

# ReWater

Water recycling in Australia

AUTUMN 09

## Changing the future of sports grounds with subsurface irrigation

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Murrumbeena Park Oval benefits from subsurface drip irrigation.

## About ReWater

This newsletter, ReWater, has been designed to make information relevant to recycled/recycled water use in horticulture more accessible to horticulturalists (growers/farmers), the water industry and other interested people. It is part of the service provided by the Australian Coordinator for Recycled Water Use in Horticulture, funded by Horticulture Australia.

Back issues and instructions for subscribing to receive ReWater electronically quarterly can be accessed at [www.recycledwater.com.au/rewater](http://www.recycledwater.com.au/rewater)

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The delivery of research and development outcomes from this project to the horticultural industry is made possible by the Commonwealth Government's 50% investment in all Horticulture Australia's research and development initiatives.

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## Changing the future of sports grounds with subsurface irrigation

The City of Glen Eira is proactively managing severe water restrictions.

Peter Todd; the Ground Maintenance Coordinator for the Glen Eira Council; is passionate about providing his community and sporting associations with access to as many quality parks and playing fields in his area of responsibility as possible.

More than 10 years ago the Glen Eira Council put in a Motorola Irrinet centralised control system to computerise the watering of their public playing fields making it easier to manage their overhead sprinkler system and reducing the requirement for manual sprinkler management which was both water and staff intensive.

As water restrictions came into place technology was pursued further in an effort to further reduce water consumption and electric pulse meters were installed to measure and manage water flow. High and low flow expectations were able to be entered and in the event of these flows being greater than anticipated the station recording the anomaly would shut down within a minute and a message be sent via SMS to the irrigation manager. If more than 3 stations recorded an anomaly within 3 minutes the system would shut down until reset by the irrigation manager removing the incident of leaks

and sprinkler 'blow outs' spouting water for hours on end.

Moisture sensors were installed at each of the grounds to identify when the watering systems needed to be activated to maintain healthy turf as well as minimising the incidence of over-watering.

*The benefits associated with using a drip irrigation system have exceeded our expectations.*

Under 3a restrictions water authorities allowed only one in four playing fields and parks to be watered. In 2005 the City of Glen Eira decided to explore other options to minimise water use on its sports fields with

a view to operating more efficiently on more grounds. They hoped that this 'best practice irrigation' approach would help them to secure a 'bucket' of water to enable them to water more area with the same amount of water they had used the year previously. With potable water becoming scarce and restrictions becoming tighter, it appeared that drip irrigation may support the future for sports turf.

They discussed the pros and cons of a conventional sprinkler system compared against subsurface drip irrigation (SDI) and felt that the advantages offered by SDI offered significant water saving and management benefits.

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Preparing Murrumbeena Park Oval for drip irrigation

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Benefits identified included;

- Watering efficiency of up to 99% - sub-surface drip systems radiate water throughout the soil profile, delivering water directly to the plant root zone.
- Water savings of up to 50% in comparison to volume required for spray irrigation
- Ready for Recycled water - The ability to apply water sub surface provides an opportunity to use alternate water resources (i.e.: recycled water, stormwater, etc) and minimises the requirement for potable water.
- No overspray therefore less staining, slippery surfaces and wasted water
- Less vandalism of watering systems as they are predominantly underground
- Even water distribution throughout playing field, no pooling and no sprinkler heads to trip over
- Reduced weed germination
- Reduced compaction of playing field
- The ability to irrigate while people are playing on the surface
- Fertigation through the drip tube making it easy to apply and ensuring less opportunity for chemical contact with the general public

While at the moment SDI is still more expensive than traditional spray systems, the Glen Eira Council felt that with water savings, reduced maintenance and management costs along with less possibility of vandalism (as the irrigation systems is all underground and not accessible to the public; unlike pop up sprinklers), the system would pay for itself very quickly. It would also help the Council supply high quality amenities to rate payers improving the general quality of life in the area.

#### Initial Implementation - Marlborough Reserve Results

In 2007 Marlborough Reserve soccer ground was identified as a surface that required a complete reconstruction and

could become a model of water conservation for future projects in Glen Eira and the State of Victoria. A Netafim subsurface drip irrigation system was installed.

Glen Eira Council completed a comparison of two sites similar in soil structure and grass variety; Marlborough Reserve (SDI) and McKinnon Oval 1 (Above ground sprinklers).

In the current climate Glen Eira Council requires approximately 6 to 7 ML/Hectare per annum to keep cool season turf alive during the summer. They are gradually changing the existing turf varieties to warm season grasses (such as Santa Ana Couch & Kikuyu), which will reduce these figures to approximately 4 to 5 ML/Hectare per annum, a total water saving across all their ovals of around 50 ML/per annum. With current water prices of \$1.22/KL it is equivalent to savings of approximately \$61,000/year). By installing SDI systems in all grounds they estimate additional savings of between 30 to 40 ML/annum (up to \$48,800/year). These savings will be amplified by any increases in water prices in the future.

'The turf quality at Marlborough Reserve; and the benefits associated with using a drip irrigation system have exceeded our expectations and we are seeing some exciting results. We will be changing our sprinkler irrigation to drip line whenever we renew or redevelop any of our sports grounds' said Peter Todd from the Glen Eira Council

A presentation was made to South East Water by Peter and Netafim's Terry Cole to demonstrate the water savings. This approach to water management has helped redefine how water is allocated to sport grounds during water restrictions (rather than being on an oval basis, its is on a water volume basis effectively rewarding good irrigation practice). In many ways Peters approach helped establish the current scheme used by South East Water, City West Water, Western Water and Yarra Valley Water to allocate water for sports grounds. Peter is now able to irrigate 18 of his 43 playing fields (where previously he could irrigate only 11) with the same amount of water used the previous year. (41% rather than 25%)

#### Murrumbeena Park Oval 1 Specification Summary

**Application:** SDI sports turf in sand, 40,000m, 150mm below grade

**Customer objectives:** reduced water application, recycled water ready

**Decision makers:** Glen Eira Council

**Installer:** Tendered- Turf Renovations Australia (TRA)

**Consultant:** Sports Turf Consultancy (turf, soil and drainage) and Netafim Landscape Department

**Product:** 40,000m Netafim Unibioline CNL dripper spacing 400mm, drip line internal dimension 17mm

#### The Second SDI Implementation: Murrumbeena Park - Oval 1

The results from the Marlborough reserve drip irrigation made it an easy decision for Glen Eira Council to decide to install a second Netafim drip irrigation system at Murrumbeena Park Oval 1.

The reconstruction at Murrumbeena Park was completed in December 2008. Couch was the turf grass species chosen for this ground due to its aggressive nature and during the summer months it requires only minimal irrigation.

Roll out turf was laid as this required only 2 to 3 weeks of intensive watering to establish while other options required 6 to 7 weeks (which could equate to up to 50% of the allocation of water used for a whole season). This approach also meant that the playing field could be used again within 6 to 7 weeks.

There are 8 zones to supply irrigation and the control system is linked to Glen Eira's centrally controlled Motorola system, and the Aquaflex soil moisture sensor aids in the accurate monitoring of moisture in the root zone to enable appropriate moisture content to be maintained.

The next stage at Murrumbeena Park Oval 1 is to recapture run off from the

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Laying Netafim dripper line

drainage system, filter the used irrigation water and pump it into tanks next to the oval.

The irrigation system will be connected to these tanks which utilising float valves to monitor the water level. When there is water within the tank system the irrigation will draw on the recaptured water held in these tanks.

Once the tank float level registers that there is no water available within the tank system it will turn off and the mains backup will turn on and irrigate the oval utilising the potable water supply under the current 3a water restrictions. This tank could also be filled with recycled water fit for this purpose as an alternative water source.

During wet periods the oval drainage system will also capture excess water and store it within the tank system. It has been estimated that the process of rain water harvesting from the oval and recapturing excess irrigation water will save Glen Eira Council approximately 30% of their water allocation for this ground.

### What is next for Glen Eira Council...

Glen Eira Council will continue to work in partnership with Netafim implementing sub-surface drip irrigation systems as the opportunities arise. Peter hopes to eventually have all 60 of the Glen Eira sports grounds utilising drip irrigation systems to provide lush green sports grounds and water savings of between 30 to 60%.

Currently in the pipeline is a swimming pool complex for East Bentleigh where they hope to utilise recycled water from the pool complex to irrigate the surrounding 3.5 hectares of playing fields without utilising a single drop of potable water! ●

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# Australia's largest water recycling project nears completion

Securing a new source of pure water that is resilient to climate change and rainfall fluctuations.

**L**ate last year, pumps were activated, valves were opened and pipelines were filled as purified recycled water flowed from Gibson Island and Luggage Point Advanced Water Treatment Plants at the mouth of the Brisbane River and into 200 kilometres of large diameter pipeline. The pipelines provide water for the region's power stations, industry and agriculture, and should the region's drinking water supplies fall below a combined capacity of 40 per cent, to the Wivenhoe Dam.

Water flowing through these pipelines marks completion of construction for the \$2.5 billion Western Corridor Recycled Water Project - the largest in the Southern Hemisphere and the third largest in the world. The project now has capacity to provide up to 232 megalitres of water a day.

The project includes a network of more than 200 kilometres of large-diameter underground pipes, three advanced water treatment plants, storage tanks and pumping stations. Sixteen of the world's leading construction, engineering, project management and water services companies formed five alliances to construct the project, along the way employing thousands of specialists from more than 40

countries and clocking up almost seven million work hours. The project alliances involved significant collaboration between the Queensland Government and private companies, with common themes being a risk and reward sharing, no-fault and no-blame culture with unanimous decision making.

