Melbourne's Water Future

A fresh approach to urban water livingvictoria.vic.gov.au

State Government Victoria

More rain falls on Melbourne than we use from our dams

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The vision for Melbourne's Water Future

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.

Image courtesy of Yarra Valley Water

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Image courtesy of Melbourne Water

Premier's foreword

I am pleased to present Melbourne's Water Future.

Melbourne's Water Future takes a new approach to managing water in Victoria to promote better outcomes for water users and for our environment. The strategy delivers on the Victorian Coalition Government's Living Victoria policy and will establish Victoria as a national and international leader in urban water reform.

Victorian communities want to be engaged and involved in the planning and decision making that affects our shared water future. Melbourne's Water Future has been developed by the Office of Living Victoria with substantial input from the community, local governments, businesses and the water sector industry. Throughout the consultation process there has been strong support for the whole-of-water-cycle approach outlined in the strategy.

Victorians understand that resilient, high-quality water services are fundamental to healthy communities and productive industries.

The integrated approach to managing urban water within water supply, stormwater, soil and wastewater systems will help us to make capacity for Victoria's growing population.

Melbourne's Water Future will drive generational change in the planning and delivery of our water services. By understanding how our water cycle works, we can make better use of our existing assets and make smarter decisions about our new investments. Over time, this will reduce cost pressures, keep our parks, gardens and sports fields green and improve the quality of our waterways and bays. The strategy will help us to sustain growth and prosperity by increasing the flexibility and resilience of our water services.

The new whole-of-water-cycle-management approach will be extended to our regional towns and cities, where local community engagement will help decide how the strategy can be used most effectively in each location to suit local circumstances.

Melbourne's Water Future is a whole-of-government strategy that will be delivered in partnership with the water sector, local government, businesses, community organisations and households. It is incorporated in Plan Melbourne, the Victorian Government's vision for the city to 2050. Plan Melbourne integrates planning and development of land, transport, and social and community infrastructure including water cycle services.

By working together, we will leave a stronger water system for future generations. The Victorian Government looks forward to working with all parts of our community to ensure water remains available and affordable, so that Victorians continue to enjoy high-quality water services and the liveability for which Victoria is renowned.

The Hon Dr Denis Napthine MP
Premier

Minister's foreword

Melbourne's Water Future signals the start of a new era in water cycle planning and management in Victoria. It is the blueprint for changing the way we plan and manage the water cycle in cities and towns to make better use of all available sources of water.

I would like to offer my sincere thanks to those who attended forums across Melbourne, the people who responded online to our surveys and the individuals, businesses, community groups, industry associations, water corporations and local governments who took the time to provide considered and insightful written submissions in response to the draft strategy.

This extensive consultation has informed this final strategy.

It is clear that Victorians care deeply about our water resources and value the liveability and environmental benefits that improved water cycle planning and management can deliver. Victorians understand the challenges posed by our variable climate and our growing population and welcome a new holistic approach to the water cycle and water services system.

Melbourne's Water Future details a smarter approach to the water cycle in our urban centres. The new whole-of-water-cycle 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 instead of drinking water – for purposes such as watering our parks and gardens and flushing our toilets – we can lower costs, secure a more resilient water supply, enhance the liveability of our neighbourhoods and improve environmental outcomes for our waterways and bays.

Making greater use of alternative local water sources makes good sense to householders, business water users and our farming community.

The new approach will help Melbourne to be more self-sufficient. Future water restrictions, if they are needed, will be less severe. We will be able to avoid buying expensive drinking water from the desalination plant for longer and we will not need to build infrastructure like the north-south pipeline which took water from productive irrigation in northern Victoria.

The new approach will drive efficiency in the water sector to keep costs down. We will do this through a mix of economic and planning reforms and by collaboration and cooperation across government, the water sector and the community.

The benefits of the new approach will not be achieved overnight, but they will be achieved over time. Already significant work has begun on implementing the 51 initiatives outlined in Melbourne's Water Future, such as the development of materials to guide the planning that will ultimately deliver this new approach at a local and regional scale.

The Living Victoria Fund is also already supporting important and innovative projects to increase our understanding and use of alternate water supplies.

I am keen to build on the innovation of our water corporations, local governments, private sector and research institutions. I welcome and encourage the engagement and involvement of all our communities in whole-of-water cycle-management and planning. I look forward to working together to build a better water future for all Victorians.

The Hon Peter Walsh MLA
Minister for Water

Outcomes of consultation on Melbourne's Water Future

This strategy builds on the consultation draft of **Melbourne's Water Future** released on 1 July 2013. A report on Community Feedback from the public consultation process is available at **livingvictoria.vic.gov.au**

148 people
registered attendance to consultation forums and 175 people responded to our surveys

600 comments
from 49 submissions

The majority of submissions were supportive of the new approach identified in **Melbourne's Water Future**. It is clear that Melburnians value the city's water cycle services and recognise the opportunity the new approach provides to reduce price pressures, improve resilience and provide liveability and environmental benefits.

Melburnians are keen for the strategy to work and have asked for further clarification in relation to implementation, governance, planning, funding and climate change.

This feedback has informed this revised **Melbourne's Water Future** strategy.

Section 2 of the strategy has been streamlined, and now includes:

- an explanation of whole-of-water-cycle management
- an overview of Melbourne's water system including a new section on groundwater
- acknowledgement of the opportunity provided by the release of the draft Plan Melbourne on 10 October 2013
- a description of the role of systems analysis in the development and implementation of the strategy, including the commitment to make any systems analysis "open source"
- a description of the system-wide benefits that could be achieved by adopting the new approach
- a description of the key priority areas identified through the consultation process: water cycle planning, economic reform, supporting innovation, regulatory reform, and governance and implementation

Section 3 retains the seven outcomes and 51 initiatives identified in the consultation draft. Specific actions for each initiative are now clearly identified. Where submissions have made suggestions for improvement or clarification, for example in initiatives relating to planning, economic reform and regulation, these have been acted upon. Additionally, new case studies have been included to reflect the large number of outstanding whole-of-water-cycle management projects and activities identified through the submission process.

Section 4 contains a high level implementation plan, which identifies short, medium and long term time frames for implementing the outcomes and initiatives described in Section 3.

Executive summary

1

Image courtesy of Melbourne Water

Context

Management of the urban water cycle in Melbourne has changed significantly since settlement as the population has grown and we have improved our knowledge about water system management. However, Melbourne's water system faces a number of pressures that will increase as a growing population consumes more water and discharges more wastewater. Victoria's 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.

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.

While improvements have been made over the years, our waterways and bays remain at risk. Our trees and parklands, although recovering, were weakened by the last drought and many trees will die early due to that stress. 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 need to make smart and informed decisions that will ensure a resilient 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 continue to build on the innovative whole-of-water-cycle approaches already evident in Victoria's water sector. We need to value and use the rain that falls on Victoria and the stormwater runoff generated by that rainfall. 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 Victoria as a centre of expertise in whole-of-water-cycle management – a key capability for the twenty first century.

To continue improving our management of the water cycle we need a new approach based on whole-of-water-cycle management and planning. Melbourne's Water Future defines this new approach and provides a long-term direction so that change can be gradual and adaptive.

Whole-of-water-cycle planning and management needs to be 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.

It is only by taking a holistic view of water cycle planning and management that the benefits of whole-of-water-cycle management can be achieved. Using a whole-of-water-cycle approach will enable different considerations to be applied at household, precinct, suburb, local, regional and metropolitan scales, better reflecting local conditions and needs.

Elements of this approach are already in place. Our communities, businesses and water corporations are already innovating in how they plan and manage the water cycle. Melbourne's water corporations have a track record in innovation and many of our local councils and planning authorities already design new developments and urban renewal sites from a whole-of-water-cycle management perspective. These efforts are the basis for Melbourne's reputation as a pioneer in whole-of-water-cycle management. Melbourne's Water Future seeks to enhance that reputation and provide support and a cohesive approach to continuing the innovation into the future.

Melbourne's Water Future provides a vision of a smart, resilient water system for a liveable, sustainable and productive Victoria. Its objectives are 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.

This powerful common sense approach to managing our water resources will be applied to urban water services across Victoria.

The strategy

Melbourne's Water Future offers a holistic approach to whole-of-water-cycle management that focuses on understanding the system – through improved data and knowledge; innovation; economic reform, governance and the legislative environment; and planning and project facilitation

Seven outcome areas have been identified as priorities that need to be addressed to ensure that a new approach to water cycle planning can be developed and implemented effectively.

To help focus and streamline the implementation of the strategy, 51 initiatives have been developed to support the outcomes above. These initiatives have been through a rigorous stakeholder and public consultation process to ensure that they provide the most effective and efficient way of achieving the vision and objectives of **Melbourne's Water Future**.

Section 4 of **Melbourne's Water Future** is an implementation plan providing responsibilities and timelines that reflect the long term approach of the strategy. Work on some of the initiatives is already underway; many others will start in the next 12 months. Partnerships between key stakeholders and ongoing meaningful engagement with the community are critical elements to the success of the strategy.

Outcomes

1	A community engaged in whole-of-water-cycle management
2	Suburbs – old and new – designed with water in mind
3	Sensible use of water in our homes and businesses
4	Resilient water systems
5	Improved waterways and bays
6	Reduced inefficiency and waste
7	Accelerated innovation and world recognition of expertise

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

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

Whole-of-water-cycle approach

2

2.1

Why do we need a new approach?

Melbourne has one of the most variable climates in the world. We have just come out of yet another severe drought and we know that we will face others. We also know that, at other times, we will continue to experience prolonged heavy rain.

Our water services system will not be able to manage these extremes effectively unless we have significant shifts in the way we manage our water. Melbourne has had a fragmented approach to how it plans and manages the various water systems. We have a history of planning for our water cycle in five separate categories.

In addition to being fragmented, Melbourne's water cycle planning has tended towards a 'one size fits all' approach across the metropolitan area. Melbourne is a large city in area and population, and consequently has significant differences – both in geography and over time – in rainfall and temperatures, types of landscape and soil, waterway systems, and industrial and commercial water management requirements. Using a 'one size fits all' approach has not led to the most efficient and effective use of our resources. We have not tailored solutions to local circumstances or used water resources that might be available locally. The desalination plant has meant that since July 2013, Melbourne's drinking water is much more expensive as we pay off the plant. In future, Melbourne will have to pay even more for every drop of desalinated water we use.

Plan Melbourne, the Victorian Government's vision for the city, forecasts Melbourne's population to grow by a further 2.5 million people by 2050 to be a city of around 6.5 million people. Much of this growth is expected to occur in the west and north, where traditional water servicing is more difficult and expensive. We need to plan now and take the opportunities available to use alternative water sources so that we are in a better and more resilient position to face future challenges.

The recent drought has taught us that we cannot continue managing our water system as we have in the past. More water runs off Melbourne's hard surfaces than we use from our dams, even in drought years. If we don't change our approach, liveability will decline, many of our gardens and trees will die during the next drought period, our rivers, creeks and streams will be degraded, and we will continue to need to use our public funds to build expensive large-scale water infrastructure.

Given the extreme weather events likely to occur in the future, Melbourne will also face increased frequency of major flooding with all the attendant 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 natural waterways.

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

Melbourne's Water Future defines this new approach and provides a long-term direction so that change can be gradual and adaptive.

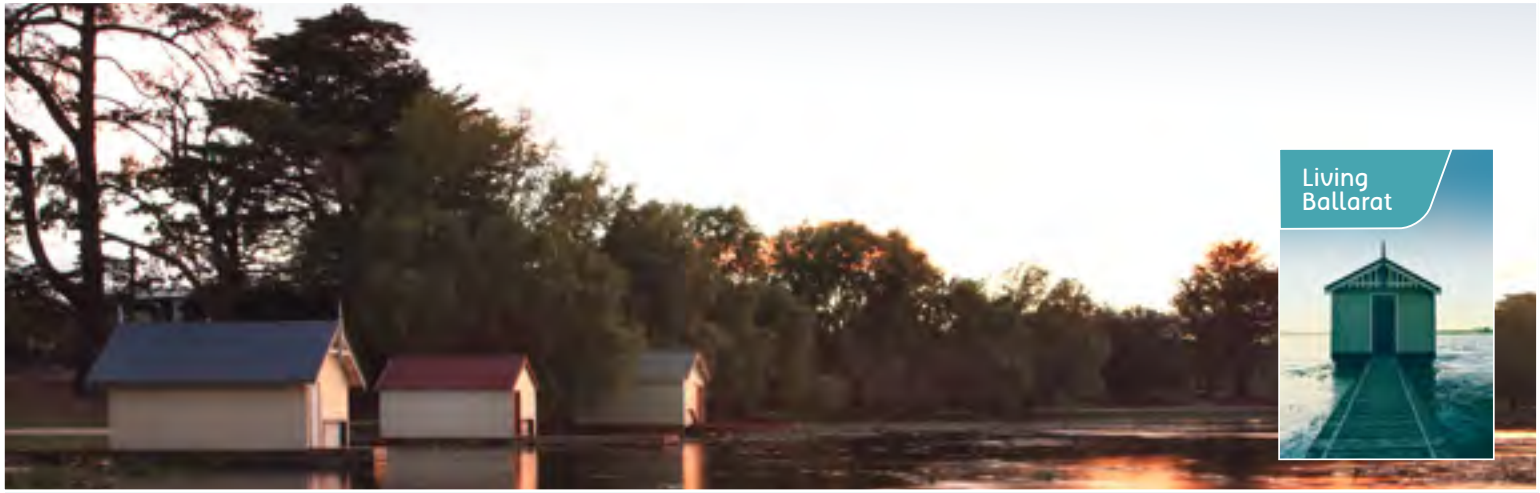
We now have an unprecedented body of knowledge and data about Melbourne's urban water cycle. We also have access to 'big data' analytical techniques that bring to light important new insights from that data and knowledge. Making considered decisions based on comprehensive information is always going 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 whole-of-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.

This will require place-based planning and management of water sources using an optimal mix of centralised and local approaches to ensure we use the best type of water for the purpose, helping us avoid the need for the severe water restrictions previously endured.

Elements of this approach are already in place. Our communities, businesses and water corporations are already innovating in how they plan and manage the water cycle. Melbourne's water corporations have a track record in innovation and many of our local councils and planning authorities already design new developments and urban renewal sites from a whole-of-water-cycle management perspective. These efforts are the basis for Melbourne's reputation as a pioneer in whole-of-water-cycle management. **Melbourne's Water Future** seeks to enhance that reputation and provide support and a cohesive approach to continue innovating into the future.

Water cycle management in Victoria's regional centres



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 with a focus and recognition of the different needs and circumstances across rural and regional Victoria.

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.

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

2.2

What is whole-of-water-cycle management?

How water has been managed in Melbourne has changed significantly. 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, and improvements in stormwater management through urban planning.

In the last 10 years the approach has shifted towards water sensitive urban design and shared benefits. 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.

We now know, for example, that once hard surfaces exceed 2 per cent of the area of a catchment, the health of downstream waterways begins to be adversely affected.

Traditionally we have planned the five elements of the water cycle separately.

Water supply
Our dams, catchments, groundwater pipes and lately desalination

Wastewater/sanitation
Our sewers, treatment plants and outfall

Stormwater and rainwater
Our drains, tanks and flood mitigation

River, creek and stream management
Protecting or improving the condition of waterways so that they can provide multiple benefits including environmental, cultural, social, amenity and economic values

Greening our suburbs and managing our parks
Our trees, streetscapes, open spaces and parks

In practice, each of these elements is part of an interconnected system that spans multiple organisational, neighbourhood and regional boundaries. A fragmented approach to planning the water cycle does not allow the interactions within the connected system to be fully considered.

