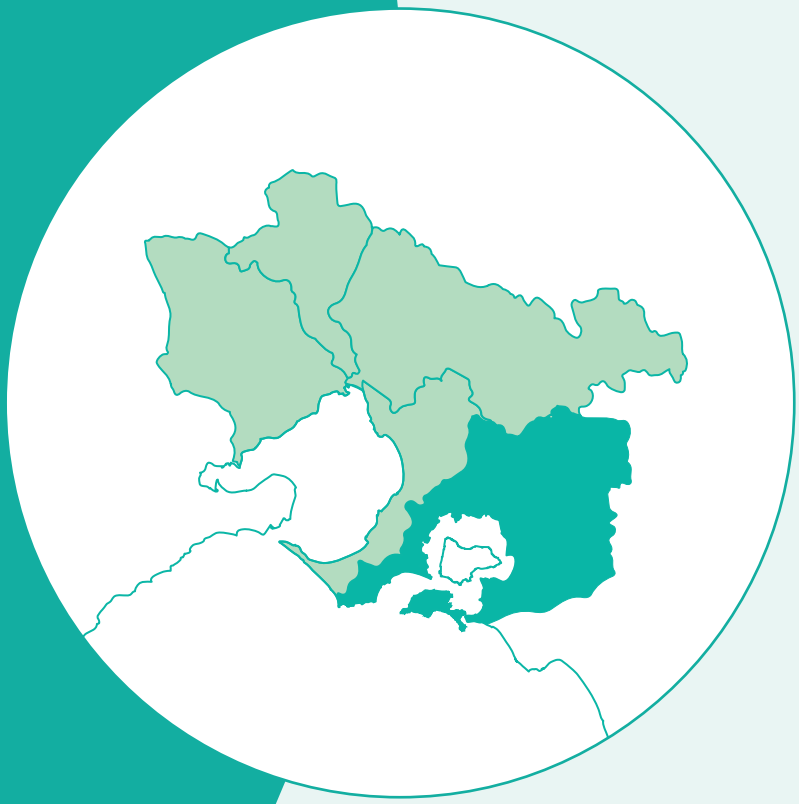
Western Port Catchment Integrated Water Management Plan

Targets Driving Outcomes



Summary
September 2022

Integrated Water Management Forums

VICTORIA State Government | Environment, Land, Water and Planning

Acknowledgement of Victoria's Aboriginal communities

The Victorian Government proudly acknowledges Victoria's Aboriginal communities and their rich culture and pays its respects to their Elders past and present. The government also recognises the intrinsic connection of Traditional Owners to Country and acknowledges their contribution to the management of land, water and resources.

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

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The Western Port Catchment Integrated Water Management Plan has been developed by the Western Port Integrated Water Management (IWM) Forum. Members of this Forum include the Chief Executive Officers and Managing Directors of the following organisations:

Bass Coast Shire Council

Baw Baw Shire Council

Bunurong Land Council Aboriginal Corporation (LCAC)

Cardinia Shire Council

City of Casey

Department of Environment, Land, Water and Planning, State Government of Victoria

Frankston City Council

Melbourne Water Corporation

Mornington Peninsula Shire Council

Port Phillip and Westernport Catchment Management Authority (Melbourne Water from 2022)

South East Water Corporation

South Gippsland Shire Council

South Gippsland Water Corporation

Southern Rural Water Corporation

Victorian Planning Authority

Westernport Water Corporation

This plan represents the collective vision and intent of the Western Port IWM Forum and has been developed through a collaborative process. As a highly complex area, touching on many different functions and responsibilities, it is likely that the path to implementation will have to be adaptive and responsive to new evidence and opportunities that come to light. Accordingly, the Plans will remain dynamic, living documents. The plan development process was facilitated by the Department of Environment, Land, Water and Planning and overseen by the Western Port IWM Forum Working Group. The Plan has been developed with assistance from the Melbourne Catchments Consortium, led by E2Designlab, and supported by Spatial Vision, Tract, Rain Consulting, Water Futures Consulting, Flying Blue Fish and the Cooperative Research Centre for Water Sensitive Cities.

The Western Port IWM Forum is grateful to the Western Port IWM Working Group, the Catchment Expert Groups, the Strategic Oversight Group and other advisors for the time and expertise they dedicated to guide the development of this Plan.

The Western Port Catchment covers the traditional lands of the Bunurong people. The Western Port 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.

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Driving Integrated Water Management at a Catchment Scale

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.

The Western Port Catchment IWM Plan will drive an integrated approach to water management that delivers clear outcomes for the Catchment. It provides a consistent framework to coordinate action by all organisations involved in the management of the water cycle, working together towards a common vision.

Western Port Marina, Victoria. Photographer: Craig Brave

A Catchment Scale IWM plan

By its very nature, IWM requires collaboration and cross-outcome thinking. Often, IWM planning has focussed on specific development areas or organisational boundaries. This has limited opportunities to work together to tackle transboundary issues and recognise the connections across the water cycle at a larger scale. By planning for IWM at the catchment scale we have a unique opportunity to identify and progress strategic interventions that may not be feasible at smaller scales and to focus our attention where we can have the most impact. This approach was introduced in 2017 through the Integrated Water Management Framework for Victoria,[1] and the subsequent formation of IWM Forums across the five major waterway Catchments in the Greater Metropolitan Melbourne Region: Werribee, Maribyrnong, Yarra, Dandenong and Western Port.

The Catchment Scale IWM Plans are part of a broader suite of strategic actions seeking to improve the resilience, liveability and sustainability of our cities and towns. At the regional level, Forum Partners are developing strategies to secure our water supplies over the next 50 years, through the Central and Gippsland Region Sustainable Water Strategy and Water for Life, the Greater Melbourne Urban Water System Strategy. At the local level, councils are developing place-based strategies and plans to adapt to climate change, create and manage green open space, and improve stormwater management. The Catchment Scale IWM Plans provide a way to bridge the gap between regional and local level initiatives by aligning and reinforcing strategic priorities. This enables all partners in IWM to identify and prioritise on-ground initiatives and infrastructure investments that maximise the social, cultural, environmental, and economic values delivered to Victorian communities.

The IWM Forums are the first of their kind in Australia and the Catchment Scale IWM Plans for the Greater Metropolitan Melbourne Region are the keystone for the IWM Program.

Photographer: Chris Kapa. Courtesy: Melbourne Water

This Plan provides the launching pad and a guiding framework for implementation of integrated water management, with IWM Forum partners continuing to work together to identify on-ground projects and initiatives that will deliver the strategic outcomes for the catchment.

The Purpose of the Plan

The collective effort of the Forum Partners over the last few years has culminated in a comprehensive Catchment Scale IWM plan for the Western Port Catchment which sets out clear indicators and measures to assess our progress towards the delivery of the vision and strategic outcomes for the Catchment.

The Plan includes outcome-focussed targets which will guide and inform decision-making and strategic investment of major infrastructure over the next 30 years. The targets were developed by nominated catchment representatives through a Forum-endorsed deliberative process, drawing on the latest evidence and expertise.

