

WATER FOR VICTORIA

DISCUSSION PAPER

VICTORIA

State
Government





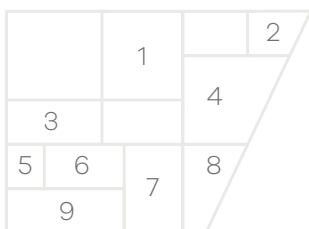
Water for Victoria Managing water together

Water is fundamental to our communities. We will manage water to support a healthy environment, a prosperous economy and thriving communities, now and into the future.

Aboriginal acknowledgement

The Victorian Government proudly acknowledges Victoria's Aboriginal community and their rich culture and pays respect to their Elders past and present.

We acknowledge Aboriginal people as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely. We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.



Throughout this document the term 'Aboriginal' is used to refer to both Aboriginal and Torres Strait Islander people. Use of the term 'Indigenous' is retained in the name and reference to programs, initiatives and publication titles, and unless noted otherwise, is inclusive of both Aboriginal and Torres Strait Islander people.

Previous pages images courtesy, 1 North East Catchment Management Authority; 2 and 3 Mallee Catchment Management Authority; 4 South East Water; 5 Museums Victoria; 6, 8 and 9 Melbourne Water; 7 Western Water

The Premier of Victoria

The Minister for Environment, Climate Change and Water



Over the past twelve months, we have travelled across Victoria to hear from local communities about water. The message was loud and clear – water is critical – and in the face of climate change, population growth and increasing demand we need a plan.

Thankfully, we aren't starting from scratch. The establishment of the Victorian Environmental Water Holder has given the environment a voice. We've also strongly invested in our water grid, our catchment management authorities and our water corporations. Work to support farmers adapting to reduced water availability is already underway. Same too with modernising irrigation and improving transparency in the water market.

But there is more to do. We need to ensure that farmers can be confident they have the information they need to make the best decisions in a drying climate. That those in our cities have the water security, so critical to liveability, they need. And that the use of water is at the forefront of our planning and decision-making.

That's why the Andrews Government has begun work to develop a new water plan. We understand the need to balance agricultural, industry, recreational and environmental needs, in order to get the most out of this precious resource. And we know that the only way we can achieve this is if we are listening to our communities and the water sector.

This discussion paper, *Water for Victoria*, begins that conversation. It also contains many firsts. Traditional Owners will have a seat at the table in a comprehensive Victorian water policy for the first time ever. It's an important step and recognises the sacred relationship Aboriginal people have with water. It also recognises that we need as many voices and views as we can in shaping our plan for the decades to come.

And so, we encourage you to contribute to the conversation, make a submission or be part of our community consultation. If we are to build on the work already done, ensure a healthy environment and a strong economy, we need a water plan that meets the needs of communities across the state, now and into the future.

We look forward to working with you as we build that future.

A handwritten signature in blue ink, appearing to read 'Daniel Andrews'.

The Hon. Daniel Andrews MP

A handwritten signature in blue ink, appearing to read 'Lisa Neville'.

The Hon. Lisa Neville MP



How to get involved

This discussion paper for public consultation has been developed with input from key stakeholders across the water sector, including water corporations, catchment management authorities, the environmental water holder, local government, Traditional Owners, farming groups, environmental groups and recreational groups.

The government is now seeking broader community input and feedback to inform the final water plan. Your views and ideas are important for achieving our vision for water. The government welcomes and encourages the involvement of all Victorians in helping to shape the strategic directions for water management in Victoria for decades to come. The discussion paper will be open for public consultation until Friday 29 April 2016, with a final water plan released in mid-2016.

There are several different ways for the community and stakeholders to get involved.

Submissions will be made public unless confidentiality is requested. Submissions that are defamatory or offensive will not be published.

Attend a regional stakeholder or community forum

Join the discussion with the
Department of Environment, Land, Water and Planning

Make a submission

Submissions close Friday 29 April 2016

Image courtesy Melbourne Water

**Have
your
say**











Have your say on **Water for Victoria**

Register to attend a forum in person or online

Take a survey, post a question or make a submission

Visit www.haveyoursay.delwp.vic.gov.au

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Introduction



This discussion paper – **Water for Victoria** – presents the water management opportunities and challenges facing Victoria over the coming decades. The strategic directions outlined here are proposals to generate public discussion and feedback.



Our vision

Water is fundamental to our communities. We will manage water to support a healthy environment, a prosperous economy and thriving communities, now and into the future. Our water system will be resilient to drought and climate change, our communities will be at the centre of decision-making and we will encourage innovation.

Victoria has a long history of managing its water resources effectively. As we come to terms with the future challenges, including climate change and population growth, we must ensure Victorians continue to get the best possible outcomes, and we can only do this by discussing with the community our proposed directions for the water sector.

This summary of the key challenges facing the water sector in Victoria explains how we can strengthen our water system for decades to come. The strategic directions outlined here are proposals to generate public discussion and feedback. Based on this feedback, a final water plan will be developed by mid-2016.

Opportunities and challenges

Water managers and Victoria's communities face a range of opportunities and challenges.

Most of our water resources are already at their sustainable limits

Most of Victoria's consumptive water users are supplied by surface water systems whose flows are regulated by storage dams and weirs. The state's regulated surface water resources are largely already being used at their sustainable limits. This means there is little opportunity for 'new' water to be made available in these systems.



Left Launching Place treatment plant water testing, Craig Moodie, image courtesy Yarra Valley Water
Above image courtesy South East Water



Groundwater and unregulated surface water systems are also significant sources of water. In some parts of the state they are already being used at their sustainable limits.

In other parts of the state some water remains available within the sustainable limits of some unregulated surface water systems and groundwater systems. It is important that any future increase in the consumptive use of water in those systems does not negatively affect the environment or other water users.

Climate change is placing pressure on our water resources

Climate modelling shows that over the longer term we can expect an increase in temperatures, a reduction in rainfall and runoff, and an increase in the frequency and duration of extreme events such as drought, flood and bushfire (Chapter 2 Climate change).

Drought and climate change mean reduced water availability and an increase in competition for our water resources.

Drought is never far away

Drought is part of life in Australia and many parts of Victoria have experienced drought conditions over the past decade.

Much of Victoria has received below average rainfall since July 2014, resulting in reduced levels of water in many of our water storages. A hot and dry end to 2015 has made conditions more challenging across the state, particularly in north-west Victoria.

A healthy environment underpins our communities and a productive economy

Victoria's environment, including our waterways and the plants and animals they support are highly valued by the community. Waterways provide places to relax, holiday, exercise, fish, bird watch, hike and swim. Waterways and catchments provide many environmental, economic, social and cultural benefits that underpin the wellbeing and productivity of our communities.

The majority of Victoria's waterways and catchments remain in poor or moderate environmental condition, and this directly affects the wellbeing of our communities. Efforts to remediate the degradation of our waterways have had good results. However, continued efforts are needed to maintain these improvements and avoid regression, particularly in the face of climate change and population growth.

Many of our urban centres are growing rapidly

By 2051, Victoria's population is predicted to almost double to reach 10 million people, with the state's major urban centres – Melbourne, Ballarat, Bendigo and Geelong – also expected to almost double. This growing population will place additional pressure on our water supplies and water infrastructure. Increasing urbanisation and development will also increase pressure on our environment, waterways and catchments.

Secure, high quality supplies are essential for a growing economy

The water industry is one of the largest sectors in the Victorian economy, with an asset base of \$40 billion and 2013–14 revenue of \$5.6 billion. Our water corporations must make significant investments to meet the needs of a growing population. Even small improvements in the efficiency of delivering water and wastewater services can make a real contribution to Victoria's economy.

Water is a primary input to agricultural production and manufacturing and processing industries, therefore access to secure, sustainable and safe water is essential for economic development, particularly in the regions. Agribusiness is forecast to be one of Australia's highest growth industries over the next 20 years. For example, some Asian markets are expected to grow six-fold by 2030.¹ This will drive significant demand for goods and services, including high value food and fibre product.

The Victorian Government's initiatives targeting jobs and economic growth, including the Regional Jobs and Infrastructure Fund, Premier's Jobs and Investment Fund, Future Industries Fund, Back to Work Scheme and Agriculture Infrastructure and Jobs Fund, will strengthen our growing regional economies and communities and help Victoria respond to growing global markets.

The water sector must efficiently meet the needs of our communities, our industries and our regional economies as they respond to these opportunities.

Aboriginal wellbeing is a priority

Aboriginal communities have cultural connections to lands, waters and resources through their associations and spiritual relationship with Country. Country is a culturally defined landscape that includes water and other resources, as well as ancestors, mythical beings, sacred sites and heritage sites. 'Cultural continuance' recognises that Aboriginal peoples' contemporary participation in land and water management allows their cultures to continue in connection to Country today.

Traditional Owners see caring for Country as a cultural responsibility; it involves protecting the land, waterways and natural resources from harm. Caring for Country is a fundamental expression of Aboriginal culture.

Water provides a range of liveability and recreational benefits

The impact of the Millennium Drought highlighted the important role of water for our local communities. Water supports liveable cities and towns with public green spaces, street trees, parks and gardens, sporting fields, heritage sites, places of cultural significance, recreational opportunities and our waterways and bays. These outcomes are highly valued by our diverse communities.

The Victorian Government supports the concept of environmental justice, and recognises that connecting our communities to the natural environment, our waterways and bays, and green urban spaces enriches our social fabric by improving community health and wellbeing.

The Murray-Darling Basin Plan

The Murray-Darling Basin Plan formally commenced in November 2012. The Basin Plan sets limits on the amount of water that can be extracted from the Basin and comes into effect in July 2019. The sustainable diversion limits are set at a 2,750 gigalitre reduction. This water will be used to help improve the environmental health of Basin rivers, wetlands and floodplains and the habitats of plants and animals that rely on the river system.

Victoria's share of this target is 1,075 gigalitres. We are making excellent progress towards this target, having already secured 679 gigalitres. Projects are planned to meet the targets within the agreed timeframes.

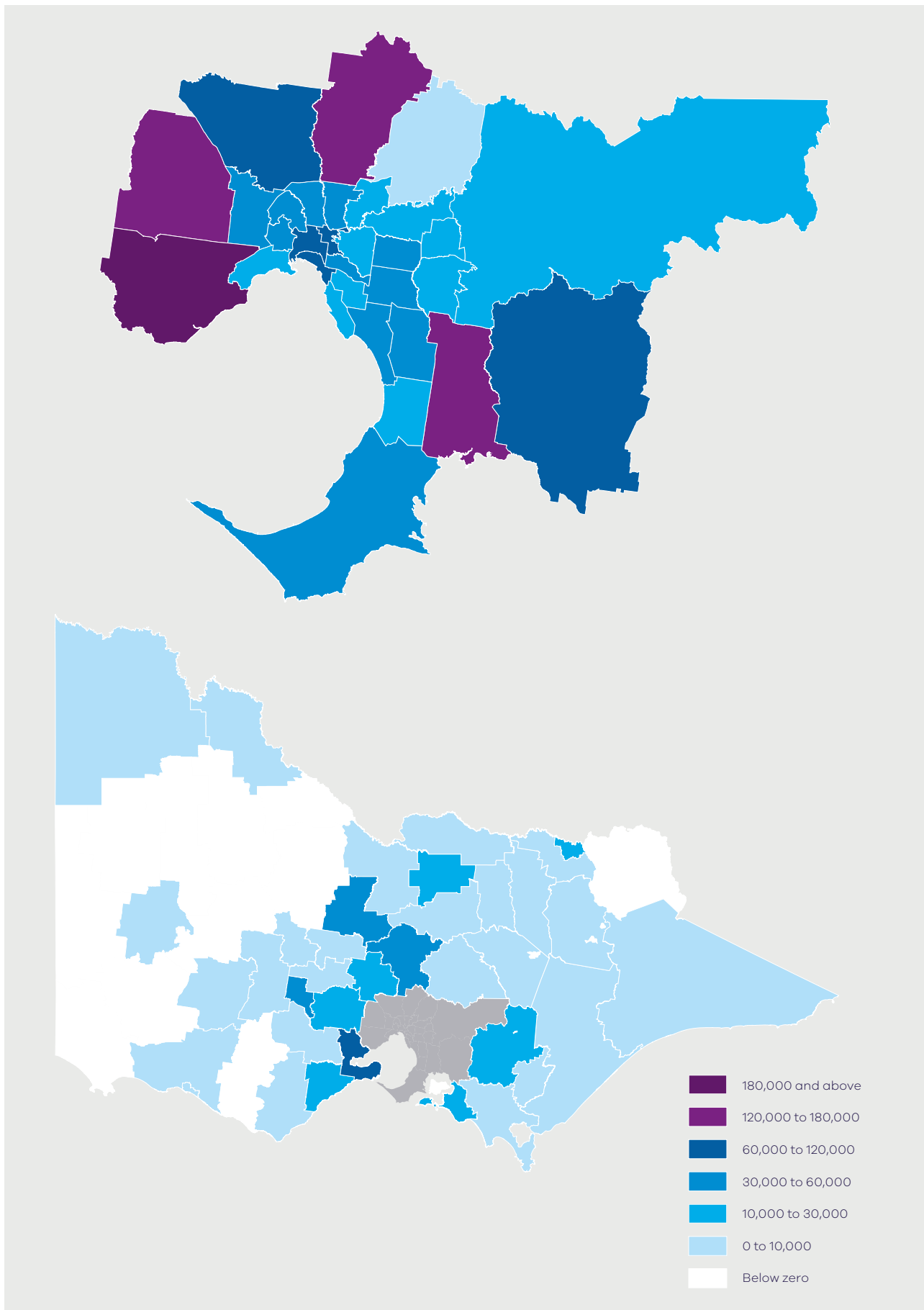
The Victorian Government is committed to balancing its obligations under the Basin Plan with any associated impacts on Victorian industries and communities by:

- prioritising water recovery through modernising irrigation delivery systems and improving on-farm water use efficiency
- achieving equivalent environmental outcomes under the Basin Plan from environmental works and other measures that will offset the need for further water recovery
- assessing and monitoring the socio-economic impacts of implementing the Basin Plan.

The Basin Plan also supports the engagement of Indigenous communities in water resource planning and the consideration of Indigenous values and uses. Victoria will need to prepare water resource plans to manage Basin water resources in the long-term.

Projected population growth By local government authority 2011–31

Figure 1.1



Source: Victoria in Future (2015)



Clockwise from left, pumping station, Kings Billabong; powering the pump, images courtesy Lower Murray Water; preparing the field at Western Treatment Plant for land filtration, courtesy Melbourne Water

Where we've come from Strong foundations

Victoria's current water management framework and institutional arrangements have developed over time, giving us strong foundations for realising future opportunities and meeting future challenges.

Our water reform history dates back to the important legislative and institutional reforms of the mid-1800s. Initially these were driven by mounting public health concerns about the contamination of Melbourne's rivers and creeks and the water supply systems that depended on them. This was followed by a push to green the state's landscape and irrigate agriculture.

Alfred Deakin introduced legislation giving control over the state's water resources to the Crown (overriding existing common law rights). This 1886 reform began an era of significant state development. By the 1960s and 1970s, population and agricultural expansion was diminishing both the quantity and quality of the state's water resources. This evidence directly challenged the earlier assumption that there were no limits to our water supply.

The recognition that water was a finite resource led to another wave of institutional, policy and legislative reform, beginning in the early 1980s with the work of the Parliamentary Public Works Committee and culminating in the 2004 blueprint *Our Water Our Future*.

The theme of those reforms (undertaken by successive state governments on a generally bi-partisan basis) was to move towards more systematic, evidence-based resource management based on economic principles and streamlined institutions that recognise that future planning must be mindful of resource limitations. This was highlighted by Victoria's experience of the Millennium Drought.

This has led us to a position where our water management system is characterised by:

- a robust understanding of the characteristics of our water resource base, including availability, climate dependence, environmental needs, surface and groundwater connectivity and the hydrology and hydrogeology of our surface and groundwater systems
- a strong regulatory framework for the protection of public health and the environment
- a formally defined and specified water entitlement framework, with a mature water market in northern Victoria
- the capability to accurately measure and account for the use of water allocated under entitlements
- a water planning and management framework based on secure rights to water which factors in environmental needs
- increased capacity to manage drought conditions through improved water infrastructure, including the desalination plant and water grid servicing key parts of the state
- strong and transparent institutional and pricing arrangements for the Victorian water sector
- a revenue source for addressing the environmental costs that arise from consumption of the state's water resources, and other sustainable water management needs (the Environmental Contribution).

Where we are going Working together

The government has identified nine key focus areas for our efforts to achieve a strong and resilient water future. Specifically we need to work together in:

- Responding to climate change
- Managing waterway and catchment health
- Managing water for agriculture
- Developing resilient and liveable cities and towns
- Recognising and managing for Aboriginal values
- Recognising recreational values
- Strengthening water entitlement and planning frameworks
- Realising the potential of the grid and markets
- Focusing on jobs, economy and innovation

Each of these focus areas is explored in detail in this discussion paper. We need to deal with each of them methodically and thoughtfully.

The government is inviting you to give feedback on those proposals, so that, working together, we can improve on them, and so that we can develop systematic ways to balance the trade-offs between our responses to different challenges.

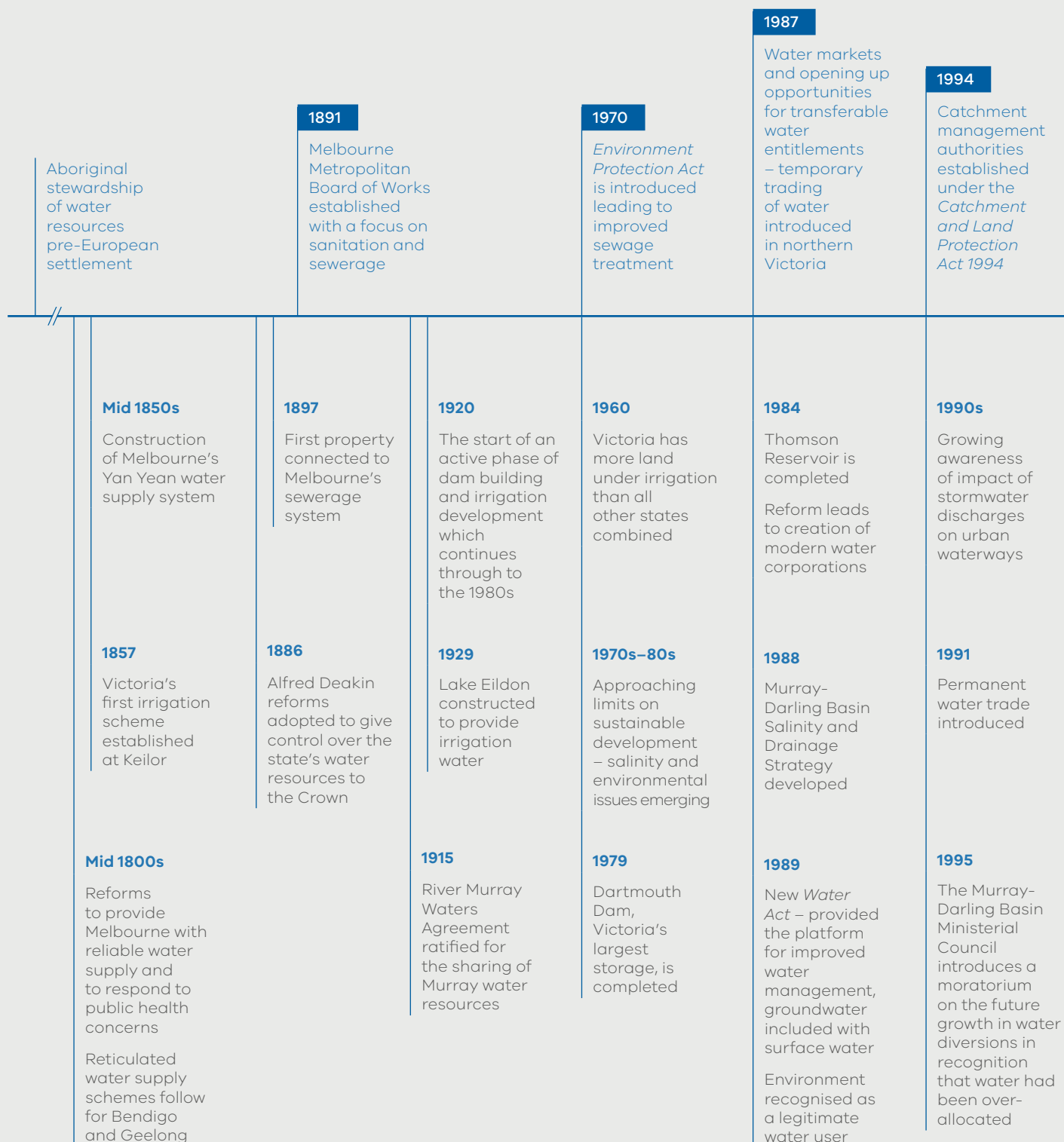
Water for Victoria Nine key focus areas
Figure 1.2



Victoria's water history

Timeline of water management

Figure 1.3



1997

Millennium Drought commences

2003

Safe Drinking Water Act – independent health regulator established

2004

Our Water Our Future introduces reforms to improve planning, flexibility for water users and address environmental needs

2010

Completion of Wimmera Mallee Pipeline, Victoria's first significant multi-benefit investment

2011

Creation of the Victorian Environmental Water Holder

2016

A new era in water management

1997–2009

Unprecedented drought conditions experienced in south-east Australia leading to significant water conservation effort

2002

Major water savings programs initiated to recover water for the Snowy and Murray Rivers

2004

Essential Services Commission established as independent regulator of Victoria's water and sewerage services.

2007

Water 'unbundled' from land

Carryover of unused allocations

First Commonwealth *Water Act* in response to Millennium Drought leads to development of Basin Plan

First round of water supply demand strategies completed by urban water corporations

2011

First round of sustainable water strategies completed covering the state of Victoria

2009

Removal of 10 per cent limit on the volume of water shares that can be held separate from land

Decision to build Victorian Desalination Project for Melbourne – completed 2012

2014

Four per cent limit on the volume of water shares that could be traded out of irrigation districts in northern Victoria removed

Restriction on who can buy allocation removed

2012

Basin Plan adopted – Sustainable Diversion Limits established for surface and groundwater systems in northern Victoria to come into effect in 2019

1997

The Murray–Darling Basin Ministerial Council formally caps diversions

1998

Interstate water trade commences

Water plan to recognise the important role of water in supporting economic development and liveability, as well as Aboriginal, environmental and recreational values of water, and to meet the challenge of climate change

Victoria's water resources

The Great Dividing Range divides the state into an inland and a coastal side. The inland rivers are part of the Murray-Darling Basin and follow meandering paths slowly north into increasingly arid country, with most connecting to the Murray River. The coastal rivers generally take shorter paths to the sea. This activity on the surface is complemented by a significant set of underground aquifers across the state, which yield groundwater of varying quality.

Only a very small proportion of our rainfall actually makes its way into streams and aquifers. For example, in 2013–14, when rainfall was close to the long-term average, only about 20 per cent of the rainfall across Victoria made its way to streams, rivers and aquifers. The other 80 per cent was transpired by plants or evaporated, with this proportion varying between different catchments depending on local conditions.

Surface water systems provide most of the water used for consumptive purposes, including irrigation, industry, urban, livestock and private domestic use. For example, during 2013–14 about 90 per cent of the water taken for consumptive use was sourced from surface water systems, with the remainder sourced from groundwater (about 8 per cent) and recycled sources (about 2 per cent) (Figure 1.4).

Of the 20,000 gigalitres of water flowing in Victorian rivers and streams in 2013–14, about 20 per cent was, on average across the state, taken for consumptive use. The percentage taken from each of Victoria's rivers and streams varies considerably depending on whether Victoria is experiencing a wet or dry year. Water not taken for consumptive use has a range of other beneficial uses, such as the support of healthy water-dependent ecosystems.

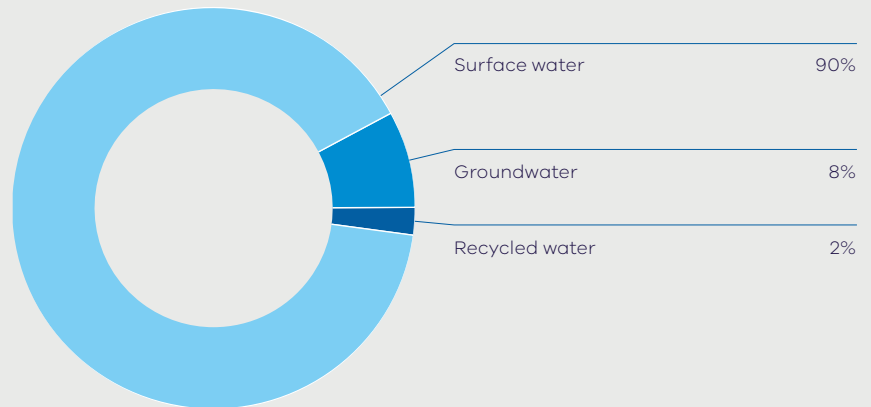
The increasing likelihood of drier conditions over coming decades means that we can expect to see reduced streamflows and groundwater levels, increasing the competition for water between different types of uses. Opportunities to improve water use efficiency, or reduce our reliance on traditional sources of supply, can help to address these challenges.

Figure 1.5 illustrates Victoria's annual water use across a range of purposes. While water for irrigation is the largest user, it is becoming increasingly efficient. Agriculture embraces and invests in water efficient production systems in response to drought and reforms, increasing the volume of water available for the environment. In addition, agriculture generates billions of dollars in economic activity and jobs across the state, sustaining regional communities.



Source of water taken for consumptive purposes

Figure 1.4

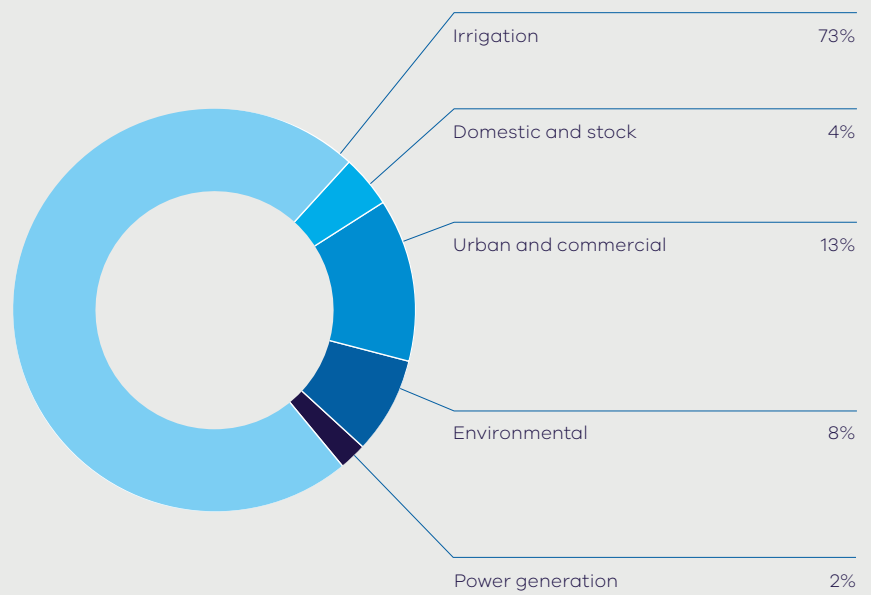


Proportion of water taken for different purposes

Figure 1.5

Source: 2013–14 Victorian State Water Accounts

Note: Environmental take includes instream releases and diversions made under water entitlements held by Commonwealth and Victorian environmental water holders



We will maintain the robust entitlement framework that underpins Victoria's water allocation and management

Victoria's robust water entitlement framework, as set out under the *Water Act 1989*, provides the basis for how our water resources are shared. The framework has developed over time to allow specified private rights to take and use water, with the government retaining the overall right to the use, flow and control of Victoria's surface water and groundwater resources, as outlined in the *Water Act 1989*. The key elements of the entitlement framework are:

- secure entitlements with tenure that is certain and protected, including bulk entitlements, environmental entitlements, water shares, section 51 licences, section 8 rights and contractual agreements to supply
- limits on water entitlements, that is, specified volumes, extraction rates and locations, diversion rules and sharing arrangements
- seasonal water allocation rules
- clear consultative processes before entitlements can be changed
- ability to trade, using markets to facilitate efficient movement of water, giving users the flexibility to buy and sell water.

One of the key principles of the water entitlement framework is that individual entitlement holders are responsible for managing the risks of water scarcity within their own contexts and systems (Figure 1.6).

Victoria's water entitlement framework has continued to change and evolve as new resource pressures arise. Our entitlements framework now provides:

- clearly defined entitlements that specify how water is shared, held, used, transferred or traded, that set out clear rights and obligations for individual entitlement holders
- mechanisms that support trade and movement of water between users, and enable water users to manage their own risks and water needs, which is fundamental to realising the benefits of water markets and the grid (Chapter 9 Realising the potential of the grid and markets)
- entitlements and seasonal allocations for a range of water users, including cities and towns, irrigation, agribusiness and industry, and the environment.

It is a key principle of this discussion paper that entitlement holders' existing legal rights and obligations will not be adversely affected.

Image below by Salahuddin Ahmad

Opposite page, top row left, panoramic view of Lauriston Reservoir; right wind pump and water tank near Sebastian, image courtesy Coliban Water. Second row Lauriston Reservoir spilling, image courtesy Coliban Water. Third row courtesy South East Water. Last row Pivot irrigator, Kelsey Rettino, image courtesy East Gippsland Water



Entitlement framework

Figure 1.6



Water that is controlled and managed by the Crown in Victoria



Entitlements to water granted by the Minister

Bulk entitlements

Environmental entitlements

Water shares

Take and use licences (also known as section 51 licences)



Water corporation water supply

Urban water supply to customers in districts

Supply by agreement

Holders of water shares and take-and-use licences may require one or more of the following instruments to use or access those entitlements



Other relevant instruments

Water use licences

Water use registrations

Delivery determinations (commonly referred to as delivery shares)

Works licences (also known as section 67 licences)



Domestic and stock rights also known as section 8 rights

Water has a key role
in helping us become
climate-ready



Climate change



2

The government is committed to restoring Victoria as a leader in climate action. Water management will play an important role in climate change mitigation and adaptation.



Climate change

Proposed objective

Victoria will continue to invest in climate science to understand the impacts of climate change now and into the future. The water sector will play an important role in both climate change mitigation and helping our communities adapt to climate change. Our water sector will be prepared to minimise the disruption that extreme events, like flood and bushfire, may cause to the provision of this essential service.

The discussion paper proposes to achieve this by:

linking with statewide climate change mitigation and adaptation action set out in other government plans and strategies, including the Victorian Climate Change Framework for Action, Climate Change Adaptation Plan and Renewable Energy Action Plan

investing in climate science

working with the water sector on climate change mitigation, including to achieve carbon neutrality

working with the water sector on climate change adaptation, including tracking the impacts of climate change on our environment and communities

ensuring that the water sector is prepared to minimise disruptions to essential water and wastewater services.

We will know we have succeeded when:

Victoria's water sector achieves carbon neutrality

the water sector and the community are equipped with accurate and useful information to address the impacts of climate change

there is strong alignment between climate change mitigation and adaptation action in plans and strategies related to the water sector.



New approaches are required to help us mitigate and adapt to climate change

Drought stricken property with vines removed, image courtesy Lower Murray Water

Climate change is a global issue that cannot be ignored. Victoria's *Climate Change Act 2010* states: "Climate change is a common concern of humankind and responding to climate change is a responsibility shared by all levels of government, industry, communities and the people of Victoria."

The 2015 Paris Climate Conference made an international accord to transform the world's fossil fuel-driven economy within decades to slow the pace of global warming to well below 2 degrees Celsius. The Australian Government now has a greenhouse gas emissions reduction target of 26–28 per cent below 2005 levels by 2030. The Australian Government is also working with a 23.5 per cent renewable energy target, representing 33,000 gigawatt-hours (GWh) of renewable electricity generation by 2020. Victoria's *Climate Change Act 2010* set a target of reducing the state's greenhouse gas emissions to 20 per cent below 2000 levels by 2020, but this commitment was repealed in 2013.

There is an increasing body of science on climate change and what that may mean for water availability and the frequency of extreme weather events. Climate modelling shows Victorians can expect a long-term increase in temperatures, reduced rainfall and runoff, and an increase in the frequency and duration of extreme events like drought, flood and bushfire. Overall they suggest a warmer, drier future with less water available for our environment, our economy and our communities, with some of the predicted changes being observed now. Climate change is having direct effects on our water resources, and it will continue to affect our management of this precious resource and the delivery of an important essential service.

Actions to reduce greenhouse gas emissions will reduce the longer term impacts of climate change on Victorian water resources. The Victorian Government's review of the *Climate Change Act 2010* and subsequent response will be critical to meeting the challenges of climate change.

Victoria as a leader in climate change action

The government has committed to restoring Victoria's position as a leader in climate change action and is taking a range of actions to deliver on this commitment, including:

- commissioning an independent review of the *Climate Change Act 2010*
- preparing a Climate Change Framework for Action
- developing the state's second Climate Change Adaptation Plan
- delivering an achievable emissions reduction target coupled with a renewable energy target of no less than 20 per cent by 2020 outlined in the Renewable Energy Roadmap
- preparing a Renewable Energy Action Plan for release in 2016
- refocusing the role of Sustainability Victoria to assist communities with climate change
- ensuring all government agencies understand the impacts of climate change on their assets and their services while contributing to the government's emissions reduction goals.

Climate Change Act 2010 review

An independent review of Victoria's *Climate Change Act 2010* was recently tabled in Parliament, identifying ways the Act can better support ambitious action on climate change. The government is considering the outcomes of this review, following its public release on 11 February 2016. A whole-of-government response and legislative amendments will follow.

Statewide climate change policy

The government is also developing a Victorian Climate Change Framework for Action. The framework, to be released in the first half of 2016, will address recommendations from the review of the *Climate Change Act 2010* and include other government initiatives to set the overall vision, objectives, priorities and programs for Victoria's future climate change response.

The framework is being developed through a comprehensive consultation process involving key stakeholders, business groups and the broader community giving feedback on issues including:

- an emissions reduction target for Victoria
- opportunities for the government to lead by example on climate action
- the need to build resilience to ensure that communities are well prepared for the impacts of climate change
- ensuring that Victoria's infrastructure is climate change ready.

Victoria's climate change adaptation plan

The government is currently developing its second Climate Change Adaptation Plan, due by 31 December 2016, under the *Climate Change Act 2010*. The adaptation plan will complement the water plan by:

- setting a clear pathway for how the government will respond to climate change adaptation challenges and opportunities in the state
- defining the government's role in working with the community, business, state government authorities and local government to adapt to climate change impacts at local and regional levels
- setting out short and medium-term actions to transition Victoria to being climate-ready in key areas, such as infrastructure, water services and catchment management.

Renewable energy action plan

The government's Renewable Energy Action Plan will be released in 2016. The action plan will set out the government's longer term actions to achieve its objectives for renewable energy, including setting renewable energy targets for Victoria for 2020 and 2025.

Climate change presents many challenges to existing paradigms in water resource management. However, it also presents opportunities for businesses and industries to develop innovative responses.



Water towers at the Pyramid Hill Water Treatment Plant, 2010 floods, image courtesy Coliban Water

2.1 Strategic direction

Investing in climate science

The Victorian Government, along with the Bureau of Meteorology and the CSIRO, is investing in the Victorian Climate Initiative to better understand the impact of climate change on our water resources and what we can expect in the future.

A future with climate change

Key findings from the research indicate that over the longer term we can expect the following impacts on our water resources:

An increasing influence of climate change

Although natural climate variability is still likely to be the dominant influence on Victorian rainfall over the next couple of decades, human-induced climate change is expected to have an increasing influence. Abrupt changes in rainfall as a result of human-induced climate change remain a possibility.

Seasonal shifts and decreases in rainfall

The reduction in rainfall observed during the cooler months is expected to continue, and possibly intensify. This change is expected to significantly reduce inflows for our storages. This may be partly offset by increases in spring–summer rainfall but summer rainfall generally does not generate large sustained inflows to storages.

Increased intensity of heavy rainfall events

The intensity of heavy rainfall events will likely increase. These events will have flooding and drainage implications that need to be considered in water management and infrastructure design.

Reduced streamflows

Although there is considerable uncertainty about the magnitude of the change, there is general agreement there will be significant reductions in streamflow, particularly within our water supply catchments.¹ Groundwater recharge will also decrease. Over the longer term, average annual streamflows may halve in some systems relative to the streamflows experienced over the last century.

Changes in water demands and catchment water use

Increased temperatures, along with increased evaporation, are expected. These changes will influence water demands. It is important to understand these changes and the implications to enable us to adapt.

Increased frequency and severity of bushfires

Bushfires may affect the quantity and quality of water flowing into our storages. Hotter and drier conditions will reduce water availability for firefighting in some regions.

Broader impacts on the water sector

Climate change is likely to have broader implications across the water sector in response to sea level rise and increases in storm surges. More frequent extreme events, like flooding and bushfires, will disrupt essential water and wastewater services more often.

Proposed strategic direction

The government will continually build our understanding of the impacts of climate change by working with a range of partners, such as communities, research organisations, businesses and industry. This will help ensure the Victorian water sector is well prepared to plan for and adapt to future climate change.

Climate change action in the water sector

The government expects the water sector to contribute to climate change adaptation and mitigation.

Water corporations already include drought and climate change scenarios in their water security planning in accordance with the Statement of Obligations issued by the Minister. They are also required to plan for extreme events like flooding and bushfires and ensure minimal disruption to essential water and wastewater services. This is discussed further in Chapter 10.

Catchment management authorities have a key role to play in protecting catchment health and adapting to, and mitigating the effects of, climate variability and climate change (see Chapter 3 Waterway and catchment health).

2.2 Strategic direction

The water sector has an important role to play in climate change mitigation

The water sector uses significant amounts of energy in the treatment and transfer of water. Indeed, Melbourne Water alone is responsible for a substantial portion of the Victorian public sector's energy usage. In 2014–15 the water sector emitted almost one million tonnes of carbon dioxide equivalents, around the same as the annual emissions from 220,000 cars. Water corporations are successfully implementing measures that reduce their energy consumption and their costs.

What we have observed

Changes in rainfall

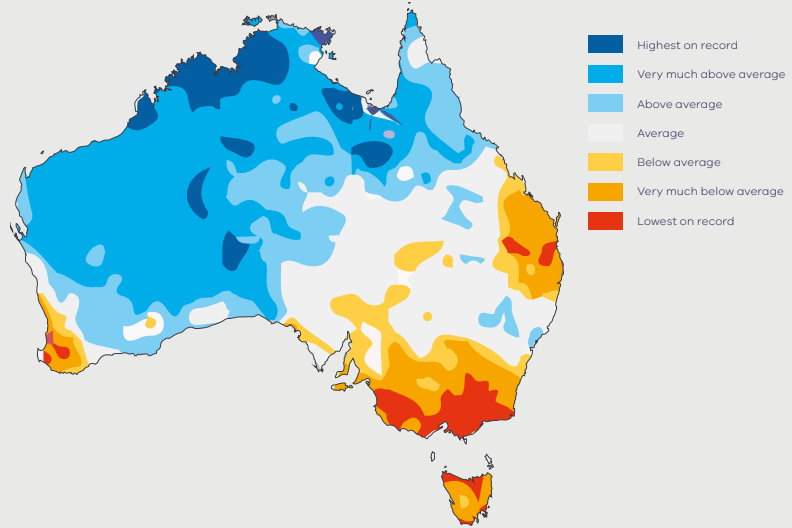
The Millennium Drought was of unprecedented duration and intensity (Figure 2.1). Research indicates human-induced climate change is likely to have contributed to its severity.²

Despite some very wet periods, rainfall over the past few years has also been below average (Figure 2.2), particularly over central and western Victoria.