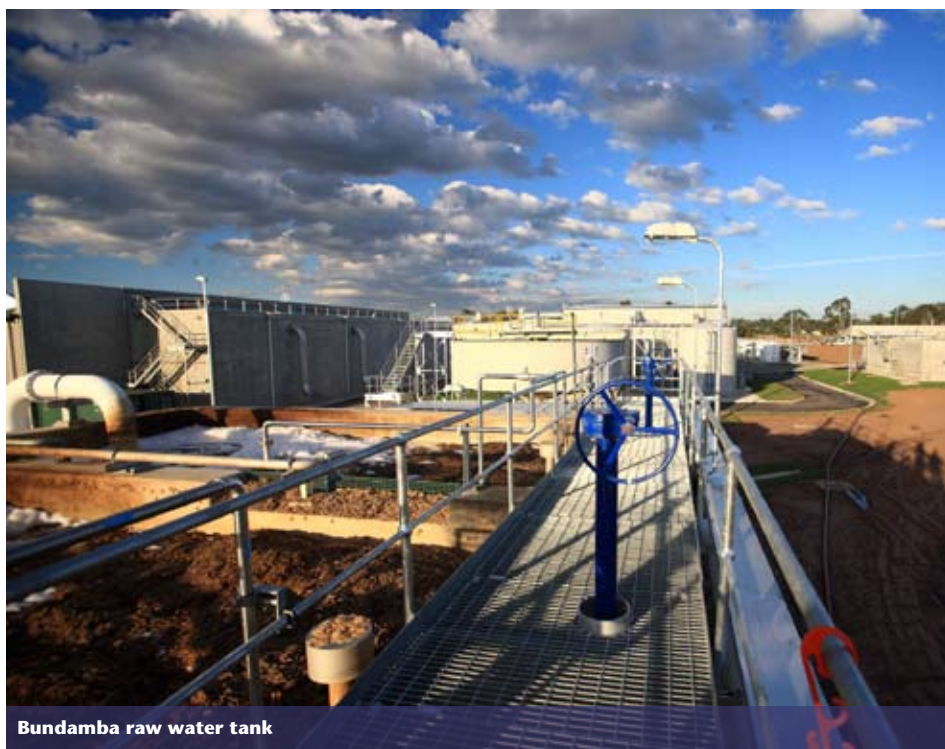
While recent rain has taken immediate

*WaterSecure is the outcome of two years of innovation, excellence and plain hard work.*

pressure off dams, the project continues to play a key role in South East Queensland's water supply strategy by creating a new source of pure water that is resilient to climate change and rainfall fluctuations. The project also provides significant environmental benefits by filtering water that would otherwise be discharged into environmentally sensitive Moreton Bay.

Western Corridor Recycled Water Pty Ltd CEO Keith Davies says the project has enjoyed phenomenal success on the global stage.

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Bundamba raw water tank



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"Plenty of pipeline innovations have been delivered and we've gained admiration and respect from engineering, industry and water bodies throughout Australia and the world," he said.

"We've won nine highly sought after industry awards, including the 2008 'Water Project of the Year' at the Global Water Awards and International Project of the Year from the Construction Management Association of America."

### Overview of the advanced water treatment plants

Three advanced water treatment plants located at Luggage Point, Gibson Island and Bundamba are central to the Western Corridor Recycled Water Project's successful operation. The plants use a world-class, multi-barrier treatment processes to produce purified recycled water that meets all water quality criteria contained in the Australian Drinking Water Guidelines and the Australian Guidelines for Water Recycling. Each of the water treatment plants will use similar technologies that have been successfully delivering purified recycled water in Singapore, Europe and the United States.

Key technologies used at advanced water treatment plants include micro filtration, reverse osmosis and advanced oxidation. In the micro filtration process, water is forced under pressure through filters with microscopic pores that remove suspended material and micro-organisms. In the reverse osmosis process, water is again forced through filters, but this time the pores are much smaller and remove viruses and inorganic compounds such as salt. Organic compounds are reduced to extremely low levels that meet national standards set out in the Australian Drinking Water Guidelines. Advanced oxidation is the final step of the advanced water treatment process. It uses hydrogen peroxide and ultraviolet light to remove micro-organisms and destroy chemicals, producing a pure, safe and secure source of water.

### Change occurring within the Western Corridor Recycled Water Project

Now the construction is complete, change is occurring within the Western Corridor Recycled Water Project. Moving forward, Western Corridor Recycled Water Pty Ltd has been brought together with SureSmart Water (the Gold Coast desalination plant) to create WaterSecure, a sustainable water business providing new sources of pure water for the South East Queensland Water Grid. WaterSecure will soon have capacity to produce up to 357 megalitres of pure water each day, providing water security for the people of South East Queensland.

CEO Keith Davies says the new entity combines the fundamental benefits of recycled water and desalination, allowing for sustained population growth demands being placed on the region's resources.

"If you do what you've always done, you'll get what you've always gotten. And we really don't want to be in the same water supply situation we found ourselves in 18 months ago," he said.

"We've looked to the best examples overseas and throughout Australia to provide reliable answers to Australia's age old problem.

"WaterSecure is the outcome of two years of innovation, excellence and plain hard work.

"We've combined two climate independent water sources to produce a pure source of water that will directly assist population growth, economic growth and water supply certainty for generations to come. And we're very proud of our efforts and those of our alliances" •

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# Downpour leaves our parks high and dry

Recent downpours added more than 800 megalitres, or about a week's supply, of water to ACT storages. But there is no relief in sight for about one-third of Canberra's 91ha of open space denied regular watering under Stage 3 restrictions.

The Cooperative Research Centre for Irrigation Futures says maintaining urban green areas such as public parks, gardens and sports grounds during water restrictions is necessary for communities' physical, emotional and spiritual needs. The centre's chief executive, Ian Atkinson, said there should be more water recycling to save urban parks and trees suffering from drought.

"Stormwater, greywater, rainwater and treated effluent are all alternative water supplies that, when properly treated and managed, are suitable to save our public parks, garden and sports fields."

Urban irrigation was not a luxury but a necessity for urban lifestyle, he said. Maintaining healthy trees during drought could even reduce energy use during summer. For example, large shade trees could provide a cooling effect of between 2 and 8 degrees and reduce building energy consumption by 7 per cent to 47 per cent.

After the weekend rain, Canberra's dams now contain almost 17 Gigalitres more than a year ago more than 30 per cent of current annual consumption. But despite the improved state of ACT water storages, no extra water is available for sportsgrounds and parks.

ACTEW managing director Mark Sullivan said "Water restrictions and water-use reduction targets are applied to ensure that we do not go to more severe levels of water restrictions, in which case the effects on the community would be even more severe."

Applying a uniform target reduction target meant there was a shared loss of amenity.

But ACTEW had allowed an exemption last month for parks and sports fields to convert turf areas to water-efficient grass species, such as couch or soft-leaf buffalo. •

Source: [www.canberratimes.com.au](http://www.canberratimes.com.au) 16/12/2008

# Sustainable water sources, innovations and applications study tour

The 'Sustainable water sources, innovations and applications study tour' was successfully completed in November; with 18 participants visiting almost 30 locations in three countries (United Arab Emirates, Israel and Spain).

Study tour participants explored a wide variety of world leading technologies, management and applications in urban, industrial and rural contexts with a focus on identifying and understanding alternative water sources (including but not limited to recycled water) and ensuring they were fit for Australian amenity and production horticulture requirements.

The tour also explored and identified ideas and opportunities to overcome barriers to the adoption of alternative water source innovations; and consider broader sustainability aspects including the philosophy for managing water resources, energy requirements, raw material use, emissions and ecological impact.

Israel, UAE and Spain were all fascinating regarding the variety of approaches to water supply management and water use strategies for a diversity of uses. Many are struggling to cope with water shortages like Australia; and desalination plants are being built at an astounding rate. All participants soaked up an amazing amount of information and saw some fantastic innovative ideas.

## Understanding the expenses involved

It is very important to understand expenses associated with treating and delivering water to the user. These expenses are specific to each scheme and dependent on the efficient utilisation of resources available in the area. For example, the type of desalination systems and associated treatment costs for desalination can be minimised if there is a heat source available (e.g. power generation plant). In Fujairah (UAE) a hybrid desalination system is used to provide significant operational savings by reducing fuel consumption by up to 25 per cent compared with a similar-sized plant based only on Multi-Stage Flash distillation (MSF) technology. MSF is a desalination process that distils sea water by flashing a portion of the water into steam in multiple stages of what are essentially regenerative heat exchangers. Reverse osmosis plants are the most common type of desalination plant, but multi-stage flash distillation plants produce over 85 percent of all desalinated water.

Other key criteria influencing the design of desalination & wastewater treatment plants include the quality of water feed-



Tour participants visit a desalination plant utilising energy recovery technology in Spain

ing into the system, what the water is to be used for and in the case of desalination the compatibility with the cogeneration of electricity.

Major expenses identified in all countries included the setup and ongoing cost of pumping water; the greater the distance the greater the associated costs. In addition to this the more treatment required to make the water fit for its intended purpose the greater the cost. It is very expensive and energy intensive to remove salt from water on a large scale.

Lessons:

- Proximity to water source & energy source is important to minimise cost of water.
- Combine the appropriate technologies for specific scenarios to meet the intended purpose.

## Competing interests for water resources

In all countries visited the water resources which were traditionally relied on were stressed and there was big demand for any suitable water available. Many agricultural based industries are doing what ever is possible to secure their water supplies – it is important for them to find opportunities to secure water sources or new alternatives. For example, staff from Energy Recover Inc (ERI) spoke about some greenhouse growers that had

sourced their own desalination plant incorporating an ERI energy recovery system for production of tomatoes in a protected cropping system in southern Spain. These growers were near the sea so desalination provided a good option for them. High value crops (based on dollar return for ML of water used) coupled with the right water treatment technology enabled the development of an economically sustainable system.



Presentation at Atlantium UV disinfection plant, Israel

There also seems to be great competition for water supplied for landscape irrigation to help maintain the urban amenities, drinking water supplies and agricultural requirements. In some places visited greater volumes of recycled water were used for landscape irrigation than agricultural use (i.e. Alicante, Spain).

Large volumes of bore water have been allocated to extensive gardens such as the Bahai Gardens (Haifa, Israel). In

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most cases the use of water for landscape irrigation (amenity horticulture) relies on efficient drip irrigation technologies being used and managed well with water from a variety of sources.

#### Lessons:

- It is crucial for the ongoing operation of business that require water to find opportunities to secure traditional and alternative water sources.
- Irrigate with efficient irrigation systems.
- High level energy recovery enables the delivery of cost effective desalinated water to a level acceptable for producing high quality, high value vegetables (high return per volume of water).

