



The 13th World Plumbing Conference
& Shanghai International Water Supply
and Drainage Equipment Technology Exhibition 2023

October 2023 Shanghai China

AGENDA

- ▶ INTRODUCTION
- ▶ MANAGEMENT OF WATER SERVICES IN SINGAPORE
- ▶ TYPES OF WATER SOURCES AND TECHNOLOGY

INTRODUCTION

- DICKROSE MASALAMANI, JD WATERS PTE LTD (EXECUTIVE DIRECTOR)
- LICENSED PLUMBER IN SINGAPORE SINCE 1998
- FORMER PUB EMPLOYEE FOR 13 YEARS
- PRESIDENT OF SINGAPORE PLUMBING SOCIETY



Singapore
Plumbing
Society




SINGAPORE'S INNOVATION IN WATER

Management of Water Services in Singapore - PUB

- ▶ PUB is a statutory board of the Ministry of Sustainability and the Environment
- ▶ It is responsible to uphold efficient water supply in Singapore.
- ▶ PUB regulates and oversees the country's entire water supply system, which involves the followings :
 - Water Catchment Systems
 - Drainage Systems
 - Water Works
 - Water Reclamation Plants
 - Sewerage Systems.



A nighttime photograph of Singapore's skyline, featuring the Helix Bridge in the foreground and the Marina Bay Sands hotel in the background. The city lights are reflected in the water. A semi-transparent blue box contains white text.

The current population of Singapore in 2023 (To date) at mid year is estimated to be around 6,014,723, a 0.65% increase from 2022

