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Stormwater Strategy

A Melbourne Water strategy for
managing rural and urban runoff

Executive summary

The *Stormwater Strategy* articulates a shift in the way stormwater is managed to contribute to a more sustainable, prosperous, liveable and healthy community. It highlights the multiple community outcomes that may be achieved by implementing integrated stormwater management solutions and outlines the role Melbourne Water will play in managing stormwater between 2013 and 2018.

The Port Phillip and Westernport region is complex; it features a variety of land uses ranging from closed water supply catchments to agricultural land and urban development. A wide range of land managers, including 38 local councils and nine water corporations, service more than four million people – about 80% of the state's population. This complexity requires a strategic approach for sustainable stormwater management.

Why manage stormwater?

In urban and rural areas where rainfall runs off hard surfaces, stormwater reaches waterways more often, more quickly and in greater volumes than waterways are naturally adapted. This erodes sediments and carries nutrients and toxicants that affect water quality and ecosystem health. Stormwater, has traditionally been managed as a threat to the health of waterways, bays and the community. In managing stormwater as part of an integrated water cycle, we have the opportunity to contribute to community wellbeing by providing safe and enjoyable recreational use of waterways and beaches, preventing nuisance flooding, providing an alternative source of water supply and protecting and enhancing the health of waterways, Port Phillip Bay and Western Port.

A wide range of partners play a role in managing stormwater. Individuals make a difference by installing raingardens and rainwater tanks. Local government manages infrastructure, administers planning regulations and works with developers to adopt best practice stormwater management.

Melbourne Water supports the adoption of water sensitive urban design, stormwater planning and research; manages stormwater assets, regional drainage and floodplain infrastructure; and manages waterway health, guided by policies such as *State Environment Protection Policy (Waters of Victoria)* and *Victoria's Urban Stormwater Best Practice Environmental Management Guidelines*.

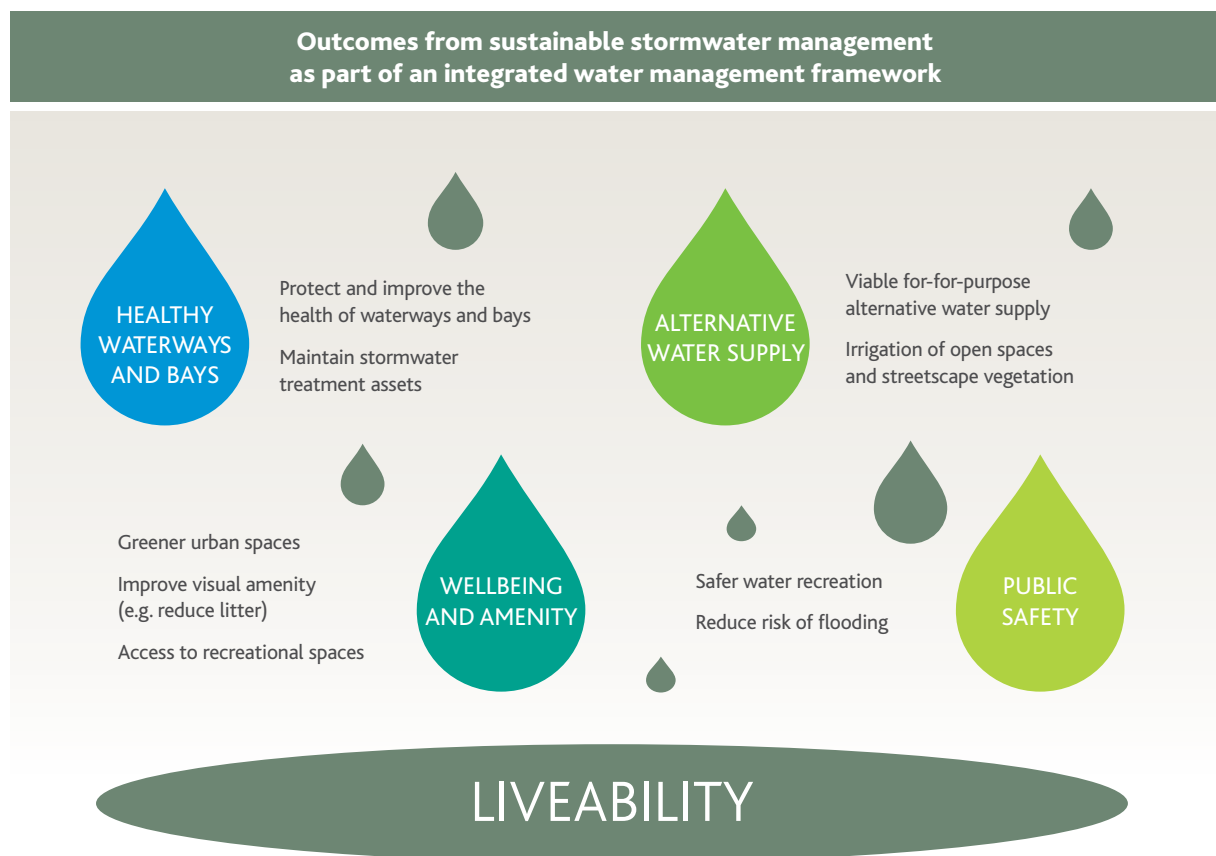


The case for change

Shared benefits may be achieved by aligning the goals and actions of this strategy with a range of policies and strategies at the state and regional level. Our long-term success is guided by the Victorian Government's *Living Melbourne, Living Victoria* vision to create 'A smart, resilient water system for a liveable, sustainable and productive Melbourne.'

As a community we have come a long way in our thinking and management of stormwater. As we become a 'water sensitive city' we can be proud of many recent achievements. We celebrate working collaboratively to build capacity for sustainable stormwater management, implementing water sensitive urban design projects, community raingardens, and on-farm capture of pollutants. Constructed wetlands, on-farm works, catchment disconnection, and stormwater capture and reuse have removed from our waterways and bays many hundreds of tonnes of nutrients and sediment, as well as litter and toxic substances. We have supported local government to develop and adopt sustainable stormwater targets and guidelines to support industry in the planning, design and management of water sensitive urban design. Innovative research, monitoring and modelling and design tools improve our understanding of stormwater impacts and the effectiveness of stormwater management.

We have learned many lessons to inform future stormwater management, the most important of which being that collaborating with others – listening, understanding and working together – yields the greatest benefits. In working with others, Melbourne Water will continue to provide leadership in the region's transition to a more sustainable water future.



Community outcomes from sustainable stormwater management

Delivering multiple community outcomes

Sustainable stormwater management is expected to protect people, property and receiving waters, enhance liveability, and supply fit-for-purpose cost-effective water. This strategy aims to meet these expectations by promoting stormwater management to achieve four broad community outcomes:

- Healthy waterways and bays
- Alternative water supply
- Wellbeing and amenity
- Public safety.

In the past, these areas might have been considered in isolation. Now we are working to achieve multiple community outcomes by considering stormwater within an integrated water management framework, alongside water supply, sewerage, drainage and waterway health.

Melbourne Water's vision for stormwater management is:

Sustainable stormwater management supports prosperous communities, thriving landscapes and healthy waterways and bays.

Achieving this vision will require us to work collaboratively with our stakeholders and for stormwater to be considered as part of integrated water management.

The *Stormwater Strategy* articulates the high level strategic direction, targets and management approaches for Melbourne Water in managing stormwater to deliver multiple community outcomes. The foundation of our approach is **working together** – establishing and maintaining genuine partnerships with others in all that we do, sharing knowledge and building capacity, and communicating outcomes.

Working together is fundamental to the successful delivery of:

- **Better on-ground outcomes** – working closely with key land management partners to construct and maintain stormwater management assets in urban and rural areas
- **Research and knowledge building** – building and sharing knowledge on the impacts of stormwater and most effective multi-benefit solutions
- **Effective planning, policy and regulation** – supporting those involved in planning, policy development and regulation to achieve better stormwater management outcomes for the community.

Working together

Working together, Melbourne Water will strengthen partnerships with the Victorian Government, local government, water corporations and other key agencies, organisations and individuals to support stormwater management initiatives. We will foster collaborative networks, explore methods for sharing knowledge and strengthen our collective capacity to manage stormwater. We will support capacity building through initiatives including the Living Rivers Program and Clearwater. We will highlight and share knowledge with stakeholders to increase our knowledge and understanding of stormwater and support communication and education.

Better on-ground outcomes

Melbourne Water will work with urban and rural communities, local government and water authorities to find integrated on-ground solutions. We will seek solutions to implement water sensitive urban design, manage rural runoff and harvest stormwater. We will continue to build, maintain and improve stormwater management assets, such as water quality treatment wetlands and bioretention systems, and flood mitigation and drainage infrastructure. Litter management at source and through on-ground capture and removal will also remain a focus.

Research and knowledge building

Melbourne Water will support research partners and programs that monitor and investigate waterway and bay health, nutrient and sediment loads, and the sources of pollutants that affect recreation and public health. Support for innovative research will improve our conceptual understanding of stormwater impacts, and understanding of social perceptions, barriers and drivers in the adoption of sustainable stormwater practices. Further development of strategic decision tools will be supported. These tools underpin our planning of on-ground activities and selection of effective management options. Managing and interpreting data, and evaluating and reporting findings allows us to adaptively manage and improve our stormwater management approaches based on what we have learned.

Planning, policy and regulation

Melbourne Water will support the use of existing policy and regulation to improve stormwater management. This will involve ensuring consistent application of Clause 56 of the *Victoria Planning Provisions* by developing guidelines and supporting materials, influencing growth area planning, and supporting alternative planning controls for stormwater generated from roads, carparks, single lot residential and industrial and commercial developments. We will partner with key organisations to improve stormwater management standards, and build capacity to implement new policy and regulation. We will support others to enforce stormwater management standards, identify and respond to pollution hotspots, and enforce litter management.

Delivering the strategy

The *Stormwater Strategy* sets out the high level strategic direction and approaches for Melbourne Water in managing stormwater from 2013/14–2017/18. We will measure progress towards the strategy's goal and vision against our five-year implementation targets (see *Appendix 4*). Investment plans will be developed to implement actions and targets identified in the strategy. Significant investment of \$52 million in capital expenditure and \$177 million in operating expenditure for stormwater management is funded via the Waterways and Drainage Charge over the life of the strategy. A number of investment principles will guide implementation activities. These principles include seeking co-investment opportunities, using grants and incentives to deliver financial support, and maintaining previous investment in water quality treatment and water sensitive urban design.

This process emphasises the importance of working closely with customers, stakeholders and partners in everything we do.

An adaptive management approach is critical to managing stormwater effectively, and an ongoing process of monitoring and evaluation will help to update management approaches during a strategic review of the *Stormwater Strategy*. This review will be undertaken by 2018.

This *Stormwater Strategy* has been submitted to the Essential Services Commission as part of Melbourne Water's Water Plan for 2013/14–2017/18.

The Essential Service Commission (ESC) has approved a price path for a three year period (2013/14–2015/16). The dollars are based on a five year period to align with the strategies that guide the Waterways and Drainage activities. Expenditure for years four and five (2016/17–2017/18) are indicative only at this time however, they are based on information in the ESC Final Determination. Final numbers for these two years will be determined at a later date as part of a future Water Plan.



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Setting the scene

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The *Stormwater Strategy* articulates a shift in the way stormwater is considered and managed to contribute to a more sustainable, prosperous, liveable and healthy community. It highlights the multiple community outcomes that may be achieved by implementing integrated stormwater management solutions and outlines the role Melbourne Water will play in managing stormwater to protect and improve the health of waterways, Port Phillip Bay and Western Port between 2013 and 2018.

1.1 A turning point in stormwater management

This *Stormwater Strategy* outlines how Melbourne Water will support the transition towards a 'water sensitive city' and region that embraces community needs and values, considers urban growth, changes in rural areas and regional management complexities including natural climate variability.

The past five years have seen significant developments in water quality management, knowledge sharing and skills development, including:

- > Construction of over 212 regional water quality treatment wetlands in urban areas
- > Increased training and capacity building programs for individuals and organisations involved with stormwater management
- > New approaches and technology for water sensitive urban design
- > Increased awareness and implementation of integrated water management planning policy for reducing the stormwater impacts of new residential subdivisions (*Victoria Planning Provisions, Clause 56.07*)
- > Collaborative approaches to urban stormwater management and water sensitive farming
- > A program encouraging rural landowners to manage runoff from agricultural properties.

These achievements highlight the opportunity to move beyond traditional management of stormwater. We are excited about transforming the way stormwater is considered and managed. This strategy signifies a turning point for the stormwater industry as we look to new and innovative approaches to stormwater management and its contribution to liveable communities.

Sustainable stormwater management needs to be addressed now. It is more cost-effective to design new developments with appropriate stormwater management than retrofitting existing urban areas.

A strategic approach is needed for effective regional stormwater management. The commitments and outcomes outlined in this strategy are designed to enable Melbourne Water and our stormwater management partners to deliver better community outcomes.

1.2 Port Phillip and Westernport region

The Port Phillip and Westernport region covers more than 12800sqkm, with over 8400km of waterways and more than 26000km of drainage pipes and other drainage infrastructure across the Werribee, Maribyrnong, Yarra, Dandenong and Westernport catchments.

The region extends from high up in the Yarra Ranges and Lancefield in the north, across to Ballan in the west, to the Mornington Peninsula and Phillip Island in the south-east and Port Phillip Bay and Western Port to the south. The region encompasses the urban area of greater Melbourne and supports a population of about four million with that number set to grow to more than five million by 2030. Figure 1 outlines land use in the Port Phillip and Westernport region, and the extent of the waterway and drainage network in greater Melbourne managed by Melbourne Water and local government.

Melbourne is recognised as one of the world's most liveable cities. The bays and waterways are highly valued environments, supporting values, recreational pursuits and economic prosperity.

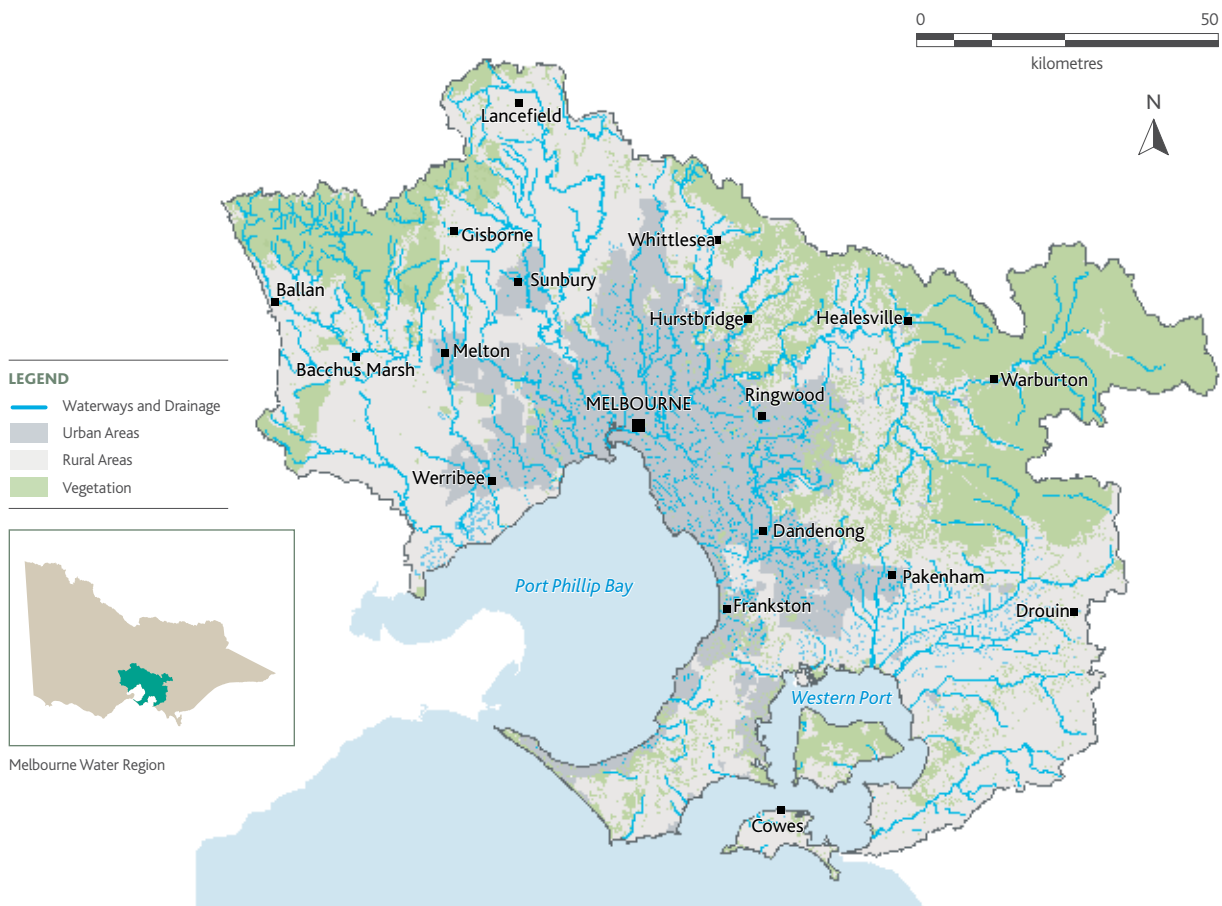


Figure 1: The waterways and drainage network in the Port Phillip and Westernport region

The region supports internationally recognised wetlands including the western shoreline of Port Phillip Bay, Western Port and Edithvale-Seaford Wetlands Ramsar sites, and a diverse range of plants and animals. The waterways support key values such as vegetation, fish, frogs, birds, macroinvertebrates, platypus, and amenity. They are also popular recreational destinations with more than 50 million visits a year by Melbournians and tourists.

Similarly, the accessible beaches and diverse aquatic environments of Port Phillip Bay and Western Port provide important recreational opportunities for residents and visitors. These bays support a rich variety of invertebrate, fish and birdlife. More than 100 species of fish have been recorded from Victorian bays, inlets and estuaries.



Wetlands are built to capture and treat stormwater across the Port Phillip and Westernport region



2

Why manage stormwater?

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Climate change, population growth, increasing urbanisation, changing land use, agricultural and forestry production, and community expectations for a liveable, sustainable and prosperous city and surrounding rural areas are some of the drivers for improved and sustainable stormwater management.

When not managed appropriately, stormwater can pose risks to the natural environment and public health, and contribute to flooding. Yet improved stormwater management can provide many benefits such as:

- > Healthier waterways and bays, with more diverse populations of waterway-dependent plants and animals
- > More attractive and greener urban environments
- > Improved drainage services and reduced flood risk
- > A fit-for-purpose alternative source of water
- > Improved recreational water quality
- > More productive and efficient forestry and agricultural practices that have fewer impacts on waterways.

2.1 What is stormwater?

During rainfall events, stormwater is generated when rain water is not able to soak into the ground due to impervious or 'hard' surfaces. This water then becomes runoff that runs over land either directly or through pipes and drains to waterways and bays. For the purposes of this Stormwater Strategy, 'stormwater' is considered as the runoff from both rural (agricultural, lifestyle and peri-urban properties) and urban landscapes.

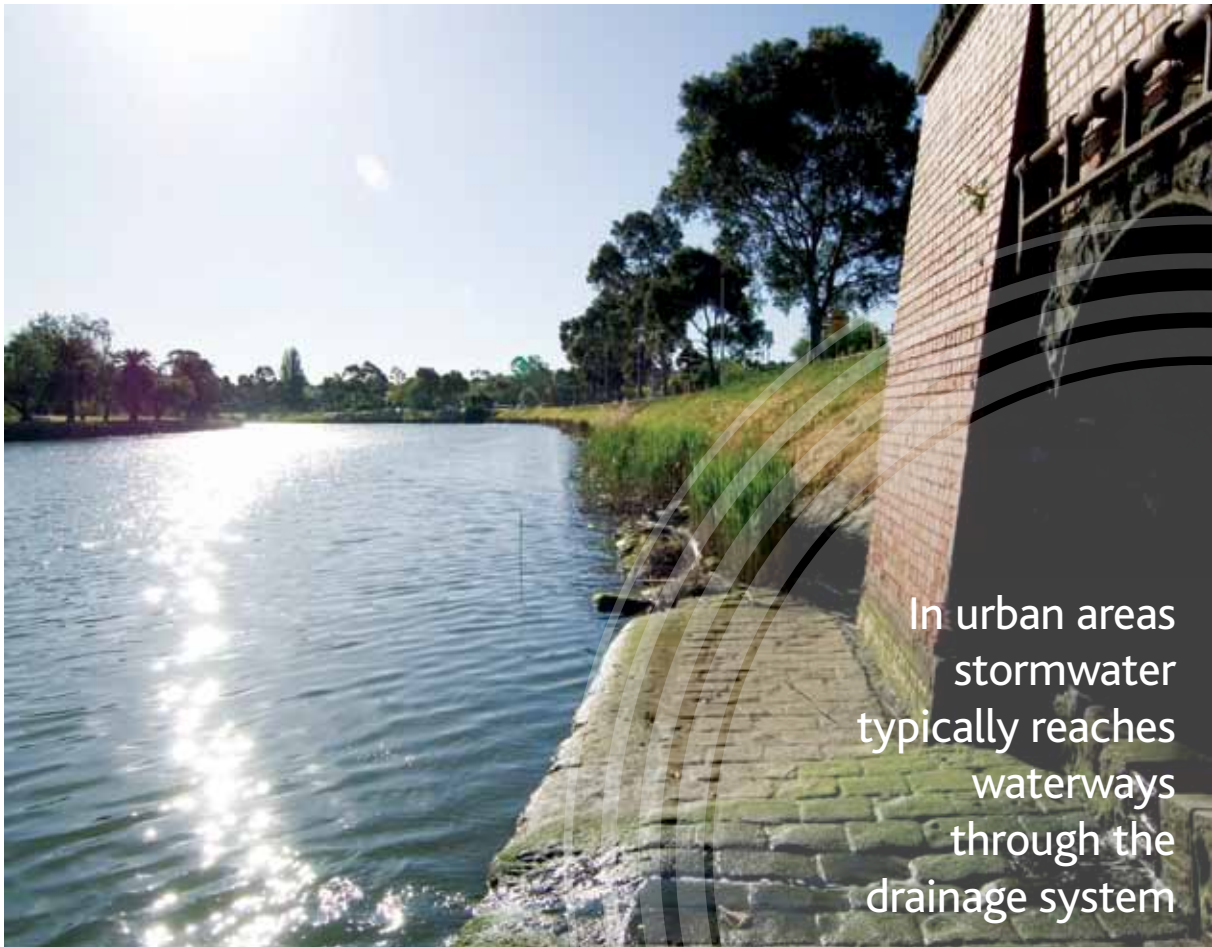
The strategy articulates a shift in stormwater management – from the traditional approach where stormwater was regarded as a threat to waterways, bays and public health – to being part of integrated water cycle management in which stormwater can contribute to sustainable, liveable, prosperous and healthy communities.

