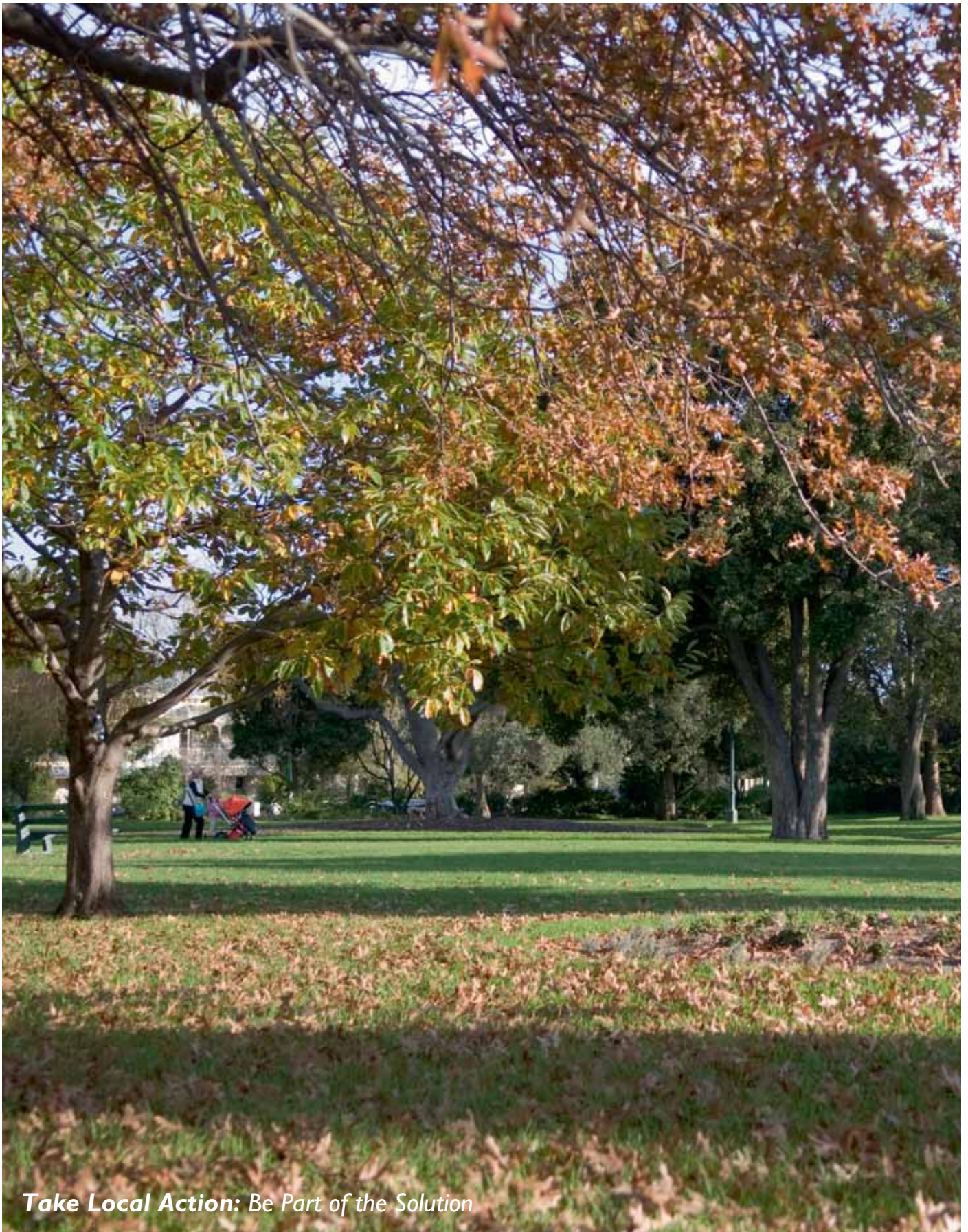


# OPEN SPACE WATER MANAGEMENT PLAN TOWARD A WATER SENSITIVE CITY



*Take Local Action: Be Part of the Solution*





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A changing climate, increasing temperatures and water restrictions are impacting the health of our trees, plants and open spaces. Council is determined to manage these impacts to ensure the protection of trees and parks in our city.

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This open space water management plan incorporates the findings and recommendations from the report provided by Cardno Grogan Richards in 2009.

## Executive Summary

In 2010 council undertook an Open Space Water Management Plan for the 176ha of council managed open space throughout the municipality. It addresses future watering requirements and responds to the challenge of climate change. The Open Space Water Management Plan seeks to ensure the liveability and sustainability of parks and open space into the future.

It is considered likely that water availability will be reduced in future and this may worsen with current climate change predictions. Water management is therefore critical for council in managing its parks and open spaces to provide a level of service that is acceptable to the community, cost effective and aims to reduce council's reliance on potable water supplies.

Council adopted a Drought Response Plan for the City of Port Phillip Open Space (2007) in response to drought conditions. The Open Space Water Management Plan will replace this, and this will help implement the City of Port Phillip's overarching Water Plan.

Council's Water Plan aims to transform the City of Port Phillip to a water-sensitive city with sustainable water management as a key driver. A target of 70% potable water reduction, based on 2001/02 water usage figures, was adopted by council and this has been achieved. However, it has been achieved to the detriment of the condition of open space. Consequently, the Water Plan 2010 sets a target for an increase in the use of alternative water sources; for open space this results in a target of 50% of future irrigation demand to be met by alternative water sources.

### Council's vision for public open space

A city where public spaces define the city's character and respond to its people's needs for places to rest, recreate and be inspired.

In 2005/06 council's water use was 251ML for all open space including parks, gardens, sports reserves, medians and nature strips. In 2008/09 the recorded potable water use was reduced to 93ML. This report considers analysis undertaken to deliver the optimal water requirements for open space and is based on the following factors:

- heritage gardens of botanical significance
- sports grounds
- high use sites including off-leash areas, event sites and popular areas for play
- access to green open space within 400m of people's residences



The optimal water requirement for open space watering has been calculated at approximately 155ML per annum for the City of Port Phillip. If the 70% reduction target is to be maintained, alternative water sources will be required.

Sport encourages community activity and is a major factor in community health and well-being. Major sporting grounds have one of the highest social and economic values, and council guidelines for the level of service for sport and recreation calls for 100% of playing surfaces to be fit for purpose.

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Without an optimal watering regime and appropriate climate adaptation measures in place, the guideline objectives for sport will not be met.

This report provides guidance on alternative water source options which may be suitable for parks and open space within the municipality, including rainwater harvesting, stormwater harvesting, groundwater extraction and sewer mining.

In particular, stormwater harvesting for the purpose of irrigation is regarded as an efficient and environmentally responsible means of providing long-term sustainability of open spaces.

Stormwater has, as recently as twenty years ago, been considered a problem to be disposed of in the most hydraulically efficient manner possible to prevent flooding. In recent years, the attitude of the Federal and State Governments has been reversed to value stormwater as a resource. Preliminary catchment analysis for City of Port Phillip has been undertaken to determine which priority sites warrant further investigation for stormwater harvesting.

Alternative water sources such as ground water should only be undertaken in the context of sustainable yields, salinity levels and asset health. Use of ground water requires a comprehensive assessment of the sustainable yield of the aquifer to determine whether it can meet the needs of its intended end use without damage to the long term health of the aquifer.

The effects of drought are apparent to the wider community and continuing education on council's actions, targets and the effect of water restrictions is required to ensure the community is kept informed and engaged during the ongoing process of climate change adaptation.

Investing in a sustainable future and ensuring that the City of Port Phillip progresses towards a water-sensitive city will require significant long-term commitment from council and the community. A water-sensitive city aims to protect its waterways, respond to climate change and sustainably manage the total water cycle. Adequate and sustainable water management is essential to provide the social, economic and environmental performance of one of Melbourne's premier municipalities.

The fundamental principles of a water-sensitive city are to minimise the use of potable water, reduce stormwater runoff volumes, improve stormwater quality and optimise the use of alternative water sources throughout the municipality in a fit for purpose capacity.

The purpose of this report is to prioritise open space sites to meet community needs and create one of Melbourne's most liveable and sustainable cities.

Key findings, recommendations and an Implementation Plan are summarised on the following pages.

## Executive Summary

Key Findings	Recommendations
<p>The reduction in irrigation has had an impact on the condition of open space assets in the city.</p> <p>To achieve the optimum irrigation there will need to be an increase in irrigation with non-potable water. If council is to achieve further reductions in potable water use, alternative water sources need to be accessed.</p>	<p>Identify priority projects and actions required to implement the Open Space Water Management Plan.</p> <p>Develop a five-year strategic resource plan that identifies all the key projects that need to be undertaken to implement the Open Space Water Management Plan and achieve the key targets and indicators for success.</p>
<p>The current application of potable water to open space is not sustainable in the context of optimal water requirements.</p> <p>Addressing the shortfall of water requirements must become a high priority for ongoing action and investment in order to continue to protect the natural and heritage values of open space assets within the municipality.</p>	<p>Sites which have been assessed as having potential urban drainage catchments of sufficient size should be investigated further for the viability of stormwater harvesting schemes.</p>
<p>The use of bore water is generally not suitable for irrigation of turf due to high salinity levels. Bore water may be mixed with a non-saline source, such as stormwater, or undergo desalination to render the bore water suitable for use on open space within the municipality.</p>	<p>Council does not currently support the use of groundwater. Council's position is that any consideration of groundwater use should only be undertaken in the context of sustainable yields, salinity levels and asset health.</p> <p>Council will continue to support groundwater protection and increased infiltration of clean, treated stormwater.</p>
<p>Approximately 90% of open space within the city is warm season grass. All open space should be converted to warm season grass.</p>	<p>Open spaces with cool season grass should be converted to warm season grass species given the reduction in water use that can be achieved.</p>
<p>Turf management practices may improve existing surfaces during extended dry periods and include alteration of grass mowing height, application of wetting agents to dry soil and strategic aeration of soil to improve water, air and fertiliser uptake.</p>	<p>Review existing turf management practices.</p> <p>These measures should be incorporated in conjunction with alternative water source schemes to minimise the extent of infrastructure required.</p> <p>Develop an irrigation system upgrade program.</p> <p>Implement the recommendations in the irrigation audit report.</p>
<p>Landscape adaptation such as the use of mulch is important in a dry climate.</p>	<p>Review current mulching practices for trees and garden beds.</p>

Key Findings	Recommendations
Use of drought-tolerant plants and trees will contribute to increasing water efficiency in the municipality.	Develop and document a drought-tolerant plant palette.
The use of passive and sub-surface irrigation systems should be increased with the use of water blocks to be considered in extreme circumstances.	<p>Identify projects and develop a program that includes installation of passive irrigation systems.</p> <p>Develop an irrigation upgrade program that includes passive irrigation systems.</p>
As an alternative to turf surfaces, synthetic surfaces require no water and deliver a high surface consistency and durability. They are becoming increasingly popular as they allow for increased use.	Further investigate opportunities and need for synthetic turf to supplement sporting facilities in the City of Port Phillip.
The effects of drought and increased water restrictions are evident to the wider community, with noticeable effects on open space and trees within the municipality. Education is an important platform in keeping the community involved and aware of council's actions for reducing potable water use.	<p>Community education programs should be developed in a coordinated multifaceted manner which supports a range of current and future policies that provide information on alternative water sources and the stormwater cycle.</p> <p>Reinvigorate the Adopt a Tree program to help raise awareness of tree health and encourage the public to care for local street trees using household grey water.</p>
<p>While not part of current legislation drivers, urban heat island effects, should be further considered by council.</p> <p>Vegetated areas can provide a cooling effect to surrounding areas downwind. Prevailing winds in the Melbourne region approach predominantly from a southerly direction with an average speed of 6m/s. Given the considerable amount of open space within the municipality, the anticipated cooling effects of increased vegetation in our open spaces may be significant. Cooling effects are also provided by onshore winds from Port Phillip Bay and Albert Park Lake located in the east.</p> <p>It is noted that urban heat island effects are a relatively recent topic for discussion and methods of measuring their effects are currently in development.</p>	<p>Develop mitigation measures for incorporation into future projects.</p> <p>Development of a strategic policy position is recommended to guide planning principles for activities which could impact significantly on the urban heat island effect.</p> <p>Undertake a project to understand the role street trees play in reducing the heat island effect, in particular identifying the areas where trees could contribute to cooling of the city.</p>

## Implementation Plan

C – Current Initiative N – New Initiative

Area	Action	C/N	Service Unit	Cost Estimate*	Outcome
Trees	Review current mulching practices for trees as part of the development of new service specifications.	N	Parks Services	TBD	<ul style="list-style-type: none"> <li>•improved tree health</li> <li>•improved moisture retention</li> <li>•improved amenity.</li> </ul>
	Continue with current tree mulch application.	C	Parks Services	\$60,000	<ul style="list-style-type: none"> <li>•improved moisture retention</li> <li>•improved tree health</li> <li>•improved amenity.</li> </ul>
	Continue to provide a two-year watering support program to all newly planted trees.	C	Parks Services	\$400 p/tree	<ul style="list-style-type: none"> <li>•improved tree health</li> <li>•reduced juvenile tree loss.</li> </ul>
	Passive irrigation for trees study. Use of captured stormwater from gutters. Study will focus on priority street tree sites with mature trees where there are no upcoming capital works. Upgrades to gutters.	N	Parks Services	\$15,000	<ul style="list-style-type: none"> <li>•improved moisture</li> <li>•improved tree health.</li> </ul>
	Tree condition audits for priority sites such as major boulevards, heritage gardens and mature trees.	C	Parks Services	\$10,000	<ul style="list-style-type: none"> <li>•better planning for tree health</li> <li>•better management of trees.</li> </ul>
	Implement recommendations from tree-condition audits for improved tree health.	N	Parks Services	Considered on a site by site basis	<ul style="list-style-type: none"> <li>•improved tree health</li> <li>•improved tree structure</li> <li>•removal of poor or dead trees.</li> </ul>
	Develop and plan the city heat island effect areas, including a tree canopy coverage current % rate and targeted % rate.	N	Parks Services/ Open Space Planning/ Sustainability	\$50,000	<ul style="list-style-type: none"> <li>•improvements to green canopy coverage of the city</li> <li>•reduction in the heating effects of hard surfaces.</li> </ul>
	Undertake project 'Sustainability in Streetscapes'. Guidelines and Implementation Plan for intergrating WSUD into the streetscape program.	N	Engineering Services/ Sustainability	\$30,000	<ul style="list-style-type: none"> <li>•improved storm water quality</li> <li>•improved tree health.</li> </ul>



