

Southern Seawater Desalination Project

Environmental monitoring



We've already learned a lot

Through coordinating the design, construction, operation and environmental monitoring of the Perth Seawater Desalination Plant at Kwinana, the Water Corporation has developed considerable experience and expertise in all aspects of large-scale seawater desalination projects.

The Kwinana plant is the largest in the Southern Hemisphere and was Australia's first major seawater desalination project. The plant and all associated infrastructure were constructed and operational in just 18 months – on time and on budget. Clearly, the Water Corporation is well placed to successfully manage a project of similar scale in the Southern Seawater Desalination Plant.

Additionally, environmental approval conditions, both for the Kwinana desalination plant itself and the 26 kilometres of pipelines that would transport desalinated water into the Integrated Water Supply Scheme, were among the most rigorous in Australia.

Environmental monitoring of Cockburn Sound

The health of Cockburn Sound is a major concern, and in the course of the planning, construction and operation of the Perth Seawater Desalination Plant, it has been the

subject of the largest marine monitoring program conducted in Australian waters, and is being used as a national and international benchmark.

It is a condition of the operation of the plant that the environment of Cockburn Sound is constantly monitored.

A system of three marine monitoring buoys transmit data on water conductivity, temperature and dissolved oxygen levels, as well as wind speed and direction to the Water Corporation's Operations Centre in Perth every 30 minutes.

Monitored 24 hours a day, 7 days a week, these data provide a very reliable early warning system.

This highly sophisticated monitoring – the most intensive program of any desalination plant in the world – has clearly shown the Perth Seawater Desalination Plant is environmentally benign.

Monitoring commenced in February 2005, well before the desalination plant began operating. Comparison of data before the plant began operation, and after it began delivering drinking water for Perth, has shown no detectable impact on Cockburn Sound from desalination.

This is confirmed in a detailed August 2007 report by the University of Western Australia Centre for Water Research summarising the results of field experiments, the ongoing monitoring program and an extensive modelling investigation completed in Cockburn Sound between August 2006 and April 2007.

Environmental monitoring at Binningup Beach

An ongoing monitoring program for the Binningup Beach marine environment will be a condition of approval – similar to that required for Cockburn Sound.

In September 2007, a Real Time Monitoring System Marine Buoy was anchored to the seabed about 800 metres off Binningup Beach.

This buoy is the same as three that operate in Cockburn Sound.

The buoy will transmit information on water and weather conditions back to our Operations Centre where it will be collected and monitored.

By gathering this data three years ahead of the proposed desalination plant beginning operation – we will gain a very thorough understanding of Binningup’s marine environment and how best to protect it.

This will help us make sure that the plant – and in particular the ocean intake and outflow – is designed to work with the existing natural conditions to minimise any environmental impact.

Preliminary studies, including ocean floor contour mapping and examination of prevailing ocean movement, suggest the proposed desalination plant is unlikely to have any adverse effect on the local marine environment. There are no coral reefs or mangroves in the proposed intake and outlet areas, and marine flora and fauna surveys will ensure that marine life is not impacted.

As part of the environmental approval process, extensive independent marine environment studies of ocean movement, the ocean floor and its flora and fauna, water quality and brine dispersion are being undertaken.

These, combined with the data we have already begun gathering, will ensure that all possible environmental impacts are explored, and strategies devised to prevent or manage them.

An ongoing monitoring program will also be developed to oversee the health of the local marine environment throughout the plant’s working life.

Critical factors to assess are:

Dissolved oxygen levels: Gaseous oxygen is naturally present in seawater. It enters the water by diffusion from the air, through rapid mixing of air into the water as the ocean moves, and as a product of natural photosynthesis. It is possible that dissolved oxygen levels could fall – with the potential to impact on marine life – if the seawater discharged from the plant is not effectively mixed back into the ocean. Binningup is a high-energy marine environment. This, coupled with effective diffuser design, will ensure that

the seawater discharged from the plant will mix back into the ocean quickly and thoroughly, making low dissolved oxygen levels unlikely.

Electrical conductivity: For water to conduct electricity, it must contain some level of salts. So, to determine how salty water is, its electrical conductivity is tested. In order to ensure there is no localised increase in ocean salinity as a result of desalination, electrical conductivity is constantly monitored.

Temperature: It is possible that desalination can cause some thermal stratification – that is, areas where there are layers of warmer and cooler water. Although this naturally occurs, ongoing monitoring will ensure that it does not exceed natural levels and cause potential impacts for sensitive marine life.

Wind speed and direction: These are also monitored to enable modelling of the likely patterns of dispersion of the seawater discharged from the plant. This enables the plant to be designed in such a way as to minimise any potential impacts and protect the marine environment.

Numerous other studies are being undertaken at Binningup Beach including:

- ❖ Sediment movement and transport
- ❖ Bio monitoring (deploying mussels)
- ❖ Water quality, measuring many elements, nutrients and pollutants

