

# Greening Our Hospitals: Water

## Case study

## Recycling of steriliser cooling water using an adiabatic cooler

### Overview

With the financial assistance of the Greening Our Hospitals: Water program Geelong Hospital has adopted an innovative approach to reclaiming and recycling water used in their sterilisers. Liquid ring vacuum pumps consume large amounts of water to generate the deep vacuum required for the sterilisation process but recycling this water is relatively easy as the water is discharged in a state that is readily reused. This is not the case with the condenser cooling water that is discharged at a high temperature and which must be cooled before it can be reused. In most cases a chilled-water heat exchanger is used to reduce the temperature but this method can be energy intensive and may require a chiller to run.

### Summary

Condenser and liquid ring vacuum pump wastewater is reclaimed from four sterilisers located in the central steriliser unit (CSU). An adiabatic cooler is used to reject excess heat from the water before it is stored in tanks, ready for reuse in the sterilisers. Water consumption is reduced by around 28,000 kilolitres per year. Reduced electricity consumption by the system's pumps brings down overall costs by around six per cent. No additional labour is required apart from maintenance of new pumps and controls.

### How it works

Condenser cooling water and liquid ring vacuum pump seal water is collected from the four sterilisers in the CSU. This warm water is gravity-fed to a 1,500-litre collection tank fitted with ultraviolet sanitising lamps to reduce microbiological growth within the tank. Reject water from the reverse-osmosis filtration plant is also pumped into the collection tank. The mixed water is then pumped to a new 4,000-litre steriliser header tank.



Adiabatic cooler

Because the water temperature is too high to be reused in the steriliser, the reclaimed water is pumped to an adiabatic cooler that cools the water to between 10–22° C. The cooled water is then pumped to another new 4,000-litre cold-water steriliser header tank for reuse. Overflow from the cold tank is piped to the warm water tank to further assist cooling. The cold tank then resupplies the CSU with water no hotter than 22° C on the hottest days.

#### Health service

Barwon Health Service,  
Geelong Hospital

#### Total investment

\$85,000  
(\$70,000 funded by GOHW)

#### Date of completion

August 2008

#### Initial water saving estimate

4,020 kL per annum

#### Actual water savings

23,000 kL per annum

#### Estimated annual cost saving

\$59,500

#### Simple payback

1.45 years

#### Project design and installation

Barwon Health

#### Water cost

1.5293 \$/kL in 2010

0.9753 \$/kL in 2008

#### Sewage disposal cost

1.31 \$/kL in 2010 (80.75%)

1.1685 \$/kL in 2008 (80.75%)



