



Department of Water  
Department of the Premier and Cabinet

# STATE WATER RECYCLING STRATEGY AN OVERVIEW June 2008

Broome  
golf course  
irrigated  
with recycled  
water



# FOREWORD

Climate change and a growing population mean that Western Australia can no longer rely solely on traditional sources of water. Finding alternative water sources is a priority for government and all possible sources must be tried and tested to determine feasible options – environmentally, economically and socially.

The *State water plan 2007* outlined the state government's commitment to strategically and effectively manage our limited and vital water resources. The need for a state water recycling strategy was identified within this plan.

Our government, in partnership with stakeholders, has now developed the *State water recycling strategy* to explore and determine how recycled water can be safely incorporated across the range of water use sectors.

We believe that recycled water has an important part to play in Western Australia's water future, and this strategy is a first step towards understanding how we can make the most of this resource.

Launching this strategy sparks an investigation into recycled water as an alternative water source for industry, agriculture, residential use, public open space and drinking water. Investigation needs to be under-way now to ensure this resource is used to its full potential.

Some forms of water recycling are already in operation. Regional Western Australia has long used it to irrigate sporting ovals, and industry in the Kwinana district is currently recycling large volumes of water. However, there are many other options to consider.

While recycling will not be the only solution to the state's water needs, it is one in a range of initiatives we need to explore to create a sustainable water future for the generations to come. It is vital to government's strategy of security through diversity, and as such government has committed over \$3 million to implement this strategy.

We commend the *State water recycling strategy* to you for consideration.



Hon Alan Carpenter MLA  
*Premier Western Australia*



Hon John Kobelke MLA  
*Minister For Water Resources*

A  
waterwise  
garden



# RECYCLING – A PRIORITY FOR GOVERNMENT

## THE DEMAND FOR WATER

The continued development of WA, in terms of both population and the economy, means that demand for water is increasing, despite demand management actions.

The Perth region receives its scheme water from the Integrated Water Supply Scheme. Water comes from a number of sources, including groundwater, surface water (dams) and, more recently, desalination. Large volumes of groundwater are used in the Perth region for public open space irrigation, agriculture and industry.

The Department of Water is undertaking significant work to reform the way we plan for and manage water in Western Australia. This includes the development of regional water plans. For more information see <[www.water.wa.gov.au](http://www.water.wa.gov.au)> Planning the water future>.

In parallel with this, the Water Corporation is also developing a strategy called Water Forever, to secure water and wastewater service delivery to Perth and the surrounding areas for the next 50 years. For more information, visit the Water Forever website at <[www.watercorporation.com.au](http://www.watercorporation.com.au)> Waterforever>.

To continue to meet the demand for water, alternative water supplies are needed to supplement existing resources.

## THE NEED TO RECYCLE WATER

The drought experienced in Western Australia in 2001 highlighted the drying climate and the need to secure alternative water supply sources.

Key reasons to recycle water:

- Recycled water can be used for applications that require lower quality water, thus conserving high quality water for high value uses.
- Wastewater as a source for recycling is climate independent, and is available any time of year.
- The volume of wastewater available for recycling is growing as the state grows.
- The recycling process draws on less energy than some other sources, such as desalination.
- Recycling improves both short-term and long-term water supply security.
- As the cost of major new scheme sources rises, the cost effectiveness of using recycled water improves.



Irrigation of  
McGillivray Oval  
using recycled  
water

## COMMUNITY SUPPORT

As part of the development of this *State water recycling strategy*, information was collected from the Perth community about their attitude towards, and current understanding of water recycling. A survey of 410 people found:

- overall community support for water recycling was very high, with 91 per cent of greater Perth metropolitan residents supportive of water recycling
- the community prioritised the increased use of recycled water for industry, followed by households (for non-drinking purposes) and public open space
- 92 per cent agreed that the state government should require more water recycling by industry.



WHAT IS WATER RECYCLING?