Rainfall during Millennium Drought

1 October 1996 to 31 January 2010, relative to long-term average

Figure 2.1



Source: Australian Bureau of Meteorology

Reduced streamflows

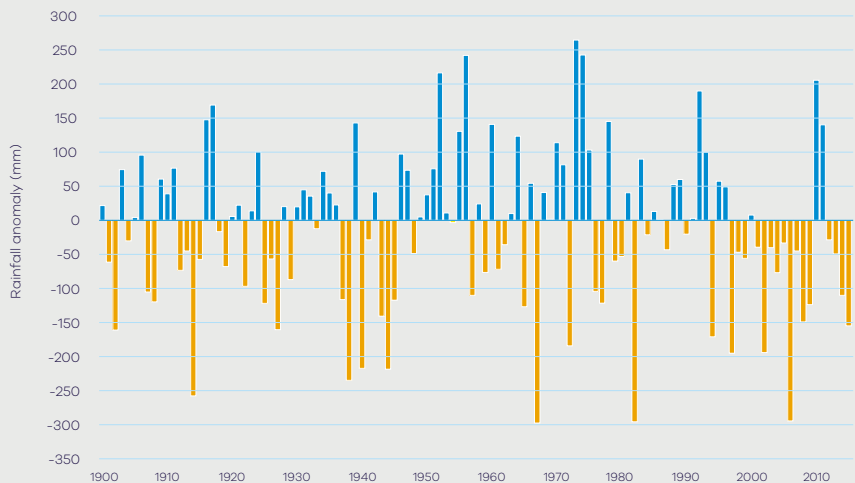
Reduced rainfall means drier soils and catchments and reduced streamflows in waterways.

This occurred during the Millennium Drought and has been experienced in many parts of the state in recent years. Typically, for every 10 per cent reduction in rainfall, streamflows reduce by 20 to 30 per cent.

Annual rainfall anomaly for Victoria

1900–2015

Figure 2.2



Source: Australian Bureau of Meteorology. Based on a 30-year climatology (1961 – 1990)

Seasonal shifts in rainfall

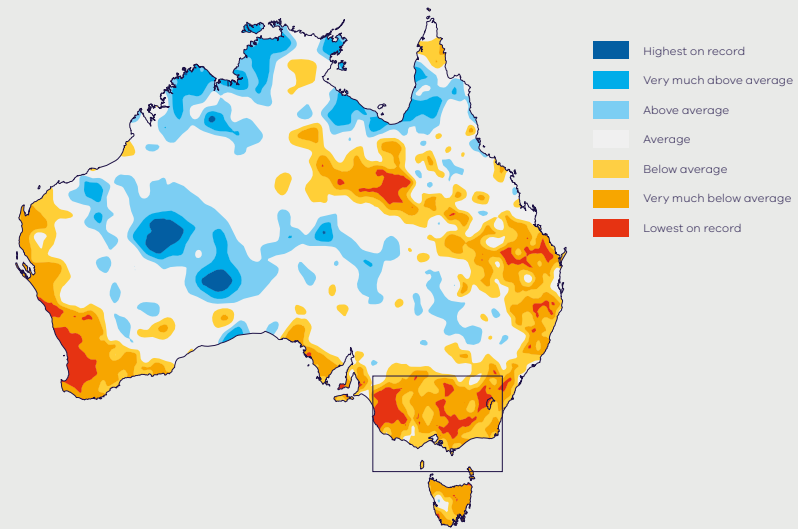
The Millennium Drought also brought with it a seasonal shift in rainfall, with proportionally less rainfall in the cooler months.³

This trend has continued in much of Victoria since the drought ended (Figure 2.3). Studies by the Bureau of Meteorology and CSIRO link this trend with human-induced climate change.^{4,5}

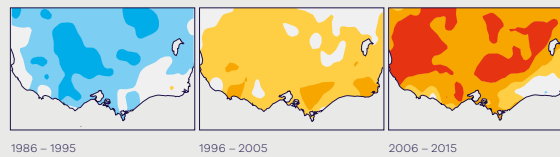
Average rainfall change during the cooler months of the year

April–October inclusive 1986–2015

Figure 2.3



Increasing April – October rainfall reductions – 1986–2015 Victoria



Source: Bureau of Meteorology, through the Victorian Climate Initiative

Increased temperatures

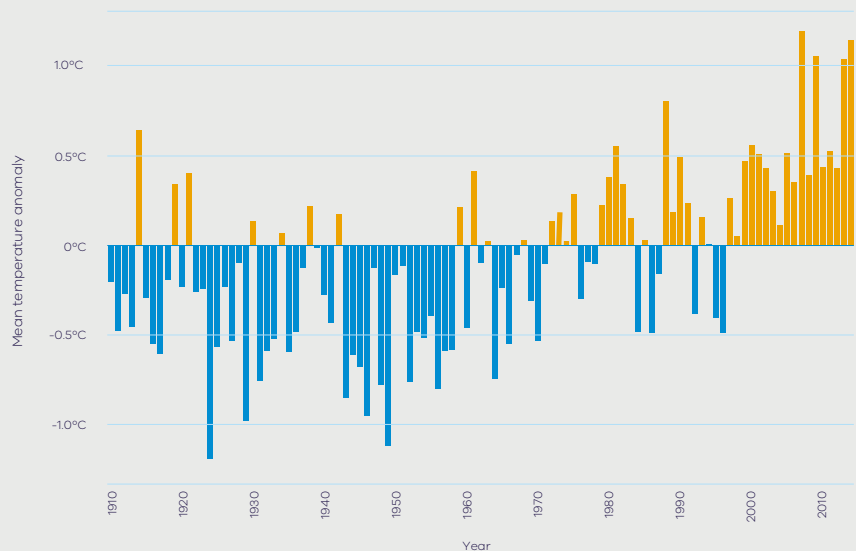
Temperature is a driver of water demands in both urban and rural areas. Evaporation and transpiration by plants also affect demand and supply. Trends in Victoria’s recent climate show temperature increases (Figure 2.4), especially since 1960.⁶

October 2015 was Australia’s warmest October on record for mean, maximum and minimum temperatures. Mean maximum temperatures in Victoria recorded the largest deviation from average ever recorded for any Australian state.⁶ For Victoria, the record temperatures were at least six times more likely to be as a result of human-induced climate change than would be the case from natural variability alone.⁷

Annual mean temperature anomaly for Victoria

Deviation from the long-term average 1961–1990

Figure 2.4



Source: Australian Bureau of Meteorology. Based on a 30-year climatology (1961 – 1990)

Significant action is already being taken to reduce emissions from the water sector. For example, the power demands of the Victorian Desalination Project are being completely offset with renewable energy certificates, which has helped to fund the development of two windfarms.

Catchment management authorities will also contribute to climate change mitigation. For example, riparian vegetation and estuarine ecosystems play an important role in maintaining biodiversity and storing carbon. Some catchment management authorities are exploring the potential of 'blue carbon' – the carbon captured and stored by marine and coastal ecosystems – to further expand their carbon sequestration activities (see Chapter 3 Waterway and catchment health).

Victoria's catchment management authorities are currently in the process of finalising their Regional Natural Resource Management Plans for Climate Change, which identify opportunities for mitigation and adaptation.

Proposed strategic direction

The government proposes that the water sector, including water corporations and catchment management authorities, will maximise its contribution to climate change mitigation by achieving carbon neutrality. The government will work with the water sector to consider implications for the sector and determine an achievable time period for this to occur. In the interim, the water sector will:

- contribute to carbon reduction targets set by the government
- at least match the state's renewable energy target through the development of renewable energy sources or purchase of renewable energy generation certificates
- exploit carbon sequestration opportunities identified by catchment management authorities
- maximise the energy efficiency of its operations and premises.

Ensuring there are consistent and rigorous frameworks to account for both carbon use and carbon sequestration will be a vital issue as the water sector moves towards carbon neutrality.

Clockwise from left Candowie Reservoir during drought, Noel Roulston, image courtesy Westernport Water; wheat field during drought, image courtesy Mallee Catchment Management Authority; Buffalo River after bushfire, Alison Poulliot, image courtesy North East Catchment Management Authority

2.3 Strategic direction

The water sector has an important role to play in climate change adaptation

As part of the Victorian Government's Climate Change Adaptation Plan, the government proposes to require water planning and management decisions affecting water assets, infrastructure, services and water quality and quantity to consider climate change.

The government is committed to putting communities at the centre of climate change action, and recognises that ultimately adaptation is achieved through local place-based action. Through effective engagement, the government will work with communities to build climate resilience.

Climate change adaptation is a priority throughout this discussion paper and is embedded in many of the proposed strategic directions in the remaining chapters.

Proposed strategic direction

The government will track the impacts of climate change on our environment and communities by:

- developing a monitoring, evaluation and reporting framework for the water sector
- collating information collected to guide ongoing action to address the impacts of climate change
- using the framework to guide evidence-based decision-making and adaptive management across the water sector.



Opportunities for climate change mitigation effort by water corporations

There are many opportunities for the water sector to extend and deepen its role in mitigation. For example:

- minimising emissions through efficiencies in water sector operations, such as:
 - using energy efficient technologies
 - maximising the efficiencies of pumping and treatment activities
 - ensuring its premises are energy efficient.
- converting waste to energy, such as using organic waste to produce biogas to supply power to treatment facilities. For example, Yarra Valley Water is constructing a facility in Wollert capable of converting organic waste into biogas, and ultimately energy
- integrating water and energy management. For example, Central Highlands Water, in partnership with Barwon Water, is installing hydro-electric generators at Lal Lal
- considering innovative approaches, such as floating solar generation in reservoirs
- exploring opportunities to take small water and wastewater treatment facilities off the power grid. For example, North East Water is exploring opportunities to meet these goals through a combination of solar, hydro-electric and battery storage technologies
- supporting the establishment of renewable energy facilities through procurement decisions, such as the renewable energy certificates purchased for the desalination plant.



Healthy waterways
are valued by
our community



Waterway and catchment health



3

Healthy waterways underpin a strong economy and community health and wellbeing. The health of our catchments influences the health of our rivers, wetlands and estuaries.

Waterway and catchment health

Proposed objective

To protect all waterways from the adverse impacts of human use and improve the condition of priority waterways to support the environmental, social, cultural and economic needs and values of communities now and into the future.

The discussion paper proposes to achieve this by:

implementing long-term programs in partnership with communities

improving environmental water management

protecting waterways from the adverse impacts of human use

strengthening community engagement and participation

improving waterway health knowledge, monitoring and innovation.

We will know we have succeeded when:

priority waterways show improved health, in accordance with the targets set for them in regional waterway strategies

the environmental, social, cultural and economic value of Victorian waterways is increasing over time.



A strategic, long-term approach is required to improve the health of our waterways

Great egret, Barmah Lake, Keith Ward, image courtesy Goulburn Broken Catchment Management Authority

Healthy waterways (including rivers, wetlands, estuaries and their catchments) underpin a strong economy, provide opportunities for recreation and enhance the liveability of our cities and towns. Waterways play a vital role in the physical and mental health of people and communities and connecting with nature has proven to be beneficial for wellbeing.

Many Aboriginal values of cultural, social, spiritual and customary significance are located on or near waterways. Access to public riparian land is critically important to enable connections to Country.

The diverse plants and animals supported by healthy waterways also have their own intrinsic value. Given the significant values of waterways, it is not surprising that a 2010 survey of over 7,000 Victorians found that waterways are vitally important to communities, with 99 per cent of respondents wanting healthy waterways in their areas.¹

In addition to their value as important community assets, waterways play an important role in carbon sequestration (known as 'blue carbon'), which is important for mitigating climate change. For example, the blue carbon value of saltmarsh and seagrass vegetation within Port Phillip and Westernport bays is estimated to be \$15 million.²

When the environmental condition of waterways declines, the values they provide can be degraded or lost, causing economic costs for communities. Water extraction, river regulation, stock grazing, nutrient runoff, reduced connectivity, invasive species, erosion and wetland excavation all pose threats to waterway health. Most river basins in Victoria, especially those in western Victoria, have less than 10 per cent of their length in good or excellent condition, and most of their basins have been extensively cleared for agriculture.³ This is shown in Figure 3.1. A condition assessment of high-value wetlands shows 44 per cent are in very poor to moderate condition.⁴

The good news is that successive condition assessments of major rivers show the deterioration in river condition has been controlled. This is encouraging given the third assessment period (2004–10) coincided with the Millennium Drought.

The health of waterways and catchments faces several future challenges. Climate change may make the impacts of some threatening processes worse, for example by reducing runoff to waterways and by placing pressure on coastal wetlands and estuaries through sea level rise. As discussed in Chapter 2 (Climate change), catchment management authorities are working with their communities to develop regional climate change plans to address this challenge, and adaptation is already happening.

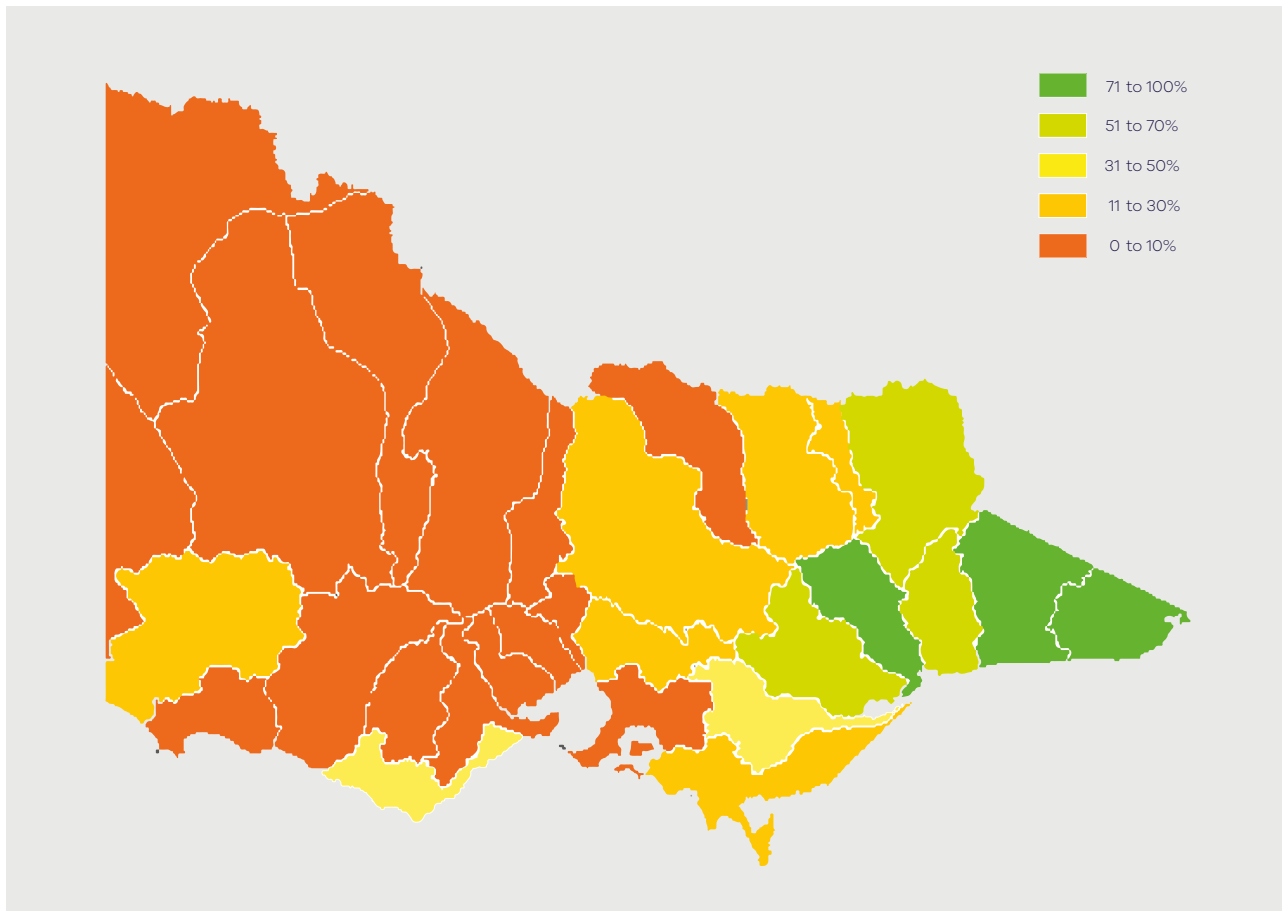
The environmental condition of a waterway has a strong influence on the types of values present. We know that native species are best protected in healthy and sustainable habitats and systems. The government's Draft Biodiversity Plan will outline proposed priorities and objectives to assist the natural environment adjust to the challenges of climate change.

In addition to climate change, increasing food and fibre demands, agriculture intensification and population growth are all trends that need to be proactively managed to ensure the benefits of clean water and food security continue (see Chapter 4 Water for agriculture and Chapter 5 Resilient and liveable cities and towns for more information).

Land management and land use within catchments are key drivers of waterway condition. Poor land management can diminish water quality, resulting in higher costs for water treatment. Poor water quality can also trigger algal blooms, which can prevent irrigation, require water carting, close lakes and waterways for some recreational purposes and reduce recreational and tourism revenue. Integrated catchment management (ICM) involves working in a deliberate, coordinated manner to deliver multiple benefits and reduce unwanted outcomes. Improvements in ICM will provide significant benefits to our waterways (Figure 3.2).

Waterway health Percentage of stream length in good or excellent condition

Figure 3.1



Source: Index of Stream Condition, 2013

The government's strategy, *Our Catchments Our Communities – Integrated Catchment Management in Victoria 2016–19*, will ensure key stakeholders from government and the community work together to better plan and deliver far-sighted, integrated, practical catchment management outcomes across Victoria.

The Victorian Waterway Management Strategy 2013 describes four types of waterways, characterised by the environmental condition and the level of modification (Figure 3.3).

Different objectives apply to the management of different types of waterways. For example, in managing an ecologically healthy waterway the objective may be to maintain its good condition. The objective for a priority sustainable working waterway may be to improve its condition and for a priority highly modified waterway it may be to prevent further decline.

For priority urban waterways, a large amount of management effort may be needed just to maintain current condition and prevent further decline.

We need to carefully consider the potential negative effects of continuing urban growth on waterways (Chapter 5 Resilient and liveable cities and towns).

Catchment management authorities set waterway objectives in partnership with local communities and Traditional Owners, informed by scientific evidence and consideration of the long-term effort required for improvement, including ongoing maintenance programs. Waterway objectives are formally assessed every eight years, in consultation with the community, as part of the development of regional waterway strategies. Changes in climate, water availability, land use and population are considered as part of the process.

The government proposes to achieve its objective for waterway and catchment health by building on our already strong policy foundations, strengthening the integrated catchment management framework and working better with communities.

Integrated catchment management

Figure 3.2



Integrated catchment management seeks to coordinate actions for multiple shared benefits and reduce perverse outcomes. It requires local coordination, collaboration with communities and long-term relationships to be successful.

- 1 Planning protection for areas of high value vegetation can reduce risk of decline or extinction of species and provide recreational use.
- 2 Managing willows in the upper catchment can reduce their spread downstream.
- 3 Improving riparian land condition ensures better water quality for rural and urban supply.
- 4 Providing fish passage allows fish to move into critical breeding sites and improves recreational fishing opportunities.
- 5 Improved land management practices can reduce nutrients into waterways.
- 6 Managing roadside weeds can reduce the risk of spread to riparian areas and impacts to high value native vegetation.
- 7 Planning schemes and controls can be used to protect significant environmental features and reduce flood risks.
- 8 Improved irrigation practices can reduce nutrient runoff into waterways and provide economic benefits to irrigators.
- 9 Improved water quality in estuaries can help drive liveability and tourism in coastal areas.
- 10 Providing environmental flows supports native plants and animals and can have shared benefits for recreational users and Traditional Owners.
- 11 Wetland protection increases plant and animal habitat, improves water quality, provides recreational use and carbon storage.
- 12 Integrated water management improves water quality, liveability and delivers economic savings.
- 13 Improved water quality flowing into bays and coastal areas can increase recreational opportunities and seagrass communities.

Types of waterways depending on their values, condition and typical uses

Figure 3.3

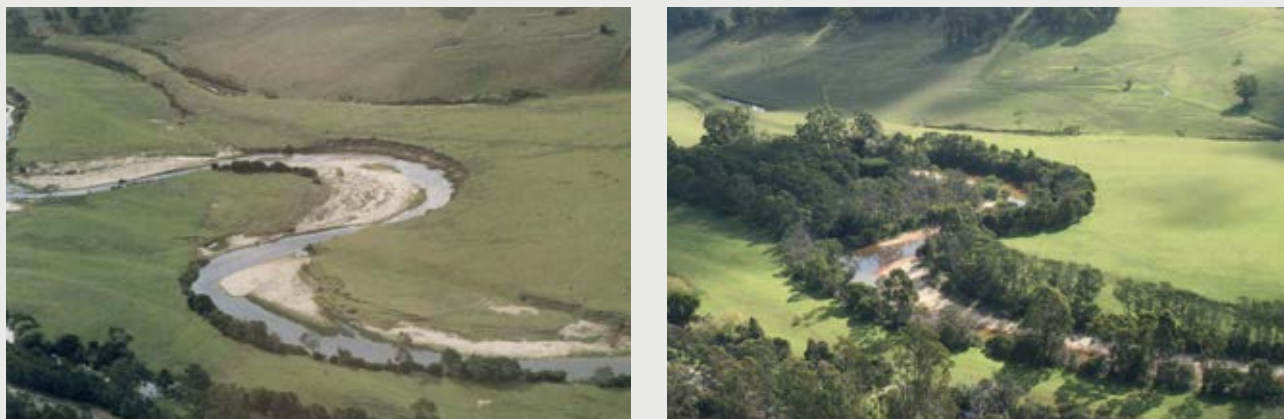
	Near natural	Ecologically healthy	Sustainable working	Highly modified
Environmental	High naturalness Significant species	High naturalness Significant species	Moderate naturalness Some significant species	Low naturalness Few significant species
Social	Moderate recreation Remote wilderness	High recreation	High recreation	Low recreation (except urban waterways)
Cultural	Aboriginal cultural heritage sites	Aboriginal cultural heritage sites	Aboriginal cultural heritage sites Other cultural heritage sites	Aboriginal cultural heritage sites Other cultural heritage sites
Economic	National and state parks	National and state parks Forested catchments	Agriculture Peri-urban	Intensive agriculture, or Highly urbanised



From left Yarra Ranges; Ovens River, Bruce Cumming; The High Country, Jon Nash, images courtesy Visions of Victoria; Merriman Creek; Yarra River.

Genoa River following riparian management

Figure 3.4



Genoa River, East Gippsland in 1989 (left) and 2009 (right) following riparian fencing and revegetation. Images courtesy East Gippsland Catchment Management Authority

Building on strong foundations

Victoria has a history of recognising the importance of its waterways and catchments and working to improve their condition through:

- an integrated catchment management approach
- service delivery through catchment management authorities and Melbourne Water
- the Victorian Waterway Management Strategy 2013, which sets out Victoria's statewide policy framework for waterway management, and robust regional waterway strategies and regional catchment strategies
- the environmental water reserve, a legally recognised amount of water set aside to meet environmental needs (including environmental water entitlements)
- the Victorian Environmental Water Holder's oversight of environmental entitlements and robust decision-making in conjunction with catchment management authorities and Melbourne Water
- four sustainable water strategies, which outline policies and actions to ensure sustainable water management over a 50-year period
- state environment protection policies to protect the quality of surface water and groundwater
- commitments to work within the Murray-Darling Basin Plan's salinity and water quality targets
- management plans for each of Victoria's 11 Ramsar wetlands
- community-based natural resource management, such as Landcare and Waterwatch.

Victoria's management arrangements, along with direct government investment into waterway health activities, has delivered many achievements, including:

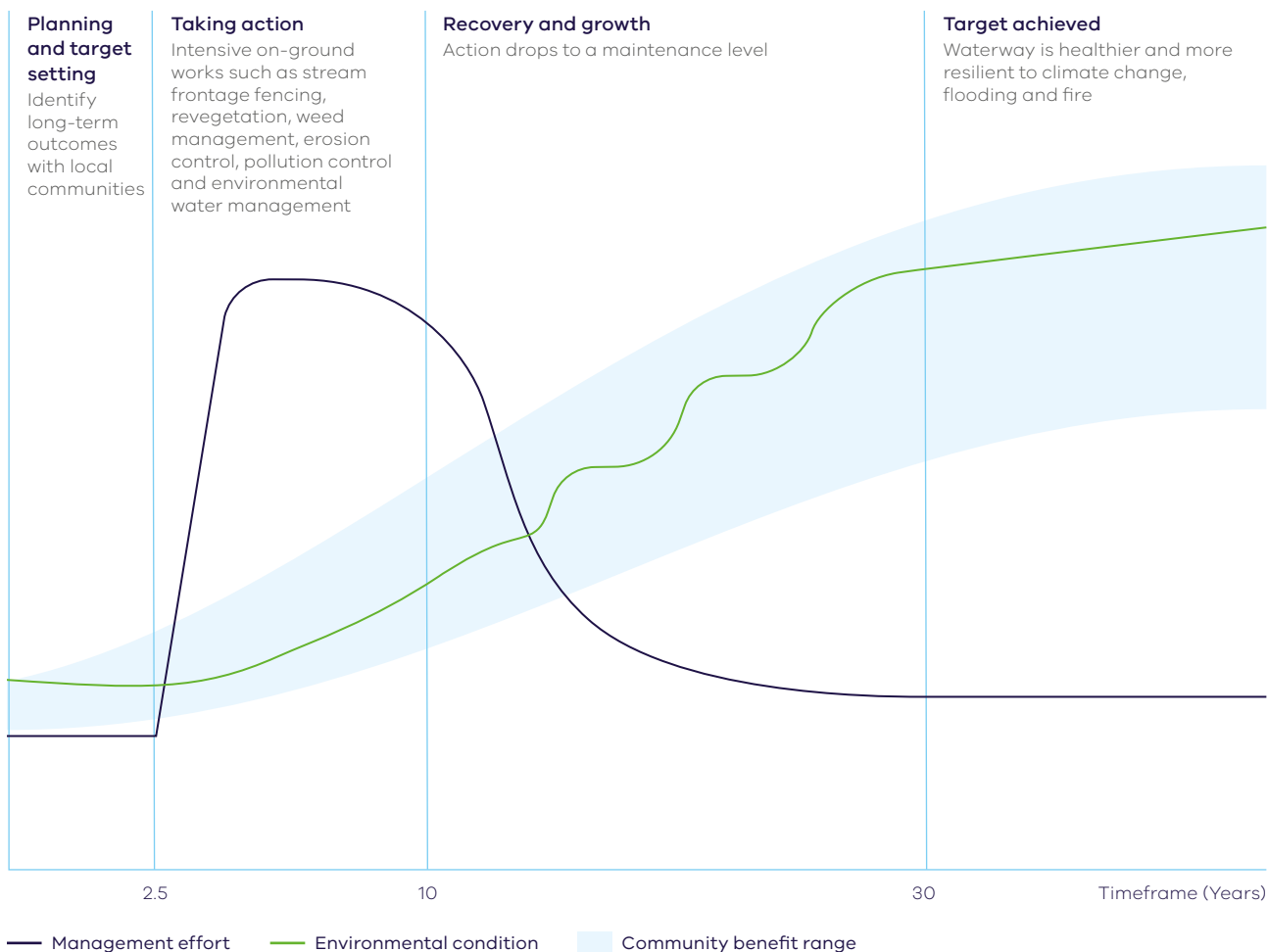
- a suite of works undertaken on priority waterways across the state since 2010, including:
 - 13,804 kilometres of vegetation works, improving the health and resilience of waterways
 - 280 sites where works have been undertaken to improve instream health
- the Victorian Environmental Water Holder (VEWH) currently holding approximately 650 gigalitres (long-term average) of environmental water entitlements⁵
- the Commonwealth Environmental Water Holder (CEWH) currently holding approximately 621 gigalitres (long-term average) of environmental water entitlements⁶
- environmental water provided to 382 rivers and wetlands between 2011–12 and 2014–15 and significant environmental works and measures to improve environmental water use efficiency.

Vinifera community day, image courtesy Mallee Catchment Management Authority



Four phases of waterway health programs

Figure 3.5



3.1 Strategic direction

Implementing long-term works programs in partnership with communities

The government recognises that protecting and improving waterway health is a long-term commitment. It will take decades of management effort to reach desired outcomes and ongoing maintenance will be required. Continued community participation in catchment management is essential for achieving desired outcomes.

We are now seeing clearly improved environmental conditions on waterways where work started over 20 years ago. The images in Figure 3.4 of the Genoa River in East Gippsland highlight an example of the significant improvement in waterway condition brought about by long-term riparian management programs.

There is scientific evidence that restoration planned and coordinated at large scales is more likely to succeed than small, isolated projects.⁷ Over time, improved waterway condition results in more habitats for native plants and animals, less erosion, better water quality, enhanced recreational and amenity benefits and shelter for livestock.

Strategic, long-term investments to improve waterway health must explicitly recognise that the full benefits may not be realised for 30 years or more. Four phases of works are needed to secure waterway health (Figure 3.5). After initial place-based planning and target-setting, on-ground works are required for approximately 10 years until the waterway enters a phase of recovery and growth. Investments and actions then drop to maintenance levels. Once the target has been achieved, the waterway is stronger and more resilient. Ongoing environmental water management and monitoring and maintenance after extreme events (such as floods and fire) will be required.



Large-scale, long-term program delivers benefits for Glenelg River

Case study

In the early 2000s, the Glenelg Hopkins Catchment Management Authority (CMA) started the Glenelg River Restoration Project to restore health to a river on the brink of ecological collapse. Over 15 years, the CMA carried out \$16 million of environmental works, funded by the Victorian and Commonwealth Governments, working with over 620 landholders, installing 1,800 kilometres of fencing, providing environmental water, treating over 2,000 kilometres for weeds, planting and seeding over half a million trees and removing 12 fish barriers.

Image courtesy Glenelg Hopkins Catchment Management Authority

Significant outcomes include a 150 per cent increase in Pygmy Perch, a 280 per cent increase in Blackfish, significant water quality improvements and an estimated \$105 million in economic benefits (including increased environmental recreational and agricultural productivity values) to the community.⁸ In 2013, the project won the prestigious Australian Riverprize Award.

The Regional Riparian Action Plan released in December 2015 outlines riparian management outcomes and aspirational targets to be achieved across regional Victoria from 2015–16 to 2019–20.

The Ramsar Convention is an international treaty that aims to halt the worldwide loss of wetlands and to conserve those that remain through wise use. Ramsar wetlands support nationally significant species and communities, and hold importance for waterbird breeding, drought refuge and nursery habitat for fish. There are 11 Ramsar-listed wetlands in Victoria and each one has a management plan for maintaining their ecological character. The Victorian Auditor General is about to commence an audit on the effectiveness of Ramsar wetland management.

The Gippsland Lakes are an example of a Ramsar-listed wetland that provides significant social, economic, cultural and environmental value for the region, and the state. The health of the Gippsland Lakes is threatened by altered water regimes, land clearing, mining, farming, forestry and urban

development. The government recognises the Gippsland Lakes' value and is committed to protecting their health. It is funding on-ground environmental works and is improving management arrangements including a refreshed Gippsland Lakes Coordinating Committee to guide future action.

The health of priority waterways in the 10 regional waterway strategies will be improved over time. Over the next eight years, 36 of the priority waterways will be the focus of large-scale, 30-year plus projects (Figure 3.6). Work on other regional priorities will continue through catchment management authority work programs and the Regional Riparian Action Plan.

Long-term monitoring of the outcomes of on-ground works and environmental watering is critical to inform public reporting and adaptive management. A focus on key large-scale, long-term management projects across Victoria provides the opportunity to develop, coordinate and communicate a statewide monitoring approach. The establishment of 10 major long-term evaluation sites will support this approach.

Thirty six waterways that will be the focus of large-scale projects to achieve targeted outcomes over 30 years

Figure 3.6

Targeted 30-year outcomes

Environmental			Economic		Social	Cultural	Long-term monitoring site
Native vegetation	Native fauna	Native fish	Town water supply	Irrigation supply	Recreational	Cultural and heritage	

Mallee

Merbein common wetlands							
Lindsay-Wallpolla Islands							
Belsar Yungera Floodplain complex							
Kings Billabong and Woorlong complex							

Wimmera

Upper Wimmera River								
Lower Wimmera River								
Wimmera wetlands								

Glenelg Hopkins

Glenelg River								
Hopkins River								
VVP and Glenelg wetlands								
Budj Bim Landscape: Lake Condah, Darlot Creek and Fitzroy estuary								

Corangamite

Great Ocean Road estuaries								
Barwon River								
Western District Lakes								
Moorabool River								



Priority waterways

Identified in regional waterway strategies for community benefit

Priority waterways from regional waterways strategies

North Central

Campaspe River	       
Gunbower Island	      
Murray Floodplain	      

Goulburn Broken

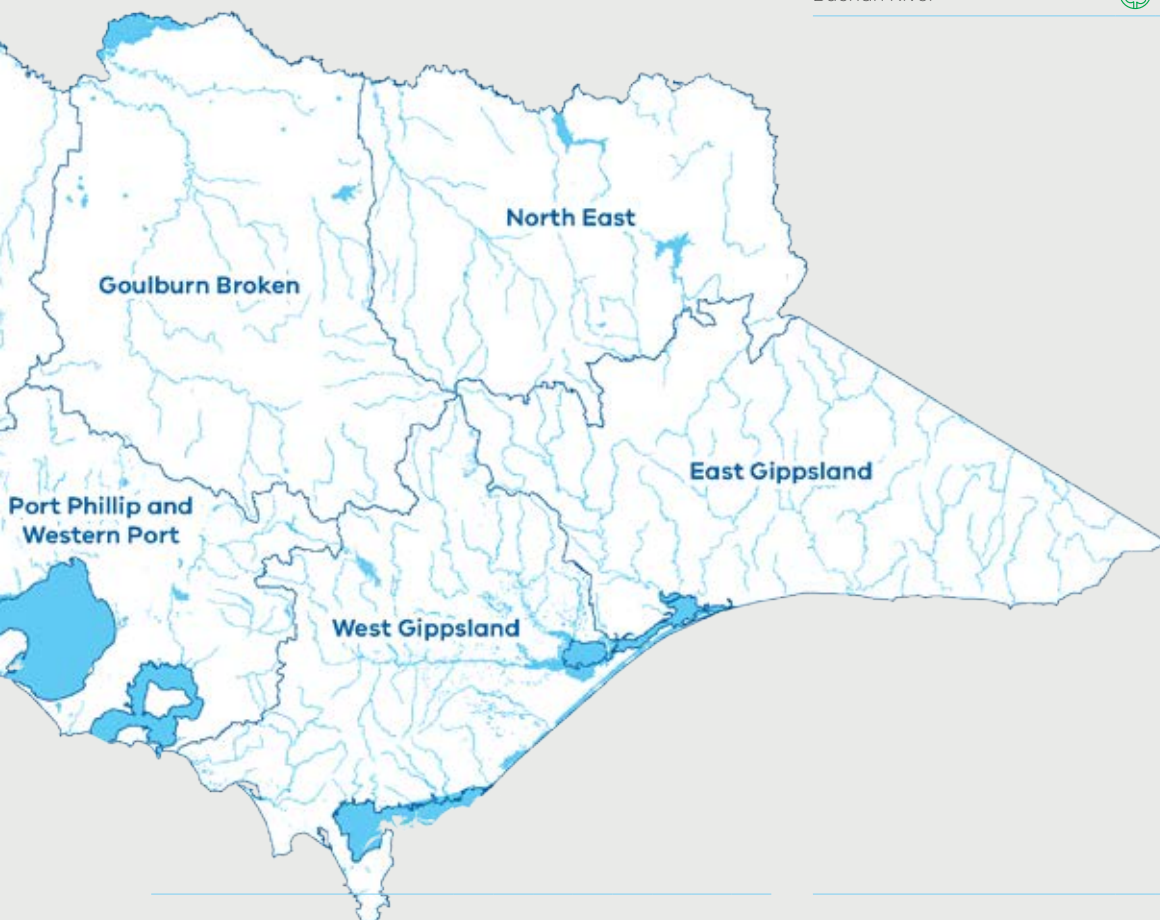
Strathbogie Streams	   
Lower Goulburn River	      
Broken Creek	      
Barmah Forest	    

North East

Upper King River	       
Ovens River	      
Kiewa River	      
Mitta Mitta River	      

East Gippsland






















Cann River	     
Mitchell River	   
Gippsland Lakes	    
Buchan River	     



Port Phillip and Western Port

Yarra River	       
Werribee River	     
Maribyrnong River	     

West Gippsland

Corner Inlet and tributaries	     
Gippsland Lakes and tributaries	      
Thomson River	       

Proposed strategic direction

Through implementation of regional waterway strategies that identify priority waterways in consultation with local communities, the government will:

- improve the health of 36 priority waterways, by focusing investment on large-scale projects to achieve targeted outcomes over the next 30 years
- continue investing in on-ground work and environmental water management of other local priority waterways identified in regional waterway strategies for community benefit
- establish long-term evaluation sites and ensure that waterway managers monitor and report back to communities on the progress of securing environmental outcomes.

Over the next four years the government will build on the Victorian Waterway Management Strategy by:

- implementing the Regional Riparian Action Plan to accelerate priority on-ground riparian work
- improving the health of the Gippsland Lakes by continuing to support the Gippsland Lakes Coordinating Committee and investing in on-ground works and community engagement
- introducing legislative provisions to improve the management and protection arrangements of the Yarra River.

3.2 Strategic direction

Improving environmental water management

Environmental water is a key component of integrated waterway management. The government has established robust arrangements for the planning and use of environmental entitlements (Figure 3.7).

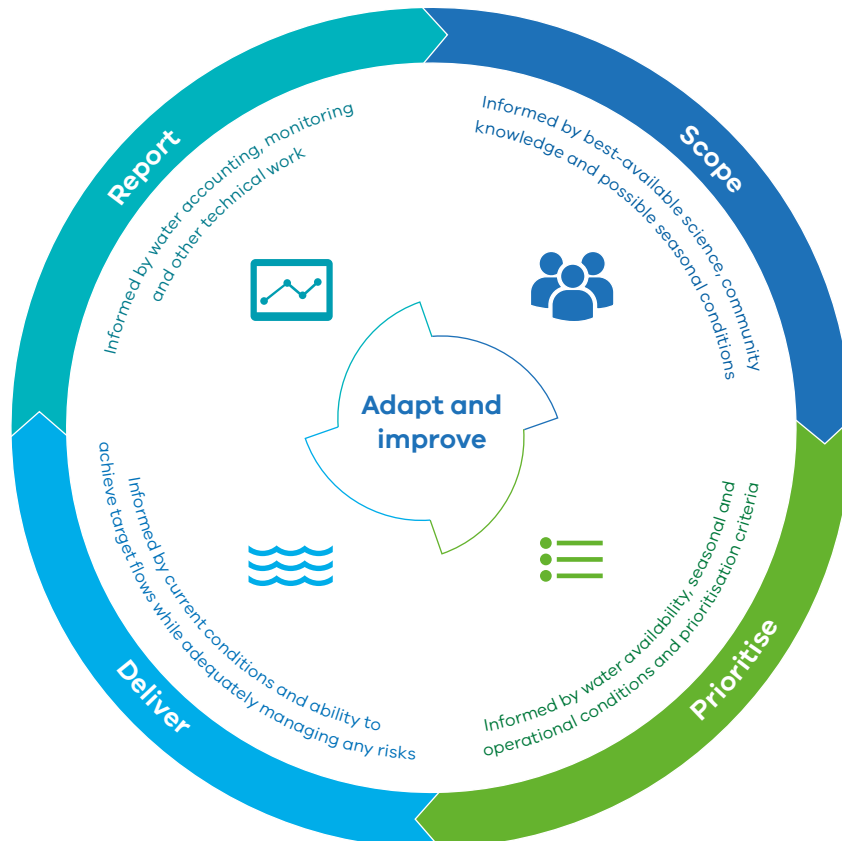
In 2011, the Victorian Environmental Water Holder (VEWH), an independent statutory authority, was established to hold and manage environmental entitlements. The VEWH works with waterway managers (catchment management authorities and Melbourne Water) to ensure environmental water entitlements are used to achieve the best environmental outcomes.

The VEWH currently holds environmental water entitlements yielding approximately 650 gigalitres per year (on average). In northern Victoria, the CEWH currently holds entitlements yielding approximately 621 gigalitres (Figure 3.8) – including those that contribute to Victoria's recovery target under the Basin Plan.

