

# Werribee

## STRATEGIC DIRECTIONS STATEMENT

SEPTEMBER 2018



Integrated Water  
Management Forums



Environment,  
Land, Water  
and Planning



**Integrated Water Management is a collaborative approach to water planning and management that brings together organisations with an interest in all aspects of the water cycle.**

It has the potential to provide greater value to our communities by identifying and leveraging opportunities to optimise outcomes.

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# Foreword

The Integrated Water Management Forums position Victoria as a leader in collaborative, state-wide water system planning and decision-making.

For the first time, Victoria's water sector, together with local and state government agencies and Traditional Owners, have committed to work as one to address some of the most urgent challenges of our time.

In the face of climate change, population growth and rapid urbanisation, we recognise our shared responsibility to plan for water differently if we are to position Victorian cities and towns to be the most liveable and resilient places in the world.

Through the work of the Werribee IWM Forum, we acknowledge that climate change is no longer a future problem. Our climate adaptation planning must progress ahead of the pace of change and growth that we now see spreading through our cities, our catchment and across the state.

The IWM Forums will help us better adapt to our changing climate while we seize opportunities to grow and prosper in a sustainable water future.

They create an environment for IWM advocacy and effective governance to facilitate collaboration and innovation in water cycle management, service delivery, urban design and planning.

As Chair of the inaugural Werribee IWM Forum, I would like to acknowledge the deep commitment of all Forum members and the hard work of the Working Group members and DELWP staff to produce this Strategic Directions Statement. The Statement demonstrates an ambitious commitment to protect Melbourne's exceptional western region and enhance the way we live within our environment.

As Lead Chair of the Metropolitan and Regional IWM Forums, I would like to acknowledge the tremendous contribution of the IWM Forum Chairs and Forum Partners across Victoria who have worked together to forge a path to achieve meaningful and long-term change that we can be proud of.

Together with our regional and metropolitan IWM Forum partners, we look forward to delivering on our commitment to achieve transformational change in Victoria.



**Rob Skinner**

Chair of the Werribee IWM Forum  
Lead Chair of the Metropolitan  
and Regional IWM Forums



# Acknowledgements

The inaugural Werribee Integrated Water Management Forum was convened in December 2017 with subsequent Forums meeting throughout 2018 to discuss and prioritise integrated water planning and management in the Werribee Forum Area.

The Forum Area covers some of Victoria's fastest urbanising greenfield areas and will be the site of substantial population growth in the coming years. Situated on the eastern extent of the Victorian Volcanic Plain, a vast geographic area characterised by sweeping grasslands, stony rises and shallow lakes, the Werribee catchment contains a breadth of iconic Victorian landscapes expressive of the volcanic creation of the region and the cultural history of early settlement. The Forum Area includes a major food bowl for Victoria and Australia, numerous nature conservation and wildlife

reserves and ecologically significant wetlands extending from the western shores of Port Phillip Bay. Preservation and management of the catchment's landscapes will have a positive impact on the long term health and security of the region's waterways.

The Forum Area covers the traditional lands of the Wurundjeri, Wadawurrung and Bunurong people of the Kulin Nation. This region is abundant in Aboriginal cultural sites with a majority of these found near waterways and the coast. The Werribee IWM Forum acknowledges these Traditional

Owners as traditional custodians who have managed land and water sustainably over thousands of generations and maintain an active connection to Country.

The Werribee Integrated Water Management Strategic Directions Statement has been developed by the Werribee Integrated Water Management Forum. Members of this Forum include the Chief Executive Officers and Managing Directors of the following organisations:



The Werribee IWM Forum is grateful to the Werribee IWM Working Group for the time and expertise they dedicated to guide the development of this Strategic Directions Statement.



# Chapter 1

# The way forward

An unprecedented opportunity to progress water cycle planning and management in Victoria through collaboration.

# Introduction

## Overview

The Werribee catchment spans a vast geographic area encompassing some of Victoria's most distinctive landscapes. Windswept agricultural plains and native grasslands meet expansive natural forests throughout the catchment. A mosaic of wetlands and coastal environments dot the western shores of Port Phillip Bay into which most of the region's rivers and creeks flow.

The Werribee Forum Area contains several densely populated urban areas and some of the fastest developing suburbs in Victoria. Considered alongside challenges posed by global climate change, the rapid transformation of the west is impacting on the water cycle and the health of waterways, including the Werribee River and other Forum Area rivers and creeks that flow directly to Port Phillip Bay. Balancing the needs and function of Werribee's water cycle with future growth and development is a complex and urgent challenge requiring careful management.

The region's water sector, local governments and Traditional Owners are working collaboratively to plan and deliver projects and strategies that will enhance the resilience and liveability of the Werribee catchment and deliver enduring environmental, economic and social benefits to local communities. Through ongoing engagement with their communities, these organisations have heard that thriving waterways are inextricably linked to community identity, amenity, value and sustained economic benefit for the Werribee catchment.

The way in which land use and water planning occurs will be fundamental to ensuring these aspirations are realised.

The water cycle in the Werribee catchment is overseen and managed by several agencies. Enhanced communication and collaboration is required to ensure plans and investments are optimised to enable shared community outcomes.

This approach is Integrated Water Management (IWM). A central premise of IWM is the overall acceptance that achieving liveability and resilience is a shared responsibility.

The *Integrated Water Management Framework for Victoria 2017* is designed to help local governments, water corporations, catchment management authorities, Traditional Owners and other organisations work together to ensure the water cycle efficiently contributes to the urban liveability of the region, with communities at the centre of decision-making.

To assist with this, IWM Forums have been established across the state to identify, prioritise and oversee the implementation of critical collaborative water opportunities.

## Integrated Water Management

IWM is a collaborative approach to water planning and management that brings together organisations with an interest in all aspects of the water cycle. It has the potential to provide greater value to our communities by identifying and leveraging opportunities to optimise outcomes.

## What is a Strategic Directions Statement?

This Strategic Directions Statement (SDS) articulates the regional context, shared vision and strategic water-related outcomes for the Werribee catchment.

It includes a prioritised list of IWM opportunities developed in collaboration by the Werribee IWM Forum partners.

Partners of the Werribee IWM Forum are committing their best endeavours to:

- Ensure priority opportunities are progressed in line with the shared vision and strategic outcomes of the Werribee catchment; and
- Support the Department of Environment, Land, Water and Planning to progress priority strategic enablers for IWM in Victoria.

It is envisaged that the SDS will be a living document which will be updated to reflect the Werribee IWM Forum's current priorities and opportunities.



# Enduring collaboration

## How we're working together

The Werribee IWM Forum identifies, coordinates and prioritises areas that would most benefit from collaborative and place-based water management planning and projects.

The Forum brings together 15 organisations with an interest in water cycle management across the Werribee catchment. These organisations include four water corporations, seven local governments, the Port Phillip and Westernport Catchment Management Authority, representatives of Bunurong, Wadawurrung and Wurundjeri Traditional Owner interests, the Department of Environment, Land, Water and Planning (DELWP) and the Victorian Planning Authority.

To ensure IWM is successful and enduring across the region, the Werribee IWM Forum partners commit to promote a collaborative and shared values culture within their own organisations and through their work with local communities and water cycle delivery partners.

The Werribee IWM Forum is governed by an open and transparent IWM planning process.

This process assumes a holistic, whole-of-cycle approach to determine water cycle solutions, considering regulatory accountabilities and service delivery responsibilities.

Each organisation has an important role to play in the decision-making and management of the catchment's water, resources and assets.

Collaboration across IWM Forum partners will ensure balanced consideration of the complex economic, environmental, cultural and community benefits and impacts associated with the range of proposed IWM opportunities. This collaborative process allows for integrated solutions that respond to individual business needs, as well as the needs of the broader catchment.

The Werribee IWM Forum partners will continue to work together to build inter-organisational trust and develop productive, enduring relationships to realise the shared vision for integrated water management and delivery in the Werribee catchment.

Further information on the IWM Forum's governance and planning framework is outlined in the *Integrated Water Management Framework for Victoria 2017*, available on the internet at [www.delwp.vic.gov.au](http://www.delwp.vic.gov.au).

## Recognising Aboriginal values in water planning and management

The Werribee IWM Forum is committed to working in partnership with Aboriginal Victorians across landscapes, communities and natural resources.

The Forum recognises that Traditional Owners throughout the metropolitan Melbourne catchments, including the Wurundjeri, Bunurong and Wadawurrung people of the Kulin Nation, are unique to Country and their involvement in IWM planning will be specific to each planning area.

Organisations involved in IWM have obligations to involve Traditional Owners and consider Aboriginal values in their organisational activities. The Forum will continue to work with Traditional Owner groups to determine the appropriate approach and level of involvement in the broader IWM planning process for each Forum Area.



Werribee River Trail. Courtesy Zarnell Photography

## Guiding principles for collaboration

The purpose of the Werribee IWM Forum is to provide a collaborative platform for overseeing, supporting and, where necessary, facilitating water's contribution to resilience and liveability in Victoria.

Applying an IWM approach, the Forum will:

- Consider the collective community needs in the regional context and develop an overall strategic direction accordingly.
- Complement and feed into existing water and land planning processes, collaborative networks, forums and associations.
- Commit best endeavours to facilitate multi-stakeholder initiatives, share organisational expertise and advance sectoral learnings.
- Respect Traditional Owner rights in water management planning.
- Ensure multiple benefits can be delivered to the community and the economy.
- Optimise investment in water management projects and strategies to deliver multiple benefits and best community value solutions.



### IWM Forum governance structure

Further information on IWM Forum collaboration and planning can be found in Chapter 3 of this SDS.



Port Phillip Bay (Western Shoreline) wetlands. Photographer: David Paul





## Chapter 2

# IWM in the region

Understanding why an integrated approach to water planning and management is critical to achieve better economic, environmental, cultural and community outcomes for the Werribee catchment.

# Regional context

The Werribee IWM Forum Area encompasses some of Victoria's most iconic waterways and landscapes. The catchment covers an area of approximately 2,715 km<sup>2</sup>, extending along the southern reaches of the Great Diving Range at the Wombat State Forest, south across dry, flat to gently undulating plains scattered with volcanic features, to where grasslands join wetlands on the western shoreline of Port Phillip Bay.

It is a geologically and ecologically diverse catchment with a rich cultural history and, in recent times, the site of significant urban growth on Melbourne's fringe.

Agriculture dominates much of the Werribee catchment with 67 per cent of the area devoted to the production of leafy vegetables, fruit and turf, as well as poultry, large scale grazing and crop operations. Only five per cent of the catchment is currently zoned for urban land use, though the region will undergo major residential and economic development in the coming years.

The Werribee catchment sustains a range of recreational activities, including nature-based tourism, bushwalking, fishing, cycling and swimming. Commercial activities in the catchment include agriculture, manufacturing and wholesale trade, as well as notable industries in health, education and high-tech research. The catchment hosts the Western Treatment Plant, operated by Melbourne Water, which treats a significant proportion of Melbourne's wastewater and produces recycled water.

The Werribee catchment includes areas of significant value where Aboriginal people have lived for thousands of years. Werribee is a word derived from both the Wadawurrung and Boonwurrung words for backbone or spine. The name is thought to have its origin in the tree-lined course of the Werribee River, which punctuated the landscape in contrast to the flat, bare plains surrounding the area. Many Aboriginal artefacts, fish traps and burial sites have been found along the region's waterways, including the Werribee River, which remains a place of significant cultural value to the Wurundjeri, Wadawurrung and Bunurong people.

## Population

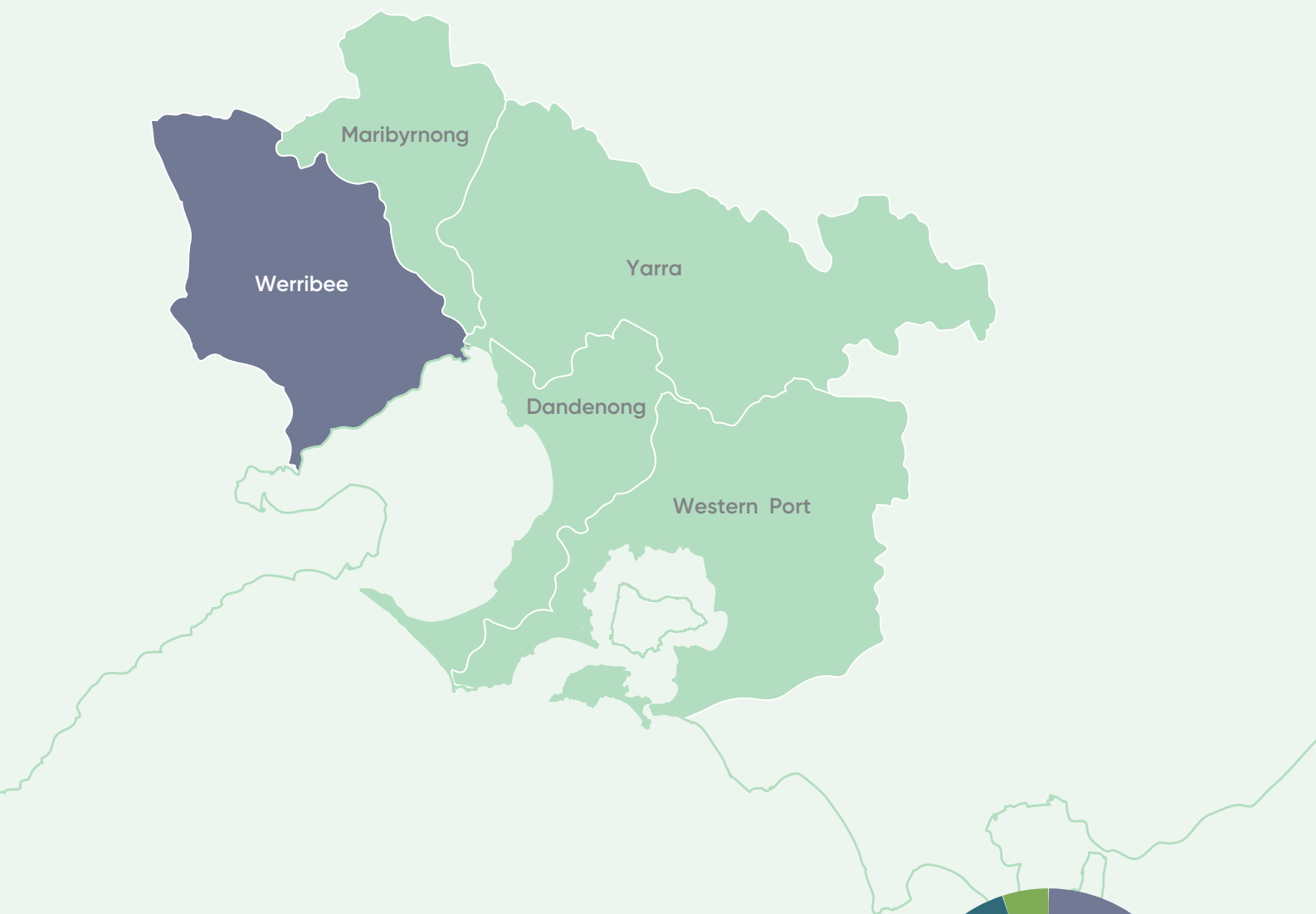
The Werribee IWM Forum Area has an estimated population of 575,000 people and is predicted to grow to 1.35 million by 2040. The region encompasses a major urban growth corridor and significant greenfield residential development in Melbourne's west will occur here over the next 20 to 30 years. Several towns in the region have already transitioned from a primarily rural to a primarily urban municipality, including Melton and Bacchus Marsh, while further densification and urban renewal is anticipated for Altona, Werribee and Sunshine West, which borders the Werribee and Maribyrnong catchments.

