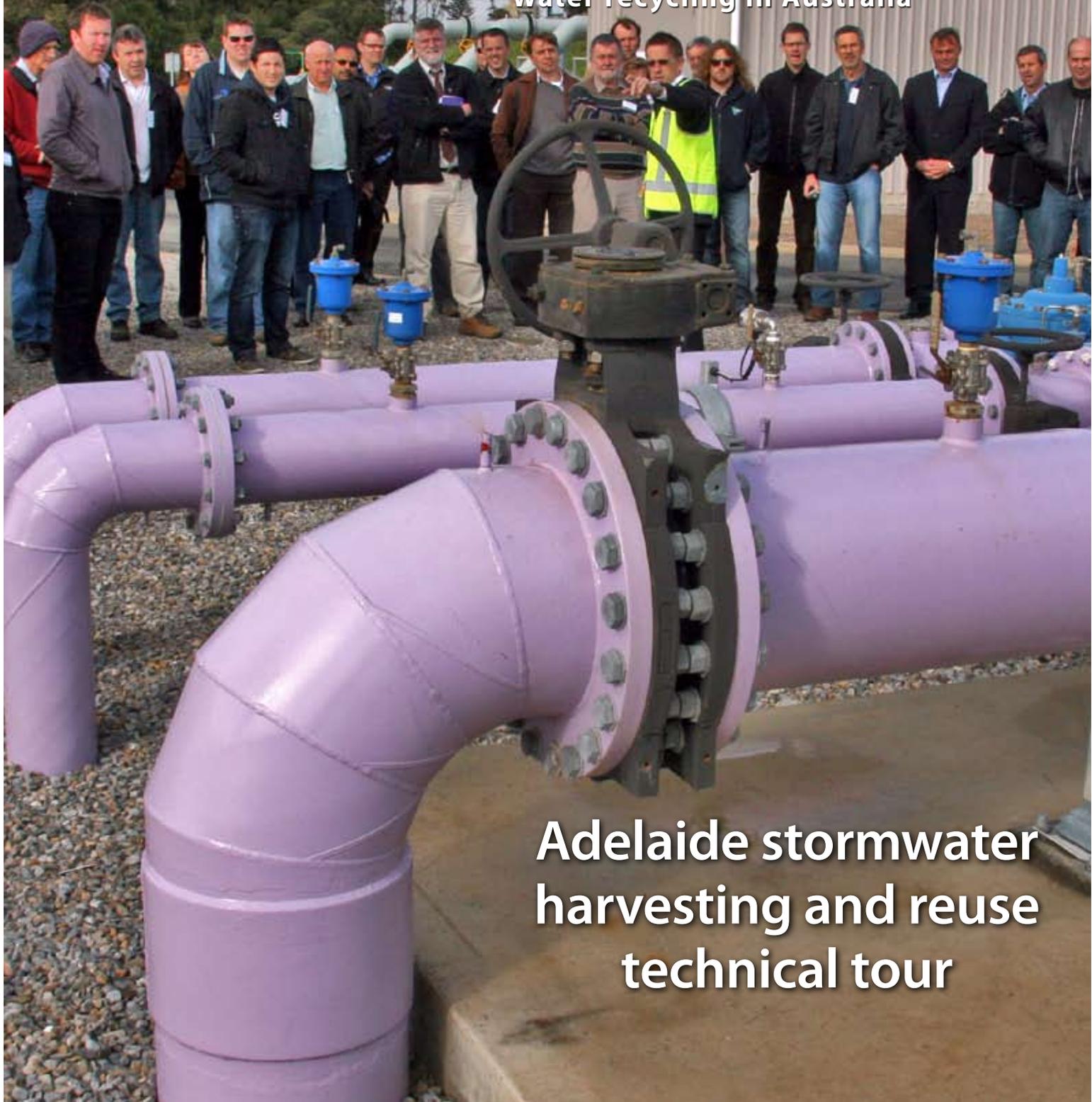


ReWater

Water recycling in Australia

Spring 2011



Adelaide stormwater harvesting and reuse technical tour

South Australia taps into recycled water

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Melbourne's newest stormwater harvesting project

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More than \$2 Million of funding for San Francisco Bay Area

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ReWater

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On the Cover:

Adelaide stormwater harvesting and reuse technical tour, viewing the start of the Glenelg to Adelaide Parklands reuse scheme.

About ReWater

ReWater is a newsletter designed to make information relevant to recycled water use in horticulture more accessible to horticulturalists (growers/farmers/landscapers), primary producers, members of 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 Limited.

Back issues and instructions for subscribing to receive ReWater electronically on a quarterly basis can be accessed here: www.recycledwater.com.au/rewater

Your Feedback and Contributions

We would appreciate your feedback and are always looking for suggestions and contributions. Please email rewater@recycledwater.com.au or contact us on 03 9602 4001.

www.recycledwater.com.au



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.

Know-how for Horticulture™

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Pumps delivering recycled water to the Adelaide City Parklands.

Adelaide stormwater harvesting and reuse technical tour

Over 40 delegates from NSW and Victorian local government, water authorities and other specialists recently participated in a stormwater recycling knowledge sharing tour, organized by Adelaide and Mt Lofty Ranges Natural Resources Management Board and the Stormwater Industry Association.

The focus of the tour was to invite New South Wales and Victorian local government practitioners to inspect successful South Australian stormwater harvesting and reuse projects, and network with industry experts and peers undertaking similar projects.

The presenters on the tour included speakers from Federal, State and Local governments, aquifer storage and recovery (ASR) and wetlands specialists, water quality experts from CSIRO, local consultants and government. The tour program included an impressive array of stormwater harvesting and waste water reuse projects with more than 12 sites visited by the delegates over the two days.

The sites incorporated the Royal Adelaide Golf Club (RAGC) Wetland and ASR Scheme, which is one of three of the Metropolitan Golf Club Wetland and ASR Schemes constructed over the last few years. In this scheme, stormwater is harvested from the municipal underground stormwater pipe network from a 4,500ha urban catchment. Treated stormwater is injected through two ASR wells into the "T1" upper Tertiary aquifer. The system operates automatically, with water quality, water level, pressure and flowrate/

volume sensors connected to PLCs which control the system pumps and valves. The scheme is designed to deliver around 200 ML per annum to the golf course's irrigation system out of a yearly 300 ML irrigation demand. The scheme's capital cost was about \$2.6 million.

The Playford Alive Development (Munno Para Wetlands and Stormwater Harvesting Scheme) was also visited, being a site designed to intercept low flow stormwater runoff from Smith Creek and the Craigmores Road drain. The scheme incorporates open space, recreation and environmental activities in the

Successful projects went through an extensive and well-structured public consultation process resulting in the community taking 'ownership' of the project.

adjacent Playford North urban development, currently being delivered by the Land Management Corporation, a State Government body. Storage volume is provided by allowing the standing water level of the wetland to vary by over one metre giving a total storage volume of approximately 50 ML. The scheme's construction cost including wetland treatment and associated infrastructure for all three sites was \$8M.

One of the first major stormwater harvesting schemes, the Parafield Airport Wetland and

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Stormwater biofiltration facility at the Unity park, City of Salisbury, SA

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ASR Scheme, was also visited. Originally it provided treated stormwater via groundwater storage to Mitchell's, a large wool scouring operation in the area. The ASR operation has expanded and has included an Aquifer Storage and transfer (ASTR) trial that enables the recovered stormwater to be further filtered by the aquifer. The scheme has the capacity to deliver 2.2 GL/annum to a variety of uses in the Salisbury Council area.