Environmental water has mostly been recovered through investment in a combination of infrastructure to reduce operational losses and purchases from farmers. Most water purchases from farmers took place between 2009 and 2012 when the 'Restoring the Balance in the Murray-Darling Basin Program' was at its peak.

Annual environmental water management cycle

Figure 3.7



Source: Victorian Environmental Water Holder, 2015

What is environmental water?

Water for the environment is protected as the environmental water reserve, which is the legally recognised amount of water available for the environment under the *Water Act 1989*. The objective of the environmental water reserve is to preserve the environmental values and health of water ecosystems.

The environmental water reserve is provided in three ways:

Environmental entitlements

These are secure rights to water for environmental outcomes. Environmental entitlements represent the amount of water authorised to be stored, taken and used to meet specific environmental needs. Environmental entitlements are legal rights to water and provide for a share of the water in a river.

Obligations on consumptive entitlements

Include the passing flows that water corporations or licensed diverters are obliged to provide to a river.

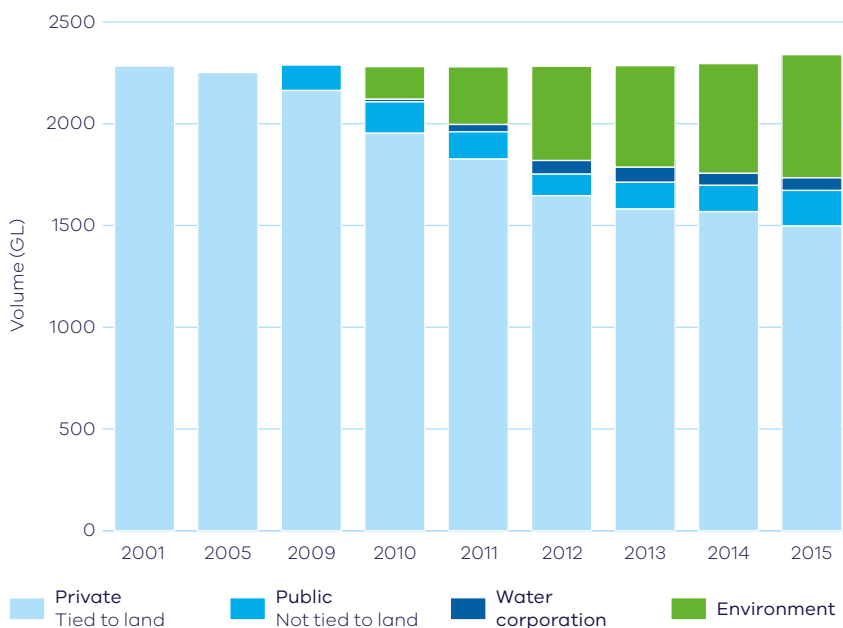
'Above cap' water

Includes water that is available after upper limits on sustainable levels of diversion have been reached and unregulated flows, which cannot be kept in storage. 'Above cap' water is considered a part of the environmental water reserve and may be groundwater or surface water.

In regulated systems, environmental water is primarily set aside through environmental entitlements. In unregulated rivers, environmental water is provided by diversion licence conditions, such as passing flow obligations, rostering and restriction rules. Most of the water available to the environment is 'above cap', which can be a very unreliable source of water and is susceptible to climate change.

Changing ownership of high-reliability water shares in northern Victoria

Figure 3.8



Note: The majority of environmental water shown in the above graph is held by the Commonwealth Environmental Water Holder. The Victorian Environmental Water Holder and water corporations also hold other water as low-reliability bulk entitlements.

In conjunction with a suite of additional environmental works and measures currently being considered by Basin governments, the Basin Plan will help restore environmental value and ecosystem services across the Basin. Victoria's priority sites for environmental water use are set out in regional waterway strategies.

Regional sustainable water strategies set water recovery targets for many rivers. While progress has been made on these targets severe drought conditions necessitated a number of water recovery proposals being put on hold. For example, there is a target for another eight gigalitres on top of the 10 gigalitres already recovered for the Thomson River.

The government supports existing commitments to increase environmental flows in the Thomson, Moorabool, Barwon, Werribee and Maribyrnong Rivers. The need for future increases in environmental flows across the state will be considered as part of the sustainable water strategy process (Chapter 8 Water entitlement and planning frameworks).

Arrangements under the Basin Plan

The CEWH manages Commonwealth environmental water entitlements, including the water recovered under the Basin Plan. The Basin-wide Environmental Watering Strategy sets out the long-term environmental targets to be achieved under the Basin Plan. In northern Victoria, the CEWH works in cooperation with the VEWH, the Living Murray program, catchment management authorities and environmental water holders in New South Wales and South Australia to plan, prioritise and use environmental water.

The next decade will be a period of consolidation and continual improvement. The VEWH, catchment management authorities and Melbourne Water will improve their use of existing entitlements to secure the best possible environmental outcomes in the face of climate change.

There will be increases to environmental entitlements in some southern Victorian river systems, but most effort will go into managing the existing portfolio. It will also be critical to strengthen the water entitlement framework (Chapter 8 Water entitlement and planning frameworks) to better protect unregulated rivers and wetlands from catchment activities that intercept water.

New opportunities for using stormwater and recycled water for environmental flows will be examined. Substituting stormwater for environmental flows would only occur where consistent with the beneficial uses of stormwater identified in the *State Environment Protection Policy (Waters of Victoria)* (Chapter 5 Resilient and liveable cities and towns).

In many cases, environmental watering outcomes can be dramatically enhanced with environmental works and measures. For example, floodplain regulators can significantly increase the area able to be watered, or maintain water levels for a longer duration, using a smaller volume of environmental water. Pumps can also be used to water wetlands which would otherwise be only watered by major floods. Monitoring the benefits of environmental water use is essential for demonstrating the value from investment, reporting and adaptive management.

The primary purpose of the environmental water reserve is to maximise environmental benefit. However, other activities that rely on a healthy environment also benefit. Environmental water managers actively maximise shared benefits (such as the provision of recreational values or the protection of Aboriginal cultural sites) when making decisions about environmental watering, where this can be done without compromising environmental outcomes. In some instances shared benefits may not be feasible. Clear and transparent decision-making will improve understanding of where this is the case.

The way we currently manage water provides shared benefits for environmental values. In regulated systems storage managers can plan to provide shared benefits by releasing water for entitlement holders in ways that provide environmental and recreational benefits.

In unregulated systems sustainable diversion limits control water diversions to protect the condition of our waterways.

Shared benefits are a critical part of protecting the condition of waterways and integrating the effective management of environmental water entitlements. The government proposes to continue to extend shared benefits by:

- requiring storage managers and water corporations to continue engaging and collaborating with environmental water managers to include environmental flow needs, along with the multiple uses of water and waterways, to provide shared benefits when possible
- requiring water managers to continue maintaining sustainable diversion limits in unregulated systems to support environmental condition of unregulated waterways.



Hattah Lakes Delivering shared benefits and efficient use of environmental water

Case study

In the early 2000s, Hattah Lakes, near Mildura, was threatened by river regulation, ongoing drought and low inflows. A partnership approach including the Mallee CMA, Murray-Darling Basin Authority, Parks Victoria, Goulburn-Murray Water, the Victorian Environmental Water Holder, the Commonwealth Environmental Water Holder and the local community saw environmental water delivered to revive the drought-ravaged lakes and permanent pumping mechanisms to ensure efficient use of the environmental water.

The \$32 million project ensures a sustainable future for this environmentally important wetland. This environmental recovery has created remarkable

opportunities for other industries as well. For example, McDonald Honey, a beekeeping and pollination business that has operated at Hattah Lakes since the late 1950s, benefited from the delivery of 74 gigalitres of environmental water to the lakes in 2014-15. This watering provided the best flowering event in approximately 20 years, helping the bees to produce large quantities of the highly sought after Red Gum and Black Box honey. After producing their honey at Hattah, bees are moved to Robinvale to pollinate almond orchards, then stone-fruit around Swan Hill, then cherry, apple and pear orchards across Victoria, delivering benefits for agriculture worth approximately \$5 million each year.

Cormorant, Hattah Lakes, image courtesy Mallee Catchment Management Authority

Proposed strategic direction

The government will continuously improve environmental water management practices by:

- continuing to work in close partnership with communities, regional partners, the Commonwealth and other state governments to achieve environmental outcomes under the Basin Plan and other intergovernmental agreements
- delivering on the existing commitment to provide an additional eight gigalitres of environmental water to the Thomson River
- reconfirming the environmental water recovery targets in the Central Region Sustainable Water Strategy and identifying options to meet existing shortfalls with local communities and stakeholders in the Moorabool, Barwon, Werribee and Maribyrnong Rivers
- continuing to invest in environmental works and measures to make the most efficient use of the available environmental entitlements and maximise environmental outcomes
- ensuring that the Victorian Environmental Water Holder, working with waterway managers, continues to identify and report on opportunities for shared benefits from environmental watering, which will support Aboriginal values and recreational benefits for local communities. This will occur where it is cost-effective and aligns with environmental objectives
- ensuring environmental watering program partners monitor and report back to communities on their progress towards expected environmental outcomes.

3.3 Strategic direction

Protecting waterways from the adverse impacts of human use

Waterway condition is very strongly influenced by the characteristics, processes and actions happening in the surrounding landscape. To protect all waterways from the adverse impacts of human use, a range of measures are used:

- The water entitlement framework provides caps on consumptive use, sets sustainable diversion limits and requires licences for works on waterways.
- Where applicable, planning controls are used to help ensure that new infrastructure is located and developed with due consideration of environmental values.
- Control of diffuse and point source pollution (including wastewater management) occurs through a combination of works approvals and licences, issuing of notices, formal enforcement and collaborative management frameworks to achieve the levels of protection required by the *State Environment Protection Policy (Waters of Victoria)*.
- Potable water supply catchment areas have specific planning guidelines to assess applications of the use and development of land within the area.
- Native vegetation permitted clearing regulations are in place to ensure impacts on biodiversity are factored into decisions about land use change and development.

With these measures in place, stronger links between the catchment management framework and the planning system could provide greater protection. To achieve this, greater attention will be placed on ensuring regional catchment management strategies provide clear guidance to assist with land use decision-making. In urban areas, integrated water management plans will identify important environmental values, to ensure they are not degraded as a result of urban development.

Waterways in urban areas are often adversely affected by urban development, the removal of riparian vegetation and channelisation. Future population growth will put further pressure on urban waterways. The government is committed to improving the liveability and resilience of cities and towns (Chapter 5 Resilient and liveable cities and towns).

As a first step, changes to the State Planning Policy Framework and planning provisions will provide clear objectives for building heights, setbacks and riparian vegetation protection along the Yarra River corridor between Punt Road, Richmond and Warrandyte. These new planning controls will support more consistent decision-making across council boundaries and will protect that part of the Yarra River from inappropriate development.

Holding an adult female platypus, captured along the Buchan River in East Gippsland, image courtesy Australian Platypus Conservancy





A win-win Water quality in the Wimmera River and Horsham's Kanamaroo Festival Case study

A key attraction of Horsham's annual Kanamaroo Festival is a water-skiing display on the Wimmera River. High water levels are needed in the Horsham weir pool to safely host the event, and in the lead-up to 2014's festival, the outlook was not good. Rainfall over winter had been well below average and the region was experiencing its driest spring in decades. The Wimmera River's water quality was poor with the Wimmera CMA planning to release a series of freshening flows to avoid fish and plant deaths.

Image courtesy Wimmera Catchment Management Authority

In a great win-win, the Wimmera CMA agreed to store the environmental water in the Horsham weir pool to keep water levels high enough to accommodate water-skiing and delay delivery of the spring freshes down the river until after the event. The upside for the river was that the freshes could be delivered as sharper peaks, making them more effective at improving water quality. Wimmera CMA looks forward to working with Horsham Rural City Council again in the future to investigate further opportunities to deliver shared benefits.

Proposed strategic direction

The government will protect all Victorian waterways from the adverse impacts of human use by:

- investigating opportunities to improve waterway protection mechanisms through planning instruments. For the Yarra River this will be explored through the work of the Yarra River Protection Ministerial Advisory Committee
- improving understanding of how and where land use and management in Victoria has the greatest impact on waterway health
- developing and implementing a new State Environment Protection Policy (Waters) to:
 - confirm the beneficial uses of Victorian ground waters and surface waters
 - confirm the water segments to which beneficial uses apply
 - set water quality indicators and objectives to protect beneficial uses
 - establish a contemporary risk-based framework for the management of unlicensed pollution sources – both point and diffuse sources in rural and urban areas
 - provide for the development of plans to manage improved water quality outcomes
 - enable water quality offsets to be used within catchments to maintain regulatory compliance within waterways, taking into account work previously conducted by the Victorian water industry.

3.4 Strategic direction

Strengthening community engagement and participation

The government is committed to providing opportunities for community involvement in waterway health decision-making. Victoria has a strong history of community-based natural resource management through programs like Landcare and Waterwatch. Over 30,000 volunteers participate in natural resource management across Victoria. Communities also contribute significant funding to waterway and catchment health. For example, in 2014–15, the community contributed an estimated \$173 million into catchment work through over 1,600 partnerships with catchment management authorities.⁹ The implementation of Our Catchments, Our Communities will enable strengthened community engagement in integrated catchment management (Chapter 10 Jobs, economy and innovation).

Proposed strategic direction

The government will strengthen community engagement and participation in waterway and catchment health through:

- involving the community to a greater extent in planning, priority and outcome setting, on-ground work and monitoring
- continued support of Landcare, Waterwatch, EstuaryWatch and other citizen science initiatives
- building partnerships with recreational anglers to plan, deliver and monitor projects to improve fish habitat.

3.5 Strategic direction

Improving waterway health knowledge, monitoring and innovation

The management of catchments and waterway health is underpinned by evidence-based decision-making and adaptive management. The adoption of best practice Environmental-Economic Accounts by the Victorian Government will improve reporting, decision-making and evaluations of waterway and catchment program investments. It will enable consideration of the synergies and trade-offs among multiple water, carbon and biodiversity outcomes.

The waterway health program has well established resource condition and operational monitoring programs in place, but greater focus on intervention monitoring, data for Environmental-Economic Accounting and strategic research is needed. Hence, Victoria's waterway resource condition monitoring programs (such as the Index of Stream Condition and the Index of Wetland Condition) will be evaluated and continually improved. Improving knowledge and monitoring programs is critical to understanding what we need to do to adapt to climate change.

Clockwise from left: community engagement, image courtesy Museum Victoria; Dr Paul Parnell of Deakin University sampling carbon storage levels at Reedy Swamp, Shepparton, image courtesy Goulburn Broken Catchment Management Authority; tree planting with Bass Coast Landcare, Geoff Russell, image courtesy Westernport Water.



Proposed strategic direction

The government will improve waterway health knowledge, monitoring and innovation by:

- establishing a waterway research hub to:
 - review Victoria's waterway monitoring program design
 - synthesise and share available knowledge and evidence
 - coordinate research to test assumptions about the relationship between outputs and outcomes
 - investigate new technologies to assist large-scale, long-term information gathering and how to perform work activities more efficiently and effectively
- developing and applying Environmental-Economic Accounting for waterway and catchment health to assist in decision-making
- investigating carbon accounting methods for waterways.

The waterway research hub will be based at the Arthur Rylah Institute and will work collaboratively across government and research organisations.



Water is
fundamental for
sustainable, productive
agriculture



Water for agriculture



4

The government will support farmers as they adapt to reducing water availability through improved water efficiency, better information, an open and transparent water market and investment in water infrastructure.



Water for agriculture

Proposed objective

The water sector will support sustainable productive agriculture, balancing the water needs of the environment, agriculture, industries and the community in managing water to support regional prosperity and jobs growth.

The discussion paper proposes to achieve this by:

adapting to reduced water availability and reliability

realising local opportunities to bring more water into production

ensuring viable investments in water infrastructure

managing the impacts of irrigation.

We will know we have succeeded when:

irrigation system efficiency and service levels have increased

rural communities' access to reliable water supply has increased

Victoria's agricultural sector is prosperous in a water-scarce future.



We need to adapt to reduced water availability and reliability

Image courtesy Gippsland Water

Water has an important role to play in supporting a prosperous agricultural sector that underpins prosperous regions across the state. Victorian agriculture, the primary production of food and fibre, is worth \$12.6 billion per year (2013–14). This is 25 per cent of Australia's agricultural production and the highest of any state or territory. Irrigated agriculture in Victoria was worth \$4.4 billion in 2013–14.¹ While our agriculture sector is diverse (Figure 4.1) there is potential for this to grow, within the sustainable limits of our natural resources, to meet increasing demand in Asia.

The Victorian Government's Food and Fibre Sector Strategy has a vision that by 2025 the food and fibre sector is creating new jobs and attracting talent, will have seen remarkable growth with more value adding and product differentiation, is demand-driven and achieving strong and sustained export growth, and has welcomed a diversity of business models, technologies and production systems. The sector must continue to pursue productivity improvements and innovative ways of sustainably generating more output and value from our land and water resources to remain competitive.

Victoria's agriculture sector operates in an open, internationally competitive market and is impacted by changes in climate. Water is a fundamental input for the production and processing of food and fibre products, yet reliable access to water remains a challenge for some businesses. Improving the water use efficiency of rural supplies and realising the benefits of the state's significant investment in modernising irrigation infrastructure is a priority for the agriculture sector. The government's Regional Statement also supports more productive use of non-urban regional land.²

Farmers make their own business decisions about water use and farm management in response to many factors including water availability, reliability and price. The farming sector is constantly adjusting with long-term

trends towards larger property sizes, more intensive and efficient production systems and changing crop types to meet the demands of domestic and export markets. The agricultural sector must continue to lift productivity to be successful within this context.

In irrigation areas this is resulting in a trend to fewer, larger farms sometimes in new areas and an increase in the number of small lifestyle properties, which have been substantially dried off and where the occupants rely on off-farm income.

It is important that Victoria maximises the productivity and shared benefits of our limited water resources. A healthy environment is essential to the state's prosperity and the agriculture sector has played a key role in the shift to more sustainable outcomes, particularly with the recovery of water for the environment in the Murray-Darling Basin, and development of local management rules in groundwater and unregulated systems.

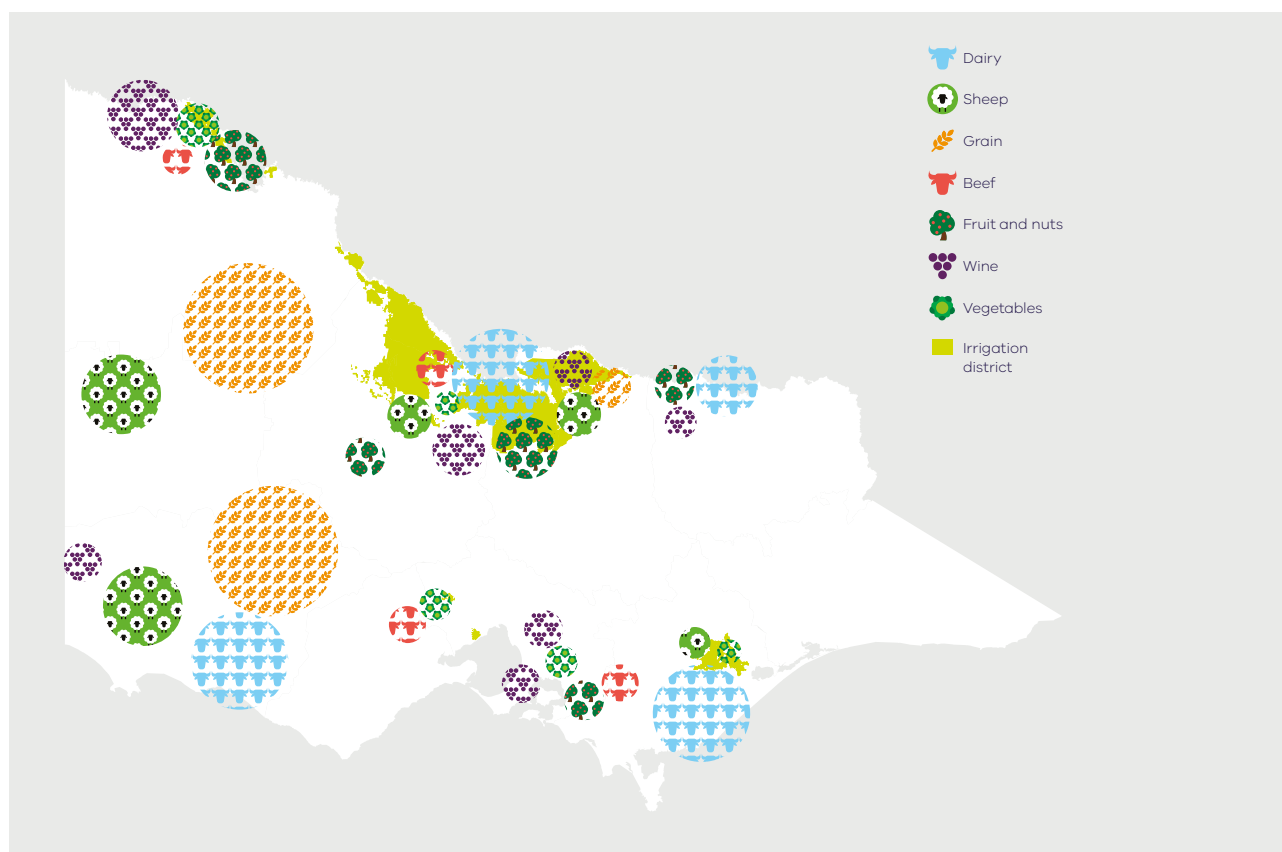
Victoria's water entitlement framework is the means by which all water users, including agricultural users, access water supplies. The entitlement framework provides certainty around the rights and obligations of entitlement holders. It provides individual entitlement holders with the flexibility to purchase additional water to improve productivity and grow their business. It also improves the choices irrigators have to reduce the costs of droughts through the use of the water market and carryover.

The water entitlement framework aims to provide as much certainty as possible to underpin investment in agriculture; the key economic driver in many regional communities.

There are marked differences in water availability, use and challenges and opportunities across the state (Figure 4.2).

Victoria's agriculture sector is diverse³

Figure 4.1



Map is indicative only

4.1 Strategic direction

Adapting to reduced water availability and reliability

The total availability and reliability of water across the state is expected to continue to decrease due to climate change. The recovery of water for the environment under programs such as the Murray-Darling Basin Plan has reduced water available for consumptive use. These changes will increase the challenge for agricultural producers to source water to maintain and expand their production, while adapting to meet changing market opportunities.

One impact of reduced water availability is affordability. Affordability for rural water customers is made up of three key components (Figure 4.3):

- charges levied by the rural water corporation to recover the costs of providing rural water services (service charges)
- market prices for water; the costs of purchasing additional water above existing held entitlements or seasonal allocations
- farm irrigation costs.

Service charges are normally a combination of fixed and variable charges. These charges are based on the cost of maintaining irrigation systems and delivering water. The government expects these charges to be kept as low as possible by water corporations continually improving the efficiencies of their business. The rural water corporations' tariff structures are designed to send a signal to customers about the cost of delivering a service; they also help facilitate system changes as they prompt customers to consider what services they require. Victoria's independent economic regulator, the Essential Services Commission, is responsible for overseeing and approving the charges and tariffs proposed by the water corporation (Chapter 10 Jobs, economy and innovation).

The government recently published a Water Markets Trends report for northern Victoria.⁴ It summarises 15 years of water availability and water trade information, and it clearly shows changes in water ownership (refer to Chapter 3 Waterway and catchment health, Figure 3.8). Since 2009, up to 26 per cent of the available water has been recovered for the environment, through buy-backs and investments in water savings. In some cases water entitlements were sold during the Millennium Drought to enable agricultural enterprises to keep going.

Figure 4.2



Water challenges and opportunities vary across the state



North

Water sources

- Regulated surface water
- Groundwater
- Unregulated surface water

Challenges and opportunities

- Changed water use locations and timing for demand
- Highly connected systems along both sides of the Murray river
- Reduced consumptive pool due to environmental water recovery
- Limited unallocated or unused water
- High reliability water entitlements
- Increasingly efficient agricultural industries
- Highly developed water market
- Climate-based pressures on unregulated river systems
- Opportunities for development into dried-off blocks in irrigation districts, especially in the west



South

Water sources

- Regulated surface water
- Groundwater
- Unregulated surface water
- Recycled water

Challenges and opportunities

- Physically disconnected water systems
- Unallocated and unused water
- Increasingly efficient agricultural systems
- Less developed water market
- Largely groundwater-dependent in the west



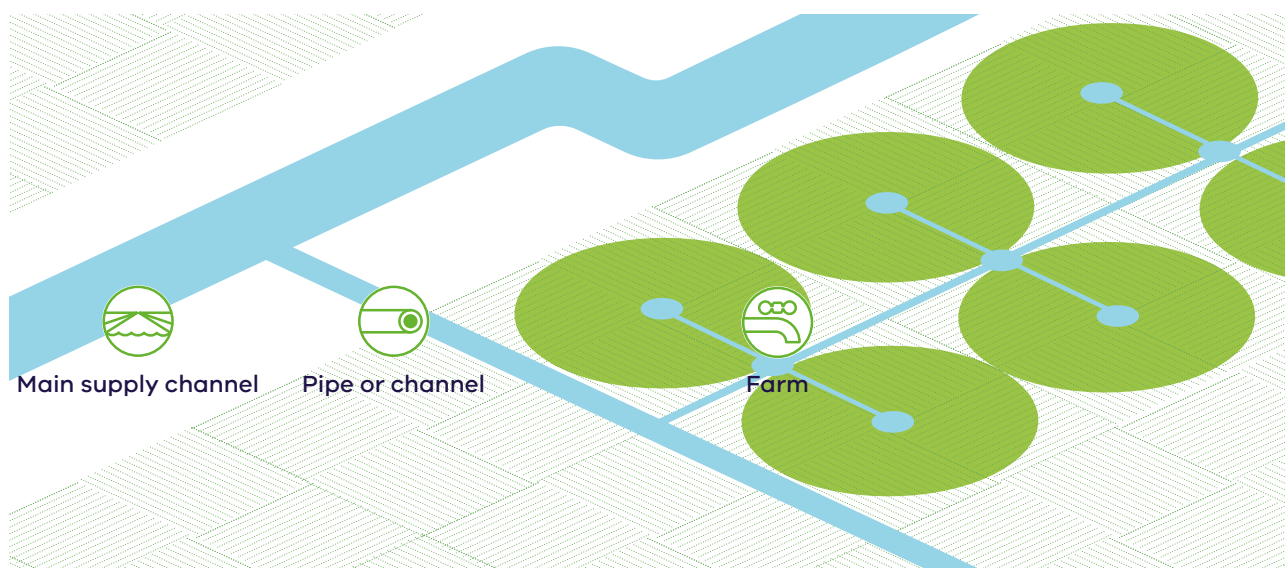
Whole of Victoria

Challenges and opportunities

- Decreasing water availability due to climate change
- Environmental water delivery
- Uneven distribution of water sources
- Infrastructure modernisation
- Increased demand for good quality, reliable regulated water supplies
- Increasing demands for food and fibre production
- Improved or expanded water markets

Affordability of water in Victorian irrigation districts

Figure 4.3



Market price of water

Permanent entitlements and seasonal allocation

Affordability depends on

Supply and demand in response to changes in climate, commodity prices and environmental water recovery from consumptive users under Basin Plan



Water corporation service costs

Fixed and variable

Affordability depends on

Age and size of the supply system
Number of customers and expected levels of service

Water corporation performance in efficient and innovative service provision



Farm delivery costs

Including operation and maintenance

Affordability depends on

Farm irrigation system selection
Energy source and energy prices

A further seven per cent of entitlement is privately held and not attached to land, although at least a third of this water appears to be associated with other accounts attached to land. Water corporations have secured three per cent to meet non-agricultural water needs. Sixty-four per cent is retained for private use tied to land.

The key driver to the overall price of seasonally allocated water (traded on an annual basis) and on entitlement (permanent change of ownership of a water share) is water availability. In the southern Murray Basin (Figure 4.4) seasonally allocated water reached a peak median price of around \$400 per megalitre during the drought (with a maximum of around \$1,000 per megalitre at one point) to around \$20 per megalitre during the very wet years of 2011–12.

The water market has worked within a slowly changing balance between horticulture, dairy, rice and mixed farming. In recent years, water recovery for the environment, and the increase in perennial horticulture outside of irrigation districts, has rapidly changed that balance. With such a wide variation in price, and in particular the peaks associated with

dry years, this is reducing the ability of different agricultural sectors to access water to maintain and grow their businesses and manage through droughts.

Lower deliveries in northern irrigation districts places upward pressure on service charges as the full cost to operate the system is recovered from a smaller customer or usage base. Cost recovery pressures are already evident in certain areas, including the Goulburn–Murray Irrigation District, which once delivered over 2,000 gigalitres per year, but is now unlikely to deliver more than 1,400 gigalitres when water is plentiful and potentially under 1,000 gigalitres when water is scarcer.⁵ The irrigation infrastructure needs to adapt to the volume of water that is in the system.

Victoria's irrigated agricultural sector is already leading in both the value of production and productivity (Figure 4.5). Productivity is likely to continue to lift as irrigators maximise water use efficiency on-farm, and use water on the most productive crops (sometimes in new areas). The water market facilitates this shift to more productive uses of water, through decisions made by individual farmers.

The government recognises that this places pressure on local communities in areas where farmers sell water. The government proposes to explore options to support these local communities.

The key factors affecting the changing value of water and some of the options to respond are summarised in Table 4.1. The government supports the right of farmers to buy and sell water to meet the needs of their businesses. However, the government has an important ongoing role in supporting efficient water use on-farm, supporting efficient delivery systems and helping irrigators make informed decisions about their future water needs through independent advice.

The government also has an important role to play in ensuring the market information needed by farmers is openly available and the rural water corporations are performing efficiently. These approaches are further outlined in Chapter 9 (Realising the potential of the grid and markets) and Chapter 10 (Jobs, economy and innovation).

Proposed strategic direction

Victoria will support water users to adapt to reduced water availability by:

- supporting an open water market, with transparent market information and free from artificial barriers to trade to provide users with the greatest possible flexibility to respond to changes in external factors
- monitoring, assessing and reporting on the capacity of the system to deliver water
- ensuring tariffs and charges reflect the costs to deliver water.

Implementing the Murray-Darling Basin Plan

The government supports the balanced implementation of the Murray-Darling Basin Plan. The Plan has set a water recovery target of 2,750 gigalitres. Part of this target may be offset by environmental works and measures (up to 650 gigalitres), for example pumps and regulators. These environmental works and measures will deliver equivalent environmental outcomes with less water. Victoria's share of the 2,750 target is 1,075 gigalitres. Victoria has recovered 679 gigalitres to date, and has projects in place to recover 824 gigalitres, or 76 per cent of Victoria's share.

The government supports meeting any remaining water recovery through investing in infrastructure to improve system efficiencies and maximising the 650 gigalitres of environmental offsets.

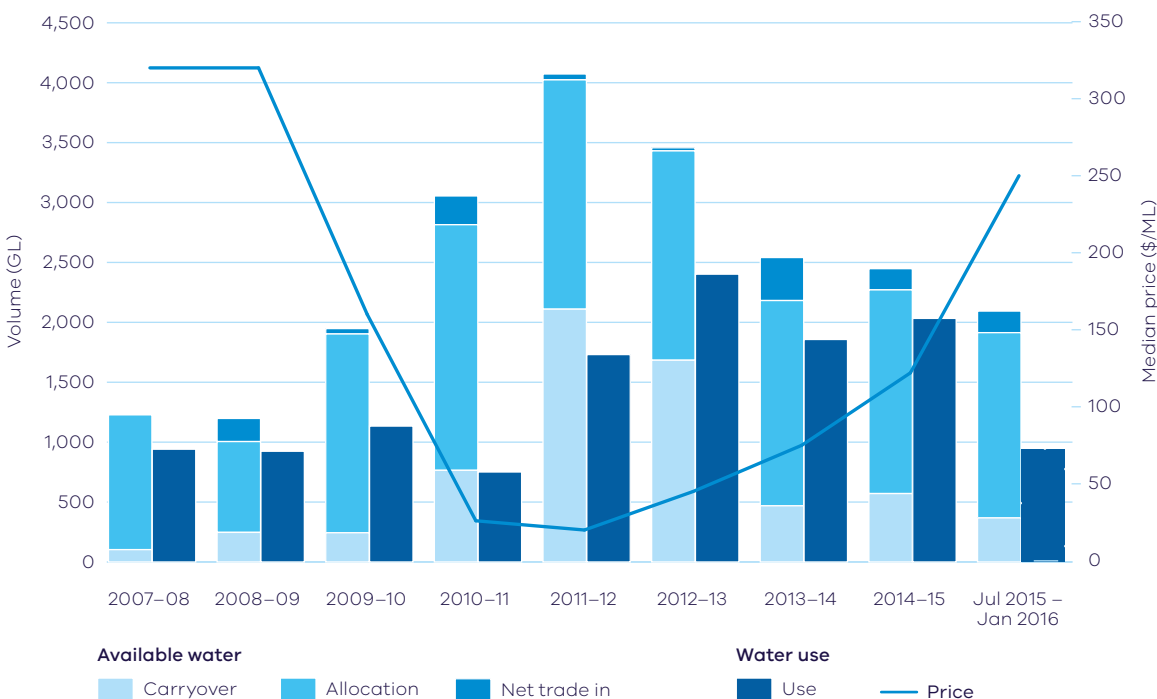
In addition to the 2,750 gigalitre recovery target, the Commonwealth aims to recover an additional 450 gigalitres of water for the environment subject to there being a neutral or positive socio-economic effect.

The Victorian Government recognises the need to properly assess and understand social and economic impacts, particularly on local irrigation-dependent communities. The criteria of neutral or positive socio-economic effects needs to be rigorously applied to any proposals to recover water over and above the 2,750 gigalitres target.

Studies are underway to determine the feasibility of options to overcome constraints at seven sites in the southern Murray-Darling Basin to deliver increased environmental flows. Basin Ministers have agreed that there will be close community and landholder involvement in the examination of options and that they will be considered as an interdependent package across the southern Basin.

Private water availability, use and allocation price Northern Victoria

Figure 4.4



Proposed strategic direction

The government will:

- continue to prioritise projects that will help it meet its 1,075 gigalitre obligation under the Basin Plan, maintaining a focus on system efficiencies
- seek to maximise the sustainable diversion limit offsets up to 650 gigalitres, with other Basin jurisdictions. Together these two directions will ensure no non-strategic water purchase is needed from the Commonwealth Government
- undertake its own socio-economic impact analysis into the impact of water recovery, to ensure that any further recovery from Victoria is based on robust evidence that it can be done with neutral or better social and economic impacts. This work will inform Victoria's discussions with the Commonwealth Government
- participate in a coordinated interstate process to investigate the feasibility of addressing constraints to environmental water delivery in the southern Murray-Darling Basin, with strong community involvement.

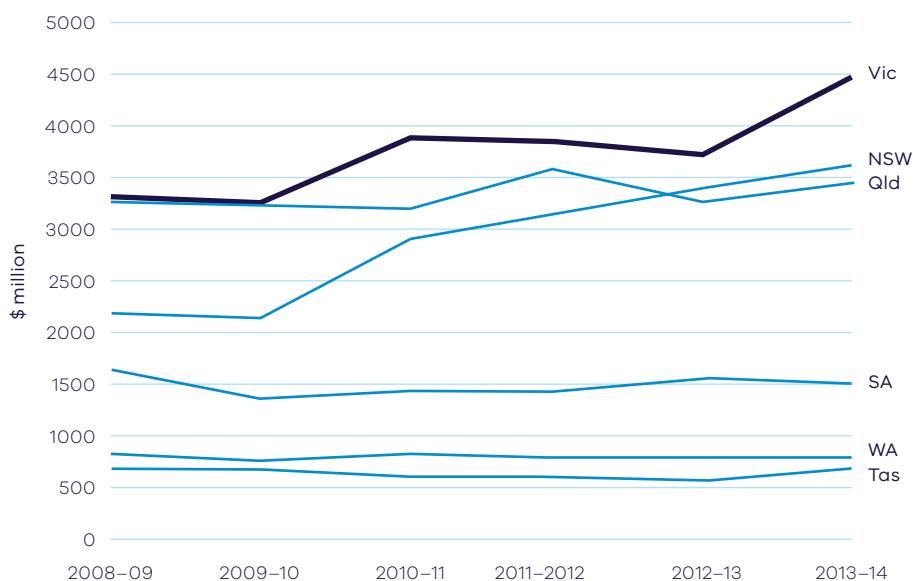
Improving rural resilience outside irrigation districts

Climate change science indicates that while average rainfall and water availability is likely to decline in future there is a greater likelihood of intense summer rainfall events, which can lead to flooding. There are about 130 rural drainage schemes covering 1,500,000 hectares of floodplain across the state. These schemes manage flooding and water-logging outside irrigation districts and are different from the public drainage schemes within districts. Rural drainage, while improving productivity, can damage the environment, with wetlands drained, creeks cleared and poor quality water diverted into streams. There can also be negative effects as water is moved from one property to the next. The floods of 2010–11 and 2013 highlighted the need for a management framework to provide certainty around the cost and responsibilities for rural drainage.

The 2013 Environment and Natural Resources Committee's parliamentary inquiry into rural drainage infrastructure identified significant policy gaps in rural drainage, which are detrimental to farm productivity and the environment. The inquiry made 32 recommendations regarding management and governance issues, including the development of a Victorian Rural Drainage Strategy.

Gross value of irrigated agriculture across Australia

Figure 4.5



Source: Water Account Australia 2013–14

Government, water corporation and farmer options for responding to the changing value of water

Table 4.1

Market price of water depends on	Water corporation service charges depend on	Farm costs depend on
<p>Amount of supply</p> <ul style="list-style-type: none"> seasonal allocations in Victoria seasonal allocations in NSW amount of carryover amount of water on the market constraints on inter-valley trading 	<p>Water corporation decisions affecting supply</p> <ul style="list-style-type: none"> management of system losses attracting new customers to maintain deliveries 	<p>Farmer decisions affecting supply</p> <ul style="list-style-type: none"> management of carryover amount of water entitlement held amount of delivery share held investment to minimise on-farm losses investment in reuse schemes investment in supplementary groundwater supplies trade-offs between energy and water use
<p>Amount of demand for water</p> <ul style="list-style-type: none"> seasonal conditions – rainfall and temperature types of crops being grown amount of crops being grown commodity prices comparative costs of water substitutes comparative costs of farm efficiency measures 	<p>Amount of demand</p> <ul style="list-style-type: none"> customer service levels levels of fees and charges ensuring the efficient and effective functioning of organisation divest or resize surplus/oversized assets proactive asset management 	<p>Farmer decisions affecting demand</p> <ul style="list-style-type: none"> seasonal conditions – rainfall and temperature type, area and mix of crops irrigation system and management trade-offs between fodder supplements and water trade-offs between the amount of land used and the amount of water used
<p>Operation of the market</p> <ul style="list-style-type: none"> information disclosure number of buyers and sellers register fees and charges broker fees and charges 		<ul style="list-style-type: none"> water market strategies
<p>Government options to respond to changing market price</p> <ul style="list-style-type: none"> minimise transaction costs on the market remove unnecessary barriers to trade 	<p>Government options to respond to changing service costs</p> <ul style="list-style-type: none"> strong economic regulation to protect customer interests and drive efficiency 	<p>Government options to respond to changing farm costs</p> <ul style="list-style-type: none"> maximise choice for entitlement holders
<ul style="list-style-type: none"> maximise the ability to use carryover 	<ul style="list-style-type: none"> support asset rationalisation in response to farmer adjustment 	<ul style="list-style-type: none"> support access to information and training for water use efficiency research opportunities to control farm water costs
<ul style="list-style-type: none"> deliver Basin Plan environmental water commitments through infrastructure and supply measure projects to maximise the efficient use of environmental water 	<ul style="list-style-type: none"> streamline regulation and reporting minimise the business costs of conforming to the Basin Plan benchmark water corporation performance reduce cost of Murray-Darling Basin Authority services 	<ul style="list-style-type: none"> streamline regulation



Recycled water supporting small-scale high value agricultural development

Case study

Because land disposal capacity at the Portarlington Water Reclamation Plant (WRP) became limited in the late-1990s, Barwon Water sought disposal alternatives for treated effluent. A local winery took the opportunity to fund the construction of a private transfer pipeline from the WRP, thereby securing a reliable water source for their business. This generated much interest in this new resource – producing on average 400 megalitres of recycled water each year.

