

Sustainable water system at Cossham Dialysis Unit, UK

Healthcare | Case Study

The Client

Cossham Hospital in Bristol first opened in 1907 funded under the will of Victorian colliery owner and local MP Handel Cossham for the 'treatment and relief of sick and injured persons of both sexes'.

It has recently undergone an extensive £19 million refurbishment which kept many original features of the historic listed building. Inside, however, the facilities are ultra-modern and include the area's first midwife-led birth centre.

As part of the refurbishment, under a partnership agreement with the South Gloucestershire PCT, North Bristol NHS Trust funded a brand-new renal dialysis unit, which opened to patients in October 2012. The 750m² Cossham Dialysis Unit is a stand-alone building behind the main hospital with the capacity to provide care for 96 patients a day, with 24 dialysis stations.

Key Figures

- Ultra pure water for renal dialysis
- Compliance with ISO 13959 and Renal Association Guidelines
- Wastewater recycling

The Client's Needs

The new renal dialysis unit require a water supply to the 24 beds and three additional points of use in the Renal Technicians' station, a total of 1900 l/h.



The hospital's water is from the local mains supply, although this requires purification to meet the ultra pure water quality requirements of ISO 13959 and the Renal Association's Guidelines, that is a total viable bacteria count <0.1cfu/ml and bacterial endotoxins <0.03EU/ml.

To supply ultra pure water to the points of use, the hospital specified a PEX ring main (which was installed during the building works to minimise project time) and integrated heat sanitisation system. Wastewater from the treatment system will need to be delivered to a grey water recovery system and used for WC flushing.

The Solution

Veolia Water Technologies's solution was to install a DWA Modula S-XL reverse osmosis unit with a DWA Nephro SAFE ultra-filtration unit, feeding a heat sanitisable ring main. The Modula S-XL has two reverse osmosis streams to provide duty/standby operation in a compact arrangement feeding the NephroSAFE unit which incorporates the heater required for an integrated heat sanitisation of the ultra filtration membrane, ring main dialysis hoses and the dialysis machine



Process Description

Mains water is pre-treated by duplex base exchange softeners to enable the reverse osmosis modules to operate at high recovery and minimise waste water. This is followed by duplex activated carbon filters to remove the total chlorine content from the feed water. Duty and standby variable speed raw water pumps deliver the pre-treated water to the Modula S-XL via 5µm particle filters. The raw water pumps modulate to match output to demand so that energy consumption is minimised. Simultaneously, the Modula's ECO Mode controller switches membrane modules in and out of service to minimise feed water usage and reject water (typically 15% of the feed flow).

Permeate from the low pressure, high flux reverse osmosis membranes is delivered to the NephroSAFE ultrafiltration membranes and into the ring main. Unused water from the ring main is recirculated through the ultra filtration module to ensure the quality in the ring main is maintained. Reject water from the ultra filtration module is recirculated back through the reverse osmosis unit. The combination of reverse osmosis and ultrafiltration ensures a consistent supply of treated water to Renal Association standards whilst consuming less energy than a twin-pass reverse osmosis system. The reject water from the reverse osmosis unit is pumped to the grey water storage tanks in the main hospital building for reuse in flushing toilets.

Results

The PEX ring main was fitted out during the building works and the renal water treatment system was factory tested prior to delivery. This meant that, when the building was handed over, the plant could be immediately connected to the ring main and the whole system commissioned. The result was that dialysis patients were being treated within four weeks of building handover. "Everything worked really well," says the hospital's Project Manager, Richard McSmythurs.

The treated water has consistently been fully compliant with the Renal Association's Guidelines and heat sanitisation has proved to be safe, effective and environmentally friendly. The use of energy saving techniques like the Modula's ECO Mode have helped to meet the hospital's carbon footprint target as well as reducing energy costs. Wastewater recycling has reduced the hospital's water footprint, and the estimated cost savings accruing from lower mains water consumption and sewer discharge are expected to amount to **more than £7,000 per annum**. **"Everyone was pleased with the result", says Richard, "and, all round, it's been a very satisfying project."**

Benefits

- Fully compliant ultra pure water
- Reduced mains water consumption by recycling
- Reduced carbon and water footprints
- In excess of £7k per annum cost savings

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