GreenCape

Rabie Property Group

Using treated effluent for a water resilient Century City Urban Square precinct

Leveraging treated effluent use for toilet and urinal flushing, irrigation and cooling tower use to decrease potable water usage.

Stresses & Shocks:

DROUGHT

CLIMATE CHANGE

CAPE TOWN'S RESILIENCE STRATEGY

PILLAR 1:	PILLAR 2:	PILLAR 3:	PILLAR 4:	PILLAR 5:
People Compassionate, holistically healthy city	**Place & Space Connected,** climate adaptive city	**Economy Capable,** job creating city	**Disaster readiness Collectively,** shock-ready city	**Governance Collaborative,** forward-looking city

What is resilience?

In human terms, resilience refers to "the ability of an individual to recover from setbacks, adapt well to change and to keep going even when facing difficult circumstances". A resilient Cape Town is a compassionate, connected, and capable City, where Capetonians collaborate across households, communities and institutions, to build collective responses to the current and future social, environmental and economic challenges.

PURPOSE

The purpose of this case study is to highlight how property developers can improve resilience to climate related shocks and stresses by implementing water management measures in their buildings. The case study utilises the example of Rabie Property Group's Century City Urban Square (CCUS), a mixed use development which makes use of treated effluent (TE)[1] to reduce its potable water demand, reduce operating costs and levies, and improve resilience to future water constraints.

[1] Treated effluent is wastewater that has been treated in municipal wastewater treatment works (WWTW) and can be accessed via TE pipeline networks or collected from the WWTW. Users pay the municipality for the TE consumed.

THE CASE STUDY INCLUDES:

- ✓ An overview of the background to the CCUS development.
- ✓ An outline of the water management solutions that were implemented by Rabie Property Group.
- ✓ The resilience impacts and benefits that Rabie Property Group and its tenants have realised as well as key insights.

IT IS WRITTEN FOR:

- ✓ Property developers looking for resilience-led interventions to decrease their dependence on potable water for new developments as well as developers looking for Green Star certification.
- ✓ Property owners and managers looking for examples of how to decrease their building operating expenses.
- ✓ Tenants wanting to understand the interventions currently utilised to withstand acute climate events such as the most recent Cape Town drought to make informed decisions when selecting a building to ensure resilience in their long term operations.

Background

A green building is a building that, in its design, construction and operation, reduces or eliminates negative impacts on the natural environment. The aim of green buildings is to preserve natural resources and improve the quality of life of its occupants. There are a number of features that can make a building green; two of which are relevant to this case study:

- The efficient use of energy, water and other resources.
- Pollution and waste reduction measures, and the enabling of re-use and recycling.

Rising utility costs, resource constraints and increasing demand from tenants for sustainable and efficient buildings, are driving the demand for green buildings.

Rabie Property Group has recognised the benefits of green buildings and one such development is the Century City Urban Square (CCUS). CCUS developed by the Rabie Property Group is a mixed-use development consisting of several buildings: Century City Conference Centre, Apex (office and retail), Annex (office), Matrix (office, retail and 51 residential units) and the 125 room Century City Hotel. The CCUS was awarded the first four-star mixed-use rating by the Green Building Council of South Africa (GBCSA). This development is registered with the GBCSA as a pilot project for the new mixed-use rating tool.

Some of the sustainable building features incorporated in the CCUS include:

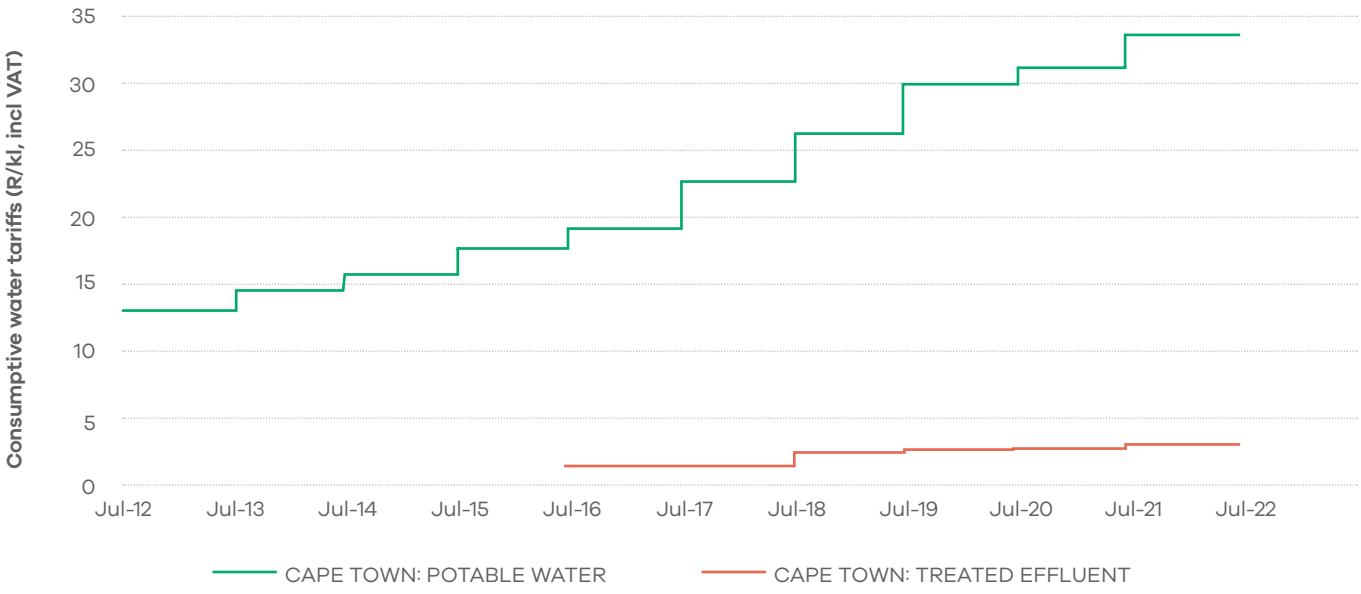
- A district cooling system serving four buildings, with heat recovery for hot water production feeding residential units and the hotel.
- **Treated effluent (TE) water supply from the local municipal plant (Potsdam treatment works – Cape Town) and distributed for irrigation, cooling tower consumption and toilet and urinal flushing.**
- Extensive metering of water, electrical and thermal consumption including real-time monitoring, enabling leak detection.
- Efficient lighting and occupancy sensors.
- Water efficient fittings such as low flow shower hoses and tap aerators are also installed throughout the precinct.

This case study focusses on the water-related resilience measures, particularly the use of TE to reduce potable water demand.

Solution

From the design phase, Rabie Property Group applied resilience-led interventions to ensure the precinct operates cost effectively, environmentally sustainably and provides its occupants with a robust environment able to handle environmental shocks. This was achieved by utilising treated effluent from the nearby municipal Potsdam wastewater treatment works. This precinct receives the treated effluent directly from the treatment works from a dedicated pipeline that it built, with agreement from the City. The cost of utilising treated effluent for these operations is R3.42 per kilolitre versus R28.39 per kilolitre if potable water was used as per the 2021 water tariffs (**Figure 1**), excluding the cost for discharging to the sewer.

Figure 1: Commercial, industrial and treated effluent (when the consumer is responsible for the infrastructure) water tariffs when minimum restrictions (no restrictions) are in place, for the City of Cape Town 2012-2022.

