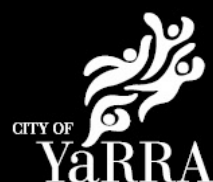


The background of the cover page is a photograph of a landscape. In the foreground, there is a metal water channel or weir structure made of corrugated metal, set into a bed of dark grey gravel. Water is flowing over the channel. The gravel is surrounded by tall, thin grasses, some of which are green and some are yellow/brown, suggesting autumn. In the background, there are more trees and a clear sky.

Draft Integrated Water Management Plan 2020–2030



CONTENTS

1. Introduction	1
1.1. Integrated Water Management and the City of Yarra	1
1.2. Developing the plan	1
1.3. Strategic context	2
1.4. Stakeholders	4
2. The City of Yarra	5
2.1. City of Yarra water use	6
2.2. Climate change	8
The urban heat island	9
2.3. Flooding	10
3. Achievements to date	11
4. Vision, objectives and outcomes	12
5. Targets	14
Objective 1: Efficient and fit for purpose use of all water supplies	14
Objective 2: A resilient and effective drainage network that flows into healthy and valued waterways	14
Objective 3: An informed and responsible community benefitting from/enjoying a vibrant and sustainable landscape	15
6. Action plan	15
Objective 1: Efficient and fit for purpose use of all water supplies	16
Objective 2: A resilient and effective drainage network that flows into healthy and valued waterways	18
Objective 3: An informed and responsible community benefitting from/enjoying a vibrant and sustainable landscape	20
7. Identified sites and action plan	22
7.1. Edinburgh Gardens	22
7.2. Yarra Bend Precinct	23
7.3. Fitzroy Gasworks Redevelopment	24
7.4. Burnley Golf Course and Kevin Bartlett Reserve	25
7.5. Citizens Park	26
7.6. East Clifton Hill Reserves	27
7.7. Areas requiring further investigation	28
8. Monitoring, Evaluation and Reporting	29
9. References	30
10. Appendix 1	31

Acknowledgement of Country

Yarra City Council acknowledges the Wurundjeri Woi Wurrung people as the Traditional Owners and true sovereigns of the land now known as Yarra. We also acknowledge the significant contributions made by other Aboriginal and Torres Strait Islander people to life in Yarra. We pay our respects to Elders from all nations and to their Elders past, present and future.

Yarra City Council also honours the land and water of the Birrarung now known as the Yarra. The First People of Melbourne, the Wurundjeri People have lived with and known the Birrarung and its tributary since the beginning.

1. INTRODUCTION

Water is the essence of all life. It is essential that water is used wisely and sustainably to keep our environment and community healthy. The impact of a changing climate have already been experienced across the globe and in our local community with more frequent and extreme weather events including heat waves, intense rainfall and drought. Sustainable management of our water resources will play an integral role in meeting current and future challenges associated with population growth, provide quality open spaces to alleviate the urban heat island effect and to ensure community and environmental resilience.

1.1. Integrated Water Management and the City of Yarra

Integrated Water Management (IWM) is a holistic and collaborative approach to water management that considers the interactions of all elements of the water cycle including potable water, rainwater, stormwater, recycled water and groundwater to ensure they are used to support and enhance social, ecological and economic outcomes.

This plan sets out a vision, targets and objectives and identifies opportunities for integrated water management for implementation. In doing so, the actions will guide Council operations pertaining to water use, drainage, stormwater management, Climate Emergency Plan, alternative water sources, open space management, waterway health and supporting the community's connection to nature.

The plan also recognises Council's role in advocacy, collaboration with external stakeholders including Traditional Owners and influencing community behaviour.

1.2. Developing the plan

This IWM plan is a successor to the Yarra Water Action Plan (2006) that contained a commitment to leadership in sustainable water management. The Yarra Water Action Plan informed the development of the IWM plan, contributing to the development of its objectives, actions and targets.

Building on the action plan, this IWM plan was developed in consultation with the City of Yarra's internal departments, water authorities and neighbouring Councils that are involved in water management. Their input has been critical to the development of the vision, objectives, targets and actions for the next four years with the emphasis of revision in the fifth year to achieve our overall 10 years plan.

Challenges and opportunities were identified through that consultation process. These were refined and grouped under desired outcomes and objectives with corresponding targets. The action plan has developed momentum for this IWM Plan, with the City of Yarra delivering on many goals and targets within the action plan, including on water use efficiency, applying water sensitive urban design (WSUD), improving waterway health and strengthening community resilience to the impacts of a changing climate.

1.3. Strategic context

This plan has been developed in the context of significant action by the State Government's IWM initiatives. In 2016 Chapter 5 of Water for Victoria was entitled "Resilient and liveable cities and towns". It extended out traditional approach to water cycle management to include references to "Healthy and valued urban landscapes" and "Community values reflected in place-based planning".

This extension shifted the focus of IWM planning to issues such as urban cooling, connecting our communities to natural assets like waterways and incorporating what the community, including traditional owners, tell us they want to see across their landscapes.

Thus began a deeper conversation about the role of IWM that led to the formation of IWM Forums. Five forums were formed in Metropolitan Melbourne, corresponding to the city's five major catchments, the City of Yarra being within the Yarra Forum. The IWM Forums were collaborations between DELWP, Victorian Planning Authority, local government, water authorities and catchment management authorities. Across 2018 and 2019 they produced Strategic Directions Statements that defined IWM visions, outcomes and objectives for their catchments. At a finer scale they also identified IWM opportunities for prioritisation and further investigation by the Forum working groups.

While the City of Yarra's IWM plan was produced independently of the Catchment scale plan Forums, it has referenced those key guiding outcomes and objectives.

In addition to State Government documents, there are a number of Local government strategies and plans that overlap with and support this plan. As such, a key aim of this IWM plan is to reference those complimentary plans to reinforce their importance and bring all IWM related policy under one banner. Figure 1 outlines the relationship of this plan to State and Local strategies and plans. Further detail is available in Appendix 1.

For the City of Yarra, contributing to the protection of the Yarra River and its riparian corridor is critical being as it is a State Government priority with numerous plans, policies and strategies relating to the protection of Melbourne's iconic river. The Wurundjeri First People have informed the development of the Yarra Strategic Plan in line with the Yarra River Protection (Wilip-gin-Birrarung murrn) Act 2017 requirement of guiding the future use and development in the wider Yarra catchment. While the objectives within each of these documents have not been reproduced here, the plan supports those objectives principally through the management and working collaboration of its own urban catchment and the stormwater generated from it.

