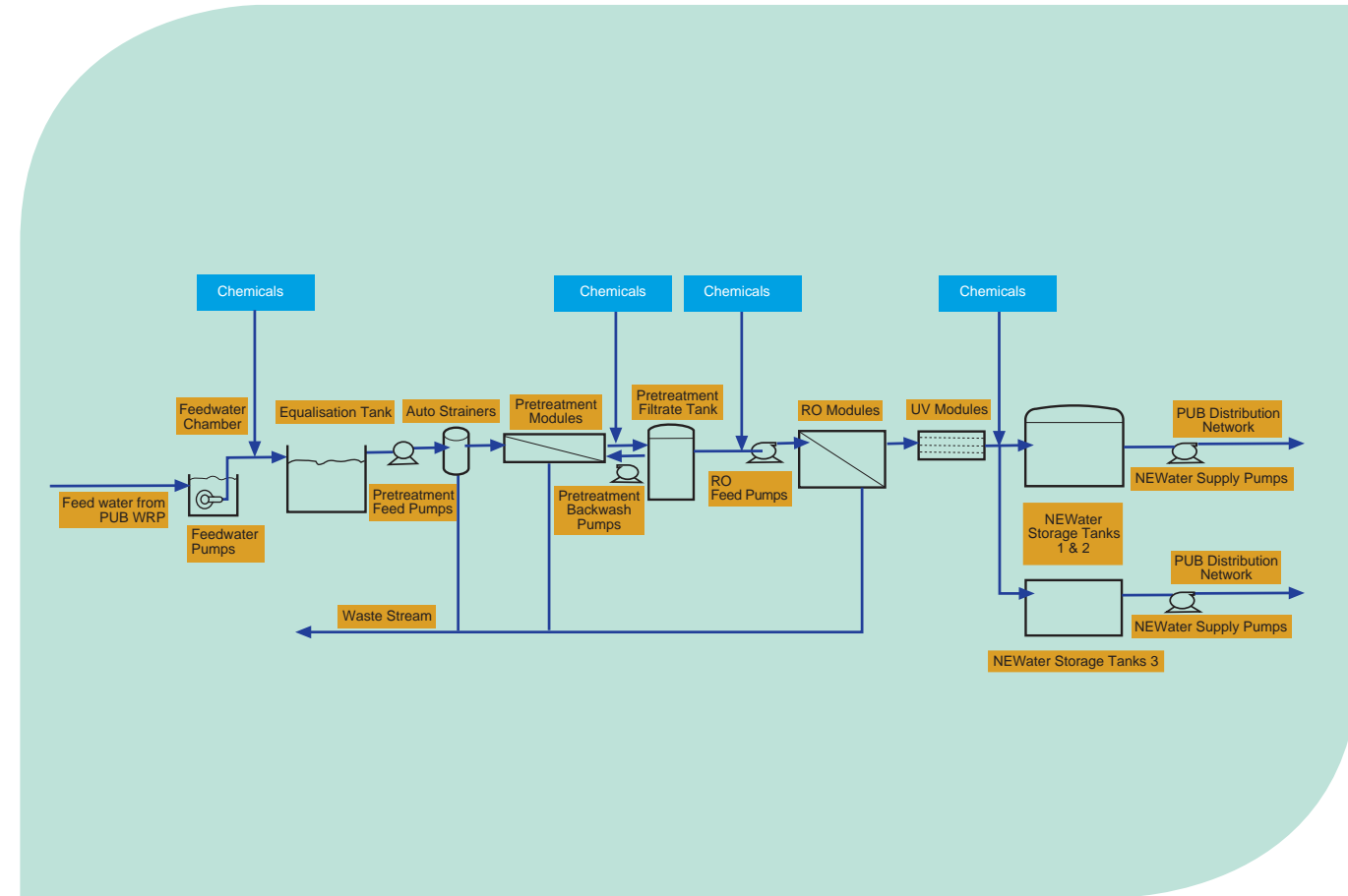


Process flow diagram



General information

Location	61 Old Toh Tuck Road
Area	26,000m ²
Capacity	148,000 m ³ /day

TYPE OF PROCESS	
UNIT OPERATION	TECHNOLOGY
Auto strainers	Automatic screening / backwashing
Pretreatment modules	Micro-filtration
RO modules	Reverse Osmosis
UV modules	Ultraviolet disinfection

ULU PANDAN NEWATER QUALITY	
pH	7.0 - 8.5
Ammonia	<1 mg / l
Conductivity	<200 us / cm
Turbidity	<2 NTU
TOC	<0.1 mg / l
Total residual chlorine (TCL ₂)	0.5 - 2 mg / l

Keppel Seghers

Keppel Seghers is a leading provider of comprehensive environmental solutions, and provides consultancy, design and engineering, technology development, construction, operation and maintenance of plants and facilities, as well as investments in large-scale environmental projects.

