



CITY OF CAPE TOWN
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WATER REUSE IN CAPE TOWN - FREQUENTLY ASKED QUESTIONS

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1 THE NEED FOR NEW WATER SUPPLY SOURCES IN CAPE TOWN

1.1 What is the future outlook for water in Cape Town?

If we don't do anything – not great. Most climate scientists predict that Cape Town will become drier and experience more severe droughts more frequently. Invasive alien plants, if left unchecked, will also consume more water in our catchment areas meaning that when it does rain - less water will reach our dams. These stresses are reducing our supply of water from rain-fed dams, but our demand is expected to increase as the city grows and develops. This puts the security of our water supply at risk.

1.2 Why is rainfall now uncertain in Cape Town?

Cape Town's rainfall is dependent on cold fronts in winter that bring water from the oceans as clouds and storms. That water falls as rain in our mountain catchment areas and we store it in dams. Climate scientists report that these cold front systems are moving southwards, missing us.

Cape Town is not alone. Hundreds of other cities and towns around the world are facing a water shortage in the context of climate change. Water shortages currently affect 1.5 billion people on our planet, and a quarter of humanity faces an imminent water crisis (New York Times, 6 August 2019).

1.3 What is the City's plan to secure future water supply?

As the recent drought crisis has taught us, we can't only rely on rain-fed dams any longer. To help secure our future water supply, the smart move for a city like ours is to keep using water very carefully and to start getting water from alternative water sources that increase our resilience in times of low rainfall.

As documented in [Cape Town's Water Strategy](#), the City is prioritising management interventions that reduce our demand (how much we use), clearing programmes for 'thirsty' alien invasive vegetation and have started diversifying our bulk water sources to include groundwater (with managed recharge of aquifers), desalinated sea water and water reuse.

1.4 How long has the City known about our water shortage problem?

Both the City and the National Department of Water and Sanitation (DWS) have been studying Cape Town's supply system and planning for the progressive implementation of alternative water supply sources for decades already. However, given the experience of the recent drought crisis, and concerns about significant reduction in future rainfall, the City has taken the decision to rapidly accelerate the rollout of various new supply schemes. See further information about the background of supportive national and municipal level policies, and the history of technical investigations which led to the City's decisions to pursue water reuse, in the presentations and/ or Fact Sheets at www.capetown.gov.za/water-reuse.

1.5 Is Cape Town not saving enough water, so we don't need new supply?

Saving water is definitely the most cost-effective way of securing our supply, and Cape Town is known for being one of the world's most water-efficient cities already. We've won international awards for it. The City is still prioritising interventions that will help us save more, and waste less – but these will not be enough on their own.

The United Nations Intergovernmental Panel for Climate Change (IPCC) scientific climate models predict we will receive less rain in future. To enable our city and economy to grow and develop we will need to keep using water wisely *and* increase our water supply from alternative water sources.

1.6 Are there any cheaper alternatives to expensive big new water supply projects?

Yes, there are:

- Reducing our consumption (or keeping our usage efficient),
- Optimally managing and operating our infrastructure better and
- Making sure we remove 'thirsty' alien invasive plants from the catchment areas which feed our dams.

These are all cheaper ways to help secure our water supply. And the City is prioritising all of these alternatives. But on their own, these interventions won't be enough. We also need new, more reliable supply options.

While these new supply schemes cost money to build and operate, they are a wise investment for our shared water future and will help ensure that we can keep the water flowing and avoid very high restriction tariffs in times of drought.

The cost of doing nothing is one we really can't afford. Severe water restrictions have a negative impact on our economy, and uncertain water security hurts our prospects for investment and growth.

1.7 Why can't we build more dams or increase the capacity of the ones that we have?

The impact of climate change in our area includes less reliable rainfall, and less rainfall in future. Therefore, relying on surface water from rainfall is no longer feasible in future.

There is planning underway for a scheme for the Western Cape Water Supply System which will direct surplus winter water from the Berg River into Voelvlei dam. Apart from that surface water scheme, all the most feasible dam sites in close enough proximity to Cape Town have already been developed. The few remaining dam sites potentially have negative environmental and social impacts.

Also, there's no point in building more dams if we can't be sure it will rain. So now's the time to consider alternative sources and invest in them.

1.8 Why can't the water that runs off the mountains, spring water, stormwater or rainwater harvesting tanks be used to supplement our water supply instead?

These alternative water sources are all helpful but are insufficient to secure our supply on their own. Their feasibility is generally limited, e.g. in terms of cost-benefit or operational challenges.

The springs and streams that run off the mountain are only available in relatively small quantities and supply varies a lot seasonally. The largest springs have already been tapped (e.g. Oranjezicht, Albion, Newlands, Kildare, Bradfield), and the annual volume that they can supply is limited in relation to the total needs of the City, less than 1% of the total need.

To capture stormwater runoff during winter generally requires substantial storage capacity to make that water available during summer when it's needed. There is not always the space in densely developed urban areas for this. The stormwater would then also require treatment to ensure that it is of drinking water quality. A better option is to encourage infiltration of stormwater into the aquifers by using permeable paving, swales and urban landscaping. Stormwater can also be polluted with toxic pollutants (petrol, oil, etc.) which are expensive to remove.

The City encourages rainwater harvesting for certain purposes which don't require drinking quality water. See the Water Bylaw at www.capetown.gov.za/waterregulations and guidelines for installation of alternative water systems at www.capetown.gov.za/thinkwater. However, it is currently not cost-effective to subsidise rainwater harvesting tanks for individual consumers, and the City is not in a position to do so.