Area	Action	C/N	Service Unit	Cost Estimate	Outcome
Trees	Install water blocks for irrigation of street trees where tree root pruning has occurred for 2 years, or until tree-health recovery. Use of recycled or reclaimed water within water blocks (water filled traffic barriers).	N	Parks Services	\$75,000	<ul style="list-style-type: none"> <li>•improved health of mature trees</li> <li>•improved soil moisture.</li> </ul>
	Develop formal agreements for the use of water from Elsternwick Park Lake and Albert Park Lake for tanker watering.	C	Parks Services	–	<ul style="list-style-type: none"> <li>•formalised usage of non potable water for future use.</li> </ul>
	Continue to liaise with City of Melbourne to ensure a consistent approach to tree management in St Kilda Rd.	C	Parks Services	–	<ul style="list-style-type: none"> <li>•consistent management programs for boulevard trees.</li> </ul>
Irrigation	Monitor water use for all sites on a quarterly basis.	C	Parks Services	–	<ul style="list-style-type: none"> <li>•better water-management practices</li> <li>•early identification of irrigation issues.</li> </ul>
	Undertake quarterly irrigation system audits in line with contract specifications.	N	Parks Services	–	<ul style="list-style-type: none"> <li>•improvements in maintenance of irrigation systems</li> <li>•improvements in contractor compliance</li> <li>•improved planning for system upgrades.</li> </ul>
	Two-yearly independent audits of irrigation systems, performance and maintenance.	N	Parks Services	\$20,000	<ul style="list-style-type: none"> <li>•better water management practices</li> <li>•early identification of issues</li> <li>•improved planning for system upgrades.</li> </ul>
	Continue to implement irrigation system upgrades.	C	Parks Services	Considered on a project-by-project basis	<ul style="list-style-type: none"> <li>•improve efficiency of existing irrigation systems</li> <li>•decrease potable water use</li> <li>•reduce risk of injury from hard sports ground surfaces</li> <li>•replacement of old and inefficient systems</li> <li>•better turf surfaces.</li> </ul>

## Implementation Plan

Area	Action	C/N	Service Unit	Cost Estimate	Outcome
Open Space Mgmt.	Identify priority projects and actions required to implement the Open Space Water Management Plan and develop an implementation plan.	N	Parks Services	–	<ul style="list-style-type: none"> <li>• identification of priorities</li> <li>• implementation of Open Space Water Management Plan.</li> </ul>
	Develop a program for ground-under-repair fencing installation.	N	Parks Services	\$25,000	<ul style="list-style-type: none"> <li>• early identification of turf damage issues</li> <li>• improvements to open-space quality.</li> </ul>
	Develop a five-year strategic resource plan (capital works program) that identifies all the key projects that need to be undertaken to implement the water management plan to achieve the key targets and indicators.	N	Parks Services	–	<ul style="list-style-type: none"> <li>• identification of priorities</li> <li>• implementation of Open Space Water Management Plan</li> <li>• strategic approach to water management.</li> </ul>
	Review and monitor key open space areas activity to ensure that open spaces are managed without excessive wear.	C	Parks/ Sport and Recreation / Animal Management	–	<ul style="list-style-type: none"> <li>• early identification of issues</li> <li>• improvements to open space quality.</li> </ul>
	Continue to monitor the impact that events have on open space, and the ongoing implementation of processes for event management in open space to ensure impact is minimised.	C	Parks / Sport and Recreation / Meetings and Events	Considered on a site-by-site basis	<ul style="list-style-type: none"> <li>• early identification of issues</li> <li>• management of open space use in line with agreed limits</li> <li>• improved turf condition.</li> </ul>
	Review existing turf management practices as part of the development of new service specifications.	N	Parks Services	–	<ul style="list-style-type: none"> <li>• improved turf quality</li> <li>• increased turf area usage.</li> </ul>
	Continue to work with sporting clubs, neighbouring municipalities and Parks Victoria regarding the use of sports and grounds and other open space areas.	C	Sport and Recreation	–	<ul style="list-style-type: none"> <li>• regionalised management of sports fields</li> <li>• improved ground quality</li> <li>• improved ground-use management.</li> </ul>

C – Current Initiative N – New Initiative

Area	Action	C/N	Service Unit	Cost Estimate	Outcome
Landscape Adaptation	Conversion of cool season grasses to warm season.	C	Parks Services	\$85,000	<ul style="list-style-type: none"> <li>•improved turf quality</li> <li>•increased use of turf areas.</li> </ul>
	Conversion of North Port Oval to warm season grass.	N	Parks Services	\$140,000	<ul style="list-style-type: none"> <li>•reduced potable water use</li> <li>•increased use of turf area</li> <li>•reduced likelihood of turf diseases.</li> </ul>
	Continue to plant drought-tolerant plants in garden beds.	C	Parks Services	–	<ul style="list-style-type: none"> <li>•reduced plant death in summer period</li> <li>•reduced plant replacement costs.</li> </ul>
	Review current mulching practices for garden beds as part of the development of new service specifications.	N	Parks Services	–	<ul style="list-style-type: none"> <li>•improved plant health</li> <li>•improved moisture retention</li> <li>•improved amenity.</li> </ul>
	Continue with current mulching of garden beds program.	C	Parks Services	–	<ul style="list-style-type: none"> <li>•improved tree health</li> <li>•improved moisture retention</li> <li>•improved amenity.</li> </ul>
	Further investigate the opportunities, need and environmental costs of synthetic turf to supplement sporting facilities in the City of Port Phillip.	N	Sport and Recreation	\$40,000	<ul style="list-style-type: none"> <li>•understanding of needs and costs for any possible installation of a sporting synthetic surface.</li> </ul>
	Develop maintenance guidelines and a maintenance program for water sensitive urban design infrastructure such as raingardens, and implement into current specifications for parks maintenance.	N	Parks Services/ Sustainability	Considered on a site-by-site basis	<ul style="list-style-type: none"> <li>•improved amenity</li> <li>•increased longevity of infrastructure life</li> <li>•ensure efficiency.</li> </ul>

## Implementation Plan

C – Current Initiative N – New Initiative

Area	Action	C/N	Service Unit	Cost Estimate	Outcome
Landscape Adaptation	Continue to implement water sensitive urban design in parks and streetscapes as part of capital upgrade works.	C	Parks Services / Open Space/ Engineering Services	Considered on a project-by-project basis	<ul style="list-style-type: none"> <li>• improved storm water quality</li> <li>• improved aquifer moisture retention</li> <li>• improved amenity.</li> </ul>
	Develop a capital program to deliver stormwater harvesting projects to priority sites.	N	Parks Services	Considered on a project-by-project basis	<ul style="list-style-type: none"> <li>• improved tree health</li> <li>• improved moisture retention</li> <li>• improved amenity</li> <li>• improved stormwater quality</li> <li>• improved aquifer moisture retention</li> <li>• reduced potable water use</li> <li>• improved plant and turf quality</li> <li>• greater open space usability.</li> </ul>
	Develop information on managing tree health for the internet.	N	Parks Services		<ul style="list-style-type: none"> <li>• improved private tree management</li> <li>• improved public tree health.</li> </ul>
	Continue to promote the Adopt a Tree program.	C	Parks Services	\$20,000	<ul style="list-style-type: none"> <li>• increased community awareness</li> <li>• increased use of grey water.</li> </ul>
	Develop and document drought-tolerant plant and tree palettes for internal use and posting on website for educational purposes.	N	Parks Services		<ul style="list-style-type: none"> <li>• increased community awareness of drought tolerant plants.</li> </ul>
	Continue to assist Friends Groups to adapt to a low water environment.	C	Parks Services		<ul style="list-style-type: none"> <li>• increased community awareness of water management processes and opportunities.</li> </ul>



Climate change is impacting our city and council is taking action to protect our way of life. We will adapt where we need to adapt, and we will be innovative in finding new and better ways to manage water.



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# I Introduction

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In 2010 council undertook an Open Space Water Management Plan for all parks and public open spaces within the municipality. It is noted that Albert Park Lake Reserve is located within the municipality and is managed by Parks Victoria. It has not been included in this Open Space Water Management Plan.

The City of Port Phillip has some 176ha of open space available for public amenity, including an extensive foreshore, significant neighbourhood parks, children's playgrounds and sports facilities catering for local competition up to state level. The city's trees, gardens and lawns are key elements of our open spaces. These elements provide the city and community with landscapes synonymous to the city, including heritage-listed boulevards, heritage gardens and foreshore recreation areas.

The neighbourhoods and foreshore of the City of Port Phillip are a popular tourist destination with an estimated four million visitors per annum. The foreshore and parks are seen as top attractions, which highlights the importance of protecting and maintaining these assets.

Melbourne is currently at stage 3 water restrictions and the reduction in water use has had a negative effect on the health of open space and recreation space throughout the municipality. The Drought Response Plan for the City of Port Phillip was developed and adopted by council in 2007. The Plan has guided council's management of open spaces in drought conditions. As the climate becomes increasingly dry and hot, parks and open space management need to consider this change as typical, and council can no longer refer to such conditions as drought. The Open Space Water Management Plan seeks to ensure the liveability and sustainability of parks and open space into the future.

The Open Space Water Management Plan will reflect the principles of the Water Plan (2010) and will create an implementation framework from which actions can be developed and prioritised.

## 1.1 Project objectives

The objectives of this study include the following:

- model the water requirements of parks and open space within the City of Port Phillip, including a review of historical water use, and provide an assessment of optimal water application rates for each open space
- review methods of increasing water efficiency
- provide a high-level review of alternative sustainable water options for open space within the municipality and identify sites with opportunities for such measures
- develop a hierarchy for future investment and prioritisation of sites based on public usage levels, existing council priorities, heritage significance and other policy drivers
- develop a framework for further action and implementation of identified sustainable water options
- develop a four year Implementation Plan for identified actions with preliminary costings
- prepare an Open Space Water Management Plan for council's review outlining results of the above.

## 1.2 Project context

Sustainable water management is becoming increasingly important to conserve and protect water resources. The use of alternative water sources can help achieve this, and the stages involved in their introduction are outlined in Figure 1. It is important to note that the feasibility stage is based on a desk top study and may change and develop as detailed information is obtained during the design phase.



Figure 1: Process for developing of Alternative Water Sources



### 1.2.1 Climate change

Climate adaptation and climate resilience are key challenges facing all municipalities. Council has indicated that the proposed Water Management Plan is to take climate change effects into consideration and not just water management in the context of drought. Climate change effects include the following:

- longer dry spells between storm events
- higher intensity storm events
- increased erosion in downstream environments
- higher peak flood flows
- higher temperatures
- reduction in evapo-transpiration cooling effects and increased urban heat islands.

Climate resilience for proposed alternative water source options includes consideration of the following:

- providing water sensitive urban design features that provide amenity, storage and natural filtration for fit for purpose open space irrigation
- provision of water security for irrigation of valued community assets
- reduction of peak flows from urban catchments
- provision of a means of capturing large quantities of stormwater and processing the water at a later time, using low-energy transfers
- increasing the rate of evapo-transpiration and cooling effect for the local area by enabling irrigation of open space during the peak summer periods and contributing to the reduction of urban heat island effects.

Council's Local Action on Climate Change Report (2007) identified the following actions and recommendations relating to water use in open space:

- achieve a 70% reduction in potable water use in parks by 2020 (based on water usage levels from 2000)
- enhance the use of recycled water and stormwater for watering parks and gardens
- develop water wise and drought tolerant parks
- enhance the use of water sensitive urban design principles in the city.



### 1.2.2 Urban heat island effects

There are currently no legislative drivers or policy to encourage local government to adopt strategies to combat urban heat island effects.

An urban heat island can be considered as a metropolitan area which is significantly warmer than a surrounding rural area. In Melbourne, a measured difference in average temperature of up to 4°C exists between the city and the outskirts which is primarily caused by urban heat island impacts.

Urban heat island effects result from human development causing reduced evapo-transpiration due to removal of soil and vegetation which normally provides a cooling effect. Other factors contributing to the urban heat island effect include building materials and their heat absorption properties, building geometry and orientation, traffic congestion and environmental effects.

Given the City of Port Phillip adjoins Port Phillip Bay and with Albert Park Lake located in the east of the municipality, cooling effects are also provided.

Mitigation measures relating to water management include the following:

- water sensitive urban design measures such as stormwater harvesting for the purpose of irrigation provide valuable benefit to the community and urban heat island mitigation measures, with an increase in cooling effects due to evapo-transpiration
- similar benefits can be realised from providing bioretention measures within a streetscape environment and increased vegetation where possible
- vegetated areas can provide a cooling effect to surrounding areas downwind. Prevailing winds in the Melbourne region approach predominantly from a southerly direction with an average speed of 6m/s.

Given the considerable amount of open space within the municipality the anticipated cooling effects of increased vegetation in our open spaces may be significant. Cooling effects are also provided from onshore winds given the municipality's location on Port Phillip Bay and Albert Park Lake located in the east.

Further assessment is required to link plant type, water use and cooling effects to local precinct scale projects.

### 1.2.3 Water quality

Water in creeks and rivers in the City of Port Phillip and surrounding areas is generally considered as being poor to moderate in quality based on Melbourne Water's Index of Stream Condition (refer to Section 8 References). These ratings are considered typical for lower reaches of urban waterways.

Stormwater from urban catchments varies considerably in quality depending on the amount of development and usage patterns. Typically, urban catchment runoff can contain various pollutants from sources indicated in Table 1.

Stormwater harvesting systems can deal with the variable water quality of urban runoff using a multi-stage treatment train approach.

