

Adelaide Desalination Project Fact Sheet

WATER IS GOOD

From ocean to tap

Making desalinated water at the Adelaide Desalination Plant is an exciting process which involves a number of steps. This fact sheet aims to explain the process of supplying desalinated water from the ocean to your tap.

Sourcing the water

Seawater intake

The intake tunnel (1.4km long) brings seawater to the desalination plant. The design of the intake and tunnels ensures water moves slowly through the inlet (about 15cm per second or about 500m per hour) and makes its way to an intake pump station. The floor of the pump station is located 8m below sea level so seawater is gravity fed to the pump station.



Gulf St Vincent

Pre-treatment

Band screens and intake pump station

Three rotating band screens in the intake pump station remove coarse solids larger than 3mm (e.g. seaweed). The screens are made from super-duplex stainless steel to ensure a long life despite saltwater contact. The rotation allows screens to be cleaned progressively and helps with efficient filtration. From the intake pump station, the screened seawater is pumped up to the main process plant building about 52m above sea level.



Band screen

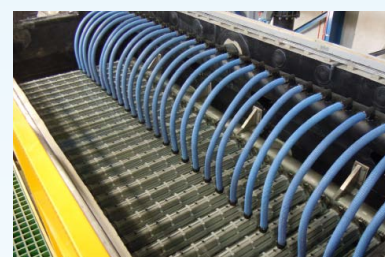
Disc filtration

Seawater from the intake pump station then flows through disc filters. These filters help remove particles larger than 100 micron (0.1mm). The discs are made of a tough plastic material called polypropylene which has small grooves to trap the particles. To clean the discs, seawater is pumped through the filters in reverse. This backwashing takes about 20-30 seconds every 1-2 hours.

Ultrafiltration

After disc filtration, water moves into the ultrafiltration (UF) cells, where submerged UF membranes remove smaller particles larger than 0.04 micron. The membranes are made of Polyvinylidene Fluoride (PVDF), a special plastic polymer material resistant to chlorine. Water moves along the membrane walls and clean seawater is drawn through the porous wall of the membrane.

The UF cells are cleaned by passing filtered seawater through the membrane fibre in reverse while air is bubbled over the external surface to help loosen



Ultrafiltration cells



Australian Government



Government of
South Australia



SA Water

Adelaide Aqua

D&C Consortium



any accumulated material. This backwash is required at intervals from 20-90 minutes depending on quality of the source water. Sometimes, more vigorous cleaning using chlorine and low pH solutions to control fouling can be undertaken every 2 to 4 days depending on the seawater quality.

The Adelaide Desalination Plant is one of the first plants in the world to use UF pre-treatment for large scale seawater desalination.

Reverse osmosis

High pressure pumps

The filtered water from the UF is pumped to the Reverse Osmosis (RO) system through a set of cartridge filters. These filters help protect the sensitive RO membranes. Water needs to be pressurised to make the RO process work (high pressure pumps are used to pressurise 50% of the filtered water). The other 50% is pressurised using recovered energy from the saline concentrate (a small booster pump overcomes hydraulic pressure loss).

The feed water entering the RO membranes requires 56-70 bar pressure (812-1015psi - compared to an average car tyre at 32psi). The actual operating pressure depends on a number of factors including seawater salinity and temperature, fresh water recovery rate and RO membrane age.

Reverse Osmosis (RO) racks and membranes

The RO membranes are the heart of the desalination process. Unlike the pre-treatment process which removes particulate or undissolved matter, the RO membranes remove dissolved salts from seawater. Enough pressure is applied to overcome the natural osmosis pressure of seawater. Fresh water passes through the membrane more readily, while dissolved salts are held up.

The membranes are housed in pressure vessels stacked together in large racks. Desalinated water, known as 'permeate' and saline concentrate are produced at this stage. This concentrate flows to the outfall and must meet Environment Protection Authority requirements. At the Adelaide Desalination Plant the fresh water recovery is 48.5%, i.e. for every two units of seawater, one unit of fresh water is produced.

Energy Recovery Devices

The saline concentrate comes out of the RO process under high pressure. We have Energy Recovery Devices at the Adelaide Desalination Plant which use spinning rotors to efficiently transfer energy from the high pressure waste stream to the incoming filtered seawater stream. About 50% of the water entering the RO membranes is partly pressurised from the Energy Recovery Devices.

Outfall

About 50% of seawater entering the plant is returned to the sea via an outfall pipeline. This concentrate flows through a number of duck bill valves on the sea floor. The valve outlets are flexible and automatically adjust depending on the volume in the outfall. This ensures saline concentrate is discharged at high



RO membrane racks



Energy Recovery Devices



Duck bill valves

velocity to achieve optimal mixing and dilution for all tidal conditions.

Post-treatment

Post-treatment

As permeate produced by the RO process is very pure and does not contain vital minerals, post-treatment is required to make the water suitable to drink and transfer through pipelines and pumps.

Some aspects of post-treatment at the Adelaide Desalination Plant are similar to existing processes used by SA Water to treat our other water sources, for example, chlorination and fluoridation of treated water from Adelaide Hills reservoirs. See our post-treatment fact sheet for more information.

Water storage tanks

Two treated water storage tanks receive the water following post-treatment. Each tank can hold 25ML (25,000,000L) which is equivalent to ten Olympic sized swimming pools.



Water storage tanks

Distribution

Transfer pipeline

The transfer pipeline delivers water from the Adelaide Desalination Plant to the Happy Valley Water Filtration Plant (WFP). The pipeline is approximately 12km long and as part of the project about 50,000 local native seedlings were planted around the pipeline route and a transfer pump station. To complement this, a shared user bike/pedestrian path was constructed for the local community along Lonsdale Road.



Happy Valley WFP

Happy Valley Water Filtration Plant

SA Water has been treating and distributing drinking water for more than 20 years at the Happy Valley WFP. Desalinated water will be combined with water from the Happy Valley plant before distribution into the existing water supply network.

Drinking water from the Adelaide Desalination Plant is mixed directly with filtered water from the Happy Valley WFP.

Your tap

A climate independent water supply ensures we can continue to supply our customers with safe drinking water.

In future, the connection of our southern and northern systems through the North South Interconnection System Project will ensure a more flexible water distribution network and, balanced with water sourced from recycling, reservoirs and the River Murray, a more secure water supply for South Australia.



A safe product to your tap

More information

For information about the Adelaide Desalination Project:

- Visit www.sawater.com.au