### Water Supply Management

Four major water sources have become crucial when securing water supplies for drinking (potable) water:

1. Recycled water (mainly potable replacement).
2. Bore water.
3. Rainwater.
4. Desalinated water.

In some cases, where urban development was rapid and water supplies limited, desalination was a crucial component for the development (Dubai, UAE). For any desalinated water produced, there was always pressure to recycle the wastewater generated from the water used to get the best value for money from the desalination process (i.e. using the water twice rather than once).

The quality of the water was always required to be fit for the intended purpose from a human health, agronomic and environmental perspective. In Israel, study tour participants were fascinated by Atlantium Water Management Technology UV disinfection units which maximised disinfection and minimised energy requirements to ensure pathogen water quality parameters met human health requirements. This is one of the most efficient (cost effective) water disinfection systems available, with obvious benefits to food production industries from paddock to plate.

Our participants visited FENACORE (the Farmers Federation of Irrigators, based in Madrid, Spain) where they discussed irrigation technology, irrigation education and best practice approach as well as their CoreNet project; an innovative digital irrigation system; which is managing irrigation systems across Spain delivering:

- Water savings
- Increased water delivery efficiency
- Water is now available for nearly all vegetable growing areas



Salt crystals forming on salt tolerant ornamental plants (ICBA) Dubai

One of the difficulties associated with many water sources is supplying the water to where it is required for when it is required. For example, water can be recycled from effluent which flows all year round, however, some horticultural crops only grow for 4-6 months of the year in particular regions. To utilise the whole water source one option, visited in Dubai (UAE), was Aquifer Storage and Recovery (ASR). Schlumberger Water Services in Dubai were investigating this option for desalinated water to help provide a storage option for this water which would minimise evaporation in such a climate, but allow large volumes of water to be stored at low cost.



Disk filters at Arkal, Israel

#### Lessons:

- The supply of any water source should be efficient, minimising energy cost and water losses.
- Other initiatives are also paramount - groundwater recharge, water reuse, and strict water conservation programs are essential.

### Water Use Management

Irrigation systems are a crucial component of water resource management. In Israel Netafim (irrigation systems) & Arkal (filtration systems) have combined to supply irrigation systems for vegetable crops using water recycled from effluent for more than 30 years now (they now service many countries around the world). They use alternative water sources with efficient irrigation technol-

ogy such as – surface and subsurface drip as a viable option for irrigation of vegetables (for more details see previous study tour also ).

Based on their experience, they have developed efficient irrigation systems that manage alternative water sources well (especially suspended solids in water) and effectively manage water quality to ensure maximum yields per volume of water and no health issues. As one participant put it, "It looks like you can grow just about any thing with drip, any where!"

The International Centre for Biosaline Agriculture (ICBA – Dubai, UAE) focus on research and development innovation in relation to the use of saline water for agriculture in Dubai (United Arab Emirates). They are also investigating the development of a range of plants, though their plant breeding program that could cope with harsh conditions and tolerate very high salinity water (above). Soil salinity and groundwater impacts need to be managed too.

#### Lessons:

- There are many methods to manage the quality of alternative water sources, finding the one that works for your specific cropping system is crucial – in some cases it just might not be possible.
- The irrigation system, plants, soils and groundwater need to be chosen wisely to optimise the benefits from irrigation with alternative water supplies.

A full tour report will be publicly available in March 2009. Stories from the tour will be reported in ReWater in coming editions and posted on the [www.recycledwater.com.au](http://www.recycledwater.com.au) website over the coming months. •

**For further information** about the tour and its outcomes contact Daryl Stevens  
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# Innovative wastewater reuse at Mackay

An innovative reuse scheme will see 90% of the city of Mackay's wastewater recycled

Ninety thousand metres of electrical cable, 11,000 square metres of concrete and 45 km of pipeline – that's a small list of the items used to construct the landmark Mackay Water and recycling Project (MWRP) along Queensland's Central Coast.

The project was the culmination of nine years of planning and the MWRP, as it is affectionately known in Mackay, is an innovative wastewater reuse scheme that will recycle about 90% of the city's wastewater and produce enormous environmental benefits.

"It ends the need for an ocean outfall and gives a sustainable water supply to local farmers whose livelihood is under threat due to diminished groundwater allocations," said Mackay regional Council Mayor, Col Meng.

"It puts our region, that is growing at about 3% per annum, in the enviable position of being well placed to cater for the future growth," he said.

***The new facility will ultimately produce more than 8,000 ML of recycled effluent annually to be used on agricultural land in the surrounding area.***

The \$154 million project had the potential to be a logistical minefield – seven different worksites operating at the one time, with up to 225 workers on site every day during peak periods.

It has been a mammoth undertaking, bringing together the passion of council water and waste staff with the expertise of two major players in wastewater systems for the design, Build and Operate project.

John Holland and Tenix Alliance formed a new joint venture partnership to handle the design, construction and operation of the project.

Project director for John Holland, Ben Kochanski, said the MWRP presented a number of challenges, but the result was a vital piece of infrastructure that will shape the region.

"We have been involved in projects that show-case innovation in water re-use, but this is something that will leave a lasting legacy," he said.

The two-year construction phase has had its fair share of challenges – most notably the February 2008 floods where 630 millimetres of rain was dumped on the region in six hours.



The Bakers Creek Wastewater Treatment Facility

It was a considerable set back for the project resulting in delays to the commissioning date and impacting on the project's overall cost.

This engineering masterpiece centres on increasing the capacity of an existing wastewater treatment facility at Bakers Creek, south of Mackay from 10,000 EP to 97,000 EP (Equivalent Persons).

The new facility will ultimately produce more than 8,000 ML of recycled effluent annually to be used on agricultural land in the surrounding area.



Sewerage pipes are laid as part of the wastewater recycling project

Council's Mackay Water Manager, Jason Devitt, said the project stands as one of the country's major environmental, economical & socially beneficial wastewater re-use schemes.

"It slashes nitrogen discharge by approximately 200,000 kg every year, while phosphorus drops from more than

58,000kg per annum to approximately 10,300 kg.

"This is a practical on the ground water solution that clearly meets the objectives of the national Water Initiative," he said.

The project was collaboratively funded by Mackay Regional Council, the Queensland Government and Federal Government.

Apart from revamping an existing plant on the southern outskirts of Mackay, the project included transfer infrastructure such as 13km of 900 diameter pipeline and construction of three pump stations, construction of 27 balance ponds, a 220 megalitre dam to store the recycled water and a \$20 million upgrade to the Buccasia Treatment Plant in the city's northern suburbs.

The new facility at Bakers Creek is currently treating about 2 megalitres of effluent and by now is expected to handle 16 megalitres (16ML) daily of diverted flow.

This signals the start of decommissioning and demolition of the 45 year old plant at Mt Basset WWTP on the northern side of the city. Mr Devitt said that would be in itself, another major component and significant milestone of the project. ●

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With permission of Ken Furdek  
Manager – Corporate Communications  
Mackay Regional Council  
Phone: 1300 622 529

# Effluent reuse for irrigation purposes

## A wastewater reuse scheme benefiting farming and the environment

**M**idCoast Water, which provides water services to communities on the mid north coast of New South Wales, has completed a wastewater reuse scheme that is benefiting both the environment and the area's farming sector.

The Wingham Effluent Management Scheme, an innovative scheme that supplies treated effluent to farmers for use in irrigation, was officially opened in late 2008. Supplying treated water to four farms at The Bight, Wingham, the \$15 million reuse project, which involved the development of an effluent management scheme at Taree and Wingham, was designed to beneficially reuse treated from MidCoast Water sewerage treatment plants.

The project included a \$6 million upgrade of the Wingham Sewerage Treatment Plant that involved the removal of the original trickling filter plant, which was constructed in 1961. The main challenge of this upgrade was for contractors to undertake construction on an operational facility. This was achieved, with the quality of the treated water produced by the plant meeting all expectations.

The project included the construction of a substantial wet-weather storage area, an additional clarifier and the modification of the bioreactor, which removes some of the nutrients found in wastewater. The upgrade also saw the construction of a new inlet works and dewatering building, as well as the refurbishment of existing infrastructure such as the ultra violet disinfectant system.

While the upgrade slightly increased the capacity of the plant to 7,500 EP (equivalent people), the main purpose of the upgrade was to improve treatment processes and produce a higher quality treated effluent. The entire complex is monitored by a state-of-the-art telemetry system to ensure its efficiency.

### Producing positive outcomes

The objective of the project was to redirect high-quality treated effluent from the Manning River to nearby agricultural land for beneficial use. This provides a benefit to the farmers by providing them with water that would otherwise be released into a saline or estuary section of the Manning River while reducing the amount of river water that they would have otherwise extracted. The treated effluent is high-quality, has some nutrients

and putting it into the river is considered wasteful when fresh water is so valuable and predicted to be even more valuable if rainfall continues to decline.