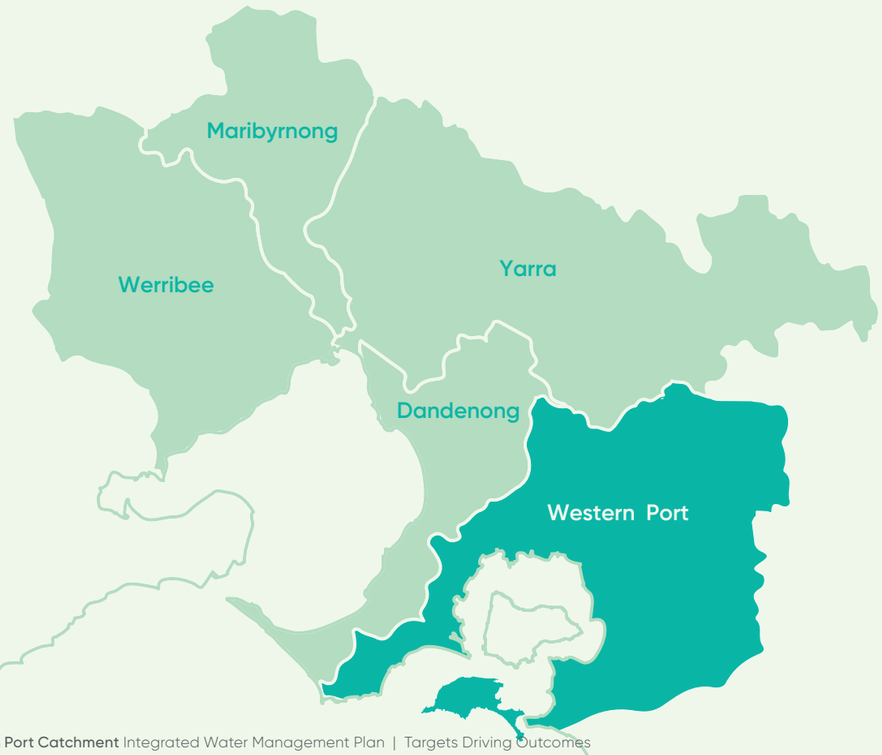
Delivering these targets will require a bold step-change in the way we manage water. The journey to meet our 2050 targets is uncharted and will require ongoing commitment, collaboration and innovation to deliver landmark outcomes for the Western Port Catchment and the communities it supports. Our 2030 targets set us on the trajectory to achieve our strategic outcomes and recognise the opportunities that can be delivered in the short-term.

Introducing the catchment

The centrepiece of the catchment, Western Port, is a semi-enclosed embayment of ecological importance on an international scale and is a unique feature of the Victorian coastline.

The Western Port Catchment extends from Mount Dandenong in the west and following the southern slopes of the Great Dividing Range to San Remo. Its eastern extent follows through to the centre of the Mornington Peninsula and includes Phillip Island.

The landscape of the Western Port catchment varies greatly from agricultural areas, parks, natural woodlands and sandy beaches, to densely populated and expanding urban areas on the fringe of Melbourne.



Adapting to the new normal

In the Western Port Catchment, now, more than ever, we need to re-frame our approach to water management. By working together to create holistic solutions that deliver a range of outcomes across the water cycle, we will create a cooler, greener and more resilient catchment.

Population growth

The Western Port Catchment had an estimated population of 234,000 people in 2016 and is forecast to grow significantly to 604,000 people by 2050.[2] Much of the greenfield growth for southeast Melbourne will occur here over the next two decades. Significant development is predicted for many suburbs across the catchment, particularly those surrounding Pakenham, Cranbourne and Beaconsfield. Large population increases are also anticipated in the Warragul, the Casey Clyde and in the designated growth areas. This considerable population growth and development raises numerous challenges for the region's built and natural water systems over the coming years.

POPULATION GROWTH

234,000 2016
604,000 BY 2050

Climate change

The future climate in the region will be hotter and drier, with lower rainfall expected to reduce inflows to reservoirs and decrease river flows, placing further strain on the water supplies servicing the catchment.[3] While there will be a reduction in average annual rainfall, the Catchment is predicted to see more frequent, intense rainfall events that will increase the risk of flooding, which is already a major challenge for the Western Port catchment. These changes, combined with increased development and growing populations, will place more pressure on water services and waterways in the Catchment.

By 2040, temperatures across the Greater Melbourne Metropolitan Region are expected to rise by an average of 1.3°C under a medium climate change scenario.[4] The risk of fire in forests and grasslands will remain high under these conditions posing a serious threat to the Catchment's communities, infrastructure and high-value native forests including water supply catchments and ecosystems.

Making progress

Catchment Vision

Working together to deliver a secure, affordable and sustainable water cycle across the Western Port Catchment for the betterment of all communities and the environment.

Measures

The vision and strategic outcomes for the Catchment were collaboratively developed by the Forum and described in the **Western Port Strategic Directions Statement** in 2018. This Plan now sets out a series of indicators and measures tailored to assess our progress towards those outcomes, creates a baseline of our current performance and sets targets for 2030 and 2050 to drive our forward journey.

Data from all organisations will be collected and mapped against the Plan's measures to assess our progress over time. The indicators, measures and targets for each strategic outcome, and for the enablers that will underpin delivery of all outcomes, are set out in the following sections of this Plan for the catchment and for the Greater Metropolitan Melbourne Region as a whole, combining all five major catchments.

Safe, secure and affordable water supplies in an uncertain future

1.1A Residential potable water use

1.1B Non-residential potable water use

1.2A Proportion of water use which is provided from alternative water sources

1.2B — Alternative water sources that substitutes potable mains water supply

Effective and affordable wastewater systems

2.1A Recycled water delivered to customers

2.1B Nitrogen recovered at treatment facilities for beneficial use

2.1C Carbon recovered at treatment facilities for beneficial use

Existing and future flood risks are managed to maximise outcomes for the community

3.1 Reduction in Annual Average Damage (AAD) delivered by flood management initiatives

3.2 Effective flood storage volume created as part of multi-functional assets

3.3 Projects that cross-consider IWM and flood mitigation opportunities as part of their design

Healthy and valued waterways and marine environments

4.1 Mean annual runoff volume reduction

4.2a Mean annual Total Suspended Solids (TSS) prevented from discharging to receiving waters

4.2b Mean annual Total Nitrogen (TN) prevented from discharging to receiving waters

4.3 Volume of water secured for the environment to improve waterway health

Healthy and valued urban and rural landscapes

5.1 Street trees that are supported with permanent (active or passive) irrigation from an alternative water supply

5.2a Active public open space (sports fields and organised recreation) supported by an alternative water source

5.2b Passive public open space (parkland and gardens) supported by an alternative water source

5.3 Reduction in land surface temperature attributed to IWM in urban areas

Community values are reflected in place-based planning

6.1a Traditional Owners' capacity to partner in IWM programs, policy, planning and projects

6.1b Other IWM partner organisations' capability to partner with Traditional Owners in IWM programs, policy, planning and projects

6.2 Blue-green infrastructure created or enhanced by IWM as a proportion of land area

6.3 Community literacy regarding the water cycle

6.4 Water is a key element in city planning and design process

Jobs, economic benefits and innovation

7.1a Alternative water supplied to agricultural production

7.1b Alternative water supplied to businesses and industry (>10ML/year)

Enablers

E1 Vision, leadership and long-term commitment through vision statement and objectives articulated in corporate documents

E2 Knowledge, skills and organisational capacity

E3 Cross-sector institutional arrangements and processes

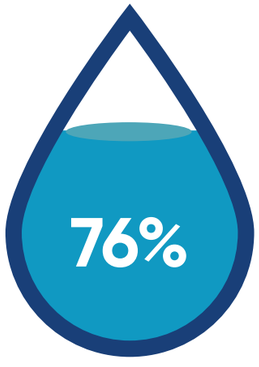
Strategic Outcome 1
Safe, secure and affordable water supplies in an uncertain future

The safety, security and affordability of our water supply can be improved by reducing the demand on our potable water resources. Making the best use of alternative water resources, such as rainwater, stormwater and recycled water can help us reduce our reliance on declining potable water supplies. The indicators and measures in this strategic outcome focus on understanding how we are working to protect and conserve our precious potable water resources, and how effectively we are delivering alternative water supplies.