This broader role means that Melbourne Water must understand and manage stormwater interactions with the environment (before it enters waterways and bays) as well as stormwater quality and quantity impacts across rural and urban landscapes.

2.2 Stormwater and the urban landscape

To understand why we need to manage stormwater, we need to understand the impacts of stormwater on urban waterways. In forested areas, the water balance (or natural hydrology) is altered only by rainfall, and associated fluctuations in infiltration, evaporation and transpiration from plant growth. But in urban areas, the hydrology is greatly modified because land has been cleared of vegetation and capped with 'hard' or impervious surfaces (see Figure 2, and Case Study: *What is directly connected imperviousness?*).

When it rains, most rainfall runs off impervious surfaces such as roofs and roads and is typically transported directly and quickly to waterways through a drainage system. As a result, stormwater reaches waterways more often, more quickly and in greater volumes than waterways are naturally adapted to, with limited opportunities for infiltration into the ground, evaporation and transpiration via plants in the landscape.



This change in the water balance and timing of flows, including sudden surges in water volume and velocity, impacts on our waterways and bays by:

- > Changing structure, variety and suitability of habitat for aquatic life such as fish and macroinvertebrates
- > Disturbing animals and plants that live in the waterway, including the opportunity and success of breeding
- > Eroding stream banks
- > Altering natural flooding regimes
- > Increasing turbidity and pollution, affecting water quality
- > Increasing volumes of litter and oils, which can significantly affect the quality of waterways and bays and threaten animals in waterways, such as platypus and birds, and marine life, such as dolphins and fish.

The increase in impervious surfaces, such as roofs, roads and paved areas, leads to an increase in the amount of stormwater runoff, which then drains to kerbs, open channels and underground drains. This infrastructure is typically designed to move stormwater quickly. Very heavy rain can exceed the capacity of the drainage system, leading to localised flooding. When new developments are planned, appropriate management interventions including infrastructure and development controls are required to manage stormwater and prevent flooding of properties.

Using and retaining stormwater in the catchment can reduce the amount of stormwater reaching the drainage system and help reduce the frequency and severity of nuisance flooding. Stormwater retention and infiltration initiatives can reduce the frequency and volume of runoff, and increase stream baseflows. Examples of these initiatives are raingardens (gardens that filter stormwater from hard surfaces), infiltration strips and rainwater tanks that slowly release water that percolates into the soil of gardens and lawns.

The stormwater drainage system transports many toxicants to waterways including heavy metals and persistent organic compounds. Toxicants accumulate in sediment and bind to organic matter and may enter the food chain by accumulating in mussels and fish. At high concentrations, toxicants may pose a risk to human health. An integrated approach to stormwater management can improve public health and community wellbeing by providing safe and enjoyable recreational use of waterways and beaches.

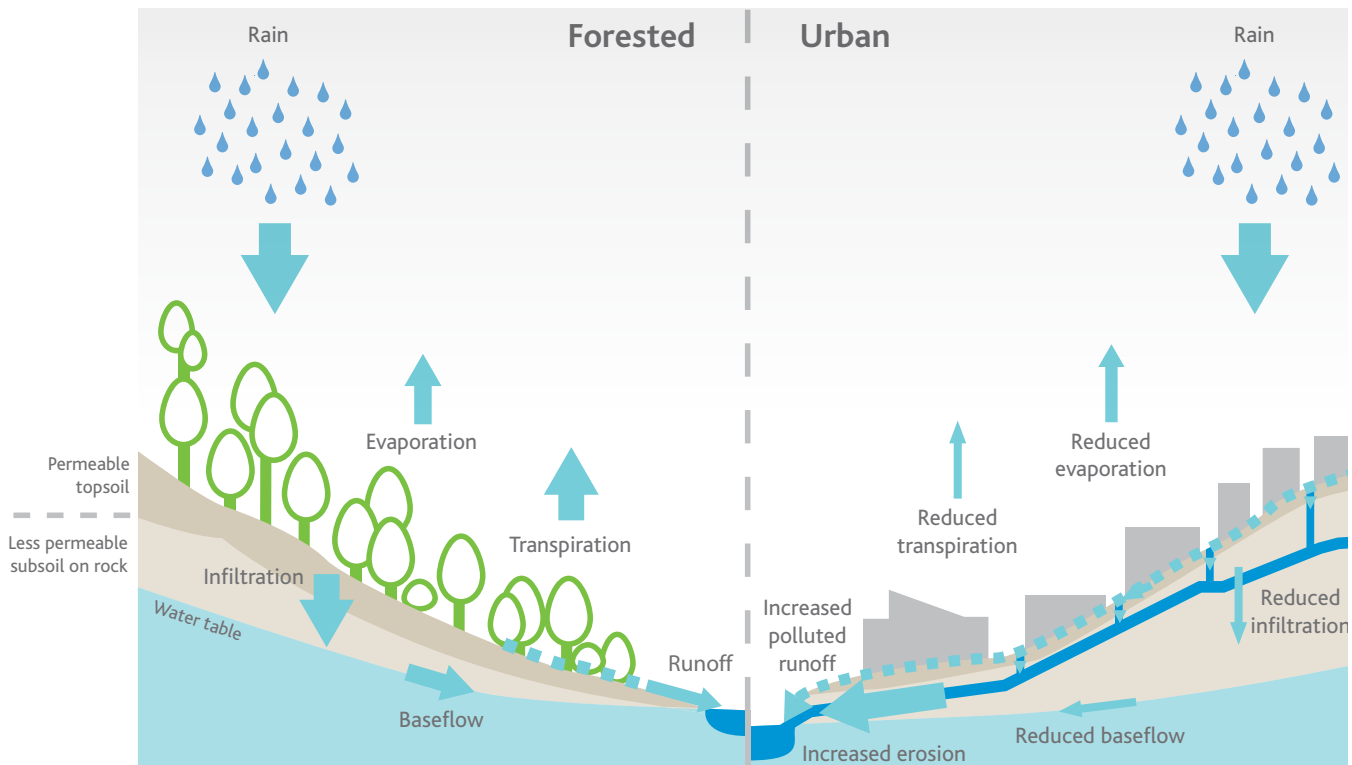


Figure 2: Typical water balance in natural (left) and 50% impervious urbanised catchment (right)(Fletcher et al [unpublished], adapted from FISREG. 1998)

CASE STUDY

What is directly connected imperviousness?

Directly connected imperviousness (DCI) is a measure of the degree of urban stormwater impact on the ecological health of urban waterways. It relates to the proportion of the impervious (hard) surface of a catchment that is directly connected to a waterway through formal drainage connection. In urban areas impervious surfaces and the proportion of direct connections between these surfaces and waterways degrades the ecological condition of those waterways.

DCI can be used to assess the scale of the stormwater management problem in a catchment (Walsh & Kunapo, 2009). Research has shown that stormwater runoff is increasingly damaging to stream ecological condition as the proportion of catchment 'directly connected' to streams increases from zero to 2%. Waterways with more than 2% DCI are in poor ecological condition.

Urban development is expected to increase impervious areas in existing and new suburbs. Effective stormwater management involves reducing the direct connection of impervious areas to waterways. This can be achieved through water sensitive urban design techniques such as using rainwater tanks to capture runoff from roofs for reuse in the house, and building raingardens where stormwater soaks into the soil to restore baseflows. Such disconnection measures are necessary to protect waterways in urbanising areas and to improve waterway health over the long term.

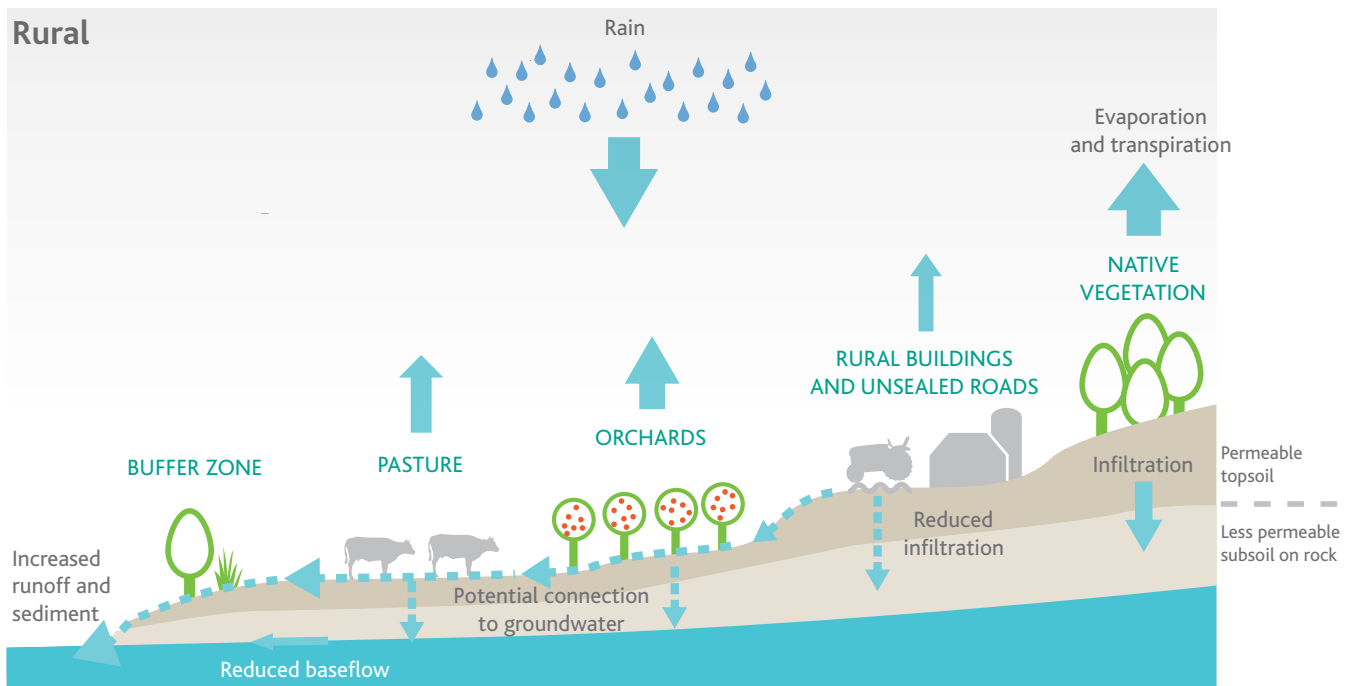


Figure 3: Typical changes to water balance and impacts on waterways from rural development

2.3 Stormwater and the rural landscape

Movement of stormwater through rural landscapes is influenced by land use, management practices and landform. Typically, land developed for agricultural use increases stormwater to waterways and decreases water originally lost to evaporation and transpiration and infiltration through the ground. Rural land generates more runoff which in turn increases transportation of sediment, agricultural fertilisers, nutrients and chemicals to waterways and the bays (see Figure 3). Together with increased dependence on rivers and creeks for irrigation and water supply, this has changed the natural timing and volume of flows in rural waterways, leading to reduced stream flows during dry periods and increased stream flows after storms.

Excessive nutrient loads from fertiliser use, stock access, road runoff and wastewater can cause rapid algal growth, including toxic algal blooms, which deplete oxygen levels in waterway or bays. Sediment eroded from unsealed roads, stream banks and construction smothers habitat and breeding sites for fish and other animals. Toxicants and heavy metals from agricultural chemicals can also be life-threatening to aquatic animals and pose serious public health risks.

2.4 Benefits of managing urban and rural stormwater

Improved stormwater management can address these impacts and achieve benefits in rural and urban landscapes including:

- > Healthier waterways and bays
- > A viable, fit-for-purpose alternative water supply
- > Increased wellbeing and amenity through greener urban spaces and access to recreation spaces
- > Improved public safety by reducing the risk of flooding and providing safer water recreation.



2.5 Who manages stormwater?

Managing stormwater in the region is highly complex. Land uses range from closed water supply catchments to agriculture and urban development. Land managers include 38 local councils, nine water authorities and more than 1.8 million households. This section provides an overview of the responsibilities of Melbourne Water, local government and property owners.

Individual property owners across the region are responsible for management of stormwater infrastructure on their own properties such as drainage pipes, agricultural drains, rainwater tanks and raingardens.

Local government manages about 25000km of street and local drainage infrastructure. Stormwater collected by these smaller local government systems drains into the regional assets managed by Melbourne Water or directly to the bays and waterways. Under the Victoria Planning Provisions, local government is required to set conditions requiring best practice stormwater management on planning permits for development.

Melbourne Water is responsible for managing more than 8400km of waterways and regional stormwater infrastructure, including about 1500km of underground drains, about 170 constructed wetlands, 219 retarding basins and 22 pumping stations.

Under the *Water Act 1989*, Melbourne Water is legislated as the caretaker of river health and is responsible for waterway, major drainage systems and floodplain management, management of the environmental water reserve, and water quality and ecosystem health monitoring throughout the Port Phillip and Western Port region. In this role, Melbourne Water also prepares Development Services Schemes to identify drainage infrastructure requirements and the charges that will apply to fund new infrastructure. There is an increasing focus on incorporating integrated water management into new growth area planning schemes. Melbourne Water is also responsible for licensing extractions of water from waterways for a significant part of the region (mainly the Yarra catchment) and water from its drainage assets.

Under the *Environment Protection Act 1970* and the *State Environment Protection Policy, Waters of Victoria (SEPP WoV)*, Melbourne Water has a role in protecting the health of waterways, Port Phillip Bay and Western Port region. As part of this role, Melbourne Water is required to take action to help achieve water quality objectives for individual waterways, and to protect environmental values and beneficial uses of waterways (such as recreation) by reducing nutrient, sediment and toxicant loads delivered by stormwater. In doing so, we implement Victoria's *Urban Stormwater Best Practice Environmental Management Guidelines* for ecological protection of waterways from urban stormwater.

While Melbourne Water has responsibility for managing a broad range of waterways and assets, the interconnected nature of drainage and waterways requires a whole-of-system approach. Melbourne Water, local government and other key stakeholders need to work together and the *Stormwater Strategy* focuses strongly on collective stormwater management through collaboration with organisations, businesses and community groups.

Melbourne Water contributes to stormwater management through partnership projects, knowledge-sharing events, grants funding and planning. Working together in a coordinated, collaborative way is central to the success of this strategy. The stakeholders we refer to throughout this strategy are shown below.

Key strategic stakeholders

Department of Environment and Primary Industries, Office of Living Victoria, EPA Victoria, other water authorities, local government, Port Phillip & Westernport Catchment Management Authority, Department of Transport, Planning and Local Infrastructure, Department of Health, Parks Victoria, Metropolitan Planning Authority, development industry, Clearwater, agricultural industry groups, rural and urban landholders, Stormwater Victoria, cooperative research centres (CRCs) such as the CRC for Water Sensitive Cities, universities and other research institutions.



Filtering
stormwater
runoff from roads

2.6 How this strategy aligns with other strategic documents

The *Stormwater Strategy* extends the lessons learned through the implementation of Melbourne Water's *Waterways Water Quality Strategy* and *Better Bays and Waterways* (Melbourne Water and EPA Victoria, 2009) (see Section 3.3).

The *Stormwater Strategy* reflects state policies, regional plans and strategies that influence Melbourne Water's strategic direction, our priorities and programs.

Together, policies, plans and strategies provide a coordinated direction for water management in Melbourne Water's Water Plan 3, which summarises the outcomes, actions, expenditures and prices we propose for water, sewerage, waterways and drainage and recycled water services over the 2013/14–2017/18 regulatory period.

The following state and regional policies and strategies guide the *Stormwater Strategy* and our commitments:

- > **Living Victoria** program – the Victorian Government has committed to a new vision and objectives for the urban water system. This program focuses on delivering resilient urban water systems that contribute to enhanced liveability, sustainability and productivity. This requires integrated water systems that are planned and managed to support the achievement of multiple outcomes (including liveable and sustainable communities, protecting the environmental health of urban waterways and bays, providing secure water supplies efficiently, protecting public health, and delivering affordable essential water services). The Victorian Government has established the Office of Living Victoria to drive reform by coordinating urban and water planning.
- > **Melbourne's Water Future (MWF)** developed by the Office of Living Victoria and supported by Melbourne Water, the Consultation Draft Strategy for Melbourne adopts an integrated or whole-of-water-cycle approach to the linked challenges of securing a safe and plentiful water supply, managing our stormwater runoff and wastewater discharge, reducing urban flooding, keeping our parks and gardens green and improving the health of our waterways. Melbourne's Water Future takes a whole-of-government approach that brings together and integrates the efforts and actions of government, local government, water authorities and the community.
- > **State Environment Protection Policy (Waters of Victoria)** and its schedules – provide the statutory policy basis, benchmark objectives and targets for improving water quality, and nutrient, sediment and toxicant loads that drive improved stormwater management in the *Stormwater Strategy*.
- > **Draft Victorian Waterway Health Strategy (in development)** – early directions from this strategy outline policy and strategic directions for management of waterways, including water quality and flow management, which are reflected in the *Stormwater Strategy*.



- **Port Phillip and Westernport Regional Catchment Strategy (RCS) (in development)** – will set strategic directions for conserving ecological integrity and resilience across the Port Phillip and Westernport region. The *Stormwater Strategy*'s actions to improve the health of waterways and bays will contribute to RCS goals for waterways and wetlands integrity.
- **A Cleaner Yarra River and Port Phillip Bay** – a taskforce with representatives from the Department of Environment and Primary Industries, EPA Victoria, Melbourne Water, Parks Victoria, the Port Phillip and Westernport and Corangamite CMAs and the Port of Melbourne was established to develop a plan to manage threats to water quality (including pollution and litter) in the Yarra River and Port Phillip Bay. The *Stormwater Strategy* will support the implementation of Melbourne Water's actions outlined in the plan.
- **Victorian Litter Strategy** – provides guidance on litter programs. Minimising litter at source through capture, education and enforcement are important objectives within the *Stormwater Strategy*.
- **Victoria Flood Management Strategy** – identifies stormwater runoff as a contributor to localised flooding in Victoria. Improved management of stormwater in priority locations to reduce the risk of flooding is reflected in the *Stormwater Strategy*.

The *Stormwater Strategy* is also strongly linked to the following strategies developed in whole or in part by Melbourne Water:

- **Melbourne Water's Strategic Direction** – guides Melbourne Water's direction. The *Stormwater Strategy* contributes strongly to the business priorities of environmental stewardship, integrated water management and service delivery.
- **Integrated Water Management (IWM) Strategy** – articulates the role Melbourne Water plays in integrated water management and explains how multiple benefits and efficiencies can be gained by aligning the goals and activities of the *Stormwater Strategy* with other strategies for waterways, drainage, sewerage and drinking water.
- **Healthy Waterways Strategy** – identifies priority areas for rural and urban stormwater management activities to protect and improve key waterway values and actions necessary for long-term ecosystem health improvement outcomes. These actions are reflected in this *Stormwater Strategy*.
- **Development Planning and Developer Services Strategies** – identifies stormwater management assets required in new and existing urban areas. Development planning is critical for better stormwater management; links to development planning are articulated in this *Stormwater Strategy*.



Stormwater treatment wetlands

- > **Flood Management and Drainage Strategy** – considers how Melbourne Water can improve the management of flood risk in the Port Phillip and Westernport region. The *Stormwater Strategy* acknowledges a range of stormwater management options that may also help to reduce flood risks and flooding in some areas.
- > **Sewerage Strategy** – provides direction for management of sewerage issues, such as stormwater flows into the sewerage system due to cross connections and leaky infrastructure. Effective management of stormwater in priority locations proposed in the *Stormwater Strategy* would help reduce impacts on the sewerage system.
- > **Waterways Communication and Engagement Strategy** – provides a framework for communication and engagement initiatives relating to waterways and drainage management. Working together with our partners, customers and stakeholders involved in stormwater management, as well as the broader community, is a key approach outlined in the *Stormwater Strategy*.

These strategies support multiple outcomes and benefits that are important in achieving sustainable stormwater management. The *Stormwater Strategy* contributes to achieving multiple outcomes through managing stormwater as part of an integrated water cycle.