1.9 Why do we need to have reuse if we are a coastal city where sea water desalination could be implemented to supply large volumes of water?

We need both. The City's Water Strategy aims to secure our water supply by diversifying our water sources. Seawater desalination and water reuse, together with groundwater and managed aquifer recharge schemes, offer the best resilience against climate change and droughts. The implementation plan prioritises groundwater schemes and water reuse as they are more affordable to build and operate than seawater desalination, which will come later.

2 WATER REUSE IN CAPE TOWN AND INTERNATIONALLY

2.1 Is water already recycled or reused in Cape Town?

Yes to some extent, but not yet in the larger-scale way that is now planned for drinking-quality direct water reuse through the demonstration plant and the permanent Faure New Water Scheme.

About 10% of Cape Town's treated wastewater – called 'treated effluent' (which is almost drinking quality) - has been used for many years for non-drinking purposes such as:

- irrigation for sports fields, garden landscapes and golf courses
- industrial and manufacturing processes
- construction sites (e.g. dust damping)

There is a 'managed aquifer recharge' scheme in Atlantis which has been in operation since the early 1980's. Here treated wastewater is stored under the ground in aquifers (where it doesn't evaporate like in surface dams), where it undergoes further natural treatment within the aquifer before being abstracted. It is treated to drinking quality standards before being used again.

More recently, the City's water reuse demonstration plant came into operation as a result of the drought crisis. See other information on the demonstration plant elsewhere in this FAQ document.

There are also a few relatively small-scale private reuse plants that produce drinking water, such as the Mutualpark building in Pinelands which has operated since 2018 and serves about 10,000 Old Mutual staff and visitors at that office complex.

A larger-scale direct water reuse scheme is now planned, the Faure New Water Scheme. It will be a 'direct' reuse scheme which will require more rigorous purification processes by comparison to the managed aquifer recharge at Atlantis which is an 'indirect' reuse scheme.

2.2 How is reuse different to other new water sources?

The new water sources being considered are very different and help to provide water security in their diversity.

- Reuse is less energy intensive than seawater desalination
- Building dams is also expensive, and potentially has more significant social and environmental impact (which reuse does not)
- Surface water projects (building dams, transfers) will not help much during droughts when there is no rain
- Reuse reduces the environmental impact on rivers from wastewater treatment works
- Seawater desalination requires the construction of large marine intake structures and produces a large volume of saline brine which is discharged to the sea. The Faure New Water Scheme proposed by the City does not produce a saline brine.
- Seawater availability is stable, water reuse and groundwater are less climate-dependent whereas surface water is completely dependent on variability in rainfall

Despite these differences, the water produced by all supply options will be comparable in terms of having high water quality.

2.3 What are the benefits of water reuse for the purpose of drinking water?

Water reuse offers the following key benefits:

- **Reliability:** It is less dependent on climate as it is based on an available and consistent source of water.
- **Safety:** The advanced purification technologies for reuse have been tried, tested and verified as safe by many countries.
- **Affordability:** Water reuse is one of the more affordable large-scale supply options being considered by the City. It has substantially cheaper start up and operational costs when compared to seawater desalination.
- **Eco-friendly:** Water reuse is more environmentally sustainable. It requires significantly less energy than seawater desalination and reduces the amount of contaminants being discharged into rivers and oceans.

2.4 How is water reuse different to using treated wastewater/ effluent?

The City generally defines water reuse as being the beneficial use of water sourced from treated wastewater once it's been through an advanced purification process. This means the water is treated to drinking water quality standards for household and commercial use and is fit for human consumption. On the other hand, treated wastewater - also called treated effluent - is sourced directly from a wastewater treatment works (not treated further or purified) and is used for non-drinking purposes only e.g. for irrigation or industrial cooling purposes.

2.5 Can't we have water recycling for non-drinking water purposes only, rather than for drinking water use?

The biggest demand in Cape Town is for domestic and commercial consumers that require drinking quality water. Where consumers are willing to use non-drinking water for uses such as irrigation, toilet flushing or cooling systems, then dual water supply systems are being considered. To retrofit a dual supply to existing buildings is not generally feasible, but the City is considering this approach for large commercial and industrial users and for new developments. There is an increase in this happening in new developments which are close to wastewater treatment plants e.g. at Century City.

2.6 Will implementing water reuse mean that there won't be water restrictions in future?

It is not possible to predict long-term rainfall or drought patterns with certainty. But by including water reuse in the mix of new water sources (combined with responsible water use) this will help reduce the probability of Cape Town experiencing severe water stress in future. It will reduce the chances of having to implement serious water restrictions and will help to prevent a "Day Zero" scenario where we would have to queue for water.

2.7 How does the purification process in water reuse schemes produce drinking-quality water?

The drinking water that the City is planning to supply to residents from either the temporary demonstration plant or a permanent reuse scheme (Faure New Water Scheme) will be purified to a quality that is compliant with South Africa's National Standard for drinking water (SANS 214), as well as the strictest international standards specifically targeting water reuse schemes. In both cases, this will be achieved by means of a robust multi-barrier advanced purification process. The process at the permanent reuse scheme involves the following stages.

- Ozonation
- Biological Activated Carbon filtration
- Granular Activated Carbon filtration
- Ultrafiltration

- Ultraviolet Advanced Oxidation
- Disinfection

For more information about the advanced treatment purification processes, see the Fact Sheets at www.capetown.gov.za/water-reuse.