Keppel Seghers' advanced technology solutions address a wide spectrum of environmental issues for both solid waste and water.

To date, Keppel Seghers has executed more than 100 waste-to-energy projects and more than 350 water and wastewater projects in more than 25 countries worldwide.

Keppel Seghers is a wholly-owned subsidiary of the Keppel Infrastructure group, which is a division of Keppel Corporation Limited, a leading company listed on the Singapore Exchange.

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Keppel Seghers Ulu Pandan NEWater Plant at a glance

Keppel Seghers Ulu Pandan NEWater Plant is Singapore's fourth NEWater plant and has a capacity to produce 148,000m³ of NEWater per day.

The plant is currently the second largest in Singapore and has the capacity to produce a third of Singapore's NEWater supply.

Awarded by PUB in early 2005 to design, build, own and operate the plant for 20 years under the Public Private Partnership initiative, the plant meets the demand from the industrial and commercial sectors in the western and central regions of Singapore.

The plant was opened officially on 15 March 2007 by Prime Minister Lee Hsien Loong. Other dignitaries present included then-Minister for the Environment and Water Resources Dr Yaacob Ibrahim, then-Minister for Defence Mr Teo Chee Hean, members of the National Research Foundation and the Research Innovation & Enterprise Council.



Second largest NEWater plant in operation in Singapore



Key Features

Modular design for flexibility

Modular design of the process enables Keppel to accommodate PUB's request to change the plant from industrial water and NEWater production to purely NEWater production, with minimal disruption to the project schedule.

Space-saving measures for compact design

Reverse Osmosis (RO) systems are built on top of the water tank. Housing with larger ports were used so that the RO modules are stacked eight to nine high compared to the usual five.

Time & cost-saving construction methods

Pre-fabricated steel bolted tanks are used instead of concrete tanks. This enables construction of the plant to be completed in 20 months (a plant of this capacity would typically take 24 months to complete).

Energy-saving features for lowest operating cost

The plant is equipped with RO inter-stage energy recovery turbine which is a first for NEWater plants in Singapore. Variable Speed Drives (VSD) are installed at all feed pumps for energy efficiency when handling variable loads.



What is NEWater?

NEWater is treated used water that has undergone stringent purification and treatment process using advanced dual-membrane (microfiltration and reverse osmosis) and ultraviolet technologies.

Since 2003, NEWater in Singapore has been used for wafer fabrication processes, non-potable applications in manufacturing processes as well as air conditioning cooling towers in commercial buildings. This has freed up a large amount of potable water for other purposes.

NEWater is currently blended with reservoir water and then undergoes conventional water treatment to produce drinking water.

NEWater is ultra-clean because it goes through a multi-barrier reclamation process that comprises three key stages:

- Micro / Ultra Filtration
- Reverse Osmosis
- Ultraviolet Disinfection

Step 1: Microfiltration

Treated secondary effluent goes through auto strainers to filter out larger particulates. It is then passed through membranes to filter out suspended solids, disease-causing bacteria and some viruses. These are retained on the membrane. The filtered water contains only dissolved salts and organic molecules.

Step 2: Reverse Osmosis

A semi-permeable membrane with tiny pores allows only very small molecules like water molecules to pass through. Undesirable contaminants such as bacteria, viruses, heavy metals, nitrates chloride, sulphate, disinfection by-products, aromatic hydrocarbons and pesticides cannot penetrate the membrane.

Hence, NEWater is Reverse Osmosis water that is free from viruses and bacteria and contains very low levels of salts and organic matter. This RO process is in two stages, and a low pressure interstage booster is used between the two stages to recover energy from the second stage reject.

Step 3: Ultraviolet Disinfection

Reverse osmosis produces water of a very high-grade. In this stage, ultraviolet light is used to ensure that any remaining organism is inactivated. Alkaline chemicals are then added to restore the pH balance, following which the NEWater is ready for use.

Step 4: Stringent Quality Monitoring

A comprehensive monitoring and audit system is in place to ensure that NEWater produced at Ulu Pandan consistently meets PUB's requirements. This includes linking the plant's key on-line water quality monitoring system to PUB's monitoring room.

The NEWater is also sampled and analysed regularly by an accredited laboratory. In addition, audits are conducted periodically by PUB to ensure that the plant's operation meets the required standards.