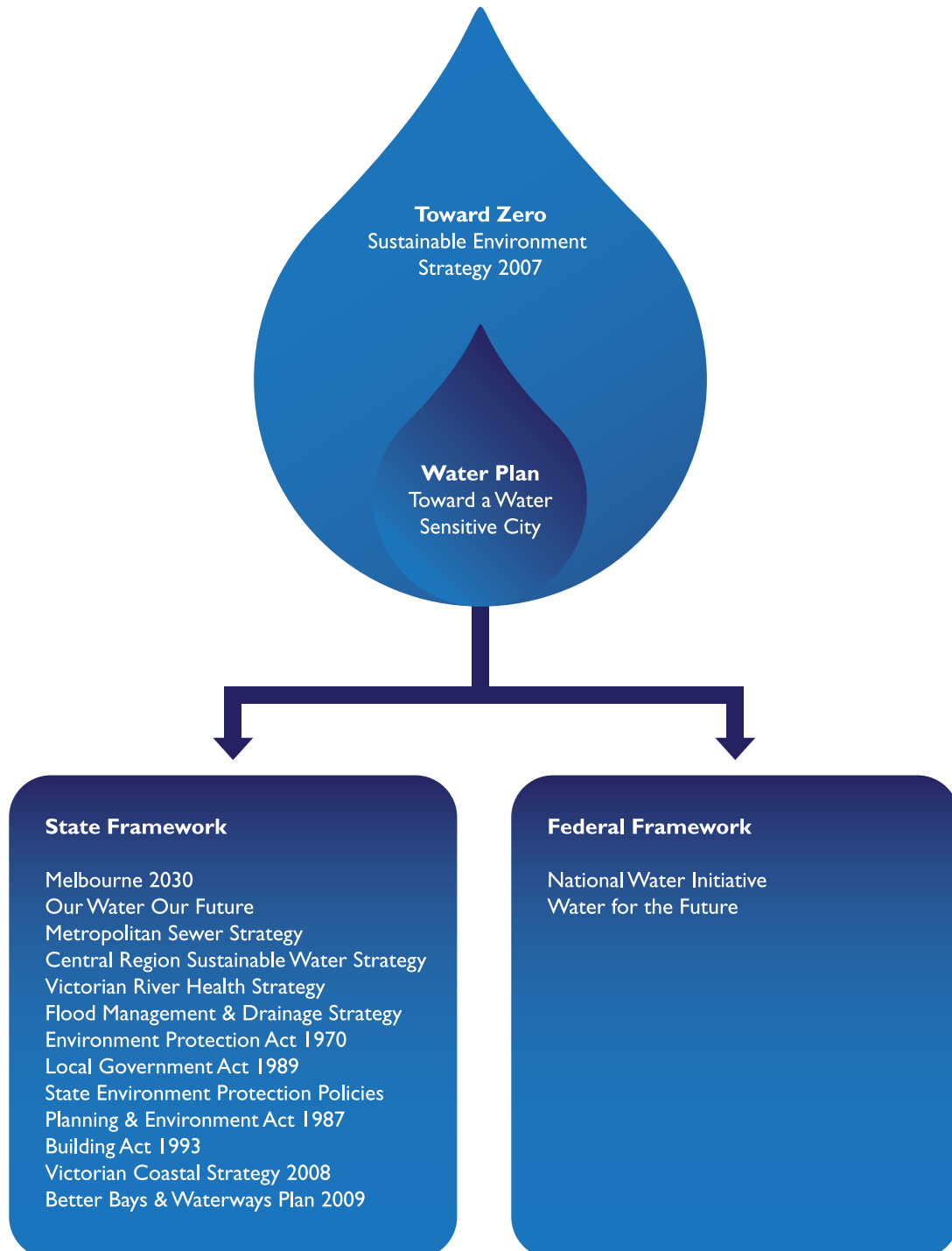
Table 1: Catchment Runoff Typical Pollutants

Soil erosion	Industrial and household chemicals
Cleared land	Industrial processes
Fertilisers	Paint and preservatives
Human and animal waste	Pesticides
Vehicle fuels and fluids	Rainfall-carried pollutants and suspended solids
Fuel combustion	

## 2 Background Review

There are a number of key council policies and documents which relate to water management within the municipality. The strategic context for sustainable water management is summarised in the Figure below. A summary of the City of Port Phillip strategies related to this plan are summarised in this section.

Figure 2: Strategic Context For Sustainable Water Management



Source: City of Port Phillip Water Plan (2010)

## 2.1 City of Port Phillip Open Space Strategy

The Open Space Strategy (updated 2009) was developed following a review of public open space within the municipality, and provided recommendations for linking existing open spaces and opportunities for improvement within existing reserves and streetscapes. The vision statement for the City of Port Phillip’s Open Space Strategy is as follows:

*“A City where public open spaces define the city’s character and respond to its people’s need for places to rest, recreate and be inspired.”*

A number of principles have been identified and adopted by council to help plan, develop and manage open space within the municipality. In 2009, Principle 9 was adopted and the principles are outlined in Table 2.

Table 2: Open Space Strategy Principles

Number	Principle	Recommendation
1	Optimise the provision of public open space.	<p>Increasing the amount of useable open space in appropriate locations to offset increases in population and the decline in private open space.</p> <p>The use of urban design strategies that produce functional and pleasing spaces irrespective of size.</p> <p>Strong design elements in the creation and renewal of public open space to inspire people and develop parks that will respond to community needs.</p> <p>Creating connections between spaces to maximise use and functional public open space.</p> <p>Community benefit to underpin the use of open space.</p>
2	Regulate and manage the effects of commercial events in public open space.	<p>Commercial events in parks need to demonstrate net community benefit. The impacts of commercial events upon public access to open space will be monitored and regulated.</p>
3	New residential development and public open space.	<p>The boundaries of public and private open space in residential developments should be clearly delineated. Where residential developments border public open space, the values of the existing public open space must be enhanced or preserved, not degraded.</p>
4	Safe access to public open space.	<p>Objectives of the City of Port Phillip Lighting Strategy will be implemented in public open space to provide safe access to high profile spaces and public transport connections as a priority.</p>
5	Provide access for all.	<p>Public open space will offer a diversity of functions and experiences, and be accessible to all.</p> <p>All functions of public open space will be provided equitably across the municipality.</p>
6	Streetscapes as public open space.	<p>Streetscapes provide opportunities for public use, particularly for communal meeting and exercise. Design and treatment of streetscapes should respond to these potential uses.</p>



Source: *City of Port Phillip Open Space Strategy, Implementation Plan Framework (2009)*

Number	Principle	Recommendation
7	Public open space managed by others.	The City of Port Phillip will continue to work with other public authorities as managers of public open space, to achieve high quality spaces for all residents.
8	Supply of public open space.	<p>Park land is a highly valued community asset. The inner city has a very limited supply of public open space, which is increasingly under pressure from high use by residents and competing demands from other community uses.</p> <p>Any loss of land currently used for open space will only be considered in the following situations:</p> <ul style="list-style-type: none"> <li>• if the available land offers poor amenity for public open space use</li> <li>• if alternative sites of higher quality can be identified for acquisition</li> <li>• when the net community gain can be guaranteed by an alternative land use.</li> </ul> <p>Criteria used to define poor amenity of public open space is that it:</p> <ul style="list-style-type: none"> <li>• is underutilised</li> <li>• offers poor connection to other spaces or streets</li> <li>• is unsafe for users</li> <li>• offers poor accessibility</li> <li>• has little potential for improvement as functional public open space.</li> </ul>
9	Sustainable open spaces.  (additional principle added in 2009 as part of the Implementation Plan Framework)	<p>Sustained drought conditions have had an adverse impact on open space. To respond to this change in climate, environmentally sustainable design features will need to be considered in the management and renewal of open space.</p> <p>Examples of this could include the use of drought-tolerant plants, warm season grasses, low-energy public lighting, alternative water sources and water sensitive urban design.</p>

An Implementation Plan Framework (2009) has been developed to assist council with delivery of actions identified in the Open Space Strategy. This document reviews actions identified in the Open Space Strategy and develops criteria for determination of open space priorities within the municipality. In addition it provides guidance on the purchasing of open space and neighbourhood-specific implementation plans. The Implementation Plan Framework is seen as a live document where actions can be readily achieved and updated annually.

## 2.2 City of Port Phillip Water Plan (2010)

The City of Port Phillip recognises the importance of conserving and protecting water sources in times of changing climatic conditions, and the Water Plan (2010) outlines a sustainable strategy to manage these water sources. The objectives of the Water Plan (2010) include the following:

- undertake a review of council's Water Action Plan (2005) and the current approach to Water Management
- clarify current and future water management challenges and issues of relevance to council
- outline a vision and principles for sustainable water management, including potable water, stormwater, wastewater and groundwater
- set targets for integrated water management across all water sources
- outline a sustainable water management program of council and community actions, incorporating regional and local partnerships

- outline elements of program support including water project accounting, program monitoring and communications planning.

The key targets that relate to Open Space management are:

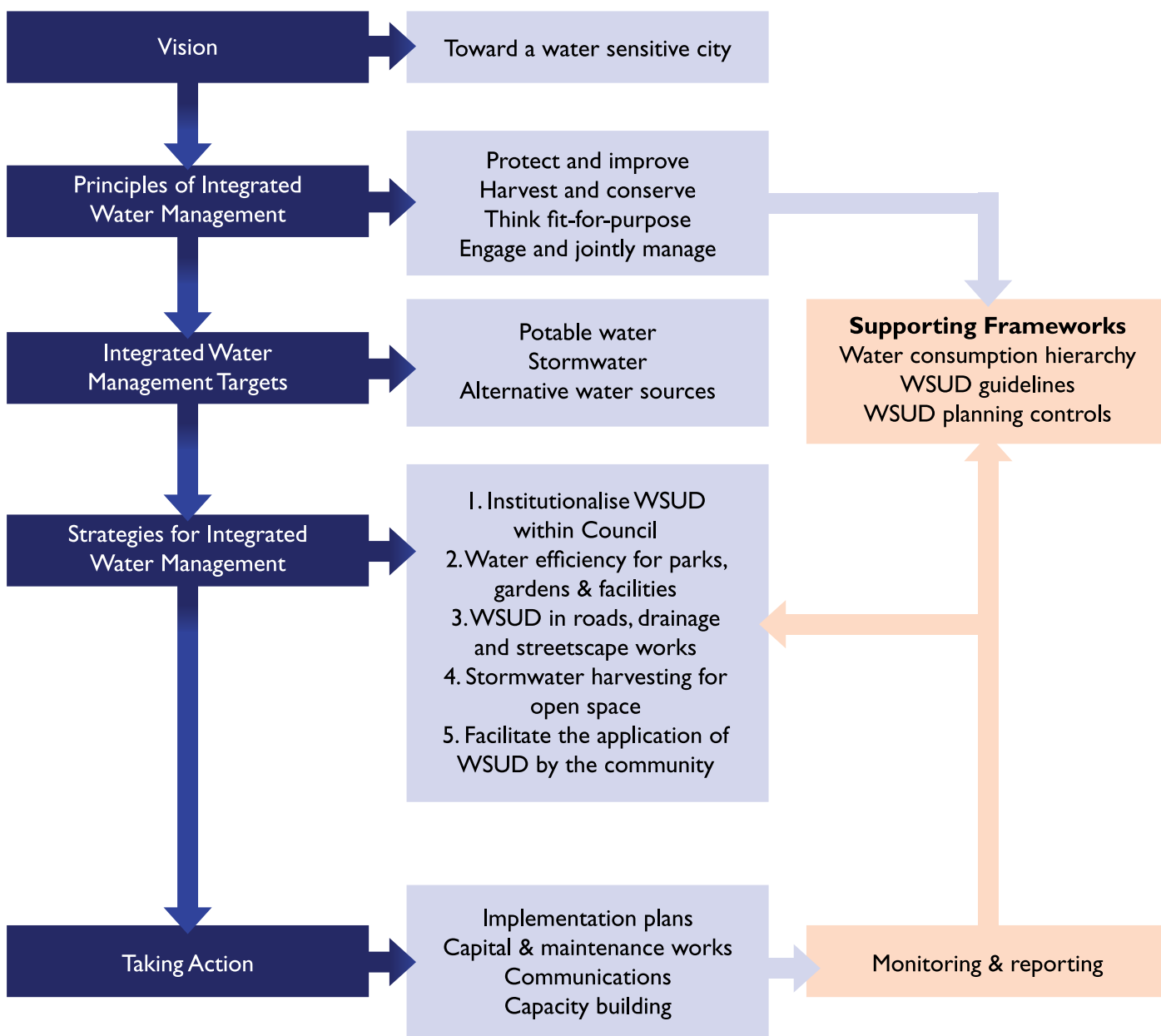
- 70% reduction in potable water use by 2020 based on 2000 figures.
- 50% of future irrigation demand in open space to be met by alternative water sources.
- Contribution to achieving stormwater quality targets.

Integrated water management aims to manage water in both scarce and abundant conditions, protect water quality, manage large damaging stormwater flows and determine new methods of managing water demand. These objectives are promoted through various local, state and national frameworks as indicated in Figure 2.



The Water Plan outlines council's integrated water management strategy which aims to achieve the vision of a water sensitive city. Melbourne is moving from a city where traditionally water supply, stormwater and groundwater were seen as separate infrastructure to a more modern approach which has greater concern for the health of water bodies and the management and delivery of water sources. This strategy is outlined in Figure 3 and states the principles of sustainable water management at a municipal level.

