

Consultation draft July 2013

Melbourne's Water Future



Office of
Living Victoria



Trailfinders Australian Garden
by Fleming's Nurseries, winner
of best-in-show at the Chelsea
Flower Show. The garden highlighted
the importance of water sensitive
design and demonstrated how our
urban landscapes can be enhanced in a
practical and sustainable manner using
alternative water sources. *Getty Images*



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From the Minister

The Hon. Peter Walsh MLA, MINISTER FOR WATER

It is with great pleasure that I release this consultation draft of Melbourne's Water Future

It is my intention that this draft strategy will trigger a community conversation that will signal the start of a new era in water planning and management in Victoria.

Our forefathers demonstrated great foresight in building Melbourne's water systems. These systems have served our communities well, but we are now entering a new phase in the evolution of our urban water services systems as we respond to future population growth and to Melbourne's variable climate.

Victoria already has a leading international reputation in our approach to urban water. Our drinking water supply enjoys an enviable reputation and we have some of the best thinkers, innovators, planners, managers, regulators, developers, engineers, landscapers and horticulturalists in the water sector anywhere in the world.

In May 2013, for example, I had the great pleasure of congratulating Fleming's Nurseries for winning the coveted best-in-show award at the 2013 Chelsea Flower Show in London. Their winning Trailfinders Australian Garden showcased Victoria's skills and capacity as a world leader in whole-of-water-cycle urban design.

It is fitting and appropriate that this extraordinary achievement is featured as a case study in *Melbourne's Water Future*.

Melbourne's Water Future is a new and innovative approach to an age-old problem. It adopts an integrated or whole-of-water-cycle approach to the linked challenges of securing a safe and plentiful water supply, managing our stormwater runoff and wastewater discharge, reducing urban flooding, keeping our parks and gardens green and improving the health of our waterways.

The distinguishing feature of this strategy is not so much that the individual elements are new, but rather that the approach is new.

Melbourne's Water Future takes a whole-of-government approach that brings together and integrates the efforts and actions of government, local government, water authorities and the community.

Melbourne's householders and businesses demonstrated during the recent drought a willingness and capability to adjust behaviours to meet the challenges of Melbourne's variable climate. However, none of us want to repeat the severity of restrictions we endured in the drought. Nor do we want to continue to pay the

high costs of major infrastructure investments like the desalination plant, which are now beginning to flow through to our water bills.

There is a better way than continuing with business as usual.

The comprehensive research and systems analysis developed by the specialist and independent Living Melbourne Living Victoria Ministerial Advisory Council demonstrates that a new and integrated water cycle management approach will have significant environmental, liveability and cost advantages over continuing with business as usual.

We now know much more than we ever did about how the different parts of the water cycle work together. Continuing to build as comprehensive a knowledge base as possible will be critical to understanding both the opportunities and risks associated with the new approach. Our variable climate, for example, means that we can never be certain about rainfall predictions. Understanding this uncertainty, and making informed decisions about the level of risk we are willing to accept as a trade-off for outcomes such as lower prices and liveability and environmental benefits, will require careful consideration and community understanding.

This consultation draft commits to building, refining and making this knowledge base more freely available, so the whole community can be active partners in making informed and effective decisions about our water future.

The new approach recognises that more water runs off Melbourne's hard surfaces than we use from our dams, even in drought years. By capturing this water locally, and using this water to substitute for expensive drinking water – for purposes such as watering our parks and gardens and flushing our toilets – we can lower costs, enhance the liveability of our neighbourhoods, reduce urban flooding and improve environmental outcomes for our waterways and bays .

The release of this consultation draft builds on the foundations of the work of our water corporations and local councils to innovate for the benefit of all water users. It is also the starting point for a long and on-going process that adopts a forty year outlook to Melbourne's water future.

The cost savings and benefits will not be achieved overnight, but they will be achieved over time. By aligning existing efforts across the water sector, and making better use of existing and future assets, the new approach can be implemented through the normal cycles of

investment. Building a distributed water system also allows greater resilience through the distribution of risk.

To achieve this generational change in the way we plan and manage the water cycle, I would anticipate a significant community contribution to the proposed engagement, planning, regulatory, investment and economic reforms. And I would expect that this new approach will both align with the wider metropolitan planning strategy currently being developed and be applicable to place-based water cycle plans in Victoria's regional urban centres.

I would like to take this opportunity to thank all those involved in the development of *Melbourne's Water Future*, including the Ministerial Advisory Council, Office of Living Victoria and the many stakeholders who have actively contributed their knowledge, assistance and advice.

I strongly encourage all sectors of our community to actively contribute to the consultation process that commences with the release of this document. I look forward to considering the views and input of individuals and organisations across Melbourne before the anticipated release of a final strategy towards the end of 2013.

We now know much more than we ever did about how the different parts of the water cycle work together



Consultation

The Living Victoria Ministerial Advisory Council consulted extensively on a new approach to water cycle planning for Melbourne. The Office of Living Victoria has continued this consultation process.

This draft allows for consultation with stakeholders and the wider Melbourne community on the adoption by Government of this strategy. Subject to these consultations, which will take place during the third quarter of 2013, it is anticipated that the final strategy will be released in late 2013.

The Office of Living Victoria will lead the consultation process, including public forums.

For further information please visit livingvictoria.vic.gov.au or telephone **03 9027 4500**

Online submissions can be made at livingvictoria.vic.gov.au and should be provided by no later than 18 September 2013.

Written submissions are also welcomed and should be provided by no later than 18 September 2013 to info@olv.vic.gov.au

Further information or assistance

VISIT livingvictoria.vic.gov.au

EMAIL info@olv.vic.gov.au

PHONE **03 9027 4500**

Improving the health of Melbourne's rivers, creeks and waterways is a primary focus of Melbourne's Water Future. The strategy recognises the important role green spaces, such as Yarra Bend Park (pictured) play in the health and wellbeing of communities.



Why are we talking about water policy now?

Melbourne has one of the most variable climates in the world. We are indeed a city of droughts and flooding rains.

We have just come out of yet another period of severe drought and we know that we will face another some time soon – we always have. We also know that we will face prolonged heavy rain again soon – we always have.

Melbourne has a history of planning for our water cycle in five separate categories:

Water supply

Dams, catchments, pipes and lately desalination;

Wastewater

Sewers, treatment plants and outfall;

Stormwater

Drains and flood mitigation;

River, creek and stream management

Water quality testing, litter management and flow management; and

Greening our suburbs and managing our parks.

In addition to being fragmented, Melbourne's water cycle planning tends towards a 'one size fits all' approach across the metropolitan area, despite differences in rainfall, temperatures across localities, types of landscape and soil, waterway systems, and industrial and commercial requirements. Using averages means that we waste money and do not tailor solutions to local circumstances.

From July this year, the desalination plant means Melbourne will have much more expensive drinking water as we pay off the plant.

Melbourne will have to pay even more for every drop of desalinated water we use.

We can no longer afford to use our drinking water to keep our trees and gardens alive, or to flush it away in our toilets. We can no longer afford not to use the plentiful supply of water that runs off our city after rain.

Melbourne is growing fast and this growth is expected to continue for the foreseeable future. Much of this growth will happen in the west and north, where traditional water planning is more difficult and expensive.

The recent drought has taught us that we cannot continue with business as usual. If we do, liveability will decline, even more of our

gardens and trees will die off over the next drought period, our rivers, creeks and streams will become even more degraded, and we will need to use our public funds to build more treatment plants and expensive large scale water infrastructure.

Continuing on as we currently do will also mean that Melbourne will face increased frequency of major flooding with all the resultant hardship and business disruption, as well as a significant increase in insurance costs.

Moreover, excessive levels of pollutants – including pesticides, hydrocarbons, industrial pollution and nutrients – could flow into our waterways.

We can no longer look at these issues piecemeal; we need a new approach.

Melbourne's Water Future defines this new approach. We cannot afford to wait, because the longer we delay, the more entrenched the pressures become and the more costly it will be to adopt a different path.

We now have an unprecedented body of knowledge and data about Melbourne's urban water cycle. We also have access to 'big data' analytical techniques that bring to light

important new insights from that data and knowledge. Making considered decisions based on comprehensive information is always going to be smarter and more effective than narrow or hasty responses.

Now is the time to make sure that whole-of-water-cycle planning and management is an integral part of our wider metropolitan urban planning – so we can be sure our new developments have water cycle planning embedded from day one and we can make informed and efficient decisions about how we respond to the inherited challenges of our existing water system.

The new approach is not being written on a blank slate. Our communities, businesses and water authorities are already innovating in how they plan and manage the water cycle. Organisations such as Melbourne Water Corporation and the retail water authorities have a track record in innovation. These efforts are the basis for Melbourne's reputation as a city at the cutting edge of water cycle management. *Melbourne's Water Future* seeks to further enhance that reputation.

About this strategy

Vision

A smart, resilient water system for a liveable, sustainable and productive Melbourne

Objectives

An integrated and resilient water system, which is planned and managed to support liveable and sustainable communities, protect the environmental health of urban waterways and bays, provide secure water supplies efficiently, protect public health and deliver affordable essential water services

Outcomes

Outcome 3.1

A community engaged in whole-of-water-cycle management
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Outcome 3.2

Suburbs – old and new – designed with water in mind
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Outcome 3.3

Sensible use of water in our homes and businesses
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Outcome 3.4

Resilient water systems
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Outcome 3.6

Reduced inefficiency and waste
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Outcome 3.7

Accelerated innovation and world recognition of expertise
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Initiatives

Initiatives 3.1.1 – 3.1.5

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Initiatives 3.2.1 – 3.2.8

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Initiatives 3.3.1 – 3.3.8

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Initiatives 3.6.1 – 3.6.7

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Initiatives 3.7.1 – 3.7.6

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This strategy defines the approach and proposed initiatives required to achieve the vision and objectives

Section 1 Executive summary.
Pages 7 – 18

Section 2 Explains what whole-of-water-cycle management is and why it is needed; and outlines the current systems within the water cycle and the history of water planning and management in Melbourne.
Pages 19 – 38

Section 3 Outlines the anticipated outcomes from the strategy and the proposed initiatives which will be undertaken to achieve these outcomes.
Pages 39 – 96

Executive summary 1

Harvesting stormwater helps ensure the health of natural waterways is preserved, especially during times of heavy rainfall. Cycling tracks, such as those along Merri Creek provide recreational opportunities and reduce pressure on roadways and public transport.



The analysis underpinning this strategy is world's best practice

Dr Robert Wilkinson

University of California and
Rocky Mountain Institute

Right As Melbourne grows, a larger city means increased areas are covered by hard surfaces such as roofs and roads, which in turn generate increased stormwater runoff. Raingardens, such as this one in Clifton Hill, allow rainwater to be collected, filtered and stored, reducing the risk of flooding and the amount of pollution flowing into our creeks and waterways.



1.1 A new approach

Management of the urban water cycle in Melbourne has changed significantly since settlement. Continuing that evolution, this strategy heralds a new approach based on whole-of-water-cycle management and planning, with use and reuse of all sources of Melbourne's water and improved environmental and liveability outcomes.

Our water system faces a number of pressures that will steadily rise as a growing population consumes more water and discharges more wastewater. Our variable climate means that droughts and floods are inevitable – we just don't know when they will next occur, or how severe they will be.

While improvements have been made over the years, our waterways and bays remain polluted. Our trees and parklands, although recovering, were weakened by the last drought and many trees will die early due to that stress. We saw a reminder of this in the hot and dry summer of 2012-13. Every year urban flooding causes hardship and costs the city millions of dollars in clean-up and repair costs. Without a new approach, all these pressures will worsen and costs will continue to rise.

We therefore need to make smart and informed decisions that will ensure an ongoing high-quality water supply as well as improved outcomes for our environment, our waterways and our liveability. To do this efficiently and at least cost, we need to build on the changes and forward thinking already adopted by Melbourne's water authorities to reform how we plan and manage our whole water cycle.

Our current approach relies on transporting water and wastewater over long distances – at high cost and involving high energy use. The real costs of water cycle services are not visible to consumers because they are buried in a complex suite of system charges. Our historical focus on big capital spending is expensive and inefficient when compared to holistic planning and local-scale responses.

The existing framework of policies, institutions and regulations reflects an outdated model of planning, managing, delivering and using water. We are paying too much to build big infrastructure like the desalination plant, and we can no longer afford the energy and infrastructure costs of piping water around Melbourne when we could be better off using and reusing the rain that falls on Melbourne and the stormwater runoff generated by that rainfall.

The volume of stormwater runoff from Melbourne's rainfall is greater than the amount we actually use from our dams; and this volume of water is more than enough to provide both an alternate water supply for non-drinking purposes and a healthy flow to our waterways and bays. We need to value and use the rain that falls on Melbourne. This will help to minimise water price increases. It will improve the health of our waterways and bays, reduce urban flooding, enhance our liveability and amenity, and help cement Melbourne as a centre of expertise in whole-of-water-cycle management – a key capability for the twenty first century.

Water to stormwater comparison for 2013 ESTIMATED

FIGURE 1.1

Stormwater runoff and wastewater from urban areas in metropolitan Melbourne are more than the water demands for metropolitan Melbourne

Stormwater in this diagram comprises the additional stormwater runoff generated by urban areas that could be used for more integrated stormwater management including holding stormwater in the landscape throughout catchments, supporting local vegetation, restoring essential soil moisture, and for rainwater and stormwater harvesting. It does not include stormwater from parks, peri-urban and

rural areas in metropolitan Melbourne, or flows in streams passing through Melbourne.

This ensures that we are only considering additional stormwater generated by urban areas that needs to be managed.

Projections to 2050 confirm that stormwater runoff will continue at similar levels relative to water demand for the next 25 to 40 years on a business as usual scenario.

It is important to note that a significant proportion of the annual volumes of wastewater are stormwater runoff.

The annual volume of wastewater includes all wastewater generated throughout the metropolitan region. This includes discharges to treatment plants operated by the water authorities and discharges to alternative systems, including septic tanks.

Drinking water used



Stormwater available



Wastewater available





The need for improved stormwater management BOX 1.1

Around the world, streams draining urban catchments are damaged by urban stormwater runoff, leading to erosion, poor water quality, loss of biodiversity, and loss of their ability to process catchment contaminants.

But in some urbanised catchments of the Dandenong Ranges, where formal stormwater drainage systems have not been installed and stormwater is retained in the catchment, streams remain healthy. To achieve healthy streams in other urban catchments, we need to manage stormwater differently.

We need to retain as much runoff from roofs and roads as possible to prevent untreated water flowing to streams in all but the largest storms. To return the natural volume of high quality water to the streams, we need to pass 15-30 per cent of runoff through infiltration or filtration systems.

To maintain healthy waterways we thus need to 'lose' 70-85 per cent of urban runoff, either by using it to supplement our existing water supply, or by increasing irrigation to trees, parks and gardens to allow plants to take up the water and lose it to the air. Across Melbourne, in an average year, this excess runoff that should be kept out of our streams is equivalent to the total water demand.

Professor Chris Walsh, Professor Tim Fletcher
University of Melbourne

1.2 Preparing for the future

Our approach to water and urban planning needs to change. The development of the new Metropolitan Planning Strategy provides an ideal opportunity to align our plan for a new way of understanding, managing and planning the water cycle with our thirty-year plan for the future of the city.

Water cycle planning will be founded upon knowledge and understanding of the entire water cycle and its drivers: geography, topography, location of community assets, hydrology, economics, climate and demography. It will be based on an informed understanding of the whole water cycle and the interactions within and between its various components; not just one component within the water cycle in isolation.

This new approach acknowledges that there are considerable differences across the neighbourhoods and regions of Greater Melbourne. A 'one size fits all' approach will not deliver the best outcomes at the lowest cost. The performance of the water cycle is driven by the behaviour of people, businesses and industry at the local scale, and so our local communities must be actively involved as partners in our whole-of-water-cycle planning and management processes and decisions.

The analysis underpinning this Strategy is based on an innovative and world-leading systems analysis approach, which is the result of considerable investment in research and analysis over more than a decade. This systems approach was first comprehensively articulated in the Living Victoria Ministerial Advisory Council Implementation Plan and has been positively and publicly peer reviewed.

The systems analysis approach attaches a value to storage, consumption, transfers and stormwater processing at each point in the water system. This allows understanding of the costs and benefits that accumulate throughout the water cycle system, and arise through the interaction of different system components – both geographical and temporal. The systems analysis accounts for local behaviours and drivers, and is able to adjust these values in response to changes in parameters like levels of rainwater capture, or the probabilities assigned to weather events and economic shocks. The approach can therefore test a wide range of options and scenarios.

The systems analysis, looking at the next 40 years, will inform the development and publication of a new water cycle planning framework for metropolitan Melbourne. This will include an outline of current and future required citywide infrastructure, guidelines for regional and local planning and overall pricing principles for the system.

The development of this framework will be coordinated by the Office of Living Victoria, and will involve all relevant water authorities, the Department of Transport, Planning and Local Infrastructure, the Department of State Development, Business and Innovation, the Department of Environment and Primary Industries, and local government. The framework will be further developed and released within the timeframe of the finalisation of this Strategy, which, subject to the consultation process, is anticipated by late 2013.

The framework will initially guide the development of regional plans in metropolitan Melbourne. Development of these regional plans will involve the Office of Living Victoria, the body responsible for the implementation of the Metropolitan Planning Strategy, Melbourne Water, the relevant water authorities, the relevant local government authorities and other organisations such as VicRoads, Parks Victoria, major regional institutions such as universities and relevant business and community organisations.

At the local level, the Office of Living Victoria will support local governments to design local water cycle plans that align with the framework for the metropolitan and regional plans.

Each level of planning will have a ten year timeframe with detailed three year implementation plans for local and regional plans to be updated regularly. The plans will include goals for reduced use of drinking water, reduced wastewater to treatment plants, reduced stormwater runoff and pollutants in waterways, and increased use of alternative local water sources.

This new planning regime at the local, regional and metropolitan levels will articulate the links and connections between behavioural changes in water use and system change in the water cycle.

1.3 Reducing costs and delivering other benefits

Melbourne's Water Future will reduce costs compared with 'business as usual' (see Figure 1.2). Inefficiencies in the current system will be reformed; planning will be improved, and a whole-of-water-cycle approach will make the system more resilient and better able to respond to future shocks such as prolonged drought, significant rainfall events, bushfires or other factors affecting our water supply catchments.

The prospect of a major interruption to water supply from one or more of our catchments – whether foreseen or unforeseen – exposes the lack of flexibility in solely relying on water supply catchments for all our water.

Melbourne's Water Future will make the costs and benefits of the water cycle more transparent by:

- more frequent and comprehensive reporting of water system costs, performance and outcomes;
- better disclosure to prospective purchasers and lessees of the water efficiency properties of new and leased commercial and residential buildings and houses
- more comprehensive information in consumers' water bills; and
- wider consideration and reporting of important external costs and benefits, such as the cost of adverse environmental impacts of stormwater runoff and flooding.

Moving water, wastewater and stormwater long distances across the city is one of the most expensive and energy-intensive aspects of the water cycle. It is no surprise then that making use of stormwater where it falls, or local water at or near its source, will save costs and energy. It will enable us to defer or scale down future big capital investments, like the next desalination plant and the next peak-load power generation plant. Systems analysis undertaken for the Living Victoria Ministerial Advisory Council showed that, under business as usual, it may be necessary to commit to two additional desalination plants (at capacities of 50 gegalitres and 100 gegalitres, and a cost of \$2 billion and \$4 billion respectively) during the planning horizon to 2050.

The Ministerial Advisory Council systems analysis compared the cost of business-as-usual against alternative approaches. Based on that systems analysis, adopting an approach that optimises local water cycle management is expected to achieve the outcomes described in Box 1.2 on page 12.

These outcomes are expected to be conservative because they exclude additional financial benefits from improved efficiency, and additional non-financial benefits such as from improved wellbeing and liveability.

Key benefits of the new approach

BOX 1.2

Based on systems analysis modelling developed for the Ministerial Advisory Council, adopting an approach that optimises local water cycle management is expected to achieve the following outcomes for Greater Melbourne:

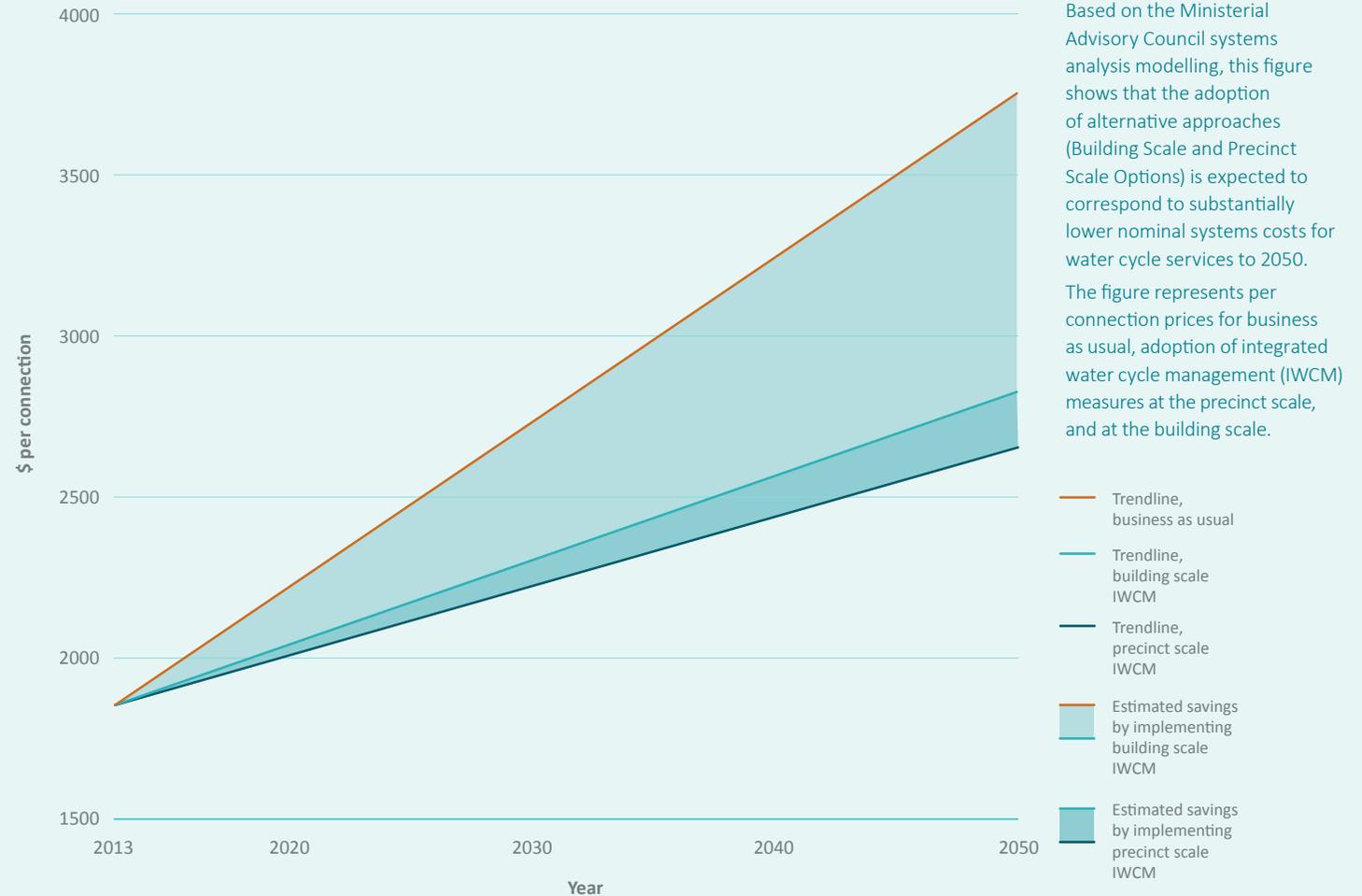
- Total savings in the order of \$6 billion to \$7 billion (net present value) compared with business as usual (approximately 10-15 per cent reduction in annual water sector costs by 2050).
- Up to 35 per cent reduction in energy use in the water sector, with emissions savings of up to 1 million tonnes of carbon dioxide by 2050.
- Up to 45 per cent reduction in mains water demand, up to 30 per cent reduction in wastewater discharge, and significant reductions in the variance or 'peakiness' of system flows – by 2050.
- Healthier waterways due to reductions in nutrient discharge of between 12 – 20 per cent (or 4760 – 8250 tonnes), with up to 40 per cent reduction in stormwater runoff volumes by 2050.
- The inclusion of further measures – including holding stormwater in the landscape for amenity and liveability purposes – can reduce stormwater runoff volumes (generated by urban areas) by greater than 70 per cent.

These benefits will support the economic growth of Melbourne into the future.

Living Melbourne, Living Victoria Greater Melbourne Systems Model in Support of Living Victoria Advisory Council, Coombes et al, 2012.

The proposed initiatives are expected to reduce cost pressures for water cycle services

FIGURE 1.2



Water cycle management in Victoria's regional centres

BOX 1.3



This strategy recognises that planning for water in Victoria's rural and regional areas has generally taken a more holistic approach than in Melbourne itself. In developing *Melbourne's Water Future*, we have carefully considered and learned from the approaches taken in regional centres. To further augment the excellent water cycle management already underway in regional Victoria – including work auspiced by memoranda of understanding between Melbourne Water and regional water authorities – we will work closely with the water authorities, local councils and regional communities. The principles and objectives of *Melbourne's Water Future* will inform development of water cycle management in all Victoria's urban centres.

This strategy's commitment to concentrate on local and regional information and input in the planning and management of the water cycle and water systems will be extended to urban towns and cities. This place-based approach will ensure that the whole-of-water-cycle approaches adopted in each regional centre are tailored to the local and regional circumstances appropriate to that city.

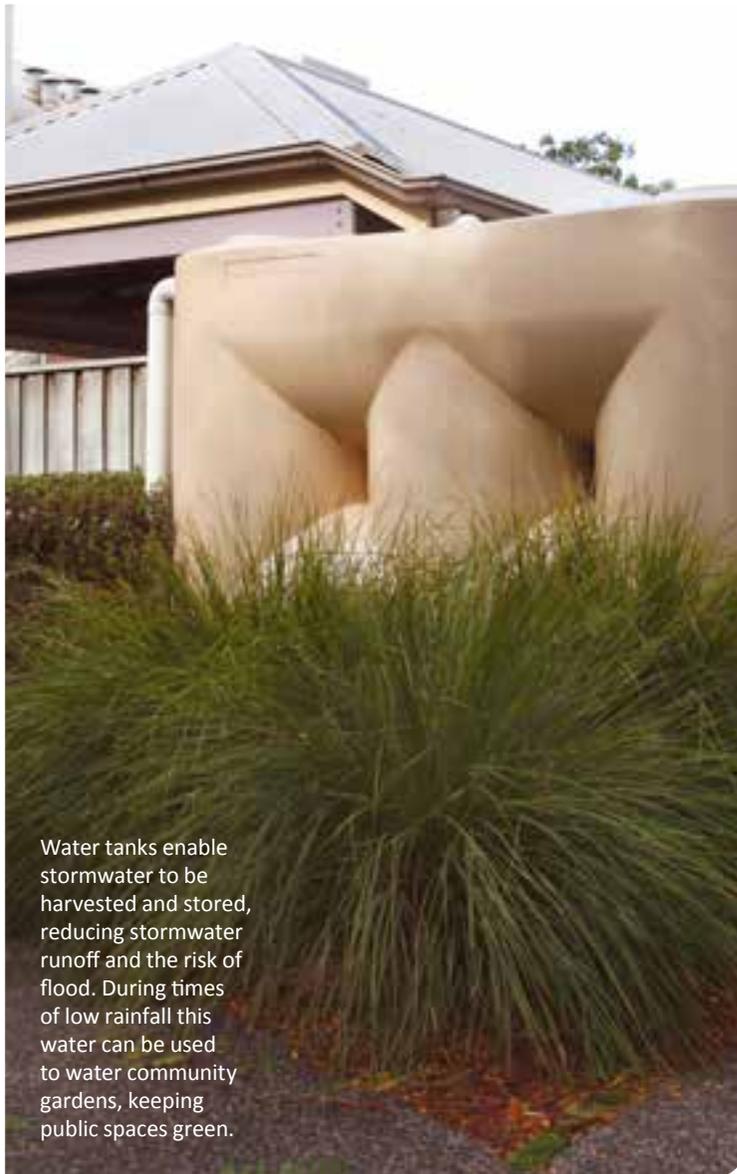
The Victorian Government will work closely with each regional city to develop a whole-of-water-cycle strategy for that city. Already, work is underway on the *Living Ballarat* Project, which incorporates the development and implementation of Ballarat's water cycle strategy – the first in the planned series of regional water

cycle strategies that will translate the principles and policies of *Melbourne's Water Future* into the context of the urban centres in Victoria's regions. Ballarat has been chosen to lead the way in demonstrating how to apply the localised, multi-scale approach to integrated water cycle systems planning for regional cities.

There is an estimated 9 gigalitres of water runoff in Ballarat each year. This is water we can put to better use. By the end of 2013, the *Living Ballarat* Project will have established a whole-of-water-cycle framework that integrates water cycle planning into the urban development of Ballarat.



Chronology of the Victorian Government's recent achievements



Water tanks enable stormwater to be harvested and stored, reducing stormwater runoff and the risk of flood. During times of low rainfall this water can be used to water community gardens, keeping public spaces green.