Water recycling is the multiple use of water, usually sourced from wastewater (also known as sewage) or stormwater, after it has been treated to a standard appropriate for its intended use.

*Wastewater* is water that carries wastes from businesses, industries and homes. It is a mixture of water and dissolved or suspended solids. The water from homes includes the water flushed down toilets, and water from the bath, sink, washing machine and other domestic sources.

*Stormwater* is water that accumulates on land as a result of rainfall or storms, and in urban areas can include runoff from roads and roofs. In Western Australia, much of the stormwater and drainage water soaks down into groundwater systems. The water that enters the ground may have environmental value or be accessed later by bores to irrigate sporting grounds, gardens or parks. More information about stormwater is available from at <[www.water.wa.gov.au](http://www.water.wa.gov.au)> Water management> Stormwater> .

In Western Australia stormwater is largely available in winter, whereas the demand for water is highest in summer. The challenge facing stormwater harvesting is storing the water in sufficient volumes until

the time that it is required. Failing that, infiltration of stormwater where it falls, where suitable, offers an opportunity to recharge superficial groundwater aquifers.

TREATMENT OF WASTEWATER

Regardless of the source, water to be recycled must be fit-for-purpose. This means that it must be treated to an appropriate level for its intended final use.

Wastewater is transported from where it is produced to a wastewater treatment plant for processing to a different level depending on whether the water will be disposed of (to the ocean or into aquifers) or recycled for a specific purpose.

Additional treatment stages are applied, depending on how the water will be used. For example, if people are to come into contact

with recycled water (such as on an irrigated sports ground), a higher level of treatment is needed than for recycled water used in sub-surface irrigation (such as dripper lines buried under the soil for horticulture). Generally, the higher the level of treatment, the more expensive it is.

WATER FOR RECYCLING

The *State water recycling strategy* focuses on wastewater sourced from treatment plants; it is available all year round, the volume is growing, and most is currently being discharged into the ocean. Treated wastewater is a climate-independent resource, which means that it isn't reliant on rainfall. Around 115 gigalitres of wastewater is currently available for recycling in Perth, increasing by two to three per cent per year, regardless of whether it rains or not.

MAJOR WATER RECYCLING MILESTONES IN WESTERN AUSTRALIA SINCE 2002	
2002	A water forum and symposium explored opportunities for water recycling in WA.
2003	The <i>State water strategy</i> was released, with the target to recycle 20% of treated wastewater by 2012.
2003	Irrigation of McGillivray Oval with treated wastewater from Subiaco wastewater treatment plant commenced.
2004	The Kwinana Water Reclamation Plant was commissioned, using wastewater from the Woodman Point wastewater treatment plant.
2005	The Premier's Water Foundation funded the project Determining Requirements for Managed Aquifer Recharge in Western Australia.
2005	The <i>Code of practice for reuse of greywater</i> was published by the Department of Health.
2007	The <i>State water plan 2007</i> was released, with the target to recycle 30% of wastewater by 2030.

This water is largely concentrated at three major wastewater treatment plants owned and operated by the Water Corporation at Woodman Point (50 gigalitres per annum), Beenyup (43 gigalitres per annum) and Subiaco (22 gigalitres per annum). These plants currently treat wastewater to a level suitable for discharge to the ocean, with some flows being further treated for recycling. A new wastewater treatment plant at Alkimos, in Perth's north-west corridor, is planned for completion in 2009. This will treat up to 58 gigalitres of wastewater per year by 2050.