Image courtesy Barwon Water

Several smaller vineyards and other agricultural customers have now connected to the private recycled water scheme, using around 130 megalitres per year on average.

Not only did access to recycled water protect vines during droughts, it also allowed the winery to expand its business through efficient and sustainable water use. It is now rated among the James Halliday Top 100 Australian Wineries and is a major tourist attraction on the Bellarine Peninsula.

Proposed strategic direction

The government will develop a Victorian Rural Drainage Strategy for public release within two years. It will be prepared through an open and consultative process.

Increasing flexibility for consumptive uses of water in unregulated systems

The impacts of climate change are challenging the relationship between environmental and consumptive uses and the management rules that underpin sustainable water use. In unregulated surface water systems, consumptive users are seeking more flexibility so they can sustainably use or trade their water entitlements to adapt to the impacts of climate change. This will be considered in reviews of trading and management rules (Chapter 9 Realising the potential of the grid and markets). Greater access to water through opportunities such as controlled access to high flows will also be considered (Chapter 8 Water entitlement and planning frameworks).

4.2 Strategic direction

Realising local opportunities to bring more water into production

Groundwater and unregulated streams

The government is committed to protecting existing entitlement holders and the environment from third party impacts and managing Victoria's water resources within sustainable limits (see also Chapter 8 Water entitlement and planning frameworks). Caps on diversions and trading rules are established in many groundwater and unregulated surface water systems for this purpose.

In some discrete locations throughout the state there are some opportunities for increased agricultural production, using groundwater or unregulated surface water within sustainable limits. The size of these opportunities varies, but volumes are generally much smaller relative to that available in regulated surface water systems.

Most of Victoria's high quality and readily accessible unregulated surface water and groundwater is held in entitlements, so users in those areas need to trade with an existing licence holder to access water. Where there is demand for more consumptive water, the permanent or temporary trade of licences can be limited by the small pools of buyers and sellers, the physical limitations of the systems and the reluctance of many entitlement holders to trade at the offered price. Some licences are held as a drought reserve.

Increased market information in these areas may lead to increased opportunities for trade, and it may also be possible to broaden areas within which trade is possible in order to increase market depth. Levels of demand and people's willingness to pay will drive the degree to which the market develops. For example, in southern Victoria there is around 102 gigalitres of groundwater entitlement that is rarely or never used, with limited trading activity. Over time, higher value industries may pursue this opportunity. The government's approach is to review and improve trading rules with the aim of increasing opportunities for licences to be traded between users, allowing more agricultural production (Chapter 9 Realising the potential of the grid and markets). Any risk to existing users, the environment and third parties associated with increasing use will continue to be managed through water planning and the assessment of individual licence trades.

There is also some scope to make more water entitlements available for consumption in some areas, where it does not negatively impact the environment. For example, around 15 gigalitres of new entitlement from the deep Dilwyn aquifer may be made available by Southern Rural Water during 2016. Although this water is expensive to access, demand for it is high because the local shallower system entitlements have reached sustainable limits and trade options are limited. More entitlements may be made available from this aquifer in the future.

In some areas, water is available but not taken up, potentially due to the high installation and set-up costs involved in building dams or drilling bores. Additional surface water was identified through the Gippsland and Western Region Sustainable Water Strategies as part of the introduction of a precautionary cap of the water resource in southern Victoria. For example, an additional 500 megalitres was identified as being available for use in the Genoa and Cann catchments and 1,500 megalitres in the Tambo catchment. This was done in a precautionary way, taking into account likely demand for additional water, potential impacts on existing users and environment and climate uncertainty. There is currently a total of 26,970 megalitres of unregulated surface water (winter-fill only) available in a limited number of systems. To date only a limited volume of this entitlement has been taken up and demand for this water has not reached the cap. This indicates that the costs associated with accessing the additional water, that is, the costs of storing water in private storages or managed aquifer recharge and the costs of installing irrigation equipment, may be prohibitive to irrigators.

As water availability across Victoria reduces, agriculture in Victoria becomes increasingly productive and the value of water increases, these opportunities are likely to become more attractive.

The potential for converting take and use licences (section 51 licences under the *Water Act 1989*) in unregulated surface water and groundwater systems into water shares and other related products will also be examined (Chapter 8 Water entitlement and planning frameworks).

Alternative fit-for-purpose water

Alternative fit-for-purpose water supplies, while not suitable for drinking, are fit for many other purposes, including agriculture and industry. Alternative fit-for-purpose water includes harvested urban stormwater, recycled water and lower quality groundwater, which can also support agricultural development, particularly close to urban areas. Using harvested urban stormwater and recycled water as alternative sources of supply has the added advantage of limiting environmentally damaging discharges to waterways.

Alternative fit-for-purpose water has a number of agricultural uses and many water corporations already supply recycled water to agricultural customers. For example, growers in the Werribee Irrigation District have used Class A water from the Western Treatment Plant for over 10 years.

Because expensive infrastructure is required, supplying recycled water to agricultural businesses can be costly, but there may be economically efficient opportunities to use fit-for-purpose water for irrigation in Bacchus Marsh and Werribee, and on other arable land near urban areas. To realise opportunities, information about the water resource needs to reach potential investors.

See Chapter 5 (Resilient and liveable cities and towns) and Chapter 8 (Water entitlement and planning frameworks) for additional information on the use of alternative water sources.

Proposed strategic direction

Water corporations will provide water resource information for consideration in regional planning by local governments and agribusiness investment facilitation by the Department of Economic Development, Jobs, Transport and Resources. This will include information on both traditional and alternative fit-for-purpose water supplies.

4.3 Strategic direction

Ensuring viable investments in water infrastructure

Investing in water efficiency

Victoria is focused on increasing the efficiency of distribution systems and on-farm practices in order to make the most of our water resources and infrastructure. Increasing efficiency means that water previously lost through evaporation, leaks or runoff can be reclaimed for environmental or consumptive use. It also increases the reliability of supply.

Distribution system efficiency can be below 50 per cent in unmodernised systems and up to 85 per cent in modernised systems,⁶ and increased farm efficiency can save up to two megalitres per hectare each watering.⁷

Together, delivery systems and on-farm works will help irrigators operate at larger economies of scale, drive regional jobs growth and support prosperous communities. This is consistent with the government's Food and Fibre Sector Strategy.

The Victorian and Commonwealth Governments and rural water customers have already invested substantially in irrigation modernisation projects throughout Victoria. Major projects include the Goulburn-Murray Water Connections Project (\$2 billion), Macalister Irrigation District 2030 Phase 1A Project (\$32 million), Sunraysia Modernisation Project (\$120 million), Goulburn-Murray Irrigation District on-farm irrigation efficiency projects (\$200 million) and the annual Sustainable Irrigation Program through the Department of Environment, Land, Water and Planning.

The Goulburn-Murray Water Connections Project aims to recover 429 of more than 800 gigalitres of average annual water losses from the system. Water recovered through this project will be issued to environmental water holders, thereby avoiding the need to buy back the same volume of entitlement. The recently released mid-term review of the Goulburn-Murray Water Connections Project Stage 2, and an internal review by Goulburn-Murray Water, both concluded that significant changes to project delivery must be made if the project is to deliver affordable water delivery services and the required water savings on time and on budget.

The system will be delivering less water than in the past and will need to be carefully tailored to provide fit-for-purpose delivery infrastructure and connections. The need for change is largely driven by the realisation that water deliveries are lower than previously assumed – and decreasing – and the number of customers to be connected has increased. This project is undergoing a reset to optimise the outcomes. The government is committed to completing the project to ensure it creates a sustainable future for the Goulburn-Murray Irrigation District. The government will work productively with communities to implement the project, which will support and promote productive agriculture and enhance the environment, locally and across the Basin.

Proposed strategic direction

The government will investigate ways to support the long-term viability of Victoria's irrigation sector by:

- focusing investment on rural water infrastructure that improves irrigation system efficiency and levels of service, consistent with agreed investment principles
- providing specialist independent advice and incentives for whole-of-property-planning to irrigators, enabling them to make informed decisions about their water use and to participate in broader system modernisation projects.

Investing in improved drought resilience for rural communities

Many parts of Victoria have limited or no connection to the state's water grid (Chapter 9 Realising the potential of the grid and markets), and may be limited in the number of accessible water sources. Some rural areas of Victoria are therefore especially vulnerable to the effects of drought and climate change.

There is no statutory obligation for all rural properties to be provided with a water supply. It is therefore crucial that rural landholders and prospective investors understand their water supply arrangements and make informed, risk-based decisions.

Rural landholders can access water for non-irrigation purposes (including household supply, livestock watering and other agricultural purposes) through access rights to groundwater and surface water, take and use licences and reticulated supply. The level of water reliability provided by these different sources, and their affordability, varies across the state. Local governments should consider their water supply and availability options, as part of regional growth planning, to ensure water demands of new rural developments can be met.

The government is seeking regionally driven solutions to improve long-term water reliability in rural areas. In areas without access to reliable supplies, landholders should work with their local government in the first instance to understand their vulnerability to drought and climate change, their options for addressing it in the long-term, and their willingness to contribute to capital and ongoing costs.

In some areas, farmers are currently experiencing on-farm water shortages due to drought. The government has previously provided funding to local government authorities and water corporations to provide emergency water supplies for critical needs during drought. These emergency water supplies are owned and managed by local government and water corporations. Improvements could be made to these arrangements to ensure that local government and water corporations can continue to provide rural communities with emergency water supplies.

Proposed strategic direction

The government will investigate ways to increase the resilience of rural communities by:

- investing in rural water infrastructure that increases access to water for domestic and stock use, consistent with agreed principles
- improving information on the constraints and availability of Emergency Water Supply Points. The government will clarify the roles and responsibilities of local government and water corporations in the management of Emergency Water Supply Points. The government will also clarify pricing policy for emergency water supplies.

There are many factors influencing the viability of different forms of agriculture across the state, but water is a critical one. The government proposes to enable opportunities to redevelop irrigation districts and expand agriculture in areas where water is available and can be delivered within the capacity of the system. In southern Victoria in particular, potential areas for agricultural growth include dairy around Warrnambool and an expansion of the Macalister Irrigation District.

The information and approvals required by potential agricultural investors and irrigation proponents are provided through a number of different agencies. The preliminary stages of irrigation development, in particular, could be better facilitated to reduce the complexity, uncertainty and time associated with gathering information and obtaining approvals for both new investment and redevelopment projects. The government's new initiatives to form Regional Partnerships and an agribusiness facilitation service, will help support greater coordination and integration, complementing the existing services provided by Invest Assist. There are opportunities to make water information more accessible to these services and the investors that they support. This would support viable agricultural development by ensuring that in the future, access to water, and its availability and reliability are considered before other approvals have been sought and investments have been made.

Macalister Irrigation District Case study

The government and Southern Rural Water irrigators have invested \$32 million in modernisation of the Macalister Irrigation District. Phase 1A of this project will increase water efficiency and reduce water losses by approximately 14,400 megalitres. It will also increase the reliability of supply, enable timely delivery of orders and consistent flow rates and, in turn, the flexibility of farm businesses. This will support economic growth associated with both on-farm and local processing. It will also provide environmental benefits by reducing nutrient discharge to the Gippsland Lakes.



Image courtesy Southern Rural Water

Proposed strategic direction

The government will consider future funding for rural water infrastructure projects using the following principles:

Net public benefit

- the health of the environment must be maintained or improved
- net public benefits to the regional economy and community values must be demonstrated.

Long-term viability

- it is consistent with Regional Strategic Plans, Regional Growth Plans and land use planning
- net benefits will be achieved under a range of future water availability scenarios
- it is consistent with any relevant land use suitability assessments, including soil quality and agricultural policy
- user demand and support for the proposed service is demonstrated, including assessment of its long-term service cost affordability.

Value for money

- it has undergone a positive and comparable cost-benefit analysis of social, economic and environmental outcomes, including water savings, economic growth and environmental sustainability
- cost share with proponents is proportionate to the public and private benefits.

Enabling viable private investment in agricultural development

Regional Development Victoria is the lead agency for economic and community development in regional Victoria. It is supporting the government's nine new Regional Partnerships and it also has a broader role in regional governance, supporting existing Regional Strategic Plans and Regional Development Australia Committees. Regional Strategic Plans outline long-term visions and priorities and provide a framework in which communities can set their own priorities and work in partnership with industry and government to deliver initiatives and projects tailored to local needs.

Drawing on Regional Strategic Plans, Regional Partnerships will provide a new vehicle to share information and identify regional priorities. This coordinated approach will allow water corporations, catchment management authorities and local government to work in partnership across government and with business and community to:

- proactively identify local strategic priorities to support economic growth
- provide strategic advice on regional priorities across economic, social and environmental issues to the government.

Proposed strategic direction

The water sector will work with the Department of Economic Development, Jobs, Transport and Resources' Invest Assist and agribusiness facilitation service and with the Regional Partnerships to:

- clarify and communicate roles and accountabilities when facilitating agricultural development opportunities in new or existing areas
- ensure water users and potential investors have access to the water-related information that they need to make timely and informed decisions about potential new environmentally sustainable agricultural developments.

The water sector will work with the Department of Environment, Land, Water and Planning to streamline water-related regulation and approval processes while maintaining protections for third parties and the environment.

Land use planning

Land use planning determines the allowable land uses for particular areas. It complements investment in agriculture and other sectors. Decisions made in the land use system can affect investment decisions, as well as the viability of existing agricultural areas. In Victoria, Regional Growth Plans are developed collaboratively between local governments. They are a key outcome of Regional Strategic Plans, providing a common approach to land use issues and setting directions for growth and land use change. The planning system provides for a range of rural and urban zones across Victoria, including the Farm Zone, Rural Conservation Zone and the Rural Living Zone. Rezoning of agricultural land can only occur following careful consultation and strategic planning.

Proposed strategic direction

The water sector will support agricultural development by providing information and advice to planning authorities on long-term water supply, availability and reliability. Regional Partnerships provide a mechanism to consider if proposed land use zone changes are consistent with rural water infrastructure investment and government's food and fibre objectives, where this is a regional issue.



Incorporating land use planning into agricultural viability and district rejuvenation

Case study

Mildura Rural City Council's Mildura Older Irrigation Area (MOIA) Incorporated Document is one example of how a community has explicitly grappled with the balance between retaining productive farming land and improving the amenity of rural living. It aims to:

- protect land within the area for horticulture
- facilitate expansion of the horticultural businesses within the area
- ensure land values reflect the horticultural value of the land
- restrict new dwellings within the area
- minimise conflict between non-horticultural uses and horticultural businesses.

Building on this, Lower Murray Water is engaging with its customers and partner agencies to develop strategies for agricultural renewal in the MOIA. A pilot project aims to reduce barriers to agricultural growth, streamline the aggregation of small holdings to viable sizes and reinvigorate the MOIA. Working with potential investors to renew productive irrigated agriculture in the region, the project will build on the success of the Sunraysia Modernisation Project. A new dedicated resource in Mildura will coordinate and facilitate these developments across government departments and agencies in water, environment, land, planning and economic development.

Image courtesy Lower Murray Water

4.4 Strategic direction

Managing the impacts of irrigation

During the 1960s, 1980s and 1990s prolonged periods of high salinity in the Murray River affected water users in Victoria, New South Wales and South Australia. Land salinisation across Victoria caused millions of dollars of agricultural production losses per year and damaged local roads and other critical infrastructure. Similarly, nutrient runoff from fertiliser use and livestock waste also caused negative environmental effects.

Victoria's approach for managing the impacts of irrigation focuses on:

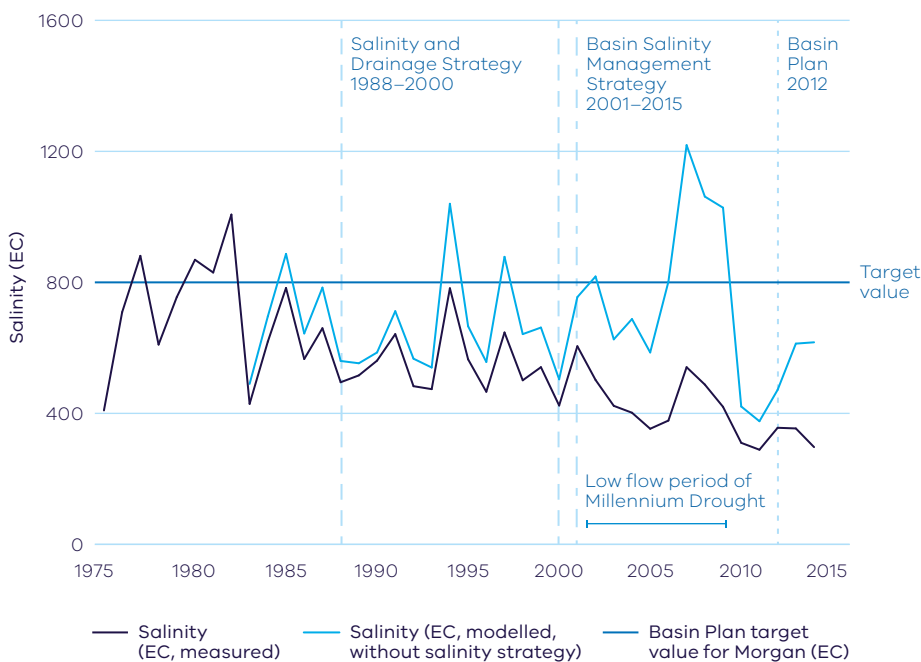
- improved on-farm practices
- catchment programs to manage regional impacts.

Significant improvements in on-farm management and catchment management have reduced the effects of salinity, water logging and nutrient runoff on the environment and on productive land. Improved irrigation management has also increased water use efficiency and drainage reuse.

The Department of Environment, Land, Water and Planning's Sustainable Irrigation Program works with its regional partners – catchment management authorities, the Department of Economic Development, Jobs, Transport and Resources and water corporations – to monitor and manage the impacts of irrigation and provide support, advice and incentives to irrigators to encourage best practice farming, reduced off-farm impacts and informed business decisions. To complement this on-farm support, Victoria also regulates on-farm water use through water use licences, has an agreement to manage salinity impacts in the Murray-Darling Basin jointly with other states and, within irrigation districts, has irrigation drainage programs to mitigate the adverse impacts of high or intense rainfall events above what farms can cope with.

Effectiveness of joint salinity management on the Murray River

Figure 4.6



Water use licences

Water use licences help manage irrigation impacts on-farm. They provide authority, with conditions, to use water on the land specified in the licence. Their primary purpose is to minimise the impacts of water use upon other persons and the natural resource base. Since their inception in 2007 there have been major changes in irrigation practices and understanding of the risks to third parties and the environment. A review of water use licences is warranted to account for these changes.

Salinity

The causes of salinity are now well known and in most areas are well managed, largely through improved irrigation efficiency programs, the operation of public and private irrigation drainage networks and through salt interception schemes on the Murray River.

In particular, joint action by Murray-Darling Basin states has been highly successful in keeping river salinity below the Basin Salinity Target of 800 EC at Morgan for 95 per cent of the time (Figure 4.6). 800 EC is a threshold above which the impacts of water salinity on domestic, industrial and agricultural uses increase exponentially. While salinity is being controlled through careful management, it will require ongoing effort. During the next 15 years salinity levels are expected to remain stable if current controls are

maintained, but are predicted to rise in the long-term. Victoria has agreed to a new salinity strategy, Basin Salinity Management 2030, which continues the commitment to joint action for salinity management.

The Basin Salinity Management Strategy 2030:

- builds on the investment and knowledge gained over the last 30 years in successful joint action of salinity management in the Basin
- recognises that salinity remains a significant management challenge and poses ongoing environmental, social and economic risks
- brings environmental water into the salinity accountability framework and provides guidance to support Basin Plan salinity targets for the management of water flows.

Proposed strategic direction

The government will review water use licences to ensure they are contemporary, relevant to the conditions and responsive to regional differences, and consistent with the Basin Salinity Management Strategy 2030 and the *State Environment Protection Policy (Waters of Victoria)*, which is currently under review (Chapter 3 Waterway and catchment health).

Clockwise from left: dry land cropping, Burramine, image courtesy Salahuddin Ahmad; centre-pivot irrigation systems near Nathalia, image courtesy Goulburn Broken Catchment Management Authority; Hydroponics at local herb farm, Geoff Russell, image courtesy Westernport Water

Nutrients

Management of nutrients (such as nitrogen and phosphorus) to control impacts on waterways and risks to environmental and consumptive uses, such as blue-green algal blooms, has led to significant investment in assessment and reduction activities.

The impact of environmental watering, changes to the irrigation footprint, and changing rainfall patterns will present new challenges and opportunities for maintaining and improving Victoria's water quality and the productive capacity of land.

Proposed strategic direction

The government will provide ongoing support for Victoria's water quality and salinity management activities and monitoring to ensure ongoing compliance with its obligations under the *State Environment Protection Policy (Waters of Victoria)*, the Murray-Darling Basin Plan and the Basin Salinity Management Strategy 2030.

Irrigation drainage

Irrigation can lead to waterlogging and salinity associated with rising groundwater levels and soil chemistry. New irrigation developments are required to manage drainage risks on-farm. In irrigation districts, the Victorian Irrigation Drainage Program manages these impacts, sharing the cost with irrigators to protect productive land, environmental assets and local infrastructure.

The Victorian Irrigation Drainage Program was successful (with the assistance of the Millennium Drought) in mitigating the most severe waterlogging, salinity, water quality and drainage risks in irrigation landscapes. But the need for ongoing effort was clearly demonstrated in 2010–11 when the below-average rainfalls of the Millennium Drought and gradually declining groundwater levels were followed by flooding rains and rapidly increasing groundwater levels.

High groundwater levels and salinity have caused new economic damage to crops, irrigation infrastructure and native vegetation in the Goulburn-Murray Irrigation District, Mallee and elsewhere. It is a threat to Victoria's \$4.4 billion irrigation sector. There is a need for an ongoing, risk-based framework to manage on-farm drainage, to deal with excess water when on-farm management systems are overwhelmed by extreme rainfall events, and to manage and regulate the disposal of drainage water to protect third parties. This can be achieved through efficient management of private and public surface and sub-surface drainage networks.

Proposed strategic direction

The government will develop priorities for the next five years of the Victorian Irrigation Drainage Program, in consultation with landholders and other stakeholders.



Resilient, liveable
communities are
important for our health
and wellbeing



Resilient and liveable cities and towns



5

Resilient and liveable cities and towns are fundamental to economic prosperity, social and environmental needs, and community identity and wellbeing.

Water's essential role in supporting these outcomes is increasingly recognised in cities around the world, where better community outcomes are being achieved through more integrated and strategic approaches to urban water service provision and urban land use planning.



Resilient and liveable cities and towns

Proposed objective

Victoria's water sector will help transform Victorian cities and towns into the most resilient and liveable in the world. We will plan and manage all elements of the urban water cycle in an integrated and innovative way to improve environmental, social and economic outcomes for our communities.

The discussion paper proposes to achieve this by:

diversifying our sources of supply to support urban liveability

delivering multiple benefits and improved community outcomes

an engaged community, focused on water efficiency and links to broader liveability outcomes.

We will know we have succeeded when:

all water sources are being effectively utilised to support water security and other outcomes

green, cooling open spaces support thriving communities, even during drought

integrated water management becomes business as usual, providing multiple benefits and driving more efficient servicing solutions

the outcomes people can expect are clear, and local communities are central to determining these outcomes

local communities have a greater capacity to actively participate in water management.



A new approach to urban water management

The Millennium Drought highlighted the extent to which urban areas rely on water for community health and wellbeing. For example, many sports grounds were unable to be used for extended periods during the drought due to the lack of water for irrigation, which had significant negative impacts on local communities who rely on these assets for recreation and social interaction.

Against the backdrop of drought and climate change, Victoria's growing urban population is placing further pressure on our water resources. For Melbourne, as shown in Figure 5.1, indicative analysis suggests that a high population growth and low inflow scenario could mean that without any other action we may need our next major system augmentation sooner rather than later.

A new approach for urban water management is required to ensure our cities are resilient and liveable, both now and into the future. Resilient and liveable cities and towns are characterised by:

- secure water supplies to support community health and wellbeing, our industries and economy
- effective management of wastewater to protect public health and the environment, and fit-for-purpose reuse
- flood resilient communities, properties and infrastructure
- healthy urban waterways that are valued as important community assets
- healthy urban landscapes to support green spaces, especially during drought.

Figure 5.2 provides a framework for considering the transition to resilient and liveable cities and towns, using the concept of 'water sensitive cities' developed by the Cooperative Research Centre (CRC) for Water Sensitive Cities. Observed through the lens of this framework, the Victorian water sector has progressed from a focus on essential needs and protecting public health, to stronger recognition of the importance of waterway health, the benefits of integrating the water cycle, and the need to more effectively support water sensitive outcomes and behaviours. A study by UNESCO-IHE found that while Melbourne is relatively advanced on the continuum compared to other international cities it is still at the 'water cycle city' stage. Furthermore, there are wide variations in performance on this continuum across Melbourne and regional Victoria.

Key opportunities and challenges we face in transitioning to more resilient and liveable cities and towns include:

- uncertainty in planning for future supply augmentations
- extreme heat and reduced surface runoff resulting from climate change
- population growth, which will increase demands on services, but will also create opportunities to achieve service excellence
- increased urban flood risk from the combined effects of urbanisation, sea level rise and more extreme rain events
- waterway degradation resulting from stormwater runoff, which will increase and accelerate unless current approaches change
- innovation and economic change, which will create opportunities to unlock unrealised potential in the sector if it has the flexibility to adapt.

Our understanding and capacity to meet these opportunities and challenges has progressed significantly in recent years. For example:

- the Victorian Desalination Project and other infrastructure has increased our ability to provide water security
- there is a much deeper understanding of the economic and social benefits of cooler, greener urban environments
- there has been a growing sophistication in water management and its relationship to urban design, for example, in more effectively managing flood risk and irrigating urban landscapes

Urban water management must build on its strong foundations and institutions while embracing new approaches that reflect our enhanced understanding of urban water management. This will require a whole-of-government approach.

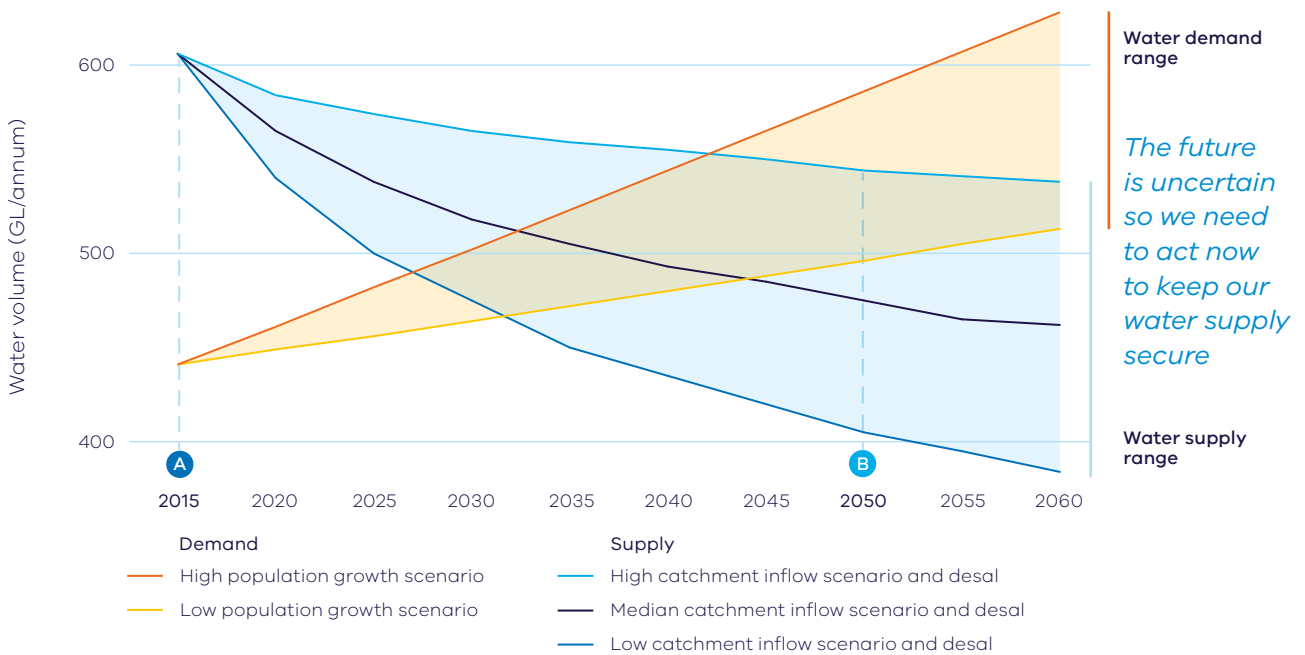
Government will support resilient and liveable cities by adopting a whole-of-government approach. In particular, the water, urban planning, and local government portfolios will align key strategies, including the water plan, Plan Melbourne Refresh and the Metropolitan Open Space Strategy to support the water-related outcome areas described in this chapter.

This chapter focuses on three key elements:

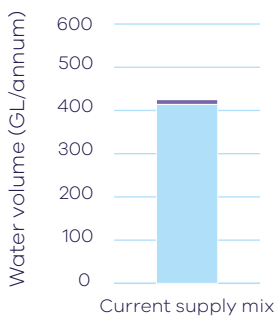
- diversifying our sources of supply to support urban liveability
- delivering multiple benefits and improved community outcomes
- an engaged community, focused on water efficiency and links to broader liveability outcomes.

Potential future supply and demand scenarios for Melbourne

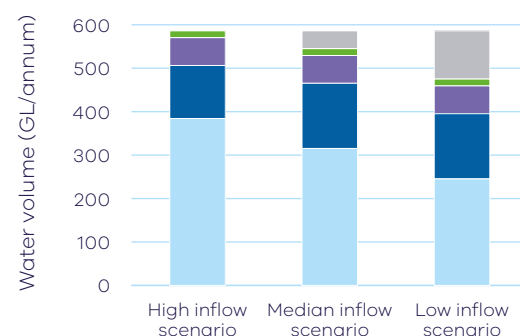
Figure 5.1



A Supply mix in 2015



B Potential high population growth scenario supply mix in 2050 under a range of catchment inflow scenarios



We need a range of sources to secure our water supply

- Source to be determined
 - Stormwater planned projects
 - Recycled water planned projects
 - Desalinated
 - Catchment
- Catchments and desalinated water in place. The recycled water and stormwater supply increase will be rolled out over time.

Source: data sourced from Metropolitan Melbourne water corporations

These elements will create better outcomes in both Melbourne and regional cities and towns, enhance Victoria’s position as an international leader in innovative water management, and support continual growth and investment in our urban centres.

5.1 Strategic direction

Diversifying our sources of supply to support urban liveability

The supply of secure, high quality drinking water will always be at the centre of urban water planning. Traditionally, urban water supplies have been sourced from rivers, streams and groundwater systems. However, using a more diverse range of water sources will provide greater resilience and adaptability in water supplies.

Figure 5.1 demonstrates that under low and median inflow scenarios and without any other actions to manage supply and demand, we may need our next major system augmentation sooner rather than later. Figure 5.1 also shows the supply mix in 2015 (part A) and the potential need for a more diverse mix of supply options in 2050 (part B) to meet projected water demand.

The use of alternative water sources, such as stormwater and recycled water, can also provide a range of other benefits. For example, better stormwater management can improve waterway health, reduce flood risk and enhance urban landscapes.

The Department of Health and Human Services and the Environment Protection Authority Victoria, as the public health and environmental regulators, have key roles in providing assurance about fit-for-purpose use of alternative water sources.

Victorian Desalination Project and Victoria’s water grid

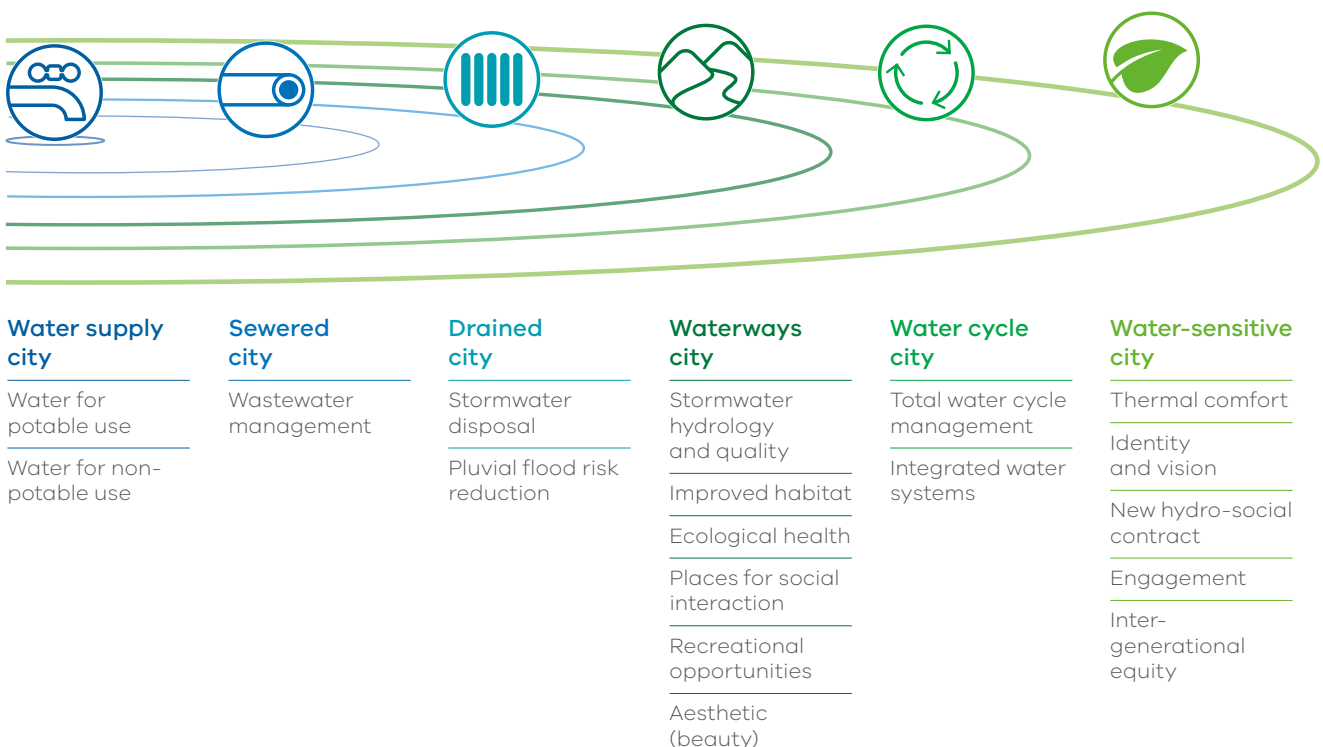
In recent years, Victoria’s water security has been significantly enhanced by the Victorian Desalination Project.

The desalination plant is a rainfall-independent source of water that can supply up to 150 billion litres a year of high quality drinking water (around one third of Melbourne’s current annual water consumption).

The grid and the sources of water connected to it are now one of a number of solutions which can support the resilience and liveability of our towns. The desalination plant and its water security role are discussed further in Chapter 9 (Realising the potential of the grid and markets).

Pathway to a water sensitive city

Figure 5.2



Adapted from CRC for Water Sensitive Cities

Proposed strategic direction

The government will make the best use of all water sources by:

- promoting the use of all available sources to support liveability outcomes where the water sources are fit-for-purpose
- requiring water corporations to assess the use of all potential water sources in the development of their urban water strategies (these strategies are required under the current Statement of Obligations for water corporations)
- promoting an evidence-based approach to diversifying our water portfolio that enables informed community consideration of the role of all potential water sources.

Stormwater

Enhanced stormwater management can deliver a range of benefits in addition to the provision of fit-for-purpose water supply. Most notably, better stormwater management will help mitigate the adverse impact of erosion and pollution on urban waterways resulting from stormwater runoff, which is expected to increase with climate change and urbanisation.

Key opportunities for improved stormwater management are:

- more effective catchment-scale planning and objective setting, which will be supported by the Integrated Water Management (IWM) planning processes described below
- clearer institutional arrangements
- better understanding of how communities value urban waterways, which will assist in prioritising actions
- improving incentives and requirements for parties to mitigate the damage caused by stormwater runoff.

The objectives for stormwater management will vary across locations depending on local circumstances. For example, in highly urbanised areas, the use of stormwater as an alternative supply can help keep urban waterways healthy by reducing stormwater discharges. In Melbourne, regional and rural areas, stormwater may contribute to improved environmental flows for rivers and streams suffering from water shortages.

Proposed strategic direction

The government will support enhanced stormwater management to realise multiple benefits, with a particular focus on protecting urban waterways by:

- reviewing current obligations and management practices to ensure that all types of development effectively manage their adverse stormwater impacts and there are economic incentives to mitigate the impacts of runoff
- supporting best practice through updating integrated water management standards in planning schemes, as part of ensuring we have the best mix of tools to address stormwater management.

Recycled water and sewage treatment

Recycled water is increasingly being used as a fit-for-purpose water supply and in many circumstances is also largely a rainfall-independent source of water. Over the last decade, many new growth areas have been developed with the inclusion of third pipe systems to deliver recycled water to new homes for outdoor water use. However, there remain opportunities to more effectively support recycled water schemes. In particular, successive government reviews have identified the need to update regulatory arrangements.

Effective sewage treatment and wastewater management are vital to public health and minimising the impact of pollutants on the health of waterways and bays. Through the adoption of flexible innovative place-based approaches, there are opportunities to enhance outcomes and deliver additional benefits. For example:

- Servicing unsewered towns
 - There are opportunities to adopt more innovative approaches to servicing unsewered towns. For example, in Blackwood it was estimated that adopting a traditional sewered approach would cost approximately \$25 million. The Environment Protection Authority, Central Highlands Water and Moorabool Shire Council collaboratively developed a solution to fix and upgrade onsite domestic wastewater management systems that will deliver the required environment and public health outcomes at less than \$5 million.

Figure 5.3

“Liveability reflects the wellbeing of a community and represents the many characteristics that make a location a place where people want to live, now and in the future” Victorian Competition and Efficiency Commission, 2008

Resilient and liveable cities and towns



Safe, secure supplies in an uncertain future

A diverse range of fit-for-purpose water supplies

Water efficiency and demand management

Clear energy consumption and mitigation objectives

Water quality that meets regulatory standards and community expectations



Effective management of wastewater

High public health and environmental standards

Efficient sewerage systems

Reuse of fit-for-purpose water

Optimised management of septic tanks



Flood resilience

Community and property resilient to flood risk

Flexible flood management infrastructure

Defined flood management objectives for urban renewal and infill development

Address legacy and infill flooding issues



Healthy and valued waterways

Maintain or improve environmental health

Maximise value of waterways as open space assets

Minimise impact of stormwater



Healthy urban landscapes and places

Integrated management of green and blue corridors

Water available to maintain green community assets through drought (green community hubs)

Clearly identify water needs of community assets

- Waste as a resource
 - There are opportunities for water corporations to work with waste managers to exploit waste-to-resource opportunities, such as sludge as an energy feedstock.
- Managing ageing infrastructure
 - Sewerage infrastructure is a major component of capital expenditure, and maintaining and replacing ageing infrastructure will be an important challenge. New technology and techniques for monitoring, maintaining and extending the life of infrastructure will enable us to manage this challenge more efficiently.

Proposed strategic direction

The government will support more effectively realising opportunities from recycled water and wastewater management by:

- improving and clarifying regulatory arrangements for recycled water schemes, particularly clarifying roles and responsibilities and other key issues identified in previous reviews of the regulatory framework
- encouraging water corporations and waste management agencies to explore waste-to-resource opportunities
- promoting innovative solutions to improve management of onsite domestic wastewater and sewerage infrastructure, including through the proposed IWM planning framework.

5.2 Strategic direction

Delivering multiple benefits and improved community outcomes

The existing regulatory framework for urban water management has been largely effective in supporting essential water, sewerage and drainage services. However, there is now greater appreciation of the need to maximise water's role in supporting broader liveability and resilience outcomes. For example there are opportunities to consider:

- place-based outcomes for local waterways, noting that current science tells us the degraded state of urban waterways will accelerate unless current practices change
- better approaches for managing urban-generated flooding, particularly in areas associated with legacy flooding issues and infill development.