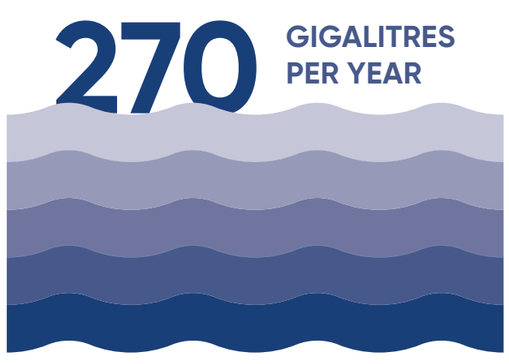
The case for change

Potable water

Potable water in the Western Port catchment is mostly provided from the Melbourne water supply system, along with some local reservoirs systems servicing townships in the south-east of the catchment operated by Western Port Water, South Gippsland Water and Gippsland Water. With the exception of the water supplied from the Victorian Desalination Plant, the surface water supplies to the system are expected to decline in the future as decreasing rainfall and drier landscapes act to reduce the inflows to reservoirs from the water supply catchments. Meanwhile, significant population growth in the Catchment is expected to increase the use of potable water. Modelling of the Melbourne water supply system shows that shortfalls in potable water supply could occur as early as 2028 if actions are not taken now to either reduce demand or increase supplies.[5]



increase in potable water use in the catchment expected by 2050[a]



Potential shortfall in the Melbourne Water system by 2050 under a high climate change and high population growth scenario[b]

7%

DECLINE

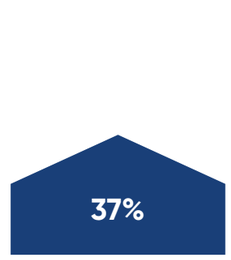
in river water availability in the last assessment period[6]

River water and groundwater

River water and groundwater are drawn on locally in the catchment to support agriculture and rural water users. River water in particular is declining with a changing climate, resulting in reduced flows being available for the environment as well as for water supplies. Groundwater use is concentrated in Groundwater Management Unit (GMU) areas such as the Koo Wee Rup GMU in the Western Port Catchment.

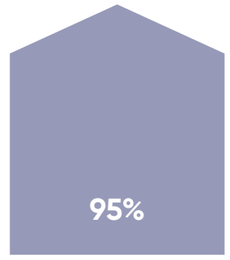
Alternative water sources

While other water resources are expected to decline, alternative water sources are expected to increase in the catchment. In this sense, alternative water sources can be considered sustainable, climate-resilient sources of water. Rainwater runoff from roofs and stormwater runoff from hard surfaces will increase as our catchment becomes more urbanised. Also, as our population grows we will use more water and create more wastewater, contributing to a growing potential recycled water resource.



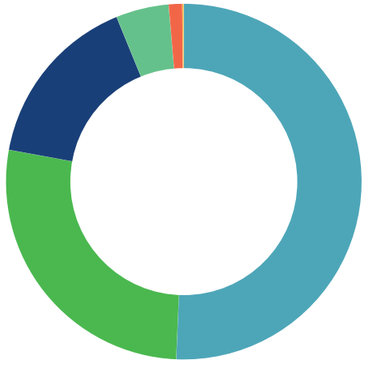
INCREASE

increase in runoff from urbanised areas generated in the catchment expected by 2050[c]



INCREASE

increase in wastewater generated in the catchment expected by 2050[d]



Current mix of water used in the catchment

Water Type	Megalitre/Year
Potable Water	23,581
River Water	12,648
Groundwater	7,428
Recycled Water	2,236
Rainwater	569
Stormwater	61

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
1.1a. Residential potable water use.	Catchment	197 litres per person per day[e]	By understanding residential potable water use on a per person basis, we can learn more about how communities use water, and track our progress in reducing demand for potable water resources in our homes.
	Region	172 litres per person per day[e]	
1.1b. Non-residential potable water use.	Catchment	7 Gigalitres /year	This measure helps us to understand where the hot spots are for non-residential water use, and therefore where we can prioritise initiatives to increase access to alternative supplies or increase efficiency of water use.
	Region	111 Gigalitres /year	
1.2a. Percent of total water use which is provided from alternative water sources.	Catchment	6.2 %	By understanding the full water use picture, we can track our overall progress in matching alternative water use for fit-for-purpose demands.
	Region	12.5 %	
1.2b. Alternative water sources that substitute potable mains water supply.	Catchment	2 Gigalitres/year	By driving an increase in alternative water supplies that will substitute potable water supplies, we will significantly reduce the risk of future shortfalls by diversifying our water supplies and making use of resources that might otherwise be wasted.
	Region	18 Gigalitres/year	

Our targets for the future, as of September 2022

150 litres per person per day by **2024** for the **Greater Melbourne Region** (as per the Central and Gippsland Region Sustainable Water Strategy)

6 Gigalitres/year of alternative water sources that substitute potable mains supply by **2030** for the **catchment**

53 Gigalitres/year of alternative water sources that substitute potable mains supply by **2030** for the **Greater Melbourne Region**

150 Gigalitres/year of alternative water sources that substitute potable mains supply by **2050** for the **Greater Melbourne Region**

Strategic Outcome 2
Effective and affordable wastewater systems

Providing effective and affordable wastewater systems in the region is the remit and responsibility of water corporations, and various performance indicators are already tracked to monitor and drive progress. The indicators and measures selected for this Plan focus on how we can better utilise wastewater as a resource and transition towards a circular economy.

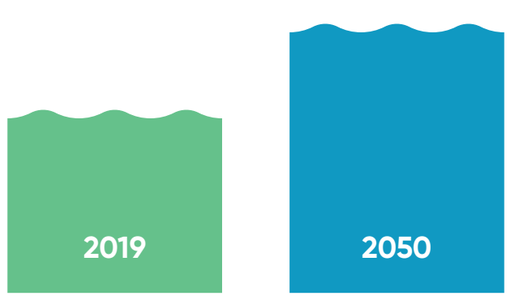
The case for change

Managing our wastewater

The catchment is served by many wastewater treatment plants, including several operated by South East Water located at Somers, Blind Bight, Pakenham, Koo Wee Rup, Lang Lang and Longwarry. Westernport Water also operates local plants at Cowes and Kings Rd, and Gippsland Water operates plants in Drouin and Neerim South.

The provision and efficacy of wastewater management services vary across the catchment. Onsite domestic wastewater systems (septic systems) are located across the Mornington Peninsula and are common for rural properties in the Western Port catchment. Many of these have the potential to pollute waterways, impacting public and environmental health.

Recycled Water Plant. Photographer: Craig Moodie



2 GIGALITRES **3 GIGALITRES**

Treated wastewater produced annually in the catchment which could be recycled, and which will otherwise be released to the environment.[f]

A growing resource

As the population in the catchment grows, so too will wastewater generation, providing further opportunity to utilise treated wastewater from local wastewater treatment plants. The Eastern Treatment Plant is also located nearby in the Dandenong Catchment, and is an important potential source of recycled water for the Catchment, with distribution networks already extending to some parts of the Western Port catchment. Cross-catchment working across the Dandenong and Western Port Catchments will be important to drive reuse opportunities here.