Water demand in Singapore is



currently about 430 million gallons a day with per person utilizing 141 litres



With the domestic sector consuming 45% and the non-domestic sector

demand could almost double, with

taking up the remaining 55%. The non-domestic sector accounting



for about 60%. By then, NEWater and

Edenport's is sufficient to meet the



consumption of water in Singapore is

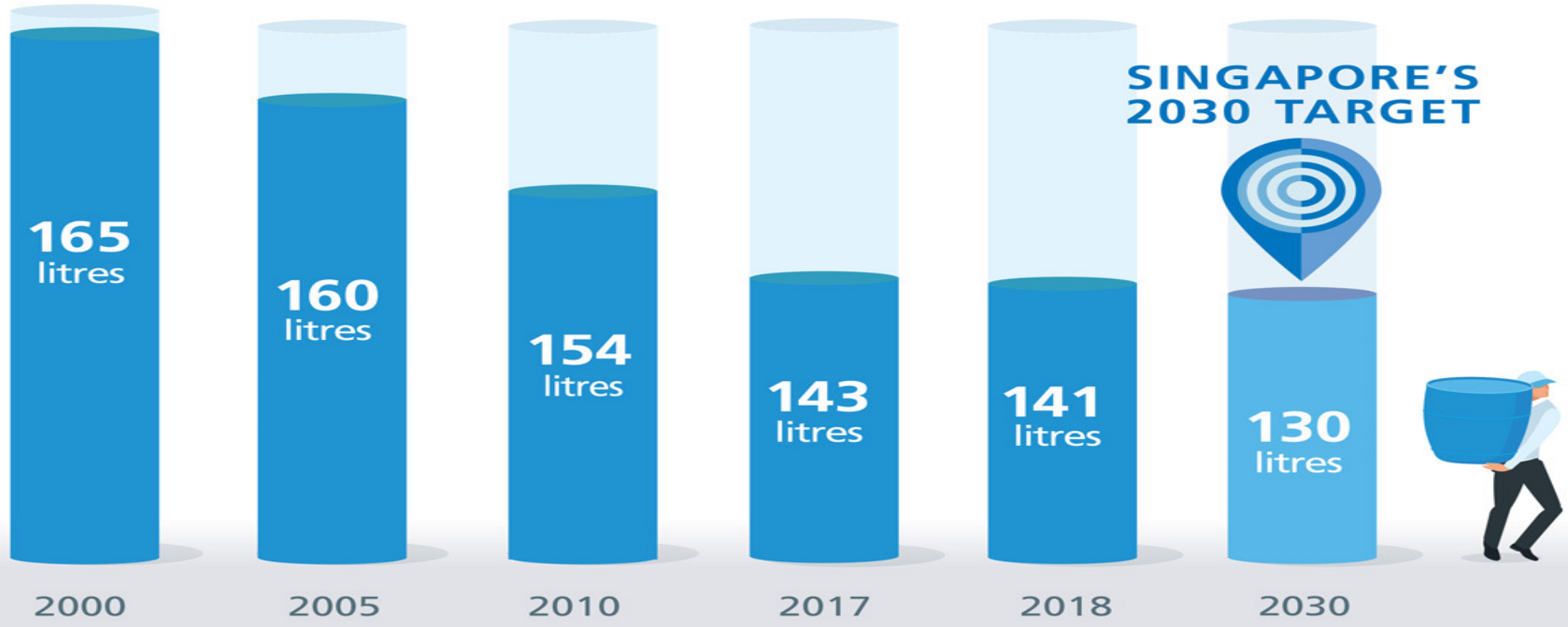
set to be met 130 litres by 2030

[Making Sense of Water Usage Through the Internet-of-Things | School of Computing and Information Systems \(smu.edu.sg\)](http://smu.edu.sg)

[PUB Singapore Water Story](#)



SINGAPORE'S WATER CONSUMPTION



(LITRES PER PERSON PER DAY)

An aerial photograph of Gardens by the Bay in Singapore. The image shows the two large glass conservatories on the left, the Supertrees in the center and right, and the surrounding greenery and water. A blue banner with white text is overlaid in the center.

The Four National Taps

○ IMPORTED WATER

The 1961 Water Agreement between the Johor State Government and Singapore expired on 31 August 2011. However, Singapore continues to import water from Johor under the 1962 Water Agreement which enables us to import in up to 250 million gallon daily from Johor River until 2060.