The municipality of Wyndham is one of the fastest growing urban areas in Australia with a population that is expected to reach 400,000 by 2050. Much of this growth will occur in Point Cook, among the five fastest growing Australian suburbs, as well as the suburbs of Tarneit and North Wyndham Vale. In the middle catchment, the City of Melton will experience a population growth rate of nearly 150 per cent over the next 20 years. Protecting the Werribee region's ecologically-diverse and fertile lands and waterways will be a priority to ensure long term community liveability and resiliency.

## Climate change

The Werribee catchment presents several opportunities to demonstrate regional growth planning and development that is resilient to climate-related impacts. By 2040, average temperatures across the Werribee catchment are expected to rise by an average of 1.3°C under a medium climate change scenario, according to the Victorian Government's *Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria 2016*. This will increase the impact of the urban heat island effect across the region, with higher density urban areas experiencing greater heat vulnerability than more forested areas in the upper catchment.





### POPULATION GROWTH

**575,000** NOW (2018)

**1,350,000** BY 2040

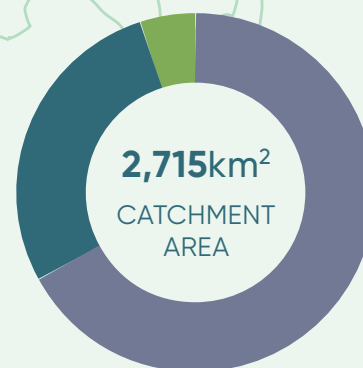


**135%**  
INCREASE



### THE REGION

- URBAN AREAS **5%**
- FORESTED **28%**
- AGRICULTURE **67%**



**14,000**

OLYMPIC SIZED SWIMMING POOLS  
WORTH OF WATER NEEDED TO  
MEET RESIDENTIAL DEMAND\*



**110%**

INCREASE  
STORMWATER  
PRODUCTION\*



VOLUME OF RECYCLED  
WATER PRODUCED  
COULD FILL THE MCG  
11 TIMES\*

\*Anticipated change in water demand and production in greenfield growth areas from 2013–2050

Source: Department of Environment, Land, Water and Planning  
Healthy Waterways Strategy 2013/14–2017/18, Melbourne Water  
Victoria in future 2016

Extreme heat waves, wildfires and drought will pose significant challenges for this characteristically dry country. Projections for Victoria's future climate indicate an increase in the frequency and intensity of bushfires for the Werribee catchment and neighbouring regions in Australia's southeast. The increased risk of bushfire poses a serious threat to the catchment's communities, infrastructure and high-value native grasslands, forests and ecosystems.

Whilst the catchment is predicted to see a reduction in average annual rainfall over the next 20 years, the frequency and intensity of short duration rainfall events is expected to rise, increasing the risk of soil erosion and movement, riverine and flash flooding and high volumes of stormwater discharging pollutants to waterways. Increased flows from

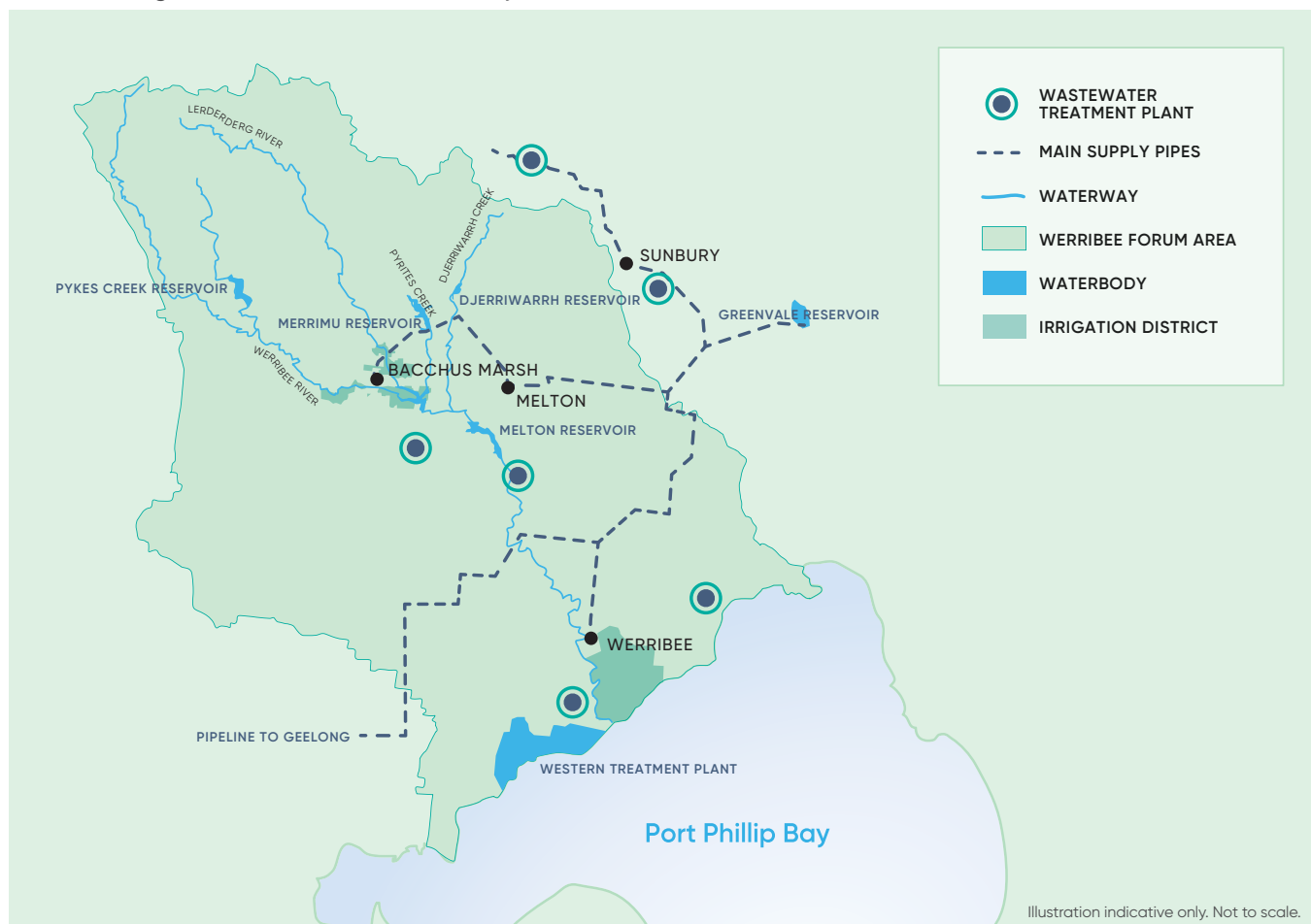
heavy rainfall events will affect water quality and the health of waterways from the upper reaches downstream to Port Phillip Bay. Coupled with fast-growing residential populations, greenfield development and industrial demands, climate change impacts will place increased pressure on water services in the catchment. The region's water security has declined over recent decades, negatively impacting productivity within the catchment's two irrigation districts that together support major producers of fruits and vegetables in Victoria. Opportunities to improve efficiency and tap alternative sources of water will help mitigate climate related pressures and better manage future risks.

Australia's changing climate will pose a serious threat to the wetlands and coastal environments of the Werribee catchment. Rising sea levels and

To meet the challenge of climate change and prepare Victoria's water system for a range of possible climate futures, **climate change mitigation and adaptation actions will be embedded in all IWM Forum decisions.**

increased storm surges will increase the costs and impacts of coastal flooding and shoreline erosion on communities and marine ecosystems. The Western Treatment Plant, an ecologically significant wetland listed under the Ramsar convention, is at risk under climate change conditions due to sea level rise. Protection and improved resilience of this and other environmental and economic assets is a priority for the Werribee catchment.

## Understanding the Werribee catchment as a system



# Vision and strategic outcomes

The Werribee catchment is resilient and thriving. Our growing communities are supported and the health of our diverse environment is enhanced.

## Collaboration to develop the shared vision and strategic outcome areas

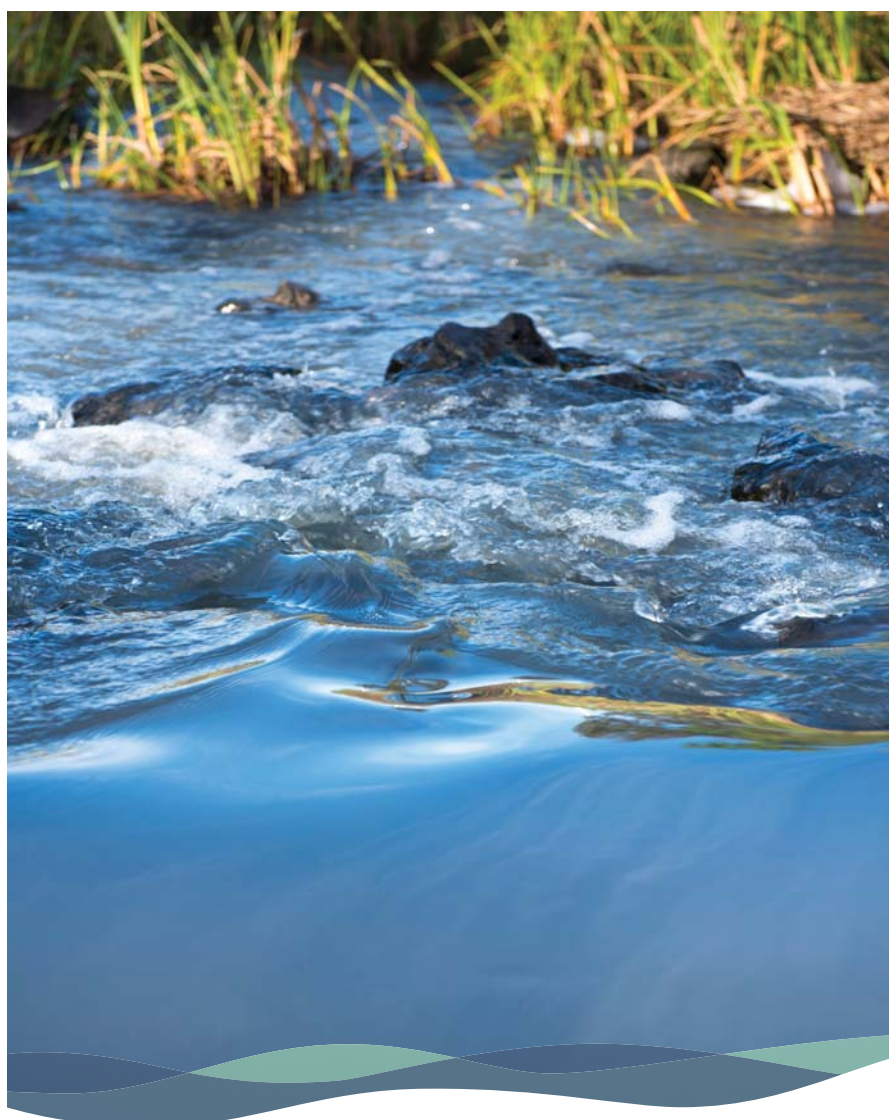
The IWM Forum demonstrates a robust and transparent process of collaboration amongst local governments and a range of stakeholders with an interest in water.

Central within this process are the community values, local interests and place-based opportunities represented by each Forum Member organisation.

The IWM Forum recognises the valuable contribution of these many and diverse actors in supporting a transformative approach to the planning and management of our wider water cycle. Each of these organisations played a leading role in determining a shared vision for IWM unique to each of the five metropolitan Melbourne catchments.

The seven primary strategic outcome areas to achieve this vision, as well as the secondary outcome areas nested beneath each primary area, were developed collaboratively by the IWM Forum partners.

These outcomes acknowledge the breadth of water plans, environmental strategies and land use plans developed by each partner organisation.