For example:

- investment in water efficiency can change flows and pollutant concentrations in the sewerage system
- rainwater tanks may be considered as optional extras if considered in isolation, but when the full range of benefits to the consumer and the water systems is considered (drought security, waterway protection and flood mitigation benefits) the case for their widespread use is clearer
- rainwater and stormwater harvesting can also repair and enhance urban waterways by reducing scouring and pollutant discharge
- 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 commercial developments
- reduction of stormwater runoff (for example through raingardens, swales and rainwater tanks) reduces pressure on wastewater and treatment plants from stormwater infiltration.

Optimising the opportunities and managing the risks and costs of providing Melbourne's water services requires consideration of all aspects of the water cycle. Failure to do so can result in poor investment decisions and missed opportunities, ultimately leading to higher water bills and social and environmental impacts.

A holistic approach

FIGURE 1

Whole-of-water-cycle management is the preferred description for what is known in the industry as integrated water cycle management (IWCM), or sometimes integrated water management (IWM). Whole-of-water-cycle captures the idea that all parts of the water cycle and all parts of the community, including government agencies, regulatory authorities, water corporations, local councils, private sector developers, builders, planners, designers and engineers, non-government organisations, community groups and water corporation customers, both business and residential – are intrinsically interconnected.

A key component within whole-of-water-cycle management is water sensitive urban design (WSUD). This process looks to manage the impacts of stormwater from development by integrating water cycle management into urban planning and design. WSUD considers among other things, urban design, infrastructure design, streetscapes, roads and drainage systems and aims to protect and improve waterway health by mimicking the natural water cycle as closely as possible.

It is only by taking a holistic view of water cycle planning and management that the benefits of whole-of-water-cycle management can be achieved. In this way, whole-of-water-cycle management can be applied at different scales and to suit local circumstances. Using a whole-of-water-cycle approach will enable different considerations to be applied at household, precinct, suburb, local, regional and metropolitan scales, better reflecting local conditions and needs.

2.3 An overview of Melbourne's water system

There are five key elements that need to be considered when planning and managing Melbourne's water system – water supply, water consumption, wastewater, stormwater and groundwater.

2.3.1 Water supply

In Melbourne's water supply system, there are 157,000 hectares of protected catchments in the Yarra Ranges, 10 water storage dams, 1,057 kilometres of water distribution mains, 27,220 kilometres of water pipes, 214 kilometres of aqueducts, 64 service reservoirs, 178 major water pumping stations and 83 water treatment plants including two large plants at Winneke and Tarago.

The bulk of the water used in Melbourne is piped in from our forested water catchments. Our protected or 'closed' catchments provide high quality drinking water. 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.

Because we live in one of the most variable climates in the world, the volume of water in our dams varies considerably from year to year (inflow into our water storages has ranged from a low of 163 GL in drought years to as high as 800 GL in above average rainfall years).

In addition to the water supply in our dams, alternative water supply sources include:

- around 25 GL per year of rainfall replenishes available groundwater supplies. Groundwater licences amount to 11 GL of which only 3 GL is normally used
- 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
- about 5 GL per year of stormwater and 5 GL of 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. There is a high cost in having this potential supply available due to the costs of constructing and financing the plant as well as paying for any water we use from the plant. 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. Additionally, the desalination plant is very energy intensive.

The likelihood of using water from the North-South Pipeline is very low as 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 of any given year.

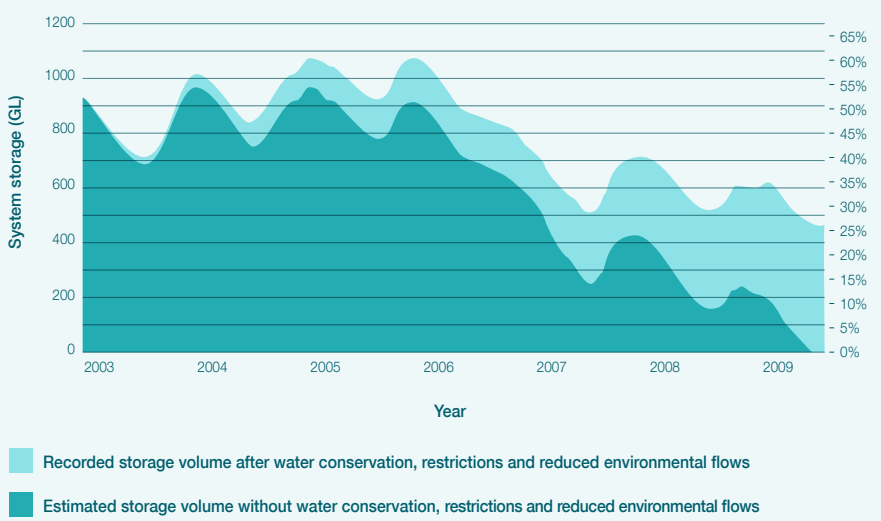
2.3.2 Water consumption

By 2050, Melbourne's population is predicted to grow from 4.1 million to about 6.5 million – and our current water system will not be able to cope with the expected level of demand if there is another sustained drought. Either we must change how we plan and manage our water cycle or we will have to invest in new desalination plants or additional dams before 2050 to augment our supply.

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 30 per cent from 315 GL to 216 GL per annum. This translated to a reduction of between 247 L per person and 146 L per person per day (40 per cent reduction per person per day). Without this reduction in consumption, Melbourne's drinking water supplies would have run dry.

Water use reduction in the drought FIGURE 2



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

Household consumption dropped by about 30 per cent per annum during the last drought

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 also dropped by approximately 35 per cent from 138 GL to 89 GL between 2000–01 and 2010–11.

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

Future total 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.

Melbourne residents have already demonstrated their willingness and capacity to change behaviours and reduce water use. While the community understands and accepts that efficiencies need to be maintained, water consumers also have a reasonable expectation that the severity of 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 meet our growing needs.

2.3.3 Wastewater / sanitation

Wastewater (or sewage) is the by-product of our water use and is one of the most expensive components of our water cycle. Collecting, pumping and treating this 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, over the past two decades Melbourne Water has been using biogas to generate energy.

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 sewage treatment plants: the Eastern Treatment Plant at Bangholme and the Western Treatment Plant at Werribee. Almost 90 per cent of our wastewater is treated at these two treatment plants.

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

One of the most significant challenges in our wastewater management is wet weather sewage overflows. In high rainfall events – such as the floods of 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 design, however, is 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 increasingly severe unless mitigating action is taken. Mitigating actions could include reducing the amount of stormwater flowing into our drains by increasing the use of rainwater tanks, raingardens and swales, or significant new effort to keep the two systems – stormwater and wastewater – separate.

2.3.4 Stormwater and rainwater

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. It is important to note that stormwater is different to rainwater. Rainwater refers to water that is captured from a roof and collected in a rainwater tank.

Traditional drainage systems are designed to convey even the smallest rainfall volumes as quickly as possible away from property and people and to receiving waterways. In contrast, natural systems intercept and filter rainfall, allowing for a slower 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 surface runoff discharge directly to creeks and streams.

Melbourne's stormwater outflows vastly exceed pre-settlement levels, and this will continue to increase with a traditional approach to urban development, which contributes to excessive stormwater runoff that carries pollutants to waterways. 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.

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. A better approach is to manage stormwater to reduce flood risk, save water and protect our waterways. We can significantly reduce stormwater runoff and redirect this water resource into more productive uses particularly in new greenfield suburbs, but also make important improvements over time to established parts of Melbourne. These changes include infiltrating more water where it falls through water sensitive urban design treatment, more widespread use of rainwater tanks and local scale wetlands and water features.

Such an approach will contribute multiple benefits:

- a secure and plentiful source of alternative water for non-drinking uses, to substitute for 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
- improved amenity though greening our city and making our waterways and bays more attractive to wildlife and to recreational users

Through the consultation process a key building industry stakeholder submitted that 'There is no doubt that prolonged droughts can have severely adverse impacts on housing and building stock, both old and new. The efficient use of stormwater could play a vital role in supporting moisture in the soil our houses and buildings are constructed upon … The submission 'supports government initiatives such as that proposed in Melbourne's Water Future … we hope it helps nourish the land our industry builds on so that our houses and buildings will continue to serve our community for decades to come.'

> Prolonged droughts can have severely adverse impacts on housing and building stock, both old and new. The efficient use of stormwater could play a vital role in supporting moisture in the soil … so that our houses and buildings will continue to serve our community for decades to come.
>
> **Building industry stakeholder submission**

2.3.5 Groundwater

Groundwater is one alternative water source suitable in some circumstances. Where it is suited for purpose, using groundwater can reduce the need for expensive treatment. It can also reduce costs associated with the transport of water supplies and wastewater through pipes.

In addition, aquifers can be used as alternatives to:

- surface dams for water storage
- traditional piped stormwater systems

Groundwater use

Since 1980, nearly 4,000 domestic and stock bores have been registered in urban areas. Total usage from these bores is estimated to be 770 ML per year[1]. Over half of these bores have been drilled since 2000. Many of these bores are in older, established areas. In urban areas these bores are typically used during times of drought or restriction. Where landowners have bores, encouraging their use at other times might be a suitable substitute for mains supplies.

Throughout the region there are about 280 licences to extract groundwater with a total allocation of 11 GL. Only about 3 GL is used each year. Some local councils, schools and golf courses already rely on groundwater as either their primary source of water for irrigating green space or as a back-up during dry years.

Using groundwater as an alternative to mains supply in cases such as these is highly viable. The volumes of extraction are reasonably small and some infiltration back into the aquifer occurs to partially offset the losses. The upfront costs to construct a bore are high, but ongoing costs are low.

Southern Rural Water is developing a groundwater atlas for the Port Phillip & Western Port region. Due for completion in August 2014 it will contain valuable information about groundwater availability, use and management. A groundwater website for southern Victoria will be available in 2015.

Managed aquifer recharge

Managed aquifer recharge (MAR), also known as aquifer storage and recovery (ASR), is not a new water source. It is a method of storing water – usually stormwater, recycled water or river water – in aquifers for later extraction and use, or environmental benefit.

Unlike dams, MAR avoids evaporation losses and is suited to urban areas because it uses little land. The stored water can be withdrawn from bores at multiple locations and may be cheaper than other alternatives, such as large desalination plants.

MAR is most suited to non-drinking uses such as toilet flushing, garden watering and irrigation. It works best in confined aquifers, preferably those that are naturally brackish and have few other users.

1 This assumes all bores drilled in the past forty years are still active and that usage per site is similar to the average total metered use of households recorded by urban water authorities (Parsons Brinckerhoff 2010).

Kingswood managed aquifer recharge

CASE STUDY

The Kingswood Golf Club in Dingley Village needed an extra 30 ML 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 were additional challenges involved in drilling into fractured rock and determining whether the fractured rock aquifer would provide adequate capacity. An innovative approach which involved identifying linear features in the topography – from stereographic 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 now 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 project was assisted by South East Water and the Smart Water Fund and won a Waterwise award from Southern Rural Water in 2010 for demonstrating innovation in water.

Photo courtesy of Kingswood Golf Course.

2.4

Land use and water cycle planning

Plan Melbourne's release for a final round of comments in October 2013 provides an ideal opportunity to align water cycle and land use planning. **Plan Melbourne** is a planning and development strategy that addresses Melbourne's infrastructure, housing, employment and environmental challenges over the next 40 years.

Plan Melbourne recognises that 'the urban development process is an important means of supporting how we manage and make use of water to improve liveability, protect waterways and minimise the impact of flooding. The Strategy supports implementation of **Melbourne's Water Future** by influencing how urban development occurs across new and established urban areas.'

A new water cycle planning approach at metropolitan, regional and local scales is one of the key drivers of change signalled by **Melbourne's Water Future** (see section 3.2).

Water cycle planning will be founded upon knowledge and understanding of the entire water cycle and local land uses including: 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.

This new approach reflects the considerable differences between the neighbourhoods and regions across metropolitan 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. So our local communities must be actively involved in whole-of-water-cycle planning and management processes and decisions.

Plan Melbourne

Melbourne depends on a range of natural processes to function. As the city grows, it will be important to maintain the health of urban waterways. **Plan Melbourne** recognises that we need to change the way we plan and manage urban development and water services to enable a more comprehensive and innovative approach to using stormwater and recycled water. **Plan Melbourne** commits to integrating whole-of-water-cycle management to deliver sustainable and resilient urban development (Direction 5.5).

Large scale urban renewal projects provide important opportunities to embed whole-of-water-cycle management principles and approaches in new developments, while at the same time avoiding or deferring major inner-Melbourne infrastructure upgrades. **Plan Melbourne** commits the Metropolitan Planning Authority to 'ensure whole-of-water-cycle management approaches are used in Melbourne's urban renewal precincts, such as Fisherman's Bend and E-Gate, to pave the way for other major redevelopments.'

Victorian Climate Change Adaptation Plan

The **Victorian Climate Change Adaptation Plan** was released 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.

Plan Melbourne adopts environmental resilience as a fundamental principle. This incorporates consideration of flooding and other natural hazards as part of planning the city's growth and development.

The Government's **Living Melbourne, 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 **Victorian 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 whole-of-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.

2.5

Systems analysis

We now have more information about Victoria's water cycle than ever before, and this information is constantly improving and will continue to grow. Systems analysis is an important tool to make best use of this information, using advanced computing techniques and 'big data', to help inform our policy thinking at all scales of the water cycle.

Systems analysis enables us to inquire about and better understand the links, relationships and feed-back loops within and between complex and inter-connected systems. In the context of our water cycle, it allows a more informed understanding of the interactions between different components of the cycle, including over time (temporal), in different locations (spatial) and across the natural and built environments.

Systems analysis permits a wide range of scenarios and options to be examined. It can help identify what could be achieved as a new approach to whole-of-water-cycle management is adopted.

The Living Victoria Ministerial Advisory Council commissioned an innovative systems analysis that indicated, over a forty year outlook, what benefits could be achieved by adopting a whole-of-water-cycle approach compared with 'business as usual'[2].

The precise way to achieve those benefits will be determined through this strategy's new approach to water cycle planning. Importantly, the new approach to planning will retain the flexibility to determine the most efficient way to achieve defined outcomes at the regional, precinct and local scales.

A process of continual improvement is best practice with all systems analyses and 'big data' modelling. In the case of water cycle systems analysis, that process has commenced, and the Victorian Government has committed to making systems analysis 'open source'. That commitment involves, among other things, documenting the modelling processes and steps involved, working collaboratively with industry analysts, and agreeing assumptions and scenarios for testing options. This will ensure there is consistency and comparability over time and between different analytical approaches. It will also support the further development and wider adoption of a systems analysis approach for modelling our water cycle.

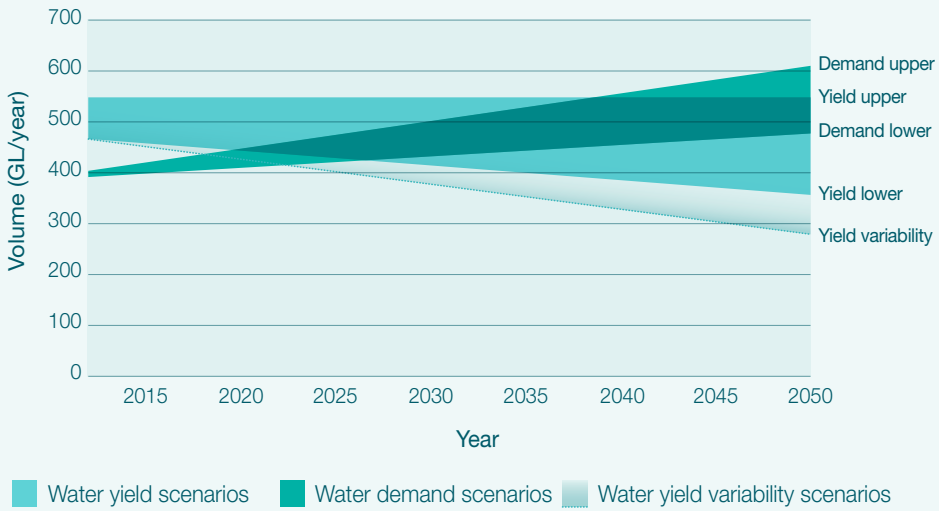
The Victorian Government will work closely with all those involved in managing the water cycle and technical specialists to establish the key processes and guidelines for developing a systems analysis and making it open source.