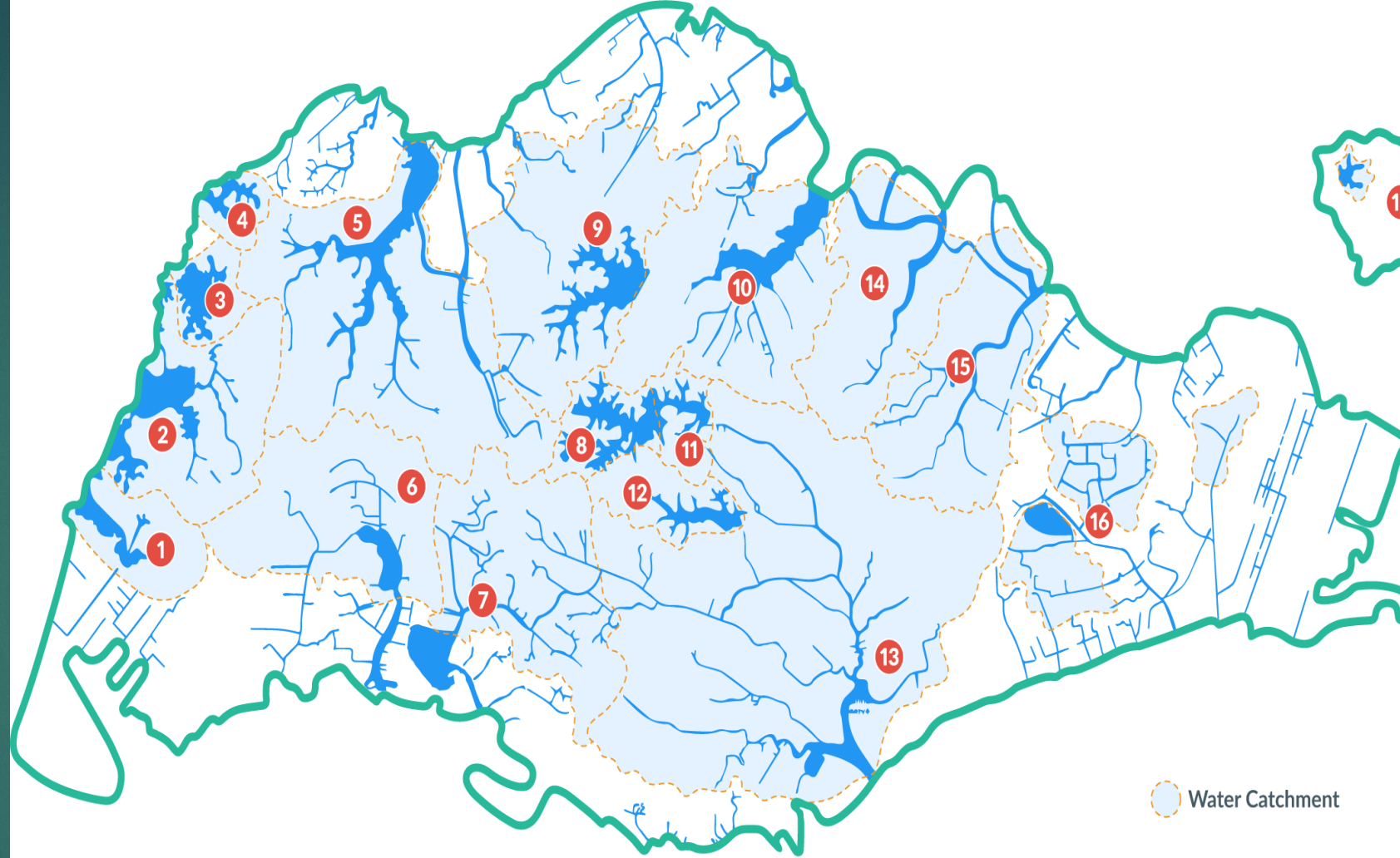


LOCAL CATCHMENT WITH RESERVOIRS

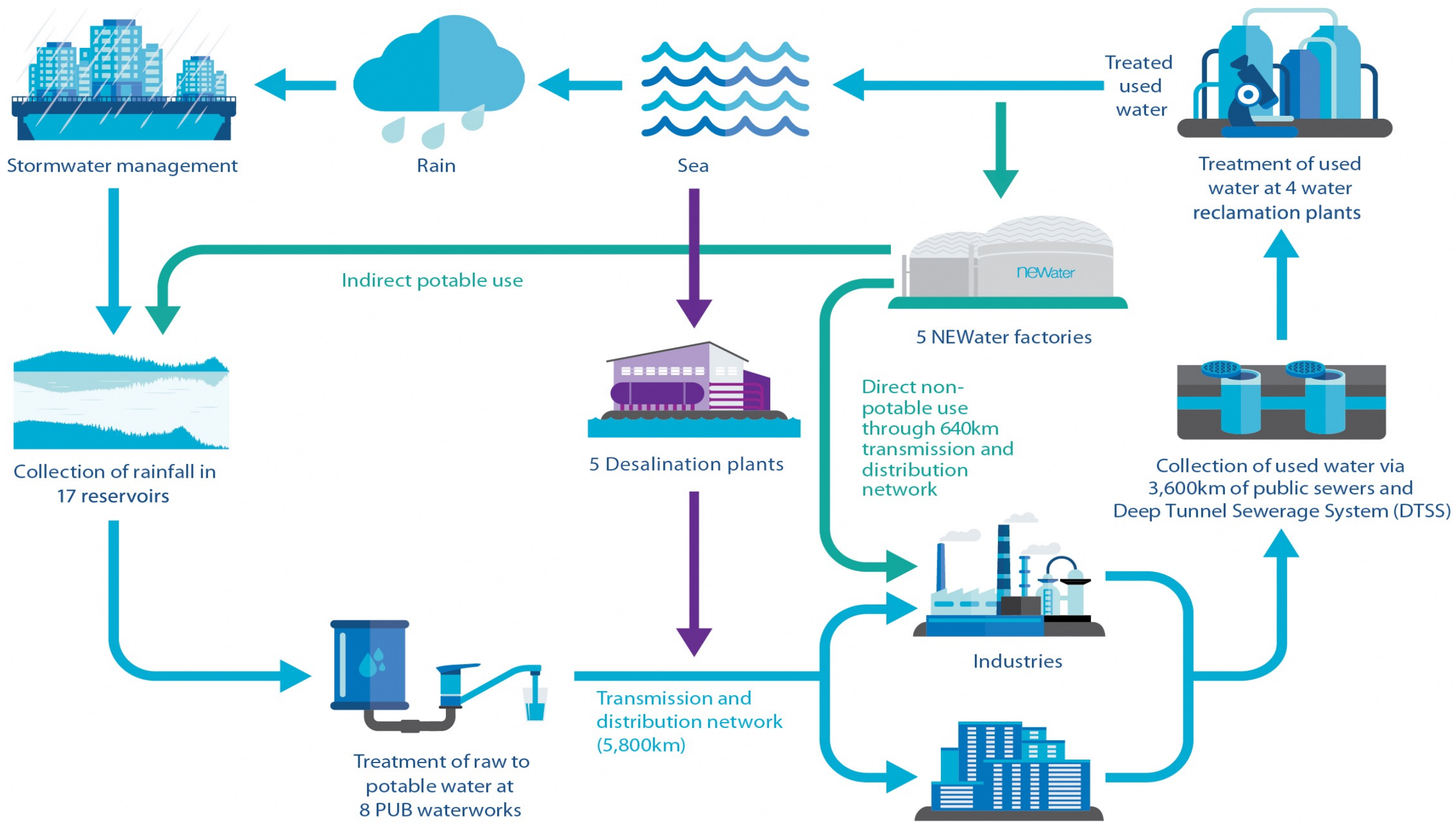
With an area of about 710 km² and growing urban areas, Singapore lacks the space to collect and store all the rain that falls on it.