2.8 Where else in the world is water reuse happening?

Countries around the world are already using reuse advanced purification plants/schemes to provide drinking water to residents. The longest serving reuse scheme is in Windhoek, Namibia which has been supplying water since 1968 (over 50 years). Others include Belgium (since 2002), Singapore (since 1998), various states within the United States of America (since 1994). Other towns and cities in South Africa have also begun to implement water reuse, including Beaufort West (since 2011) and Ballito (since 2018). Australia is in the process of planning a water reuse scheme for Perth, whilst the United States is planning an intensive water reuse network, most significantly in the California region.

2.9 Are there any other municipalities in South Africa which have water reuse schemes for drinking water?

Yes. A water reuse plant was commissioned in Beaufort West in 2011. This was in response to a severe drought and water scarcity, which left their local dam empty and their boreholes dry. This water reuse plant has successfully delivered drinking water to consumers for almost ten years.

Ballito (near Durban) has also implemented water reuse for drinking and has successfully supplemented the drinking water supply since 2018.

Many towns in South Africa benefit from what's called 'de-facto' water reuse. This means a wastewater treatment works upstream discharges treated wastewater into a river which flows into a supply dam or other abstraction point for users downstream. From here the water is abstracted and treated for drinking by the same, or another municipality. Most of our country's inland population is drinking water that has been used at least once upstream by another town or city. This is true for some Western Cape municipalities too.

2.10 Are there any private companies in South Africa that do water reuse for drinking purposes?

Yes. An example of this is Old Mutual's large Mutualpark office complex, located in Pinelands, Cape Town where an advanced purification system was installed in 2018 to treat their wastewater (primarily from sewage) all the way to drinking water quality. This water is then blended with other water sources for use on site. This system serves about 10,000 people in this commercial property complex, every weekday. According to Khiyam Fredericks, previously Technical Director at Mutualpark, "The modern water treatment facility at Mutualpark ensures that water from many different sources can all be purified to the highest drinking-quality level. This technology is now tried and tested over a few years now, and it's reliable and trustworthy."

2.11 Do we really need more water for our population and economic growth?

It is difficult to accurately predict how our population and economy will grow in future. The City of Cape Town makes use of sophisticated water demand models that are adjusted monthly to estimate future demand. These models currently show a consistent growth in demand over time (aligned with urban growth and development).

We have been successful in reducing water use in relation to population size and growth since 2000 with intensive water savings measures. Cape Town is still using less water now than we were twenty years ago, despite our population and economic growth – because we're far more efficient with the way we use water and we waste less of it. However, there are limits to how much more efficient we can become. It's now relatively harder to reduce our consumption even more than we already have done. We are already very efficient by global standards. So we need to have further supply to provide for growth into the future.

We need to ensure the supply of sufficient water to improve the quality of life for our citizens and to enable the economy – which is why Cape Town's Water Strategy has adopted a diverse approach including 'demand management' interventions to keep usage low and new water supply sources.

2.12 Why can't we transfer water from other wetter regions or from large rivers?

Long-distance transfer schemes for Cape Town would be prohibitively expensive to build, operate and maintain and ultimately it would be cheaper to desalinate seawater closer to the point of demand.

Furthermore, the National Department of Water and Sanitation is progressively discouraging large inter-basin transfer schemes and recommends that coastal cities rather adopt water reuse and seawater desalination.

3 THE TEMPORARY DEMONSTRATION PLANT IN CAPE TOWN

3.1 Is there a municipal water reuse plant in Cape Town yet?

Yes. There is a water reuse demonstration plant at Zandvliet wastewater treatment works. There is information about it in this FAQ document, in the brochure, Fact Sheets and there is a video of the advanced purification process at the demonstration all available at www.capetown.gov.za/water-reuse

3.2 What is the origin and purpose of the temporary water reuse demonstration plant?

During the recent drought crisis, the City was searching for new water sources that could be implemented as quickly and effectively as possible. This included a temporary emergency water reuse plant being set up at Zandvliet Wastewater Treatment Plant, which is able to provide up to 10 million litre per day (ML/d) of drinking-quality water. When the rain came again, the immediate need for supplemented water from the temporary reuse plant was no longer essential. This, however, presented an opportunity for the City to utilise the contracted plant as a water reuse demonstration facility, in preparation for the eventual operation of a permanent, larger-scale reuse scheme - called the Faure New Water Scheme.

This temporary plant was thus repurposed as a demonstration plant to help build capacity in the implementation of water reuse technologies. It enables the City to analyse the water quality over time at different points in the purification process, and learn about the correct design, operating, monitoring and management protocols as we do the planning for the permanent production-scale reuse scheme. It helps build trust in the product, and serves as a platform for the City and its partners to develop expertise in the design, commissioning, validation, testing, operation, maintenance and management of advanced purification processes.

The demonstration plant is set to be decommissioned by the end of May 2021.

See a short video describing the advanced purification process at the water reuse demonstration facility at: www.capetown.gov.za/water-reuse

3.3 Is the City's water reuse demonstration plant currently injecting reuse water into the drinking water supply?

No. The demonstration plant is operational and is currently in testing phase. The City is considering injecting this purified water into the supply network, subject to the outcomes of water quality assurance and internal approval processes. Until then, the purified water is being used for industrial applications at the Zandvliet Wastewater Treatment Works

3.4 When will water from the City's water reuse demonstration plant be added into the drinking water supply?

The City will only consider blending the purified water from the demonstration plant into the drinking water supply once the water quality and necessary protocols to integrate this water are well-established and verified. The City will also only do it subject to internal approval processes.

If and when injection does start, it is likely to be only 2 million litres a day ramping up to about 5 million litres per day, which is less than 1% of the total water supply at current consumption levels. (Well over 800 million litres a day in March 2021).