2 Business as usual was defined by the Living Victoria Ministerial Advisory Council as a 'traditional servicing approach to the provision of water services based on current day water storages, embedded water efficiency and existing dual-pipe waste water reuse systems, supplemented by the desalination plant and bulk supplies from the North-South pipeline for critical human needs only'.

Figure 3 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.

Uncertainty and variability in water use and supply FIGURE 3



Variability of water supply and population growth creates significant uncertainty about future water supplies

2.6

Benefits

The Living Victoria Ministerial Advisory Council analysis showed that, under a 'business as usual' scenario, it may be necessary to commit to two additional desalination plants (at capacities of 50 GL and 100 GL, and a cost of $2 billion and $4 billion respectively) during the planning horizon to 2050.

A new whole-of-water-cycle management approach 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. The Living Victoria Ministerial Advisory Council systems analysis compared the cost of its defined business-as-usual scenario against alternative approaches.

Based on that systems analysis, the level of benefits that could be achieved by adopting an approach that optimises local water cycle management for Greater Melbourne is as follows[3]:

- 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 by 2050
- Up to 30 per cent reduction in wastewater discharge by 2050
- 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 4,760–8,250 tonnes)
- Up to 40 per cent reduction in stormwater runoff volumes by 2050

Many of the benefits identified by the Living Victoria Ministerial Advisory Council systems analysis are considered conservative because they exclude additional financial benefits from improved efficiency, and additional non-financial benefits such as improved community wellbeing and liveability.

Based on the systems analysis, $6–7 billion (NPV) could be saved by 2050

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

Guilfoyle's Volcano Royal Botanic Gardens working wetlands project

CASE STUDY

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 $2.25 million grant from the Myer Foundation (of which $1.2 million 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 $6.5 million project is a leading example of a collaborative approach to whole-of-water-cycle management. Partners include the Royal Botanic Gardens, Victorian Government, Commonwealth Government, the Myer Foundation and Sidney Myer Fund 2009 Commemorative Grants Program, Melbourne Water, South East Water, 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.

2.7

Key priority areas

Public consultation has helped to identify key priority areas in **Melbourne's Water Future**. While all the initiatives outlined in Section 3 will be progressed in the short to medium term, work has already commenced on a number of priority initiatives.

A new water cycle planning approach

An immediate priority is the development of the Metropolitan Whole-of-Water-Cycle Planning Framework (the Metro Framework). The Metro Framework, currently under development, will provide guidance for the development of regional and local water cycle plans in metropolitan Melbourne. The proposed new planning approach is described in Section 3.2.

The new water cycle planning framework for metropolitan Melbourne will include an outline of current and future required citywide infrastructure and guidelines for regional and local planning. These guidelines will include overall policy and pricing principles and agreed measures and indicators to achieve environmental and liveability outcomes at lower economic cost. Monitoring and evaluation will measure progress and allow continual improvement over the period to 2050.

The Metro Framework will initially guide the development of regional water cycle plans in metropolitan Melbourne. These regional plans will involve the Office of Living Victoria, the Metropolitan Planning Authority, Melbourne Water, the relevant water corporations, planning authorities, local councils 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 councils to design local water cycle plans that align with the Metro Framework and are consistent with the regional plans. Each level of planning will have a ten year timeframe with detailed implementation plans for local and regional plans.

The proposed water cycle planning will take place within overall policy and pricing principles to be developed as part of the Metro Framework and the projected resources and expenditure of relevant organisations. The plans will include goals for reduced use of drinking water, reduced wastewater flows, increased use of alternative local water sources and reduced peak flows and pollutants in waterways.

Economic reform

The objectives of **Melbourne's Water Future** are aimed at: a resilient water cycle, security of supply and water quality, lower costs and improved value for money in meeting our water needs, greater environmental and amenity benefits, increased innovation across the water sector, and improved transparency and decision making by sector participants.

These will require a new approach to incentives and frameworks to:

- encourage greater efficiency and innovation in the water sector
- improve price signals, including signalling the value of water
- improve the allocation of funding for purposes such as environmental works, and
- establish a whole-of-water-cycle approach to investment planning, including a common framework for assessing investment decisions

These changes require careful yet decisive economic reform.

An initial focus in 2014 for economic reform will include:

- disaggregating Melbourne's bulk water entitlements, as a first step towards a transparent and functional water market
- applying standardised Project Assessment Guidelines to ensure that evaluation of whole-of-water-cycle projects are assessed consistently across the sector and have regard to all costs and benefits
- piloting improved prioritisation and allocation of funding, including through the use of market-based approaches like auctions. Investment would be prioritised based on the most efficient means of achieving outcomes, and
- piloting 'out of area' competition between the publicly owned water corporations for the provision of water cycle services in major new developments. A fundamental principle of this approach is that the best solution for water services in new areas will often be driven by the geography of the area, and the availability of innovative solutions, rather than existing water corporation boundaries

Supporting innovation in small and large scale projects

The Victorian Government recognises that new approaches and projects – at different sizes and scales and addressing a range of water cycle management approaches – may need assistance to ensure innovation can be adopted and tested across different geographies.

Large scale urban renewal projects such as Fishermans Bend and E-Gate provide important opportunities to embed whole-of-water-cycle management principles and approaches in new developments. This will reduce the need to invest in costly new debt-funded water and wastewater infrastructure. The **Plan Melbourne** commits the Metropolitan Planning Authority to 'ensure whole-of-water-cycle management approaches are used in Melbourne's urban renewal precincts, such as Fishermans Bend and E-Gate, to pave the way for other major redevelopments'.

The $50 million **Living Victoria Fund** supports a range of projects that promote and deliver whole-of-water-cycle approaches. Some of the diverse projects already funded under the **Living Victoria Fund** include:

- Albert Park Stormwater Harvesting and Southbank Flood Mitigation Scheme will receive $995,000 for a feasibility study, plan designs and site works. Project manager, Parks Victoria, will be working with other interested stakeholders as the works progress
- $405,320 to help businesses in the Brooklyn Industrial Estate switch to alternate water supplies, lower water bills and save precious drinking water
- $120,000 to help the City of Stonnington and City of Port Phillip determine how whole-of-water-cycle principles could help mitigate flooding in local high risk areas
- $135,000 to assist in the development of new software to gain a better understanding of the environmental benefits of green roofs and walls on buildings

In addition, water corporations and local councils will continue to support householders and local whole-of-water-cycle projects and trials such as Little Stringybark Creek and Dobsons Creek (see case study on page 73). As regional and local water plans are developed in collaboration with a range of partners, more examples of collaborative effort will emerge over time.

Regulatory reform

The Victorian Government is currently working on a cost benefit analysis looking at options for improving the water performance of houses, buildings, precincts and communities using the planning provisions and building code. Before embarking on any changes the Victorian Government will engage thoroughly with the community and those with a particular interest in regulatory reform. Any specific measures applying to building regulations will undergo a formal regulatory impact assessment prior to implementation.

Improvements may in some cases come from regulation, for example, meeting higher standards for stormwater or more efficient appliances in the home. Other improvements may come from removing or reducing regulatory barriers. In this regard, **Melbourne's Water Future** will take a proactive approach to streamlining and simplifying current regulatory barriers.

Public consultation has helped identify priority areas for implementation

2.8

Governance and implementation

This strategy proposes key reforms to the current institutional arrangements for Melbourne's water cycle consistent with the objectives of the Water Act. The reforms will clarify roles and boundaries, improve incentives, and focus public agencies on increasing productivity and reducing cost pressures.

Public ownership of water corporations will remain, with the wider range of organisations involved in managing the water cycle more fully engaged in water cycle planning.

Implementation will involve assigning clear roles and responsibilities for delivery to a range of agencies and organisations, including local government, within the sector. Partnerships and collaboration will be critical to achieving the benefits and outcomes described in this strategy.

This is also reflected in the high level implementation plan in Section 4 which identifies timeframes and shared responsibilities for delivering Melbourne's Water Future's 7 outcomes and 51 initiatives. The actions contained within this strategy are subject to available government funding.

Following the release of this strategy more detailed work will be undertaken with each responsible agency to ensure the implementation plan is comprehensive and can deliver on the work required to achieve the strategy's vision and objectives.

The Office of Living Victoria will be responsible for monitoring and evaluating the implementation of the strategy.

Office of Living Victoria

A key development which clarifies Victorian Government responsibility for urban water policy and regulation is the recent machinery-of-government change to merge the urban water functions of the Department of Environment and Primary Industries, and the Office of Living Victoria. The designation of the Office of Living Victoria as a single authority for urban water policy in Victoria creates both opportunity and momentum for the consistent implementation of Melbourne's Water Future and the extension of the principles of whole-of-water-cycle management to urban centres throughout Victoria.

Office of Living Victoria

Melbourne's Water Future has 7 outcomes, 51 initiatives and 134 actions

Even in dry years, more water falls on Melbourne than we use from our dams

International use of treated and recycled wastewater

Melbourne's Water Future proposes substituting drinking water with recycled wastewater but only for purposes such as flushing toilets and watering our parks and gardens. Some international jurisdictions go further, using treated wastewater either directly or indirectly in the drinking water supply. The Victorian Government will monitor and keep abreast of international developments, including

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, United States

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 Hartbeespoort Dam is recycled water and this dam supplies Johannesburg with drinking water.

Las Vegas, United States

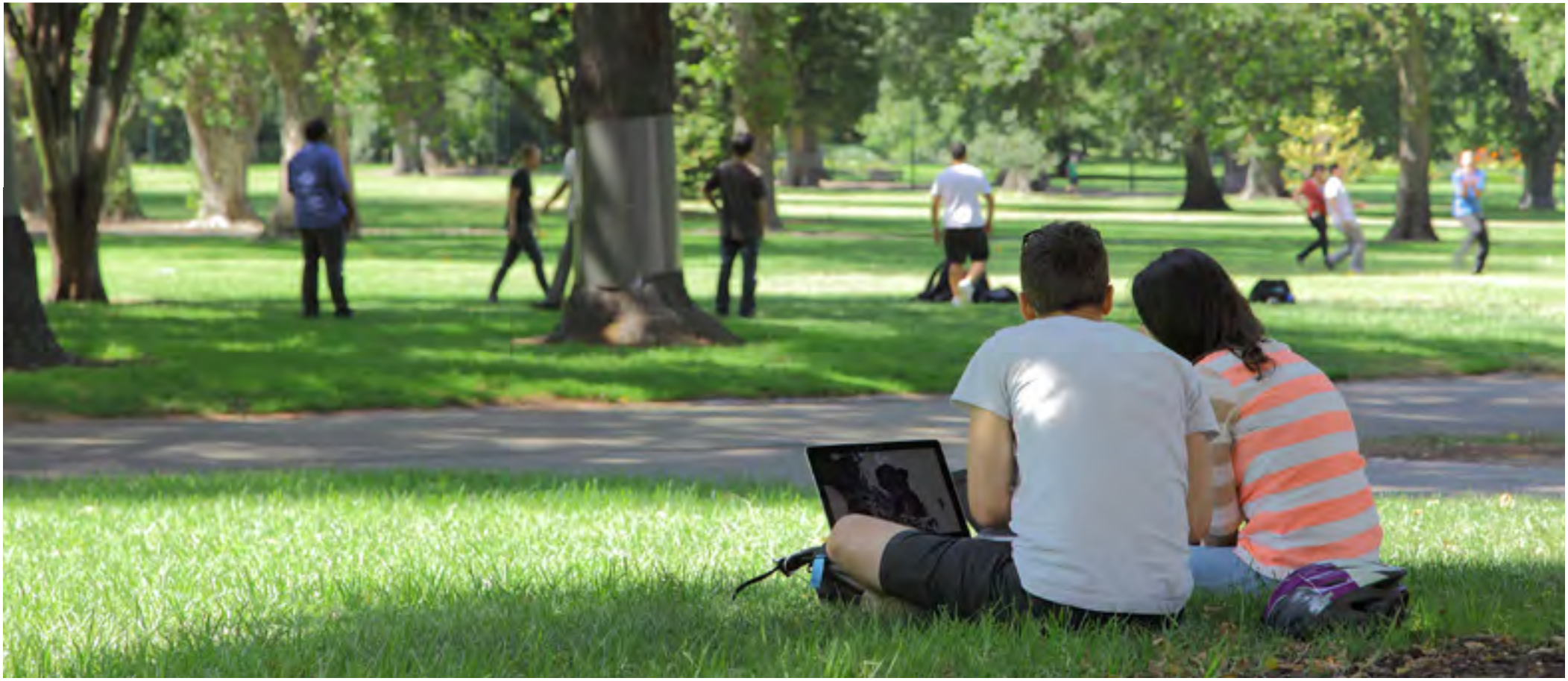
The Las Vegas Water District extracts 360 GL per year from Lake Mead (Hoover Dam), which is near the limit of its entitlement. The district secures its water entitlements by receiving credits for returning 180 GL per year of wastewater to the lake.

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.

Outcomes and initiatives

3



Outcomes and initiatives

Outcomes

Initiatives

3.1 A community engaged in whole-of-water-cycle management Page 34

- 3.1.1 Ensure meaningful community involvement in water cycle planning
- 3.1.2 Improve transparency and information provision
- 3.1.3 Improve disclosure of the water performance of homes for sale and rent
- 3.1.4 Partner with communities
- 3.1.5 Support community activities and projects

3.2 Suburbs – old and new – designed with water in mind Page 40

- 3.2.1 Plan to use local water locally – metropolitan and regional water cycle planning
- 3.2.2 Plan to use local water locally – local water cycle planning
- 3.2.3 Incorporate whole-of-water-cycle management into growth area planning and urban renewal precincts
- 3.2.4 Green our suburbs
- 3.2.5 Improve stormwater management in new developments
- 3.2.6 Reduce urban flooding
- 3.2.7 Influence design guidelines for stormwater quality and flooding
- 3.2.8 Support opportunities to link local water, energy and waste cycles

3.3 Sensible use of water in our homes and businesses Page 52

- 3.3.1 Encourage households to use local water sources
- 3.3.2 Facilitate the use of local water in public buildings
- 3.3.3 Establish world-class water use for Melbourne's sporting grounds
- 3.3.4 Work with businesses to adopt cost-effective local water options
- 3.3.5 Increase peri-urban farms' use of non-drinking water
- 3.3.6 Make the water cycle more energy efficient
- 3.3.7 Review regulatory support for local water use
- 3.3.8 Reform the structure of water bills to reward water efficiency

3.4 Resilient water systems Page 60

- 3.4.1 Support and facilitate investment in projects that enhance water system resilience
- 3.4.2 Change the incentives of our water corporations
- 3.4.3 Reform regulatory arrangements for water corporations
- 3.4.4 Increase scrutiny of major investment decisions in the water sector
- 3.4.5 Embed good water management in public buildings and major projects
- 3.4.6 Monitor access and use of data
- 3.4.7 Improve the safety and resilience of our water systems
- 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

3.5 Improved waterways and bays Page 70

- 3.5.1 Engage the community on waterway health
- 3.5.2 Reduce adverse impacts of stormwater on our waterways
- 3.5.3 Improve funding allocation for stormwater management
- 3.5.4 Make better use of treated wastewater
- 3.5.5 Protect our catchments and plan for the long term management of our waterways
- 3.5.6 Measure, monitor and publish the level and composition of stormwater runoff

3.6 Reduced inefficiency and waste Page 74

- 3.6.1 Increase transparency about water sector costs and performance
- 3.6.2 Better allocate water sector investment
- 3.6.3 Develop new design guidelines for water and sewerage infrastructure
- 3.6.4 Improve leak detection, asset management and maintenance
- 3.6.5 Ensure our water corporations are focused on driving productivity and lower cost delivery for consumers
- 3.6.6 Enhance collaboration and sharing of research and data
- 3.6.7 Simplify and streamline regulation

3.7 Accelerated innovation and world recognition of expertise Page 80

- 3.7.1 Establish Melbourne as a global leader in water cycle management
- 3.7.2 Establish an online portal for innovative water cycle management
- 3.7.3 Promote our expertise to the world
- 3.7.4 Enhance research and policy capacity
- 3.7.5 Reorient the Smart Water Fund
- 3.7.6 Further build skills and capability in the water sector

3.1

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

Melbourne's Water Future affects everyone and is a shared responsibility. Deep and genuine involvement of all stakeholders, including the community, is essential to the success of the strategy.

