From crisis to resilience – how Cape town averted #DayZero

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Contact information

Agnieszka Gajewska
Partner
Engagement Partner for World Bank City Resilience Program
T: + 48 517 140 537
E: agnieszka.gajewska@pwc.com

Lukasz Stanecki
Project Manager for World Bank City Resilience Program
T: + 48 519 506 572
E: lukasz.stanecki@pwc.com

Oliver Redrup
Director
PwC Asia Hub for World Bank City Resilience Program
T: +65 8876 5274
E: oliver.jw.redrup@sg.pwc.com

Yogan Reddy
Partner
PwC Africa Hub for World Bank City Resilience Program
T: +27 83 276 3279
E: yogan.reddy@pwc.com

Piotr Brysik
Senior Associate, CDT member for World Bank City Resilience Program
T: + 48 519 507 194
E: piotr.y.brysik@pwc.com

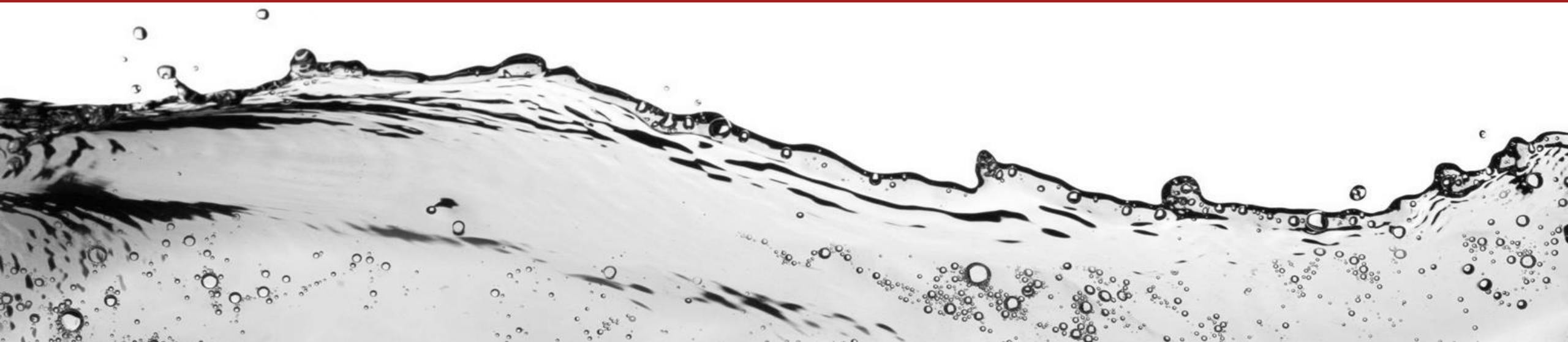
Akshay Kumar
Senior Manager
PwC Asia Hub for World Bank City Resilience Program
T: +65 8876 7726
E: akshay.s.kumar@sg.pwc.com

Jorge Seré
Partner
PwC Latin America Hub for World Bank City Resilience Program
T: +598 988 84 015
E: jorge.sere@uy.pwc.com

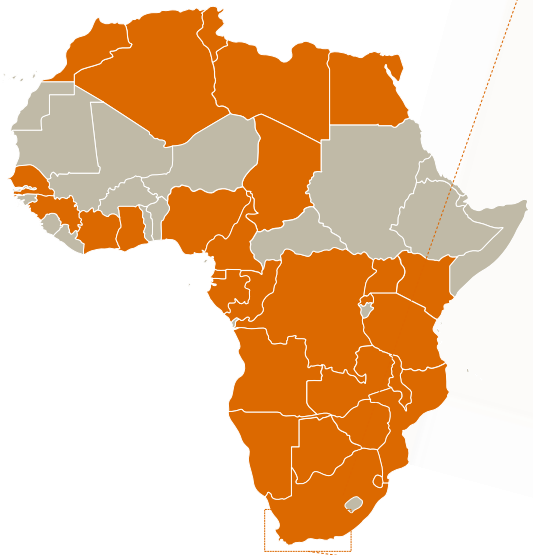
Presentation Overview

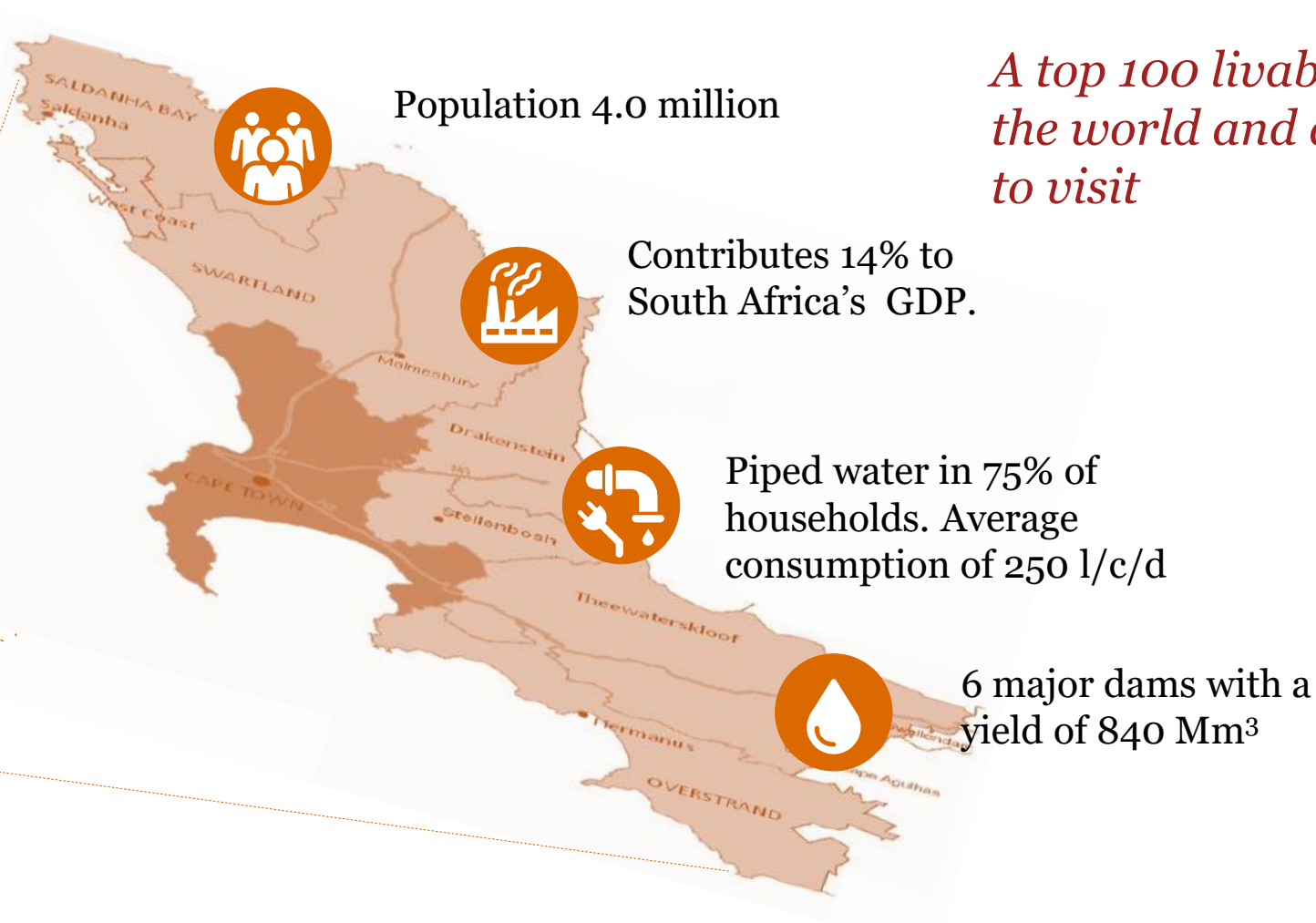
Section	
1	Cape Town: A World Class City
2	Drought
3	Dealing with the srisis
4	Partnering in crisis
5	Building resilience
6	Critical lessons

Cape Town: A World Class City



South Africa's mother city - Cape Town





Population 4.0 million

Contributes 14% to South Africa's GDP.

Piped water in 75% of households. Average consumption of 250 l/c/d

6 major dams with a yield of 840 Mm^3

A top 100 livable City in the world and a top 10 City to visit


ABSA


Len Theivendra

What's driving cape town?