3.5 What will happen to the City's water reuse demonstration plant in future?

The water reuse demonstration plant at Zandvliet WWTW is set to be decommissioned from the end of May 2021. The equipment belongs to the Contractor and will be removed for their use on other projects.

3.6 How does the purification process at the City's water reuse demonstration plant work?

The advanced purification process at the Zandvliet temporary demonstration plant uses a multi-barrier, membrane-based process to convert the treated wastewater to purified drinking water. This involves:

- Sedimentation
- Pressurised granular media filtration
- Ultrafiltration
- Reverse Osmosis
- Ultraviolet Advanced Oxidation
- Remineralisation
- Disinfection

See the Fact Sheets for more detail, and a short video describing the advanced purification process at the water reuse demonstration facility at: www.capetown.gov.za/water-reuse.

3.7 What happens to the contaminants removed from the water at the City's water reuse demonstration plant?

The contaminants removed by the multi-barrier treatment process at the temporary demonstration plant are concentrated in filter backwash water and reverse osmosis brine streams which are returned to the Zandvliet wastewater treatment works. This demonstration facility has a relatively small capacity, so it generates relatively small quantities of waste product called 'brine' that is manageable within the wastewater treatment works and the brine solution does not get returned directly to the environment.

3.8 Who will be supplied with purified water from the demonstration plant?

When the temporary demonstration plant is ready to supply purified water this will be achieved by injecting into the main bulk supply line coming from the Faure Water Treatment Plant where it will blend with treated water supplied from other sources e.g. from the Steenbras Water Treatment Plant.

See the map indicating the very broad distribution area where this water will go across Cape Town, at www.capetown.gov.za/water-reuse.

Note that if and when injection does start, it is likely to ramp up to 5 million litres per day, which is about 0.6% of the City's overall water supply and approximately 2 % of the water usually coming from Faure water treatment plant. (This may vary slightly depending on water production levels over time).

4 FAURE NEW WATER SCHEME

4.1 What is the purification process that will be used at the Faure New Water Scheme?

The advanced purification process being considered for the Faure New Water Scheme will be a carbon-based multi-barrier process involving:

- Ozonation
- Biologically activated carbon filtration
- Granular activated carbon filtration
- Ultrafiltration
- Ultraviolet advanced oxidation
- Disinfection

See the Fact Sheets for more detail, and a video about the Faure New Water Scheme at www.capetown.gov.za/water-reuse

4.2 Why was a carbon-based purification process chosen for the Faure New Water Scheme?

The carbon-based process was selected over the membrane-based method, for the following reasons:

- Reverse osmosis is a process which removes and concentrates contaminants into a stream of what's called 'brine', which is not well suited for return to the environment particularly in large volumes. At the scale/size of the Faure New Water Scheme (producing up to 100 million litres per day) the costs and environmental impact of dealing with such a large volume of brine are significant.
- The construction, operating cost and the energy input are substantially less for a carbon-based process, resulting in a more sustainable solution with a lower impact on the environment.

4.3 When will construction of the Faure New Water Scheme commence?

The City proposes to invite eligible bidders to apply for the tender to construct the Faure New Water Scheme, with the aim of constructing the Scheme and commissioning it by mid-2026. However this is subject to change, and see updates about this in the City's Water Outlook document at www.capetown.gov.za/thinkwater.

4.4 What is the capacity of the Faure New Water Scheme?

The Faure New Water Scheme will initially be commissioned at a 70 Ml/day (million litres per day) capacity, with allowance to be upgraded to a production yield of 100 Ml/day.

4.5 The Faure New Water Scheme will be a direct reuse scheme. What does this mean?

A direct reuse scheme delivers advanced purified water to a drinking water plant or drinking water distribution system without passing it through an environmental buffer such as a river, lake, dam or aquifer. Direct reuse schemes therefore make use of additional treatment steps, monitoring, and/or engineered buffers to achieve the required water quality.

4.6 What is an indirect scheme?

An indirect water reuse scheme involves increasing bulk water supplies by purifying treated wastewater and releasing it into groundwater and/or surface water sources. These water bodies provide storage and act as environmental buffers so that the water may later be treated and distributed for drinking purposes. Environmental buffers provide public health protection benefits, such as contaminant attenuation, dilution as well as time to detect and respond to failures before final treatment and distribution.

4.7 Why is the City injecting this water straight into the water network, rather than into an aquifer first like is commonly done elsewhere?

We are doing both. The City together with the National Department of Water and Sanitation has undertaken several studies to investigate the social, environmental and cost impacts of numerous direct and indirect reuse schemes. Direct reuse involves more engineering upfront, but reduces the risk of downstream contamination from the urban environment (you only have to treat the water once).

These studies showed that the options with the best potential, and which are now being implemented, are the direct reuse scheme at Faure (the Faure New Water Scheme), and two indirect reuse schemes (the Atlantis Managed Aquifer Recharge scheme, and the Cape Flats Managed Aquifer Recharge scheme). In future, these schemes will collectively be able to contribute about 170 ML/d (million litres per day) to the drinking water supply. See the City's Water Outlook document for updates on this, at www.capetown.gov.za/thinkwater

Although indirect reuse schemes are more common historically, there is an increasing global trend for cities to adopt direct schemes, and many of these have already been successfully implemented in countries around the world.

4.8 What will happen to the contaminants once removed in the purification process at Faure New Water Scheme?

The multi-barrier purification process is designed to remove the contaminants from the water by several different mechanisms, including filtration, biological assimilation (metabolism) and chemical reaction. Some of these processes convert, isolate and store the contaminants, and some processes break the contaminants down to harmless compounds.