Members of the community have a direct stake in water cycle management decisions that affect current and future generations of Melburnians. How we plan to meet our city's water needs must reflect community values and preferences. A strong focus on meaningful community engagement will give us the best opportunity to maximise benefits for all sections of the community. The community is a rich source of innovation and practical on-ground action, and this should be reflected in how we plan and reform the urban water sector.

Recent sampling of community views revealed strong support for the whole-of-water-cycle approach articulated by this strategy. Firstly, 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, as 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.

Genuine community engagement involves ensuring people are provided with balanced and objective information at all stages in the decision making process. Community engagement in the implementation of **Melbourne's Water Future** will take a number of forms ranging from information provision and consultation through to collaboration and partnership.

Initiative 3.1.1
Ensure meaningful community involvement in water cycle planning

Communities need to be informed about the water cycle costs, benefits and options in each local area, and to be closely involved in local-scale planning. The water savings made by Victorians during the recent drought revealed that Victorians are good water managers who are well placed to drive future planning decisions around water. Communities also demonstrated that they know their local area and can provide a rich source of innovation for local-scale water projects. During the consultation process, local councils provided examples of how the community has been successfully engaged in water planning in the past. Councils offered their support in helping the government and the water sector to engage with the community in the future.

As a starting point, we have listened to the community to establish perspectives and attitudes towards water and how it is used.

The community:

- wants a sustainable, smart alternative approach to water management in Melbourne
- considers alternative water sources such as filtered stormwater, treated sewage, unfiltered tank water and treated recycled water as acceptable water sources for suitable domestic uses other than drinking
- is positive about the use of stormwater in public parks and gardens because it leads to greater urban amenity and a more liveable city
- wants to know more about environmental benefits of whole-of-water-cycle management

Actions

Develop a simple but powerful set of criteria for improving community engagement in water cycle planning while respecting the need for different approaches depending on the community. 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.

Work with water corporations and relevant government departments to ensure dedicated, skilled stakeholder relationship and liaison managers are employed to facilitate collaborative local-scale planning involving multiple stakeholders and the community.

Grant Street Reserve

CASE STUDY

In 2007, the City of Melbourne identified a lack of public open space in the city's Southbank area. Originally calling for the 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 of Melbourne consulted with the local community using a detailed stakeholder engagement process to understand what the community 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 raingarden 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 kL 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 right A 200 kL tank, situated underneath the reserve, stores water for irrigation of grassy areas

Bottom right Dry creek bed in Grant Street Reserve

Melbourne's population is forecast to grow to 6.5 million by 2050

Initiative 3.1.2
Improve transparency and information provision

To ensure people can stay informed about urban water, and in response to feedback, the Government will develop and make accessible an on-line information and collaboration site, with the working title of **Water Source**. The site will be developed using a partnership approach to draw on existing knowledge and ensure there is no duplication of effort. The **Water Source** site will compile and disseminate local, regional, national and international good practice, and information and research about innovative water management from a diverse range of sources. The site will provide a rich resource of information, technical advice and project development opportunities.

The information to be provided on the **Water Source** site includes:

- recent and up-to-date information about Melbourne's water cycle, water use patterns, the effectiveness of water efficiency measures and new research
- local water cycle performance goals along with geographically specific water-use benchmarks for households and businesses
- improved disclosure of the actual costs of water cycle services
- information that will help the community understand and stay abreast of any relevant institutional or water authority actions, as we recognise that decisions and actions at the system level will also affect local conditions
- information and advice about local, national and international innovations and best practice in whole-of-water-cycle systems, approaches and tools
- details from the Living Victoria Ministerial Advisory Committee 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 council whole-of-water-cycle plans

Increased provision of information through the **Water Source** website will improve information flow and transparency so that all stakeholders have access to the latest information and research.

Actions

Establish the **Water Source** website.

Align the **Water Outlook** with **Melbourne's Water Future**. Each year the **Water Outlook** will continue to outline the state of short term water security for Melbourne and provide an update on key insights and progress towards the strategy's vision.

Maintain an accurate and current understanding of the community's perspectives on water, and approaches to water cycle management in Melbourne, by conducting and publishing 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.

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 Office of Living Victoria website will also host an entry point to the **Water Source** site. All of this material will be made freely available to the community.

Investigate new technologies to provide improved information. For example, 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.

Initiative 3.1.3
Improve 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 (separate pipes for recycled water), or the level of performance of raingardens and water tanks.

In partnership with the housing sector, the Victorian Government will consider whether further actions are required to improve disclosure of the water efficiency performance of homes that are for sale or rent. This could include, for example, a simple checklist or self-assessment completed by an owner, the real estate agent or a consultant, as a cost effective method of disclosure, which would also increase awareness of efficiency performance.

Actions

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 a voluntary, industry-led, low-cost scheme that will achieve the goal of a cost-effective method of disclosure of key household water efficiency features to home-buyers and prospective tenants.

Work with stakeholders such as the Housing Industry Association, the Real Estate Institute of Victoria and Consumer Affairs Victoria to encourage landlords to meet basic water cycle measures (such as absence of leakages, and the presence of dual-flush toilets and water-saving shower heads) in their rental properties.

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. Melburnians have a strong connection with their local waterways, open spaces and personal gardens, with a desire to improve their quality and amenity. 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. The research also demonstrates community understanding that action is required to ensure current levels of 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 the Victorian Government and the community to form a genuine partnership in water cycle planning and management. This partnership will allow us to continue building a shared vision and a transparent decision-making process about Melbourne's Water Future.

Actions

Work with the community to understand the most effective ways to meet the needs of individual communities. Through this the Victorian Government will build the community's understanding of and engagement with water management issues and improve our understanding of local water issues and initiatives from a community perspective.

Continue to support programs that enable consumers to make informed choices when purchasing water efficient appliances.

Continue to partner with water corporations, 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.

Continue to work with the water corporations 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.

Bentleigh Secondary College

CASE STUDY

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 6 ML 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.

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, the Victorian Government will provide project funding and information facilitation.

The $50 million **Living Victoria Fund** supports a range of projects that promote and deliver whole-of-water-cycle approaches. To date, $5 million of the **Living Victoria Fund** has been committed to the City of Melbourne to implement water cycle projects that deliver on liveability, flooding and efficient water cycle management outcomes. A priority catchment is Elizabeth Street where projects will be developed in collaboration with key resident stakeholders such as the University of Melbourne and RMIT. $1.5 million has also been committed to Knox City Council water cycle projects, including stormwater harvesting and the laying of warm weather turf. Some of the other diverse projects already funded under the **Living Victoria Fund** include:

- $995,000 for a feasibility study, plan designs and site works for the Albert Park Stormwater Harvesting and Southbank Flood Mitigation Scheme. Project manager Parks Victoria will work with other stakeholders as the works progress
- $405,320 to help businesses in the Brooklyn Industrial Estate switch to alternate water supplies, lower water bills and save precious drinking water
- $120,000 to help the City of Stonnington and City of Port Phillip determine how whole-of-water-cycle principles could help mitigate flooding in local hotspots
- $135,000 to assist in the development of new software to gain a better understanding of the environmental benefits of green roofs and walls on buildings

These projects complement a range of commercially funded local water cycle projects already in development.

Actions

The **Living Victoria Fund** will provide funding to a variety of projects including stormwater and drainage, land use planning, local open space planning and management, asset infrastructure and maintenance and sustainability initiatives.

Information about all projects supported by the **Living Victoria Fund**, including information about Fund application processes and timing, will be published on the **Water Source** site. That site will also link to the proposed online portal (see initiative 3.7.2).

Use the **Water Source** site as a place for communities and other stakeholders to share news and information about whole-of-water-cycle projects and initiatives to help communities learn from the experiences of other projects.

Image courtesy of Yarra Valley Water

3.2

Suburbs – old and new – designed with water in mind

Integrating water cycle planning with land use planning is fundamental to changing Victoria's approach to urban water management. Melbourne varies in a wide range of respects that affects the water cycle.

Our different localities are growing and changing at different rates and have different climates, rainfall, topography, geology, existing infrastructure, demography, industry, water use patterns and wastewater profiles.

Using the Metro Framework to guide the development of regional and local plans will enable us to plan for the individual characteristics of different regions within Melbourne while supporting the broader strategic direction of water cycle management in the metropolitan area.

The release of **Plan Melbourne** provides the opportunity to align our water planning with land use planning.

This new approach will facilitate lower cost solutions over the long term. In the future, planning for the use of local water will be done at the same time as planning for local communities. Local water cycle planning will be an integral part of all new developments, at both precinct and subdivision stage. Consultation has shown substantial support for a tiered approach to water cycle planning.

However, local councils and industry also wanted to ensure that the considerable work already undertaken in many councils will be recognised during the planning process. **Melbourne's Water Future** explicitly recognises this work.

In existing suburbs, stormwater renewal projects and other local water infrastructure initiatives will allow those suburbs to enjoy the benefits of the new planning approach. In the short term, developers, businesses and local councils will be supported to showcase innovative approaches to water design that will reduce or reverse the damage to our trees and open spaces.

Using the approach outlined in this strategy, 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 perhaps even produce in a drought year.

Initiative 3.2.1

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

A number of key elements are required to implement effectively the new approach to water cycle planning and integrate it with land use planning. These elements include adopting a long term planning horizon, developing plans at the metropolitan, regional and local levels and ensuring there is a strong evidence base to support the plans.

The adoption of a 40-year outlook permits our planning to be based on a range of plausible outcomes rather than a single end point, with adjustments being made as our knowledge improves.

The preparation of analytical guidelines within the Metro Framework will provide a shared approach to systems analysis to ensure consistency across the various scales of planning. This will build on the systems analysis outlined in the Living Victoria Ministerial Advisory Council's Road Map and Implementation Plan. Critically, the analysis will allow water cycle planners and land use planners to consider and protect long term options to ensure that our water future is not unduly 'locked in' by decisions taken now.

The Living Victoria Ministerial Advisory Committee systems analysis and 40 year outlook will inform the development and publication of a new Metro Framework for metropolitan Melbourne, which will include an outline of the current citywide infrastructure, future citywide infrastructure that could be deferred with alternative planning, guidelines for regional and local water cycle planning and overall pricing principles for the system.

The Metro Framework will guide the development of metropolitan regional plans, providing a coherent link between water cycle planning and other water services and water infrastructure planning occurring across Melbourne. The regional water cycle plans will have regard to and inform local water cycle plans developed by each local council within the region. In addition, Victorian Government agencies involved in the regional water cycle planning will be required to consider the local plans in the preparation of their corporate and business plans.

Actions

Develop a Metropolitan whole-of-water-cycle planning framework.

Prepare regional water cycle plans, starting with the western, northern and central regions as a priority.

Continue planning for the high growth regions of Melbourne as a priority, including the designated growth areas on Melbourne's fringe and identified urban renewal sites. This would include reviewing any existing infrastructure planning.

East Werribee Employment Precinct

CASE STUDY

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 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 approximately 58,000 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.

Water cycle planning

Melbourne's local water cycle plans

- Planning based on guidelines and templates within the metropolitan framework, consistent with city-wide water cycle infrastructure planning and the relevant regional plans, and based on a detailed examination of the specific characteristics of the municipality
- Build on the planning work already undertaken by local councils
- Demonstration plans in first year, with funding support from the Office of Living Victoria, to inform the rollout of additional plans in subsequent years
- Ten year timeframe with detailed implementation plans to be updated 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

Melbourne's regional water cycle plans

- Metropolitan regions consistent with the regions outlined in **Plan Melbourne** with consideration of cross catchment boundary issues
- Consistent with the Metro Framework, including city-wide infrastructure planning and based on detailed examination of the specific characteristics of each region
- Consistent with regional water cycle planning guidelines
- Includes goals for reduced use of drinking water, reduced wastewater flows, 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
- Ten year timeframe with detailed implementation plans to be updated on an ongoing basis
- To be developed in 2014-2015 coordinated by the Office of Living Victoria, with strong regional ownership involving the relevant land use planning authorities, Melbourne Water, the relevant water corporations, the relevant local councils and other organisations such as the Metropolitan Planning Authority, 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 planning work undertaken by water corporations

Metropolitan whole-of-water-cycle planning framework – Metro Framework

- Underpinned by Living Victoria Ministerial Advisory Committee systems analysis and 40-year forward look
- Ten year timeframe
- Outlines current and future required city-wide infrastructure
- Provides guidelines for regional and local planning
- Includes high level policy and pricing principles
- Includes high level goals and indicators
- Includes guidelines and drivers for behavioural change
- Includes guidelines on how to assess options
- To be developed and released by early 2014
- Coordinated by the Office of Living Victoria and will involve all relevant water corporations, relevant government departments and local authorities

- Developed in close collaboration with the local community and local business and industry, the local and state-wide water corporations and the relevant regulators
- Will include goals for reduced use of drinking water, reduced wastewater flows, 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

- 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)
- 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, as required, a new Water Industry Regulatory Order and the Statements of Obligations of the water corporations
- Will have regard to and inform local water cycle plans developed by each local council in the wider metropolitan area
- 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

- Monitoring and continuous improvement process coordinated by the Office of Living Victoria
- Once completed will inform, as required, a new Water Industry Regulatory Order and the Statements of Obligations of the water corporations

Renaissance Rise, Mernda

CASE STUDY

Occupying a land area of 77 hectares at the urban fringe to the north east of Melbourne, 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 include 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 raingardens, restoration of local urban waterways and deferred requirement for a major constructed wetland and regional flooding facilities.

A system of rainwater tanks, raingardens, tree gardens, bio-retention swales, cascading basins and restored local waterways act to treat local rainwater and stormwater. Stormwater flows from roads into the raingardens 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, sewage discharges by 24 per cent and stormwater runoff by up to 65 per cent.

Image courtesy of Dr Peter Coombes

Initiative 3.2.2

Plan to use local water locally – local water cycle planning

Councils have a key role in planning and managing key actions outlined in **Melbourne's Water Future**. In Victoria, local councils have 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, most local stormwater drainage, most local roads, streets, footpaths, nature strips and street trees, most parks and playing fields, many swimming pools, and much of the land around our waterways. At a practical level, local councils play a key role in determining water service requirements in new and existing suburbs.

Local councils also have a well-developed knowledge of local characteristics and of the needs and preferences of local residents and businesses. Importantly, most local 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.

Local level planning for water 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 an increasingly important part of actions to implement **Melbourne's Water Future** as activities at the neighbourhood level start to shape how we design our urban environment and manage water across our cities and towns. These plans will build on the excellent planning of many local councils and appropriately place local government as a key player in the delivery of whole-of-water-cycle management.

Action

Develop demonstration local plans 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 Victorian Government will assist local councils to work with water corporations and other relevant authorities to develop these plans in alignment with the principles and timeframes of this strategy.

