

Desalination

– fresh water from the sea

What is desalination?

Desalination is a technology that separates dissolved salts and other minerals from seawater or other salty water to provide clean drinking water. The Gold Coast Desalination Plant uses a process called reverse osmosis, which involves the removal of salts and other minerals out of the water as it moves through layers of extremely thin membranes under high pressure. The pure water is then blended with other drinking water supplies and distributed directly to users via south-east Queensland's new water grid.

What are the benefits of a desalinated water supply?

The major benefit of desalination is that it can continue to deliver high quality drinking water for consumption, even during periods of drought. It also provides an alternative source of water that will make our overall supply more diverse and less vulnerable to interruption.



The Gold Coast Desalination Plant at Tugun produces drinking water for south-east Queensland.

Did you know?

The Gold Coast Desalination Plant will produce up to 133 megalitres a day.



Gold Coast Desalination Plant

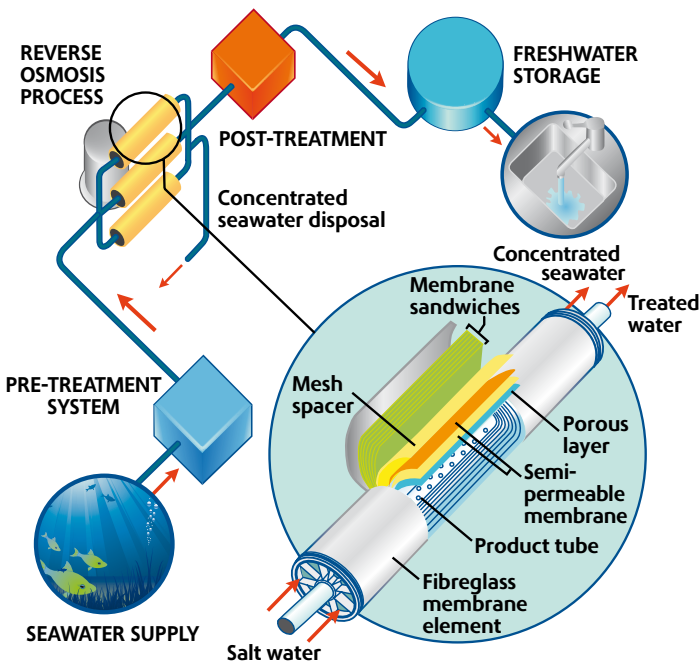
Seawater is drawn through an inlet tunnel that extends more than one kilometre from the beach at Tugun. The seawater first passes through a drum screen to remove particulates larger than 3mm. To help remove suspended solids in the filtration system, pH is corrected and polyelectrolyte coagulant is added. Pre-treatment filtration involves dual filters of sand and coal.

There are more than 56,000 reverse osmosis membranes in the plant.

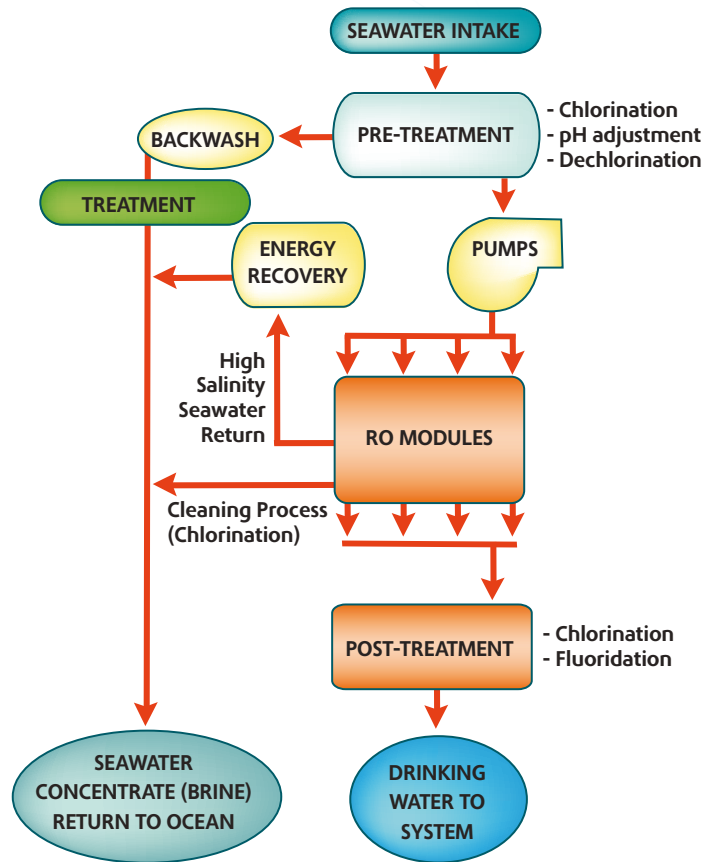


How does reverse osmosis work?

Reverse osmosis is the most popular type of desalination process in the world. Reverse osmosis involves forcing sea water through layers of specially engineered membranes at high pressure (about 60 times atmospheric pressure) to remove dissolved salt and other microscopic particles. The membrane is so thin that a stack of five thousand of them would be only one millimetre thick. The process produces water that is of a higher level of purity than water from dams and reservoirs (see 'How Reverse Osmosis Works' fact sheet).