Kororoit Creek. Photographer: Christian Pearson.  
Courtesy Melbourne Water

# Strategic outcomes for IWM

## Outcomes



### Safe, secure and affordable supplies in an uncertain future

Strategically balanced catchment-based hierarchy of use

Development considers precinct scale water balances and servicing solutions

Fit for purpose water quality meets regulatory standards and community expectations

Demand management and water-wise communities

Water available to maintain valued passive and active green community assets

Climate-resilient fit for purpose alternative sources of water, such as stormwater and recycled water, for a diverse range of uses, including agricultural and industrial use, human consumption, ecological and cultural purposes, and recreational amenity



### Effective and affordable wastewater systems

Meets or exceeds public health and environmental standards

Maximise the use of recycled water for beneficial use

Waste-to-resource opportunities are maximised for beneficial outcomes

Best practice centralised and decentralised septic and sewerage systems and optimised onsite domestic systems to deliver whole-of-catchment benefits



### Opportunities are optimised to manage existing and future flood risks and impacts

Appropriate levels of flood management across the catchment considering climate change impacts

Community and property resilient to local flood risk across the catchment and coastal environment

Development in the Werribee catchment recognises and mitigates exacerbated flooding risks

Coordinated urban and flood management planning processes across stakeholders and organisations



### Healthy and valued waterways and marine environments

Management of the catchment is integrated and includes the whole water cycle

Impacts from urban, peri urban, irrigation and industrial activities are mitigated to protect our waterways and the bay

Ramsar wetlands are protected and sustained

The health of waterway reaches and tributaries are improved

Waterways across the catchment are improved and managed to maintain and protect coastal and marine ecosystems in Port Phillip Bay

Reduced nutrient and sediment discharges to both waterways and Port Phillip Bay

Traditional Owner and Aboriginal values, knowledge and practices are integrated and protected in waterway management and planning



The Werribee catchment is seeking to achieve seven strategic outcomes through IWM. Each of these will have a significant role in shaping the liveability, prosperity and resilience of Victoria's cities and towns. These outcome areas provide a guide to identify and prioritise the various IWM opportunities included in Chapter 3 of this SDS.



### Low-emission solutions

IWM opportunities that minimise the release of greenhouse gas (GHGs) emissions will be considered by the Forum as solutions are evaluated for implementation.



### Valued landscapes for health and wellbeing

Active and passive recreation supported by water

Urban landscapes retain moisture for cooler, greener cities and towns

Waterways and coastal environments are accessible as valuable open space

Aboriginal cultural values associated with waterways are protected

Biodiversity supported through connected habitats within and along waterways and across landscapes



### Strengthened community knowledge and local values reflected in place-based planning

Diverse landscapes that reflect local conditions, community values and willingness to contribute

Empowered, engaged and water literate community

Local water related risks and issues understood, managed and mitigated

Aboriginal values are understood and recognised early and included in project planning and delivery

Community values communicated to IWM partners are incorporated into the objectives and water cycle decision making for place based projects

Planning and development reflects the regional landscape

Communities value the unique regional landscape



### Jobs, economic benefits and innovation

Jobs and economic growth supported by water

Innovative planning delivery and operation supported by feasible funding models

Strong governance, collaboration, performance and accountability

Alternative water is used beneficially to drive regional economic growth

Traditional Owner and Aboriginal consultation, engagement, participation, employment and economic development have been comprehensively implemented

Secure alternative water to enable long term investment

The regulatory environment supports fit for purpose water in industry

# The case for IWM in the Werribee catchment

Over the coming years, the pace of urban growth, development and climate change will transform the Werribee region, putting pressure on the catchment's water cycle and resources, natural environments, communities and industries. Adapting to change and translating liveability and water management objectives into practice will involve working across organisational boundaries to achieve the following strategic outcomes. These outcomes are aligned with those reflected in the strategic plans and environmental strategies of the Forum's partner organisations.

## Aquifer Storage and Recovery

(ASR) involves the capture and use of stormwater or recycled water to recharge an aquifer for future recovery and use. The aquifer provides not only the mechanism to store the stormwater or recycled water, but can also improve the quality.

ASR schemes provide an alternative to the construction of new surface reservoirs, which can be expensive and difficult where available land is scarce. Water stored underground through ASR does not experience loss by evaporation, prolonging the availability of water for use when and where it's needed most.



## Safe, secure and affordable supplies in an uncertain future

Six water corporations oversee water supply for the Werribee catchment. These include Melbourne Water, City West Water, Western Water and Southern Rural Water. Barwon Water and Central Highlands Water oversee water supply to a very limited extent within the catchment and as such, are not included as standing members of the Werribee IWM Forum.

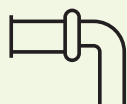
The catchment includes reservoirs at Pykes Creek, Merrimu and Melton, which hold water from both the Werribee and Lerderderg River systems. The Werribee and Bacchus Marsh Irrigation Districts, two major food production regions in the of the catchment, receive their irrigation supplies from a combination of these storages. Part of the Upper Stony Creek Reservoir is also located within the catchment on its western boundary with the Barwon catchment.

Groundwater is accessed across the catchment and is predominantly used for irrigation. Groundwater is water that is beneath the earth's surface in pores and crevices of rocks and soil. The layers of soil and rock that contain useable quantities of groundwater are called aquifers and these lie beneath all parts of Victoria. Groundwater is allocated for consumptive use under the *Water Act 1989*. Recent years of low rainfall over the Werribee catchment have resulted in low reservoir storage stocks and the use of aquifers to store and access treated recycled water for later

recovery and use. The West Werribee Aquifer Storage and Recovery (ASR) Trial by City West Water investigated the possibility of storing volumes of recycled water and stormwater to help balance water supply and demand with future growth in the west. ASR is the process of recharging water into an aquifer for the purpose of storage and subsequent withdrawal for other uses, including water supply, horticulture, industries and municipalities.

Water security is a concern in the north and west areas of the Werribee catchment due to anticipated population growth and greenfield development. Changes to the water cycle driven by growth and climate change will mean more water will be needed across the catchment for urban, agricultural and environmental flow purposes. The catchment's residential population is expected to double in next two decades, emphasising the need to diversify the water supply system and reduce dependency on reservoirs.

There is an opportunity to plan for the provision of secure water sources to provide reliable and fit for purpose supplies to the Werribee catchment's growing communities, industries and developing precincts.



### Effective and affordable wastewater systems

The majority of wastewater generated in the Werribee catchment is treated at Melbourne Water's Western Treatment Plant, located southwest of Werribee, 32 km from Melbourne's CBD. The plant processes half of Melbourne's sewage and produces almost 40 billion litres of recycled water to irrigate crops, parklands and sporting fields. Recycled water is wastewater that has been collected and treated so that it can be used again for a variety of non-drinking purposes.

The Western Treatment Plant also provides a wetland habitat for tens of thousands of migratory birds. The site is recognised as a wetland of international importance under the Ramsar convention.

The Werribee catchment also contains the smaller Altona Treatment Plant, operated by City West Water. The facility services over 20,000 industrial and residential properties in the catchment's southern coastal communities, including Altona, Altona Meadows and Point Cook. Much of the treated wastewater

is used in either manufacturing processes in Laverton or the irrigation of recreational spaces within the community.

The Melton and Bacchus Marsh Recycled Water Plants treat wastewater from their communities throughout the Werribee catchment. Owned and operated by Western Water, these plants supply recycled water to residential and agricultural users and generate significant liveability, food production and economic outcomes for the region. As the west continues to grow, much of the wastewater generated in emerging communities will be treated at these plants. Managing additional volumes of wastewater generated from this growth and maintaining the health of waterways into which wastewater is discharged will be a significant challenge for the Werribee catchment. There is an opportunity now for organisations to collaboratively determine the best use for added volumes of recycled water produced from the Werribee catchment's increased wastewater generation.

### Ensuring alternative sources are fit for purpose

The use of recycled water is an attractive water management strategy to meet growing needs for water over the long term, particularly in drought prone areas.

The use of recycled water and stormwater needs to be 'fit for its purpose' – that is, an appropriate quality for the intended use. Appropriate opportunities for substitution of river and groundwater with treated recycled water or stormwater include non-drinking uses in households and industry, and for agriculture, irrigating open spaces and gardens.



### Opportunities are optimised to manage existing and future flood risks and impacts

Most of the flooding in the Werribee catchment is a combination of riverine and stormwater flooding, though coastal flooding and flash flooding can also occur. Riverine flooding by the catchment's major rivers, including the Werribee and Lerderderg Rivers and Kororoit Creek, occurs during periods of heavy and prolonged rainfall where water levels rise and overflow the banks of the waterway.

Several low-lying areas in the region can also experience flash flooding, impacting communities, infrastructure and amenities. Moorabool Shire in the catchment's northwest is subject to riverine flooding and flash flooding in urbanised areas, such as Ballan and Bacchus Marsh. These areas are particularly susceptible to overflows from the Werribee River after prolonged periods of rain. Melton West and Brookfield can also be affected by flooding from Arnolds Creek or by heavy rainfall overwhelming local drainage systems. Towards the catchment's south, dense suburban development means that rain water is not easily absorbed into the ground, tending to inundate low-lying communities near the coast. The Werribee catchment's coastal suburbs, including Altona, Seaholme and Williamstown, lie on relatively flat terrain, with some parts lower than sea level. Over the past decade, damage from flash flooding, storm surges and tidal flows from Port Phillip Bay have impacted on public and private infrastructure, including The Esplanade foreshore area, which frequently floods due to storm surges.



## Healthy and valued waterways and marine environments

The Werribee catchment contains an array of significant and biologically diverse waterways ranging from expansive rivers, small ephemeral creeks and the western shoreline of Victoria's iconic Port Phillip Bay. The catchment encompasses a naturally arid landscape where many small waterways run dry during periods of low rainfall.

Major waterways in the Werribee catchment include the Lerderderg, Werribee and Little Rivers, as well as Toolern Creek, Kororoit Creek, Cherry Creek, Lollypop Creek, Laverton Creek and Skeleton Creek. Several of these creeks and rivers comprise their own sub-catchment through the broader Werribee Forum Area, and each flow directly to Port Phillip Bay. The Lerderderg River originates in the Wombat State Forest near Blackwood, meandering southeast before reaching its confluence with the Werribee River at the Melton Reservoir. One of only two Victorian Heritage Rivers found in the five metropolitan IWM Forum regions, the Lerderderg River has retained many of its natural features and supports a range of environmental, geological, cultural and recreational values for the Werribee catchment.

Several small creeks join to form the Werribee River in the Wombat State Forest, on the southern slopes of the Great Dividing Range. The river flows approximately 110 km, meeting the Lerderderg River and farmlands through Bacchus Marsh along the way, before it eventually joins Port Phillip Bay. The river supports important agricultural districts and provides water entitlements for rural communities and urban centres throughout the catchment. Native animals at home in or near the Werribee and Lerderderg systems include platypus,

diverse frog populations, a variety of fish species and a range of birds, lizards and butterflies. In parts of the mid and lower systems, native species are on the decline as streamside habitat corridors face the challenges of urbanisation, agricultural and industrial activity and climate change impacts. Vegetation and habitat linking works throughout the mid and lower catchment aim to improve these populations, control pollution and invasive species and stabilise waterway and environmental health over the long term.

Water quality is considered fair for nearly half of the region's waterways, indicating some evidence of stress is apparent. Rivers and creeks in the forested upper reaches of the catchment, including the upper Werribee and Lerderderg Rivers, are in better condition than those near urban and industrial areas. For rural areas and the lower catchment, 42 per cent of waterways are in poor condition or flow stressed, however there is an overall trend of improvement in water quality since the 2000s. Stormwater is among the major sources of pollution to waterways within the catchment. According to the *State of the Bays 2016*, 95 per cent of litter on Port Phillip Bay's beaches, including those along the catchment's western bay shoreline, was transported from suburban streets through the stormwater system.

Wetlands play a key role in the treatment of stormwater within the lower catchment. Most of the major rivers and creeks flowing through the region drain to wetland areas, including the Truganina Swamp, Cheetham Wetlands and the Spit Wildlife Reserve, before meeting Port Phillip Bay.

There is a need to investigate improved stormwater storage capabilities across the catchment, particularly in areas where stormwater harvesting and management could reduce the risk and cost of major rainfall events and minimise impacts, such as pollution, to the bay's marine environments.

The existing environmental entitlements for the Werribee River do not fully address the flow-stressed nature of this important river system. Improving both the volume and pattern of water flow across the upper and lower reaches is a complex challenge. This challenge includes considering water security for agricultural initiatives which do not compromise river health, as well as understanding and improving environmental flow deficits. There is a need to investigate more widespread use of alternative water to supplement environmental flows in the Werribee catchment.

Further, there is an opportunity to collaboratively manage the region's increased development activity, agricultural demands, increased stormwater volumes and nutrient discharge to rivers and creeks, to ensure the health of the catchment's waterways and Port Phillip Bay can be improved for future generations.

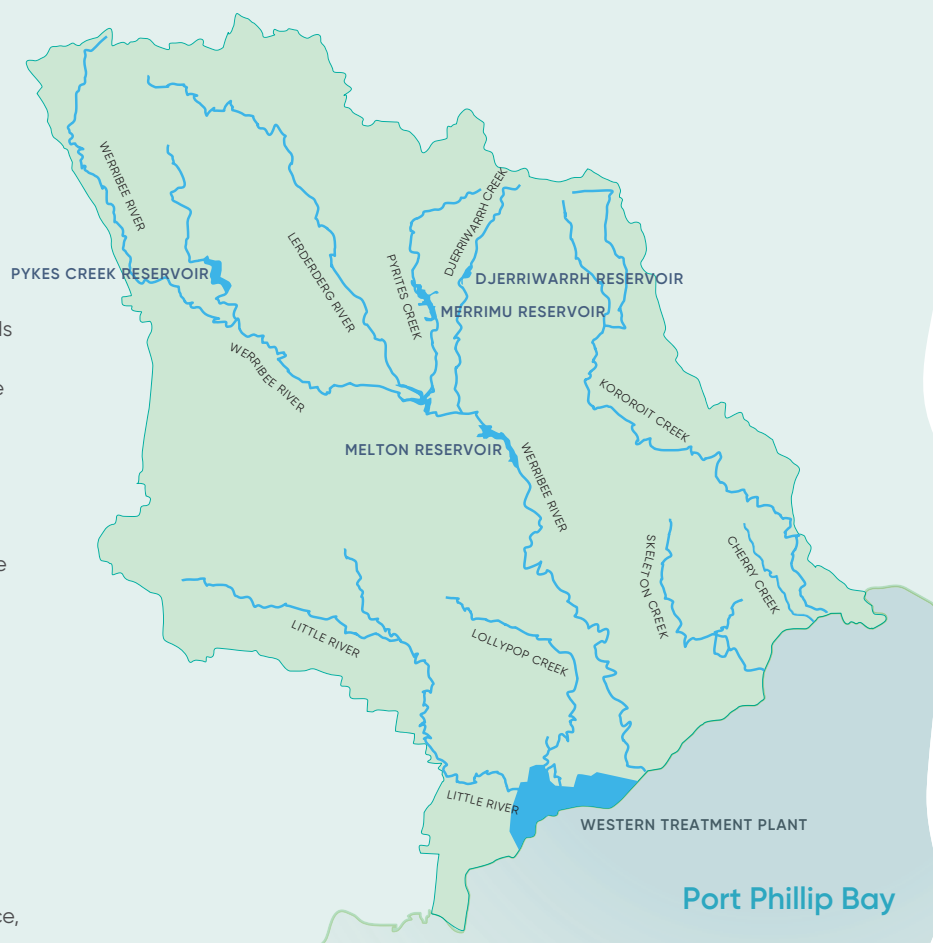
On the eastern boundary of the Werribee catchment, wetlands, sandy beaches and rocky shores span the coast from Williamstown, 9 km southwest of Melbourne, to Point Wilson on the northern shores of Corio Bay. Many of the major waterways within this part of the catchment flow through coastal wetlands before draining to Port Phillip Bay.



