SOUTH AFRICAN
ACADEMY OF ENGINEERING

Building a Better post-COVID Water Sector

Advisory Note 5: Revision of operating rules for the Lesotho Highlands Water Project.

Revised operating rules for the Lesotho Highlands Water Project are currently being negotiated. South Africa must use the opportunity to improve operation, reduce waste and keep the region water secure.

The 14 dams of the Integrated Vaal River Supply System (IVRS)* provide a reliable water supply to the economic heartland of South Africa, with Gauteng as hub. However, increasing demand due to growth in population and economic activity is placing the system under strain.

Additional supplies will be provided by the Polihali Dam and Tunnel, the 2nd phase of the Lesotho Highlands Water Project (LHWP2). However, this will not be completed until 2028 at the earliest. Until then, the IVRS will not be able to supply more water than at present without putting the region at risk of severe restrictions in the event of a drought.

Already, major water users such as municipalities have been told that they cannot expect to receive additional supplies. They will have to meet growing demands for water by reducing wastage and the volumes that their consumers use. But savings can also be made by the operators of the IVRS.

At present, the way the IVRS is operated wastes water. When there are good rains, instead of storing the water to use when it is needed, the Katse and Mohale dams in Lesotho release a continual flow to Vaal and Bloemhof Dams. If those dams are full, water from the IVRS simply runs to the sea.

So in April of this year, when both Vaal and Bloemhof were full and overflowing (the Vaal Dam at 105% capacity and Bloemhof at 109%), water continued to be released from Katse and Mohale even though they were still recovering from earlier drought and only 79% and 40% full, respectively. As a result, a huge volume of water that could have been stored in Lesotho's dams flowed to the Atlantic Ocean and was lost

Office of the President/Chairman

PO Box 13071, Hatfield 0028
Cell: 072 594 1441
E-mail: office@saae.co.za
Web: http://www.saae.co.za

to potential users. The amount lost was equivalent to almost 8% of the total IVRS storage capacity, sufficient for almost 6 months of supply to the users served by Rand Water.

This approach also increases evaporation, another source of water losses. Less water would be lost through evaporation if it was stored in Lesotho's deep cool dams rather than in the shallower and warmer Vaal Dam.

This inefficient operation puts the security of IVRS users at risk and should be ended. This will require amendments to the agreement between Lesotho and South Africa on operating arrangements. However, the current negotiations are only considering the operation of the new Polihali Dam. Their scope must be expanded to address the whole LHWP system, as was intended under the revised Treaty between the countries.

At present, Lesotho has an incentive to keep letting the water run down from the Drakensberg, even if it is then wasted. The original LHWP Treaty agreement, signed in 1986, allowed Lesotho to build the 72MW Muela hydropower station as an ancillary development, using the water released to South Africa, to generate electricity.

If it agrees to change its operating routines and keep additional water in storage rather than always releasing a constant flow to generate electricity, Lesotho will have to be compensated financially or in kind to ensure that its users and institutions are no worse off than before. In addition, the South African government will have to guarantee that South Africa's ESKOM will supply electricity to Lesotho under conditions no less favourable than those enjoyed with Muela generating.

For South Africa, the costs involved will be small compared to those that would be caused by severe drought restrictions across Gauteng and the wider IVRS. Cape Town's 'Day Zero' experience cost the City billions of Rand, so compensation to Lesotho for the insurance provided by their storage would be cheap at the price.

Greater cooperation in water releases may also bring additional benefits to Lesotho if it can coordinate with ESKOM to generate electricity at peak periods, when it is more valuable, particularly as the proportion of intermittent renewable sources supplying South Africa's grid increases. Tourism, recreational uses and fish farming activities in Lesotho may also benefit from higher and more predictable dam levels.

Detailed technical consultations between water and electricity authorities in both Lesotho and South Africa will be required to design, agree and implement new operating arrangements. However, the operating and royalty payment negotiations now underway are only focusing on LHWP2. It is urgent to ensure that these additional issues are placed on the agenda and finalised as part of the revised LHWP agreement.

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The South African Academy of Engineering (SAAE) recommends that this matter be addressed by the Minister of Water and Sanitation in consultation with his counterparts in the Departments of Minerals and Energy, Public Enterprises, International Relations and Cooperation and National Treasury. SAAE and its Fellows stand ready to support the process if required.