Siemans and Bayswater Cricket and Football Club oval

CASE STUDY

Knox City Council, Bayswater Cricket and Football Club and the Business Committee for Bayswater identified a need to maintain 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 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 though a UV filtration unit to kill any bacteria and then through 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 importance of the commitment by the five funding partners representing private industry, federal, state and local government and community partners to fulfil a vision.

Toolern Integrating stormwater harvesting in new suburbs

CASE STUDY

Located in one of the lowest rainfall areas in the state, Toolern will be home to around 50,000 new residents by 2030. Toolern is planned to be water neutral, as every home will be supplied with Class A recycled water, and all stormwater in the precinct will be captured, stored and reused.

Toolern provides a unique whole-of-water-cycle approach benefiting all involved as a result of high levels of collaboration over two years with key stakeholders - including City of Melton, the former Growth Areas Authority, developers, Office of Living Victoria, Melbourne Water, Southern Rural Water (SRW) and local environment and community groups. Alternative water supplies were integrated into Toolern's Precinct Structure Plan which included a target to reduce drinking water consumption by 50 per cent through substitution with other water sources. The Toolern stormwater harvesting project is one of the mechanisms to achieve this reduction and involves capturing treated stormwater from urban development and transferring it to Melton Reservoir, which is managed by SRW.

Water from this reservoir is used in the Werribee Irrigation District for agricultural purposes. In a unique water entitlement sharing arrangement, SRW and Western Water are investigating the possibility of exchanging a bulk entitlement allocation from Melton Reservoir for the incoming stormwater, for an equivalent share in Merrimu Reservoir (which provides drinking water to Melton and Bacchus Marsh). This is a fit for purpose solution for both agricultural and drinking uses as Western Water customers receive a more cost effective and reliable local water supply and Werribee irrigators benefit from increased reliability in supply, particularly in low rainfall years. The environment also benefits from a reduction in urban runoff in storm events, assisting in waterway health.

Photo courtesy of Western Water.

Initiative 3.2.3

Incorporate whole-of-water-cycle management into growth area planning and urban renewal precincts

The Metropolitan Planning Authority is responsible for the preparation of Precinct Structure Plans to allow the planned development of new suburbs in Melbourne's growth areas, Principal Activity Centres and urban renewal sites identified in **Plan Melbourne**, including Fishermans Bend, E-Gate, Richmond Station, Federation Square East and along rail corridors. This planning is an ideal opportunity to ensure that the residents, businesses and local councils in new areas are able to use local water and that water efficiency and stormwater management is 'planned in' from the outset.

By identifying the whole-of-water-cycle management options that best suit the circumstances of each growth area and urban renewal precinct early in the planning process, the cost of achieving more sustainable outcomes is minimised. 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 to ensure that achieving more liveable and sustainable outcomes does not adversely affect housing affordability.

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.

Action

Work with the Metropolitan Planning Authority, the water corporations, local councils and developers to embed whole-of-water-cycle management into growth area and urban renewal Precinct Structure Plans. This work will build on the excellent approach to water sensitive urban design in many developments in the growth areas.

Initiative 3.2.4
Green our suburbs

For almost two decades between the 1970s and the 1990s, Victoria was known as the 'Garden State'. Private gardens, public parks and magnificent avenues of tree-lined streets were a 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 when drinking water is limited. The 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.

The City of Melbourne has also estimated that without alternative water, a large proportion of the city's trees will die during the next long dry period. 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.

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.

Greening Monash

CASE STUDY

Greening Monash is a pilot project jointly funded by Office of Living Victoria, City of Monash and Melbourne Water to trial, test and promote simple, cost effective road edge treatments that provide a practical watering solution for local street trees.

During Victoria's extended drought many urban trees died and many others will have shortened life spans due to water restrictions. This costs ratepayers money and reduces the amenity that green tree-lined streets provide.

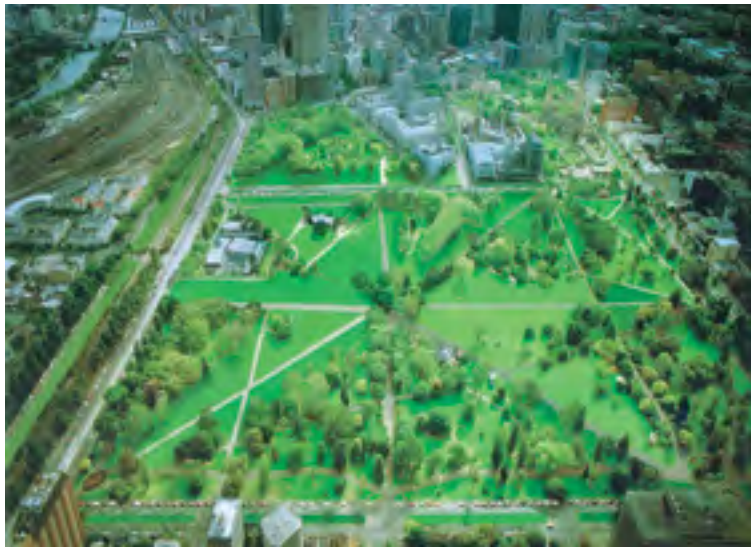
By improving watering techniques using alternative water this project will help grow and maintain street trees even in times of drought and water restrictions. The simplicity of the technique is intended to encourage maximum uptake in municipalities across Victoria.

This project has the potential to generate savings of up to $10,000 per year in irrigation and tree replacement costs for the 100,000 street trees in the City of Monash. Comparable financial savings can be expected across all of Melbourne's local government areas as well as the related reduction in pressure on Melbourne's mains water supplies. In line with whole-of-water-cycle principles the project will also reduce stormwater volumes and improve the quality of stormwater runoff.

Left A weather station forming part of Monash's street tree watering trial.

Photo courtesy of Dr Andrew Coutts, Monash University

Fitzroy Gardens with and without the elms



Left Fitzroy Gardens with and without the current abundance of trees. The images highlight the importance of creating a secure alternative water supply to protect trees for the liveability of the city.

Images courtesy of City of Melbourne

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. **Melbourne's Water Future**, in line with Direction 4.5 Make Our City Greener in **Plan Melbourne**, will encourage more tree planting and the development of more open space including new parks in urban renewal precincts and established suburbs.

Actions

Keep our existing green areas and trees thriving by planning for the availability of alternative water – even in times of drought – through the local whole-of-water-cycle 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, through public education, partnerships with water corporations and local councils, and incentive and support programs.

Support local government to set new goals for tree canopy coverage and soil moisture for water-dependant open space as part of the local whole-of-water-cycle management plans, and ensure that these plans include an effective street tree policy to accommodate shade trees including native trees.

Encourage new developments in the growth areas and in inner Melbourne to 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 corporation programs 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.

Work with government agencies and local councils to ensure open spaces can benefit from the whole-of-water-cycle management approach.

This new approach will facilitate lower cost solutions over the long term

Initiative 3.2.5
Improve stormwater management in new developments

Clause 56.07-4 of the Victoria Planning Provisions contains stormwater management requirements for new residential subdivision (to two or more lots) to protect against the adverse impacts of stormwater on our waterways and bays. However, since Clause 56.07 was first introduced there have been significant changes in our understanding of the role of stormwater in managing the water cycle.

Clause 56.07-4 does not currently apply to the subdivision of land where the subdivision is for commercial or industrial purposes. The Victoria Planning Provisions will be reviewed to apply more contemporary standards to other land uses where this will achieve significant environmental gains.

The stormwater performance requirements for Clause 56.07-4 are currently being reviewed to investigate how advances in scientific understanding and stormwater management can be applied to 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.

Actions

Continue working with local councils, water corporations and developers to improve implementation of Clause 56.07-4 through capacity building and investigating incentives for effective stormwater management.

Update the State Planning Policy Framework to modernise and improve references to whole-of-water-cycle management.

Introduce clearer and more relevant stormwater management requirements into the Victoria Planning Provisions.

Provide consistency and links between water management provisions in the planning system with those under consideration for inclusion in the building controls to enable whole-of-water-cycle management outcomes to be achieved at the scale most appropriate to each location (lot-precinct-growth corridor etc).

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

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.

Initiative 3.2.6
Reduce urban flooding

For Melbourne's suburbs, urban flooding is a major issue, and is likely to remain 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.

In Melbourne, there are more than 100,000 properties known to be at risk from flooding from the rivers, creeks and drains that are the responsibility of Melbourne Water. A considerable but unquantified number of properties are also at risk from flash flooding from local government catchment drains. 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 affected were previously unaware of the flood risk. The total number of properties likely to be affected by flooding across Melbourne may be significantly underestimated because of the incomplete flood mapping.

Actions

Map the properties and infrastructure at risk of flash flooding from local drainage systems and riverine flooding as part of the regional and local water cycle planning.

Continue working with relevant agencies at all levels of government to map properties and infrastructure at risk from coastal tidal and storm surge flooding.

Review flood control design responses for new subdivisions in light of the new standards under development (initiatives 3.2.7 and 3.5.2).

Trial new flood prevention measures in established suburbs during stormwater drainage maintenance and replacement.

Measure the cumulative effect of these initiatives 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 whole-of-water-cycle management approach.

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.

Action

Collaborate with Engineers Australia to develop new stormwater guidance, in light of **Melbourne's Water Future** 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 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.

Actions

Develop planning guidelines to ensure that energy generation, conservation and reuse are considered in local and regional water cycle planning.

Provide funding through the **Living Victoria Fund** to co-invest in innovative projects. This initiative will use and build upon the water corporations' significant achievements in generating energy from wastewater treatment.

Collaborate with the Commonwealth Government to support energy saving and generating initiatives in the water cycle.

Right Debris carried by Merri Creek after heavy rains in June 2013

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.

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 where it is efficient to do so, to replace or supplement expensive, piped-in drinking water. For example, 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.

Melburnians 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. Feedback during consultation reiterated the success of water campaigns over the past decade and the importance of continuing to engage with the community regarding behaviour-change programs.

We need to avoid the danger of complacency replacing the diligence we have previously shown. A slide into complacency about water use could follow the 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 those water supplies, and the constant and ongoing threat to drinking water supplies from a growing population, potential shifts in already variable climatic conditions, and the next inevitable drought.

Initiative 3.3.1
Encourage households to use local water sources

A number of measures will be required to encourage adoption of best practice whole-of-water-cycle management and prevent wasteful behaviours. The measures include education and information to encourage behaviour change, and regulation 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. Most water saving measures are aimed at home owners. People renting their housing can implement behavioural changes, but may have less opportunity to implement significant changes to the water infrastructure of their homes.

Actions

Continue to build on the positive contributions of the **Living Victoria Water Rebate Program** by continuing the program until June 2015, at which time the Government will assess whether further extensions would be valuable.

Implement a community behaviour change program, with the working title of **What Water Where**, to provide information on what alternative sources of water are available at the local level, or what needs to be done to make that water available to neighbourhoods or households. **What Water Where** will convey the requirement for water goals, 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.

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. To be eligible for the award, the innovation must reduce our reliance on the current primary source of our drinking water from dams.

Publish guidelines and provide education materials to support the safe implementation of rainwater-fed hot water systems that have been successfully implemented in other states and offer a promising opportunity for Melbourne.

Eynesbury clothes washing pilot trial

CASE STUDY

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.'

Left Kristy Logan and her young family during the installation of their free washing machine.

Courtesy Western Water

Initiative 3.3.2
Facilitate the use of local water in public buildings

The Victorian Government will use the lessons learned from the Greener Government Buildings program and pursue local water solutions for public buildings, including government buildings, schools, hospitals and train sheds, and undertake targeted work with public housing. To achieve this, we will approach high-water use facilities and offer assistance with identifying, planning and implementing alternative, local water sources. All high water use public buildings will be considered and appropriate local water alternatives will be pursued where cost effective. This initiative will be complemented by other initiatives relating to local water planning.

Actions

Identify and assess a sample of public buildings to further understand their consumption patterns with a view to seeking cost effective water efficiency opportunities.

Build on the Victorian Government Greener Government Buildings Energy Performance Contracts to facilitate water audits and to determine the most effective opportunities for implementing local water solutions.

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 Australian 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 Yarra Park water recycling at MCG case study on page 55).

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 and to help local communities and schools to better manage the supply and use of water at regional and suburban sporting grounds.

Action

Work with local councils and communities to pilot new whole-of-water-cycle management projects at regional and suburban sporting grounds using, among other things, the lessons learned from Melbourne's major sporting precincts.

Yarra Park water recycling at MCG

CASE STUDY

Melbourne's iconic sporting ground is now a pioneer in water re-use, recycling 600 kL 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 (MCG).

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 (MCC) reduce its use of drinking water by 50 per cent.

The MCC 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 3.3.4

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 $2,000 for small and medium businesses with fewer than 50 staff. As noted in Initiative 3.3.1, this expanded scheme will remain in effect until at least June 2015. Annual reviews will inform any changes or extensions to the water rebate program.

Some industries – such as manufacturing, energy generation and minerals processing – are heavy water users. The Victorian Government has been working with the water corporations to assist these industries to find local water solutions. Examples of industry-specific programs being delivered include:

- The Cooling Tower Water Efficiency Program, completed in 2010 was implemented to optimise cooling tower maintenance and operating processes through site assessments, free training and check meters, and an online calculator for tracking against best practice.
- The Non-Residential Laundries Water Efficiency Program which is aimed at assisting laundry operators in improving their water and resource efficiency to best manage their running costs, and educating staff on water efficient practices.
- The National Business Water Efficiency Benchmarking Project, which is a national partnership involving the Victorian Government, to develop a web tool which gathers water use information across a wide range of business sectors to enable businesses to compare their water use to industry averages and identify their own ways to use water in the most efficient manner and therefore save costs.
- The Schools Water Efficiency Program is assisting Victorian schools to monitor water usage for leakage and educational purposes through the provision of data loggers to continuously record water use and access to an interactive web portal so that this information can be utilised as part of the students' school curriculum.

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'. The paper suggests that 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 (FMCG).

Non-residential water users account for approximately 30 per cent of total water demand

Actions

Support Melbourne's businesses to continue the move toward local water use, by continuing 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 corporations, 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 will progressively build a stronger picture of how water is used by industry, including examples of innovative and effective use of local water.

Acknowledge leading and innovative efforts to reduce use, harvest local water, and manage discharge to encourage good practice among high water users through an annual report to Parliament.

Assist businesses to build on the excellent work and existing programs of the water corporations to capture water consumption savings through business analysis systems and to facilitate identification and implementation of local water savings.

Work with the water corporations to support smaller businesses with high water use by developing guidelines and goals for their water use to maximise opportunities for increased water efficiency. This will be done in collaboration with these businesses as many have already identified and implemented water efficiency measures.

Initiative 3.3.5

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

Farmers and other primary producers on Melbourne's 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.

Greater capture of stormwater in the green wedges and on the urban fringe – in areas such as the Yarra Valley, Casey, Mitchell, Bacchus Marsh, Hume, Werribee and the Koo Wee Rup Plain – will help reduce the impact of runoff 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 the 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. Whole-of-water-cycle management, and managing water at the upper reaches of catchments, can reduce water salinity significantly.

Actions

Work with farmers on the urban fringe to ensure a secure water supply, including in low-rainfall periods, through more extensive use of harvested stormwater and treated wastewater where this approach is cost effective.

Support projects demonstrating net benefits that improve the use of local water on farms. Key insights and lessons from these projects will be shared on the **Water Source** site.

Non-Residential Laundries Water Efficiency Program

CASE STUDY

The Non-Residential Laundry Water Efficiency Program was developed after non-residential laundries were identified as a potential sector in which significant further water efficiencies could be achieved.