Figure 3: City of Port Phillip Integrated Water Management Strategy



Source: City of Port Phillip Water Plan (2010)

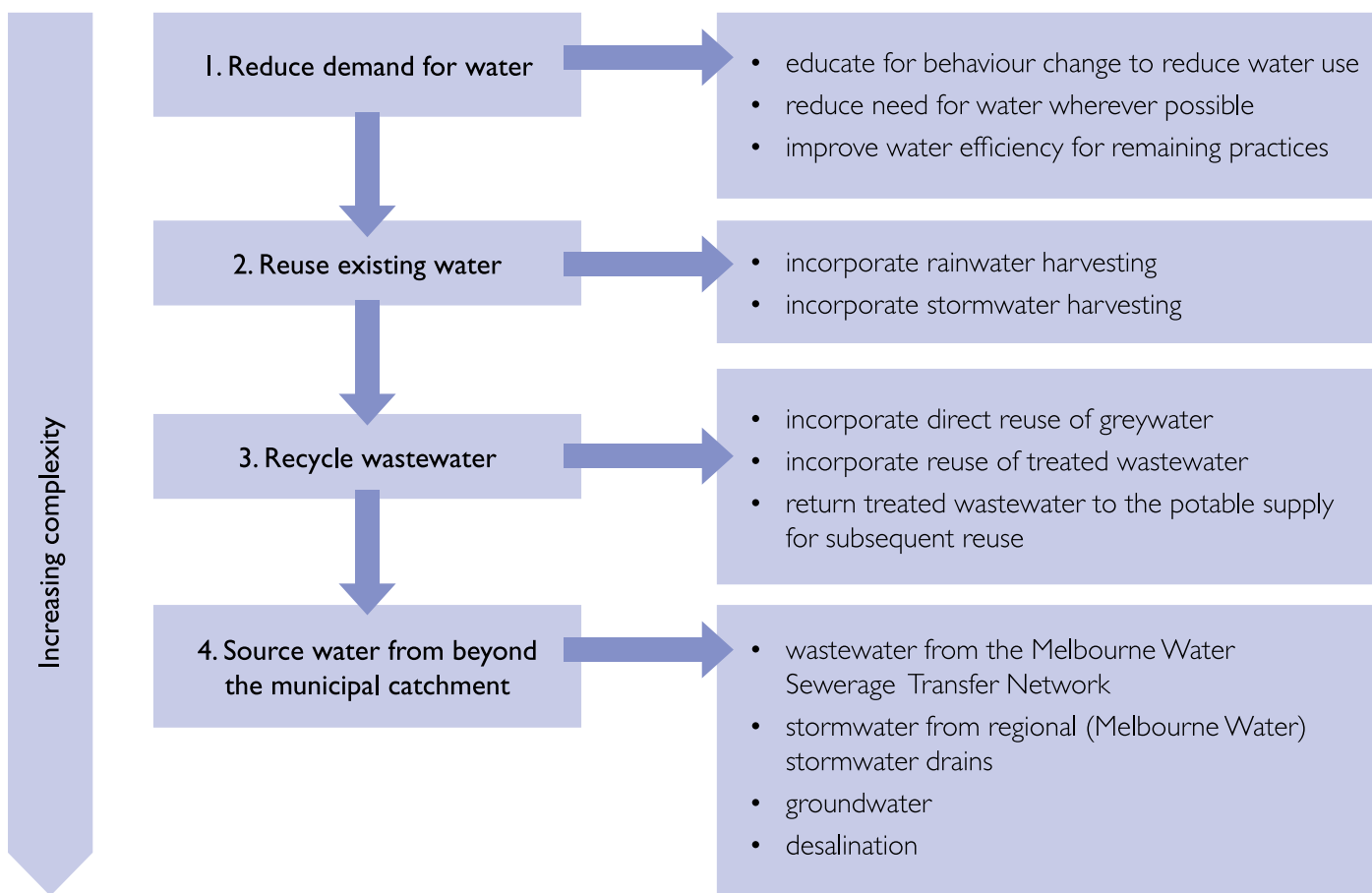






As part of this strategy council has created a water management hierarchy, included in Figure 4, which ranks alternative water options in order of increasing complexity. The hierarchy is to be used at the concept stage of sustainable water projects to guide council on their implementation, based on potential benefits and future impacts.

Figure 4: Water Management Hierarchy



Source: City of Port Phillip Water Plan (2010)









### **CASE STUDY: Rainwater Garden Coventry Street (pictured)**

Raingardens were installed at the intersection of Coventry Street and Clarendon Street South Melbourne, Fitzroy and Carlisle Street, St Kilda. This has resulted in improved water quality to Port Phillip Bay, through the removal of suspended solids, nitrogen and phosphates.

Actions undertaken during the lifetime of the Water Management Local Action Plan (2005) are summarised as follows:

- installation of a rainwater tank at JL Murphy Reserve to capture rainwater runoff for the purpose of toilet flushing
- water recycling at JL Murphy Reserve from stormwater collected in the metropolitan area. Stormwater is treated to Class C standards and is used to irrigate ovals at the Reserve as well as tree watering
- installation of a rainwater tank at council's South Melbourne Depot to collect rainwater for the purpose of street cleaning, vehicle cleaning and plant watering
- updated irrigation systems have been installed at some reserves to provide optimum irrigation requirements depending on soil and weather conditions
- investigation has begun into stormwater harvesting for the purpose of irrigation at various locations. This topic is discussed in more detail within this report in section 6.3.4
- Water Sensitive Urban Design (WSUD) measures are being progressively introduced to improve stormwater quality and are being incorporated into streetscape improvement schemes.

### 2.3 Sport and Recreation Guidelines

Council has provided Sport and Recreation Guidelines to ensure fairness, equity and responsiveness in dealing with sporting organisations throughout the municipality. Council has a number of objectives to achieve the goals set out in these guidelines as follows:



Table 4: Sports and Recreation Guidelines

Objective	Outcomes
Increased participation	<p>A 10% increase in active and social sports club participation</p> <p>Increase the number of women and children participating in sport and recreation, with a target of another eight women's and/or junior teams across the municipality</p> <p>Increasing the number of people from Culturally and Linguistically Different (CALD) backgrounds to participate in sport and recreation</p> <p>A 10% increase in participation in the Lifestyles program.</p>
Continued good relationships	<p>The excellent relationships with clubs and all relevant agencies will be maintained at 80% satisfaction rating</p> <p>Council will continue with existing levels of financial support for sporting clubs</p> <p>Improved community health.</p>
Better infrastructure	<p>All (14) sports fields will be maintained at an agreed standard consistent with the sports ground hierarchy (see Figure 6) and sport played</p> <p>100% of sport and recreation facilities will be fit for purpose</p> <p>Assets that meet current and future community needs</p> <p>Improved environmental performance of council's sports facilities, recreation land and buildings</p> <p>Reduced water use and improved water management.</p>

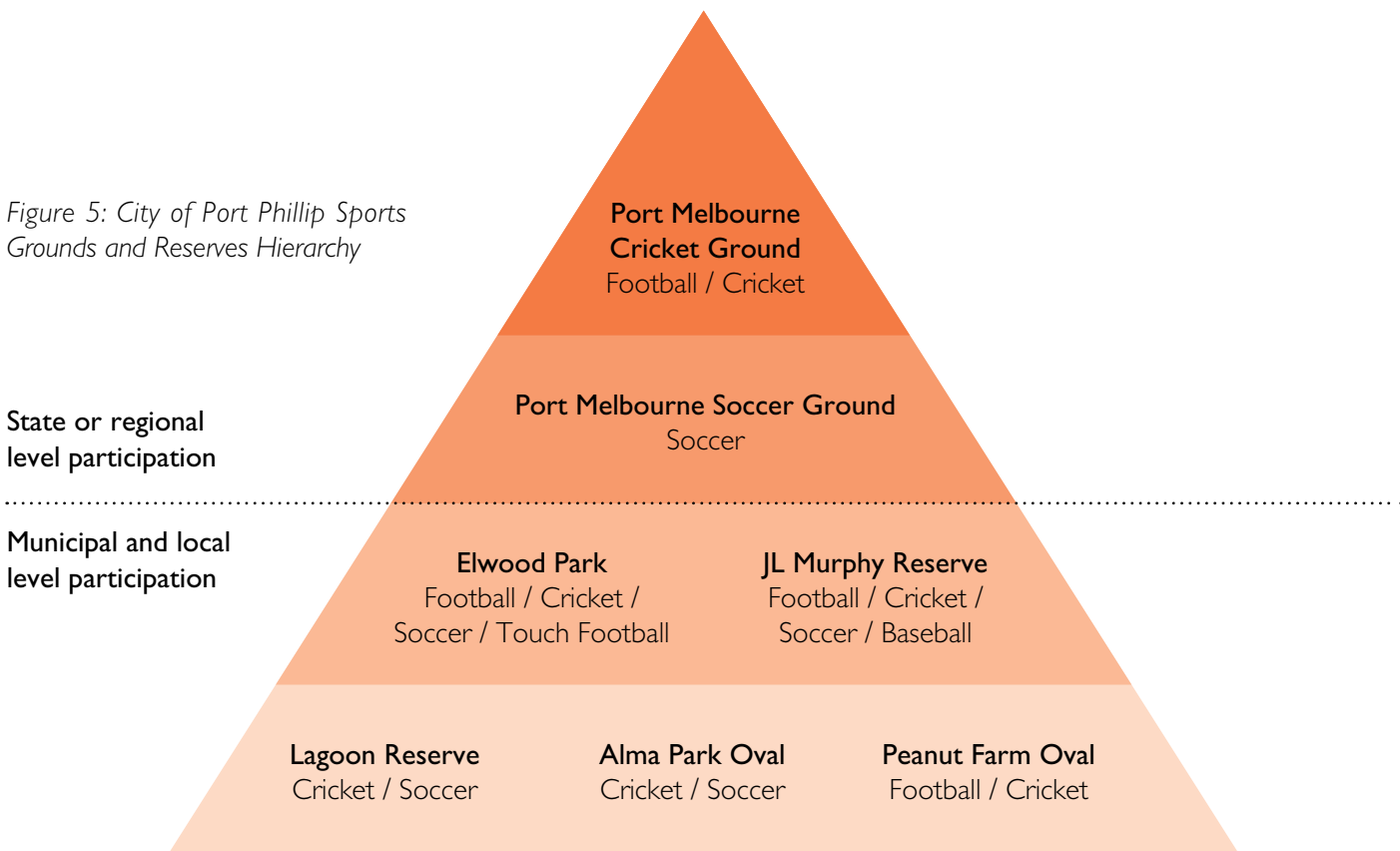
Source: City of Port Phillip, Sport and Recreation Guidelines

There is a range of sporting facilities in the municipality which host various levels of competition from state level to local community events. Council has adopted a hierarchy for sporting reserves to guide decision making on where

its resources and priorities lie. This is outlined in Figure 5. This report uses the principles of the Sport and Recreation Guidelines.



Figure 5: City of Port Phillip Sports Grounds and Reserves Hierarchy



Source: City of Port Phillip, Sport and Recreation Guidelines

### Sports reserves

A review of sports reserves, considering the frequency of events (training, games etc) for 2008/09 at each venue, was undertaken to determine the most frequently used playing surfaces. Table 5 outlines the reserves and playing surfaces and frequency of use.

### Bowling clubs

Bowling clubs located on council-managed land control irrigation of playing surfaces in accordance with their water restrictions, and this is included in council's overall water usage. Albert Park VRI Bowls Club has installed synthetic surfacing. Port Melbourne Bowls Club has installed water tanks and converted grass to a more drought-tolerant species to reduce reliance on potable water.

### Croquet and trugo clubs

There is one croquet and three trugo clubs located within the City of Port Phillip. Each club manages its own water application and their usage contributes to council's overall water use.

Table 5: Sporting Reserves

Reserve	Playing Surface	Event Frequency 2008/2009
Elwood Park	Esplanade Ground	220
	Head Street Ground A and Ground B	327
	Wattie Watson Oval	287
JL Murphy Reserve	Anderson Ovals 1 and 2	261
	AT Aanensen Oval	135
	JW Woodruff Oval	129
	Williams Oval	105
Peanut Farm Reserve	Peanut Farm Oval	367
Alma Park	Alma Park East Oval	278
Lagoon Reserve	Lagoon Reserve Oval	250
Port Melbourne Cricket Ground	Port Melbourne Cricket Ground	194



## 2.4 Tree management strategy

Within the City of Port Phillip there are some 55,000 trees, with approximately 27,000 trees lining major boulevards and suburban streets and the remainder in public parks and gardens. The Greening Port Phillip – An Urban Forest Approach was developed in 2010 and includes the development of a Tree Policy. The Greening Port Phillip strategy will govern all future tree management activities. Council's vision regarding tree strategy is as follows:

*The City of Port Phillip will have a healthy and diverse urban forest that uses innovative greening solutions to enhance the community's daily experience ensuring environmental, economic, cultural and social sustainability for future generations.*

The Tree Policy takes into consideration the following:

- tree planting and selection
- tree protection
- tree asset management
- tree removal and replacements
- tree root management
- climate change adaptation
- community consultation and involvement
- trees and the urban character.

When replacing dead or dangerous trees in an established streetscape, council will, wherever possible, plant tree species that reflect the character of the street and are suitable to that environment. Council will take into consideration the long-term viability of tree species when replacing planting to minimize the need for supplementary watering of trees in drought conditions.

When undertaking streetscape upgrade works, opportunities for installing water sensitive urban design elements will be investigated to maximise onsite tree water use.

Trees are important community assets that need to be actively managed. Trees will be assessed for individual watering needs and council will aim to use alternative water reuse options when available, with potable supplies used in the immediate future to guarantee tree survival.



### **CASE STUDY: Mulching of tree bases (above)**

All newly planted trees are mulched. A layer of vegetative mulch is placed below trees for retention of soil moisture. This reduces potable water use and improves the trees' health.

## 2.5 Other strategic documents

### 2.5.1 City of Port Phillip Council Plan 2009-2013

The City of Port Phillip Council Plan 2009-2013 outlines directions, strategies and actions for council over the next four years. The Council Plan was developed with four key strategic directions:

- engaging and governing the city
- taking action on climate change
- strengthening our diverse and inclusive community
- enhancing liveability.

In the context of this Open Space Water Management Plan, the City of Port Phillip places an emphasis on protecting and preserving the local environment with a focus on maintenance of existing trees and open space. Numerous strategies have been identified with the most pertinent aspects relating to this study outlined below. Refer to the current City of Port Phillip Council Plan for specific actions within accompanying strategies.

Table 6: Council Plan 2009-2013  
Water and Open Space Related Strategies

Council Reference	Strategy
2.1.2	Reduce council's potable water use.
2.1.3	Facilitate community action in reducing potable water and non-renewable energy use.
4.1.2	Maintain and enhance streetscapes for improved amenity, character and sustainability.
4.3.2	Protect, preserve and reinstate local natural environments and open spaces within the city.
4.1.7	Preserve our heritage, valuing the past and planning for the future.