To ensure that urban water planning takes account of these broader benefits, water planning and management for Victoria's cities and towns will be aimed at delivering across five core outcome areas (Figure 5.3). While Figure 5.3 describes these outcome areas separately, they are highly interdependent, and a key strategic direction is enabling more effective coordination and integration across them, whilst maintaining clear accountabilities for service delivery to the community.

These outcomes will be explicitly considered during the local and sub-regional IWM planning processes described below. These processes determine specific place-based outcomes based on local conditions and will consider how these outcomes will be delivered. A key aim of this approach is to achieve more consistent outcomes across Victorian cities and towns. This is consistent with other state policies such as the Victorian Public Health and Wellbeing Plan 2015–2019 and the principles of environmental justice.

Proposed strategic direction

Local and regional integrated water management planning will engage the community to deliver on the following core outcome areas for urban water management:

- safe, secure supplies in an uncertain future
- effective management of wastewater
- flood resilience
- healthy and valued waterways
- healthy urban landscapes and places.

Enabling and embedding integrated water management

IWM involves better coordination of all elements of the urban water cycle and better alignment of water and urban land use planning, and is characterised by:

- servicing solutions that deliver multiple benefits
- coordinated planning and delivery
- using the best mix of localised and centralised servicing approaches to optimise infrastructure and investment
- fit-for-purpose approaches that are tailored to local conditions with community input.

There is wide support for more systematic adoption of IWM across the urban water sector. For example the Resilient Melbourne initiative, involving 32 councils across Melbourne, has proposed the development of an IWM framework that supports local government involvement and decision-making.

The directions in this chapter also provide important opportunities to link IWM planning with planning for receiving environments, such as Port Phillip Bay.

The government proposes a more systematic approach to IWM for Victorian cities and towns. To achieve this, the government is proposing a range of actions focusing on the critical factors that need to be in place to embed and enable IWM, drawing on recent experience. Specifically:

- planning – formalising processes to embed IWM planning
- holistic decision-making – supporting the provision of better information and guidance to support efficient, system-wide decisions
- economic incentives – aligning economic incentives while maximising community value and efficiently allocating cost and risk
- funding – supporting more efficient allocation and sourcing of funding to achieve better outcomes across the five core outcome areas
- clearly defined roles and responsibilities – to support delivery
- regulation – outcome-focused regulation
- research, capacity building and innovation – to support new approaches.

Proposed elements of IWM planning for Victorian cities and towns

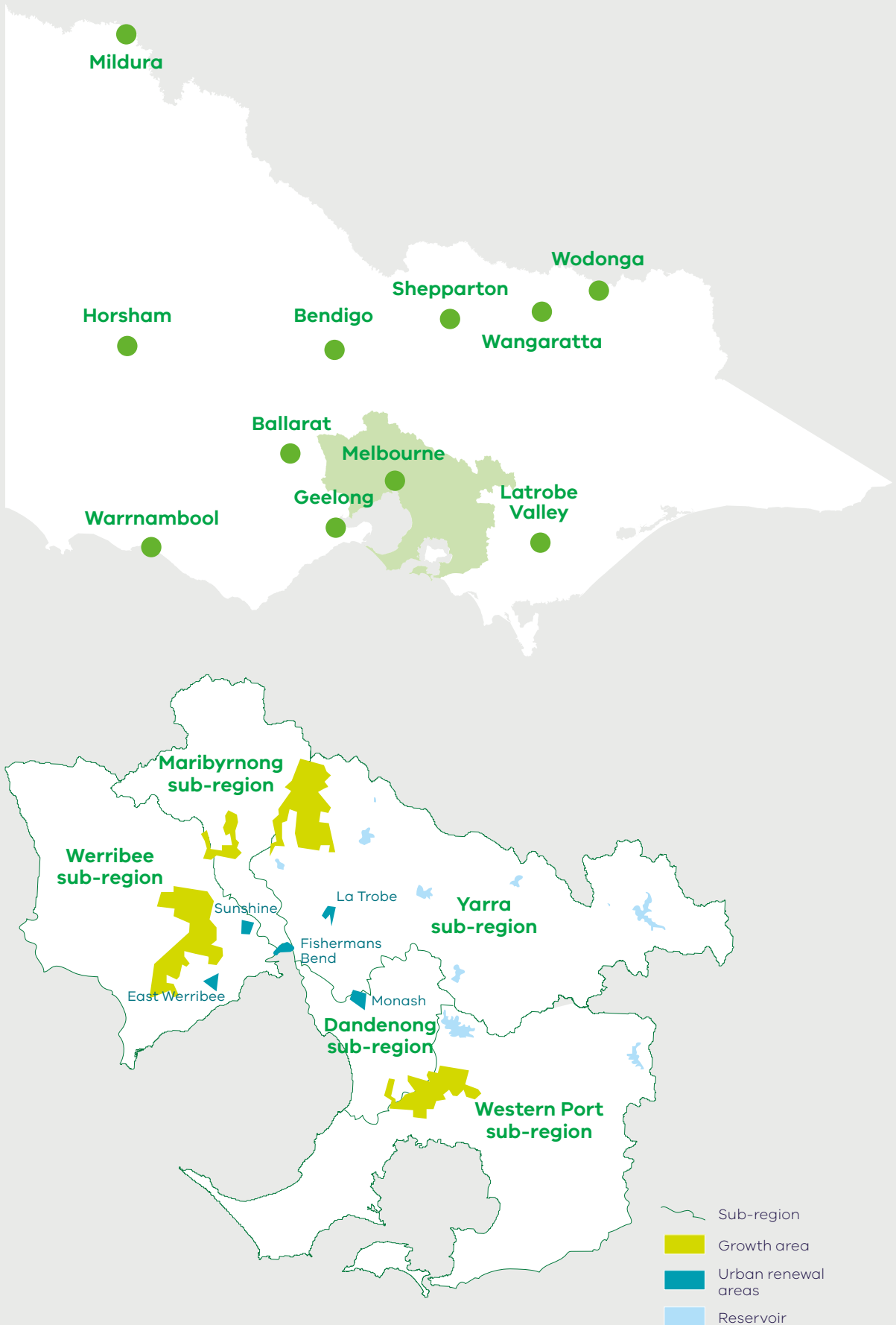
IWM requires coordinated planning involving participants from across the water cycle, including water corporations, catchment management authorities, local councils, other planning authorities and community representation.

The government is proposing a framework for systematic adoption of IWM across Victoria. Key features of the framework would include:

- Sub-regional IWM planning – to determine place-based outcomes, undertake analysis at a sub-regional scale and outline actions for participants. The scale of this planning will need to reflect local circumstances.

Proposed integrated water management plans

Figure 5.4



- Local IWM planning – to develop integrated water cycle servicing solutions to meet the place-based outcomes developed through sub-regional planning, and to guide delivery plans of the various participants.
- Management and/or funding agreements – to support implementation across relevant entities.
- Planning boundaries to reflect local circumstances – for example, sub-regional plans based on catchment boundaries, and local plans based on particular lengths of waterway, areas at risk of flooding, or development zones, such as Melbourne's National Employment Clusters.
- Collaborative forums to support IWM planning and local leadership – to integrate information and agree on outcomes. These forums would also help inform ongoing planning tasks, such as Precinct Structure Plans, and identify strategic project opportunities that clearly demonstrate IWM outcomes.
- Using local IWM plans to inform urban water strategies – the relationship between IWM planning and urban water strategies and the broader water planning framework is further described in Chapter 8 (Water entitlement and planning frameworks).
- Maintaining current statutory responsibilities – the proposed IWM planning framework does not change current statutory responsibilities for relevant agencies.

Proposed priority areas for sub-regional planning have been identified based on criteria such as population growth, urban areas subject to heat and flood stress, areas with high environmental values, and areas where there are opportunities for improving environmental, social and open space values. Priority areas for sub-regional planning in Melbourne are illustrated in Figure 5.4. They include the catchments of the Werribee, Maribyrnong and Yarra Rivers, Dandenong Creek and Westernport Bay, with local plans to be developed for priority growth and urban renewal areas.

In regional Victoria, the proposed focus will be supporting collaborative and integrated planning approaches covering key regional cities and towns (refer to Figure 5.4).

Roles and responsibilities for IWM planning

To catalyse IWM in Victoria, the Department of Environment, Land, Water and Planning has been facilitating collaborative IWM processes in recent years, particularly at the sub-regional level in Melbourne and in some regional cities and towns. This work will continue as a transition period to help ensure that priority IWM plans can be delivered effectively and that there is continuity for processes in regional Victoria in the short-term.

There are several other agencies that could facilitate IWM effectively:

- water corporations
- local government
- other Victorian Government agencies.

The Department of Environment, Land, Water and Planning will work with water corporations, local government, planning authorities and other parties to provide a clear statement in the final water plan about roles and responsibilities for the respective IWM plans in the longer term and, if necessary, a transition process for assignment of responsibilities. This process will be aligned with the development of the urban water strategy guidelines.

Proposed strategic direction

The government proposes the following elements as part of a new framework for urban water planning for Victorian cities and towns:

Sub-regional IWM planning

The government will identify priority areas for IWM planning and will continue to support existing IWM processes.

Local IWM planning

Local IWM planning will be developed where required to identify integrated water cycle servicing solutions to meet place-based outcomes and guide delivery plans of the various participants.

Responsibilities for IWM planning

The government will work with water corporations, local government and other key parties to determine roles and responsibilities for IWM planning.

Formalised agreements, guidelines and templates

The government proposes to work with water corporations, local government and other key stakeholders to provide guidelines and templates for the development and implementation of IWM plans. This process will also consider the need for support for local government in the development and implementation of IWM plans. Arrangements for implementation of IWM planning will be formalised through agreements between water corporations, local government and other delivery partners.

Legislative and regulatory support for IWM plans

The government will also consider options for embedding IWM planning into relevant legislation.

Supporting other key elements of IWM

Apart from coordinated planning, other key enablers of IWM are holistic decision-making, effective economic incentives, better coordinated funding, outcomes focused regulation and support for capacity, research and innovation. The government is proposing a range of measures to support these elements of IWM.

The government proposes to work with Melbourne's water sector on the 'avoidable systems cost project', which is providing better projections of the long-term costs of Melbourne's sewerage, water and drainage systems. This will enable better assessment of the costs that can be avoided through decentralised servicing options, delaying large augmentations or avoiding them completely.

Funding for projects across the urban water cycle comes from various sources, including water and sewerage charges, waterways and drainage charges (in Melbourne), council rates and developer contributions.

There is significant potential to access and co-ordinate different funding sources to support broader liveability outcomes. An example of a strategic, collaborative funding approach was that used to prioritise investment in the Merri Creek corridor, which identified potential savings of over \$10 million over five years. The IWM planning processes described above will be a key forum for enabling more coordinated funding approaches.

Proposed strategic direction

The government will enable widespread adoption of integrated water management through the following:

- in consultation with the Department of Treasury and Finance and the Essential Services Commission, developing economic evaluation and cost allocation guidelines to support whole-of-life investment decisions to be incorporated into IWM planning
- requiring water corporations to consider alternative servicing strategies when making investment decisions
- working with industry to refine and embed the 'avoidable system cost' project and other mechanisms to support whole-of-life assessments
- working with the water sector to support capacity building, particularly in regional towns and cities, including considering the potential benefits of IWM facilitators
- providing support for local councils to assist in facilitating IWM planning processes, particularly in resource constrained locations across the state
- supporting research undertaken by academic institutions, such as the CRC for Water Sensitive Cities.

Recycled water on golf course, courtesy Barwon Water



Integrated water management

Figure 5.5





Cooler, greener cities



Trees shade buildings and surfaces



Green roofs and walls keep buildings cooler and reduce stormwater runoff



Raingardens and street trees benefit from, and reduce, stormwater runoff

Healthier waterways



Retention ponds collect and filter local stormwater



Rainwater tanks alleviate stormwater reaching waterways



Permeable surfaces replenish the watertable and reduce stormwater runoff

Resilient water systems



Recycled wastewater irrigates sporting grounds and peri-urban agriculture



Harvesting local stormwater irrigates parks and protects waterways



Diversified water sources to ensure water security

Reduced flooding risks



Rainwater tanks alleviate stormwater runoff



Community and property more resilient to flood risk

Thriving communities



Riverside commuter paths increase health and wellbeing



Green, irrigated playing fields year-round



Waterways providing community centres

Additional measures to strengthen alignment between water and urban land use planning

Aligning urban water management, land use planning and urban development is essential to IWM and achieving resilient and liveable cities and towns. Incorporating IWM approaches into the planning and design of new urban development is a key opportunity in this regard. For example, it is fundamental to managing flood risk and efficient infrastructure sequencing. Another key opportunity is linking IWM planning with planning for receiving water environments such as Port Phillip Bay. For example, a revised Environment Management Plan for Port Phillip Bay is being developed, which will assist in determining the catchment outcomes required to deliver a healthy and resilient Port Phillip Bay into the future.

The IWM planning framework proposed above will be a key mechanism for more effectively aligning urban water management and land use planning. The government is also proposing other key measures, including:

- strongly integrating water planning into its strategic urban land use planning processes and major projects
- more effectively aligning water management with planning instruments and processes, including Environmentally Sustainable Design standards and systems.

Water corporations also have opportunities to contribute to more liveable urban environments through their land holdings. There are many examples of this already occurring, such as the Upper Stony Creek Project, which will transform a concrete drain in Sunshine North into a revegetated public corridor with a naturalised waterway and wetland.

Proposed strategic direction

The government will better integrate urban water management and land use planning and development by:

- integrating water outcomes in key government strategies, such as the Plan Melbourne Refresh, Metropolitan Open Space Strategy, Regional Growth Plans, the Biodiversity Plan, the Yarra River Protection Project, and other major projects (such as the Level Crossing project)
- aligning water outcomes with urban land use planning instruments and standards, such as state and local planning policy frameworks and Environmentally Sustainable Design performance standards for buildings
- working with water corporations to clarify expectations on how their land can be better used to optimise liveability outcomes
- working with water corporations, planning agencies and local government to develop water sensitive urban planning and design guidelines that incorporate IWM, which will be tailored to reflect local circumstances. The guidelines will initially focus on Melbourne, and will then be adapted for across Victoria.

5.3 Strategic direction

An engaged community, focused on water efficiency and links to broader liveability outcomes

The community has a critical role in achieving water management outcomes. For example, the highly successful Target 155 water conservation campaign, which promoted responsible residential water use in response to the Millennium Drought, saw average residential water consumption drop from 247 litres per person per day to an average use of 160 litres per person per day. While this program was focused on Melbourne, its success clearly showed the willingness of Victorian communities to participate in tangible programs.

The government will implement the next generation of this successful behaviour management program. A new statewide campaign will be built on the evidence-base of previous successful campaigns, including the Schools Water Efficiency Program (see case study). The program will have a renewed focus on education programs, new technologies and innovative approaches that enable customers, businesses and communities to have more direct involvement in determining and achieving urban water outcomes. The program will be directed at residential and non-residential customers.

Proposed strategic direction

The government will:

- build on T155 and the Schools Water Efficiency Program to develop a collaborative behaviour change campaign for residential and non-residential customers, working with industry and appropriate research institutions
- partner with water corporations and local government to build an informed and engaged community, including ensuring water-related data and information is available and accessible to water customers and the community
- develop a program to support efficient use of water by industry.

Clockwise from left, Bruce Cumming, image courtesy Western Water; Box Hill, Craig Moodie, image courtesy Yarra Valley Water; Geoff Russell, image courtesy Westernport Water

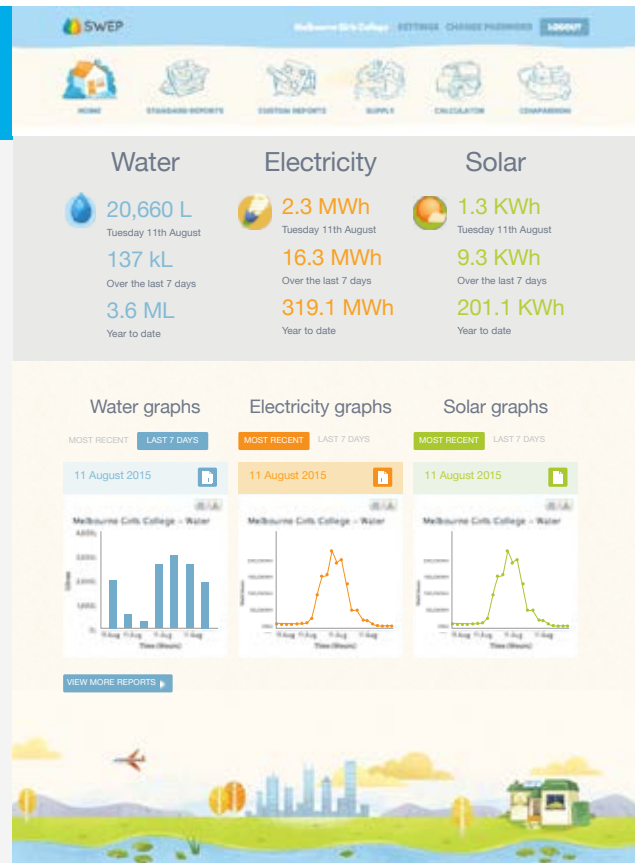
Schools Water Efficiency Program

Case study

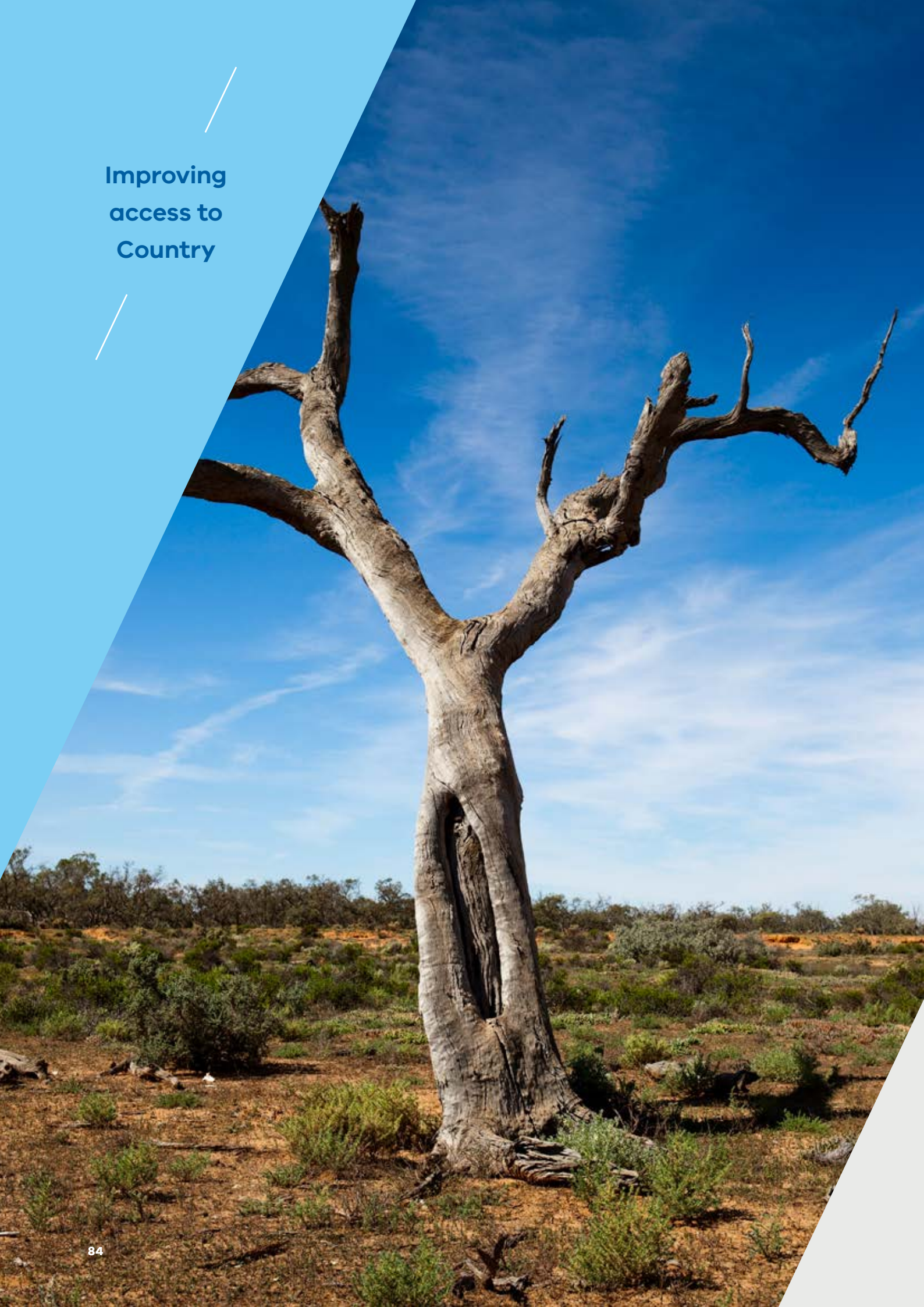
The Schools Water Efficiency Program (SWEP) has identified, and saved participating Victorian schools, more than 2.1 billion litres of water (that would have cost more than \$5.7 million over the last three years) through the early identification of leaks, faulty appliances and inefficient practices.

Using data loggers to monitor daily school water use in 15-minute intervals, every participating school has been able to better understand their water use as well as identify at least one problem with their water use that may not have been recognised as quickly, or at all, without SWEP intervention.

A world-class and internationally recognised program, SWEP is available to every Victorian school and provides access to subsidised data loggers, a dedicated website, specialist advice and curriculum materials for managing and monitoring water consumption and continuing the water efficiency education of Victorian school children. SWEP delivers water (and electricity) consumption data in a format that is meaningful to users from primary school students to principals.



Improving
access to
Country



Recognising and managing for Aboriginal values



6

Aboriginal communities have cultural connections to lands, waters and resources through their associations and spiritual relationship with Country.

A new approach to support Aboriginal Victorians' access to Country, while also improving water resource management, is proposed.



Recognising and managing for Aboriginal values

Proposed objective

Victorian water planning and management frameworks will recognise the cultural value that water has for Aboriginal people. Our existing water planning and management processes will have regard to the rights and interests of Victoria's Traditional Owners. This will be achieved through Aboriginal participation in water management.

The discussion paper proposes to achieve this by:

developing an Aboriginal Water Program

recognising and understanding Aboriginal values in water resource management

including Aboriginal values and water uses in water resource management

building capacity for increased participation.

We will know we have succeeded when:

all agencies with responsibility for water management operate with regard to the rights of Traditional Owners to use and care for their traditional lands and waters

Traditional Owners participate, from the beginning, in water management planning and decision-making processes

water planning documents incorporate locally identified and supported Aboriginal water values

all agencies with responsibility for water management have the capacity to fulfil all relevant legal, regulatory and policy obligations to work with Traditional Owners.

Opposite page Aunty Esther Kirby, Emma Coats, image courtesy Victorian Environmental Water Holder; Mallee District Aboriginal Services Cultural Garden, image courtesy Lower Murray Water



The government has a role in enabling and supporting Traditional Owners and Aboriginal communities in ways that advance economic prosperity and assist and strengthen the continuation of their cultural connections. Supporting Aboriginal culture is one aspect of environmental justice – it helps to sustain healthy lives and is an investment in the future of all Victorians. This chapter proposes an approach that supports Aboriginal Victorians having access to Country while also improving water resource management.

The government is committed to fulfilling its obligations to recognise Aboriginal water values and objectives, as set out in the National Water Initiative, Murray-Darling Basin Plan, Aboriginal Partnerships Action Plan, Victorian Aboriginal Affairs Framework, Council of Australian Governments' Closing the Gap and the Department of Environment, Land, Water and Planning's Mungarin Gadhaba – Aboriginal Inclusion Plan 2016–2020.

The Commonwealth *Native Title Act 1993* and Victorian *Traditional Owner Settlement Act 2010* formally recognise the rights and interests that Victoria's Traditional Owners continue to hold in land and water. Recognition and Settlement Agreements represent a formalised partnership between the state and Traditional Owner groups on a range of outcomes that relate to the access, use and management of natural resources, including water. Four settlement agreements between the state and Traditional Owners have been made to date, and more settlement agreements are anticipated to be finalised in the coming years, signalling strengthened relationships between the state and Traditional Owners.

The Murray-Darling Basin Plan requires Basin states to identify the objectives and outcomes for water resource management desired by Aboriginal people when preparing water resource plans. Water resource plans must also be developed with regard to the views of relevant Indigenous organisations

on a range of matters including risks to Indigenous values and uses and views on cultural flows. This plan proposes an Aboriginal Water Program that will fulfil obligations by recognising values, building capacity and collaborating with Traditional Owners to ensure their participation in water management.

Aboriginal people have had limited involvement in decision-making in Victoria's water planning and management framework, leading to a lack of protection of Aboriginal water values and a failure to make use of traditional ecological knowledge. Collaborating with Traditional Owners in water planning and management is an aspect of maintaining access to Country and its resources. This has been lacking in water management to date.

6.1 Strategic direction

Recognising and understanding Aboriginal values in water resource management

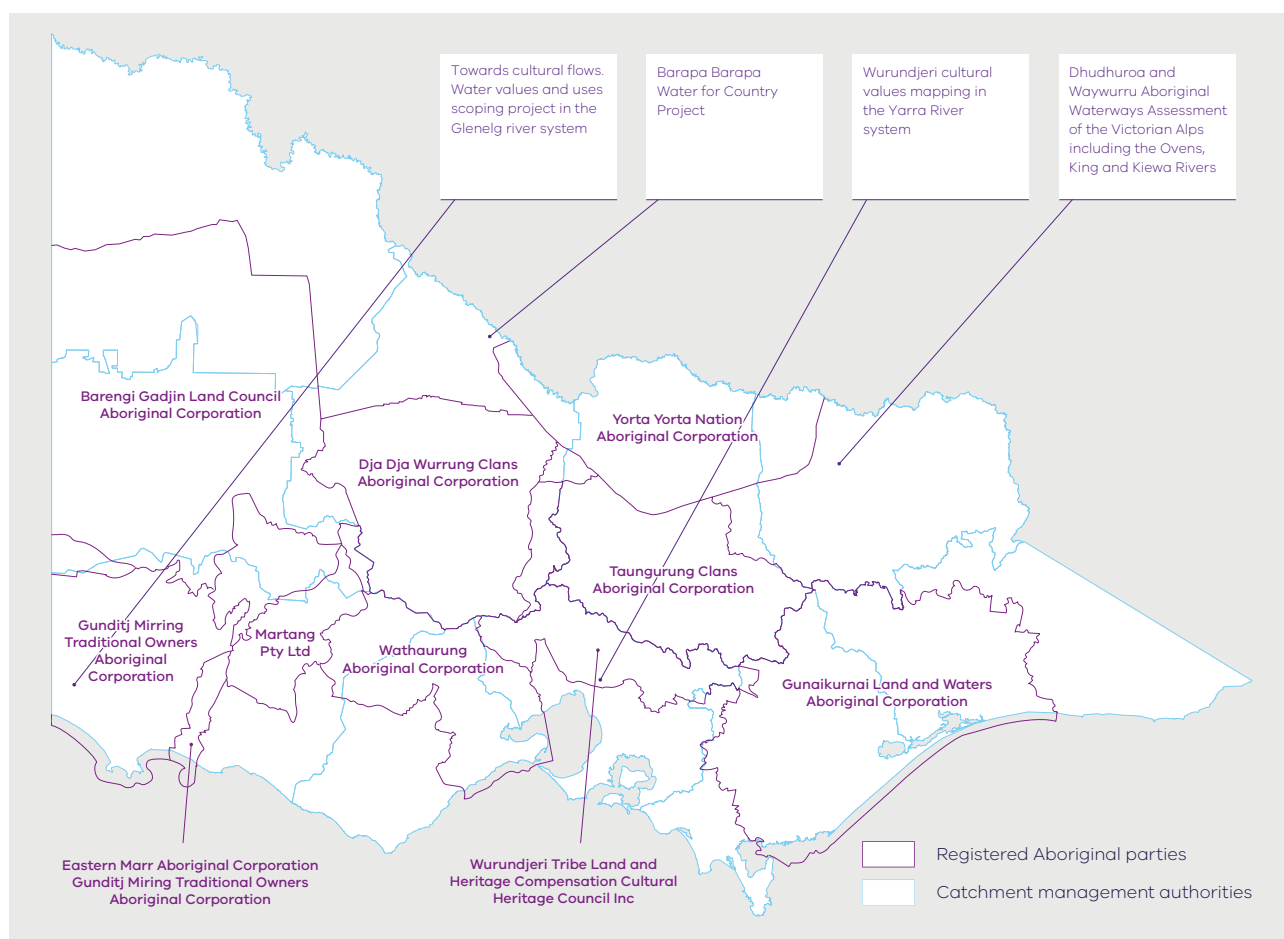
The government is keen to better understand Aboriginal values and objectives for water resources and the potential impacts of threatening processes, such as climate change. To the extent deemed appropriate by Traditional Owners, it would be helpful to have these values articulated and documented. Doing this requires bringing communities together to spend time engaging on Country and developing a shared vision.

Together with Traditional Owners and catchment management authorities, the government is supporting four initial pilot projects to start to understand Aboriginal water values, uses and sites of significance, and to develop supporting water objectives (Figure 6.1).

Working with Traditional Owners

Understanding how to incorporate cultural objectives into Victorian water management and planning

Figure 6.1



These projects will build understanding of Aboriginal water objectives at a local level; they are the first step towards identifying how to achieve those objectives more broadly in the water planning framework. The government proposes to build on these four projects, engaging with more communities at new locations to further develop this work. Figure 6.2 describes how these types of projects will then help to incorporate Aboriginal objectives into water management, where they are complementary to meeting the needs of existing entitlement holders.

Proposed strategic direction

The government will support an expanded program of projects to identify Aboriginal water values, uses and objectives across Victoria and to facilitate their inclusion in the water planning and management frameworks.

6.2 Strategic direction

Including Aboriginal values and water uses in water resource management

Aboriginal Australians have managed land and water sustainably over thousands of generations. The traditional ecological knowledge they developed over time could benefit future water strategies, policies and plans. The Department of Environment, Land, Water and Planning's Munganin Gadhaba – Aboriginal Inclusion Plan 2016–2020 is aimed at establishing a best practice approach towards the recognition and protection of Aboriginal customary knowledge. By engaging with Traditional Owners, water resource managers will seek to incorporate this knowledge, where appropriate, into Victoria's water management approach, thereby giving government an opportunity to recognise and protect Aboriginal water values and improve the sustainable management of our water systems.¹

Aboriginal water program

Values and uses

Figure 6.2

Identify cultural objectives	Aboriginal environmental outcomes	Build capacity to enter the market for cultural flows	Outcome
Can include:	Tangible benefits that result from healthier rivers and wetlands:	Nourish a socio-economic relationship with water	Contributing to Closing the Gap
Social	Improved fish populations	Water entitlements held by Aboriginal people	
Spiritual	More reeds that can be harvested	May have a commercial benefit	
Economic	Increased bird-breeding events, etc	Revenue accrued goes to Aboriginal people	
Environmental			



Decision making by Traditional Owners

Identify values and uses	Look for alignment with environmental water entitlements and water for supply	Identify shared benefits eg. Barapa Water for Country project	Identify cultural flow objectives, volumes of water required	Assess the impact versus investment eg. Lake Condah project	Access to water
					Involvement in regional and state planning and management
					Employment, business opportunities and trade



Barapa Barapa Water for Country project

Case study

Following on from the Barapa Barapa cultural mapping of the Lower Gunbower Forest and the Barapa Barapa cultural flows projects in 2014–15, the Barapa Barapa Water for Country project will help build a framework for determining culturally informed watering proposals. The project will run from June 2015 to July 2017 with the aim of understanding cultural values to improve the outcome and

management of environmental water on Gunbower Island. In identifying cultural objectives for scarred trees the project will look for opportunities to maintain their health through environmental flows. Funding provided by North Central CMA from the Victorian Government's Department of Environment, Land, Water and Planning, with support from the Murray-Darling Basin Authority.

Image: Barapa Barapa Traditional Owners and North Central Catchment Management Authority monitoring results of a watering event, image courtesy NCCMA

Victoria's water planning and policy frameworks, including the waterway management strategies, sustainable water strategies and the *State Environment Protection Policy (Waters of Victoria)*, have taken initial steps towards recognising Aboriginal values and water uses. However, the gaps in knowledge at a local level have inhibited the implementation of those frameworks.

As Aboriginal values, uses and objectives for water are progressively identified in projects and through consultation with, and the participation of, Traditional Owners, opportunities to embed them into government's water planning and management will arise.

Exploring the potential for shared benefits

It is proposed that once Aboriginal water objectives are identified, waterway managers, resource managers and the Victorian Environmental Water Holder (VEWH) will collaborate with Traditional Owners on ways to realise any potential shared benefits. It is possible that some of the Aboriginal objectives for water may be realised in conjunction with the use of water for environmental, recreational or agricultural purposes. Storage management may also play a future role in achieving some Aboriginal water objectives.

Success will be defined, measured and reported on in partnership with Traditional Owners.

Proposed strategic direction

The government will consider Aboriginal values and ecological knowledge in water planning and management frameworks. A range of mechanisms for achieving priority Aboriginal water objectives will be developed through partnership and collaboration between water resource managers and Traditional Owners. This will include exploring opportunities for achieving shared benefits.

6.3 Strategic direction

Building capacity for increased participation

Building capacity in water management

Capacity building in both the water sector and among Aboriginal Victorians is critical to supporting Aboriginal water values and uses, and developing and addressing Aboriginal water objectives. This can be achieved through expanding opportunities for:

- training in cultural competency for water resource managers
- Aboriginal scholarships for postgraduate training in natural resource management
- internships for Aboriginal Victorians within government and government agencies, for example the VEWH, water corporations, catchment management authorities and Parks Victoria
- engagement with Aboriginal Victorians in key positions, incorporating the expertise of Aboriginal professionals in the water sector, drawing on the proposed Aboriginal water reference groups
- increased Aboriginal representation in water management.

The government, together with catchment management authorities and Traditional Owners, will agree on a consistent approach to engagement with Traditional Owners, building on experiences from developing Whole of Country Plans. This will strengthen the cultural competency of catchment management authorities and support Aboriginal aspirations for recognition, reconciliation, representation, participation and employment, while recognising the diversity of Traditional Owners and Aboriginal communities and the need for place-based projects.

Yorta Yorta youth journey, image courtesy Goulburn Broken Catchment Management Authority





Woka Walla natural resource management

Case study

In 2011, Yorta Yorta Nations Aboriginal Corporation (YYNAC) established the Woka Walla (Country and Water) Natural Resource Management employment enterprise. The business was supported by Goulburn Broken CMA through the Caring for Our Country program with the vision of seeing Yorta Yorta and other Aboriginal people engaged in real economy, jobs and development through a successful on-Country natural resource management (NRM) business lead by YYNAC.

Woka Walla work crew planting by the Murray River, image courtesy Goulburn Broken Catchment Management Authority

Woka Walla operates as a stand-alone NRM enterprise, developing, engaging and sustaining Yorta Yorta and other Aboriginal people through its provision of NRM and related services, such as sustainable agriculture, infrastructure works, carbon sequestration program support and climate change mitigation.

Lake Condah project Restoring cultural values and a vision for the future

Case study

Lake Condah, or Tae Rak, as it is traditionally known, is part of the Budj Bim National Heritage Landscape listed in 2004. The Gunditjmara people likened the seasonal rising and falling of water in Tae Rak to that of the beating heart of the Budj Bim landscape. The stone eel trap systems used by the Gunditjmara for thousands of years, are the oldest example of freshwater aquaculture in the world; the landscape is therefore recognised as an internationally significant site. Unfortunately the construction of a rural drainage scheme in 1954 damaged this vital place.

After 40 years of effort, a weir constructed in 2010 restored the lake, bringing healing to the Gunditjmara cultural values of the Budj Bim landscape. A key part of the weir construction was the promotion of Aboriginal employment. The Australian Government provided resources to support the employment of local Gunditjmara and Aboriginal and Torres Strait Islander people on the construction team. Reactivation of the eel trap systems now provides commercial opportunities along the Budj Bim landscape and at Lake Condah through cultural tourism.

Recently, Aboriginal Victorians were appointed to two water corporation boards and four catchment management authority boards, an important step towards more representation in water and catchment management decision-making.

To improve Aboriginal involvement and representation in water planning and management, the government aims to develop professional forums for Traditional Owners to provide specialist advice, and capacity building opportunities, in the implementation and evaluation of pilot projects within water resource planning programs. This will ensure that the government, with the guidance of Traditional Owners, is making informed decisions about the value of water to Traditional Owners, Aboriginal communities and organisations. The creation of Aboriginal water reference groups will help the government strengthen existing relationships with Aboriginal Victorians on the issue of water management. It will also help to build new relationships.

Capacity to access the water market

Access to water is important to Aboriginal communities. Access to water through the entitlement framework may have other major benefits for some Aboriginal communities, including sustaining employment, creating business opportunities and generating ongoing revenue streams.

The government acknowledges the rights of all existing entitlement holders and will not reallocate existing water entitlements (Chapter 8 Water entitlement and planning frameworks). However, it also recognises that the water sector has engaged successfully with other water users in the past,

who now have greater confidence to use the water market to meet their objectives. Greater access to water entitlements through the water market may similarly increase opportunities for Traditional Owners and Aboriginal Victorians. Projects such as the Glenelg River cultural flows scoping study and the Lake Condah project will help to identify these opportunities and inform Traditional Owners' decisions about entering the water market.

Once cultural flow needs are better recognised and understood, the government proposes to work with Traditional Owners to identify barriers to accessing water, and it will seek ways to overcome them. This process is expected to build greater understanding of the requirements, benefits and costs associated with enabling Traditional Owners to participate in water management, within the bounds of the existing water entitlement and planning framework, to meet cultural flow objectives. This could involve a natural resource agreement, projects aimed at understanding water's role in cultural and development outcomes, or participation in the water market. It could also mean providing employment for regionally-based water management project officers to support Traditional Owners in negotiations on Traditional Owner Settlement Agreements.

Clockwise from left: courtesy Mallee Catchment Management Authority; Ovens project courtesy Murray-Darling Basin Authority; long neck turtle at Gunbower, image courtesy Victorian Environmental Water Holder



Proposed strategic direction

The government will build increased participation of Aboriginal Victorians in water management by:

- building the capacity of the water sector to collaborate with Traditional Owners
- seeking advice from Aboriginal water reference groups
- supporting the appointment of Aboriginal people to key positions in the water sector
- investigating further opportunities for scholarships and internship programs.

The government will work with Traditional Owners to identify barriers to them accessing water to meet cultural flow objectives and to inform their decision about whether to enter the water market.



Health and wellbeing
benefits, support
for local tourism



Recognising recreational values



Victoria's waterways support a range of recreational activities. The government will support recreational users to adapt to drying conditions by providing better water resource information and involving recreational users in water and waterway planning.



Recognising recreational values

Proposed objective

Victoria will recognise the shared benefits enjoyed by recreational users on and around water storages and waterways, while maintaining the rights and obligations of entitlement holders. Recreational communities will be included in water planning and management decisions to incorporate recreational perspectives. They will be empowered with better information and understanding to improve their resilience to the impacts of drought and climate change.

The discussion paper proposes to achieve this by:

water and waterway planning and management recognising recreational values

building capacity of recreational water users

transparent allocation of costs for improved recreational outcomes.

We will know we have succeeded when:

regional recreational objectives are known and able to be considered in water and waterway planning and management

Victoria's water storages and waterways are managed, where possible, to take recreational needs into account

community understanding of the water system and access to information about recreational opportunities are improved

community confidence and satisfaction about water and waterway management being available for multiple beneficial uses, particularly recreational uses, is improved.



Left: courtesy Lower Murray Water; right: Chris Kapa, courtesy Melbourne Water

Connection to nature through our waterways provides significant benefits to our health and wellbeing. Recreational users of Victoria's waterways recognise and seek these benefits in their daily lives through many water-related recreational activities, including sporting events, fishing, skiing, rowing, camping, walking and gathering with friends and family. The government recognises that equitable access to water storages and waterways for recreation enhances wellbeing.