The stored contaminants are concentrated to remove excess water and discharged to the sewer network, which drains back to Zandvliet wastewater treatment works where they can be removed. The excess water is 'polished' to remove suspended particles by on-site filters and released into the Eerste River via stormwater drainage.

The activated carbon will be periodically removed and regenerated by thermal treatment. This reactivates the carbon and restores its filtration capacity, and also recovers and converts any volatile organic contaminants to carbon dioxide and water.

4.9 Who will be supplied with purified water from the Faure New Water Scheme?

Purified drinking water from the permanent Faure New Water Scheme will first be blended with water from dams and treated again in the conventional way at the existing Faure Water Treatment Plant. The advanced purification plant will produce up to 100 million litres of clean drinking water per day. This water will initially be blended with a maximum ratio of 20% reuse water and 80% dam water.

The distribution network will have the flexibility to supply this water widely across most of Cape Town from the existing Faure and Blackheath reservoirs. These bulk reservoirs serve most of the distribution networks within the Cape Town metropolitan area. See the map indicating the very broad distribution area where this water will go across Cape Town, at www.capetown.gov.za/water-reuse.

4.10 Will there be any independent, expert oversight or review of the Faure New Water Scheme?

During the design stage of the project, the City appointed a specialist international water reuse consultant from the United States (called Hazen and Sawyer) to provide guidance, expert technical review and advice on water reuse through advanced purification processes and technologies. This advice has been incorporated into the design of the Faure New Water Scheme.

The City is in the process of establishing an independent Expert Review Panel, in collaboration with and under the supervision of the national Water Research Commission. The panel will consist of local and international experts from various fields. They will provide support and independent review, during the preparation and implementation of the scheme and its future operations.

4.11 How will the unreliable electricity supply in South Africa affect the reliability and safety of the Faure New Water Scheme?

In the event of power failures or load-shedding, standby power will be provided onsite which will enable essential monitoring and control functions to remain in operation and the safe shutdown of the plant. This will prevent any untreated water from entering the distribution network.

The scheme will also be tapping into the existing hydropower at the Faure water treatment plant, which will offset some of the power required to operate the scheme. This makes the Faure New Water Scheme a relatively “green” scheme and reduces the operating cost of the scheme fairly significantly.

5 WATER QUALITY AND HEALTH

5.1 What will the water look and taste like? Will it be different to what I’m used to?

The water from the Faure New Water Scheme will be blended with the same water from the existing Faure water treatment plant that currently supplies drinking water to a wide area in Cape Town, and it will look the same as the clear water that is being supplied to our taps at present.

People are generally highly sensitive to taste and odour (smell). Scientists now believe the average human has over 400 olfactory receptors that can detect over 1 trillion different odours (as per Bushdid, C., Magnasco, M. O., Vosshall, L. B. & Keller, A. in ‘Science’ volume 343, pages 1370–1372 in 2014.)

But we experience taste and odour differently. Some people have more sensitivity than others. In our drinking water, for example, some of us are more sensitive to when the dams have geosmin in them, while some don’t notice any difference. (Geosmin is a harmless, naturally occurring substance produced in soil and algae in surface water, which produce an ‘earthy’, musty-type odour.) Others can smell when borehole/ wellpoint water has a salty taste or a sulphurous (rotten egg) smell.

The purified drinking water to be supplied from water reuse schemes will not have any of these tastes/odours. It goes through an advanced purification process, and is blended as a small proportion of normal tap water.

5.2 How much of the water in our taps will be water from reuse schemes?

Once a decision is taken to inject purified water from the water reuse demonstration plant into the drinking water supply, up to 5 million litres per day will be injected into the Faure bulk supply line. This is about 2% of the volume of water distributed in that line (it will vary slightly depending on how much water is coming from the Faure treatment plant at any time), and about 0,6% of the total supply to the broad distribution area in Cape Town.

When the larger permanent Faure New Water Scheme is complete, it will produce 70 million litres per day, and will be capable of producing up to 100 million litres per day. This water will initially be blended with a maximum ratio of 20% reuse water and 80% dam water i.e. no more than 20% of the water supplied at any time to consumers from the Faure Water Treatment Plant will be water produced from the advanced treatment plant.

5.3 Have there been any health implications in any of these cities where water reuse is practised?

No. While there have been several toxicological and epidemiological studies conducted on the health implications of water reuse around the world, there have been no published reports of long-term health concerns at any of the cities that supply water from reuse schemes and none of these schemes has had to stop production for extended periods due to public health concerns.

5.4 Is there a possibility that the treated wastewater quality can be too dirty or contaminated to be purified to drinking water quality?

It's not likely but yes it could happen, and there is a system in place to handle this. The Faure New Water Scheme is specifically designed to purify the treated wastewater from the upgraded Zandvliet WWTW because this will be a good quality source. If the quality of the source water is unacceptable for any reason, the online monitoring system will alarm and automatically divert this water to waste before it is fed to the advanced purification process at the Faure New Water Scheme.

5.5 How clean will water produced from the reuse plant be?

The purified water from the Faure New Water Scheme reuse plant will be healthy and safe to drink.

We can be sure of this because we test it to make sure all the contaminants have been removed to below the limits of the South African standards and the strictest international standards for drinking water quality.

It will comply with the South African national standard for drinking water quality (called SANS 241), which applies to all water provided by municipalities and 'Water Service Providers'.

There are currently no South African National Standards specifically for drinking water produced from water reuse schemes, so the City is pioneering this technology and complying with well-established international standards for this instead.