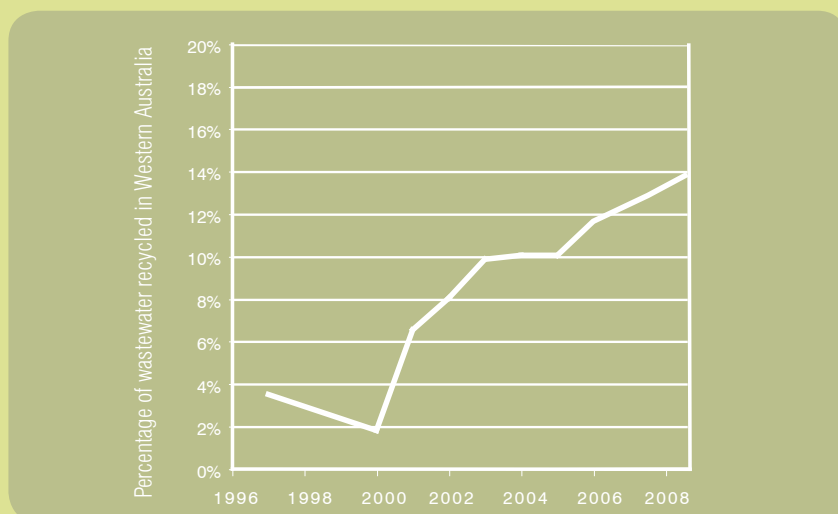
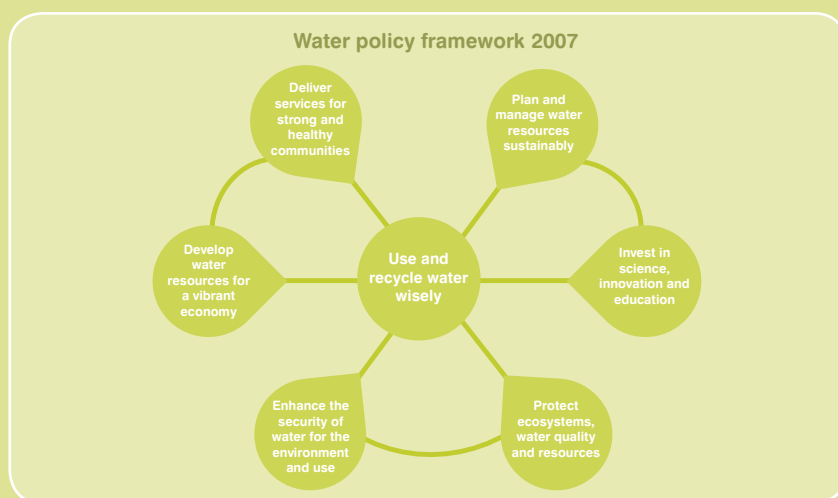
As well as considering the volumes of water available for recycling, there also needs to be consideration and matching of locations and demand. For example, industry may require a large volume of recycled water during the development or maintenance of a site, but not on an average operational day. So we also need to consider how we use, store or release recycled water to meet demand and manage costs.

In 2007 about 17 gigalitres or 12.5 per cent of wastewater was recycled in the state, an increase from 11.6 per cent in 2006. The strategy direction provides opportunities to further increase the percentage of wastewater recycled, and progress towards our long-term target.

## HISTORY OF WATER RECYCLING IN WESTERN AUSTRALIA

In 2003 the *State water strategy* set an objective to recycle 20 per cent of treated wastewater produced in WA by 2012. In view of environmental, economic and public health considerations, the priority for government was for large-scale, centralised reuse options. It was recognised in the strategy that the Perth metropolitan area had a key role to play in achieving the target, given the volume of wastewater available and the demand for water over a variety of uses.

The *State water Plan 2007* continued this commitment to water recycling as central to securing our water future. The water policy framework recognises the need to 'Use and recycle water wisely' as the central objective.



# STATE WATER RECYCLING STRATEGY

The strategy sets out initiatives to achieve recycling of 30 per cent of wastewater by 2030, as called for in the *State water plan 2007*, in a manner that is sustainable and supported by the community. The strategy uses case studies from key water-use sectors to identify recycling opportunities.

Issues relating to health, community acceptance, ability to pay and the availability of water for recycling have been considered, and these factors have been used to identify strategy direction for water recycling in Western Australia. Any future sources must be tried and tested to ensure they are safe and feasible options.