The City of Salisbury also developed the Unity Park Wetland and Biofiltration Facility for Stormwater Harvesting. A key objective of this project was to demonstrate the performance of the biofiltration cells for large scale stormwater harvesting for ASR. The six cells are each configured slightly differently and are extensively monitored to help determine the best operating configuration for small footprint bio-filtration technology. The systems combined are designed to harvest up to 1.3 GL each year. Treated water from Unity Park is pumped to a nearby ASR well field that feeds supply into Salisbury's network of over 100 km of recycled water pipe.

The \$15 million Christie Creek upgrade project, which is a part of the City of Onkaparinga's Water Proofing in the South strategy was another site visited. The scheme captures stormwater and creates a reuse distribution system throughout the catchment with capacity to harvest, filter, disinfect, store and distribute up to 850ML of stormwater/annum. The scheme also reduces the impact of low water quality on the marine environments.

A large scale transfer scheme that was incorporated in the tour was Glenelg Wastewater Treatment Plant & Glenelg to Adelaide

Pipeline (GAP) Scheme. The \$75m Glenelg to Adelaide Pipeline (GAP) wastewater reuse scheme funded by the State and Federal Government provides the treatment and distribution infrastructure to supply a minimum of 1.3GL recycled water per year and potentially up to 5 GL per year. At this stage, the bulk of the use is for the City of Adelaide's Parklands irrigation through which a supply main (8km) and ring main distribution (34 km in length) has been successfully established.

Iouri Vaisman, Special Projects officer with the Stormwater Industry Association of Victoria and an organiser of the tour, commented that "The key to the success of the South Australia stormwater harvesting and waste water reuse projects seems to be its regional rather than localised or decentralised nature. The regional approach appears to provide a much better outcome both in quantity, quality, costs and public benefit compared to the localised approach. Of course, there are many challenges at this scale, one being the coordination of stakeholders and resources and acquisition of funding for the early concept development. And this is where the role of Adelaide and Mt Lofty Ranges Natural Resources Management Board became pivotal in the successful delivery of these projects. There doesn't appear to be a similar body in Victoria and NSW who could fulfil this role."

Mr Vaisman also noted that each of the successful projects went through an extensive and well-structured public consultation process resulting in the community taking ownership of the project rather than merely accepting it. Importantly, every project had a "project champion" typically a well-known local resident providing a "personal touch" to

the otherwise large and technically complex project. "Development and adoption of a robust regional water reuse strategy (Water for Good) and committed, well organised local councils in combination with the use of innovation and the research science technology (CSIRO research on ASR) seem to be the key factors in securing the Australian Government's funding support for the South Australia projects." Mr Vaisman said.

The organisers of the SA tour received a very positive and encouraging response from the tour delegates. The event was judged to be timely and informative and most importantly encouraged the dissemination of knowledge and experience across the industry. A number of people expressed their interest in attending/hosting similar knowledge sharing events in other states of Australia (Victoria, NSW) where local projects could be showcased. With sufficient interest and support from the industry the knowledge sharing tour of stormwater harvesting and water reuse projects could become an annual event. To gauge the industry interest, Stormwater Industry Association would welcome your view and opinion on organising or hosting similar events. The Adelaide and Mt Lofty Ranges Natural Resources Management Board and the SA project tour guides are acknowledged for putting on an excellent tour. Special thanks goes to Alan Ockenden and Caron Duffield for their great work and ongoing support in organising the event and making it a success. ●

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South Australia taps into recycled water

Residents in Adelaide's south will now use high-quality recycled water in and around their properties following the completion of the \$62.6 million Southern Urban Reuse Project.

Residents in Adelaide's south will now use high-quality recycled water in and around their properties following the completion of the \$62.6 million Southern Urban Reuse Project. The innovative project has the capacity to provide up to 1.6 billion litres of recycled water each year to about 8000 new homes in the southern suburbs. Minister for Water, Paul Caica, Parliamentary Secretary for Sustainability and Urban Water, Senator Don Farrell, and Federal MP for Kingston, Amanda Rishworth, visited Seaford Meadows in June where recycled water has been plumbed into more than 500 houses for purposes such as toilet flushing and garden watering.

Mr Caica said the use of recycled water in new homes for toilet flushing and irrigation will reduce reliance on mains water and utilise an alternate water source. "The completion of the Southern Urban Reuse Project will help to increase Adelaide's water security by conserving drinking water supplies and using a water source which would have otherwise been treated and discharged to the sea," he said. "Years of drought conditions have taught us that we need to value every drop of water and this project is one way we can do just that. Adelaide is one of Australia's leading capital cities in water recycling with SA Water recycling about 30 per cent of wastewater, compared to the national average of about 17 per cent."

Seaford Meadows is the first residential development supplied with recycled water as part of the Southern Urban Reuse Project and its benefits will include helping householders keep their gardens green, even during hot, dry summers.

The \$62.6M project, which began in April 2009, has received \$15M funding support from the Australian Government through its

Water for the Future initiative as part of the overall contribution to stage 1 of Water Proofing the South. It included upgrades to existing infrastructure and construction of new infrastructure at SA Water's Christies Beach and Aldinga wastewater treatment plants to enable Seaford Meadows properties to access recycled water.

Construction works for the project included:

- A new pump station at the Christies Beach Wastewater Treatment Plant to transfer the water to the Aldinga WWTP site
- A transfer pipeline from Christies Beach WWTP to the Aldinga WWTP site
- Construction of a bulk water storage at the Aldinga site
- Construction of a tertiary water treatment process at the Aldinga site and;
- Construction of a pumping station and a dual reticulation (purple) pipeline from Aldinga to the Seaford Meadows urban development.

The project is one element of stage 1 of City of Onkaparinga's Water Proofing the South initiative – a localised integrated water resource management strategy that is based entirely within the City of Onkaparinga. Stage 1 was completed in May 2011 and was delivered through a collaboration

between the City of Onkaparinga, SA Water and the privately owned Willunga Basin Water and aims to deliver 3.8GL of agricultural, viticultural and urban reuse and 1.1GL of additional storage which facilitates the anticipated level of reuse. It received funding support from the Australian Government, Adelaide and Mount Lofty Ranges Natural Resources

The project will offset as much as possible of the city's mainswater demand with stormwater.



Photos courtesy of SA Water

Management Board and the Department of Planning and Local Government.

The City of Onkaparinga's Water Proofing the South initiative aims to provide alternative water sources such as recycling water from wastewater and stormwater to replace the use of traditional water sources such as mains water and groundwater so that overall water use in the region is sustainable—economically, environmentally and socially.

The objective is to ensure the sustainable management of water resources and security of supply for the community through:

- conserving water
- protecting water quality
- reducing reliance on water sourced from the River Murray and ensuring that water is used efficiently
- protecting water dependent ecosystems, including coastal and marine environments
- promoting economic development opportunities.

The City of Onkaparinga has recently extended the initiative to include a \$30M stage 2, that aims to capture, store, treat and reuse stormwater by creating an integrated system of Managed Aquifer Recovery (MAR) Schemes, wetlands and a pipe network across the city. The Australian Government's contribution towards Stage 2 of \$15 million will also be funded through the Water for the Future initiative.