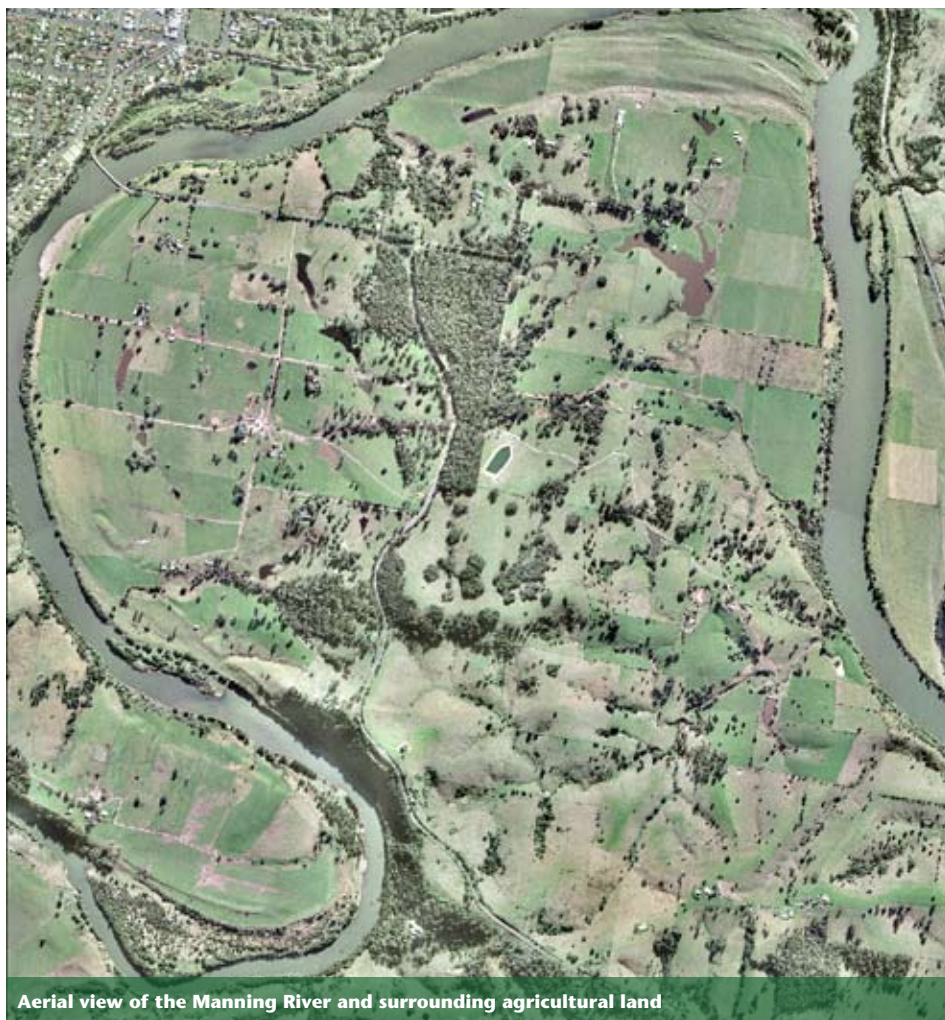
Nearby farmers came on board to an effluent reuse scheme to supplement their river and groundwater extraction and benefit from the treated effluent use while doing the townsfolk a service and reducing the level of nutrients discharged to the river system.

The target reuse of effluent is 70% or 350 ML/annum of Wingham township's treated effluent, and to reduce about 9 tonnes of nitrogen and 11 tonnes of phosphorus per year being discharged into the Manning River. Agricultural reuse of effluent offered the greatest potential for maximum reuse and at an economical rate while reducing water extraction from the environment.

### Working collaboratively

This project involved 'winning' over the farmers' confidence that treated effluent would be safe and beneficial to their operations. Without their support there was no scheme and no one to use the water. At each stage of the process the farmers were engaged and consulted in an open and collaborative way. Field days, regular meetings and demonstrations to show the accepted use of treated effluent by others and the level of treatment the water goes through enabled a close and respected working relationship. A better understanding was gained by the farmers of MidCoast Water's business and MidCoast personnel of the farmers operations. The farmers were the key to the success of the project and will continue to be the key to the scheme's ongoing success.

*continued page 10*



Aerial view of the Manning River and surrounding agricultural land

from page 9

Support by MidCoast Water's customers was also essential and various workshops were undertaken at an early point to ensure their support for better utilisation of the water resources previously considered as waste. The environmental assessment was prepared and circulated to the community and regulators.

Knowledge gained from aspects of this project has been utilised in other reuse projects at Taree and Forster, such as on-farm irrigation, effluent storage, pipeline construction and irrigation management. The farmers at Wingham had irrigation experience prior to this scheme and their assistance in helping the Taree farmers (who have had no or limited irrigation experience) has been invaluable.

### Everyone is a winner

The scheme will maintain and support local farmers and improve their irrigation and farm nutrient management efficiency to achieve sustainable agriculture. Each farmer's property will be tested each year for accumulation of nutrients and salts and advised of management changes that would best suit their land use.

Each farmer uses a computerised calendar to assess when it is time to irrigate this system, and maintains a slight soil water deficit after irrigation is complete in case of any rainfall to ensure any surface nutrients enter the soil rather than runoff. The computerised calendar is based on simple weather conditions the farmers can enter, such as rain, cloud,



Computer controlled irrigation of pastoral land

sunny or windy, and pre-programmed average evapotranspiration conditions based on the time of year and crop.

The farmers have guaranteed water quality and supply volume even when 'cease to pump' has been placed on river extraction. Better nutrient and irrigation management is coordinated by Mid-Coast Water on each of the participating farms.

The environmental and social benefits are harder to quantify but will generally reduce nutrients released to the river, reduce river extraction by the farmers

participating especially during low flows, and maintain a viable agricultural industry in this area, benefiting the river's recreational users and support for the scheme by the townsfolk.

Everyone is a winner, effluent to the river is reduced, water extracted from the environment is reduced, and a valuable resource is recycled and reused for beneficial purposes. ●

**Extract from** Public Works Engineering – Dec 2008  
Courtesy of Graeme Watkins  
Mid Coast Water's Engineer Strategic Operations.  
For more information phone MidCoast Water  
on 1300 133 455.

## Racecourse water pact stirs calls for offset deals

Support is growing for water-offset deals to be approved more widely across Victoria in the wake of a controversial Flemington Racecourse arrangement.

Water-offset deals hit the headlines in January when the Victoria Racing Club (VRC) was given permission to use an extra 23 ML of drinking water at Flemington as part of an offset deal where the VRC pays for water saving elsewhere. The water savings have not been identified as yet.

Despite Flemington's extra consumption, the deal will save millions of extra litres each year. Australia's top water sector organisation has joined calls from business groups for more offset deals to be considered by governments, provided they achieve a "net water saving". Australian Water Association executive director Ross Young said saving water should be the ultimate goal. "The most important thing is to have investment made in water efficiency to ensure we save the biggest amount of water we can," he said. "If that means some people who can afford

to undertake that investment make that investment in other businesses, then take a portion of the water savings - I think that's fine."

The VRC deal was arranged by City West Water, which supplies the bulk of Melbourne's industrial sector, including many of the concerns that are among the city's biggest water users. The Age believes City West has identified close to 1.5 billion litres in potential water savings that cannot currently be funded, but could be realised if an offset regime were implemented.

City West managing director Anne Barker would not confirm exact figures but said financial pressures meant potential water savings were not always realised. "The 'watermaps' program has identified significant potential water savings, many which have a comparatively high

cost," she said. "Often, many of these potential projects are not financially viable in a conventional business sense, and City West Water aims to provide assistance for these projects."

Across Melbourne, under 3a water restrictions, councils may water only one in four sports grounds. The impact on outdoor activities and clubs has been huge, although councils have done their best, on tight budgets, to install water tanks and truck in recycled water to supplement supply and improve irrigation efficiencies (see "Changing the future of sports ground with subsurface irrigation" page 2).

In 2007, councils and water retailers also put to the Government a plan to buy water saved by private companies.

*continued page 11*



The VRC is perfectly capable of taking a leadership role and purchasing recycled water

This would boost water-saving incentives while helping councils minimise the future cost, running to millions of dollars, of rehabilitating grounds ruined by drought. The plan was rejected.

How galling it must be then for councils to look across to the lush gardens and turf of Flemington racecourse and learn that the Victoria Racing Club is allowed to use an extra 23 ML of drinking water a year by paying a third party to achieve water savings. The basis of Water Minister Tim Holding's rebuff of the councils' plan was that it was not an option for country Victorians. Part of the reason the public has successfully cut water use is that as long as the rules are the same for all, everyone tends to do their bit. Bending the rules for special cases, or favouring one sector of the community over another, risks undermining the public goodwill on which savings depend. Yet this principle has been set aside for one of Australia's richest sporting bodies.

The Age accepts the argument that Flemington has a special status, although it is odd that the VRC can increase annual water use to 345 ML before a third party meant to save 160 ML is even identified. In light of the VRC precedent, the Government should reconsider the councils' proposition. Collectively, their grounds are no less significant for community and sporting activities than Flemington.

### Council viewpoint re water- deal exclusion

Maribyrnong Mayor Michael Clarke said he was "overwhelmingly disappointed" by what he considered to be double standards and "cherry picking".

"If it's good enough for the VRC, why isn't it good enough for the City of Maribyrnong?" he said. "What was the logic behind approving the VRC application and the flagrant rejection of the application made by local government?"

City of Whitehorse chief executive Noeline Duff said she hoped councils could negotiate similar offset deals in future. "It is certainly one thing that we would like to be able to consider," she said.

Wyndham City Council chief executive

Peter Marshall said water offsets were a good idea in principle and he hoped the council - which has a shortage of suitable sports grounds - could enter into similar deals.

But spokesman Luke Enright said the Government would not reconsider its stance on water offset deals for councils despite supporting the VRC plan. "Most people would understand the need to protect an event that attracts hundreds of thousands of spectators, provides employment for more than 3000 people and contributes millions of dollars to our economy," he said.

"Instead of an offsets scheme for suburban sportsgrounds, the Government and water authorities are focused on other initiatives like providing access to recycled water."

Opposition Leader Ted Baillieu attacked the VRC's use of drinking water. "It sends a shocking message to those north of the divide who know the water that will go down the (north-south) pipeline will be there to water the roses at the VRC," he said.

"The VRC is perfectly capable of taking up its leadership role and purchasing recycled water."

VRC chief executive Dale Monteith said salinity from Maribyrnong River water posed a danger to the racetrack and the club needed to be careful. "We can't have anything that is tainted that might otherwise affect the grass of Flemington racecourse," he said.

Mr Monteith said there were difficulties in arranging supply of recycled water and while harvesting rainwater off grandstand roofs at Flemington had been investigated, it would not fully satisfy the club's needs.

Councils around Melbourne last month urged the Government to allow them to strike offset deals. The Victorian Employers Chamber of Commerce and Industry said it was keen to see the concept explored further. ●

Source: [www.theage.com.au](http://www.theage.com.au) - 2/2/2009

## Research centre to boost water saving

**WATER conservation is set to get a boost when the Global Water Sustainability Centre (WSC) moves into the Qatar Science & Technology Park in the first quarter of 2009.**

The primary objective of the WSC, a ConocoPhillips-General Electric co-venture, is to research and develop water solutions for the petroleum and petrochemical sectors. The WSC will also focus on municipal and agricultural solutions apart from creating awareness on the judicious use of water resources.