## RECYCLING OPPORTUNITIES

### RECYCLED WATER FOR INDUSTRY

Use of recycled water by industry is a high priority for the community, government and industry.

The Kwinana industrial area represents the largest concentration of industrial activity in the state.

Other heavy industrial centres are located in Neerabup, Kemerton, the Burrup Peninsula and Port Hedland.

It is expected that water demands in these industrial areas will continue to grow. Recycled water offers a suitable alternative to meet this growing demand with some recycled water already supplied to Kwinana.

#### *Strategy direction*

*There is an opportunity to increase the use of recycled water in Western Australia given the current and future demand from industry.*

*Government supports the expansion of the existing Kwinana Water Reclamation Plant to 9.6 gigalitres per annum by 2010. This expansion will reduce industry's use of drinking-quality water, freeing it up to meet the needs of new southern suburbs.*

*Government will also investigate the establishment through the Economic Regulatory Authority of an industrial tariff to promote the efficient use of water and the use of recycled water by industry.*

*In the future, new heavy and general industrial areas will be required to investigate the installation of a third pipe to distribute recycled water. Where feasible and cost effective, existing heavy industrial areas should be retrofitted to facilitate the use of recycled water.*

### KWINANA WATER RECLAMATION PLANT

The Kwinana industrial area contains the largest concentration of heavy and supporting industrial activity in Western Australia. This area accounts for significant economic output, employment and linkages to the local community. For more information on the Kwinana industrial area, see the Kwinana Industries Council website <[www.kic.org.au](http://www.kic.org.au)>.

Since 2004, the Kwinana Water Reclamation Plant has recycled approximately six gigalitres of wastewater per year from the Woodman Point Wastewater Treatment Plant. The recycled water is used by major industries in Kwinana, including BP, Hismelt, CSBP and Tiwest. This use of recycled water has enabled drinking water to be made available to householders, that would otherwise have been used by industry.

## RECYCLED WATER FOR AGRICULTURE

In 2005 an estimated 864 gigalitres of water, or 37 per cent of all water in Western Australia, was used by the agricultural sector. Almost all of this water was used in the relatively high-value irrigated agricultural sector, which includes irrigated pasture, turf farms and horticulture.

### *Strategy direction*

*Due to increasing pressure on our groundwater resources, the state government is currently investigating the viability of horticultural precincts. Water from the new Alkimos Wastewater Treatment Plant has some potential for future use in horticulture, and may be reserved for this purpose.*

## WATER RECYCLING FOR AGRICULTURE AROUND AUSTRALIA

Recycled water is successfully used around Australia to irrigate fruit and vegetable growing areas. This includes Virginia Plains in South Australia, and Werribee Farm in Victoria. Produce from these schemes is retailed in Australian supermarkets.


Under health regulations requiring water to be fit-for-purpose, produce that is eaten raw (such as lettuce, carrots, strawberries) generally requires wastewater to be treated to a higher level. Before any scheme is progressed, substantial investigation is required.

## RECYCLED WATER FOR PUBLIC OPEN SPACE

Public open space provides important health and lifestyle benefits for communities. Those surveyed indicated support for using recycled water to irrigate public parks, public playgrounds, sporting grounds and golf courses, and this already occurs in many regional towns.

In regional Western Australia about 40 per cent of treated wastewater is recycled for the irrigation of public open space. In the Perth metropolitan area, McGillivray Oval in Mount Claremont has been irrigated using treated wastewater from the Subiaco Wastewater Treatment Plant since 2004.

With the right management, recycled water can provide a fit-for-purpose water source for public open space on a wider scale.