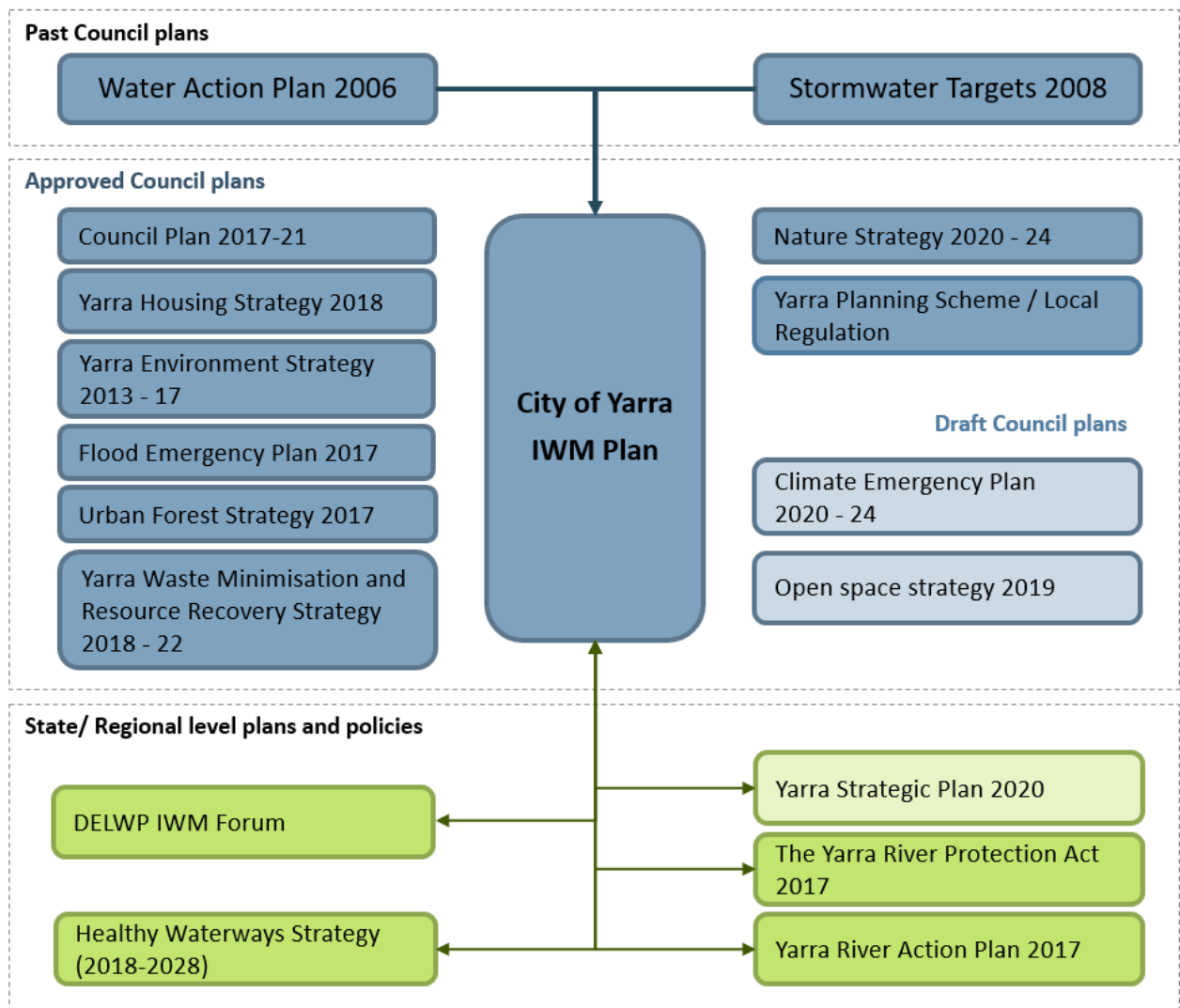


Figure 1. Strategic context for the City of Yarra IWM Plan

1.4. Stakeholders

The City of Yarra will work closely and collaboratively with the Victorian Government, water management agencies, Traditional Owner, and community groups to achieve this plan's objectives. Table 1 summarises who these stakeholders are, their responsibilities and potential collaboration actions.

Table 1. Stakeholders and responsibilities for collaboration in IWM

STAKEHOLDER	RESPONSIBILITY	POTENTIAL COLLABORATION ACTION
DELWP	State Water Policy Water for Victoria / IWM Forums Strategic Directions statement (Yarra Catchment)	Collaboration to develop the Catchment scale IWMP for Yarra Catchment
City West Water / Yarra Valley Water	Water, sewerage and trade waste retail services IWM Plans and projects	Identification and implementation of non-potable potable water sources Potential funding partner
Melbourne Water	Waterway manager Drainage and stormwater management (for larger catchments) Flood management	Healthy Waterways strategy implementation Flood management planning Potential funding partner Yarra Strategic Plan
Development Victoria	Urban renewal of public land Housing affordability and public open spaces	Fitzroy Gasworks redevelopment
EPA Victoria	State Environment Protection Policy (SEPP) Water for Victoria	Stormwater management to contribute to policy outcomes
Parks Victoria	Public parks of regional significance	Yarra Bend Park & Public Golf Course alternative water use
Neighbouring councils and community groups	Stormwater management (into Yarra) Open space management New developments and inner-city land use planning	Knowledge sharing Collaborative, cross catchment projects
Traditional Owners	Cultural and heritage knowledge and approvals Strategies and actions within the Yarra Strategic Plan	Advice on cultural values of water as it pertains to planning and management Merri Creek and Birrarung Rehabilitation Project
Friends of Merri Creek and Merri Creek Management Committee	Preservation and restoration of natural, cultural heritage, and the ecologically sensitive areas	Delivery of community engagement and education on waterway health plus support of Waterwatch community monitoring of waterway health. The Waterwatch program, funded by City of Yarra, includes education activities across the entire municipality, not just the Merri
Friends of Darebin Creek and Darebin Creek Management Committee	Preservation, restoration and protection of ecologically sensitive area for future generation	Knowledge sharing, Alphington Park
Abbotsford Riverbankers	Preserving and restoring Yarra River's health	Knowledge sharing, collaboration on restoration projects

2. THE CITY OF YARRA

The City of Yarra is an inner-city council approximately 5km from Melbourne central business district (CBD) with an area of 19.5 square kilometres and a population of approximately 94,000 people. It is the second smallest and the second most densely populated local government area in Victoria (Australian Bureau of Statistics 2018). The municipality is culturally diverse with almost 30% of residents born overseas.

The City of Yarra is highly urbanised with residential and commercial land uses across the municipality, with heritage-listed buildings reflecting a rich and diverse commercial and industrial history. It is estimated that approximately 60% of the City of Yarra's land area is impervious, mainly from being covered in buildings, roads and footpaths. Impermeable hard surfaces increase stormwater run-off carrying pollutants into waterways and also exacerbate the urban heat island effect.

Figure 2 shows us that the City of Yarra is bounded by three iconic Victorian waterways: Merri Creek, Darebin Creek and the Yarra River. These reaches are flanked by open space, with 235 hectares of parks across the municipality (Yarra Council Plan 2017) including heritage-listed reserves and bushlands with significant biodiversity value. These waterways represent iconic connections to Melbourne's cultural history, character, amenity and natural environment.

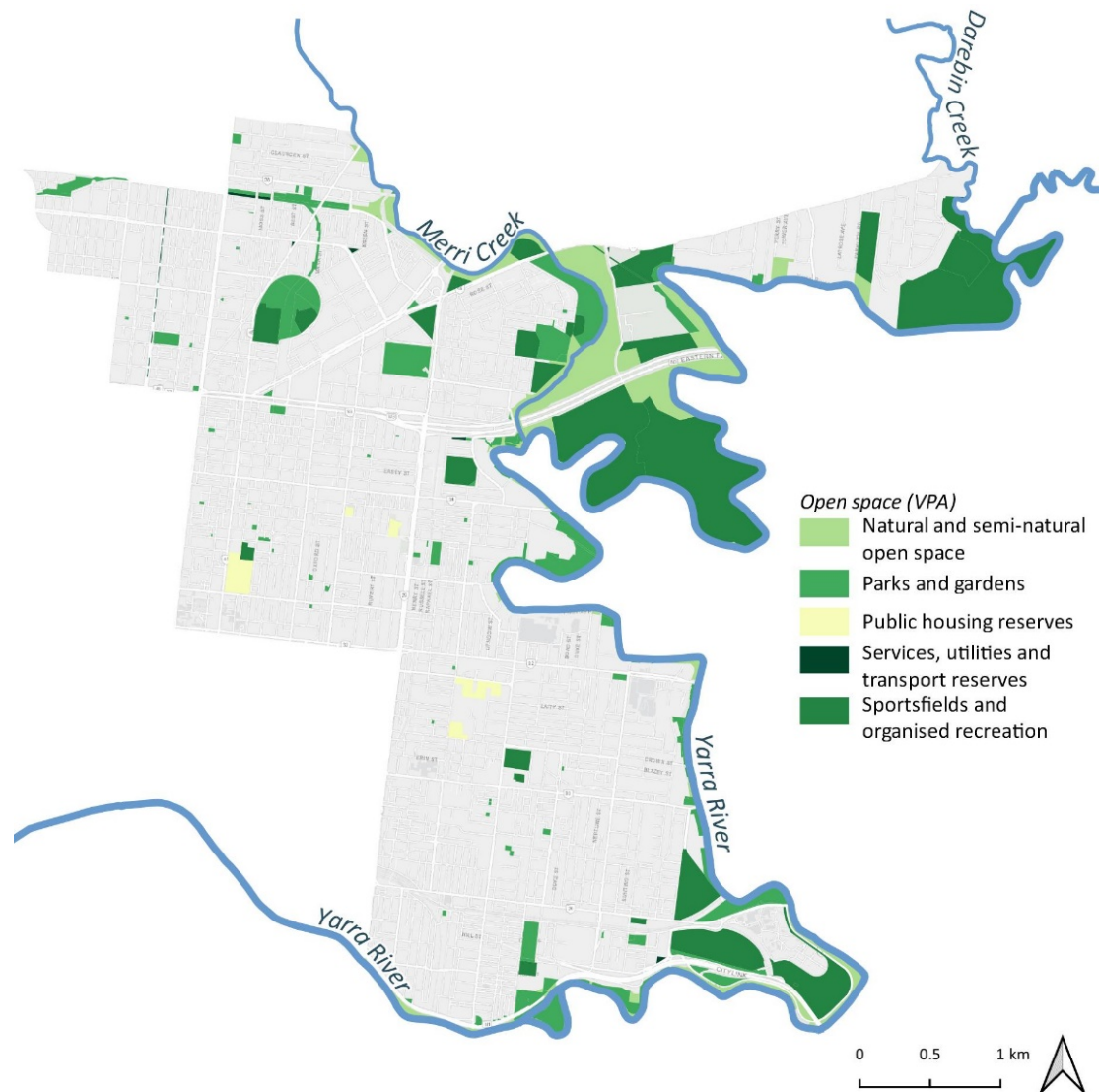


Figure 2. Waterways and open space in the City of Yarra

The Yarra River Protection (Wilip-gin Birrarung murrn) Act 2017, considers the public parklands and open spaces along the Yarra River corridor as part of ‘one living, integrated natural entity for protection and improvement’ under the heading of the *Greater Yarra Urban Parklands*. These open spaces also provide people of all ages and abilities with recreational and sporting opportunities.