Sources: Media release Senator Hon Don Farrell
27 June 2011 www.environment.gov.au
and www.onkaparingacity.com



Darling Street: City of Melbourne's newest stormwater harvesting project

City of Melbourne are currently installing an innovative new stormwater harvesting system that will utilise stormwater from existing drains to irrigate the neighbouring park and tree medians.

The project on Darling Street in East Melbourne will capture stormwater from existing drains into an underground tank, treat it through a biofilter system where it will percolate to a holding tank ready for irrigation use. The project will not only support and enhance the local landscape, but will introduce new trees into the roadway median strip which mitigate the urban heat island effect. Use of treated stormwater will reduce pressure on potable (drinking water) supply and will introduce an economically viable alternative water source as the costs of Melbourne's potable water supply begin to rise. The project cost is projected to be 75% cheaper than traditional WSUD projects achieving the same volume of stormwater treatment. One of the key saving measures will be the incorporation of a mechanised maintenance system which will reduce the manual maintenance costs normally associated with WSUD systems.

Stormwater is collected from two separate catchments with a combined runoff of 147ML, based on the last ten years of below average rainfall data. The modelled annual irrigation demand for the reserves and median strips is 24ML and the system has been designed to meet the full irrigation demand. The project takes advantage of current plans for road works which include replacement of the poorly performing golden elms, modification of tree islands and resurfacing of roadways to install stormwater harvesting infrastructure below the road surface. The works will involve the installation of diversions in the existing stormwater system, installation of Gross Pollutant Traps, underground tanks and pumps to facilitate water treatment and reuse, and central raised bio-filtration beds.

The irrigation pumps will be connected to existing irrigation networks, which may require some upgrading to utilise the treated stormwater in an efficient, safe, fit-for-purpose manner. The technology has been developed by Biofilta Stormwater Solutions and engineering firm Cardno. It uses natural filters comprised of triple-washed sand and carefully selected indigenous plant species. Biofilta director Brendan Condon says: "The microbes that live on the roots of the plants break down nutrients and utilise them. Heavy metals get bound up in the top layer of sand. The system can recirculate the water for multiple passes so the bugs get more grabs at the pollution."

In addition to supplying the conventional irrigation system, the stormwater harvesting system could also be used in the passive



irrigation of park areas using underground trenches. In this instance, stormwater would be pumped into the trenches and slowly disseminate through the ground to tree roots/vegetation using capillary action. The slow infiltration mechanism would keep the surrounding soil moist for a longer period of time compared to surface irrigation. This would slow the drying process through the soil profile in the summer months and provide additional resilience to the supporting

vegetation. These infiltration trenches would operate primarily in winter, when the storage tank is at capacity. Input from Council's arborists would be required to determine the optimum distance of offset required between the trees and the trench.

Professor Tony Wong, director of the Centre for Water Sensitive Cities at Monash University, suggests we must shift our mindset about stormwater. "Stormwater is often seen as a nuisance we should get rid of very quickly," he says.

He argues that our standard approach not only misses a chance to improve our water security, but also causes erosion and degradation of our waterways and Port Phillip Bay. The scale of the problem grows as the city expands and housing density rises. "Creeks are now getting more water than they would normally get in any storm event."

"The traditional infrastructure is less able to cope, so we see water on the road more frequently now than in the past," Professor Wong says. In a natural environment, only about 15 per cent of rainwater flows into waterways, and is filtered through the soil. The rest evaporates or is transpired by plants. Hard surfaces flip the ratio.

"When we knock the trees down and pave the land, we find that the creeks now get 85 per cent of the rainfall," Professor Wong says. "The numbers vary from city to city, but with any urbanisation, natural creeks receive about four to eight times the water that used to flow into them. Our urban creeks are suffering from too much water."

A number of other local governments — including Port Phillip and Kingston by the bay — have begun to install rain-gardens to treat and minimise stormwater run-off.

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Professor Wong believes that within two decades up to a third of Melbourne's water consumption could come from stormwater. "Having gone through the last drought, a lot of councils are now looking at stormwater to help with the public space maintenance," he says. "It's not just about water as a commodity. It's about water providing the means for liveability and for the greening of the city. With water we can bring some biodiversity back and influence the microclimate to protect against the effects of heatwaves."

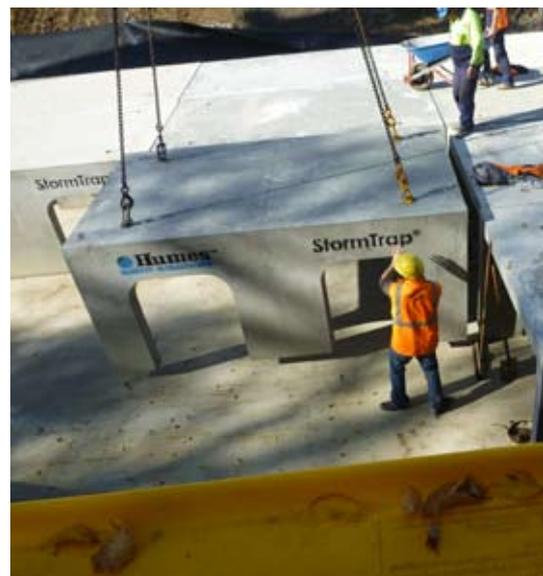
This project has received funding from the Victorian Governments Stormwater and Urban Recycling Fund and Melbourne Water as part of the Living Rivers Stormwater Program.

The City of Melbourne and Clearwater are organising industry site visits during the construction of the project. The first presentation

and site visit took place at the end of May and provided visitors with an opportunity to see installation of the Humes tank systems. Future site visits will provide opportunity to view secondary tank installation, biofilter installation, and see the project on completion.

For more information please visit [here](#) to view an ABC news clip on the project and see the primary tank installation. To stay informed of site visits contact tania.struzina@melbourne-water.com.au or for other details of the site contact Ralf Pfeleiderer, Water Sensitive Urban Design Coordinator, City of Melbourne ralf.pfleiderer@melbourne.vic.gov.au •

Source: The Clearwater website and Sydney Morning Herald article 3 July 2011



16 EVENTS diary dates

Australia



National Water Recycling Guidelines Workshop series

11 Oct Perth, 12 Oct Adelaide, 24 Oct Hobart, 25 Oct Melbourne, 26 Oct Melbourne, 27 Oct Sydney

AWA is delivering a series of workshops on the Water Recycling Guidelines – Phase 2 on behalf of the National Water Commission. Contributing authors to the Guidelines; Dr Peter Dillon, Dr David Cunliffe, Dr Daryl Stevens, Chris Davis, Dr Nick O'Connor, Adam Lovell, will present at the workshop, focusing on content, application and report writing in the context of regulatory requirements.

The day long workshops will incorporate a summary of the Australian Recycled Water Guidelines, augmenting drinking water with recycled water, managed aquifer recharge, stormwater harvesting and reuse and a discussion on the tools available to assist implementation of the guidelines. Participants will also have the opportunity to undertake small group exercises and pose questions to the authors. This is a FREE workshop series and places are limited so preregister as soon as possible

For more information: www.awa.asn.au



Ozwater'12 – Sharing knowledge, planning the future

8-10 May 2012, Sydney

CALL FOR PAPERS NOW OPEN. There are five major conference themes and specialist stream and for Ozwater'12; history and heritage, water and people, changing times, rural and regional water and water and wastewater systems and processes. Don't miss a great opportunity to participate in Australia's leading national water industry event. Submissions close 1 September 2011.