2011				
Q1	Q2	Q3	Q4	
<p>January 2011 Living Melbourne, Living Victoria Ministerial Advisory Council established</p> <p>11 March 2011 Release of Living Melbourne, Living Victoria roadmap</p> <p>20 March 2011 Water filtration plant at Rossllynne Reservoir</p> <p>22 March 2011 Doncaster Hill stormwater harvesting project</p>	<p>19 April 2011 Recycled Water Plant in Altona See case study, page 77</p> <p>4 May 2011 Mordialloc Creek funding</p> <p>3 June 2011 Funding for the first steps of Living Ballarat – a new plan to transform the city through integrated water cycle management.</p> <p>29 June 2011 Rebates on water-efficient products for all households</p>	<p>14 July 2011 Completion of a \$60 million main replacement project between Preston and North Essendon to save water and strengthen security of supply in Melbourne's northern and western suburbs</p> <p>19 July 2011 Water efficiency rebates extended to small businesses</p>	<p>4 October 2011 Recycled water project for Point Cook's sporting grounds and open spaces</p> <p>17 October 2011 New water restrictions regime released for public comment</p>	<p>11 November 2011 Northern Sewerage Project: Completion of a \$650 million project to boost sewerage capacity in Melbourne's north and protect the health of local waterways</p> <p>15 November 2011 New rules for use of North-South pipeline – the pipeline will only be used to boost Melbourne's supply during times of critical human need; if Melbourne's water storage levels are below 30 per cent on 30 November; and only as a last resort for use during extremely dry conditions or for fire-fighting purposes</p> <p>30 November 2011 Victorian Government adopts the new water restrictions regime and permanent water savings rules proposed by the metropolitan water retailers, and announces a return to Stage 1 restrictions</p>

2012				2013			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<p>13 February 2012</p> <p>Commencement of a project to improve the health and amenity of Merri Creek</p>	<p>2 April 2012</p> <p>Victorian Government places a first water order of zero gigalitres from the Wonthaggi desalination plant for the 2012 – 13 financial year</p> <p>23 April 2012</p> <p>Release of the Living Melbourne Living Victoria Implementation Plan: the final report from the Living Victoria Ministerial Advisory Council</p> <p>1 May 2012</p> <p>\$10 million to create the Office of Living Victoria, to reform the urban water sector and improve how we use water</p> <p>1 May 2012</p> <p>Victorian Government invests \$66 million to improve water management, establish Victoria as a world leader in liveable cities, improve the environmental health of Victorian waterways and provide mechanisms to understand and manage water resources</p>	<p>6 July 2012</p> <p>Water rebates extended to more Victorian households and small businesses by increasing rebates on products such as rainwater tanks and by making greater allowances for small businesses</p> <p>15 August 2012</p> <p>Announcement that the West Werribee Dual Water Supply Project will progress quickly to supply drinking water and Class A recycled water to housing developments currently underway (including Manor Lakes, Bluestone and Riverwalk) and also to the numerous open spaces across the Wyndham municipality</p>	<p>13 November 2012</p> <p>Victorian Government announces the development of a new framework for managing the state's groundwater resources</p> <p>17 November 2012</p> <p>Narre Warren recycled stormwater pilot project</p> <p>20 November 2012</p> <p>Release of the Precinct Structure Plan (PSP) for the East Werribee Employment Precinct heralds the first large-scale implementation of the Living Victoria policy and represents an important first step in the transformation of Melbourne's water cycle systems. The East Werribee precinct plans to harvest rainwater, stormwater and wastewater for non-drinking purposes</p> <p>27 November 2012</p> <p>Ending of Stage 1 water restrictions on 1 December 2012 is announced</p>	<p>2 December 2012</p> <p>Schools Water Efficiency Program, a voluntary program that allows schools to continuously track their water consumption through a water data logger and analyse the information obtained in the class room</p> <p>3 December 2012</p> <p>\$50 million Living Victoria Fund to support the development of integrated water cycle management projects across Victoria</p> <p>14 December 2012</p> <p>Opening of a new \$2.5 million fishway at Dights Falls in Abbotsford that will help to restore native fish populations in the upper reaches of the Yarra River</p> <p>See case study on page 87</p>	<p>26 February 2013</p> <p>Mount Evelyn stormwater reuse project: a two-year pilot developed by Yarra Ranges Council and Melbourne Water to dramatically reduce the amount of stormwater runoff and pollution entering the Little Stringybark Creek</p> <p>See case study on page 85</p> <p>13 March 2013</p> <p>Announcement of the appointment of a Project Control Board and Chair for the Victorian Coalition Government's \$1 million Living Ballarat project – the pilot project for developing an integrated water cycle management framework for Victoria's regional centres</p> <p>19 March 2013</p> <p>Victorian Climate Change Adaptation Plan adopted by the Victorian Government</p> <p>See box 2.3 on page 37</p>	<p>8 May 2013</p> <p>\$50 million to improve the management of Victoria's water resources and explore innovative ideas for future water management announced in the 2013-14 Victorian State Budget</p> <p>14 May 2013</p> <p>Announcement of a \$22 million upgrade to the Pakenham Water Recycling Plant to enable another 2,000 Victorian homes to use recycled water on their gardens and for flushing toilets</p> <p>Class A recycled water will initially be provided through purple pipes for all households in the Eden Brook, Amberlea, Cardinia Village, Aspect and Arena estates, as well as Caversham Waters and Devonia Park homes in the Lakeside Pakenham estate</p>	<p>July 2013</p> <p>Release of Melbourne's Water Future</p> <p>The release of this document builds on the excellent earlier work and contributions of the Ministerial Advisory Committee, water authorities, local government, and the wider Melbourne community</p> <p>Extensive consultation has informed this document, and further extensive consultation will be conducted prior to the finalisation of the strategy by the end of this year</p> <p>Living Victoria Fund Announcement</p> <p>Announcement of successful projects in the first round of the Living Victoria Fund</p>

A vision for Melbourne's water future



Vision

The Government's vision for Melbourne's water system is:

**A smart, resilient water system
for a liveable, sustainable
and productive Melbourne**

Objectives

Achieving this vision will take time. It will require a generational shift in thinking about how we use, plan, manage, value and cost our drinking water, stormwater and wastewater.

It is only by making this change that we can achieve the objectives of *Melbourne's Water Future* for an integrated and resilient water system, which is planned and managed to:

- support liveable and sustainable communities;
- protect the environmental health of urban waterways and bays;
- provide secure water supplies efficiently;
- protect public health; and
- deliver affordable essential water services.

What will our city be like in coming decades? A new approach to our water cycle, integrated with planning for land use, transport and other services and utilities, provides new opportunities for Melbourne. If we seize these opportunities in the right way, the result will be a very different city in 2050. Present-day Melbourne is dependent on a single centre and highly centralised water systems. In contrast, a future city with a number of key centres and more decentralised management of water will ensure more affordable water is available for the purposes we want to use it for.

In 2050 Melburnians will continue to have access to some of the highest quality drinking water in the world. This access will be retained through a combination of water efficiency initiatives, and making better use of rainwater, harvested and treated stormwater, and treated wastewater. Investing in these sources of water will substantially reduce, and potentially eliminate, the need for large scale additions to our drinking water supplies from big infrastructure projects like desalination plants and new dams.

Greater use of alternative and local water sources will reduce the costly need to transport water, wastewater and stormwater long distances across the city. The cost and energy savings from reduced transport of water in

combination with the elimination of large scale additions to our drinking water supplies will deliver long term savings to the community.

Overall, our water systems will be more robust and resilient, and there will be a wider range of options from which to source suitable water. Water users will have greater choice about the type of water services that they receive, and better information about the costs and benefits of their water management decisions. Increased use of decentralised water infrastructure will mean the community has greater opportunity to engage with and make decisions about water cycle services.

Droughts will continue to occur, but in 2050 Melbourne will have a portfolio of water services that means that the impact of low catchment inflows are less pronounced.

Greater use of the city as a catchment – keeping the water that falls on Melbourne in Melbourne – means that the impacts of urban development on flooding and the environment will be far less pronounced.

Affordable and resilient water cycle services will provide businesses with the opportunity to invest in the city, secure in the knowledge that the right water services will be available at a reasonable price and with clear rights and responsibilities. Where it makes economic sense, and public health standards can be

assured, the city's treated wastewater and stormwater will be used to grow food for the city, promoting local urban fringe agriculture.

In 2050 Melbourne will continue to be a great place to live. Water will play a crucial role in shaping the city and the local environment. Melbourne's streetscapes, parks, gardens and sports fields will be enhanced to help confirm Melbourne's status and reputation as one of the world's most liveable cities. Green open spaces will enable Melburnians to maintain their wellbeing and provide opportunities for communities to meet and connect.

Innovative local solutions to harvesting rainwater and stormwater will create new and exciting street, building and park landscapes which will distinguish Melbourne as a world leader in urban design for whole-of-water-cycle outcomes.

Our urban waterways and bays will become even more iconic features of Melbourne – they will be more attractive for recreational use and will support a vibrant bio-system including native fisheries and thriving populations of some of our most cherished native animals such as platypus, penguins and koalas.

Using different types of water in appropriate ways will maintain all these city assets for future generations in perpetuity.

Image opposite Elwood to Melbourne CBD bike path. Liveability and amenity outcomes are a key outcome from the whole-of-water-cycle management approach. Mitigating urban flooding is particularly important for suburbs like Elwood (see Flood conditions in the City of Port Phillip Council on page 65).

Key insights Melbourne's Water Future

BOX 1.4

- Melbourne is different everywhere
- The performance of the water cycle for Melbourne is driven by people and businesses at the local level
- Members of the community and businesses should be partners in strategies for water cycle management
- Melbourne generates more water than it uses
- Water management for Melbourne is dependent on the integrated water cycle
- Melbourne's water sector has demonstrated the capability and capacity to deliver innovative solutions
- Traditional water management is a transport logistics problem
- Water planning should count all costs of infrastructure – not just the cost of new infrastructure
- Plans for infrastructure should include the cumulative costs of water cycle services
- The timing of investment in water cycle infrastructure should be optimised – no more lumpy just-in-time investments
- The best time to save water is when it is raining
- The best solutions provide multiple benefits throughout the community
- Water cycle strategies should include continuous improvement to respond to the ongoing evolution of cities and communities



Whole-of-water-cycle approach 2



2.1 A water system in need of reform

Our water system faces a number of pressures that will steadily rise as Melbourne's growing population consumes more water, discharges more wastewater and increases the intensity of our stormwater runoff as more hard surfaces are built.

While improvements have been made to our water system over the years, our waterways and bays remain polluted. Our trees and parklands, although recovering, were weakened by the drought and many trees will die early due to that stress. In conservative estimates, urban flooding costs our city an average of \$230 million every year. Without a new approach, all these pressures will worsen and costs will continue to rise.

The current framework of policies, institutions and regulations is overly complex and reflects last century's model of managing, delivering and using water. *Melbourne's Water Future* strategy will simplify and streamline (i) the strategies currently governing policy and planning for Melbourne's water cycle, and (ii) other regulatory and policy instruments.

The current management model was set up in a different era and is centralised and expensive. While this approach suited earlier circumstances, it is no longer economically sustainable. It relies on transporting water long distances, at great cost, rather than using or reusing water available locally. It lacks transparency for consumers and taxpayers because minimal information is provided and costs are hidden. It provides very limited scope for competition and regional differences, and suffers from a range of other inefficiencies.

Through their water bills, Victorians are paying the price of building big infrastructure like the desalination plant, large-scale wastewater recycling and long transfer pipes. We can no longer afford the cost of pumping and piping water around Melbourne when we could be adopting lower cost and more environmentally friendly local options involving using and reusing the rainwater that falls on Melbourne.

In recent decades, we have focussed on big capital projects to add to our water supply. Further, a significant proportion of our spending in the water system is not on the supply of water, but on managing the wastewater created from our use of that supply, which is collected

and pumped to treatment plants. Collecting and pumping wastewater to the Western and Eastern treatment plants accounts for around 40 per cent of the total cost of water cycle services for the city.

Our approach to water and wastewater planning needs to change to rebalance our spending and make decisions based on an understanding of the whole water cycle, not just single components within that cycle.

The development of the new Metropolitan Planning Strategy provides an ideal opportunity to align our plans for a new way of understanding the water cycle with our thinking and plans for the future of the city.

Keeping and using the water that falls on Melbourne as rain makes good sense. More can be done to encourage rainwater use through clear and transparent water pricing that provides clear financial rewards over time.

System-wide, more effective use of Melbourne's rain will help to minimise price increases, improve the health of our waterways and bays, enhance our liveability and amenity, mitigate costly urban flood damage and help establish Melbourne as a world leader in whole-of-water-cycle management.

2.2 Generational change

This strategy recognises that past practices have sometimes not made best use of all the water resources – including rainwater, stormwater and treated wastewater – available in Melbourne.

Accessing and using all our water resources will be necessary to meet this strategy's objectives, reduce costs, reduce pressure on our stressed river systems, and remove any expectation of using water from other parts of the State where it is also needed for our farming and regional communities.

This is the first time that a strategy has been based on a clear and accurate understanding of the whole water cycle in and around our city.

Past investments in 'big capital' solutions are no longer suited to the growing size and population distribution across metropolitan Melbourne. It is also clear that some of the largest investments in the past decade were very costly. A better investment approach would make fuller use of the available information about the water cycle; more fully take into account interdependencies and the time value of money; compare a wider range of investment options; and reflect price signals for the value of water, including bulk water supply and discharges.

Today, we know much more about Melbourne's water cycle than ever before – how water moves through the landscape, the impact of buildings and built surfaces, the differences in rainfall and water use across the Greater Melbourne area, and how water can be better

managed. For instance, we now know that once hard surfaces exceed 2 per cent of the area of a catchment – as is the case for most of inner and middle Melbourne – the health of downstream waterways begins to be adversely affected.

Much of this knowledge comes together under the heading 'integrated water cycle management', an international term that refers to a more holistic approach to managing water.

Water cycle planning has traditionally been managed as five distinct areas: water supply; wastewater management; drainage and flood management; management of natural waterways (rivers, streams and groundwater) and management of our parks and green suburbs. In practice, each of these is part of a larger, interconnected system that spans multiple organisational, neighbourhood and regional boundaries. A fragmented management approach to separate parts of the water cycle does not fully consider the interactions within the connected system. Examples of these interactions include:

- Investment in water efficiency can change flows and pollutant concentrations in the sewerage system.
- A rainwater tank may be considered to be an expensive supply option if considered in isolation but becomes more cost-effective when the water supply, waterway and flooding benefits are considered.
- Rainwater and stormwater harvesting can also benefit programs to repair and enhance urban waterways.

- Increasing the use of stormwater to supply non-drinking water demands can reduce the need to invest in large-scale pipes and pumps to transport drinking water from Melbourne's catchments to service new residential and industrial developments.
- Reduction of stormwater runoff (for example through raingardens, swales and rainwater tanks) reduces pressure on wastewater and treatment plants.

Optimising the opportunities, risks and costs of meeting Melbourne's water services requires the linked consideration of all aspects of the water cycle. Failure to consider the whole water cycle in this way can result in poor investment decisions, higher costs and missed opportunities.

For example, basing investment decisions on averages of the metropolitan system and network can lead to costly distortions, missed opportunities and wasted investment. Modelling undertaken for the Living Victoria Ministerial Advisory Committee sought to quantify these costs, and found them to be highly significant.

The analysis underpinning this strategy is based on an innovative and world-leading systems analysis approach, which is the result of considerable investment in research and analysis over a number of years. This new approach acknowledges that there are considerable differences between the neighbourhoods and regions across Greater Melbourne.



Above Darling Street in East Melbourne is one of a number of stormwater harvesting projects devised by City of Melbourne. The raingardens divert stormwater from nearby drains and have the capacity to capture an estimated 21 million litres of stormwater each year. See case study on page 57.

Key system influences

Growth

Melbourne is currently growing by 1.8 per cent per year and its population is predicted to grow by about 60 per cent between now and 2050 – to about 6.5 million. Coupled with forecast economic growth, the demand on our water system will intensify, requiring a new approach that makes the best use of our whole water cycle, and optimises investment.

Capital constraints

Globally, public sectors are facing intense fiscal constraints. Resources for public investment were never infinite, but today more than ever they are scarce. In a fiscally constrained environment, it is crucial that investment decision making is built upon clear and transparent systems analysis, innovative and efficient investment, and a clear long-term vision owned by the community.



Climate

Ours is one of the most variable climates in the world; this variation occurs over time and across the metropolitan area and water supply catchments. This variability manifests in significant differences in rainfall and catchment inflows. The volume of water flowing into Melbourne’s dams varies with rainfall and temperature, and this variation is considerable. For example, between 1967 and 2011 inflow into Melbourne’s dams averaged 515 GL per year, but ranged from a low of 176 GL to a high of more than 800 GL. A change in global temperatures is predicted to exacerbate this variation.

Community

Drought has raised awareness and public consciousness about the value of water. Price increases have also affected the way Melburnians value water. It is clear that our community now wants an engaged and meaningful role in planning and decision making about the future of our water cycle. Despite the complexities of our water cycle and management arrangements, much of what needs to be done is clearly understood as necessary action – because ignoring the systemic problems won’t work. Recent research into community attitudes towards Melbourne’s water management demonstrates the community’s positive

reception to whole-of-water-cycle management, because it provides a way for communities to be actively involved in the management of their local water. The research demonstrates that Melburnians are engaged with the need to save water and are eager to identify ways to help focus their thinking about the importance of water (JWS, 2013). Melburnians want to be empowered to be a part of the solution. *Melbourne’s Water Future* makes clear and unequivocal commitments to the active engagement of community at local, regional and metropolitan levels.



2.3 Setting the scene – Government Institutional Arrangements

This strategy proposes key reforms to the complex institutional arrangements for Melbourne’s water cycle. The reforms will clarify roles and boundaries, increase competition, and focus public agencies on increasing productivity and reducing cost pressures. Public ownership of the water supply and wastewater system will remain, but the wider range of organisations which are involved in managing the water cycle will be fully engaged in water planning for the first time.

2.4 The cost of transporting water

In metropolitan Melbourne there are 178 water pumping stations, 27,220 kilometres of water pipes, 447 sewerage pumping stations and approximately 25,000 kilometres each of sewerage pipes and stormwater drains. There are also 1,062 kilometres of large water distribution mains, 214 kilometres of aqueducts and 391 kilometres of main or trunk sewers in greater Melbourne. A conservative assessment identifies the written down value of these capital assets as approximately \$19.4 billion (National Performance Report 2010-11 – Urban Water Utilities, National Water Commission and Water Supply Association of Australia, 2012). In addition, the estimated asset value of local government stormwater infrastructure is greater than \$11 billion.

Building, renewing and operating infrastructure to transport large volumes of water, wastewater and stormwater over long distances is one of the most expensive and energy intensive aspects of the water cycle. For this reason, Melbourne Water is one of the state’s largest energy users. Moving water, wastewater and stormwater across the city involves a range of increasing challenges.

The bulk of Melbourne’s water is captured in water supply catchments in the north east of the city and distributed via major storages using

large transfer pipes and pumps. While much of the water system is gravity-fed, pumping water is a major cost to the system.

Supplying to different areas of the city requires the transportation of water across significant distances.

For example:

- The South Eastern suburbs of Melbourne receive water from Cardinia Dam. In addition, some of the far south suburbs and the Mornington Peninsula are supplied from Tarago Dam. The transfer distances for water to this part of the city can be greater than 61 kilometres;
- The Eastern suburbs of Melbourne are supplied from Silvan Dam, involving transfer distances of greater than 26 kilometres;
- The Western suburbs receive water that has been transported from Silvan Dam to Greenvale across distances that can be greater than 62 kilometres; and
- The Northern and Central suburbs receive water from Sugarloaf Dam that includes transfer distances of over 62 kilometres.

Figures 2.1, 2.2, 2.3 and 2.4 on pages 24 and 25 demonstrate water cycle transfer distances and elevations, and the infrastructure required.



Water transfer distance, example

FIGURE 2.1



Wastewater transfer distance, example

FIGURE 2.2



Water and wastewater transfer elevation examples

FIGURE 2.3

Melton gain in elevation 1144m



Manningham gain in elevation 543m



The distance and changes in elevation throughout each transfer were measured by combining a digital terrain model with the water and wastewater distribution networks as shown (for example) above for water transfers to Melton and wastewater transfers from Manningham. The figure shows that the transfer of water from Silvan Reservoir to Melton in the trunk water network includes an average distance of 61.9 km and a cumulative increase in elevation of 1144 m. The figure also shows that wastewater from Manningham is transferred across a distance of 64.9 km (Western Treatment Plant) with a cumulative increase in height of 543 m. Transfers of water and wastewater across Melbourne’s terrain is dependent on both gravity and pumping.

Infrastructure for transporting water and sewerage

FIGURE 2.4

Water pumping stations	178
Water pipes	27,220 kms
Sewerage pumping stations	447
Sewerage pipes	25,000 kms
Stormwater drains	25,000 kms
Large water distribution mains	1,062 kms
Aqueducts	214 kms
Large sewer mains or trunk sewers	391 kms
Value of these capital assets	\$19.4 billion

Costs Wonthaggi desalination plant

BOX 2.1



On 2 April 2012, the Minister for Water, Peter Walsh, announced that the Victorian Government had placed a first water order of zero gegalitres (GL) from the Wonthaggi desalination plant for 2012-13. Had an order been placed for 2012-13, it would have cost an extra \$25 million to purchase 50 GL from the plant, and an extra \$109 million to purchase 150 GL.

Water orders are based on a range of factors including the cost to customers and the need to manage water security through the analysis of supply and demand, water storage levels and management, and a range of future weather scenarios.

The cost of purchasing water from the plant is in addition to the holding charge. As of 18 December 2012, a \$1.8 million per day holding charge commenced. This payment is required whether or not any water is purchased.

2.5 Cost pressures and transparency

Adopting a whole-of-water-cycle approach will minimise future cost pressures from the water system, by reducing demand for additional infrastructure, and enabling large-scale future investments to be deferred or scaled down.

Melbourne's Water Future will make the costs and benefits of the water cycle more transparent by:

- More frequent reporting of water system costs, performance and outcomes. Currently, reporting is limited to annual updates containing information on storage levels, water use, seasonal climate forecasts, the status of any restrictions, and a summary of current activities. *Melbourne's Water Future* will establish a program of regular updates of additional – and more detailed – information, including key insights and progress towards the Living Victoria vision, data on water use patterns and water efficient appliance uptake, local water cycle performance goals and performance against these, and the composition of stormwater. These regular information updates are in addition to the annual reporting in the 'Water Outlook' (see Initiative 3.1.5).

- More comprehensive information in consumers' water bills, to help customers better manage their water use, and provide better disclosure to prospective purchasers of the water efficiency properties of new buildings.
- Wider consideration and reporting of important external costs and benefits, such as the cost of the adverse environmental impacts of stormwater runoff and flooding. For example, analysis shows that reductions in stormwater runoff volumes of up to 65 per cent more than in a business as usual scenario are possible by 2050. Similarly, a whole-of-water-cycle approach offers total annual reductions in nitrogen loads of at least 462 tonnes per year (including reductions in stormwater of 158 tonnes per year and wastewater discharge reductions of 304 tonnes per year), and possibly considerably more.

2.6 Reducing costs

The Living Victoria Ministerial Advisory Committee systems analysis provides a conservative estimate of total savings to 2050 in the order of \$6 billion to \$7 billion (net present value) compared with business as usual, equivalent to an approximate 10-15 per cent reduction in annual water sector costs. Over and above these savings, significant

environmental and amenity benefits are expected to accrue from the new approach, as are efficiency gains from economic reform and the wider take-up of a whole-of-water-cycle approach.

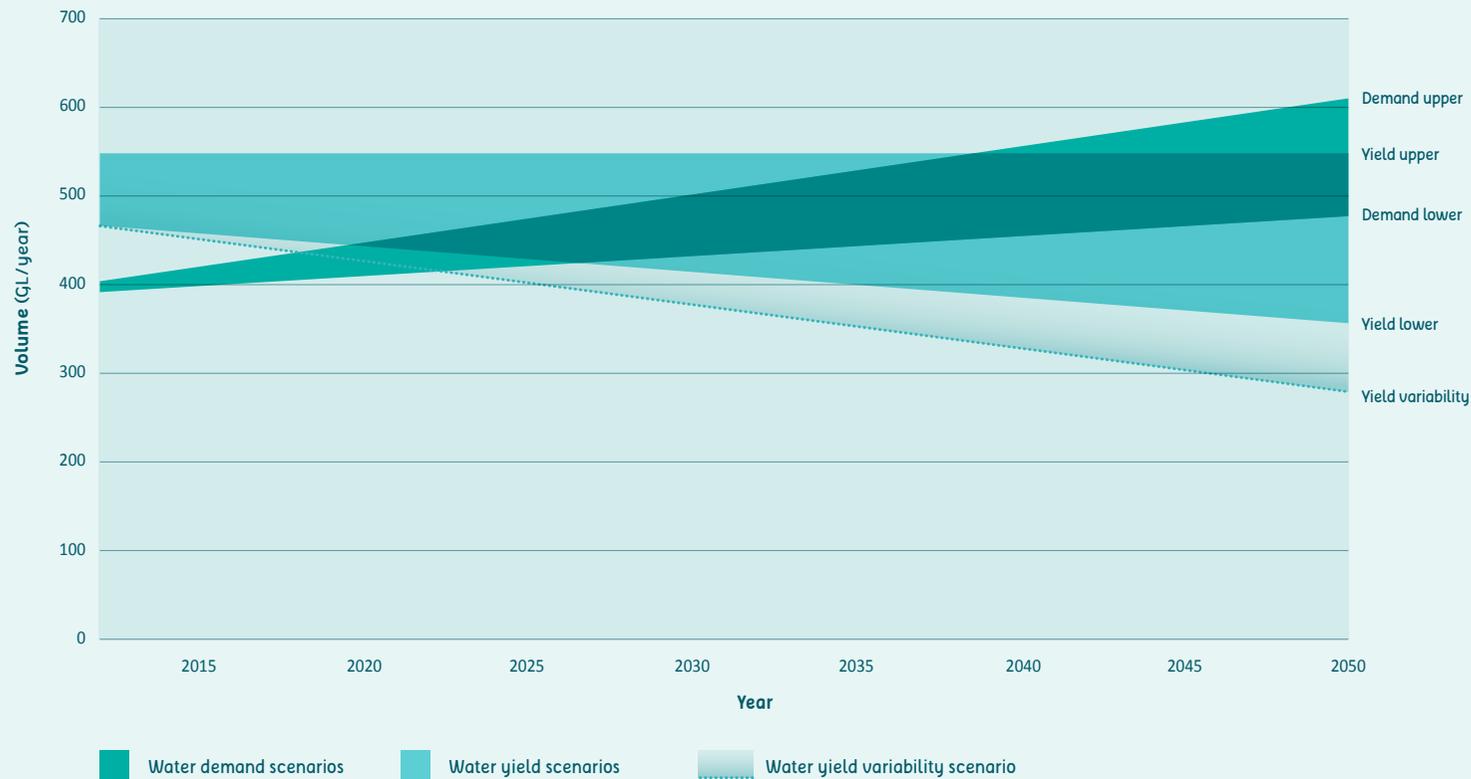
Based on that systems analysis, adopting an approach that optimises local water cycle management is also expected to achieve the following outcomes for Greater Melbourne:

- Up to 35 per cent reduction in energy use in the water sector, with emissions savings of up to 1 million tonnes of carbon dioxide by 2050;
- Up to 45 per cent reduction in mains water demand, up to 30 per cent reduction in wastewater discharge, and significant reductions in the variance or 'peakiness' of system flows;
- Healthier waterways due to reductions in nutrient discharge of between 12 – 20 per cent (4760 – 8250 tonnes), with up to 40 per cent reduction in stormwater runoff volumes; and
- The inclusion of further measures – including holding stormwater in the landscape for amenity and liveability purposes – can reduce stormwater runoff volumes (generated by urban areas) by greater than 70 per cent.

Figure 2.6 on pages 28 and 29 shows water cycle service costs and the way differences across Melbourne translate into cost variations.