These activities and events are important not only to local communities, but to visitors from larger urban centres and interstate. Prime recreational sites provide economic opportunities, especially in tourism and hospitality, which add significant value to rural economies.

During the last drought, water users and the environment felt the impact of low water availability. Recreational activities were severely affected by low lake levels and low river flows. Many lakes were dry, with water levels only recovering in the last few years, and recent dry conditions are again starting to affect lake levels.

The recurring cycle of drought, followed by periods of increased inflows, is a feature of Victoria's climate and affects all water users.

Recreational opportunities abound when water storages are full and our rivers are flowing. However, in drought, it is not possible to hold water in storages if that water is needed by its entitlement holders to meet agriculture needs, to provide water for towns and to maintain drought refuges for birds and fish. Climate change will further increase the frequency and duration of dry conditions.

More information on the legal rights and obligations of entitlement holders is provided in Chapter 8 (Water entitlements and planning framework).

The government proposes to achieve its objective for recreational values by recognising shared benefits enjoyed by recreational users and building capacity of recreational water users. Figure 7.1 illustrates the current framework and opportunities to recognise recreational values and improve recreational users' resilience to drought and climate change.

Recognising recreational values while maintaining the rights of entitlement holders

Current framework and opportunities to recognise recreational values

Figure 7.1



Water and waterway management framework

Water supply management

Waterway management

Environmental waterway management

Entitlement framework



Water and waterway planning and management

Within legislative requirements

Consider community values



Opportunity

Recognise shared benefits enjoyed by recreational users



Community engagement

Information sharing

Consultation

Prioritisation of community values and objectives



Opportunity

Build on engagement processes to better inform consideration of community values including recreational values



Community

Recreational users

Local businesses

Other water users



Opportunity

Enhance community capacity to engage with water and water management frameworks to achieve recreational outcomes

Timing environmental watering to enhance recreational use on the Thomson River Case study

The West Gippsland Catchment Management Authority provides freshening flows from Thomson Reservoir in autumn (April–May) to target breeding and recruitment of the threatened Australian Grayling freshwater fish.

The catchment management authority also recognises that its releases can enhance the recreational kayaking opportunities along the Thomson River and has been working with the relevant peak bodies to provide advanced notice of the watering events and, where possible, to adjust the timing to coincide with these events.

Previously, releases have been timed to coincide with the Labour Day long weekend. This approach achieves environmental objectives and also shares the benefits of environmental water management in the Thomson River with recreational water users.

Image courtesy Gippsland Water



7.1 Strategic direction

Water and waterway planning and management that recognises recreational values

The way we currently manage our water resources, water infrastructure and waterways already provides shared benefits for recreational uses. By protecting and improving the condition of our waterways and wetlands, environmental water management creates opportunities for recreational fishing, camping, walking and relaxing (Figure 7.2).

Sometimes recreational users would like greater certainty about being able to undertake specific recreational activities on water storages and waterways, and often they would like to have certainty about doing that at particular times of the year. In regulated systems, the flows necessary to deliver water to entitlement holders can occasionally be timed or delivered in a way that shares the benefits of these flows with other uses, for example water-skiing at Lake Narracan in Gippsland or kayaking on the Thomson River (see case study). These opportunities are not always available, however, and they may incur additional costs that need to be recovered in some way by water sector agencies or other agencies organising the event, or else be met directly by community members.

In the case of high priority recreational sites like the storages where boating and fishing are popular, it is often not possible to make water management decisions that result in water levels suitable for these activities; water levels in storages vary with inflows and the releases required to meet entitlement holders' requests.

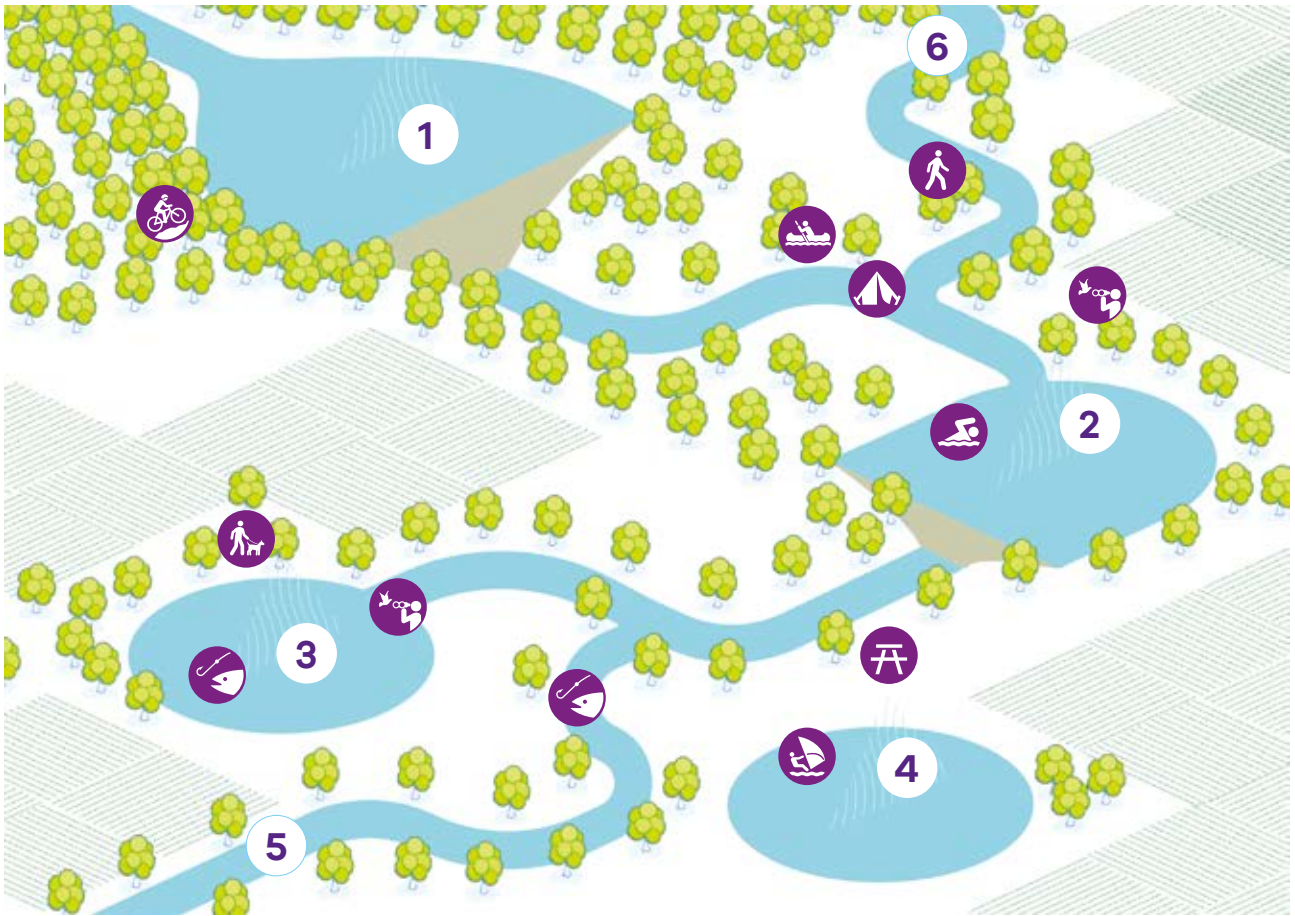
The planning framework outlined in Chapter 8 (Water entitlement and planning frameworks) provides a mechanism to identify, consider and incorporate recreational objectives into water and waterway management. It provides opportunities for early and informed discussions about trade-offs, costs and benefits when communities are working with the water sector to consider the way water resources are managed. It allows for better coordination of recreational values at regional and statewide scales, alongside the consideration of the other type of values associated with water and waterways.

Planning for recreational benefits needs to be adaptive to seasonal conditions and integrated with the broader framework of waterway, land and recreation management.

Water corporations, catchment management authorities and the Victorian Environmental Water Holder (VEWH), alongside local government and other land and recreation managers, all play an important role in delivering recreational benefits for the community, a critical part of which is community engagement.

Water management opportunities for recreational values

Figure 7.2



1	2	3	4	5	6
Source storage	Transfer storage	End point lake or wetland	Disconnected lake or wetland	Regulated river	Unregulated stream
Harvest unregulated inflows	Provide temporary storage during season to enable water supply for entitlement holders	Water cannot be returned for consumption elsewhere	No existing connection to water grid	Recreational benefits from water supply and environmental flows	Sustainable limits on taking water support recreation
Critical for supplying downstream entitlement holders' water demands	Possible management of through-flows to support recreational values	Can receive supply that supports recreational values, where available	Infrastructure investment required to supply water for recreational use	Some ability to manage flows to support recreational values	Limited active management options to support recreational values
Ability to manage water to support recreational values very limited					



Provision of an alternate and more suitable site for recreational use at Walkers Lake

Case study

Following the completion of the Wimmera Mallee Pipeline, Grampians Wimmera Mallee Water coordinated a thorough consultation process with bulk water entitlement holders, relevant stakeholders and the broader community to review the performance of the operating rules for managing the region's major water reservoirs. The consultation identified a broad consensus among water entitlement holders that there were parts of the region serviced by the Wimmera Mallee Pipeline where ongoing access to recreation water was assumed.

This led to a decision that water would no longer be supplied to Lake Batyo Catyo, but instead the recreational water entitlement would be used to supply the nearby Walkers Lake. Being a smaller storage, Walkers Lake requires a smaller annual water top-up than Lake Batyo Catyo, and will therefore provide more reliable recreational opportunities.

Proposed strategic direction

The government will enhance the water planning and management framework to ensure that water sector agencies:

- consider recreational benefits along with the multiple uses of water and waterways in annual and long-term planning
- undertake effective engagement to support consideration of community recreational objectives in planning and management decisions
- establish collaborative approaches between the water sector, community members and other agencies to achieve recreational and regional outcomes.

7.2 Strategic direction

Building capacity of recreational water users

Recreational communities are diverse. They include local recreational users, tourists, recreation and tourism-related businesses, upstream and downstream users, and passive and active users. Providing the public with better statewide information on where water-related recreational opportunities exist will enable recreational water users to plan their activities and investments. Recreational communities can better adapt to periodic dry periods if they are provided with good information about water resources, and what changing conditions mean for them.

This understanding is particularly important in dry conditions when options to enable water-dependent recreational activities in some areas are limited, for example, in relation to water storages and unregulated systems. It is then important that recreational water users understand the management decisions they can be involved in and the choices open to them.

The government proposes to provide better, more accessible information on its water entitlement and planning frameworks so recreational users can make informed choices and contribute effectively to water and waterway planning processes.

Proposed strategic direction

The government will build the capacity of recreational water users by:

- requiring water agencies to provide better, more recreational user friendly information about their water and waterway management activities, and the resulting opportunities or limitations on recreational enjoyment of our waterways
- requiring water agencies to be more transparent about water and waterway management decision-making and outcomes
- providing more coordinated avenues for accessing information about the water framework and statewide recreational values across multiple relevant information sources and agencies.

A unique aspect of the Wimmera-Mallee water supply system is that its entitlements include an explicit water entitlement of 3,090 megalitres to allow for water-dependent recreation in the region. This entitlement is held and managed by Grampians Wimmera Mallee Water and decisions about its use are informed by the Regional Recreation Water Users Group. This entitlement enables water to be delivered to priority recreational lakes and weirs in the region when water is available.

There is virtually no additional water that can be converted into entitlements for consumptive use in Victoria's regulated surface water systems without going beyond sustainable diversion limits. As a result, the future creation of recreational water entitlements, such as that used to supply priority lakes in the Wimmera region, is unlikely to be possible. Additional water for recreation can only come from existing users by purchases through the water market. During dry periods, when water in storages is low, market water prices will be high, consistent with the usual supply-demand relationships.

Recreational users' ability to access water entitlements varies considerably, depending on the water volumes required and the water available. Volumes of water required for recreational uses can be significant, which means purchasing water for recreational benefit is only viable at a very small number of sites. Additionally, the ability to maintain or improve water levels for recreational uses at a specific site may be limited by the connecting infrastructure (or lack thereof) and costs of delivery.

The government proposes to provide better information on the water market for communities who may wish to access these options (Chapter 9 Realising the potential of the grid and markets).

Clockwise from left: Lake Hattah, image courtesy Mallee Catchment Management Authority; Lake Lascelles, image courtesy Goulburn-Murray Water; kids by the Campaspe, Victoria Penko, image courtesy Victorian Environmental Water Holder

7.3 Strategic direction

Transparent allocation of costs for improved recreational outcomes

Water corporations recover the cost of providing water services from their customers. In cities and towns, customers are billed for the delivery of water to their businesses and homes and similarly, irrigators are billed for the delivery of water to their farms. Irrigators and environmental water holders also purchase water on the water market to acquire water entitlements and seasonal allocations.

The water sector, in partnership with local communities and other agencies, may be able to identify some opportunities to use the operation of the water system to share benefits with recreational users, at negligible cost. Other options to improve recreational outcomes may involve significant cost. For example, a change of timing in delivery of flows to support a recreational event may be achievable with no significant additional effort. By contrast, if water for entitlement holders is to be supplied via a particular water storage that has recreational values rather than via the most efficient route for supply, this may incur water losses that need to be paid for. Similarly, maintaining of infrastructure for water supply may also provide recreational benefits, for example a weir pool. However, if additional facilities or infrastructure for recreational users, such as boat ramps and picnic facilities, are desired this will also incur costs.

These additional costs should be recovered from the appropriate beneficiary of the services with a demonstrated willingness to pay and transparency around the service provided. There are existing examples of mechanisms to achieve this.

Grampians Wimmera Mallee Water has in place a Recreation Contribution Charge which is paid by all customers and allows for discounted costs of delivery of recreational water to priority recreational lakes and weirs and recreational and sporting clubs in the region. Other water corporations recover the costs of land and recreation management functions relating to water storages via the Recreational Urban Storage Ancillary Fee paid by urban water customers.

Responsibilities for service provision will differ according to the nature of the desired services and the range of agencies, including water sector agencies, involved in providing recreational services related to waterways. Therefore the agency responsible for recovering the costs of providing the services may vary. For example funding for recreational services is also obtained via cost recovery mechanisms such as fishing licences.

As a first step, the government proposes to work with the community and service providers, including water corporations, environmental water holders, local government and other relevant agencies to better understand the costs of providing water-related recreational services and how those costs might be recovered. As a starting principle, any additional recreational levies will be recovered on a beneficiary pays basis.

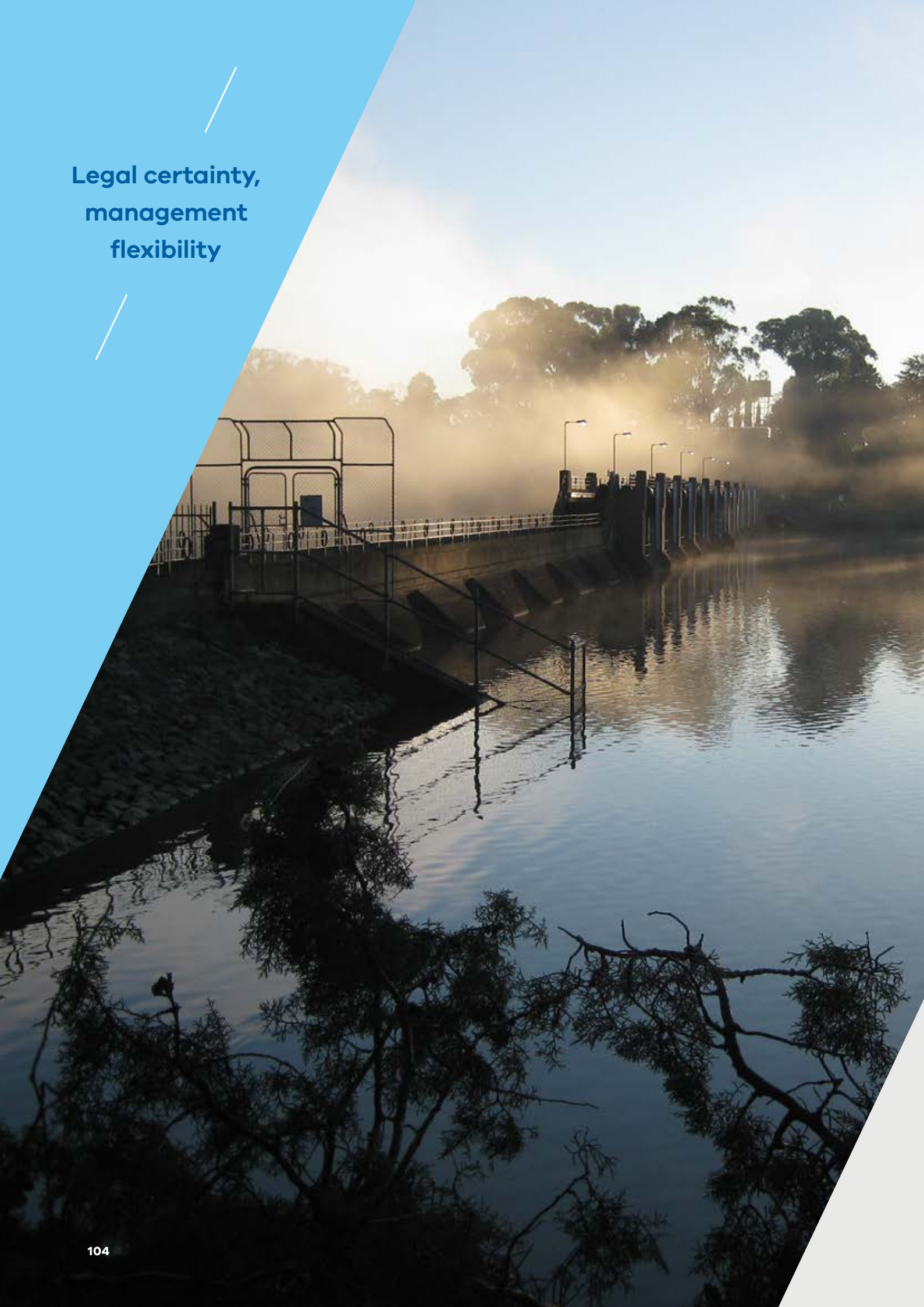
Proposed strategic direction

The government will ensure the transparent allocation of costs of providing recreational benefits by:

- building our understanding of the costs of providing improved recreational outcomes
- where additional costs are incurred to provide increased recreational benefits, determining a transparent method of cost recovery on a beneficiary pays basis.



Legal certainty,
management
flexibility



Water entitlement and planning frameworks



8

Our water entitlement and planning frameworks form the basis of water management in Victoria. The rights and obligations of entitlement holders are set out under the *Water Act 1989*. This robust framework creates confidence to support investment. There is an ongoing need to understand, manage within, and plan for changing water availability.



Water entitlement and planning frameworks

Proposed objective

Victoria will have improved and responsive water entitlement and planning frameworks that enable us to better adapt to climate change.

The discussion paper proposes to achieve this by:

strengthening our water entitlement framework

improving the water security planning framework for the challenges of the 21st century to plan for environmental water, rural water security, Aboriginal values, recreational values, liveable cities and towns, and extreme events.

We will know we have succeeded when:

water users know their rights and obligations in the sharing of water

risks to water availability are managed, accounting for significant water uses, including in response to changes in scientific understanding and/or community values

the water sector is better prepared to meet critical water needs in times of drought and ready to respond to other extreme events that have significant water-related effects, like bushfires and flooding

our communities are resilient in the face of reduced water availability, and able to plan for the future, confident that their existing and emerging water needs are understood and incorporated into planning.



Victoria's capability to deal with a range of conditions, including severe drought, is built on providing certainty and flexibility in how water is shared and managed through our water entitlement and planning frameworks. These frameworks have guided Victorian water management over the past 35 years and their relevance was reinforced during Victoria's driest 13 years; the Millennium Drought.

Our water entitlement and planning frameworks form the basis of water management in Victoria and along with water supply infrastructure, are designed to ensure an acceptably reliable water supply that supports a range of uses, despite Victoria's variable rainfall. The rights and obligations of entitlement holders are set out under the *Water Act 1989*. This robust framework creates confidence to support investment.

Our water entitlement and planning frameworks must continue to evolve to realise opportunities and meet future challenges. There is an increasing body of science on climate change and what it may mean for water availability and the frequency of extreme weather events (Chapter 2 Climate change). Victorians have a long history of managing climate extremes, such as drought, and have been progressively adapting to long-term reductions in water availability since the mid-1990s.

Climate change, population growth and changing uses mean that both the supply of water and the demands for it will continue to change. There will be an ongoing need to understand, manage within, and plan for the changing water availability. There is also now a recognition of the important role that water plays for Aboriginal, liveability and recreational values of water.

8.1 Strategic direction

Maintaining a robust entitlement framework

Victoria is recognised nationally and internationally for its robust water entitlement framework, which is considered one of the most valuable assets in the Victorian water management system.

The *Water Act 1989* establishes an entitlement framework that defines the rights to take and use Victoria's surface and groundwater resources. The right to take and use water for domestic and stock needs will continue. Entitlements have secure tenure, provide for a share of the water available, set out the associated conditions and can be traded. The *Water Act 1989* also provides for a person's right to take water for domestic and stock purposes in certain circumstances. This has made Victoria an attractive place to invest.

To ensure our entitlement system is robust into the future we need to continually refine and strengthen the framework. The water plan provides the opportunity to continue this process.

Accounting for significant water uses

A number of potentially significant water uses occur outside the current entitlement framework. This is an issue if these uses increase because it will reduce the amount of water available to the environment and/or reduce the amount of water available to entitlement holders. These reductions can have significant economic, environmental and social consequences, particularly as competition for water increases.

As an example, section 8 of the *Water Act 1989* provides for a private right to take water for domestic and stock use. Concerns have been raised regarding the potential increase in water interception by domestic and stock dams and bores, particularly in peri-urban areas. This discussion paper proposes a review to consider the possibility of the introduction of a reasonable use limit, in consultation with the community.

Increasing water scarcity has also increased the demand for stormwater as an alternative water source. Stormwater in the works of water corporations and in waterways falls within the water entitlement framework, but stormwater in municipal drains does not. Options for including all stormwater need to be considered.

Opportunities to clarify entitlements and provide consistency across Victoria by converting take and use licences

The majority of the regulated water systems in irrigation-dominant areas in Victoria have been unbundled. 'Unbundling' involves separating the traditional water-related entitlements into a water share, a water use licence or water-use registration and a delivery or extraction share. As yet, unbundling has not been undertaken in unregulated surface water systems, groundwater systems and in urban regulated systems.

Separating water from land in irrigation areas creates new flexibility to plan water use, trade water shares, tailor delivery services and manage risk. This approach recognises that water is a critical farm and business resource, providing more flexibility and choice for customers on how they own, use and manage their water in line with their business strategies, such as capacity to mortgage, 'lease', as well as trade more efficiently.

The establishment of unbundled entitlements has supported a cheaper, faster and more secure trading environment. This proved particularly valuable during the Millennium Drought. The government proposes to undertake a pilot study in northern Victoria for selected systems with high demand to investigate the benefits and disadvantages of converting take and use licences (section 51 licences) in unregulated surface water and groundwater systems into water shares and other related products, where appropriate.

Opportunities to manage changing water availability

Climate change is expected to decrease annual rainfall and lead to more extreme climatic events. As outlined in Chapter 2 (Climate change), the Millennium Drought demonstrated a noticeable shift in rainfall seasonality.

The prospect of a more variable climate, with extended dry periods and floods, requires water harvesting rules to make the best use of storages while protecting the interests of all water users and the environment. The challenge is to find the right balance of providing flexible management options that do not adversely impact the environment or third parties. One option is controlled access to high flows, which would add to the options available to adaptively manage to changing water availability.

Transparent and streamlined water resource management instruments

Victoria's water management arrangements are contained across a variety of instruments such as bulk entitlements, trading rules, permissible consumptive volumes, and streamflow management plans. This complexity limits the transparency of water resource management, as there is no single instrument in a given area. This makes it more difficult to understand the arrangements, may duplicate requirements or lead to gaps in particular areas.

A more streamlined instrument will support better understanding of how water is managed in Victoria. Transparency in water resource management is particularly important during drought when water resources come under pressure, and there is increased competition for water.

A streamlined Victorian water resource management instrument that draws together the documents for each water system will also make alignment with the Commonwealth *Water Act 2007* and Murray-Darling Basin Plan more transparent.

Proposed strategic direction

To ensure that our entitlement framework remains robust in the face of emerging pressures on resource availability and sharing the government will:

- support actions to account for significant water uses and take active steps to understand and manage the impact of water use on other users and on the environment (for example domestic and stock use, stormwater)
- maintain landowners' rights to domestic and stock water use in a way that does not undermine water resource management. To ensure we also protect the security of the system, and equitable access to water, a review of reasonable use limits is proposed, to be undertaken in consultation with the community
- investigate the costs and benefits of converting take and use licences into water shares and other related products for unregulated and groundwater systems, beginning with a pilot study in northern Victoria for selected systems with high demand
- consider opportunities for individuals to capture water during high flow periods in some systems within the sustainable limits of the resource. This would not increase the total volume of entitlements, although the reliability of entitlements may consequently increase
- build transparency by investigating the merits of amalgamating various resource and system management instruments and policies into a single water resource instrument that would describe water sharing arrangements for a specific area or water system. This would include surface and groundwater system management rules and water resource management roles and responsibilities.

8.2 Strategic direction

A state water planning process for the 21st century

Our Water Our Future established a sound basis for water security planning in Victoria. It established requirements:

- to undertake long-term water resource assessments every 15 years to determine whether resource availability has permanently changed
- that if the long-term water resource assessment finds the resource base has reduced and has fallen disproportionately to either consumptive or environmental users, or river health is deteriorating because of flow, then establish an open, consultative review of the balance between the water available for consumption and the environmental water reserve, and if necessary take corrective action
- for government to prepare regional sustainable water strategies at intervals of no more than 10 years to address threats to, and identify potential to improve, water security and river health over a 50-year planning horizon
- for urban water corporations to prepare long-term plans that consider the supply and demand needs of urban water customers every five years to identify the best mix of demand measures and supply options, over a 50-year planning horizon (water supply-demand strategies).

Wavy marshwort, Reedy Inlet after environmental watering, image courtesy North East Catchment Management Authority



To guide the management of water allocated under the entitlement framework in a range of water availability scenarios, Victoria has a robust and adaptive water planning framework. In addition to the retention of 10-year cycles for sustainable water strategies and 15-year cycles for long-term water resource assessments, the water planning framework will include these new elements (Figure 8.1):

- the production of annual water supply outlooks
- short-term drought planning
- local integrated water management planning to inform the development of urban water strategies every five years
- local integrated water management planning to maintain and improve the health of rivers and wetlands (regional river health strategies developed every five years).

The responsibility for implementing various elements of the planning framework lies with government and a range of agencies including water corporations, catchment management authorities and the VEWH.

This existing suite of planning instruments provides forums for deliberative engagement in water management issues and supports water literacy – the improved understanding of water security challenges and opportunities. The planning instruments are evidence-based and they consider a range of solutions to manage threats to water availability. This broad planning framework helped Victoria to manage its way through the Millennium Drought. It is also sufficiently flexible to accommodate Victoria's water challenges and opportunities into the 21st century.

At the height of the Millennium Drought it was necessary to qualify rights to water in a number of rivers and streams across the state, including the Thomson River, to secure Melbourne's water supply. This had negative effects on the environment. Future planning arrangements must ensure that the qualification of rights to water, either temporarily or permanently, is a last resort.

Four sustainable water strategies for Victoria were prepared between 2005 and 2011. Implementation of these strategies, the creation of the VEWH and the Murray-Darling Basin Plan have resulted in a change in the balance in water held for consumptive and environmental water use over the last decade (Chapter 3 Waterway and catchment health). Future sustainable water strategies will consider Aboriginal values, liveability and recreational benefits.

In northern Victoria, where the Murray-Darling Basin Plan performs a similar role to Victoria's sustainable water strategies, there is a need to consider the alignment of Victoria's planning processes with the Basin Plan's timing for reviews every 10 years. Under current state and Commonwealth legislative

requirements, northern Victoria is facing a review of the Northern Region Sustainable Water Strategy and the preparation of water resource plans within the next 10 years. There is a strong argument for not duplicating these processes. In line with existing legislative requirements long-term water resource assessments will not be carried out more than every 15 years.

The government proposes to annually review progress on the implementation of state planning commitments and compare observed water resource trends with the planning scenarios. A mid-term review of sustainable water strategies, informed by more detailed monitoring and reporting of strategy actions, will also now be undertaken every five years (Figure 8.1). This increased oversight will improve the quality of information provided to all water users and it will help government to make timely water resource and infrastructure investment decisions (Chapter 9 Realising the potential of the grid and markets).

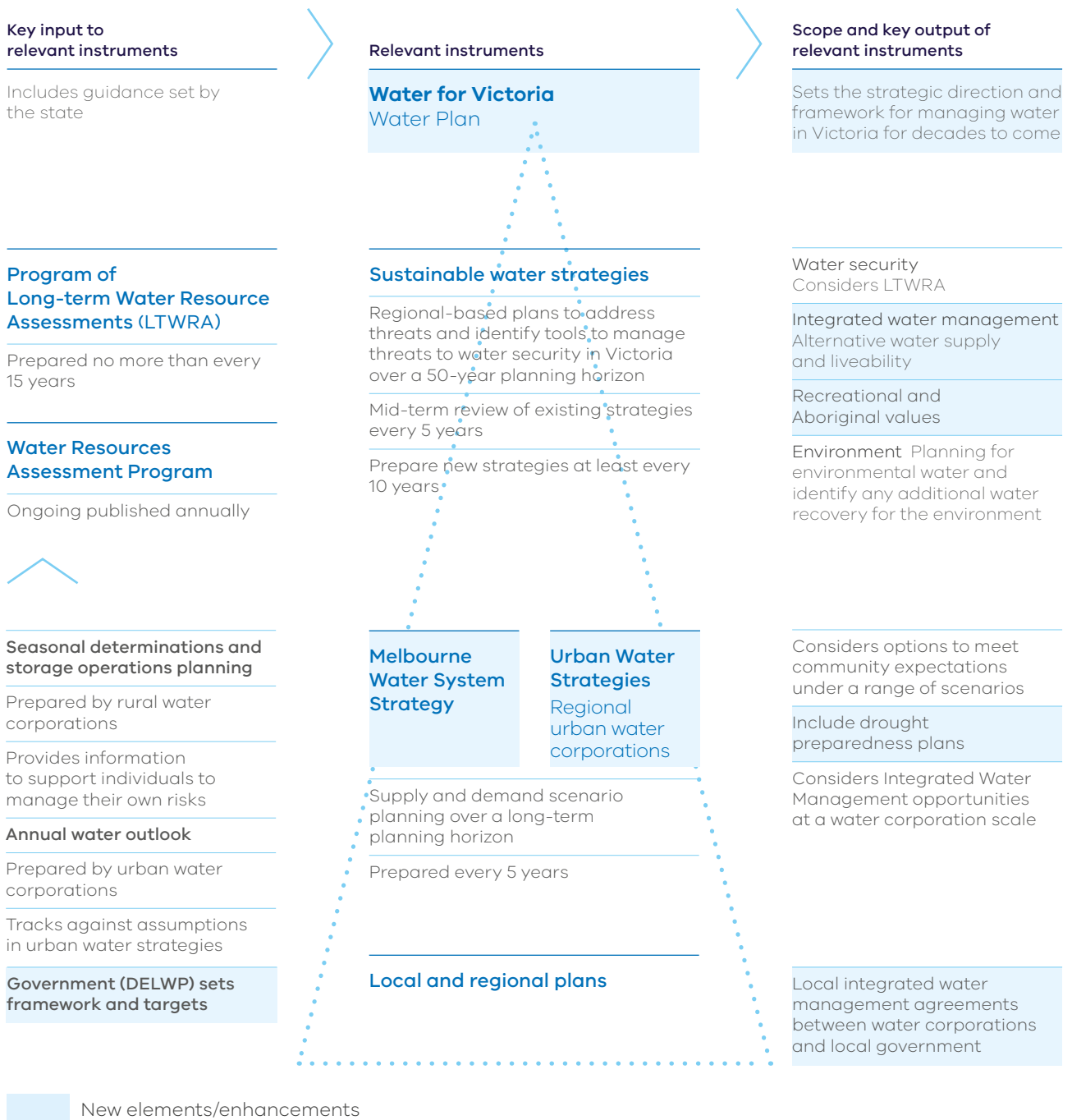
Proposed strategic direction

The government will enhance the existing water resource planning framework by:

- ensuring that Victoria's water security planning arrangements do not duplicate any requirements under Commonwealth legislation
- ensuring that future planning considers Aboriginal values, and the recreational and liveability benefits of water
- requiring the Department of Environment, Land, Water and Planning to annually review progress on the implementation of state planning commitments and compare observed water resource trends with the planning scenarios to inform resource management and grid investment decisions (Chapter 9 Realising the potential of the grid and markets)
- requiring a mid-term review of sustainable water strategies every five years informed by more detailed monitoring and reporting of progress against strategy actions
- requiring the department to annually provide simple and easily accessible information on the drought preparedness of Victoria's water sector to the community
- ensuring that the community will be consulted as part of planning for urban water security
- ensuring that the temporary or permanent qualification of rights would only occur as a last resort.

Proposed water security planning framework

Figure 8.1



Planning for best use of environmental water

Wimmera River at Lochiel

Figure 8.2



Drought

Main objective

Protect

Avoid official loss

Maintain key refuges

Avoid catastrophic events



Dry

Main objective

Maintain

Maintain river functioning with reduced reproductive capacity

Maintain key functions of high-priority wetlands

Manage within dry-spell tolerances



Average

Main objective

Recover

Improve ecological health and resilience

Improve recruitment opportunities for key animal and plant species

'Piggy back' on natural inflows to meet in-channel environmental objectives



Wet to very wet

Main objective

Enhance

Restore key floodplain and wetland refuges

Enhance recruitment opportunities for key animal and plant species

'Piggy back' on natural inflows to meet in-channel floodplain and wetland objectives

Planning for environmental water

Environmental water is a key component of integrated catchment management and is discussed further in Chapter 3 (Waterway and catchment health).

Like water users in the urban and rural water sectors, environmental water managers have access to a range of tools to help manage variable water availability, such as carryover, trade and structural works to improve delivery efficiency. These tools enable them to manage some of the risks of low environmental water availability, and to take opportunities to maximise environmental outcomes. The VEWH, an independent statutory authority, provides rigorous decision-making about the use of environmental entitlements. As part of its decision-making around how to make the best use of held environmental water, the VEWH, like the urban and rural water sectors, is planning and preparing for risk and uncertainty, including the possibility of drought and climate change. The VEWH has developed flexible and adaptive planning arrangements to plan for a range of scenarios (Figure 8.2).

The primary purpose of environmental watering is to maximise environmental benefit. Environmental water managers will actively maximise shared benefits, such as Aboriginal values and recreational values when undertaking operation planning for environmental watering, provided this can be done without compromising environmental outcomes. Long-term water resource assessments will identify where there has been a decline in water availability and where the impact occurs. Sustainable water strategies will set evidence-based principles and priorities to identify future opportunities for environmental recovery.

The VEWH will continue to work with waterway managers to ensure environmental entitlements are used to achieve the best environmental outcome. The community will inform priorities for new environmental water recovery through the planning framework (Chapter 3 Waterway and catchment health).

Proposed strategic direction

The government will strengthen planning for environmental water through requiring sustainable water strategies to consider any new opportunities for environmental water recovery targets, taking into account the findings of long-term water resource assessments. Sustainable water strategies will rely on evidence-based principles, priorities and community input.

Planning for rural water

Storage managers are responsible for water resource seasonal allocation and rural water corporations deliver water to entitlement holders. In regulated surface water systems, storage managers operate storages within agreed water management rules and policies that are designed to ensure water is delivered to entitlement holders as intended by their entitlements. These policies are designed to help entitlement holders manage their own risks within the rights and obligations of their entitlement.

In the regulated systems, storage managers issue fortnightly seasonal allocations and provide a monthly outlook that describes the anticipated seasonal allocations for a range of inflow scenarios for the remainder of the irrigation season. Rural water corporations also track water availability in unregulated rivers and groundwater, and inform licence holders if restrictions or rosters of bans are required to manage current water availability.

The Millennium Drought showed the importance of functioning water markets and other measures, such as carryover policies, to allow entitlement holders to better manage their own water security risks.

Storage managers are in the best position to provide information to customers and other water users on the risks to water supply in their area. The form and detail of this information will be more accessible and more effective in future, to enable other water users to plan their activities and manage their risks during drought. As with urban water strategies, trends in this information will inform statewide planning.

Rural water corporations are also best placed to engage with water users to consider shared benefits of water (where feasible) when planning their water storage and operations management.

Sustainable water strategies provide the opportunity to address system-wide issues to provide flexibility to entitlement holders. Those strategies enable rural water users, water corporations and catchment management authorities to collaboratively explore options to manage and respond to identified threats over a 50-year planning horizon.

Rural water corporations are also required to plan for drought. This includes developing contingency plans for managing severe water shortages in consultation with any urban water corporations that they supply. In future, the government proposes to require rural water corporations to consult more broadly and consider other water values in developing these contingency plans.

Proposed strategic direction

The government will:

- require ongoing annual resource reporting and regular outlooks by rural water corporations, to support analysis of statewide water trends and enable individuals to make better informed decisions
- clarify the requirements for community engagement by water corporations
- require rural water corporations to consider shared benefits when planning their water storage and operations management.

Planning for Aboriginal water values

To improve Aboriginal involvement and representation in water planning and management, the government aims to develop professional forums for Traditional Owners to provide specialist advice, and capacity building opportunities, in the implementation and evaluation of pilot projects within water resource planning programs. This will ensure that the government, in collaboration with Traditional Owners, is making informed decisions to recognise and manage for Aboriginal values of water (Chapter 6 Recognising and managing for Aboriginal values).

Proposed strategic direction

Future sustainable water strategies will consider opportunities to enhance Aboriginal water values.

Bird monitoring after environmental watering, Gunbower Forest, image courtesy North Central Catchment Management Authority



Planning for recreational values of water

As identified in Chapter 7 (Recognising recreational values), our planning framework provides a mechanism to identify, consider and implement water-related recreational objectives for water and waterway management while recognising the rights of entitlement holders. It provides opportunities for early and informed discussions about the requirements, trade-offs, costs and benefits in the way that water resources are managed. The management of water is part of a broader framework of waterway, land and recreation management that contributes to the achievement of recreational benefits. Water agencies have a role in this broader framework alongside local councils and other agencies whose functions need to be integrated to work towards achievable and strategic outcomes for regional communities.

Proposed strategic direction

Future sustainable water strategies will consider opportunities to enhance recreational values of water.

Planning for resilient and liveable cities and towns

Urban water corporations are responsible for managing their water resources to meet the needs of their customers now and into the future. The current Statement of Obligations for water corporations requires each water corporation to develop an urban water strategy, which is based on a long-term outlook of 50 years and on a range of climate change scenarios and future demands. The urban water strategies are also required to include measures for delivering sub-regional planning outcomes, and IWM through relevant planning schemes.

As further detailed in Chapter 5 (Resilient and liveable cities and towns), urban water strategies will be informed by sub-regional and local IWM planning, which covers the five core outcome areas for urban water (security of supply, wastewater, flood resilience, urban waterways and urban landscapes and spaces). Current statutory responsibilities for individual agencies will not be affected by these IWM planning processes and local agencies will work with communities to develop and implement IWM plans. These IWM plans will create efficiencies across the five outcome areas.

Urban water strategies will also be streamlined and integrated with drought planning, recognising the need to not just respond to drought, but to be prepared for it. Urban water corporations will also continue to prepare and report on the annual water resource outlook. This will build community understanding of likely water security risks over coming years. Community engagement will be a critical component of planning for resilient and liveable cities and towns.

Proposed strategic direction

In addition to the proposed directions for IWM planning outlined in Chapter 5:

- the guidelines to be developed for urban water strategies will be informed by sub-regional and local IWM planning. The guidelines will be developed in the first half of 2016
- urban water strategies will incorporate water corporation drought preparedness planning
- urban water corporations will consider the potential for shared benefits during water resource and operational planning
- for Melbourne, the government will work with Melbourne Water and the metropolitan water corporations to ensure that timing of these strategies and plans is aligned, streamlined and efficiently delivered.