A $1 million Victorian Government initiative, this program involved 1,070 laundries across metropolitan and regional Victoria, and was managed by Yarra Valley Water in partnership with water corporations across the state.

The program objectives were to reach all Non-Residential Laundry segments in Victoria, reduce drinking water use and increase overall resource efficiency, provide economic and environmental benefits with minimised financial outlay, promote best practice across the industry and deliver water efficiency education for laundry staff. Water use monitoring devices were also offered to help operators understand where and how water was being used in their laundries, along with free steam traps and subsidies to facilitate machine upgrades and water recycling. Additionally, a discounted audit and advisory service was made available to maintain best practice water and energy efficiency process.

While it was not possible to measure the exact amount of water that was saved as a result of the program, a conservative estimate was made of the water savings result from installation of water-saving devices. Additional savings were achieved as a result of changing laundry practices and enhanced awareness, such as washing with fuller loads or better linen sorting resulting in better targeted cycles. In summary, the conservative estimation of water savings was 67,000 kL per year, 600,000 kL over the life of devices, estimated investment: $1.40 per kL saved.

This program was highly successful in engaging water corporations with non-residential laundry operators and learning of their key water use behaviours. The success of the program resulted in further rebates for small laundry operators being made available as part of the Living Victoria Water Rebate Program.

Initiative 3.3.6
Make the water cycle more energy efficient

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. The Victorian Government 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. It is clear from the energy use profile of the water cycle that there are several points at which energy use can be reduced. Improving the efficiency of energy use at all these points will help avoid high-energy uses of our water system, and help to moderate peak annual, seasonal, daily and hourly demands.

The first opportunity for improved energy efficiency is with the end user, as described in Sections 3.2 and 3.3 of this strategy. The second opportunity for energy efficiency in water cycle management relates to the treatment and distribution of water across the whole system. The third opportunity relates to wastewater treatment. These opportunities will be considered in local and regional planning, and in the investment decisions of the Victorian Government and the water corporations.

Actions

Work with end-users to encourage energy-efficient water applications to deliver positive cost benefit outcomes tailored to local solutions.

Maximise the efficiency of the existing water treatment and transportation system by progressively installing energy-efficient infrastructure wherever viable and cost effective.

Investigate greater use of local, small scale and efficient treatment plants to reduce the impact of increasing wastewater system demands on the energy burden.

Collaborate with the Commonwealth Government where there are opportunities to support energy saving and generation initiatives in the water cycle.

Left 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.

Initiative 3.3.7
Review regulatory support for local water use

As Melbourne's households and businesses move towards more diversified local water use, it is critical that our regulatory arrangements keep pace. For this reason, a permanent water saving regime for drinking water has been implemented. This regime outlines a range of measures and restrictions 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 infrastructure or 'purple pipes' in some new residential estates and industrial developments near wastewater treatment plants is already a routine practice in local water planning requirements.

Through a variation to the National Construction Code, the Victorian Government requires the installation of either a solar hot water or rainwater tank in new class one 6-star dwellings. This requirement is an example of where a regulatory adjustment warrants consideration. As this requirement currently 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 corporations' costs are increased because they need to provide sufficient infrastructure for a full water and energy load, even though this may not ultimately be required.

The Victorian Government is preparing a cost-benefit analysis to inform future regulatory options and any regulatory impact statement that consider the net community costs and benefits of implementing new controls to improve the water performance of new buildings.

Feedback from industry and local councils showed strong support for regulatory change, particularly streamlining of regulation, so long as there was not an overall increase in regulations or an increase in the complexity of regulation. In line with normal practice, the Victorian Government will only pursue new regulation if there are significant net social and economic benefits, and the medium-term cost impact on individual water users is neutral or modest. This would be achieved if industry has time to adjust to new efficiency requirements or if the changes result primarily in short-term adjustment costs. Flexibility in compliance and offsetting any increase in up-front costs for consumers by expected savings will also help to achieve this. These principles and parameters will be applied in any regulatory impact statement process.

Actions

Provide more certainty for developers and water corporations regarding the water infrastructure and servicing requirements for new developments through regulatory and non-regulatory options, whichever is most effective.

Work with other state governments to improve the National Water Efficiency Labelling and Standards scheme, to continue increasing the water efficiency of new appliances.

Making the health of business and household water users a central priority in any future water-cycle related regulatory changes (see also the discussion of safety in Initiative 3.4.7).

Initiative 3.3.8
Reform the structure of water bills to reward water efficiency

The Victorian Government has 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 do not currently offer 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.

The actions below will build on the water corporations' own initiatives in areas such as pricing flexibility and metering options while having regard to their commercial viability.

Actions

Monitor progress of trials of alternative pricing arrangements by Yarra Valley Water and South East Water.

Consider further measures to increase flexibility and choice in tariff structures, including investigating changing the structure of water bills to create stronger incentives to manage water efficiently (such as through a higher variable consumption component of bills).

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 better 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 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 future. 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 and be better able to adapt to shocks to the system.

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 approach will be improved by implementing 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 improve our understanding of system behaviour, and to respond to unexpected events and pressures when they do occur.

Where it is efficient and prudent to do so, the strategy will assist in redirecting water sector investment to fund projects that improve the management of the water cycle and increase 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 that could be considered include: stormwater harvesting and treatment, mitigation of stormwater runoff, and wastewater treatment and re-use. To provide greater certainty for water investment, the Victorian Government will establish new arrangements for bulk water supply and clarify Victoria's water rights and trading framework to include alternative water sources such as urban stormwater and wastewater.

Dights Falls weir replacement and fishway project

CASE STUDY

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 16 km 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.

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

Initiative 3.4.1

Support and facilitate investment in projects that enhance water system resilience

Government support and facilitation of whole-of-water cycle projects for rainwater collection, stormwater harvesting and treatment, mitigation of stormwater runoff and wastewater treatment and re-use is essential to the implementation of **Melbourne's Water Future**. To assist in the approval of projects that will deliver the most significant water cycle benefits, the Victorian Government is developing whole-of-water-cycle project assessment guidelines. These will guide consistent investment decisions by ensuring all costs and benefits of projects are taken into account, including not just financial viability but consideration of social and environmental benefits from a whole-of-system perspective.

The guidelines focus on large-scale developments that under 'business as usual' would involve major system upgrades. Ultimately the guidelines will also assist in identifying the most appropriate funding source for whole-of-water-cycle projects. Public funding will be drawn from several sources as appropriate, including the Melbourne's water corporations, other state government agencies, urban flooding funds, the **Living Victoria Fund** and Melbourne Water's Waterways and Drainage Strategy funds.

Co-investment funds will be encouraged where appropriate from local government, the Commonwealth Government, the private and philanthropic sector and community organisations, where whole-of-water-cycle objectives are consistent with the objectives and priorities of these organisations.

Actions

Complete and publicly release whole-of-water cycle project assessment guidelines that will provide additional guidance on investment decisions in line with the Department of Treasury and Finance's investment lifecycle guidelines.

Streamline the approvals process for developments that are consistent with sound water cycle management principles.

Living Victoria Fund projects 2013 and Melbourne's Water Future case studies

FIGURE 4

Living Victoria Fund projects (CBD)

Street greening projects

Living Encyclopaedia

IWCM plan

Fitzroy Gardens

William Angliss raingarden

Case studies (CBD)

Guilfoyle's Volcano

Yarra Park water recycling at MCG

Grant Street Reserve

Non-residential laundries water efficiency program (Melbourne-wide)

Case studies (international)

Chelsea Flower Show

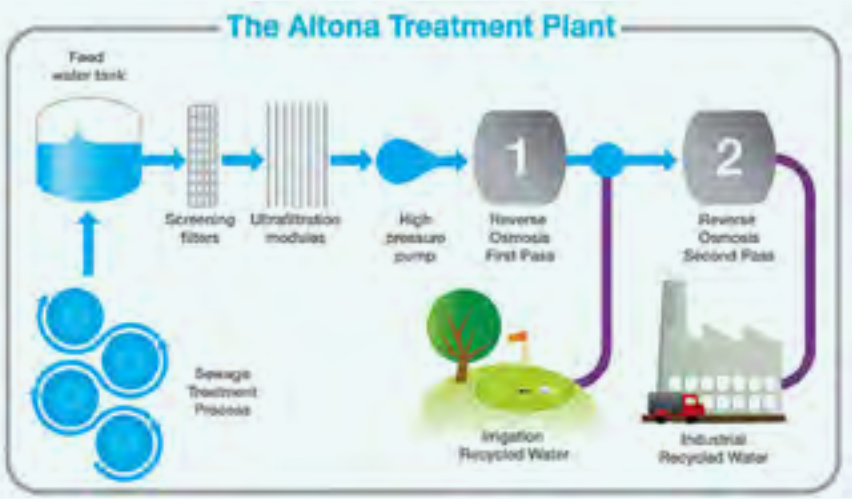
Asia Development Bank Twinning Program

Living Victoria Fund projects

Case studies

Altona Recycled Water Project

FIGURE 5



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.

Initiative 3.4.2

Change the incentives of our water corporations

The incentives and drivers of the water corporations will be reformed, to ensure appropriate consideration of the scarcity value of water, and the benefits of integrated and innovative water cycle management options. This will embed a new approach to water management that recognises the potential benefits of local and innovative solutions and is expected to result in both significant cost savings and improved amenity and wellbeing. This initiative will also support the water corporations' Managing Directors and Boards to consider market approaches as outlined in Initiative 3.6.5.

Actions

Establish new objectives for the water corporations to reflect this strategy and sound water management principles, and ensure operational efficiency.

Investigate amending the regulatory framework to strengthen the water corporations' abilities to consider wider costs and benefits in their business cases. Investigate whether adjustments could be made to improve the evaluation of the benefits of local and innovative solutions.

Initiative 3.4.3
Reform regulatory arrangements for water corporations

Melbourne's Water Future will establish new regulatory arrangements for the water corporations, including for price setting and strategic planning.

The details of the new regulatory arrangements will be developed as part of the current and future reviews of the Water Act, and will address:

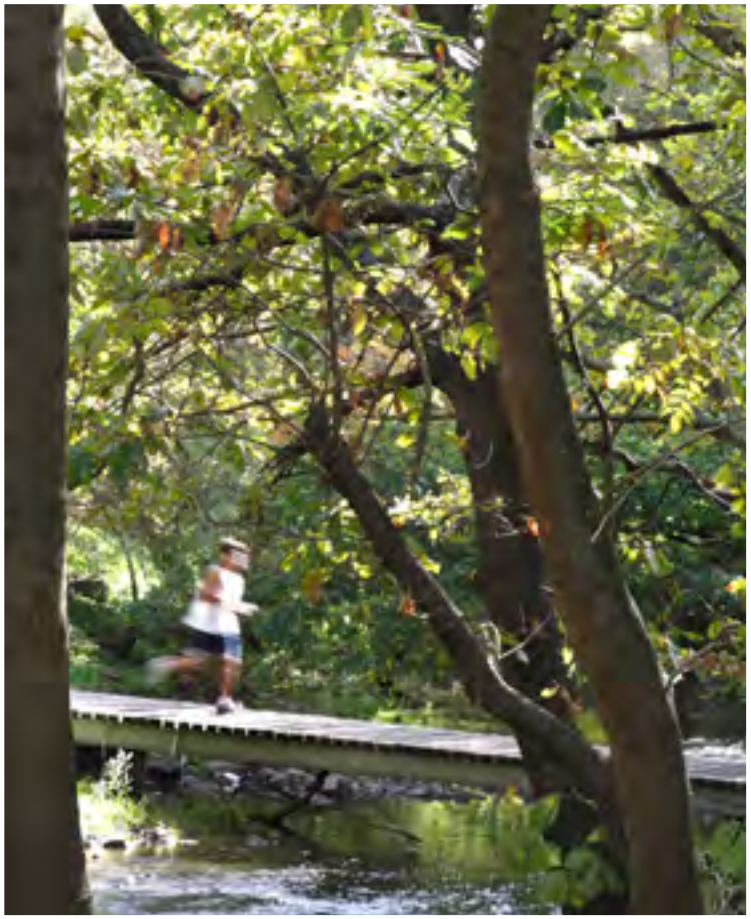
- adopting the principles of whole-of-water cycle management
- reflection of the policies and reforms established by this strategy (including the governance reforms)
- better integrating pricing and investment planning with water cycle planning at the city, regional and local levels, municipal and land-use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

Actions

Require the water corporations to develop business plans and corporate plans that are consistent with this Strategy and that have regard to the regional water cycle plans.

Review the water corporations' corporate plans and other key plans to ensure their alignment with **Melbourne's Water Future**.

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



City of Casey Recreation and Aquatic Centre

CASE STUDY

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 L 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 3.4.4

Increase scrutiny of major investment decisions in the water sector

It is essential that all major government investment decisions in the water sector reflect the new approach to water cycle management. Planning for major investments will consider adherence to the principles in the strategy – including clarity of whole-of-society and whole-of-system costs and benefits.

Action

Increase scrutiny of major water cycle investment decisions, including by adopting a statewide approach to valuing non-financial benefits of the whole-of-water-cycle approach, and applying a cost-effectiveness test to innovative water projects.

Initiative 3.4.5

Embed good water management in public buildings and major projects

Today, even where it could save water and money, efficient water use is often not considered in the development of public buildings and major projects.

Action

Work across the Victorian Government to improve consideration of water efficiency in government-funded major projects, where there are net benefits to do so.

Initiative 3.4.6
Monitor access and use of data

Understanding the performance of our water systems is a fundamental part of identifying opportunities for innovation, behaviour change and application of the new approach to water management.

Actions

Implement a monitoring and data management system for the entire Greater Melbourne water, sewerage and stormwater networks. To ensure consistency, this system will be implemented and managed in partnership with all our water corporations. The 'whole of Melbourne' monitoring and information management systems will also include observations of stormwater runoff volumes and quality.

Provide open, transparent and freely accessible information about the performance of the water cycle systems throughout Greater Melbourne to all stakeholders including the community.

Establish measures that indicate opportunities to reduce waste of drinking water, increase use of rainfall and stormwater, increase wastewater recycling, and reduce wasteful energy use in the water cycle.

Establish, publish and annually review benchmarks for efficient use of drinking water.

Initiative 3.4.7
Improve the safety and resilience of our water systems

The water sector needs to be ready to respond appropriately and quickly to risks and unexpected events such as security risks, engineering risks, natural hazards and ash contamination from bushfires. The 2012 Emergency Management White Paper provides an all hazards/all agencies approach for managing emergency risk.

The Victorian Government is committed to ensuring public health is not compromised by water cycle risks, 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'.

Actions

Continue to improve the emergency readiness of our water systems by adopting the reforms contained in the Victorian Government's 2012 Emergency Management White Paper.

Progress the work around the safe use of wastewater, greywater, stormwater and bio solids, consistent with the Victorian 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 resource allocation 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.

Any changes to the water 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 Victorian Government's commitment to retaining public ownership of the water corporations.

Action

Clarify Victoria's water rights and trading framework to include alternative water sources. This will provide greater certainty for water investment within the context of ongoing public ownership of our water corporations. 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 will support this. This approach will promote the involvement of new participants in the water sector.

Melbourne has 52,343 km of water and sewerage pipes, enough to encircle the entire globe

Watsons Creek

CASE STUDY

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.

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. 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 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. 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 corporations will be empowered to individually manage the balance between their customers' demand and the available supply, while being accountable for meeting performance requirements regarding security of supply. 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. This approach will provide greater incentive for water efficiency across the network and may lead to downward pressure on water prices for consumers.

Actions

Under new transparent metropolitan bulk water arrangements, entitlements for Melbourne's catchment will be disaggregated and could become tradeable between water authorities as a first step towards a transparent and functional water market. A bulk water resource cost could also be introduced.