Integrated water management

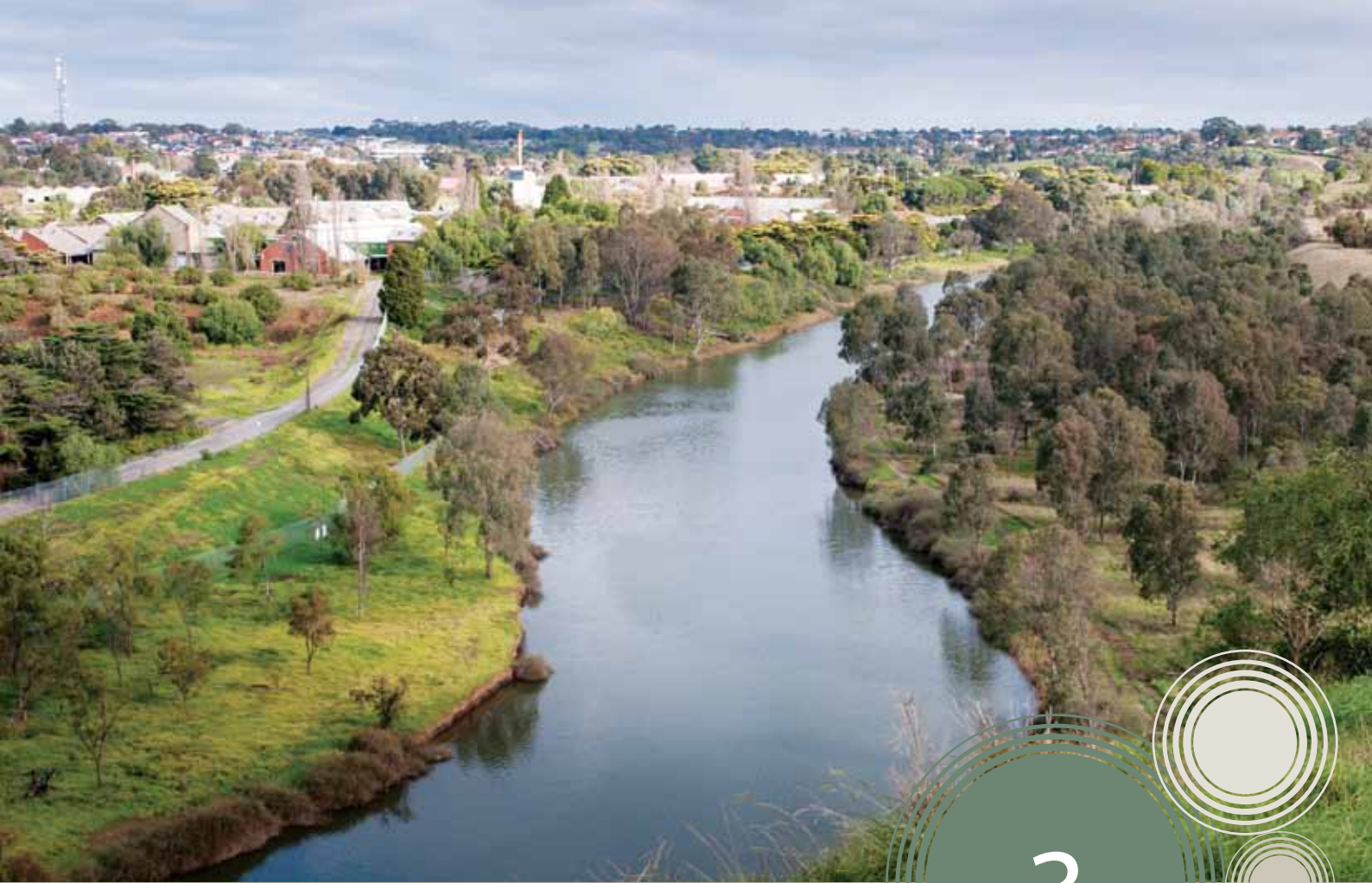
Integrated water management (IWM) is a holistic approach to planning and management of all facets of the water cycle to maximise social, environmental and economic benefits. The water cycle is traditionally managed as separate water, sewerage, waterway and drainage systems. IWM integrates the planning of these systems to provide benefits that would not be considered if developed separately. It requires shared goals and mutually supportive activities across these systems. Sustainable stormwater management is an essential component of IWM. Shared benefits may be realised by aligning goals and activities with a range of strategies, for example, the *Flood Management and Drainage Strategy* and the *Healthy Waterways Strategy*.

The following diagram illustrates how two strategies, such as the *Stormwater Strategy* and *Flood Management and Drainage Strategy*, can align to achieve shared benefits.



Shared benefits of integrated management

1. Targeted implementation of Water Sensitive Urban Design features for improved waterway values and to manage flood risk, reducing flood mitigation costs compared with structural solutions
2. Flood retention assets provide opportunities to improve recreation and amenity for local communities by including wetlands, as well as stormwater harvesting and fit-for-purpose use instead of drinking water



The case for change

3.1	The history of stormwater management in Port Phillip and Westernport region	22
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3.1 The history of stormwater management in Port Phillip and Westernport region

Over the decades, the way water and stormwater have been managed and perceived has changed significantly. This change has moved from an initial focus on public health, then flooding, then water quality and amenity, through to alternative water supply and now to a more integrated approach focused on achieving broader outcomes for the community, including enhanced liveability: creating community wellbeing and a place where people want to live now and in the future.

At the end of the 19th century, stormwater management was yet to become a consideration. In that era as a 'water supply and sewered city' (see Figure 4), water management for Melbourne was driven by public health considerations, specifically the need to supply safe drinking water and remove sewage. In the early to middle 1900s, stormwater was seen as something that needed to be disposed of quickly and efficiently to reduce flooding risk. This meant constructing drains, channels and pipes to take stormwater from agricultural land and urban areas and transport it to waterways or directly to the bays.

The 1960s and 1970s brought a new focus on improving stormwater quality following community concern about environmental issues and the state of waterways and Port Phillip Bay. However Melbourne was still largely managed as a drained city in which rapid stormwater transport and disposal was a principal goal. Similarly in rural areas, diverting excess water off-site was common practice, while in-line dams (which capture streamflow directly) were seen as a means of securing water supply.

In the 1980s and 1990s, the focus on environmental issues increased, leading to community recognition of the detrimental impacts of urban stormwater on the environmental health and amenity of waterways and the bays. A new era as a 'waterways city' emerged, where community attention was drawn to water quality, with nitrogen loads to Port Phillip Bay a key consideration following publication of *The Port Phillip Bay Environmental Study* in the mid-1990s. This community awareness translated into an emphasis on improving stormwater management through urban planning. In rural areas, the value of streamside vegetation to stabilise banks and provide shelter for stock was recognised, and the potential for increased nutrient loads from stock access to waterways was better communicated. The Landcare movement emerged, providing awareness and incentives for landholders to better manage land and waterways for sustainability of farms and catchments.

The beginning of the past decade saw widespread adoption of water sensitive urban design in the Port Phillip and Westernport region, and an increasing awareness of the impacts of stormwater flows on environmental values. The emergence of the 'water cycle city' focused on point source and diffuse source pollution, strengthened planning schemes to improve stormwater management, and emphasised shared benefits.

As we transition to a 'water sensitive city', we are working towards integrated water management, managing stormwater alongside drinking water, sewerage and recycled water across organisations for a range of shared outcomes. Similarly on rural landholdings, the potential to capture and treat runoff for reuse is being recognised and an integrated approach to water management is becoming better accepted and practised. The past five years have seen significant developments in water quality management, knowledge sharing and skills development, including:

- > Construction of a significant number of regional water quality treatment wetlands in urban areas
- > Increased training and capacity building programs for individuals and organisations involved with stormwater management
- > Learning from implementing design and maintenance
- > Collaborative approaches to urban stormwater management and to water sensitive farming
- > A program encouraging rural landowners to manage runoff from agricultural properties
- > New techniques and technology for water sensitive urban design.

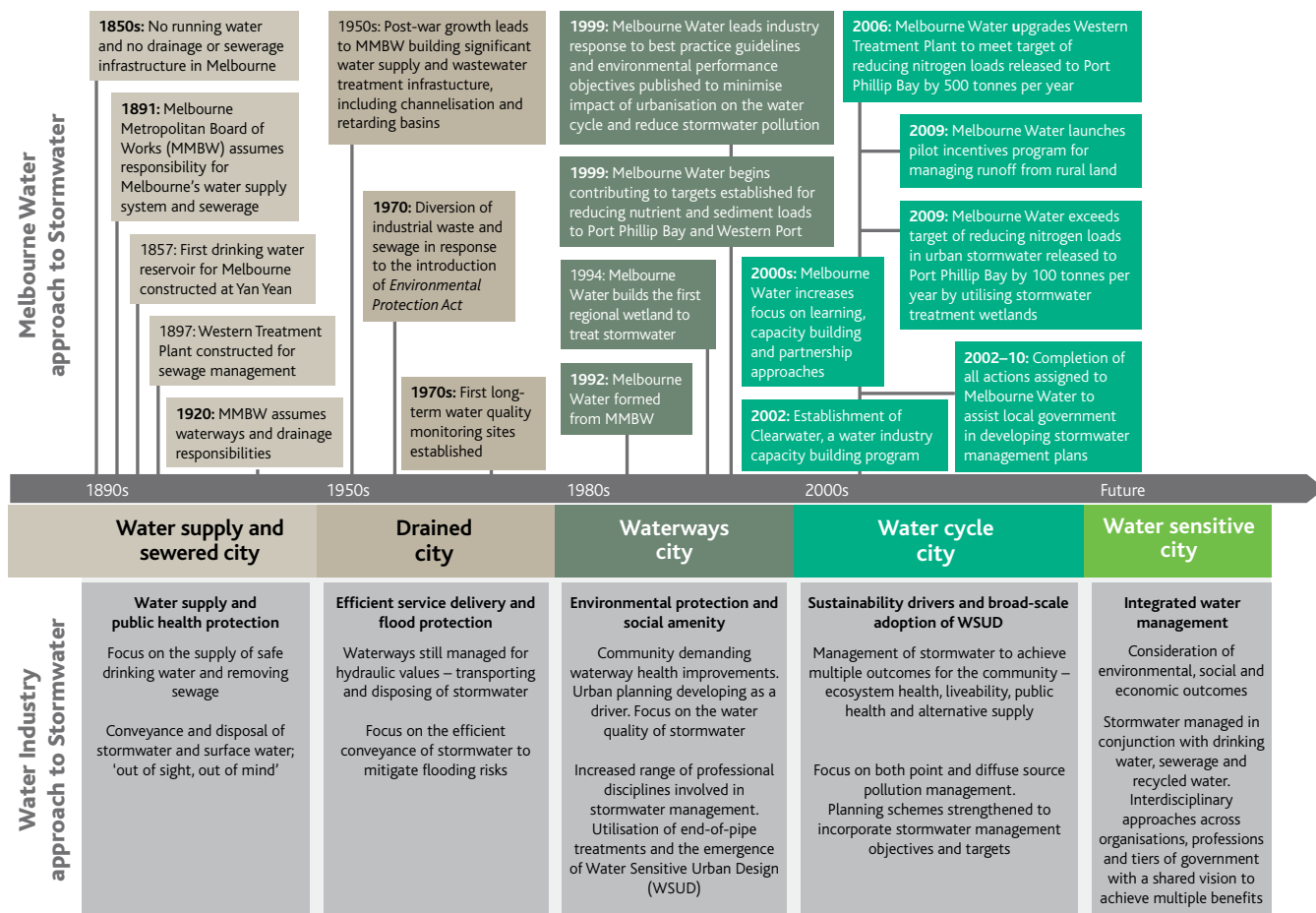


Figure 4: History of water, sewerage and stormwater management in the Port Phillip and Westernport region (adapted from Brown et al, 2009)

3.2 Key achievements over the past five years

Over the past five years we have invested significant time and resources in stormwater management activities, through delivery of on-ground works, providing incentives, advocating change, and influencing others.

Stormwater management achievements between 2008 and 2012 in the Port Phillip and Westernport region include:

Working with others

- > More than 130 water sensitive urban design projects were implemented by local government in partnership with Melbourne Water through the Lower Yarra and Living Rivers stormwater programs.
- > More than 10000 raingardens were built working with the community through the 10000 Raingardens program.
- > On average, Melbourne Water's Healthy Waterways Waterwatch program educates 53000 participants, conducts more than 2000 activities and monitors more than 400 waterway sites a year.
- > Through Clearwater, 132 stormwater management training courses were delivered to 3290 people across local, state and Federal Government organisations, industry associations, developers, water corporations, specialist consultants, elected officials, policy advisers and researchers.
- > Through the Rural Land Program, more than 30 landholders have partnered with Melbourne Water to construct treatment systems on their farm, preventing transport of nutrients and sediments to waterways.

Melbourne Water on-ground activities

- As part of the \$60 million Nitrogen Reduction Program, 50 regional water quality treatment wetlands were constructed over the past decade, resulting in a 109-tonne reduction in nitrogen entering Port Phillip Bay.
- The Rural Land Program delivers on-farm works and was piloted in the Woori Yallock and Upper Bass/Lang Lang catchments. It has reduced more than 500 tonnes of sediment, 2000kg of nitrogen and 800kg of phosphorus entering Port Phillip Bay and Western Port.
- A research project to pilot catchment disconnection in the Little Stringybark Creek catchment has assisted in the construction of three neighbourhood raingardens, 1.49 million litres of water storages (rainwater tanks), 17.1 million litres of water harvested per year and 5.3ha of catchment treated, to date (see Case Study: Disconnecting stormwater to improve stream health and ecology).
- More than 54000 cubic metres of litter and debris removed from waterways.
- Nine stormwater reuse schemes initiated by others and supported by Melbourne Water – utilising stormwater as an alternative water source for watering sporting grounds and urban parks.

Research and knowledge building

- More than 130 fixed sites across the Port Phillip and Westernport region are monitored regularly for various water quality parameters.
- A comprehensive review of the scientific information and knowledge on the assets and threats in Western Port was completed, setting research priorities and enabling more informed target setting.
- We collaborated with key academic institutions on research projects and investigations, such as the Centre for Aquatic Pollution Identification and Management (CAPIM), Monash University and the University of Melbourne, ensuring action is informed by the latest science.
- We worked with local government, water authorities and government agencies to identify and address pollution hotspots that threaten ecosystem and/or public health. Key pollution hotspots identified through the research are being addressed through targeted enforcement from EPA Victoria and local government, and through innovative structural treatments and education programs undertaken by Melbourne Water. To date, more than \$3 million has been spent addressing hotspots.

Planning and policy support

- Collaborative development and delivery of the *Better Bays and Waterways* water quality improvement plan for Port Phillip Bay and Western Port, outlining 93 actions across 15 focus areas aimed at reducing the amount of pollutants entering waterways and bays from rural, urban and coastal areas.
- In new subdivisions, Melbourne Water has created 31 Development Services Schemes and 10 Development Services Strategies that include water sensitive urban design features.
- We provided strategic support towards the adoption of sustainable stormwater targets in eight municipalities and the development of targets in a further fourteen municipalities.
- We supported development of six guidelines to support industry, in the planning, design and management of water sensitive urban design.

CASE STUDY

Disconnecting stormwater to improve stream health and ecology

The **Little Stringybark Creek** project is a world-first research program which demonstrates the connection between catchments and stream health. Involving the University of Melbourne, Monash University, Melbourne Water, Yarra Ranges Shire Council, Yarra Valley Water and local residents, the project aims to restore the hydrology and ecological health of Little Stringybark Creek in the Yarra catchment by managing and improving urban stormwater runoff. Residents and landholders are involved in stormwater harvesting and reuse through rainwater tanks, raingardens (gardens that filter stormwater from hard surfaces such as roofs, driveways and paved areas) and infiltration pits. The project team has worked closely with landholders, demonstrating the value of partnerships between agencies and the community to achieve on-ground solutions that will improve waterway health.

The **Dobsons Creek project** has taken the practical lessons learned from the Little Stringybark project and applied them to the Dobsons Creek catchment in south-east Melbourne. Melbourne Water, South East Water and Knox City Council are working with residents of The Basin to disconnect the upper reaches of Dobsons Creek catchment to improve water quality and streamflow. The project delivers multiple community outcomes including stormwater harvesting for fit-for-purpose reuse, and use of stormwater for watering green spaces surrounding the site. Melbourne Water and South East Water provide allotment-scale solutions such as downpipe diversions, and internally plumbed rainwater tanks through the Tanks for Helping Our Creek program. Knox City Council and Melbourne Water are working on streetscape projects, including the award-winning Wicks Reserve bioinfiltration project. This project helps assess viability, costs and potential targets for future initiatives.



Little Stringybark Creek residents and project team

3.3 Lessons learned to inform stormwater management

Managing stormwater helps protect the health of waterways and bays. Melbourne Water's *Waterways Water Quality Strategy and Better Bays and Waterways* (Melbourne Water and EPA Victoria, 2009) aimed to reduce nutrient, sediment and toxicant loads to waterways, Port Phillip Bay and Western Port. These strategies give effect to our long-term commitments to protect environmental values under *State Environment Protection Policy (Waters of Victoria)* and associated schedules for waters of the Yarra catchment, Port Phillip Bay, and Western Port and catchment. The *Stormwater Strategy* reflects the lessons learned through the implementation of these strategies and policy schedules.

We have improved collaboration with other groups in planning and policy development, and in monitoring and research. We have faced and overcome challenges, and learned useful lessons for stormwater management over the next five years and beyond.

We celebrate working collaboratively to build capacity for sustainable stormwater management, implementing water sensitive urban design projects, community raingardens, and on-farm capture of pollutants. Constructed wetlands, on-farm works, catchment disconnection, and stormwater capture and reuse have removed from our waterways and bays many hundreds of tonnes of nutrients and sediment, as well as litter and toxicants. We have supported local government to develop and adopt sustainable stormwater targets and guidelines to support industry in the planning, design and management of water sensitive urban design. We need to continue to provide support and assist local government because almost one in five councils fails to enforce developers to comply with permit conditions relating to water sensitive urban design in Clause 56.07 of the *Victoria Planning Provisions* (Eggleton et al, 2012).

Innovative research, monitoring, and modelling and design tools and have been used to improve our understanding of stormwater impacts and effectiveness of stormwater management. We know that we need to continually assess programs and activities to incorporate new science, meet stakeholder and customer needs and expectations, and adapt to changes in community values and interests.

A paradigm shift in stormwater management is required to exploit the opportunities it provides, manage the threats that it poses, and achieve multiple community outcomes. Using structural measures alone to reduce flood risk in a catchment can be expensive and not always financially sustainable. There is no 'one size fits all' approach to stormwater management. Different stakeholders have different needs. The Needs Analysis we have undertaken with local government has identified that each council has different needs and we need to adapt our support accordingly (see *Case Study: Needs Analysis shows progress in stormwater management, Section 5.2*).

3.4 Where we are heading

Melbourne Water will continue to play a leadership role in the region's transition to a more sustainable water future. Our activities will help to protect and improve waterways and inputs to Port Phillip Bay and Western Port, resulting in multiple outcomes for the community.

We will continue to work on preventing degradation to waterways occurring from land use changes and new development as well as strategically investing to decrease the negative impacts from stormwater in priority areas.

The Victorian Government's *Living Melbourne, Living Victoria* vision is to create 'A smart, resilient water system for a liveable, sustainable and productive Melbourne'. Melbourne Water will work with our partners, stakeholders and customers towards this shared vision as we make the transition from a 'water cycle city' to a 'water sensitive city' (see Figure 4).

The priorities for managing stormwater are also evolving for Melbourne Water. As well as retaining a priority on protecting waterways and bays from the adverse impacts of stormwater, we are looking to take advantage of opportunities in the catchments. These opportunities, to improve management and use of stormwater, will deliver multiple outcomes for wellbeing and amenity, agriculture and industry and support the fit-for-purpose use of stormwater to reduce demand on drinking water supplies. Working together with others, such as local government, water authorities and the community, will be critical for delivering these multiple outcomes.



4

Delivering multiple community outcomes

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4.2	Our 'toolbox' of approaches	29
4.3	Key focus areas for investment	30

Sustainable stormwater management is expected to protect people, property and receiving waterways and bays, enhance liveability, and supply fit-for-purpose cost-effective water. This strategy aims to meet these expectations by promoting stormwater management to achieve the four broad community outcomes of healthy waterways and bays, wellbeing and amenity, public safety and alternative water supply.

Melbourne Water’s consultation on the *Stormwater Strategy* highlighted that the community seeks a variety of outcomes and benefits to support a liveable region (see Appendix 3 for more information on the community consultation process).

In the past, these areas might have been considered in isolation. Now we recognise that multiple community outcomes (see Figure 5) can be achieved by considering stormwater within an integrated water management framework planning for water supply, sewerage, drainage and waterway health.

Melbourne Water promotes the development of collaborative partnerships to plan, design and invest to achieve multiple outcomes, achieve efficiencies in investment such as co-investment, and shortened time frames to completion.

For example, minimising flooding and providing greener urban spaces might be a key outcome that local government seeks from managing stormwater and is a good starting point for a conversation around stormwater management. In the rural context, securing water supply and improving productivity drive landholders to better manage the quantity and quality of runoff from their properties.

An example of this multiple benefits approach is that constructed wetlands can contribute to healthy waterways and bays by treating nutrients and sediment from stormwater as well as providing wellbeing and amenity for the community. Similarly, a stormwater harvesting scheme can provide an alternative water supply for irrigating sporting grounds while keeping damaging flows from entering the waterways and bays.

While not all projects will achieve all outcomes, considering what can be achieved means we are seeking multiple benefits as our standard way of working. This approach is the basis for actions outlined in the rest of the strategy.

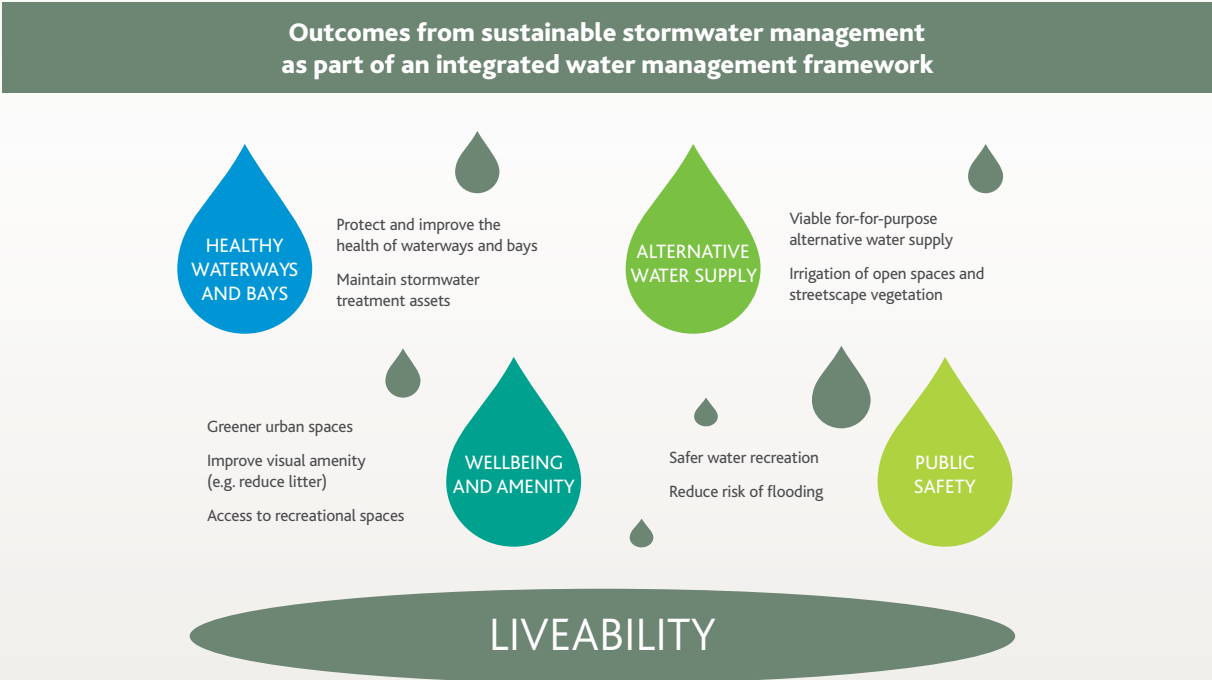


Figure 5: Examples of multiple community outcomes from sustainable stormwater management contributing to liveability in rural and urban areas

4.1 Our vision

Our long term success is guided by the Victorian Government's *Living Melbourne, Living Victoria* Vision to create: A smart resilient water system for a livable, sustainable and productive Melbourne.