Clockwise from left: West Barwon Reservoir, image courtesy Barwon Water; Lauriston Reservoir spilling, image courtesy Coliban Water; Dethridge wheel Merbein property, image courtesy Lower Murray Water



Planning for future flood events

The 2010–11 floods following the Millennium Drought underscored the need to prepare for extreme events. The 2010–11 Victorian Floods Review noted community concerns around agency roles, available flood information and warnings. The government has moved to address these concerns through the Victorian Floodplain Management Strategy. The strategy has been developed with extensive engagement with communities and stakeholders. It places local communities at the centre of decision-making about managing their flood risk. Clear accountabilities are established for government in supporting communities in this decision-making. Improved access to flood risk information is a central component, alongside better agency collaboration. The strategy also sets out a framework for considering climate change impacts on flood risks.

The vision is to make Victorian communities, businesses and government agencies aware of flooding and actively take measures to manage their risks, to minimise the consequences to life, property, community wellbeing and the economy. Its objectives are encouraging communities to take action to manage their own risks, reducing legacy issues to minimise exposure to future flood risk and consequences, not making things worse and supporting emergency services by focusing on prevention activities.

Proposed strategic direction

The government will finalise the Victorian Floodplain Management Strategy, with a proposed release in mid-2016. The Victorian Floodplain Management Strategy seeks to assist in planning for and mitigating flood risks, strengthening communities to invest in projects that mitigate the risks of floods and empowering communities to respond to and recover from floods.



Sharing our
improved water
security



Realising the potential of the grid and markets



9

Victoria's investment in water infrastructure means we now have a rainfall-independent source of water, the Victorian Desalination Project, and a highly interconnected water system, known as the grid. This means that Victoria is more resilient to future drought and climate impacts.



Realising the potential of the grid and markets

Proposed objective

Victoria's water grid and markets will help Victoria realise the greatest benefit from our valuable water resources. Victoria's water grid and markets will enable water to be accessed from a wider range of sources. Through the water market, users will be able to move water to where it is most valued and delay or avoid costly water supply augmentations. This market-based approach enables sharing water security benefits in ways that are fair, responsive and transparent. Our communities will be more resilient to changes in supply and demand, such as climate change and population growth.

The discussion paper proposes to achieve this by:

clearly defined water market trading rules to enable better use of the grid

improved open, efficient and transparent markets

establishing a central oversight and facilitation function for the grid

planning for future augmentations to the grid.

We will know we have succeeded when:

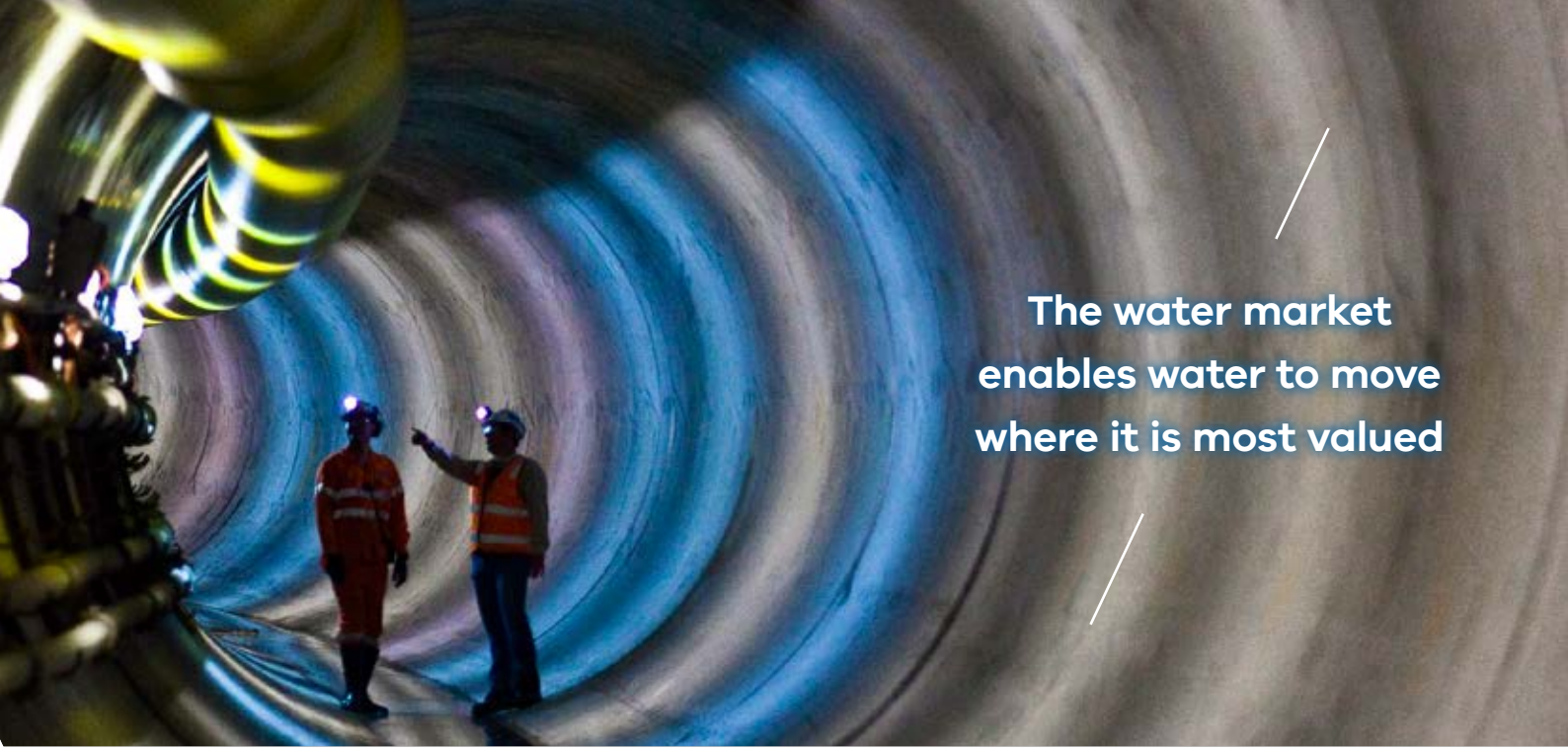
the opportunities to increase the use of the current grid are identified and implemented

the outcomes of the five-year southern market trial have been reviewed and the capacity to improve water transfer rules to facilitate water movement around the grid is understood

the grid is factored into long-term water planning

the majority of water register transactions are available online

ways of accessing unregulated surface water and groundwater are understood.



The water market enables water to move where it is most valued

Ocean inlet pipe, Victorian Desalination Project, courtesy Capital Projects, Department of Environment, Land, Water and Planning

Victoria's water grid connects water sources, including dams, reservoirs and the desalination plant, via constructed infrastructure, including pipes and pumps, and natural elements, such as rivers (Figure 9.1). The grid allows water to be moved from where it is captured and stored to where it is required for use. Victoria's water grid and markets now allow the transfer of water around large areas of the state, primarily from east to west, enabling water to move to where it is most needed according to users' willingness to pay.

Over the last decade, the Victorian community has made significant investment in Victoria's water grid, including:

- Sugarloaf (North-South) Pipeline
- Melbourne-Geelong Pipeline
- Tarago-Warragul-Moe Pipeline
- Wimmera Mallee Interconnector
- Goldfields Superpipe (connecting Ballarat and Bendigo to the northern water system)
- Hamilton Grampians Interconnector
- modernisation of the Goulburn-Murray Irrigation District (currently underway)
- modernisation of the Sunraysia Irrigation District (currently underway).

This investment has created new opportunities to enhance Victoria's water security. For example, at the peak of the Millennium Drought, investments such as the Goldfields Superpipe enabled the key regional cities of Bendigo and Ballarat to meet basic water needs. Irrigation modernisation projects have increased efficiency for agriculture and grid investment has also helped recover water for the environment, improving the health of stressed waterways.

Melbourne's water security is now underpinned by the Victorian Desalination Project, which can deliver an additional 150 gigalitres of water per year into the Melbourne water system. The desalination plant underpins Melbourne's security of supply, regardless of whether or not it is turned on. The enhanced connectivity provided by the grid creates an opportunity to leverage Melbourne's increased water security to provide broader benefit across the state.

As an example, the Melbourne storage system is now physically connected:

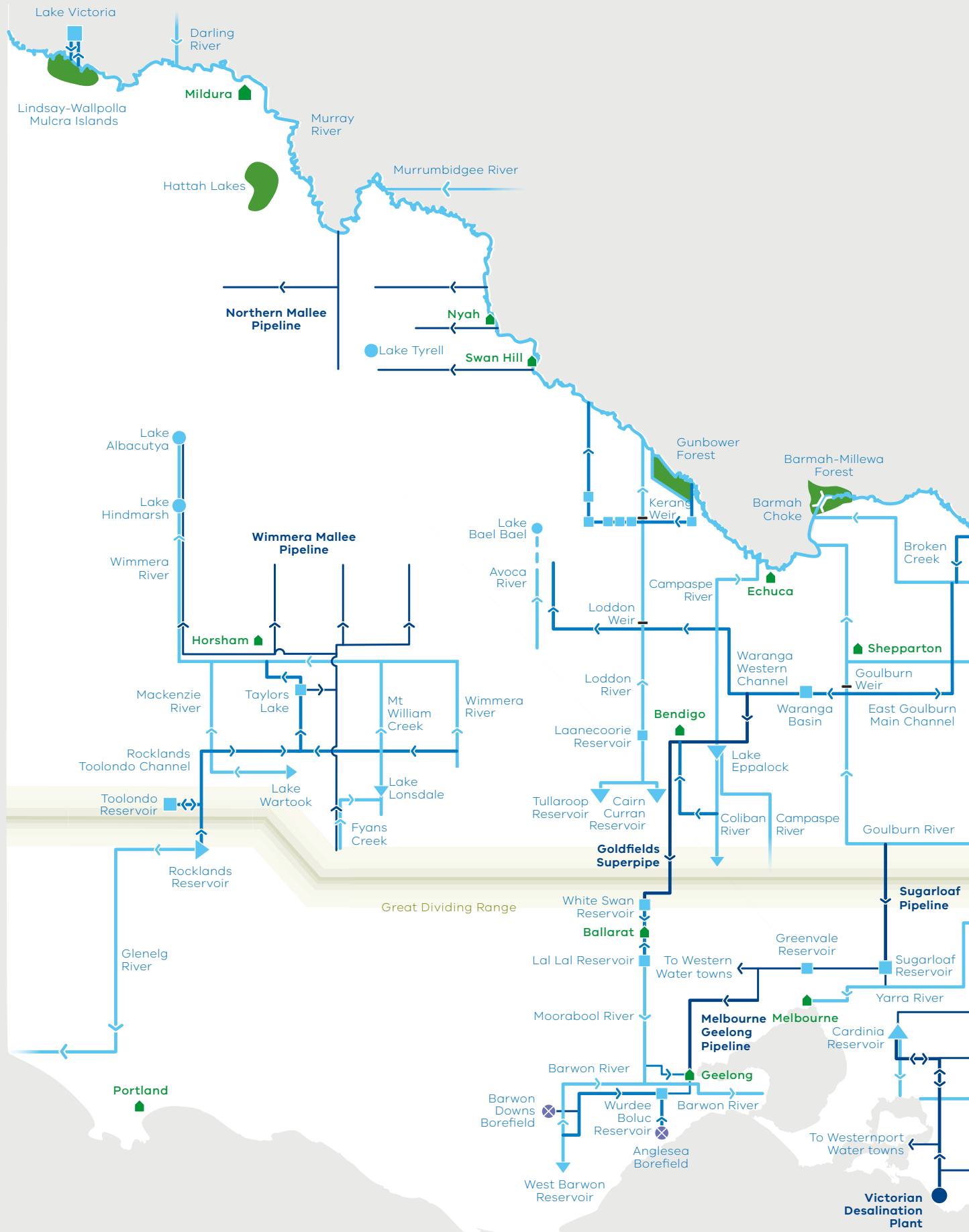
- via the Melbourne-Geelong Pipeline to Barwon Water
- via Geelong, the Moorabool River and Lal Lal Reservoir to Central Highlands Water (Ballarat)
- via Ballarat and the Goldfields Superpipe to Coliban Water (Bendigo), in the state's north.



The Victorian water market enables water to move in connected systems to where it is most valued. The water grid improves the connection between systems and therefore increases the potential opportunities for water market trade. The water market allows water users, such as farmers, the environment and water corporations, to buy and sell water entitlements and seasonal allocations, so that they can manage their own risk according to their willingness to pay.

Water can move across the grid via the market, physically or by substitution. Trade by substitution may involve the use of desalinated water in one part of the grid, thereby enabling the water in storages that would otherwise have been used there, to be sold to users in other parts of the grid. It is important that movement of water around the grid does not result in adverse environmental impacts.

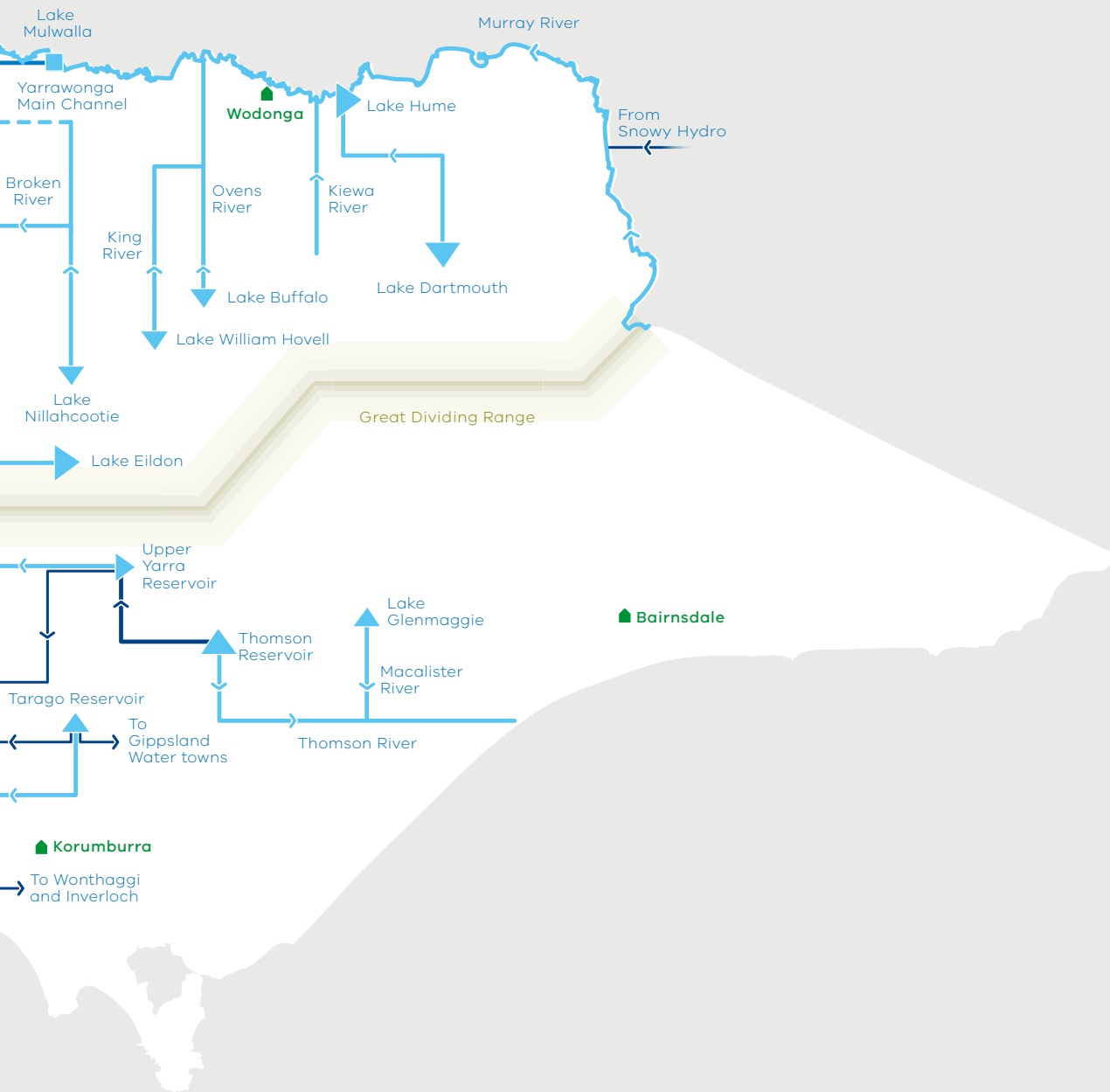
Victoria's water grid A schematic

Figure 9.1



-  River
-  Channel
-  Piped connection
-  Drainage line/ephemeral stream
-  Catchment storage
-  Operational storage
-  Other lakes
-  Groundwater extraction location
-  Desalination plant
-  Living Murray Icon site
-  Weir
-  Town

November 2015



To achieve the government's objective to better realise the potential of Victoria's water grid and water markets, the government proposes the following strategic directions:

- clearly defined water markets and trading rules to enable better use of the water grid
- improved open, efficient and transparent markets
- establishing a central oversight and facilitation function for the grid
- planning for future augmentations to the grid.

9.1 Strategic direction

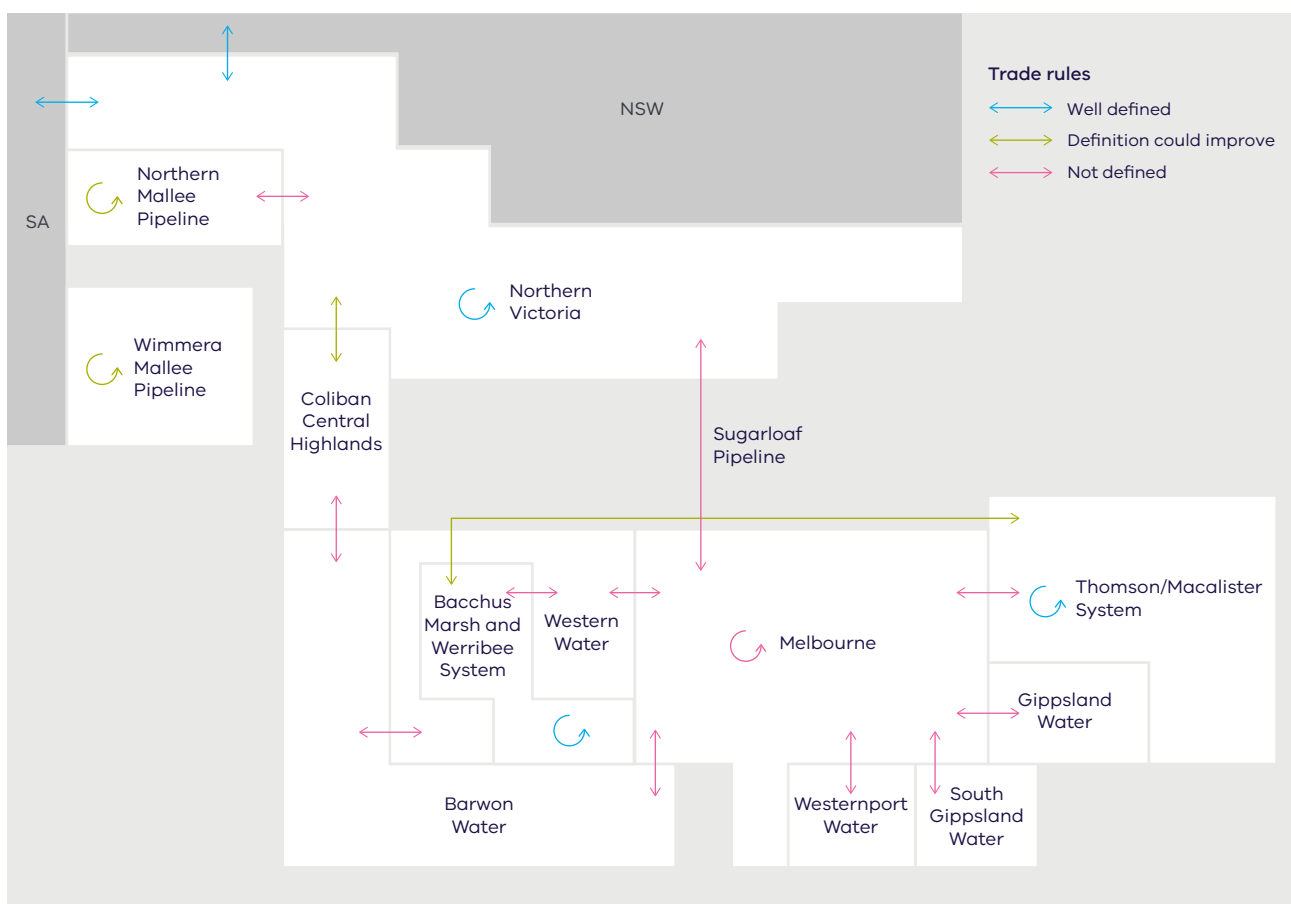
Clearly defined water market trading rules to enable better use of the grid

To realise the potential of the grid, it is crucial to have appropriate and clearly defined rules and processes governing the operation of the water market. Trading rules and processes enable water to move around the grid and facilitate new connections. Trading rules and processes include water-sharing arrangements, market rules, market settings, and operational rules on infrastructure that control how water can be traded and delivered. Trading rules must reflect the hydrologic or physical constraints to water movement and they must protect third parties and the environment. Clear and accessible information is critical to the efficient operation of water markets and to efficient investment in the infrastructure of the water grid.

Victorian water grid trade rules

Expansion of the grid via markets

Figure 9.2





Sharing Melbourne's water security benefits through the existing water grid

Case study

Melbourne now has a variety of water supply options to increase its water security. In addition, having learned hard lessons from the Millennium Drought, Melburnians continue to use water efficiently and have permanent water saving rules in place.

Therefore, there are opportunities to share Melbourne's water security more widely across the state, either physically through connected systems, or through water trade by substitution.

For example, Melbourne has already made some of its seasonal allocation in northern Victoria available on the water market. The government supports the temporary trade of these seasonal

allocations by Melbourne's urban water corporations for use by northern water users during dry periods.

It may be economical to operate the desalination plant during both wet and dry times, with Melbourne's water corporations offsetting their costs by selling their water allocations in the Goulburn area to irrigators. This would enable greater flexibility in the use of the northern water reserve, held by Melbourne's water corporations.

The government proposes to undertake a proof of concept and preliminary business case to assess the potential to upgrade the Sugarloaf Pipeline south-north transfer.

Victorian Desalination Project, courtesy Capital Projects, Department of Environment Land, Water and Planning

Once formalised, trading rules provide the bounds within which market participants are free to make independent decisions about their own water needs. Some parts of the existing grid already have well developed rules and processes (Figure 9.2) enabling water to move around the system within the physical constraints (Figure 9.1). Other parts need further development.

In northern Victoria, water markets are generally mature in the regulated surface water irrigation systems where irrigation is the dominant water use. It is important to ensure that consistent rules govern the large interstate water market that operates across the southern-connected Murray-Darling Basin. Victoria's water users are active buyers and sellers of seasonally available regulated surface water. For example, excluding environmental trades, Victoria was a net importer of more than 190 gigalitres in 2013-14. It is important to ensure there is a level playing field in the interstate water market; it is also important to provide high quality and robust information to facilitate water trade.

In southern Victoria, much larger volumes of water for urban water use dominate the market. Where irrigation is the dominant use, the water market operates well, but for the bulk of the system, the market is immature. This discussion paper proposes setting up the necessary rules for an efficient market for bulk urban water between the urban water corporations who are connected to the grid. This could also help to further free up the market within the southern irrigation districts. For example, new rules could facilitate water transfers between the Macalister Irrigation District and the Werribee and Bacchus Marsh districts.

In terms of how well developed Victoria's trading rules are, it is helpful to categorise them according to the types of water systems in which they operate. There are four main types of water systems to consider:

- irrigation dominant areas
- other regulated surface water systems
- unregulated surface water systems
- groundwater systems.

Key opportunities for improving water markets in the four different types of water systems are described below.

Water markets in irrigation dominant areas

In the Goulburn–Murray and Macalister systems in particular, Victoria has well developed, mature water markets. These markets have delivered enormous value and will continue to do so in the face of an uncertain water supply and demand future. They increase the productivity of irrigated agriculture within Victoria while also enabling better environmental water management. Importantly they have also enabled urban water corporations in those systems to match their water availability to their population and customer needs.

Water markets in these systems have given individual irrigators, urban water corporations and environmental water holders more tools to manage their water security and associated risks. Other water users, including those concerned with managing recreational needs and Aboriginal water values, also have opportunities to make use of the market.

The water market in the Goulburn–Murray system interacts with the markets of South Australia and New South Wales to the point where water users in the Murray–Darling actually have varying levels of access to one large and diverse water market. The active water market in this system has evolved over time. Open water markets enable more productive water use and more cost-effective and flexible recovery of water, which can then be put towards economic, social and environmental objectives. Conversely, artificial restrictions on the water market can lead to unintended and often negative consequences.

Within the market, trading rules are required to protect third parties and the environment from unintended consequences. As the market develops and water movement increases, pressure on different parts of the grid can change. Trading rules may need to be refined over time to reflect this. Any refinement to trading rules in the north will also need to be consistent with the requirements of the Murray–Darling Basin Plan.

Proposed strategic direction

The government will continue to refine the trading rules in irrigation areas to facilitate trade and enable farmers to manage their business needs.

The government will work with the Murray–Darling Basin Authority to provide appropriate and timely information for northern Victorian water users about the risk of congestion in the Basin, and how trading rules are used to manage physical constraints in the southern Basin.

Water markets in other regulated systems

Water markets are not well developed in regulated surface water systems where irrigation is not dominant. These include the Melbourne water supply system, the Wimmera Mallee Pipeline domestic and stock system, the Coliban rural system and various waterworks districts serviced by other rural water corporations.

Around Melbourne, water trade is primarily through negotiations between water corporations, which is an inefficient process that lacks transparency. Bulk water entitlements for the various urban water corporations around Melbourne have only recently been disaggregated to make better use of the market to move water around the grid. The features of these entitlements need to be further developed and refined.

Further developing regulated surface water markets across the state will enable better use of Victoria's water resources and infrastructure. For example, improving and developing the water market could assist water corporations, as market participants, to access the lowest cost water, get the most value out of existing water resources and deliver benefits to the Victorian community.

Water treatment, image courtesy Gippsland Water





Barmah Choke Case study

The Barmah Choke is a relatively narrow section of the river through the Barmah-Millewa Forest. This narrowing of the river is a significant constraint on the ability to deliver water to the lower Murray in summer. Spring flows can be high enough to include some overbank flow into the forest, mimicking natural conditions. But overbank flows must be avoided in the summer because they have undesirable ecological effects.

As water continues to trade from the Goulburn Murray Irrigation District (GMID) to the Mallee it results in a change to seasonal water demand patterns.

Water use in the GMID traditionally peaked in the spring and autumn when annual pastures were being watered. By contrast, water use for the perennial horticultural crops being grown in the Mallee peaks in the summer.

The Victorian Government is working with other governments, through the Murray-Darling Basin Authority, to establish clearer capacity sharing arrangements for the Barmah Choke. If there are significant risks associated with meeting peak daily irrigation demands, within Victoria's share of that capacity, the government proposes to develop options to manage these risks.

Image Keith Ward, image courtesy Goulburn Broken Catchment Management Authority

A well developed water market in these areas will depend on:

- improved understanding by market participants of:
 - the accounting rules governing capacity sharing within storages
 - the charging arrangements for headworks, including the role of the desalination plant, and delivery infrastructure
 - entitlement characteristics and the policies for determining seasonal allocations
- trading rules to protect the environment and third parties
- functionality within the Victorian Water Register to record trades and to provide market information.

The government proposes to encourage the development of the water market in the regulated surface water systems in southern Victoria. It proposes to do this through a staged and community-focused approach. This approach will allow the market to develop over time, leveraging past experience, existing infrastructure, new data, technology and ways of thinking, and removing

market barriers, drawing on expertise in market development, managing risks and remaining flexible about the pace of market development.

This approach will draw on lessons from the development of water markets in the irrigation-dominant areas of the state to inform southern market trials. However, the differences between these different types of regulated water systems means that developing the market there will present new challenges and require new approaches. For example, the market trial is likely to involve the formalisation of trading rules across the southern urban water systems.

A staged approach is prudent as it allows time for good decision-making and the development of a water market. As a first step in the staged approach, the government proposes a five-year southern market trial to ensure that the level of effort in establishing the market is proportionate to the benefits that can be gained and that all parties have realistic expectations about the benefits the water grid and markets can provide.

The proposed objectives of the southern market trial are to:

- better understand the current physical and regulatory constraints within southern markets
- facilitate more flexible use of existing state water assets and resources, particularly the southern grid infrastructure and potentially the desalination plant, through trade by substitution, to get the most value from surplus water and to support water management
- inform decisions on future market development.

The government also proposes to continue to explore opportunities to further develop markets in the west, including the capacity to improve access to the grid.

Good governance will be crucial to the success of the trial. The government proposes to work with stakeholders to define the details of the institutional arrangements and governance for the trial. This will ensure it has experience and expertise to succeed and commercial rigour and tight scrutiny over activities related to identifying and facilitating transactions. It will be important that these are done fairly in ways that build trust, understanding and confidence. On completion, the government proposes to review the outcomes of the trial.

Proposed strategic direction

The government will catalyse development of the water market in southern Victoria by establishing a five-year southern market trial from 2016–21. The trial will support the development of fit-for-purpose water markets in southern Victoria to share water security benefits more broadly, manage variability in water availability over time and across regions and make better use of the grid.

The trial will not only consider market rules but also the role of the desalination plant, entitlement structures, allocation policies and storage and delivery changes. Initially, the trial will focus on trade between urban water corporations.

A strategic partnership, led by the Department of Environment, Land, Water and Planning in partnership with water corporations and other relevant parties will be established to reduce barriers to water trading.

A key component of this trial will be to build understanding of the grid through improved system information and modelling.

The government will also continue to explore opportunities to further develop markets in the west, including the capacity to improve access to the grid.

Markets in unregulated surface water systems

In unregulated water systems, water markets are immature. To further develop those markets the first step is to improve the capacity to operate a cap-and-trade system.

The prerequisite caps are already in place for the unregulated systems in northern Victoria as a result of the sustainable diversion limits established through the Murray-Darling Basin Plan. Outside of the Murray-Darling Basin, in some unregulated systems that are subject to permissible consumptive volumes, the sum of the entitlements on issue is still less than the cap. In these systems, water users can apply for new entitlements. Once the cap is reached, access to water would be through trade.

For those unregulated surface water systems that are physically connected to the regulated systems of the grid, as is typically the case in northern Victoria, it may be possible to add depth to the market by refining the arrangements for trade from the unregulated systems to the regulated system.

In isolated unregulated water systems, which are not physically connected to the regulated systems, it may be possible to add depth to the market by broadening the areas within which trade is possible. Trade in unregulated systems is typically allowed downstream, but is not allowed upstream. In winter, upstream trade can occur as long as there is sufficient water available under the local Victorian Sustainable Diversion Limit. In some unregulated systems, however, the licensed volume is low compared to the volume of available water and freer trading rules may be possible.

Markets in groundwater systems

In groundwater systems, water markets are immature. The first step to further developing these markets is also to improve the capacity to operate a cap-and-trade system. As with unregulated surface water systems, caps have been set in the Murray-Darling Basin. Many groundwater systems outside of the Murray-Darling Basin also have caps in the form of permissible consumptive volumes. These have been set using a risk-based approach to the assessment of demand and supply.

As for unregulated systems, in some groundwater systems with permissible consumptive volumes, the sum of the licence volume is still less than the cap. In these systems, water users can apply for new entitlements. Once the cap is reached, access to water would be through trade.

In areas where the cap on entitlement has been reached, it may be possible to add depth to the market by broadening the areas within which trade is possible. Typically groundwater trading rules have been defined around high intensity use areas in order to manage local impacts. Broader trade may be possible, however, where groundwater is connected.

Proposed strategic direction

The government will investigate the potential for broader water trade:

- within unregulated and groundwater systems
- between these systems, where they are connected
- between these and the regulated system, where this is connected.

9.2 Strategic direction

Improved open, efficient and transparent markets

Good information is essential if all potential and existing market participants are to understand the water market and its trends. The government plays an important role in providing timely, accessible, transparent information for water users, planners and managers.

The Victorian Water Register is a robust, transparent, innovative and efficient system that is now central to water management in Victoria. It provides water users with access to essential information about water entitlements, seasonal allocations, trade and transfers. It provides the authoritative record for water entitlements worth over \$4 billion and facilitates the transactions that underpin Victoria's water market. Last year, the water register facilitated approximately 47,000 transactions.

The Victorian Water Register is an example of leading innovation in water management. Business and industry depend on the Victorian Water Register for fast, efficient transactions to drive economic productivity. The register provides business confidence for water users, an operational platform for water corporations and information for water planners and managers. Water corporations are increasingly relying on the register in place of their own systems, saving money and time. Ongoing maintenance and development of the register is critical to:

- enabling government to fulfil its statutory obligations
- supporting market development and water corporation strategic planning
- providing information to water resource managers and the public.

Clear and accessible information is critical to the efficient operation of the water grid, particularly the water market. The government is committed to continual improvement of the water market information and systems, including the register. This includes reducing red tape, making transactions simpler, quicker and cheaper for users, and better integrating with water corporation operations. The priorities are using spatial functionality to improve transaction efficiency and aiming to move applications online.

Proposed strategic direction

The government will commit to continuous improvement of the water market information and systems including:

- increasing the transparency of the water market and water resources by making data on market behaviour, how water is held, and the distribution of water resources more accessible
- ongoing improvement of the Victorian Water Register with consideration of moving applications online and addressing the current obstacles to this.

This will assist in meeting water corporations' and water market participants' expected levels of service.

9.3 Strategic direction

Establishing a central oversight and facilitation function for the grid

Victoria's water corporations currently make investment decisions that focus on maintaining the security of supply for their individual water systems. Water corporations are, and continue to be, best placed to make these decisions.

However, with the connectivity across water corporation boundaries provided by the grid, the government recognises the need to establish a formal oversight role that considers strategic, statewide investment in the grid. This function is best performed centrally, provided it is underpinned by robust local and regional planning undertaken by water corporations, and informed by sustainable water strategies and long-term water resource assessments, as set out in Chapter 8 (Water entitlement and planning frameworks).

By collecting and publishing system-wide water resource and market information, this oversight role would inform water corporation decisions at a regional level as well as government investment decisions across water corporation boundaries. This new function would work closely with water corporations and Infrastructure Victoria.

Proposed strategic direction

The government will establish a new centralised function based in the Department of Environment, Land, Water and Planning to provide oversight and a system-wide perspective on Victoria's water resources to inform strategic statewide investment decisions.

9.4 Strategic direction

Planning for future augmentations to the grid

The government is currently exploring options to better use the water grid's existing infrastructure. For example, the government has invested over \$3.6 million since 2015 to increase the extent of the Wimmera Mallee Pipeline network including:

- \$1.15 million to investigate supply options and develop a business case for the South West Loddon Rural Water Supply Project
- \$1.73 million for the construction of South West Loddon Rural Water Supply Project Stage 1
- \$0.74 million for the Wartook, Quambatook North and Pella Rural Water Supply Schemes, which was matched by Grampians Wimmera Mallee Water.

As part of the Regional Statement (2015) a further \$20 million has been committed to the implementation of the MID2030 Phase 1B: Southern Tinamba Pipeline Project.

Water corporations regularly engage with local communities and government to explore opportunities to realise the potential of the Victorian water grid.

Through consultation with rural and regional communities and customers, water corporations have already identified the following projects for further investigation and/or construction (subject to funding availability):

- Mitiamo Stock and Domestic Pipeline Project
- Macalister Irrigation District 2030 Phase 2 Project
- South West Loddon Rural Water Supply Project Stage 2
- Northern Towns Project, Gippsland – connecting Korumburra, Poowong, Loch and Nyora to the Melbourne water supply system via the Lance Creek Reservoir.

Further augmentation will be informed by strategic needs identified as part of the state's water planning framework (Chapter 8 Water entitlement and planning frameworks), opportunities identified through open and transparent information and catalysed by the southern market trial. A robust evaluation and risk analysis will test and evaluate the comparative advantages of efficient regional solutions through connection to the grid compared with local water supply options.

Proposed strategic direction

The government will explore options for additional connections to better use the state water grid to share the water security benefits of the grid and the desalination plant more broadly.

Clockwise from left: Underground pipeline connecting desal water to the Melbourne grid, Victorian Desalination Project, courtesy Capital Projects, Department of Environment, Land, Water and Planning; Sunraysia Modernisation Project pipeline installation, image courtesy Lower Murray Water; construction workers, Victorian Desalination Project, courtesy Capital Projects, Department of Environment, Land, Water and Planning





Insights from the development of the irrigation water market Case study

The process by which the water market developed in regulated irrigation systems provides insights into the development of future water markets in the regulated water systems of southern and western Victoria. Notably:

- benefits of the irrigation water market were not fully understood at the outset, they were revealed over time
- in the Murray-Darling Basin, market development progressed once the available water was fully allocated and the only way to access water was through trade
- the first step in developing the market was clarifying entitlement structures and allocation policies. From there, trading rules were developed for the large interconnected water systems
- these trading rules require continued adaptation as water movement and market use is better understood
- development of the market, and the platform on which water is traded, the Victorian Water Register, has occurred incrementally as a result of experience and in response to individual and community needs
- community and participant confidence, understanding and capability grew. Community understanding of the market continues to require careful management.

Irrigation, David Lawler, image courtesy Goulburn Broken Catchment Management Authority



Safe, secure
supplies



Jobs, economy and innovation



10

Water has a key role in supporting the Victorian Government's focus on people, jobs and growth, underpinning a prosperous economy and supporting urban, regional and rural development, business and industry and our communities.

Ensuring Victoria's water sector is efficient, and delivering sustainable, reliable and affordable water services is a key determinant of future growth and the prosperity of metropolitan, regional and rural communities.

Jobs, economy and innovation

Proposed objective

Victoria's water sector will deliver efficient and innovative water services to support jobs, growth and economic development across Victoria. Through strong governance, efficient service delivery, secure funding and innovation the water sector will support productive industries and investment, public health and wellbeing, and improve community and environmental outcomes across Victoria.

The discussion paper proposes to achieve this by:

strengthening our institutions

streamlining and improving regulation

securing funding for sustainable water management

enabling an innovative water sector.

We will know we have succeeded when:

the sector continues to protect human health and safety through its delivery of services and contribution to emergency management

the sector continues to provide the community and industry with affordable and secure water services

services are delivered affordably and meet customer and community expectations, as expressed through measures of customer satisfaction

the export of Victoria's water expertise is increasing, and Victoria is recognised as a leading centre for water management

there are measurable improvements in customer and community engagement.



Efficient, reliable water services

Western Treatment Plant, Christian Pearson/Misheye, image courtesy Melbourne Water

Victoria's economic outlook is solid, reflecting our continued resilience in light of recent challenging conditions.

Positive signs have emerged in the state's traditional growth drivers of household consumption and dwelling investment as the national economy shifts from growth led by mining investment to broader-based drivers. These are responding to low interest rates and strong asset price growth, while the lower Australian dollar is assisting business competitiveness.

Other structural shifts are presenting challenges for some industries as well as growth opportunities in new and developing sectors. The state's diverse industry structure, its highly skilled workforce and strong population growth will help Victoria adapt to external pressures and take advantage of emerging opportunities.

The government is encouraging growth in six key sectors with the potential to drive longer-term economic growth: medical technology and pharmaceuticals, new energy technology, food and fibre, transport, defence and construction technology, international education and professional services.

Water is a critical input to Victorian industry and household needs. While the Victorian economy is strong, and the outlook for jobs and economic growth is positive, businesses are facing increasing competition and cost pressures from local and global competitors.

Periods of drought, and pressures from growth in demand (particularly in metropolitan areas) have also placed stress on the water sector in recent times.

Ensuring Victoria's water sector is efficient, and delivering sustainable, reliable and affordable water services is therefore a key determinant of future growth, and the prosperity of metropolitan, regional and rural communities.