Uncertainty and variability of water supply and demands without future augmentation of supply

FIGURE 2.5

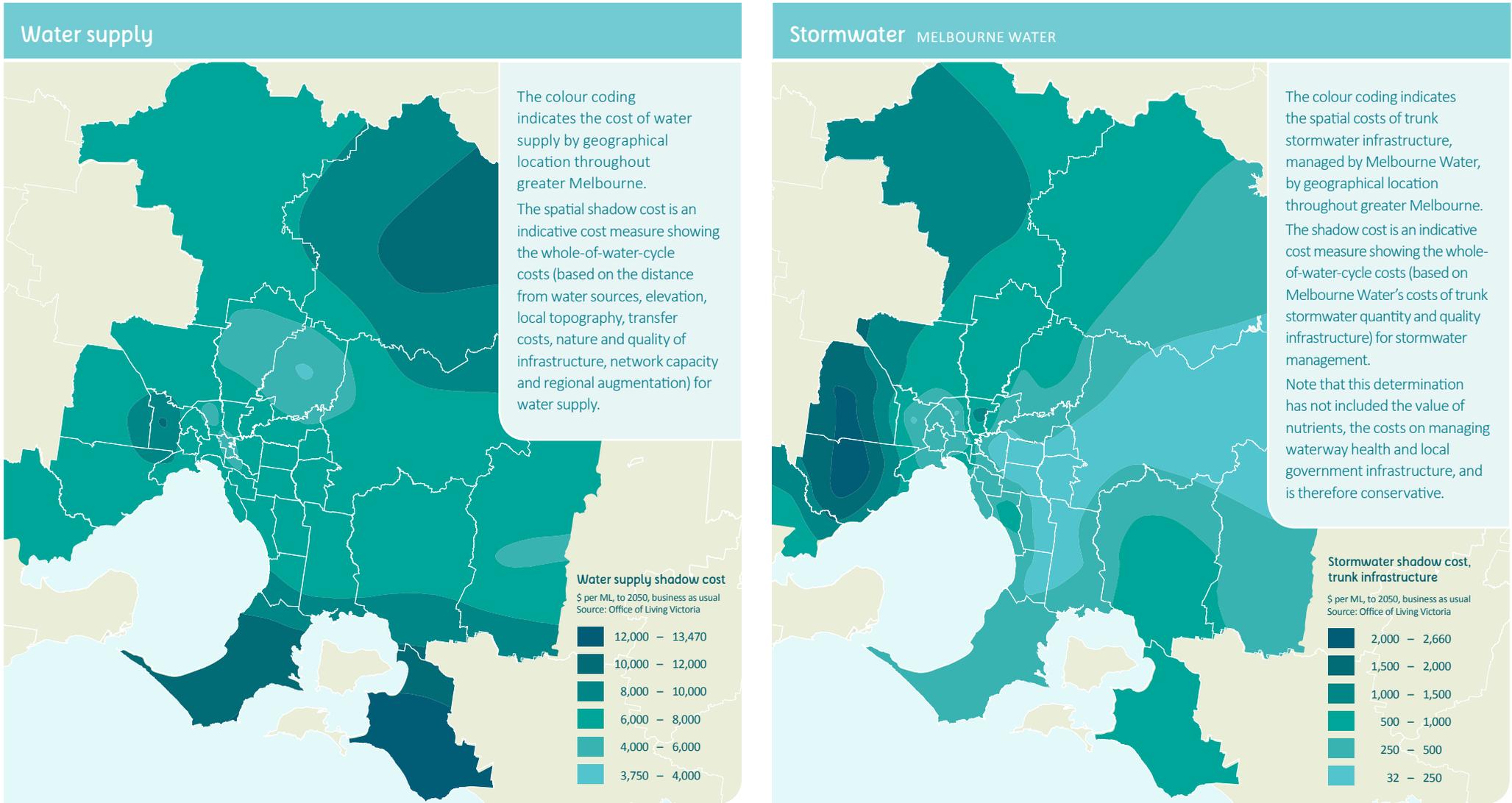


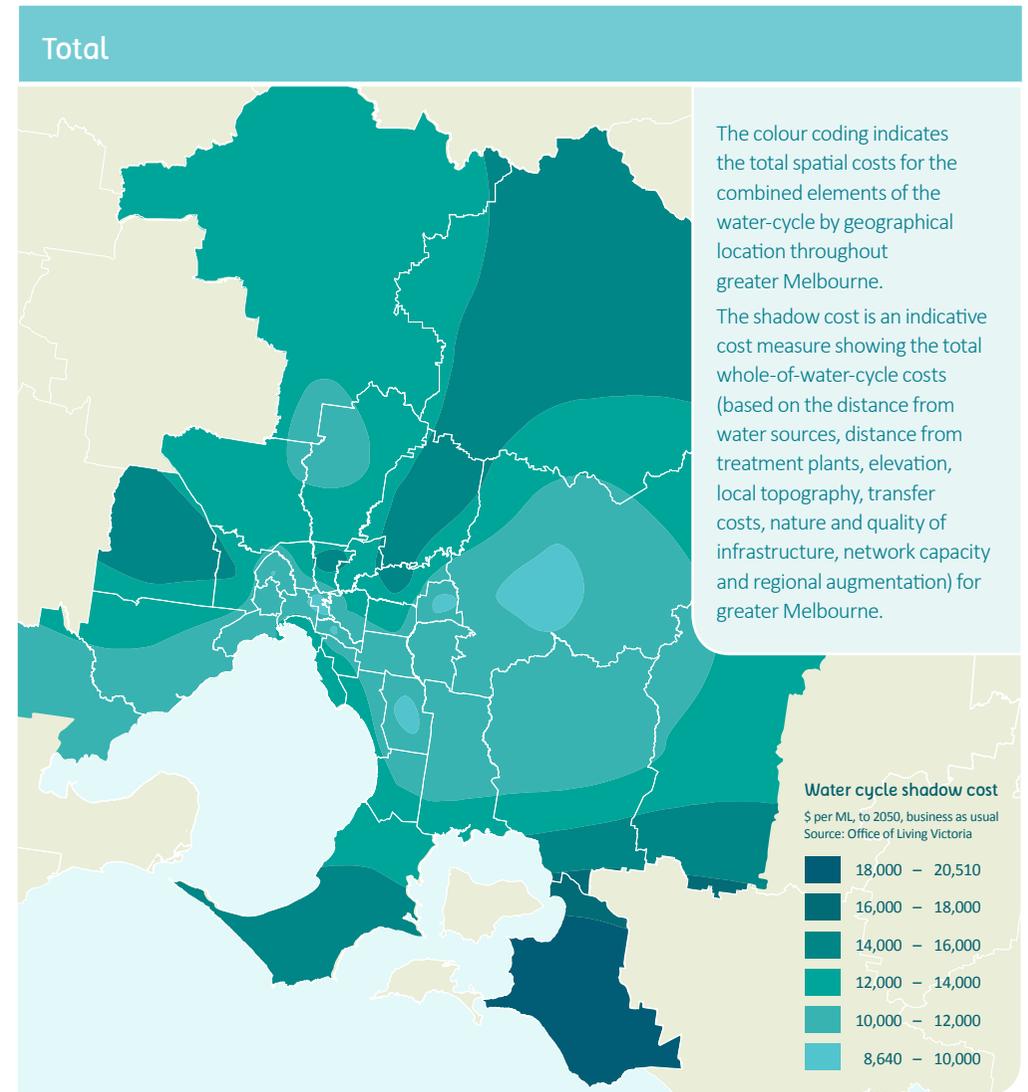
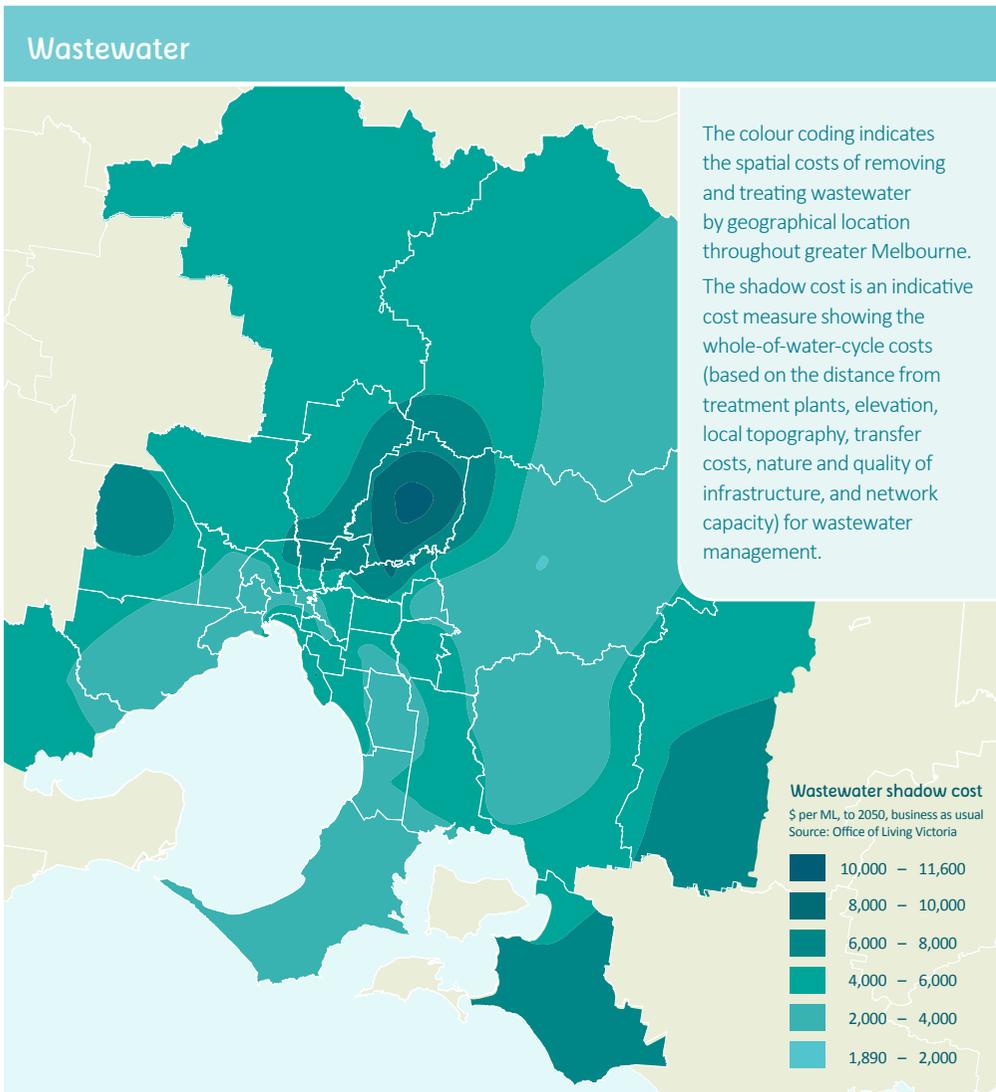
The figure outlines the uncertainty of water supply yields from Melbourne’s water supply system, that is subject to natural variability and the potential impacts of climate change. The lower limits of yield are generated by the high emissions scenario published by the IPCC. The water supply system includes all regional water storages and the Wonthaggi Desalination Plant, and only uses the North South Pipeline when the volume of water in regional water storages is less than 30 per cent. The demand results include all drinking water demands from all areas throughout the region that source water from Melbourne’s water supply. A range of water demands is described by population growth of 0 to 2 per cent. In addition, the worst case yield scenario accounts for a combination of increasing variability of inflows to dams and the impacts of climate change. The figure highlights that variability of water supply and population growth create significant uncertainty about the security of future water supplies.

The yields from the water supply system have been derived using the Integrated Systems Framework as the balance of inflows from streams, supply from desalination, environmental releases, evaporation, losses in the headworks network and regulatory allocation of reserves for irrigators and other users.

Water cycle services costs Differences across Melbourne translate into differences in costs FIGURE 2.6

Cost variability across Melbourne and between water cycle systems







2.7 Water cycle planning

Our approach to water cycle planning needs to change. The development of the new Metropolitan Planning Strategy provides an ideal opportunity to align our plans for a new way of understanding, managing, planning our water cycle with our thinking and plans for the future of the city (see section 3.2).

The Living Victoria systems analysis and 40 year forward look will inform the development and publication of a new water cycle planning framework for metropolitan Melbourne to include an outline of current and future required citywide infrastructure, guidelines to provide a template for regional and local planning and overall pricing principles for the system.

The framework will initially guide the development of regional water cycle plans in metropolitan Melbourne. These regional plans will involve the Office of Living Victoria, Melbourne Water, the relevant water authorities, planning authorities, local

government authorities and other organisations such as VicRoads, Parks Victoria, major regional institutions such as universities and relevant business and community organisations. The regional plans will be informed by the growth area water cycle plans currently in development in those regions with significant future growth on the fringes of the city.

At the local level, the Office of Living Victoria will support local governments to design local water cycle plans that align with the framework and are consistent with the regional plans. Each level of planning will have a ten year timeframe with detailed three year implementation plans for local and regional plans to be updated regularly.

The proposed water cycle planning will take place within current pricing principles and the projected resources and expenditure of relevant organisations. The plans will include goals for reduced use of drinking water, reduced wastewater to treatment plants, increased use of alternative local water sources and reduced peak flows and pollutants in waterways.

Left Melbourne's Water Future seeks to incorporate whole-of-water-cycle management principles into the initial stages of planning for all new suburbs. These approaches will be tailored to the specific geography, rainfall patterns, demographic needs and wastewater issues particular to individual suburbs, rather than adopting a one-size-fits-all approach. Designing new suburbs with the water cycle in mind makes for healthier, happier, more liveable communities.

This figure shows the jurisdictional boundaries of those water authorities that are in or adjacent to the greater Melbourne region. Note that this figure does not include the jurisdiction of Southern Rural Water, which operates as the rural water manager for Southern Victoria.

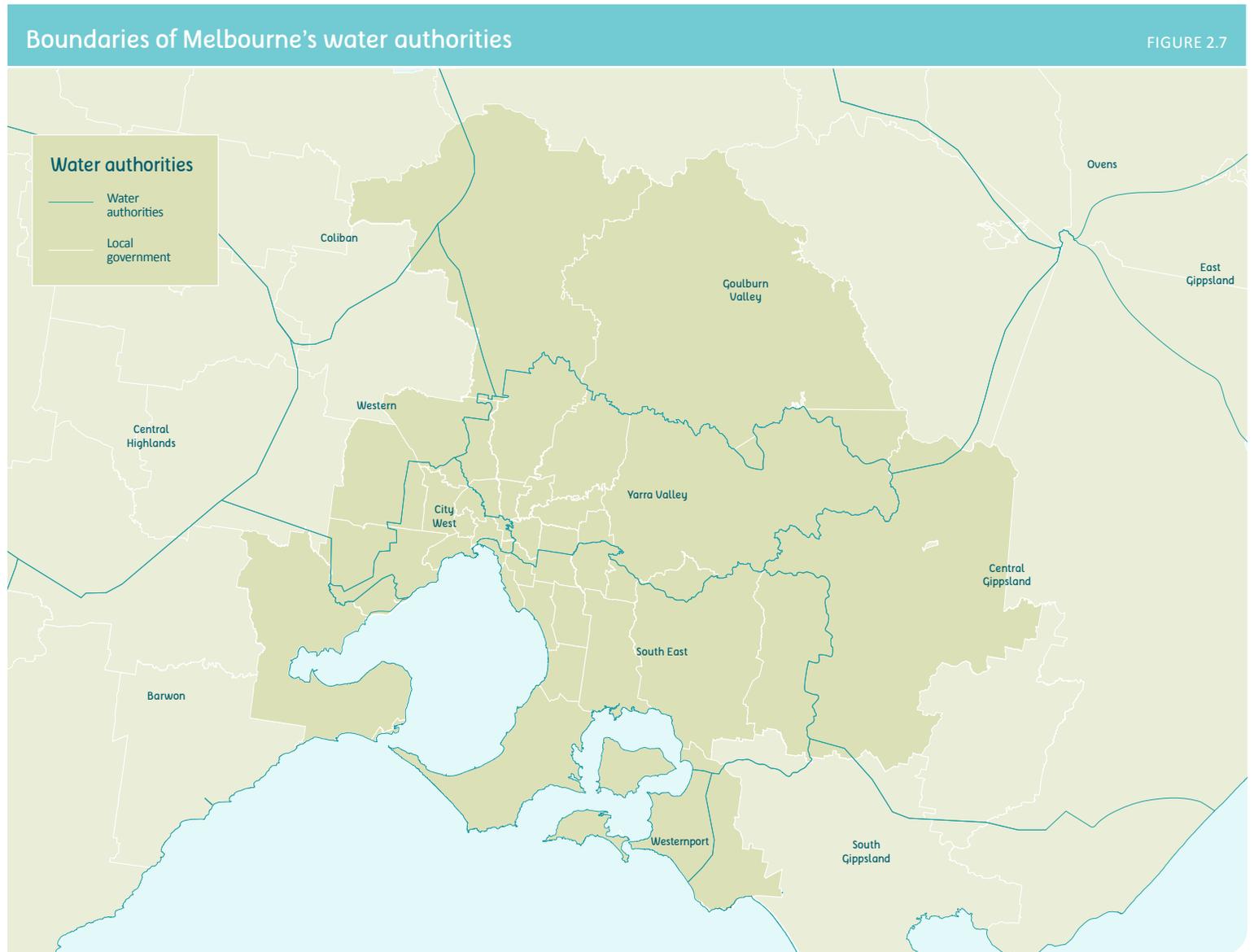


FIGURE 2.7

2.8 Melbourne's water system

2.8.1 Water supply

In Melbourne's water supply system, there are 157,000 hectares of protected catchments in the Yarra Ranges, 10 water storage dams, 1,062 kilometres of water distribution mains, 27,220 kilometres of water pipes, 214 kilometres of aqueducts, 65 service reservoirs, 178 major water pumping stations and 42 water treatment plants including two large plants at Winneke and Tarago.

Currently, the bulk of the water used in Melbourne is piped in from our forested water catchments.

Our protected or 'closed' catchments provide good drinking water that still requires some filtration and treatment. Water from these catchments is stored primarily in the Thompson, Upper Yarra and Cardinia Dams along with a number of smaller reservoirs.

Some of Melbourne's drinking water comes from open water catchments where farming and other activities are allowed. Water from these open catchments is stored primarily in Sugarloaf and Tarago Reservoirs, and is filtered and treated to bring this water to the quality required for drinking.

The cost of transporting water – including pumping it over long distances and high elevations – is substantial. Additionally, the 60 year design life of the pipes and commensurate maintenance and replacement costs, adds to cost pressures and concerns about vulnerability to supply interruptions.

Because we live in one of the most variable climates in the world, the volume of water in our catchments varies considerably from year to year. In addition to the bulk water supply in our dams, we also use water from alternative sources such as:

- Up to 30 GL per year of groundwater licensed for private use;
- About 50 GL per year of recycled water from the Eastern and Western treatment plants, with an additional 35 GL released into wetlands or used in the treatment process; and
- About 5 GL per year of stormwater and rainwater, including water collected from the 30 per cent of new households now with rainwater tanks installed.

An additional 150 GL per year is now available for purchase from the newly commissioned Wonthaggi desalination plant – although the cost of this water is high because it includes the costs of constructing and financing the plant and paying for any water we use from the plant (as detailed in Box 2.2: Wonthaggi desalination plant). We will also need to factor in the additional cost of increasing our electricity generation capacity, because the desalination plant is highly energy intensive.

The likelihood of using water from the North-South Pipeline is very low, because taking water from other areas of Victoria which also need the water is a short-sighted solution. It is not acceptable to take water from one drought-affected area to supply another. The Government has committed to only use water

from this source in times of critical human need, when there is sufficient water in the Goulburn system and when Melbourne's storages are below 30 per cent on 30 November.

2.8.2 Water consumption

During the recent drought, Melbourne's residents and businesses substantially curtailed their water consumption. In the period 2000-01 to 2010-11, overall annual drinking water consumption in Melbourne dropped by approximately 30 per cent, from 500 GL to 343 GL per annum.

During this period, household consumption (which accounts for 63 per cent of Melbourne's drinking water use, and comprises mainly garden watering, showers and baths, toilets, taps and clothes washers) dropped by about 40 per cent from 247 to 146 litres per person per day. Without this reduction in consumption, Melbourne's drinking water supplies would have run dry.

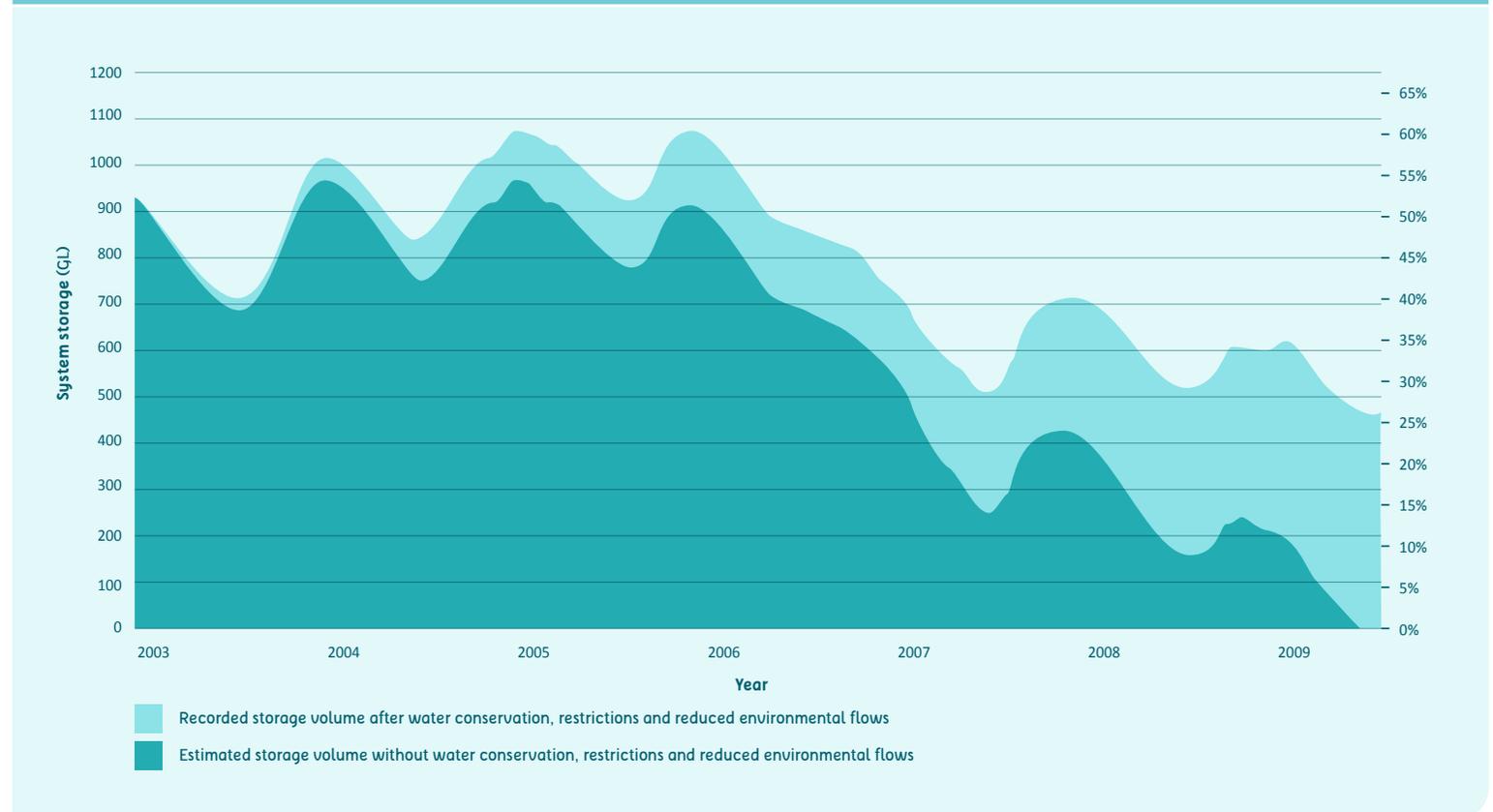
Non-residential water use accounts for 26 per cent of Melbourne's drinking water use, and comprises water for small and large businesses, schools, hospitals, universities, parks and sports grounds.

This category of water use dropped by approximately 35 per cent from 138 GL to 89 GL in the same period.

The remaining 11 per cent of Melbourne's drinking water use is categorised as 'non-revenue water' – this includes loss of water from mains bursts and leaks, water used for fire-fighting and mains flushing, and water theft.

Water use reduction in the drought

FIGURE 2.8



This figure demonstrates that the water savings made by Victorians during the recent drought helped prevent Melbourne from running out of water.

These non-revenue drinking water uses reduced by 40 per cent during the drought – from 60 GL to 36 GL.

Future consumption will increase: it is not a case of if this will occur, it is by how much as our city grows. Consumption will also vary, as it always has done, according to a mix of factors including temperature – for example, a hot summer will always cause a spike in use – and behavioural norms and expectations of the time.

By 2050, Melbourne’s population is predicted to grow by about 60 per cent – from 4.1 million to about 6.5 million – and our current water system will not be able to cope with the anticipated level of demand. Either we must change how we plan and manage our water cycle, or we will have to invest in the high cost of two new desalination plants or additional dams before 2050 to feed our supply. Without action now, the first of these two new plants could, in some scenarios, be needed some time within the next 15 years.

The price impacts on consumers associated with these kinds of big infrastructure projects are beginning to flow through to water bills. Water users will continue to be frustrated and dissatisfied with the big infrastructure approach when the costs of building, operating and generating electricity to power energy intensive solutions are being absorbed by water users.

Melbourne residents have already demonstrated their willingness and capacity to change behaviours and reduce water use. At the same time, water users have a reasonable expectation that the restrictions and behaviours

adopted in the drought will ease in non-drought periods; and that we will learn from past experience to introduce new ways to approach our water cycle, to avoid having to adopt the severity of restrictions that were formerly needed to prevent our water supply from running dry.

2.8.3 Wastewater

Wastewater (or sewage) is the by-product of our water use and is one of the most expensive components of our water cycle. Collecting and pumping wastewater to the Western and Eastern treatment plants, which treat approximately 90 per cent of Melbourne’s wastewater, accounts for around 40 per cent of the total cost of water cycle services for the city.

Experience from overseas shows that treated wastewater can provide a reliable supply of alternative water where public health concerns are adequately addressed and community acceptance is achieved. And smarter use of by-products – such as biogas and sediments – can reduce the costs associated with this part of the water cycle. As an example Melbourne Water has been using biogas to generate energy over the past two decades.

As with our water supply network, our wastewater system relies on an extensive network of pipes and pumping stations. Melbourne’s sewerage system currently consists of 25,123 kilometres of sewer mains (pipes), 447 sewerage pumping stations and two main treatment plants: the Eastern Treatment Plant at Bangholme and the Western Treatment Plant at Werribee.

The high costs and energy use associated with transferring our wastewater over long distances underlines the importance of small scale wastewater treatment plants to provide a valuable, reliable – and local – alternative supply for a variety of purposes.

In 2010-11, Melbourne Water treated a total of 325,308 million litres of sewage – about 44 per cent at the Eastern Treatment Plant and 56 per cent at the Western Treatment Plant. This total flow is comparable to the volumes experienced in 2004-05, before the recent drought.

One of the most significant challenges in our wastewater management is wet weather sewage overflows. In high rainfall events – such as the floods of February 2005 and 2011 – stormwater runoff enters the sewerage mains (through manholes, cracks and joins in terracotta pipes, connection points, cross-connections with drainage pipes, and illegal connections). When the capacity of sewerage infrastructure is exceeded, sewage overflows into metropolitan creeks and waterways through many overflow points throughout Melbourne.

To minimise these events, up to 75 per cent of the capacity of sewerage mains is dedicated to handling stormwater that enters the system. The system has been designed, consistent with national guidelines, to cope with 1 in 5 year flood levels. This, however, is simply not capable of managing the heavy or intense rain that falls in Melbourne from time to time. Moreover, as urbanisation increases and there are more hard

surfaces channelling stormwater into our drains, these floods will become more regular and severe unless mitigation action is taken. This could include, for example, reducing the amount of stormwater flowing into our drains by the use of rainwater tanks, raingardens and swales, or significant new effort to keep the two systems – stormwater and wastewater – separate.

Based on the systems analysis for the Living Victoria Ministerial Advisory Council, the estimated total cost of stormwater entering Melbourne's wastewater system is in the order of \$10 billion to \$15 billion (net present value, to 2050). This cost reflects the impacts on operation, energy costs, renewal and design of infrastructure, but does not account for the cost of additional adverse impacts on the health of our waterways.

2.8.4 Stormwater

Stormwater runs off our city's hard surfaces such as roofs, roads and footpaths. This water is channelled through drains and typically flows into rivers and creeks and eventually into Port Phillip and Westernport Bays.

Melbourne's stormwater outflows vastly exceeds pre-settlement levels, and these outflows will continue to increase with a traditional approach to urban development, which contributes to excessive stormwater runoff that carries pollutants to waterways. Through an improved understanding of the ecological needs of our urban waterways we know that stormwater runoff needs to closely

mimic natural flow patterns both in terms of quantity and the timing of inflows, and that pollution loads need to be reduced.

Traditional drainage systems are designed to convey even the smallest rainfall volumes as quickly as possible to receiving waterways. In contrast, natural systems intercept and filter rainfall, allowing for a slow runoff to receiving waterways. In a natural system, excess water falling on a catchment soaks into the ground where it contributes to recharging groundwater levels and waterway flows. Only on rare occasions does direct surface discharge to creeks and streams occur.

Directing more runoff to streams through a pipe network increases levels of erosion as greater volumes of water arrive more quickly. Ecological processes required for the establishment of healthy flora and fauna are disrupted by increased frequency and volume of flows.

In a similar way, stormwater contributes to flooding; runoff generated from impervious surfaces is conveyed through the drainage network. Where there is insufficient capacity in the network there is a risk of flooding. A traditional approach to drainage management would require an increase in network capacity to convey stormwater, leading to outcomes that undermine the ecology of our waterways.

An alternative approach which seeks to manage the various stormwater objectives of flood reduction and waterway protection requires strategies that reduce the volume of

International use of treated and recycled water BOX 2.2

Melbourne's Water Future proposes substituting drinking water with treated stormwater and recycled wastewater, but only for purpose such as flushing toilets and watering our parks and gardens. Some other jurisdictions go further, using treated wastewater either directly or indirectly in the drinking water supply.

Singapore

Singapore currently imports water from Malaysia, and this agreement ends in 2061. As a way towards having a long term strategy, Singapore built a water-reclamation plant that produces treated water that it calls NEWater. About 15 per cent of Singapore's water demand is met by NEWater, mostly for commercial and industrial sectors. Less than one per cent of drinking water supply is augmented by recycled water.

Orange County, California

The main source of water supply was groundwater. However, by the late 1950s, increased development and agriculture drained the groundwater level to such an extent that it was below sea level. After evaluating different options, the county decided to use recycled water and to inject deep-well water into the coastal barrier. Initially the recycled water, produced by a pilot recycled scheme called Water Factory 21, was blended and injected into multi-point injection wells forming a freshwater mound to stop saltwater intrusion into the groundwater. It was then expanded

to increase the groundwater recharge. A new purification plant built in 2007 supplies water for groundwater recharge.

Berlin, Germany

Surface water lakes are recharged with treated effluent. This surface water is then used to artificially recharge aquifers, which are used as a drinking water supply.

Johannesburg, South Africa

In the inland areas of South Africa the return of wastewater flows to rivers has been considered an important part of water management. For example, up to 50 per cent of flow in the Hartebeespoort Dam is recycled water and this dam supplies Johannesburg with drinking water.

Las Vegas, United States

The Las Vegas Water District extracts 360 GL per year from Lake Mead (Hoover Dam), which is near the limit of its entitlement. The district secures its water entitlements by receiving credits for returning 180 GL per year of wastewater to the lake.

London, United Kingdom

Around 360 sewage treatment plants discharge treated water into the Thames River upstream of the London water supply taken from the river.

Right Main Yarra Bike Trail, which runs along the Yarra River from Melbourne's CBD to Templestowe in the city's north east. During periods of heavy rain, the Yarra's water levels increase dramatically, causing sections of the trail to flood and become impassable. The hundreds of cyclists who commute to work along the trail must then find alternative cycling routes.



stormwater (through harvesting) and manage flows. Such an approach will contribute to multiple benefits:

- a secure and plentiful source of alternative water for non-drinking uses, to substitute for our high cost drinking water;
- improved environmental health of our waterways, bays and associated biosystems;
- reduced urban flooding, particularly as more households are exposed to increasing risk as the volume of runoff increases; and
- improved amenity through greening our city and making our waterways and bays more attractive to wildlife and to recreational users.

2.9 Setting the scene – history

Drought has always been a key driver of the urban water cycle and shocks such as flood, fire and drought have always tested the resilience of our water system.

How water has been managed in Melbourne has changed significantly over time. In the late nineteenth and early twentieth century, Melbourne's water system was essentially about supplying safe drinking water, removing sewage and disposing of stormwater as quickly as possible. In the second half of the twentieth century, the focus of water management began to shift towards flood protection, management

of environmental damage and social amenity, including improvements in stormwater management through urban planning.

In the first decade of this century, the approach has shifted towards water sensitive urban design and shared benefits.

This strategy heralds a new approach for the future based on whole-of-water-cycle management and planning, use and reuse of all sources of Melbourne's water, and improved environmental and liveability outcomes.

This approach builds on the strengths, innovation and forward thinking of past approaches and relies on learning the lessons of the past 200 years.

Victorian Climate Change Adaptation Plan

BOX 2.3

The Victorian Climate Change Adaptation Plan was adopted by the Victorian Government in March 2013.

In releasing the Plan, the Minister for Environment and Climate Change, the Hon. Ryan Smith MP, explained that the key to the plan was integrating climate risk planning into policy settings and existing risk management strategies, across all portfolios and regions of the state.

The Plan outlines actions being taken to manage risks across Victoria's essential public infrastructure and services, natural assets and natural resource-based industries; and quotes projections in the Victorian Government's Report on *Climate Change Science and Greenhouse Gas Emissions in Victoria* (March 2012) including reduced average rainfall and stream flows, fewer and heavier rainfall days and an increased risk of floods and droughts.

Among other things the Plan notes that:

- Recent events (such as heatwaves, drought, bushfires and flooding) are consistent with scientific understanding of conditions that may be more likely in a warmer world, compared to natural variability. However, it is very difficult to identify the specific causes of individual extreme weather events.