Water For Victoria. Photographer: Craig Moodie. Courtesy: DELWP

N

23%

NITROGEN

from the catchment's wastewater is recovered and used beneficially.[g]

C

9%

CARBON

from the catchment's wastewater is recovered and used beneficially.[g]

Harnessing resources and avoiding waste

Treated wastewater in the catchment is either recycled or discharged into local waterways or to the sea. It has been recognised that we need to move away from a linear 'treat and discharge' system to a 'resource recovery' system to support a circular economy and drive more sustainable outcomes.[7] We have started this journey by progressively using more recycled water. However, there are other resources from wastewater that could also be harnessed to fertilise crops or generate energy.

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
2.1a Recycled water delivered to customers.[h]	Catchment	1.8 Gigalitres /year	This measure gives insight into the use of recycled water to support needs in the community. In achieving the targets for this measure (see below), the Melbourne region will be a world leader in advancing a circular economy and will be on track to beneficially use 100% of our water and resources by 2070 while ensuring affordability for current and future generations of Melburnians.
	Region	44 Gigalitres /year	
2.1b Nitrogen recovered at treatment facilities for beneficial use.[g]	Catchment	23 %	These measures have been chosen to enable tracking of the recovery of two of the more valuable components of wastewater, nitrogen and carbon. The proposed 2050 targets (see below) are based on the concept of a major paradigm shift in how we manage wastewater. These targets will drive a change that re-frames wastewater as a key resource, from which resources can be harvested for beneficial use. The targets give focus to where the greatest impacts can be made - primarily at the Western and Eastern Treatment Plants which service the majority of the region.
	Region	8 %	
2.1c Carbon recovered at treatment facilities for beneficial use.[g]	Catchment	9 %	
	Region	17 %	

Our targets for the future, as of September 2022
85 Gigalitres/year of recycled water delivered to customers by **2030** for the **Greater Melbourne Region**
230 Gigalitres/year of recycled water delivered to customers by **2050** for the **Greater Melbourne Region**
94% nitrogen recovered at treatment facilities for beneficial use by **2050** for the **Greater Melbourne Region**
67% carbon recovered at treatment facilities for beneficial use by **2050** for the **Greater Melbourne Region**

Strategic Outcome 3

Existing and future flood risks are managed to maximise outcomes for the community

Flooding can have major impacts on communities and businesses, and needs to be considered as part of an IWM approach. To date, flood risk management has often been managed separately from the rest of the water cycle, but there are many ways in which flood risk management initiatives can deliver multiple benefits to the water cycle, and in which other stormwater management and greening initiatives can reduce flood risk.

The case for change

Increasing impacts of flooding

The Western Port Catchment contains several areas familiar with the risks and impacts of flood events. Approximately 18 per cent of the Catchment lies in areas subject to inundation or overland flow paths during periods of heavy rain when water build up swells beyond the capacity of drainage systems. These areas include the large and populous shire of Cardinia, communities near the Bass River and the former Koo Wee Rup swamp. The Catchment is expected to see more intense and frequent short duration rainfall events in the summer months, raising further concerns for flood-prone coastal communities along Western Port and the Mornington Peninsula.

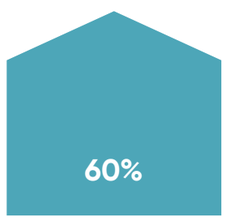
An IWM approach to flood management

An IWM approach can reduce the impacts of flooding from drainage systems by harvesting rainwater or stormwater, retaining more water in the landscape, or creating more storage in catchments to slow flows to the drainage system. Equally, flood management infrastructure such as retarding basins and floodplains can be designed to enhance recreation opportunities and provide greater amenity. Better integration between flood management and other IWM initiatives will ensure we deliver cross-benefits to the community.

$735.5

MILLION

is the estimate of the annual average damage (AAD) caused by flooding in the region (2020 baseline).[8]



INCREASE

in the economic impact of damages from flooding could be seen by 2050 if no action is taken.[8]

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
3.1 Reduction in Annual Average Damage (AAD) delivered by flood management initiatives.	Catchment	Zeroed to 2020 baseline	This measure considers progress in reducing the estimated AAD from flooding through physical interventions, policy changes or education. It is baselined against the AAD estimation for 2020. A 2050 target has been set for the region (see below) which seeks to negate the increases expected due to both climate change and urban consolidation, thereby ensuring that the impacts of flooding in the region do not significantly increase in the future.
	Region	Zeroed to 2020 baseline	
3.2 Effective flood storage volume created as part of multi-functional assets.	Catchment	1,000 m3	This measure seeks to understand how well we are integrating flood mitigation through an IWM process by delivering multi-functional assets that also provide flood storage.
	Region	106,000 m3	
3.3 Projects that cross-consider IWM and flood mitigation opportunities as part of their design	Catchment	Data collection methods under development	This measure is designed to drive a change in practice by building knowledge and stronger relationships between flood management and other aspects of IWM.
	Region		

Our targets for the future, as of September 2022
$11 million[i] reduction in AAD delivered by flood management initiatives by **2030** for the **catchment**
$37 - 102 million[i] reduction in AAD delivered by flood management initiatives by **2030** for the **Greater Melbourne Region**
$408 million reduction in AAD delivered by flood management initiatives by **2050** for the **Greater Melbourne Region**
100% of projects cross-consider IWM and flood mitigation opportunities as part of their design by **2030** and maintained by **2050** for the **catchment** and **Greater Melbourne Region**

Strategic Outcome 4
Healthy and valued waterways and marine environments

An understanding of the health of our waterways and marine environments is crucial to IWM as they interact with many parts of the water cycle and support a range of community and environmental values . This strategic outcome explores how IWM can improve the health of our waterways and bays. It also explores the impacts of the use of river catchments for water supplies and how we are improving the amount of water available for the environment in waterways.

The case for change

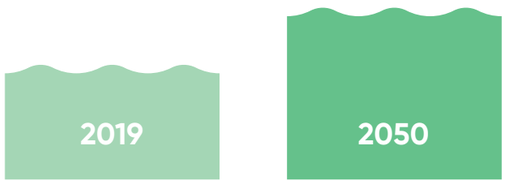
Our waterways and Western Port

The Western Port Catchment contains a vast array of waterways and marine environments, ranging from iconic coastal beaches and large rivers such as the Bunyip and the Tarago, to small creeks popular as fishing, swimming and tourism destinations. Three of Victoria's 13 Marine National Parks are located in the catchment, including the Ramsar-listed Western Port, recognised nationally and internationally for its rich marine ecosystems and diverse habitats. Fringed by the world's southernmost mangroves and saltmarshes, Western Port is home to several of Australia's iconic and protected species of migratory and resident shorebirds, as well as diverse aquatic plants, fish and invertebrates.

The estimated value of the ecosystem services provided by Western Port, including nutrient recycling, fishing and tourism.[10]

Changes in stormwater runoff volumes

Increasingly, the volume of stormwater runoff from urbanised areas entering waterways is being recognised as a key predictor of waterway health.[9] As an area is developed and more hard surfaces are introduced, more stormwater runoff is created and directed to waterways through the drainage system instead of soaking into the ground, evaporating or being absorbed by plants. These large volumes of runoff enter waterways very quickly and with greater intensity, disrupting natural flow patterns and degrading waterway forms and habitats. The Western Port Catchment is predominantly rural, but is becoming increasingly urbanised, changing the volume, location and timing of runoff entering waterways.