For more information see Ozwater'12 www.ozwater.org

International

Potable Reuse Conference: A Reliable Source for our Future

November 13-15, 2011, Florida, USA.

The WaterReuse Association will be holding its second specialty conference on Potable Reuse, a specialty conference bringing leading experts in the field together to discuss critical factors in the success of potable reuse projects, including addressing regulatory issues, demonstrating environmental and economic viability, and enhancing public understanding and acceptance.

More information: www.watereuse.org

7th International Conference on Water Sensitive Urban Design

21–23 February 2012, Melbourne Cricket Ground, Melbourne, Australia

Understanding the nexus between sustainable urban water management and the vitality, liveability and prosperity of urban communities is one of the most significant challenges of the 21st Century. Many urban communities are now faced with rising temperatures, longer and more severe droughts, more frequent and devastating floods and increased levels of water borne pollutants; all of which diminish the liveability of our urban areas and degrade our natural environments. Building a water sensitive community cannot be achieved with traditional urban water management approaches alone. To meet to this challenge, an integrated approach is necessary; we should strive to effectively link the myriad design and implementation cultures of the different disciplines involved in urban water management. During WSUD2012, we invite you, through your participation, to demonstrate how this linking is possible, and let this conference be the first stepping stone toward building the water sensitive community.

More information: www.wsud2012.com



Pharmaceuticals and personal care products Communications Toolkit



The WaterReuse Research Foundation has developed a Pharmaceuticals and Personal Care Products (PPCP) Communications Toolkit based on a study of potential health risks of recycled water.

The toolkit was developed in order to help overcome one of the hurdles to gaining public acceptance of recycled water projects, that of the perceived human health risks.

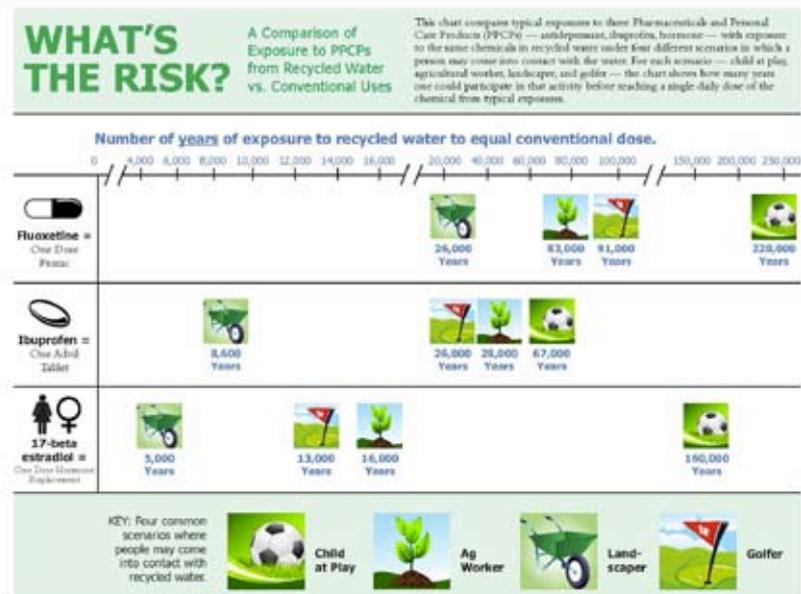
Among the perceived risks, there is concern about the presence of trace concentrations of PPCPs found in recycled water. However, findings from a recent WaterReuse Research Foundation study indicate that, depending on the chemical and the exposure situation, it could take anywhere from a few years to many millions of years of exposure to non-potable recycled water to reach the same exposure to PPCPs that we get in a single day through routine activities.

Thus the unique communications toolkit was developed, and is a "must have" for any recycled/reclaimed water agency that needs to have the latest information on PPCPs for briefing elected officials, policy makers, or the general public. The information is gathered in a user-friendly pocket folder, ready to hand out to people in your community.



The PPCP Communications Toolkit includes:

- A four page illustrated colour brochure titled "Recycled Water: How Safe is it?" which puts the safety of recycled water into perspective for the general public;
- Four double-sided flyers that explain estimated health risks from pharmaceuticals and personal care products for children on the playground, golfers, and landscape and agricultural workers; and



- A 12 minute DVD, which synthesizes the results of the Risk Assessment Study. This beautifully shot video includes easy-to-understand interviews with the scientists behind the research.

The Toolkit is based on a Risk assessment study which examined four scenarios in which people could come into contact with recycled water used for irrigation — children on a playground, golfers, and landscape and agricultural workers. Out of the hundreds of PPCPs that can be detected in recycled water and the environment, a team of scientists identified 10 to include in the study. The selected chemicals include a variety of PPCPs, such as prescription drugs, over the counter drugs, household products, food additives and more. Some were chosen because of their associated health risks; others, because they are easily recognised. All are representative of the PPCPs found in recycled water.

The risk assessment findings are being used to foster open communications and promote informed public discussions.

The Risk Assessment Study estimated health risks from exposures to these PPCPs in recycled water and compared those exposures to conventional uses of the same chemicals.

The study used measured levels of PPCPs from a report prepared by a science advisory panel for the California State Water Resources Control Board; the concentrations used in the study represent the 90th percentile of detected concentrations in both secondary- and tertiary-treated effluent, or among the highest measured levels from wastewater treatment plants in that state. The study concludes that an agricultural worker would have to toil for 16,000 years in a field irrigated with recycled water to receive the equivalent of a single dose of 17-beta estradiol (prescription hormone replacement). A child could play on a recycled-water irrigated lawn for 110 million years before being exposed to the equivalent of one application of insect repellent (DEET). The risk assessment findings are being used to foster open communications and promote informed public discussions about the relative health risks associated with the use of recycled water through the PPCP Toolkit. •

For more information or to order the PPCP Communications Toolkit, see the Water Reuse website or for more information on the study click here.



GOOD READS and website links

Microfiltration and ultrafiltration – membranes for drinking water

AWWA Manual of Water Supply Practices M53 1st edition ISBN: 9781583213605

This manual provides thorough coverage of water membrane science, concepts, and theory. Chapters discuss membrane applications, testing of membrane systems, design concepts and operations, costs, residuals, plus the various manufacturers. The final chapter covers future trends in low-pressure membranes followed by extensive tables and figures. \$115.00 + P & P + GST

More information: AWA bookshop
www.awa.asn.au

Adapting Urban Water Systems to Climate Change

CLEI, UNESCO-IHE and IWA have authored, as part of the 'SWITCH – Managing Water for the City of the Future' project, a handbook on adapting urban water systems to climate change. The handbook aims to fill a gap in the adaptation field: while a lot of information is available about various adaptation topics, there is a lack of guidance for decision makers at the local level working on urban water who wish to proactively prepare for and adapt to climate change.