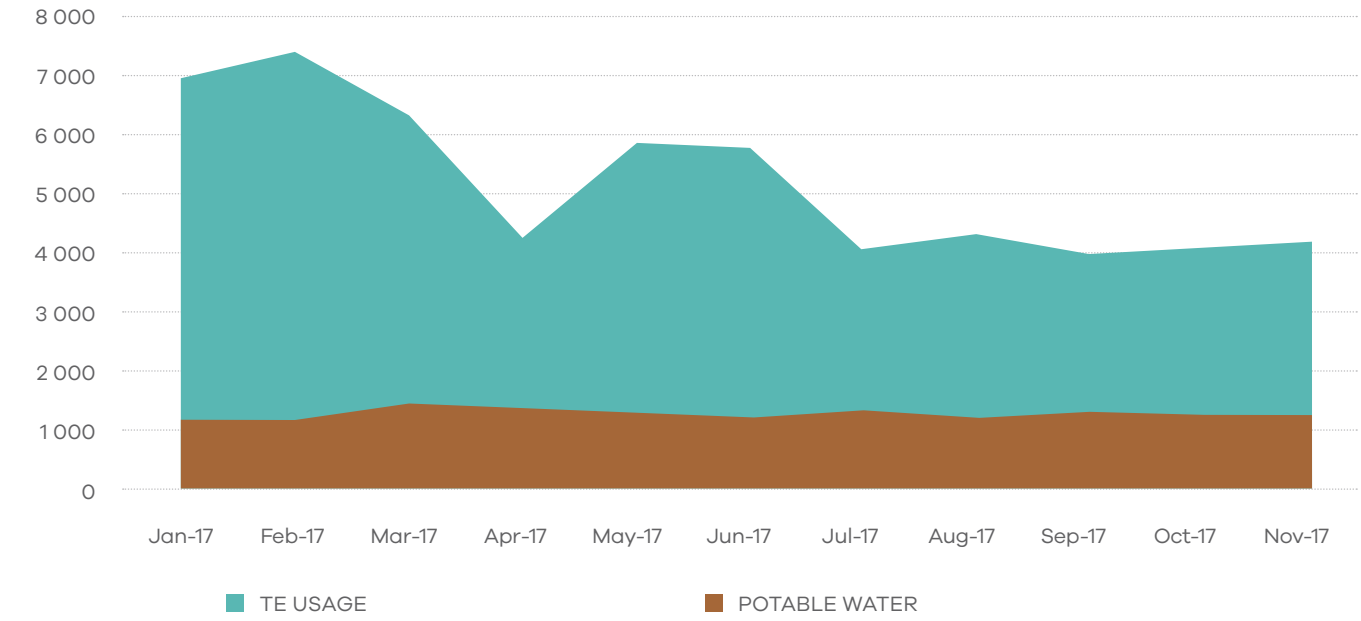


Impact

Using TE has offset potable water consumption in the CCUS by ~44 000 kl/annum resulting in R2.3-million in water and sanitation savings (based on 2021 tariffs).

Figure 2 highlights the total water usage for the year of 2017 as well as the proportion of TE versus potable water used.

Figure 2: Water usage at the Century City Urban Square for 2017.




MATRIX

Various other water efficiency measures (e.g. low flow showerheads, aerators etc.) were also implemented, which also contributes to the reduction in potable water use at the CCUS. The impact of these measures, together with the use of treated effluent (for cooling, irrigation and toilet flushing) can be demonstrated by comparing the potable water usage of the CCUS to a similar mixed use development that does not have these measures in place. The comparable development, located near to the CCUS, was also developed by Rabie Property Group, seven years prior, before they took the decision to incorporate water efficiency measures as a standard feature in their new developments. The comparison between these two buildings are presented in **Table 1**.

Table 1: Comparison between the Century City Urban Square and a comparable mixed use development without resilience measures both for water use data during 2017.

	CCUS	Comparable mixed use development without resilience measures
Number of residential units	51	90
Number of hotel units	125	180
Gross Retail Area (Commercial) m^2	15 574	7 713
Gross Retail Area (Retail) m^2	1 836	616
Gross Build Area (GBA) m^2	79 587	34 573
Potable water consumption (kl per annum) 2017	14 030	37 856
Potable water consumption per Gross Build Area (kl per annum per m^2)	0.18	1.09

As indicated in **Table 1**, the comparable mixed-use building without the resilience measures, uses 1.09kl per annum per Gross Building Area (GBA m^2) compared to 0.18kl per annum per GBA for the CCUS. In other words, the comparable building uses 270% (2.7 times) the potable water the CCUS uses, despite being only 43% of the gross building area (GBA) of the CCUS.

Therefore, the measures implemented by the Rabie Property Group at the CCUS have significantly reduced water demand, saved costs, reduced levies, leading to improved resilience.

Key Insights

1. TE is wastewater that has been treated in municipal wastewater treatment works.
2. Where available, property developers can design buildings to access and use TE instead of potable water for use in cooling towers, toilet and urinal flushing and irrigation in buildings. Rabie Property Group's CCUS is an example of such a building.
3. The use of TE in buildings should be considered during the building design phase as specific infrastructure for the supply of treated effluent needs to be incorporated.
4. As TE is significantly cheaper than potable water, the building operating costs and hence levies are reduced, making it more affordable and attractive for tenants. For example, the use of TE in the CCUS development saves R2.3-million per year offsetting 44 000kl of potable water (based on 2021 tariffs).
5. By being proactive, the Rabie Property Group had already implemented its water efficiency measures in the CCUS when the 2017/2018 drought hit Cape Town, making it more resilient to the situation.
6. More broadly, the use of treated effluent also serves to reduce potable water consumption, and therefore places less demand on municipal water resources. This helps build resilience in municipal water systems by reducing the risk of future water constraints.
7. Property developers can engage with their local municipalities around the availability of TE and can consider connecting their developments to the TE network.
8. Although the use of TE makes the building more resilient, when there are water shortages within a city, wastewater flows, and hence TE flows also decrease. Alternative water efficiency measures such as low-flow taps and tap aerators will add to the resilience of the building.

SUMMARY

SURVIVE

The annual escalating price of potable water coupled with acute climate events such as droughts resulted in the Rabie Property Group investing in water resilient-led measures to ensure sustainable operations of the Century City Urban Square. This was achieved by using treated effluent obtained from the local Potsdam treatment works for toilet and urinal flushing, irrigation and for the cooling towers instead of potable water.

ADAPT

The Rabie Property Group rose to the challenge by altering the design of their CCUS to include the necessary infrastructure to utilise treated effluent for the bulk of the building operations but still provide access to the supply of potable water for these operations should it be required. The reliance on potable water significantly decreased and the use of treated effluent resulted in substantial savings.

THRIVE

The CCUS was awarded the first four-star mixed-use rating by the Green Building Council of South Africa (GBCSA). This development is registered with the GBCSA as a pilot project for the new mixed-use rating tool. The development is attractive to tenants due to its reduced operating costs and levies, and improved resilience.

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