Accelerating urbanisation

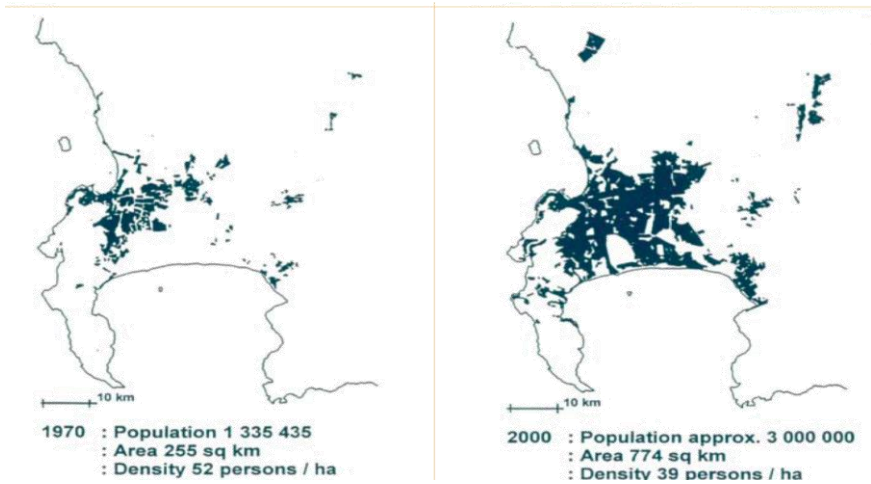
- Population growing at almost 3% p.a
- 2000000 people added to the population in the last 5 years
- Preferred destination for internal migration as a result of perceptions about living standards

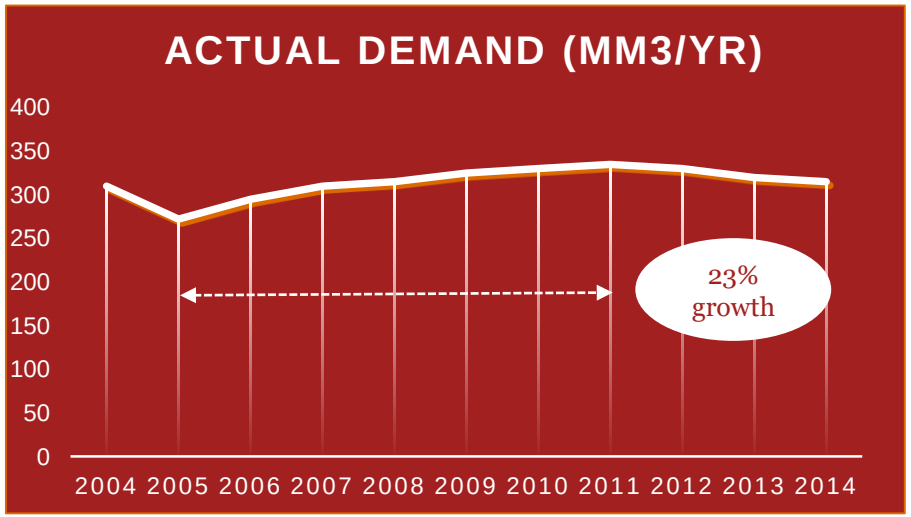
Demographic shifts

- 70 % of the population of working age
- Unemployment level of 22% is lower than national average
- Gini coefficient of 0.62 – high levels of income inequality

Climate change and resource scarcity

- Winter rainfall
- 500 mm of annual average rainfall
- No descernable trends in variation of weather, temperature or other patterns



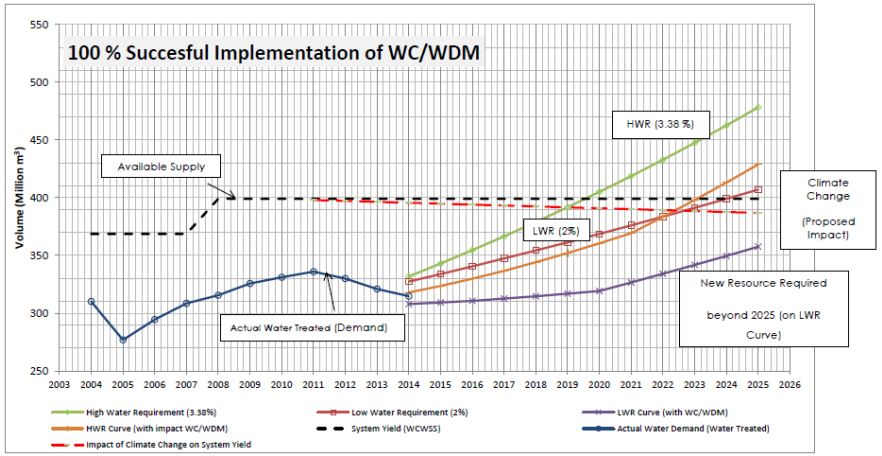


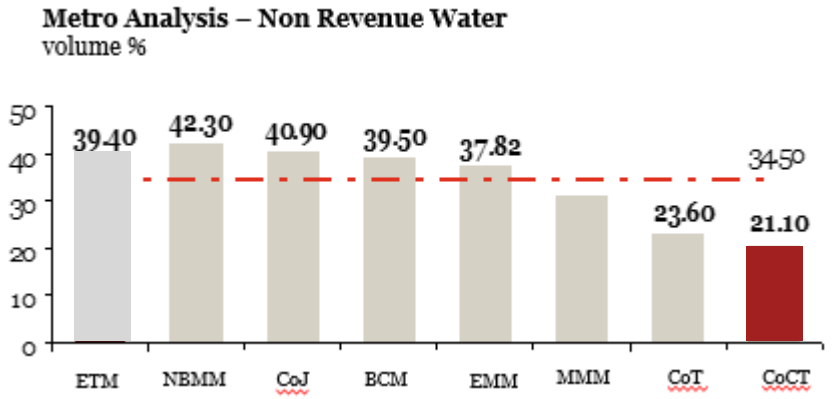
Western Cape Water Supply System

DAM	Capacity (mil m³)
Theewaterskloof Dam	432
Voelvlei Dam	158
Wemmershoek Dam	58
Upper Steenbras Dam	30
Lower Steenbras Dam	34
Berg River Dam	127
Total	839

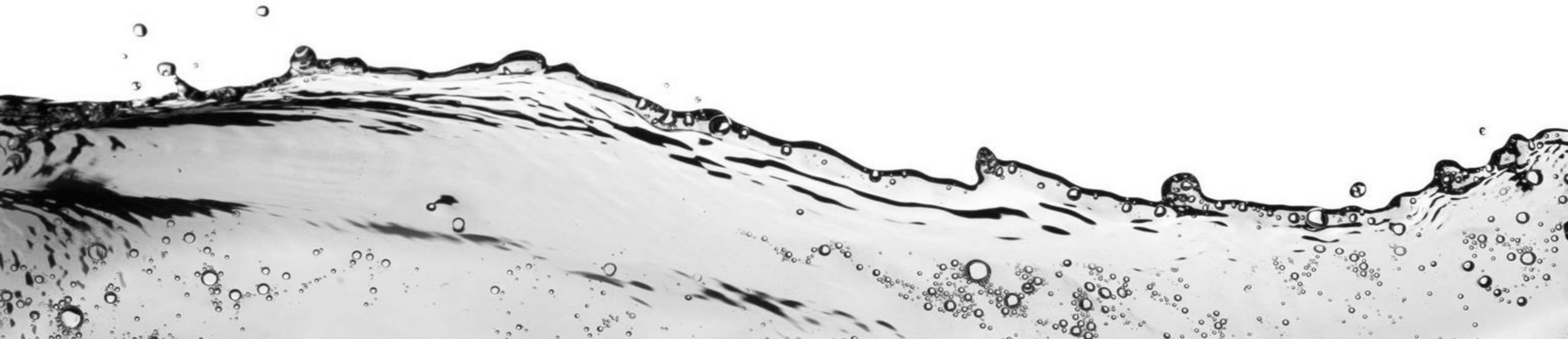
A well managed water supply system

- Member of C40, Resilient Cities
- Robust system of 6 dams supplying 99% of Cape Town's water demand – system yield of 840Mm³
- Sufficient capacity in the systems to meet medium term water requirements until 2023 – under moderate growth scenario - 73% system utilization in 2014
- Berg River Dam completed in 2008 and feasibility studies for the next phase of augmentation completed in 2014 (TMG aquifer and 100 – 120 Ml/d desalination)
- Compares favourably to international non revenue water benchmarks – 21%