- The recent drought (1997 – 2009) demonstrated the need for a diverse portfolio of water supply options, including non-climate dependent sources, to ensure that Victoria is prepared for a range of future climate scenarios.
- Reductions in rainfall combined with warmer temperatures are likely to increase the frequency of drought in Victoria over the coming years.
- Increased incidence of heavier rainfall events may create risks of river flooding, flash flooding and storm damage.
- The Metropolitan Planning Strategy is being framed to adopt environmental resilience as a fundamental principle and this incorporates consideration of flooding and other physical hazards as part of planning the city's growth and development.
- The Government's *Living Victoria* program centres on a new integrated approach to managing urban water systems and making the most of all the water available in Melbourne and Victoria's regional centres. By accessing all water resources available in Melbourne, the city will reduce its reliance on water from other parts of Victoria – from irrigation and regional communities. It also reduces pressure on river systems.

- The Office of Living Victoria's reform agenda includes reducing the amount of stormwater runoff from urban areas, which can contribute to a reduction in the risk of localised nuisance flooding.
- Measures to ensure water sustainability can also yield complementary benefits, for example the Gippsland Sustainable Water Strategy helps to address risk to electricity generation in the Latrobe Valley from a reduced water supply.

The Climate Change Adaptation Plan also identifies the following new policy frameworks for urban water management:

- Increase the resilience of the urban water system to maintain the liveability, sustainability and productivity of Melbourne and Victoria's regional centres.
- Drive integrated water cycle management to increase use of alternative water sources and reduce the negative environmental impacts of stormwater on receiving waterways.
- Amend the Victoria Planning Provisions to apply current performance requirements for managing stormwater in new residential subdivisions more broadly to other types of urban development.

Case study



Guilfoyle's Volcano, Royal Botanic Gardens working wetlands project

In 1876 William Guilfoyle, the second Director of the Royal Botanic Gardens Melbourne, oversaw the construction of a bluestone reservoir at the highest point of the Gardens. The reservoir was styled in the form of a volcanic crater to provide gravity-fed irrigation for the Gardens.

Guilfoyle's Volcano was the main water supply for the gardens for about sixty years until it fell into disrepair. With support from a \$2.25M grant from the Myer Foundation (of which \$1.2M went towards the restoration of Guilfoyle's Volcano), it has now been restored as one component of a significant water management program, the Working Wetlands project.

The project aims to reduce reliance on drinking water for landscape irrigation by up to 40 per cent, improve water quality in the lakes, reduce bluegreen algal blooms, increase wetland habitat for waterbirds, frogs and other aquatic fauna, and reduce 'dirty' stormwater flows into the Yarra River and Port Phillip Bay.

The innovative project works by diverting stormwater from local streets through gross pollutant traps to the Nymphaea Lily and Ornamental Lakes. Specially designed floating island wetlands 'clean' the water as it flows through the lake system and Guilfoyle's Volcano reservoir. Water is then pumped, filtered and stored in four large water tanks. The stored water is then treated with UV and circulated via underground pipes and pumps into the existing irrigation system to water the gardens.

This innovative \$6.5M project is a leading example of a collaborative approach to integrated water cycle management. Partners include the Royal Botanic Gardens, Victorian Government, Australian Government, the Myer Foundation and Sidney Myer Fund 2009 Commemorative Grants Program, Melbourne Water, South East Water Limited, Friends of the Royal Botanic Gardens, Melbourne Inc., Royal Botanic Gardens Foundation Victoria, The Calvert-Jones Foundation and a significant number of individual donors.

Photographer Katie O'Brien

Improving urban water cycle management in Melbourne 3



Melbourne's water future

Improving urban water cycle management in Melbourne

Outcomes	3.1 A community engaged in whole-of-water-cycle management <small>Pages 42 – 48</small>	3.2 Suburbs – old and new – designed with water in mind <small>Pages 48 – 65</small>	3.3 Sensible use of water in our homes and businesses <small>Pages 66 – 74</small>
Initiatives	3.1.1 Ensure meaningful community involvement in local water cycle planning <small>Pages 70 – 81</small>	3.2.1 Plan to use local water locally – metropolitan and regional water cycle planning	3.3.1 Encourage households to use local water sources
	3.1.2 Improve transparency and information provision	3.2.2 Plan to use local water locally – local water cycle planning	3.3.2 Facilitate the use of local water in public buildings
	3.1.3 Improving disclosure of the water performance of homes for sale and rent	3.2.3 Incorporate integrated water cycle management into growth area planning	3.3.3 Establish world-class water use for Melbourne's sporting grounds
	3.1.4 Partner with communities	3.2.4 Green our suburbs	3.3.4 Work with businesses to adopt cost-effective local water options
	3.1.5 Support community activities and projects	3.2.5 Improving stormwater management in new developments	3.3.5 Increase peri-urban farms' use of non-drinking water
		3.2.6 Reduce urban flooding	3.3.6 Minimise energy use in the water cycle
		3.2.7 Influence design guidelines for stormwater quality and flooding	3.3.7 Establish regulatory support for local water use
		3.2.8 Support opportunities to link local water, energy and waste cycles	3.3.8 Reform the structure of water bills to reward water efficiency in the home

3.4 Resilient water systems Pages 75 – 83	3.5 Improved natural waterways Pages 84– 88	3.6 Reduced inefficiency and waste Pages 89 – 93	3.7 Accelerated innovation and world recognition of expertise Pages 93 – 96
3.4.1 Invest in and fast-track projects that enhance water system resilience	3.5.1 Engage the community on waterway health	3.6.1 Increase transparency about water sector costs and performance	3.7.1 Establish Melbourne as a global leader in water cycle management
3.4.2 Change the incentives of our water authorities	3.5.2 Reduce adverse impacts of stormwater on our waterways	3.6.2 Better allocate water sector investment	3.7.2 Establish an investment portal for innovative water cycle management
3.4.3 Overhaul water planning and regulation	3.5.3 Fund improved stormwater management	3.6.3 Develop new design guidelines for water and sewerage infrastructure	3.7.3 Promote our expertise to the world
3.4.4 Increase scrutiny of major investment decisions in the water sector	3.5.4 Make better use of treated wastewater	3.6.4 Improve leak detection, asset management and maintenance	3.7.4 Enhance research and policy capacity
3.4.5 Embed good water management in public buildings and major projects	3.5.5 Protect our catchments and plan for the long term management of our waterways	3.6.5 Ensure our water authorities are focused on driving productivity and lower cost delivery for consumers	3.7.5 Invest in and reorient the Smart Water Fund
3.4.6 Monitoring, access to and use of data	3.5.6 Measure, monitor and publish the level and composition of stormwater runoff	3.6.6 Enhance collaboration and sharing of research and data	3.7.6 Further build skills and capability in the water sector
3.4.7 Improve the safety and emergency readiness of our water systems		3.6.7 Simplify and streamline regulation, and expand competition and the use of markets in the water sector	
3.4.8 Improve investment certainty and the efficient allocation of urban water			
3.4.9 Reform bulk water arrangements			
3.4.10 Address knowledge gaps and other barriers to improved water system resilience			
3.4.11 Establish a whole-of-water-cycle design competition			

3.1 Outcome

3.1 A community engaged in whole-of-water-cycle management

Government alone cannot successfully implement the new approach to managing Melbourne's water cycle. This strategy will only work if there is deep and genuine involvement of, and collaboration with, all stakeholders, including the community. *Melbourne's Water Future* affects everyone and is a shared responsibility.

Members of the community have a direct stake in the water cycle management decisions that affect current and future generations of Melburnians. More immediately, people also have a stake in water cycle management in their role as customers of water authorities.

The Victorian Government has analysed the needs and expectations of the community. It is clear that there is no 'typical' water service user: different people and businesses have different needs, and these must be catered for as we plan and deliver a different water future for Melbourne.

The community is also a rich source of innovation and practical on-ground action, and this should be reflected in how we plan and reform. Recent sampling of community views revealed three key benefits to the whole-of-water-cycle approach articulated by this strategy. First, community members indicated their satisfaction that a whole-of-water cycle

approach includes actions individuals can undertake to make a difference. Secondly, respondents perceived the ability to treat water at a local level as beneficial for communities, because local awareness around water use and re-use aligns with widespread desires to return to a more sustainable and community-oriented approach to infrastructure planning. Thirdly, the community research identified strong optimism about the ability of communities to work together to achieve better water management outcomes that benefit society now and for future generations.

Melbourne's Water Future marks a significant shift to a strong focus on meaningful community engagement.

This means the way we plan to meet our city's water needs must reflect community values and preferences. This approach will give us the best opportunity to maximise benefits for all sections of the community.

A new approach to community engagement requires a commitment in the water sector to greater openness and transparency, and further embracing best practice and innovative solutions.

Genuine community engagement involves ensuring people are provided with balanced and objective information at all stages in the decision making process, to assist them in understanding the issues and opportunities they face; seeking feedback through comprehensive

consultation; ensuring concerns and aspirations are understood and considered; and partnering with the community at all levels of decision making.

A partnership approach reflects the understanding that to reform our water system, changes in approach are required at the community and the system level. It is essential that the community is fully engaged with *Melbourne's Water Future* to enable participation in local water cycle decision-making.

We will engage with the wider community and interest groups through a range of communication and engagement mechanisms, including education campaigns, crowd sourcing and new media. We will develop and make accessible an on-line information and collaboration site known as the '*Water Source*'. The *Water Source* site will compile and disseminate local, regional, national and international good practice, and information and research about innovative water management. The site will provide a rich resource of information, technical advice and project development opportunities.

We will provide regular news and updates on the progress of the strategy, via platforms that suit community users. The platforms could include, for example, Twitter, YouTube, Flickr and multi-format apps for mobile devices, as already used successfully by the Water Authorities.

Initiative 3.1.1

Ensure meaningful community involvement in local water cycle planning

The water savings made by Victorians during the recent drought prevented Victoria from running out of water. Victorians demonstrated they are good water managers and are well placed to drive future planning decisions around water. Communities know their local area and provide a rich source of innovation for local-scale water projects. They also experience how risks such as flooding can materialise at the local level.

Communities need to be fully informed about the water cycle costs, benefits and options in each local area, and to be closely involved in local-scale planning.

To achieve the right level of community involvement in local water cycle planning, we will develop a simple but powerful set of criteria to guide local water cycle planning. These criteria will include requirements such as the need to provide information in a clear form that avoids jargon, and in timeframes that allow community members to digest and respond before decisions are made.

In recent years, water authorities and agencies have learnt a lot about the community, its views on water cycle management and its priorities for the future. One of the key insights is the community's desire to be meaningfully involved in the planning and management of their water resources.

Case study

Grant Street Reserve

In 2007, the City of Melbourne identified a lack of public open space in city's Southbank area. Originally calling for Grant Street Reserve playground to be built to improve community facilities in the area, the project was expanded to redesign the whole reserve. The City consulted with the local community to understand what it wanted in this space. As a result, Grant Street Reserve was transformed into a recreational area of 'grass, trees and play spaces', with the addition of a number of water sensitive urban design features.

At the core of the design is a 'dry creek bed' (surrounded by trees and shrubs) running parallel to the path from one end of the reserve to the other. Stormwater flows from Grant Street (1400 square metres) are diverted into a rain garden situated at one end of the park. The treated water is then directed into the creek bed, which also captures the water running off the path.

The creek bed partially filters the water and directs the flow to a large underground 200 kilolitre capacity storage tank, situated underneath the playground. The water is fed into a drip irrigation system for the landscaped areas. The grassy areas usually do not require irrigation, but in times of drought, the water can also be used for manual irrigation of these areas. In addition to serving the purpose of a stormwater swale, the creek bed also provides a nature-based play experience for children and greatly enhances the local amenity.

Top A 200 kilolitre tank, situated underneath the reserve, stores water for irrigation of grassy areas
Bottom Dry creek bed in Grant Street Reserve





Above Research shows that residents who live near green spaces such as parks (Yarra Bend Park pictured) and reserves exercise more often and enjoy a higher quality of life. Such sites are also popular for family gatherings, weddings and other celebrations.

To support the community to be effective in its planning participation, we will work with water authorities to ensure dedicated stakeholder relationship and liaison managers are employed and skilled to facilitate collaborative local-scale planning involving local government, relevant water authorities, community members and local businesses. Where appropriate, representatives from development organisations will also participate in this planning process. This collaborative planning process will ensure the community is appropriately involved in identifying and assessing possible local water solutions. (Refer also to Initiative 3.2.2).

Initiative 3.1.2 Improve transparency and information provision

We appreciate that people want to stay informed about water and the available water management options. We will therefore work with water authorities and other bodies to publicise regular information updates on the *Water Source* site. These updates will include the most recent and up-to-date information available about Melbourne's water cycle, water use patterns, the effectiveness of water efficiency measures, and new information and research developed during the year. As part of this information, we will move towards publicising local water cycle performance goals along with geographically specific water-use benchmarks for households and businesses. These geographically specific water-use benchmarks provide a more nuanced and helpful measure than the previous flat target of 155 Litres per person. This will provide water users with the necessary information to identify when their water use is relatively high, and to adjust their water use behaviours accordingly.

We recognise that decisions and actions at the system level will also affect local conditions. We will publish information that will help the community understand and stay abreast of any relevant institutional or water authority actions. Currently water retailers and Melbourne Water publish an annual 'Water Outlook'. We will work with Melbourne Water to align the 'Outlook'

with *Melbourne's Water Future*. Each year the 'Outlook' will set out the long-term objectives of the Government's policy and provide an update on key insights and progress towards the strategy's vision.

As people become increasingly engaged in the management of Melbourne's water cycle, they will require more and better information and improved levels of transparency to inform their decisions at the household and community planning levels. As a first step to meeting this need, we have compiled detailed data on Melbourne's water use behaviours, including water use patterns and uptake of water efficient appliances in different areas across the city. We will continue to build this data so we have a detailed and accurate picture of Melbourne's water use over time. The publication of this information (without compromising privacy) on the Office of Living Victoria website and *Water Source* site, and in the annual 'Water Outlook' report will support informed and tailored water management decisions that reflect local water priorities.

The Office of Living Victoria will also work closely with the water authorities to facilitate improved disclosure of the actual costs of water cycle services.

Over time we will also investigate and, if the expected net benefits are significant, adopt new technologies that provide improved information. An example of such a technology would be a metering system for large industrial

or municipal water users (e.g. factories, public buildings, apartment buildings, commercial and industrial sites) that provides real-time water use information rather than quarterly retrospective figures. This enhanced information would help large water users understand their demand and use patterns and respond accordingly. Large-user metering also aids in the detection of leaks. This strategy does not propose the introduction of smart metering for domestic water users.

A further approach, for the longer term, that may be valuable to communities is the option (where the necessary infrastructure is in place) for large commercial and industrial water collectors to provide water back into the water system for use in improving community amenity. For example, Siemens and Woolworths both collect rainwater from their roofs and currently make it available for public amenity use (see case study on page 71).

Several changes need to be made to enable this, including clarification of urban water rights and changes to bulk water arrangements; these are detailed elsewhere in the strategy.

Initiative 3.1.3

Improving disclosure of the water performance of homes for sale and rent

Home buyers and tenants often lack information about the water efficiency performance of new and existing homes on the market – for example, whether a home is plumbed with purple pipes, or the level of performance of raingardens and water tanks.

With the housing sector, we will consider whether further actions are required to improve disclosure of the water efficiency performance of homes that are for sale or rent. To this end, we will engage with housing sector peak bodies and regulators including the Housing Industry Association, the Real Estate Institute of Victoria, Master Builders Association of Victoria and Consumer Affairs Victoria to consider development of an industry-led, low-cost scheme that achieves the goal of a consistent approach to disclosure of key household water efficiency features to home-buyers and prospective tenants. Such an approach will need to be considered in the context of parallel actions to improve disclosure of energy efficiency.

Initiative 3.1.4

Partner with communities

The community's experience in the recent drought has raised awareness of the long-term challenges around Melbourne's water supply. Research into the community's perceptions of water demonstrates a strong awareness of alternative water sources and how water can be used, reused or recycled – many of which people are very open and receptive to. The research demonstrates community understanding that action is required to ensure water quality and supply in the face of population growth, drought, and other future challenges.

To address these long-term and complex issues, it is critical for Government and the community to form a genuine partnership in water cycle planning and management. This partnership will allow us to build a shared vision and a transparent decision-making process about Melbourne's water future. As a starting point, we have listened to the community to establish perspectives and attitudes towards water, water use and water efficiency.

What the community told us is:

- They want a sustainable, smart alternative approach to water management in Melbourne.
- They consider alternative water sources such as filtered greywater, treated sewage, unfiltered tank water and treated recycled water as acceptable water sources for domestic uses other than drinking.

- They are positive about the use of stormwater in public parks and gardens because it leads to greater urban amenity and a more liveable city.

To maintain an accurate and current understanding of the community's perspectives on water, and approaches to water cycle management in Melbourne, the Office of Living Victoria will conduct and publish an annual survey of Melburnians. The survey will help identify and assess shifts in the community's water priorities, which will provide valuable input to water cycle policy and help to frame future water cycle planning.

In parallel, the Government will engage the community through the Office of Living Victoria website and social media, with regular news on the progress of *Melbourne's Water Future* strategy initiatives, and a crowd-sourcing approach to innovation. The website will also host an entry point to the *Water Source* site described above. All of this material will be made freely available to the community.

We will build the community's understanding of and engagement with water management issues. We will continue to support labelling schemes that enable consumers to make informed choices when purchasing water efficient appliances. We will continue to work with water authorities, local councils and community organisations to develop and run locally relevant water programs such as water efficient gardens, alternative water options for households, or how to minimise your water bill.

Case study



Bentleigh Secondary College

Bentleigh Secondary College is a State Government school located in Melbourne's south east. The college's diligent approach to water savings is mirrored by its commitment to education and sustainability throughout the school. Bentleigh Secondary College is a 5 Star Green Star certified school and their water efficiency program has reduced water use by

incorporating rainwater collection, wetland filtration, sub-surface irrigation and South East Water's HydroShare tool to identify water leaks.

As a part of their ongoing commitment to sustainability, the college has installed a 50,000 litre and a 125,000 litre water tank to harvest rainwater, which are both plumbed into the toilet blocks for flushing. It has also constructed a wetland area on school grounds to capture excess stormwater.

This excess water is treated as it travels through wetland plants before being channelled into a 50,000 litre underground storage tank. In turn, this tank is connected to a sub-surface irrigation system to irrigate one of the college's playing fields. In a typical rainfall year, the wetland area processes around six megalitres of water. More recently, Bentleigh Secondary College has constructed a billabong capable of harvesting a further 200,000 litres of water.

As part of their sustainability program, the college uses South East Water's HydroShare program to monitor water use, with data loggers attached to water meters to record usage and help identify leaks within the system. These data loggers were installed as a part of the Schools Water Efficiency Program. Large screens in the college's reception area and Learning Centre display live water use data from HydroShare to continually highlight water awareness to the school community and visitors. Together with tanks for toilet flushing, these initiatives have reduced the college's total water usage by 91 per cent. These savings, in conjunction with their water education programs, saw Bentleigh Secondary College achieve gold accreditation for the Victorian Government's "Water – Learn it! Live it!" program – the first secondary school in Victoria to achieve this recognition.

Also, with the water authorities we will continue to support school education programs such as the *Water – Learn it! Live it!* program, which provides schools with water education resources and professional learning sessions for teachers, and the Resource Smart Schools program which recognises and rewards the sustainability efforts of Victorian primary and secondary schools through prize money and resource support.

Program-specific community engagement forums will be held through the Living Victoria Fund and Living Ballarat Project. Other purpose-specific engagement forums will be convened as appropriate to inform local planning, provide information about new projects or programs, and build partnerships for project and program delivery.

Initiative 3.1.5

Support community activities and projects

Many whole-of-water-cycle projects and initiatives are generated at the local community level. To support the success of these efforts and the effective transfer of knowledge between projects and communities, we will provide project funding and information facilitation.

We will support a range of community activities and projects through the Living Victoria Fund, which in its first year of operation will provide funding to a variety of projects including, for example, stormwater management, strategic and business planning for whole-of-water-cycle management, guideline development, innovative asset design and community space greening.

We have committed \$5 million of the Living *Victoria Fund* to City of Melbourne water cycle projects, including the University of Melbourne Precinct Strategy and centre square redevelopment. We have also committed \$1.5 million to Knox City Council water cycle projects, including stormwater harvesting and the laying of warm weather turf. These projects build on a range of commercially funded local integrated water cycle projects now in development.

To facilitate the success of community initiatives and projects, we will establish an online *Water Source* site that will operate as a place for communities and other stakeholders to share news and information about whole-of-water-cycle projects and initiatives. *Water Source*

Key insights from consumer research

BOX 3.1

In early 2013, quantitative and qualitative research was undertaken to better understand consumer insights into water use and policy. A summary of the research report includes:

- The community view water as too important an issue to be played out in the political arena, especially in light of the last drought. They expect politicians to be getting on with ensuring we have a safe and secure water supply and they believe that the desalination plant cost too much.
- In Melbourne many people believe that because the desalination plant is twice as big as originally planned, it has drought-proofed Melbourne. This perception that the desalination plant is a guarantee of Victoria's water supply needs to be addressed.
- There is a strong reception to the need for permanent or stronger water restrictions. People feel good when they're saving water, but acknowledge that the lifting of restrictions has resulted in personal complacency.
- Integrated water cycle management must incorporate an appreciation of water saving and efficiency as well as outlining smarter and more sustainable options to water management.
- Receptiveness to stormwater capture and reuse is driven by acceptance that the use of stormwater in public parks and gardens leads to greater urban amenity and more liveable cities and suburbs.
- Urban flooding is seen as too infrequent an occurrence to serve as a compelling imperative for stormwater harvesting.
- Any education campaign must be accompanied by use of local examples of integrated water cycle management in action to dispel fears about costs and logistics.
- Environmental fears need to be addressed with examples of positive environmental effects, i.e. the ability of stormwater capture to contribute to healthier local water systems.
- The basic language used to promote integrated water cycle management needs to be simple and clean. Use of technical terms and jargon is more likely to lead to confusion and non-acceptance.
- Integrated water cycle management allows for engagement of the community in water cycle management versus current disengagement.
- Integrated water cycle management needs to focus initially on community projects and new suburbs, to demonstrate practical examples in action.
- Small achievable community projects should be undertaken, such as stormwater capture and reuse to improve liveability and amenity of community spaces
- Education is necessary to shift firmly held views that water storage and supply is limited to dams and rivers.
- Raising awareness of funding available for private and community projects, including household rebates and incentives, will help address the current perception that cost and practicality is a barrier to integrated water cycle management.

3.2 Outcome

will provide comprehensive information and advice about local, national and international innovations and best practice in whole-of-water-cycle systems, approaches and tools. The site will publish the Living Victoria systems analysis and associated tools for comparing the relative costs and benefits of water cycle projects (see Initiative 3.4.1), the annual 'Water Outlook', and Local Government whole-of-water-cycle plans.

The *Water Source* site will host information about all projects supported by the Living Victoria Fund, including information about Fund application processes and timing. It will also link to the proposed investment portal (see initiative 3.7.2).

Water Source will contain technical advice, manuals, and case studies that can be applied to multiple locations and be adapted to different scales. To help foster support and momentum for new ideas and activities, the *Water Source* site will also operate as an entry point for partnerships with other stakeholders and across localities and regions. The site will contain a comprehensive list of links to the web pages and resources of relevant organisations. *Water Source* will be the platform from which we will convene community engagement or other targeted forums to foster partnerships or launch engagement activities.

3.2 Suburbs – old and new – designed with water in mind

One of the keys to understanding the new approach to Melbourne's water future outlined in this Strategy is that different localities across Melbourne differ in a wide range of respects affecting the water cycle. Our different localities have different climates, rainfall, topography, geology, existing infrastructure, demography, industry, water use patterns and wastewater profiles.

In the past, we have planned for water management and infrastructure using whole-of-Melbourne averages and peak estimates. This served us well when Melbourne was a much smaller city and when we did not have the capacity to analyse large data sources to underpin local planning. Now, advances in science across multiple disciplines and increases in computing power allows more realistic 'integrated' or linked systems analysis that better represents reality. In the past, too, Melbourne's economy was much more protected than it is now, and governments were able to borrow to pay for infrastructure well in advance of need, and simply pass the costs on to households and businesses via charges or taxation. This is no longer an acceptable or prudent approach.

Another key to understanding Melbourne's water cycle is that we do not have a shortage of water – more water runs off Melbourne as

stormwater every year than we use, even in a dry year. The severe water restrictions that have been a feature of Melbourne's summers for generations are a result of our past approach to city planning and should not be necessary in the future if we plan and manage our city, suburbs, neighbourhoods and homes differently – with water in mind.

At the same time, we should be able to ensure that our parks and playing fields are green and healthy, our streets and industrial and commercial areas are shaded and beautified by thriving trees and our gardens can continue to give us pride and, sometimes, produce, even in a drought year.

Our past planning approach concentrated on removing all rainwater and 'used' water as quickly as possible. This approach, together with our tendency to cover our city with hard surfaces, has led to large water runoff in Melbourne's rainy weather; expensive urban flooding when the rain is intense; scouring of our streams, creeks and rivers by much greater volumes of water than natural flows; and pollution of our waterways and Port Phillip Bay and Westernport Bay with all the litter and pollutants picked up by the rapid flow of stormwater. In addition, this large centralised catchment approach simply moved an increased flood and water quality risk downstream. During heavy rain, across the system our large sewer networks can spill into our waterways through numerous overflow points.

The new approach is to plan to use local water locally by slowing and retaining stormwater through local storage including tanks, raingardens, swales, lakes and wetlands and, where feasible, treating and reusing wastewater at or near its source.

A lower and more natural rate and volume of stormwater runoff, together with measures to reduce pollutants, will dramatically improve the health of our waterways and the health of Port Phillip and Westernport Bays. Reduced stormwater run-off will also prolong the life of stormwater infrastructure and reduce the level and cost of on-going maintenance.

All of this is achievable by local and regional water cycle planning within a metropolitan framework. Furthermore, all the evidence is that this new approach will actually cost less than how we have planned, delivered and removed water in the past. In the future, our planning for the use of local water will be done at the same time as our planning and replanning for local communities. Local water cycle planning will underpin all new developments, so that the most significant developments will achieve a step-change reduction in their use of water.

In our existing suburbs, stormwater renewal projects and other local water infrastructure will allow those suburbs to enjoy the benefits of this new approach. In the shorter term, developers, businesses and Councils will be supported to showcase innovative approaches to integrated water design that will reduce or reverse the damage to our trees and ‘garden city’ reputation and ensure residents and businesses can benefit from our renewed ‘garden city’.

Decreased urban flooding will reduce the relative cost of flood insurance over time, and have other, more immediate benefits for the community and the environment. Further work on direct waterway improvements will help to undo the damage of the past.

At the same time, developing expertise on water cycle planning and a greater degree of competition among water providers for the provision of water cycle projects and services in new suburbs will help to keep costs in check.

Figure 3.1 on pages 50 and 51 shows Melbourne’s diversity for such criteria as rainfall, rain frequency, elevation and personal income.

Case study



East Werribee Employment Precinct

The East Werribee Employment Precinct, in Melbourne’s west, proposes to harvest rainwater, stormwater and wastewater for non-drinking purposes, including targets such as reducing drinking water demands by 60 per cent and wastewater discharges by 50 per cent (based on typical 2006 demands).

There are also targets to reduce stormwater, nitrogen and phosphorus runoff while keeping waterway and soil salinity to pre-urban levels.