Stages of the desalination process



Stages of the desalination process

1. Seawater is drawn from the ocean through a submerged inlet tunnel to the plant.
2. Pre-treatment involves micro-filtering particles from seawater, adjusting the pH, and adding an inhibitor to control the build-up of scale in pipelines and tanks.
3. Reverse osmosis forces seawater through layers of synthetic membranes to remove salt and minerals. Concentrated salt water is separated and returned to the ocean.
4. Post-treatment involves stabilising the water with small amounts of lime and carbon dioxide, then chlorine for disinfection.
5. Desalinated water is blended with other Gold Coast water supplies and joins south-east Queensland's water grid to supply homes and industry.

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Why are minerals added to the pure water?

After reverse osmosis filtration the water is so pure that minerals, salts and other elements need to be added to bring the desalinated water closer in taste and properties to treated water from our dams and reservoirs. The purified water also needs to be 'hardened' to prevent corrosion in the distribution system. Chlorine is also added for disinfection.

Is desalinated water safe to drink?

Yes. All water must meet the requirements of the Australian Drinking Water Guidelines, including desalinated water as it is added to the water grid. The desalinated water is blended with water from other supply sources, such as Hinze Dam. Most people will not notice any change in taste and odour.



How much pure water is produced?

The Gold Coast Desalination Plant can produce up to 133 megalitres of pure water a day, which is equivalent to about 53 Olympic-size swimming pools. The plant can be operated at zero, 33 per cent, 66 per cent and 100 per cent capacity depending on demand.

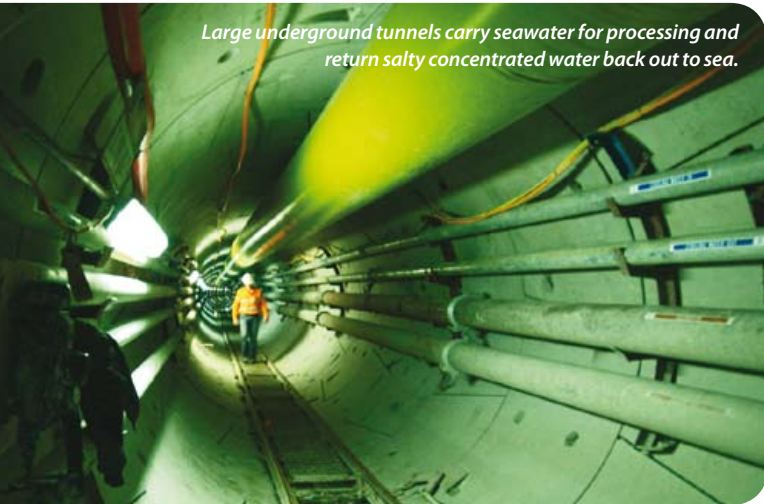
Who produces desalinated water?

The Gold Coast Desalination Plant is owned by WaterSecure (a Queensland Government agency). LinkWater moves the desalinated water by pipelines to various locations through the Water Grid depending on demand. Finally, local council organisations such as Gold Coast Water take ownership of the water once it enters the water distribution network and is delivered to homes and businesses.

Depending on demand, a blend of dam and desalinated water may be supplied to Gold Coast, Logan and Brisbane regions.

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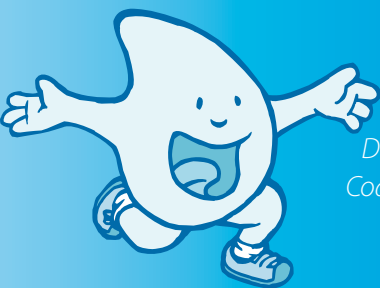


Large underground tunnels carry seawater for processing and return salty concentrated water back out to sea.

Where does the left over salt go?

The unused seawater (about 55%), containing dissolved salts and minerals, is returned to the ocean via an outlet tunnel, and dispersed 1.2 kilometres out to sea in water approximately 20 metres deep.

The salty concentrated water, called brine, is released through a one metre diameter pipeline containing eight diffuser heads. The brine then mixes with the surrounding seawater and is dispersed by strong tidal currents in the ocean. The increased salinity level does not cause stress to marine life. In fact the outlet structure has created an artificial reef which is a new habitat for sea creatures.



Did you know?

Desalinated water from the Gold Coast Desalination Plant complies with the Australian Drinking Water Guidelines.

Is desalinated water used for drinking water supply in other states in Australia?

Yes, the impact of climate change has encouraged water authorities in Australia and overseas to diversify their water sources and reduce their dependency on rain for water supply. Some examples include:

- Perth Desalination Plant in Kiwana.
- Large desalination plants are being built in Sydney, Melbourne and Adelaide. A second plant is being built in Perth.
- Small desalination plants have been operating across Australia for many years, providing drinking water for towns like Penneshaw, Coober Pedy and Marion Bay in South Australia.
- There are at least 20 desalination plants in Queensland. Ten of these are seawater desalination plants, including five on the Torres Strait Islands and one on Hamilton Island. There is also a groundwater desalination plant at Dalby.

Further reading

WaterSecure
www.watersecure.com.au

Gold Coast Council Waterfuture Plan
www.goldcoast.qld.gov.au

Wikipedia Gold Coast desalination plant
http://en.wikipedia.org/wiki/Gold_Coast_desalination_project

Waterwise
www.nrw.qld.gov.au/waterwise

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