More information: www.iwahq.org

Advances in Water Reclamation Technologies for Safe Managed Aquifer Recharge

Editor(s): Christian Kazner, Thomas Wintgens, Peter Dillon. Publication Date: 15 Oct 2011 ISBN: 9781843393443

Advances in Water Reclamation Technologies for Safe Managed Aquifer Recharge has been developed from the RECLAIM WATER project supported by the European Commission under Thematic Priority 'Global Change and Ecosystems' of the Sixth Framework Programme. Its strategic objective is to develop hazard mitigation technologies for water reclamation providing safe and cost effective routes for managed aquifer recharge.

Different treatment applications in terms of behaviour of key microbial and chemical contaminants are assessed. Engineered as well as natural treatment trains are investigated to provide guidance for sustainable MAR schemes using alternative sources such as effluent and stormwater. The technologies considered are also well suited to the needs of developing countries, which have a growing need of supplementation of freshwater resources. A broad range of international full-scale case studies enables insights into long-term system behaviour, operational aspects, and fate of a comprehensive number of compounds and contaminants, especially organic micropollutants and bulk organics. Advances in Water Reclamation Technologies for Safe Managed Aquifer Recharge

depicts advances in water reclamation technologies and aims to provide new process combinations to treat alternative water sources to appropriate water quality levels for sustainable aquifer recharge.

More information: www.iwapublishing.com

Pharmaceuticals in the Environment Current knowledge and need assessment to reduce presence and impact

Editor(s): Benoit Roig. Publication Date: 15 Aug 2010 ISBN: 9781843393146

About 4000 medical compounds are being used in the drugs applied today. It is estimated that worldwide consumption of active compounds amounts to some 100 000 tons or more per year. Consequently, there is a need to highlight the most important questions and issues related to presence of pharmaceuticals in the environment.

Pharmaceuticals in the Environment: current knowledge and need assessment to reduce presence and impact brings together results of previous and on-going EU projects with published data from both governmental sources and scientific literature and manufacturers' data on production and usage of pharmaceuticals.

This book puts together the current knowledge and emphasises questions that deserve attention such as:

- What is the spectrum of most relevant pharmaceutical products (PPs) for the aquatic environment? Which indicators for supporting environmental managers, health authorities?
- What is the efficiency of urban and industrial sewage treatment plants over a year? What is the fate and behaviour of PPs in sewage treatment plants? If receiving waters are used for potable water supplies, does the presence of these compounds represent a potential hazard to human health?
- Could we solve some problems by environmental or cleaner technologies?
- What regulatory approaches, incentives, prevention actions can be implemented in order to lower PPs concentration in the environment? Can a European practical guidance be developed?
- Can the impacts of PPs on the environment be reduced through the use of eco-pharmaco-stewardship approaches including the use of clean synthesis, classification and labelling, and better communication of methods of 'good practice'?
- How can we better monitor the environmental impact of a pharmaceutical once it has received a marketing

authorisation?

More information: www.iwapublishing.com

Attenuation of PPCP/EDCs Through Golf Courses Using Recycled Water

WERF1C08 Author(s): Michael D. McCullough. Publication Date: 20 May 2012 ISBN: 9781780400235

A multi-year, collaborative study was conducted to investigate the fate and transport of pharmaceuticals and personal care products (PPCPs) in soil and turfgrass systems irrigated with recycled water. The study involved laboratory adsorption and degradation studies, controlled lysimeter studies, and field-scale monitoring of drainage concentrations and mass flux below fairways on four different golf courses. Fourteen different compounds were monitored in the drainage and irrigation waters in these studies.

In summary, the results support the use of recycled water for irrigation purposes, as long as sound, science-based irrigation management practices are implemented. The use of recycled water allows communities to extend their water resources while minimizing the discharge of such waters into aquatic systems.

More information: www.iwapublishing.com

Measuring Water Ingestion Among Water Recreators

WERF Report PATH5R09 Author(s): Samuel Dorevitch. Publication Date: 30 Jun 2011 ISBN: 9781843396192

Ambient water quality criteria for recreational waters have been established based on epidemiologic studies of swimmers at beaches. Waters that cannot be used for full contact water recreation (swimming) might support the safe use of limited contact water recreation activities (such as paddling, rowing and fishing). It is not known how the volume of water ingested during full contact activities compares to that during limited contact activities. If that were known, such information could be used to estimate health risk and potentially support the development of site-specific water quality standards to protect the health of "on the water" recreators. The results identify three categories of recreational activities based on the occurrence and magnitude of water ingestion. Swimmers were found to ingest water more frequently and in larger average volumes than canoers and kayakers, who in turn ingested water more frequently and in larger volumes than those who wade/splash or fish. Canoers and kayakers who do not capsize ingest water about as frequently and in similar volumes to those who fish or wade/splash. Canoers and kayakers who do capsize swallow somewhat less frequently and in reduced volumes compared to swimmers.

More information: www.iwapublishing.com



Recycled water network in Sydney

City of Sydney is in the final planning stages to decouple the electricity network from the statewide supply grid and to provide cheaper electricity to the CBD through a network of power generators.

Since this work requires digging trenches and traffic management which cost up to 60% of the infrastructure cost, it is also “the golden opportunity to put in a recycled water network”, the council’s chief development officer for energy and climate change, Mr Allan Jones, said.

The plans for the \$10 million recycled water network include the use of water from the Botany aquifer and recycled water and stormwater from new developments. Botany aquifer extends from Redfern and Surry Hills through Centennial Park and on to Botany Bay.

New developments, such as Barangaroo and Green Square are planned to use recycled water and stormwater. Barangaroo development will create a surplus of recycled water which is expected to be used in water cooling towers in other parts of the CBD. This combination of water resources and uses in the city of Sydney can help addressing other issues such as flooding and climate change adaptation while the aquifer can be used as a storage. •

Source: www.smh.com.au

Melbourne’s south east Water Initiative for 2050

Eighteen months of investigation by project partners: South East Water, Melbourne Water, Southern Rural Water in consultation with 25 member Stakeholder Reference Group have led to development of an integrated water management strategy for Melbourne’s south east.

The strategy, Water initiatives for 2050: an Integrated Water Management Strategy for Melbourne’s south east, presents a range of future options to determine the most sustainable mix of all possible water solutions amongst stormwater, recycled water, grey water and groundwater. The strategy includes six core recommendations and 36 supporting actions .

The Strategy is available for comment from 28th September to 28th October 2011. Project partners are seeking your feedback



and submissions can be made electronically or by post. Information sessions are held throughout October at different locations in Melbourne. •

For more information as well as the submission template visit: www.waterinitiatives2050.com.au

Australian Water Recycling Centre of Excellence

The Australian Water Recycling Centre of Excellence has developed a Strategic Research Plan which details four industry relevant goals, the Centre’s investment priorities for the next three years and outlines the Centre’s research themes (available here).