Through a network of rivers, canals and drains, rain that falls on two-thirds of Singapore's land area is transported to our **17**

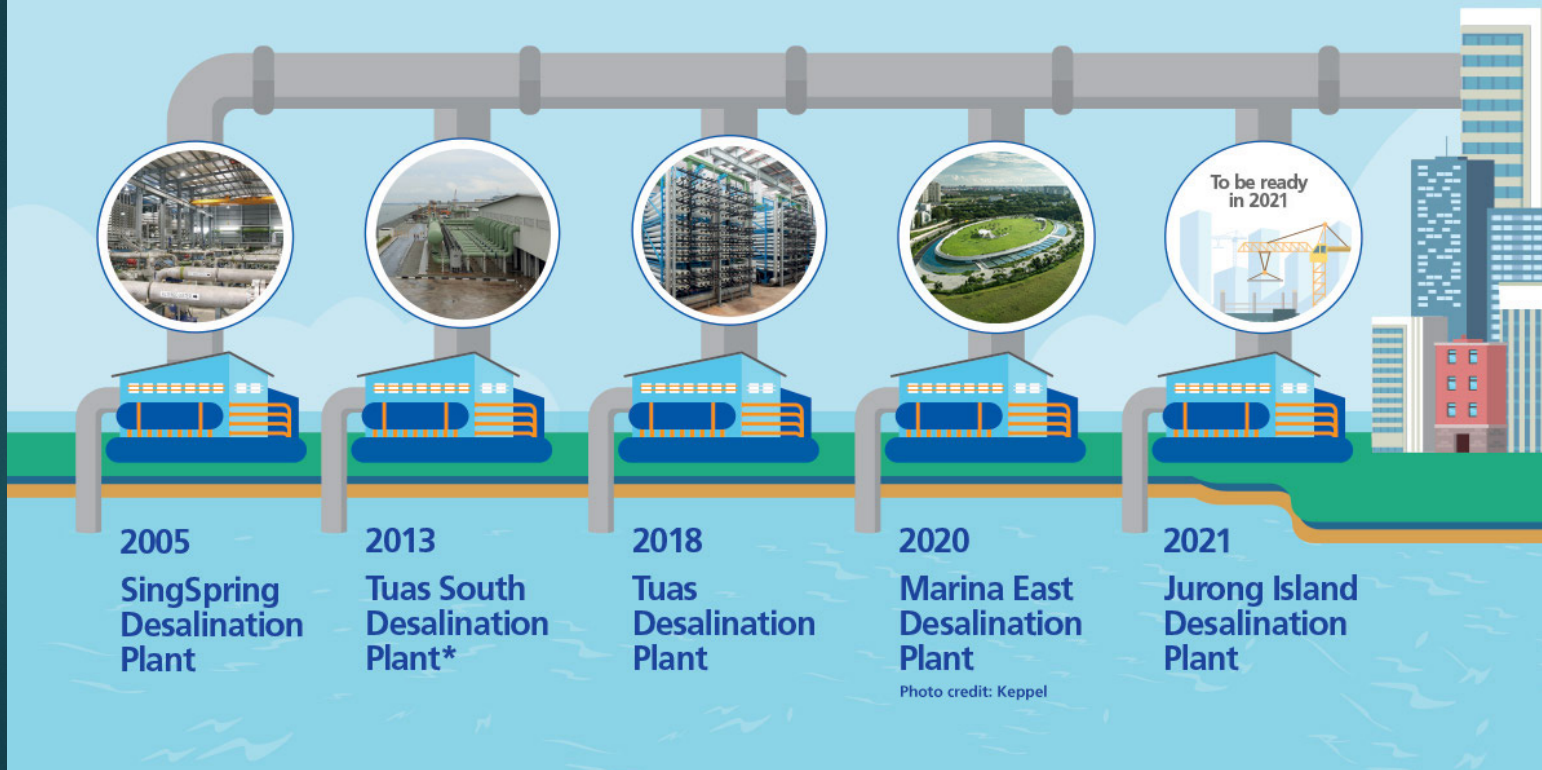
PUB Water from Local Catchment reservoirs.