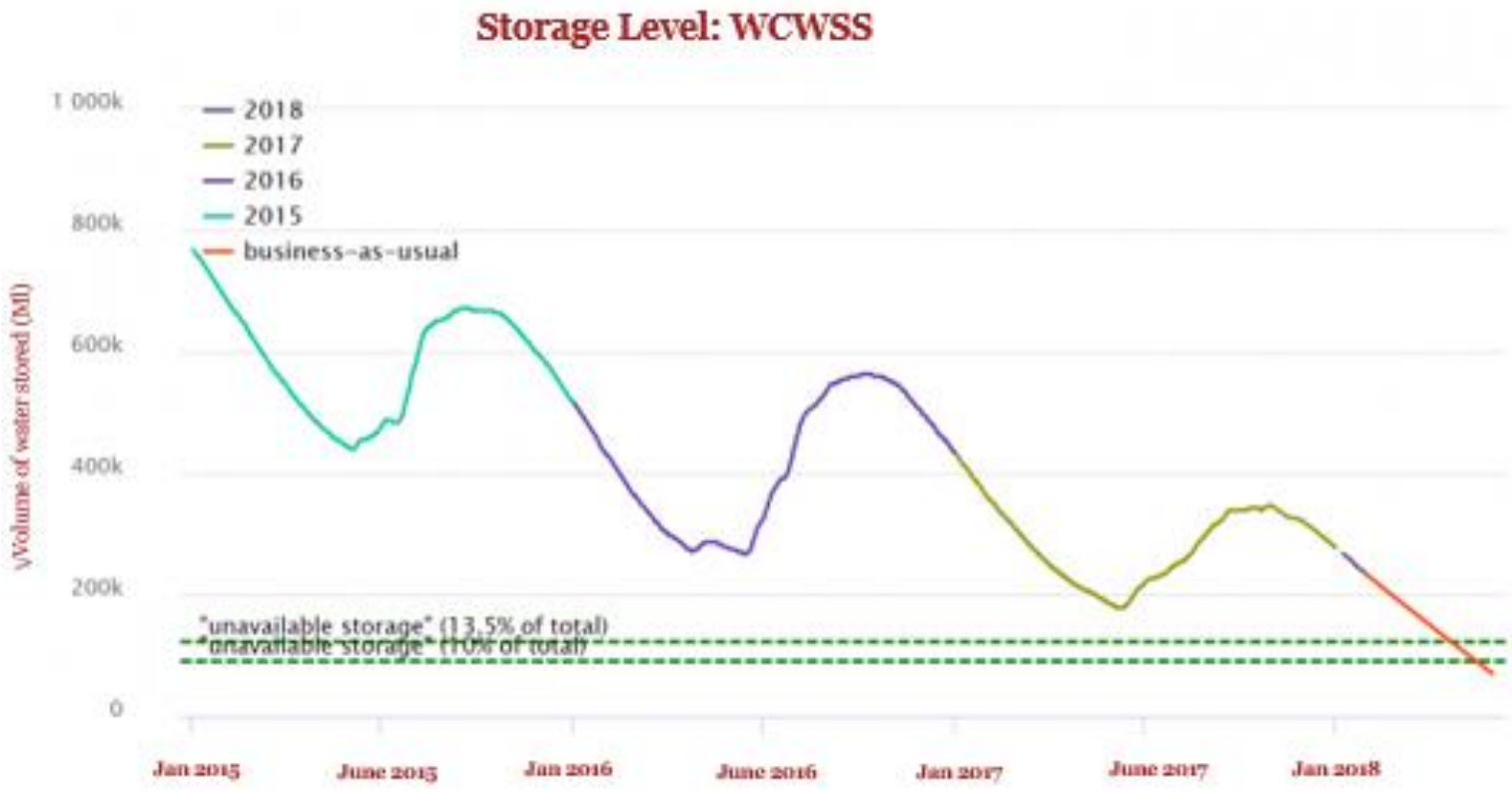


Drought



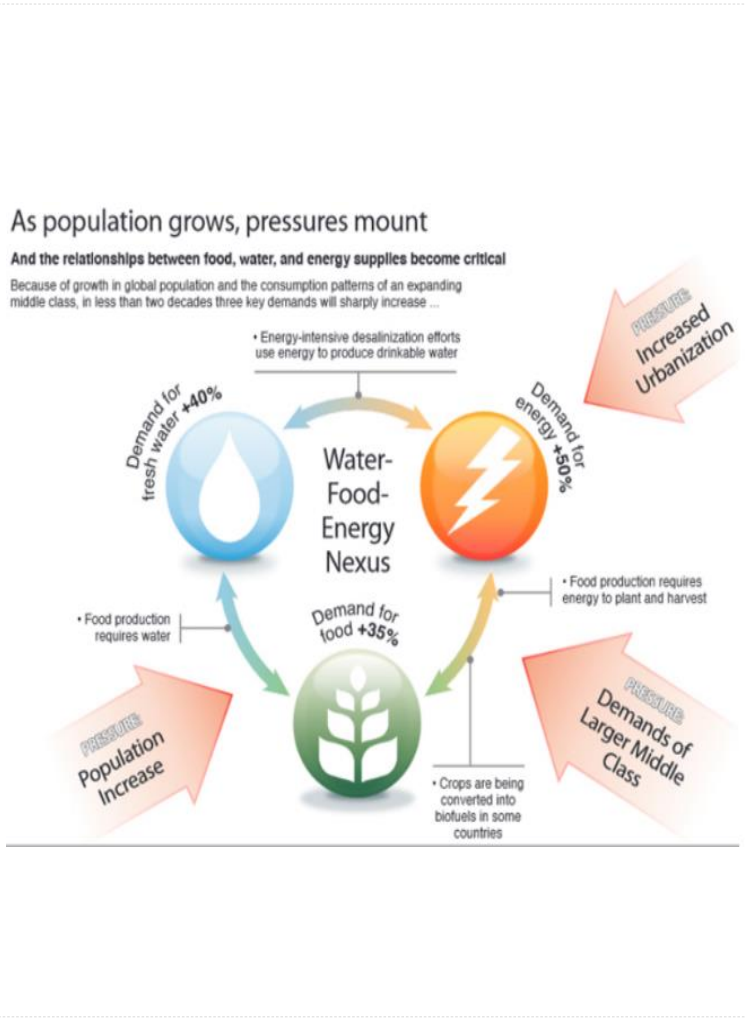
Droughts are difficult to predict

- Above average rainfall in 2014 and 2015 and 2017 were lowest recorded levels
- 3 consecutive years of below average rainfall represents a 1 in 400 year event
- Could the drought have been predicted the drought and responded quicker?




2013
2017

Economic and Social Impact



$100 million
Potential lost water sales revenue for the City

15%
Drop in hotel bookings and accommodation

1%
Impact on Western Cape economic growth rate

Revenue from wastewater treatment

20%
Drop in annual wine production

Declining wastewater quality – increased concentration of contaminants

50 000
Seasonal agricultural jobs lost as a result of the drought

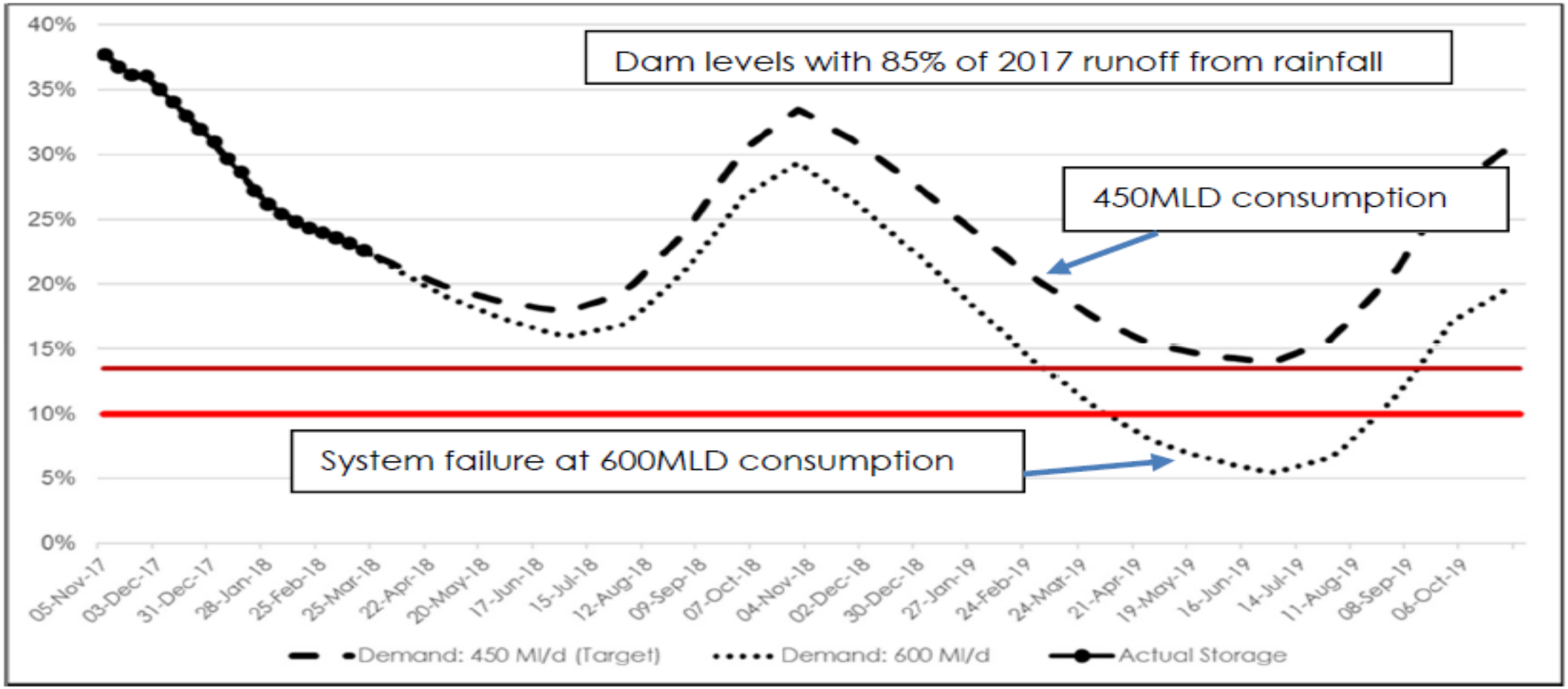
Pipe bursts in water system and increased blockages in wastewater system

