

GoldCoast Waterfuture

Understanding the desalination process

Desalination produces drinking water by removing dissolved salts and other impurities from seawater or brackish water. Water supply from a desalination plant is not dependent on the climate and is therefore available continuously all year round.

What is desalination?

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.

Desalination processes include:

- Reverse osmosis - involves seawater being pushed through a semi-permeable membrane that traps the salt and other impurities on one side and allows water to be filtered through a microscopic strainer.
- Thermal distillation - involves boiling saline water and collecting the purified vapour.
- Electrodialysis - involves the removal of salts by separating and collecting their chemical components through electrolysis and is more suited to salty groundwater than seawater.

In Australia, the most common desalination process is reverse osmosis, which is the process commonly used on cruise ships and navy vessels to supply very pure water. Reverse osmosis has been chosen as the preferred processing method for the proposed Gold Coast desalination plant due to advances in technology associated with this method.

What is reverse osmosis?

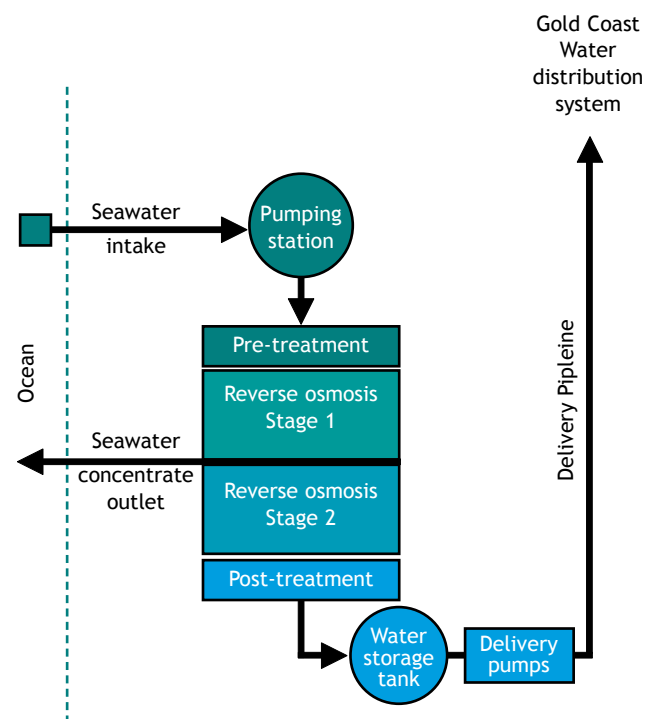
This filtering process removes 95% to 99% of dissolved salts and inorganic material.

Reverse osmosis is the finest level of filtration available and supplies water that is clean, safe, healthy and pleasant to drink.

Advances in technology have seen reverse osmosis become the most popular desalination process used in most parts of the world. Improvements in efficiency have led to reduced energy consumption, cheaper processing costs and a superior product being produced.

Increases in the reliability of reverse osmosis also come from the increased life span of the membrane. Research indicates that the cost of producing water from a reverse osmosis plant is often less than half that produced by the distillation method of processing water.

Sea Water Reverse Osmosis Desalination Process



Key parameters for selecting reverse osmosis over other processing methods include:

- Quality and salinity of the water intake
- Temperature of water intake
- Efficiency of membranes has improved significantly
- Energy consumption has reduced and is less than other processing methods
- Lower capital and operating costs
- Most major desalination plants now use seawater reverse osmosis

An overview of the water treatment process

To avoid membrane fouling and to extend membrane life, seawater is pre-treated before the reverse osmosis process begins. The cleaning process involves changing the consistency of the fluid and applying filtration similar to a water treatment plant, which treats dam water.

This filtered water is then pumped through microfilters to provide further protection of the reverse osmosis membranes. The water is pushed through these membranes under pressure, to remove the salt from the seawater.

Under current technology, approximately 50% of the feedwater taken from the source becomes product water. The remaining 50% is returned to the source, with concentrated salts.

A post-treatment stage of the product water, involves adding alkalinity to the soft processed water. A similar treatment stage is used for soft dam waters as this prevents corrosion in the distribution system. In keeping with other treatment methods, chlorine is also added for cleansing and maintenance of the distribution system.

History of desalination processes

The thermal desalination process for water distillation was the technology employed in the first major desalination plants in the 1950s which were predominantly in the Middle East region.



The IDE 330 ML/day Ashkelon Plant, Israel, is the world's largest reverse osmosis plant

Membrane technologies were developed in the 1960s and 1970s and by the late 1980s, reverse osmosis desalination technology made up 40% of desalination plants worldwide. This has now increased to levels approaching 60% in 2006.

Large improvements in membranes have caused the increased use of reverse osmosis, which have led to greater efficiencies and reduced energy consumption. Such advances have also resulted in electro dialysis now being significantly more expensive than reverse osmosis for seawater desalination

By contrast, the distillation method uses high-energy consumption to heat the water. This major drawback means thermal plants now have higher capital and operating costs than reverse osmosis desalination technology.

More information

To provide feedback on this project or to source further information, please:

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