A designated Ramsar site along the bay's western shoreline links wetlands near Altona and Werribee, through the Western Treatment Plant to Lake Connewarre, south of Geelong. The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site spans more than 22,000 hectares and encompasses the Point Cook Marine Sanctuary, the largest marine sanctuary in Victoria, and the Spit Wildlife Reserve. The sanctuary's richly diverse marine ecosystem hosts numerous species of fish, invertebrates, molluscs, planktonic and pelagic species, as well as 44 threatened bird species and 30 internationally important migratory bird species. In addition to their important ecological function, the wetlands and nearby coastline are a significant recreational resource, providing an important open space that is highly valued by local communities.

Beyond the Ramsar boundary at Williamstown, the Jawbone Marine Sanctuary provides an important feeding and roosting habitat for 36 threatened bird species and 24 internationally important migratory bird species. Basalt reefs, shallow inshore waters, mudflats and seagrass beds encourage a variety of planktonic, pelagic and fish species to visit and breed in these shallow waters in the upper northwest corner of Port Phillip Bay.

The bay continues to offer high water quality and an abundance of marine flora and fauna, despite the four million people residing near its 333 km coastline. Along the coast, water quality tends to be lower than in the protected marine sanctuaries within the bay, and this is largely related to urban, industrial and agricultural influences on stormwater runoff to the bay.



The Werribee catchment contributes most of the total amount of nitrogen entering Port Phillip Bay. This nutrient is considered among the greatest threats to the health of the bay and the marine species it supports, leading to higher instances of algal growth and phytoplankton blooms affecting water quality and the function of marine ecosystems. The Western Treatment Plant contributes 54 per cent of total nitrogen to the bay, whilst the remaining areas of the Werribee catchment contribute approximately 6 per cent of total nitrogen to the bay from runoff.

There is an opportunity to incorporate improved planning and waterway protection controls, as well as strategies to manage nutrients, sediment and pollution, as the Werribee catchment continues to urbanise.

IWM outcomes to achieve healthy and valued waterways and marine environments in the Werribee catchment complement Melbourne Water's draft *Healthy Waterways Strategy 2018*. The strategy focuses on protecting and improving waterways in the Port Phillip and Westernport region on behalf of the community. It identifies a range of priority areas and management actions for waterways, and many of these align with the strategic outcome areas and IWM opportunities identified by the Werribee IWM Forum Members and further detailed in Chapter 3.



## Landscapes for health and wellbeing

Many of Victoria's most iconic landscapes are found throughout the Werribee catchment. From expansive forests and vast dry plains scattered with volcanic stony rises, to marshy wetlands and sandy beaches on the western shores of Port Phillip Bay, the catchment characterises a variety of culturally and historically significant settings.

The Werribee catchment covers an area of approximately 2,715 km<sup>2</sup> and 67 per cent of this land is devoted to agriculture. Only five per cent of the catchment is zoned as urban, though recent years of development in cities and towns on Melbourne's fringe have dramatically changed the landscape of the area. The west is now one of the fastest growing regions in Australia, presenting new challenges for the conservation of natural environments for ecological and community benefit. There is an opportunity to improve connections through residential areas, linking green corridors and parklands for improved community health and wellbeing. Cycling and walking tracks along the Werribee River Trail and the Federation Trail are examples of two well-used and well-loved recreational assets connecting communities in the west.

Only about one quarter of the Werribee catchment reflects its natural vegetation before settlement and most of this is confined to the upper Werribee catchment where fern gullies and dry open forests shelter hundreds of native and threatened species. Grey kangaroos, wombats, wallabies, echidnas and koalas are at home in the bushland of the Wombat State Forest, located 50 km west of Melbourne. The forest provides an important breeding habitat for many migratory birds. More than 350 species of native plants, including boldly coloured fungi and 25 rare and threatened plant species, can be found in the forest. The 300-m deep Lerderderg River gorge is a dominant feature of the Lerderderg State Park, a haven for bushwalkers on the southeast corner of the Wombat State Forest. Both the Lerderderg and Werribee gorges are recognised as landscapes of international and state geomorphological significance. Coupled with the Brisbane Ranges National Park, Victoria's richest wildflower environment, these near-natural forested regions contribute enormous environmental value to the west and provide excellent recreation opportunities for locals and visitors alike.

The Western Grasslands Reserve, a 15,000 hectare vegetation community, aims to restore some of the last remaining native grasslands that once covered much of the Werribee catchment. The reserve links the You Yangs to the Werribee River across the Victorian Western Plains, a vast and largely flat plain studded with stony volcanic rises. The area supports several threatened plant and animal species of national significance, such as the Growling Grass Frog, the Golden Sun Moth and the Southern Brown Bandicoot. Councils, communities and water industry partners are working to further restore native vegetation through the west through sustainable land use management practices that balance the dry, rocky landscapes typical of the region with the necessity to provide urban cooling.

Increasing temperatures will place greater emphasis on the necessity of green infrastructure to cool western landscapes and improve community liveability in this historically arid and rocky region. In contrast to naturally lush and forested neighbouring regions, suburbs in the Werribee catchment have tree canopy coverage of only five to 10 per cent, compared to between 10 and 30 per cent in other areas of metropolitan Melbourne. Water is required to increase and sustain canopy cover over the landscape with vegetation that may not naturally thrive in these dry conditions.



## Strengthened community knowledge and local values reflected in place-based planning

The Werribee catchment area holds a wide range of values for Victorians, including nature-based tourism, cultural heritage and recreation on and near rivers and Port Phillip Bay.

The catchment encompasses the Traditional lands of the Wurundjeri, Wadawurrung and Bunurong people of the Kulin Nation. More than 3,500 Aboriginal cultural sites have been recorded across the catchment, including scarred trees, fish traps, camp sites, burials and ceremonial sites. A majority of these are found close to waterholes, wetlands and rivers, including the Werribee River, which remains a place of significant cultural value. The Werribee catchment derives its name from both the Wadawurrung and Boonwurrung words meaning backbone or spine, and is believed to refer to the tall trees that lined the banks of the Werribee River in contrast with the flat, grassy plains of its surrounding area.

Maintaining community liveability and enhancing cultural, social, ecological and recreational values of regional waterways, parks and forests remain areas of focus as growth planning continues in the west. The region already encompasses some of the largest and fastest growing suburban populations in Australia, with new communities emerging in Point Cook, Tarneit, Bacchus Marsh and North Wyndham Vale. Rural townships will continue to urbanise, transforming the region with a network of satellite cities on Melbourne's fringe. In the municipality of Melton, the amount of urbanised area will triple by 2040, while in already developed suburbs such as Werribee, Altona and

Sunshine West, new employment precincts will attract more residents and further growth.

Water demand will continue to grow with the expansive newly planned suburbs emerging in the west. There is an opportunity to integrate water planning and management with urban design and development to ensure innovative water infrastructure can service growing communities and deliver secure water supplies to homes, businesses and facilities. Examples include water-sensitive urban design in new residential estates, recycled water and stormwater harvesting to irrigate parklands and sporting fields and other public and private spaces, the provision of community amenities with water features and the maintenance of open space and green wedges to support recreation and cooling in this naturally dry landscape.

The catchment's local governments, communities and water industry partners are working together to improve connections between people and the landscape during this period of change. Collaborative initiatives to strengthen community knowledge of land and waterway values are abundant and there are numerous community-led or co-designed projects in the region working to protect natural assets, restore vegetation and improve community health and wellbeing. Notable examples include the Grow West project, which aims to enhance native vegetation, create biolinks and protect natural landscapes in the upper Werribee catchment. Groups including Environmental Justice Australia, Friends of Steele

Creek, Friends of Maribyrnong Valley and the Werribee River Association are also working to improve planning and environmental protection in the Werribee catchment. The Rivers of the West campaign aims to achieve legal reform in the planning and management of the west's waterways.

Other cross-government and water sector initiatives that seek to elevate community priorities include the Greening the West and Greening the Pipeline initiatives. Greening the West brings together 23 organisations to improve urban greening, cooling and amenity by planting over one million trees across western metropolitan Melbourne. In the catchment's southwest, the Greening the Pipeline project at Williams Landing has transformed an underutilised stretch of the heritage listed Main Outfall Sewer pipeline reserve into water-sensitive parklands to better connect the new communities of the west.

The Western and Inner Metropolitan Partnerships brings together community and business representatives with state and local governments to identify priorities for jobs, services and infrastructure within the region. Among a range of priorities, the Partnerships provide advice to ensure ongoing environmental benefits and connections to the environment within each region.



## **Jobs, economic benefits and innovation**

The Werribee catchment covers a major growth corridor in Melbourne's west, one of the fastest growing regions in Australia. It includes several areas designated for population and economic growth, significant transport and freight infrastructure and fertile agricultural lands comprising a major Australian food bowl.

The Werribee Irrigation District and the Bacchus Marsh Irrigation District support two of Australia's most productive food growing regions and provide Victorians with fresh leafy vegetables, such as lettuce, broccoli and cauliflower, stone and pome fruit, market garden plants and turf. Water for agricultural irrigation is derived from several reservoirs in the catchment and is further supplemented by recycled water from the Western Treatment Plant. Piping infrastructure modernisation projects are underway to return water back to the environment and make these regions more efficient, reliable and resilient to the drier climate facing the Werribee catchment.

Beyond the irrigation districts, agricultural land in the catchment is used for livestock grazing and crop production. Ensuring the provision of secure water supplies, including recycled water for sustainable agriculture and irrigated cropping, will be vital to the catchment's ongoing productivity.

Planning is underway for the Western Irrigation Network (WIN), an alternative water scheme led by Western Water for the catchment's agricultural region. The WIN will support future recycled water customer supply to enable high value agriculture, regional economic growth and liveability in the west.

The Werribee catchment's strong industrial and manufacturing roots have contributed to the growth of Victoria's largest State Significant Industrial Precinct (SSIP). Spanning the Altona, Laverton and Derrimut region, the West SSIP provides strategically located land for major industrial developments linked to key freight and transport gateways, including Melbourne's second international airport, Avalon Airport, the West Gate Freeway, Princes Freeway and the Western Ring Road. Wholesale trade accounts for around one quarter of all industries in the West SSIP, followed by manufacturing (20 per cent) and transport and warehousing (16 per cent). Several petrochemical and petroleum refining industries are also located in the Werribee catchment, as well as extractive resource industries, including Victoria's largest producer of hard rock for building and road construction. Managing the impact of these industries on waterway health is a central concern for the Werribee catchment.

The Werribee National Employment and Innovation Cluster (NEIC) is a major employment hub for the catchment, providing around 8,400 jobs across health, education and research industries. The Werribee NEIC has the capacity to host up to 50,000 more jobs as the region matures, presenting new opportunities for economic development and regional self-sustainability. Secure water supplies and adequate water management infrastructure for water, wastewater and stormwater to support the catchment's key industries will be critical to its continued economic growth and success.





## Chapter 3

# IWM opportunities

A portfolio of priority IWM projects and strategies that the Werribee catchment's collaborative partners have committed their best endeavours to progress.

# Priority Portfolio

The following portfolio of priority projects and strategies represents a suite of IWM opportunities for which the Werribee IWM Forum's collaborative partners are committed to progress within the next 12 to 18 months.

The status of each IWM opportunity included in the Priority Portfolio reflects the phase of work to be undertaken in this time period.

Additional opportunities that require further assessment are included in the Appendix of this SDS.

In developing this portfolio, the collaborative governance of the Forum recognises the water cycle complexities of the region and considers the balance of outcomes, opportunities, roles and responsibilities for Forum Members and their communities.

A Forum Area (or catchment-wide) IWM Strategy is yet to be developed, however the Werribee IWM Forum has agreed to initiate development of a strategy over the next 12-18 months.

The IWM opportunities listed within the Priority Portfolio have not been guided by an existing IWM Strategy, rather they were developed based on the experience and knowledge of the Forum Members, and in consideration of their potential to impact on the seven strategic outcomes for IWM sought for the Werribee region.

In addition, consideration was given to the urgency of taking such actions, particularly where opportunities could be lost if no action was taken, as well as the level of commitment demonstrated by partner organisations to progress IWM opportunities over the next 12-18 months.

The projects and strategies within acknowledge a number of existing metropolitan-wide strategies and plans, such as the *Melbourne Water Systems Strategy* and the draft *Healthy Waterways Strategy 2018*, as well as the clear and measurable targets identified in the existing strategies. Targets may include alternative water use and stormwater harvesting and infiltration. Further, climate change mitigation goals, including low emission IWM solutions and those that support urban cooling and greening, will be considered by the Forum during the evaluation of projects and strategies.

The IWM Forum recognises that the contribution of this Priority Portfolio to the seven strategic outcomes, including the targets identified in the existing metropolitan-wide strategies, has not yet been quantified. It is the intention of the Forum to consider a targeted evaluation of these IWM opportunities where the Forum agrees this is necessary. This work may occur in tandem with the development of a catchment-wide strategy.