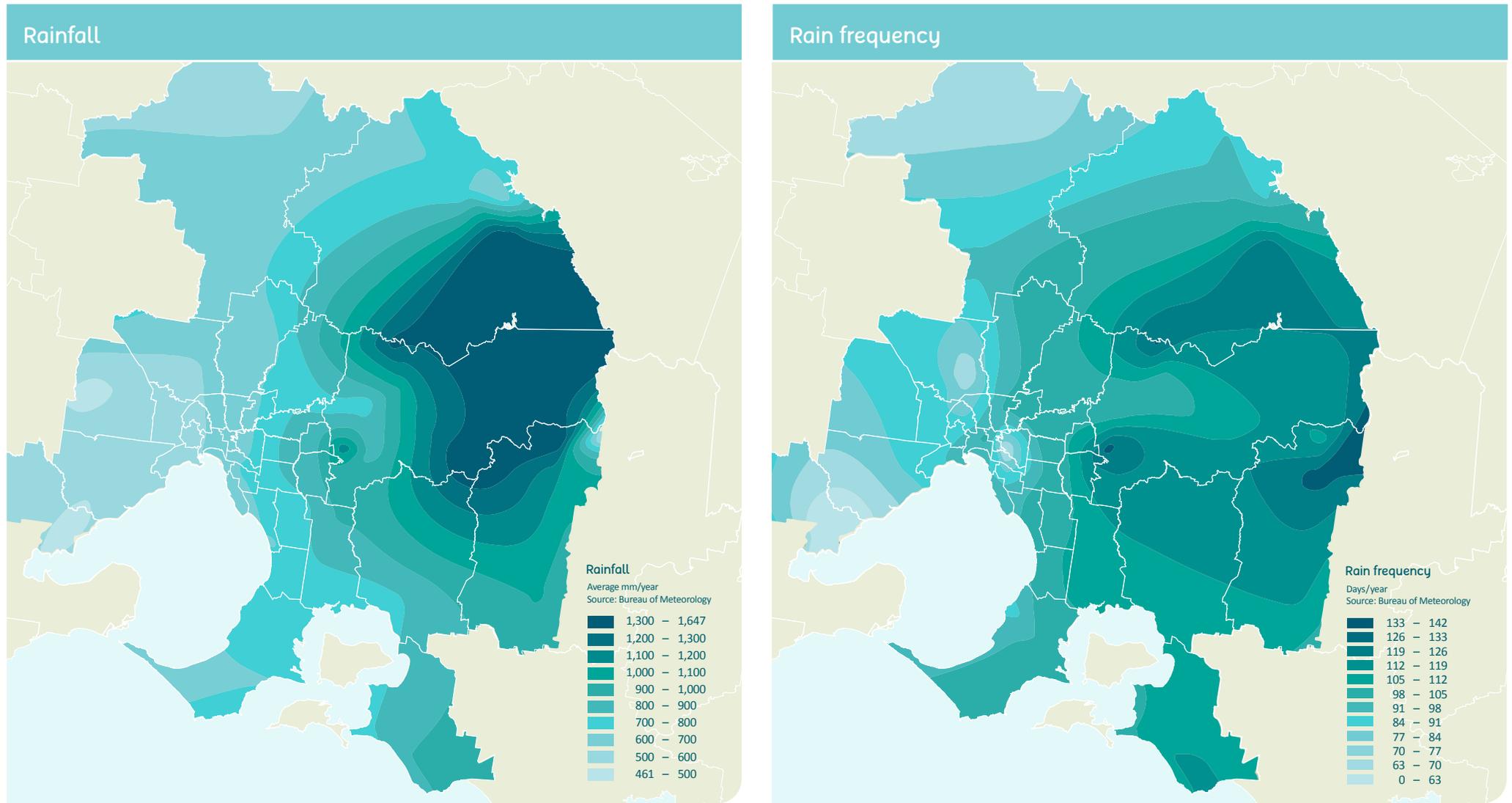
The draft precinct structure plan proposes the largest new employment cluster in Melbourne. Its features will include a health and learning

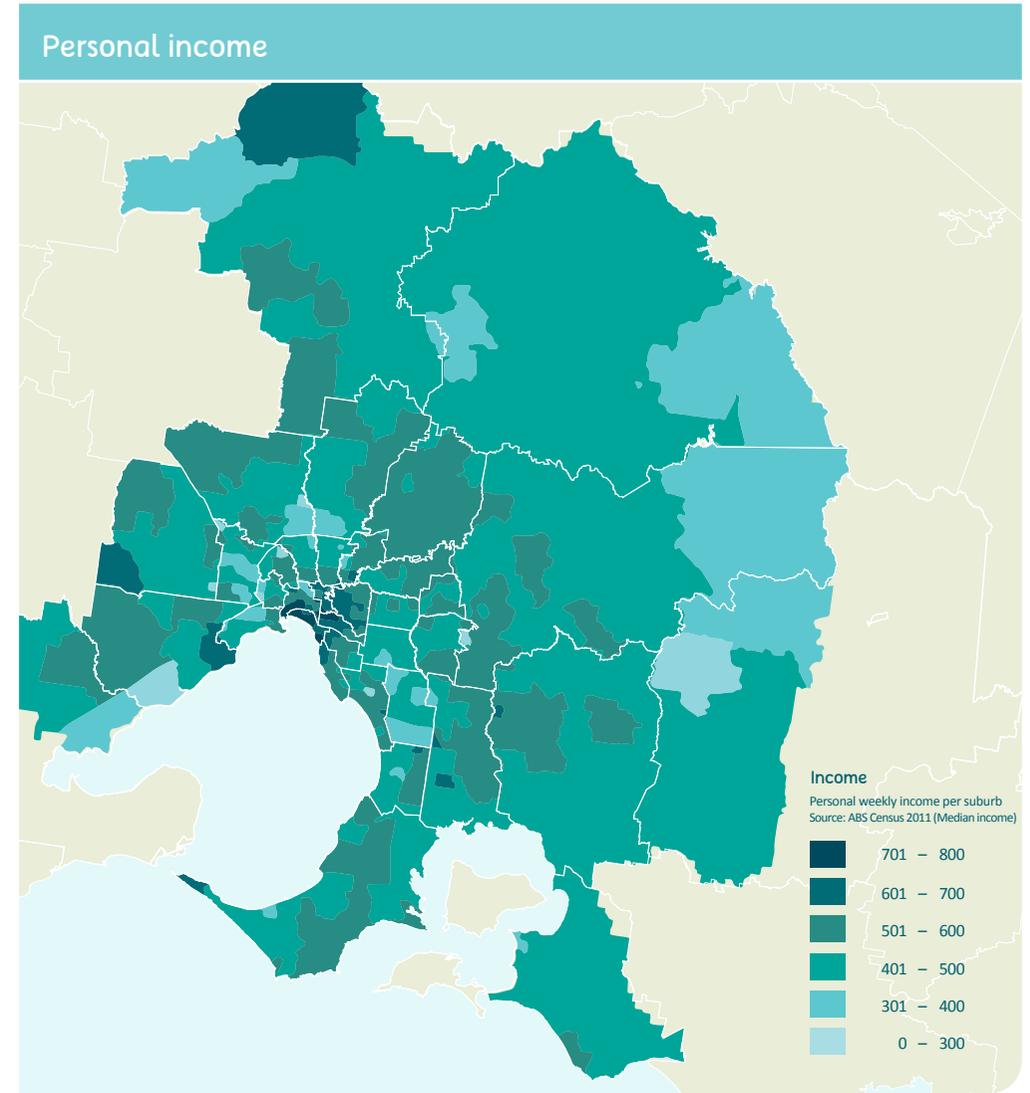
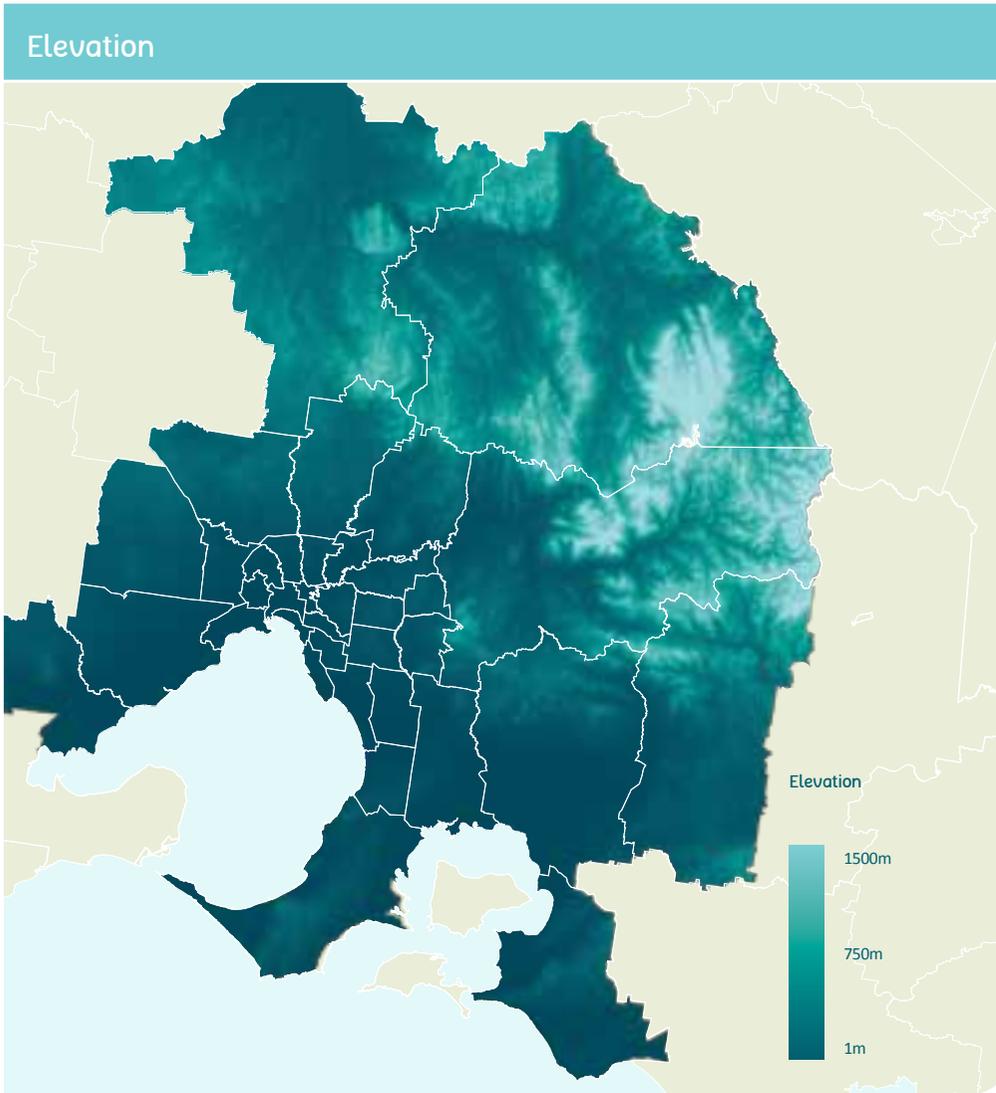
precinct, a town centre, commercial precinct and transport infrastructure, each based around a series of water bodies, including a lake, to mitigate the risk of flooding.

Whole-of-water-cycle management will form a primary focus of planning and construction, with the development providing for 50,000 jobs and 7,000 homes. The release of the East Werribee Precinct Structure Plan heralds the first large-scale implementation of the Living Victoria policy and represents an important first step in the transformation of Melbourne’s water cycle systems.

Melbourne is different everywhere

FIGURE 3.1





Water cycle planning

Melbourne's local water cycle plans

TABLE 3.1

- Planning based on guidelines and template within the metropolitan framework, consistent with city-wide infrastructure planning and the relevant regional plans, and based on a detailed examination of the specific characteristics of the municipality
- To build on the excellent planning work already undertaken by Councils
- Five demonstration plans in first year, to inform the rollout of additional plans in subsequent years, with funding support from the Office of Living Victoria
- Ten year timeframe with detailed implementation plans to be updated every three years on an ongoing basis
- Input from a monitoring program and continuous improvement process coordinated by the Office of Living Victoria
- Developed within the parameters of reasonable projections of likely future expenditure based on current budget arrangements
- Developed in close collaboration with the local community and local business and industry, the local and state-wide water authorities and the relevant regulators
- Will include goals for reduced use of drinking water, reduced wastewater to treatment plants, increased use of alternative local water sources and reduced peak flows and pollutants in waterways
- Will consider intermediate measures such as the extent of tree canopy coverage and soil moisture for water-dependent open spaces, management and reduction of existing areas of directly connected hard surfaces, and flooding and drainage goals
- Will provide for any high-water use industrial business customers in the local area and the local authority itself.
- Over time, local water plans will form a part of the metropolitan land use planning arrangements and will also be an ongoing part of *Melbourne's Water Future* strategy

Melbourne's regional water cycle plans

- Metropolitan regions based on catchments and groupings of local government authorities.
- Planning will be consistent with city-wide infrastructure planning, based on guidelines and template within the metropolitan water cycle planning framework and based on detailed examination of the specific characteristics of each region
- Ten year timeframe with detailed implementation plans to be updated every three years ongoing
- To be developed in 2014 coordinated by the Office of Living Victoria, with strong regional ownership involving the relevant land use planning authorities, Melbourne Water, the relevant water authorities, the relevant local government authorities and other organisations such as the Port Phillip and Westernport Catchment Management Authority, VicRoads, Parks Victoria, major regional institutions such as universities and relevant business and community organisations.
- Builds on the excellent planning work undertaken by water authorities
- Input from a monitoring program and continuous improvement process coordinated by the Office of Living Victoria and informed by the growth area water cycle management planning currently underway (described further in Initiative 3.2.3)
- Include goals for reduced use of drinking water, reduced wastewater to treatment plants, increased use of alternative local water sources and reduced stormwater runoff volumes with associated loads of pollutants in waterways and improved liveability and community health indicators
- Planning within the parameters of reasonable projections of likely future expenditure (based on current planning arrangements in accordance with the metropolitan water pricing principles and the budgets of other relevant partners to the plans)
- Government agencies involved in regional water cycle planning will be required to have regard to those plans in the preparation of their corporate and business plans
- Once completed will inform a new Water Industry Regulatory Order and the Statements of Obligations of the water authorities
- Will have regard to and inform local water cycle plans developed by each local government authority in the wider metropolitan area

Metropolitan water cycle planning framework

- Underpinned by Living Victoria systems analysis and 40-year forward look
- Ten year timeframe
- Outlines current and future required city-wide infrastructure
- Provided guidelines for regional and local planning
- Includes high-level pricing principles
- To be developed and released by late 2013
- Coordinated by the Office of Living Victoria and will involve all relevant water authorities, relevant government departments and local authorities
- Monitoring and continuous improvement process coordinated by the Office of Living Victoria
- Once completed, will inform a new Water Industry Regulatory Order and the Statements of Obligations of the water authorities

Initiative 3.2.1

Plan to use local water locally – metropolitan and regional water cycle planning

Fundamental to implementation of integrated water cycle management in Melbourne is a new approach to water cycle planning. This planning will take place at the metropolitan, regional and local levels.

Underpinning this new approach is the systems analysis outlined in the Living Victoria Ministerial Advisory Council's Road Map and Implementation Plan. This systems analysis and the documented assumptions behind it will become the shared basis for the long term planning for the water cycle in Melbourne. Critically, the analysis will allow water cycle planners and land use planners to consider long term options to ensure that our future is not unduly 'locked in' by decisions taken now.

The adoption of a 40 year outlook and a new water cycle planning framework permits our planning to be based on likely futures rather than a fixed end point, with adjustments being made as our knowledge improves.

The Living Victoria systems analysis and 40 year forward look will inform the development and publication of a new water cycle planning framework for metropolitan Melbourne to include an outline of current and future required citywide infrastructure, guidelines to provide a template for regional and local water cycle planning and overall pricing principles for the system. The development of this framework will

be coordinated by the Office of Living Victoria, and will involve all relevant water authorities, the relevant government departments and local government. The framework will be completed within the timeframe of the finalisation of this Strategy, which, subject to the consultation process, is anticipated to be in late 2013.

The framework will guide the development of metropolitan regional plans, thus providing a coherent link between water cycle planning and other planning at the scale of the retail water authorities.

Regional planning for inner Melbourne will be given priority because of the ageing infrastructure in the inner city and the very significant level of development predicted for this area for the next 20 years. Current plans for the renewal of water, wastewater and stormwater infrastructure indicate that up to \$3 billion will need to be invested to allow the predicted developments. This infrastructure planning will need to be reviewed in the context of the commitment to an integrated water cycle management approach and the new understanding that this approach can reduce costs and increase benefits.

Priority will also be given to planning for the regions that include the growth areas of Melbourne. In addition to planning for growth on the fringe of Melbourne, these plans will ensure that drainage renewal in established suburbs is planned from an integrated water cycle approach and that planning for in-fill and brownfields development is supported by effective water cycle planning.

Under this strategy, the regional water cycle plans will be developed under the auspices of the Office of Living Victoria, but with strong regional ownership. Planning will involve the relevant land use planning authorities, Melbourne Water, the relevant water authorities, the relevant local councils and other organisations such as VicRoads, Parks Victoria, the Port Phillip and Westernport Catchment Management Authority, major regional institutions such as universities and relevant business and community organisations.

Each plan will be based on detailed examination of the specific characteristics of the region including climate, topography, geology, waterways, land use (including industrial and commercial development), existing infrastructure, and demographic, social, economic and cultural factors. All of these factors, together with existing water use and wastewater production, will provide the basis for developing a staged plan for a new approach to water cycle management.

It is expected that the plans will include goals for reduced use of drinking water, reduced wastewater to treatment plants, increased use of alternative local water sources and reduced stormwater runoff volumes, reduced loads of pollutants in waterways and improved liveability and community health indicators.

Regional water cycle plans will be informed by the growth area integrated water cycle management planning which is currently underway. Planning will take place within the parameters of reasonable projections of likely

future expenditure based on current planning arrangements in accordance with the metropolitan water pricing principles and the budgets of other relevant partners to the plans.

The Metropolitan Framework and the regional plans will have a timeframe of 10 years with detailed implementation plans for the regional plans to be updated every three years on an ongoing basis with input from a monitoring program and continuous improvement process coordinated by the Office of Living Victoria. Once completed, the Metropolitan and regional plans will inform a new Water Industry Regulatory Order (or equivalent) and the Statements of Obligations of the Water Authorities.

Importantly, the regional water cycle plans will both have regard to and inform local water cycle plans developed by each local government authority within the region. In addition, Government agencies involved in the regional water cycle planning will be required to have regard to their plans in the preparation of their corporate and business plans.

Case study



Renaissance Rise, Mernda

Occupying a land area of 77 hectares at the urban fringe to the north east of Melbourne, the Renaissance Rise (formerly Groves estate) in Mernda showcases the benefits of sustainable suburbs through the application of whole-of-water-cycle management and water sensitive urban design.

The estate contains 1,500 homes and uses water efficient appliances and rainwater harvesting to reduce demand on drinking water supplies and sewerage discharges. Water sensitive urban design initiatives includes

retention of old river red gums in multi-purpose 'green fingers' that provide amenity whilst managing stormwater drainage, quality and flooding.

The project includes stormwater rain gardens, restoration of local urban waterways and deferred requirement for a major constructed wetland and regional flooding facilities.

A system of rainwater tanks, rain gardens, tree gardens, bio-retention swales, cascading basins and restored local waterways act to treat local

rainwater and stormwater. Stormwater flows from roads into the rain gardens where it is delayed and filtered before entering restored waterways for further treatment. These systems are designed to support the old river red gums as part of the liveability of the area. It is estimated that these measures reduce mains water demands by 45 per cent, sewerage discharges by 24 per cent and stormwater run-off by up to 65 per cent.

Image: Dr Peter Coombes

Brimbank Water Cycle

FIGURE 3.2

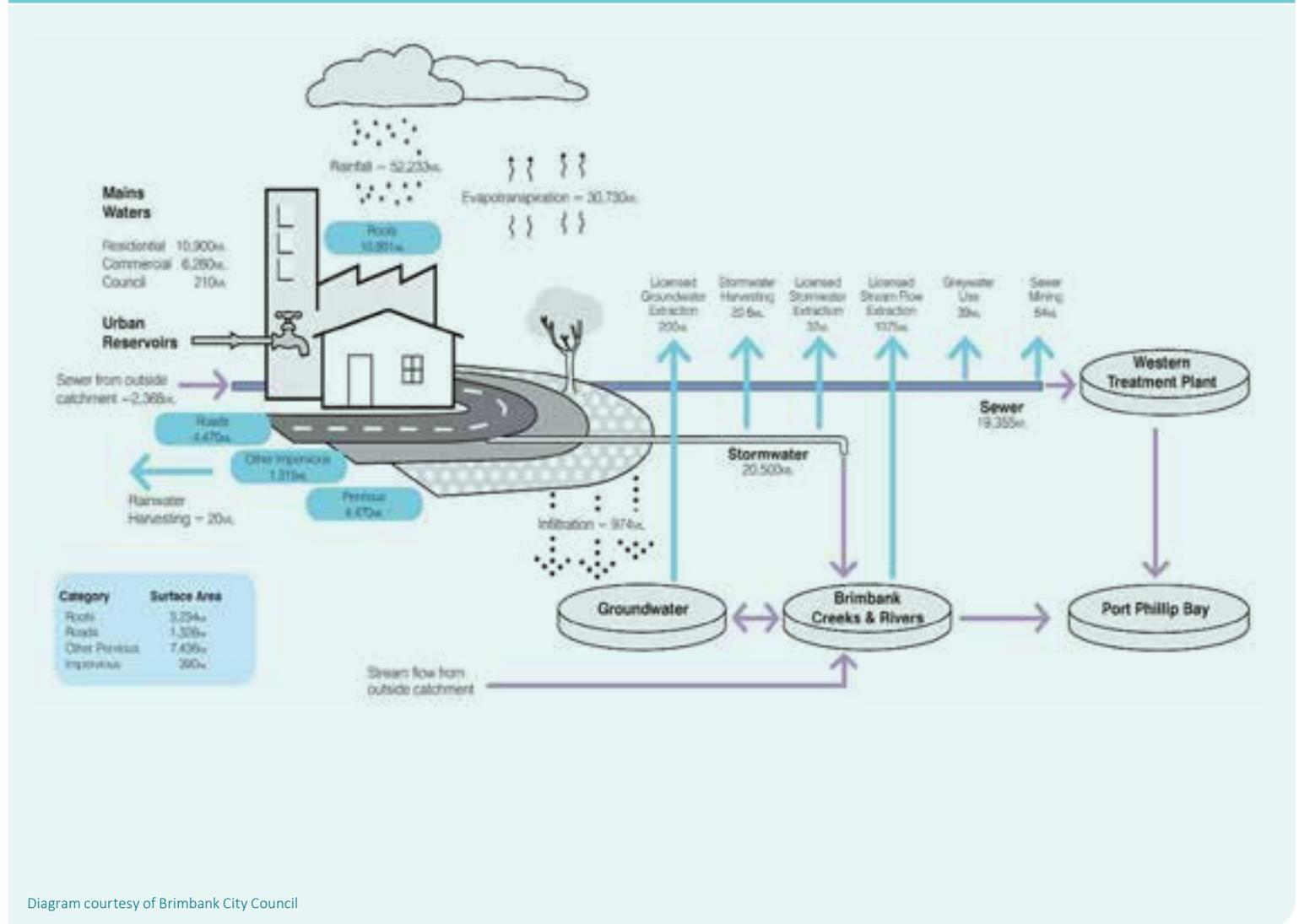


Diagram courtesy of Brimbank City Council



Above Mount Waverley Stormwater Harvesting Project is a Melbourne Water project that involves runoff from a nearby water storage reservoir being collected in tanks located on land adjoining the reserve. The water is then used to irrigate the sportsfield and nearby nature strips.

Initiative 3.2.2

Plan to use local water locally – Local water cycle planning

This Strategy acknowledges and recognises the key role of Councils in planning and managing Melbourne’s water future.

In Victoria, local councils fulfil a range of responsibilities that are critical to the implementation of the new approach to local water cycle management. Local Government is responsible for strategic planning for each municipality through the development of Council plans, land use planning, which determines what can be built where, and on what conditions (within State guidelines), most local stormwater drainage, most local roads, streets, footpaths, nature strips and street trees, most parks and playing fields and many swimming pools, and much of the land around our waterways.

Councils also have a well developed knowledge of local characteristics and of the needs and preferences of local residents and businesses. Importantly, most Councils also have well tested means of communication with local residents and businesses, both to provide input to planning and to support positive community engagement. And finally, Councils are very heavy users of water, and have a strong interest in reducing the costs of water cycle management and provision in their municipality.

We propose five demonstration plans in the first year to inform the roll out of additional plans in subsequent years. Funding from the Living Victoria Fund has been allocated to contribute to this. The Office of Living Victoria will assist Councils to work with water authorities and other relevant authorities to develop these plans in alignment with the principles and timeframes of this strategy.

Development of the local water cycle plans will build on the excellent planning work already undertaken by Councils such as the Cities of Melbourne, Kingston and Brimbank. As with the regional plans, the local plans will be based on a detailed examination of the specific characteristics of the municipality and be developed within the parameters of reasonable projections of likely future expenditure based on current budget arrangements. Each plan will be developed in close collaboration with the local community and local business and industry, the local water authorities and the relevant state-wide regulators.

As with the regional plans, the local plans will include goals for reduced use of drinking water, reduced wastewater to treatment plants, increased use of alternative local water sources, reduced stormwater runoff volumes, reduced pollutants in waterways and improved liveability and community health indicators.

As part of the planning process, local plans will consider intermediate measures such as the extent of tree canopy coverage and soil moisture for water-dependent open spaces, management and reduction of existing areas of directly connected hard surfaces, and flooding and drainage goals (such as the volume of stormwater retained in the landscape and flowing through or across vegetated areas prior to discharge into drainage or waterways).

Local planning will also provide for any high-water use industrial business customers in the local area and the local authority itself. Visibility of the water use of various business and municipal sites in the local area will enable the community to participate meaningfully in the design and implementation of plans to optimise the water profile of these sites, to make the best possible use of alternative water sources such as rainwater and treated stormwater.

Over time, local water plans will form a part of the metropolitan land use planning arrangements and will also be an ongoing part of the *Melbourne's Water Future* strategy.

These plans will appropriately place local government as a key player in the delivery of integrated water cycle management.

Case study



Darling Street stormwater harvesting project

Situated in Darling Street in East Melbourne, the project provides treated stormwater to irrigate neighbouring parks and tree medians, including Darling Square, Powlett Reserve and medians in Grey, Simpson, Powlett and Albert streets. The project took advantage of a local streetscape upgrade – including replacement of poorly performing golden elms – to trial a new stormwater harvesting technology requiring infrastructure to be installed below ground.

The \$1,737,000 project – funded by the City of Melbourne, Melbourne Water and the Victorian Government – harvests stormwater from two nearby existing drains, directs it through a pollutant trap and a sedimentation chamber before it is treated in underground tanks. Collected stormwater is then pumped into the above-ground bio-filtration systems for treatment, with treated stormwater stored in holding tanks ready for irrigation use.

The main objective of this project was to reduce drinking water demand by providing an alternative water supply source for irrigation of local parks and tree medians. The harvesting capacity of the system was therefore sized to meet irrigation demand for the nominated streets and reserves within the precinct. The project also provides shade and increased landscape amenity.



Initiative 3.2.3 Incorporate integrated water cycle management into growth area planning

The Growth Areas Authority is responsible for the preparation of Precinct Structure Plans to allow the planned release of land for new homes and new suburbs in Melbourne's growth areas in the west/north-west, north and south-east. This planning is an ideal opportunity to ensure that the residents, businesses and local Councils in new areas are able to use local water locally and that water efficiency and stormwater management at its source is 'planned in' from the outset.

Melbourne's Water Future commits the Office of Living Victoria to work with the Growth Areas Authority, the water authorities, relevant local authorities and developers to embed whole-of-water-cycle management into Precinct Structure Plans. This work will build on the excellent approach to water sensitive urban design in many developments in the growth areas.

By identifying early in the planning process the integrated water cycle management options that best suit the circumstances of each growth area and precinct we can ensure that the cost of achieving more sustainable outcomes is minimised. To ensure that achieving more liveable and sustainable outcomes does not adversely affect housing affordability, a case

by case approach will be taken to assessing the costs and benefits of whole-of-water-cycle management options at a precinct scale.

It is highly likely that early attention to whole-of-water-cycle management planning will enable development costs to be reduced in many instances. In other cases, costs will be equivalent to those that would be incurred under a business as usual approach. For some development projects, while the direct costs of water infrastructure may be somewhat higher, this will be offset by wider benefits or savings that the whole-of-water-cycle management approach makes possible in other aspects of the project. A business as usual approach will be adopted in those instances where this is clearly shown to represent the best value for money.

Initiative 3.2.4 Green our suburbs

In the 1970s, Victoria was known as the 'Garden State'. Private gardens, public parks and magnificent avenues of tree-lined streets were seen as the defining feature of the State and its capital. Melbourne's gardens, parks and trees are still very important to our city, but the recent drought made us aware of how vulnerable they are at times of limited drinking water. City of Melbourne has estimated that the trees within its boundaries are valued at \$700 million, and that the recent drought reduced the life expectancy of those trees by 10 per cent.

City of Melbourne has also estimated that without alternative water, a large proportion of the city's trees will die during the next inevitable long dry period (see figure 3.3 on page 59). This analysis holds true for much of our green and leafy established suburbs. In the outer suburbs, more recent developments tend towards smaller lot sizes, which makes provision for large trees in streets, parkways and waterways critical to the liveability and amenity for residents and local businesses.

Royal Parade now



Royal Parade, future



Above Royal Parade with and without the current abundance of trees. The images highlight the importance of trees for the liveability of the city. Right: City of Melbourne estimates that without alternative water, a large proportion of the city's trees will die during the next inevitable long dry period

Images and diagrams courtesy of City of Melbourne

Life expectancy of trees MELBOURNE CBD AND ST KILDA ROAD

FIGURE 3.3



Melbourne's Water Future reaffirms Melbourne as a green and leafy city through five related proposed initiatives. The Strategy will:

- Plan to keep our existing green areas and trees thriving by planning for the availability of enough alternative water – even in times of drought – through the local integrated water management plans.
- Encourage and support the planting and maintenance of new trees – including native trees – in gardens, streets and parks of the outer suburbs developed in the last 30 to 40 years. The strategy will do this through public education, working with water authorities and local councils, and incentive and support programs.
- Set new goals for tree canopy coverage and soil moisture for water-dependant open space as part of the local integrated water cycle management plans, and ensure that these plans include an effective street tree policy to accommodate shade trees including native trees.
- Ensure that new developments in the growth areas and in inner Melbourne include provision for water-effective landscaping and increased tree canopy cover including native trees.

- Develop a Melbourne-wide program of 'green neighbourhoods' which will promote local activity to support a wide range of activities including planting trees, establishing linkages and 'park avenues' between green spaces and along waterways, establishing community gardens, and recreating or improving wetlands. Existing Water Authority programs such as Melbourne Water's 10,000 rain gardens will be continued, but tailored to ensure greater affordability to allow wider take up. Much of this effort will be community-based, with activities to bring people of diverse ages, ethnicities, abilities and life stages together.

New and innovative projects are proving that there is growing public interest in greening the city. Federation Square's *Pop up Patch* brings edible gardening to the concrete surfaces of our city centre, while City West Water's 'Greening the West' program works with stakeholders to establish bold targets for developing a greener urban environment in both old and new suburbs.

Effective use of green space and water in the urban landscape will improve Melbourne's liveability and market appeal. A survey by Brisbane City Council found that for every dollar invested into water sensitive urban design, there was a 90 per cent return in increased property values.

Initiative 3.2.5 Improving stormwater management in new developments

Clause 56.07-4 of the Victorian Planning Provisions contains stormwater management requirements for new residential subdivision (to two or more lots). An evaluation of the effectiveness of the implementation of Clause 56.07-4 undertaken by the Office of Living Victoria, Melbourne Water and the Department of Environment and Primary Industries suggests that the Clause is not being implemented consistently, due to reasons that could include a lack of (i) experience, (ii) access to simple guidance material, and (iii) feedback between the design and maintenance phases. The Office of Living Victoria is therefore working with local councils, water authorities and developers to resolve these issues, through capacity building as well as investigating incentives for effective stormwater management.

Clause 56.07-4 does not currently apply to the subdivision of land that already contains an existing building or carpark, which means that nearly all of the infill development that occurs within the inner city is not required to manage the additional stormwater generated by increased hard surfaces. The clause also does not currently apply where the subdivision is for commercial or industrial purposes. The Office of Living Victoria is therefore also working with the Department of Transport, Planning and Local Infrastructure, developers, water authorities

and councils to address this inconsistency by introducing suitable stormwater management requirements to other types of subdivisions.

The stormwater performance requirements for Clause 56.07-4 are being reviewed, in a project led by the Environment Protection Authority, to investigate how recent data and advancements in stormwater related science and engineering can be applied new developments.

New stormwater requirements will ensure that stormwater is managed in new developments in a way that protects the health and amenity of downstream waterways and our bays, and reduces localised flooding, cost effectively.

The Office of Living Victoria is also working with the Department of Transport, Planning and Local Infrastructure to reflect the Government's approach to integrated water cycle management in the State Planning Policy Framework and to provide consistency and links between integrated water management provisions in the planning system with those in the building controls, to enable integrated water cycle management outcomes to be achieved at the scale most appropriate to each location (lot – precinct – growth corridor etc).

We will also consider how best to encourage whole-of-water-cycle approaches in the disposal of surplus government land, including by Places Victoria.

It is anticipated that Melbourne Water will continue to play a key role in stormwater management and flood and stormwater management planning.