- | | | | | |
|----------------------|--------------------------|----------------------------|------------------------|---------------------|
| 1 Tengeh Reservoir | 5 Kranji Reservoir | 9 Upper Seletar Reservoir | 13 Marina Reservoir | 16 Bedok Reservoir |
| 2 Poyan Reservoir | 6 Jurong Lake | 10 Lower Seletar Reservoir | 14 Punggol Reservoir | 17 Tekong Reservoir |
| 3 Murai Reservoir | 7 Pandan Reservoir | 11 Lower Peirce Reservoir | 15 Serangoon Reservoir | |
| 4 Sarimbun Reservoir | 8 Upper Peirce Reservoir | 12 MacRitchie Reservoir | | |



SINGAPORE'S DESALINATION JOURNEY



*Formerly Tuaspring Desalination Plant

A total of five desalination plants exists in Singapore

Desalination is an energy-intensive water source.

Singapore uses reverse osmosis for its desalination, which uses about 3.5kWh/m³ of energy to make seawater drinkable.

It produces pure drinking water by pushing seawater through membranes to remove dissolved salts and minerals.

Water reclamation plants In Singapore

- ▶ **Used water is collected through a network of sewers that leads to the water reclamation plants. Currently, there are four water reclamation plants in Singapore**
- **Changi water reclamation plant**
- **Kranji water reclamation plant**
- **Jurong water reclamation plant**
- **Ulu pandan water reclamation plant**



Journey of Newater in Singapore

- ▶ **1970s- the emergence of NEWATER began when the Singapore government commissioned a study to determine the feasibility of producing reclaimed water. Although the study found it was technically possible, the technology's high cost and unproven reliability then were insurmountable concerns.**
- ▶ **In 1990s, however, membrane technology's cost and performance had improved considerably**
- ▶ **In 1998, PUB set up a team to test the latest proven membrane technology's use in water reclamation for potable purposes. Two years later, it commissioned a full-scale demonstration plant that could produce 10,000 cubic metres daily.**
- ▶ **In 2003, we launched NEWater to the Singaporean public, with the opening of the first two NEWater plants at Bedok and Kranji, and the NEWater Visitor Centre, a water museum to showcase our journey towards water sustainability.**

○ Newater

The NEWater process recycles our treated used water into ultra-clean, high-grade reclaimed water

There are a total of five Newater plants in Singapore. By 2060, NeWater is expected to meet up to 55% of Singapore's future water demand



