



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD



WATER OUTLOOK 2018 REPORT

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Produced by Department of Water and Sanitation
City of Cape Town

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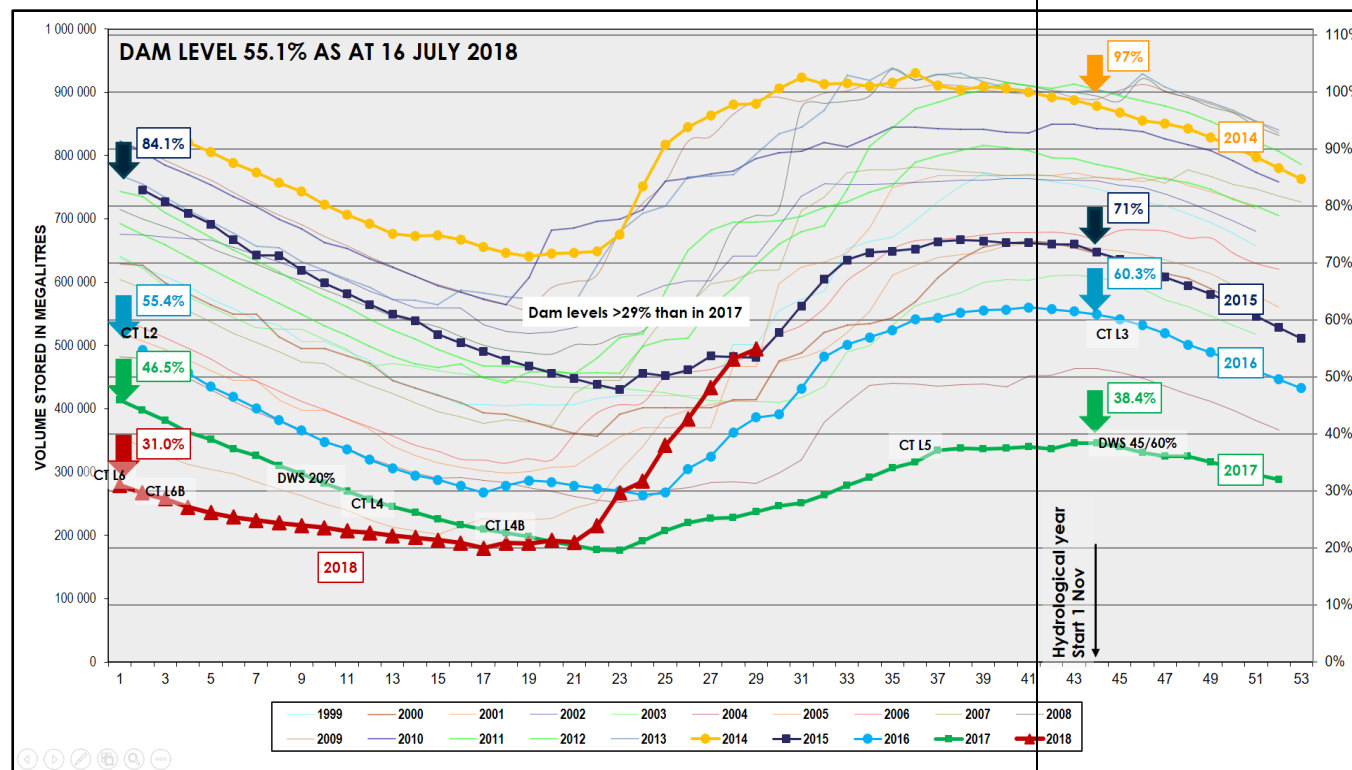
INTRODUCTION:

The City's Water Outlook was first released early in January 2018. Circumstances have changed significantly since then, in that dam levels bottomed out above 20% thanks to enforcing restrictions on agricultural users and reduction in urban consumption. The rainy season started late in April, and the region has experienced average rainfall to the end of June which increased dam levels by ~25%. The water outlook has thus significantly improved, and this version will focus on the current outlook rather than updating previous versions. For background information, previously released versions of the Water Outlook can be found at www.capetown.gov.za/waterreports.