Melbourne Water's **vision** for stormwater management is:

Sustainable stormwater management supports prosperous communities, thriving landscapes and healthy waterways and bays.

The actions in this strategy will help us head towards this vision. To measure our progress towards our vision, we have set a **20-year goal** which is:

Stormwater is collaboratively managed to protect and improve waterways and bays, resulting in multiple outcomes for the community.

Achieving this vision and goal will require Melbourne Water to work collaboratively with our stakeholders and for stormwater to be considered as part of integrated water management.

Improvement in the health of waterways and bays and associated community outcomes of wellbeing and amenity, public safety and alternative water supply are unlikely to occur without a concerted, catchment-based approach to stormwater management. Stormwater needs to be sustainably managed at all scales by Melbourne Water, local government and the community in collaboration with other key stakeholders.

4.2 Our 'toolbox' of approaches

To overcome potential challenges and make the most of opportunities to achieve our goals, Melbourne Water will continue to use a range of approaches to manage stormwater over the next five years. We will need to use a combination of all these approaches to achieve sustainable stormwater management.

The foundation of our approach is **working together** – establishing and maintaining genuine partnerships with others in all that we do, sharing knowledge, building capacity and communicating outcomes. This is fundamental to successful delivery of:

- > **Better on-ground outcomes** – working closely with key land management partners in the construction and maintenance of stormwater management assets in urban and rural areas
- > **Research and knowledge building** – undertaking a focused program to build and share knowledge on the impacts of stormwater and most effective multi-benefit solutions
- > **Planning, policy and regulation** – supporting those involved in planning, policy and regulation to achieve better stormwater management outcomes for the community.

This strategy outlines each approach separately to articulate how we will undertake our activities over the next five years. Each has a series of commitments that Melbourne Water will deliver through implementation planning (see Section 9 – *Delivering the strategy*). We will draw on all approaches to successfully achieve our commitments.



Our toolbox of approaches to deliver sustainable stormwater management

4.3 Key focus areas for investment

Significant financial investment in managing stormwater, particularly for water quality improvements in the Port Phillip and Westernport region, has occurred over the past decade.

Sustainable stormwater management needs to be addressed now. It is more cost-effective to design new developments with appropriate stormwater management than to retrofit existing urban areas. With rapid urban growth underway and planned for the region, the size and expense of the stormwater challenge will continue to increase.

The Essential Service Commission (ESC) has approved a price path for a three year period (2013/14–2015/16). The dollars shown in the figure above are based on a five year period to align with the strategies that guide the Waterways and Drainage activities. Expenditure for years four and five (2016/17–2017/18) are indicative only at this time however, they are based on information in the ESC Final Determination. Final numbers for these two years will be determined at a later date as part of a future Water Plan.

This strategy outlines investment of \$50 million of capital expenditure and \$169 million of operating expenditure for stormwater management from 2013/14–2017/18 (see Figure 6). Investment is funded via the Waterways and Drainage Charge.

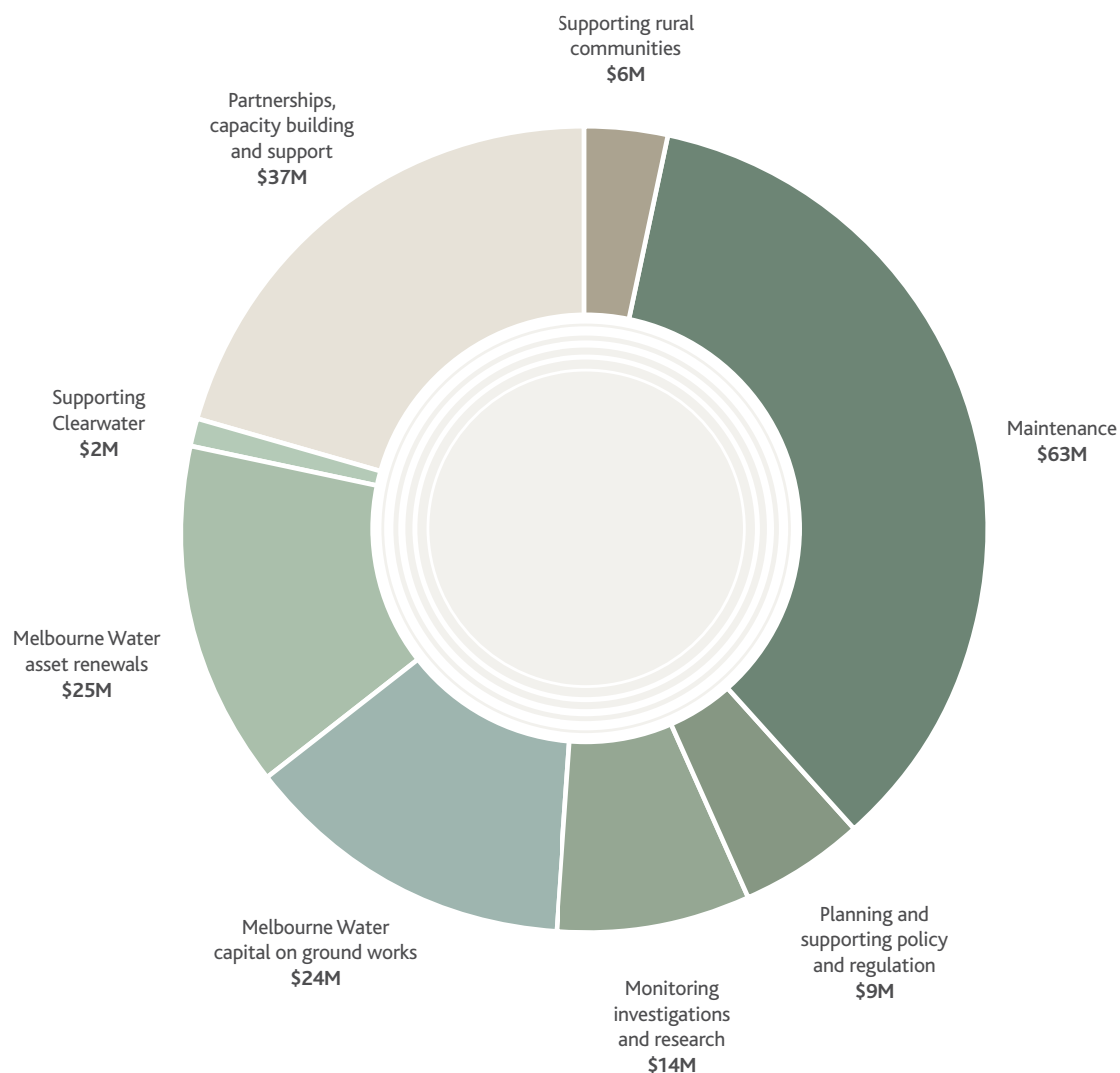


Figure 6: Proposed financial investment by focus area 2013/14–2017/18

Implementation of this strategy will follow several investment principles including:

- > Identifying co-investment opportunities
- > Delivering financial support via grants and incentives
- > Maintaining previous investment in water quality treatment and water sensitive urban design.

To achieve the most efficient outcomes it will be necessary to consider who benefits from potential stormwater management projects to determine appropriate cost-sharing arrangements. An example of this is where a regional water quality wetland is constructed and stormwater is harvested from the wetland for irrigation. An appropriate cost-sharing arrangement may be that one organisation pays to construct the wetland, another pays for paths and facilities and another pays for the harvesting component.

The Clayton South Retarding Basin project (*see Case Study: Clayton South Retarding Basin*) provides an example of a shared funding arrangement. This co-funding approach means beneficiaries contribute in proportion to the benefit they receive, and the public benefit achieved.

To deliver our commitments Melbourne Water has defined eight focus areas for investment over the next five years:

- > **Partnerships, capacity building and support** – Working together is the core function underpinning success in stormwater management. This focus area includes partnerships, capacity building, relationships and customer service, and delivery of financial support and co-investment opportunities.
- > **Supporting Clearwater** – Includes key work areas such as industry training, networking capacity building and support through knowledge-sharing initiatives.
- > **Supporting rural communities** – Includes building capacity among rural landholders through knowledge sharing and providing support and incentives for landowners to implement best practice agricultural management.
- > **Melbourne Water asset renewals** – Includes key work areas such as Melbourne Water asset renewal works – minor works, structural works and replacement of existing stormwater assets.
- > **Melbourne Water capital works** – Includes planning, designing and constructing new Melbourne Water assets and other assets where Melbourne Water capital can be co-invested to achieve multiple outcomes.
- > **Melbourne Water maintenance** – Includes maintenance on Melbourne Water assets to remove litter and sediment, control weeds, and carry out revegetation.
- > **Monitoring, investigations and research** – Includes monitoring, investigations and research, and collaboration with research partners.
- > **Planning, policy and regulation** – Includes supporting and informing policy framework reviews and utilising existing regulations to support outcomes for waterways and bays.

In delivering programs under each focus area, Melbourne Water will measure our progress towards achieving our vision against five-year implementation targets. An overview of the strategy and implementation targets are summarised in Figure 7.

CASE STUDY

Clayton South Retarding Basin

A new water quality treatment wetland and stormwater harvesting system has been constructed in the Clayton South Retarding Basin and neighbouring Namatjira Park with funding from the Federal Government, Melbourne Water and Kingston City Council. Multiple integrated objectives delivered by the project include reduced flood risk, improved stormwater quality, access to passive recreation opportunities, and an alternative water supply. As part of the project, Kingston City Council has installed a pump station to distribute water collected by the stormwater harvesting system to irrigate playing fields and public gardens. This provides a fit-for-purpose alternative to drinking water for irrigation. The retarding basin function will be improved to protect about 110 more properties from flooding. The wetland provides habitat for a range of animals including birds, fish and frogs. Parklands and pathways established around the wetland provide valuable recreation benefits for the community. The wetland and harvesting project combined will provide an alternative supply of up to 92 million litres of water and remove 1.3 tonnes of nitrogen a year from Port Phillip Bay.

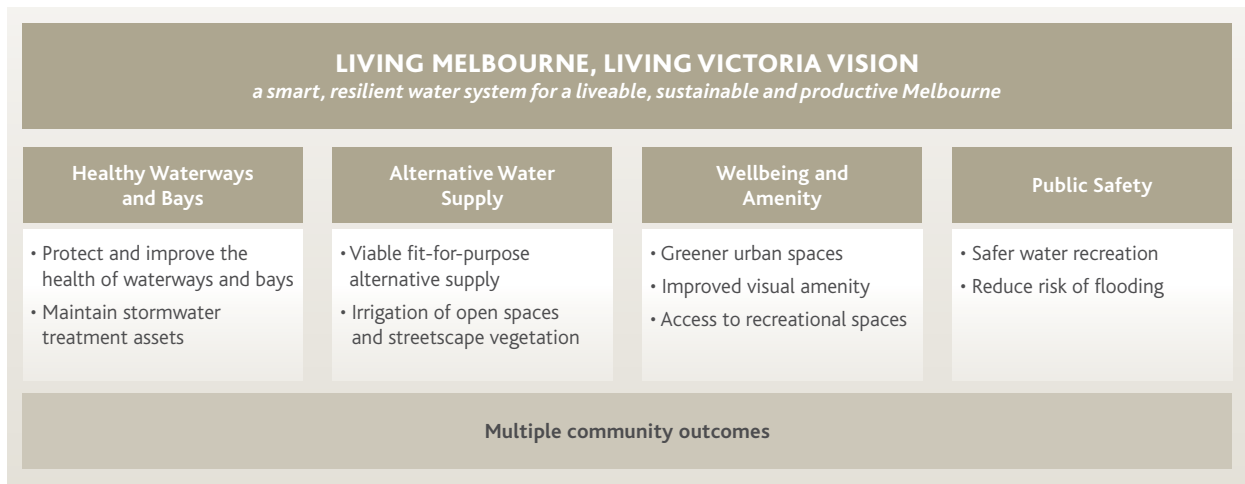
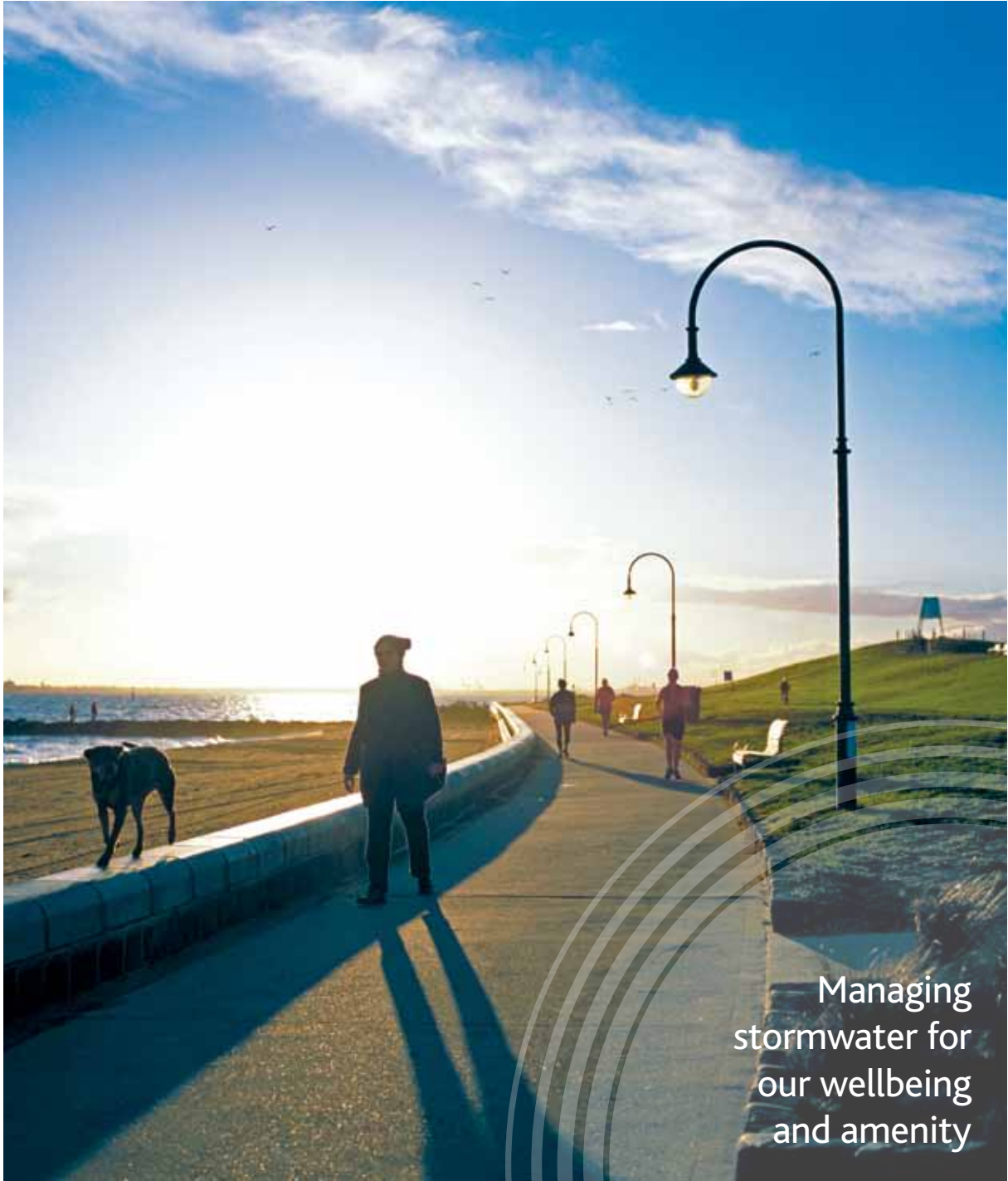


Figure 7: An overview of the Stormwater Strategy and Implementation targets

STORMWATER STRATEGY FOCUS AREAS FOR INVESTMENT AND TARGETS

Partnerships, capacity building and support	Supporting Clearwater	Supporting rural communities	Monitoring, investigations and research
<p>Our Aim Supports others to manage stormwater for multiple outcomes through capacity building and incentives programs.</p> <ul style="list-style-type: none"> • Provide technical and financial support to our partners to deliver 125 structural and strategic stormwater projects over five years to achieve multiple community outcomes. • A minimum of two greenfield developments will commit to implementing stormwater management measures beyond existing requirements to protect high value waterways. • A minimum of 25 communication and education initiatives to raise community awareness on stormwater management will be delivered. • Undertake targeted disconnection projects to improve urban runoff management practices in priority areas through partnerships. • Melbourne Water commitments under A Cleaner Yarra River and Port Phillip Bay Action Plan are delivered. 	<p>Our Aim Support knowledge sharing and build capacity within the stormwater industry.</p> <ul style="list-style-type: none"> • 100 capacity building initiatives will be delivered under the Clearwater program over five years. • A minimum of ten industry workshops aiming to reduce key industry gaps in stormwater management identified with partners will be delivered under the Clearwater program over five years. 	<p>Our Aim Support rural landholders to improve their land management for water quality improvements.</p> <ul style="list-style-type: none"> • 250 rural landholders will be engaged to increase action for reducing diffuse pollution from agricultural land. • At least one alternative engagement model trialled to improve our understanding of the effectiveness of rural land management delivery methods. • Rural runoff management practices are refined and evaluation techniques are developed to assess performance in reducing pollutant loads discharged to waterways and bays, at both the farm-scale and catchment-scale. 	<p>Our Aim Foster opportunities to collaborate with partners in research, adapt to new technology and promote emerging thinking.</p> <ul style="list-style-type: none"> • Refine monitoring programs by July 2013 and implement the program by July 2018: • To improve understanding of ecological and public health risks from stormwater pollutants; and • To inform the implementation of effective management measures. • Establish strategic research partnerships that foster knowledge sharing and collaboration and address Melbourne Water's strategic knowledge gaps in stormwater management. • Undertake research priorities identified in the Western Port Environment Science review to inform the development of water quality requirements for Western Port. • Establish research partnerships to update stormwater management objectives and to improve stormwater technology and evaluation techniques. • Provide technical input, data and support to agencies involved in litter program development and undertake litter removal from priority waterways. • Improve our asset management and data sharing approach including effectively using our asset management information system to enable efficient planning and reporting of stormwater management activities. • Undertake social research and community engagement to understand drivers and barriers to participation in stormwater management and waterways health initiatives to inform stormwater management program activities.
	<p>Melbourne Water asset renewals</p> <p>Our Aim Renew water quality treatment assets that protect our waterways and bays by working towards targets for the receiving waters.</p> <ul style="list-style-type: none"> • 100% of Melbourne Water's stormwater treatment wetlands are assessed for compliance with design requirements to inform prioritisation of rectification works. • Deliver 25 projects to reset and rehabilitate stormwater treatment wetlands to meet asset design requirements. 		
	<p>Melbourne Water maintenance</p> <p>Our Aim Maintain our water quality treatment assets that protect the health and amenity of our waterways and bays by working towards targets for the receiving waters.</p> <ul style="list-style-type: none"> • Stormwater treatment assets are maintained on a prioritised risk basis so that they continue to deliver the required level of service in respect to hydraulic function, vegetation values and public safety to maintain achievement of nitrogen reduction targets. 	<p>Melbourne Water capital works</p> <p>Our Aim Deliver stormwater assets that achieve multiple benefits for our community and contribute towards targets for the receiving waters.</p> <ul style="list-style-type: none"> • Construct a minimum of five regional stormwater assets to contribute to Port Phillip Bay and Western Port water quality targets and provide multiple benefits to the community. • Nitrogen loads will be reduced by a further ten tonnes towards the Port Phillip Bay water quality target. 	
<p>Planning, policy and regulation</p> <p>Our Aim Support effective planning, policy and regulation to better deliver stormwater outcomes.</p> <ul style="list-style-type: none"> • Develop and implement a program of activities to improve the alignment of the stormwater policy and regulatory framework. 			



Managing
stormwater for
our wellbeing
and amenity



5

Working together

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5.2	Understanding needs and capacity building	38
5.3	Communication and education	40
5.4	Relevant targets	42

Sustainable stormwater management requires greater collaboration with key stakeholders to deliver multiple outcomes and benefits that address a variety of needs and priorities.

When we work together towards a shared vision in strong supportive partnerships, we deliver better outcomes for the community.

The Victorian Government's *Living Melbourne, Living Victoria* vision is to create 'a smart, resilient water system for a liveable, sustainable and productive Melbourne'. Melbourne Water will work with our partners, stakeholders and customers towards this shared vision for our region.

The Port Phillip and Westernport region is experiencing significant change as a result of rapid population growth, land use change and climate variability. Coordinated planning is essential for the region's sustainability, liveability and prosperity. To achieve this, it will be necessary to work towards a clear vision for our cities and catchments in which collaborative sustainable stormwater management plays an important role.

Working together is the foundation for Melbourne Water to deliver stormwater management initiatives across three themes:

- > Better on-ground outcomes (see Section 6)
- > Research and knowledge building (see Section 7)
- > Policy, planning and regulation (see Section 8).

To ensure we are working together effectively, Melbourne Water will:

- > Build strong stakeholder **partnerships and support** delivery of strategic outcomes
- > Support **capacity building** across the region by understanding the needs of stakeholders and developing initiatives to support those needs
- > Provide and support clear **communication and education** on sustainable stormwater management
- > Engage with stakeholders to **share their experiences, knowledge and expertise** to enable better stormwater management.

This section outlines Melbourne Water's directions for partnerships and support, understanding needs and capacity building, communication and education, and engaging with stakeholders to highlight and share their knowledge.

Key strategic stakeholders

Department of Environment and Primary Industries, Office of Living Victoria, EPA Victoria, other water authorities, local government, Port Phillip & Westernport Catchment Management Authority, Department of Transport, Planning and Local Infrastructure, Department of Health, Parks Victoria, Metropolitan Planning Authority, development industry, Clearwater, agricultural industry groups, rural and urban landholders, Stormwater Victoria.



5.1 Partnerships and support

Strong relationships with key stakeholders are crucial to securing collaborative action across the region. Melbourne Water aims to establish targeted stormwater partnerships that protect and improve waterways and bays. A clear understanding of sustainable stormwater management and the strengths, needs and objectives of all stakeholders are essential for the success of these partnerships. In addition, partners must adopt an open and responsive approach, and develop an agreed mutual focus on multiple outcomes. These multiple outcomes include healthy waterways and bays, wellbeing and amenity, public safety, securing alternative water supply, and economic viability of projects.