The Forum acknowledges that this is a dynamic list of IWM opportunities and is subject to further assessment by the IWM Forum Members. The organisations listed as collaborative

partners in the IWM Priority Portfolio have been identified by the Forum Members as important stakeholders to progress the IWM opportunities. For opportunities in initial stages of development, additional stakeholders may be included as the project or strategy progresses.

By co-delivering a range of water planning and management initiatives, the Werribee IWM Forum seeks to build on the strengths of the community, the water sector and governments to achieve better value and long term shared benefits for the region.

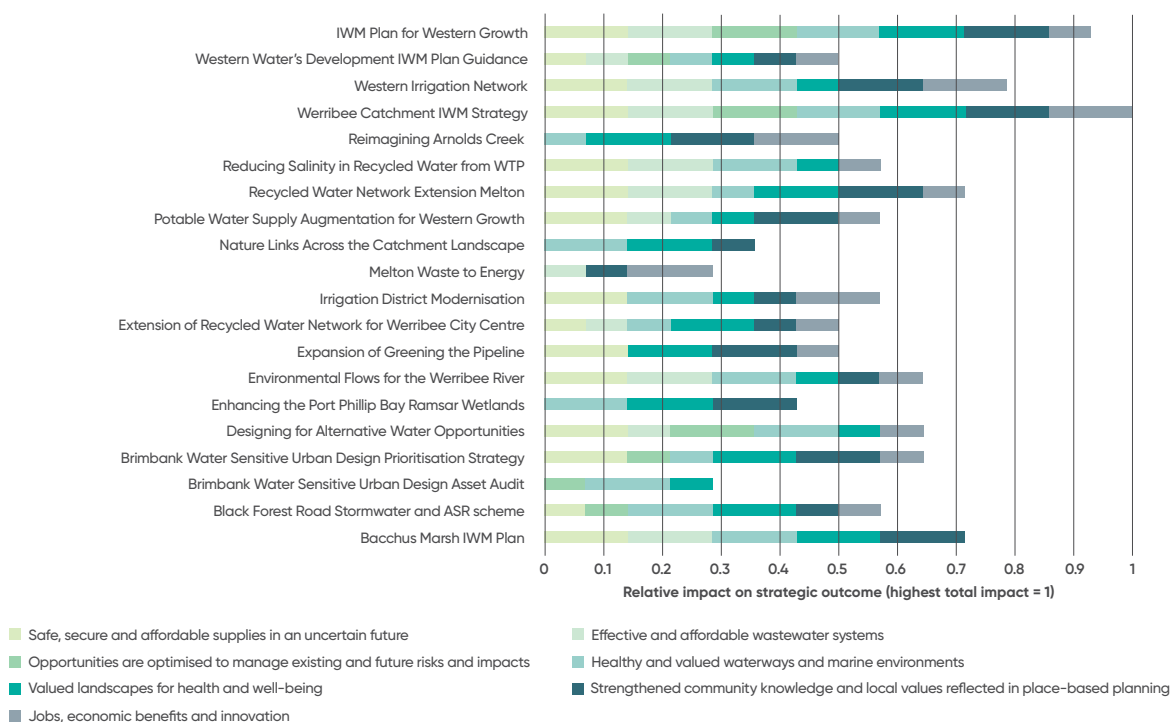
The Werribee IWM Forum presents an unparalleled opportunity for these organisations to build lasting partnerships across sectors and geographical boundaries to enhance, accelerate and generate greater visibility for water cycle initiatives that will improve Victoria's resilience and liveability.












































































































Grasslands.

Photographer: Chris Kapa

# Impact of IWM opportunities on the Forum's strategic outcomes



# IWM opportunities: An overview of projects and strategies

IWM opportunity	Strategic outcomes							Location	Spatial scale
Bacchus Marsh IWM Plan								Bacchus Marsh	Growth area
Black Forest Road Stormwater and ASR Scheme								City of Wyndham	Greenfield subdivision
Brimbank Water Sensitive Urban Design Asset Audit								City of Brimbank	Sub-catchment
Brimbank Water Sensitive Urban Design Prioritisation Strategy								City of Brimbank	Sub-catchment
Designing for Alternative Water Opportunities								City of Melton	Sub-catchment
Enhancing the Port Phillip Bay Ramsar Wetlands								Port Phillip Bay Ramsar site	Forum area
Environmental Flows for the Werribee River								Werribee catchment	Forum area
Expansion of Greening the Pipeline								Along the Main Outfall Sewer	Sub-catchment
Extension of Recycled Water Network for Werribee City Centre								Werribee	Growth area
Irrigation District Modernisation								Werribee	Forum area
IWM Plan for Western Growth								Western Growth Area	Sub-catchment
Melton Waste to Energy								Melton Recycled Water Plant	Sub-catchment
Nature Links Across the Catchment Landscape								Werribee Forum Area	Forum area
Potable Water Supply Augmentation for Western Growth								Western Water Service Region	Inter-forum
Recycled Water Network Extension Melton								City of Melton	Sub-catchment

The status of each IWM opportunity included in the Priority Portfolio reflects the phase of work to be undertaken in this time period.

## Shade scale



Low High

Level of shading refers to the degree of impact the IWM opportunity has on each strategic outcome area. Dark shading represents highest impact.



Collaborative partners	Status
Western Water, Moorabool Shire Council, Melbourne Water, Wadawurrung, Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation (L&CCHCAC), Victorian Planning Authority (VPA)	
City West Water, Wyndham City Council, Melbourne Water, Wadawurrung, VPA	
Brimbank City Council, Melbourne Water, Bunurong Land Council Aboriginal Corporation (LCAC), Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation (L&CCHCAC)	
Brimbank City Council, Melbourne Water, Wurundjeri L&CCHCAC, Bunurong LCAC	
Melton City Council, VPA, MW, WW, CWW, Councils, developers, Bunurong LCAC, Wurundjeri L&CCHCAC*	
Port Phillip and Westernport Catchment Management Authority (PPWCMA), Parks Victoria, Melbourne Water, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*, Hobsons Bay City Council, Friends of Hooded Plover, Conservation Volunteers Australia, Birdlife Australia	
Western Water, Melbourne Water, Southern Rural Water, PPWCMA, Wadawurrung, Wurundjeri L&CCHCAC, Bunurong LCAC	
Melbourne Water, Wyndham City Council, City West Water, Bunurong LCAC, Wurundjeri L&CCHCAC*, Greening the West, Vic Roads	
City West Water, Wyndham City Council, Melbourne Water, Bunurong LCAC, Wurundjeri L&CCHCAC*	
Southern Rural Water, Melbourne Water, Western Water, Victorian Environmental Water Holder, Bunurong LCAC, Wurundjeri L&CCHCAC*	
Melbourne Water, Melton City Council, Wyndham City Council, City West Water, Western Water, Bunurong LCAC, Wadawurrung, Wurundjeri L&CCHCAC, VPA, DELWP	
Western Water, Sustainability Victoria, Department of Treasury and Finance, Environment Protection Authority, Dept. Health and Human Services, Melton City Council, Bunurong LCAC, Wurundjeri L&CCHCAC*, water utilities, waste groups and associations, local hospitals	
PPWCMA, Melbourne Water, Southern Rural Water, Parks Victoria, Moorabool Shire Council, Lead West, City of Greater Geelong, Wyndham City Council, Bunurong LCAC, Wurundjeri L&CCHCAC, local Landcare groups	
Western Water, Melbourne Water, Southern Rural Water, Bunurong LCAC, Wadawurrung, Wurundjeri L&CCHCAC	
Western Water, Melbourne Water, Southern Rural Water, Bunurong LCAC, Wadawurrung, Wurundjeri L&CCHCAC	

\*The Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation will remain informed of progress related to this IWM opportunity.

#### Project opportunity status






































#### Strategy opportunity status





# IWM opportunities: An overview of projects and strategies

IWM opportunity	Strategic outcomes							Location	Spatial scale
Reducing Salinity in Recycled Water from the Western Treatment Plant								Werribee	Inter-forum
Reimagining Arnolds Creek								City of Melton	Sub-catchment
Werribee Catchment IWM Strategy								Werribee Forum Area	Forum area
Western Irrigation Network								Gisborne, Sunbury, Melton, Bacchus Marsh	Inter-forum
Western Water's Development IWM Plan Guidance								Western Water Service Region	Greenfield subdivision

The status of each IWM opportunity included in the Priority Portfolio reflects the phase of work to be undertaken in this time period.






## Shade scale



Low

High

Level of shading refers to the degree of impact the IWM opportunity has on each strategic outcome area. Dark shading represents highest impact.

Collaborative partners	Status
Melbourne Water, Southern Rural Water, Western Water, Wadawurrung	
Melbourne Water, Melton City Council, Western Water	
Werribee Forum partner organisations	
Western Water, Moorabool Shire Council, Melton City Council, Hume City Council, City West Water, Southern Rural Water (advisory), Melbourne Water, Bunurong LCAC, Wurundjeri L&CCHCAC	
Western Water, Moorabool Shire Council, Melton City Council, Hume City Council, Macedon Ranges Shire Council, Melbourne Water, VPA, Bunurong LCAC, Wurundjeri L&CCHCAC	

\*The Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation will remain informed of progress related to this IWM opportunity.

#### Project opportunity status



#### Strategy opportunity status



# Priority Portfolio of IWM opportunities

The impact of climate change and population growth in the Werribee catchment are primary considerations for the Werribee IWM Forum. The opportunities contained in this IWM Priority Portfolio aim to manage the challenges presented by rapid growth, as well as adapt to climate change and avoid further exacerbating its drivers. Together, these actions will improve the region's resilience, ensure the long term health of its environment, and enrich the liveability of its communities.

All IWM opportunities included in the Priority Portfolio demonstrate value for the Werribee catchment. Most projects and strategies will be enhanced or accelerated by collaboration and visibility through the IWM Forum process. Many demonstrate the potential to generate, enhance, or benefit from, new cross-organisational learnings and capacity-building opportunities.








Some IWM opportunities in the Priority Portfolio offer unique additional values. These include benefits derived from additional resources and support gained through the IWM Forum process, as well as the ability to be a mechanism for IWM advocacy and policy innovation.

Some IWM opportunities demonstrate potential to contribute substantial benefits to the Werribee region, or specifically to its iconic natural assets, such as Werribee River and its tributaries, and Port Phillip Bay.

## ACTION 1

### Bacchus Marsh IWM Plan








The population of Bacchus Marsh is projected to double from 20,000 to 40,000 residents by 2041. An integrated approach to water planning and management in this growing region, including the Merrimu and Parwan Station areas, will benefit from secure supplies and water sensitive community amenities, such as open space reserves. The Bacchus Marsh IWM Plan will explore integrated water options to address the challenges of climate change and rapid growth in the west. The use of alternative local sources of water, such as stormwater and recycled water, will be a key focus of the plan. The plan will also explore opportunities to protect local ecological values within waterways from the impacts of excess urban stormwater generated in new developed suburbs.

						
<b>Status</b>		<div><div></div><div></div></div>				
<b>Location</b>		Bacchus Marsh				
<b>Collaborative Partners</b>		Western Water, Moorabool Shire Council, Melbourne Water, Wadawurrung, Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation (L&CCHCAC), Victorian Planning Authority (VPA)				
<b>Spatial scale</b>		Growth area				

## ACTION 2

### Black Forest Road Stormwater and ASR Scheme








This project involves harvesting approximately 3 GL of treated stormwater from a proposed manmade lake in the City of Wyndham and supplying this water to the Western Growth Corridor recycled water network through the existing recycled water system. The lake is proposed to be a major amenity asset for new developed suburbs in the west. The area also shows high potential for Aquifer Storage and Recovery (ASR) to better manage harvest yield with availability from rainfall events.

						
<b>Status</b>		<div><div></div></div>				
<b>Location</b>		City of Wyndham				
<b>Collaborative Partners</b>		City West Water, Wyndham City Council, Melbourne Water, Wadawurrung, VPA				
<b>Spatial scale</b>		Greenfield subdivision				

## ACTION 3

### Brimbank Water Sensitive Urban Design Asset Audit








Brimbank City Council will conduct an audit of WSUD assets, including wetlands, to ensure they are performing as per design intent. This includes both physical and structural asset elements. Maintenance schedules informed by audit results will be developed and may assist other Councils in ensuring their assets are performing at their optimum.

						
<b>Status</b> <div><div></div><div></div><div></div><div></div></div>						
<b>Location</b> City of Brimbank						
<b>Collaborative Partners</b> Brimbank City Council, Melbourne Water, Bunurong LCAC, Wurundjeri L&CCHCAC						
<b>Spatial scale</b> Sub-catchment						

## ACTION 4

### Brimbank Water Sensitive Urban Design Prioritisation Strategy








Brimbank, Hobsons Bay and Hume City Councils undertook a pilot study to develop a methodology and develop a multi-criteria framework to prioritise locations for stormwater interventions. Brimbank has subsequently undertaken designs for three stormwater harvesting installations and has expanded the assessment to include the Sunshine National Employment and Innovation Cluster, an area of jobs growth and strategic infrastructure investment on the border of the Werribee and Maribyrnong catchments. Brimbank proposes to build on this work to undertake assessment of all sub-catchments within the municipality to develop a prioritised list of projects for construction, subject to a budget being available. There is potential for this work to be expanded across the Werribee catchment.

						
<b>Status</b> <div><div></div><div></div></div>						
<b>Location</b> City of Brimbank						
<b>Collaborative Partners</b> Brimbank City Council, Melbourne Water, Wurundjeri L&CCHCAC, Bunurong LCAC						
<b>Spatial scale</b> Sub-catchment						

## ACTION 5

### Designing for Alternative Water Opportunities








The City of Melton will explore collaboration opportunities with planning authorities, developers and neighbouring Councils to ensure urban planning and design considers alternative water sources at the earliest stages prior to development. This project will identify opportunities to reduce potable water usage, improve resilience to extreme flooding or drought events, and support high-quality open space using alternative supplies, such as stormwater, in several new greenfield developments occurring within the municipality over the next two decades. The potential outcomes of designing for alternative water opportunities could be replicated in other urban and regional growth areas where climate change and stormwater management will be a challenge.