5.6 How do you know all the harmful things like germs, contaminants or hormones are taken out in the purification process?

The water we've used contains many different things. Some are good for us, like minerals, vitamins and salts, and some could make us sick. To restore the water to drinking water quality, we need to be absolutely sure that we've removed all the harmful contaminants properly in the multi-barrier advanced treatment process.

To do this we test for over 250 individual contaminants including viruses, bacteria, parasites, hormones, pharmaceuticals, pesticides, personal care products, herbicides, endocrine disrupting compounds, persistent organic pollutants, industrial chemicals, plasticisers, flame retardants, nanoparticles, radionuclides, metals, radioactive components and disinfection by-products.

Only once the test results show that these are within the standard limits, can we be sure the water is safe to drink. See other FAQ items on the purification process, and the videos at www.capetown.gov.za/water-reuse

5.7 How can I be certain that my family and I will not become sick after drinking water from the reuse plant?

The only way to be sure the water is safe to drink is to test it in a laboratory. The Faure New Water Scheme will only produce water that has been verified to meet the strictest international water quality standards. This will be confirmed with testing by independent laboratories and the City will publish the water quality results for you to view. The same applies to the temporary demonstration plant.

It may provide further assurance for residents to know that the purification processes being used at the advanced water purification plants in Cape Town are based on globally established and verified scientific treatment processes. These have been proven to purify water to the most stringent international standards for drinking water.

To our knowledge, there have been no health scares to date, effecting any of the cities that drink recycled water. Windhoek for example, has been consuming reuse water for over 50 years already, with no health problems.

5.8 What exactly are the standards that reuse water will be purified to?

Drinking water quality in Cape Town is generally proven by compliance with the South African National Standard SANS 241:2015, but this does not yet address some of the emerging contaminants of concern for water reuse.

The City has therefore adopted the strictest of available international standards for each of these contaminants, from the World Health Organisation, the American Environmental Protection Agency, California, Texas, and Australia. This is a conservative approach that will ensure the purified water is safe to drink.

5.9 What kind of monitoring and testing regime will be in place and what happens if there is a problem?

The advanced water purification facility monitors the water quality after each step of the purification process in real-time. There are eight critical control points (CCPs) each equipped with several online monitoring instruments. If the water quality deviates from the allowable range at any of the eight CCPs along the advanced purification process, then the water from the plant will be diverted to waste before it enters into the next step in the process. It is stopped from being able to continue, and the problem is addressed.

Water samples will be taken and tested for certain operational performance parameters at an onsite laboratory every 8 hours. Additional samples will also be tested for operational performance twice a week at the City's Scientific Services nationally accredited laboratory.

The Scientific Services branch will also conduct regular compliance testing, with the frequency varying from daily to weekly to monthly, depending on the parameter's associated risk level. These results will be interrogated by other stakeholders and independent specialists, through an Expert Advisory Panel.

Samples will also be sent for extensive external/independent laboratory testing to verify the City's testing programme and results, either at local SANAS-accredited laboratories, or at international specialist laboratories, where required.

5.10 Will tests conducted on reuse water be available to the public?

The City will be making all water quality data accessible to the public, see www.capetown.gov.za/water-reuse.

5.11 Will testing of purified water be conducted by independent laboratories?

Yes. Currently, the product water from the Zandvliet demonstration plant undergoes routine and rigorous testing by an independent laboratory, including at international laboratory facilities. This approach will be extended to the eventual Faure New Water Scheme.

5.12 Will the purification process for water reuse be able to remove contaminants of emerging concern (CECs)?

Yes. Contaminants of Emerging Concern (CECs) is the name given to a broad range of contaminants that aren't targeted for removal by conventional water treatment plants, but which pose a risk to human and environmental health. They include things like hormones, endocrine disruptors, and persistent organic pollutants.

The advanced water purification process is specifically designed to thoroughly, carefully and repeatedly remove particles, pathogens and pollutants (including CECs) using multi-barrier treatment processes that break down, convert, metabolise or filter out contaminants to within acceptable standard limits.

5.13 Can we get COVID-19 from drinking water, wastewater or water reuse?

While recent research has shown that genetic traces of the SARS-CoV2 virus (which causes COVID-19) are detectable in municipal wastewater (and measuring this is being used to predict infection levels of COVID-19) it should be noted that this is not the live virus. It's only the remnants, or the traces of what was the live virus. There is currently no evidence internationally of the live virus agent being present in wastewater. The COVID-19 disease can only be contracted from the live virus.

This means that there is no reason for concern that the COVID-19 disease could be contracted from treated drinking water or from wastewater, particularly if it is treated or purified wastewater.

The World Health Organisation (WHO) has conducted research about COVID-19 and wastewater, and their report says that "To date no infectious SARS-CoV-2 has been detected in either drinking-water supplies or in untreated or treated sewage. Therefore, it appears that there is a low health risk for drinking water and sanitation workers and users." (WHO Regional Office for Europe's report called 'Rapid expert consultation on environmental surveillance of SARS-CoV-2 in wastewater. July 2020, p2 of the summary report).