Source: City of Port Phillip Council Plan 2009-2013





### 2.5.2 City of Port Phillip Community Plan 2007-2017

The Community Plan provides a ten-year vision for the future of the City of Port Phillip. The goals of social equity, economic viability, environmental responsibility and cultural vitality remain central to our desire to foster a sustainable city. The Community Plan identified ten top priorities, three of which guide the management of open space, namely;

1. Manage water use and reuse, planting and park usage for prolonged drought
2. Encourage environmentally sustainable design, while advocating for mandatory state government controls to reduce greenhouse gas emissions and water consumption
3. Make the physical environment support community - "claim our streets"; for example, street parties, better lighting to improve safety at night, recreational space for young people, extend community bus, better use of public gardens, better public transport links and better spaces for pedestrians.

The community places a high degree of importance on maintaining open space through times of drought and climate change.

### 2.5.3 Drought Response Plan for the City of Port Phillip (2007)

The Drought Response Plan for City of Port Phillip Open Space was adopted in 2007 in response to ongoing drought conditions with changing rainfall patterns and hotter, drier summer periods. Its objective was to maintain high-quality parks and gardens while reducing potable water use in the long term.

It considered the effects of water restrictions on parks and open space within the municipality, water initiatives employed to date and a prioritised list of parks, heritage gardens, sports facilities and trees which can be irrigated during water restrictions. These priorities are adopted throughout this report and the impact of current water restrictions on open space is discussed further in Section 3.1.

A number of actions were identified, and are ongoing, in the Drought Response Plan. These are summarised as follows:

Table 7: Drought Response Plan Actions

Drought Response Plan Actions	Status
Seek exemptions for irrigation at a number of sports grounds.	Completed
Undertake trees condition audits at identified priority areas including St Kilda Road, heritage gardens and major boulevards.	Ongoing
Removal and replacement of dead trees.	Ongoing
Application of mulch to mature trees.	Ongoing
Undertake irrigation audits at priority parks and follow recommendations for system upgrades.	Completed
Implement water sensitive urban design measures in parks and landscaping areas of new developments.	Ongoing
Provide education and information programs for the community regarding water resources and efficiencies.	Ongoing
Seek funding for water-saving projects.	Ongoing

#### 2.5.4 Toward Zero – Sustainable Environment Strategy (2007)

The City of Port Phillip has a sustainable environment strategy in place to guide strategic environmental policy and decision making over the next 5-10 years within the municipality. Toward Zero (2007) outlines sustainability challenges facing the community and provides a method of addressing these challenges through the setting of goals and targets while updating existing policy and strategies.

A number of key sustainability challenges have been established to help meet council's vision, including the following most relevant to this study:

- Toward Zero potable water use – it is proposed to attain a 70% reduction in council's potable water use by 2020, based on water usage levels from 2000. A means of achieving this includes stormwater and rainwater harvesting, reuse and recycling for council services that do not require potable water. Additionally, it is intended to achieve a 50% reduction in per capita community potable water use by 2020
- Toward Zero contamination and pollution – it is intended to incorporate Water Sensitive Urban Design (WSUD) methods into future developments and planning measures to improve the quality of stormwater discharge to Port Phillip Bay.

#### 2.5.5 Towards Sustainable Irrigated Sports Grounds (2009)

In 2009 a study of irrigated sports facilities and bowling greens within the municipality was undertaken to review existing irrigation practices and performance standards. The study involved an audit of existing sports facilities with an assessment of the condition and functioning of existing irrigation systems. The following recommendations were made in relation to these sites:

- all irrigated grounds comply with regulatory requirements, in particular backflow prevention
- all irrigation infrastructure within the municipality should be recorded in council's Dekho system
- dedicated irrigation meters should be incorporated at all sites with a central control system to enable council to effectively manage water consumption remotely. The use of real time flow meters is recommended
- sports facilities which currently have adequate irrigation facilities should be upgraded to industry best practice. Best Management Practice (Irrigation Australia 2006) comprises irrigation system design, performance standards, installation, scheduling of irrigation periods and system maintenance.

Table 8 indicates a list of sports facilities with existing irrigation systems requiring upgrade and the level of intervention proposed.

Sports grounds should be managed to optimise the use of rainfall including managing turf and soil to ensure the net infiltration capacity is maintained at acceptable levels, the water holding capacity of the soil is maximised and soil moisture content is managed to capture the majority of rainfall that occurs. The use of soil moisture sensors is recommended.

An Irrigation Maintenance Plan should be developed to facilitate high operating effectiveness and ensure regular maintenance is carried out.

Table 8: Sports Facilities and Recommended Irrigation Systems Upgrades

Sports Facility	Level of Upgrade Required	Budgeted Works
Alma Park	Major irrigation upgrade required	Complete
Elwood Park Oval 1	Upgrade existing irrigation system to best practice standard	2010/2011
Elwood Park Soccer	Upgrade existing irrigation system to best practice standard	2010/2011
Elwood Park Touch Football 1 & 2	Major irrigation upgrade required	Complete
JL Murphy Soccer 2	Upgrade existing irrigation system to best practice standard	2009/2010
Lagoon Reserve	Major irrigation upgrade required	
Peanut Farm	Major irrigation upgrade required	Complete



#### **CASE STUDY: Sub-surface drip irrigation installation**

We have started to upgrade our irrigation systems to ensure that they are efficient. A new drip irrigation system has been installed at the Port Melbourne baseball ground. Drip irrigation has also been installed for mature trees at Garden City Reserve, Port Melbourne light rail reserves, South Melbourne triangular parks and Alma Park. This has reduced our potable water use and improved turf quality and tree health. New systems are also being installed at Alma Park, Elwood Touch and Peanut Farm Reserve.

### 2.5.6 Inner Melbourne Action Plan (2006) - Action 9.6

The Inner Melbourne Action Plan (IMAP) covers the municipalities of Port Phillip, Melbourne, Docklands, Yarra and part of Stonnington with an objective to provide a framework for growth and development for Melbourne’s inner city suburbs. IMAP sets out the strategies and actions

that respond to issues identified in Melbourne 2030, the State Government’s vision for the city.

It addresses key environmental issues such as water usage, reuse and quality with actions as identified in Table 9.

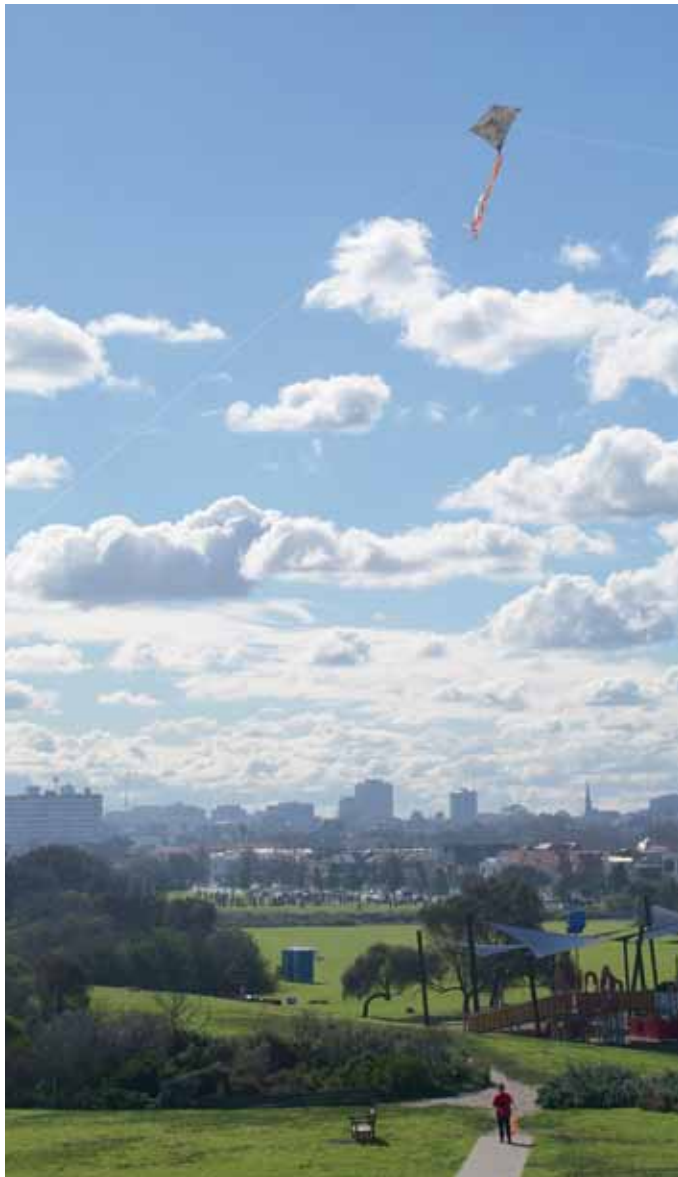
Table 9: IMAP Water-Related Strategies

IMAP Strategy	IMAP Action
Strategy 9.3 Water sensitive design	Develop a regional approach and strategy to achieve water sensitive design, including: <ul style="list-style-type: none"> <li>• developing a common Local Planning Scheme Policy encouraging new developments to be more water efficient</li> <li>• encouraging new developments to minimise stormwater runoff by reusing rainwater and recycling wastewater; providing information, education and professional development opportunities</li> <li>• encouraging landscape designs for new development to maximise use of permeable surfaces wherever possible.</li> </ul>
Strategy 9.6 Use of recycled water for open space	Work collaboratively to reduce water use in the Inner Melbourne Region’s parklands and with water retailers to establish water recycling facilities for use by parklands.

Source: Inner Melbourne Action Plan (2006)



**CASE STUDY: Adopt a Tree**  
 Residents can help to water trees by participating in the Adopt a Tree program.  
 Council is giving away free buckets and conducting educational programs to help residents use grey water to water street and park trees.



Strategy 9.3 concluded with a WSUD amendment being prepared. The proposed C78 Stormwater Management Local Planning Policy Amendment will require all types of developments to incorporate WSUD. It is intended to request the Minister for Planning give permission to exhibit and prepare the amendment which is currently underway.

Strategy 9.6 resulted in completion of a report which outlines a preliminary assessment of sustainable water options, including the use of rainwater, stormwater, groundwater, sewer mining and industrial wastewater for irrigating some twenty inner Melbourne urban parks.



## 3 Water Usage Analysis

### 3.1 Stage 3 water restrictions

Water restrictions are categorised under four stages with a hierarchy ranging from limited watering methods and timing to no watering permissible under Stage 4. Melbourne had been at Stage 3a water restrictions since 2007 with record dry months and reduced rainfall. In 2010, water restrictions were eased back to stage 3.

The City of Port Phillip applies these water restrictions as its standard base operating conditions and has made significant reductions in water use for open space to date. Stage 3 water restrictions comprise the following measures:

- no lawn watering at any time
- spray sprinkler and watering systems can no longer be used

- automatic dripper systems can be used to water public gardens (not lawns) between midnight – 8 am on specified water days
- garden areas (other than lawns) can be watered by a manual dripper system or hand-held hose fitted with a trigger mechanism between 6 am – 10 am and 8 pm – midnight
- no other sprinkler systems are allowed.

The effects and impacts of Stage 3 water restrictions within the City of Port Phillip are summarised in Table 10.





Table 10: The Effects and Impacts of Stage 3 Water Restrictions Within the City of Port Phillip

Area	Actions	Impacts
Parks and sports grounds	<p>Under current restrictions, watering is banned on non-exempt playing surfaces. Exempt surfaces (eg. cricket pitch, tennis court and bowling green) can be watered by a manual dripper system between 6 am – 10 am and 8 pm – midnight or an automated watering system between midnight – 8 am. Sports exempt surfaces can be watered under specific council water allocation. Watering of all sporting reserves is permitted via this exemption.</p> <p>The following public parks have full water exemptions:</p> <ul style="list-style-type: none"> <li>• Gasworks Park, South Melbourne</li> <li>• St Kilda Botanical Gardens, St Kilda</li> <li>• St Kilda Town Hall Forecourt, St Kilda</li> <li>• St Vincent Garden, South Melbourne.</li> </ul>	<p>Reduced preseason training</p> <p>Increased demand for irrigated sports grounds.</p>
Removal of dead trees	<p>During extended drought years, tree deaths can be expected across the municipality. The following measures are currently in operation for assessment and removal of dead trees:</p> <ul style="list-style-type: none"> <li>• during autumn following drought conditions, evergreen trees are to be inspected with any dead trees collated and subsequently removed</li> <li>• during spring following drought conditions deciduous trees are to be inspected with any dead trees collated and subsequently removed</li> <li>• dead street trees will be identified during tree pruning and subsequently removed</li> <li>• any trees identified by the public as being in poor condition will be inspected and removed if found to be dead.</li> </ul>	<p>Early leaf drop of deciduous trees.</p>
Garden beds	<p>Garden bed vegetation will be removed if required and vacant space will be documented and identified for replacement under planting programs or streetscape improvement works.</p>	<p>Loss of open space public amenity.</p>
New planting	<p>Any new plantings will be drought tolerant, specific to the site and soil conditions and involve minimal watering using recycled water.</p>	<p>Drought conditions have resulted in tree planting becoming more difficult, requiring an increased watering regime and inspection program.</p>
Tree watering	<p>Mature trees will be watered in future using passive stormwater collection systems. Current wheelie bin watering devices may be used as interim measures where the option of stormwater diversion is not possible.</p>	<p>Water costs are expected to increase by 20% in the coming years.</p>
Grass and turf type	<p>In excess of 90% of open space currently comprises warm season grass with the remaining cool season grass to be converted.</p>	<p>Conversion will assist with reduction in water use.</p>
Soil structure	<p>Drier conditions can lead to hydrophobic soils which do not retain moisture and hence have less resilience to dry periods.</p>	<p>Loss of open space public amenity.</p>

### 3.2 Stage 4 water restrictions

With the possible introduction of Stage 4 water restrictions at a future date, the following measures would be introduced across the municipality:

- all outside watering is banned, including residential and commercial gardens and lawns, public gardens and lawns, all sporting grounds
- water authorities may declare emergency measures to further restrict water consumption in consultation with the State Minister.