Our aim in developing partnerships and support is to achieve improved stormwater management outcomes. Melbourne Water will work with:

- > The Victorian Government to improve stormwater management to help achieve the government's vision and objectives for urban water, including supporting liveable and sustainable communities and protecting the environmental health of urban waterways and bays
- > Local government on improved planning, design, delivery, management and maintenance of stormwater assets, and developing municipal strategies to increase the integration of green infrastructure and achieve multiple benefits
- > Key agencies such as other water authorities to share knowledge about waterway values and deliver projects and initiatives using stormwater as an alternative water supply
- > Key agricultural organisations and rural landholders to improve management of runoff from rural land
- > Communities and individuals to increase ownership of the stormwater challenge and identify new ways to manage stormwater in households.

Melbourne Water will:

- > Support appropriate, cost-effective stormwater management projects and initiatives that achieve **multiple outcomes** for the community. This support can be in-kind, technical expertise or financial to maximise potential benefits
- > Foster strong, **collaborative networks** and partnerships to achieve sustainable stormwater management and integrated water management. This includes seeking innovative responses to stormwater management (see *Case Study: Streetscape change in Broadmeadows wins recognition*).
- > Explore **additional methods of sharing knowledge** and capabilities that will strengthen our collective capacity to manage stormwater
- > Work with Government agencies, local government and the broader community to **implement** actions outlined in ***A Cleaner Yarra River and Port Phillip Bay action plan***.

CASE STUDY

Streetscape change in Broadmeadows wins recognition

The multiple award-winning water sensitive streetscape of Tanderrum Way in Broadmeadows is the result of close collaboration between Melbourne Water and Hume City Council.

Tanderrum Way's innovative water sensitive urban design infrastructure won prizes at the Stormwater Excellence Awards and the Australian Institute of Landscape Architects (Victoria) Awards in 2010.

Traditional road construction was originally planned for Tanderrum Way. The strong relationship between Melbourne Water and Hume City Council employees enabled a significant change in thinking on project design. Hume City Council chose to build a community-focused space that uses water sensitive urban design in its construction. It meets requirements for pedestrian amenity, vehicle control and parking, and addresses social, environmental and economic factors. The project improved the council's capacity, skills and experience in delivering water sensitive urban design projects. It also demonstrates excellence in construction, using a variety of materials for the paving and sub-surface filtering layers. Our involvement is part of a larger program of support and projects with Hume City Council.



Tanderrum Way, Broadmeadows is one of many projects delivered in partnership with local government.

5.2 Understanding needs and capacity building

Stormwater management continues to evolve, rapidly improving and developing new knowledge and approaches. As a result, it is essential to continue to build our capacity and that of key stakeholders to adopt and lead new developments and ideas in stormwater management.

A key step is to develop a clear understanding of the current capacity of our industry stakeholders, including their strengths and opportunities for improvement.

An example of this approach is Melbourne Water's Living Rivers program, which developed a Needs Analysis tool in 2006 so that local councils could clearly identify their capacity to deliver effective stormwater projects. The tool is replicated every two years to track progress in capacity development of each council, and to help Melbourne Water tailor the Living Rivers program to meet each council's needs (*see Case Study: Needs Analysis shows progress in stormwater management*).

To complement the Needs Analysis tool, the Living Rivers program provides councils with funding, training, guidance and support to improve their skills and capacity for strategic and structural stormwater management and to implement initiatives that remove pollutants from stormwater.



Fostering strong collaborative networks and partnerships.

Clearwater is a leading capacity building program in sustainable urban water management that provides technical training, tours, events, advice, online tools and information.

The Clearwater program is aimed at people and organisations with responsibility for planning, designing and managing stormwater in urban environments. It is hosted and funded by Melbourne Water with special project funding provided by the Department of Environment and Primary Industries, the Municipal Association of Victoria and EPA Victoria. Clearwater will collaborate and have a strong partnership with the newly established Office of Living Victoria and its knowledge hub for integrated water management.

Through Clearwater, Melbourne Water will continue to support improved stormwater management practices through capacity building initiatives that:

- > Support others with practical application of research, regulation and best practice
- > Design and deliver professional, industry-relevant education and training
- > Promote and support information and knowledge exchange
- > Encourage better process management within and between organisations to address key stormwater responsibilities
- > Inform research institutions, government policy makers and water industry leaders about the drivers and limitations encountered by people implementing stormwater management policy and practice.

CASE STUDY

Needs Analysis shows progress in stormwater management

Since 2006, some 72% of councils in the Port Phillip and Westernport region have increased their capacity to sustainably manage stormwater. This demonstrates the effectiveness of partnerships formed with local government through Melbourne Water's Living Rivers stormwater program.

This change in capacity was measured using the Needs Analysis self-assessment tool. The Needs Analysis identifies relative capacity related to nine fundamental themes for delivery of water sensitive urban design. Needs Analysis workshops were conducted with each council in 2006/07 and 2010/11, allowing comparative analysis. The results provide a snapshot of internal commitment and resourcing for management of water sensitive urban design.

Information is used to tailor support to individual councils needs and re-focus Melbourne Water's program around common strategic needs. Melbourne Water will continue to work with local government to assess needs and provide support to improve capacity to deliver sustainable stormwater management.

5.3 Communication and education

Open communication is essential for identifying multiple benefits, understanding different perspectives and project approaches and to define the reasons we want to work together.

As part of this communication, Melbourne Water understands that we have a responsibility to articulate:

- > Our commitment and responsibilities for sustainable stormwater management
- > Our objectives and needs, including healthy waterways and bays
- > Links between stormwater and waterway and bay health, including stormwater inputs, water quality and stormwater harvesting (*see Case Study: Water Smart City Model*)
- > That sustainable stormwater management provides multiple outcomes for the community
- > How the water cycle is altered under different land uses and what fit-for-purpose supply means, so that the community can take action
- > How we work with our stakeholders and the role we play together to achieve outcomes for the community.

We will explain these objectives and issues by engaging with stakeholders, and by highlighting and sharing their knowledge. When engaging with stakeholders, Melbourne Water aims to learn from their experience, knowledge and expertise to increase overall knowledge of stormwater management. We aim to reduce barriers to participation for stakeholders so that they are more likely to engage in stormwater management and strategic planning, consistent with their interests and capabilities.

An essential part of engaging with stakeholders is reducing barriers to participation and listening and responding to feedback.



Backyard rain garden

CASE STUDY

Water Smart City Model

To raise awareness of what influences stormwater quality and surface runoff, we have developed the Water Smart City Model – an educational activity suitable for all ages that can be used at community festivals and in schools.

The activity involves the audience building a city with roads and buildings made from Lego plastic building blocks. Food dye, representing pollutants, is placed on the city and rain is simulated over the model which carries the pollution over the impervious surfaces and into the 'bay'.

A variety of water smart features are then added to the city e.g. raingardens, rainwater tanks, swales and rooftop gardens. Pollution is again added to the model and rain is simulated. The amount of surface runoff is dramatically decreased due to the amount of water withheld locally in the water smart features, reducing the risks of flooding. Pollution is also captured in the water smart features, so the water that flows into the 'bay' is a lot cleaner.



The Lego 'Water Smart City Model'.

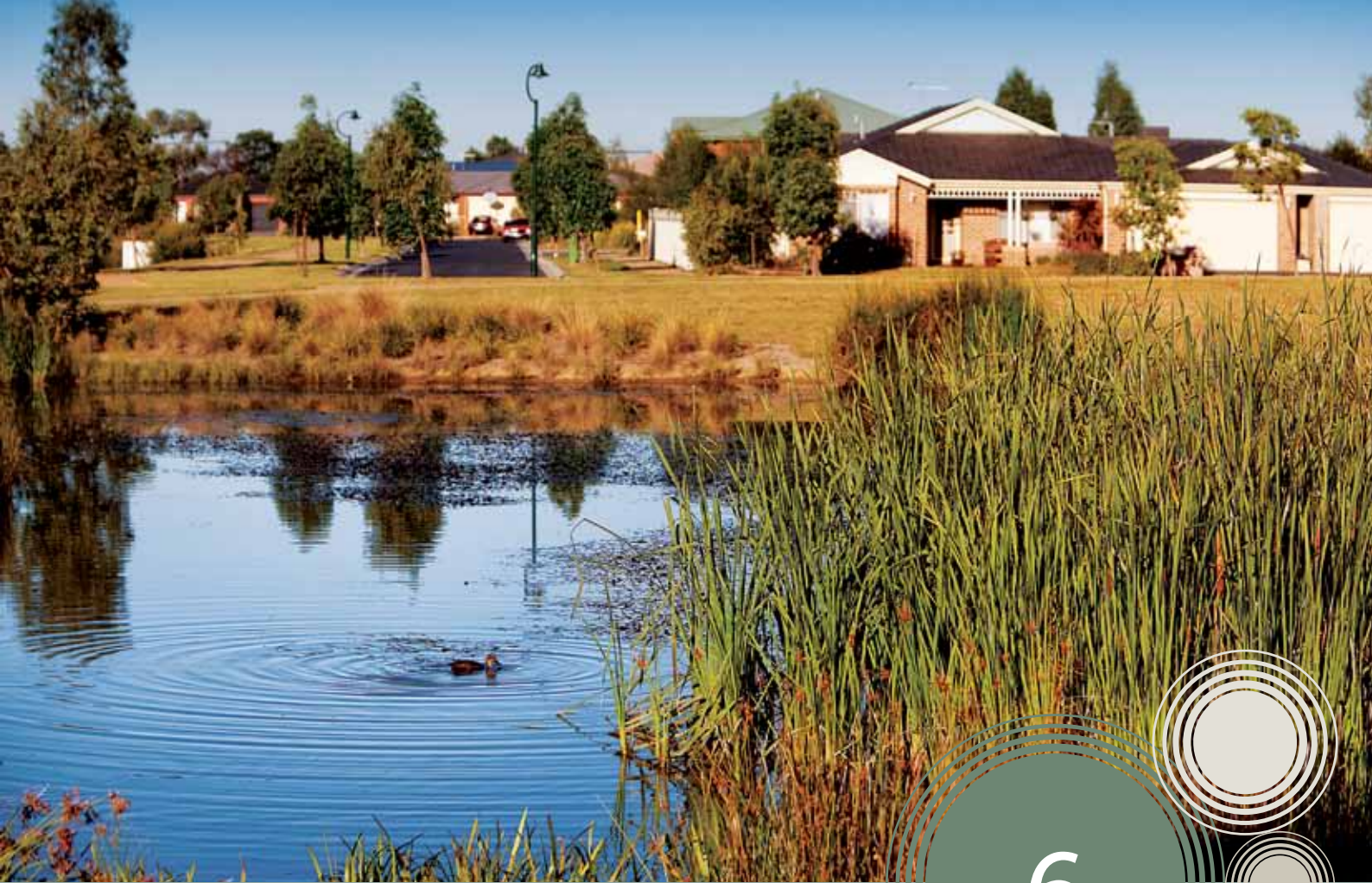
5.4 Relevant targets

In delivering our Stormwater Management Program commitments, Melbourne Water will measure our progress towards achieving our vision against five-year implementation targets. We will draw on all approaches to achieve our targets.

The commitments outlined in this approach will contribute towards the achievement of the following targets:

- | | |
|--|---|
| IT1 Provide technical and financial support to our partners to deliver 125 structural and strategic stormwater projects over five years to achieve multiple community outcomes. | IT6 Melbourne Water commitments under <i>A Cleaner Yarra River and Port Phillip Bay</i> action plan are delivered. |
| IT2 100 capacity building initiatives will be delivered under the Clearwater program | IT7 Provide technical input, data and support to agencies involved in litter program development and undertake litter removal from priority waterways. |
| IT3 A minimum of ten industry workshops aiming to reduce key industry gaps in stormwater management identified with partners will be delivered under the Clearwater program | IT8 Undertake targeted disconnection projects to improve urban runoff management practices in priority areas through partnerships. |
| IT4 A minimum of 25 communication and education initiatives to raise community awareness on stormwater management will be delivered | IT9 Undertake social research and community engagement to understand drivers and barriers to participation in stormwater management and waterways health initiatives to inform stormwater management program activities. |
| IT5 At least one alternative engagement model trialled to improve our understanding of the effectiveness of rural land management delivery methods. | |

A summary of all implementation targets can be found in Appendix 4.



6

Better on-ground outcomes

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Sustainable stormwater management requires on-ground solutions that are well planned, designed, constructed and maintained in order to reduce the impacts of stormwater, deliver multiple outcomes for the community and protect waterways and bays. Melbourne Water promotes stormwater management works that incorporate water sensitive urban design at lot, street, precinct (suburb) and regional scales.

As well as constructing our own on-ground stormwater management assets, Melbourne Water will work with key stakeholders in planning, design, construction and maintenance of on-ground works that deliver better stormwater management outcomes. Support includes education and training to build stakeholder capacity, financial assistance and technical advice and support.

It is necessary to prioritise works to areas where we will get the 'best outcome for effort' by considering where the best results will be delivered from one set of works over another. Sharing costs through co-investment and reducing overall life-cycle costs through good planning, design and maintenance are instrumental to successful stormwater management. By working closely with our stakeholders, we identify opportunities to invest in on-ground works that deliver multiple outcomes for all stakeholders.

Melbourne Water's investment priorities for on-ground works are:

- > Stormwater management practices that complement other river health activities aiming to protect and improve waterway and bay values such as fish, platypus or amenity, consistent with the *Healthy Waterways Strategy*
- > Locations where stormwater runoff is the limiting factor to waterway health and can be managed in a cost-effective manner
- > Development of partnerships that achieve joint benefits through co-investment
- > Delivery of multiple community outcomes including healthy waterways and bays, wellbeing and amenity, public safety and alternative water supply.

This section outlines Melbourne Water's directions for supporting and delivering on-ground outcomes. This includes working with urban and rural communities, local government and water authorities to find integrated on-ground solutions; building, maintaining and improving stormwater management assets; and managing litter.

Key stakeholders

Local government, Office of Living Victoria, other water authorities, Department of Environment and Primary Industries, Metropolitan Planning Authority, development industry, agricultural industry groups, rural and urban landholders.



6.1 Supporting on-ground outcomes

6.1.1 Supporting urban communities to manage stormwater

Stormwater can be managed at a range of scales in the urban environment. Managing it at source is one of the most efficient ways of reducing harmful impacts on waterways. On individual properties, stormwater can be managed by installing raingardens, infiltration ponds and rainwater tanks, disconnecting or diverting downpipes, building a green roof or laying permeable pavement (see *Case Study: Applying water sensitive urban design at the local scale – 10000 Raingardens program*).

Melbourne Water will:

- > Continue to **support communities to make informed decisions** to improve stormwater management on their properties by providing educational materials and funding
- > **Support** communities in priority catchments to undertake **stormwater management improvements** to protect key waterway values.

CASE STUDY

Applying water sensitive urban design at the local scale – 10000 Raingardens program

The Healthy Waterways 10000 Raingardens program aims to establish a change in thinking about stormwater from community, local government and industry. Traditionally, stormwater has been regarded as something that needs to be efficiently channelled to sea and this outdated approach has affected water quality and the health of waterways and bays.

Raingardens come in a variety of shapes and sizes, and can combine an infiltration function which allows rainwater or stormwater to slowly soak into the underlying soils to recharge groundwater and stream baseflows.

Melbourne Water works with local government and the community to build raingardens in public spaces such as streets, parks and schools. We encourage people to build raingardens in their own homes, with the aim of 10000 raingardens being registered. So far, more than 5000 raingardens have been registered.

Melbourne Water's 10000 Raingardens program supports community and local government by providing tools to encourage effective stormwater management around the home.



Were Street Raingarden constructed by Banyule City Council with support from Living Rivers Stormwater Program

6.1.2 Supporting agricultural communities to address farm runoff

Managing stormwater from agricultural and rural properties is an important part of protecting waterways and bays in the Port Phillip and Westernport region. Improved management of runoff reduces transport of nutrients and sediment to waterways, and also provides other benefits, such as reducing nuisance flooding, improving pasture quality, stock health and water efficiency.

Nutrient, sediment and agricultural chemicals will be the focus of stormwater management on farms, while sediment and toxicants are a greater threat from rural roads. Melbourne Water will prioritise support in catchments that generate high pollutant loads to protect waterways and bays.

Stormwater can be managed on agricultural properties through improved farm management practices such as better on-farm nutrient management, re-aligning tracks and fences, and revegetating gullies.

Runoff can be treated effectively through works such as sediment traps, wetlands, filter beds, swales and drains to reduce volume and velocity, and vegetation buffers along waterways.

Melbourne Water will:

- > Support agricultural communities and rural landholders to **manage stormwater** inputs to waterways, particularly nutrients and sediment in priority areas
- > Investigate effective ways to **address agricultural pollution hotspots** identified in the monitoring and investigation program, including those affected by agricultural chemicals
- > Investigate alternative means of engaging landholders to **adopt practices for improving water, nutrient and sediment management** on rural properties
- > Investigate partnership opportunities with Landcare groups, state agencies, peak rural industry organisations and local government to establish programs for **engaging rural landholders** and increasing adoption of practices for improved management of runoff.

Since 2009, Melbourne Water has piloted a Rural Land Program aimed at helping rural landholders improve the management of agricultural land to reduce the amount of nutrients and sediment entering waterways.

The program operates in the Woori Yallock and Upper Lang Lang/Bass catchments and provides advice and support to landholders, including grants to improve runoff management on farms. Although the management of runoff from rural land is a relatively new area of work for Melbourne Water, the pilot Rural Land Program has already demonstrated the multiple benefits that can be achieved through adoption of good stormwater management practice (see Case Study: A landholders innovative approach to managing water and nutrients).

Melbourne Water will:

- > **Extend the pilot Rural Land Program** beyond the Woori Yallock and Upper Lang Lang/Bass catchments into other priority catchments across the Port Phillip and Westernport region
- > Continue to support agricultural and other rural communities by **working with landholders and key stakeholders** to improve on-farm management practices on agricultural land
- > **Build capacity** among rural landholders by sharing knowledge about technical information, industry networks and the development of codes of practice
- > **Build relationships** with landholders and agricultural industry groups to raise awareness of the impacts of diffuse pollution on waterway and bay health
- > Provide incentives for landowners to implement **agricultural best management practices** and/or install treatment systems to manage runoff from their farms
- > **Promote successful projects** as demonstrations of good stormwater management for improved health of rural land and waterways.



Supporting agricultural communities to manage stormwater inputs to waterways.

CASE STUDY

A landholders innovative approach to managing water and nutrients

A new water quality treatment wetland on a property in Wandin North in the Yarra catchment is one of the success stories from Melbourne Water's pilot Rural Land Program. The program works in partnership with landholders to reduce sediment and nutrient movement from farms into waterways.

The wetland is located on a nursery at the headwaters of Wild Cattle Creek in the Woori Yallock catchment. This wetland holds and pre-treats nutrient-enriched runoff that would have otherwise made its way into the creek, a tributary of the Yarra River.

Modelling has estimated that each year, the wetland will prevent up to 40kg of nitrogen and 20kg of phosphorus from entering Wild Cattle Creek. Treated water will be used as a supplementary supply for the landholder's horticultural enterprise.

The project demonstrates an innovative approach to water and nutrient management on a rural property, providing benefits for the landholder and local waterway.



The wetland during construction

6.1.3 Supporting local government to manage stormwater with on-ground works

Working with local government is essential to achieving street-scale and large-scale outcomes for stormwater management. Local government manages stormwater using on-ground works featuring street-scale water sensitive urban design, such as raingardens, through to large-scale systems such as stormwater harvesting. These works can be undertaken through gradual improvement of urban areas during programmed capital and renewal works, new and infill urban development, and in specific stormwater management projects.

Melbourne Water works closely with local government across the region to manage stormwater. This partnership is important because local government is responsible for about 25000km of local drains and road drains, which feed into regional stormwater assets, waterways and the bays.

Melbourne Water supports local government to reduce the quantity of stormwater, and improve the quality of stormwater from land owned or managed by local government to protect and improve waterways.

Melbourne Water will support local government in variety of ways, including:

- > Helping to develop well planned, designed, constructed and maintained **on-ground stormwater management assets** and infrastructure
- > Creating **opportunities to share knowledge**, build capacity, provide technical information and develop best practice
- > Working to initiate and fund **litter prevention**, reduction and education programs, and resources in priority waterways **as part of integrated stormwater management solutions**
- > Co-investing in projects that deliver **multiple community outcomes**
- > Encouraging local government and other partners to **adopt targeted approaches** to stormwater infrastructure improvements that focus on catchments with potential for stormwater disconnection over the medium to long term
- > Seeking **alternative and more sustainable solutions** for the management of unsealed roads and road sealing works.



Dandenong Valley Wetland

6.1.4 Working with other water authorities to manage stormwater

Water authorities are responsible for delivering a range of planning, development, infrastructure and other services to the community. Key focus areas are exploring opportunities for demonstration of stormwater harvesting, governance, fit-for-purpose water, and balancing the use of recycled water and stormwater. Melbourne Water and other water authorities are key partners for planning and delivering integrated on-ground outcomes for the community. The links with stormwater management are reflected in water authority documents such as regional stormwater and integrated water management strategies.

Melbourne Water will:

- > Explore ways to **align planning, share knowledge of waterway values** and investment opportunities with other water authorities and Office of Living Victoria to ensure multiple outcomes for the community in priority areas.

6.2 Delivering on-ground outcomes

6.2.1 Building stormwater management assets

Constructing assets is one of the main ways in which stormwater management outcomes, particularly water quality treatment, have been delivered to date. Pollutant (nutrients and sediment) reduction to the bays will continue to be a driver for capital works over the next five years with additional emphasis on achieving multiple community outcomes (see Case Study: Developing wetlands to reduce nitrogen loads).

Water quality treatment wetlands constructed in urban areas across the Port Phillip and Westernport region are examples of treating stormwater at a collection point, away from the source of pollutants. The wetlands retain pollutants, reducing pollutant loads from urban development to Port Phillip Bay and Western Port, and play a major role in working towards *State Environment Protection Policy (Waters of Victoria)* objectives.

