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Algoa Water Supply Area reconciliation strategy study and NMBM's drought emergency measures

INTRODUCTION

In 2008 the Department of Water Affairs (DWA) appointed Aurecon and Afri-Coast Engineers to develop a reconciliation strategy for ensuring a sustainable future water supply for Nelson Mandela Bay Municipality (NMBM) and for the other towns and the irrigators served by the Algoa Water Supply System (AWSS). The reconciliation strategy was invaluable to NMBM for selecting emergency drought interventions to mitigate the effects of the severe drought of 2009/2010, which had a recurrence interval of between 1 in 50 and 1 in 100 years.

THE SYSTEM

The AWSS comprises three systems:

- The Western System provides water to NMBM from the Churchill and Impofu dams on the Kromme River, from the Kouga Dam on the Kouga River and from the Loerie Balancing Dam on the Loerie Spruit, a tributary of the Gamtoos River. This System also supplies water to various small towns and to the Gamtoos Irrigation Board.
- The Eastern System receives water transferred from the Gariiep Dam on

the Orange River via the Orange–Fish Tunnel, the Fish River, the Fish–Sundays Canal, the Skoenmakers River, and Darlington Dam.

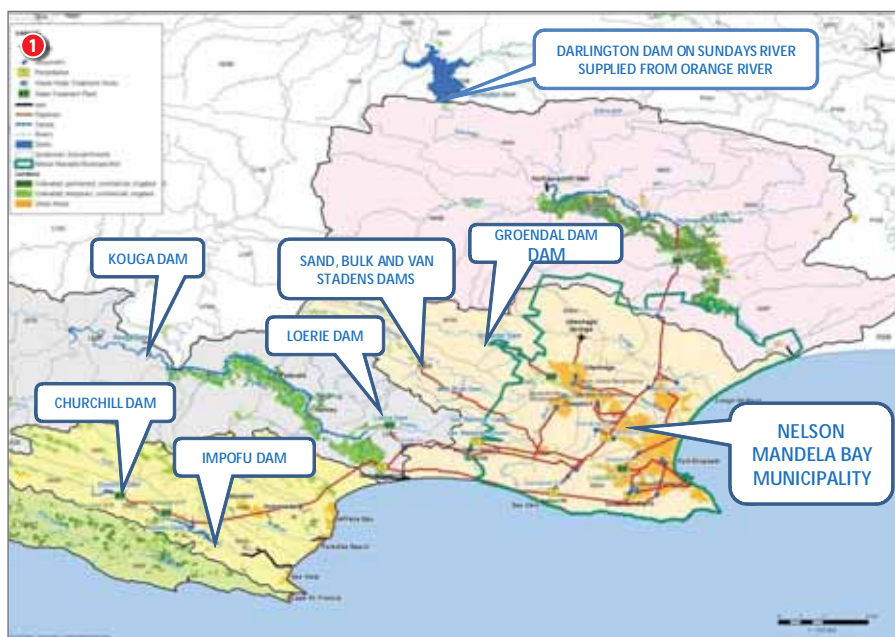
- The Central System consists of the older Sand, Bulk, Van Stadens and Groendal Dams and the Uitenhage Springs, all of which supply NMBM. Groendal Dam also supplies water to irrigators.

The combined yield of these sources at an assurance of 1 in 50 years is 147,5 million m³/a, of which 99 million m³/a (271 Mℓ/day) is for urban use by NMBM and other small towns, and

48,5 million m³/a for irrigation. By 2010 the requirements of NMBM had grown to about 300 Mℓ/day and had exceeded the combined 1 in 50 year yield of the AWSS.

THE ALGOA RECONCILIATION STRATEGY AND THE DROUGHT

The Department of Water Affairs Reconciliation Strategy developed low- and high-growth future water requirement scenarios for NMBM for a 25-year horizon. These requirement scenarios included the probable future industrial (non-potable) water requirements of the



① The Algoa Water Supply System

② Reconciliation of future water requirements of the Algoa Water Supply System (AWSS) and supplies provided by additional interventions

Coega IDZ. The Strategy investigated a number of possible future interventions that could be implemented to meet these water requirement scenarios. These interventions were assessed in terms of yield, infrastructure constraints, environmental impacts, cost for various discount rates and time taken for implementation. The interventions included water conservation and water demand management (WC/WDM), local surface water supply schemes, groundwater schemes, additional supplies from the Orange River, waste water re-use and desalination.