Table 11: Open Space - Historical Water Usage Data

Open Space	2005/06	2006/07	2007/08	2008/09	2009/10
Parks / Gardens Sports Grounds	221.9ML	120.1ML	98.7ML	109.6ML	110ML
Medians / Nature Strips	28.3ML	8.4ML	3.9ML	4.0ML	0.7ML

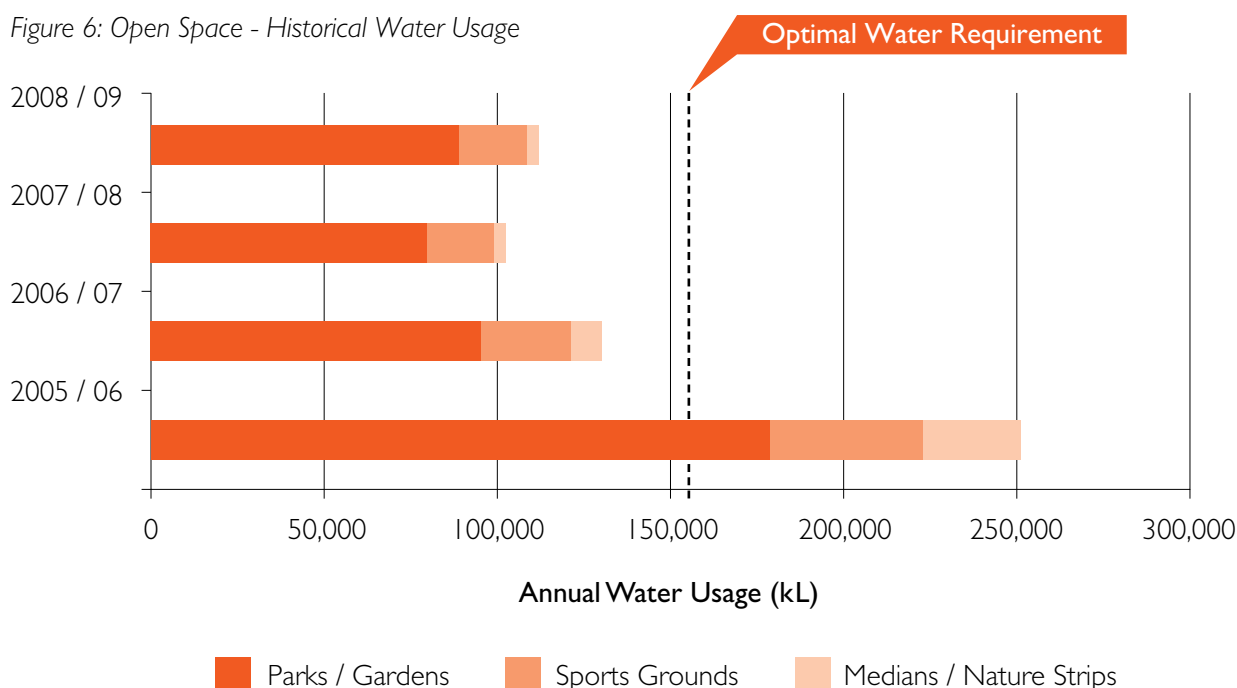
### 3.3 Historical water usage

Water usage data was provided by council in order to assess usage rates over time and provide a basis for the development of the site hierarchy. Figure 6 below shows a significant reduction in water use occurred within the municipality for parks and gardens, sports grounds and median strips between 2005/06 and 2008/09 with water usage data outlined in Table 11. This represents a reduction of approximately 55%, and this achievement aligns with council's commitment to provide a 70% reduction in potable water use by 2020.

An overall open space optimal water requirement of 155ML has been calculated in Section 4.0. Water consumption figures for individual sites, where available, have been included in the site hierarchy as shown in Annexe 2.

The difference between the 2009/2010 and optimal usage is approximately 81ML and this is leading to water-stressed open space which exhibits the impacts highlighted in Table 10.

Figure 6: Open Space - Historical Water Usage



## 4 Optimal Water Requirements

In order to assess opportunities for sustainable water use and establish management practices at a large number of sites with different uses, a number of factors require appraisal including the following:

- optimal water requirements
- level of use
- turf and vegetation type
- number and type of trees
- site significance.

### 4.1 Optimal water requirement

Research indicates that grassed playing surfaces and high use sites require a water volume of 8-12 ML/ha/year; this equates to a water application rate of 15 m/m<sup>2</sup>/week. This water application rate is regarded as optimum for a warm season grass surface in metropolitan Melbourne. Optimal

watering requirements take into consideration rainfall events and reduced irrigation requirements required over winter months.

Council undertook an evaluation of all open space to assess current use, condition, irrigation and vegetation type. This information was then used to determine optimal water requirements for sites. From this it was identified that 155 ML per year was required to achieve optimal water requirements. This has been outlined in table 12. Annex 2 summarises the current water use for each site and grass type.

Table 12: Optimal Water Requirements

Open Space Water Requirement	Water Application Rate
Open space with a high water requirement including heritage sites and sports fields of regional significance.	15 mm/m <sup>2</sup> /week
Open space with a medium water requirement including sites with high visitation, community use and sports fields of local significance.	10 mm/m <sup>2</sup> /week
Open space with a low water requirement including local parks and low-use sports fields.	5 mm/m <sup>2</sup> /week
Open space with no water requirement including sites which have not previously been irrigated and have low impact usage.	0 mm/m <sup>2</sup> /week



### 4.2 Level of use

A number of factors can be taken into consideration to determine the level of use at open spaces within the municipality, including:

- the number of users at each site and its capacity
- the frequency of use and how many different groups use the site
- its suitability for purpose
- the level of competition played (state, regional, municipal and local) for sporting facilities
- the significance of the site within the wider community
- occasional use sites, for example festival sites and triathlon sites.



Membership records for sports clubs give an indication of the extent of community involvement at each site with a higher number of participants indicating greater usage at the site and its significance to the wider community.

In addition to considering vegetation and climate, the optimum water applications have been determined by considering the frequency and type of use; this information has then been used to prioritise sites, and is summarised in Annexe 2.

Table 13: Summer Ratings for Five Turf Grass Species

Property	Tall Fescue	Kikuyu	Couch	Buffalo	Ryegrass
Heat resistance	Medium	Excellent	Excellent	Excellent	Medium / poor
Irrigation requirement	Very high	Medium	Low	Medium	Very high
Drought resistance	Medium	Excellent	Excellent	Good	Medium / very poor

Source: *Strategies for Managing Sports Fields in a Drier Climate* (GHD 2007)

### 4.3 Turf and vegetation type

The water requirements of grassed surfaces varies depending on a number of factors including turf grass species, the level of wear, the function of the surface, evaporation rate, local rainfall and the effectiveness of irrigation measures, if applicable. However, as we implement this water management plan we will need to monitor this and make adjustments where necessary to ensure the condition of open space within the city.

Certain grass species have a low water usage and superior drought resistance compared to typical cool season grasses. A selection of grass species and their properties are outlined in Table 13.

Couch and kikuyu are considered the most drought resistant species and are discussed below.

- couch is a strongly stoloniferous (horizontal surface stemmed) summer growing perennial warm season grass which has a finer leaf texture than kikuyu grass
- it grows where temperatures do not fall below 10°C for prolonged periods of time. To ensure the use of sports surfaces over winter, couch grass can be oversown with cool season grass. Ideal soil conditions for couch grass include dry to very dry, sandy to lightly loamy soil and either acidic or alkaline conditions
- kikuyu can form a dense, mat-forming, low-growing, coarse-textured warm season surface that spreads by long, creeping stolons (surface stems) and rhizomes (underground stems). Kikuyu grass grows where temperatures do not fall below 8°C-10°C for prolonged periods of time and can survive typical Melbourne winters without loss of colour and function. Ideal soil conditions include moist, medium-textured and fertile soils.





### **CASE STUDY: St Kilda Botanical Gardens**

New plant design will be focused on lower water needs (less than 800mm per annum). Recent garden bed restoration has used succulent plants and drought tolerant plants within the central heritage core. This has reduced our potable water use.

The conversion of open space from cool season grass to warm season grass is one method of increasing water efficiency and can achieve a reduction in potable water usage in the order of 40%.

Warm season grass installation has been undertaken across the City of Port Phillip with approximately 95% of sports grounds and 90% of other open space converted to warm season grass species. Key upgrade works to warm season grass species have been conducted at the following sites:

- Port Melbourne Soccer Ground
- Esplanade Oval
- Peanut Farm Reserve
- Lagoon Reserve
- Alma Park Oval.

The open space areas that still require conversion are:

- Port Melbourne Cricket Ground
- SS Andersons Oval
- St Vincent Gardens
- South Melbourne Town Hall surrounds.

Typical costs to convert a playing surface to warm season grass range from \$12,000 to \$25,000 per playing surface for a typical oval area of 1.6ha. This is a cost estimate for the installation of turf by means of line planting.

Line planting is a technique where lines of running warm season grass are planted 300mm apart. With irrigation and good growing conditions the grass joins up making a quality playing surface over 6 months.

To install instant turf the cost for an oval is \$130,000-\$150,000. Such installations are conducted where a ground is required immediately after upgrade works.

#### 4.4 Trees

Trees are susceptible to prolonged drought conditions due to reduced soil moisture and the resulting hydrophobic soils. Some tree species have better resistance than others and can overcome the effects of drought naturally. It is noted that the City of Port Phillip aims for optimal tree health which will enhance the city's liveability.

Optimal water requirements for trees should take into consideration tree location, existing soil conditions and their level of priority to council. The Greening Port Phillip Strategy identifies specific actions to help manage trees in a drier environment.

Tree locations which have been identified as having high importance, from a community and heritage perspective, are listed in Table 15. Methods of tree watering that are currently used within the municipality are described in Table 14.

The Greening Port Phillip Strategy does not support reliance on potable water, as trees reliant on potable water are susceptible to health decline if water availability changes in the future. Tree selection based on ability to grow under natural rain fall patterns of Melbourne ensures long term tree health.

Table 14: Tree Irrigation Methods

In this table, sub-surface irrigation represents an efficient means of water delivery without the risk of aerosols, wastage of water from overspray and losses due to evaporation.

Method	Description
Passive irrigation	Passive irrigation incorporates surface runoff from road pavements and footpaths captured during rain events and is conveyed to tree pits.
Sub-surface drip irrigation	Sub-surface drip irrigation involves drip lines placed at shallow depths beneath the surface and provides water directly to the root zone by capillary action.
Water blocks	Water blocks comprise above ground devices located at the base of mature trees which are filled with recycled water and slowly release water directly to the root zone.

Trees are of considerable importance to the community and Table 15 outlines the locations of priority trees throughout the municipality. The sites have been chosen due to the existence of significant mature trees within the sites, the tree species and their value as a major boulevard or street in the city.

Opportunities to provide irrigation to these trees should be prioritised through streetscape renewal, stormwater systems upgrade and road/curb rehabilitation programs.

Within the Tree Management Strategy all streetscapes within the municipality have been inspected and a priority order of streetscape upgrade will be developed. This priority order will then allow for projected tree planting works in streets for the next five years.





#### 4.5 Site significance

Certain open spaces within the municipality fall under the protection of Heritage Victoria due to their cultural and heritage significance. Heritage sites can be defined as natural and cultural environments that are of special value for the present community and for future generations.



Table 15: Priority Tree Locations

Gardens	Boulevards*	Streetscapes	
St Kilda Botanical Gardens	St Kilda Road	St Vincent Place	Normanby Road
St Vincent Gardens	Kerferd Road	St Vincent Street	Richardson Street
Catani Gardens	Brighton Road	Albert Road	Page Street
Cleve Garden	Bay Street	Ferrars Street	Acland Street
Alma Park	Fitzroy Street	Charnwood Road	Bridport Street
	The Boulevard	St Kilda Street	Dandenong Road
	The Broadway	Crimea Street	Tennyson Street
	Beaconsfield Parade	Barkly Street	Cecil Street
	Jacka Boulevard	Canterbury Road	Williamstown Road
	Ormond Esplanade		
	Queens Road		
	Marine Parade		

\*The Boulevards as identified in the Municipal Strategic Statement

## 5 Open Space Water Management Options

There are a range of options for managing open space in an increased dry climate. This section discusses the options available.

### 5.1 Alternative water source options

There is a range of alternative water options available for open space and sporting facilities, including the following:

- rainwater collection
- stormwater harvesting
- sewer mining
- aquifer recharge and recovery
- waterway diversion
- bore water extraction
- recycled water, classes A, B and C
- greywater.

Long-term sustainable options for each open space should be selected to provide the best triple bottom line answer for council and the community. Options should be avoided which consume large quantities of electricity, are costly to maintain, require truck movement producing CO<sub>2</sub> emissions, are small scale or are generally unreliable in delivery of fit-for-purpose water.

A description of each alternative water option, including relative advantages and disadvantages, is outlined in Annexe I.

### 5.2 Synthetic surfaces

Synthetic surfaces are an alternative to turf surfaces which require no water and delivers a high surface consistency and durability. They are popular in sports such as tennis, bowls and, increasingly, soccer.

Although these surfaces are accepted for the above sports, they are generally not recommended for more physical sports such as football.

Synthetic-surface advocates such as product manufacturer claim that the industry's third generation of synthetic rubber infill systems provides real alternatives to natural grass for traditional contact sports such as soccer, rugby codes and AFL. Moreover, third-generation systems are now FIFA and

IRB approved for both junior level sports and competition at the highest levels. The AFL and Cricket Australia have produced guidelines for synthetic-surfacing options which are currently being assessed by product manufacturers. The advantages and disadvantages of using synthetic surfaces are outlined in Table 16.