Stage 1 – Microfiltration / Ultrafiltration

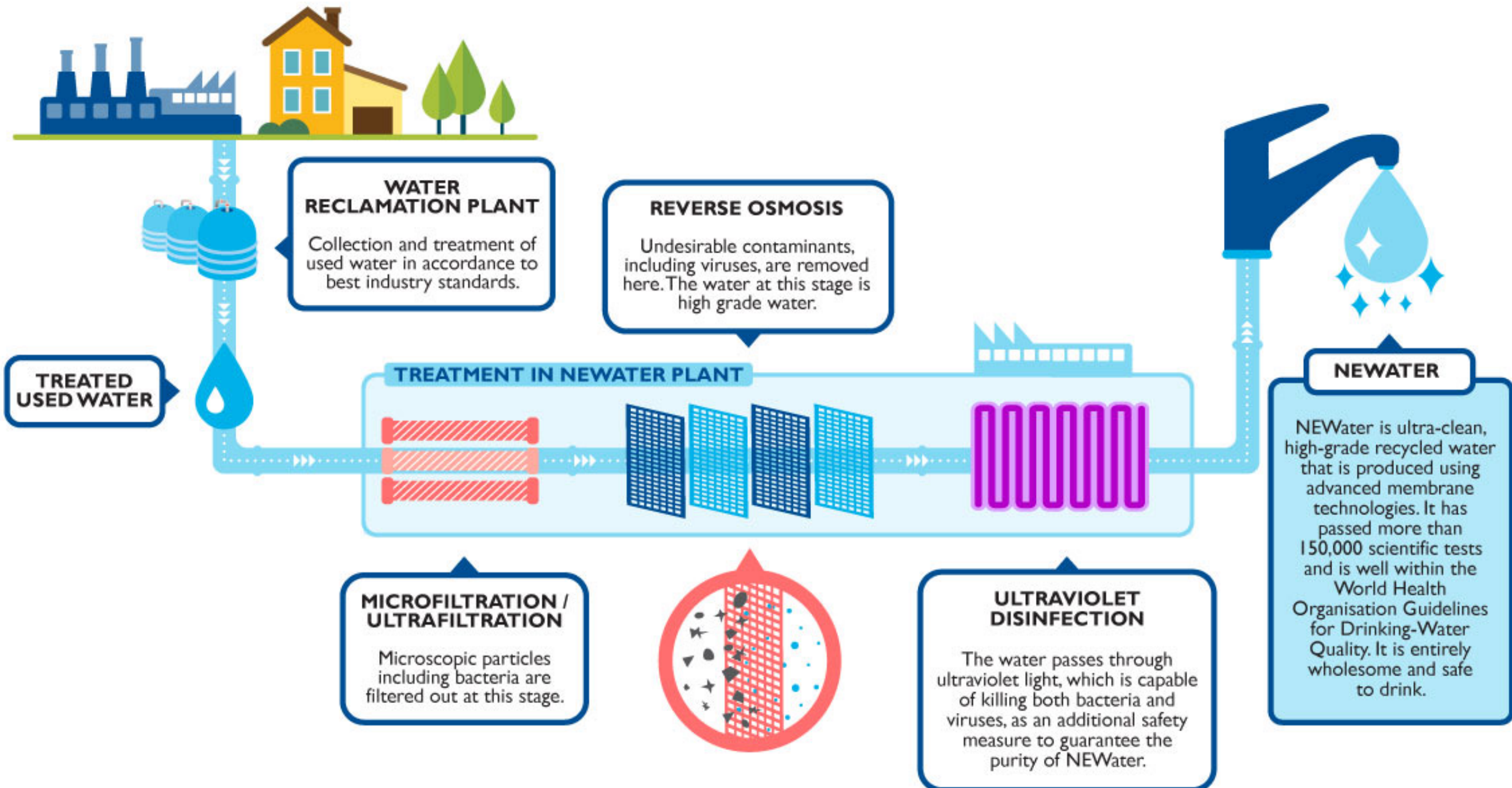
during microfiltration, the treated used water is passed through membranes to filter out microscopic particles and bacteria.

Stage 2 – Reverse Osmosis

In RO, a semi-permeable membrane is used. The semi-permeable membrane has very small pores which only allow very small molecules like water molecules to pass through. Consequently, undesirable contaminants including viruses cannot pass through the membrane.

Stage 3 – Ultraviolet Disinfection

After the RO stage, the water is already of a high-grade water quality. However, the UV disinfection is able to kill both bacteria and viruses. This process acts as an additional safety measure to guarantee the purity of NEWater.





For Any questions, doubts or insights, we more than insist for you to email us at

admin@singaporeplumbingsociety.org.sg or
president@singaporeplumbingsociety.org.sg

References



PUB, Singapore's National Water Agency.

40 Scotts Road, #22-01
Environment Building
Singapore 228231

For more information. Visit
www.pub.gov.sg