The Centre has already completed three funding rounds. Currently, in October 2011, the Centre is at Round 4 of funding, and is calling for Expressions of Interest (EoI) for Goal 1 which is for applied and strategic research projects that quantitatively demonstrate and/or enhance the social, economic and/or environmental value of water recycling in Australia. This is the second call for proposals to deliver on the Centre’s Goal 1 and there are \$2 million of funding available. The key dates for funding Round 4 are:

- 31 October 2011 – Information session in Adelaide
- 4 November 2011- Deadline for registering intention to submit EoI
- 2 December 2011- Deadline for submitting EoI
- February 2012- Centre evaluation of EoI
- 13 April 2012- Deadline for full proposals (by invitation of the Centre)



The Centre is also seeking new partners with expertise and experience in water recycling delivery chain. The Centre currently has eight partners (four industry and four research organisations) and has a capacity of up to twelve. The particular expertise sought from organisations is in political, social, media or economic arenas, as well as strong industry networks and advocacy/policy skills. •

For further information visit: www.australianwaterrecycling.com.au
Download the Strategic Research Plan here.
Click here for further information on funding key dates for Round 4
Nominations are considered by the end of November 2011 (click here for more details).

More than \$2 Million of funding from WaterSmart for San Francisco Bay Area

The Bureau of Reclamation announced at the beginning of August that the sponsors of 13 projects have been awarded \$2.12 million to fund feasibility studies that assess the opportunity for reclamation and reuse of wastewater and naturally impaired ground and surface water in the San Francisco Bay area.

If successful, the feasibility studies will result in the construction projects which will be owned by non-federal sponsors, uniting local communities with the U.S. government in a broad range of programs promoting energy efficiency, clean water, and environmental stewardship.

The Bureau of Reclamation's water reclamation and reuse program is authorized by the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992, also known as Title XVI. The act directs the Secretary of the Interior to undertake a program to investigate and identify opportunities for water reclamation and reuse of municipal, industrial, domestic and agricultural wastewater, and naturally impaired ground and surface waters, and for design and construction of demonstration and permanent facilities to reclaim and reuse wastewater. Title XVI is

an important part of the U.S. Department of the Interior's WaterSMART Program that seeks to achieve a sustainable strategy to meet the nation's water needs. The WaterSMART Program focuses on improving water conservation and

sustainability and helping water resource managers make sound decisions about water use. It identifies strategies to ensure that this and future generations will have sufficient supplies of clean water for drinking, economic activities, recreation and ecosystem health. The program also identifies adaptive measures to address climate change and its impact on future water demands. The SMART in WaterSMART stands for "Sustain and Manage America's Resources for Tomorrow." Since its establishment in 2010, the WaterSMART Program has provided more than \$80 million in all competitively awarded funding to non-federal partners, including tribes, water districts and universities.

"We are hopeful that the studies being funded today will result in projects that will increase the amount of recycled water available for irrigation, and municipal and industrial uses in the greater San Francisco Bay Area," said Deputy Regional Director Pablo Arroyave. "Funding these studies is another step in promoting the efficient use of water in California."

The following is a list of the sponsors of the 13 proposed projects in California, a description



Studies being funded today will result in projects that will increase the amount of recycled water available for irrigation, and municipal and industrial uses.

of the feasibility studies, and the amount of federal funding:

Central Contra Costa Sanitary District, Concord Recycled Water Project: US\$97,000

The Central Contra Costa Sanitary District in Martinez will assess the feasibility of providing about 255 acre-feet per year (314 ML) of recycled water to 40 sites for irrigation at local businesses, office parks, and landscape medians within the City of Concord.

Central Contra Costa Sanitary District, Refinery Recycled Water Project: US\$180,000

The Central Contra Costa Sanitary District will assess the feasibility of providing up to 22,500 acre-feet per year (27750 ML) of recycled water to the Shell and Tesoro refineries in Martinez for use in cooling towers and as boiler feed water. The study will address new construction, including a new recycled water treatment facility that would include ammonia removal, filtration, and disinfection.

Delta Diablo Sanitation District, Recycled Water Master Plan: US\$71,000

The Delta Diablo Sanitation District in Antioch will assess options for expanding and improving the District's current recycled water system. The feasibility study will examine the operations of the overall system for ways to maximize recycled water production and

conveyance, while minimizing operations costs.

Dublin San Ramon Services District, Central Dublin Recycled Water Distribution and Retrofit Project: US\$253,400

The Dublin San Ramon Services District in Dublin will assess the feasibility of extending the current recycled water system to provide about 215 acre-feet (265 ML) of recycled water for landscape irrigation within central Dublin and to plumb retrofits to connect existing irrigation systems to the recycled water distribution system.

City of Hayward, Recycled Water Project: US\$156,500

The City of Hayward will assess the feasibility of a recycled water project that would serve up to 3,760 acre-feet per year (4640 ML) of recycled water to over 20 customers, including Calpine Corporation's Russell City Energy Center.

Ironhouse Sanitary District, Recycled Water Project: US\$133,100

The Ironhouse Sanitary District in Oakley will assess the feasibility of constructing a recycled water distribution system to provide up to 1,365 acre-feet per year (1685 ML) of recycled water for existing and future landscape, agricultural, commercial, and industrial uses in and around the City of Oakley. The project could include about 15 miles (24km) of distribution and transmission pipeline, a distribu-

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tion pump station, storage, and the retrofit of user connections.

City of Mountain View, Recycled Water System Expansion: US\$100,000

The City of Mountain View will assess the feasibility of expanding the current recycled water distribution system to new customers within the city and surrounding communities; and to connect with the City of Sunnyvale's recycled water distribution system to maximize water reuse while minimizing construction costs.

City of Palo Alto, Recycled Water Pipeline Project: US\$268,800

The City of Palo Alto will assess the feasibility of expanding the current recycled water distribution system to deliver recycled water to additional customers within the City of Palo Alto. The proposed project would include a transmission pipeline, a booster pump station, laterals, and site retrofits.

City of Pleasanton, Recycled Water: US\$177,750

The City of Pleasanton will assess the feasibility of a new recycled water system to serve recycled water to customers within the City of Pleasanton and surrounding communities. The recycled water would mostly be used for landscape irrigation. But other uses such as reverse osmosis groundwater recharge, agricultural irrigation, and industrial applications will be analysed.

Redwood City, Central Redwood City Recycled Water Project: US\$94,700

Redwood City will assess the feasibility of expanding the current recycled water distribution system to provide about 507 acre-feet

per year (625 ML) of recycled water to over 20 customers for commercial, residential, and municipal irrigation. The project could include about 9.5 miles (15km) of distribution pipeline and would enable Redwood City to become a regional recycled water supplier to neighbouring communities.

City of San Jose, Improvements and Expansions for South Bay Water Recycling Facilities: US\$268,000

The City of San Jose will assess the ability of the existing recycled water distribution system to meet current and future recycled water demands and recommend capital improvements to enhance system reliability, maintain water quality, and increase recycled water use. The study will also evaluate regional opportunities and recommend agreements and partnerships necessary to promote the regional coordination of recycled water use in northern Santa Clara County.

San Jose Water Company, San Jose Water Company Recycled Water Master Plan, US\$249,950

The San Jose Water Company in San Jose will assess the feasibility of expanding the current recycled water distribution system to serve recycled water to additional customers for landscape irrigation, industrial and cooling uses, and groundwater recharge.

Town of Yountville, Recycled Water Feasibility: US\$80,700

The Town of Yountville will assess the feasibility of expanding the current recycled water distribution system to serve recycled water to urban and agricultural uses. The project could include additional distribution pipeline, seasonal storage ponds, and pumping and

control facilities. The study will also assess the feasibility of decreasing discharges to the Napa River, which flows through the Napa-Sonoma Marsh and Mare Island Strait to San Pablo Bay and San Francisco Bay.