Table 16: Synthetic Surfaces Advantages and Disadvantages

Advantages	Disadvantages
Minimal or zero water use providing substantial water savings, although some hockey-playing surfaces require watering to maintain a safe playing surface.	Initial cost is relatively high compared with grass conversion.
Carrying capacity or usage rate is significantly increased.	Replacement of synthetic surface after 10 to 15 years.
Provides for consistent ball roll and bounce.	Known to cause abrasion burns to players.
Provides continuous and immediate availability.	Light watering is required in hotter climates.
Manufacturers claim playing surfaces are highly durable.	Regular maintenance is still required.
Not prone to seasonal maintenance, renewal intervention and cost as a result of extreme or prolonged weather events.	Increases urban heat-island effects with reduced evapo-transpiration rates.

#### CASE STUDY: Reclaimed water

Reclaimed water from Albert Park Lake is being used for watering trees and plants. Water is extracted from lakes into portable water tankers. The water is then used on newly planted trees. This has reduced our potable water use.

The cost of a fully constructed synthetic sports surface has been estimated at \$800,000 with typical ongoing maintenance costs of \$15,000 per annum (GHD 2007). It is noted that the lifespan of a synthetic surface is in the order of ten years, after which the surface would need to be removed and replaced. Synthetic surfacing materials are constantly being enhanced and their lifespan and use is expected to increase in the future.

Where a sports ground is to be considered for conversion, a cost benefit analysis is recommended to consider the capital and maintenance costs of grass versus synthetic surfacing options.

Synthetic surfaces contribute to the urban heat island effect due to the lack of evapo-transpiration from the artificial surface. As climate change effects increase, consideration of urban heat island effects and the role of WSUD in the urban landscape will play an important role in future decision making.

In the future, should council consider the use of synthetic turf, a detailed study would need to be undertaken that considers as a minimum the costs and benefits, including urban heat island impacts, potential harvesting opportunities and the demand for use.

### 5.3 Landscape management

The conversion of cool season grass to warm season varieties can result in significant savings in water use as outlined in Section 4. Similarly, new and replacement tree plantings should have a high drought resistance. The use of mulch on tree beds assists soil from drying out and maintains moisture.

There are some turf-management practices which improve existing surfaces during extended dry periods, such as:

- alteration of grass-mowing regime by increasing the mowing height can allow grass to develop deeper root systems, which in turn improves the depth at which water may be extracted. Mowing as infrequently as possible and higher mowing heights help protect the soil from solar radiation. Higher mowing heights should only be conducted in passive open space and not in sports grounds
- wetting agents are typically sprayed on dry soil surfaces and help to break down the water repellent nature of dry soils, therefore maximising rainfall and irrigation effects

- on playing surfaces, strategic aeration places holes in the grass surface to improve water, air and fertiliser movement into the soil, thereby improving the soil properties and maximising the effect of rainfall and irrigation.

Landscape adaptation practices to support trees and garden beds include:

- mulching of garden beds and at the base of trees is considered the best management process for maintaining healthy trees and plants. Mulch is a layer of organic product which allows the retention of soil moisture. Mulch comes in the form of bark chips, gravels and rocks. All garden beds and tree bases should be mulched yearly to promote good vegetation health and provide reduced irrigation frequencies
- planting in the cooler months will improve the success rate of new plants, including trees. The planting season should be between autumn and spring each year. Trees should be maintained and irrigated for a 2-year period to help with establishment.









Irrigation should occur fortnightly over summer, autumn and spring, and weekly in severe heat periods. Tree maintenance should include:

- straightening of stakes
- tightening the tree ties
- installation of a water basin to retain irrigation moisture
- retention of a 75mm-thick mulch layer
- pest control if required.

#### 5.4 Education

The effects of drought and increased water restrictions are evident to the wider community with noticeable effects on open space and trees within the municipality. Education is an important platform in keeping the community involved and aware of council's actions for reducing potable water use. The following measures may also assist with community education:

- providing information on rainwater and stormwater harvesting on a domestic level
- continuing to encourage water efficiency among residents with information sessions held by council
- providing information on the stormwater cycle with emphasis on stormwater quality and a change in thinking from the theory of stormwater being removed to stormwater being seen as a resource
- stencilling on existing stormwater drainage infrastructure to raise awareness of its function and importance. For example, the drawing of fish on existing drainage pits where the pipes outfall to Port Phillip Bay
- advertising of open spaces undergoing stress due to drought conditions on how water restrictions are working and targets for reduced water use are being met
- educate the community on drought-tolerant species
- deliver information on horticultural requirements of plants and trees in open space and streetscapes
- reinvigorate the Adopt a Tree program and encourage the community to care for trees within their locality. This can also assist with the monitoring of tree health.

It is recommended that council considers multifaceted approaches to generally raise awareness of the importance of open space sustainability and gain support for the costs and measures involved in providing this service.

#### 5.5 Water Sensitive Urban Design

Water sensitive urban design describes all measures that will help us achieve a water sensitive city.

These include:

- rainwater tanks
- water efficient fixtures and appliances
- raingardens, swales and other stormwater treatment measures
- greywater and wastewater treatment systems.

Water sensitive urban design is a common sense way of designing our cities and means using the right quality of water for the right purpose. For example, not using our valuable drinking water for watering open space. It can help us reduce our mains water use, adapt to hotter drier conditions and improve the quality of water that goes to the bay.

Raingardens are a new form of landscaping our streets and open space. Raingardens are depressed garden beds that are self-watered as they receive stormwater runoff from the surrounding hard surfaces (e.g. road, pavement and roof). They can be constructed in a range of scales and shapes, making them ideal for both small and large spaces. They can be incorporated into nature strips, roundabouts, traffic calming and other streetscape features as well as open spaces.

Raingardens also act as a natural filter to remove pollutants from stormwater. Stormwater is filtered through different layers of soil and the cleansed stormwater is then collected at the bottom, and either discharged to the bay (or to groundwater) or collected for re-use.

Recently raingardens have been installed in Fitzroy Street and Coventry Street where they are helping to achieve multiple benefits including amenity, flood calming, stormwater treatment and harvesting to meet their water needs.

Raingardens can be installed anywhere, in city streets or your own courtyard. Gardens or planter boxes harvesting and feeding off rainwater from your down pipe is a great way to help treat stormwater.

### How much does it all cost?

Water sensitive urban design is a common sense way of designing our cities but it does have some additional costs:

- raingardens: the cost of a raingarden may not be much greater than the cost of conventional landscaping. The need for different soils to filter stormwater can add an additional \$350-\$1700 to every square metre landscaped, depending on the site. There are also some additional costs in maintaining these treatment systems
- tanks: in addition to tanks, there are costs for plumbing and installation. Above ground tanks generally cost less than underground tanks, which may be required for large scale stormwater harvesting schemes. Costs will vary depending on the scale of the project, but a good benchmark is \$1000 for every thousand litres of storage.

Costs can be kept down if the water objectives are built into the design phase. In any case, these costs are substantially reduced when you consider the multiple benefits offered by these systems, such as improved liveability and sustainability of open space, less dependency on mains water, lower operational costs and flooding control.



Raingardens on Fitzroy Street, St Kilda

## 5.6 Stormwater Harvesting

Stormwater harvesting involves the capture and use of stormwater for irrigating purposes.

Connection to the urban drainage infrastructure offers a sustainable method of sourcing an alternative water resource that is fit for purpose and has a positive environmental impact. The magnitude of supply is dependent on the following:

- the size of the contributing catchment
- the size of storage tank.

Each site will differ in harvesting potential and on-site storage options. A feasibility study would need to be undertaken for selected sites to determine an appropriate stormwater diversion point, with potential storage and treatment locations to enable a detailed cost estimate to be produced.

It is also recommended that water quality testing of the source water be undertaken to identify and inform a risk management process and to assist the determination of the required treatment elements for the source water.

A key driver of the Open Space Water Management Plan is reducing the amount of potable water used to irrigate open space. When considering stormwater harvesting priority will be given to sites that currently have high existing water demands and thus high potable water use. Reducing the use of potable water at these sites as a priority will help Council achieves its target of 50% of water for irrigation to be sourced from non potable water by 2020.

A desk top assessment was undertaken for a range of parks across the city. This involved a preliminary analysis of existing topographical information and stormwater infrastructure to determine potential available catchments.

Table 17 shows the predicted catchment yield on five reserves from the desktop assessment.

Table 17: Preliminary Desktop Analysis for selected sites

	Catchment Yield*	Optimum Catchment
Alma Park	41ML/yr	38 ML/Yr
Catani Gardens	117 ML/yr	21ML/yr
Elwood Park	31ML/yr	27 ML/yr
St Kilda Botanical Gardens	95ML/yr	24ML/yr
JL Murphy Reserve	64ML/yr	30 ML/yr
O'Donnell Gardens	38 ML/yr	3 ML/yr

It is noted that potential catchment yields are based on a preliminary desktop assessment only and require verification at concept design stage.

From this preliminary analysis further work was undertaken at the following sites:

- Elwood Park
- Murphy Reserve
- St Kilda Botanical Gardens
- O'Donnell Gardens
- Alma Park.

A summary of the findings from these investigations is provided as follows:

#### Elwood Park – Partnership project with the City of Bayside

- The City of Bayside and the City of Port Phillip are undertaking a stormwater harvesting project which will see the golf course dam expanded and a wetland constructed to treat stormwater prior to irrigation. Treated water would then be fed into Elsterwick Park Lake and a proportion of the harvested water (30ML) would be piped from Elsterwick Park to Elwood Park

- This project would achieve 37.5% of council's 2020 target for alternative water sources
- This project has significant stormwater quality benefits with the reduction of nitrogen and suspended solids to the bay.

#### Murphy Reserve

The feasibility study for Murphy Reserve has proposed a stormwater harvesting scheme that would consist of a wetland. This project would achieve:

- A reliable source of water providing an average of 21 ML/year for irrigating sports fields.
- A greatly enhanced passive recreational space
- Substantial water savings of 21 ML/year achieving 25% of the City of Port Phillip's alternative water source targets for 2020
- A significant contribution towards reducing stormwater pollutant loads to the bay, particularly nitrogen (TN).

#### St Kilda Botanical Gardens

Detailed investigations are underway for stormwater harvesting options for the St. Kilda Botanical Gardens.

The preliminary investigations identified the base flow from the stormwater drain at 95ML per year , 24 ML is needed to irrigate the gardens and maintain the water levels in the pond. This would achieve approximately 30% of the alternate water source targets for 2020.

#### Alma Park

A water management options assessment for Alma Park was conducted. The assessment included the investigation of irrigation demands, potential opportunities for stormwater harvesting and treatment at the park.

The simplest and most cost effective option identified was to divert water 50 litres per second from the Alma Park drain immediately adjacent to the wetland, expanding the size of the wetland to 550m<sup>2</sup> and gravity flows from the wetland to a 300 kL underground storage located along the eastern boundary fence.

The proposed scheme would deliver a non-potable source of water for the oval with a yield of 4,350 kL , this is approximately 6% of the City of Port Phillip's objective for alternative non-potable sources by 2020.

### O'Donnell Gardens

A feasibility analysis was conducted into stormwater harvesting opportunities for irrigating O'Donnell Gardens in St Kilda. The preliminary investigations identified that this was feasible, with an annual base flow estimated at 95ML per year, with the demand for O'Donnell Gardens being 3.1ML. This is approximately 4% of objective for alternative non-potable sources by 2020.

The feasibility identified that it was possible that water could also be captured to irrigate Peanut Farm.

### 5.7 Prioritising Stormwater Harvesting

To achieve the City of Port Phillip Water Plans 2020 targets of:

- 70% reduction in potable water use
- 50% of water for irrigation to be sourced from the potable water.

Stormwater projects will need to be undertaken that maximise the reduction of potable water use.

Projects that will be prioritised are those that result in significant reductions in potable water use and have a higher cost benefit ratio.

### 5.8 Use of groundwater

The Department of Sustainability and Environment is the responsible government authority for monitoring and caring for groundwater in Victoria and has in place a State Environment Protection Policy (SEPP) called Groundwaters of Victoria, 1997. The goal of this policy is to maintain and where necessary improve groundwater quality. The principles upon which this is based include:

- groundwater is an undervalued resource and all Victorians share the responsibility to protect groundwater
- the protection of groundwater and aquifers is fundamental to the protection of the environmental quality of surface waters
- groundwater and aquifers should be protected to the greatest extent practicable from serious or irreversible damage arising from human activity.

This SEPP sets a beneficial use of groundwater, based on salinity for various applications of groundwater, including ecosystem protection.

Any use of groundwater requires a comprehensive assessment of the sustainable yield of the aquifer to determine whether it can meet the need of its intended end use without damage to the health and longevity of the aquifer.

The aquifer in City of Port Phillip currently has insufficient data to determine a sustainable yield or health of the asset .

Based on this, it would be recommended that council does not currently support the use of groundwater. Council's position is that any consideration of groundwater use should only be undertaken in the context of sustainable yields, salinity levels and asset health.

Council will continue to support groundwater protection and increased infiltration of clean, treated stormwater.



## 5.9 Salinity levels of ground water

Groundwater quality is poor in most parts of the municipality due to high salinity levels as a result of a shallow water table (<5m) and generally low-lying land close to sea level.

The proximity of the city's groundwater aquifer to the bay means that ongoing unmonitored extraction can result in increased salinity as water from the bay enters the aquifer.

Furthermore, ongoing application of saline groundwater can impact on land and can be ill suited to crops. An analysis of a sample of monitored bores indicates that salinity levels are in the order of 1,000-3,500 Mg/L across most of the municipality, increasing to 3,500-7,000 Mg/L around Port Melbourne.

The lower range of salinity levels is considered acceptable for irrigation, however prolonged use may potentially lead to salinity problems or adverse impacts on more sensitive plants. The underlying confined aquifers have similar salinity ranges of 1,000-3,500 Mg/L for the lower aquifer and eastern areas of the upper, increasing to 3,500-7,000 around the Port Melbourne area for the upper aquifer (EDAW, 2009).

Typical chemical properties of the extracted bore water indicate high levels of sodium and chlorides which can be extremely harmful to turf growth, while bore water with a high bicarbonate concentration results in increased water hardness which can impact irrigation systems. At these levels groundwater is considered unsustainable for irrigating turf without desalination or mixing with a less saline water source (City of Port Phillip, 2010).