Jobs and economic development

The Victorian water sector is a major sector in its own right. For example, Victoria's water corporations employ approximately 6,000 people, have a total asset base of around \$40 billion, had revenue of \$5.6 billion in 2013–14 and made capital investments of \$1.2 billion in that year.

Water is vital to a number of Victoria's identified high growth potential sectors. The primary production of food (including fisheries) employed over 87,000 people, with 86 per cent of these jobs located in regional Victoria, in 2013–14. The food manufacturing industry (including beverages) employed 69,000 people. These important industries are heavily reliant on water. Water is also a key input into a range of other sectors including electricity generation, construction and mining.

More significantly, the delivery of sustainable, reliable and affordable water services is vital to key industries across Victoria and the prosperity of metropolitan, regional and rural communities. For example, water is a critical input into Victoria's agricultural sector, particularly irrigated agricultural production with a gross value of approximately \$4.5 billion in 2013–14 (about 31 per cent of total gross value of irrigated agricultural production in Australia). Water is also a key input into a range of other sectors, such as electricity generation, food processing and mining.

The Victorian economy will be subject to significant economic changes in the coming decades, from a range of long-term industry structural trends, demographic trends and population growth, climate change and the increasing pace of change from new technological advancements.

Prospering from these changes will require adaptation, new innovations and the development of new market opportunities. The water sector can play a key role in assisting industry and communities make these transitions through ensuring that water management in Victoria provides the certainty, efficiency and sustainability required to support productive industries and economic development in Victoria now and into the future. The proposed strategic directions focused on the water grid opportunities, strengthened planning and management of water, underpinned by a robust entitlement framework, all work to achieve these outcomes.

At the same time, the water sector itself can provide new economic growth opportunities.

Over the last decade in particular, Victoria has developed skills and leadership in water management in a drying climate. There is a significant opportunity for Victoria to leverage this knowledge and expertise for export.

This chapter focuses on the performance of the Victorian water sector in supporting jobs, growth and the economy across Victoria, driving innovation and ensuring Victorians receive safe, reliable and affordable water services.

Healthy natural capital supports a strong economy

Natural capital includes water, biodiversity, soil and air. A report for the Future Economy Group by Nous Group found that “an economy underpinned by healthier natural capital will outperform (over the medium to longer term) an economy where natural capital is degraded. Victoria’s economy can expect substantial economic returns of between \$9 billion and \$38 billion in output and 24,000 and 230,000 jobs in the year 2028 from healthier natural capital”.¹

10.1 Strategic direction

Strengthening our institutions

The governance and regulation of the Victorian water sector assures the provision of affordable, high quality services that underpin the economy, the community and environmental improvement activities. Its key elements include:

- obligations established through legislation, particularly the *Water Act 1989*, *Water Industry Act 1994* and *Catchment and Land Protection Act 1994*, Statements of Obligations and other relevant instruments
- independent boards overseeing water corporations and catchment management authorities
- independent economic regulation of water corporations provided by the Essential Services Commission, which promotes the long-term interests of Victorian consumers with regard to the price, quality and reliability of water services
- a robust set of pricing principles applied by the Essential Services Commission.

Water corporations

Victoria’s water corporations currently perform at a high level. Performance has been enhanced recently through a range of initiatives, including a greater focus on shared procurement. It can be further enhanced by:

- articulating more clearly the government’s expectations of water corporations
- ensuring that there are clear, consistent indicators to measure service levels and financial performance and operational performance
- enhancing transparency through more effective performance comparisons and benchmarking, while recognising the different circumstances of the various water corporations.
- analysing the factors and processes affecting performance, to identify good practice and sharing this information.

The Essential Services Commission is currently undertaking a review of its approach to the price regulation of Victoria’s water corporations, which will be completed by the middle of 2016. This will inform the next round of price reviews that will take effect from 1 July 2018. Key focus areas of this review include:

- considering options to enhance the efficiency and effectiveness of the price reviews
- setting out the Essential Services Commission’s expectations regarding customer consultation and the information provided by water corporations to customers to inform customer discussions about the balance between service levels and price.

Water sector institutional arrangements

Water makes an important contribution to the economy of Victoria. We have an obligation to ensure that the costs of water services remain affordable and are able to meet the needs of our communities.

Under the *Water Act 1989*, rural water corporations are required to provide irrigation, drainage and storage services. These services are critical for agricultural water users in underpinning on-farm investment decisions.

Urban water corporations manage water resources and deliver water supply and sanitation services within our cities and towns. Ninety five per cent of total water corporation expenditure is spent by the urban water sector on the provision of these services within our cities and towns. Furthermore, the forecast growth in urban population will add increasing pressure on our existing water systems, placing growing demand on current assets, infrastructure, water supply and wastewater services.

The Victorian Environmental Water Holder relies on the services of storage managers to deliver environmental water where it is required.

It is important to ensure that we are making the best use of our existing infrastructure, that capital and operational investment is appropriate to meet current and future challenges, and that the water

sector, on behalf of its customers, is managing risks appropriately, without over or under investing in water infrastructure.

The Victorian economic regulation framework, established under the *Essential Services Commission Act 2001* and the *Water Industry Act 1994*, provides a framework to guide water corporation pricing and investment decisions. This economic regulatory framework is overseen by the Essential Services Commission. In addition, the quality of water supplied by water corporations is independently regulated by the Department of Health and Human Services in accordance with the *Safe Drinking Water Act 2003* and the environmental performance of water corporations is independently regulated by the Environment Protection Authority Victoria in accordance with the *Environment Protection Act 1970*.

Victoria has a well established catchment management framework in place to conserve our environment while maintaining and increasing productivity from our land and water resources. The *Catchment and Land Protection Act 1994* is the legislative basis for catchment management in Victoria. It provides for 10 catchment management authorities across the state that each develop a regional catchment strategy for their area. It also establishes the Victorian Catchment Management Council to advise on statewide matters.

Proposed strategic direction

The government will improve the performance of water corporations by:

- setting clear and unified expectations of performance and reflecting them through appropriate instruments, such as corporate plan guidelines
- working with water corporations and the Essential Services Commission to develop clear, fit-for-purpose indicators that measure performance in terms of service delivery and value for customers and the community
- undertaking a benchmarking exercise for Victoria's water corporations to encourage performance improvement and innovation.

Catchment management authorities

As described in Chapter 3 (Waterway and catchment health), catchment management authorities have a key role in protecting the health of our waterways and catchments and ensuring the use of the environmental water reserve for environmental outcomes across Victoria.

Our Catchments, Our Communities – Integrated Catchment Management in Victoria 2016–19 will set the strategic direction for catchment management over the next four years. Key elements of this strategy will be:

- greater community engagement in catchment management
 - building on strong relationships with key community partners, including Traditional Owners and Landcare networks to facilitate on-ground action
- better connections between national, state, regional and local planning
 - linking grass roots interests with broader policy and strategy

- strengthened implementation of regional catchment strategies
 - the government proposes to work with catchment management authorities to improve investment into integrated catchment management
- clearer roles, strengthened accountabilities and regional coordination
 - there are multiple parties involved in catchment management and the strategy provides for a review of current arrangements to better clarify roles and accountabilities for delivering on-ground action
- improved monitoring and reporting
 - including more comprehensive regional reporting of actions by the partners of catchment management authorities. The Victorian Commissioner for Environmental Sustainability and the Victorian Catchment Management Council will coordinate improved reporting and the whole sector will be encouraged to use a consistent set of indicators.

Proposed strategic direction

The government will improve the governance of catchment management authorities by:

- implementing key directions in *Our Catchment, Our Communities*
- communicating priority matters to catchment management authorities' boards
- developing new Statements of Obligations for catchment management authorities under the *Water Act 1989* and the *Catchment and Land Protection Act 1994*.

Victorian Environmental Water Holder

The Victorian Environmental Water Holder (VEWH) is an independent statutory body responsible for making decisions on the most efficient and effective use of Victoria's environmental water entitlements. It was established through amendments to the *Water Act 1989* and commenced on 1 July 2011. VEWH is accountable to the Minister for Environment, Climate Change and Water and is subject to the *Financial Management Act 1994* and the *Public Administration Act 2004*. It is required to submit its annual report to Parliament and the Auditor General audits its accounts.

Formal Ministerial Rules set expectations for the performance of its functions. These governance arrangements are designed to provide a high level of accountability and public scrutiny commensurate with the economic and public value of the environmental water entitlements it manages. Given that the VEWH is now fully operational, it is timely to ensure that the respective roles of the department and the VEWH are clearly defined.

Effective monitoring of the management and the benefits of environmental watering is essential to maintain community support.

Proposed strategic direction

The government will ensure the governance arrangements for the Victorian Environmental Water Holder are efficient and effective in meeting its statutory environmental management objectives.



Diffusers,
image courtesy
Gippsland Water

Strengthening governance of Victoria's environmental entitlements

Consistent with Victoria's commitments under intergovernmental water reform agreements, the government proposes to ensure that the characteristics of entitlements held for environmental use are not enhanced or diminished relative to equivalent entitlements held and used for other purposes. The time is opportune to restate this important commitment in respect to the service level and charging regimes applied to the storage and delivery of environmental water.

The costs associated with the management of environmental water are required to reflect:

- the nature of the environmental entitlement in a particular water system
- the level of infrastructure service required to meet the environmental entitlement ecological objectives
- additional costs to water corporations to provide this service.¹

Where environmental entitlements share the same properties as consumptive entitlements, environmental water holders are required to pay the costs of services provided by water corporations just as other water users do.² However, some of the charges attached to environmental water entitlements are reduced:

- where the environmental entitlement is less reliable or more constrained than other consumptive entitlements
- in recognition of government investment in water savings projects to recover water for the environment where there have also been significant benefits to other water entitlement holders.³

Since 1 July 2014, in keeping with Policy 8.8 of the Victorian Waterway Management Strategy 2013, appropriate storage and delivery charges have been applied to all environmental water entitlements. As a result, environmental water holders collectively paid approximately \$12.1 million in service charges in 2014–15.

Proposed strategic direction

The government will:

- continue to review and refine charging arrangements for environmental water holders and the way these are expressed in the environmental entitlements to ensure they are consistent with government policy
- require environmental water holders and water corporations to negotiate service levels and charging arrangements in good faith, with negotiations undertaken within the context and timing of Essential Services Commission price review processes, any applicable intergovernmental commitments to which Victoria is a signatory, and relevant budgetary processes and constraints
- in developing charging arrangements between environmental water holders and water corporations, require parties to negotiate towards achieving agreement based on the following principles:
 - prices for services to environmental water holders should be cost reflective
 - prices should reflect the level of services received
 - prices should be efficient in terms of providing signals for the efficient and sustainable use of water infrastructure
 - prices should not deter environmental watering.

Enhancing community and industry engagement

The desire and capacity of the community and industry to be informed and engaged is growing. While the Victorian water sector has a strong record of engagement on particular issues, the relationship between all parties must get stronger. This will be achieved by:

- improving the sector's ability to understand community and industry perspectives
- understanding the roles communities and industries are seeking to play in the policy development process
- overcoming barriers to two-way engagement
- providing a coordinated, integrated approach to complex water issues across government.

Many of the building blocks are already in place. Victoria has well established community and industry forums working on water management issues. The government has a strong expectation that the water sector will continue to identify opportunities and initiatives to engage more effectively with its customers, the community and industry, and maximise shared benefits from use of water. For example:

- advances in data capture and analysis and more sophisticated deployment of social media and other communication channels offer significant opportunities for the community to more actively input into decision-making
- adopting more innovative and sophisticated approaches that put the community at the heart of developing outcomes and designing solutions from the outset. Such approaches have been piloted in Ballarat, where an independently chaired local leadership forum is continuing to implement a long-term integrated water strategy for the region. In the creation of the strategy the community was engaged on their vision and objectives for the region's water future, which resulted in 32 actions with clear accountabilities for delivery and ownership. The delivery of these actions will better integrate the management of groundwater, stormwater, urban flooding and public space.

There are a range of specific options and mechanisms which can assist the water sector improve community engagement. New approaches to community and industry engagement will be supported by the Essential Services Commission. Our Catchments Our Communities will support new engagement processes for integrated catchment management.

Community engagement and empowering public participation will be critical to achieving this outcome.

Proposed strategic direction

The water sector will continue to improve community engagement, involving the community and industry in how it plans and delivers its services.

Promoting diversity in the water sector

Victoria's diversity means that our communities' needs and values differ across the state. To understand these needs and values we must ensure our institutions represent our diverse communities. The government recognises that there are clear benefits to having gender and cultural diversity in the boards and management of the water sector, such as providing a range of perspectives, driving efficient and innovative service delivery, and ensuring water sector leadership reflects the communities it serves.

The recent appointment of Victoria's new water sector boards demonstrate the government's commitment to diversity, with:

- women accounting for over half of all new water corporation and catchment management authority board members and half the Victorian Catchment Management Council
- appointments including a number of Aboriginal Victorians.

There are opportunities to further promote diversity in the sector.

Proposed strategic direction

The government will promote diversity within our institutions by:

- requiring Victoria's water corporations and catchment management authorities to focus on diversity in executive leadership positions across the sector
- partnering with the water sector and peak industry bodies to establish a Women in Water Leadership Program to train senior women in the sector
- investing in Aboriginal participation through increased access to capability building opportunities, including sponsoring Aboriginal people in relevant study and training courses and funding water sector agencies to provide traineeships.

Clarifying the water sector's role in emergency management

Victoria's strong risk and emergency management frameworks and practices underpin the water sector's capacity to provide safe, secure and reliable water services. The government expects that the water sector will continue to provide leadership in risk and emergency management.

Climate change projections indicate an increased frequency in extreme weather events, including bushfires, floods, heatwaves and more intense rainfall events and storms. The water sector also faces other emergency risks such as cyber-attacks, technology failures, security breaches and terrorism. Building resilience in the delivery of water services will help maintain business continuity and mitigate the effects these extreme events and emergencies have on communities.

Significant improvements have been made to Victoria's emergency and risk management frameworks over the past decade. The government has introduced major reforms to Victoria's emergency management arrangements, including establishing Emergency Management Victoria, the Inspector-General for Emergency Management, and adopting the all-hazards all-agencies approach. This approach requires the water sector to work in partnership with Emergency Management Victoria and other supporting agencies in preparing for, responding to, and recovering from extreme events and emergencies. It also emphasises the need to work with communities to deliver the best outcomes. While significant progress has been made, there are still opportunities to improve these arrangements by further clarifying the role of the water sector in emergency management.

Proposed strategic direction

The government will clarify the role of the water sector in emergency response and recovery by providing an enabling environment under the all-hazards all-agencies emergency management framework that is consistent with its skills, resources and capabilities, and with relevant protections in place.

Maintaining business continuity

Victoria depends on the water sector to maintain critical services during extreme events and emergencies. The sector operates under robust risk management frameworks to minimise disruptions to the supply of essential services for industry and households. Continual improvements to risk management policies, practices, systems and processes are required to ensure the frameworks are best practice and enduring. Further work is also required to incorporate obligations arising from the Critical Infrastructure Resilience Strategy and the *Emergency Management Act 2013*.

The water plan provides opportunities for government to review its risk management arrangements and assurance processes to ensure the water sector has the tools, systems, processes and training, to mitigate the risks and challenges posed by extreme events and other emergencies to protect critical water infrastructure.

Proposed strategic direction

The government will strengthen its assurance framework with a suite of tools, systems, processes and training to ensure the sector can maintain business continuity, and is well equipped to mitigate the risks and challenges posed by extreme events and other emergencies.

Western Treatment Plant, Christian Pearson/Misheye, image courtesy Melbourne Water



10.2 Strategic direction

Streamlining and improving regulation

The provision of safe, reliable and affordable services by the water sector relies on effective and efficient legislative and regulatory frameworks. The current frameworks have generally served Victoria well, but there are opportunities for improvements. The government proposes to streamline regulation to help our institutions deliver efficient and innovative water services and improved community outcomes.

Access to infrastructure

There is a high level of interconnectivity in water and wastewater networks, meaning that participants regularly need to access the infrastructure and assets of other parties. This can be particularly important for enabling participation by new participants and facilitating innovative approaches. For example, sewer mining requires access to wastewater infrastructure.

Therefore, it is important that parties can access infrastructure on transparent and commercial terms, and that this occurs in a manner that protects the interests of the community, customer and the environment.

Proposed strategic direction

The government will consider options to facilitate third party access to water and wastewater infrastructure on transparent and commercial terms that protects community interests.

Improving enforcement and compliance

Victoria's water corporations are responsible for preventing, detecting and stopping illegal activities by monitoring and enforcing compliance with the *Water Act 1989*.

The compliance and enforcement regime under the *Water Act 1989* is outdated and does not provide an adequate range of tools to respond appropriately to non-compliance. This can make the regime difficult to enforce and potentially undermine its effectiveness. Additionally, the regime does not align with the Victorian Human Rights Charter adopted in 2006.

The government proposes updating and modernising the compliance and enforcement regime so that it remains effective and aligns with government policies.

Proposed strategic direction

The government will consider options to update and modernise the compliance and enforcement regime so that it remains effective and aligns with Victorian Government policies.

Streamlining regulation and administration

Regulatory frameworks need to protect the public interest and provide a high level of assurance about the safety and reliability of services. They also need to be updated from time to time to accommodate new approaches to service delivery and technology. For example, as described in Chapter 5 (Resilient and liveable cities and towns), there are opportunities to improve regulation relating to recycled water.

The government proposes to continue to focus on opportunities to streamline regulation and administration. For example, the Department of Environment, Land, Water and Planning is participating in whole-of-government efforts to reduce unnecessary red tape. This involves ensuring the government's regulatory policy is delivered at lowest cost to the community, removing barriers to job creation and investment, prioritising reforms that promote growth and seeking to deliver on the government's election commitment to reduce the burden of regulation by 25 per cent. Elsewhere, this discussion paper sets out proposed strategic directions that will assist in enhancing and streamlining regulation, such as modernising compliance and enforcement, while also minimising regulatory burdens.

Proposed strategic direction

The government will improve legislative and regulatory frameworks by identifying opportunities to reduce unnecessary red tape and streamline processes, as part of the government's commitment to reduce the burden of regulation by 25 per cent.

10.3 Strategic direction

Securing funding for water management

The Victorian economic regulatory framework for water corporations provides the framework to guide water corporation pricing and investment decisions. Under these arrangements, water-related service delivery costs are recovered from customers. However, there are also costs associated with water management and provision of water services that are not recovered under this framework. The Environmental Contribution funding model was established through *Our Water Our Future* as a means to account for the environmental costs of providing water services and the cost of managing a scarce resource.

Since its establishment, the Environmental Contribution has been critical in helping Victorians manage water resources more sustainably. Under the *Water Industry Act 1994* funds collected through the Environmental Contribution must be spent on initiatives 'that seek to promote the sustainable management of water or address adverse water-related environmental impacts'. Over the past decade, the Environmental Contribution has funded strategic investment in sustainable water management across Victoria.

The Department of Environment, Land, Water and Planning recently conducted an evaluation of the first decade of the Environmental Contribution which confirmed the significant outcomes, achievements and return on investment provided over the 10 years of investment, particularly under the first two tranches. While the achievements have been significant, recent reviews of the Environmental Contribution have found that its strategic focus has waned, particularly in the most recent third tranche. The Department of Environment, Land, Water and Planning is continuing to improve the management of the Environmental Contribution in response to recommendations from the Victorian Auditor General's Office and the recent evaluation. This work is structured around four key directions:

- improving processes that inform the legislative alignment and selection of projects
- ensuring clearer alignment of funding with strategic priorities
- improving the evaluation of programs and the Environmental Contribution as a whole
- improving public reporting and information on the Environmental Contribution and its programs.

This discussion paper proposes strategic directions for sustainable water management to be supported by a refocused Environmental Contribution investment strategy.

Proposed strategic direction

The government will:

- maintain the Environmental Contribution as a key tool to deliver the water plan's strategic priorities
- implement the key recommendations from recent evaluations of the management of the Environmental Contribution to ensure its investments continue to align with legislative objectives, and enhance governance arrangements to improve transparency, accountability and decision-making.

10.4 Strategic direction

Enabling an innovative water sector

Innovation improves efficiency, maintains affordability and keeps the Victorian water sector at the forefront of water management. It can take several forms, including:

- developing new service delivery and funding models
- developing and applying new technology
- improving supply chain processes and management.

Innovation ultimately needs to be driven by the water sector and researchers, but government does have an important role in:

- funding research and education
 - basic research has long been recognised as having public good characteristics, meaning government has a key role in supporting these activities
- sharing risk, facilitating collaboration and disseminating knowledge
 - government can help overcome barriers to the development and deployment of technology by sharing risk, facilitating collaboration and disseminating knowledge, such as through the Intelligent Water Networks program (see case study)
- being clear that it expects the sector to be innovative
 - if the sector is to be innovative, the management and boards of water corporations and catchment management authorities need to foster organisational cultures that promote innovation. The government has a role in setting expectations for boards and management to promote innovative cultures.

The Australian Government's National Innovation and Science Agenda reflects government's key role in innovation, as do a range of Victorian Government initiatives that support innovation.

Opportunities for innovation

Victoria is at the cutting edge of innovation in water management. There are now exciting opportunities to accelerate innovation and embed Victoria's leading position. Some key areas of opportunity include:

Innovation in service delivery and business models

There has been significant innovation in service delivery in recent years, such as through IWM approaches.

Responding to climate change

As described in Chapter 2 (Climate change), the water sector has a key role in climate change adaptation and mitigation, which will create opportunities to innovate and develop marketable expertise.

'Big data' and communications technology

Adopting digital technology, improving the capture and analysis of large quantities of data and more effectively using social media and other communications technology – for example, to enable more substantive community input and better informed decision-making.

Technological advances

Developing and adopting new technology can enhance performance and service delivery – for example, more sophisticated leak detection techniques developed through the Intelligent Water Network Program.

Learning from national and international approaches and other industries

Victoria will need to adopt national and international innovations if it is to retain a leading position in water and catchment management. Insights from other industries can contribute to innovation in the water sector – for example, as described in Chapter 2 (Climate change), there is a strong nexus between the water, energy and waste industries.

The CRC for Water Sensitive Cities was established in 2012 and focuses on the role of water in sustainable, resilient and liveable cities. The CRC for Water Sensitive Cities has 80 research, industry and government partners, including Monash University, Victorian water corporations, local councils and the Victorian Government. It is exporting knowledge, expertise and water management solutions to a number of countries around the world, including Singapore and China.

By continuing to strengthen governance and encourage innovation in the water sector, we will ensure that Victoria is well poised to take advantage of opportunities in areas of strength. This includes the state's export sectors tapping into the burgeoning Asian middle class and recently signed free trade agreements with China, Japan and Korea. Water's role in the food and fibre sector amongst other industries will continue to be important for decades to come.

Proposed strategic direction

The government will incentivise innovation in the water sector through:

- supporting collaborative programs where they deliver value, including the Intelligent Water Network Program
- establishing a Minister's Innovation Award to promote and recognise innovation in the water sector
- ongoing participation in the CRC for Water Sensitive Cities
- working with water corporations to make information more accessible to communities to assist them in being active participants in water management
- working with local government to assess opportunities to more effectively share knowledge and expertise about innovative local scale solutions
- ensuring expectations and measures for water corporations relating to innovation performance are effective.

Clockwise from left: construction workers, Victorian Desalination Project; courtesy Capital Projects, Department of Environment, Land, Water and Planning; Budgee Creek into Barmah Lake, Keith Ward, image courtesy Goulburn Broken Catchment Management Authority; underground pipeline Cardinia Road crossing Victorian Desalination Project; courtesy Capital Projects, Department of Environment, Land, Water and Planning



Intelligent water networks Collaboration between industry and government Case study

The water sector has established the Intelligent Water Network Program, a collaboration between the Victorian water corporations, Victorian Government and the Victorian Water Industry Association. The program provides a platform for innovation and action across the sector by:

- providing industry leadership opportunities to develop research projects that benefit the water industry and its customers
- developing ideas, innovations and technologies that can be accessed by the water industry to improve their businesses
- promoting research and development by demonstrating its commercial benefits.

This networked approach allows for greater risk sharing and innovation and draws out benefits for the industry as a whole. Examples of work include trials of pipe integrity and leak detection technologies which have led to adoption of improved methodologies.

Trial partners Martin Shaw (left) from Detection Services and Eddy Segal (right) from Utilis, onsite with Dean Barnett from Western Water, image courtesy Western Water





Appendix



11

Endnotes

Chapter 2

Climate change

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Chapter 3

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Chapter 4

Water for agriculture

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- 2 State of Victoria 2015 Victoria's Regional Statement: Your voice, your region, your state, <http://www.rdv.vic.gov.au/regional-statement>
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Chapter 6

Aboriginal values of water

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Chapter 10

Jobs, economy and innovation

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Acronyms and abbreviations

BE	Bulk entitlement	GLCC	Gippsland Lakes Coordinating Committee
CDE	Carbon dioxide equivalents	ICM	Integrated catchment management
CEWH	Commonwealth Environmental Water Holder	IWM	Integrated water management
COAG	Council of Australian Governments	MDBP	Murray-Darling Basin Plan
CMA	Catchment management authority	ML	Megalitre
CRC	Cooperative Research Centre	MPA	Metropolitan Planning Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation	MWSS	Melbourne Water System Strategy
DELWP	Department of Environment, Land, Water and Planning	NWI	National Water Initiative
D&S	Domestic and stock	SEPP WoV	<i>State Environment Protection Policy (Waters of Victoria)</i>
DTF	Department of Treasury and Finance	SWS	Sustainable water strategy
EC	Electrical conductivity units (salinity)	SWEP	Schools Water Efficiency Program
ESC	Essential Services Commission	T155	Target 155
ESD	Environmentally Sustainable Design	UNESCO-IHE	United Nations Educational, Scientific and Cultural Organisation – Institute for Water Education
EPA	Environment Protection Authority Victoria	VEWH	Victorian Environmental Water Holder
EWR	Environmental water reserve	VDP	Victorian Desalination Project
GL	Gigalitres	VWMS	Victorian Waterway Management Strategy
		WSUD	Water Sensitive Urban Design

Key Victorian Government initiatives

Victorian Government policy, strategy or plan	Description
Climate Change Framework	The Victorian Government has committed to restoring Victoria as a leader in climate change action; action that will protect and enhance Victorian's health and wellbeing, increase skills and jobs and modernise our economy, reduce air pollution, conserve our natural environment and ensure our towns and cities remain great places to live into the future. The Victorian Climate Change Framework will bring together these actions.
Biodiversity Plan	The Victorian Government is developing a new Biodiversity Plan to help us build a greater understanding of the complex interactions between our environment and the millions of plants and animals that call Victoria home. The Plan will not only recognise the intrinsic value of nature, but also the importance of a healthy natural environment for people and prosperity.
Plan Melbourne Refresh	The Victorian Government is undertaking a refresh of Plan Melbourne. The revised document will provide a framework to enhance Melbourne's productivity, move jobs closer to where people live and to create great new urban areas that accommodate Melbourne's growth. This will optimise benefits from investment in infrastructure and maintain what we value about Melbourne.
Yarra Ministerial Advisory Committee	A Ministerial Advisory Committee has been formed to make recommendations to the government on the future management and protection arrangements for the Yarra River.
Food and Fibre Sector Strategy	The Victorian Government is developing a Food and Fibre Sector Strategy to support future growth and development of this priority sector.
Review of the Local Government Act	The Victorian Government is conducting the first comprehensive review of the <i>Local Government Act 1989</i> in response to calls from the local government sector for legislative reform after over 90 amending acts have resulted in hundreds of individual amendments to the Act in the past 25 years.
Victorian Public Health and Wellbeing Plan	The Victorian Public Health and Wellbeing plan 2015–2019 outlines the government's key priorities over the next four years to improve the health and wellbeing of all Victorians, particularly the most disadvantaged. As many chronic diseases and injuries are preventable, the plan focuses on encouraging healthy living from the early years and throughout life.
Infrastructure Strategy	Infrastructure Victoria, an independent statutory authority, will prepare a 30-year infrastructure strategy, provide advice to the Victorian Government on infrastructure matters and publish research on infrastructure issues.
Regional Statement	The Regional Statement is the Victorian Government's acknowledgment of the enormous contribution regional Victoria makes to Victoria's economic strength and way of life. Its centrepiece is the establishment of nine new Regional Partnerships across the State that will direct regional priorities straight into the heart of government.
Future Industries	The Victorian Government has identified six priority sectors that have potential for extraordinary economic growth and the capacity to create high-skill, high wage jobs: medical technologies and pharmaceuticals; new energy technologies; food and fibre; transport, defence and construction technologies; professional services and international education. The \$200 million Future Industries Fund will support high growth, high value industries.
Renewable Energy Roadmap	A roadmap defining actions the Victorian Government will take to accelerate renewable energy, job creation and promote sustainable jobs in Victoria.
Energy Efficiency and Productivity Statement	The Victorian Government's Energy Efficiency and Productivity Statement: Saving energy, growing jobs outlines a vision and priorities to deliver an energy efficient and productive economy for Victoria.
LaunchVic	The Victorian Government has established a startup company called LaunchVic, and committed \$60 million to support the ecosystem for local startup businesses and the rapidly growing startup sector in Victoria.

More information on these initiatives is available at www.delwp.vic.gov.au, www.agriculture.vic.gov.au, www.economicdevelopment.vic.gov.au and www.climatechange.vic.gov.au

Glossary

Allocation	<ol style="list-style-type: none"> 1. Water that is actually available to use or trade in any given year, including new allocations and carryover. 2. The water that is actually in the dam in any given year is allocated against water shares. The seasonal allocation is the percentage of water share volume available under current resource conditions, as determined by the resource manager.
Aquifer	A layer of underground sediment that holds water and allows water to flow through it.
Augmentation	Increase in size and/or number (eg. of assets in a water supply system).
Biodiversity	The numbers and variety of plants, animals and other living beings, including micro-organisms, across our land, rivers and oceans. It includes the diversity of their genetic information, the habitats and ecosystems in which they live and their connections with other life forms.
Blue carbon	The carbon captured and stored by marine and coastal ecosystems.
Bulk entitlement (BE)	The right to water held by water corporations and other authorities defined in the <i>Water Act 1989</i> . The BE defines the amount of water that an authority is entitled to from a river or storage, and may include the rate at which it may be taken and the reliability of the entitlement.
Cap	An upper limit for the diversion of water from a waterway, catchment or basin.
Carbon capture and storage	The capture of carbon dioxide from industrial emissions and injecting it under pressure into rock formations that can naturally store it.
Carryover	Allows entitlement-holders to retain ownership of unused water allocated or purchased from the current season into the following season (according to specified rules).
Catchment	An area of land where runoff from rainfall goes into one river system.
Catchment management authorities (CMAs)	Government authorities established to manage river health, regional and catchment planning, and waterway, floodplain, salinity and water quality management.
Community	Includes individuals, public and private landholders, community groups and business owners.
Country	Traditional Aboriginal culture revolves around relationships to the land and water. For Traditional Owners, Country is a part of who they are, just as they are a part of it.
Delivery share	An entitlement to have water delivered to land in an irrigation district and a share of the available channel capacity in a delivery system. It is linked to land and stays with the property if the water share is traded away.
Desalination	Removing salt from water sources – normally for drinking purposes.
Diversions	The removal of water from a waterway.
Domestic and stock	Water used in households and for pets and other animals.
EC units/level EC	Electrical conductivity – a measure used to indicate salinity levels in water.
Ecosystem	A dynamic complex of plant, animal, fungal and microorganism communities and the associated non-living environment interacting as an ecological unit.
Effluent	Treated sewage that flows out of a sewage treatment plant.
Environmental flow	The water needed in a river, floodplain, wetland or estuary to maintain healthy, natural ecosystems. It includes the volume, timing, duration, frequency and quality of flows.
Environmental water reserve (EWR)	The share of water resources set aside to maintain the environmental values of a water system.
Environmental Water Holder	A body established to hold and manage environmental entitlements.
Fit-for-purpose	Water which requires no further treatment for intended use.
Floodplain	Land subject to overflow during floods and that is often valuable for its ecological assets.
Freshes	The first seasonal 'flush' of water through a waterway.

Gigalitre (GL)	One billion (1,000,000,000) litres.
Groundwater	All subsurface water, generally occupying the pores and crevices of rock and soil.
High-reliability water share	Legally recognised, secure entitlement to a defined share of water. Water shares are classed by their reliability, which is defined by how often full seasonal allocations are expected to be available. Allocations are made to high-reliability water shares before low-reliability shares.
Hydrology	The scientific study of water and its movement, distribution and quality.
Inflows	Water flowing into a storage or waterway.
Instream	The component of a river within the river channel, including pools, riffles, woody debris, the river bank and benches along the bank.
Integrated catchment management	An approach that seeks to coordinate actions for multiple shared benefits and reduce perverse outcomes. It requires local coordination, at a catchment scale, in collaboration with communities and long-term relationships to be successful.
Integrated water management	An approach to planning that brings together all facets of the water cycle including sewage management, water supply, stormwater management and water treatment ensuring environmental, economic and social benefits.
Megalitre (ML)	One million (1,000,000) litres.
Millennium Drought	The drought in Australia spanning from 1995 to 2009.
National Water Initiative (NWI)	Agreed to and signed at the 2004 meeting of the Council of Australian Governments (COAG), with the agreed imperative of increasing the productivity and efficiency of water use and the health of river and groundwater systems in Australia.
Non-residential	Water use in industry, commercial/institutional buildings, open spaces (parks and gardens) and the water distribution system.
Passing flow	Flows that a water corporation must pass at its reservoirs before it can take any water for consumptive use.
Permissible consumptive volume (PCV)	The volume of water permitted to be allocated in discrete groundwater management areas. Previously called permissible annual volumes (PAVs).
Point source	Any single identifiable source of pollution from which pollutants are discharged such as a pipe, ditch, ship or factory smokestack.
Potable	Suitable for drinking.
Qualification of rights	The Minister for Water declares a water shortage and qualifies existing water entitlements to reallocate water to priority uses.
Ramsar wetlands	Wetlands listed as internationally significant under the Convention on Wetlands held in Ramsar, Iran in 1971.
Rainwater	Water that has fallen as rain or has been obtained from rain.
Recreational values	The objectives and benefits that recreational users and community members associate with the use of water, reservoirs and waterways for recreational activities. These objectives and benefits include wellbeing and enjoyment, derived from social interaction, physical activity and relaxation associated with activities including sporting events, fishing, water-skiing and rowing, camping, walking and gathering with friends and family. It also includes flow on economic benefits to local communities from visitors to regional areas to make the most of these opportunities.
Recycled water	Water derived from sewerage systems or industry processes that is treated to a standard appropriate for its intended use.
Regulated systems	Systems where the flow of the river is regulated through the operation of large dams or weirs.
Reliability of supply	Represents the frequency with which water that has been allocated under a water entitlement is expected to be supplied in full.
Reservoir	Natural or artificial dam or lake used for the storage and regulation of water.
Riparian	Land or vegetation that adjoins a river, creek, estuary, wetland or lake.
River basin	The land into which a river and its tributaries drain.
Salinity	The total amount of water-soluble salts present in the soil or a stream.

Seasonal determination	The percentage of water share volume available under current resource conditions determined by the resource manager for northern Victorian regulated river systems. Since 1 July 2012 the resource manager has used seasonal determination instead of the previously used term, seasonal allocation. This is to distinguish between water available under current resource conditions and the water customers have available because of carryover.
Sewage	Wastewater produced from household and industry.
Sewerage	The pipes and plant that collect, remove, treat and dispose of liquid urban waste.
Shared benefits	Shared benefits are achieved when water is managed primarily to meet the needs of the entitlement holder, but also provides other types of benefits through decision making that deliberately targets other outcomes. All water users should seek shared benefits from the storage, delivery and use of water. Water corporations will consider shared benefits in storage management and river operation decisions, and catchment management authorities will consider shared benefits in environmental watering decisions. This will require greater community engagement with communities to understand the values and uses of water that may be achieved through shared benefits. Where significant trade-offs are required, the options should be considered in a sustainable water strategy.
Statement of Obligations	Statements made under section 41 of the <i>Water Industry Act (1994)</i> that specify the obligations of Victoria's water corporations in relation to the performance of their functions and the exercise of their powers.
Stormwater	Runoff from urban areas. The net increase in runoff and decrease in groundwater recharge resulting from the introduction of impervious surfaces such as roofs and roads within urban development.
Stranded assets	Distribution infrastructure left with too few customers to pay for its maintenance.
Streamflow	Water that runs in streams. This water comes from runoff in a catchment or from rain.
Streamflow management plan	Prepared for a water supply protection area to manage the surface water resources of the area.
Surface water	Water on the surface of the planet, including streams, rivers, lakes, wetlands and oceans.
Sustainable diversion limit (SDL)	The upper limit on winter-fill diversions within an unregulated river sub-catchment, beyond which there is an unacceptable risk to the environment.
Sustainable water strategies	These are regional long-term planning documents that are a current legislative requirement under the Water Act 1989, to address threats to, and identify opportunities to improve water security and river health outcomes.
Temporary trade	Transfer of a seasonal allocation.
Traditional Owners	People who, through membership of a descent group or clan, are responsible for caring for particular Country. A Traditional Owner is authorised to speak for Country and its heritage as a senior Traditional Owner, an Elder or, in more recent times, a registered native title claimant.
Unaccounted water use	Water use outside the water entitlement framework. In many cases, unaccounted water use is not recognised formally, measured accurately or managed effectively.
Unbundle/unbundling	Separation of entitlements previously called water rights or take and use licences in declared water systems into a water share, delivery share and a water-use licence.
Unregulated systems	River systems with no large dams or weirs to regulate flow.
Urban water cycle	The cycle of water through urban environments. Distinguished from the natural urban water cycle by the transfer of water through built infrastructure and the high runoff rates generated by impervious surfaces.
Urban water strategies	All urban water corporations in Victoria are required to develop these strategies, which detail how water supplies and water demands will be balanced over the long term. These are the next iteration of Water Supply Demand Strategies first prepared in 2007.
Victorian Desalination Project (VDP)	The formal name of the Wonthaggi desalination plant and associated infrastructure; made up of the plant, underground pipeline and dedicated power supply.
Wastewater	Water that has had its quality affected by human influence, deriving from industrial, domestic, agricultural or commercial activities.
Water corporations	Government organisations charged with supplying water to urban and rural water users. They administer the diversion of water from waterways and the extraction of groundwater. Formerly known as water authorities.
Water market	Market in which the trade of permanent and temporary water is allowed under certain conditions.

Water rights	Previously rights to water held by irrigators. As a result of 'unbundling', these have now been separated into a water share, delivery share and water use licence in declared systems.
Water entitlement	A legally recognised, secure share of the water available to be taken from a water system. It can be traded permanently or leased.
Water systems	All sources of water supply including centralised and decentralised sources and structural or non-structural options, including planning, regulatory or pricing measures.
Water sector	Water corporations, catchments management authorities, environmental water holder and the Water and Catchments Group in the Department of Environment, Land, Water and Planning.
Water security	Is the capacity of a population to access adequate quantities of acceptable quality water to sustain life, socio-economic development and human wellbeing.
Water sensitive city	Resilient, liveable, productive and sustainable cities that interact with the urban hydrological cycle to provide water security, healthy watercourses and wetlands, mitigate flood risk, create healthy spaces and contribute to biodiversity, urban heat island reduction and carbon sequestration.
Water sensitive urban design	Integrating the urban water cycle into urban design to minimise environmental damage and improve recreational and aesthetic outcomes.
Water-use licence	Authorises the use of water on land for irrigation.
Waterways	Rivers and streams, their associated estuaries and floodplains (including floodplain wetlands) and non-riverine wetlands.
Waterway condition/waterway health	Waterway condition (or waterway health) is an umbrella term for the overall state of key features and processes that underpin functioning waterway ecosystems (such as species and communities, habitat, connectivity, water quality, riparian vegetation, physical form, and ecosystem processes such as nutrient cycling and carbon storage).
Wetlands	Inland, standing, shallow bodies of water, which may be permanent or temporary, fresh or saline.
Winter-fill licence	A licence issued that permits taking water from a waterway only during the winter months (typically July–October).
Yield	The quantity of water that a storage or aquifer produces.

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