Initiative 3.2.6

Reduce urban flooding

For Melbourne's suburbs, urban flooding is a major issue now, and is likely to be one in the future, with significant financial, economic and human costs. In the last five years alone, insurance payouts to affected parties for flooding in Melbourne have totalled almost \$2 billion. Melbourne Water reports that it is still actively cleaning up after major floods that occurred two years ago.

Various types of floods typically affect the city. First, riparian flooding is caused when rivers and creeks breach their banks and flow on to the surrounding floodplain. Secondly, flash floods are caused by runoff from storms beyond the capacity of underground drainage systems where water runs downhill along overland flow paths such as valleys, open spaces and roads. Engineers Australia divides such non-riparian flooding into major and minor events – the former applies to stormwater events equal to and greater than 100 years' average recurrence interval, and the latter for events that affect urban drainage systems (two to 20 year average recurrence interval). The bulk of costs from urban flooding and infrastructure are generated by the 'minor' flood events.

Finally, coastal, tidal and storm surge flooding is caused by extreme weather conditions or ocean tides above normal sea levels causing the coastline and nearby tidal rivers to flood.

In Melbourne, there are more than 100,000 properties known to be at risk from flooding from the rivers, creeks and drains that are



Above Melbourne has one of the world's most variable climates. Melbourne's Water Future is designed to provide the city with a flexible, resilient water system that can tolerate not only drought but also periods of heavy rainfall, reducing the risk and impact of floods such as the one pictured on the corner of Chapel Street and Commercial Road, Prahran, 6 March 2010. Image: Fairfax.



Left The Sandhurst Club, located just outside of Frankston in Melbourne's southeast, uses purple pipes and recycled water to reduce its dependence on mains water supply

the responsibility of Melbourne Water. A considerable but unquantified number of properties are also at risk from flash flooding from local government catchment drains. Of the properties known to be at risk, 80 per cent are potentially threatened by flash flooding from the drainage system. These problems have often arisen from urban development constricting the flood plain or blocking natural drainage lines and flow paths that existed prior to urban development. The risk of local flooding in urban drainage catchments is also increasing due to ageing infrastructure in established suburbs and the increasing density of existing areas – such as the inner city of Melbourne. The floods often happen with little warning, and many people who are affected were previously unaware of the flood risk.

A critical early requirement of this strategy is to map the properties and infrastructure at risk of flash flooding from local drainage systems. This will occur as part of the local water planning outlined above.

As with flash flooding in urban areas, the total number of properties likely to be affected by riparian flooding – including Maribyrnong and some areas of the southern suburbs – may be significantly underestimated because flood mapping is incomplete. This mapping will also be a priority task of the regional and local water plans.

The properties and infrastructure at risk from coastal tidal and storm surge flooding is even less well documented than the mapping of

properties at risk from other forms of flooding. Recent work supported by the Commonwealth Government will be developed further in consultation with relevant agencies and will form part of the regional and local plans.

Many of the proposed initiatives outlined in this Strategy will reduce the risk of downstream flooding in Melbourne by concentrating on moving flood mitigation higher up the catchments. In particular, stormwater and rainwater harvesting, rainwater tanks and a reduction in the connection of hard surfaces to the drainage systems will reduce flows, as will soil moisture retention strategies such as tree planting, raingardens, vegetated open space and wetlands. We will work closely with relevant planning authorities to ensure such flood prevention measures are built into new suburbs at the design stage. In established suburbs, there is a significant backlog of stormwater drainage maintenance and replacement. This program of works provides the opportunity to trial new approaches with multiple benefits including flood mitigation and improvement in the quality of runoff into waterways.

The cumulative effect of these proposed initiatives needs to be measured together with the social and economic cost associated with flooding, including the cost of insurance premiums. This research will form an important input into the business cases for the integrated water cycle management approach.

Victorian Floods Review BOX 3.2

The Victorian Floods Review (2011) identified the need to look at how we build greater resilience into the management of infrastructure, planning and protection of our settlements, and design of new developments in the context of flood risks. Land use planning is highlighted as the most effective means of reducing future risks and damages from flooding. The principal statutory authorities responsible for land use planning on flood prone lands in Victoria are catchment management authorities, Melbourne Water and municipal councils. The Victorian Government has an important role in flood and storm risk management and works in partnership with local government, catchment management authorities, Melbourne and regional water utilities, and the Victorian State Emergency Service to mitigate and respond to risks and implement flood and storm warning systems. The Bureau of Meteorology plays a critical role in flood forecasting and warnings.

Right Flood water roars down Elizabeth Street, Melbourne, with the GPO in the background, 17 February 1972. Image: Fairfax.





Left Mernda is one of many new Melbourne suburbs designed with water sensitive features such as raingardens to reduce stormwater runoff and improve amenity.

Initiative 3.2.7

Influence design guidelines for stormwater quality and flooding

The professional practice for design of stormwater infrastructure and analysis of flooding is guided by the national guideline 'Australian Rainfall and Runoff' published by Engineers Australia. These guidelines are currently subject to review and modernisation by Engineers Australia. Similarly, Australian Runoff Quality published by Engineers Australia is a national guideline for professional practice in stormwater quality and waterway health. It is critical that these guidelines are underpinned by the latest knowledge, understanding and integrated systems processes and consider the impacts of multiple water sources, water efficiency, whole-of-water-cycle processes and local variability on the design of stormwater systems. The Office of Living Victoria will collaborate with Engineers Australia in developing new stormwater guidance, with a view to achieving consistency with this strategy and the *Living Victoria* policy.

Initiative 3.2.8

Support opportunities to link local water, energy and waste cycles

Effective planning practice places significant emphasis on the synergies between water, energy and waste cycle planning, and the link of this planning to land use planning. In areas of significant development or redevelopment, the alignment of land use planning and the *Melbourne's Water Future* strategy will ensure that opportunities to develop local integrated solutions to water, energy and waste requirements and conditions are 'planned in' from the beginning.

There are significant benefits to be gained in planning to generate, conserve and reuse energy in the water cycle at a local level. Planning guidelines will be developed in such a way as to ensure that these issues are considered in local and regional water cycle planning.

Funding will be available through the Living Victoria Fund to co-invest in innovative projects. Also, this initiative will use and build upon the water authorities' significant achievements in generating energy from wastewater treatment.

Actions in this area will complement Initiative 3.3.6 which involves minimising energy use in the water cycle. As noted in that Initiative, the Commonwealth Government is an important participant in reducing energy use and promoting energy innovation, and we will collaborate with the Commonwealth Government to support energy saving and generating initiatives in the water cycle.

Flood conditions in the City of Port Phillip Council

FIGURE 3.4



Existing flood conditions in the City of Port Phillip Council (Elwood Canal) for a 100 year storm event

This figure does not factor in climate change scenarios
Municipal Association of Victoria

3.3 Outcome



In many of Melbourne's new suburbs, such as Aurora in the city's north, Class A recycled water is used to substitute for drinking water for purposes such as watering gardens and flushing toilets

3.3 Sensible use of water in our homes and businesses

The quality of Melbourne's drinking water is generally high. However, the luxury of using this water for all our everyday requirements is one we can no longer afford.

To ensure a sustainable water future for Melbourne, we do not need to use less water, we simply need to use less *drinking* water. There is no need to use drinking water to flush our toilets. We can substitute locally available water – such as rainwater, and treated stormwater and wastewater – for purposes that do not need drinking water, provided of course that public health standards continue to be met. Transporting such drinking water over long distances is not only costly in financial terms, but adds a significant – and unnecessary – energy and carbon burden to our city, since the energy it takes to move the water comes from our largely coal-fired electricity generation sector.

Smarter use of alternative water sources matches the quality of the water to the use of that water. Whole-of-water-cycle management offers a fresh approach to water management

because it targets alternate local sources of water to replace or supplement expensive, piped-in drinking water.

By adopting a whole-of-water-cycle management approach, we can continue drinking quality water from our dams while our population grows; we can keep our parks, gardens and streets green and beautiful by using and reusing the rain that falls on our city; and we can improve the environmental health of our waterways and bays by reducing urban flooding and the volumes, intensity and pollutant loads of stormwater run-off and wastewater discharge.

Melbourne's water users understand the need to reduce the level of consumption of our precious drinking water. This was demonstrated when reductions in water use by the community during the recent drought were sufficient to prevent our water supply from our dams running dry.

There is, however, a present danger of complacency replacing the diligence we have previously shown. The slide into complacency about water use follows recent rain and consequent replenishing of our dams, whose

levels are reported daily in our newspapers and nightly in our television weather bulletins. What these reports do not show are the competing demands on these water supplies, and the constant and ongoing threat to drinking water supplies from a growing population, potential future shifts in already variable climatic conditions, and the next inevitable drought or bushfire.

A number of measures will be required to encourage adoption of best practice whole-of-water-cycle management and prevent wasteful behaviours. Education and information are essential to managing public and institutional perceptions that can lead to complacency about water use. Rewarding innovative and constructive behaviours are a proven mechanism for encouraging good practice. At the same time, planning and regulation is also needed to ensure high use of drinking water or wasteful behaviour is managed, limited or controlled. Effective water cycle management will require collaboration between the community, government, the water sector, and associated sectors such as land use planning and developers.

Case study

Eynesbury clothes washing pilot trial

In September 2012, a group of Eynesbury households took part in a Western Water investigation into the use of Class A recycled water for clothes washing.

Households washed their clothes for eight weeks with Class A recycled water, while another group washed their clothes with drinking water. Participants made observations about each wash they did and included a cloth swatch in every white wash, which was colour tested at the end of the trial.

The results showed that householders saw no difference between clothes washing with Class A recycled water compared to drinking water, despite the different water standards.

The trial also highlighted the significant impact that detergent choice and material type has on wash quality and the importance of community education around laundry practices.

All participants expressed their willingness for permanent access to Class A recycled water for clothes washing at the end of the Western Water trial.

Mother of two, Kristy Logan, was one of the participants using Class A water in the trial.

“The machine is working well and everything is coming out clean,” she said.

“Some people are sceptical about using recycled water in the wash but I don’t think people realise what good quality the recycled water is.”

Right Kristy Logan and her young family during the installation of their free washing machine. Courtesy Western Water.



3.3 Initiatives

Case study



Yarra Park water recycling at MCG

Melbourne's iconic sporting ground is now a pioneer in water re-use, recycling 600 kilolitres of local wastewater per day.

Winner of the Australian Water Association Victoria's 2012 Infrastructure Project Innovation Award, the Yarra Park Water Recycling Facility treats sewage from the local sewerage network to Class A standard.

Treated water is used to provide a secure and sustainable supply to irrigate the heritage-listed Yarra Park and Punt Road Oval, and for cleaning and toilet flushing at the world-renowned

Melbourne Cricket Ground.

Located adjacent to the Gate 2 members' entrance at the MCG, the underground recycling plant produces more than 180 million litres of fit-for-purpose recycled water each year, and has helped the Melbourne Cricket Club reduce its use of drinking water by 50 per cent.

The Melbourne Cricket Club is the owner and manager of this innovative project. Arup acted as the technical advisor to the MCC. Tenix constructed and currently operates the plant.

Initiative 3.3.1

Encourage households to use local water sources

To encourage and assist Melbourne's households to use alternative water sources, we will introduce a series of incentives. The Living Victoria Water Rebate Program, launched in 2012, expanded previous rebates to include a greater range of water efficient appliances, plumbing retrofits, and a greater range of water efficiency items such as pool covers to reduce evaporation. We have committed to continue to build on the positive contributions of this program, and to continue the program until June 2015, at which time we will assess whether further extensions would be valuable.

We will build on the community water saving efforts demonstrated during the recent drought by running a community engagement and education program – *'What Water Where'*. This will provide information on what alternative sources of water are already available at the local level, or what needs to be done to make that water available to neighbourhoods or households. It will convey the requirement for water goals and regulations, and how households and localities can ensure public health is maintained while drinking water is

substituted by local water harvested from our roofs, stormwater systems or small-scale wastewater treatment facilities.

To raise the profile of local water cycle innovation, we will establish a *Victorian Water Cycle Award* for clever and innovative use of alternative water sources in homes and gardens. Prizes will be granted for household and neighbourhood categories, and judged by a panel of technical experts and prominent community representatives.

The *Victorian Water Cycle Award* differs from other water saving awards (such as the Savewater Awards or the Prime Minister's Water Wise Award) because it celebrates innovative approaches to efficiency, stormwater management and use of alternative water sources (such as harvested stormwater and treated wastewater) that may in fact increase our water use. To be eligible for the award, the innovation must reduce our reliance on the current primary source of our drinking water from dams.

The *Water Source* site and associated community education and engagement approaches described above will play a critical role in delivering information, advice and awareness to consumers.

Rainwater-fed hot water systems have been successfully implemented in other states and offer a promising opportunity for Melbourne. We will publish guidelines and provide education materials to ensure that this opportunity is implemented safely.

Water saving measures are available to renters as well as home owners. However, although those renting their housing can implement behavioural changes, they have less incentive – and opportunity – to implement significant changes to the water infrastructure of their homes. In concert with the industry-led water efficiency disclosure scheme (introduced above in Initiative 3.1.3), we will work with stakeholders such as the Housing Industry Association, the Real Estate Institute of Victoria and Consumer Affairs Victoria to help ensure that rental properties meet basic water cycle measures (such as absence of leakages, and the presence of dual-flush toilets and water-saving showerheads).

Initiative 3.3.2

Facilitate the use of local water in public buildings

There are approximately 6813 units in the 44 public housing high rise towers in Melbourne. They used about 1,534,784 kilolitres of water in 2011-12.

We will work with the Department of Human Services to identify and audit a sample of public housing dwellings to further understand their consumption patterns with a view to seeking water efficiency opportunities.

The Department of Human Services will investigate the potential for using the Victorian Government Greener Government Buildings Energy Performance Contracts mechanism to facilitate water audits and to determine the most effective opportunities for implementing local water solutions.

In addition to this targeted work in public housing, we will pursue local water solutions for all public buildings, including government buildings, schools, hospitals, airports, train sheds, libraries and shopping centres. To achieve this, we will approach high-water use facilities and offer assistance with identifying, planning and implementing alternative, local water sources. We will continue this approach until all public buildings have considered and adopted appropriate local water alternatives. This proposed initiative will be complemented by other initiatives relating to local water planning, and adoption of whole-of-water-cycle management in major publicly funded capital works projects.

Initiative 3.3.3

Establish world-class water use for Melbourne's sporting grounds

Melbourne's sporting precincts are world famous. They are a key feature of our city's amenity and its attraction as one of the most liveable cities in the world. International sporting events such as the Australian Open, the Melbourne Cup, the Grand Prix, and the Boxing Day Test cricket match showcase Melbourne's sporting grounds to the world. Ensuring we have sufficient water to service our sporting grounds and racecourses, to keep them at their best must therefore be a priority for our city.

Significant effort has already been invested to this end. The Melbourne Cricket Ground, for example, already recycles 600 kL of wastewater every day. The Class A recycled water is used primarily for irrigation of Yarra Park, which surrounds the Melbourne Cricket Ground, as well as for cleaning and toilet flushing within the Grounds and at nearby Punt Road Oval (see case study on page 68).

The challenge for the future is to build on these excellent beginnings to make Melbourne's sporting precincts a world leader in water cycle management. We will use these precincts to showcase how water cycle management can accommodate all the water needs and discharges of these large-scale sporting grounds within a closed system.

Changes to small business and household rebates BOX 3.3

Changes to small business and household rebates include:

- small businesses with up to 50 employees are now eligible;
- small businesses can now make multiple claims to receive their maximum \$2,000 rebate;
- homes which received their building permit prior to the introduction of the 6 Star building standards on 1 May 2011 are now eligible for tank rebates;
- households can claim \$1,500 for a 4,000 litre or greater rainwater tank connected to the toilet and laundry, increasing the largest tank rebate by an extra \$500;
- rainwater tanks must be certified to Australian Standards to be eligible; and
- five-star water rated washing machines with at least a four-star energy rating will continue to be included in the program for a further three years.

Case study

Fire sprinkler water saving

A fire sprinkler system water saving project aims to cut up to 90 per cent of the estimated 500 million litres of drinking water annually discharged into Melbourne drains through fire sprinkler system maintenance – without compromising fire protection.

Fire sprinkler systems are a highly valuable part of Melbourne’s fire protection framework and their operational readiness needs to be maintained. Most of this maintenance occurs through periodic testing of the key components of the systems, such as alarms, pumps and water supply. The operational readiness of fire sprinklers also needs to be retained as much as possible when the systems are affected by building renovations, such as changes in the fit-outs of offices or shops.

A Victorian Government initiative aimed at saving up to 450 million litres per year involves a range of partners including the Plumbing Industry Commission, City West Water, South East Water, Yarra Valley Water, the Department of Environment and Primary Industries, Building Commission, Fire Protection Association Australia, National Fire Industry Association, Communication, Electrical and Plumbing Union and the Australian Institute of Building Surveyors.

Case studies spread across Melbourne, including properties ranging from high rise office buildings to shopping centres and major factories, have shown that a high proportion of consumption can be cut through affordable methods such as adjusting pressure relief valves; installing new pressure regulating valves; switching from weekly to monthly testing (in compliance with Australian Standard 1851-2005); better zoning and draindown management; and the installation of a tank to recapture the test water for recirculation or recycling.

Based on these case studies, the Plumbing Industry Commission has produced the Guide to fire sprinkler system water saving, which focuses on identifying the opportunities for cutting the amount of water used in maintaining fire sprinkler systems and the steps needed to adopt these opportunities. The information in the Guide is part of the larger multi-faceted project aimed at sprinkler water conservation and encouraging property owners and fire services firms to adopt the recommended water saving measures.

Initiative 3.3.4

Work with businesses to adopt cost-effective local water options

Non-residential water users account for approximately 30 per cent of total demand for water in Melbourne. Over recent years the non-residential sector, which includes industrial, commercial and institutional users, has made significant progress in more effective water use.

As well as expanding rebates available to households, the Living Victoria Water Rebate Program extended the scheme to include up to \$2000 for small businesses with fewer than 50 staff. As noted in Initiative 3.3.1 above, this expanded scheme will remain in effect until at least June 2015, when further extensions will be considered.

To support Melbourne’s businesses to continue the move toward local water use, we will continue the *Water Management Action Plan (WaterMAP)* program, which encourages businesses using more than 5 ML a year to prepare water management action plans to help achieve water efficiency improvements. Where applicable, small business rebates will be available to assist *WaterMAP* participants in implementing actions developed as part of their plan.

Through the water authorities, we will continue to work with businesses to build knowledge of water cycle patterns and options and to encourage large water users to adopt local water solutions. The publication of local water cycle performance goals and geographically specific water-use benchmarks in the annual ‘Water Outlook’ report will progressively build a stronger picture of how water is used by industry, including examples of innovative and effective use of local water. To encourage good practice among high water users, we will table an annual statement in Parliament acknowledging leading and innovative efforts to reduce use, harvest local water, and manage discharge.

Some industries – such as manufacturing, energy generation and minerals processing – are heavy water users. Again, working with the water authorities, we will continue to work with these industries to assist them to find local water solutions. Examples of industry-specific programs completed to date include:

- The Cooling Tower Water Efficiency Program, completed in 2010, which was implemented to optimise cooling tower maintenance and operating processes. The program developed an online tool to allow businesses to increase water efficiency in the operation of their cooling towers.

- The Laundry program, completed in 2010, which was aimed at best practice operating processes for laundries.
- The Plastics and Chemicals Industries Association (PACIA), in conjunction with the Victorian Government, developed a series of Five Minute Guides to assist industrial water users in evaluating and measuring their water use and to ensure relevant industry water users operate efficiently to produce significant water, energy and cost savings.

The advantages to high water use businesses in better understanding the broader costs of water has recently been highlighted by McKinsey (McKinsey Quarterly, March 2013), which argued that ‘big savings are available to companies that look beyond their utility bills and understand the broader economic costs of water consumption’. In the case example described in the article, a pulp and paper company was able to reduce costs by 10 per cent and cut water use by 45 per cent by closely examining the role and cost of water in its operations, including charges to dispose of effluent, the value of chemical and

products in wastewater, the cost of pumping water, and energy lost in cooling processes. The paper suggests that similar efficiencies and cost savings would apply to industries such as steel, packaged goods, chemicals and pharmaceuticals. Similarly, there is significant potential for water savings in industries such as beverage production and fast-moving consumer goods. Building on the excellent work and existing programs of the water authorities, we will assist these businesses to capture water consumption savings through business analysis systems and understanding to facilitate identification and implementation of local water solutions.

There are also significant opportunities for water efficiency among smaller businesses that use large amounts of water, such as carwashes and commercial laundries. Many such businesses have already identified and implemented water efficiency measures. The Office of Living Victoria together with the water authorities will support these efforts by working with representatives of such businesses to develop guidelines and goals for their water use.

Case study



Siemens and Bayswater Cricket and Football Club oval

Knox City Council, Bayswater Cricket and Football Club and the Business Committee for Bayswater identified a need for maintaining the usability of the Bayswater Oval throughout the summer months for local sporting activities. Sourcing alternative water supply for irrigation was supported by Siemens. Siemens provided funding support, site access, use of area for infrastructure and ongoing maintenance. The project delivery was done by the ‘us’ - Utility Services, an alliance between South East Water, Thiess Services and Siemens.

Harvested stormwater from the Siemens property catchment at 885 Mountain Highway, Bayswater is collected through a silt pit and oil separator before entering underground buffer storage chambers to balance for high flow events. The water is then pumped through a

UV filtration unit to kill any bacteria and then a 1.3 km pipeline along Dandenong Creek to fill a 1.5 ML storage tank near the oval. Water for irrigation is controlled via telemetry and integrated with the sprinkler cycle.

The available yield is 17 ML per year and currently about 4 – 5 ML is used each year to water the oval. The underground buffer tank holds 90 kL of water whilst the storage tank at the oval holds 1.5 ML. Surplus capacity in the system will provide opportunity to expand the network to support future development opportunities.

This project demonstrated the important of commitment by the five funding partners representing private industry, federal, state and local government and community partners to fulfil a vision.

Initiative 3.3.5

Increase peri-urban farms' use of non-drinking water

Farmers and other primary producers on the urban boundary are increasingly supplying local and export markets with world-class produce. The intelligent management and use of water is essential to sustaining and growing these businesses. We will work with farmers to ensure a secure water supply, including in low-rainfall periods, through more extensive use of harvested stormwater and treated wastewater.

Greater capture of stormwater in the green belt and on the urban fringe – in areas such as the Yarra Valley, Keilor, Bacchus Marsh, Hume, Werribee and the Koo Wee Rup Plain – will help reduce the impact of run-off on the quality of our catchments and waterways. It will also help address the issue of salt accumulation in alternative water sources.

Accumulation of the loads of salts and other pollutants at end of the pipe networks results in high concentrations of total dissolved solids. It is much more cost efficient to manage this challenge in advance of accumulation. Integrated water management, and managing water at the upper reaches of catchments, can reduce water salinity significantly.

We will support projects that improve the use of local water on farms, including demonstration projects for innovative solutions. We will share key insights and lessons from these projects on the *Water Source* site.

Farmers on the urban fringe of Melbourne will also benefit as we find new ways to provide alternative reliable water supplies more cost effectively. Local water such as treated stormwater and wastewater can be used to expand agricultural production within the wider metropolitan area.

Initiative 3.3.6

Minimise energy use in the water cycle

As our population increases, demand for energy will increase. Because our water cycle uses significant volumes of energy, we need to be wary of any water cycle management approach that generates a heavy energy burden, which could increase water costs and make water cycle management vulnerable to volatility or price shocks in the energy market. Over-dependence on energy-intensive water service systems could create risks to the levels of service. We will therefore look for ways to generate, conserve and reuse energy across the water cycle.

Water is heavy, and transporting, distributing and treating it uses a large amount of energy. In a typical water cycle, a quarter of the energy use is required for water extraction, purification and distribution.

The amount of energy depends on the water source and type of treatment (for example, desalination of water requires a large amount of energy), and the distances and height differences over which the water is pumped. Pumping groundwater across surface distances also dramatically increases energy requirements.

It is clear from the energy use profile of the water cycle that there are several points at which energy use can be minimised. We will seek to minimise energy use at all these points. The first opportunity to minimise energy use in our water cycle is by working with the end-users of water to encourage energy-efficient water applications. The suite of proposed initiatives described in sections 3.2 and 3.3 provide examples of how *Melbourne's Water Future* capitalises on this opportunity.

The second opportunity for energy minimisation in water cycle management relates to the treatment and distribution of water across the whole system. By encouraging the use of local water, this strategy will supplement drinking water supplies with alternative water, thereby minimising the volume of drinking water that needs to be treated and transported long distances across the city. Smart positioning of local rainwater and stormwater treatment plants will minimise the distances and elevations the water needs to be transported. In addition,

Peri-urban farming provides an opportunity to turn small plots of land on the city's fringes into productive farmland. Whole-of-water-cycle management reduces the use of drinking water for irrigation.



where groundwater of acceptable quality is available, it will be used locally to avoid the need for high-cost transportation.

These measures will help to avoid high-energy uses of our water system, and help to moderate peak annual, seasonal, daily and hourly demands. In addition, we will maximise the efficiency of the existing water treatment and transportation system by progressively installing energy-efficient infrastructure wherever such options are viable.

The third opportunity for energy minimisation in the water cycle relates to wastewater treatment. We need to ensure that increasing demands on our wastewater system do not escalate the energy burden. This may best be achieved through greater use of local, small scale and efficient treatment plants to reduce the costs of transportation. These considerations will be included in local and regional planning, and in the investment decisions of the Government, the Office of Living Victoria and the water authorities.

The Commonwealth Government is also an important participant in reducing energy use and promoting energy innovation.

We will collaborate with the Commonwealth Government where there are opportunities to support energy saving and energy generating initiatives in the water cycle.

Initiative 3.3.7 Establish regulatory support for local water use

As Melbourne's households and businesses move towards more sophisticated local water use, it is critical that our regulatory arrangements keep pace. For this reason, we have already implemented a permanent water saving regime for drinking water. This regime outlines a range of measures that apply to the use of drinking water at all times, including the requirement for hoses to have trigger nozzles, and limitations on hard surface cleaning. Similarly, the installation of recycled water or 'purple pipes' in new residential estates and industrial developments near wastewater treatment plants is already a routine practice in local water planning requirements and the Government has mandated the installation in new class one dwellings of either 6-star solar hot water or a rainwater tank.

To continue in this direction, the Office of Living Victoria is preparing a cost-benefit analysis to inform future regulatory options and a regulatory impact statement that considers the net community costs and benefits of implementing new controls to improve the water performance of new buildings.

We will adopt the principle that new regulations should only be pursued if there are significant net social benefits, and the medium-term cost impact on individual water users is neutral or modest, with all relevant costs considered. This would be achieved if industry has time to adjust to new efficiency requirements; if the changes result primarily in short-term adjustment costs; there is flexibility about how to comply; and if any increase in up-front costs for consumers is offset by expected savings. These principles and parameters will be applied in any regulatory impact statement process.

An example of a regulatory adjustment being considered in the regulatory impact statement concerns the current requirement for new dwellings to include either rainwater tanks or solar panels. As this requirement stands, there is no way for a developer to know what proportion of houses will opt for rainwater tanks as compared with solar panels. Consequently, developers' and water authorities' costs are maximised because they need to provide sufficient infrastructure for a full water and energy load, even though this may not ultimately be required.

Through the regulatory impact statement, we will seek to provide more of the certainty that developers and water authorities require to be able to tailor their plans to achieve cost

savings available through eliminating the need to install redundant infrastructure and reducing developers' costs.

We will work with other State Governments to propose changes to the national Water Efficiency Labelling and Standards scheme, to lift the water efficiency of new appliances.

While *Melbourne's Water Future* will have a beneficial effect on our city and waterways, it is also important to ensure that the public health of business and household water users is not compromised. This will be a central priority in any future water-cycle related regulatory changes (see also the discussion of safety in Initiative 3.4.7).

Case study



City of Casey Recreation and Aquatic Centre

City of Casey's Recreation and Aquatic Centre is Australia's first drought proof aquatic facility and is one of the few pools in Australia which doesn't rely on mains water for filling or topping up. The centre's design uses collected rainwater and recycled pool water to save over 26 million litres of drinking water every year.

Rainwater is harvested from the roof of the building and nearby council facilities and is stored in a 2 million litre holding tank. Rainwater is filtered and disinfected for pool use, cleaning

backwash pool filters, toilet flushing, showers and watering gardens. Forty per cent of backwash water is collected and stored in three 90,000 litre underground tanks. This water is then filtered, disinfected and reused – without this new system, 10 million litres of water would be lost down the sewer.

Casey is one of Melbourne's fastest growing areas. The Office of Living Victoria is in discussion with City of Casey about opportunities to provide further support for this innovative recreational facility.

Initiative 3.3.8

Reform the structure of water bills to reward water efficiency in the home

The Victorian Government is committed to maintaining 'postage stamp' water pricing across Melbourne, whereby prices are consistent regardless of where people live. The Government has also committed, in *Securing Victoria's Economy*, to 'Provide greater choice for customers by allowing more flexible water pricing, subject to strict consumer

protection safeguards and price regulation. Flexible and efficient prices provide important signals for supply and demand and can encourage innovation and productivity.'

Despite greater variety in water sources, with different costs and reliability levels, pricing structures have not to date offered sufficient choice for consumers. Recent changes to the framework for the regulation of water services (Water Industry Regulatory Order 2012) facilitate the introduction of greater customer choice in tariff structures.

We will monitor progress and consider further measures to increase flexibility and choice in tariff structures. We will investigate changing the structure of water bills, to create stronger incentives to manage water efficiently (such as through a higher variable consumption component of bills).

As part of the commitment in this strategy to allow 'out of area' competition among water retailers to supply new greenfields and brownfields developments, we will introduce greater pricing flexibility. If lower water price

caps can be shown to be sustainable for such developments, they will be permitted under the new regulatory framework that is to be developed under this strategy.

These actions will build on the water authorities' own initiatives in areas such as pricing flexibility and metering options.

3.4 Outcome

3.4 Resilient water systems

Melbourne's Water Future embodies a new and more resilient approach to understanding, planning and managing our urban water cycle. This new approach will meet the demands of future population growth, and respond to system shocks from outside influences such as climate change and major supply interruptions.

In 2050, Melbourne's population is projected to reach about 6.5 million. Current levels of drinking water use (approximately 200 litres per person per day) would not be sustainable at that population level, and certainly not in drought conditions.

Many uncertainties affect the long-term future of Melbourne's water cycle. We need a more diversified, decentralised and resilient system to better position Melbourne and Victoria to face the uncertain future. To achieve this, we need an integrated approach to water cycle management, that operates at all levels, from the household to the Greater Melbourne region. That approach needs to be informed by 'bottom up' analysis that recognises important differences in the water cycle at different times and locations across Melbourne, rather than relying on averages.

