Desalination
in South East Queensland

Supplying water from sources that allow us to be less dependent on rain is essential to South East Queensland's water future. Desalination is the process of treating seawater so it is safe to drink.

Unlike the majority of drinking water produced in South East Queensland, the Gold Coast Desalination Plant is less dependent on rainfall to operate and may be used in times of extreme weather and if our conventional water treatment plants are offline. It can produce up to 133 million litres of drinking water a day, which is equivalent to 50 Olympic-sized swimming pools.

How does it work?

Seawater is drawn into the plant via a pipeline, one kilometre off the coast. A process called reverse osmosis forces seawater onto thin, porous membranes at high pressure which separate water molecules from salt and other dissolved minerals. The desalinated water is then blended with other treated water or directly distributed to homes, businesses and industries connected to the SEQ Water Grid.

The desalination process

Seawater intake

Seawater is filtered through a mushroom-like inlet structure on the seabed. Fish and marine animals are not drawn in, as the flow into the inlet is slower than the current. The seawater then travels through a pipeline to the desalination plant, which is situated about two kilometres inland at Tugun, on the Gold Coast. Particles more than three millimetres in size are screened out before the water is put through a finer filter to remove smaller particles.

Pre-treatment

In large tanks, a coagulant called ferric sulphate, is mixed with the seawater to bind small suspended particles into clumps, so they sink and are removed by sand filters at the bottom of the tanks. Large pumps are used to move the filtered water to the next stage.

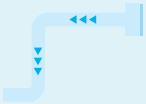
Reverse osmosis

This process forces the filtered seawater, at high pressure, through thousands of pressure vessels that contain semi-permeable membranes. High pressure pumps increase the pressure of the sea water to between 50 and 60 bar (more than 50 times atmospheric pressure).

This enables salt and other impurities to be trapped on one side of the membrane and pure water, called 'permeate', to pass through to the other side. Seawater makes two passes through the pressure system. There are more than 16,000 membrane elements inside.

Distribution

The water produced after reverse osmosis is very pure so we add small amounts of chlorine, fluoride, carbon dioxide and calcium in the form of lime. The treated water is then stored in two, 15 million litre tanks at the plant before it is pumped to the Robina Reservoir at Clover Hill, where it is mixed with treated water from Hinze Dam or Little Nerang Dam and piped to the Gold Coast, Logan and Brisbane.



Outlet shaft

The seawater not converted into drinking water, called brine, is returned to the ocean through an underground pipe. A diffuser system releases the water in an area about the size of eight football fields.

Energy use

Desalination processes are energy intensive. By re-using the water produced in the first pass of the reverse osmosis process, to continue to force water through the membranes, we can recover about 97% of the energy that would otherwise be lost. The total energy recovery for the treatment process is 55%.

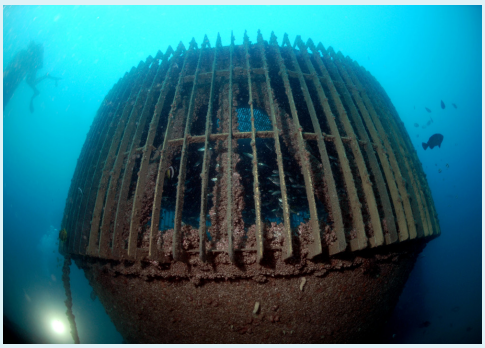
Is desalinated water safe to drink?

Yes. Desalinated water meets the same criteria as water treated from dams, such as public health regulation standards and the *Australian Drinking Water Guidelines 2011*. It is regularly tested to ensure it is clean and safe.

The Gold Coast Desalination Plant in Tugun

Is the desalination plant affecting the marine environment?

A long-term independent marine monitoring program, designed in conjunction with the State Government and independent marine experts, is in place. It shows that the plant is operating in compliance with licence conditions which have been developed to prevent environmental impacts. Results indicate small plants and animal organisms are thriving on and around the inlet structure. Footage reveals that the seawater intake is providing a habitat for a diverse variety of marine organisms, effectively creating an artificial reef. Real-time monitoring of the quality of the brine discharged back into the ocean includes measurement of pH, chlorine, dissolved oxygen, temperature, turbidity and salinity.



For more information on desalination in South East Queensland, **visit seqwater.com.au/desalination**