IPWEA (NSW Division)
EXCELLENCE AWARDS 2007

Category 3: Innovation in Water Supply and Wastewater

PORT MACQUARIE
HASTINGS

Port Macquarie Reclaimed Water Scheme

Port Macquarie-Hastings Council
PO Box 84
PORT MACQUARIE NSW 2444

Murray Thompson – Water Supply Manager
Telephone: 02 65 818 563
Facsimile: 02 65 818 735
Email: murray.thompson@pmhc.nsw.gov.au

Names of participants responsible for project

Port Macquarie-Hastings Council
Murray Thompson – Water Supply Manager
Stuart Brook – Water Supply Projects Engineer

WaterWise NSW
Graham Smith – Director
Allan Stuck – Consultant

NSW Dept. of Commerce
Geoff Chennall – Project Manager
Michael Partridge – Project Officer

Hunter Water Australia
David Davies – Senior Project Engineer

Lahey Constructions Pty Ltd
Darren Ferguson – Project Manager
Geoff Latham – Site Officer

Veolia Water Systems Australia
Samson Tam – Project Manager
Dave Jefferies – Mechanical Engineer
Troy Walker – Process Engineer

Water Futures Pty Ltd
Dr Annette Davison – Director
Dr Daniel Deere – Director

Brooks Irrigation
Peter Brueck – Director
**Description of Project**

The $12 million Port Macquarie Reclaimed Water Scheme will supply Council and commercial premises with an alternative, drought secure water source.

Up to 15% of the tertiary treated effluent currently discharged will be further improved using advanced processes including micro-filtration, reverse osmosis and UV disinfection.

The reclaimed water will be used to irrigate parks, gardens, nurseries, bowling greens, in wash-down areas, and for washing cars, flushing toilets and construction applications. It will ease demand on the town water supply and reduce the amount of treated effluent entering local waterways.

The scheme consists of the 1 ML/day reclaimed water treatment plant, refurbished storage reservoir, and a 13 km reticulation network that extends throughout the inner urban area of Port Macquarie, separate to the town water supply.

**Concepts and Objectives of the Project**

- Savings on potable water use & capacity of existing water supply infrastructure
- Improved drought security & water restrictions outcomes
- Offer affordable non-potable water supply to targeted large water users such as commercial users, residential developments & Council facilities
- Decrease effluent discharges into Kooloonbung Creek
- Ability for Council to maintain playing fields, parks, gardens & open space areas in a more sustainable manner
• Trial & promote the safe & acceptable use of water recycling schemes, now & the future
• Address other related environmental issues, IWCM & WSUD principles
• Promote Tourism within a “green” urban environment

Uses for the reclaimed water include:

• Public reserves, open space & sporting field irrigation
• Sewerage pumping stations [well washers]
• School toilet flushing, ovals & playing fields irrigation
• Caravan parks, toilet flushing, laundries & outdoor uses
• Car washing & detailing premises
• Marina & boat ramp washing facilities
• Bowling clubs toilet flushing & irrigation
• Commercial & Medium Density Residential buildings toilets & rainwater tank top-up
• Commercial users including printing presses
• Industrial users including concrete batching, tile & brick manufacturers

Approval for other uses such as clothes washing and topping up swimming pools will be sought from the NSW Department of Health once validation of treatment process is complete.

The reclaimed water originates as treated wastewater from the Port Macquarie wastewater treatment ponds. This treated wastewater is then treated further by microfiltration, reverse osmosis, UV disinfection and chlorine at a new Reclaimed Water Treatment Plant in Hindman St. After this high level of treatment the reclaimed water is odourless, free from viruses, bacteria and pathogens and conforms to national and state guidelines for the production and use of reclaimed water.

The main components of the scheme are:

• The Reclaimed Water Treatment Plant

![Figure 2: External Views of the Port Macquarie Reclaimed Water Treatment Plant](image)

The main barriers in the multiple barrier approach employed for the production of reclaimed water are microfiltration and reverse osmosis. This equipment allows water molecules to pass through their membranes, while trapping the bacteria, protozoa, viruses, salts, nutrients and other contaminant molecules. The 2 skids are shown over page.

IPWEA Excellence Awards 2007
Port Macquarie-Hastings Council
Port Macquarie Reclaimed Water Scheme
Figure 3: Microfiltration skid (left); Reverse Osmosis skid (right)

Other treatment processes used include ultra-violet light disinfection and dosing of sodium hypochlorite and ammonia to form chloramines.

