mdloti system and become the source of supply to the proposed Dube Trade Port, the new airport, and the rapidly growing urban areas to the north of Durban.

In terms of its contractual agreements, UW has an obligation to supply its customers at a 99% assurance of supply for the Mgeni system and 98% for the Mdloti system. Due to the growth in water demand in the past years, the current levels of supply are at 95% of assurance for the Mgeni system. The Mdloti system is due to reach this level within the next year. This does not mean that the systems are

failing, but rather that the risk of supply constraints has increased marginally. This risk can be reduced either through expanding the water resources or by reducing the water demand.

The importance of undertaking both augmentation schemes is regarded as a matter of urgency. Once completed, the augmentation schemes will restore assurance of supply to 99% for the Mgeni system and 98% for the Mdloti system. Planning is underway for augmentation beyond these schemes. The successful implementation of water demand management initiatives within the supply area is key to minimising the risk of water shortages.

UW continuously monitors the water resource situation and makes changes to the operating rules for these systems where necessary, to ensure that water supply constraint risks are minimised at all times. Notwithstanding this, storage within the Mgeni and Mdloti systems is large enough to buffer the effects of a few years of poor rainfall before supply constraints are considered necessary. Another above-normal rainfall season in the Mgeni catchment will confidently see the region past 2010. **35**



# Refurbish, repair

The Galaxy Panel Reservoir offered an affordable, safe and efficient water storage solution to the Ntabaskop and Insiminya Community Water Supply Scheme's increasing water loss problems.

During early 2003 the Umgeni Water Operations Division experienced difficulties in coordinating water balancing checks in the Ntabaskop and Insiminya areas due to severe water leakages in most of the ferro-cement reservoirs within the reticulated network. In a combined attempt to investigate and resolve the situation, the Umgeni Water Design Support Division was tasked to prepare a comprehensive report together with recommendations of repair, refurbishment or replacement.

Ntabaskop is situated in the Ndwedwe magisterial district located approximately 40km north-west of the town of Verulam, KwaZulu-Natal and falls within the jurisdiction of the Ilembe District Municipality.

The original reticulation scheme was constructed in 1994 as part of a labour intensive project funded by the then Port Natal-Ebdwe Joint Services Board. The second phase was undertaken in 1998 as part of the Reconstruction and Development Programme (RDP) funded by the Department of Water Affairs and Forestry (DWAf). The reservoirs were of varying sizes ranging from break pressure tanks of 1 000l, 50kl and a number of 100kl and 200kl structures. The basic construction method of all the ferro-cement reservoirs was the same: They were circular with dome-shaped roof designs, wall heights of 2.1m and 80mm thick, reinforced with 3.6mm x 100mm mesh placed two layers back to back. The reservoir floors were of 5.6mm x 200mm square mesh covered to form a 100mm thick concrete floor slab.

Close investigation of the reservoirs revealed that their failure was largely attributed to substandard and shoddy workmanship, characteristic of many labour-intensive RDP projects of the time. The larger cracks over the entire structure could have been due to weak concrete mixes. The very difficult terrain, hills and poor site access, compounded by very limited access to good clean water and raw materials have indeed contributed to these failures. The urgency to repair these reservoirs was further compounded by a need to transfer ownership of the reservoirs from the local water committees, supported by Umgeni Water to the newly-appointed

1 to 3: Original ferro-cement reservoirs showing extensive leaks, cracks and sprawling of reinforcement internally

4: Demolishing of reinforced ferro-cement reservoirs, walls demolished to floor level, leaving concrete base only

# or replace?

water services authority and provider, Ilembe District Municipality. Before any transfer could be undertaken, the reservoirs had to be presented in a fully operational and leak-free condition to the Ilembe District Municipality. The results of the investigation done by Umgeni Water included many thoroughly researched options including:

- the use of cementitious repair products
  - the use of bituminous torch-on and paint-on methods of repair
  - the installation of bladder-type liners inside ferro-cement tanks.
- All the above were deemed temporary and unsatisfactory as they provided no lasting warranty/guarantee.

Replacement of the reservoirs was then proposed as an alternative method, including:

- Pressed steel tanks – these were found to be exorbitantly expensive and required the tanks to be positioned on base supports which was too difficult to achieve given the difficult terrain and limited space available on some sites.
- Prefabricated concrete reservoirs – this particular construction method comprises the installation of a series of in situ vertical concrete columns interspaced with precast concrete walling on a concrete base, with all the joints sealed with a bitumen sealant to render the tank waterproof. These are usually roofed with galvanised sheeting. Firstly, these tanks need high-load access roads for delivery to the site, which leads to extra expense and construction possibly being hampered by difficult terrain. Secondly, the need to undertake the ongoing maintenance required by these types of reservoirs and, thirdly, the need to always have water in the tank led to this design not being considered.

Galaxy reservoirs were recommended for a number of reasons, including:

- more than R450 000 cheaper than prefabricated concrete and as much as R930 000 cheaper than pressed steel
- only option to offer a ten-year non-leak guarantee which was welcomed by the Ilembe District Municipality
- the reservoir was constructed on the existing ferro-cement floor/base, requiring minimal site preparation and concrete work
- ease of assembly and construction facilitated that all reservoirs could be replaced
- short contract period and speedy delivery times
- the reservoirs can also be increased in volume or dismantled and reassembled elsewhere.

In a record period of less than three months the ferro-cement reservoirs totalling 17 units, were demolished, the existing floors were levelled where necessary and the new reservoirs were installed and commissioned. **35**

- 5: Installation of the new reservoir inside the 'old reservoir'  
6: Installation of the roof before final trimming  
7: Galaxy break-pressure tank alongside the decommissioned ferro-cement break pressure tank  
8: Operational reservoir used for advertising by Ilembe District Municipality

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