25%
Proposed water tariff increase to fund drought

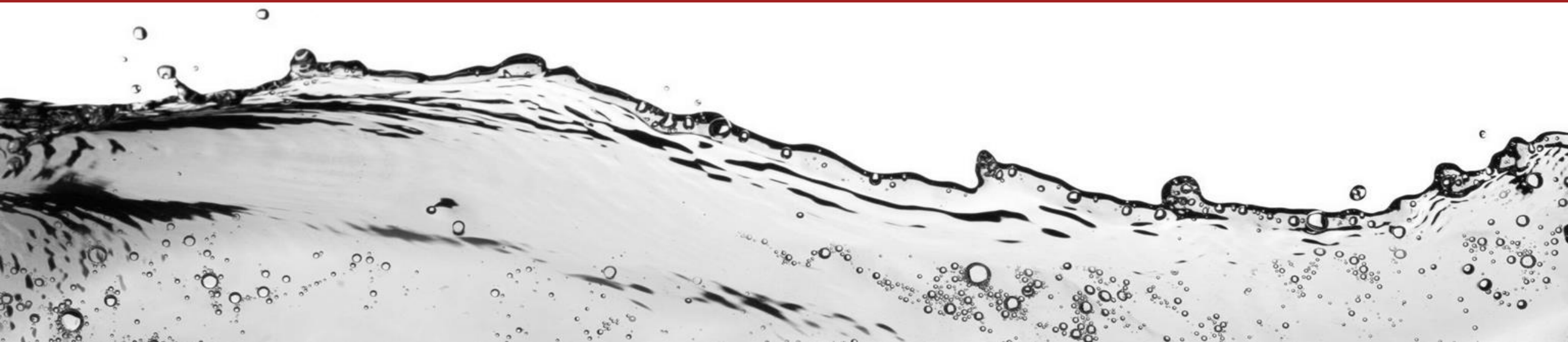
Small scale hydro generation outputs

Making the drought real…

Day Zero projections



Dealing with the crisis



A comprehensive approach..

- Leadership driven response. Executive Mayor took ownership of the drought programme
- Developed a clear strategy – manage what is in our control.
- Set up governance and implementation structures.
- Coordinating committee chaired by the City Manager
- Integrated City response – not just driven by water department
- Augmented capacity with technical, financial, social, environmental expertise

Manage Demand

Reduce water demand from above 1000 Ml/d to 450 Ml/d to delay Day Zero

Restrictions

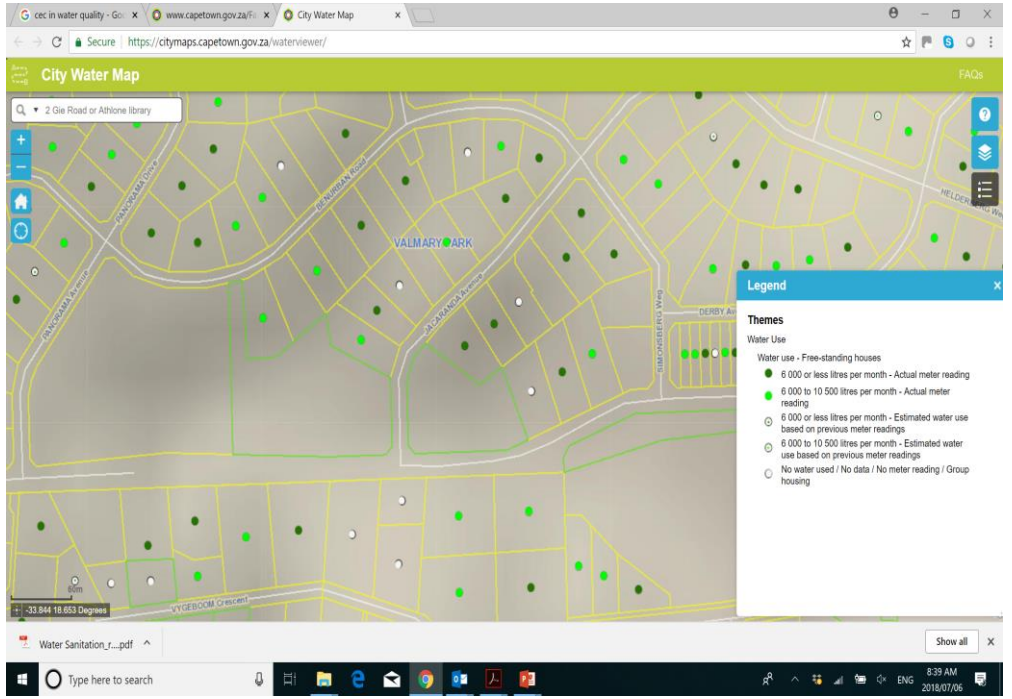
- Ramped up restrictions to level 6B - households restricted to 350 l/day – equivalent of 87 l/c/d
- Average per capita consumption in Cape Town prior to the drought – 270 l/c/d – 30% higher than the international average
- What did this mean?
  - ✓ No watering garden, washing cars, use of hose pipes
  - ✓ No filling swimming pools
- Installation of flow restriction devices for non compliant households
- Commercial and industrial consumers were required to reduce usage by 40% from baseline
  - ✓ Hotels – removed bath plugs, water efficient behaviors
  - ✓ Employed more efficient practices, sunk boreholes, etc.
  - ✓ DWS restrictions on agriculture in WCWSS

Leveraging technology

- Installed pressure management valves in 25 water supply zones
- Reduced flow in the network – reducing consumption. minimized physical losses and night flows
- Estimated savings of 30 Ml/d
- Installing water metering devices (WMDs) to manage quota and facilitate more efficient meter reading
- Leak detection and early response to issues on the bulk system
- Used social media platforms for leak reporting
- Leak repairs and flow control in indigent households

Stricter Enforcement

- Strengthened city bylaws to implement tighter restrictions
- Issuing of significant fines for consumers exceeding quotas. Admission of guilt set at R1500 and fines adjusted based on transgressions
- Empowered city law enforcement officers to deal with water transgressions
- Installation of flow restriction devices for non compliant households
- Improved response times to reported bursts
- Registering of boreholes
- Use of self and peer regulation



Punitive tariffs

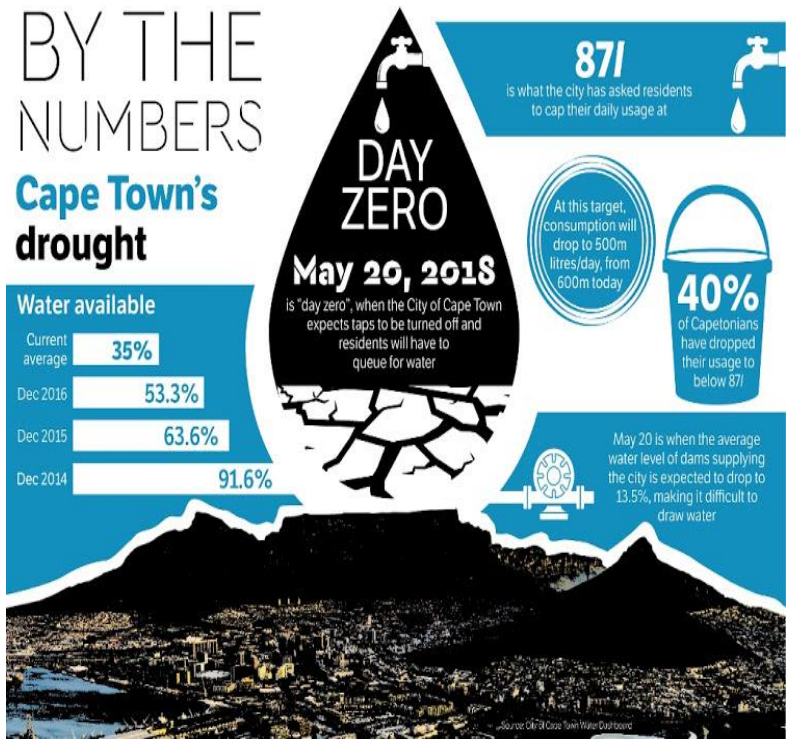
- Drought tariffs to assist recover revenue shortfalls
- Set punitive tariffs for high consumption – approximately $70/m^3 for consumption over 30 m^3/month
- Fixed and variable components to the tariffs – charge dependent on the size of the meter