2.1. City of Yarra water use

In 2000, Council’s annual potable water consumption was approximately 334 ML. Over the subsequent decade, the millennium drought and subsequent water restrictions saw a dramatic decrease in consumption by almost 50% to 170 ML in 2010. As the drought broke and water restrictions were relaxed, consumption has risen to 242 ML in 2019.

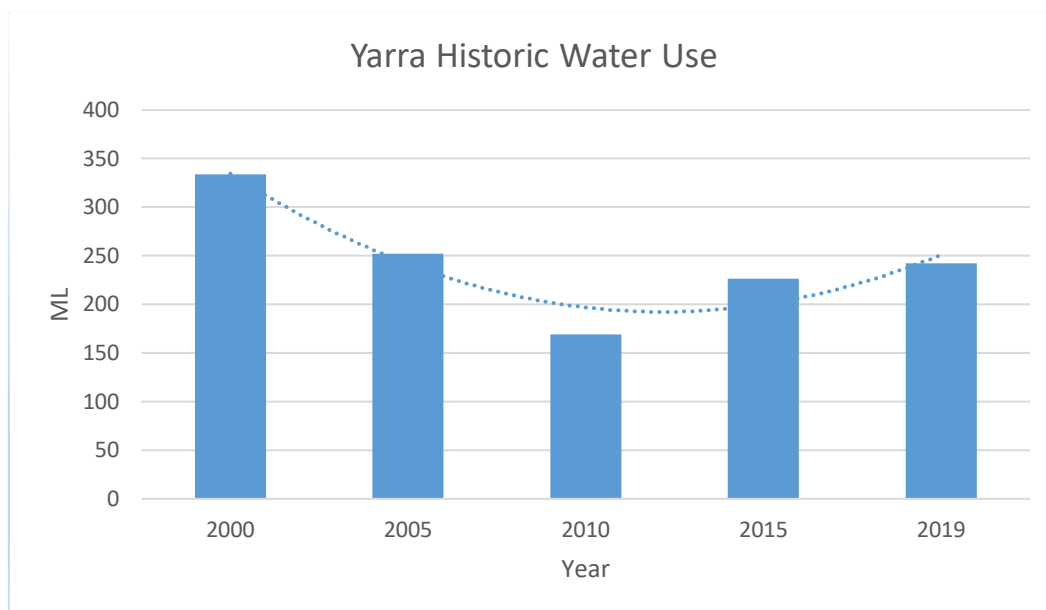


Figure 3. Yarra Water Usage Volume in ML (1 million litres) from 2000 to 2019

The majority of that potable water consumption is associated with the irrigation of open space including sports and recreation facilities and also for leisure services, specifically three aquatic centres within the municipality. This usage is consistent with the City of Yarra's aim of delivering a high level of service to public facilities and open space, and this is seen as critical to the character of the municipality.

Combined, these two categories account for 87% of Council's annual potable water consumption.

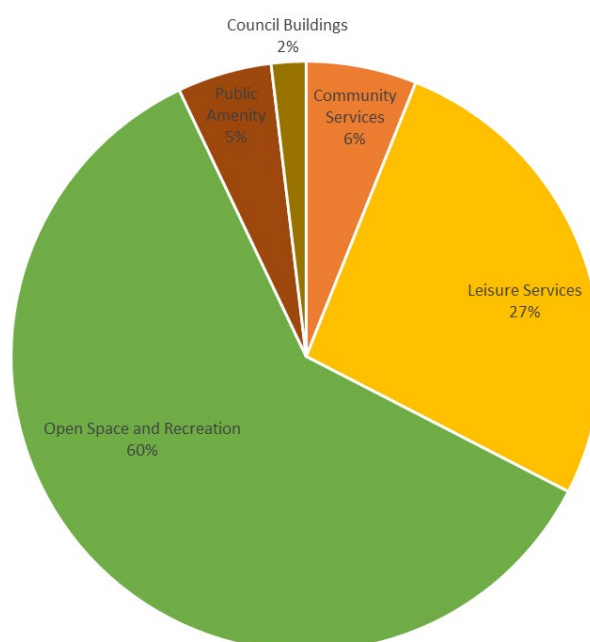


Figure 4. Average water usage percentage breakdown for council services

The current population of over 94,000 is expected to grow by approximately 27,000 people over the next 14 years, with much of this growth adding to the 46% of Yarra's residents that are currently living in flats and apartments (Yarra Housing Strategy 2018). While high-density housing generally requires less water than larger blocks with gardens, it creates

other challenges; including finding space for the use of alternative water sources (like rainwater) and the implementation of WSUD. This transition of the urban landscape to multi-unit apartment living, will also place pressure on shared public facilities and open spaces as people would prefer public rather than private spaces.

The City of Yarra also experiences high rates of visitation that increases demand on facilities and water use, particularly during the day. Of the 70,000 people who work in the City of Yarra, 86% live outside the municipality (Yarra Council Plan 2017). While water saving actions have reduced per capita water consumption in public facilities, increased visitation rates have resulted in an overall increase in water consumption over time. Efficient use of water in pools and parks will be essential as the City seeks to continue delivering high levels of service to an increasing resident and visiting population.

While much of this water is drawn from the potable network, Council have made progress in increasing the volume of non-potable water used through the installation of rainwater tanks and stormwater harvesting schemes. It is estimated that Council has a combined rainwater storage capacity of around 800kL on its buildings that delivers about 6ML per year in rainwater for flushing toilets, irrigation and other non-potable uses.

The city's flagship stormwater harvesting scheme is in Edinburgh Gardens, one of Melbourne's most popular parks, where a terraced raingarden captures about 4ML of stormwater per year for irrigation within the park. Further expansions to this scheme will see the total volume of harvested water increase to 24 ML to meet most of the irrigation water demand for Edinburgh Gardens (Section 7.1).

Through these projects, plans and policies, Council will continue to work with the community, land developers, water retailers and other stakeholders to build water literacy and emphasise the importance of water efficiency, the use of non-potable water sources and the improvement of stormwater quality through WSUD and stormwater harvesting. A combination of all of these initiatives will drive the Council toward achieving the goals and targets set out in this plan.

2.2. Climate change

Long-term climate projections for the Yarra catchment (DELWP, 2016) predict hotter and drier conditions leading to higher temperatures and evaporation rates as well as reductions in rainfall and water runoff (Table 2). While annual runoff is forecast to decrease, the frequency and intensity of rainfall will increase leading to flooding and waterway health impacts. Understanding and responding to the impacts of climate change both on the natural and built environment is a key driver of this plan. *Table 2* shows the projected reduction in rainfall and runoff over time that reflects the drying condition of the catchment. This calls for actions that contribute to a rehydrating of the environment particularly using urban stormwater. The increase in temperature will also be amplified given the City of Yarra's landscape.

Table 2. Estimated changes under moderate condition relative to current climate baseline in the Yarra River Basin (DELWP, 2016)

	2040	2065
Temperature change (°C)	+1.3	+ 2.3
Potential evapotranspiration (%)	+ 4.6%	+ 7.6%
Rainfall (%)	-2.7%	- 4.3%
Runoff (%)	-11%	-16.4%

The urban heat island

The impacts of climate change are already being experienced with January 2019 being the hottest summer season on record in Victoria (Yarra Climate Emergency Plan 2020). In urbanised areas like the City of Yarra, this is even more acute as hard surfaces absorb and re-radiate heat. Figure 5 below has been reproduced from the City's Urban Forest Strategy (2017) to highlight areas of increased urban heat. It can be observed that streetscapes in particular are the source of urban heat, where temperatures of between 27 and 50°C greater than ambient temperatures can be experienced on a hot summer day (Berdahl, 1997).

This 'urban heat island' effect is linked to increase in health issues including mortality, particularly among vulnerable members of the community. A priority of this plan will be to ensure that water sources are available to sustain council's trees, parks and open spaces into the future, as these assets are a critical defence against the urban heat island effect.