Adopting a whole-of-water-cycle approach that increases the use of local water will reduce or defer the need for investments in large scale infrastructure, minimise the increase in water bills for domestic and business consumers, improve environmental and liveability outcomes (including reducing urban flooding), and be more responsive to shocks to the system.

Critically, the new approach must ensure that Melburnians no longer face excessive water price increases due to over-investment in big capital infrastructure.

Continuing to invest in 'big capital' infrastructure is like putting all our eggs in one basket. It is an expensive and fragile solution that lacks flexibility and commits us to relying on transporting water long distances rather than using or reusing water near where it is collected. The 'big capital' approach entails high energy consumption, with associated issues of high asset management costs, and pressure on electricity generation. Additionally, the high costs of maintaining and extending the water system are concealed in the complexity of different organisational responsibilities and different types of fees and charges.

A whole-of-water-cycle management approach also provides security of water supply for businesses and householders, because it makes better use of our drinking water, provides for more efficient water use, adds new supply from alternative sources to substitute for wasteful and inappropriate uses of drinking water, and improves our ability to respond to shocks to the system. This has significant benefits for all consumers, but is a key requirement for retention and attraction of businesses, particularly those that are highly water dependent for their commercial success.

Where it is efficient and prudent to do so, the strategy will redirect water sector investment to fund projects that improve the management of the water cycle and increase

Improving urban water cycle management in Melbourne 3



the resilience of our water systems. It will do this without increasing total costs, and without compromising the return on public investment. The range of projects include stormwater harvesting and treatment, mitigation of stormwater run-off, and wastewater treatment and re-use. These projects, and the strategy's other proposed initiatives, would be implemented within the quantum of revenue established by the metropolitan water authorities' current water plans.

The Government is only one player in the water sector. To provide greater certainty for water investment, *Melbourne's Water Future* will establish new arrangements for bulk water supply, and extend Victoria's water rights and trading framework to include alternative water sources such as urban stormwater and

wastewater. The strategy will also improve reporting and capability building for the water sector to encourage holistic water management.

Underpinning this new approach is a fundamental shift in how we plan for our water future. The current water planning system relies on a five-year cycle of water demand, supply and essential services planning. This will be improved by an ongoing planning process, making better use of the data collected, and aligning spatial and geographical planning boundaries to the way water flows (as opposed to administrative boundaries). As our knowledge base grows, planning will continuously improve with a resulting ability to better anticipate system behaviour, and to respond to unexpected events and pressures when they do occur.

3.4 Initiatives

Initiative 3.4.1

Invest in and fast-track projects that enhance water system resilience

The Victorian Government and water authorities will co-invest in whole-of-water-cycle projects including for stormwater harvesting and treatment, mitigation of stormwater run-off, and wastewater treatment and re-use. To assist in the identification of projects that will deliver the most significant water cycle benefits, the Office of Living Victoria will develop a framework that compares the costs and benefits of projects, including not just financial viability but consideration of social and environmental benefits from a whole-of-system perspective. This framework will be made available to the public on the *Water Source* site, as described in Initiative 3.1.5. Development of this framework will build on the existing Options Assessment Framework, 'Planning for Resilient Water Systems: A Water Supply and Demand Investment Options Framework' (December 2011).

State Government funding will be allocated through a competitive process in which potential projects are compared based on the estimated water cycle outcomes and the level of co-investment and innovation.

Public funding will be drawn from several sources as appropriate, including the Living Victoria Fund, Melbourne's water authorities, other State Government agencies, urban flooding funds and Waterways Operating Charter funds. Co-investment funds will come from local government, the Commonwealth Government, the private sector and community organisations, where whole-of-water-cycle objectives are consistent with the objectives and priorities of these organisations.

Building on existing project review processes, all major water sector investments will be reviewed for their alignment with this strategy and sound water cycle management principles. Projects will be reviewed in the phases of design, approval and delivery. In the near term, the Office of Living Victoria will also play a bigger role in monitoring, guiding and facilitating specific projects that have a whole-of-water-cycle focus.

The funding allocation process will involve competition to achieve specified water cycle management outcomes, and will build on market-based environmental programs already piloted by the Department of Environment and Primary Industries, such as the Little Stringybark Creek trial and Eco-Tender program.

Key projects already being funded include:

- Large scale alternative water use at Kalkallo
- Western Growth Area Scheme
- Centralised recycling in the east
- Doncaster Hill.

The Office of Living Victoria will support delivery of these projects, such as through practical facilitation, and will work with the projects' stakeholders to align the projects with this strategy. This will include working with the water sector on projects like the Altona facility and refocusing the western and eastern schemes to be locally efficient.

The Victorian Government will facilitate and accelerate other projects that have a large impact on water system resilience and improved water cycle management. For example, we will facilitate projects that reduce flooding and associated impacts on the Yarra, and increase urban amenity, by retaining stormwater in the landscape.

We will substantially accelerate the approvals process for developments that are consistent with sound water cycle management principles. To improve current processes, we will identify then eliminate overlaps and administrative loops.

Initiative 3.4.2
Change the incentives of our water authorities

The historical bias toward large, centralised solutions is reflected in the formal rules under which our water authorities operate. We will reform the incentives and drivers facing the authorities, to ensure appropriate consideration of integrated and innovative water cycle management options.

Those incentives and drivers are currently reflected in the Authorities’ operating objectives and strategic plans; legislative and regulatory instruments such as the *Water Act*, the Statement of Obligations and the Water Industry Regulatory Order; and plans and policies such as security of supply objectives. The Government, through the Office of Living Victoria, will work with water authorities and others to reform the incentives and drivers to address the big-project bias and to embed a new approach to water management that recognises the potential benefits of local and innovative solutions. This is expected to result in both significant cost savings and improved amenity and wellbeing. Also, we will improve clarity by providing greater guidance on how water authorities must balance the various objectives in the Water Industry Regulatory Order.

A review of the *Water Act* is underway to simplify and modernise the legislation. That review is a critically important step, as the Act is outdated and overly complex. The streamlining of the *Water Act* will provide the foundation for further amendments to ensure that the Act reflects sound water cycle management principles, and drives transformation of the urban water sector. The reformed Act must establish the right governance and incentive arrangements for water authorities to adopt an integrated, innovative approach. This will include revisiting water authorities’ security of supply obligations, which drive much of the authorities’ decision making about investment.

The Government will establish new objectives for the water authorities, to reflect this strategy and sound water management principles. We will amend the Water Act Statement of Obligations and the Water Industry Regulatory Order to allow water authority business cases to consider wider costs and benefits, including environmental and social costs, while at the same time requiring the Essential Services Commission to consider the balance between the benefits of projects and the impacts of price rises on consumers.

Case study



Altona Recycled Water Project

The \$48 million Altona Recycled Water project involved the design, construction and operation of a recycled water treatment plant at the Altona Sewage Treatment Plant, located 16 kilometres west of Melbourne, supplying approximately 2.5 billion litres of Class A recycled water for local industry and irrigation each year.

First opened in the 1960s to provide sewage treatment services to the Altona area, the plant today services more than 20,000 residential

and business properties in the Altona, Altona Meadows, Laverton and Point Cook areas and treats close to 13 million litres of sewage a day. Instead of releasing millions of litres of treated wastewater into Port Phillip Bay, the plant now uses membrane technology to remove salt and other contaminants. The recycled water is then pumped to a plastics manufacturer for cooling tower and boiler operation, as well as to two golf courses and council-owned public space for irrigation.

Diagram courtesy of City West Water.

Case study



Doncaster Hill

Located 15 kilometres east of the Melbourne's central business district, Doncaster Hill is the major population and business growth area in the city of Manningham and is supported by a planning scheme requiring the implementation of Environmentally Sustainable Design (ESD) principles in developments.

In 2008, the council partnered with Yarra Valley Water and Melbourne Water to examine integrated water management options to cater for the predicted levels of growth. After a detailed assessment, which looked at different water servicing options, Yarra Valley Water mandated the area for recycled water requiring all buildings to be constructed to include a

'third pipe' to allow the supply of recycled water for toilet and laundry use. The third pipe initiative complements council's requirements for stormwater management to improve the quality of discharge into waterways and lifts the environmental credentials of the development. Yarra Valley Water propose to construct a recycled water treatment facility and reticulation network to supply water to new dwellings, reducing mains water demand by up to 30 per cent with a corresponding reduction in wastewater volumes sent to Melbourne's western treatment plant (over 60 kilometres distant at Werribee) and impacts on the Bay from wastewater discharge after treatment.

Initiative 3.4.3

Overhaul water planning and regulation

The current regulatory approach features five-year Water Plans that set prices, the investment decisions and strategic directions of Victoria's water authorities. This approach can be inflexible and can undermine development of planning capability. It runs the risk of being poorly integrated with business planning, the evolution of the metropolis, the economy and climate processes.

Melbourne's Water Future foreshadows a new approach to water planning. The strategy will establish new planning and regulatory arrangements for the water authorities, including for price setting and strategic planning. The new framework will:

- adopt the principles of whole-of-water cycle management;
- reflect the policies and reforms established by this strategy (including the governance reforms);
- better integrate pricing and investment planning with water planning at the city, regional and local levels, municipal and land-use planning, and the corporate planning cycle of the authorities; and
- establish high-level long-term pricing principles (with the Essential Services Commission) drawing on pricing models and regulatory experience from other sectors such as transport.

Within these parameters, the precise features of the new regulatory framework will be developed as part of the review of the *Water Act*.

We expect that:

- the water authorities will develop annual business plans and three-year corporate plans that are consistent with this Strategy and the relevant land use requirements, and which have regard to the regional water cycle plans
- the Office of Living Victoria will review the water authorities' corporate plans and other key plans to scrutinise their alignment with this strategy and sound water cycle management principles
- the new regulatory and planning process will make better use of historical and new data from a whole-of-system perspective.

We will consider revising the institutional and administrative boundaries in the water sector, to better align those boundaries with the metropolitan boundary, how water flows in the landscape, and the connections between Melbourne and surrounding environments.

Initiative 3.4.4

Increase scrutiny of major investment decisions in the water sector

To embed a new approach to water cycle management, it is essential that all major investment decisions in the water sector reflect that approach. *Melbourne's Water Future* will establish that planning for major investments will include consideration of coordination of expenditure and adherence to the principles in the strategy – including clarity of whole-of-society and whole-of-system costs and benefits.

Further, a statewide approach to valuing non-financial benefits will be adopted and a threshold test will be applied to innovative water projects, such as the following:

- (i) If a proposed innovative approach will achieve the traditional outcomes at a lower total monetary cost than the 'business-as-usual' approach, it may be implemented.
- (ii) If the monetary costs are similar and the innovative approach will deliver the traditional outcomes *and* has higher environmental and social benefits (unpriced externalities), as demonstrated through a qualitative assessment framework, the innovative approach may be implemented.
- (iii) If the proposed innovative approach has a significantly higher monetary cost than the business-as-usual approach, then, even after considering unpriced externalities as above, it may not be pursued.

In finalising and applying the threshold test we will have regard to (i) cumulative total system costs across all of the Melbourne region, (ii) costs over time, and (iii) the cost-benefit approach of Infrastructure Australia.

Initiative 3.4.5

Embed good water management in public buildings and major projects

Today, public buildings and major projects are sometimes not planned, designed and scrutinised with good water use in mind.

The Government will assess the costs and benefits of requiring all major Government-funded projects to manage efficiently the water cycle, such as through collecting and using rainwater, and managing the flow of stormwater from hard surfaces.

Initiative 3.4.6

Monitoring, access to and use of data

We will monitor and publish the performance of our water systems. To support that commitment, we will implement a monitoring and data management system for the entire Greater Melbourne water, sewerage and stormwater networks. This system will be implemented and managed independently and in partnership with all our water authorities to ensure consistency. The 'whole of Melbourne' monitoring and information management systems will also include observations of stormwater runoff volumes and quality.

We will provide open, transparent, and freely accessible information about the performance of the water cycle systems throughout Greater Melbourne to all stakeholders and the community. This information will be managed by the Office of Living Victoria and be available in a common location and format.

We will establish measures that indicate the scale of opportunity to reduce waste of drinking water, increase use of rainfall and stormwater, increase wastewater recycling, and reduce energy use in the water cycle. The performance of our water systems will be monitored and published by the Office of Living Victoria and in the 'Water Outlook' report. We will also establish, publish and annually review benchmarks for efficient use of drinking water. Performance against the targets will be published in the 'Water Outlook', with progress reported to Parliament.

Initiative 3.4.7

Improve the safety and emergency readiness of our water systems

We will work with the water authorities and other stakeholders (including Emergency Management Victoria and the emergency services agencies) to develop and publish a readiness plan for unexpected events such as security risks, engineering risks and ash contamination from bushfires. To continue to improve the emergency readiness of our water systems we will engage with Emergency Management Victoria and the State Crisis and Resilience Council in accordance with the 2012 Emergency Management White Paper.

The Government is committed to ensuring public health is not compromised, and notes that the requirements and processes for ensuring safe use of sewage, greywater and stormwater are the subject of a discussion paper released in March 2013 by the Department of Health – 'Review of the public health regulatory framework for alternative water supplies in Victoria: Supporting the safe use of sewage, greywater and stormwater'. This discussion paper highlights the current state of regulation, and calls for public discussion on this important issue. The Office of Living Victoria is working with the Department of Health to progress this work, consistent with the Government's objectives.

Initiative 3.4.8

Improve investment certainty and the efficient allocation of urban water

Currently, across Greater Melbourne there is a complex and uneven regime of licensing for the use of alternative water sources. Rights and requirements are unclear. As a consequence, potential investors in projects that use alternative water sources such as stormwater and wastewater lack certainty about the availability and quality of those sources.

To provide greater certainty for water investment (within the context of ongoing public ownership of our water authorities), we will extend Victoria's water rights and trading framework to include alternative water sources. This action will be supported by a clear and tailored framework of legal rights and requirements, new pricing models and the introduction of alternative water markets to ensure that water is allocated to the best uses.

The rights and trading framework will recognise the interests of owners of land, the important role played by local councils in managing stormwater and other alternative water sources, and the Government's commitment to retaining public ownership of the water system.

In developing the framework we will consult widely, and learn from the experiences in regional and rural Victoria and those of other jurisdictions.

Following the development of the metropolitan water cycle planning framework, the Office of Living Victoria and the water authorities will prepare and publish a 'Statement of Opportunities' showing the 10 year outlook for investment in the water cycle in Melbourne. The Statement of Opportunities will be updated annually, and will provide a keystone of an efficient secure and innovative system: transparent, reliable and timely information on future opportunities for investment and demand-side initiatives. As such, the Statement will support new entrants and investment, and encourage innovation.

Initiative 3.4.9

Reform bulk water arrangements

Currently, Melbourne water retailers each hold a share of the water available from the Melbourne 'pool', which aggregates all bulk water sources available to Melbourne. The retailers take water as they need it without paying for the resource itself (except in the case of desalinated water). Some regional water businesses adjoining Melbourne also hold entitlements to the pool. Decisions relating to the use of water held under the source entitlements are made by the Melbourne water retailers unanimously through the Bulk Entitlement Management Committee.

This approach can lead to poor outcomes because it dilutes the incentives for individual water businesses to invest efficiently, as the benefits and risks of individual investment are shared between holders of the pooled entitlement. Also, the lack of a cost signal obscures the real value of bulk water; there has been no market price signal about the scarcity of water resources. Nor has there been a cost signal for discharges of water into our rivers and bays. Such signals would better inform water use, investment and demand management, particularly in relation to the use of alternative water sources.

In the new water future, water authorities would be empowered to manage individually the balance between their customers' demand and the available supply, while being accountable for meeting security of supply performance requirements. Each water

business would be able to realise the benefits of its water efficiency, supply sourcing and demand management activities, and would bear the risk of not doing these things efficiently and effectively.

The Living Victoria Ministerial Advisory Council recommended devolution of the bulk water entitlements; the introduction of tradeable delivery entitlements for Melbourne's catchment; and a bulk water resource cost. Such a cost could be introduced in a staged way, initially in the form of a spatially specific estimated cost. The same is true of a cost signal for discharges of stormwater and treated wastewater, and a cost signal for different geographical costs of water cycle services. New governance and market arrangements and rules would be required to support this new approach, and will be developed as part of the proposed legislative and regulatory reforms under the Strategy.

New bulk water arrangements for Melbourne are a priority for the Office of Living Victoria and will be integrated in the proposed legislative and microeconomic reform program. The new arrangements will include steps to ensure adequate flows in our natural waterways.

To facilitate a new approach to bulk water, we will work with Melbourne Water to 'ring fence' Melbourne Water's internal functions that relate to bulk water delivery and system planning. This will enable a clearer and more transparent division between Melbourne Water's whole-of-system functions, and those that relate to its commercial and business functions. We will also consider whether steps should be taken to 'unbundle' water and sewage costs.

Initiative 3.4.10

Address knowledge gaps and other barriers to improved water system resilience

Our current water sector structures, regulations and administrative systems are not built for an integrated and holistic approach to water cycle management. To achieve a step change in how we manage water, a range of barriers and gaps need to be addressed. These include regulatory barriers to investment in innovative water use; knowledge gaps about the actual water cycle (including specific aspects such as future scope for storing and treating water in aquifers); and the need for protocols and guidelines that help inform and guide water sector participants and members of the community about how to achieve Melbourne's new water future.

To address barriers and gaps as a means to implementing a new approach to managing water in Melbourne, we will, in consultation with the relevant authorities:

- Complete a stocktake of regulatory and administrative barriers to the adoption of a better approach to water cycle management
- Engage with the water authorities, Red Tape Commissioner, the Essential Services Commission, Victorian Competition and Efficiency Commission, Department of Health and the Environment Protection Authority to address the regulatory barriers identified in the stocktake

Case study

Watsons Creek

Watsons Creek is a tributary of the Yarra River slightly downstream of Yering Gorge. In the late 1960s, the Parliamentary Public Works Committee recommended that the Melbourne and Metropolitan Board of Works should acquire and control the Watsons Creek catchment to pave the way for a large off-stream storage reservoir on the site.

The purpose of this reservoir was to store water extracted from the Yarra River by the Yering Gorge pump station, which was to be duplicated as part of this scheme. Subsequent consideration of this scheme undertaken in the 1980s and 1990s concluded that a smaller scheme, with a much smaller reservoir, would be appropriate, given the needs of the environment and the availability of water from the Yarra River. Significant land holdings within the inundation area of the smaller potential reservoir and the surrounding buffer area are still retained by Melbourne Water.

More recent desk studies of this option suggest that the volume of water that could potentially be made available by this option could be much lower than in previous assessments.

Additionally, this scheme would have significant environmental and social impacts, including the disruption of an important wildlife corridor between the Yarra River and Kinglake National Park and the relocation of roads and houses from the inundation area.

These recent studies have not been wide enough to fully explore the broader strategic value of this option. For example, Melbourne in the longer term may require additional seasonal storage to provide for peak summer demands, particularly in the northern and western urban growth areas, and the potential role of this reservoir in combination with other sources of water needs further consideration.

A more detailed investigation, consistent with the Melbourne's Water Future approach, needs to be undertaken to clearly establish the potential strategic value that this specific option, and the associated land holdings, could still offer in the longer term, transparently considering the needs of all stakeholders.

Case study



Kingswood managed aquifer recharge

The Kingswood Golf Club in Dingley Village needed an extra 30ML each year to supply summer peak demand and maintain the quality of presentation of the golf course.

Managed Aquifer Recharge – the process of injecting water into an aquifer for later extraction – was adopted as it is suited to circumstances where there is limited space for above ground storage.

Generally, bores are drilled into sand and gravel aquifers, but in this case, there was an additional challenge of drilling into fractured rock and whether the fractured rock aquifer would provide adequate capacity. An innovative approach of

identifying linear features in the topography – from stereophonic aerial photographs – was used to best position the trial bore.

A new bore was successfully drilled on the golf course to 114 metres. Aquifer extracted stormwater is pumped into an existing storage dam to supply the golf course irrigation scheme. If the salinity level of extracted groundwater exceeds the limit for irrigating greens, the water is diverted to a new above ground storage tank reserved for irrigating fairway turf only.

This South East Water project was assisted by the Smart Water Fund and won a Waterwise award from Southern Rural Water in 2010 for demonstration of innovation in water.

Photo courtesy of Kingswood Golf Course

- Establish within the Office of Living Victoria an advocate for innovation and streamlining, who can help identify and rapidly address systemic water cycle issues such as unwieldy and out-of-date regulations
- Ask the Knowledge and Innovation Panel in the Office of Living Victoria to undertake a stocktake of knowledge gaps and research gaps in integrated water cycle management.
- Review, update and publish existing information on Melbourne’s aquifer locations and quality, building on the Smart Water Fund aquifer mapping project completed in 2006 and the Southern Rural Water Groundwater Atlas. The Smart Water Fund project identified a potential 105 GL of economically viable aquifer storage in the greater Melbourne region, which could supply irrigation quality water of up to a quarter of Melbourne’s current total annual water demand (Report on Broad Scale Map of ASR Potential in Melbourne. SKM and CSIRO Report to Smart Water Fund, March 2006, 49p. By Dudding, M., Evans, R., Dillon, P. and Molloy, R).
- Model and document local and coastal flooding risks.
- Engage with the water authorities to review regulatory arrangements for ‘purple pipes’ in new developments.
- Disseminate new protocols and guidelines for integrated water cycle management via the *Water Source* site, including protocols and guidelines for increased and sustainable use of aquifer storage (building on the technical guidelines outlined in ‘Developing Aquifer Storage and Recovery Opportunities in Melbourne’ published by the Smart Water Fund in March 2006).
- Continue to use ‘big data’ computing and ‘bottom-up’ systems modelling approaches to model the urban water cycle over time and in all its complexity.
- Make the models, and the modelling results, accessible to all via the *Water Source* website.

Initiative 3.4.11

Establish a whole-of-water-cycle design competition

To raise the profile of whole-of-water-cycle processes and systems while simultaneously building the knowledge base about innovative strategies, we will establish a whole-of-water-cycle design competition. The competition will challenge leading water sector professionals including engineers, consultants and research institutions in a design competition to develop leading edge whole-of-water-cycle solutions. The winner of the competition will be awarded the right to implement their design, and will be publicised on the *Water Source* site. The award will be funded by the water sector.

How will the strategy improve efficiency?

Put a value on water	Put a value on bulk water supply and water disposal	Reform and broaden the 'security of supply' framework for urban water	Encourage more efficient use of water	Optimise use of all water sources	
Reform water sector governance	Review institutional boundaries	Ring-fence Melbourne Water's bulk water delivery and system planning functions	Establish consolidated rules for developing, managing and operating Melbourne's water system	Pursue shared services and joint procurement	Simplify and streamline regulation
Reform water prices and increase competition	Greater flexibility and choice in tariff structures	Structure water tariffs to enhance incentives to manage water efficiently	Enable competition among water service providers for new development areas	Scope to reduce water price caps in new development areas	
Inform future investment in the water cycle	Develop a water sector 'Statement of Opportunities', which is a 10 year perspective on the supply/demand balance and options				
Increase investor certainty in alternative water sources	Ensure clear ownership and rights to alternative water resources (stormwater, recycled water, wastewater)		Enable trading in rights and entitlements so water is allocated to its most valuable uses		
Improve transparency about local water system costs and demand	Greater disclosure of information about water value, systems costs and system performance				

Table 3.2

The strategy includes key microeconomic reforms that will improve efficiency in the sector by placing a value on water, sharpening water authorities' incentives to operate efficiently, and improving regulation and governance. The key reforms that will enhance economic efficiency are summarised in this table.

3.5 Outcome



Melbourne's Water Future will help ensure the health of iconic Melbourne waterways like Merri Creek, which attract wildlife, joggers, cyclists and families

3.5 Improved natural waterways

One of the five objectives of *Melbourne's Water Future* is to protect the environmental health of our urban waterways and our bays. For many Melburnians, our relationship with the city is defined, at least in part, by our relationship with our coastal waters and natural waterways. They provide direct economic, social and cultural benefits for all residents and visitors to our city. From the perspective of the environment, they represent our most fundamental and important water assets, supporting the health and vibrancy of biodiversity and providing four types of ecosystem services identified by the United Nation's 2010 Millennium Ecosystem Assessment:

- provisioning services, such as food and fresh water;
- regulating services, such as climate and pollination services;
- supporting services such as for soil formation and nutrient cycling; and
- cultural services – educational, aesthetic, cultural heritage, recreation and tourism values.

The environmental health of urban waterways is now recognised and understood as a key underpinning for the functioning, health and character of urban communities.

The health of Melbourne's 7,000 kilometres of waterways and our bays, and the biodiversity and eco-systems that rely on them, is crucial to our liveability and environment. The challenges posed by increasing urbanisation include a significant threat to the environmental condition

of waterways, and hence to key waterways values as indicated by the presence and health of platypus, fish, frogs, birds, invertebrates and vegetation. The condition of our waterways is primarily a consequence of the quantity, velocity and quality of urban stormwater run-off, and the discharge of wastewater. The more effectively that stormwater and wastewater are managed, the cleaner and healthier our waterways will be.

In the past, a 'bandaid approach' has been adopted to address problems such as urban flooding and damage to our waterways. Rather than addressing underlying causes, effort has been directed at the symptoms of historically poor water management. More recently, Melbourne has adopted an urban design approach to this issue and through the innovative work of the water authorities and local government, Melbourne has become a world centre for water sensitive urban design.

Currently, around 30 per cent of the Port Phillip and Westernport Region, which includes Melbourne, is urban, but this proportion is rapidly increasing with population growth and the resulting urban development.

Urbanisation presents several challenges, including:

- increasing the volume of stormwater generated by catchments, changing the frequency and intensity of high and low flow in waterways;
- decreasing the infiltration of stormwater into the groundwater system, changing the baseflow in waterways during dry periods; and
- increasing the amount of litter and other pollution that is washed into waterways with stormwater.

These challenges pose a significant threat to the environmental condition of waterways. Complementary works to maintain and protect urban waterways include the restoration of vegetation, management of stormwater flows to urban waterways and reinstatement of fish habitats.

As Melbourne transitions toward whole-of-water-cycle management, the drivers for managing its waterways are changing. We are moving beyond traditional centralised ‘bottom of the catchment’ management approaches that reduce pollution and maintain and restore waterways to an approach that produces multiple social, economic and environmental benefits for the city. Key areas of focus include value-based planning and management, investment and risk analysis frameworks; rights, allocations and use of alternative sources; multi-scale whole-of-water-cycle management and planning, best practice land management and data and knowledge sharing.

Whole-of-water-cycle management approaches that can reduce the impacts of flooding also have benefits for waterways. The extensive distribution of stormwater retention and harvesting can benefit the waterways by returning them to more natural conditions. While wastewater reuse projects do not have the capacity to remove the impacts of flooding, they can have a positive influence on the health of Melbourne’s waterways and bays, by reducing the nutrient loads from overflows that would otherwise be discharged.

The economic benefits of enhanced waterways will consequently be key criteria in the consideration of business cases for whole-of-water-cycle management projects.

The *Melbourne’s Water Future* strategy will, as a priority, address waterways health in the upper reaches of our catchments, to reduce the need for remediation at the bottom.

We know stormwater management programs have previously struggled to provide adequate abatement and treatment of stormwater, and this has had direct consequences for the quality of our waterways and bays. As our population grows, this pressure will increase.

In 1999, the Victorian Best Practice Environmental Guidelines for Urban Stormwater developed state-wide performance objectives for receiving waterways for pollution (nutrients and sediment), litter and flow. However, these guidelines are now over a decade old and need updating. The review of the Best Practice Environmental Guidelines will need to be carried out concurrently with the Engineers’ Australia review of the national guideline ‘Australian Runoff Quality’ to ensure alignment of professional practice and will need to take account of the latest scientific and policy thinking about this issue.

Understanding that the quality of our waterways and bays is the result of what flows through and out of the city, and through our stormwater drains, helps to explain why adopting a whole-of-water-cycle approach not only improves our water security and usage, it also has direct consequences for the health of our waterways and bays.

Case study



Protecting Little Stringybark Creek

In an Australian-first, the Yarra Ranges Council is proposing a new Environmental Significance Overlay to encourage residents to use more of stormwater runoff at home. The proposed amendment would apply to all buildings and works that would increase the amount of hard surfaces such as roofs or paving by 10m² or more. Planning approval will be conditional on the proponents finding options to capture and treat more of their stormwater runoff onsite. This pilot program encourages residents to capture stormwater at home and use it to flush toilets, water gardens and for other non-drinking purposes around the home.

The proposed amendment is part of a pilot program initiated by Melbourne Water in collaboration with the University of Melbourne, Monash University and Yarra Ranges Council to restore the ecological health of Little Stringybark Creek.

The project, which is also sponsored by Yarra Valley Water, Port Phillip and Westernport Catchment Management Authority, the Australian Government and Storm Consulting, is essentially aimed at retaining excess storm water on the site instead of discharging it directly into the creek.

Image: Video frame courtesy of Clearwater

3.5 Initiatives

Initiative 3.5.1

Engage the community on waterway health

Understanding the links between domestic and business water use and behaviours, and the health of our waterways and bays, is a key requirement for community engagement around reducing environmental harm.

In partnership with the community and industry, we will develop an education program about the importance of reducing nutrient-rich and other stormwater run-off that are detrimental to the environmental health of our waterways and the wellbeing of waterway users. This will form one component of the wider community education and engagement strategy described in 3.1 above.

We will provide support and assistance for 'Friends' groups that take practical on-ground action to improve water cycle management. Community-based groups working to protect and enhance the environmental health and amenity of local waterways are a critical local resource. We will provide specialist and technical advice and assistance, and the on-line *Water Source* site will enable sharing of information within and between local groups and the wider community. Additionally, these local groups will be key partners in the development and delivery of the education program, and local water plans.

Initiative 3.5.2

Reduce adverse impacts of stormwater on our waterways

The proposed resilience initiatives in this strategy will minimise the level of nutrient, stormwater runoff and wastewater discharges into our waterways.

To help further reduce the impacts of stormwater on our waterways, we will work with the Environment Protection Authority and local government to update and implement Best Practice Environmental Guidelines for Urban Stormwater to take into account the most recent scientific knowledge and policy thinking about stormwater management. As noted above, this review will need to be carried out concurrently with the Engineers' Australia review of the national guideline 'Australian Runoff Quality' to ensure alignment of professional practice.

Further, the metropolitan water cycle planning framework (initiative 3.2.1) will provide guidance for regional and local planning for stormwater management including proposing goals for the reduction of stormwater impact and nutrient pollution. Additionally, we will work with industry to streamline the many standards and guidance notes for stormwater quality.