"Given that about three barrels of water comes with every barrel of oil produced, we intend to look into potential ways to treat this water and utilise it for other beneficial purposes," WSC managing director Samer Adham told Gulf Times.

A Water Visitors' Centre, an integral part of the WSC's 1,000sq m within QSTP, is to focus on community outreach, education and training by sharing messages related to water conservation as well as enhancing water recycling. "In line with the global trend, we mainly aim to inspire children to conserve water, by offering them tours at the Visitors' Centre, which is scheduled to start in the first half of 2009," he said.

Though Qatar, given its topography and location, has to continue to focus on desalination of sea water for meeting a substantial portion of its drinking water needs, the use of recycled water for other purposes is going to be an essential component from the population and infrastructure growth point of view.

An expert in water research and technology, Adham explained that proposed uses for treated water could include crop irrigation, livestock watering, wildlife habitats, and industrial cooling, potentially leaving more fresh water available for domestic use.

"Considering the environmental and cost issues associated with desalination, you cannot depend on it alone for all future requirements, especially looking from the sustainability angle, and hence the pressing need for recycling the petroleum water," he said. The water pumped out with oil in Qatar has high salinity, but the water produced as part of liquefied natural gas processing is potentially more feasible to treat, according to Adham. ●

Source: [www.gulf-times.com](http://www.gulf-times.com), Qatar - 15/12/2008

# Water recycling target for Melbourne

In 2004 the Victorian Government's *Our Water Our Future* White Paper established a water recycling target of 20% by 2010 for metropolitan Melbourne. This target has been achieved by Melbourne Water and the three metropolitan retailers<sup>^</sup> for two consecutive years.

In 2004 the Victorian Government's *Our Water Our Future* White Paper established a water recycling target of 20% by 2010 for metropolitan Melbourne. This target has been achieved by Melbourne Water and the three metropolitan retailers for two consecutive years. In 2006/07, 22.5% (65,647 ML) of Melbourne's wastewater was treated and recycled, and in 2007/08, 23.2% (66,742 ML) recycling was achieved, exceeding the Government's target of 20% by 2010.

The high usage of recycled water is partly an impact of the drought on demands for alternative water supplies, and a result of extraordinary climatic conditions and water conservation and restrictions reducing inflows to the wastewater treatment plants. For example, Melbourne's Western Treatment Plant (WTP) has previously treated a long term average of 475 ML/day raw sewage influent, but in 2007/08 this reduced to an average of 415 ML/day.

Melbourne Water and the retail water businesses are currently working towards the second of the Victorian Government's water recycling targets, 10 GL/year of potable substitution with recycled water by 2030. Potable substitution projects involve the utilisation of fit for purpose recycled water for appropriate non-potable uses that would otherwise require a potable water supply. A number of projects have been identified to meet this target, involving end uses such as garden watering and toilet flushing in residential estates, some industrial uses, and watering of open spaces such as sports grounds.

## Recycled Water at the Western Treatment Plant

The majority of sewage entering WTP from the Western Trunk Sewer is sent to two large treatment lagoons, 55 East and 25 West, which each consist of 10 ponds connected in series. The treatment lagoons utilise naturally occurring bacteria to consume the biodegradable matter. The 55 East and 25 West systems are fitted with Activated Sludge Plants (ASPs) which reduce nitrogen and pathogen levels. Effluent leaving the ASPs is directed through a series of naturally aerobic maturation ponds where pathogen levels are further reduced.

Final effluent from the 55 East and 25

West lagoons is Class C standard recycled water, and can be transferred to a recycled water storage basin for distribution to on-site and off-site recycled water customers. For the off-site customers, further UV disinfection and chlorination treatment is also applied to achieve Class A standard recycled water as required for those uses.

To address the competing demands for recycled water supplies from WTP, an "Allocation Hierarchy" has been developed, which prioritises the supply of recycled water to higher value uses over lower value uses. The Allocation Hierarchy prioritises recycled water supplies as follows:

1. Conservation at WTP (biodiversity and habitat flows)

2. On-site irrigation for salinity management at WTP

3. Off-site committed contracts (potable and river water substitution)

4. New potable substitution uses (off-site and on-site)

5. On-site / off-site projects that are not potable / river water substitution

The main objective of the Allocation Hierarchy is to prioritise the allocation of reliable recycled water volumes on an annual basis, and ensure that seasonal water demands are met. Daily operations sometimes require flexibility from some end-users to ensure that immediate needs from sensitive customers are met, whilst still supplying the overall contrac-

*continued page 13*



**Table 1: Water recycled from the Western Treatment Plant, Werribee**

Customers and uses of recycled water	Volume supplied in 2007/08 (ML)	Class	Retail Water Authority	Contributes to 20% target*
On-site: Salinity management - as well as some irrigation of stock pastures for stock grazing and irrigation of crops for primary production.	27,840 (~5,000ha)	C	n/a	YES
On-site: Conservation - management of conservation lagoons, and biodiversity values of Ramsar wetlands and habitats on the site.	15,930	C	n/a	NO
Off-site: Standpipe customers - alternative water source for commercial businesses and the local community.	160	A	City West Water	YES
Off-site: MacKillop College - for irrigation of the school's sporting fields, gardens and recreation areas since 2006.	30	A	City West Water	YES
Off-site: Werribee Technology Precinct - for industrial purposes, irrigation and commercial wash down. The largest recycled water customer in the precinct is Melbourne Water's Hoppers Crossing Pumping Station, which uses approximately 100 ML/year to lubricate and cool eight large pumps (upgraded 2007).	90	A	City West Water	YES
Off-site: Werribee Tourist Precinct - supplied via Southern Rural Water, customers include the Werribee Park Golf Club, the National Equestrian Centre, the Werribee Open Range Zoo and Werribee Park and Mansion.	200	A	Southern Rural Water	YES
Off-site: Werribee Irrigation District (WID) - Farms of nearly 180 market gardeners account for over 82% of the total area, and pasture production accounts for a further 15%. The main vegetable crops grown are broccoli, lettuce and cauliflower accounting for over 80% of the intensive market garden area, with smaller crops of cabbages, onions, artichokes, celery and fennel also grown. The recycled water scheme is likely to be critical to the future of WID in the context of potential climate change impacts, with river water allocations for 2008/2009 currently set at less than 10% and ground water harvesting still banned.	12,520	A	Southern Rural Water	YES
<b>Total</b>	<b>56,770</b>			

<sup>^</sup> South East Water, Yarra Valley Water and City West Water

\* Water recycling schemes in the Yarra Valley Water and South East Water regions also contribute to meeting this target



Werribee Treatment Lagoons

from page 12

tual volumes over the season and year to all customers. A summary of the current uses of recycled water from WTP is provided in Table 1.

### Salinity Management Case Study: WID

High salinity in both the river water and recycled water (salinity exceeding 2,000 EC has been experienced) has meant that Werribee Irrigation District farmers have had to employ a range of salinity management practices during the severe drought conditions of the last few years, customised to their own sites and crops. While each irrigator has their own approach, several on-farm practices have emerged through intensive soil analysis and experimenting with different techniques to maximise yield and maintain crop quality, particularly for lettuce (the most salt sensitive crop). Some of these include:

- Increase in water application – particularly during the hotter weather. This can be up to an additional 30% of water applied to crops (helping with leaching of salt, keeping the soil moist and maintaining high levels of plant readily available water),
- A shift toward more sulphate fertiliser instead of nitrate fertiliser to increase trace elements available in the soil – particularly potassium and magnesium,

- An increased focus on gypsum application,
- Some research has also shown drip irrigation can help maximise yields while minimising water use, salt build-up and salt stress.”

The WID Recycled Water Scheme operates under an EPA approved Regional Environmental Improvement Plan (REIP), which outlines the management requirements to permit the reuse of recycled water and exempt the Scheme from licensing as a wastewater discharge.

Due to the drought, the scheme has operated well beyond initial expectations, given it was originally designed as a supplement to river water supply. With high reliability river water allocation currently at 5% and a total groundwater extraction ban in place, the entire WID is now supported solely by recycled water. The REIP also assumed that approximately 40% of growers would use recycled water, however over 85% of growers currently rely entirely on recycled water. Consequently, environmental impacts are being observed from the interim scheme at a greater rate and over a greater area, than predicted in the original REIP.

The REIP requires each of the farms participating in the recycled water scheme provides annual soil samples to monitor the effect of irrigating with recycled water. A recent statutory audit of the REIP



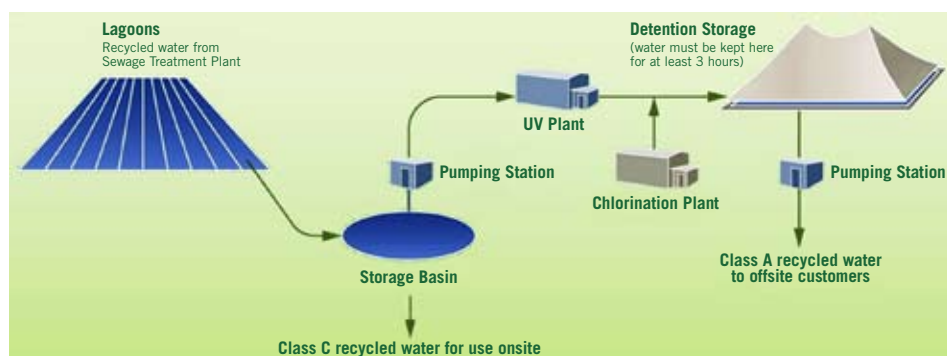
Aerators at Werribee Treatment Plant

showed that around two thirds of participants have experienced an increase in soil salinity; while the remaining third have stayed constant or improved, indicating the salts may be manageable under some farm management strategies.

To address findings in the audit, the differences between the actual and planned operating regime of the scheme, and the ongoing issues associated with salinity, the REIP is currently under revision, with implementation of the updated REIP scheduled from 1 July 2009.