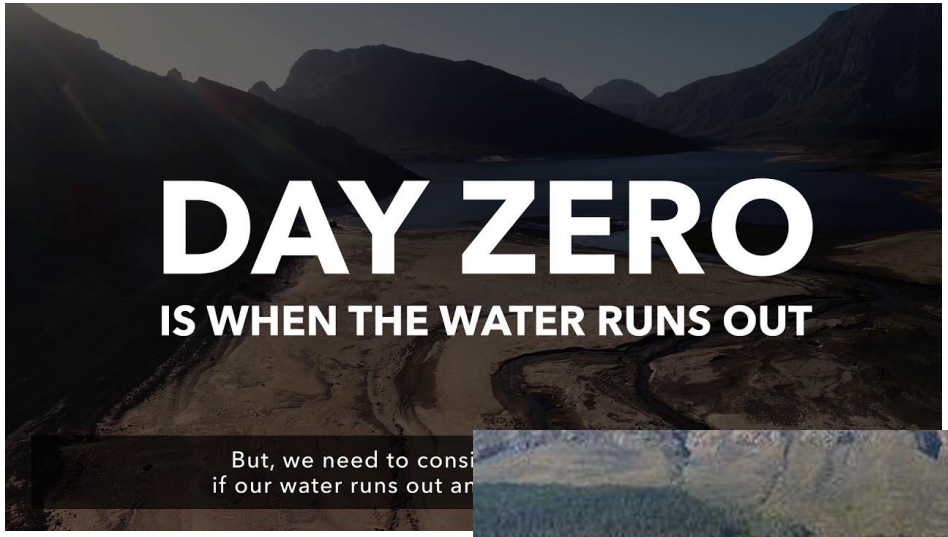
Residential Water Tariffs		
Water Steps	Level 6 (2018/19) Rands (incl VAT) per kl	Level 4 (2017/18)
Step 1 (>0 ≤ 6 kl)	R33.24 (free for indigent households)	R4.56
Step 2 (>6 ≤ 10.5 kl)	R52.90 (free for indigent households)	R17.75
Step 3 (>10.5 ≤ 20 kl)	R115.00	R25.97
Step 4 (>20 ≤ 35kl)	R345.00	R43.69
Step 5 (>35 ≤ 50kl)	R920.00	R113.99
Step 6 (>50kl)	R920.00	R302.24

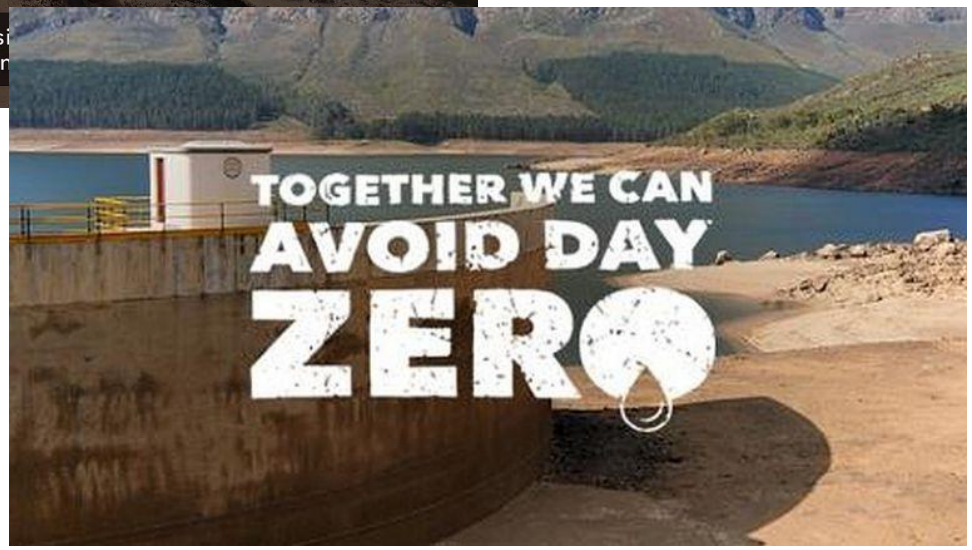
Placing water at the top of mind

- One of the most effective drought campaigns
- Scaled up from education and awareness to focusing on day-zero
- National awareness campaign
- Multiplier effect - integrated into business communication strategy
- Water conservation became part of daily conversation
- Use of social media