The Center for Communicable Diseases (CDC) in the USA is also clear that there is no current evidence that people can get COVID-19 by drinking water, particularly treated water, or that it can spread to people by drinking treated water. The COVID-19 virus has not been detected in drinking water. Conventional water treatment methods that use filtration and disinfection, such as those in most municipal drinking water systems, should remove or kill the virus that causes COVID-19. There is no information to date that anyone has become sick with COVID-19 because of exposure to wastewater. Wastewater treatment plants use chemical and other disinfection processes to remove and degrade many viruses and bacteria. SARS-CoV-2 is inactivated by the disinfection methods used in wastewater treatment. (This comes directly from the FAQs on Food and Water at www.cdc.gov/coronavirus)

5.14 If the water from my tap comes out brown or discoloured, is this sewage in my drinking water?

No. The water which will come from the demonstration plant or the permanent Faure New Water Scheme does not have any colour. Discoloration of drinking water from a tap, especially brown discolouration, is most likely caused by traces of sediment or rust that have accumulated and become dislodged in the water pipes on your property or during planned or unplanned repair work to the water supply network near your property (e.g. repair of a burst pipe in your street or local area).

5.15 Where do I report my concerns about water quality?

In cases where residents are worried about the quality of the water, the matter can be reported to:

- the call centre on 0860 103 089 (option 2), to arrange for a sample to be taken
- SMS 31373
- Email us on water@capetown.gov.za
- Or log a fault online at www.capetown.gov.za/servicerequests/

5.16 Where can we see the results from the water reuse monitoring and testing?

All water quality data from the demonstration plant and from the Faure New Water Scheme will be made publicly available via the City's website, see www.capetown.gov.za/water-reuse

6 TECHNICAL EXPERTISE

6.1 Does the City have the expertise and capacity to operate a permanent reuse scheme with advanced water purification processes, or would this be outsourced?

At this stage, a decision on who will operate the permanent Faure New Water Scheme has yet to be taken but the City will consider all options, taking into account technical capacity, cost and risk. In the meantime, the City is developing operational capacity and expertise through the establishment of an expert advisory panel, and through the lessons learnt at the demonstration plant.

6.2 What technical expertise and management systems are in place to maintain effective operation of water reuse plants?

The City of Cape Town has been developing critical technical and institutional capacity in water reuse by engaging other water utilities around the world and learning from their experience, as well as partnering with local and international experts in water reuse. A peer review panel including local and international experts is being set up under the supervision of the national Water Research Commission.

The City has also gained valuable experience in water reuse through the operation of a demonstration-scale advanced purification plant for over two years. This demonstration plant has enabled us to analyze the water quality over time at different points in the purification process, put in place the correct design, operating, monitoring and management protocols and to engage with key stakeholders to show them how reuse works.

These initiatives have helped us to develop the expertise and capacity required to implement large production-scale water reuse schemes like the Faure New Water Scheme.

6.3 What would happen if municipal procurement delays result in the required equipment, chemicals, specialist skills, etc. not being in place when needed?

The timing of commencement of the scheme's operation is fundamental to ensuring its optimal and cost-effective use. If the City is to operate the scheme itself, then the City will need to have all the necessary procedures and protocols in place, so that tenders for the procurement of equipment and chemicals through Supply Chain Management are timeously carried out. Alternatively, if the scheme is operated by a third party (under a concession), then that tender process must also be synchronised and co-ordinated to ensure that the concessionaire is appointed on time and that all required materials are in place when required.

6.4 Will substandard wastewater treatment that is common throughout SA have any bearing on the quality of water produced by the Faure New Water Scheme.

The Zandvliet Wastewater Treatment Works is currently being upgraded, to ensure a reliably good supply of wastewater in terms of volume and quality (compliant with treated effluent standards).

The Faure New Water Scheme is being designed to purify the general, expected quality of the treated wastewater from the Zandvliet Wastewater Treatment Works (WWTW). This level of quality has been determined through an analysis of this wastewater quality, gauged over an extended period, taking into account the control for possible variations.

It is theoretically possible that a particularly polluted "batch" of wastewater could result in a treated wastewater quality that is not desirable for further purification, for example from an industrial spill. In such a case, the 'critical control points' or a hazard and operability (HAZOP) monitoring system would indicate this, and the feed water to the advanced purification plant would not be accepted. Checks and balances have been put in place to deal with this and divert that water until quality improves to acceptable levels.

6.5 What is the City doing to ensure good quality of treated wastewater, considering that water reuse will now draw from this water source?

The City is currently undertaking a large upgrade project at the Zandvliet Wastewater Treatment Works (WWTW) which supplies water to the water reuse demonstration plant and which will supply source water to the Faure New Water Scheme. This upgrade includes new state-of-the-art technology treatment infrastructure and refurbishment of old infrastructure that will ensure that the quality of the treated wastewater is good enough. The City is also in planning stages for the next phase of upgrades at Zandvliet to make sure this plant will be able to cope with increased volumes of wastewater well into the future.

The Zandvliet WWTW is operated by a private sector specialist operator with highly qualified personnel who have extensive expertise in the operation of sophisticated wastewater treatment processes.

7 COST IMPLICATIONS

7.1 How much more will customers pay for the new sources of supply, and for water reuse in particular?

The costs of the new water sources are already being included in the current water and sanitation tariffs, and will continue to be in future. It is not possible to predict what water and sanitation tariffs will be in future years, as the operational context and related costs are always changing. However, as the Water Strategy has explained there is an investment required in new water sources to help ensure better water security in our shared water future.

It is estimated that the cost of implementing the overall New Water Programme would be approximately R8 billion. Some of the costs of the groundwater schemes have already been incorporated into the water tariff. Extensive financial modelling on the impacts on the water tariffs is due to commence shortly and will help inform any updates of the water strategy.