The development of reconciliation scenarios comprised the formulation and assessment of various sequences of intervention development to meet the alternative low- and high-growth water requirement scenarios. Eight scenarios were assessed, three of which included the possible effects of climate change and/or the potential impact of implementing ecological Reserve releases from the existing dams.

The Reconciliation Strategy assisted NMBM to identify interventions to be fast-tracked to mitigate the impact of the drought and the growth in requirements. The Strategy also showed that the construction of the schemes to treat and re-use water from the Coega and Fishwater Flats Waste Water Treatment Works for industrial use in the Coega IDZ could be deferred until about 2021, as industrial water for the Coega IDZ could initially be supplied by the

Nooitgedacht Low-Level Scheme as indicated in Figure 2. Thereafter these re-use schemes should be the next major augmentation schemes for the AWSS.

The Algoa Reconciliation Strategy Study was completed in April 2010, and made the following recommendations:

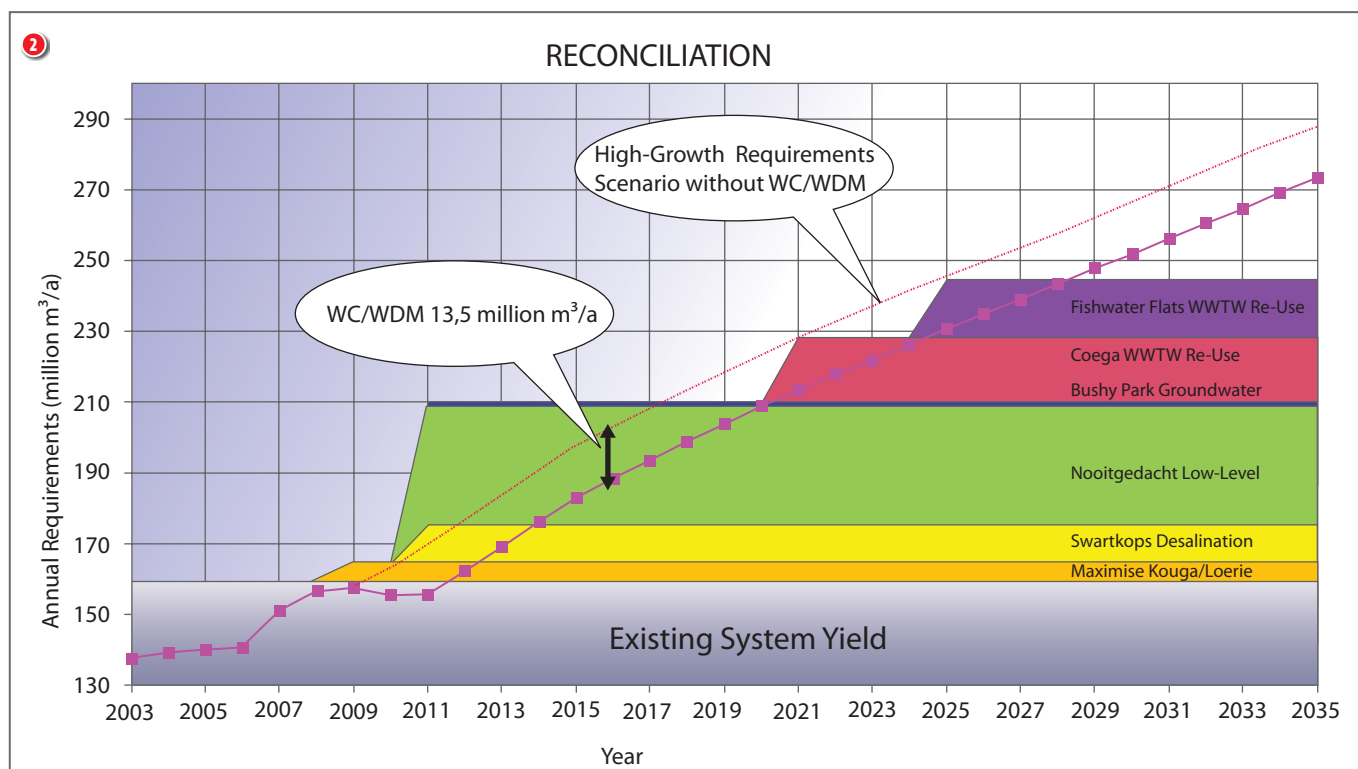
- A Strategy Steering Committee with representatives from NMBM and other significant water users should be established to monitor and update the future water requirement scenarios and to monitor the implementation of the actions identified by the Strategy.
- NMBM should continue to maintain and expand the suite of water conservation and water demand management measures that it implemented during the drought emergency.
- A number of studies should be undertaken to ensure that actions can be taken and that schemes can be evaluated and, if necessary, implemented before the requirements exceed the available supplies. The interventions to be studied include alternatives if the Orange River allocation is reduced in the future, the Kouga Dam augmentation scheme, various groundwater development schemes, the use of treated waste water and the desalination of sea water.