Intense focus on Day Zero



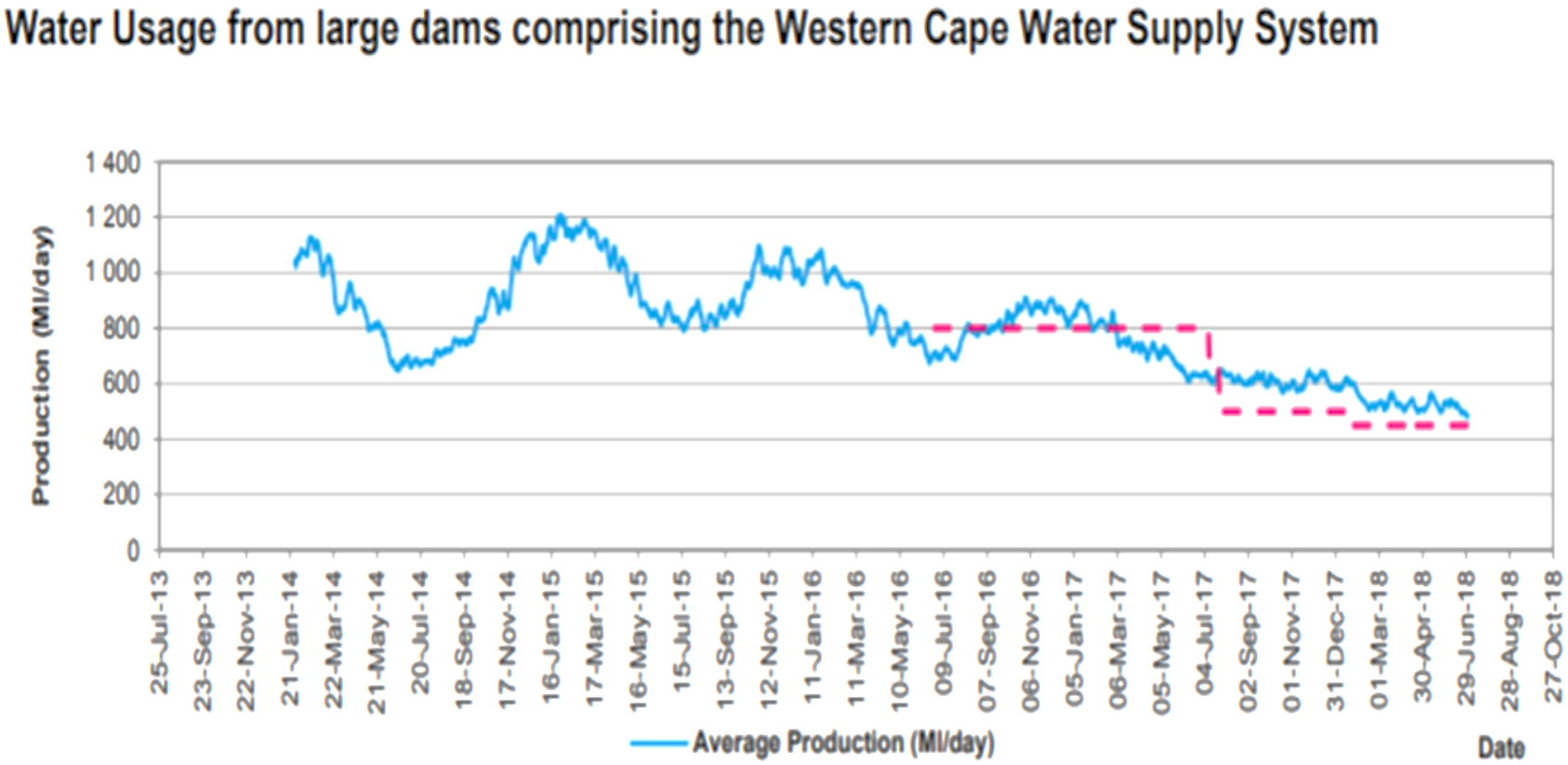




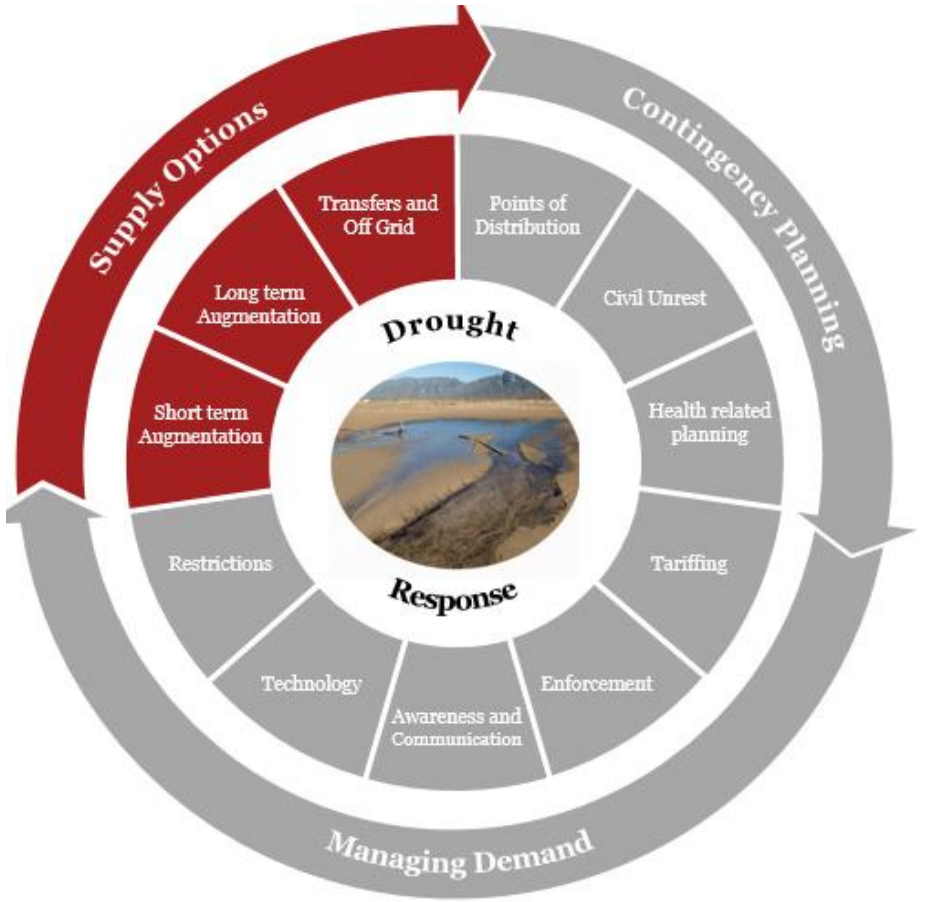
What can be achieved when people work together

Results

- Reduced demand to approximately 480 Ml/day – 50% of 2014 demand levels
- Helped push out Day Zero beyond 2018

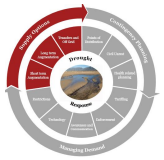


Augmenting supply

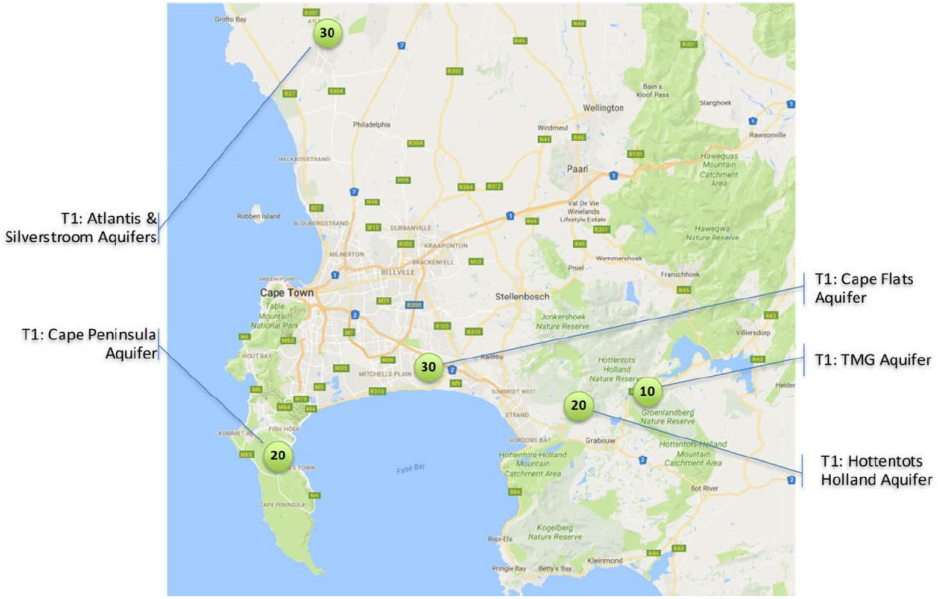


Introduce 350 Ml/d of new water into the system

Ground Water

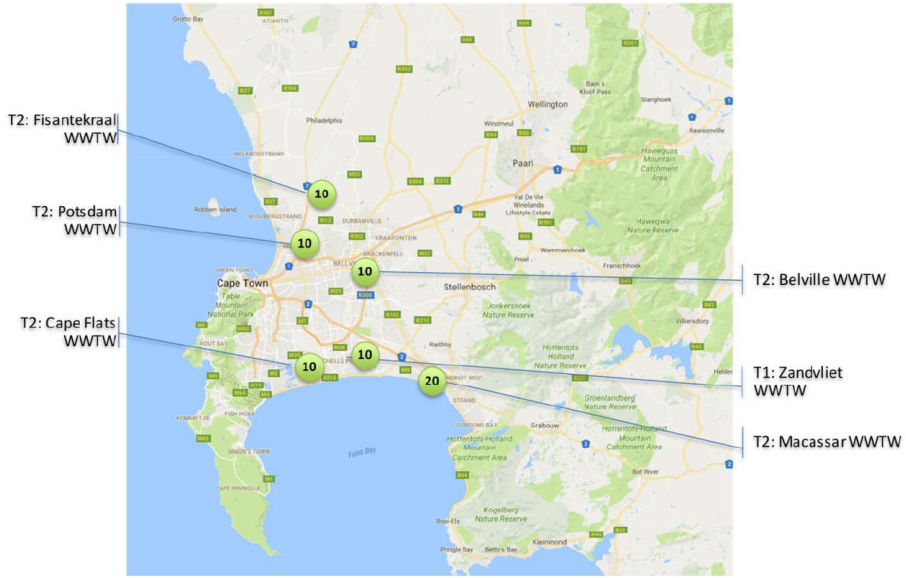


- Potential 150 Mld from variable and permanent augmentation
  - ✓ Cape Flats Aquifer 80 Ml/d
  - ✓ Atlantis Aquifer 20 Ml/d
  - ✓ Table Mountain Group Aquifer 50 Ml/d – deep abstraction +/- 900 m
- Risk of over abstraction and saline intrusion
- Environmental impacts – TMG in environmentally sensitive area. Process delayed as a result of EIA – drilling footprint, widening of road, run off to river
- Potential 10 Ml/d from springs and rivers (Newlands, Oranjezicht and Lourensriver)



Water reuse

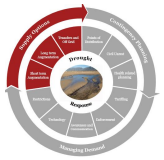
- Temporary 10 Ml/day reuse plant – supplying industrial quality water to industries – at reduced prices
- Potential permanent reuse potential of 60 Ml/d
  - Industrial use
  - Recharge aquifers to prevent saline intrusion
  - Diverting upstream of the dams