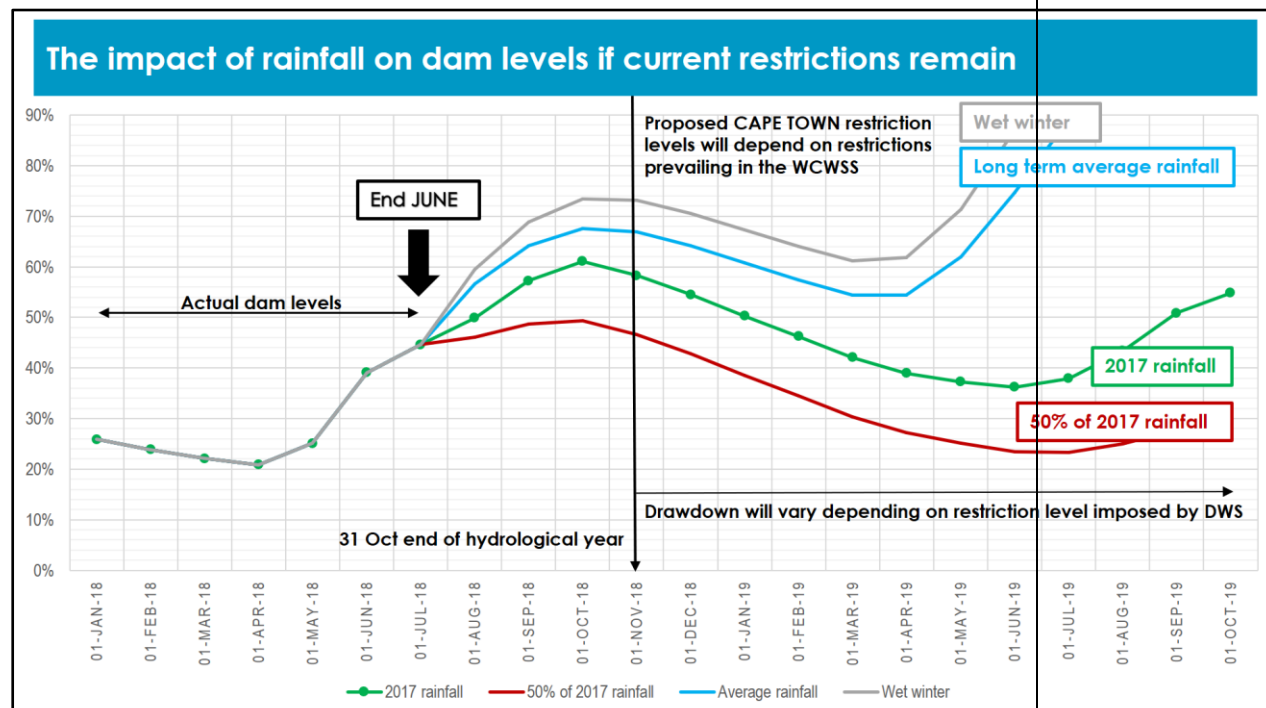
Although dam levels have greatly improved, Level 6 restrictions are still in place and will be until the national Department of Water & Sanitation (DWS) reduces urban restrictions. Lowering of restrictions prematurely is not advisable and will need to happen incrementally to ensure that dam storage is not compromised as there is no guarantee of how much rain will fall for the balance of this year or in next winter. The City is committed to ensure water security and to avoid a repeat of the severe restrictions necessitated by the current drought. This requires close cooperation with the DWS to provide resilience in reconciling the available system yield with required future water sources as well as managing the supply system according to the established rules. System modelling indicates that dam levels could have been significantly higher had rules been applied appropriately.

RAINFALL 2018 IMPACT ON DAMS & RESTRICTIONS:

The South African Weather Service (SAWS) has confirmed that rainfall for both May and June 2018, compared to average rainfall, was 75% and higher. There are sustained, almost countrywide indications for above-normal rainfall for the period through to September, but there is still no confidence for this period. Mindful of a similar outlook in July 2017 which did not eventuate, it is important not to reduce restrictions in haste.