						
<b>Status</b> <div><div></div></div>						
<b>Location</b> City of Melton						
<b>Collaborative Partners</b> Melton City Council, VPA, MW, WW, CWW, Councils, developers, Bunurong LCAC, Wurundjeri L&CCHCAC*						
<b>Spatial scale</b> Sub-catchment						

## ACTION 6

### Enhancing the Port Phillip Bay Ramsar Wetlands








Port Phillip Bay (Western Shoreline) is recognised globally as a 'Wetland of International Importance' under the Ramsar Convention. The site regularly sustains more than 20,000 waterbirds and supports vulnerable, endangered or critically endangered species or threatened ecological communities of plants and animals at critical stages in their lifecycle. This important ecological area currently faces increased pressures and stressors, such as invasive species, urban development, climate change and pollution. To address these threats and maintain this complex and important wetland, management interventions and conservation actions are required. This project builds on the work of an established network of groups and landowners working collaboratively to protect and enhance the ecological values of the Port Phillip Bay Ramsar wetlands. Through a range of conservation activities, including weed control, revegetation, habitat protection and augmentation, and community education activities, this project will assist in improving the condition of wetlands and coastal saltmarsh vegetation communities, as well as help support and stabilise a range of bird species.

						
<b>Status</b>						
<b>Location</b>						
Port Phillip Bay Ramsar site						
<b>Collaborative Partners</b>						
Port Phillip and Westernport Catchment Management Authority (PPWCMA), Parks Victoria, Melbourne Water, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*, Hobsons Bay City Council, Friends of Hooded Plover, Conservation Volunteers Australia, Birdlife Australia						
<b>Spatial scale</b>						
Forum area						

## ACTION 7

### Environmental Flows for the Werribee River

Environmental flows support a healthy river environment. Critical to protect the plants, animals and overall health of rivers, wetlands, floodplains and estuaries, environmental flows also provide social, cultural and economic benefits. This project investigates opportunities to improve the ecological values of the Werribee River, including environmental flow and quality, with the introduction of offsets and alternative water sources, such as recycled water and stormwater, and the timing of water releases to the river.

						
<b>Status</b>						
<b>Location</b>						
Werribee catchment						
<b>Collaborative Partners</b>						
Western Water, Melbourne Water, Southern Rural Water, PPWCMA, Wadawurrung, Wurundjeri L&CCHCAC, Bunurong LCAC						
<b>Spatial scale</b>						
Forum area						








## ACTION 8

### Expansion of Greening the Pipeline

This project explores opportunities to transform the heritage-listed Main Outfall Sewer (MOS) reserve, located along the Federation Trail bike path, into a parkland to service a growing population in Melbourne's western suburbs.

The project envisions the creation vibrant community social and recreation spaces that will connect neighbourhoods, enhance active transport options for residents, manage water sensitively for urban greening and cooling benefits, and provide a unique space to meet, play and relax.

The project's collaborative partners are presently focused on Zone 5 of the broader Greening the Pipeline initiative. This 4 km section is one of nine zones along the MOS that together form part of a larger, long term place activation project.









						
<b>Status</b>						
<b>Location</b>						
Werribee catchment						
<b>Collaborative Partners</b>						
Melbourne Water, Wyndham City Council, City West Water, Bunurong LCAC, Wurundjeri L&CCHCAC*, Greening the West, Vic Roads						
<b>Spatial scale</b>						
Sub-catchment						



## ACTION 9

### Extension of Recycled Water Network for Werribee City Centre









This project investigates the extension of the recycled water network to supply the suburbs of Chirnside Park, Wyndham Park and growth across Werribee's city centre. High quality recycled water is currently being supplied to around 3,750 homes in Werribee, Wyndham Vale and Manor Lakes. It will soon be connected to homes in the Cornerstone, Kings Leigh and Vineyard estates. The recycled water originates from Melbourne Water's Western Treatment Plant to City West Water's plant, where it is further processed to improve its quality and then sent to homes and open spaces in the Wyndham area through a dedicated 'purple pipe' recycled water system. An extension of the recycled water network in Werribee's city centre and surrounding communities will support liveability in the region and ensure high quality open spaces can be maintained for future greening and cooling benefits.

						
<b>Status</b>						
						
<b>Location</b>		Werribee				
<b>Collaborative Partners</b>		City West Water, Wyndham City Council, Melbourne Water, Bunurong LCAC, Wurundjeri L&CCHCAC*				
<b>Spatial scale</b>		Growth area				

## ACTION 10

### Irrigation District Modernisation









This project will modernise the Werribee Irrigation District by replacing 40 km of old channel with new pipelines, saving approximately 5 GL of water per year. This is a jointly funded project by Southern Rural Water and the State Government. Water saved from the first three stages of this multi-staged project will be split equally between irrigators and environmental flows to the Werribee River. Pending funding support, the final two stages of the project are scheduled for 2020-21. There is an opportunity for the Werribee IWM Forum to consider the value of investment into the final phases of work and whether further investment in the project will realise value in further water for the environment or other uses.

						
<b>Status</b>						
						
<b>Location</b>		Werribee				
<b>Collaborative Partners</b>		Southern Rural Water, Melbourne Water, Western Water, Victorian Environmental Water Holder, Bunurong LCAC, Wurundjeri L&CCHCAC*				
<b>Spatial scale</b>		Forum area				

## ACTION 11

### IWM Plan for Western Growth

The impact of urban growth on the water cycle in the Werribee catchment is significant. Additional water demand is expected to exceed 35 GL/year, while an additional 21 GL/year of stormwater and 17 GL/year of recycled water will be generated. This IWM Plan for the Western Growth area will identify and evaluate options to service the region and manage the impacts of increased volumes of water on the environment.








						
<b>Status</b>						
						
<b>Location</b>		Western Growth Area, including Werribee				
<b>Collaborative Partners</b>		Melbourne Water, Melton City Council, Wyndham City Council, City West Water, Western Water, Bunurong LCAC, Wadawurrung, Wurundjeri L&CCHCAC, VPA, DELWP				
<b>Spatial scale</b>		Sub-catchment				

## ACTION 12

### Melton Waste to Energy

The Melton Recycled Water Plant will enhance its energy production by repurposing heat and electrical power from biogas generated in the processing of organic waste. The facility will include a dedicated anaerobic digester that will create additional heat and electrical power from the existing biogas co-generation capabilities at the plant.

The facility will reduce greenhouse gas emissions by replacing the use of coal-fired generated electricity. The anaerobic digester will also enhance the digestion process to reduce volatile suspended solids and produce a biosolids product with added value, reducing the costs associated with treating and diluting high-strength organic waste loads, as well as redirect problematic trade waste and regional waste streams that impact on sewer networks and the water recycling process.








						
<b>Status</b> <div><div></div><div></div></div>						
<b>Location</b> Melton Recycled Water Plant						
<b>Collaborative Partners</b> Western Water, Sustainability Victoria, Department of Treasury and Finance, Environment Protection Authority, Dept. Health and Human Services, Melton City Council, Bunurong LCAC, Wurundjeri L&CCHCAC*, water utilities, waste groups and associations, local hospitals						
<b>Spatial scale</b> Sub-catchment						

## ACTION 13

### Nature Links Across the Catchment Landscape

Nature Links cultivate vegetation corridors across the landscape to support the movement and health of native animal species and increase landscape resilience to future climate pressures. In doing so, Nature Links improve landscape amenity and recreation opportunities for local communities.








This project builds on the work of the Grow West project over the past 12 years that has undertaken major revegetation action with many community and funding partners to rejuvenate degraded landscapes around Bacchus Marsh. Working alongside landholders to create new vegetation corridors across public and private land, this project extends the Grow West Nature Link between the Brisbane Ranges and the Lerderderg State Park, and extends the concept to initiate new Nature Links along the length of the Werribee River and between the Brisbane Ranges and the You Yangs.

						
<b>Status</b> <div><div></div><div></div><div></div><div></div></div>						
<b>Location</b> Werribee Forum Area						
<b>Collaborative Partners</b> PPWCMA, Melbourne Water, Southern Rural Water, Parks Victoria, Moorabool Shire Council, Lead West, City of Greater Geelong, Wyndham City Council, Bunurong LCAC, Wurundjeri L&CCHCAC, local Landcare groups						
<b>Spatial scale</b> Forum area						

## ACTION 14

### Potable Water Supply Augmentation for Western Growth








Significant population growth projected for the Western Water service region, in combination with low inflows to local reservoirs, is placing pressure on the region's potable water supplies. Western Water is becoming increasingly reliant on Melbourne's water supply system. However, its current entitlements will likely be insufficient to meet the growing demand for service in the region. This project involves exploring potable water supply augmentations using an IWM approach. Options include further optimising local supplies, creating new local supplies, extending the water grid to access supplies from outside the region, and trading water allocations.

						
<b>Status</b> <div><div></div><div></div></div>						
<b>Location</b> Western Water Service Region						
<b>Collaborative Partners</b> Western Water, Melbourne Water, Southern Rural Water, Bunurong LCAC, Wadawurrung, Wurundjeri L&CCHCAC						
<b>Spatial scale</b> Sub-catchment						

## ACTION 15

### Recycled Water Network Extension Melton

The lack of access to fit for purpose recycled water has been identified as a barrier to the productive use of green wedge land and public open space irrigation. This project will explore the opportunity to supply Class B recycled water to public open space in the western growth corridor in the City of Melton. The Class B recycled water supply that will transfer Class B recycled water to the Western Irrigation Network will be augmented to enable supply through the growth area and green wedge.








						
<b>Status</b>		<div><div></div><div></div></div>				
<b>Location</b>		City of Melton				
<b>Collaborative Partners</b>		Western Water, Melbourne Water, Southern Rural Water, Bunurong LCAC, Wadawurrung, Wurundjeri L&CCHCAC				
<b>Spatial scale</b>		Sub-catchment				

## ACTION 16

### Reducing Salinity in Recycled Water from the Western Treatment Plant

The reliability of irrigator entitlements has decreased since the Millennium Drought. To improve water security for irrigators, the Western Irrigation District has a bulk supply of 11 GL of Class A recycled water from the Western Treatment Plant. However, the water has high levels of sodium, which impacts crop growth and causes sodicity issues in the soils that reduce permeability and cause soil dispersion. Sodicity issues add significant cost to production and could threaten the sustainability of the Western Irrigation District.








This project aims to analyse options to reduce the salinity of the water, including reverse osmosis, shandying with other streams of recycled water, and shandying with potable water. Reducing the salinity of the recycled water by 30 to 50 per cent would enable sustainable use of recycled water, reduce costs of production for irrigators and potentially free up river water for other uses, including potable use or environmental flows.

						
<b>Status</b>		<div><div></div><div></div></div>				
<b>Location</b>		Werribee				
<b>Collaborative Partners</b>		Melbourne Water, Southern Rural Water, Western Water, Wadawurrung				
<b>Spatial scale</b>		Inter-forum				

## ACTION 17

### Reimagining Arnolds Creek

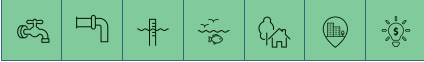
The Reimagining Your Creek project aims to create a vibrant and beautiful linear park and open space reserve for Melton residents to connect and interact with nature. At present, neighbourhoods in the region are divided by the existing Arnolds Creek concrete drainage channel, an unsightly, dry and underutilised parcel of land with little shade or amenity. Alongside community partners and stakeholder representatives, Melbourne Water has co-designed a plan to re-naturalise the creek environment and revitalise more than one kilometre of land at the heart of Melton. The old drainage channel will be transformed with vegetation and high-quality landscaping to cool the region, new community amenities, such as benches and tables, and shared use bicycle and walking paths to better connect neighbourhoods to nearby schools, shops and community services.

						
<b>Status</b>		<div><div></div><div></div><div></div></div>				
<b>Location</b>		City of Melton				
<b>Collaborative Partners</b>		Melbourne Water, Melton City Council, Western Water				
<b>Spatial scale</b>		Sub-catchment				

## ACTION 18

### Werribee Catchment IWM Strategy

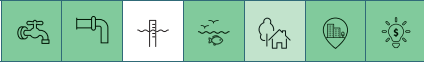
An IWM strategy at the catchment-scale will guide the Werribee Forum Members to effectively contribute to achieving the Forum's vision and strategic outcomes. The Forum will first define a plan to deliver an IWM strategy in collaboration with all Werribee IWM Forum Members and Working Group members. The plan will be executed by the Forum and supported by agreed governance.

						
<b>Status</b>	<div> <div></div> <div></div> </div>					
<b>Location</b>	Werribee Forum Area					
<b>Collaborative Partners</b>	Werribee Forum partner organisations					
<b>Spatial scale</b>	Forum area					

## ACTION 19

### Western Irrigation Network

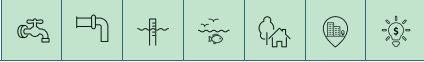
The significant population growth taking place through the Sunbury and Melton growth areas will create a substantial volume of recycled water, which will need to be managed to minimise impact on the environment. The Western Irrigation Network is exploring the use of this recycled water to create a new agricultural irrigation district. The utilisation of the recycled water in this way will not only protect the environment while keeping costs to customers low, but it will also add to the local economy and improve the agricultural productivity of the region.

						
<b>Status</b>	<div> <div></div> <div></div> </div>					
<b>Location</b>	Gisborne, Sunbury, Melton, Bacchus Marsh					
<b>Collaborative Partners</b>	Western Water, Moorabool Shire Council, Melton City Council, Hume City Council, City West Water, Southern Rural Water (advisory), Melbourne Water, Bunurong LCAC, Wurundjeri L&CCHCAC					
<b>Spatial scale</b>	Inter-forum					

## ACTION 20

### Western Water's Development IWM Plan Guidance

Western Water has issued guidance for land developers across their region to put together IWM Plans at the development scale. Development IWM Plans facilitate a more holistic approach to urban water management that enables development and the increased demand for water services while also mitigating environmental degradation and the effects of climate change. Planning with an IWM approach and implementing IWM solutions aims to ensure the best value infrastructure is provided for customers and the resulting services will support thriving, liveable communities.