Initiative 3.5.3

Fund improved stormwater management

Melbourne already invests in the health and resilience of our rivers and bays through Melbourne Water's Waterways Operating Charter 2013 – 14 to 2017 – 18. While much has been achieved under this charter, its current focus on the downstream symptoms of stormwater management misses an opportunity to mitigate the original causes of the problem. We will therefore work with Melbourne Water to rebalance the Operating Charter to make it more outcomes-focused. This will include increasing the emphasis on reducing the incidence and impact of damaging flood events, and reducing runoff higher in the catchment, thereby reducing the need for remedial action downstream. (See also Section 3.4 for other details of stormwater funding and projects.)

Initiative 3.5.4

Make better use of treated wastewater

Wastewater discharged at Gunnamatta, for example, is treated to a high standard and could be used for various purposes, rather than be discharged into the sea. Currently, less than 10 per cent of the high-quality reusable water available from this plant is productively reused. This Strategy proposes a major effort in conjunction with Melbourne Water, the Department of State Development, Business and Innovation and local government authorities to promote the use of this important resource, including productive use of water, energy, nutrients and biosolids.

Case study



Dights Falls weir replacement and fishway project

In late 2012 Melbourne Water completed a project to replace the ageing Dights Falls Weir and build a new fishway on the Yarra River in Abbotsford. The previous weir at Dights Falls dated back to 1895 when a timber weir was built to provide water to the Melbourne Flour Milling Company. Today, the weir sets the minimum water levels of the Yarra River for about 16km upstream, supporting the historic Fairfield and Studley Park boathouses and activities such as canoeing, kayaking and fishing.

The old weir was replaced with a new concrete weir and a fishway was installed to increase native fish populations; the Yarra River supports 17 species of native freshwater fish, including 11 that need to migrate between saltwater and freshwater environments as part of their lifecycle. In the past, Dights Falls has been a significant barrier to this migration.

The fishway is expected to benefit up to 2,000 kilometres of the Yarra and its upstream tributaries, boosting native migratory fish numbers, including endangered species, such as the Australian Grayling.

The Dights Falls area has significant cultural importance to the Wurundjeri people, the traditional land owners of the area. The site was originally a Wurundjeri fish trap and the south side of the area was an early men's ceremonial ground. The rocky outcrop at Dights Falls was a natural crossing place used by the Wurundjeri and the nearby junction of the Merri Creek and Yarra River was an important meeting place for trade, marriage, dispute resolution and other ceremonies. It is also the likely burial place of their ancestor Billibellary, Chief of the Yarra Yarra Tribe. Wurundjeri people still visit Dights Falls for traditional meetings and activities.

Melbourne Water worked closely with the Wurundjeri Tribe Land and Compensation Cultural Heritage Council during the planning of the project, completing a voluntary Cultural Heritage Management Plan and involving Wurundjeri elders in the project's consultation and construction phases.

As an outcome of Wurundjeri's involvement in the project, the project team changed the weir design and construction schedule to enable the location at which the new weir was attached to the rock escarpment on the southern side of the river to be altered to avoid any possible damage to the rock. Wurundjeri elders also met with Melbourne Water project staff and onsite work crews on a number of occasions to discuss the values of the site and promote particular issues that they needed to be aware of.

Melbourne Water is currently working with Yarra City Council, the Wurundjeri Tribe Land and Compensation Cultural Heritage Council and Parks Victoria to install interpretive signage at Dights Falls highlighting the various social, historic and environmental values of the site. The signage will be in place by late 2013.

Right Debris carried by Merri Creek after heavy rains in June 2013 demonstrates the need for a new approach to waterway health



Initiative 3.5.5 **Protect our catchments and plan for the long term management of our waterways**

The health of our catchment areas is fundamental to the health and viability of the water system. Melbourne’s drinking water quality is world renowned, and this reputation will be maintained and enhanced by continuing to ensure the highest quality standards for our bulk water supply catchments. Consistent with the Timber Industry Action Plan, we will continue to develop evidence-based, economically efficient and environmentally sustainable approaches to timber harvesting in Melbourne’s water catchments.

Maintaining our current world-class catchment management standards will involve protecting our catchments from inappropriate development and encroachment.

Melbourne Water has responsibility for waterway health but only manages a small part of the water cycle system which contributes to the health of our rivers, creeks and streams.

As part of the regional and local water cycle planning proposed in this Strategy, Melbourne Water will work with other key stakeholders including water authorities, local government and Parks Victoria to ensure the provision of a more holistic plan for the health of Melbourne’s waterways. This will involve planning for water management higher in the catchments of our waterways as well as remediation of past damage over time.

Initiative 3.5.6 **Measure, monitor and publish the level and composition of stormwater runoff**

Informed and transparent decision-making and practice requires clear and transparent information about the impacts of runoff and the composition of pollutants, chemicals, sediment and other litter in that run-off. This information will be monitored carefully and published in the regular ‘Water Outlook’, which will also publish changes to existing strategies and programs designed to take best advantage of approaches that are proven to work. This proposed initiative will build upon the current information gathering and monitoring activities of the Environment Protection Authority, local government, Parks Victoria and other organisations.

3.6 Reduced inefficiency and waste

Delivering affordable water services for the people of Melbourne and Victoria requires prudent spending and a concerted effort to combat duplication. We need to identify the best places to intervene in the system, and the optimal use of constrained funds.

Over the last 100 years, Melbourne's water system and the agencies that administered it have served the city well. More recently, technological advances, emerging capabilities, and new understandings of 'big data' have enabled fresh insight into the complex, spatial and temporal problem of our water cycle.

Today, there is evidence of several areas of potential overspending and lost opportunities to improve investment outcomes in water cycle management. The *Melbourne's Water Future* strategy will make targeting these areas a priority.

One of the highest priority areas is the well evidenced bias toward large capital investments, instead of less costly approaches that could achieve comparable outcomes. This bias is also

reflected in network investment – for example, network investments that are based on peak load levels and are consequently under-used. There is also a need to review outdated system requirements and better plan and manage interruptions and leakage between sewers and stormwater infrastructure.

Moreover, in the wider governance framework there is evidence of duplication and excessive complexity across programs and projects; unnecessarily burdensome regulations; scope to enhance the sharing of knowledge and innovation; and duplication of back office roles and functions in water authorities.

According to the Productivity Commission, conflicting objectives and unclear roles and responsibilities of governments, water corporations and regulators have contributed to misdirected investment, inefficient allocation of water resources, costly water conservation programs and undue reliance on water restrictions.

Decisions on capital investments and operational spending levels are a direct consequence of the interaction between

available and relevant data, policy priorities and management approaches and practices. These interactions need to be enhanced to improve efficiency, reduce spending and avoid duplication and waste.

The existing water sector arrangements provide weak incentives for optimal investment and collaboration among the water authorities.

This Strategy will improve the operations and efficiency of the existing system, and implement the Victorian Government's commitments in *Securing Victoria's Economy* to:

- Refocus the urban water businesses towards efficient delivery of water, wastewater and stormwater services. Clear, integrated and non-conflicting objectives will facilitate lower cost delivery to customers.
- Review the governance arrangements for the urban water sector (while ensuring that public ownership is maintained) seeking changes to business or financial structures that will ensure downward pressure on costs to those businesses that will flow on to the end user.

3.6 Initiatives

Initiative 3.6.1

Increase transparency about water sector costs and performance

As was noted above, the current water sector structure and approaches tend to conceal the real costs of investing in and operating Melbourne's water systems. Costs are spread across many different participants in the sector, and decisions about investment, innovation, replacement and maintenance, for example, are rarely made with a complete picture of the water cycle in mind.

The *Melbourne's Water Future* strategy will make water system costs more transparent and will increase disclosure of other data and information that is relevant to the performance of our water systems.

To inform greater disclosure, we will develop and release a detailed map of cross-agency expenditure on the water cycle in Melbourne. This will clarify the level of expenditure, the available funds, and where the spending and funds are concentrated. The map of expenditure and costs will then inform decisions about how we can optimise the use of water sector funds, and identify anomalies and improvements.

Initiative 3.6.2

Better allocate water sector investment

A number of independent reviewers, including the Productivity Commission and the Victorian Auditor-General's Office, have identified opportunities to improve investment decision making and implementation in the water sector. It is clear that significant value can be generated from a new approach to asset investment and management.

Over-investment in water infrastructure is one area where change is needed. There have been instances in the past where high assumptions about peak demands have been used to set the size and attributes of water infrastructure. This has resulted in water assets that are capable of dealing with extreme events, but which are therefore substantially under used almost all the time. This approach to peak and surge demands is expensive to build and maintain. More effective demand management, opportunities to reduce the number and severity of peaks and surges, and mitigation measures when peaks or surges occur, need to be considered at the infrastructure planning stage.

To address this issue, we will include consideration of investment practices in the scrutiny of new water sector projects and in the revision of water infrastructure standards and design guidelines (Initiative 3.6.3).

These practices and standards should be informed by consultation and engagement about the levels of risk and cost that the community is willing to accept as outcomes of water authorities' investment decisions.

The Office of Living Victoria will provide practical assistance to industry participants seeking to apply improved approaches to investment and asset management. This will include working with water industry professionals, the body responsible for the implementation of the Metropolitan Planning Strategy, master plumbers and builders on how to translate innovative water cycle management approaches into practice.

This proposed initiative complements several other actions in the strategy, including those actions that: sharpen water authorities' incentives to optimise investment; improve our understanding of system costs; and invest in modelling tools and benchmarks.

Improved water cycle management will reduce the variance of water flows through Melbourne's water cycle systems. This in turn will improve the performance of the whole system and make investments based on unrealistic peak flows even less necessary. With a new whole-of-water-cycle approach, informed by a better understanding of demands on the water cycle systems, new ways to manage or avoid peak flows will become more viable, including demand mitigation strategies.

Initiative 3.6.3

Develop new design guidelines for water and sewerage infrastructure

Flows in the sewer system generally follow residents' living patterns with peaks in the mornings and evenings reflecting household water use. During rain events, however, stormwater enters the system, which greatly increases the amount of sewage flow. In the worst case scenario, the upstream flow exceeds the pipe capacity which causes surcharging and sewer overflow throughout catchments.

In general, leakages and overflows of sewage from traditional sewers damage waterway health and create risks to human health. Leakages also reduce the quality of stormwater, and put pressure on infrastructure.

The greater system resilience outlined in this strategy will help avoid these impacts. Reducing leakage between stormwater and sewerage infrastructure will significantly improve the performance of both water cycle systems.

In addition to targeting leakage through project planning and investment, we will guide and inform the development of new infrastructure guidelines.

In collaboration with the water authorities, the Office of Living Victoria will lead the development of the infrastructure design guidelines that are aligned with this strategy

and are underpinned by the latest knowledge, understanding and integrated systems processes for water cycle management.

The new guidelines will consider the impacts of multiple water sources, water efficiency and local variability on the design of water and sewerage infrastructure. These new design guidelines will be based on the existing monitoring and data available throughout the Greater Melbourne system.

Ideally, these Victorian guidelines will ultimately be reflected in the national Water Services Association Australia guidelines for the design of infrastructure. We will pursue that goal through national forums and engagement.

Initiative 3.6.4

Improve leak detection, asset management and maintenance

In Victoria, approximately 11 per cent of reticulated drinking water is lost through pipe leakages (National Performance Report 2010-11 – Urban Water Utilities, National Water Commission and Water Supply Association of Australia, 2012). This water contributes to ‘non-revenue water’ and is estimated to have resulted, in 2010, in water losses of 40,754 ML, at a cost of approximately \$74 million per year.

Victorian water authorities are leaders in asset management, and will continue to strive for ongoing improvements. Currently, asset replacement is based on age, criticality, and the failure history of adjacent sections. This means it is sometimes necessary to replace sections of pipeline in relatively good condition, generating costs associated with excavation and reinstatement. Ongoing innovation in asset monitoring and management will help to reduce uncertainty about asset replacement and minimise replacement costs. To support this innovation, this strategy will sharpen incentives to manage assets more efficiently, make the best use of emerging technologies, and encourage greater sharing of ideas and less duplication of research effort.

Other benefits would arise from improved management of wastewater infrastructure. For example, the problem of sewer spills as a consequence of failure of sewer rising mains would be reduced. These mains can traverse environmentally sensitive areas and develop leaks well before they are detected. A more

Case study

Intelligent networks optimising water services

Sewers and waterways are an integral part of any urban water system. Traditionally sewers are designed to handle a peak hourly flow with allowance for infiltration of storm flows. As a consequence, sewage networks remain significantly under capacity for the majority of their service life.

South East Water has developed a remote control and real-time monitoring system (SUREpoint) that was applied to local household pump stations discharging to a pressure sewer system. The innovation significantly reduces peak flows and balances the flow profile of the sewer network. The benefits of intelligent operation of water cycle networks includes infrastructure and operating savings of tens of millions of dollars and the ability to combat more intense storms.

Key features of the innovation include: integrated real-time monitoring of multiple sites, alerts for identifying issues, full remote control and diagnostics for individual sites in real-time, and peak flow management through control of pump run times.

The SUREpoint device is also linked to the Bureau of Meteorology data to allow proactive operation of the system in the event of storms to maximise the available storage in the network and to minimise the impact of a storm event on the sewerage system. Waterways affected by increasing development and climate variability are subject to a higher frequency and magnitude of peak flows.

This solution is now being applied to management of rainwater tanks in the Dobsons Creek area in the City of Knox as part of the “Tanks for helping your creek” project. This project is a partnership with Melbourne Water, Knox City Council and the community and will deliver improved outcomes for the waterway. By applying this technology to rainwater tanks it is possible to better understand customer demand, usage patterns, optimise the tanks for forecast rain and provide security to environmentally sensitive areas. A key feature is its ability to smooth creek flows and reduce flooding by controlling the timing for release of roof runoff collected in rainwater tanks.

holistic approach to network management will help address this problem. *Melbourne's Water Future* will prioritise addressing leaks and other problems in our water networks. This will be informed by a better understanding of the extent of leaks across our water systems.

We will achieve that understanding through 'big data' analysis that compiles everything we know about the types of pipes in use (some of them are more than a century old); what we know about leaks and the causes of flows between stormwater and wastewater infrastructure; the profile and probability of unplanned maintenance; and other key data, drawn from all metropolitan water authorities as well as local councils, VicRoads and the Environment Protection Authority. The Office of Living Victoria will lead this analysis, building on the Integrated Systems Framework that underpins the *Living Victoria* policy. In conjunction with the water sector, the Government will also set goals for leak detection and reduction.

Initiative 3.6.5

Ensure our water authorities are focused on driving productivity and lower cost delivery for consumers

Within the context of continuing public ownership, Victorians want their water authorities to vigorously pursue cost reductions and efficiency improvements. In the interests of a leaner, more commercial approach to managing the water authorities, the Government has begun building stronger, more skills-based and commercial boards for the authorities. The *Melbourne's Water Future* strategy will continue that initiative, and expand its scope to include other actions to improve the commerciality of the authorities, and their efforts to achieve greater efficiency.

Consistent with the Government's economic strategy *Securing Victoria's Economy*, we will pursue opportunities to increase outsourcing, shared services (e.g. for procurement, back office functions and information and communication technology) and the use of commercial and market-based approaches in the water authorities.

We will also benchmark the efficiency of our water authorities against each other and with other jurisdictions.

Initiative 3.6.6

Enhance collaboration and sharing of research and data

Increasing the uptake of emerging technologies (such as remote asset condition monitoring technologies, and advanced materials) and enhancing data management practices (including data sharing and knowledge management) will result in more efficient operation and development of water assets.

Water authorities can benefit from better use of the available data on the water cycle. This data could be used to drive more efficient use of assets, and, with improved collaboration, enhance innovation and research. Useful research, the results of trials of emerging technology, and relevant management data (such as data on trends in demand) could be more widely shared among the water sector. If we fail to make the best use of our collective knowledge and research, we will incur higher costs to deliver water services, which in turn will put upward pressure on water prices for customers.

Enhanced knowledge and research sharing, and collaboration, will be supported by our investment in the *Water Source* site, as well as other water sector forums. We will investigate including greater sharing as part of the contracts and performance plans of senior water sector staff, and the use of the new 'crowd source' technologies to identify solutions to complex problems.

Initiative 3.6.7

Simplify and streamline regulation, and expand competition and the use of markets in the water sector

Under the current regulatory structures, the publicly owned water retailers in Melbourne operate as geographical monopolies within their respective regions. This means only one retailer is able to provide services to a particular location. As a key microeconomic reform, we will allow 'out of area' competition between the water retailers for the provision of services to major new greenfields and brownfields developments.

Implementation of this reform will require clarification of bulk water, water entitlement and access arrangements for Greater Melbourne. The reform will be undertaken in concert with the establishment of a new framework of rights and requirements for stormwater and wastewater in Melbourne (see Initiative 3.4.8). That framework will require further work on guidelines and regulations that provide guidance and assurance about water quality and appropriateness of use. Once these steps are taken, we anticipate the development of markets in stormwater and wastewater rights, which will help ensure that water flows to its most valuable uses. The arrangements for out-of-area competition and water trading will include rules and parameters governing the mode of competition and the nature and extent of permissible trading.

Melbourne's Water Future will use market instruments in various other ways, including in the allocation of co-investment funds, the procurement of water sector services, the commercialisation of funded research and the export of specialist expertise to generate income and defray costs. To ensure that consideration of market approaches becomes routine in the water sector, this will be included in the performance contracts and agreements of senior water authority personnel, and will be reflected in Ministerial directions and the *Water Act* Statement of Obligations.

The regulations governing Melbourne's water are overly complex and increasingly outmoded. To simplify and streamline the regulatory framework, better align it with this strategy, and increase scope for competition and market-based approaches, the Office of Living Victoria will engage with the Red Tape Commissioner to include cutting water sector red tape on his agenda. The water authorities, the Essential Services Commission and the Victorian Competition and Efficiency Commission will also help identify priority areas for regulatory reform, as will the Office of Living Victoria advocate for innovation and streamlining.

The Office of Living Victoria will convene a multi-agency regulatory taskforce to streamline environmental regulation of our urban water authorities, in collaboration with the Environment Protection Authority, the Department of Environment and Primary Industries, and the Department of Health.

3.7 Accelerated innovation and world recognition of expertise

This strategy, by its very nature, strives to place Melbourne at the forefront of research, knowledge and global best practice in whole-of-water-cycle management.

Our status and reputation as the most liveable city in Australia and one of the most liveable cities in the world is important to all Melburnians. We clearly understand the importance of water to our daily lives and to our recreational and economic well-being. We have demonstrated, during the recent drought, that we have the will and capacity to reduce our consumption and find substitute water sources for purposes that do not require our high-quality, pristine drinking water.

At the same time, we have a proven knowledge, research and innovation base that has made us a leading provider and exporter in knowledge and technical industries. Urban water cycle management is a stand-out example of a new and expanding opportunity, with growing export potential.

We already have internationally recognised research capacity in water, including in the Cooperative Research Centre for Water Sensitive Cities, the Department of Environment and Primary Industries, the Office of Living Victoria – whose key members have been involved in policy and strategy setting at the United Nations and in the Middle East – water authorities, and our universities.

At the local and community level, Melburnians have demonstrated an extraordinary capacity to adapt to change, with a range of new and innovative approaches responding to the challenges of the recent extended drought. Importantly, many of these innovations and new ideas came from local groups and communities recognising opportunities to reduce water consumption and/or use previously unused water resources to improve liveability and amenity, and sustain our status as the garden state.

The Victorian Government will support the development of this new and innovative industry sector to supply services and expertise to other urban water authorities seeking new ways to respond to the challenge of urban water cycle management in the twenty first century.

3.7 Initiatives

Initiative 3.7.1

Establish Melbourne as a global leader in water cycle management

We will target investment in building our capacity in research, education and technology relating to whole-of-water-cycle management. Melbourne already hosts the Cooperative Research Centre for Water Sensitive Cities with more than 70 researchers and PhD students, and approximately 20 industry partners from south eastern Australia. We will continue to invest in the Cooperative Research Centre while simultaneously building partnerships with other national research and innovation organisations.

In conjunction with the Growth Areas Authority, we will connect with urban water, urban design and planning, and environmental sustainability research and innovation organisations across the world, establishing Melbourne as the centre of an international network of whole-of-water-cycle expertise. We will also promote and foster a range of academic and industry opportunities to build the specialist and technical expertise necessary to export our knowledge and expertise to the world, and to attract students

and researchers to purpose-designed course and research programs at our leading academic and research institutions.

Excellence in the efficient use of energy in the water sector will be one key area of research focus, capacity building and export promotion. We will continue to build world-class expertise and knowledge about efficient energy use in water systems; leveraging resources from and in collaboration with the Commonwealth.

The Office of Living Victoria will work with the Department of State Development and Business Innovation to plan and encourage the commercialisation of Victoria's water management knowledge and expertise.

Initiative 3.7.2

Establish an investment portal for innovative water cycle management

Good ideas about water cycle management can come from anywhere. New communications technologies enable people to build on emerging ideas and to connect with potential funders, sponsors, commercial partners and volunteers.

Building on the proposed *Water Source* site (see Initiative 3.1.5), the *Melbourne's Water Future* strategy will establish an online investment portal where people and organisations can post project ideas to advance water cycle management. Each project will nominate the expected economic, social and environmental benefits. People will be able to comment on and value add to the projects and ideas; businesses can invest in ideas with commercial potential; and community groups and philanthropists can support projects that have significant social and environmental benefits.

Applicants for State Government program funds will be able to use the portal to identify potential sources of co-investment.

Initiative 3.7.3

Promote our expertise to the world

The Victorian Government will include urban water management knowledge and expertise as a key component of trade missions to strategic markets overseas. Additionally, and as the sector develops, targeted trade missions and other export promotion strategies will be implemented to ensure Melbourne is internationally recognised as a leading centre of knowledge and innovation for urban water cycle management.

To achieve that goal, the Office of Living Victoria will work with the Department of State Development and Business Innovation to include water cycle innovation and industry development in the Victorian Government's export promotion and market development activities, including the trade missions program and the marketing efforts of our overseas business offices.

Initiative 3.7.4

Enhance research and policy capacity

The Victorian Government will develop and make available a range of research and modelling tools to support water cycle management practice and planning, including the development of a detailed research and innovation roadmap for the Victorian water industry, the measurement and costing of amenity and environmental benefits, and a comprehensive review of water cycle design goals. These tools are in addition to the development of the cost-benefit project assessment tool described in Initiative 3.4.1.

Additional support for the sector will include demand forecasting tools, collaboration with national and international research institutions to reduce duplication and value-add to existing research; and building a virtual knowledge base, including international expertise on emerging water management technologies such as recycling and desalination.

The Office of Living Victoria’s Knowledge and Innovation Panel will analyse and make recommendations on how to optimise our research capacity.

Initiative 3.7.5

Invest in and reorient the Smart Water Fund

The Smart Water Fund is a joint initiative of the Victorian Government and the four Melbourne water authorities: Melbourne Water, City West Water, South East Water and Yarra Valley Water. The Fund is focused on industry-led applied research projects and knowledge transfer opportunities.

The seven themes of the industry-driven projects are water quality, water efficiency, resource recovery, climate change, water smart cities, intelligent networks, new market solutions and consumer insights.

Since its establishment in 2002, the Smart Water Fund has distributed \$30 million to 197 projects. The Victorian Government currently invests \$1 million annually in the Smart Water Fund. The Office of Living Victoria is reviewing existing investment in water sector research, knowledge and innovation to define needs and identify the best way for Victorians to get the most from this investment.

In this context, the Office of Living Victoria will work with the funders of the Smart Water Fund to ensure its priorities align with this strategy. This will be informed by the work of the Office of Living Victoria’s Knowledge and Innovation Panel.

Case study



Chelsea Flower Show

21–25 May 2013 Trailfinders Australian Garden by Flemings Nurseries highlighted Victoria’s status as a world leader in water management at the 2013 Chelsea Flower Show, where the garden won best-in-show.

Rainwater collection and filtration was the central focus of the award-winning Victorian entry, which featured Australian native plants, a billabong, gorge and waterfalls. All hard surfaces in the garden channelled rain to two

primary catchments, while aquatic plants on the margins of the billabong absorbed nutrients from the incoming water and provided habitat for frogs and insects.

The garden highlighted the importance of water sensitive design and demonstrated how our urban landscapes can be enhanced in a practical and sustainable manner using alternative water sources.

Image: Designer Phil Johnson with HRH The Queen. Getty Images



Initiative 3.7.6 Further build skills and capability in the water sector

The Victorian water sector is highly skilled in traditional water management. However, whole-of-water-cycle management requires a set of new and different capabilities – such as for designing swales and laying purple pipes. These capabilities span technical fields (for technicians and trade workers including plumbers), community interface fields (such as sales representatives or liaison personnel) as well as leadership and management roles. Associated fields such as urban planning will also require new and different capabilities to enable their full contribution to whole-of-water-cycle management activities.

Through various projects and programs, the water sector has been gradually building the knowledge, skills and capabilities necessary to successfully design, implement and run whole-of-water-cycle systems. We will support the sector to build and embed the necessary skills and expertise through a range of efforts focused on coordination, training provision and influencing certification standards.

We will work with businesses in the water sector and related sectors such as urban planning to identify skills gaps and coordinate appropriate training. Through the *Water Source* site we will collect ideas for training and assess demand for capability building. *Water Source* will help connect businesses that are facing similar issues, and link them with potential providers and sources of capability development.

We will also work to address current limitations in the availability of training opportunities for water sector employees. The 2011-12 State of the Water Sector survey indicated that only 60 percent of respondents feel training opportunities are adequate. Building training opportunities in the dynamic, innovative field of whole-of-water-cycle management will help to address this issue. Enhanced training opportunities will contribute to Melbourne's position as a leader in whole-of-water-cycle management by facilitating the acquisition of knowledge, skills and capabilities not available elsewhere in Australia or internationally. The Office of Living Victoria and the water sector will support organisations and programs that provide training and build capability in ways that advance the *Melbourne's Water Future* strategy. The Office of Living Victoria will also foster sector-wide collaboration and capacity building.

Succession planning is another important consideration for the water sector, whose workforce has a relatively high median age. To reinforce Melbourne's position as a global leader in whole-of-water-cycle management, the Government will sponsor a scholarship program for young leaders in whole-of-water-cycle management. In partnership with research institutions, we will identify and support the ongoing education of young leaders in skills and capabilities necessary to drive ongoing improvement and innovation in whole-of-water-cycle knowledge and practice. To support Melbourne's reputation as a global leader in water cycle management and attract the best talent, the scholarship will be open to applicants from across Australia and the world. It will be awarded to up to five recipients each year, and will take the form of payment for the whole-of-water-cycle education programs or activities of the awardee's choice, to a value of \$5,000 per recipient.

As whole-of-water-cycle approaches become increasingly embedded in Victorian water management, we will liaise with Skills Victoria to identify opportunities for whole-of-water-cycle skills and capabilities to be reflected in certification standards.

Glossary

Building scale IWCM (integrated water cycle management) Includes improved building standards underpinned by the existing potable supply system. The investment profile used to deliver these performance standards and outcomes was assumed to be a combination of enhanced household water efficiency and rainwater tanks for toilet, laundry and outdoor use. Potable water was assumed to be used for personal washing and in the kitchen (Ministerial Advisory Council)

Business as usual A traditional servicing approach to the provision of water services based on current day water storages, embedded water efficiency and existing dual-pipe wastewater reuse systems, supplemented by the desalination plant and bulk supplies from the North- South pipeline for critical human needs only (Ministerial Advisory Council)

BASIX Building Sustainability Index, New South Wales building scheme which sets mandatory and performance based targets for water and energy

Building Commission The Building Commission is a statutory authority that oversees the building control system in Victoria

Decentralised water services Water cycle service system which is not connected to the centralised network. These are typically smaller in size than centralised infrastructure

Desalination The process of removing salt from seawater or brackish water so that it becomes suitable for drinking or other uses

Drainage systems The infrastructure that collects, transports and treats stormwater

End use model Model used in the Melbourne water sector to simulate water demand

Environment Protection Authority Victorian authority responsible for environmental protection

Essential Services Commission Victoria's independent economic regulator of the electricity, gas, water and sewerage, ports and rail freight industries

GL Gigalitre – this is a billion litres. This equates to approximately 400 Olympic sized swimming pools

Growth Areas Authority Victorian authority responsible for planning and delivery of urban expansion in Melbourne

Green Star Green Building Council of Australia's optional building rating scheme covering nine components including water

Hydraulic model Model of the way in which water flows through networks of pipes and pumps. These models are used to sized distribution and collection infrastructure

IWCM Integrated Water Cycle Management. A multi-disciplinary and multi-objective approach for the sustainable management of water cycle services

Living Victoria Fund Fund established by the Victorian Government to fund IWCM innovation

Living Melbourne, Living Victoria Policy Government's policy for urban water services

MW Melbourne Water Corporation

MBA Master Builders Association

Office of Living Victoria Victorian government agency established in 2012 to drive reform by coordinating urban and water planning. The immediate focus of the OLV is integrated water cycle planning

Precinct scale IWCM (integrated water cycle management) Building scale IWCM with introduction of the use of localised recycled water at the precinct scale for toilet flushing and outdoor use, with domestic rainwater used for hot water and laundry purposes (Ministerial Advisory Council)

Resilience The capacity of a system to continue to perform its function in spite of variability, shocks and long term change

Shadow water cycle costs The sum of the full cumulative costs of providing water, waste water and stormwater services to different locations throughout Greater Melbourne

Stormwater Rainfall runoff from urban areas defined as the net increase in runoff and decrease in groundwater recharge from the increase in impervious surfaces, such as roofs and roads that occur within urban development

Urbanisation The physical growth of urban areas

Urban water cycle The urban water cycle includes water supply, waste water, stormwater and urban water ways and park management and greening of suburbs

Water Act The Water Act 1989 is the legislation that governs the way water entitlements are issued and allocated in Victoria

Water cycle services Water cycle services include water supply, stormwater management, sewerage management, protection and enhancement of waterways as well as liveability and amenity benefits the community receives from water

Water efficiency Any measure that reduced the amount of water used per unit of a given activity, without compromising the achievement of the value expected from that activity

WaterMAP Water Management Action Plan, individualised water efficiency program for high water use businesses

Water Supply and Demand Strategy Water resources strategy setting out supply and demand management initiatives to ensure water supply meets the agreed level of service over a fifty year period

Water Efficiency Labeling Scheme Nationally co-ordinated scheme to provide consumer information on appliance water efficiency performance

Water Industry Regulatory Order Gives regulatory powers to the ESC

Yield The amount of demand that a supply source is capable of providing at an agreed level of service

6 Star Energy Mandatory and prescriptive building code for new and redeveloped buildings in Victoria addressing primarily energy but with some water indicators

Melbourne's Water Future

Have your say

- Give feedback online
- Register for a community discussion forum

Visit livingvictoria.vic.gov.au