Work with Melbourne Water to establish consequential institutional arrangements, including where necessary 'ring fencing' Melbourne Water's internal functions that relate to bulk water delivery and system planning to facilitate a new approach to bulk water.

Consider the costs and benefits of 'unbundling' 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.

Actions

Complete a stocktake of regulatory and administrative barriers to the adoption of a better approach to water cycle management.

Engage with the water corporations, Red Tape Commissioner, the Essential Services Commission, Victorian Competition and Efficiency Commission and the Environment Protection Authority to address the regulatory barriers identified in the stocktake.

Review, update and publish existing information on Melbourne's aquifer locations. The Southern Rural Water Groundwater Atlas for the Port Phillip and Westernport region is due for completion in August 2014.

Engage with the water corporations to review regulatory arrangements for 'purple pipes' for recycled water in new developments.

Disseminate new protocols and guidelines for whole-of-water-cycle management via the **Water Source** site.

Continue to use 'big data' computing and systems modelling approaches to model the urban water cycle over time.

Make the models, and the modelling results, accessible and available.

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, the Victorian Government 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.

Action

Establish a whole-of-water-cycle design competition.

3.5

Improved waterways and bays

The health of Melbourne's waterways and bays, and the biodiversity and eco-systems that rely on them, is crucial to our liveability and environment. 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. 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
- cultural services – educational, aesthetic, cultural heritage, recreation and tourism values

Currently, around 30 per cent of the Port Phillip and Westernport catchment, which includes Melbourne, is urban, but this proportion is rapidly increasing with population growth and the resulting urban development. The challenges posed by increasing urbanisation include a significant threat to the environmental condition of waterways. The condition of our waterways is primarily a consequence of the quantity, velocity and quality of urban stormwater runoff, and the discharge of wastewater. 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 a whole-of-water-cycle approach not only improves our water security and usage, it also improves the health of our waterways and bays. The more effectively that stormwater and wastewater are managed, the cleaner and healthier our waterways will be.

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 to an approach that produces multiple social, economic and environmental benefits for the city throughout the catchment.

The Victorian Government has begun this process with A Cleaner Yarra River and Port Phillip Bay – A Plan of Action. Melbourne's Water Future builds upon this work. Key areas of focus for Melbourne's Water Future include value-based planning and management; investment and risk analysis frameworks; rights, allocations and use of alternative water sources; multi-scale whole-of-water-cycle management and planning; best practice land management; and data and knowledge sharing.

Initiative 3.5.1
Engage the community on waterway health

Community-based groups are already working to protect and enhance the environmental health and amenity of local waterways and are a critical local resource in engaging the broader community and implementing **Melbourne's Water Future**. This will include better engagement with the community around reducing environmental harm, and building a greater understanding of the links between domestic and business water use and behaviours, and the health of our waterways and bays.

Actions

Partner with the community and industry to develop an education program about the importance of reducing nutrient-rich and other stormwater runoff 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.

Provide support and assistance for 'Friends' groups that take practical on-ground action to improve water cycle management.

Provide specialist and technical advice and assistance through a variety of means including the on-line **Water Source** site to enable sharing of information within and between local groups and the wider community.

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. In addition, the Metro Framework (initiative 3.2.1) will provide guidance for regional and local planning for stormwater management including meeting environmental standards for the reduction of stormwater impacts and nutrient pollution.

Actions

Work with industry to streamline the many standards and guidance notes for stormwater quality.

Work with the Environment Protection Authority, water corporations and local councils to update and implement new stormwater standards, which will be cognisant of the Engineers' Australia review of the national guideline 'Australian Runoff Quality' to take into account the most recent scientific knowledge and policy thinking about stormwater management.

Build upon the existing work of local councils to investigate ways to maintain waterways health in the upper reaches of our catchments to reduce the need for remediation lower down the catchments.

Work with local councils and the development industry to extend stormwater management planning, as appropriate.

Melbourne Water invests around $65 million each year to protect and improve the health of our rivers, estuaries and wetlands

Above Improving the health of Melbourne's rivers, creeks and waterways is a primary focus of **Melbourne's Water Future**.

Initiative 3.5.3
Improve funding allocation for stormwater management

The Victorian Government already invests in the health and resilience of our waterways through Melbourne Water's Waterways and Drainage Strategy (formerly known as the Waterways Operating Charter), which allocated funds collected from a levy on water bills.

A large proportion of these funds are allocated to a narrow range of programs. Wider adoption of market-based approaches (such as auctions) to make the allocation of funds more efficient, transparent and competitive, with a wider range of proponents and solutions, will allow us to achieve outcomes at better value for money, leverage other resources and widen participation. These approaches have been successfully used in the Victorian Government's BushTender and EcoTender initiatives, and build on the small trial of market-based allocation used in the Little Stringybark Creek project.

The use of market-based tools provides the opportunity for more efficient use of public resources, and is consistent with the government policy of using economic instruments to better inform decision-making. The proposed approach will encourage organisations, individuals, local councils and industry to develop projects and 'bid' for program funding. Funding decisions will be based on the most efficient means of achieving outcomes, as defined by an agreed benefits index.

Action

Rebalance the Waterways and Drainage Strategy to make it more outcomes-focused by introducing greater use of market-based tools to inform improved allocation of funding.

Initiative 3.5.4
Make better use of treated wastewater

Wastewater treated to a high standard could be used for various purposes, rather than be discharged into the sea. This Strategy proposes a partnership between the Victorian Government, Melbourne Water and local government to promote the use of this important resource where this is cost effective, including productive use of water, energy, nutrients and biosolids.

Action

Collaborate with key stakeholders to investigate and promote the cost-effective use of treated wastewater.

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

Actions

Continue to develop evidence-based, economically efficient and environmentally sustainable approaches to timber harvesting in Melbourne's water catchments, consistent with the Timber Industry Action Plan.

Ensure the provision of a more holistic plan for the health of Melbourne's waterways as part of the regional and local water cycle planning proposed in this Strategy. 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

Changing the management of stormwater is essential in protecting the health of Melbourne's waterways and bays. Urban development has a significant detrimental impact on stormwater quality and quantity. The new approach to stormwater management will improve the quality of water flowing in our waterways and manage the physical impact of increased stormwater flows. Informed and transparent decision-making and practice in stormwater management requires clear information about the impacts of runoff and the composition of pollutants, chemicals, sediment and other litter in that runoff. This initiative will build upon the current information gathering and monitoring activities of the Environment Protection Authority, local government, Parks Victoria and other organisations.

Action

Monitor and publish information about the composition and impacts of runoff.

Publish changes to existing strategies and programs designed to take best advantage of approaches that are proven to work.

Protecting Little Stringybark Creek and Dobsons Creek

CASE STUDY

Protecting Little Stringybark Creek was a research project initiated by Melbourne Water in collaboration with the University of Melbourne, Monash University and Yarra Ranges Council that was aimed at retaining excess stormwater on site instead of discharging it directly into the creek to maintain the ecological health of Little Stringybark Creek.

The research took place using data from over a ten year period and produced a series of valuable lessons that are now being applied as part of a pilot project further down the catchment area in Dobsons Creek.

Dobsons Creek is a small sub-catchment in Dandenong Creek catchment, and a tributary to Dandenong Creek, that flows into Liverpool Road Retarding Basin. Its middle to upper reaches are recognised as being in good to excellent environmental condition supporting platypus, significant regional fish species and pockets of excellent vegetation.

Modelled from the Little Stringybark Creek project, Melbourne Water, Knox City Council and South East Water have been working in partnership to reduce urban runoff in the Dobsons Creek catchment using precinct, streetscape and residential lot scale water sensitive urban design solutions such as installing rainwater tanks in homes near Dobsons Creek.

Current works in the catchment are designed to disconnect enough of the traditional stormwater network to capture and reduce frequent flow events reaching the creek. This will address the degrading impacts associated with runoff from hard surfaces and help restore the catchment hydrology towards a pre-development state.

One precinct-scale and two streetscape water sensitive urban design packages designed to deliver multiple community outcomes have been completed. All projects deliver on commitments in Council's stormwater strategy and have resulted in staff capacity building.

Image courtesy of Clearwater.

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 have enabled fresh insight into the complex, spatial and temporal challenges of our water cycle. Governance structures and capital investment decision making processes and incentives have been identified as key areas for review in order to improve the operation and efficiency of the system.

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

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.

In addition, the legal framework within which water corporations currently operate limits their ability to implement the best solution for the whole community. 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.

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.

Initiative 3.6.1

Increase transparency about water sector costs and performance

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.

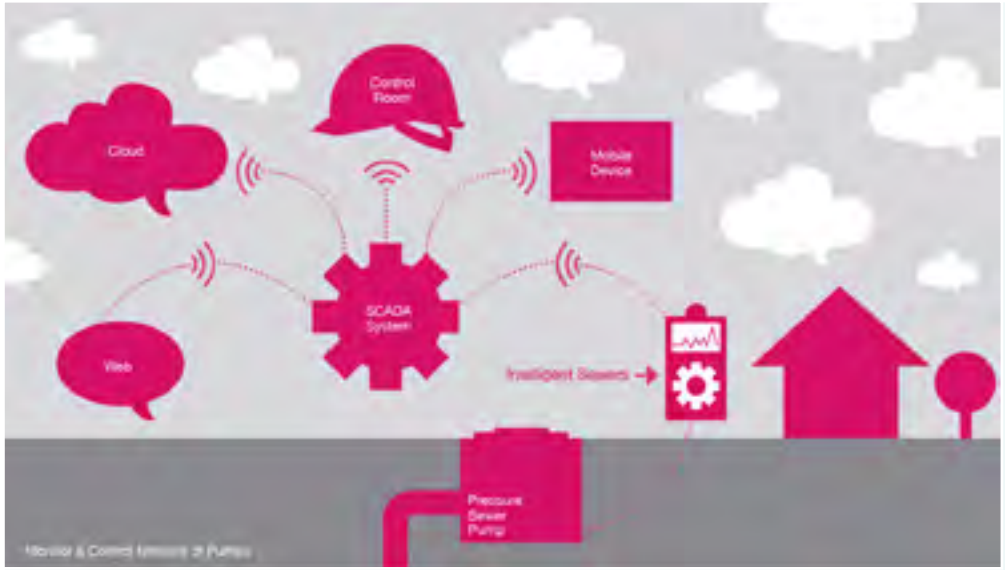
Actions

Make water system costs more transparent and increase disclosure of other data and information that is relevant to the performance of our water service systems.

Develop a detailed map of cross-agency responsibilities and expenditure on the water cycle in Melbourne. This will inform decisions about how the use of water sector funds can be optimised, and help identify anomalies and improvements.

South East Water creates intelligent water and sewerage networks

CASE STUDY



The water and sewerage network is 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 during heavy rain events. As a consequence, sewerage networks remain significantly under capacity for the majority of their service life.

To optimise the system, South East Water has developed Intelligent Sewers, a remote control and real-time monitoring system that has been 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 sewerage network. Intelligent water cycle networks can also achieve infrastructure and operating savings of tens of millions of dollars and have 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 Intelligent Sewers technology is also linked to the Bureau of Meteorology data to allow proactive operation of the system in the event of storms – maximising the available storage in the network 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.

South East Water has now applied the smarts behind this technology to the management of the water system as well – with the creation of **Talking Tanks** technology. The technology helps manage 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 **Talking Tanks** 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.

Diagram courtesy of South East Water.

St Albans Main Integration of centralised and decentralised systems CASE STUDY

Water demand from Wyndham in Melbourne's west, one of the fastest growing areas in Australia, is forecast to increase significantly over the next 25 years requiring construction of a new main to service growth. Melbourne Water has worked collaboratively with City West Water to understand this demand and identify other ways it can be met.

An analysis of the benefits of whole-of-water-cycle management and the impacts of changing growth rates and peak demands was undertaken resulting in the proposal of a 'third–pipe' use of recycled water for non-drinking demands within households creating reductions in peak drinking water demand. This allows City West Water to reduce the diameter of the new mains pipeline which means construction will now cost millions less due to savings identified through a customer focused service delivery approach and whole-of-water-cycle management, with Stage Two of the St Albans to Werribee pipeline project saving $12 million.

This work has highlighted that the use of alternative water sources for non-drinking water purposes in new growth area developments, can contribute to network capacity efficiencies reducing costs and conserving our precious drinking water resources.

Photo courtesy of Melbourne Water.

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.

Actions

Consider 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.

Provide practical assistance to industry participants seeking to apply improved approaches to investment and asset management. This will include working with water industry professionals, urban planners, master plumbers and builders on how to translate innovative water cycle management approaches into practice.

Require regional and local water cycle plans to consider, where appropriate, opportunities for cost effective means of using existing assets more effectively.

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 through improved infrastructure design will significantly improve the performance of both water cycle systems.

Action

Guide and inform the development of new infrastructure guidelines that are aligned with this strategy and underpinned by the latest knowledge, understanding and integrated systems processes for water cycle management. Ideally, these Victorian guidelines will ultimately be reflected in the national Water Services Association Australia guidelines for the design of infrastructure. The Victorian Government will pursue this 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 in 2010 is estimated to have resulted in water losses of 40,754 ML, at a value of approximately $74 million per year. In addition, septic tank leakages are a serious source of pollution in our waterways and require households to ensure the integrity of their systems.

Victorian water corporations are leaders in asset management, and will continue to strive for ongoing improvements. Currently, asset replacement is based on factors such as 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 from 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, Melbourne's Water Future 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.

Actions

Address leaks and other problems in our water networks as a priority. This will be informed by a better understanding of the extent of leaks across our water systems.

Improve arrangements for maintaining the integrity of households' septic tank systems.

Support a comprehensive analysis about leak detection, asset maintenance and asset management that includes the types of pipes in use; the causes of leaks and flows between stormwater and wastewater infrastructure; the profile and probability of unplanned maintenance; and other key data, drawn from all metropolitan water corporations as well as local councils, VicRoads and the Environment Protection Authority.

Approximately 11 per cent of reticulated drinking water is lost through pipe leakages

Initiative 3.6.5

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

Victorians want their publicly owned water corporations to vigorously pursue cost reductions and efficiency improvements. In the interests of a leaner, more commercial approach to managing the water corporations, the Victorian Government has begun building stronger, more skills-based and commercial boards for the corporations. The **Melbourne's Water Future** strategy will build on this initiative, and expand its scope to include other actions to improve the commerciality of the corporations, and their efforts to achieve greater efficiency.

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, the Government will allow 'out of area' competition between the water retailers for the provision of services to major new greenfield and brownfield developments. The arrangements for out-of-area competition will include rules and parameters governing the mode of competition. Allowing competition among corporations for services to new greenfield and brownfield developments will also contribute to potential 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.

Melbourne's Water Future will use market instruments in various other ways, including in the allocation of co-investment funds and the procurement of water sector services. To ensure that consideration of market approaches becomes routine in the water sector, this will be reflected in Ministerial directions and the Statement of Obligations. A requirement to consider market approaches in the performance contracts and agreements of senior water authority personnel will be encouraged.

Actions

Pursue opportunities to increase efficiency through outsourcing, shared services (e.g. for procurement, back office functions and information and communication technology), streamlined registration and accreditation processes and the use of commercial and market-based approaches in the water corporations, consistent with the Victorian Government's economic strategy **Securing Victoria's Economy**.

Benchmark the efficiency of our water corporations against each other and with other jurisdictions.

Pilot 'out of area' competition between the publicly owned water corporations for the provision of water cycle services in major new developments.

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 development and operation of water assets.

Water corporations can benefit from better use of the available data on the water cycle. This data can 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 management data (such as demand trends) can be more widely shared across the water sector.

Action

Work with the water corporations' Boards to investigate the inclusion of information sharing as part of the contracts and performance plans of senior water sector staff.

Investigate the use of the new 'crowd sourcing' technologies to identify solutions to complex problems.