Further updates on the cost of reuse will be provided in updates of this FAQ document on the City's website, as well as in the City's Water Outlook document which is updated regularly at www.capetown.gov.za/thinkwater

7.2 How much will the construction of the Faure New Water Scheme cost?

The Faure New Water Scheme is currently in design and the costs for the first phase of construction (70ML/d) are estimated to be in the order of about R1.8 billion. Updates on this will be available in the City's Water Outlook document which is regularly updated, see www.capetown.gov.za/thinkwater

7.3 How will the cost of water reuse compare with the other new water options like groundwater from aquifers or desalination of sea water?

The cost of the New Water Programme, including the Faure New Water Scheme, groundwater from the Table Mountain Group (TMG) aquifer and the Cape Flats Aquifer (CFA, which is a Managed Aquifer Recharge scheme) have partially been factored into the current water tariffs. Overall, the average, levelised cost of water produced by the FNWS will be 25% more than the TMG groundwater scheme, and about 60% of the cost of seawater desalination.

7.4 Will water reuse and construction of the Faure New Water Scheme be funded from the fixed service charge that is included in the tariffs for water services?

The monthly fixed basic charge doesn't pay for any one thing in particular. Revenue from both the 'fixed' charges and 'variable' charges (for usage) all goes into the same central account, from where it is allocated to our large number of services.

Revenue needed to fund the implementation of the new water programme (which includes water reuse as one of the new water sources) has already partially been factored into the City's water tariffs.

There have been many misconceptions about the fixed basic service charge which is a part of the water and sanitation tariff system. It was introduced to ensure reliability of income to cover the costs of providing water and sanitation services, regardless of how much water is used. It is not a penalty or a drought charge. Such a charge was never approved by Council so it never came into effect.

The fixed charge is meant to stabilize the income stream for water services. If the revenue stream of a water service provider is unstable, it means there is less capacity to manage and conserve the water we have available, and prepare for a predicted future with even more serious water challenges due to climate change. Dividing the tariff into a fixed part and a variable part relating to the amount we use improves the stability of our revenue streams to help the City ensure that water continues to flow reliably, despite climate change. The City doesn't budget to make a profit from water income and seeks to keep costs of service delivery as low as possible.

7.5 How has the City financed the Zandvliet temporary demonstration plant?

The City does not own the Zandvliet demonstration plant, but buys water directly from the private company that built and operates it. The price of the water paid by the City covers the cost of the plant and the expenses of running it.

7.6 How will the permanent Faure New Water Scheme be funded?

The City has budgeted for the construction of the Faure New Water Scheme under the City's capital budget provision. The financing loans raised by the City will be funded over the longer term from revenue from water sales to residential, business and other customers in Cape Town.

7.7 If the purified water from the reuse scheme costs more than water from the dams, what will happen in the times when the dams are full?

The technology used in the Faure New Water Scheme cannot easily be switched on and off, as and when required. But it can operate at a much lower output, to reduce costs. The scheme is being designed so that when there is an abundance of water available from cheaper sources (like the dams in winter), it can be operated at reduced capacity. This will ensure that it remains operational and well maintained, but does not become a financial burden, until the demand for this water capacity increases again.

8 POLICY AND LEGISLATION

8.1 Which national legislation, policies, strategies and guidelines indicate that water reuse is sustainable or desirable for water security in South Africa?

Water reuse in South Africa - and notably in Cape Town - is strongly aligned with many water reuse policies, strategies and guidelines, over and above the City of Cape Town's own Water Strategy of 2018. These include the **National Water and Sanitation Masterplan** (National Department of Water and Sanitation, 2018), the **Western Cape Reconciliation Strategy** (National Department of Water and Sanitation, 2016), the **National Water Resources Strategy Second Edition** (National Department of Water and Sanitation, 2013), the **United Nations Sustainable Development Goals** (United Nations, 2012), the **National Development Plan** (National Planning Commission, 2012), the **National Strategy for Water Reuse** (Department of Water Affairs and Forestry, 2011), the **Western Cape Reconciliation Strategy** (Department of Water Affairs and Forestry, 2007) and the **National Water Resources Strategy First Edition** (Department of Water Affairs and Forestry, 2004).

Most of these highlight the significant opportunity for implementing water reuse nationally (potable/drinking use), and in particular in the coastal regions.

For more information on the enabling policy and strategic direction, as well as the many feasibility and planning studies undertaken for water reuse in Cape Town, see the Fact Sheets at www.capetown.gov.za/water-reuse

9 STAKEHOLDER ENGAGEMENT

9.1 What kind of stakeholder engagement process has been done for water reuse?

Water reuse is one of the new water sources outlined in the City's Water Strategy, which was open for public comment in February and March 2019 and was subsequently approved by Council in May 2019.

Since 2020 the City has been undertaking a targeted stakeholder engagement process, engaging with specific interested parties, including: branches of government, political party caucus groups in Cape Town (Councillors), public health officials, environmental organisations, academics, traditional healers, traditional leaders and religious/faith groups.

Feedback from these organisations and individuals has been valued and carefully considered, and to date none of them have given outright objections to the City's planned water reuse due to religious or other reasons.

9.2 What information materials are available?

A set of communications materials has been developed about water reuse, the temporary demonstration plant and the permanent Faure New Water Scheme, including:

- Two videos, one focused on the Zandvliet demonstration plant and another one which describes the overall water story for Cape Town with water reuse for future water security. In English, Afrikaans and isiXhosa.
- An information brochure and a summary leaflet, in English, Afrikaans and isiXhosa.
- Detailed technical 'Fact Sheets'
- Frequently Asked Questions (FAQs) with responses.

All water quality data from the demonstration plant and from the operational Faure New Water Scheme will also be publicly available. See www.capetown.gov.za/water-reuse