2018 dam behaviour can be seen plotted against that of the past 20 years. The shape of the curve for 2018 is important as it is evident that storage has been tightly managed through reduction in demand. At the beginning of 2018, dam levels were 15.5% lower than in 2017. The impact of the average rainfall in 2018 can be seen on the impact on dam levels, which by the middle of July exceeded that of 2015 (which was the first year of unprecedented low rainfall) when there were no restrictions in place.



Dam behaviour and anticipated storage is modelled by using water usage and probable runoff. The exceedingly poor rainfall in 2017 resulted in the actual dam levels dropping below the 2% probability range at the end of May, July and August 2017. A more conservative approach was then introduced, modelling dam behaviour on the same poor rainfall of 2017, with the rainy season modelled between May and October.

As we are only halfway through the rainy season, much can still change which will determine where dam levels will be at the end of October. Modelling a couple of scenarios between very low rainfall to that of a wet winter indicates that it should be possible to reduce restrictions at the end of October. The current gazetted notice from DWS provides that restrictions would lapse only if dam levels are above 85% at the end of October.

The City has drafted a recovery plan with a structured approach to recovering from the drought, and bedding down restriction levels, concomitant tariffs, pressures and demand. In an effort to provide relief to customers under strain of Level 6B tariffs, and given that dams are at 2015 levels, the City will endeavour to reach agreement with DWS to introduce interim restrictions before the end of October, based on dam level and storage tracking above the 50% stochastic probability. Due to continued dependence on rainfall and uncertainty around climate change a cautious approach must be followed to safeguard the supply system from having to move to such extreme restriction levels again.

DEMAND MANAGEMENT:

While the urgency has shifted from not running out of water towards ensuring long-term water security and sustainability, official restrictions still need to be met. At present the City is on a trajectory to achieve a 41% saving, which is less than the DWS-imposed restriction of 45%. The City has thus continued with demand management interventions as the demand has been fluctuating around 520 MLD for a number of weeks. This is a reduction of nearly 60% from pre-drought summer peak use resulting in a gross¹ average consumption of ~125 lcd for a population of ~4 million down from 200 lcd pre-drought. The average across urban metros in South Africa is approximately 270 lcd. The World Health Organisation promotes a minimum of 50lcd for intermediate access such as in severe drought situations and 100 lcd as optimal access to promote health.

WMDs: The City has been installing water management devices to manage debt for many years. The programme has been dramatically ramped up to households who have not reduced consumption to restrict daily household consumption and safeguard against the impact of leaks. In many cases this was due to undetected leaks, but under level 6 restrictions, the city has been installing these where consumption is higher than 10.5kl/month.

The rollout was aimed at hitting highest consumption first, with a target of 3,000 installations a week. Average number of installations since October is ~1,500 a week, and this has reduced in line with the number of households with excessive consumption. In the past 6 months, the number of high consuming non-indigent households has reduced by 61% and high-consuming indigent households by 44%.

The rapid rollout resulted in spikes in WMD "no-water" notifications of which the majority of calls logged have been due to undetected leaks and households depleting the daily allocation and not due to faulty installation or meter issues (~15%). While Level 6 restrictions are in place, consumers are urged to be vigilant in leak detection as the current tariffs result in bills rapidly ramping up with excessive water use.

City's advanced pressure management and related leak-fixing programme is saving **66 MLD** as at 10 July 2018, including 61 MLD from pressure reduction, 3.5 MLD from reticulation leak repairs & 0.3 MLD from indigent household leak fixing.

Pressure management has been introduced on **163 zones** across the City so far, covering 4 804 km (45%) of the 10,594 km total possible length of reticulation. The current programme will continue until 6,210 km (59%) of reticulation will be managed, and all zones can be controlled to ensure optimal water conservation.

¹ Where gross consumption includes total water produced i.e. including business, commerce, water losses etc.

SUPPLY MANAGEMENT

During the drought crisis, the City has focussed on driving down demand and initiated some short term augmentation projects as part of the water resilience programme. Interactions with DWS were aimed at optimising management of the system of dams and ceasing agricultural releases once restriction levels had been met. As dams are now in a more stable situation, the focus in consultation with DWS needs to move towards water resilience for the supply system. This includes improving governance, catchment management, supply system management, system yield under updated hydrology and confirming allocations.