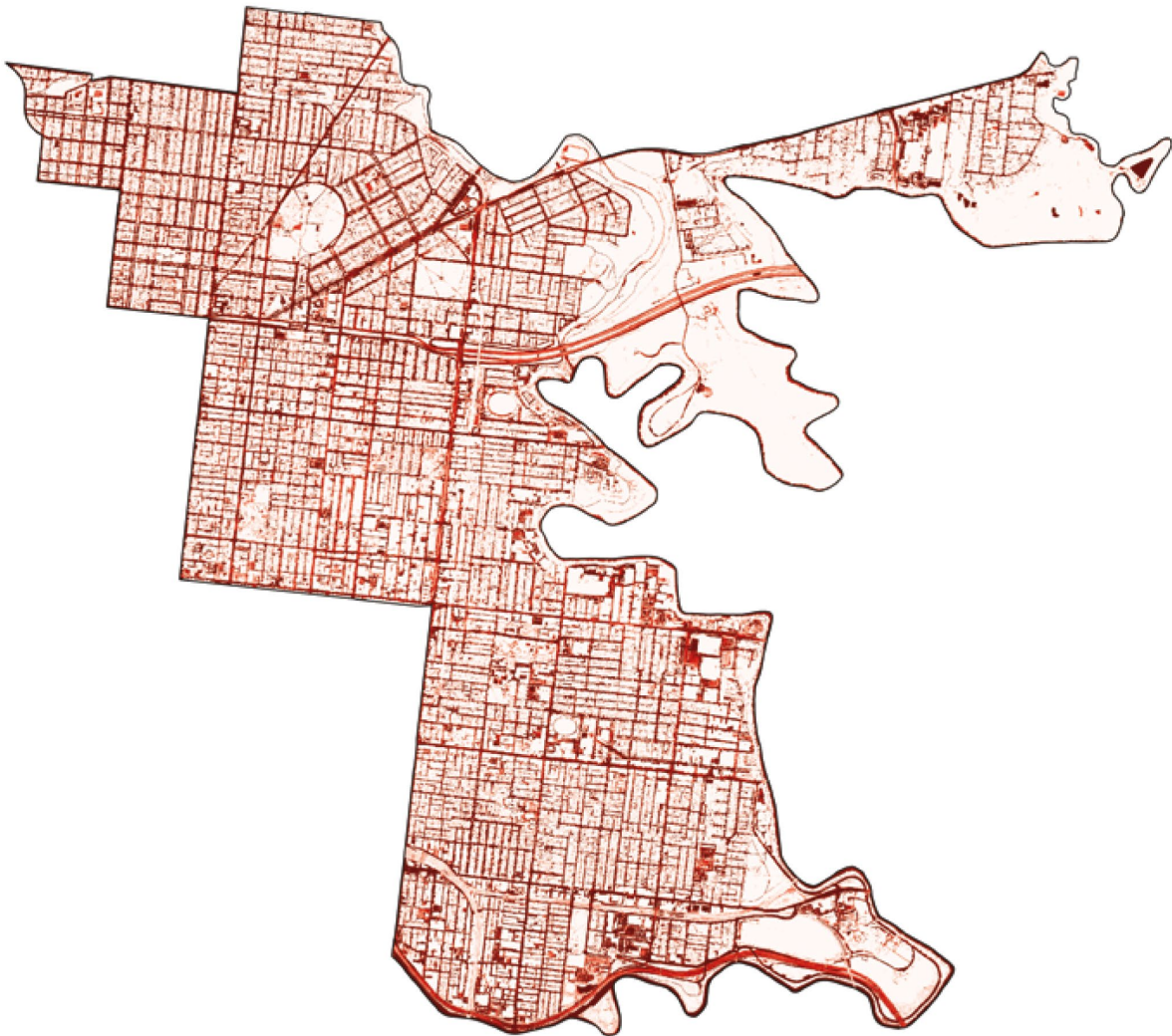


Figure 5. Thermal hotspots for the City of Yarra (Urban Forest Strategy, 2017).

2.3. Flooding

The City of Yarra is susceptible to two types of flooding: riverine and flash flooding. Riverine flooding occurs when heavy, prolonged rainfall in the Yarra catchment raises water levels in the Yarra River, impacting people and property within that floodplain. Due to its low-lying topography and proximity to receiving waterways, some areas within the municipality are prone to riverine flooding, including areas within Alphington, Burnley and Cremorne.

Flash flooding is associated with shorter-duration, high-intensity rainfall events that can overwhelm drainage systems triggering localised flooding both along overland flow paths and low-lying areas. While flash flooding is generally not widespread or long lasting, it can damage property, cause inconvenience and impact personal safety.

The City of Yarra have prepared a Flood Management Plan (2017) in collaboration with Melbourne Water and Emergency Response Plans with the State Emergency Services (SES). Flood modelling for the entire municipality is currently being undertaken to understand flood impacts under climate change.

Based on the outcomes of the flood modelling study, flood overlay in the form of Special building overlays will be developed and used to update the City of Yarra Planning Scheme and Land Subject to Inundation Overlay (LSIO) – where needed.

3. ACHIEVEMENTS TO DATE

The City of Yarra has been implementing and investigating projects that contribute to the objectives of this IWM plan with some notable milestones listed in **Table 3** below:

Table 3. City of Yarra's IWM achievements and milestones

PROGRAM	DESCRIPTION
Infrastructure	<ul style="list-style-type: none"> • 57 raingarden assets • 33 bio-retention tree pits (for irrigation and stormwater treatment) • 92 litter traps in place • 5 gross pollution traps across the city • 700 square metres bio-retention system at Edinburgh Gardens
Water and pollutants	<ul style="list-style-type: none"> • 27 per cent reduction in total potable water consumption since 2000 • 4 ML/yr. of stormwater harvested from the Edinburgh Gardens Raingardens system • 4 per cent (10ML per year) increase in alternative water use • Stormwater Target 2020 (set in 2008), achieved including: <ul style="list-style-type: none"> ○ 20 per cent (Total Suspended Solids kg/yr.), ○ 10 per cent (Total Phosphorus kg/yr.) and; ○ 10 per cent (total Nitrogen kg/yr.) as per.
Stakeholder engagement	<ul style="list-style-type: none"> • Yarra IWM Working Forum (DELWP) • City West Water funding for Edinburgh Gardens extension
Guidelines and Standard	<ul style="list-style-type: none"> • Yarra City Council WSUD design and policy 2016
Efficiency programs	<ul style="list-style-type: none"> • 9 councils building sites using more than 10ML per year completed a 'WaterMAP' developed actions to save water (CWW - 2010)
Investigations	<ul style="list-style-type: none"> • Open spaces irrigation with alternative water (with City West Water, 2012) • Concept designs for four sites for alternative water irrigation • Trialling rubber permeable surfaces for capture, treat, store and reuse of stormwater • Continue planting trees and installing WSUD infrastructure into drainage capital works programs • Enhance the city urban forest program to increase biodiversity and climate change adaptation • Improving soil condition to retain moisture longer hence reduce water usage • Utilising pool backwash water for irrigation of nearby parks and gardens

While some of the above milestones have been achieved, further work is needed and these additional actions have been carried over into this IWM plan, building on the City's work to date.

4. VISION, OBJECTIVES AND OUTCOMES

VISION: A water wise city in a healthy urban environment.

This vision reflects a recognition that all water is a resource that can be used in a fit for purpose way to support community and environmental health. Achieving this vision will require collaboration across Council, the community and external stakeholders to sustainably use this limited, valuable resource.

OBJECTIVES:

- 1. Efficient and fit for purpose use of all water sources***
- 2. A resilient and effective drainage network that flows into healthy and valued waterways***
- 3. An informed and responsible community benefitting from/enjoying a vibrant and sustainable landscape.***

These objectives provide the strategic framework for the actions and targets developed as part of this plan to guide Council's IWM journey.

Under each objective, there are a number of outcomes that are measurable changes in condition, helping us to define the ongoing success of this plan. The program logic structure provided in Figure 6 below shows how actions and targets are linked to outcomes, objectives and our overall vision.