To determine the long term feasibility and sustainability of the scheme, Southern Rural Water has commenced the Western Irrigation Futures project. This aim of this project is to develop a detailed long-term strategic infrastructure investment plan for its irrigation supply systems in the Werribee (and Bacchus Marsh) irrigation districts, and is anticipated for completion in 2010. •

**Source:** Liz Roder  
Team Leader, Water Recycling  
Melbourne Water  
phone 9235 7255  
email [Liz.Roder@melbournewater.com.au](mailto:Liz.Roder@melbournewater.com.au)



Treatment process for Werribee Irrigation District (WID)

\*\* [www.recycledwater.com.au](http://www.recycledwater.com.au)

# Recycled Water Training for Werribee Tourist Precinct

**Innovative on-line training course for staff and volunteers**

Staff and volunteers from the Werribee Tourist Precinct, west of Melbourne, will use an innovative on-line training course to fulfil their Class A recycled water induction requirements.

The on-line course, initiated by the Victorian Department of Sustainability and Environment (DSE), Southern Rural Water (SRW) and the members of the Werribee Tourist Precinct (Werribee Mansion – Parks Victoria, Werribee Open Range Zoo, National Equestrian Centre and Werribee Park Golf Club) will see staff and volunteers undertake a 1-hour training course that provides them with valuable information relating to the safe and sustainable use of Class A recycled water.

Participants will be able to access the course from the comfort of their own home, or from computer terminals provided by the precinct site members.

According to Victorian EPA requirements, all staff and volunteers that may use, or come in contact with Class A recycled water are required to be educated on the



appropriate uses of recycled water so as to protect their health, and the health of the sites being irrigated.

The on-line course will form part of a more extensive Class A recycled water induction program for grounds staff actually responsible for irrigating the sites.

The on-line course will provide the precinct sites with an easy and effective way of ensuring the volunteers who donate their time at the sites, are aware of their Class A recycled water obligations, and have a greater understanding of the significant benefit recycled water is playing in protecting Victoria's water resources.

Prior to the course being developed, the precinct sites had been bringing in agency staff (e.g. EPA, SRW) and consultants to provide the induction courses 'face-to-face'. However, with the volunteer groups regularly changing in size and personnel, it was not possible to continually provide the training and capture everyone.

The on-line course is able to solve this issue, with participants working their way

through seven course themes and sitting a series of multiple-choice questions at the end of each theme. Participants are required to achieve a pass rate of 80%, and successfully answer a number of 'non-negotiable' questions (questions they must get right) before being able to send off a request for a certificate stating that they have successfully completed the training. The certificate will be emailed back to the participant. They can then present it to their site manager and commence their work.

The course is expected to be available from the end of February 2009, and can be accessed through the web address [www.recycledwateronline.com.au](http://www.recycledwateronline.com.au). This is the first course offered by the site, however it is hoped that other schemes and courses will use the site to provide similar on-line training. ●

**For further information please contact:**  
Matt Shanahan of RM Consulting Group (RMCG)  
Phone: 03 5441 4821 or  
email: [matthews@rmcg.com.au](mailto:matthews@rmcg.com.au)  
[www.recycledwateronline.com.au](http://www.recycledwateronline.com.au)

## Groundwater replenishment trial

**The Water Corporation will undertake a three-year trial of groundwater replenishment to assess the treatment processes and determine whether the approach is safe, has community support and that it can be operated to the satisfaction of the WA Departments of Health, Water and Environment & Conservation.**

The Water Corporation has committed to meeting water quality parameters established and approved by the Department of Health.

Treated wastewater, taken from the ocean outfall of Beenypup Wastewater Treatment Plant, will undergo advanced treatment processes including membrane filtration, reverse osmosis and ultra-violet disinfection

to produce water safe for drinking, and then pumped into the Leederville aquifer, 120-200 metres underground in an area where there is no risk to the public.

Construction of the advanced water treatment plant commenced in December 2008 and background monitoring of the confined Leederville aquifer is in progress to establish the baseline against which any changes in the groundwater can be measured.

The advanced water treatment plant is scheduled to commence commissioning in September 2009 and following approval from regulators, will begin adding highly treated water to the Leederville aquifer from January 2010. The Trial will run until the end of 2012. A report on whether groundwater replenishment is a safe, viable and sustainable option that should be used in Perth's drinking water supplies will be produced in 2013.

Detailed monitoring of the water pro-

duced by the plant will be undertaken in partnership with researchers and overseen by regulators, and the plant will automatically shut down if it is not performing as designed, ensuring the safety of the public and the environment. Water from the Trial will only be used for monitoring and testing and will be too deep to be drawn up by domestic or commercial bores.

The advanced water treatment plant, to be located adjacent to the Beenypup Wastewater Treatment Plant, will be designed, constructed and commissioned by the W2W Alliance, an alliance of Black & Veatch, Thiess and SKM. The project is part-funded by the Federal Government, through the Department of Environment, Heritage, Water and the Arts' WaterSmart Australia program. ●

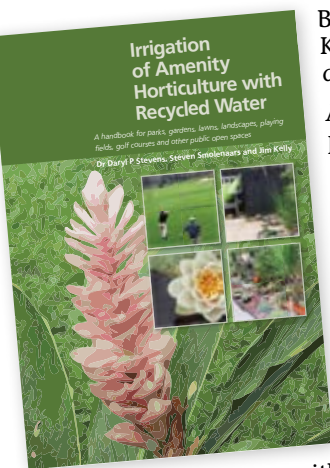
**Source:** Lisa Nylander  
Communications Officer, Water Corporation  
phone: 08 9420 2202 F: 08 9420 3626



# GOOD READS and website links

## Irrigation of Amenity Horticulture with Recycled Water

By: DP Stevens, J Kelly, S Smolenaars



A handbook for parks, gardens, lawns, landscapes, playing fields, golf courses and other public open spaces.

This handbook equips designers and managers of amenity horticulture recycled water schemes

with information to implement recycled water projects and provides advice for managing common problems.

For a hard copy of this free handbook\* contact Jodie Hannaford at Arris on (03) 9421 1701 or email the request to [rewater@recycledwater.com.au](mailto:rewater@recycledwater.com.au) (\*Please note \$10 postage and handling fee). Alternatively, download a PDF version from [www.recycledwater.com.au](http://www.recycledwater.com.au).

## Study into Recycled Water use in Agriculture

A report by the Federal Government's Bureau of Rural Sciences has listed important factors to ensure success of agricultural recycled water schemes. A copy of the report is available at <http://affashop.gov.au>

## Water and Wastewater Finance and Pricing: A Comprehensive Guide, Third Edition

By: George A. Raftelis from Taylor & Francis Group

Water and Wastewater Finance and Pricing provides a framework from which utility professionals can address financial planning and pricing objectives. In this volume, the lead author and his co-authors apply experience gained over the past quarter century working with nearly 1,000 utilities throughout the United States. This book can be used as a management tool and technical guide to beneficial financial planning and rate-setting practices.

Price : \$179.95 - 432 pages/  
Hardcover/2005

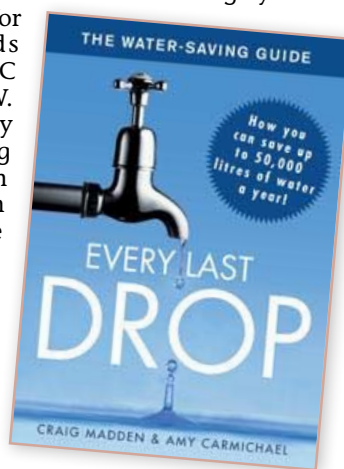
[www.pennwellbooks.com](http://www.pennwellbooks.com)

## Every Last Drop: The Water Saving Guide

By: Craig Madden, Amy Carmichael

The number one issue and concern in Australia today is WATER. Save water, save money, save our future! Every Drop Counts is a practical guide that will take you on a journey through your kitchen, bathroom, laundry and garden offering low cost tips that will help you save 50,000 litres of water a year. Craig Madden has been working in the water industry for over four years with a 'hands on' approach to solutions in domestic water saving. He has installed over 500 grey water systems for households around VIC and N.S.W. and currently installing rain flush systems in Melbourne that take the water from the roof and use it to flush the toilet and fill the washing machine.

[www.booktopia.com.au](http://www.booktopia.com.au)

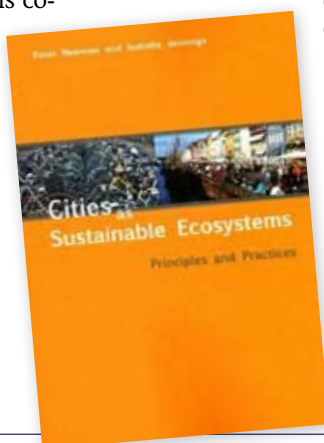


## Cities as Sustainable Ecosystems: Principles and Practices

By: Peter Newman, Isabella Jennings

"Cities as Sustainable Ecosystems" shows how cities and their residents can begin to reintegrate into their bioregional environment, and how cities themselves can be planned with nature's organising principles in mind. Taking cues from living systems for sustainability strategies, Newman and Jennings reassess urban design by exploring flows of energy, materials, and information, along with the interactions between human and non-human parts of the system.

Drawing on examples from all corners of the world, the authors explore natural patterns and processes that cities can emulate in order to move toward sustainability. Some cities have adopted simple strategies such as harvesting rainwater, greening roofs, and producing renewable energy. Others have



created biodiversity parks for endangered species, community gardens that support a connection to their foodshed, and pedestrian-friendly spaces that encourage walking and cycling.

A powerful model for urban redevelopment, "Cities as Sustainable Ecosystems" describes aspects of urban ecosystems from the visioning process to achieving economic security to fostering a sense of place.

[www.booktopia.com.au](http://www.booktopia.com.au)

## The MBR Book: Principles and Applications of Membrane Bioreactors for Water and Wastewater Treatment

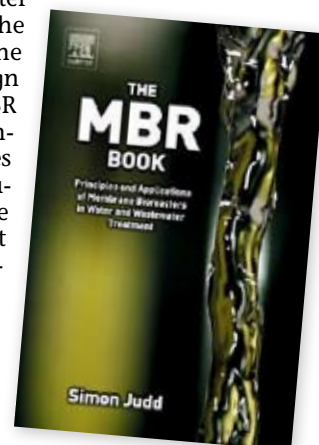
By: Simon Judd, Claire Judd

The use of membranes is increasing throughout industry, and particularly the water industry. The municipal water industry, which is concerned with the provision of clean drinking water to the population, is a big user and developer of membrane technology which helps it to provide water free of pathogens, chemicals, odours and unwanted tastes. Municipal authorities also have to process sewage and waste water, and membranes are used extensively in these processes.