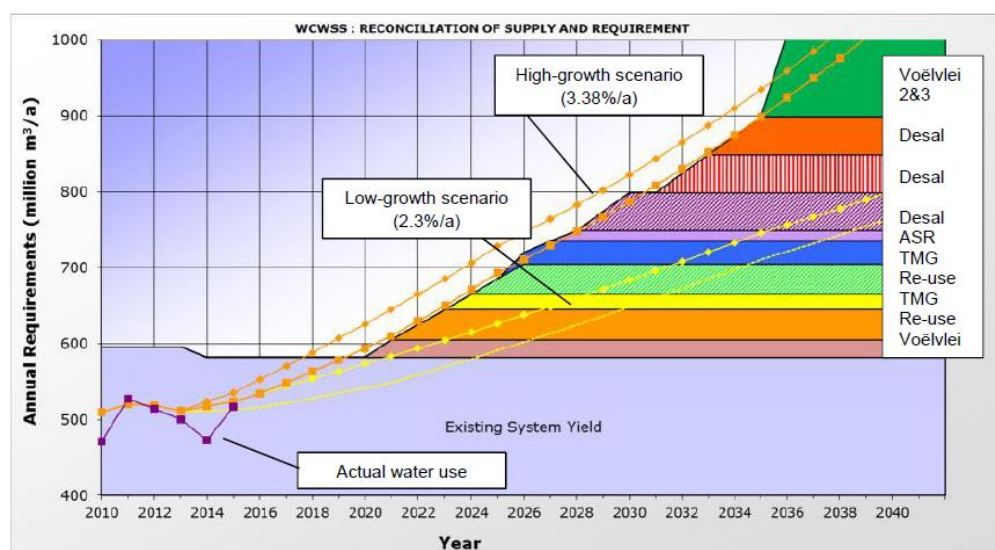
Review of Cape Town Augmentation: Third party expert advice on augmentation resulted in a change in focus at the end of 2017. This was again confirmed in 2018 when a second desalination expert provided advice to the City². The cost of water sources other than surface water necessitates careful consideration given the permanent impact of augmentation on the water tariff. There thus needs to be a balance of urgent implementation of augmentation projects without incurring excessive fast-tracking costs.

In the long-term, it is possible to provide water security through significant volumes of non-surface water. The sustainable yield (with recharge) of the final phase of licenced ground water sources exceeds 200 MLD. In addition, Cape Town could produce over 200 MLD of potable water from wastewater. The quantity of water available from the sea is only constrained by the high cost that would be incurred in desalination. Of the three 'new sources' of water – ground water, wastewater reuse and seawater desalination – only desalination is totally independent of rainfall.

DWS is responsible for developing further surface water schemes which form part of the WCWSS reconciliation strategy. Responsibility for non-surface water schemes has not been conclusively defined. Where groundwater enters the municipal reticulation system, it appears logical to be a municipal responsibility. Similarly, treating municipal wastewater to potable standard can be reasoned to be a municipal responsibility as wastewater treatment works are owned and operated by the municipality and in the case of Cape Town, these lie within the metropolitan boundary. Aligned with these considerations, the City has committed to the following:

- **Groundwater:** the combined yield in the first phase provides ~100 MLD. The cost of operating the three groundwater schemes will inform the speed of roll-out, and once the Phase 1 schemes are operational, the development of further phases and schemes are expected to be easier;
- **Re-use:** Water re-use schemes include both recharge of Cape Flats Aquifer as well as treating water to drinking standard at Faure water treatment plant to provide 70 MLD. Depending on the long-term City growth requirements, this is likely to be extended to other wastewater treatment works around the metro;
- **Desalination:** The cost and complexity of large-scale desalination projects requires significant time to develop. The optimal location, scale, responsibility and timing is still under consideration.

The reconciliation strategy status will be updated from the 2016 report shown below to reflect the impact of the drought and any other factors on the system yield. Following the drought, it is also necessary to evaluate whether the City's level of assurance of 1:50 provides sufficient water security weighed against the cost of provision of a higher level of assurance. This, together with the anticipated bounce-back and growth in demand will determine the timing and quantum of additional water sources required in the supply system.