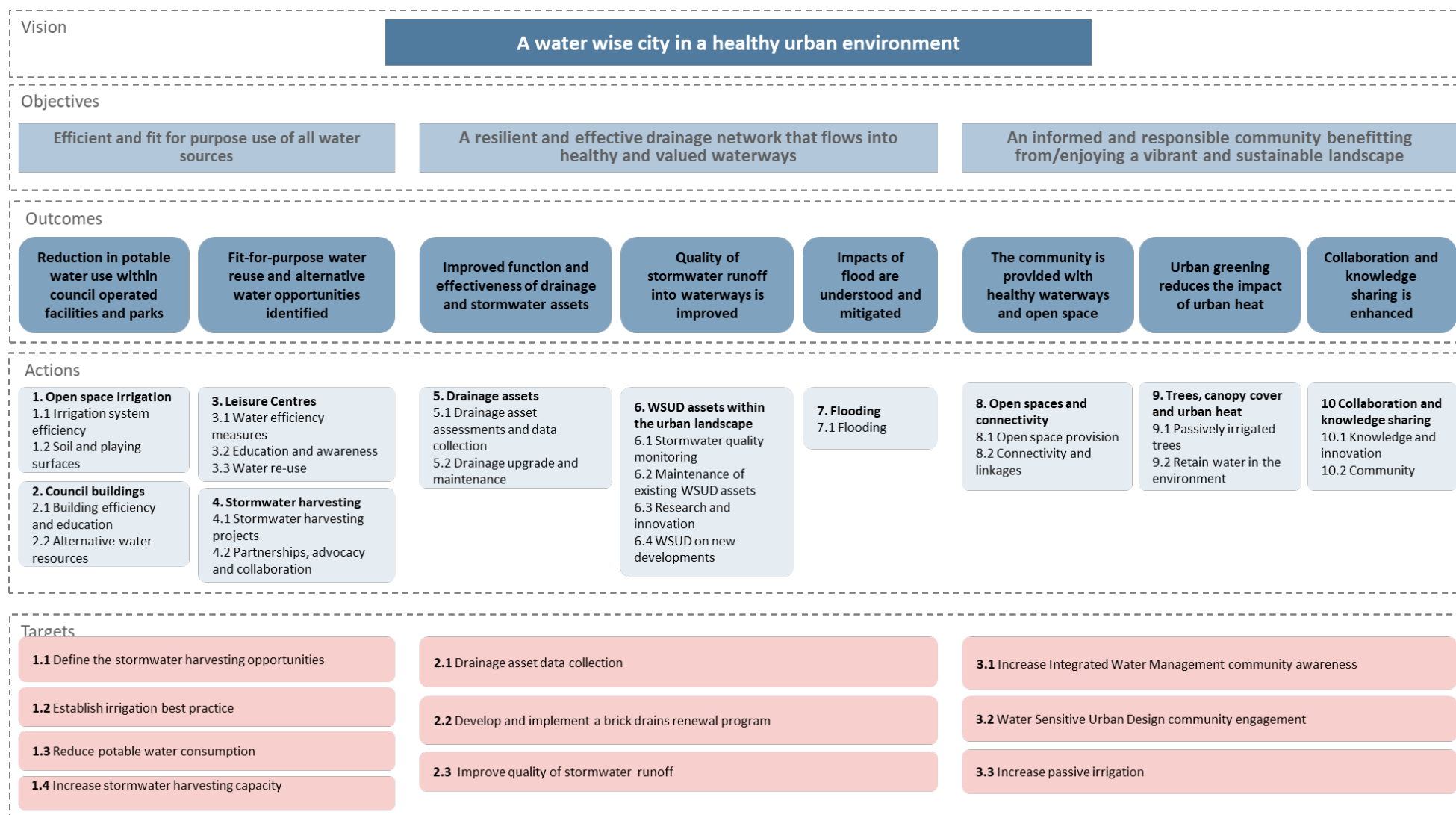


Figure 6. City of Yarra IWM program logic

5. TARGETS

Objective 1: Efficient and fit for purpose use of all water supplies

Target	Description	Timing	Success Indicators
1.1 Define the Stormwater Harvesting Opportunities	Investigate the feasibility of stormwater harvesting opportunities across the municipality and develop concept designs	2022	<ul style="list-style-type: none"> Complete a municipality wide feasibility study Develop 3 concept designs
1.2 Establish Irrigation Best Practice	Complete investigation of irrigation practices and vegetation in all open spaces	2023	<ul style="list-style-type: none"> Completion of investigation
1.3 Reduce Potable Water Consumption	Through the actions outlined within the plan, reduce the potable water consumption within council. The reduction will be measured against the current demand.	2024	<ul style="list-style-type: none"> 15% reduction in Council's potable water consumption
1.4 Increase Stormwater Harvesting Capacity	Design and deliver stormwater harvesting schemes in strategic locations across the municipality.	2025	<ul style="list-style-type: none"> Design and construct 3 stormwater harvesting schemes

Objective 2: A resilient and effective drainage network that flows into healthy and valued waterways

Target	Description	Timing	Success Indicators
2.1 Drainage Asset Data Collection	Survey and obtain critical information of drainage network	2024	<ul style="list-style-type: none"> Reduce gap in drainage data base to from 80% to 20%
2.2 Develop and implement a brick drains renewal program	Inspection, structural assessment and placement on renewal or monitoring program for 50% of brick drain assets	2024	<ul style="list-style-type: none"> Undertake maintenance or structural assessment of 50% of the Yarra's brick drains network.
2.3 Improve Quality of Stormwater Runoff	Through the actions outlined within the plan, continue to reduce the stormwater nutrient loads.	2025	<ul style="list-style-type: none"> Achieve an additional 10% reduction in stormwater nutrient loads compared to the 2008 baseline.

Objective 3: An informed and responsible community benefitting from/enjoying a vibrant and sustainable landscape

Target	Description	Timing	Success Indicators
3.1 Increase Integrated Water Management Community Awareness	Engage the community through awareness programs, detailing water conservations, council intentions and actions.	2022	<ul style="list-style-type: none"> Run 4 stories, posts, or articles related to the communities role in IWM through the following media; Yarra website, community newsletters, or interactive social media.
3.2 Water Sensitive Urban Design Community Engagement	Provide the community with insights into the inner workings of the various WSUD elements across Yarra.	2023	<ul style="list-style-type: none"> Install infographic signs for 50% of Yarra's WSUD
3.3 Increase Passive Irrigation	Investigate, develop and implement cost effective passive irrigation techniques and practices.	2030	<ul style="list-style-type: none"> 5% of the annually planted in 2030 new trees to be passively irrigated

6. ACTION PLAN

This plan provides Council with an Integrated Water Management direction for the next 10 years. Actions and targets have been identified for the first four years of the Plan's lifecycle with a review planned in the fifth year to identify actions and targets for the remainder of the plan's life that are reflective of the achievements and findings of the first four years. The delivery of the Plan will be actualised through;



Figure 7: Ways to deliver Integrated Water Management for Yarra

Objective 1: Efficient and fit for purpose use of all water supplies

No	Action	Description	Timing	Priority	Responsibility	Related target(s)
Outcome: Reduction in potable water use within council operated facilities and parks						
1. Open space irrigation						
1.1	Irrigation system efficiency	<ul style="list-style-type: none"> Identify and prioritise irrigation systems requiring upgrade based on age, condition and projected water saving Through smart systems, adopt watering regimes that respond to environmental conditions (e.g. during low evapotranspiration and not before rain) Establish leak detection and repair process Undertake scheduled maintenance of irrigation systems Engage external irrigation consultant to define works priority and ultimate irrigation processes 	Ongoing	High	Open Space Maintenance & Open Space Planning & Design	1.2 1.4
1.2	Soil and playing surfaces	<ul style="list-style-type: none"> Implement measures that aim to increase soil moisture retention and improve soil condition Implement based upon the highest priority spaces 	Ongoing	High	Open Space Maintenance & Open Space Planning & Design	1.2 1.3
2. Council buildings						
2.1	Building efficiency and education	<ul style="list-style-type: none"> Retrofit council buildings with water efficient water appliances during building refurbishment and upgrades based on Water Efficiency Labelling and Standards (WELS) ratings All new council buildings to meet industry best practice in water and energy consumption equivalent to 5 Star NABERS ratings Educate staff on water use within buildings through information bulletins, posters and displays to inform user group Investigation feasibility of green roofs on Council buildings for urban greening and heat reduction 	Ongoing	High	Building services, Drainage & stormwater, Sustainability	1.3
2.2	Alternative water resources	<ul style="list-style-type: none"> Investigate rainwater harvesting opportunities in existing Council buildings. Install where possible for non-potable purposes including toilet and irrigation Continue to adopt Council's Environmentally Sustainable Development (ESD) policy such that all new Council buildings include rainwater harvesting for non-potable purposes such as g toilet and irrigation Maintain information register on rainwater storage capacity within Council buildings 	Ongoing	Medium	Building services, Drainage & stormwater	1.3

3. Leisure centres

3.1	Water efficiency measures	<ul style="list-style-type: none"> Install shower timers with limit in all recreation centre showers Audit existing sand filters and replace where suitable to reduce water consumption Installation of smart water meters to improve water use data, understanding of end uses to identify efficiency measures 	2024	High	Leisure, Building Services	1.3 3.1
3.2	Education and awareness	<ul style="list-style-type: none"> Compare water use to the benchmarking program for pools around Victoria being undertaken by the Centre for Economics Continue education / collaboration on water use and behaviour change in conjunction with CWW Educate staff through information, workshops and regular updates on water consumption data Inform visitors of water use through posters and displays at centres 	Ongoing	Medium	Leisure, Building Services, Sustainability	1.3 3.1
3.3	Water re-use	<ul style="list-style-type: none"> Investigate the reuse possibility of pool backwash water at all swimming pools within Yarra's leisure centres 	2021	High	Leisure, Building Services	1.3

Outcome: Fit-for-purpose water reuse and alternative water opportunities identified