The MBR Book covers all important aspects of Membrane BioReactors in water and waste water treatment, from the fundamentals of the processes via design principles to MBR technologies. Industrial case studies help interpret actual results and give pointers for best practice. Useful appendices provide data on commercial membranes and international membrane organisations.

- Major growth area in the water industries
- Internationally-known author
- Principles and practice, backed by case studies

[www.booktopia.com.au](http://www.booktopia.com.au)



# 16 EVENTS diary dates

## Australia

### ozwater'09

#### OZWATER 09 – Australia's National Water Conference and Exhibition

16-18 March 2009, Melbourne Convention & Exhibition Centre

'From Challenges to Solutions' Ozwater 09 will address the wide ranging issues that face the water industry today. These include major national water reforms, climate change and its impacts, technological advances, recycled water uses and the challenges of human resources to name a few.

For more information see [www.ozwater09.com.au](http://www.ozwater09.com.au)

#### Water Efficient Landscape Design and Alternative Water Sources

19 March 2009, Grand Hyatt, Melbourne

Free seminar held by Rainbird – for more information call 1800 424 040 or email [jwsmith@rainbird.com](mailto:jwsmith@rainbird.com)



#### EcoForum Conference & Exhibition 2009

28-30 April 2009, Australian Technology Park, Sydney

The EcoForum exhibition will accompany the EcoForum conference in Sydney. Some examples of what the program will cover include: Sustainability of water supply, Water quality and recycling, Water supply asset management, Waste management challenges, Climate change and the carbon footprint, Practical ways to reduce your carbon footprint and save money, Clean futures with biotechnology, Achieving sustainable solutions and more.

For more information see: [www.ecoforum.net.au/2009](http://www.ecoforum.net.au/2009)



#### WSUD09: Towards Water Sensitive Cities and Citizens

5 – 8 May, Perth

The 6th International Water Sensitive Urban Design Conference and the 3rd Hydropolis takes place in Perth. With over 200 abstracts submitted, conference streams will cover topics such as reducing mains water demand, managing urban stormwater, protecting waterways and much more. Details of speakers and sponsorship options available online.

For more information see: [www.keynotewa.com](http://www.keynotewa.com)



#### Irrigation Efficiency Courses 2009

This course provides training for three units of competency from the Certificate III in Irrigation: RTE3605A – troubleshoot irrigation systems; RTE3607A – measure irrigation delivery system performance; and RTE3611A – operate pressurised irrigation systems. The course trains people who are involved in operating or managing landscape irrigation systems to evaluate their systems for efficiency, adjust irrigation schedules if necessary, conduct basic maintenance on equipment and know when to get expert help.

**Adelaide, Brisbane, Melbourne, Perth, Sydney:** 1 & 2 April 2009 and 8 & 9 September 2009

**Townsville:** To be advised in the New Year

Before enrolling make sure you read the Student Information.

Courses run on demand.

For information contact Catherine Parbery, IAL head office, phone 02 9476 0142, or visit [www.irrigation.org.au](http://www.irrigation.org.au)

#### 7th International Conference on Water Reclamation & Reuse 21-25 September 2009, Brisbane

Call for submission of abstracts: Due by 3 April 2009

In recent times, the coalescence of many different pressures - population growth, increasing urbanisation, drought, reduced run-off - has put a major strain on water supply infrastructure globally. The level of water abstraction is reaching its natural limits and this calls for a dramatic shift in our water utilisation concepts. The traditional "linear society" is not a sustainable solution and the "circular society" has to become the new standard.

The program will have a strong focus on the interaction between practice and research and will present excellent opportunities to share and exchange knowledge and expertise. You will also see first hand the largest water recycling scheme worldwide.

For more information see: [www.reuse09.org](http://www.reuse09.org)

#### IWA Efficient 2009

25 – 28 October 2009, Sydney Convention & Exhibition Centre

Registration opens in May 2009 for this conference on efficient use and management of urban water.

For more information see: [www.efficient2009.com/](http://www.efficient2009.com/)

## International



#### Recycling of Water - 20th Anniversary New Zealand Land Treatment Collective Conference

25 – 27th March, Taupo New Zealand

This year's conference focuses on recycled water and offers the opportunity for members and non members alike to meet and discuss research, engineering, legal, community and practical issues related to land treatment. It provides a unique and relaxed environment where researchers, consultants and government organisations can mix freely, share ideas, develop contacts and provide future directions for land treatment.

[www.ensisjv.com](http://www.ensisjv.com)



#### 13th Annual Water Reuse & Desalination Research Conference

18-19 May 2009 Hilton Waterfront Beach Resort, Huntington Beach, California, USA

The 13th Annual Water Reuse & Desalination Research Conference will showcase results from "cutting edge" research related to water reuse and desalination. This is the conference you need to attend to learn about technologies that will become mainstream in 5-10 years.

The Foundation's Research Conference provides an opportunity for the water reuse and desalination communities to hear and see presentations by researchers on the latest results of ongoing research. The conference provides a forum for water reuse and desalination research professionals to interact, network, and discuss current and future research needs and trends.

For more information see: [www.watereuse.org](http://www.watereuse.org)



## EVENTS

## diary dates

### 6th IWA Leading Edge Conference on Water and Wastewater Technologies (LET Conference)

23 – 25 June 2009, Singapore

The 2009 edition of the LET conference will see its scope expand from its traditional focus on treatment technologies to include technologies that minimise the impact that the water sector has in climate change, resource recovery – such as water reuse and nutrient recovery – and advancements in nanotechnology.

IWA has teamed up with PUB, Singapore's national water agency, to co-locate the LET Conference at the Singapore International Water Week 2009 in Suntec Convention Centre, Singapore. (See details below) LET conference delegates can therefore look forward to enjoying greater networking opportunities with a diversified group of participants including top government officials and industry leaders, and benefiting from a wider spectrum of trade activities.

For more information see:  
[www.let2009.com.sg/](http://www.let2009.com.sg/)



### Singapore International Water Week - Sustainable Cities – Infrastructure & Technologies for Water

22 – 26 June 2009, Suntec Convention Centre, Singapore

The goal for Singapore International Water Week is to provide policy makers, industry leaders, experts and practitioners with a new global platform to address challenges, showcase technologies, discover opportunities and celebrate achievements.

For more information see:  
[www.siwww.com.sg](http://www.siwww.com.sg)

### 3rd African Regional Conference.

11-17 October, 2009. Abuja, Nigeria

Conference theme is The Role of Irrigation and Drainage in Food Security: towards attaining the millennium development goals in Africa.

For more information see:  
[www.icid2009.org](http://www.icid2009.org)



### 3rd IWA Aspire Conference and Exhibition

18 – 29 October 2009, Taipei

The main theme of the 3rd IWA-ASPIRE Conference and

Exhibition is “Working for Asia-Pacific Water Sustainability”. Topics will cover the most recent innovations, successful practices in the treatment of water and wastewater systems, including in-depth case studies on safe and reliable systems for the removal of nutrients, reusable water, and methods of better operation.

For more information see:  
[www.aspire2009.org](http://www.aspire2009.org)

### International Desalination Association (IDA) World Congress

7-12 November – 2009, Atlantis Resort, The Palm, Dubai, UAE.

Call for papers is now on. Extended abstracts are being accepted online at <http://ida.pmcc.com/abstracts> beginning July 1 and ending October 1, 2008

For more information see:  
[www.idadesal.org](http://www.idadesal.org)



## NEWS innovations & information

### National

#### Standardising Greywater Treatment Technologies

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) has launched a Greywater Technology Testing Protocol (December 2008), which provides a national approach for regulating and testing greywater treatment technologies in Australia. According to the CSIRO, a national approach to the regulation and testing of greywater treatment technologies would simplify the process for manufacturers and increase consumer adoption rates.

Source: SAI Global Water Newsfeed  
20/01/09  
CSIRO's media release 14/1/09

#### National Rainwater and Greywater Initiative

As part of the \$12.9 billion Water for the Future plan, the Government is delivering the \$250 million National Rainwater and Greywater Initiative to help people use water wisely in their everyday lives.

The Australian Government is providing:

- Grants to surf life saving clubs of up to \$10,000 to install a rainwater tank or undertake a larger water saving project.
- Rebates of up to \$500 for households to install rainwater tanks or greywater systems
- The purchase and installation of a new rainwater tank which is connected for internal reuse of the water for toilet and/or laundry use; or
- The purchase and installation of a permanent greywater treatment system.

Source: [www.environment.gov.au](http://www.environment.gov.au)

#### National Urban Water and Desalination Plan: Guidelines Released

Guidelines governing the Federal Government's \$1 billion National URBAN WATER and Desalination Plan have been announced. Under this Plan, funds will support the building of desalination

plants and recycling and stormwater harvesting infrastructure in urban areas with populations of more than 50,000 people. The release of the guidelines follows passage of the Water Amendment Bill 2008. (Minister for Climate Change & Water) (The Australian) (National Water Commission)

Source: AWA e-News 8/12/08

### New South Wales

#### Build and be dammed

The State Government is pushing ahead with construction of a \$406 million dam the size of Sydney Harbour on the Williams River that will send water bills in Newcastle and the Hunter soaring and could kill industry moves to switch to recycled water.

Source: SMH 7/02/2009  
[www.smh.com.au](http://www.smh.com.au)

## South Australia

### Security Projects get Underway

Water Security Minister Karlene Maywald has advised that preliminary works have commenced at Christies Beach and Port Stanvac in preparation for two major water infrastructure projects. Ms Maywald stated that site preparation works has progressed at "the Christies Beach Wastewater Treatment Plant as part of the \$272 million upgrade as well as preliminary works for the 50-gigalitre desalination plant".

Source: SAI Global Water Newsfeed 20/01/09

Water Security Minister's media release 19/1/09

### Cheltenham Racecourse Project: Stormwater Scheme

Ms Maywald has announced that the \$20 million Cheltenham racecourse redevelopment project will "include a 4.5-hectare wetland and Aquifer Storage and Recovery scheme with the capacity to treat, store, recover and reuse 1.2 gigalitres per year of stormwater". The water captured via this new scheme will be connected to dual-reticulation systems at nearby homes and industrial sites for uses such as garden watering and toilet flushing.