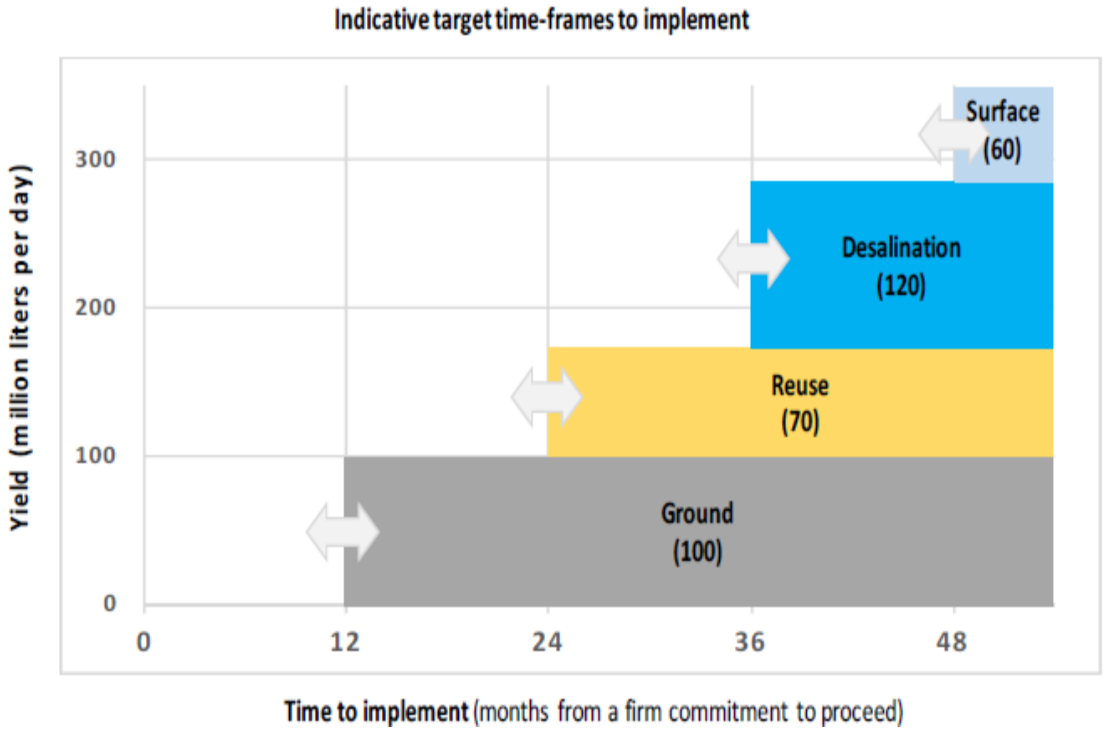


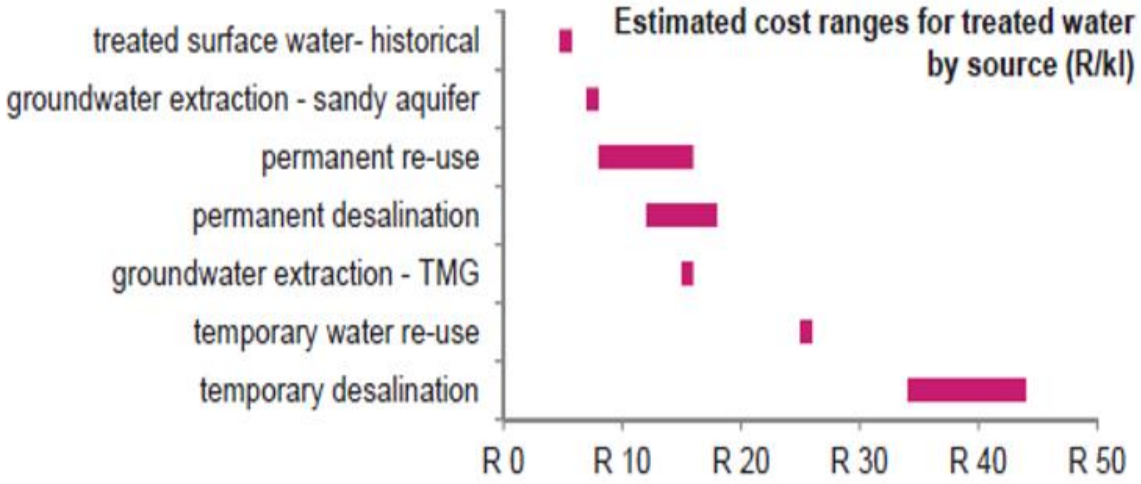
Desalination

- 7 potential short term sites – 3 commissioned and contributing 14 Ml/d into the system (Strandfontein, Monwabisi and V&A)
- PPPs – build, own operate and transfer – 3 year. Short term solution was not cost effective – economies of scale, contracting period constraints
- Longer term 100 -120 Ml/d desalination capacity planned for 2021
- Key requirements for locating the desalination plant/s
  - Availability of electricity capacity
  - Connecting infrastructure for bulk water supply
  - Abstraction and brine injection points (environmental impact – salinity, temperature, etc.)

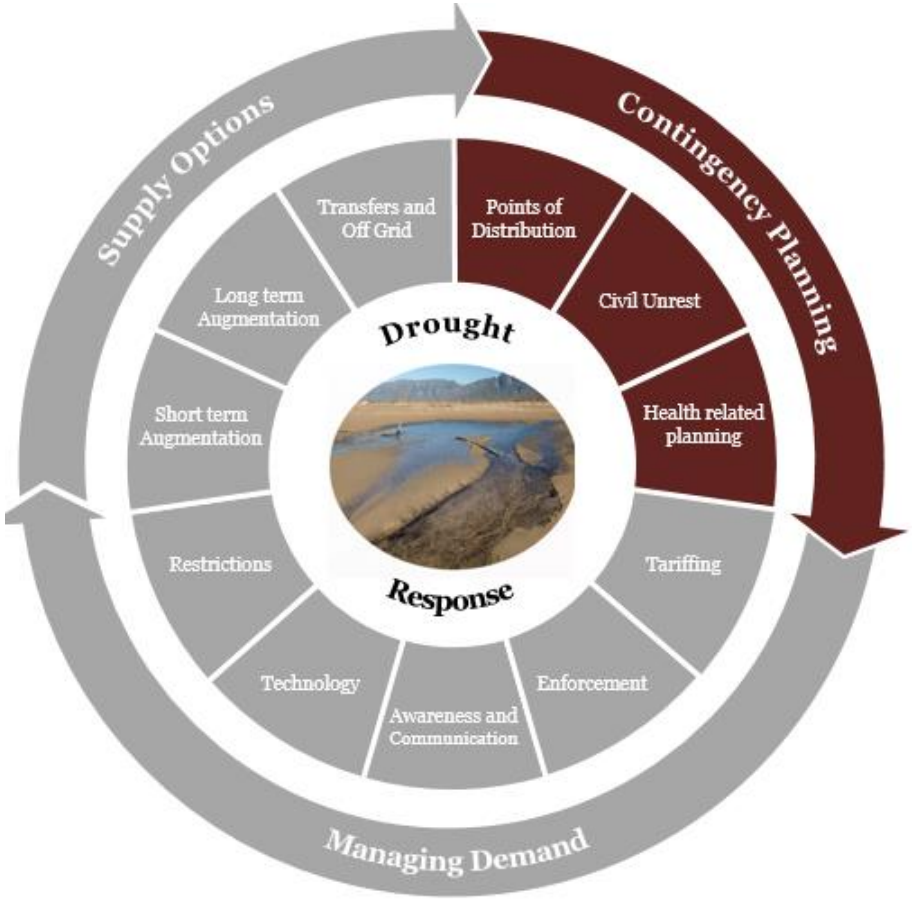
Implementation timeframes







Contingency Planning



What if the taps run dry?

Planning for disaster

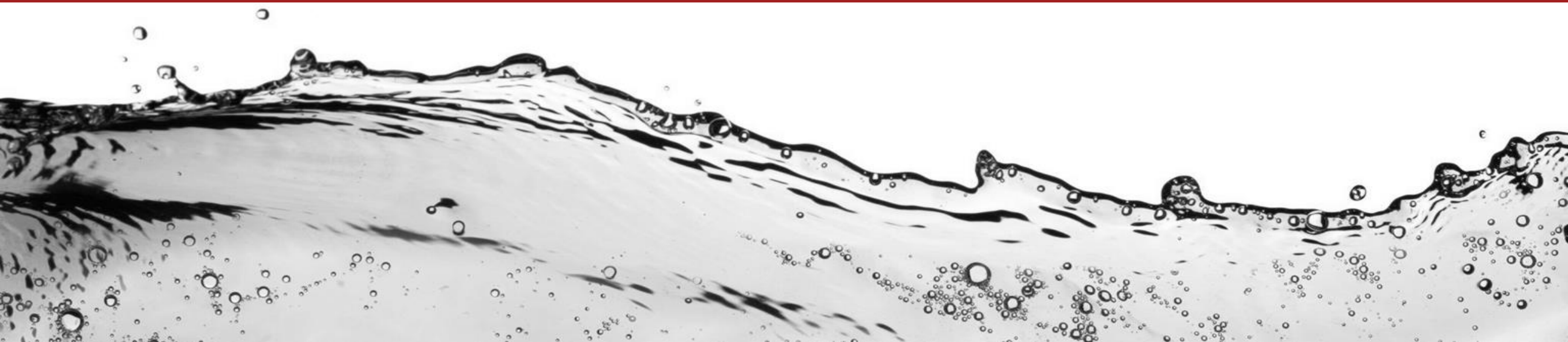
- At 13.5. % of dam capacity – abstraction is no longer possible and the taps would run dry
- Day zero – a moving target
- Households will be disconnected from the system and supplied through 200 POD sites throughout the city
- Citizens collect 50 l/p/d
- Risks to socio economic stability – civil unrest, disease, sanitation system shutdown


2

Challenges in dealing with the response

- Fragmented institutional landscape – who is responsible for the drought response?
- Keeping the City running while dealing with the drought.
- Procurement frameworks are relatively rigid
  - ✓ Insufficient provision for emergency procurement
  - ✓ Constrained to the medium term expenditure framework
- Working within environmental constraints
  - Time consuming – little relaxation on requirements
  - No provision to relax standards in the case of an emergency (desalination abstraction and discharge, drilling in sensitive areas, etc.)
- Public pressure – intense scrutiny from all spheres, desire to see something happening, separating self interests from genuine offers of support