4. Stormwater harvesting

4.1	Stormwater harvesting projects	<ul style="list-style-type: none"> Investigate the feasibility of stormwater harvesting opportunities across the municipality Develop concept designs for the three highest priority locations Implement one stormwater harvesting project per year upon the completion of that investigation Upgrade storage at the stormwater harvesting facility at Edinburgh Gardens Employ an IWM Officer to manage the stormwater harvesting program as well as the management of Stormwater and Drainage actions Initiate discussion relating to reusing stormwater from the Alphington Wetlands for irrigation of Alphington Parks and surrounds. 	2024	High	Drainage & Stormwater	1.1 1.2 1.3 1.4
4.2	Partnerships, advocacy and collaboration	<ul style="list-style-type: none"> Collaborate with external stakeholders, including water authorities, to investigate funding opportunities for stormwater harvesting Continuously investigate opportunities to embed Integrated Water Management principles and goals across all Council operations Advocate to Development Victoria for alternative water opportunities for irrigation of open spaces within the Fitzroy Gas Works Redevelopment site Advocate to Parks Victoria to investigate the feasibility of stormwater harvesting in Yarra Bend Park Work with Melbourne Water to identify collaboration opportunities to improve the condition of City of Yarra waterways identified in the Healthy Waterways Strategy 	Ongoing	High	Drainage & Stormwater, Open Space Maintenance, Open Space Planning & Design, Urban Design, Civil Engineering	1.1 1.3 1.4 2.3 3.1 3.2

- Seek opportunities for funding from the Living Rivers Program for WSUD and stormwater harvesting projects
- Advocate for Yarra's interests in the Melbourne Urban Stormwater Institution Arrangements (MUSIA) Review
- Develop guidelines for stormwater, drainage and groundwater management

Objective 2: A resilient and effective drainage network that flows into healthy and valued waterways

No	Action	Description	Timing	Priority	Responsibility	Related target(s)
Outcome: Improved function and effectiveness of drainage and stormwater assets						
5. Drainage assets						
5.1	Drainage asset assessment and data collection	<ul style="list-style-type: none"> • Survey, inspect and assess drainage infrastructure • Present the gathered information in suitable GIS layers 	Ongoing	High	Assets, Drainage & Stormwater	2.1 2.2
5.2	Drainage upgrade and maintenance	<ul style="list-style-type: none"> • Develop a Drainage Asset Management Plan (DAMP), incorporating data gathered under Step 5.1 • Commence a brick drains inspection and renewal program • Utilise flood modelling data and condition assessment to prioritise drainage asset upgrades 	Ongoing	High	Assets, Drainage & Stormwater	2.2 2.3
Outcome: Quality of stormwater runoff into waterways is improved						
6. WSUD assets within the urban landscape						
6.1	Stormwater quality monitoring	<ul style="list-style-type: none"> • Undertake an assessment of stormwater quality runoff to identify water quality improvement locations and requirements. • Identify possible and strategic locations and install pollutant capturing devices 	2022	High	Drainage & Stormwater	2.3
6.2	Maintenance of existing WSUD assets	<ul style="list-style-type: none"> • Develop and implement a WSUD maintenance process according to best practice 	2023	High	Open Space Maintenance, Drainage & Stormwater	2.3
6.3	Research and innovation	<ul style="list-style-type: none"> • Update the 2016 WSUD policy document incorporating latest practices and technology • Consider and incorporate new WSUD designs such as proposed by developers, research bodies, academic institutions into those guidelines as appropriate 	Ongoing	High	Drainage & Stormwater, Civil Engineering	2.3

6.4	WSUD in new developments	<ul style="list-style-type: none"> • Work collaboratively with developers on WSUD for new developments and Precinct Structure Plans to ensure new impervious surfaces are not directly connected to waterways • Comply with Yarra Planning Scheme clause 12.03 & 22.16 to ensure development does not increase the rate or quantity of stormwater, sediment or other pollutant entering the river • Promote alternative resources in the construction and operation consumption of new building spaces as per planning clause 15.02 	Ongoing	High	Open Space Planning & Design, Drainage & Stormwater, Urban Design, Civil Engineering	2.3
Outcome: Impacts of flood are understood and mitigated						
7. Flooding						
7.1	Flooding	<ul style="list-style-type: none"> • Undertake municipality wide flood modelling and utilise the findings to develop a list of priority projects • Partner with Melbourne Water to update the Special Building Overlay (SBO) in accordance with results of updated flood modelling • Monitor the Land Subject to Inundation Overlays (LSIO) and liaise with Melbourne Water to undertake any necessary amendments. • Investigate the need for an online flood level warning system. Potentially collaborate with other Councils who have similar systems in place. • Review of Flood Emergency Plan according to revised flood model as per flood management plan 2017 • Collaborate with State Emergency Services in responding to flooding 	2024	High	Urban Design, Drainage & Stormwater, Communication & Engagement, Building services, Emergency Management Team, Strategic Planning	2.1 2.2 2.3

Objective 3: An informed and responsible community benefitting from/enjoying a vibrant and sustainable landscape

No	Action	Description	Timing	Priority	Responsibility	Related target(s)
Outcome: The community is provided with healthy waterways and open space						
8. Open spaces and connectivity						
8.1	Open space provision	<ul style="list-style-type: none"> Continue to provide a high level of service for open spaces of high value and in close proximity to residents Create new local parks where possible in densely urbanised environments to achieve more green space Identify irrigation opportunities for those spaces, particularly including rainwater from surrounding large roofs (if they exist) Increased permeability in the design of open spaces to support infiltration. Consider also the inclusion of infiltration trenches as part of design to create 'no runoff' open spaces 	Ongoing	High	Open Space Maintenance, Open Space Planning & Design, Urban Design, drainage & Stormwater	1.2 1.3 3.3
8.2	Connectivity and linkages	<ul style="list-style-type: none"> Create explicit community link to green open spaces by shading walking paths and well defined cycling tracks and paths to improve community access to open space Continual maintenance and condition improvement of existing paths and walkways along rivers and creeks 	Ongoing	High	Open Space Planning & Design, Urban Design	3.1 3.2
Outcome: Urban greening reduces the impact of urban heat						
9. Trees, canopy cover and urban heat						
9.1	Passively irrigated trees	<ul style="list-style-type: none"> Maintain existing and established trees that provide habitat and shade promoting biodiversity and cooling within city (Planning Clause 15.01) Investigate the inclusion of passive irrigation infrastructure for all newly planted Council trees (including investigating increased pervious surfaces around trees to capture more water) Use passive irrigation to support tree health and canopy density on city streets to increase cooling and encourage biodiversity 	Ongoing	High	Open Space Maintenance, Drainage & Stormwater, Urban planning	1.3 3.3
9.2	Retain water in the environment	<ul style="list-style-type: none"> Investigate opportunities for WSUD in urban streets – particularly as part of road surface and drainage renewals - for stormwater treatment and passive irrigation of street trees Investigate opportunities for green roofs on new Council buildings to contribute to reduced runoff and urban cooling Trial new cooling methods in identified hotspots including green ground cover, canopy cover and increased permeability Work with the City of Melbourne to share urban heat island effect research outcomes 	Ongoing	High	Open Space maintenance, Open Space Planning & Design, Drainage & Stormwater, building services	1.2 1.3 3.3

Outcome: Collaboration and knowledge sharing is enhanced

10. Collaboration and knowledge sharing

10.1 Knowledge and innovation	<ul style="list-style-type: none"> Collaborate with inner-city councils to share IWM knowledge and how their work has been incorporated into policy and future planning requirements. Focus on involvement in the IWM Forum for Yarra 	Ongoing	Medium – High	Urban Design, Drainage & Stormwater, Civil Engineering	1.3
	<ul style="list-style-type: none"> Work with DELWP by contributing data that will support target setting within the Yarra catchment as part of the IWM Forum process. 				1.4
	<ul style="list-style-type: none"> Improve interdepartmental communication at the project inception stage to incorporate IWM opportunities within building and infrastructure works 				2.3
	<ul style="list-style-type: none"> Continued collaboration with academic institutions on WSUD research and emerging technologies 				3.3
	<ul style="list-style-type: none"> Major project developments to meet City of Yarra's sustainability targets and planning requirements Clause 22.17 				
	<ul style="list-style-type: none"> Collaborate with Melbourne Water to support the development of the Yarra Strategic Plan 				
10.2 Community	<ul style="list-style-type: none"> Share IWM objectives, actions and targets through awareness programs, community working groups, forums and meetings 	Ongoing	Medium	Communications and Engagement, Sustainability	3.1
	<ul style="list-style-type: none"> Ongoing community consultation on specific IWM projects (e.g. Edinburgh Gardens), providing signage, fact sheets and case studies on sustainable water management on websites and onsite 				3.2

7. IDENTIFIED SITES AND ACTION PLAN

The sites listed below have been studied and present opportunities to contribute to IWM outcomes.