The projects are in addition to seven projects in four states which received \$1.2 Million in WaterSMART grants in July. These projects in Arizona, California, Nevada and Utah were developed to better manage water resources in a changing climate. These seven projects were selected through a competitive process and are being funded through WaterSMART's Grants to develop climate analysis tools.

These projects will help inform Reclamation activities under the SECURE Water Act and future reports such as the SECURE Water Act Report released on April 25. The projects that were selected help fill the information gaps outlined in the joint Reclamation and U.S. Army Corps of Engineers Report, Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information published in January 2011.

The results of these projects will be integrated with ongoing activities at the Climate Science Centers, Landscape Conservation Cooperatives, and NOAA Regional Integrated Sciences and Assessments, all agencies working together with Reclamation. The agencies jointly support the development of new research and science to manage resources in a sustainable manner. •

Source: United States Bureau of Reclamation website articles 01 August 2011 and 26 July 2011 and United States Department of the Interior website

NEWS innovations & information

Australia

If you are a water utility that is involved in water recycling projects or otherwise involved in the procurement or operation of water recycling schemes, the NatVal Project team would like your feedback on a proposed National Validation Framework for Water Recycling.

A background paper and a questionnaire to gather the input of water recycling proponents and water utilities on the proposed framework has been developed. This survey aims to gain feedback from proponents of water recycling schemes and water utilities on their experiences with validating water recycling technology and provide a structure for feedback to be given on the proposed approach for a validation framework for water recycling schemes/technologies.

For more information contact
palenque.blair@watercorporation.com.au
To complete the survey click here.

Victoria

Recycled water takes pressure off Bendigo

In May 2011, water from the Epsom Recycled Water Factory helped a group of drought-affected small landholders plus parks and sports facilities in Bendigo. Coliban Water offered Class A recycled water to 350 rural customers along its Ascot, Axe Creek and Cockatoo Hill channels which are connected to the recycled system.

Recycled water sustained public gardens and sports grounds including primary schools, Rosalind Park, Queen Elizabeth Oval, Tom Flood Sports Centre, the Botanical Gardens, a soccer ground, the Jockey Club, the Golf Club and the Harness Racing Club.

Source: www.water.vic.gov.au

Small towns invited to apply for water project funds

Funding is now available for improved water supply and sewerage management projects in small towns across Victoria. At the end of July Minister for Water, Peter Walsh, announced the fourth round of the Small Towns Water Quality Fund with a commitment of \$3.9 million. "The Victorian Coalition Government is making a vital investment in rural communities. This funding will help drive projects which identify solutions to provide improved water supply services and sewerage management for our small towns. Funding is available for water corporations and local government to develop wastewater management solutions and improve water quality such as new water supply services, septic tank upgrades and waste water treatment and management solutions for small towns."

Source: Media release Peter Walsh Wednesday, July 27, 2011 www.peterwalsh.org.au

For more information: www.water.vic.gov.au

Work begins on stormwater recycling project

Work has begun on a project that could save an estimated 21 million litres of stormwater in East Melbourne.

Melbourne City Council used cranes to lower water tanks to be installed in the road on Darling Street as part of the water harvesting plan.

The scheme will divert stormwater from existing drains in nearby streets and it will be captured in underground storage tanks. The water saved, the equivalent of up to 18.5 Olympic swimming pools, will be used to water the tree-lined median strips and reserves in the area. The project is part of a \$7 million council plan to rescue Melbourne's parks and reserves.

City of Melbourne Councillor Cathy Oke, says the technology used to filter the water is an Australian first.

"When the stormwater is collected from the road, it needs to be filtered so it can be used again, so it is clean water," she said. "This technology does the same thing as a wetland or a rain garden. So the engineers say it is like a turbo-charged rain garden."

Source: ABC News May 31, 2011 www.abc.net.au

Sunbury Primary School to benefit from Recycled Water

When Sean Lawless took over as principal of Sunbury Primary a year ago he noticed one big difference from his previous school. Diggers Rest Primary, had lush green ovals and grass play areas, thanks to the supply of recycled water. Sunbury Primary's oval, by contrast, was yellowed and patchy after years of drought. Mr Lawless is planning to change that, after applying to become a Western Water recycled water customer. He says prior to the supply of recycled water the Diggers Rest Primary grounds were "basically unusable in summer". "During the summer these cracks would just open up and we used to joke about losing preps down them - which wasn't that far-fetched," he says. Once Western Water began supplying recycled water from the Sunbury-Melton pipeline, the school was transformed. "It's green all year round, the children can play on it and it's used by other sporting groups,"

he says.

Source: Western Water Recycled Water News September 2011 www.westernwater.com.au

New South Wales

Recycled water is just the shot

Work is about to start on the installation of a new irrigation system at Tuncurry Golf

Course, as part of MidCoast Water's Tuncurry Recycled Water Scheme. The installation of the irrigation system at the course is the first step in the scheme, with work to follow at the South Street playing fields.

The installation of the irrigation system is expected to be completed by November, and will initially use existing groundwater sources until it is connected to a new Recycled Water Treatment Plant to be located in Grey Gum Road, Tuncurry. The scheme will take tertiary treated effluent from Hallidays Point Wastewater Treatment Plant to the Grey Gum Road site for further advanced treatment, then supply recycled water to various sites in Tuncurry, including sports fields and parks.

Source: www.greatlakesadvocate.com.au

Queensland

Water plan to secure future of world-famous backyard

Residents in the Port Douglas and Mossman region are set to benefit from an \$11 million dollar water management plan to provide sustainable water security for the region. Under the Our Water; Our World-Famous Backyard plan, \$7.6 million will be spent by Council and the Federal Government on a range of water management initiatives by June 30 2012 in Division 10, taking in Port Douglas and Mossman. A further multi-million dollar budget has been allocated by Council on upgrades to existing water infrastructure and on planning for new sources of water in the Port Douglas/Mossman region with \$5.5m allocated to the Mossman Recycled Water Scheme.

Source: www.raineandhorne.com.au

Western Australia

WA government keen to trial recycled water

The expansion of Western Australia's second desalination plant could be put on the backburner forever, Water Minister Bill Marmion says, as the government seeks to speed up a trial of recycled drinking water. Mr Marmion has written to the Water Corporation asking whether a two-year sewage treatment trial could be fast tracked to meet the worsening water shortage facing Perth and the South West.

The trial was launched in November last year in which five megalitres of waste water is treated each day and pumped into the Gngarara aquifer near Beenyup. Although the water has undergone intensive treatment removing bacteria and chemicals and mixed with existing groundwater, it won't be used for drinking supplies until the trial is finished

and the government gives the go ahead for a full scale project.

Source: Sydney Morning Herald 27 May 2011 <http://news.smh.com.au>

South Australia

Water begins to flow from Adelaide's new desalination plant

The first desalinated water has been pumped through the pipes of Adelaide's new desalination plant and should be flowing through the taps of southern suburbs homes within weeks. Water minister Paul Caica today took the first few gulps from a tap at the Port Stanvac plant, which has cost taxpayers \$1.83 billion.

"I'm very excited that I'm here drinking this first permeate, this first water that has been produced by the desalination plant - a desalination plant that is very important to the future of this state," he said. He said the milestone was a "crucial" step in securing a South Australian water supply which would remain constant regardless of climatic conditions.