CASE STUDY

Developing wetlands to reduce nitrogen loads

The 1000 tonne nitrogen reduction target for Port Phillip Bay (SEPP WoV Schedule F6) has driven a significant program of works to reduce nitrogen entering Port Phillip Bay. This has encouraged the water and land development industries to adopt improved stormwater management practices.

Melbourne Water has contributed more than 600 tonnes towards this target. An upgrade of the Western Treatment Plant in 2005 to improve nitrogen treatment contributed more than 500 tonnes. Melbourne Water's \$60 million nitrogen reduction program involved construction of 52 regional water quality treatment wetlands, which have reduced annual nitrogen loads from stormwater to Port Phillip Bay by 109 tonnes. This included the 48-hectare Dandenong Valley Wetland, the largest constructed wetland in Victoria.

The nitrogen reduction target has increased industry skills and knowledge in building wetlands and helped develop new technologies and science relating to wetland construction.



Large raingardens – Federation Square

Melbourne Water will work with partners to design and construct alternative treatment systems at various scales, including smaller-scale treatments to manage pollutants at source, such as bioretention systems, infiltration ponds and stormwater harvesting systems. These alternative systems address stormwater quality and quantity requirements, and achieve multiple community outcomes, such as alternative water supply and wellbeing and amenity.

In certain catchments, stormwater can be disconnected to protect the environment by preventing excess flows being directly transported to waterways. Priorities for this type of work will be based on stormwater being the key limiting factor to the health of waterways, the presence of waterway values, and feasibility of the project. Assessment of the limiting factor to waterway health will be informed by directly connected imperviousness data, the condition of water-dependent animals, and other catchment and waterways characteristics, such as agricultural and urban land use and pollution, streamside vegetation quality, and water extraction. Stormwater disconnection is most effective when Melbourne Water is able to partner with other stakeholders to deliver multiple benefits to the community, and consider opportunities for integrated water management.

Melbourne Water will develop partnerships with others to:

- > Construct **new stormwater management assets** that deliver multiple **community outcomes** such as alternative water supply, wellbeing and amenity or healthy waterways and bays
- > Work with partners towards **achieving the 1000 tonne nitrogen reduction target for Port Phillip Bay**
- > Investigate co-investment opportunities for **targeted disconnection initiatives** and priority areas during implementation planning.



Regular maintenance can ensure system performance of stormwater assets

6.2.2 Developer-funded stormwater management assets

Melbourne Water undertakes planning with the Metropolitan Planning Authority, Office of Living Victoria, local government, water authorities and land developers to ensure that new urban developments have appropriate and cost-effective drainage infrastructure. This includes adequate consideration of the quantity and quality of stormwater for each site.

Melbourne Water will continue to prepare Development Services Schemes and strategies in greenfield areas, as they are rezoned for development. These strategies and schemes ensure that development includes drainage infrastructure appropriate for controlling the quantity and quality of stormwater.

The scheme master plan defines local conditions for land development and infrastructure requirements for drainage, flood control and stormwater management in the catchment. Major works are based on providing the most economical system, taking into account development timing, and operating costs.

All developers within scheme areas pay a rate per hectare of land to fund the required drainage, flood management and stormwater treatment infrastructure. Development within a scheme area takes place over many years and as it occurs, developers build the necessary assets required by the scheme. Melbourne Water reimburses those who develop the assets to ensure costs are equitably distributed.

Flood mitigation, drainage and stormwater treatment infrastructure built by developers includes pipes, channels, stormwater treatment wetlands, swales and retarding basins. When complete, these assets are transferred to local government or Melbourne Water to manage, depending on the size of the drainage catchment.

Developer-constructed assets can provide additional benefits to the community because they are often integrated with public open space.

6.2.3 Maintaining and improving stormwater assets

It is vital that existing and future assets are maintained to ensure they continue to perform as designed and treat nutrients, sediment and other pollutants in stormwater.

Melbourne Water owns and maintains more than 180 stormwater treatment wetlands. Many of these were constructed as part of new urban development projects and have been handed over to Melbourne Water to manage. Over time, the ponds built as part of these wetlands fill up with sediment. The sediment needs to be periodically cleaned out or 'reset' to ensure the wetlands continue to function as designed.

Given the rapid urban growth over the past decade and the resulting construction of numerous water quality treatment wetlands, several of these wetlands are at or nearing the stage where they need to be cleaned out or reset. In the remaining wetlands, ongoing sediment management is required regularly.

A program to manage and maintain assets will be delivered using a risk-based approach to ensure assets continue to perform their designed functions. Routine inspections and condition assessment will be completed to inform works. Typical maintenance activities cover:

- > Weed and animal pest species control
- > Public safety works
- > Minor infill planting
- > Desilting, sediment removal and disposal
- > Structural and operational works
- > Litter removal from existing litter traps, water quality assets and priority waterways.

Melbourne Water will:

- > Maintain a **register of all stormwater assets**. When assets are replaced at the end of their life, we will consider the potential to achieve additional benefits when resetting the asset. We will work with key stakeholders to share costs for these additional benefits where possible
- > Prepare **strategic asset management plans** for all constructed assets **to guide the management** of existing and future Melbourne Water stormwater treatment assets
- > Undertake a regular program of **maintenance on existing assets** using a risk-based management approach
- > **Clean out** or reset existing stormwater treatment wetlands managed by Melbourne Water, in accordance with their strategic asset management plan.

6.2.4 Managing litter

Litter from stormwater runoff in the urban environment is a common problem affecting the quality and amenity of waterways and bays. This is a problem for which there is no single solution. Melbourne Water will continue to support litter management focused on education programs in the community and schools, and existing litter management programs designed to minimise the problem at source.

We will also continue a program of litter removal from high priority waterways and water quality treatment assets. Under this program, litter is collected regularly from 146 dedicated litter traps, and from more than 5000 sites throughout Melbourne Water's waterways and drainage network that are identified areas for accumulation of litter, debris and silt.



Large raingardens – Federation Square

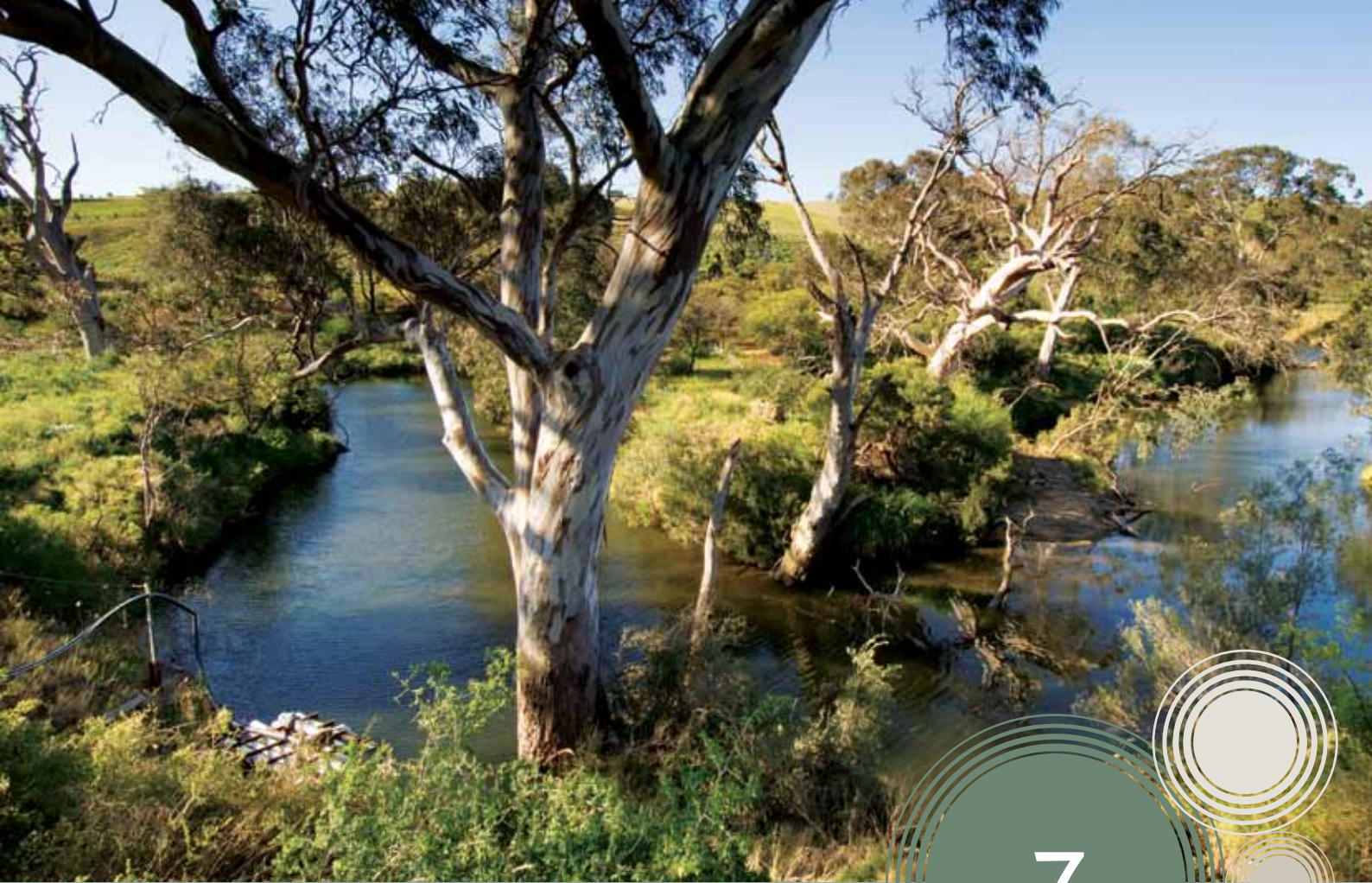
6.3 Relevant targets

In delivering our Stormwater Management Program commitments, Melbourne Water will measure our progress towards achieving our vision against five-year implementation targets. We will draw on all approaches to successfully achieve our targets.

The commitments outlined in this approach will contribute towards the achievement of the following targets:

- IT1** Provide technical and financial support to our partners to deliver 125 structural and strategic stormwater projects over five years to achieve multiple community outcomes.
- IT4** Deliver a minimum of 25 communication and education initiatives to raise community awareness on stormwater management.
- IT5** At least one alternative engagement model trialled to improve our understanding of the effectiveness of rural land management delivery methods.
- IT7** Provide technical input, data and support to agencies involved in litter program development and undertake litter removal from priority waterways.
- IT9** Undertake targeted disconnection projects to improve urban runoff management practices in priority areas through partnerships.
- IT10** Nitrogen loads will be reduced by a further ten tonnes towards the Port Phillip Bay water quality target.
- IT11** Construct a minimum of five regional stormwater assets that contribute to the protection of local waterways or improvement of receiving waters to provide multiple benefits to the community.
- IT12** Stormwater treatment assets are maintained on a prioritised risk basis so that they continue to deliver the required level of service in respect to hydraulic function, vegetation values and public safety to maintain achievement of nitrogen reduction targets.
- IT13** 100% of Melbourne Water's stormwater treatment wetlands are assessed for compliance with design requirements to inform prioritisation of rectification works.
- IT14** Deliver 25 projects to reset and rehabilitate stormwater treatment wetlands to meet asset design requirements.
- IT15** 250 rural landholders will be engaged each year to increase action for reducing diffuse pollution from agricultural land.
- IT16** Rural runoff management practices are refined and evaluation techniques are developed to assess performance in reducing pollutant loads discharged to waterways and bays, at both the farm-scale and catchment-scale.

A summary of all implementation targets can be found in Appendix 4.



Research and knowledge building

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Melbourne Water’s investment in managing rural and urban runoff is supported by effective monitoring, targeted investigations, strategic research, and evaluation and reporting.

One of our key priorities is to improve our knowledge of the impacts of urban and rural stormwater on waterways and bays, and develop effective multi-benefit management solutions through comprehensive and focused monitoring, investigation and research.

We need to be adaptive, flexible and open to changes in management approaches as new knowledge or information becomes available. Using an adaptive management approach ensures that management decisions are based on the most advanced and sound knowledge. Adaptive management is a systematic process for improving the effectiveness of natural resource management by learning from past experience and utilising current knowledge to inform decision making. This increases our ability to carry out activities that will result in the greatest gains for sustainable stormwater management.

Adaptive management relies on monitoring and evaluating results of activities against specified outcomes, and testing our assumptions. We then adapt and improve our approach based on what we have learned. These outcomes may be on-ground actions, planning, or developing and implementing policy and regulation. Conceptual (or logic) models are used to capture the relationships between values and threats, and assess our assumptions about the improvements we expect from certain management activities. This helps us understand how our activities can contribute to improved rural and urban runoff to support community outcomes from effective stormwater management: healthy waterways and bays, public safety, liveability and alternative water supply.

Our monitoring, investigations and research program:

- > Allows us to measure changes in the condition of waterways and the values they support
- > Informs us of the success of our interventions
- > Tests and further develops the assumptions underpinning our conceptual models
- > Addresses critical knowledge gaps, assists strategic decision making and policy development, and supports efficient and effective on-ground activities.

Knowledge generated by targeted monitoring, investigations and research informs:

- > Strategic planning, such as strategy development, works prioritisation and planning, and asset management systems
- > Delivery of actions and programs.

Key stakeholders

EPA Victoria, Department of Environment and Primary Industries, Department of Health, Port Phillip & Westernport Catchment Management Authority, other water authorities, local government, universities and other research institutions, cooperative research centres (CRCs) such as the CRC for Water Sensitive Cities.



Evaluating this information and sharing the outcomes of monitoring, investigations and research with our partners and the community helps promote effective collaboration for collective action. It enables us to communicate:

- > The values and condition of waterways and bays, including major threats to their health
- > The effectiveness of activities and investment outcomes
- > Our progress towards achieving management targets.

An adaptive management approach ensures we can continually learn and improve our management approaches.

Figure 8 shows Melbourne Water’s adaptive management cycle, which underpins our investment in sustainable stormwater management. It is based on the principle of continuous improvement and includes planning, implementation, monitoring, and evaluation and reporting. Coordination and collaboration are central to our approach; knowledge and information management, particularly knowledge gained through our monitoring, investigation and research programs, informs every step.

This approach is consistent with the Department of Environment and Primary Industries’ adaptive management approach outlined in *Monitoring, Evaluation and Reporting Framework. Land, water and biodiversity, June 2012.*

It is important to establish partnerships with a range of organisations and develop a collaborative approach to sharing lessons, information and research. Melbourne Water’s strategic approach to monitoring, investigations and research enables us to concentrate our efforts and resources on high priority projects and achieve multiple outcomes.

This section outlines Melbourne Water’s directions for monitoring and investigations, research, data management, and evaluation and reporting.

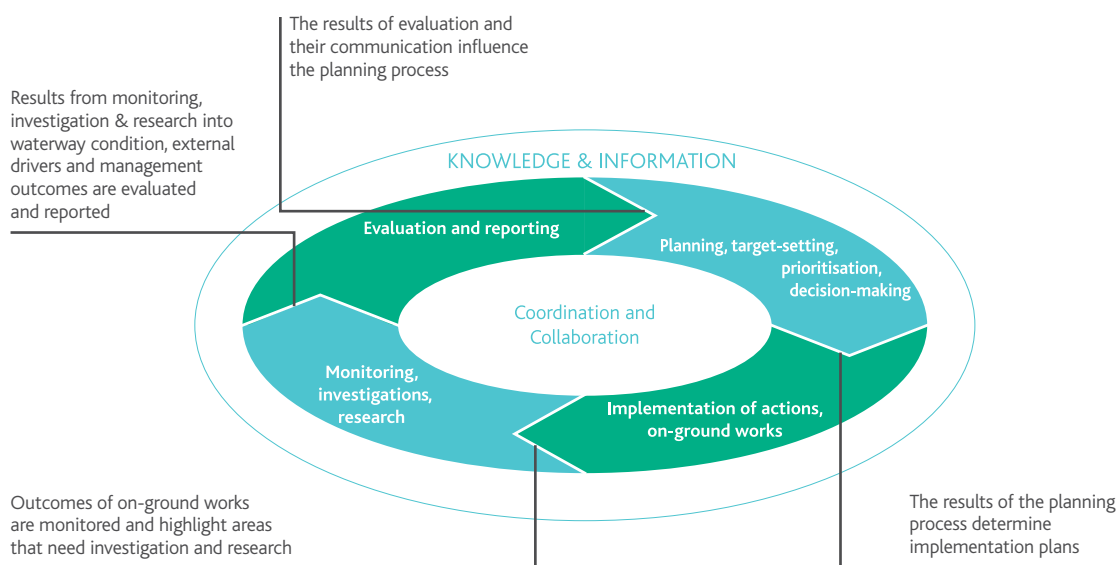


Figure 8: Adaptive management approach

7.1 Monitoring and investigations

7.1.1 Waterway health monitoring

Water quality monitoring in waterways provides important information about changes in their condition. Melbourne Water undertakes water quality monitoring at a range of water quality sites throughout the Port Phillip and Westernport region. In addition, community-based monitoring programs such as Waterwatch and EstuaryWatch provide valuable data on water quality in waterways and an opportunity to engage the community on waterway issues.

Melbourne Water will:

- Continue to **monitor water quality** at a broad range of water quality sites throughout the Port Phillip and Westernport region, including estuaries
- Use the results to **measure attainment of SEPP objectives and other strategic waterway health targets**, and to understand the condition of rivers and estuaries
- Continue to **support Waterwatch and EstuaryWatch** to train community groups and individuals to monitor water quality at another 300 sites across the Port Phillip and Westernport region
- Use **monitoring data to help understand the condition of waterways** and the values they support across the region.



Monitoring waterway health

7.1.2 Monitoring of pollutant loads into the bays

Monitoring sites have been established at key waterways entering Port Phillip Bay and Western Port to measure loads of nutrients, sediment and other key pollutants entering the bays from the catchments. This data is used to assess the bay health impacts of catchment management changes.

Melbourne Water will:

- > Continue monitoring at these sites to **improve understanding of pollutant loads** entering Port Phillip Bay and Western Port
- > Assess **progress towards strategic water quality targets.**



Protecting highly valued seagrass communities is key to the health of Western Port

7.1.3 Recreational and public health monitoring and investigations

Monitoring and investigating water quality from a public health perspective is important, given the popularity of waterways in the Port Phillip and Westernport region for amenity and aquatic recreation.

Melbourne Water will:

- > Continue to work with EPA Victoria and the Department of Health on the **Yarra Watch monitoring program** (or equivalent) to publish online recreational water quality monitoring information and alerts to the community about conditions in the Yarra River
- > Investigate and **track down key sources of faecal pollution in the Yarra catchment** and other key locations for aquatic recreation and strategic microbial public health assessments
- > Monitor, investigate and **identify pollution hotspots and their sources** to help EPA Victoria and local government enforce regulation
- > Work with the Department of Environment and Primary Industries and the Department of Health to **monitor blue-green algae** in key recreation waterways.



Maintaining water quality for recreation

7.1.4 Investigations to improve our conceptual models

Targeted investigations and other research improve the knowledge underpinning our conceptual models and assumptions. This research will be undertaken continuously. Melbourne Water will:

- > Gather information on the function and **effectiveness of** a selection of wetlands and other water sensitive urban design features as **treatment systems** for improving the quality of urban runoff
- > Further **investigate the links and assumptions between stormwater and key values for waterways** identified in the *Healthy Waterways Strategy*
- > Undertake targeted investigations of rural land management practices to understand the impact of **improved land management practices** on the quality of rural runoff.

7.2 Research

To improve our knowledge of the impacts of stormwater on the health of waterways and bays, it is important for Melbourne Water to continue to invest in research. This helps to identify ways to protect key values, address major threats and ensure we deliver full value from our programs to the community.

Melbourne Water undertakes research in collaboration with other natural resource management agencies, public health agencies and researchers. Advantages of this collaborative approach include access to a broad range of expertise and current thinking, undertaking a larger volume of research across diverse themes, and identifying opportunities to leverage additional research funds, such as through cooperative research centres.

The key principles of this stormwater research are:

- > Collaboration
- > Innovation
- > Scientific excellence
- > Knowledge sharing
- > Sustainability – social, environmental, economic.

7.2.1 Improving strategic decision support tools

Strategic decision support tools underpin most of our waterways strategies and planning of on-ground activities in stormwater management in rural and urban areas. In particular, decision support tools are valuable for testing possible outcomes from management scenarios – helping to identify management options that are most likely to deliver the best social, environmental and economic outcomes.

Melbourne Water will:

- > Continue to work with partner organisations to **develop modelling and design tools that support performance** assessment to meet standards. This includes developing rural land treatment assessment tools to complement existing urban tools.

7.2.2 Waterway health research

Ongoing research into new and emerging waterway health issues is important to ensure that we continue to improve our strategic direction-making processes and knowledge base in an often complex and changing context.

Melbourne Water's collaborative research will include:

- > Working with **key academic and research institutions** and stakeholders to understand the sources, impacts and management actions for reducing toxicants to waterways and bays
- > Studying the **impacts of urbanisation** and urban runoff on stream ecology and strategic management approaches
- > Investigating the **impacts of runoff from rural land** on stream ecology and strategic management approaches
- > Identifying the impacts of **alternative water supply options** of stormwater, for example in partnership with the CRC for Water Sensitive Cities
- > Working to understand stormwater management options for the **protection of estuaries and bays**, such as nutrient thresholds and ecosystem function
- > Understanding the major sources, fate and public health risks associated with faecal microbes in waterways, including identifying the **most effective approaches for reducing risks**.

7.2.3 Social research

Implementing changes to stormwater management by government agencies, local government, water authorities and the community involves more than data and technology; it involves a change in behaviours, attitudes and practices. It is essential for Melbourne Water to undertake social research to:

- > Understand the **perceptions, barriers and drivers** in the adoption of sustainable stormwater management in rural and urban areas
- > Identify how **stormwater can be considered equally** alongside other forms of alternative water supply, to enable more accurate understanding and accounting for the costs and multiple benefits of stormwater management
- > Improve our understanding of **community perceptions** of waterways (through our twice-yearly research program).

Melbourne Water's partnership with the CRC for Water Sensitive Cities will address part of our social research needs (see Case Study: CRC for Water Sensitive Cities).

CASE STUDY CRC for Water Sensitive Cities

The Cooperative Research Centre (CRC) for Water Sensitive Cities was established in July 2012 in collaboration with 74 research, industry and government partners, including Melbourne Water. The CRC for Water Sensitive Cities is an extension of the former Cities as Water Supply Catchments research program. It will develop solutions to make Australian towns and cities water sensitive, and builds on a decade of investment in stormwater research for Melbourne Water. Water sensitive cities are resilient, liveable, productive and sustainable, using the diversity of water resources available.