Source: SAI Global Newsfeed 10/2/09  
Water Security Minister's media release 5/2/09

[www.premier.sa.gov.au](http://www.premier.sa.gov.au)

### Southern Urban Reuse Project

In a joint statement, Federal Water Minister Penny Wong and Ms Maywald have announced that the federal and state governments have entered a jointly funded project to supply 1.6 billion litres of treated wastewater per year to new housing developments in Adelaide's southern suburbs. The \$62.6 million, Southern Urban Reuse Project, will involve the connection of approximately 8000 new homes to a dual reticulation system allowing them to receive recycled water for non-potable uses, such as on gardens and for toilet flushing.

Joint media release 12/2/09

Source: Federal Water Minister; Water Security Minister

## Western Australia

### Esperance Wastewater Upgrade Commences

Water Minister Graham Jacobs has advised that the Water Corporation will commence work this month on the first of a series of upgrades to the Esperance wastewater system. The initial project

stage includes the building of a new pump station and almost four kilometres of new pipeline. "These new facilities will improve the flow of wastewater from the existing wastewater treatment plant near Jetty Road to a second wastewater treatment plant proposed for a site at Wylie Bay", Dr Jacobs said.

Source: SAI Global Newsfeed 10/02/09

Water Minister's media release 9/2/09

[www.mediastatements.wa.gov.au](http://www.mediastatements.wa.gov.au)

### Water Forever

The Water Corporation has released its draft plan for providing water and wastewater services for Perth and surrounding areas for the next 50 years.

Water Forever: Directions for Our Water Future, includes targets for increasing water recycling in the metropolitan area to 30% by 2030 and to 60% by 2060. The Water Corporation believes that major advances in water recycling can be made through large scale recycling schemes such as groundwater replenishment, recycling to industry and irrigating public parks, gardens and horticulture with recycled water. The draft plan will be open for comment till 15 May 2009.

For further information or to comment on the proposed direction, please visit:

[www.watercorporation.com.au/waterforever](http://www.watercorporation.com.au/waterforever)

or phone 13 39 10 to request a copy to be mailed to you.

Source: Water Corporation, WA

## Victoria

### Sunbury Ready for Summer Demand

Western Water recently commissioned a new 8.8 million litre recycled water storage at the Sunbury Recycled Water Plant to provide greater security of supply for customers during the peak irrigation period of summer. The new storage will allow recycled water to be stored during cooler months and then accessed during hot weather when demand for the recycled water increases considerably.

Source: Western Water Recycled Water News Jan 2008

### Shell's Water Recycling Plant

Shell Australia has announced that an agreement to construct a major water recycling plant at its Geelong Refinery has been approved by Shell Australia and Barwon Water. The water recycling plant will save 2,000 ML of drinking water a year used by the refinery. Shell Geelong Refinery general manager Huck Poh has stated that "this project represents just part of our journey to reducing our water use". The federal and state government will also be contributing a combined amount of approximately \$45 million to

this project along with Shell Australia's own \$45 million.

Source: SAI Global Water Newsfeed 8/1/09

Shell Australia's media release 30/12/08

### Funding Received for Recycled Water at Riddells Creek & Gisborne

With support from Macedon Ranges Shire Council and a Regional Development Victoria grant, a Western Water pipeline will link the Riddell's Creek Recycled Water Plant with the local recreation Reserve. The new recycled water scheme will provide alternative water supply option to a sports oval used for cricket and football, tennis courts and future recreational developments. Construction will begin in February 2009. At Gisborne, Macedon Ranges Shire Council secured government funding for a system to irrigate 4 soccer pitches on Dixon's Field. Construction is due to start shortly after this project also

Source: Western Water Recycled Water News Jan 2008

### A Stormwater Gift for Stawell

Sports and Recreation Minister James Merlino has launched a \$152,000 initiative which will establish a pipeline to link local park irrigation systems in Stawell to newly constructed storm water catchments. "The pipeline will provide 90 megalitres of water per year to grounds and natural turf used by clubs, schools, community and sporting associations across Stawell", Mr Merlino said. The parks and reserves to benefit under the initiative include North Park and Central Park, home of the Stawell Gift.

Source: SAI Global Water Newsfeed  
Sport and Recreation Minister's media release 21/1/09

### Draft Guidelines for Water Recycling Released

The Department of Human Services Victoria has released draft Guidelines for water recycling in Healthcare Facilities to facilitate establishment of water recycling schemes with a focus on providing specific risk management advice. Feedback on the guidelines is being invited and will close on Friday 16 January 2009.

For a copy of the guidelines, contact Amelia Savage at

[amelia.savage@dhs.vic.gov.au](mailto:amelia.savage@dhs.vic.gov.au)

Source: AWA News 15/12/08

Victorian Dept. of Health

### Recycled water safe for Yarra

One of the major arguments against pumping Melbourne's recycled sewage into the Yarra River has been dismissed by a report recently submitted to Victorian Water Minister Tim Holding.

The expert report has found that breeding and migration habitats of fish would not be significantly affected by the plan, which would pipe recycled water from Carrum to the Yarra at Yering.

But the Yarra plan is still no certainty to proceed, with the Government refusing to guarantee that either of the two options being investigated for recycled water will be adopted.

The twin investigations have explored how 100 billion litres of recycled water from the Eastern Treatment Plant can be put to better use than the current policy of pumping it to sea at Gunnamatta.

The options under consideration are pumping the water into the Yarra near Yering, or piping it to Gippsland for industrial use.

"The minister has received the business case and will consider the practicality and viability of the options," his spokesman Luke Enright said.

Source: The Age 13/12/08

## Queensland

### Business turns off effluent recycling

No businesses have signed up as customers for Queensland's \$2.5 billion water recycling scheme, despite a claim by Premier Anna Bligh that industry has embraced the option of using recycled sewage and industrial effluent.

Government and industry sources confirmed that no businesses had signed contracts, although chemical manufacturer Incitec Pivot was expected to do so soon, and negotiations were continuing with a small number of other companies.

Industry at present is using 50ML a day from Wivenhoe Dam, accounting for 15 per cent of the water used from Brisbane's main storage. The only current users of recycled water are the Tarong and Swanbank power stations. "Companies have refused to sign up because of a lack of clarification about costs and supply," Mr Harrison said.

Source: The Australian 15/12/08

### Murrumbidgee Treatment Plant Upgrade

Local Government Minister Warren Pitt has announced that the state government has allocated over \$63 million to

Moreton Bay Regional Council, representing its contribution to the \$152 million upgrade of the Murrumbidgee wastewater treatment plant. Mr Pitt advised that the upgrade would "improve the quality of wastewater from the existing treatment plant and will also benefit the environment and nearby residents by providing a large volume of purified recycled water for industrial reuse". The upgrade is scheduled for completion in late 2010.

Source SAI Global Newsfeed 27/1/09  
Local Government Minister's media release 21/1/09

### SEQ Recycled Water in August

Plans to add treated sewage to South East Queensland dams has been delayed by an extra three months following early summer rain and lower than expected demand boosted supplies, reports the Courier-Mail. The Queensland Water Commission had previously predicted that combined dam levels would fall below the 40% trigger in May 2009, but following the storms late in 2008, the new prediction has reportedly moved to August 2009. See story on page 8.

Source: Courier Mail 22/1/2009  
Queensland won't need to recycle water for another three months

## International

### Modular Homes Go Greener and are Greywater Ready

Modular homes not only offer a green alternative to site-built homes, some builders are soaring far beyond eco-friendliness to new heights of sustainability.

LivingHomes of Santa Monica, California is distinguishing itself from traditional modular builders by integrating a comprehensive environmental program in all of its homes.

"LivingHomes include sustainable building materials, technologies and fixtures that minimize energy and water use and that generate energy from renewable resources, as well as materials that reduce indoor air pollution," says CEO Steve Glenn. "We also design our homes to maximize natural light and ventilation. All LivingHomes are built to receive a U.S. Green Building Council LEED (Leadership in Energy and Environmental Design) rating of Silver or above to verify that they are built in a sustainable way."

Taking eco-friendliness to new levels, these modular homes are even built with greywater-ready plumbing, which means there is separate plumbing from sinks,

showers and laundry that can be filtered and reused to irrigate landscaping.

Source: [www.bobvila.com](http://www.bobvila.com)

### All sewage in Beijing to be reused within three years

Reporters learned from the Beijing Sewage Association that within three years, all water processed in the city's sewage treatment plants will meet requirements for reuse.

The annual capacity of Beijing's nine sewage treatment plants totals 900 million tons, but only 100 million tons of treated water is qualified for reuse.

An official from the association said Beijing's sewage treatment rate has reached 93% this year and the water quality has met standards for safe reuse.

The total quantity of treated water in Beijing is currently 600 million tons, 50% of which can be reused. The official said that although the sewage treatment rate has reached 93% in urban areas, it is very difficult to meet a 7% sewage treatment rate in the intersecting areas between urban and rural regions.

Beijing's nine sewage treatment plants recycle 900 million tons of sewage annually, but only 100 million tons of treated water is qualified for reuse. Therefore, the city is scheduled to make all recycled water from sewage treatment plants safe for reuse, meeting a standard referred to as "white and pure," and restore the 1960s' landscape of the capital being surrounded by clean water in the coming three years.

Source: People's Daily Online December 15/12/08  
<http://english.people.com>

### Aqua-Pure Ventures Signs Contract for Water with City of Weatherford USA

Aqua-Pure Ventures Jacob Halldorson, CEO of Aqua-Pure Ventures Inc. is pleased to announce that Fountain Quail Water Management LLC., a wholly owned subsidiary of Aqua-Pure, has signed a contract with the City of Weatherford's Municipal Utility System to buy treated effluent from the city's sewage treatment plant.

This water will be used to replace potable water with recycled water for drilling and completions in the Barnett Shale area. This is one of the critical elements required to complete the "Parker County Water Supply Pipeline" project.

Source: Industry ids newsletter 30/12/08  
[www.idswater.com](http://www.idswater.com)