Stormwater infiltration in the City of Mandurah



#### *Strategy direction*

*Government encourages the efficient management of water to irrigate public open space through the development and implementation of water conservation plans. These plans help communities to prioritise and water only highly valued areas, while replacing excess grassed areas with waterwise surrounds, verges and public facilities.*

*Where there is an appropriate water source, it may be an option to maintain highly valued public open space with recycled water.*

#### RECYCLED WATER FOR DRINKING

Our booming economy and growing population means that the demand for drinking-quality water is increasing. There is a possibility that recycled water could contribute to drinking water supply for Perth, along with existing sources such as groundwater, dam water and desalinated ocean water. This already takes place in a number of locations around the world. However, the Government of Western Australia is committed to testing under local conditions, to be sure that this approach is appropriate for our population and environment.

#### *Strategy direction*

*A three-year trial of groundwater replenishment is being planned to commence in 2009. This will inject highly treated wastewater*

*underground to test the feasibility of replenishing groundwater on the Gnangara Mound. Water from the trial will not be used for drinking; it will only be used for research.*

*The Gnangara groundwater replenishment trial will increase the understanding of public-health safety, technical and economic feasibility, and the potential for environmental benefits or impacts. It will also provide an opportunity for the community to learn more about groundwater replenishment. The outcomes of this trial will influence any further decisions about recycled water use in the drinking water supply.*

*In recognition of the potential for water to be recycled for drinking purposes, water from the Beenyup Wastewater Treatment Plant will be reserved for this purpose. This will ensure that there is a source available should groundwater replenishment become an acceptable drinking-water-supply option in the future. For more information about groundwater replenishment, see <[www.watercorporation.com.au](http://www.watercorporation.com.au)>.*

#### RECYCLED WATER FOR HOUSEHOLDS (NON-DRINKING)

In the average household, around 47 per cent of water use is outside the home, approximately 14 per cent is used in the laundry and 12 per cent in the toilet. This means that potentially

73 per cent of household water use in the average household may not require treatment to drinking water standard. The supply of non-drinking water for some domestic uses is therefore a possible alternative to the supply of only drinking water from the scheme.

A number of water recycling systems and fit-for-purpose options exist for residential use, including greywater systems, community bores and rainwater tanks. These range in scale from individual on-site systems to residential estate systems.

A community survey endorsed the use of individual home greywater diversion systems. These are supported by government waterwise rebates <[www.water.wa.gov.au](http://www.water.wa.gov.au)> Wise water use> Waterwise rebates> and 5 Star Plus.

#### *Strategy direction*

*To integrate and further develop options for household-scale water conservation and recycling, an online waterwise communities toolkit is being developed.*

*This toolkit will promote water conservation and recycling to local government, developers and other users. It will provide access to information on both recycling and wise water use, including:*

- *the availability of shallow groundwater*



- *the availability of sources for recycled water*
- *key land planning considerations*
- *alternative water solutions including rainwater tanks, community bores, greywater and landscaping*
- *streamlined application and approval processes.*

*It is expected that the toolkit will be online by 2010.*

## POLICY AND REGULATION

National guidance on regulatory policy for health, environment, water resource management and pricing has progressed substantially in recent years.

*The Australian guidelines for water recycling – Managing health and environmental risks* was released in November 2006. The guidelines provide a risk assessment framework for water recycling, and consider on-site greywater recycling and large-scale wastewater recycling for non-drinking purposes. The

guidelines document is available at [www.ephc.gov.au/ephc/water/recycling.html](http://www.ephc.gov.au/ephc/water/recycling.html).

A second phase of the *Australian guidelines for water recycling* is currently under development. This includes guidelines for the augmentation of drinking water supplies, guidelines for managed aquifer recharge and for stormwater recycling.

At a state level, there is a need to improve policy and regulation to facilitate water recycling. Regulatory issues involve a number of government areas, including health, environment, land planning, water resource management, pricing, water service provision, infrastructure, building and plumbing codes. Local government also has a role in the approval and provision of recycled water schemes.