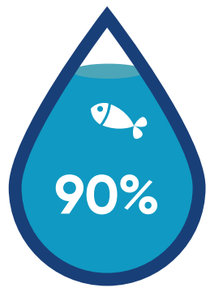


Runoff generated from urban areas in the catchment in excess of that which would runoff a natural landscape, which, if not retained or harvested, is drained to receiving environments.[c]

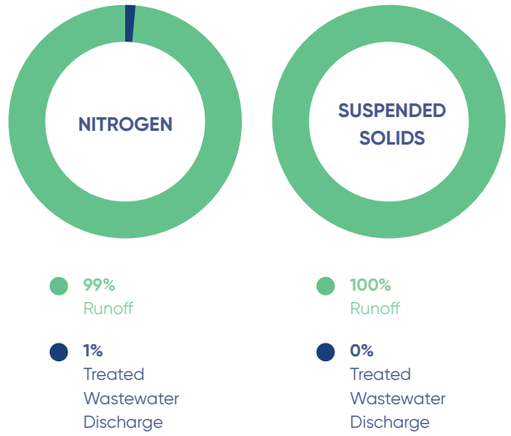
Changes in water quality

Poor or declining water quality in our waterways and receiving environments has long been recognised as an issue in the region.[9] Two key sources of pollution of our waterways and Western Port are land runoff (from both rural and urban areas) and releases of treated wastewater. Over the last three decades, there has been considerable work done in the Melbourne region to improve water quality through improved treatment and local recycling of stormwater and wastewater, and improved management of rural land and our waterway corridors. However, as our population grows, so too will the potential pollution of our receiving environments. The Western Port catchment is largely rural, and land management is a key focus for water quality improvement.

Western Port is a complex system with a large tidal range, extensive intertidal mudflats, and two large islands (Phillip Island and French Island). Much of its coastline is fringed by mangroves and saltmarshes, and there are extensive seagrass meadows on mudflats and below the low tide level. Nutrient transfer via stormwater and wastewater discharges to the bay are a focus for water quality but sediment has been identified as the key indicator of the health of Western Port, and it is believed Western Port Bay is highly sensitive to any further discharges of sediment. Sediment from both urban and rural runoff is a major threat to Western Port.



Current share of the flows in the Bunyip Basin for the environment.[6]



Proportion of pollutants released to the environment in the Catchment.[i]

Environmental flows in waterways

Natural flow patterns in some waterways in the Western Port Catchment have been altered by bulk water supply and irrigation diversions, though the impacts are considerably less in the Western Port Catchment than other catchments. An IWM approach can support changes to catchment management and water supplies that will enable more water to be provided to the environment.

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
4.1 Mean annual urban runoff volume reduction.	Catchment	2 Gigalitres/year	This measure focuses on runoff volume reductions from urban areas, reflecting the desire to reduce the adverse impact that increases in stormwater runoff have on waterways. The targets (see below) aim to remove a majority of anticipated increases in stormwater runoff in targeted locations where our waterways are most vulnerable to flow increases.
	Region	22 Gigalitres/year	
4.2a Mean annual Total Suspended Solids (TSS) prevented from discharging to receiving waters.[j]	Catchment	21,000 tonnes/year	These measures focus on how well we are employing water management techniques to improve water quality by measuring the reduction in two key pollutants transferred to receiving environments. These targets will protect the health of Port Phillip Bay and Western Port.
	Region	211,000 tonnes/year	
4.2b Mean annual Total Nitrogen (TN) prevented from discharging to receiving waters.[j]	Catchment	424 tonnes/year	
	Region	20,363 tonnes/year	
4.3 Volume of water secured for the environment to improve waterway health.	Catchment	3 Gigalitres/year	This measure drives the contribution of IWM to environmental entitlements, which are important for waterways where natural flow patterns have been significantly altered by bulk water supply and/or irrigation diversions.
	Region	22.6 Gigalitres/year	

Our targets for the future, as of September 2022

18 Gigalitres/year and 70 Gigalitres/year of mean annual urban runoff volume reduction by **2030** for the **catchment** and the **Greater Melbourne Region** respectively

38 Gigalitres/year and 197 Gigalitres/year of mean annual urban runoff volume reduction by **2050** for the **catchment** and the **Greater Melbourne Region** respectively

Remove TSS and TN to achieve the marine pollutant load objectives for the **Port Phillip Bay** and **Western Port,** as specified in the Environment Reference Standards 2021[k]

4.3 Gigalitres/year and 53.9 Gigalitres/year of water secured for the environment to improve waterway health by **2032** for the **catchment** and the **Greater Melbourne Region** respectively (as per the Central and Gippsland Region Sustainable Water Strategy)

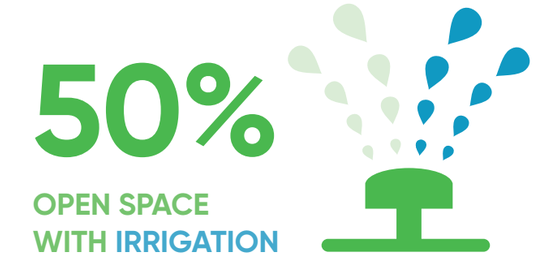
Strategic Outcome 5
Healthy and valued urban and rural landscapes

Water is integral to the health and wellbeing of our landscapes. By supporting and enhancing vegetation and green spaces, water helps to provide greater amenity, better opportunities for recreation, improved ecological value and localised cooling that gives relief to communities during hot weather. Landscapes that harness alternative water supplies can also enhance resilience during droughts, when potable water supplies may be restricted, and provide water to landscapes that may not otherwise receive irrigation.

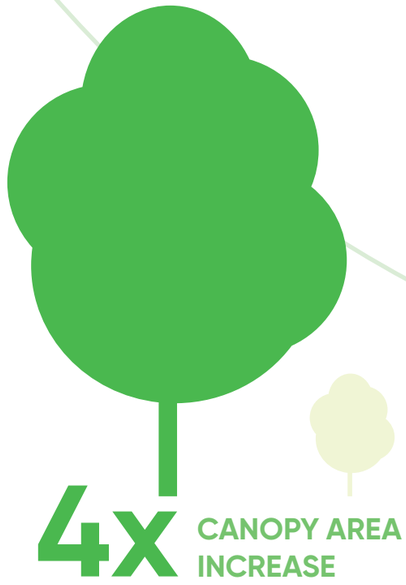
The case for change

Active and passive open space

Public open space is an important asset for communities. These spaces are diverse, including 'active' open space such as sportsgrounds and ovals, and 'passive' open space such as parklands and gardens. Provision of irrigation to these spaces can increase greening and amenity, but also enhance usability and safety for sports. To date, irrigation has been prioritised for active open spaces, but there is increasing recognition of the importance of improving passive open spaces for communities and creating local cooler, greener environments during heat waves. Alternative water supplies can provide irrigation of open space by harvesting stormwater runoff or connecting to a recycled water supply.



The proportion of open space with irrigation which will reduce the average land surface temperature across an urban area by up to 5 degrees Celsius on an extreme heat day.[15]



4X CANOPY AREA INCREASE

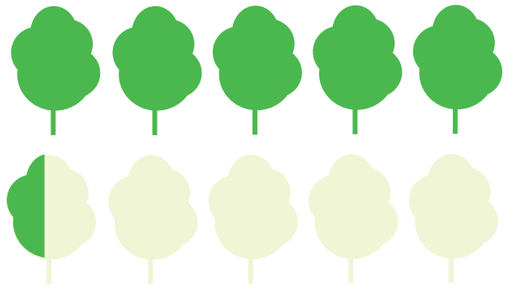
Canopy area increase when irrigation is provided to a street tree planted in typical conditions in urban Melbourne.[14]

Urban heat

Temperatures in urban areas tend to be significantly higher than rural areas because of higher concentrations of paved surfaces that retain heat, and less vegetation cover. Our future climate is likely to be hotter and drier, with increased regularity of heat waves. Heat waves and high temperatures pose a significant threat to human health, particularly for vulnerable populations such as the elderly and young children. The Western Port Catchment has areas with high vulnerability to urban heat, in Cardinia and Casey in particular. Adapting our cities to mitigate the impacts of urban heat through better integration of water and vegetation is a key priority for the Melbourne region, recognising the importance of this for both liveability and resilience.[11]

Trees and canopy cover

The benefits of trees in the urban environment are well-known, providing shade, amenity and biodiversity.[12] Trees with a large, healthy canopy provide the greatest benefits, and provision of irrigation is often necessary to support healthy tree canopies in urban environments where trees are planted in constrained areas and have limited access to water through their root systems. In the future, drier and hotter conditions are likely to make this need even greater. There are hot-spot areas in the Catchment with low canopy cover where increases in tree cover will be crucial, particularly in Casey.[12] Generally, tree canopy cover in the catchment is higher than the western areas of the region. However, a recent study of tree resilience identified that a substantial proportion of trees in Melbourne would not be able to survive future climates.[13] To manage this risk, provision of irrigation is a key strategy to improve survival rates. Street trees can be supported by alternative water resources, by directing runoff from roads to trees or by irrigating with a recycled water supply.