7.2.4 Bay research

Many pollutants that end up in Port Phillip Bay and Western Port are delivered by the waterways flowing into them. Melbourne Water has a responsibility to manage the amount of pollutants entering the bays and understand the impacts of catchment activities on these receiving waters.

In Western Port, Melbourne Water will be working with others to implement research priorities identified in the *Western Port Environment Science Review* (see Case study: *Understanding the condition of Western Port*). This review identified the condition of key assets, and the priorities for catchment and waterway management activities. These activities are required to protect and improve the health of the marine environment, including the water quality requirements of highly valued seagrass and benthic algal habitats. For example, in partnership with EPA Victoria and the Department of Environment and Primary Industries (DEPI), this information could be used to update SEPP objectives for Western Port and regionally relevant urban stormwater management objectives.

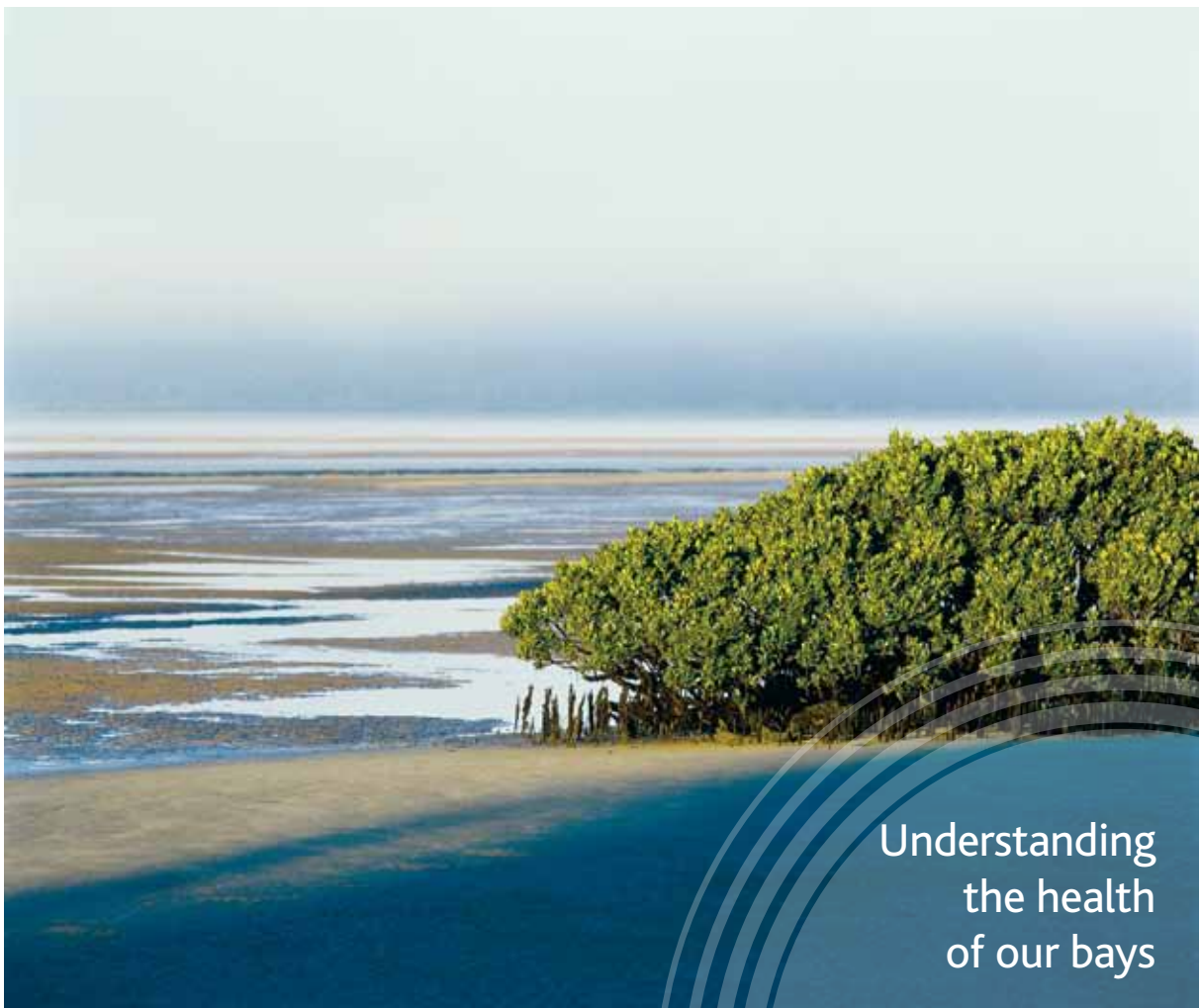
In partnership with EPA Victoria, DEPI and other key agencies such as Parks Victoria, Melbourne Water will continue to contribute towards reducing nitrogen entering Port Phillip Bay, and focus on new knowledge about the environmental condition and requirements of the bay.

Melbourne Water will work with DEPI and EPA Victoria to update SEPP objectives, and identify priority pollutants that should be managed for Port Phillip Bay and Western Port by providing technical input and research findings.

CASE STUDY

Understanding the condition of Western Port

Western Port is internationally designated as a Ramsar site, protected under Commonwealth legislation, and one of 500 biosphere reserves around the world. Research collaboration between DEPI, Melbourne Water and several other agencies in the Westernport region assembled an expert scientific team to review the scientific knowledge on Western Port. This led to the publication of *Understanding the Western Port Environment: A summary of current knowledge and priorities for future research*, in 2011. This summary made 43 recommendations, and identified 12 priorities for future research, which will help to set performance targets. A community forum was held to communicate the findings of this research.



Understanding
the health
of our bays

7.3 Data management

Effective data management is vital to provide access to reliable information required for planning, communication, legislative reporting, auditing and tracking the effectiveness of on-ground works. Melbourne Water manages a range of data associated with waterways and their values, derived from individual species data, records of our on-ground works, and water quality data.

Capturing this data at the appropriate spatial scale is important for access and ease of use of the information. Melbourne Water will:

- Ensure the systems and processes for **collecting and storing our data** are consistent with a strategic asset management approach to allow easy access to data.

7.4 Evaluation and reporting

It is important to interpret and evaluate monitoring and investigations data at regular intervals to translate it into information. This information can then be used to evaluate project or program goals and targets. New knowledge identified in the evaluation process is also used to update our conceptual models, management and monitoring plans, and shared with our partners.

Melbourne Water will:

- > Use this information to **report to our partners**, stakeholders and the community on key findings and progress towards achieving management targets
- > Continue to **report and share information** through targeted stakeholder and community presentations, conferences and industry events, technical reports and scientific publications
- > Improve the way we share this information with our partners, stakeholders and the community, including through **improved reporting and online accessibility** of data.

7.5 Relevant targets

In delivering our Stormwater Management Program commitments, Melbourne Water will measure our progress towards achieving our vision against five-year implementation targets. We will draw on all approaches to successfully achieve our targets.

The commitments outlined in this approach will contribute towards the achievement of the following targets:

IT9 Undertake social research and community engagement to understand drivers and barriers to participation in stormwater management and waterways health initiatives to inform stormwater management program activities.

IT17 Refine monitoring programs by July 2013 and implement the program by July 2018 :

- To improve understanding of ecological and public health risks from stormwater pollutants; and
- To inform the implementation of effective management measures.

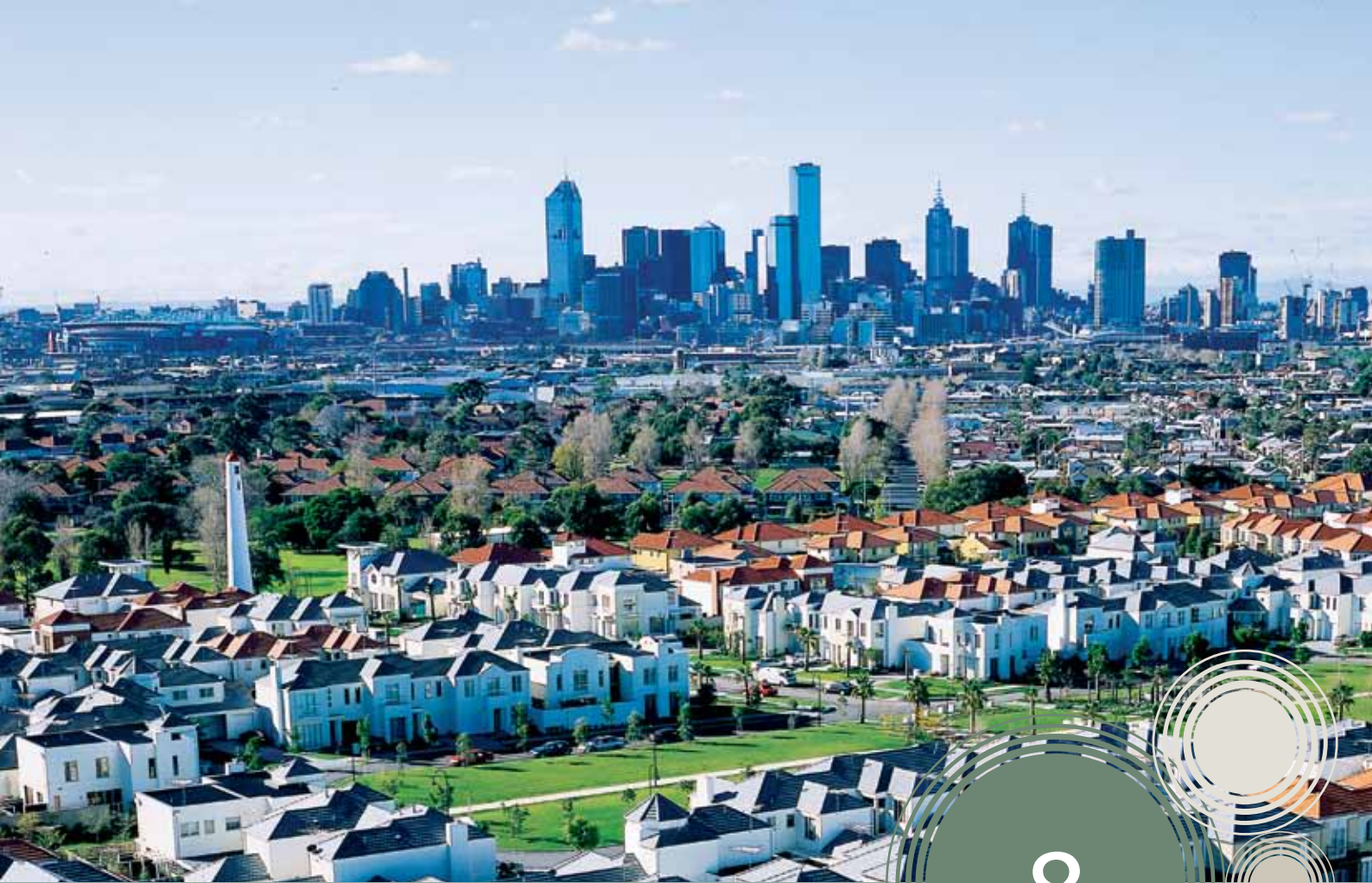
IT18 Undertake research priorities identified in the Western Port Environment Science review to inform the development of water quality requirements for Western Port.

IT19 Improve our asset management and data sharing approach including effectively using our asset management information system to enable efficient planning and reporting of stormwater management activities.

IT20 Establish research partnerships to update stormwater management objectives and to improve stormwater technology and evaluation techniques.

IT21 Establish strategic research partnerships that foster knowledge sharing and collaboration and address Melbourne Water's strategic knowledge gaps in stormwater management.

A summary of all implementation targets can be found in Appendix 4.



8

Planning, policy and regulation

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Effective planning, policy and regulation are essential for sustainable stormwater management.

Good planning is essential to establish an integrated approach to water management. Effective policy and regulation for urban development and agricultural practices are crucial to improve the health of waterways and bays. The combination of these elements is necessary for stormwater management to achieve other multiple community outcomes, including wellbeing and amenity, public safety and alternative water supply.

The Port Phillip and Westernport region is evolving with agricultural intensification, urban growth and increasing population density. Planning for integrated and sustainable land use in urban and rural areas is critical to ensure the region remains highly liveable and resilient to climate change.

Melbourne Water works closely with state and local government and the development industry to address stormwater management in new and existing urban areas. A key outcome from this collaboration is the preparation of Development Services Schemes and Strategies. These strategies are prepared to identify the drainage infrastructure requirements to help protect the health of waterways and bays and to provide wellbeing and amenity, public safety and alternative water supply.

The diversity of rural land use and the many industry and government organisations involved in rural land management means that Melbourne Water needs to work with a range of stakeholders to facilitate adoption of better land and water management practices by urban and rural land managers.

The Government's policy and regulation framework for stormwater is set out in the *State Environment Protection Policy (Waters of Victoria)*, Victoria's Urban Stormwater Best Practice Environmental Management Guidelines (BPEM) and the *Victoria Planning Provisions*, Clause 56.07. These policies, guidelines and provisions inform minimum environmental standards for stormwater discharge for all new development. Clause 56.07 codifies the BPEM standards for residential subdivision of two lots or greater. BPEM is the legally sanctioned instrument for establishing standards for ecological protection of waterways from urban stormwater. Melbourne Water supports improved stormwater management for all development types.

A proposed review process by key agencies will ensure SEPP (WoV) and BPEM reflect current best practice in stormwater management.

This section outlines Melbourne Water's directions for using existing policy and regulation to protect waterways and bays, supporting and informing the improvement of policy and regulation for effective waterway outcomes, and supporting enforcement.

Key stakeholders

Department of Environment and Primary Industries, Office of Living Victoria, EPA Victoria, other water authorities, local government, Department of Transport, Planning and Local Infrastructure, Department of Health, Metropolitan Planning Authority, development industry, Clearwater, agricultural industry groups, rural and urban landholders, Stormwater Victoria.



8.1 Using existing policy and regulation to protect waterways and bays

8.1.1 Application of state planning policies

Consistent application of existing state planning policies regarding stormwater management is vital for improving stormwater management practices across all land uses. In new urban areas, a key policy is Clause 56.07 of the *Victoria Planning Provisions*. Levels of success in applying this clause have varied across the Port Phillip and Westernport region.

Melbourne Water will seek to ensure that integrated water management solutions are designed, implemented and maintained to a consistent and high standard in residential subdivisions. This includes developing guidelines and other materials to support constructed wetlands and constructed drainage assets, and to support the goals of Melbourne Water's *Healthy Waterways Visions* for waterways across the region. The *Healthy Waterway Visions* communicate Melbourne Water's longer-term aims for the form and function of major waterways in the Port Phillip and Westernport region. They ensure a consistent approach to stream rehabilitation, management and maintenance of waterways at the local level and in a catchment context, and provide guidance for stakeholders working to improve waterway health.

Melbourne Water will also work with local government and industry to apply a 'best solution for catchment' approach for sustainable stormwater in the urban landscape. Distributed stormwater treatments are needed at a range of scales to protect waterways. The foundation of a 'best for catchment' approach is the investigation and implementation of a combination of appropriate lot, precinct and regional-scale systems to protect and improve waterways and other environmental assets requiring protection within a catchment. The approach will seek multiple community outcomes and optimal solutions for an individual catchment.



Good planning can help establish an integrated approach to water management

8.1.2 Influencing growth area planning

Continuing urban expansion will inevitably lead to problematic stormwater being generated in the Port Phillip and Westernport region. It is important that the implementation of integrated water management with water sensitive urban design is considered in the early stages of the planning process for new neighbourhoods. This is necessary to achieve the most appropriate environmental outcomes and to meet Clause 56.07-4 of the *Victoria Planning Provisions*. Careful planning should identify opportunities to protect and improve waterways while achieving multiple community outcomes, including alternative water supply and wellbeing and amenity. This includes investigating ways to treat, harvest and use stormwater at the local level.

Melbourne Water will:

- > Work closely with the Office of Living Victoria, Metropolitan Planning Authority, local government and water authorities to **provide input** into precinct structure plans and growth corridor plans for stormwater management in new urban areas
- > Work with Office of Living Victoria, local government and developers to **plan water sensitive urban design** at regional-scale and lot-scale levels into new urban developments
- > Ensure Development Services Schemes (drainage plans for new growth areas) **identify opportunities for integrated water management** including water sensitive urban design measures to achieve multiple outcomes
- > Continue to **work with the development industry and local government** to establish ways to sustainably implement water sensitive urban design at regional-scale and lot-scale levels, considering the technical and financial aspects of implementation in new developments
- > Continue to work with the Department of Environment and Primary Industries, Office of Living Victoria and local government to **achieve higher stormwater management standards** in prioritised, high value catchments, to protect key waterways and bay values.

8.1.3 Use of alternative controls to protect waterways and bays

Clause 56.07 of the *Victorian Planning Provisions* applies only to residential subdivision of two lots or more. It remains an important task for Melbourne Water and our partners to focus on managing stormwater generated from roads and carparks, single lot residential developments, and industrial and commercial developments.

With Melbourne Water's support, several local councils are using amendments to planning schemes to implement new integrated water management planning controls and apply relevant planning overlays for these land uses. These amendments establish water quality targets for all industrial and commercial developments. There is also potential to amend local planning schemes to promote and facilitate sustainable land and water management in rural areas to improve protection of receiving waterways.

Melbourne Water will:

- > Work with the Department of Transport, Planning and Local Infrastructure and Office of Living Victoria to **support amendments to planning provisions** to more broadly apply current performance requirements for management of stormwater
- > Work with key partners to identify and implement alternative ways to **improve stormwater management outcomes**, such as the use of planning overlays for priority areas.



Tree-Pit

8.2 Supporting policy and regulation development for effective waterway outcomes

8.2.1 Review policy and regulation and support development of improved stormwater management standards

Current stormwater management standards do not fully protect waterways and bays from stormwater impacts and do not embrace other potential beneficial outcomes.

The current regulatory frameworks, Best Practice Environmental Management Guidelines and SEPP (WoV), are due for review. Best practice stormwater management has evolved since the guidelines were developed. A review will ensure new findings from research and practical on-ground lessons are incorporated. For instance, the impacts of stormwater are not fully reflected in these regulatory frameworks. They focus on water quality and do not account for changes to flows that alter the water cycle, causing significant impacts on waterway health. The BP EM guidelines need to be updated to reflect these changes and recognise other benefits that stormwater can provide. The SEPP (WoV) guidelines also need to be reviewed and updated to incorporate the latest scientific knowledge about actions required to protect waterways and bays.

As caretaker of river health, it is important for Melbourne Water to support and inform the amendment and improvement of these standards. Development of new policy, regulation and guidelines will ensure protection of waterway and bay health and integration of additional potential benefits of improved stormwater management.

Melbourne Water also runs a Stormwater Offsets program, where, if objectives set in Clause 56.07 of the *Victoria Planning Provisions* cannot be achieved onsite due to it not being practically feasible (or where water quality works are planned as part of a Development Services Scheme), Melbourne Water collects a stormwater offsets contribution. This contribution is used for water quality works elsewhere in the catchment to offset pollution loads and flows. To date, these offset works have primarily been regional constructed wetlands.

Melbourne Water will:

- > **Work in partnership** with Office of Living Victoria, the Department of Environment and Primary Industries, EPA Victoria and other relevant organisations to complete an **evaluation of rural and urban regulatory frameworks**. This evaluation will assess how efficient and effective these regulations are in protecting waterways and bays, and to what extent they seek multiple benefits from stormwater management
- > Review the **efficiency and effectiveness** of Melbourne Water's **Stormwater Offsets program**. This review will ensure the program is achieving the best possible outcomes for improved ecosystem health, as well as other benefits provided by stormwater management
- > Work with EPA Victoria, DEPI and other agencies to **define new standards for stormwater management** to achieve improved outcomes for waterways and bays, regarding the quality and quantity of stormwater entering waterways and bays
- > Work with agencies such as EPA Victoria, DEPI, OLV, water authorities and local government, **to implement new policies and regulations** to protect waterways and bays and the values they support.

8.2.2 Capacity building and support

New policies and regulations will be successful only if the development industry and local and state authorities have adequate capacity and confidence to adopt and implement them, (see Case Study: Supporting local government with sensitive urban design).

Melbourne Water will:

- > Support key stakeholders to **implement new policies and regulations** relating to stormwater management
- > Partner with rural industry stakeholders or organisations and local government in rural areas to **improve management of runoff from rural land**
- > Contribute towards appropriate **pilot or demonstration projects** to build industry capacity and confidence in managing stormwater from urban and rural land
- > Provide training and **promote knowledge sharing** through the Clearwater program.

CASE STUDY

Supporting local government with water sensitive urban design

Through the Living Rivers stormwater program, Melbourne Water is helping local government to understand and incorporate water sensitive urban design into its standard practices. Practical support is complemented by assistance to develop strategies and implementation targets that are specific to individual councils. This initiative provides tools and support for local government to define a vision for stormwater management, and adopt a strategic approach to implementing water sensitive urban design. Several councils have adopted targets with integrated water management strategies including for reducing pollutants, and for alternative water supply and water savings. In collaboration with local government, Melbourne Water has developed guidelines for strategic implementation of WSUD. These guidelines provide a methodology for developing implementation targets and capture the experiences of councils that have successfully completed this process.

8.3 Supporting enforcement

8.3.1 Enforcement of stormwater management standards

Local government and the development industry require support to implement stormwater measures to meet standards required by policies and regulations, such as Clause 56 of the *Victorian Planning Provisions*. This support is necessary for effective and consistent implementation of these standards. At present these standards are applied inconsistently across the region.

Melbourne Water will work with its partners to:

- > Investigate means to **support and achieve improved implementation** of water sensitive urban design that conforms to **current policy standards**
- > Consider alternative mechanisms to **enable regulation and enforcement at a local government level**, such as co-funding for dedicated officers to ensure compliance with development standards for stormwater management.



Litter management

8.3.2 Pollution hotspot

'Pollution hotspots' are areas where a combination of land use, poor management practices, failing infrastructure or deliberate polluting activities (current and historic) presents a chronic source of pollution to waterways. Pollution hotspots vary greatly in nature and include toxicants (such as heavy metals and pesticides), pathogens and litter. Pollution from hotspots affects waterways and bays through threats to plant and animal life, public health risks and reduced amenity.