Partnering in crisis



A coordinated response

General Public

- Installed water tanks for rainwater harvesting
- Grey water systems to reuse water
- Swimming pool evaporation covers
- Switch to indigenous gardening

Civil Society

- Funding of infrastructure
- Supporting research
- Communication and awareness

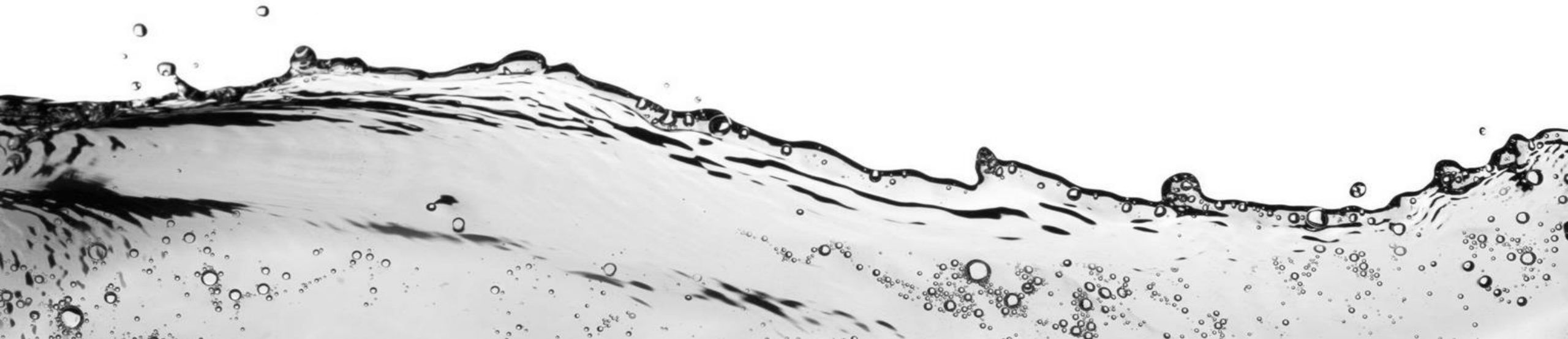
Business Response

- Platforms and structures to work with the City
- Reduced water usage - water efficient practices, relocating operations, water reuse
- Off grid solutions – drilled boreholes and deployed desalination plants – supplied surplus to neighbouring communities
- Built WCWDM in their business communication e.g airlines landing in cape town
- Technology innovation and solutions to deal with the water crisis
- Funding facilities for infrastructure development
- Crop switching – more water resilient crops

Partnership with agriculture

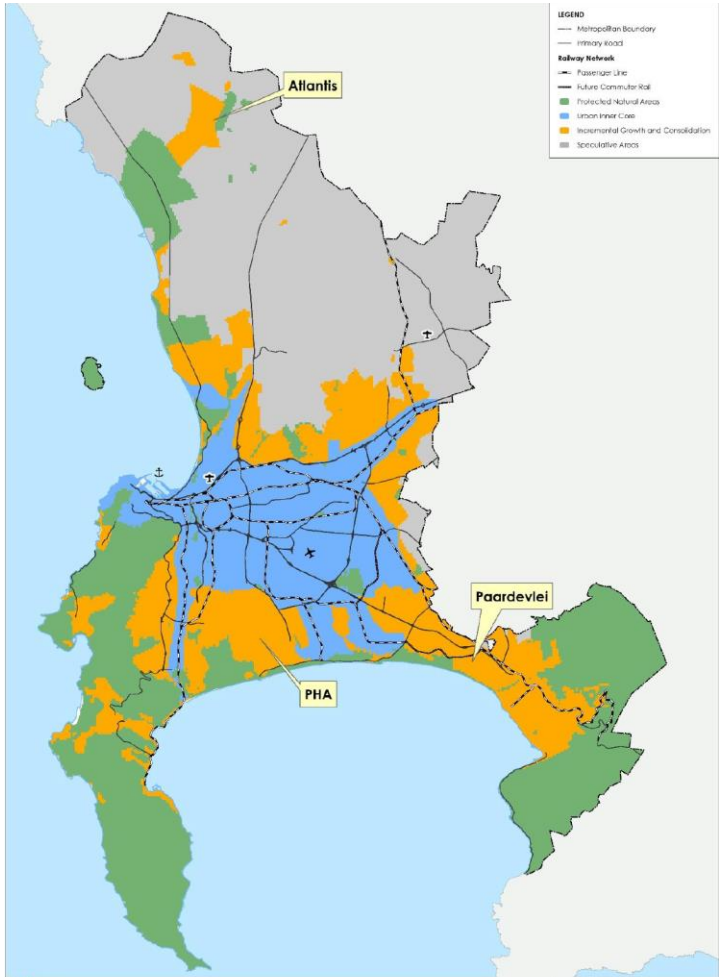
- Generally an adversarial relationship between the farmers who use 60% of the country's water and other water users. In this case:
- 150 farmers in Grabouw and Elgin regions built Eikenhof Dam on the Palmiet River with private financing. The dam is not linked to the Western Cape Supply System
- They operate the dam and associated systems through the Groenland Water Users Association to manage stable irrigation systems for the fruit farmers in the area (who create tens of thousands of jobs).
- Infrastructure is well maintained and operated efficiently allowing them to free up 10 Mm^3 of their own allocation – to be transferred into the Western Cape Supply System.
- Reallocation was pivotal in deferring day zero – postponing it by a further 20 days.

Building resilience

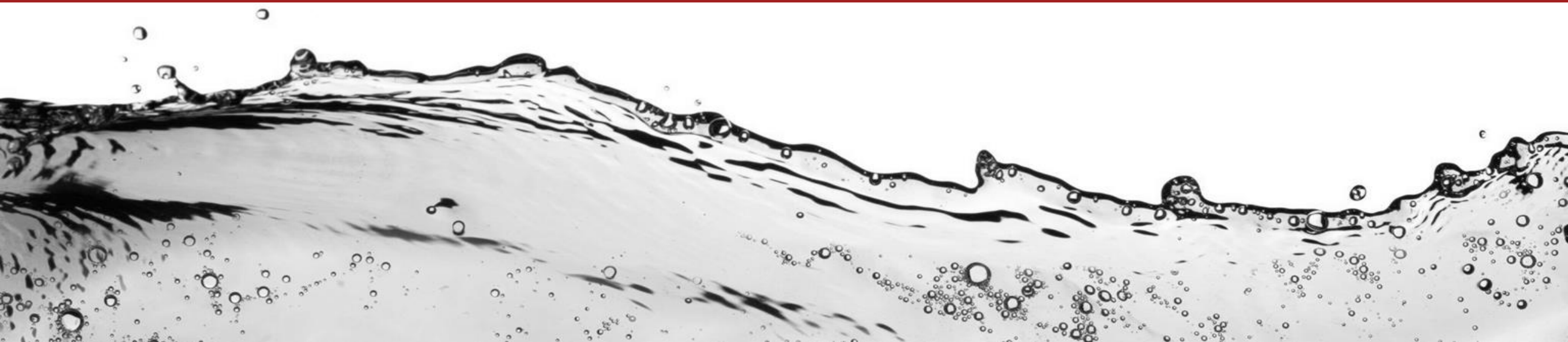


Building Resilience

- Redefining the water supply mix - minimizing reliance on surface water . Potentially 30% of water could come from groundwater, desalination and reuse in the future
- Incorporating resilience into design standards and specifications. Old infrastructure designed for a 1 in 50 year drought. Investigation of implications revising standards to 1 in 200 years
- Building resilience into city planning
  - Building a compact city – 2017 Spatial Plan - promoting development around transit routes – Blue Zone. Strict requirements in other areas
  - Building standards – water efficient fittings, garden size, etc.
- Off grid solutions – a growing proportion of houses are installing rainwater tanks and grey water systems
- Living the new normal – citizens are now water wise and efficient practices and behaviors are likely to be entrenched.



Critical lessons



Critical lessons

- Keep your eye on the long term plan. Don't let the crisis solutions derail long terms sustainable plans.
- Find solutions to the immediate crisis but not at all costs:
  - ✓ Have a clear, well considered and robust plan to deal with the crisis. Consult and socialize the plan. Stick to the plan.
  - ✓ Don't compromise on environmental sustainability
  - ✓ Don't burden citizens with future costs because of poor choices or unsustainable solutions
  - ✓ Don't breach governance – policies and legislation – no matter how desperate the situation gets. These are general robust enough and are there for a purpose.
  - ✓ Don't bow to public pressure. Everyone becomes an expert in crisis.

When is the right time to plant a tree?

"The best time to plant a tree was 20 years ago. The second best time is now." – Chinese Proverb

THANK YOU!