A public viewing area has been included within the treatment plant building to allow tours to gain insight into the treatment process and enhance education and community awareness of reclaimed water. The building and landscaped surrounds will also be a local showcase for urban design, incorporating many water and energy efficiency principles and practice.
• Morton St Reservoir

The storage and supply reservoir for the reclaimed will be the newly refurbished Morton St Reservoir. This reservoir, built in 1950, was the original water supply reservoir for Port Macquarie. It was decommissioned in the early 1980’s as Port Macquarie grew and it was no longer able to meet pressure or flow demands. However, due to its location it was ideally suited to supply the inner urban area of Port Macquarie with reclaimed water. A structural integrity inspection was completed and determined that the reservoir was in serviceable condition with the only requirements for its recommissioning being a new roof structure including a divers platform and an epoxy coating of the internal wall to guard ensure water quality and guard against any age related cracking. New inlet and outlet pipework was also installed in the refurbishment.

Figure 5: Morton St Reservoir

• Reclaimed Water Reticulation Network

The 13km reclaimed water reticulation network extends along the major arterial roads of the inner urban area of Port Macquarie to supply reclaimed water to all major Council parks, gardens and facilities. These areas also coincide with major commercial areas where the reclaimed water will be used for car washing, toilet flushing and irrigation.

The extent of the network is shown on the graphic at the top of the next page. Shown at the bottom of the next page is the current network plus the proposed stage 2 extensions.
Figure 6: Current Extent of the Reclaimed Water Reticulation Network

Figure 7: Current and Future Extent of the Reclaimed Water Reticulation Network

IPWEA Excellence Awards 2007
Port Macquarie-Hastings Council
Port Macquarie Reclaimed Water Scheme
A Safe and Separate System

Ensuring the safety of the community and that the reclaimed water is used only for its intended purposes are of the highest priority for the scheme.

Marking and Labeling
- Lilac pipes and pits
- Signage
- Separate Tools for work on RW System
- Prevent possible cross connections

Users
- User Agreements
- Individual Site Management Plans
- Plumbers, Community and Schools Education

Reclaimed Water Quality Plan and Hazard Analysis and Critical Control Point (HACCP) Analysis of Scheme
- Same system used for food safety
- Critical Points/Levels in system identified and responses to failures formulated
- All inputs and outputs to the system are monitored and documented.

Figure 8: Lilac pipes used in Reclaimed Water Scheme compared to blue pipe used for town water mains (left) and Hydrant Lids - Reclaimed Water Main (lilac) and Town Water Main (yellow) (right)

Duration

The Port Macquarie Reclaimed Water Scheme has taken just over 10 years in realisation from original concept to fruition. The timeline of the project is set out below.

Project Timeline

1995
- Water Supply Augmentation Scheme - Demand & Drought Management will remain a key part of the future scheme, including permanent water conservation measures
1998
- Effluent Management Strategy - Opportunity for high quality “non-potable” supply to be provided to specific premises & outdoor areas

2002
- Hastings IWCM Study - More sustainable management of the urban water cycle and an integrated focus upon water, sewerage and stormwater

2003
- Initial Potential User And Community Consultation
- Feasibility Study And Concept Design
- Review Of Environmental Factors
- Survey And Design For Initial Sections Of 13km Reclaimed Water Reticulation Network
- Reservoir Integrity Report For Refurbishment Of Morton St Reservoir

2004
- Survey And Design Completed For 13km Reclaimed Water Reticulation Network
- Design For New Roof And Pipework For Morton St Reservoir
- Design Of Reclaimed Water Treatment Plant Building
- Process Design For Water Treatment Equipment
- Reclaimed Water Quality Plan And HACCP Analysis Of Scheme Begins
- Continued Potential User And Community Consultation

2005
- Construction Of Reclaimed Water Reticulation Network Continues
- Construction Of New Roof And Pipework For Morton St Reservoir Begins
- Construction Of Reclaimed Water Treatment Plant Building Begins
- Manufacture Of Water Treatment Equipment
- Continued Potential User And Community Consultation

2006
- Construction Of Reclaimed Water Reticulation Network Stage 1 Continues
- Construction Of New Roof And Pipework For Morton St Reservoir Completed
- Construction Of Reclaimed Water Treatment Plant Building Completed
- Installation And Commissioning Of Water Treatment Equipment Begins
- Continued Potential User And Community Consultation

2007
- Construction Of Reclaimed Water Reticulation Network Stage 1 Completed
- Installation And Commissioning Of Water Treatment Equipment Completed
- Continued Potential User And Community Consultation
- Testing for Verification in consultation with NSW Dept. of Health
- Proposed supply of reclaimed water to customers April 2007 pending NSW DOH approval and signing of user agreements and site management plans
Achieving Objectives

By producing an alternative water source for non-potable uses from tertiary treated effluent, the Port Macquarie Reclaimed has the following objectives:

- Savings on potable water use & capacity of existing water supply infrastructure
- Improved drought security & water restrictions outcomes
- Affordable non-potable water supply to targeted large water users such as commercial users, residential developments & Council facilities
- Decreased effluent discharges into Kooloonbung Creek
- Ability for Council to maintain playing fields, parks, gardens & open space areas in a more sustainable manner
- Trial & promote the safe & acceptable use of water recycling schemes, now & the future
- Address other related environmental issues, IWCM & WSUD principles
- Promote Tourism within a “green” urban environment

40 Word Synopsis

The $12 million Port Macquarie Reclaimed Water Scheme will supply Council and businesses with an alternative, drought secure water source for non-potable uses. Up to 15% of the tertiary treated effluent currently discharged will be further improved using advanced processes including micro-filtration, reverse osmosis and UV disinfection. It will ease demand on town water use while reducing the amount of treated effluent entering local waterways.

List of Organisations Involved

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>WaterWise NSW</td>
<td>Reclaimed water customer identification &amp; liaison, Presentation of community &amp; school education programmes</td>
</tr>
<tr>
<td>NSW Dept. of Commerce</td>
<td>Design, Project Management, Supervision</td>
</tr>
<tr>
<td>Hunter Water Australia</td>
<td>Concept Design, Feasibility Study, REF, Survey and Design of Reticulation Network, Design of reclaimed water reservoir refurbishment</td>
</tr>
<tr>
<td>Lahey Constructions Pty Ltd</td>
<td>Building &amp; Civil Works</td>
</tr>
<tr>
<td>Veolia Water Systems Australia</td>
<td>Water Treatment Equipment Design &amp; Installation</td>
</tr>
<tr>
<td>NSW Government Architects</td>
<td>Design of Water Treatment Plant Building and Surrounds</td>
</tr>
<tr>
<td>Mid Coast Telemetry</td>
<td>Electrical &amp; Telemetry Installation</td>
</tr>
<tr>
<td>Water Futures Pty Ltd</td>
<td>Hazard &amp; risk analysis, including HACCP Study</td>
</tr>
<tr>
<td>Brooks Irrigation</td>
<td>Irrigation System - Design &amp; Installation</td>
</tr>
</tbody>
</table>

Description of How the Project Addressed Environmental Issues

Minimisation of environmental effects during construction

Environmental effects during construction were minimised by the steps included in the project-specific erosion and sediment control plans.

IPWEA Excellence Awards 2007
Port Macquarie-Hastings Council
Port Macquarie Reclaimed Water Scheme
The construction erosion and sediment plans included various control measures including:

- Sediment control measures (i.e. sediment fencing, reinforcement of drainage lines and catch/diversion drains)
- Designated stockpile, storage, parking and office areas
- Staged construction/rehabilitation to minimise the risk of erosion

These initiatives were undertaken to prevent scour, loss of valuable topsoil, migration of sediments off site and aid in the regeneration of ground cover.

As noted above, the erosion and sediment control plan included numerous control measures to prevent contamination of the Kooloonbung Creek Nature Reserve, which the regenerated creek area adjacent to the Reclaimed Water Treatment Plant feeds into. There was minimal clearing of the site for construction and barriers were erected to prevent plant movements from damaging areas where the vegetation did not require removal for construction.

**Decrease effluent discharges into Kooloonbung Creek**

The reclaimed water scheme will reduce the amount discharged to Kooloonbung Creek by approximately 15% of currently daily discharge. Due to the estuarine nature of this creek and SEPP 14 wetland areas it is expected that the reduction in discharge will have a positive effect. Constant monitoring of estuarine water quality will provide feedback on the expected improvement.

**Regeneration of degraded urban creek area adjacent to the Reclaimed Water Treatment Plant**

As part of the Reclaimed Water Treatment Plant construction, 2 urban creeks adjacent to the site have been rehabilitated and replanted with native vegetation. The creeks had previously been redirected underground via stormwater pipes in an attempt to combat flooding issues in the area. A flood study was completed as part of the works, which determined the rehabilitation would produce the best future outcome.

---

**Figure 9: Concept for creek regeneration at Port Macquarie Reclaimed Water Treatment Plant**
Separate Water Directorate Criteria – Efficiency and Cost Saving

Efficiencies and Cost Savings demonstrated by the Port Macquarie Reclaimed Water Scheme include:

- Savings on potable water use & capacity of existing water supply infrastructure by diverting large users to the reclaimed water
- Offer affordable non-potable water supply to targeted commercial users, residential developments & Council facilities
- Automatic operation of the plants via the PLC program and telemetry allows visits to the plant to be limited for routine maintenance, or when a shutdown alarm is activated.
- The submerged membranes utilised in the microfiltration process require little manual maintenance and display a long working life.