Melbourne Water will:

- > Work with other agencies including local government and other water authorities to **identify and act on urban and rural priority hotspots**
- > Work closely with partners such as EPA Victoria and local government to improve enforcement of existing regulation and **respond to polluting activities** (such as illegal discharges)
- > Investigate self-funding opportunities to establish an **identification and enforcement program** in response to polluting activities
- > Investigate innovative ways of addressing rural hotspots, such as industry endorsement and **promotion of 'clean agriculture'**, using codes of practice, programs and tools for whole farm planning, or working with diversions managers to include standards for management of runoff in licence conditions.

8.3.3 Litter

Litter is the most visible form of pollution in waterways and bays and includes waste products, such as plastic bottles, cans and cigarette butts. Rain washes litter into roadside gutters and into the drainage system, which conveys litter across catchments into waterways. Sediment from building sites, concrete and food oil and scraps are example of less visible form of litter that is sometimes discharged to waterways. The effect of litter in waterways includes threats to animal health, loss of amenity and social value, and smothering waterway and marine vegetation. Melbourne Water recognises litter is an important concern for the community.

In addition to education and on-ground activities related to litter management, outlined in this and other sections of this strategy, Melbourne Water will work with the Victorian Litter Action Alliance, local government, Parks Victoria, EPA Victoria and other partners to:

- > Support regulation of litter management and **enforcement of litter provisions** in the *Environment Protection Act 1970*.
- > Highlight waterway sites with known litter issues and **investigate actions to prevent litter** entering waterways at its source.
- > Support **integration of litter programs** with other stormwater management programs.

Sediment from building sites, concrete and food oil and scraps are example of less visible form of litter that is sometimes discharged to waterways.

8.4 Relevant targets

In delivering our Stormwater Management Program commitments, Melbourne Water will measure our progress towards achieving our vision against five-year implementation targets. Melbourne Water will draw on all approaches to successfully achieve our targets.

The commitments outlined in this approach will contribute towards the achievement of the following targets:

- IT1** Provide technical and financial support to our partners to deliver 125 structural and strategic stormwater projects over five years to achieve multiple community outcomes.
- IT3** A minimum of ten industry workshops aiming to reduce key industry gaps in stormwater management identified with partners will be delivered under the Clearwater program.
- IT7** Provide technical input, data and support to agencies involved in litter program development and undertake litter removal from priority waterways.
- IT16** Rural runoff management practices are refined and evaluation techniques are developed to assess performance in reducing pollutant loads discharged to waterways and bays, at both the farm-scale and catchment-scale.
- IT22** Develop and implement a program of activities to improve the alignment of the stormwater policy and regulatory framework.
- IT23** A minimum of two greenfield developments will commitment to implement stormwater management measures beyond existing requirements to protect high value waterways.

A summary of all implementation targets can be found in Appendix 4.



9

Delivering the strategy

9.1 Reviewing the strategy

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The *Stormwater Strategy* sets out the high level strategic direction and approaches for Melbourne Water in managing stormwater over the next five years. The next step in the strategy is to plan on-ground works through implementation planning. This process emphasises the importance of working closely with other stakeholders and partners in everything we do.

More detailed planning is required to translate the strategy direction into an action plan for on-ground works. This is known as implementation planning. Implementation planning is an integrated process that takes the directions set in this and other related strategies (such as the *Healthy Waterways Strategy*) and uses it to develop detailed plans for undertaking works. Through implementation planning, opportunities will be identified to align priorities of related strategies to achieve efficient delivery.

The implementation plan will be a five-year plan, from 2013–18, for the Port Phillip and Westernport region. The implementation plan will provide a solid basis for annual projects planning.

Although the *Stormwater Strategy* is a Melbourne Water strategy and outlines programs and approaches that Melbourne Water will undertake, successful planning and delivery of the strategy and outcomes for the community requires the involvement of a range of stakeholders and partners.

As described in *Section 5: Working together*, our key principles for working with stakeholders are building strong partnerships; engaging with stakeholders to highlight and share their experience, knowledge and expertise; capacity building in response to identified needs; and ensuring clear communication and education on stormwater management.

To guide and monitor our progress towards our vision and goal, strategic targets have been set to measure our success. These targets articulate how Melbourne Water measures success from the commitments described under our management approaches: working together, better on-ground outcomes, research and knowledge building, and planning, policy and regulation.

Melbourne Water will:

- > Develop investment plans to **implement actions and targets** defined in the *Stormwater Strategy* during 2013–18 across the Port Phillip and Westernport region
- > **Measure and assess progress** towards the strategy's goal, vision and five-year implementation targets (a summary of all targets can be found in Appendix 4)

9.1 Reviewing the strategy

An adaptive management approach is critical for managing stormwater, given its responsiveness to changes in land use and climate. Using best available knowledge will be vital for informing our programs and ensuring efficient and effective program delivery. Ongoing monitoring and evaluation will help to update management approaches during the strategic review.

Melbourne Water will:

- > **Review** the *Stormwater Strategy* by 2018.



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Appendix 1: Acronyms

BBW	Better Bays and Waterways
CAPIM	Centre for Aquatic Pollution Identification and Management
CRC	Cooperative Research Centre
DCI	Directly Connected Imperviousness
DEPI	Department of Environment and Primary Industries
DoH	Department of Health
DTPLI	Department of Transport, Planning and Local Infrastructure
EPA	EPA Victoria
HWS	<i>Healthy Waterways Strategy</i>
IWM	Integrated Water Management
MPA	Metropolitan Planning Authority
OLV	Office of Living Victoria
PPWCMA	Port Phillip and Westernport Catchment Management Authority
SEPP (WoV)	State Environment Protection Policy (Waters of Victoria)
VLAA	Victorian Litter Action Alliance
WSUD	Water Sensitive Urban Design



Large raingardens – Federation Square

Appendix 2: Glossary

Term	Definition
Agricultural land	Land managed for agricultural production purposes, e.g. horticulture, beef, dairy or grazing.
Bioretention system	See Raingarden.
Baseflow	Groundwater flows underground until the water table intersects the land surface and the flowing water becomes surface water in the form of springs, streams/streams, lakes and wetlands. Baseflow is the continual contribution of groundwater to rivers and is important source of flow between rain events. In urban waterways, dry weather may mean the flow consists only of subsurface flows from pervious land delivered through natural topographic flow paths, or leakage from water supply and wastewater sewerage systems. This dry weather drainage flow can supplement the lack of baseflows entering our waterways, and is required at times to provide critical habitat for fish and macroinvertebrates.
Capacity building	Improving the ability of individuals, groups and organisations to achieve desired outcomes in an effective, efficient, and sustainable manner.
Capital expenditure	Expenditure involved in creating or upgrading assets.
Catchment	The area of land contributing water flows from rainfall to a point on a drainage or river system.
Directly connected imperviousness (DCI)	The proportion of a catchment covered by impervious surfaces directly connected to a stream via stormwater pipes.
Diffuse source pollution	There are two types of diffuse source pollution – passive and active. Passive diffuse source pollution results from natural processes or passive human behaviours throughout the catchment, e.g. driving motor vehicles is passive in that it is not purposefully polluting behaviour, but still results in heavy metals deposition throughout the catchment; atmospheric nitrogen deposition is a natural process but is a source of pollution in runoff from impervious surfaces. Active diffuse source pollution results from 'active' human behaviours throughout the catchment, e.g. litter pollution is the result of people 'actively' or consciously disposing of litter in the street, sediment from building sites and toxicants from industrial premises are the result of people inappropriately managing land such as poor sediment control, and/or actively generating and discharging these pollutants to the stormwater system.
Effectiveness	The extent to which actual outcomes are achieved, in terms of the planned outcomes, via relevant outputs or administered items.
Efficiency	The extent to which resource use is minimised for a given level of outputs, or outputs are maximised for a given level of resources.
Evaluation	A periodic assessment of a policy, program or project to generate systematic information that can help improve performance.
Evaporation	A major water cycle process in which water is transferred from the surface of the Earth to the atmosphere. Through evaporation, liquid water is transferred to gas or vapour.
Flashy	Urbanisation increases the total amount of stormwater runoff and the speed with which it reaches streams. Urban streams often have higher flow rates during rainfall and more rapid rises and falls in water level – this is described as 'flashy' behaviour. Larger volumes of water lead to a greater frequency of flooding, and the increased velocity of water gives the stream greater erosive power.
Greenfield	A site that is constructed on former agricultural or other previously non-urban land or on the edge of communities to which new roads and services are usually required.
Groundwater	Water collecting below ground level in an aquifer.
Impervious surface	Any surface that water easily runs off and does not readily soak in or infiltrate, such as tiled roofs, roads or paved areas.
Indicator	A factor or variable, either quantitative or qualitative, which provides a simple and reliable basis for assessing achievement, change or performance. Indicators are agreed units of information measured over time that help to show changes in a specific condition. A given goal or objective can have multiple indicators.
Infill development	Urban development within an already developed urban area. The site is likely to be close to existing dwellings and amenities.

Term	Definition
Input	The financial, human and material resources necessary to produce the intended outputs of a program or project.
Integrated water management (IWM)	A whole-of-cycle approach to water resource management, considering the social, environmental and economic issues of a project. IWM incorporates adaptive management, participation and holistic approaches to planning, development and implementation.
Key values	Melbourne Water recognises seven key environmental and social values to direct the management and implementation of works in waterways in the Port Phillip and Westernport region. These 'key values' are platypus, fish, frogs, birds, water bugs (macroinvertebrates), vegetation and amenity.
Life-cycle assessment	The environmental impacts associated with all the stages of a product's life, from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, to disposal or recycling.
Lot-scale	Activities that occur at the level of individual residential urban or rural properties. For example, lot-scale disconnection involves urban homes using rainwater tanks and raingardens to disconnect impervious areas from local waterways.
Monitoring	The regular collection and analysis of information used for decision-making, accountability and evaluation and learning. Monitoring is a continual process that collects data to help management and stakeholders to assess progress and achievement of objectives.
Objective	High level action or strategic intervention proposed in a response to an identified driver. This intervention is framed within the context of an organisation's purpose.
Outcomes	The results or impacts on the community or the environment that can be achieved through stormwater management.
Participation	One or more processes in which an individual or group takes part in specific decision-making and action, and over which they may exercise specific controls, such as getting involved in planning and decision-making, implementation, learning and evaluation.
Point source	Discharge to receiving waters from a single point, such as a stormwater drain. Point sources of pollution enter receiving water at a discrete, identifiable location and can be measured.
Pollution hotspots	Areas where a combination of land, poor management practices, and failing infrastructure presents a chronic source of pollution to waterways. Pollutant hotspots vary greatly in nature and include toxicants (such as heavy metals, pesticides), pathogens (such as E. coli) and litter. Pollution from hotspot areas negatively impacts a waterway's values through threats to plant and animal life, public health risks and reduced amenity.
Precinct structure plans	Precinct structure plans are master plans for whole communities which usually cater for between 10,000 to 30,000 people. Precinct structure planning defines the location of roads, shopping centres, schools, parks, housing, employment, and transport connections. PSPs attempt to address the complex issues of biodiversity, cultural heritage, infrastructure provision and local government charges.
Raingarden	A constructed vegetation and soil medium system that filters polluted stormwater through a vegetated filter media layer. Water is retained, naturally treated and released to a receiving water body (e.g. waterway, drain, groundwater) or to storage for reuse. Raingardens are also called bioretention systems. Raingardens designs come in a variety of shapes and sizes, and can combine an infiltration function which allows rainwater or stormwater to slowly soak into the underlying soils to recharge groundwater and stream baseflows.
Retention basin	A type of basin that is used to contain stormwater runoff. A retention basin provides an area to hold water from a small surrounding drainage area that would otherwise flow into other areas. This is different to a detention basin, which holds water for a limited period of time from a larger basin area to prevent flooding and releases all the water contained over a period of time.
Risk assessment	A risk assessment is the overall process of using available information to predict how often hazards or specified events may occur and the magnitude of their consequences.
Rural landowners	Landowners managing agricultural production properties (e.g. horticulture, beef, dairy, grazing) or rural lifestyle properties.

Term	Definition
Stakeholder	An agency, organisation, group or individual with a direct or indirect interest in a project or program. Stakeholders can have a positive or negative effect on a program or project, and can be affected by the implementation and outcome of a program or project.
Stormwater	During rainfall events, stormwater is generated when rain water is not able to soak into the ground due to impervious or 'hard' surfaces. This water then becomes runoff that runs over land either directly or through pipes and drains to waterways and bays. For the purposes of this <i>Stormwater Strategy</i> , 'stormwater' is considered as the runoff from both rural (agricultural, lifestyle and peri-urban properties) and urban landscapes.
Stormwater disconnection	In this document, stormwater disconnection refers to the retention, infiltration, and harvesting of stormwater for the management of the water cycle.
Stormwater harvesting	The collection and storage of rainfall that runs off impervious surfaces for subsequent use. This water can carry a wide range of contaminants, including oil from roads, nutrients, pathogens and heavy metals.
Target	A quantifiable performance level or change in level to be attained by a specified date.
Transpiration	The evaporation of water through minute pores, or stomata, in the leaves of plants. Large groups of appropriate plant species, such as in natural or constructed wetlands, can trap or treat pollutants while releasing clean water vapour back into the water cycle (see water cycle).
Toxicant	Any substance that causes injury, illness or death of a living organism. Toxicants found in stormwater include metals, pesticides, herbicides and hydrocarbons.
Wastewater	Any water which has been used at least once and cannot be used again without being treated. Treated wastewater can often be used for recycling purposes depending on the level of treatment.
Water balance	A mass balance accounting for water entering, accumulating and exiting a system. It includes rainwater, drinking mains water, evaporation, transpiration, infiltration, wastewater and stormwater.
Water cycle	The water cycle, also known as the hydrologic cycle, describes the continuous movement of water on, above and below the surface of the Earth.
Water demand management	An approach to reducing the consumption of water. This includes educating people about how to save water, promoting water efficiency and using smart appliances such as dual-flush toilets, real time data meters for irrigation and putting a price on water that reminds people of its true value.
Water sensitive city	A water sensitive city integrates the water cycle and the built environment through respect of waterways, the value of water and the role it plays in sustaining the environment and society (adapted from Water Sensitive Cities Tour, 2009).
Water sensitive urban design (WSUD)	Embraces a range of measures that are designed to minimise environmental impacts of urbanisation. WSUD recognises all water streams in the urban water cycle as valuable: waterways, groundwater, stormwater, drinking water, greywater and sewage. In the <i>Stormwater Strategy</i> , WSUD is used in its broadest meaning, and as such, WSUD measures could be also called integrated water management. These encompass stormwater treatment systems, such as wetlands and raingardens, as well as water saving and water harvesting systems (for example, rainwater tanks).
Water quality	The physical, chemical and biological characteristics of water in relation to a set of standards. Water quality standards are created for different types of water bodies and locations and desired uses, such as drinking water, safety of human contact, and health of ecosystems.
Water recycling	The multiple uses of water, usually sourced from sewerage or stormwater systems, treated to a standard appropriate for intended use.
Wetland	A transitional area between land and water systems which is either permanently or periodically inundated with shallow water. Constructed surface wetlands use enhanced sedimentation, fine filtration and biological uptake processes to remove pollutants from stormwater. Sub-surface wetlands are a complex assemblage of water, soils, microbes, plants, organic debris and invertebrates where water flows through the soil. The soil is highly permeable and contains gravel and coarse sand.

Appendix 3: Community consultation

The *Draft Stormwater Strategy* consultation included engagement with landholders, Indigenous groups, government agency representatives, river health experts, community groups and the general community. Consultation was run in two phases with thirteen workshops held across the region in March and April 2011 and eight workshops in May and June 2012. In addition numerous individual meetings with stakeholders were held and an online forum enabled the community, customers and stakeholders opportunity to be involved and provide comments. Meetings were also held with Indigenous elders in phase one and phase two of consultation. Indigenous elders were invited and attended the stakeholder consultation workshops in phase two with a Wurundjeri representative completing a 'Welcome to Country' for some of our workshops.

The two phases of consultation helped provide direction about management approaches, in particular, the need to explain and improve management approaches regarding advocacy and enforcement.

Consultation also helped provide direction on the layout and structure of the strategy, particularly the need to present information regarding objectives and targets as standalone sections.

Additionally, feedback on the location of values across the catchment aligned with the selection of priority areas, which were selected through data analysis and in consultation with environmental experts. More than 70% of the areas identified by the community as having values are within priority areas. This feedback will also help to direct where work funded by grants and maintenance programs will take place during implementation of the strategy.

Feedback from the workshops and online forum in phase two in May June 2012 was used to:

- > Review the vision and receive general feedback as well as specific changes. Overall, participants wanted to see inspiring visions, without jargon, that clearly articulate the outcome that the strategies aim to achieve
- > Review the expected outcomes of public health, ecosystem health, supply and liveability. There was overwhelming support for the outcomes
- > Collect feedback from participants' experience of working with Melbourne Water, including what they value about the way they work with us now, and how we could improve.

Appendix 4: Summary of implementation targets

No.	Implementation Target	Supporting Commitments - Section reference
IT1	Provide technical and financial support to our partners to deliver 125 structural and strategic stormwater projects over five years to achieve multiple community outcomes.	<p>5.1 Partnerships and Support</p> <p>6.1.2 Supporting agricultural communities to address farm runoff</p> <p>6.1.3 Supporting local government to manage stormwater with on-ground works</p> <p>6.1.4 Working with other water authorities to manage stormwater</p> <p>8.1.2 Influencing growth area planning</p>
IT2	100 capacity building initiatives will be delivered under the Clearwater program.	5.2 Understanding needs and capacity building
IT3	A minimum of ten industry workshops aiming to reduce key industry gaps in stormwater management identified with partners will be delivered under the Clearwater program.	<p>5.2 Understanding needs and capacity building</p> <p>6.1.3 Supporting local government to manage stormwater with on-ground works</p> <p>8.2.2 Capacity building and support</p>
IT4	A minimum of 25 communication and education initiatives to raise community awareness on stormwater management will be delivered.	<p>5.3 Communication and education</p> <p>6.1.1 Supporting urban communities to manage stormwater</p> <p>6.1.2 Supporting agricultural communities to address farm runoff</p> <p>6.1.3 Supporting local government to manage stormwater with on-ground works</p>

No.	Implementation Target	Supporting Commitments - Section reference
IT5	At least one alternative engagement model trialled to improve our understanding of the effectiveness of rural land management delivery methods.	5.1 Partnerships and Support 5.3 Communication and education 6.1.2 Supporting agricultural communities to address farm runoff 7.2.3 Social Research
IT6	Melbourne Water commitments under <i>A Cleaner Yarra River and Port Phillip Bay</i> action plan are delivered.	5.1 Partnerships and Support
IT7	Provide technical input, data and support to agencies involved in litter program development and undertake litter removal from priority waterways.	5.1 Partnerships and Support 6.2.4 Managing litter 8.3.3 Litter
IT8	Undertake targeted disconnection projects to improve urban runoff management practices in priority areas through partnerships.	5.2 Understanding needs and capacity building 6.1.3 Supporting local government to manage stormwater with on-ground works 6.2 Delivering on ground outcomes 8.1.2 Influencing growth area planning
IT9	Undertake social research and community engagement to understand drivers and barriers to participation in stormwater management and waterways health initiatives to inform stormwater management program activities.	5.2 Partnerships and Support 5.3 Communication and education 6.1.1 Supporting urban communities to manage stormwater 6.1.2 Supporting agricultural communities to address farm runoff 6.1.3 Supporting local government to manage stormwater with on-ground works 7.2.3 Social Research
IT10	Nitrogen loads will be reduced by a further ten tonnes towards the Port Phillip Bay water quality target.	6.2.1 Building stormwater management assets 6.2 Delivering on ground outcomes
IT11	Construct a minimum of five regional stormwater assets that contribute to the protection of local waterways or improvement of receiving waters to provide multiple benefits to the community.	6.2 Delivering on ground outcomes 6.2.1 Building stormwater management assets
IT12	Stormwater treatment assets are maintained on a prioritised risk basis so that they continue to deliver the required level of service in respect to hydraulic function, vegetation values and public safety to maintain achievement of nitrogen reduction targets.	6.2.3 Maintaining and improving stormwater assets
IT13	100% of Melbourne Water's stormwater treatment wetlands are assessed for compliance with design requirements to inform prioritisation of rectification works.	6.2.3 Maintaining and improving stormwater assets
IT14	Deliver 25 projects to reset and rehabilitate stormwater treatment wetlands to meet asset design requirements.	6.2.3 Maintaining and improving stormwater assets
IT15	250 rural landholders will be engaged to increase action for reducing diffuse pollution from agricultural land.	6.1.2 Supporting agricultural communities to address farm runoff
IT16	Rural runoff management practices are refined and evaluation techniques are developed to assess performance in reducing pollutant loads discharged to waterways and bays, at both the farm-scale and catchment-scale.	6.1.2 Supporting agricultural communities to address farm runoff 7.1.4 Investigations to improve our conceptual models 8.3.1 Pollution Hotspots

No.	Implementation Target	Supporting Commitments - Section reference
IT17	Refine monitoring programs by July 2013 and implement the program by July 2018: <ul style="list-style-type: none"> To improve understanding of ecological and public health risks from stormwater pollutants; and To inform the implementation of effective management measures. 	7.1 Monitoring and Investigations 7.4 Evaluation
IT18	Undertake research priorities identified in the Western Port Environment Science review to inform the development of water quality requirements for Western Port.	7.2.4 Bay research
IT19	Improve our asset management and data sharing approach including effectively using our asset management information system to enable efficient planning and reporting of stormwater management activities.	7.3 Data Management
IT20	Establish research partnerships to update stormwater management objectives and to improve stormwater technology and evaluation techniques.	7.2.1 Improving strategic decision support tools
IT21	Establish strategic research partnerships that foster knowledge sharing and collaboration and address Melbourne Water's strategic knowledge gaps in stormwater management.	7.2.1 Improving strategic decision support tools 7.2.2 Waterway health research
IT22	Develop and implement a program of activities to improve the alignment of the stormwater policy and regulatory framework.	8.1 Using existing policy and regulation to protect waterways and bays 8.2 Supporting policy and regulation development for effective waterway outcomes 8.3 Supporting enforcement
IT23	A minimum of two greenfield developments will commitment to implement stormwater management measures beyond existing requirements to protect high value waterways.	8.1.2 Influencing growth area planning 8.2.2 Capacity building and support

Appendix 5: References

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