7.1. Edinburgh Gardens

Edinburgh Gardens is one of Yarra's largest parks at 24 hectares. It is located in the heart of bustling North Fitzroy and dates back to the 1860s. The Gardens contain open lawn areas, shaded / sheltered sports facilities, garden beds and two active sports ovals. Within the gardens are a 700m² raingarden that treats stormwater runoff from Melbourne Water's Fitzroy Main Drain passing underneath the Gardens.

The City of Yarra has commenced the design process for rejuvenating the existing raingarden to capture and treat greater volumes of stormwater from the Fitzroy main drain. This augmentation work involves:

- Completion of detailed design
- Increasing the existing 200kL underground storage capacity by an additional 1ML to optimise stormwater capture and increase the system yield from 4ML/yr. to 24ML/yr.
- Rejuvenating the existing raingarden to provide adequate detention and to accommodate the additional inflows into the system.



Operating and maintaining the system as per maintenance checklist periodically to ensure raingarden is performing as per design specification (Action 6.2).

The implementation of this project is expected to reduce downstream flooding in the Fitzroy area and directly contribute to Council's water reduction target. City West Water provided funding for this project through their Stormwater Harvesting Fund.

7.2. Yarra Bend Precinct

The Yarra Bend Precinct comprises the 16.5 hectares redevelopment of the former Amcor Paper Mill site in Alphington into a residential community of approximately 2,500 households, three local parks, and a mix of commercial and retail spaces. Adjacent to the redevelopment is Alphington Park, which contains 5.2 hectares of parkland including active and passive recreation facilities. The 1.8-hectare Alphington Park wetland has been revegetated in recent years to improve performance, habitat and its ecological value within the Yarra River corridor. A walking trail provides access to the wetland and connectivity for local residents to the Yarra River.



Opportunities and Action Plan with the precinct

- Complete investigation into stormwater harvesting at each of the three local parks (Action 4.1). Apply for funding from Melbourne Water / Yarra Valley Water to undertake concept design and investigation into stormwater harvesting and reuse
- Undertake a catchment analysis for stormwater runoff into the constructed Alphington Park wetland, current storage capacity and irrigation demand within the park. Advocate/partner with Yarra Valley Water to understand potential for funding of a stormwater harvesting scheme for Alphington Park
- Partner with stakeholders including developers to ensure best practice stormwater treatment requirements are met at the site (Action 6.4)
- Improve access to the existing Alphington Park and Alphington Park wetland together with Yarra Bend to enhance public recreation and amenity within the precinct (Action 8.2)

7.3. Fitzroy Gasworks Redevelopment

The former four hectares Gasworks site, located in the heart of Fitzroy will be transformed into a mixed-use precinct comprising residences, a school and small businesses as well as open spaces. The development is being managed by Development Victoria (DV). Drainage on the site currently runs through the site towards Alexandra Parade and ultimately discharges into the Merri Creek where it converges into the Yarra River.

Opportunities and Action Plan with the precinct

The site has a very compact footprint which provides challenges in supplying non-potable, alternative water to the site. We are working closely with stakeholders to develop an IWM approach for this precinct that includes:

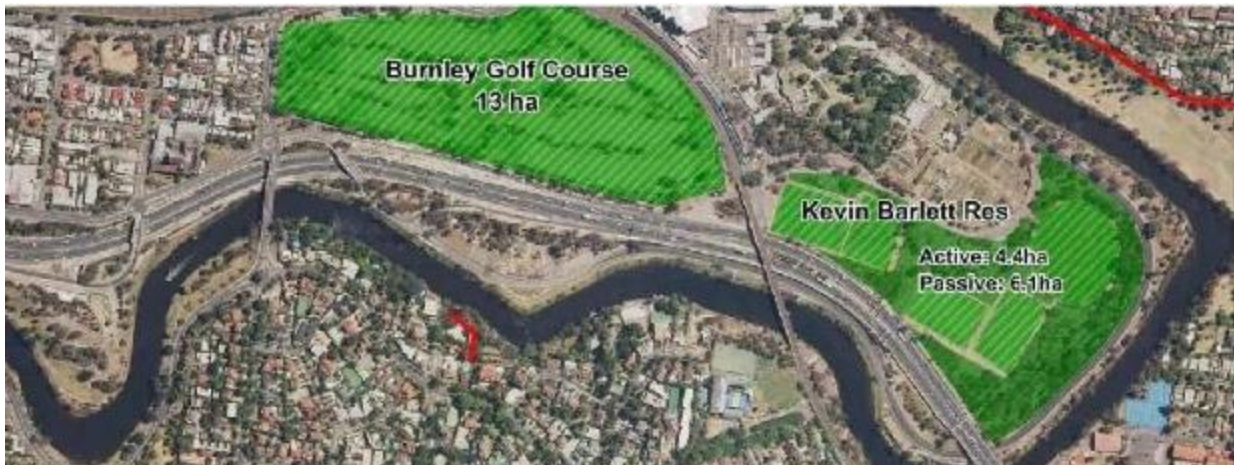
- Include a requirement for rainwater harvesting and reuse within buildings for non-potable reuse and to meet best practice runoff requirements (Action 2.2)
- Strategically design and upgrade the drainage network to achieve a net decrease in stormwater volume discharge to the Alexandra Parade Main Drain while containing the 1 in 10 ARI event
- Developer to maintain ground levels 300mm above flood level
- Ensure building and landscape treatments meet best practice and Council policy requirements of minimising runoff and maximising water reuse. Incorporate assets to reduce flood risk where possible and appropriate
- Educate community on the use of water in surrounding landscape by installing signage and information boards (Action 10.2)
- Advocate with Education Victoria to incorporate water reuse as part of school sustainability initiatives e.g. collecting rainwater for garden irrigation
- Collaborate with City West Water and Melbourne Water for support in investigating IWM solutions for the site.



7.4. Burnley Golf Course and Kevin Bartlett Reserve

Burnley Golf Course is a 13 hectare, nine-hole golf course and the Kevin Bartlett Reserve is a 10.5-hectare, high-profile sporting complex located in the suburb of Burnley. The Reserve has five sporting ovals, multi-purpose nets and pavilions that support a number of sports and activities and is also home to Richmond Senior Soccer Club.

The site is bounded by the Monash Freeway to the south and Swan St. is within proximity of their northern boundaries. Both sites are managed by Council and have a combined annual water consumption of 30ML/year.



Opportunities and Action Plan with the precinct

Council, in partnership with Melbourne University are investigating and trialling the use of permeable surfaces and biofiltration systems that incorporate reused rubber tyres for the re-development of the onsite carparks to treat surface runoff and provide stormwater for the irrigation of Burnley Golf Course.

The Action Plan for Burnley Golf Course and Kevin Bartlett Reserve will entail:

- Co-ordinate and develop a flood evacuation plan for Kevin Bartlett Reserve with SES (Action 7.1)
- Undertake a stormwater quality assessment and consider monitoring program
- Undertake a feasibility assessment for stormwater harvesting and reuse across both open spaces. If feasible, construct a stormwater harvesting system to and supply irrigation to the precinct. Incorporate flood mitigation opportunities where possible
- Collaborate with Melbourne Water to incorporate flood mitigation infrastructure as required
- Investigate opportunities for partnerships and funding to investigate a reduction in the nutrient pollution entering the Yarra (including the Living Rivers Program) (Action 4.2)
- Collaborate with Melbourne University Burnley Horticulture Campus to design pollution reduction assets and/or utilise excess stormwater for irrigation

7.5. Citizens Park

Citizens Park is a sports oval situated in the suburbs of Richmond. The site is situated in a densely urbanised, mixed-use area in close proximity to the Richmond Town Hall. As the only open space area in central Richmond providing recreational amenity, harvesting stormwater for reuse on this site would improve the appearance and profile of this site. This project could also consider the adjacent Richmond Bowling Club as a recipient of harvested stormwater for irrigation.

Running beneath Citizens Park is the Melbourne Water's Palmer St stormwater Main Drain, which captures stormwater runoff from a 71 hectare mixed-use catchment. This scheme considers the extraction of stormwater from this pipe. This project would also reduce the effect of downstream flooding by capturing and retaining water in the environment for irrigation and cooling.

The Action Plan for Citizens Park includes:

- Undertake a stormwater harvesting feasibility investigation incorporating improved stormwater runoff quality
- Investigate the use of pool backwash water from the adjacent Richmond Recreation Centre for irrigation of Citizens Park (Action 3.3)
- Engage with bowling club to understand interest in stormwater for irrigation
- Seek external funding if feasible



7.6. East Clifton Hill Reserves

This site is located adjacent to Merri Creek and near Quarries Park. There is an existing raingarden to the north-east of this area that currently treats stormwater runoff from a 3-hectare residential catchment mainly to the north of Walker St. This raingarden then drains into a minor wetland and then onto Merri Creek. There have been a number of investigations for stormwater treatment in this area, especially via a wetland at Merri Creek Labyrinth which lies to the south of the Walker Street Reserve within the broad floodplain of Merri Creek. A previous proposal to collect local stormwater here and pump it back up the escarpment to these three reserves was not considered value for money as the total volume of water required to make the proposal viable was well in excess of the demand from these tree reserves. Hence, attention has now turned to irrigation of each of the three reserves separately, or in some combination, from their 12-hectare local catchment located at the end of Ramsden St.