						
<b>Status</b>	<div> <div></div> <div></div> <div></div> </div>					
<b>Location</b>	Western Water Service Region					
<b>Collaborative Partners</b>	Western Water, Moorabool Shire Council, Melton City Council, Hume City Council, Macedon Ranges Shire Council, Melbourne Water, VPA, Bunurong LCAC, Wurundjeri L&CCHCAC					
<b>Spatial scale</b>	Greenfield subdivision					

# Strategic enablers to put IWM into practice

The IWM Forums were established in Victoria to identify, coordinate and prioritise place-based and catchment-wide opportunities that would most benefit from collaborative water cycle planning and management.

Alongside these opportunities, the IWM Forum Members identified a range of barriers that could prevent effective implementation of IWM across metropolitan Melbourne and regional Victoria.

The DELWP Water and Catchments Group is responsible for addressing these barriers to implementation in a holistic manner alongside relevant government organisations involved in land use planning and land management.

Advisory groups drawing on industry and independent expertise support DELWP in the development and implementation of strategic initiatives to fill knowledge gaps and address issues identified through the IWM Forum process.

Barriers to IWM are reviewed, with local implications and potential state-wide resolutions, or strategic enablers, discussed. These discussions will help DELWP determine potential options for policy reform and associated areas of impact for industry sectors and organisations.

Advisory groups provide advice regarding areas where planning, water, local government and other arms of government need to work more collaboratively to maintain and enhance the liveability and resilience of Victoria's cities and towns.



Williams Landing parkland. Courtesy: Melbourne Water



# Success stories

## Alternative water supports liveability and resiliency in the west

The suburb of Toolern, in Melbourne's outer west, is one of several growth areas earmarked for significant suburban development in the coming years. By 2030, more than 50,000 new residents will make Toolern their home. With the incoming growth, secure water supply is a challenge due to a naturally occurring rain shadow effect that creates unreliable regional rainfall patterns and dry land conditions.

To ensure incoming residents could benefit from social amenities, such as recreational green spaces, and reduce the need to draw water supply from potable sources outside the region, Western Water and a range of

stakeholders collaborated to integrate water management solutions into the early planning stages of Toolern.

In partnership with Melbourne Water, Southern Rural Water, Melton City Council, State Government, developers and the community, Western Water conceived the Toolern Stormwater Harvesting Scheme. This scheme reduces drinking water use and increases alternative water supply solutions in the region.

Through the scheme, urban stormwater water run-off is captured, reducing the impact of the stormwater on local waterways and the environment. The stormwater is then supplied to agriculture, freeing up potable water for its highest value use as drinking water in Toolern and other Western Water communities.

To complement the Stormwater Harvesting Scheme, water and sustainability targets were included within Toolern's Precinct Structure Plans to ensure land developers would invest in water to add value to their development, increasing the area's liveability and resilience to climate extremes. Blue-green infrastructure, such as wetlands and rain gardens, helped provide enhanced biodiversity outcomes and micro-climate benefits to keep the Toolern region cool and green.

With strong integration to its natural water environment, Toolern now proudly stands as one of Victoria's first water neutral suburbs.



Toolern wetland. Courtesy: Western Water



Williams Landing parkland (Greening the Pipeline). Courtesy: Melbourne Water

### Greening the Pipeline Pilot Park, Williams Landing

The Main Outfall Sewer (MOS) is a 27 km heritage-listed sewerage channel that runs through several of Melbourne's western suburbs. Built in the 1890s, it was the largest civil engineering project ever undertaken in Victoria. In 1993, the MOS was decommissioned and what remained of the unused concrete lined channels created a physical barrier and potential safety hazard for local communities. Located in an urban growth region with few existing green spaces and high heat stress vulnerability, the MOS pipeline reserve was ripe for revitalisation.

The Greening the Pipeline Pilot Park at Williams Landing has transformed a portion of the old reserve into a well-used public space that celebrates heritage and links communities in the west. A partnership between Melbourne Water, Wyndham City Council, City West Water, VicRoads and State Government, the linear park responds to local needs for improved connectivity, active transport and vibrant open spaces for health and wellbeing, providing a unique place for social engagement and recreational activities in a once isolating and underutilised area.

To counteract the risk of heat stress, shady vegetated spaces line the old channel. As a demonstration site for best practice integrated water management, the park is fitted with

assets to capture, filter and reuse local stormwater to irrigate grass, shrubs and trees along the reserve. The result is a cooler, more comfortable microclimate and new habitats for native species.

Solar lights through the park demand little energy and keep the area active and safe, while a shared use bicycle and pedestrian path links suburbs from Brooklyn to Werribee, improving liveability and providing physical and mental health benefits.

Thanks to the success of the Greening the Pipeline collaborations, investigations are underway to co-design the entire length of the MOS reserve into a world-class linear park.



# Continued success through collaboration

IWM is an evolving process that seeks to coordinate and balance many views and interests in the water sector around common goals and agreed outcomes.

IWM Forums collaborate and oversee ongoing IWM planning. The IWM Forum cycle is summarised at right.

Phase One of the IWM Forum cycle has established an enabling environment for Victoria's water sector stakeholders to develop shared IWM objectives and overcome sectoral, institutional and geographic boundaries through collaboration. This phase was guided by the experience and knowledge of the Forum Members.

Phase Two of the IWM Forum cycle will assume a more strategic approach to successful IWM implementation and planning for the Forum Area. This phase will include the development of catchment-wide IWM strategy to inform IWM investments.

Phase Two will also provide an opportunity for IWM Forum Members to update relevant organisational policies, plans and strategies to reflect the outcomes of the IWM Forum.

It is anticipated that the IWM Forum collaborative partners will continue use their best endeavours to advance priority IWM initiatives through regular meetings and future Forums.







Forum Members will also assess the feasibility of additional IWM opportunities identified in Phase One (refer to Appendix).

Phase Two will create an opportunity to evaluate and share learnings from Phase One. It will also optimise resources and explore the development of innovative tools and approaches that plan for, and respond to, water supply and demand in the future.

Phase Three prepares the Forum to refresh the Strategic Directions Statement and review the progress of strategic enablers for IWM.



Western Treatment Plant wetlands. Photographer: David Paul

	Outcomes	Participants	
Phase I			
	<b>Establish</b>  Organisational leaders come together in collaborative IWM Forums and Working Groups to discuss integrated water management challenges, opportunities and priorities for each region	Preliminary work on regional characterisation and collaborative governance  Agree vision, objectives and goals  Agree criteria for selection and prioritisation of IWM opportunities  IWM opportunities identified and prioritised  Collaboratively develop and endorse Strategic Directions Statement for each region	Local governments  Catchment Management Authorities  Water corporations  Traditional Owners  Department of Environment, Land, Water and Planning  Chair  Others as relevant
↓			
Phase II			
	<b>Planning</b>  Cultivate a collaborative culture to progress IWM opportunities	Co-design and agree on Terms of Reference, governance structure, stakeholder engagement and/or community participatory planning guidance for IWM project/strategy	Collaborative partners  Community representatives  Others as relevant
↓			
	<b>Progress</b>  Forum Members use best endeavours to progress IWM opportunities to next stage	IWM Project Groups initiate work as per identified project/strategy status, including: feasibility assessment; technical and economic analysis; cost allocation; business case development  Strategic enablers for IWM progressed by DELWP with support from Forum Members  IWM Project Groups report progress to IWM Forums	Collaborative partners  Individual organisations who have committed to a project/strategy  Community representatives  Relevant stakeholders
↓			
	<b>Incorporate</b>  Collaborative Partner organisations incorporate relevant elements of IWM in their own plans, guidelines or frameworks	IWM Project Groups to take IWM commitments (projects and strategies) to their Board or Councils for investment endorsement  IWM Project Groups incorporate elements into their own organisational planning systems, e.g. Council and corporate plans, Construction Guidelines, etc.  Report back to IWM Forum	Individual organisations who have committed to deliver a project/strategy
↓			
	<b>Realise</b>  IWM benefits are realised following implementation of project/strategy	Application of practical IWM tools and innovative approaches  Additional community value added through participatory planning  Monitoring and evaluation of key measures and outcomes  Economic savings through shared resources, costs, etc.  Improved resilience and liveability of cities and towns	Collaborative partners  Individual organisations who have committed to a project/strategy  Community representatives  Others as relevant
↓			
Phase III			
	<b>Prepare</b>  IWM Forums prepare to refresh the Strategic Directions Statement	Collaborative partners prepare for next round of IWM Forums  IWM Forums collaboratively review key learnings and outcomes from Phase I & II, including catchment-scale IWM Strategy and progress on strategic enablers  Next round of IWM opportunity identification and prioritisation	Collaborative partners



#### Next 12-18 months

The feasibility of IWM opportunities will be continually reviewed and assessed in Phase II to confirm the need for specific IWM projects/strategies






































# Appendix

## Additional IWM opportunities in the Werribee catchment

The following list of additional IWM opportunities was identified by the Werribee IWM Forum in the first phase of the IWM Forum cycle.

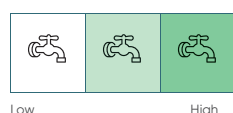
Further assessment will be required by the collaborative partners to progress these opportunities through the IWM Forum.

The list captures potential future priorities for the Werribee IWM Forum.

IWM Opportunity	Collaborative partners	Strategic outcome areas						
Environmental Accounts for Werribee	Port Phillip and Westernport CMA, Commissioner for Environmental Sustainability (Victoria), Melbourne Water, Parks Victoria, local councils, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*, Wentworth Group							
Healthy Waterways Strategy Stormwater Management Opportunities	Melbourne Water, Councils, Environment Protection Authority, Victorian Planning Authority, water corporations, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*, industry stakeholders, VicRoads, Victorian Environmental Water Holder							
Improving Soil and Land Management to Protect Waterways	Port Phillip and Westernport CMA, Councils, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*							
Substitution of Irrigation Demands with Fit for Purpose Alternative Water Supplies	Western Water, Melbourne Water, Southern Rural Water, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*							
Urban Cooling Program for Bike and Pedestrian Paths	Melbourne Water, Councils, community groups, Wadawurrung, Bunurong LCAC, Wurundjeri L&CCHCAC*							

\*The Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation will remain informed of progress related to this IWM opportunity.

### Shade scale



Level of shading refers to the degree of impact the IWM opportunity has on each strategic outcome area. Dark shading represents highest impact.



# Understanding the Werribee River catchment as a system

The Werribee River crosses four municipal regions – Hepburn Shire, Moorabool Shire, City of Melton and Wyndham City. As it flows downstream from its origin in the Wombat State Forest, water is taken out of the river system to supply urban and rural centres, irrigation districts and private diverters licensed to use water for agriculture. The Werribee River is also used for leisure fishing, water sports and other recreational uses.

There has been significant work completed to develop an understanding of the Werribee River catchment as a holistic system requiring integrated water management and balanced distribution to support its diverse user groups. Southern Rural Water, Melbourne Water, Western Water and the Department of Environment, Land, Water and Planning (DELWP) have collaboratively initiated and progressed this work, consulting other stakeholders at various stages. Options to improve water security for the Werribee and Bacchus Marsh Irrigation District have been examined, as have investigations to manage the increased volumes of wastewater and stormwater generated in growth areas west of Melbourne and opportunities to address flow deficits in the Werribee System.

Balancing the health of the many interlinked creeks and tributaries through the Werribee River system is a complex challenge. The Werribee River's lower reaches are currently flow stressed, with rapid development in areas such as Melton and North Wyndham Vale further altering flows and negatively impacting the ecological health of waterways in the system into which wastewater treatment plants discharge and stormwater drains flow.

The *Melton and North Wyndham Vale IWM Analysis (2015)* sought to address water servicing options to meet growing demands in urbanising areas where additional volumes of recycled water and stormwater presented environmental challenges to the Werribee River system. This work was not pursued to its conclusion. The Werribee IWM Forum has developed a statement of urgency to address growth area scale integrated water planning in the west. Among its recommendations was that work undertaken in the Melton and

North Wyndham Vale IWM Analysis be concluded and further analysis be commenced for other growth and infill areas to enable clarity for planning and development on water-related assets.

Other work to date on this issue includes:

- IWM analysis for the Werribee River system, comprising:
  - Stage 1: Opportunity Identification: Identified various IWM options, not mutually exclusive, which could increase irrigation water security and improve waterway health.