management (WC/WDM) measures as the first and most crucial step to ward off a water supply crisis arising from the drought and the growth in requirements. These measures included leak detection and repair, household plumbing repairs, an improved tariff structure, an effective awareness creation campaign, more informed billings, as well as a proactive call centre. NMBM implemented these measures rapidly and cost-effectively and, together with water restrictions, reduced the water requirements of 300 Mℓ/day (which exceeds the available 1 in 50 year yield) to less than 240 Mℓ/day.

The Reconciliation Strategy had shown that improving the operation of Loerie Dam could increase the yield of the Kouga Dam/Loerie Dam sub-system by about 14 Mℓ/day and this measure was immediately implemented by DWA, NMBM and the Gamtoos Irrigation Board. The Strategy had also identified the Nooitgedacht Low-Level Scheme, which the NMBM had been investigating as a next possible augmentation option, for accelerated implementation. This enabled NMBM to expedite this scheme which will supply an additional 90 Mℓ/day from the Orange River to NMBM. As the Orange River catchment has not been impacted by the local severe drought affecting the local sources of supply, this scheme will greatly relieve the pressure on the local supply schemes from surface water resources.

DROUGHT MITIGATION MEASURES

NMBM implemented aggressive water conservation and water demand



The NMBM also decided to take the steps that would be necessary to enable the proposed 30 Mℓ/day Swartkops Desalination Scheme to be rapidly implemented. The site of the old Swartkops Power Station was selected on account of the relatively low environmental impact that the desalination plant would have at this location, the opportunity to dispose of the brine via the existing outfall of the Fishwater Flats Waste Water Treatment Works and the proximity to existing water supply and electricity infrastructure

Although the Nooitgedacht Low-Level Scheme has been accelerated and is scheduled for completion by July 2012, there is still a risk that this scheme may not be implemented in time to mitigate the effects of the drought. It is therefore of paramount importance that effective water conservation and water demand management is continued and further amplified.

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studies, was approved within six months. However, unless the required funding can be realised, this scheme will not be constructed at this stage. The NMBM has also decided that, as the Swartkops site can only accommodate a 30 Mℓ/day desalination plant, another site should be found where further phases could also be accommodated, up to at least 70 Mℓ/day. The desalination plant is still to be constructed as the next major augmentation intervention, after completion of the Nooitgedacht Low-Level Scheme, and when funds can be sourced.

SUMMARY

From the foregoing it is clear that the current situation in the Algoa Water Supply System is critical. The Algoa Reconciliation Strategy has put in place various scenarios to address the challenges, and it has borne fruit even before completion, in that the NMBM was put in a position where decisions on emergency measures could be taken very quickly, because the interventions for future implementation had already been identified. □

Source :

http://www.saice.org.za/downloads/monthly_publications/2011/2011-Civil-Engineering-june/#/0