Possible opportunities and actions include:

- Investigate the potential of converting the end of Ramsden Street car park to a permeable surface with media filtration and storage to allow water capture and reuse (Action 9.2)
- Build a business case for Ramsden St local stormwater drain to irrigate Ramsden St and Quarries Park
- Advocate for funding partners for this project, which contributes to improving stormwater quality to Merri Creek (Action 4.2)
- If feasible build and operate stormwater harvesting system

7.7. Areas requiring further investigation

Within the municipality there are a number of high-profile sites that would benefit from an Integrated Water Management approach. This includes active sports oval and local passive park spaces. Some constraints and key action need to be addressed includes:

- Undertake investigation into Melbourne Water's Harper St Main Drain to assess its water quality and suitability for stormwater harvesting (Action 4.1)
- Undertake analysis to determine the optimal stormwater treatment and harvesting scheme for the Campbell St local drain for the irrigation of Burnley Park
- Examine the feasibility of stormwater harvesting for Barkly Gardens and Allan Bain Reserve
- Partner with Melbourne Water to investigate feasibility of constructing a raingarden/bio-retention asset in Curtain Square (drawing water from the MW main drain running down Canning St in North Carlton)
- Investigate feasibility of a stormwater harvesting scheme for Gahan Reserve for irrigation and flood mitigation
- Coate Park: investigate the need and feasibility of an alternative water supply.
- Fairfield Park: Investigation into stormwater harvesting feasibility at car park. The 7.9 hectares site is a nature conservation containing one active oval of 1.3 hectares, playground and heritage trees.
- Yarra Bend Park & Yarra Bend Public Golf Course: Advocate with Parks Victoria and Melbourne Water for current management practices and potential concept investigation design of stormwater harvesting to supplement irrigation on site (Action 4.2)

8. MONITORING, EVALUATION AND REPORTING

This IWMP will be monitored and updated every two years to tracks its progress and to make sure that the contents are still relevant. To do this effectively collaboration between inter-departments within the city and external stakeholders is needed to meet the objective and targets including reporting.

A new plan is to be developed after 10 years (2030) to replace this plan to be reflective of the change in operating environment.

9. REFERENCES

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City of Yarra (2017), Council Plan 2017 – 2021, Incorporating the Community Health and Wellbeing Plan

City Of Yarra (2018), Yarra Housing Strategy 2018

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City of Yarra (2018), Waste Minimisation and Resource Recovery Strategy 2018-2022

City of Yarra, Climate Emergency Plan 2020

City of Yarra, Nature Strategy 2020-2024 - Draft

DEWLP (2016), Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria.

DEWLP (2020), Yarra Planning Scheme

DELWP (2016), Water for Victoria

City of Yarra Stormwater Targets 2008

Integrated Water Management Forums (2018), Yarra Strategic Directions Statement

10. APPENDIX 1

Plan	Description and relevance to the IWM plan
Council Plans	
City of Yarra Water Action Plan 2006	The Water Action plan provided a strategic direction for sustainable water management. The plan outlined actions for implementing water reduction initiatives and water quality improvements.
City of Yarra Stormwater Targets 2008	The Stormwater targets outlines an approach to setting and achieving targets for stormwater pollution reduction. The 2020 target is to reach 10% of Best Practice Environmental Management (BPEM) through water sensitive urban design (WSUD).
Council plan 2017 - 2021	The Council Plan represents the vision for the City of Yarra. It guides priorities and sets a direction for the next four years based on extensive community consultation. Key priorities identified by the community include open space, recreation and leisure, and vibrant activity centres. The Council Plan also contains objectives for sustainability and liveability.
Yarra Housing Strategy 2018	This strategy looks at how to best accommodate the housing growth with growing population in the next 15 years. Key message is to have a well-planned and managed development in a way that maintains the city's liveability and creates additional benefits.
Municipal Flood Emergency Plan – A Sub-Plan of the Municipal Emergency Management Plan 2017	The Municipal Flood Emergency Plan details arrangements for the planning, preparedness/ prevention, response and recovery from flood incidents within the City of Yarra. The plan: <ul style="list-style-type: none"> Identifies the flood risk to the City of Yarra Supports the implementation of mitigation measures Details response and recover arrangements Identifies linkages with local, regional and state emergency and wider planning arrangements.
Open space strategy 2019 (draft)	Yarra's Open Space Strategy provides the direction for the provision, planning, design and management of open space in the municipality to 2031. It considers the role of open space in liveability and sustainability and the pressures of a growing urban population.
Urban forest strategy 2017	Yarra's Urban Forest Strategy provides guidance for the future management of Yarra's park and street trees to support liveability and mitigate the impacts of urban heat. The strategy has a target to increase tree canopy cover from 17% to 21.25% by 2040.
Nature Strategy 2020-2024 (draft)	The Nature Strategy considers ecosystem services provided by nature and identifies actions to restore, protect and enhance the natural habitat within the City of Yarra including the role of stormwater management in ensuring the health of waterways, and considering the cultural importance of wetlands and waterways.
Yarra Environment Strategy 2013 - 2017	The Yarra Environment Strategy (YES) defines a vision and sets actions for the City of Yarra to improve Council's resilience and sustainability. The YES sets a framework for reducing the municipality's environmental impact, including targets for potable water consumption and actions to improve stormwater quality including WSUD.
Climate Emergency Plan 2020 – 2024 (draft)	Yarra was one of the first councils in the world to declare a climate emergency. The plan sets out objectives to respond to the climate emergency and focused actions over the next four years. The plan aims to: <ul style="list-style-type: none"> Achieve zero-net emissions across the entire community Ensure the community is engaged, healthy and resilient Create a city that adapts to a changing climate Lead by example with a best-practice climate emergency response

Yarra Waste Minimisation and Resource Recovery Strategy 2018-2022	<p>The long-term ambition of the Waste Minimisation and Resource Recovery Strategy is to move the community towards zero waste to landfill. It will be delivered through a large suite of actions around five priority objectives:</p> <ol style="list-style-type: none"> 1. Valuing our resources 2. Delivering high quality, accessible services and programs 3. Encouraging community pride through clean public spaces 4. Ensuring Yarra has access to the programs, infrastructure and technology to meet its targets 5. Collaborate, partner and advocate for better outcomes
Yarra Planning Schemes (Local Regulation)	<p>The Yarra Planning Schemes, through development applications require stormwater to be carefully managed to balance the need for cooling of our highly urbanised landscape, retaining and reusing stormwater runoff in landscape where possible and disposal as the last option. There are existing flood overlays in the Yarra Planning Scheme. The most relevant clauses include:</p> <ul style="list-style-type: none"> • Clause 22.16 - Stormwater Management (Water Sensitive Urban Design) • Clause 15.02 -1S Sustainable development – Energy and resource efficiency • Clause 55.07-5 Apartment developments - Integrated water and stormwater management objectives
State or regional plans, policies and strategies	
DELWP IWM Forum	<p>The IWM Forums followed Water for Victoria with DELWP. Within Metropolitan Melbourne, the 'forums' were defined by their catchment, with the City of Yarra within the Yarra Catchment Forum. Forum attendees included Government and agency representatives whose role was to collaboratively define outcomes and objectives for each catchment and identify IWM opportunities that align with those outcomes.</p>
The Yarra River Protection Act 2017	<p>In 2017, the Yarra River Protection (Wilip-gin Birrarung murrn) Act passed through the Victorian Parliament, legislating the protection of the Yarra River for future generations. The Act declares the Yarra River and the public parklands and open spaces within its corridor as the Greater Yarra Urban Parklands considered as 'one living, integrated natural entity for protection and improvement' recognising Traditional Owners' custodianship and intrinsic connection to the river.</p>
Yarra River Action Plan 2017	<p>The Yarra River Action Plan sets objectives and 30 actions for the protection of the Yarra River corridor, supported by the Yarra River Protection Act 2017.</p>
Yarra Strategic Plan	<p>The Yarra Strategic Plan developed by Melbourne Water will be an overarching policy and planning framework to guide collaborative management of the river. It guides planning and outlines actions as well as facilitates collaboration between stakeholders, Traditional Owners and the community.</p>
Melbourne Water, Healthy Waterways Strategy 2018-2028	<p>The Healthy Waterways Strategy (HWS) provides strategic direction and framework for the management of waterways throughout the Port Phillip and Westernport regions for the next 50 years. It outlines co-designed catchment programs for each major catchment including the Yarra Catchment and outlines a holistic approach to waterway management for environmental, social, cultural and economic values. The HWS sets performance objectives that guide progress towards waterway targets, values, goals and visions.</p>