Initiative 3.6.7
Simplify and streamline regulation

The regulatory frameworks governing Melbourne's water cycle services are overly complex and increasingly outmoded.

The Victorian Government is re-writing the Water Act to make it simpler and up to date, and is reviewing the State Planning Policy Framework to consider ways to streamline the planning provisions that apply to water. Melbourne's Water Future will provide the foundation to ensure that the Water Act and the State Planning Policy Framework reflect modern water cycle management principles, and allow transformational change of the urban water sector. Feedback through the submissions process reinforced the importance of minimising red tape in the water sector and ensuring that the regulatory frameworks are complementary to the other regulations and legislation under which the water sector operates.

Actions

Engage with the Red Tape Commissioner to include cutting water sector red tape on his agenda to further simplify and streamline the regulatory framework, better align it with this strategy, and increase scope for competition and market-based approaches.

Identify priority areas for regulatory reform in collaboration with the water corporations, the Essential Services Commission and the Victorian Competition and Efficiency Commission.

Work with all relevant agencies to streamline environmental regulation of our urban water corporations.

3.7 Accelerated innovation and world recognition of expertise

This strategy places Melbourne at the forefront of research, knowledge and global best practice in whole-of-water-cycle management.

Melbourne's 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 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. Case studies and examples provided during the consultation phase by local councils, industry bodies and research institutions further demonstrated the wide range of knowledge and the level of expertise and innovation that already exists in the Victorian water sector.

Victoria has internationally recognised research capacity in water, including the Cooperative Research Centre for Water Sensitive Cities, the Department of Environment and Primary Industries, the Office of Living Victoria, water corporations, 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 in response to the challenges of the recent extended drought. Importantly, many of these 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 to supply services and expertise to other urban water corporations seeking new ways to respond to the challenge of urban water cycle management in the twenty first century.

Initiative 3.7.1
Establish Melbourne as a global leader in water cycle management

Victoria's capacity in research, education and technology relating to whole-of-water-cycle management is extensive and provides a solid foundation to build upon. 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. The Victorian Government intends to expand upon this in a variety of areas.

The Victorian Government and other relevant corporations and institutions 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.

Actions

Continue to support the Cooperative Research Centre for Water Sensitive Cities to deliver leading edge whole-of-water-cycle performance in Victoria, while simultaneously building partnerships with other national research and innovation organisations.

Continue to build world-class expertise and knowledge about efficient energy use in water systems; leveraging resources from and in collaboration with the Commonwealth.

Plan and encourage the commercialisation of Victoria's water cycle management knowledge and expertise.

Asia Development Bank Twinning Program

CASE STUDY

City West Water (CWW) is a founding member of the Asia Development Bank's (ADB) twinning program. Since mid 2008, CWW has undertaken six projects with water utilities located in North Asia and South East Asia. Through this program, CWW has built strong relationships with utilities and industry partners throughout Asia, and in particular in China.

This peer-to-peer program pairs a mentoring utility with a recipient utility of common characteristics. A project is selected and scoped during a diagnostic visit. This is then followed by around four visits over about two years by the mentoring twin (CWW) to oversee the conduct of the project. Additionally, the recipient twin (the Asian utility) spends one week with CWW to experience first-hand the operation of an Australian water utility.

Examples of projects in China include:

- twinning with Zheng Zhou Water Corporation in China to development an asset management system enabling ZZ Water to better target its pipeline renewal program and improve the management of its asset risk
- twinning with Baotou Water Corporation on various asset management activities including the development of a hydraulic model and reduction in non-revenue water
- working with the Beijing Waterworks Group (the city's water supply authority) to develop a non-revenue water action plan

Examples of projects in South East Asia include:

- partnering with the Cebu water authority in the Philippines to reduce non-revenue water and improve hydraulic modelling and asset management
- assisting the Edu Ranu water authority for Port Moresby in New Guinea to upgrade its water testing laboratory
- CWW is also partnering with EPA Victoria on a World Bank project to improve the waterway health of the Ganges River in India

The business improvements experienced by the recipient twin can be substantial, while CWW has found that this program is an excellent way to develop staff, broaden CWW's outlook and develop strong relationships with other utilities, particularly in China.

Left Sophie Wang, Chinese speaking City West Water engineer, inspecting water assets on the diagnostic visit to Bautou, Inner Mongolia. Photo courtesy of City West Water.

A resilient, adaptable and flexible water system is a prerequisite for a liveable city

Initiative 3.7.2
Establish an online 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. Facilitation of these ideas and potential projects is a key part of **Melbourne's Water Future**.

People and organisations will be encouraged to use an online investment portal to post project ideas which 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 Victorian Government funding, such as the **Living Victoria Fund**, will be able to use the portal to identify potential sources of co-investment.

Action

Develop an online portal on the **Water Source** site where people and organisations can post project ideas to advance water cycle management.

Initiative 3.7.3
Promote our expertise to the world

The Victorian Government will continue to include urban water management knowledge and expertise as a key component of trade missions to strategic markets overseas to promote information sharing with other jurisdictions and attract experts and students in the area. As the sector develops, targeted trade missions and other export promotion strategies will be implemented to promote Melbourne as a leading centre of knowledge and innovation for urban water cycle management.

Action

Include water cycle innovation and industry development in the Victorian Government's international export promotion and market development activities, including the trade missions program.

Initiative 3.7.4
Enhance research and policy capacity

Continual development of Victoria's water management research and policy capacity is integral to the ongoing improvement and innovation of the water sector. New ideas and approaches will ensure that whole-of-water-cycle management in Victoria continues to utilise new technologies and tools and improved research will allow better planning and investment decisions to be made. Local government and industry indicated during consultation that increasing research and policy capacity needs to be a priority across the water sector, to ensure that the changes and initiatives outlined in **Melbourne's Water Future** can be implemented by a skilled and knowledgeable workforce.

Actions

Develop and make available a range of research and modelling tools to support water cycle management practice and planning. This will include the development of a detailed research and innovation roadmap for the Victorian water industry, and a comprehensive review of water cycle design goals.

Provide additional support for the sector including demand forecasting tools and building a virtual knowledge base, including international expertise on emerging water management technologies.

Facilitate collaboration with national and international research institutions to reduce duplication and value-add to existing research.

Initiative 3.7.5

Reorient water sector research funding

Since its establishment in 2002, the Smart Water Fund has spent $30 million, funding 197 projects for research into water quality, water efficiency, resource recovery, climate change and water smart cities.

Following a review of the state's investment in water sector research, knowledge and innovation, the Victorian Government recognises a need to refocus and better target research investment. This will maximise our return and ensure its research supports the objectives of **Melbourne's Water Future**.

Actions

Smart Water Fund contributing parties will work together to take a new approach to funding collaborative research in the sector to ensure alignment with **Melbourne's Water Future**.

Chelsea Flower Show

CASE STUDY

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 HM The Queen. **Photo** 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. The water sector has been gradually building the knowledge, skills and capabilities necessary to successfully design, implement and run whole-of-water-cycle systems. Whole-of-water-cycle management requires a set of new and different capabilities – such as for analysing systems from a whole-of-water-cycle perspective; designing swales and laying purple pipes for recycled water. These capabilities span technical fields (for technicians and trade workers including plumbers), community interface fields (such as sales representatives or liaison personnel), analytical skills (consultants), 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. As part of the Industry Participation Model, introduced by the Victorian Government on 1 July 2012, Industry Skills Portfolio Teams were formed to consult directly with industry groups and employers. These teams gather and share detailed information, data and research about skills and training. Work has commenced with stakeholders to discuss issues and opportunities targeted to the water sector.

The 2011–12 State of the Water Sector survey indicated that only 60 per cent 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 Victoria' 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.

Succession planning is another important consideration for the water sector, whose workforce has a relatively high median age. Identification and support of the ongoing education of young leaders is essential 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 Victorian Government will support and promote industry scholarship programs for young leaders in whole-of-water-cycle management.

Actions

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.

Work with businesses in the water sector and other related sectors such as urban planning to identify skills gaps and coordinate appropriate training.

Address current limitations in the availability of training opportunities for water sector employees.

Connect businesses that are facing similar issues, and link them with potential providers and sources of capability development.

Support organisations and programs that provide training and build capability in ways that advance the **Melbourne's Water Future** strategy.

Identify opportunities for whole-of-water-cycle skills and capabilities to be reflected in certification standards.

Implementation plan

4

		Short term 1–3 years	Medium term 4–10 years	Long term 10–40 years	C'wealth Government	State Government	Local Government	Water corporations	Industry associations	Research institutions
3.1	**A community engaged in whole-of-water-cycle management**									
3.1.1	Ensure meaningful community involvement in water cycle planning					•	•	•	•	
3.1.2	Improve transparency and information provision					•	•	•	•	•
3.1.3	Improve disclosure of the water performance of homes for sale and rent					•			•	
3.1.4	Partner with communities				•	•	•	•	•	•
3.1.5	Support community activities and projects				•	•	•	•	•	
3.2	**Suburbs – old and new – designed with water in mind**									
3.2.1	Plan to use local water locally – metropolitan and regional water cycle planning					•	•	•	•	
3.2.2	Plan to use local water locally – local water cycle planning					•	•	•	•	
3.2.3	Incorporate whole-of-water-cycle management into growth area planning and urban renewal precincts					•	•	•	•	
3.2.4	Green our suburbs				•	•	•	•	•	
3.2.5	Improve stormwater management in new developments					•	•	•	•	
3.2.6	Reduce urban flooding				•	•	•	•	•	
3.2.7	Influence design guidelines for stormwater quality and flooding					•	•	•	•	•
3.2.8	Support opportunities to link local water, energy and waste cycles				•	•	•	•	•	•
3.3	**Sensible use of water in our homes and businesses**									
3.3.1	Encourage households to use local water sources					•	•	•		
3.3.2	Facilitate the use of local water in public buildings				•	•	•	•		
3.3.3	Establish world-class water use for Melbourne's sporting grounds				•	•	•	•		
3.3.4	Work with businesses to adopt cost-effective local water options					•	•	•	•	
3.3.5	Increase peri-urban farms' use of non-drinking water					•	•	•	•	•
3.3.6	Make the water cycle more energy efficient				•	•	•	•	•	
3.3.7	Review regulatory support for local water use				•	•	•	•	•	
3.3.8	Reform the structure of water bills to reward water efficiency					•		•		

Project development Implementation Ongoing

		C'wealth Government	State Government	Local Government	Water corporations	Industry associations	Research institutions
3.4	**Resilient water systems**						
3.4.1	Support and facilitate investment in projects that enhance water system resilience	•	•	•	•	•	
3.4.2	Change the incentives of our water corporations		•	•	•		
3.4.3	Reform regulatory arrangements for water corporations		•		•		
3.4.4	Increase scrutiny of major investment decisions in the water sector		•		•		
3.4.5	Embed good water management in public buildings and major projects	•	•	•	•	•	
3.4.6	Monitor access and use of data	•	•	•	•		•
3.4.7	Improve the safety and resilience of our water systems	•	•	•	•		
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	•	•	•	•	•	
3.5	**Improved waterways and bays**						
3.5.1	Engage the community on waterway health	•	•	•	•	•	•
3.5.2	Reduce adverse impacts of stormwater on our waterways	•	•	•	•	•	
3.5.3	Improve funding allocation for stormwater management		•	•	•		
3.5.4	Make better use of treated wastewater	•	•	•	•		•
3.5.5	Protect our catchments and plan for the long term management of our waterways	•	•	•	•		
3.5.6	Measure, monitor and publish the level and composition of stormwater runoff		•	•	•		•

Project development Implementation Ongoing

		Short term 1–3 years	Medium term 4–10 years	Long term 10–40 years	C'wealth Government	State Government	Local Government	Water corporations	Industry associations	Research institutions
3.6	**Reduced inefficiency and waste**									
3.6.1	Increase transparency about water sector costs and performance				•	•	•	•		
3.6.2	Better allocate water sector investment				•	•	•	•	•	
3.6.3	Develop new design guidelines for water and sewerage infrastructure				•	•	•	•	•	
3.6.4	Improve leak detection, asset management and maintenance					•	•	•	•	
3.6.5	Ensure our water authorities are focused on driving productivity and lower cost delivery for corporations					•		•		
3.6.6	Enhance collaboration and sharing of research and data				•	•	•	•	•	•
3.6.7	Simplify and streamline regulation				•	•	•	•	•	
3.7	**Accelerated innovation and world recognition of expertise**									
3.7.1	Establish Melbourne as a global leader in water cycle management				•	•	•	•	•	•
3.7.2	Establish an online portal for innovative water cycle management					•	•	•	•	•
3.7.3	Promote our expertise to the world				•	•		•	•	•
3.7.4	Enhance research and policy capacity				•	•	•	•	•	•
3.7.5	Re-orient the Smart Water Fund					•		•		
3.7.6	Further build skills and capability in the water sector				•	•	•	•	•	•

Glossary

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

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)

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.

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 equivalent to a billion litres. This equates to approximately 400 Olympic sized swimming pools.

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.

kL (kilolitre) This is equivalent to 1000 litres, 1 metric tonne or 1 cubic metre.

Liveability A measure of a city's residents' quality of life, used to benchmark cities around the world. Includes socio-economic, environmental, transport and recreational measures.

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

Living Victoria Fund Established by the Victorian Government to fund whole-of-water-cycle innovation.

Metropolitan Melbourne The area within the outer limits of the 31 municipalities that make up metropolitan Melbourne, plus an extended section of Mitchell shire within the Urban Growth Boundary.

Metropolitan Planning Authority Victorian authority responsible for planning and delivery of urban expansion in Melbourne.

Open Space Includes land reserved for natural landscape, parklands, recreation and active sports, as well as waterways and bays.

Peri-urban areas The hinterland beyond the metropolitan urban boundary.

Precinct Structure Plans detailed plans created prior to development that identify alignments of transport routes, town centre locations, open space, densities of residential areas, and areas for industry and employment. These plans assist in identification of state and local infrastructure needs and development contributions.

Rainwater Water that is captured from a roof and collected in a rainwater tank.

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

Statement of Obligations Specifies how a water corporation must perform its functions and exercise its powers in relation to a range of matters including governance, quality and performance standards, community service obligations and customer and community consultation.

Stormwater Water that runs off hard surfaces such as roofs, roads and footpaths. This water is channelled through drains and typically flows into rivers, creeks and bays.

Urbanisation The physical growth of urban areas, often known as urban development.

Urban renewal Improvement or rehabilitation of urban areas. Traditionally involved demolishing old or run-down buildings on brownfield sites in inner-city areas to build new residential or commercial developments or large-scale public works. Can also build on an area's existing strengths to make better use of underutilised land located close to jobs, services and transport.

Urban water cycle Includes water supply, wastewater/sanitation, stormwater, river, creek and storm management, and management of parks, streetscapes, trees and open space.

Victoria Planning Provisions A comprehensive set of standard planning provisions that provides a standard format for all Victorian planning schemes. It provides the framework, standard provisions and State Planning Policy Framework.

Water Act The Water Act 1989 provides the legal framework for water management and use across Victoria, including issuing and allocating water entitlements and provision of water services by state-owned water corporations and catchment management authorities.

Water cycle services Includes water supply, stormwater management, sewerage management, protection and enhancement of waterways.

Water efficiency Any measure that reduces 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 is an individualised water efficiency program for high water use businesses.

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

Water Industry Regulatory Order Provides Government's instructions to the Essential Services Commission (ESC) regarding what water services for which it must regulate prices and how it must do so.

Water Sensitive Urban Design (WSUD) Manages the impacts of stormwater from development by integrating water cycle management into urban planning and design.

Whole-of-water-cycle management Captures the idea that all parts of the water cycle and all parts of the community are intrinsically interconnected.

More rain falls on Melbourne than we use from our dams

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