Steriliser water collection tank

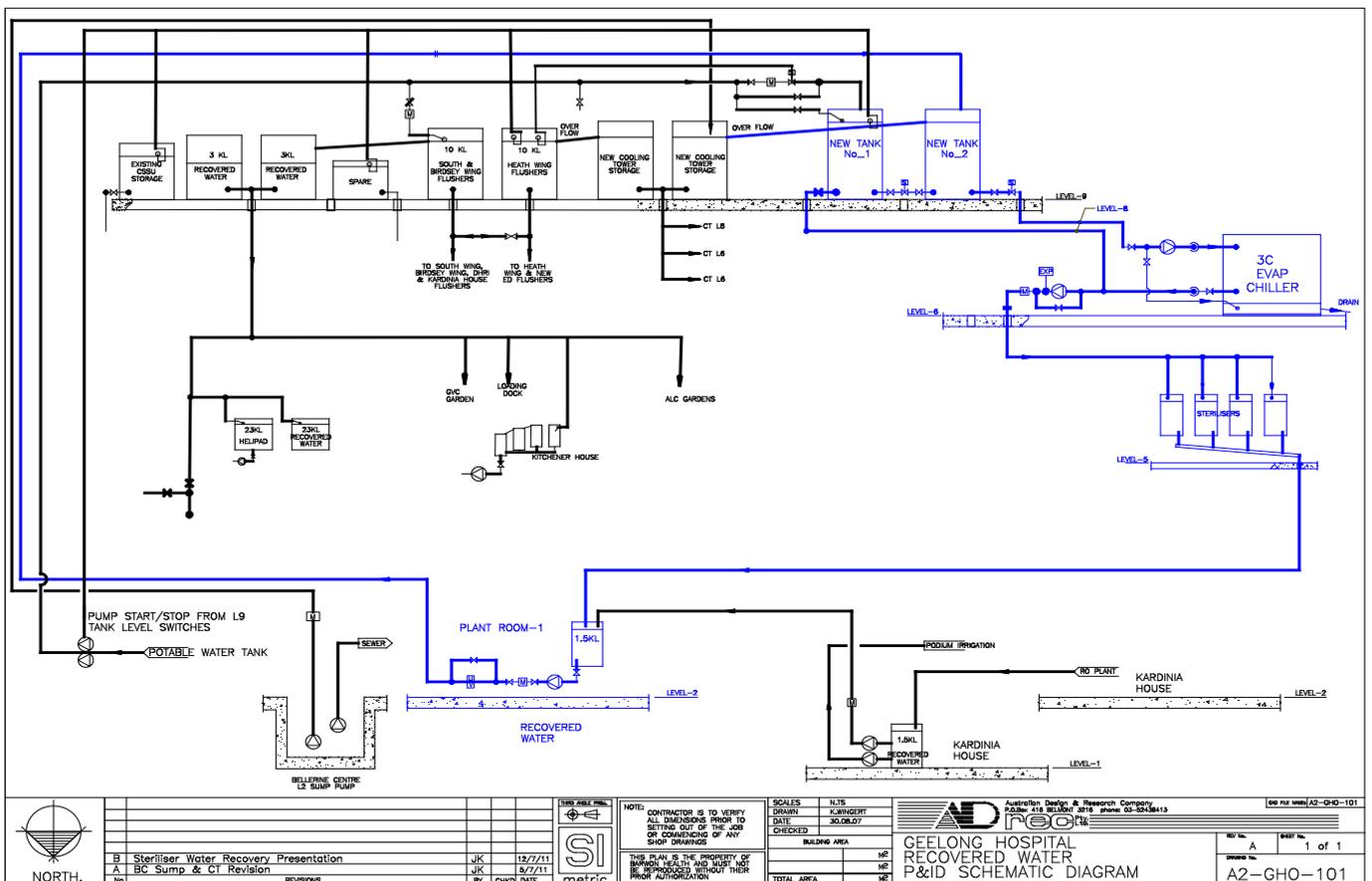
Recycled water header tanks

When the reclaimed water inflow exceeds the outflow, excess water is gravity-fed from both the header tanks to the flusher tanks. Only water that has already been through the sterilisers is overflowed from the warm tank into the flusher tanks.

In the event of a plant failure or if water use exceeds the recycled flow rate, potable water is automatically diverted from the main flusher tanks to the second steriliser header tank. This tank acts as a backup supply in the event insufficient water is returned from the sterilisers. Water meters record potable water consumption and the performance of pumps and controls is remotely monitored.

Recovery of reverse-osmosis water from the in-house dialysis treatment plant contributes an additional 2,000 kilolitres per year. Of the \$85,000 project cost the Geelong Our Hospitals: Water program contributed \$70,000 and Barwon Health contributed \$15,000.

Schematic diagram of water recycling system



### What worked well:

- installation of all plant and equipment
- the system has proven to be reliable
- understanding of the system by maintenance personnel
- the installed plant performance exceeded the estimated recovery volume.

### What did not work well:

- plant was installed while the hospital was in full operation
- minor disruption of services due to the presence of trades personnel installing pipework
- not being able to test the system before cutting across the new pipework.

## Health service profile

Formed in 1998, Barwon Health is one of the largest and most comprehensive regional health services in Australia, providing care at all stages of life and circumstance.

Health services available through Barwon Health cover the full spectrum from primary care, community services, aged care, rehabilitation, mental health, emergency and acute care. With the exception of neurosurgery and transplantation, virtually all other specialties are available through the Geelong Hospital including: 370 inpatient beds, 10 operating theatres, 15 intensive care unit beds, 24-hour emergency department, cardiac catheter and angiography laboratory, oncology and radiation services and a special care nursery.

With more than 5,000 staff, Barwon Health is also one of Australia's largest regional employers and a major education provider through our relationships with Deakin University, Melbourne University, Monash University, the Gordon and a number of other educational centres and universities.

### For further information:

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