54% EXISTING TREES

Of existing trees across ten local government areas in Melbourne were found to be at risk under future climate conditions.[13]

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
5.1 Street trees that are supported with permanent irrigation from an alternative water supply.	Catchment	3 %	This measure seeks to drive a change in practice across the region that will support our healthy, thriving street trees in a sustainable way.
	Region	2 %	
5.2a Active public open space (sports fields and organised recreation) supported by an alternative water source.[I]	Catchment	3 %	This measure seeks to ensure we take opportunities to support sport and recreation, and cool our neighbourhoods during heat waves, increasing the resilience and liveability of our neighbourhoods.
	Region	6 %	
5.2b Passive public open space (parkland and gardens) supported by an alternative water source.[I]	Catchment	0 %	This measure seeks to ensure we take opportunities to support passive open space irrigation where it makes sense, to enrich communities by providing healthier, greener and multi-functional open spaces.
	Region	1 %	
5.3 Reduction in land surface temperature attributed to IWM in urban areas.	Catchment	Data collection methods under development	Where IWM increases shade, vegetated surfaces or the presence of water in the landscape, there is the potential to reduce local air and land temperatures. By measuring this impact, we can build understanding and better articulate the change we are making.
	Region		

Our targets for the future, as of September 2022

11% and 23% of street trees are supported with permanent irrigation from an alternative water supply by **2030** and **2050** respectively, for the **catchment**

12% and 23% of street trees are supported with permanent irrigation from an alternative water supply by **2030** and **2050** respectively, for the **Greater Melbourne Region**

14% and 40% of active public open space (sports fields and organised recreation) is supported by an alternative water source by **2030** and **2050** respectively, for the **catchment**

19% and 48% of active public open space (sports fields and organised recreation) is supported by an alternative water source by **2030** and **2050** respectively, for the **Greater Melbourne Region**

9% and 25% of passive public open space (parks and gardens) is supported by an alternative water source by **2030** and **2050** respectively, for the **catchment**

6% and 28% of passive public open space (parks and gardens) is supported by an alternative water source by **2030** and **2050** respectively, for the **Greater Melbourne Region**

Strategic Outcome 6
Community values are reflected in place-based planning

This strategic outcome explores the benefits provided to local communities through effective IWM planning. Measures for this outcome include community understanding of water and Traditional Owner perceptions around how well IWM initiatives incorporate Aboriginal values, as well as how proposed initiatives support amenity, health and well-being which are important values to all communities.

The case for change

Traditional Owner values

Traditional Owners and Aboriginal Victorians have a strong cultural, spiritual and economic connection to water, gathered from the sustainable management of land, water and resources over thousands of generations. Water for Victoria[16] outlines Traditional Owners and Aboriginal Victorians' role in the management of the state's water resources.

It includes provisions to recognise and incorporate Aboriginal values and knowledge in water planning and to support Aboriginal participation in water management. Respecting the connection to Country of Traditional Owners can positively impact on health, well-being and cultural identity.

Courtesy: Parks Victoria

220x
MELBOURNE CRICKET GROUND

= 439 HECTARES

Of blue-green infrastructure has already been created or enhanced through IWM initiatives in the catchment.[m]

Community understanding of the water cycle

Community understanding of the water cycle has progressively changed over recent years, with a greater acknowledgement of the role that water can play in enhancing community health and well-being, local amenity and overall urban liveability. The Millennium Drought highlighted the importance of water for communities, with water restrictions directly impacting neighbourhood amenity and bringing water use and efficiency front of mind. It has been shown that Australians have a good knowledge of some water issues, however, Victorians tended to have some of the lowest levels of water knowledge.[18] A number of organisations play an important role in supporting and facilitating increased community understanding and connections to the water cycle, including councils, water corporations, local Landcare groups and schools.

Sense of place and amenity

Sense of place and satisfaction with local amenity are broad concepts that planners and local governments work hard to enhance. Water can play a significant role in enhancing amenity and local character through the integration and enhancement of blue-green infrastructure, such as waterways, wetlands, and other stormwater management assets. Greener neighbourhoods and access to quality open space, waterways, lakes and beaches have been shown to significantly improve both physical and mental health.[17] Recently, the COVID-19 pandemic has led to a growing community appreciation of the multiple health and well-being benefits that blue-green spaces in urban areas can provide. Through better integration of IWM with neighbourhood planning, we can enhance amenity and benefits for the community.

74%

Of Australians were found to have a clear or general sense of how the water cycle works.[18]

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
6.1a Traditional Owners' capacity to partner in IWM programs, policy, planning and projects (Rating out of 5).	Catchment	Insufficient data[n]	Representatives of the Registered Aboriginal Parties in the metropolitan Catchments report unsustainable levels of demand for their interest and insight, which is impacting their capacity to genuinely partner in IWM. This measure aims to understand the amount or volume of work placed on Traditional Owners, and their ability or power to deliver outputs.
	Region	Insufficient data[n]	
6.1b Other IWM partner organisations' capability to partner with Traditional Owners in IWM programs, policy, planning and projects (Rating out of 5).[o]	Catchment	3.1	Organisations involved in IWM have obligations to include Traditional Owners and consider Aboriginal values in their organisational activities. This measure helps us track our progress in improving partnerships with Traditional Owners.
	Region	2.5	
6.2 Blue-green infrastructure created or enhanced by IWM as a proportion of land area.[m]	Catchment	0.13 %	This measure recognises that where green-blue infrastructure is either added or significantly enhanced, it is likely to improve local amenity and sense of place, as well as the health and well-being of the community. By measuring this impact, we can articulate how IWM supports amenity.
	Region	0.59 %	
6.3 Community literacy regarding the water cycle (Rating out of 5).[p]	Catchment	2.7	Community connection and understanding of the water cycle are important contributors to water sensitive placemaking. This measure will drive community confidence and participation in IWM solutions.
	Region	2.6	
6.4 Whether water is a key element in city planning and design process (Rating out of 5).[p]	Catchment	2.9	This measure considers the degree to which water system planning is integrated into urban planning and design. This measure will drive an integrated approach to planning at all scales, which plans for and enables the delivery of IWM.
	Region	2.7	

Our targets for the future, as of September 2022

Rating of 5 out of 5 for community literacy regarding the water cycle by **2030** and maintained by **2050**, for the **catchment**

Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for community literacy regarding the water cycle for the **Greater Melbourne Region**

Rating of 5 out of 5 for water as a key element in city planning and design processes by **2030** and maintained by **2050,** for the **catchment**

Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for water as a key element in city planning and design processes for the **Greater Melbourne Region**

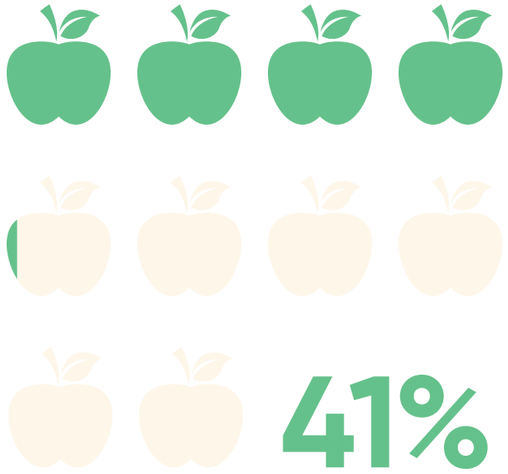
Strategic Outcome 7
Jobs, economic benefits and innovation

This outcome explores how IWM can enhance business and local economies by supporting food production, tourism and commercial activities. It is difficult to directly attribute increases in business revenue to IWM, but measures have been selected for this outcome which recognise the essential role of water to support agriculture, production and major industries.

