

The Perth Seawater Desalination Plant

Environmental Management in Cockburn Sound



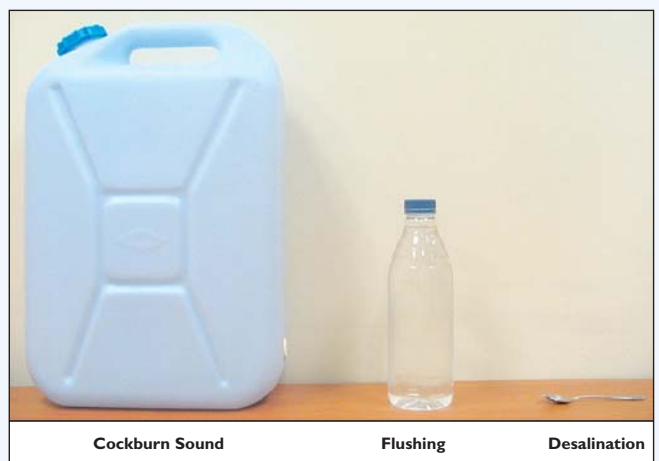
- ❖ Less than 0.02 per cent of the water in Cockburn Sound will be removed per day by the desalination plant.
- ❖ The amount of water that will be taken out by the desalination plant is 1/400th (0.25 per cent) of the water that moves in and out of Cockburn Sound each day with the tides.
- ❖ Expert studies by the University of New South Wales demonstrate that the salinity in Cockburn Sound will increase by less than one per cent because of natural flushing in the Sound, and that there will be no adverse ecological effect.
- ❖ The Department of Environment has advised the Water Corporation that the environmental aspects of the operation of a desalination plant at Kwinana can be appropriately managed. The Department's advice is based on a number of independent expert reports it required relating to the predicted environmental impacts.

Introduction

The Perth Seawater Desalination Plant (PSDP), when complete in late 2006, will provide an extra 45 gigalitres of climate independent water to the Integrated Water Supply Scheme. That's about 17 per cent of the current consumption in the metropolitan area and represents 80 litres of water per person per day.

The PSDP will operate by taking seawater (less than 0.02 per cent per day of the water in Cockburn Sound) and processing about half the volume of water into high quality scheme water. The salt remains in the other half of the water, which will be diluted about 45-fold as it returns to the ocean (this happens because the seawater concentrate is jetted out under high pressure through a diffuser and mixes rapidly with the surrounding waters).

To put the above into perspective, it is useful to look at the tides that move in and out of Cockburn Sound every day. The volume of seawater which floods in and out of Cockburn Sound every day is more than 400 times the amount that is taken out by the desalination plant. Another way of looking at this is if Cockburn Sound were a jerry can, then the daily tidal movement volume in and out of the Sound is equivalent to a bottle of water, while the amount of water taken out of the Sound by the PSDP is half a teaspoon.



Environmental studies and approvals

The PSDP has satisfied all environmental approval requirements so far.

The Department of Environment has advised the Water Corporation that the environmental aspects of the operation of a desalination plant at Kwinana can be appropriately managed. The Department's advice is based on a number of independent, expert reports that were required for review, relating to the predicted environmental effects.

Additionally, the Water Corporation has committed to a detailed monitoring program to monitor the health of Cockburn Sound on an ongoing basis. Further management action will be taken should this monitoring identify any possible environmental impacts.

More specifically, the expert reports focused on increased stratification (salinity layering) and any subsequent dissolved oxygen effects in the deeper area of Cockburn Sound that may result from the operation of the PSDP.

Will environmental criteria be met?

An expert study carried out by the University of New South Wales (UNSW) coupled with an ecological assessment undertaken by Dr Des Lord (Adjunct Professor, University of Western Australia) indicates that the operation of the PSDP is unlikely to affect dissolved oxygen levels from an ecological perspective for the vast majority of the year. Any potential for significant change to dissolved oxygen levels would be restricted to infrequent longer calm periods. Such potential effects can be detected by monitoring and, if required, mitigating action can be taken to ensure that Cockburn Sound is protected.

The UNSW study shows that the operation of the PSDP will increase the salinity in Cockburn Sound by up to one per cent. In practical terms, there will not be salt 'build-up' in Cockburn Sound and there will not be any adverse ecological effects associated with salinity.

How will it be known if there is a problem?

Any potential issues that may occur associated with the operation of the PSDP can be related back to dissolved oxygen levels. Dissolved oxygen levels in Cockburn Sound will be monitored continuously and also predicted in advance using various forecasting techniques. This will allow management actions, should any be required, to be implemented in a timely manner.

What management actions are available?

Management actions include:

- ❖ Routine maintenance activities that require production to be reduced will be scheduled for autumn when dissolved oxygen levels are likely to be at their lowest due to naturally prevailing calm conditions.
- ❖ Adding seawater to the desalination plant discharge would result in the diluted discharge being even closer to the properties of the background seawater, reducing further any possible effects.

These management actions can be implemented without affecting the annual operating capacity of the desalination plant to produce 45 gigalitres of water per year.

The model developed by the UNSW will be further verified against additional data currently being collected by the Water Corporation. The model will then be used to optimise the various management actions within the Water Quality Management Plan. This plan will be developed in late 2006 in collaboration with the Department of Environment and following public consultation.

Where can I find the expert reports?

The expert reports can be obtained on request from the Water Corporation:

Email: michelle.rhodes@watercorporation.com.au
Phone: 9420 3681

These major reports are:

- ❖ D Van Senden and B Miller, University of New South Wales, 2005. *Stratification and Dissolved Oxygen Issues in Cockburn Sound Pertaining to Discharge of Brine from Desalination.*
- ❖ Des Lord and Associates, 2005. *Ecological Review of the Cockburn Sound Associated with the Perth Seawater Desalination Plant.*

Supporting reports (providing information used within the major reports):

- ❖ D Read and C Oldham, University of Western Australia, 2005. *Sediment Oxygen Demand in the Deeper Basin of Cockburn Sound. Centre for Water Research.*
- ❖ C Pattiaratchi, University of Western Australia, 2005. *A Pilot Field Measurement Program To Define Dissolved Oxygen Dynamics In Cockburn Sound. Centre for Water Research.*
- ❖ Worley, 2005. *Perth Seawater Desalination Plant – Stratification and Dissolved Oxygen Issues.*