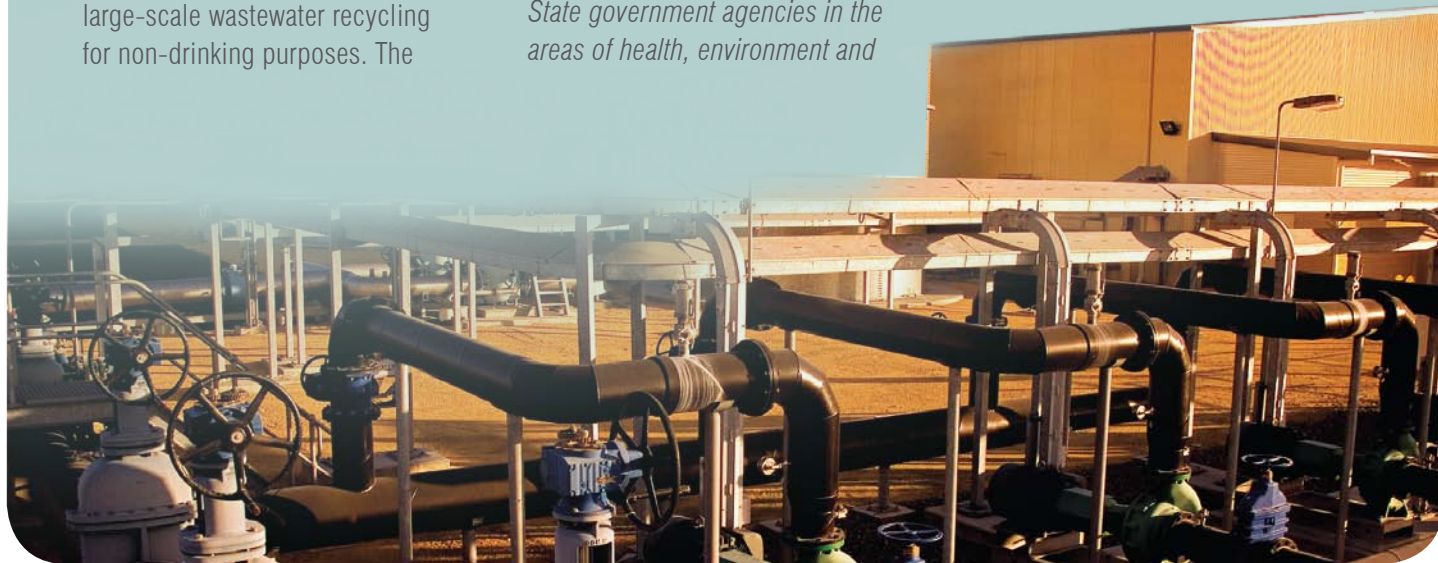
### *Strategy direction*

*State government agencies in the areas of health, environment and*

*water resource management will review and develop policy in the next 12 months to support water recycling, and the outcomes will be linked to the forthcoming waterwise communities toolkit.*

*A review of Water Corporation charges for extending water infrastructure to new urban areas will be undertaken, with consideration given to reflecting the contribution of alternative water supplies.*

*Land planning processes, as related to water issues, will continue to be undertaken at early stages with improved integration at a regional level to optimise compatible land uses and provide adequate long-term investment security. The revision of building codes through 5 Star Plus will support the inclusion of complementary water supplies to meet demand for external garden use, toilet flushing and clothes washing.*



## IMPLEMENTATION

The Department of Water is the agency responsible for coordinating and expediting policy development across government, and for streamlining administrative processes for proponents.

To support the department and other government agencies in the implementation of the strategy, government has provided funding of over \$3 million over five years. This will fund the development of a waterwise communities toolkit, detailed policy and a regulatory framework for water recycling.

## TO FIND OUT MORE

The *State water recycling strategy* document will be available on the Department of Water website <[www.water.wa.gov.au](http://www.water.wa.gov.au)> Wise water use> by the end of June 2008.

As this strategy is implemented, there will be opportunities for stakeholder and community involvement.

To find out more, email [recycling@water.wa.gov.au](mailto:recycling@water.wa.gov.au) or call the Water Recycling and Efficiency branch on 1800 508 885.