The case for change

Economic support and stimulation

Water is vital for our economy. Many productive businesses and industries, including manufacturing, agriculture, food processing, energy, and mining, rely on safe, secure and affordable water supplies. IWM can support and stimulate local economies by providing resources to businesses and industry which leverage a circular economy and add resilience in times of drought. "One man's waste is another man's treasure" is a sentiment that can be true for complementary water resources. For example, wastewater is an excellent resource for many types of agriculture, where both a reliable source of water and rich nutrients are needed to increase yield. Equally, alternative sources of water can be suitable for certain industrial and commercial water users, and for those who use large amounts of water as they depend on a sustainable water supply in determining their business viability and selection of location.



41%

of the food needs of greater Melbourne's population can currently be met by Melbourne's food bowl.[19]

6,542
JOBS

in the agriculture, forestry and fishing sector in the South Study Area of the Melbourne Region.[20]

Supporting our local food bowl

Agriculture and horticulture in the Greater Metropolitan Melbourne Region are crucial to the economic success and the future resilience of the region. Melbourne's food bowl includes multiple relatively small areas of food production scattered around the city fringe, which are highly productive and are an important industry for the region. The Western Port catchment plays a key role in food production for the region. Conventionally, in the Western Port catchment, agricultural areas have relied on water from groundwater and river water resources, however these are fully allocated and in decline due to the impacts of climate change. Rich soils and productive growing conditions make agricultural expansion a major opportunity and supporting and enhancing agricultural production with alternative water supplies will be important for the success and resilience of the catchment.

Agriculture is a dominant industry in the Western Port catchment and will continue to be a key area of economic growth for the Catchment in the future. Secure water supplies, adequate water storage and distribution infrastructure to support agricultural production will be critical areas of focus for the catchment moving forward.[20]

Supporting our industries and businesses

As the region grows and changes, commercial and industrial uses of water will also change. Water corporations expect that on a per hectare basis, non-residential water use will increase over time, however the proportion of land in urban areas dedicated to non-residential use is generally declining. The growth areas on the fringe of Melbourne will include commercial and industrial areas, creating opportunities for shared water resources.

The Western Port Catchment includes a State Significant Industrial Precincts identified in the catchment include the areas of Pakenham, Officer and Hastings.[21]

3,500
ADDITIONAL JOBS

Created in the planned Pakenham South Employment precinct in the Catchment.[21]

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
7.1a Alternative water supplied to agricultural production	Catchment	0.9 Gigalitres /year	Conventionally, agriculture has been dependent on river water and groundwater, the availability of which is declining with climate change and other pressures. The targets (see below) will support Melbourne's population with local food supply (continuing the existing proportion of 41%), by enhancing the Melbourne region's food bowl through the supply of alternative water resources.
	Region	34 Gigalitres /year	
7.1b Alternative water supplied to businesses and industry (>10ML/year)	Catchment	172 Megalitres /year	The measure reflects the provision of alternative water sources to major water users, where water is likely to be a key resource impacting the viability of their production process or business.
	Region	3393 Megalitres /year	

Our targets for the future, as of September 2022
9 Gigalitres/year of alternative water is supplied to agricultural production in the **catchment** by **2030**
27 Gigalitres/year of alternative water is supplied to agricultural production in the **catchment** by **2050**
63 Gigalitres/year of alternative water is supplied to agricultural production in the **Greater Melbourne Region** by **2030**
112 Gigalitres/year of alternative water is supplied to agricultural production in the **Greater Melbourne Region** by **2050**

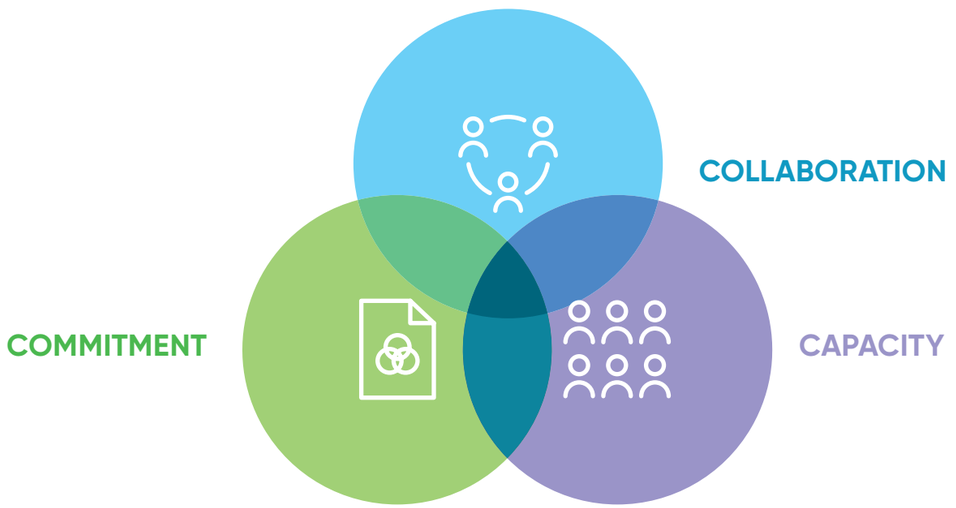
Enablers
Commitment, Capacity and Collaboration

Strategic enablers represent a series of useful indicators and measures that are overarching to the success of the seven key strategic outcomes. Without these fundamental factors in place, the mainstreaming of IWM will remain challenging. This is in recognition of the fact that across Greater Metropolitan Melbourne there are multiple organisations that hold responsibility for managing the urban water cycle, with a collaborative and integrated approach essential for effective planning and delivery of IWM initiatives.

The case for change

Transitioning to integrated water management

Conventionally, the water cycle has been managed in separate parts, with water supply, wastewater management, and stormwater drainage infrastructure typically being managed by different organisations, and in a centralised manner. However, population growth and a changing climate has led to stressed ecosystems and increasing unpredictability around water supply, requiring a more integrated approach to water management. The evidence-based targets specified in this Plan provide an important basis for ongoing commitment, capacity and collaboration to implement IWM. These three factors are considered critical to transitioning towards more widespread integrated water management practices.[22]



A continued cross-organisational approach

The Forum brings together 17 organisations with an interest in water cycle management across the Western Port Catchment. To ensure IWM is successful and enduring across the Catchment, the Western Port 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. This ongoing commitment, collaboration and investment in capacity to deliver IWM is crucial to drive this Plan forward.