Over the past year, the City initiated a number of small scale augmentation projects delivering modest yields which were not in sequence with the reconciliation strategy:

- Springs & rivers – consistent yield of **7.5 MLD** increasing during rainy season;
- Atlantis aquifer – sustained yield of **5-12 MLD**;

- Temporary desalination – maximum yield of **16 MLD**. To date this has peaked at ~8 MLD with Monwabisi 7 MLD to come into system in July;
- Temporary transfers – Greenland transfer provided **7 MCM** (million cubic meters) in the first quarter of 2018.

Augmentation Projects Committed to and in Progress

- **Cape Flats Aquifer (CFA):** License conditions provide for three phases of extraction of **20, 25 & 30 MCM/year** respectively. This translates to a sustainable yield of **55 – 83 MLD** and a peak yield of between **83 – 124 MLD**. Conditions have been such that progress has been slower than planned, but the licensed yields are the ultimate target for permanent augmentation. The license conditions further require artificial recharge of between **12 – 25 MCM** for the three phases, for which the projects are in design;
- **Table Mountain Group aquifer:** License conditions cover three phases at a number of locations providing for a yields of between **42 & 130 MCM/yr** translating to **115 – 355 MLD** sustainable yield. As with CFA, it may take considerably longer than originally planned to realise the yield but work will continue until the licensed yields are achieved. Due to environmental sensitivities, initial work will be confined to Steenbras which license provides for **12-35 MCM** translating to **33-96 MLD** over the three phases;
- **Atlantis & Silverstroom aquifer:** potential for an additional **20 MLD** – injection into the system in design;
- **Berg River Voelvlei augmentation scheme (BRVAS)** in progress by DWS to yield **60 MLD** by 2021;
- **Zandvliet temporary re-use** scheme was part of the section 29 projects funded in Dec 2017, and will be complete towards the end of 2018;
- **Faure permanent re-use:** This project is in design to provide **70 MLD** (expandable to 90 MLD) of re-use water from Zandvliet & potentially Macassar into the raw water supply from Steenbras at Faure water treatment plant;
- **Alien vegetation clearing:** The impact of unmanaged alien vegetation on the system yield has been calculated as significant, currently in the region of 20 MCM. The city has accelerated programs in its own catchment areas and will work with other spheres of government and stakeholders to cover all relevant catchments. (Thirsty alien plants use water before it can reach the dams.)

Augmentation Still to be Triggered:

- **Permanent desalination:** procurement of a permanent desalination plant has not commenced. a project is in progress to enable water quality sampling over an extended period to feed into the site selection process for permanent desal. While the immediate requirement to augment supply has not been agreed, undertaking an updated feasibility study is seen as a no-regret endeavor.
- **Further augmentation through WCWSS reconciliation strategy:** The reconciliation strategy is currently being updated by the WCWSS, incorporating the updated hydrology and the impact of the three-year drought. For Cape Town alone, accounting for anticipated growth will require an additional 30 MLD every year. Additional water schemes will thus be a requirement into the future.

SUMMARY

1. Collaborate with DWS to lower restrictions responsibly before end of hydrological year (31 October) to provide relief to customers, while continuing to manage and monitor **dam behaviour** and **rainfall**;
2. Develop an integrated **Cape Town Water Strategy** which will crystallise the financial impact and governance issues surrounding the of level of assurance, optimal augmentation volume, timing and water sources;
3. Continue **demand management** initiatives (in line with NDWS restriction saving required – currently 45%);
4. Continue work on **augmentation projects, focus shifted to sustainability and cost efficiency**;
5. Continue work to inform considerations by the City on **optimal augmentation** types, volumes, methods and responsibility;
6. Continue managing financial impacts through appropriate adjustments to the **tariff structure** and level. Monitor tariff revenues as a result of significant shifts in demand patterns and a steeply inclining block tariff;
7. Continue efforts to improve **coordination** and leadership within and between spheres of government;
8. Continue to improve information flows and consistency of messaging; actively **engage citizens** and stakeholders to encourage active citizenry and stakeholder partnerships to jointly solve problems.

² Reports can be accessed at www.capetown.gov.za/waterreports