- Stage 2: Opportunity  
Development: Developed four of the IWM Opportunities identified in Stage 1 to understand feasibility. These opportunities were:
  - > Provision of Recycled Water to Bacchus Marsh Irrigation District
  - > Modernising the Bacchus Marsh Irrigation District
  - > Supply of recycled water (from Melton Recycled Water Plant) or stormwater to Werribee River
  - > Piping the Werribee Irrigation District

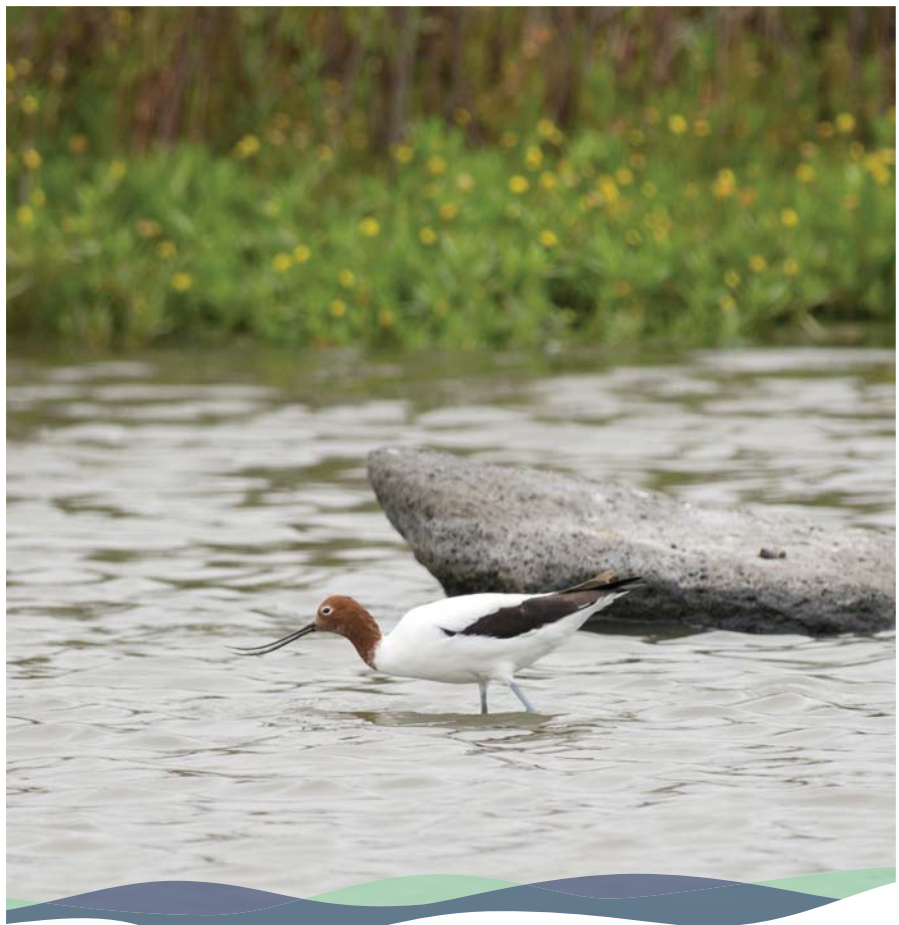
- Werribee River Impacts Study:  
An ecological risk assessment of the impact alternative water (stormwater or recycled water) delivery to the Werribee River might have on waterway health (positive and negative).
- Werribee River Waterways Investigation: Assessed the conditions under which alternative water delivery to the Werribee River might satisfactorily comply with the risks assessed.
- Western Irrigation Network (WIN) business case and feasibility reports.

Since this work, Southern Rural Water has progressed implementation of modernising the irrigation districts.

Many stakeholders are involved in the decision-making to address the challenges of the Werribee River catchment system. For example, as the waterway manager, Melbourne Water is responsible for managing

the health of the Werribee River. Water, sewerage and recycled water for urban areas are managed by City West Water and Western Water, whilst Southern Rural Water manages the Werribee River system's main storages: Pykes Creek Reservoir, Melton Reservoir and Merrimu Reservoir and the supply of water to irrigation districts. Irrigation district water entitlement holders also play a significant role in the management of the Werribee River system. Local government has a role in stormwater management, land-use planning and irrigation of public open spaces.

An integrated approach to water planning and management will ensure the balance of supply security for urban and irrigation needs with the management of stormwater and recycled water discharges to waterways and the provision of environmental flows for ecological health. The Werribee IWM Forum can facilitate further analysis of the system's interactions and decision-making by providing an oversight view that considers the costs and impacts for the whole community and environment across the Werribee River system.



Red-necked Avocet at the Western Treatment Plant. Photographer: David Paul

# Glossary of terms

## Aboriginal Victorians

An Aboriginal Victorian is a person of Aboriginal descent who identifies as an Aboriginal and is accepted as such by the Victorian Aboriginal community in which he or she lives.

## Algal blooms

A rapid increase in the population of algae that can occur in waterways, often caused by excess nutrients (particularly phosphorus and nitrogen).

## Allocation

Water that is actually available to use or trade in any given year, including new allocations and carryover.

## Assets

Assets are resources that provide benefit. This includes, for example, infrastructure such as treatment plants, pipes and pumps, water assets such as dams, bores and wetlands, and community assets such as sporting facilities, public gardens and street trees. Natural assets are assets of the natural environment, for example waterways and vegetation, also known as natural capital.

## Aquifer

An underground layer of rock or sediment that holds water and allows water to flow through it.

## Aquifer Storage and Recovery (ASR)

The recharge of an aquifer via a well for subsequent recovery from the same well.

## Biodiversity

The numbers and variety of plants, animals and other living beings, including micro-organisms, across our land, rivers and oceans. It includes the diversity of their genetic information, the habitats and ecosystems in which they live and their connections with other life forms.

## Catchment

An area where water falling as rain is collected by the landscape, eventually flowing to a body of water such as a creek, river, dam, lake or ocean; or into a groundwater system.

## Catchment management authorities (CMAs)

The *Catchment and Land Protection Act 1994* established 10 catchment and land protection regions, each with a catchment management authority responsible for the integrated planning and coordination of land, water and biodiversity management.

## Central business district (CBD)

Melbourne's original 'Hoddle Grid' street layout bounded by the Yarra River, Spring Street, La Trobe Street and Spencer Street, as well as the triangular area to the north bounded by Victoria, Peel and La Trobe streets.

## Climate change

A long term change of the earth's temperature and weather patterns, generally attributed directly or indirectly to human activities such as fossil fuel combustion and vegetation clearing and burning.

## Climate change mitigation

Actions that prevent or reduce emissions of greenhouse gases that contribute to climate change.

## Coastal flooding

Inundation along the coastline mainly due to flooding from the sea associated with storm surge. It may also include additional flooding caused by heavy rainfall.

## Community

Includes individuals, public and private landholders, community groups and business owners.

## Connectivity

Connections between natural habitats, such as a river channel and adjacent wetland areas. Connectivity is a measure or indicator of whether a waterbody (river, wetland, floodplain) has water connections or flow connections to another body.

## Department of Environment, Land, Water and Planning (DELWP)

Supports Victoria's natural and built environment to ensure economic growth and liveable, sustainable and inclusive communities. The department assists the minister, develops and implements state policies and programs, and oversees the administration of organisations including catchment management authorities.

## Ecosystem

A dynamic complex of plant, animal, fungal and microorganism communities and the associated non-living environment interacting as an ecological unit.

**Entitlement (or water entitlement)**

Authorisation to take water issued in accordance with the *Water Act 1989*. It includes bulk entitlements, environmental entitlements, water shares, and surface water and groundwater licences (also known as take and use licences).

**Environmental water**

Water to support environmental values and ecological processes.

**Fit for purpose (water quality)**

Water of a quality that is appropriate for its intended use.

**Flash flooding**

Sudden and unexpected flooding caused by sudden local heavy rainfall or rainfall in another area. Often defined as flooding which occurs within six (6) hours of the rainfall event.

**Floodplain**

Low-lying land adjacent to a river or stream with unique ecosystems dependent on inundation from flood events.

**Flow**

Movement of water – the rate of water discharged from a source, given in volume with respect to time.

**Gigalitre**

One billion (1,000,000,000) litres. One gigalitre is the equivalent of approximately 400 Olympic size swimming pools.

**Green-blue infrastructure**

Green infrastructure refers to key vegetation features such as street trees, parklands, grassed sports fields and vegetated walls. Blue infrastructure refers to key waterways, wetlands, recreational lakes, stormwater retarding basins,

or other water body features. Green-blue infrastructure brings these assets together through integrated approaches to deliver community benefits.

**Greenfield land**

Undeveloped land identified for residential or industrial/commercial development, generally on the fringe of metropolitan Melbourne.

**Groundwater**

All subsurface water, generally occupying the pores and crevices of rock and soil.

**Growth areas**

Locations on the fringe of metropolitan Melbourne designated in planning schemes for large-scale transformation, over many years, from rural to urban use.

**Heritage River Area**

Land in particular parts of rivers and river catchment areas in Victoria which have significant nature conservation, recreation, scenic or cultural heritage values. These areas are identified and protected under the *Heritage Rivers Act 1992*. There are 18 Heritage River Areas in Victoria.

**Impervious area**

A surface or area within a catchment that significantly restricts the infiltration of water. Impervious surfaces can include concrete, road surfaces, roofs and saturated ground such as a lake or pond.

**Infill**

Development of unused or underutilised land in existing urban areas.

**Infrastructure**

Basic facilities and networks needed for the functioning of a local community or broader society.

**Integrated water management (IWM)**

A collaborative approach to planning that brings together all elements of the water cycle including sewage management, water supply, stormwater management and water treatment, considering environmental, economic and social benefits.

**Integrated Water Management Forum**

A meeting of urban water management organisations to identify, prioritise and commit to the investigation of integrated water management opportunities.

**Integrated water management opportunity**

A servicing need that has the potential to leverage broader benefits when undertaken collaboratively, using an integrated water management approach.

**Irrigation district**

An area declared under the *Water Act 1989* that is supplied with water by channels and pipelines used mainly for irrigation purposes.

**Liveability**

A measure of a city's residents' quality of life, used to benchmark cities around the world. It includes socioeconomic, environmental, transport and recreational measures.

**Managed Aquifer Recharge (MAR)**

The intentional recharge of water into an aquifer either by injection or infiltration and recovery by planned extraction.

**Megalitre (ML)**

One million (1,000,000) litres.

## **Metropolitan Melbourne**

The 31 municipalities that make up metropolitan Melbourne, plus part of Mitchell Shire within the urban growth boundary.

## **National employment and innovation clusters (NEIC)**

Designated concentrations of employment distinguished by a strong core of nationally significant knowledge sector businesses and institutions that make a major contribution to the national economy and Melbourne's positioning in the global economy.

## **Open space**

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

## **Potable**

Water of suitable quality for drinking.

## **Productivity**

The economic value produced for an hour of work or a dollar of investment. Increasing productivity is a key source of economic growth and competitiveness.

## **Project**

A planned set of interrelated tasks or activities to be executed over a defined period and within certain cost and other considerations, to achieve a goal.

## **Rainwater**

Water that has fallen as rain or has been collected from rainfall.

## **Ramsar Convention**

Defined by section 4 of the *Commonwealth Water Act 2007* as the Convention on Wetlands of International Importance especially as Waterfowl Habitat done at Ramsar, Iran, on 2 February 1971.

## **Ramsar wetlands**

Wetlands of international importance, designated under the Ramsar Convention.

## **Recreational water or recreational benefits**

The objectives and benefits that recreational users and community members associate with the use of water, reservoirs and waterways for recreational activities. These objectives and benefits include wellbeing and enjoyment, derived from social interaction, physical activity and relaxation associated with activities including sporting events, fishing, water skiing and rowing, camping, walking and gathering with friends and family. It also includes flow-on economic benefits to local communities from visitors to regional areas to make the most of these opportunities.

## **Recycled water**

Water derived from sewerage systems or industry processes that is treated to a standard appropriate for its intended use.

## **Regional Victoria**

Includes all municipalities outside metropolitan Melbourne (except part of Mitchell Shire within the urban growth boundary).

## **Reservoir**

Natural or artificial dam or lake used for the storage and regulation of water.

## **Resilience**

The capacity of individuals, communities, institutions, businesses, systems and infrastructure to survive, adapt and grow, no matter what chronic stresses or shocks they encounter.

## **Riparian**

Refers to land or vegetation that adjoins a river, creek, estuary, lake or wetland.

## **Riverine flooding**

Inundation of normally dry land occurring when water overflows the natural or artificial banks of a creek or river. Also called main channel flooding.

## **Runoff**

The portion of rainfall which actually ends up as streamflow, also known as rainfall excess.

## **Sewage**

Wastewater produced from households and industry.

## **Sewerage**

The pipes and plants that collect, remove, treat and dispose of liquid urban waste.

## **State-significant industrial precincts (SSIP)**

Strategically located land available for major industrial development linked to the Principal Freight Network and transport gateways.

## **Stormwater**

Runoff from urban areas. The net increase in runoff and decrease in groundwater recharge resulting from the introduction of impervious surfaces such as roofs and roads within urban development.



## **Stormwater flooding**

Inundation by local runoff. Stormwater flooding can be caused by local runoff exceeding the capacity of an urban stormwater drainage system or by the backwater effects of mainstream flooding causing the urban stormwater drainage system to overflow.

### **Strategy**

A high-level direction designed to achieve an outcome, or a set of outcomes related to IWM, over a defined time period for a defined geographic location.

### **Traditional Owners**

People who, through membership of a descent group or clan, are responsible for caring for Country. Aboriginal people with knowledge about traditions, observances, customs or beliefs associated with a particular area. A Traditional Owner is authorised to speak for Country and its heritage.

### **Urban greening**

Growing plants wherever possible in cities to contribute to urban vegetation coverage, and providing a connection to nature.

### **Urban heat-island effect**

When the built environment absorbs, traps, and in some cases directly emits heat, causing urban areas to be significantly warmer than surrounding non-urban areas.

## **Urban renewal**

The process of planning and redeveloping underutilised medium and large-scale urban areas, precincts or sites for mixed land-use purposes.

### **Urban water cycle**

The cycle of water through urban environments. Distinguished from the natural urban water cycle by the transfer of water through built infrastructure and the high runoff rates generated by impervious surfaces.

### **Use (water use)**

The volume of water diverted from a stream or groundwater bore. It is not the same as 'use' by the end consumer of the water.

### **Wastewater**

Water that has had its quality affected by human influence, deriving from industrial, domestic, agricultural or commercial activities.

### **Water corporations**

Victorian Government organisations charged with supplying water to urban and rural water users. They administer the diversion of water from waterways and the extraction of groundwater. Formerly known as water authorities.

### **Water infrastructure**

Facilities, services and installations needed for the functioning of a water system.

## **Water sector**

Organisations involved in water management, including water corporations, local government and catchment management authorities.

### **Water sensitive urban design (WSUD)**

Integrating the urban water cycle into urban design to minimise environmental damage and improve recreational and aesthetic outcomes.

### **Waterways**

Rivers and streams, their associated estuaries and floodplains (including floodplain wetlands) and non-riverine wetlands.

### **Waterway condition/ waterway health**

Waterway condition (or waterway health) is an umbrella term for the overall state of key features and processes that underpin functioning waterway ecosystems (such as species and communities, habitat, connectivity, water quality, riparian vegetation, physical form, and ecosystem processes such as nutrient cycling and carbon storage).

### **Wetlands**

Areas, whether natural, modified or artificial, subject to permanent or temporary inundation, that hold static or very slow-moving water and develop, or have the potential to develop, biota adapted to inundation and the aquatic environment. Wetlands may be fresh or saline.