Prof E Kearsley
President, South African Academy of Engineering
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* The Integrated Vaal River System includes dams in the Orange/Senqu, Thukela, Usutu and Komati river basins as well as and links to the Olifants Basin, as shown in the diagram attached.

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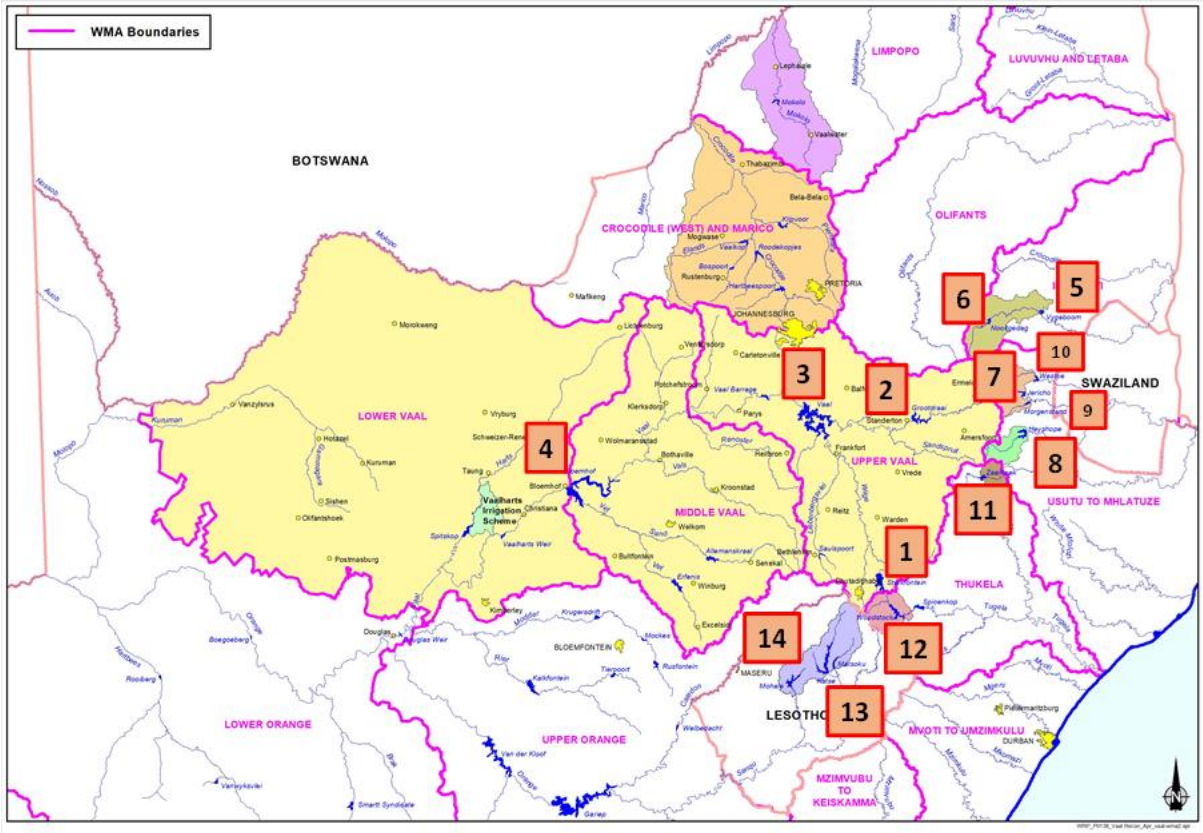
DAMS OF THE INTEGRATED VAAL RIVER SYSTEM



Catchment	Dam	Gross storage (million m^3)	Net Storage (million m^3)	Reference as per locality map
Vaal	Sterkfontein	2617	2617	1
Vaal	Grootdraai	350	350	2
Vaal	Vaal	2610	2603	3
Vaal	Bloemhof	1240	1240	4
Komati	Vygeboom	83	78	5
Komati	Nooitgedacht	78	78	6
Usutu	Jericho	60	59	7
Usutu	Heyshope	447	445	8
Usutu	Morgenstond	101	100	9
Usutu	Westoe	61	60	10
Thukela	Zaaihoek	184	184	11
Thukela	Woodstock	373	373	12
Senqu	Katse	1950	1519	13
Senqu	Mohale	947	857	14

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