However, the Opposition says the Government is misleading South Australians on the progress with the desalination plant. Opposition water spokesman Mitch Williams says first water is defined as the plant running at 10 per cent of its capacity and says that has not been achieved. "This Government spent \$46 million a couple of years ago to ensure we got first water by December last year, then we had an announcement it would be delayed, then we had a further announcement that first water would be achieved by the end of July," he said.

"The bit of water we had down there is not what's defined as first water."

Water Minister Paul Caica says, despite delays, the first drops of desalinated water are an important milestone in the \$1.8 billion project. "The first people to have desalinated water in the pipes will be those in the southern areas down here, we expect that in the next few months," he said.

Source: ABC News 1 August 2011 www.abc.net.au and The Advertiser 31 July 2011 www.adelaidenow.com.au

International

Adversity creates a boom for recycled water in Texas

In Fort Worth, Texas, treated water is running through specially labeled, purple-coloured pipes to irrigate nearby golf courses and a park, instead of just being dumped into the nearby Trinity River, as it had for decades. With Texas facing dramatic population growth and constraints on its water supplies, interest in the use of recycled water is growing. The

current 10-month drought has prompted calls to Fort Worth's plant asking for recycled water, which is cheaper than potable water. "We can't provide it fast enough," said Jerry Pressley, a water systems superintendent at the plant.

Source: [New York Times 24 July 2011 www.nytimes.com](http://www.nytimes.com)

Dow to invest in water technology in Saudi Arabia

Dow Water & Process Solutions recently announced plans to build a new world-class reverse osmosis membrane plant in the Kingdom of Saudi Arabia. The proposed facility will deliver local supply security of cutting-edge technologies for water desalination and water reuse for potable, non-potable and industrial water serving Saudi Arabia, the surrounding Middle East and North Africa region and emerging markets worldwide. These water membrane technologies will also deliver cost-savings through reduced energy usage and superior operational efficiencies for customers in desalination, industrial, municipal, commercial and residential sectors.

Source: [Market Watch website 26 July 2011 www.marketwatch.com](http://www.marketwatch.com)

Council approves \$22.7 million water recycling project in Simi Valley, California

The Simi Valley City Council unanimously adopted a resolution approving the West Simi Valley Water Recycling Project. The approved \$22.7 million water recycling project is intended to serve large customers such as golf courses, parks and schools in the city's west side. The project will include upgrading an existing recycled water pump station at the Water Quality Control Plant and constructing another small pump station, a reservoir and underground pipelines. The project has identified 28 potential customers for the recycled water, including the Simi Valley Town Center, Caltrans, parks, schools and cemeteries. The Public work director Ron Fuchiwaki wrote.

"They are big water users and rather than use potable water, it's desirable to use the recycled water to irrigate their landscape."

Source: [Ventura County Star website 26 July 2011 www.vcstar.com](http://www.vcstar.com)

Water future bright in Chino Basin, California

This past year marked a record for putting water back into the Chino Groundwater Basin. Following several years of below to average precipitation, this wet winter provided a generous amount of storm water that was captured in the recharge basins and percolated into the ground.

During the storms of 2011, the Inland Empire Utilities Agency (IEUA) and Chino Basin Water Conservation District (CBWCD) were able to capture and recharge over 17,000 acre-feet of storm water (21,000ML) plus 8,000 acre-feet of recycled water (9,900ML), both record highs compared to previous years. One acre-foot of water (1.23 ML) can typically serve two households for an entire year.

The real success is the decade-long partnership in local investment for the recycled water, groundwater and water conservation programs by IEUA, Chino Basin Watermaster, CBWCD, San Bernardino County Flood Control District, and our local cities and retail water districts. Together, the improvements helped achieve a 50 percent increase in local water supplies and reduce the region's dependence on costly imported water supplies. This investment has provided us with over 170,000 acre-feet (210,000 ML) of "new" water supplies, a value of over US\$110 million when compared to imported water rates.

Source: [Water world website 6 August 2011 www.waterworld.com](http://www.waterworld.com)

Zoo animals benefit from recycled water

The elephants, rhinos and tapirs at Denver Zoo will soon be using recycled water in their mud wallows, scratching trees and swimming and bathing pools. Water for the pools will come from Denver Water's recycled water system and will be recirculated through the zoo's enclosures. "The water will circulate through a complex filtration system that will settle solids, filter and disinfect the water in a continuous cycle, allowing us to maintain the water in the pools for a few months at a time," said Barnhart. "We, at the Denver Zoo, have worked with our lead veterinarian to determine whether or not the recycled water is suitable for animal consumption. After thorough study, we found that Denver's recycled water quality is very high due to the disinfection process it undergoes before being distributed. Denver's recycled water is safe and currently is used in some animal areas at the zoo."

Other water conserving features at the exhibit are Zurn ultra-low consumption urinals, and American Standard low-consumption toilets with Sloan dual-flush flushometers in the visitor restrooms.

Source: [Contractor Mag website 1 August 2011 http://contractormag.com](http://contractormag.com)

Water Park still operating, but with recycled water

Harry's Water Park in Trinidad is operating as usual, despite disconnection of its water supply on Tuesday by WASA. The assurance was given yesterday by Sahadeo Ragoonanan, a director of the popular facility located in Rio Claro. Ragoonanan clarified that even though the Water and Sewerage Authority

disconnected the supply to the facility, they are using re-cycled treated water for the water slides and other facilities at the park.

"This water is also used for the washrooms, but is not used for drinking, or cooking. We have taken steps to ensure we have an adequate supply to run the operations. I want to assure all the people who are coming to the water park to enjoy themselves that we are operating as usual. We are taking the normal measures to ensure that all hygienic requirements are met. The comfort of our patrons is of paramount importance."

Source: [Trinidad and Tobago's Newsday 11 August 2011 http://www.newsday.co.tt](http://www.newsday.co.tt)

Recycled water in Cottonwood's future

The somewhat contentious plan to use treated and recycled wastewater for Riverfront Park is only half the story of future water recycling in Cottonwood, Arizona. In addition to the Cottonwood plan for a fully "green" wastewater plant at Riverfront Park, the city's Utility Division has also begun a long-term plan to bring recycled water to many of its parks within Central Cottonwood.

Right now, only the Cottonwood Ranch housing development and the city's airport clear zones at ends of the runway have access to the recycled water. That is about to change.

As utility and road work allow, Cottonwood is developing a large loop of purple pipe that will eventually bring recycled water to the Cottonwood Middle School and Elementary School campuses on Mingus Avenue and the Garrison Park green areas around the city and county complexes across the street and eventually other green areas.

Source: [Verde Independent 14 August 2011 http://verdenews.com](http://verdenews.com)

Recreational Water Exposures

A team of US researchers has published a new study of recreational water exposures that combines self-reported estimates of water ingestion from recreational water users with volume estimates based on measurement of an ingested chemical in the urine. Both techniques have been used separately in previously published studies but this is the first instance where they have been combined. By examining the correlation between the two types of estimates, the researchers developed "translation factors" which allow conversion of self-reported exposures into volumetric terms. This methodology has the potential to provide more certainty about recreational water exposure volumes to help refine recreational water quality guidelines.

Source: [Water Quality Research Australia Health Stream Newsletter June 2011 www.wqra.com.au](http://www.wqra.com.au)