Acting early to embed change

This Plan sets out ambitious targets for IWM in the Western Port Catchment and the broader Greater Metropolitan Melbourne Region. To enable this step-change in approach, it is crucial that the right conditions are put in place early to enable this transition.

Measuring the change we want to make

Our measures	Scale	Our current performance (2019)	Why is this measure important?
E1 Vision, leadership and long-term commitment through vision statement and objectives articulated in corporate documents (Rating out of 5)[p]	Catchment	3.5	This measure tracks the degree to which organisational leadership is supportive of the adopted vision and water management agenda, and able to strategically commit to and initiate IWM initiatives.
	Region	3.1	
E2 Knowledge, skills and organisational capacity (Rating out of 5)[p]	Catchment	3.3	This measure rates the knowledge and skills of key water related organisations in the Catchment, together with organisational capacity to successfully deliver IWM.
	Region	2.9	
E3 Cross-sector institutional arrangements and processes (Rating out of 5)[p]	Catchment	3.4	This measure assesses whether the institutional arrangements and processes required to achieve IWM are in place and embedded across the sector.
	Region	2.9	

Our targets for the future, as of September 2022
Rating of 4 out of 5 by **2030**, and 5 out of 5 by **2050** for vision, leadership and long-term commitment through vision statement and objectives articulated in corporate documents for the **catchment**
Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for vision, leadership and long-term commitment through vision statement and objectives articulated in corporate documents for the **Greater Melbourne Region**
Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for knowledge, skills and organisational capacity for the **catchment**
Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for knowledge, skills and organisational capacity for the **Greater Melbourne Region**
Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for cross-sector institutional arrangements and processes for the **catchment**
Rating of 4.5 out of 5 by **2030**, and 5 out of 5 by **2050** for cross-sector institutional arrangements and processes for the **Greater Melbourne Region**

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Notes

a. Based on comparison of 2018/2019 potable water use data with projected potable water use in 2050 under the Reference State examined by the Plan. Potable water use projections will be updated in Water for Life: Greater Melbourne Urban Water Systems Strategy 2022.

b. Based on modelling in Melbourne Water (2017) Melbourne Water Systems Strategy. Supply-demand shortfall projections will be updated in Water for Life: Greater Melbourne Urban Water Systems Strategy 2022.

c. Based on adaptation of a Source Catchments model of the Port Phillip and Western Port Catchment (DELWP/Melbourne Water 2020) comparing runoff generated in the developed catchment model compared with natural grassland model to determine the 'urban excess runoff'.

d. Based on residential and commercial/industrial water use in the catchment factored by 0.8.

e. Based on the total potable water use (2018/2019) for the five catchment areas in the region divided by the most recent population data of that area (Census data August 2016). The Melbourne Water Outlook 2020 reported an average of 162 litres per person per day for 2018/2019, which is calculated to a different boundary (the service areas of City West Water, Yarra Valley Water and South East Water) and using a population projection for those service areas.

f. Based on reported total releases of treated wastewater to the environment in 2018/2019 and projected additional wastewater (minus projected recycled water use) in 2050 under the Reference State examined by the Plan.

g. A weighted average based on wastewater inflow volumes to the wastewater treatment plants.

h. This measure includes recycled water provided to customers, and does not include recycled water utilised by water authorities within the treatment process or to irrigate land owned by the water authority.

i. Range to be further refined through feasibility testing and optioneering.

j. Represents pollutants released to the environment within each sub-catchment. Pollutants from runoff generated in the catchments was estimated using a Source Catchments model of the Port Phillip and Western Port Catchment (DELWP/Melbourne Water 2020), minus estimated removals from stormwater treatment, harvesting and management initiatives and assets within each sub-catchment. Pollutants from treated wastewater based on reported releases of treated wastewater to the environment in 2018/2019.

k. As outlined in Environment Protection Authority Victoria (2019) Development of environmental quality indicators and objectives for SEPP (Waters). Publication 1733, the SEPP (Waters) targets for Port Phillip Bay include a nitrogen (TN) target that seeks to ensure that "nitrogen loads entering the Bay should not exceed current levels to reduce the risk of frequent and intense algal blooms" and a sediment (TSS) target "to improve water quality and reduce pollutants that are typically bound to sediment particles". Western Port has a sediment (TSS) target "intended to prevent an increase in catchment sediment inputs to allow in-bay sediments to be naturally removed by tides and currents". The relationship between pollutant removal within a catchment, and pollutant loads entering Port Phillip Bay and Western Port is complex but can be represented through catchment scale modelling. Further work is required to recommend the most effective pollutant reduction strategies and locations to meet the Environment Reference Standards. However, in broad terms the targets seek to ensure pollutant load objectives do not increase further beyond the baseline levels determined for Port Phillip Bay (2017) and Western Port (2018).

l. The current total area of public open space is calculated using the data set from the Victorian Environmental Assessment Council (2011) Public open space categories in the entire metropolitan Melbourne area. The State of Victoria. Active open space is equated to 'organised recreation areas' and passive open space includes 'parkland and garden' and 'services and utilities areas'.

m. Including stormwater treatment assets that include vegetation or open water, naturalised waterways, open spaces that have been created or enhanced through water management.

n. A baseline rating for measure 6.1a could not be determined by the time of publication due to insufficient data being available. It is acknowledged that IWM Forum engagement and partnership with Traditional Owner Corporations has been inconsistent throughout the development of the Catchment Scale IWM Plans, including the co-creation of a survey to acquire data for this indicator. It is therefore reasonable to accept that a rating (out of five) of Traditional Owners' capacity to partner in IWM programs, policy, planning and projects is not "zero", however it would not reflect best practice to infer an overall rating for this measure without an adequately representative sample. This outcome further substantiates what all IWM Forum partners, including Traditional Owner Corporations, have come to understand from experience: significant capacity constraints continue to prevent Traditional Owner partners from meaningfully contributing to IWM in a manner that is consistent with their Corporations' priorities and the principles of self-determination. This result strengthens the position stated by other IWM Forum partner organisations (i.e. organisations not identifying as a Traditional Owner Corporation) that more must be done to empower Traditional Owner as partners in IWM.

o. Ratings were compiled for each catchment area based on a survey of IWM Forum organisations.

p. Ratings were compiled for each municipality area based on Water Sensitive City Index records (where available) and a Council survey (2020). Respondents were encouraged to collectively agree a rating with other stakeholders involved in IWM in the municipality.

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).

Alternative water sources
In this document, alternative water sources refer to recycled water, greywater, rainwater and urban stormwater.

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.

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

Blue-green infrastructure
Green infrastructure refers to key vegetation features such as street trees, parklands, grassed sports fields and vegetated walls. Blue infrastructure refers to waterways, wetlands, recreational lakes, stormwater retarding basins, or other water body features. Blue-green infrastructure brings these assets together through integrated approaches to deliver community benefits.

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.

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.

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

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.

Environmental water
Water to support environmental values and ecological processes.

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

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

Greater Metropolitan Melbourne Region
The Port Phillip and Western Port Bay catchment area, including the Werribee, Maribyrnong, Yarra, Dandenong and Western Port catchments.

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.

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.

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 wastewater 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.

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.

Megalitre (ML)
One million (1,000,000) litres.

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.

Potable
Water of suitable quality for drinking.

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

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

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.

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

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.

Sub-catchment
A minor waterway catchment within one of the major waterway catchments in the region. There are 69 sub-catchments defined by the Healthy Waterways Strategy (Melbourne Water, 2018) in the Port Phillip Bay and Western Port Region, which are used as the spatial unit for the Plan analysis.

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.

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.

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

Waterway health
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.

For more information visit:
www.water.vic.gov.au/liveable/integrated-water-management-program

Integrated Water Management Forums

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