Despite the salinity levels bore water is increasingly being used for garden irrigation (the use of desalination units on bores is becoming increasingly common). From 2003-2007, 416 bores were licensed in the municipality. Many older existing bores may not have licenses and therefore it is difficult to accurately quantify the reliance on bore water across the municipality.



## 6 Implementations, Targets and Indicators for Success

### 6.1 Implementation

The City of Port Phillip aims to be a water sensitive city with a target of 70% potable water reduction by 2020. To achieve this target 50% of future irrigation demand in open space must be supplied by alternate water sources.

#### How will this be achieved?

This will be achieved through a range of actions including:

- (i) Landscape Adaptation
  - Conversion of cool season grass to warm season grass
  - Planting drought tolerant trees and plants
  - Use of mulch.
- (ii) Infrastructure improvements
  - Improvements to existing irrigation systems and renewal of irrigation systems for greater efficiencies.
- (iii) Use of water sensitive urban design
  - Raingardens
  - Passive irrigation
  - Stormwater.

#### How will we prioritise?

The community places a high degree of importance on maintaining open space. In order to prioritise implementation of actions for this plan criteria were developed.

The criteria aim to prioritise directions so that council can systematically develop an open space network that enhances liveability and reduces potable water use.

A key driver of the Open Space Water Management Plan is reducing the amount of potable water used to irrigate open space. For stormwater harvesting priority will be given to sites that currently have high existing water demands and thus high potable water use. Reducing the use of potable water at these sites as a priority will help Council achieves its target of 50% of water for irrigation to be sourced from non potable water.

The criteria that will be used to prioritise the implementation of actions for this plan are:

### Heritage Gardens

This has been identified as a priority because heritage gardens have a high potable water use, have high cultural and social significance and need to be maintained to a high quality.

### Sporting Grounds

Have high potable water use and high participation numbers. Sports grounds must also be maintained to high standard to minimise risk and ensure playability.

In determining priorities for irrigation of sports grounds, council applies an assessment criteria based on the following:

- current standard of the ground
- ground's ability to regenerate from irrigation
- ground's usage capacity including the availability of floodlights
- number of teams/sports which can be accommodated by the ground
- distribution of irrigation systems across the municipality.

### High-use sites

High use sites including off-leash dog parks, festival and event sites and popular areas for play, have been prioritised to ensure that the open spaces can support the intensive usage.

### Access to green open space

The Port Phillip Open Space strategy seeks to achieve a goal of all residents living within 400m of open space. This has been prioritised to ensure that there is access to 'green' quality open space, that it to ensure that all residents have equitable access to quality open space across the city.

## 6.2 Recommendations

The following actions are recommended:

- council acknowledges that the current application of potable water to open space is not sustainable in the context of optimal water requirements. Addressing the shortfall of water requirements must become a high priority for ongoing action and investment, in order to continue to protect the natural and heritage values of open space assets within the municipality
- develop a five-year strategic resource plan that identifies all the key projects that need to be undertaken to implement the OSWMP
- sites which have been assessed as having potential urban drainage catchments of sufficient size, be investigated further for the viability of stormwater harvesting schemes
- the use of bore water is generally not suitable for irrigation of turf due to high salinity levels. Bore water may be mixed with a non-saline source, such as stormwater, or undergo desalination to render the bore water suitable for use on open space within the municipality. Based on this it is not recommended that council supports the use of groundwater. Any consideration of groundwater use should only be undertaken in the context of sustainable yields, salinity levels and asset health
- further analysis and research is required to investigate the suitability of bore water for irrigation purposes on a site-by-site basis
- open spaces with cool season grass, as identified in this report, are converted to warm season grass species given the reduction in water use that can be achieved
- turf management practices may improve existing surfaces during extended dry periods and include alteration of grass mowing height, application of wetting agents to dry soil and strategic aeration of soil to improve water, air and fertiliser uptake. These measures should be incorporated in conjunction with alternative water source schemes to minimise the extent of infrastructure required
- continued use of drought tolerant plants and trees will contribute to increasing water efficiency in the municipality
- the use of passive and sub-surface irrigation systems should be increased, with the use of water blocks to be considered in extreme circumstances
- synthetic surfaces are an alternative to turf surfaces which require no water and deliver a high surface consistency and durability. They are becoming increasingly popular as they allow for increased use. Develop a process for further investigating the opportunities and “need” for synthetic turf to supplement sporting facilities in the City of Port Phillip
- community education programs be developed in a coordinated multifaceted manner which support a range of current and future policies that provide information on alternative water sources and the stormwater cycle. For example, use of the Adopt a Tree program to help raise awareness of tree health and encourage the public to care for local street trees
- urban heat island effects, while not part of current legislation drivers, be further considered by council and mitigation measures be developed for incorporation into future projects. In conjunction with this, a strategic policy position is recommended to be developed to guide planning principles for activities which could impact significantly on the urban heat island effect. It is noted that urban heat island effects are a relatively recent topic for discussion and methods of measuring their effects are currently in development.

## 6.3 Targets and indicators for success

The provision of sustainable alternative water sources to reduce the use of potable water will have far-reaching benefits to the community. The Open Space Water Management Plan will assist in achieving these objectives.



The key indicators for the Open Space Water Management Plan are:

- access to open space across the city that is fit for purpose, in good condition and provides good amenity
- healthy, well maintained trees
- improved maintenance of major boulevards
- irrigation systems that operate to a minimum of 75% efficiency
- increase application of WSUD, including passive irrigation and other WSUD systems
- maintain current savings in potable water
- increase the use of alternative water sources to achieve 50% water reduction in open space.

The targets established for the Open Space Water Management Plan will also facilitate the achievement of key objectives from the Water Plan, Open Space Strategy, Sport and Recreation Strategy and the Greening Port Phillip Tree Strategy.

The Open Space Strategy Implementation Plan Framework (2009) has a number of key objectives which are:

- open space that is fit for purpose and is to be located within walking distance (400m) of people's residences and include areas for informal ball games, opportunities for play, barbeque and picnic facilities, seating, shade and paths
- outdoor playing fields are provided within 800m of people's residences
- easy access to open spaces for dog exercising, including dog off-lead spaces
- all sites with native vegetation and conservation significance will be protected
- provide attractive treed streetscapes with recreation opportunities
- sustainable design features are incorporated in open space.

The Sport and Recreation Strategy key objectives include:

- maintenance of sports facilities to a consistent standard;
- improving water management and reducing potable water use
- increasing community participation in sport by 10% with resulting benefits to community health.





## 8 Glossary

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### **Aquifer storage and recovery**

A system of water storage where surface water, typically stormwater or treated wastewater, is pumped into an aquifer (underground layer of rock that can hold water), and extracted for use at a later.

### **Bioretention systems**

These are another name for rain gardens (see below).

### **Blackwater**

Water polluted with high levels of organic material, such as food, animal or human waste. In a domestic situation, blackwater is any stream of wastewater that contains toilet waste.

### **C78 Amendment**

The proposed C78 Stormwater Management (WSUD) Amendment has been developed based on a common stormwater management local planning policy prepared by the Inner Melbourne Action Plan Action 9.3.

### **Catchment**

The area of land drained by a creek or river system, or a place set aside for collecting water which runs off the surface of the land. Catchments provide the source of water for the reservoirs that collect our drinking water. Most of Melbourne's catchments are "protected": that is, they are fenced to keep out people and domestic animals and minimise the potential of pollution.

### **City as a catchment**

"City as a catchment" describes a catchment-based approach to urban areas that attempts to close the loop on the urban water cycle.

### **Greywater**

Greywater is wastewater from the kitchen, laundry and bathroom (but not the toilet). It usually contains soap, detergents and fats.

### **Gross pollutant trap**

A gross pollutant trap (GPT) is a structure used to trap large pieces of debris (>5mm) transported through the stormwater system.

### **Impervious**

Impermeable, does not allow water to drain through.

### **Integrated water management**

Where the collection, treatment and storage of stormwater and wastewater is embedded into the urban landscape to address issues of water supply and quality in urban areas.

### **Mean annual rainfall**

The arithmetically averaged total amount of rain recorded during a calendar year.

### **Megalitre (ML)**

1,000,000 litres.

### **MUSIC**

MUSIC is the acronym used for the Model for Urban Stormwater Improvement Conceptualisation software developed by the Cooperative Research Centre for Catchment Hydrology to model urban stormwater management schemes.

### **Nutrients**

Nutrients are organic substances such as nitrogen or phosphorous in a water.

### **Potable water**

Potable water is water suitable for drinking or ingestion purposes. It is assigned as potable on the basis of water quality standards. It is provided to householders through a reticulated (piped) water distribution network.

### **Pervious**

Permeable to water, as in pervious paving which allows water to permeate the surface.

### **Raingarden**

Raingardens are constructed vegetation systems such as swales that filter polluted stormwater through a vegetated filter media layer. Water is treated, purified and released so it can flow downstream into waterways or into storage for reuse. Raingardens can often provide a habitat for flora and fauna. Raingardens are also referred to as bioretention systems.

### **Rainwater**

Rainwater includes roof runoff and is generally stored in rainwater tanks.

### **Recycled water**

Recycled water is taken from any waste (effluent) stream and treated to a level suitable for further use, where it is used safely and sustainably for beneficial purposes. This is a general term that can include reclaimed water.

### **Sewage**

Sewage (also called “wastewater”) is the human waste material that passes through a sewerage system. Sewage is much more than what gets flushed down the toilet. It also includes everything that goes down the kitchen, laundry and bathroom sinks as well as trade waste from industrial and commercial premises.

### **Sewerage system**

Sewerage is the system of pipes and pumps that transports wastewater.

### **Stormwater**

Stormwater is rainfall runoff from all types of surfaces. Stormwater is generated predominately in urban catchments from impervious surfaces such as roads and pavements

### **Suspended solids**

Suspended solids refer to small solid particles which remain in suspension in water as a colloid or due to the motion of the water. It is used as one indicator of water quality. Particles can be removed by sedimentation or filtration.

### **Water balance**

A water balance is a mass balance accounting for water entering, accumulating and exiting a system. It includes rainwater, potable mains water, evapo-transpiration and infiltration, wastewater and stormwater.

### **Wastewater**

Wastewater is water which has been used for a specific purpose and is no longer required or suitable for that purpose. It comprises blackwater, greywater, as well as industrial and commercial wastewater and trade waste.

### **Water Sensitive Urban Design (WSUD)**

WSUD embraces a range of measures that are designed to avoid, or at least minimise, the environmental impacts of urbanisation. WSUD recognises all water streams in the urban water cycle as a resource. Rainwater (collected from the roof), stormwater (collected from all impervious surfaces), potable mains water (drinking water), greywater (water from the bathroom taps, shower, and laundry) and blackwater (toilet and kitchen) possess an inherent value.

### **Water reuse**

Water reuse is the beneficial use of recycled water that has been treated for reuse on a site.

## 9 References

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# ANNEXE I: OPEN SPACE WATER MANAGEMENT OPTIONS

There is a range of alternative water options available for open space and sporting facilities including the following:

- rainwater collection
- stormwater harvesting
- sewer mining
- aquifer recharge and recovery
- waterway diversion
- bore water extraction
- recycled water, classes A, B and C
- greywater.

Long term sustainable options for each open space should be selected to provide the best triple bottom line answer for council and the community. Options should be avoided which consume large quantities of electricity, are costly to maintain, require truck movement producing CO<sub>2</sub> emissions, are small scale or are generally unreliable in delivery of fit for purpose water.

#### On-site rainwater collection

Collection of stormwater runoff can be sourced from roof areas such as pavilions and toilet blocks, and/or from paved or unpaved hardstand areas such as car parks, located within the facilities' boundaries.

Analysis has determined that roof run-off alone rarely supplies sufficient quantities of water for full irrigation of playing surfaces or open spaces. This is due to the fact that the catchment area and storage requirements are significantly undersized with respect to the volumes of irrigation required.

Rainwater collection may be appropriate for the purpose of toilet flushing, machinery wash down, vegetated building surrounds and planter bed watering and is a sustainable option for effectively reducing the consumption of potable water. Above-ground tanks are cost effective for small-scale water reuse from roof areas and are relatively simple to install.

When choosing a tank, the recommended minimum size capacity is 10,000 litres to provide water for toilet flushing for small numbers of people. Larger tanks will provide for greater use and supply reliability. Costs for underground storage will be considerably more expensive due to excavation required, geotechnical investigation for design and removal of contaminated soil, if found to be present.

#### Stormwater harvesting

Connection to the urban drainage infrastructure offers a sustainable method of sourcing an alternative water resource that is fit for purpose and has a positive environmental impact. The magnitude of supply is dependent on the following:

- the size of the contributing catchment
- the size of storage tank.

Each site will differ in harvesting potential and on-site storage options. A feasibility study should be undertaken for each site to determine an appropriate stormwater diversion point, with potential storage and treatment locations to enable a detailed cost estimate to be produced.

It is recommended that water quality testing of the source water be undertaken to identify and inform a risk-management process and to assist the determination of the required treatment elements for the source water.



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## Sewer mining

Sewer mining (or more correctly, water mining from sewers), is regarded as a high-value triple bottom line option which requires detailed analysis to determine its viability in relation to each facility. Local scale sewer mining is not widely adopted in Victoria on the basis that construction and maintenance costs and requirements will be borne by the local council or private owner. This can be problematic from a risk perspective as few councils or private owners have the technical and financial ability to undertake the required maintenance regimes, thereby impacting on potential scheme success.

It should be highlighted that sewer mining proves a more reliable (both quality and quantity) water supply than many other alternative water sources such as stormwater harvesting.

The sewage treatment system typically required for sewer mining facilities includes the following elements:

- in-line coarse screening
- pumping of screened waste water
- fine screening
- biological treatment
- sand filtration
- UV disinfection
- chlorination
- land area of approximately 1,000m<sup>2</sup>.

For sewer mining to be technically feasible, several site constraints such as minimum sewer flow requirements and other site-specific aspects must be satisfied.

Public and environmental health concerns relating to black water recycling schemes such as sewer mining are addressed in specific guidelines developed by EPA Victoria.

Alternative water source options such as stormwater harvesting and bore water are advantageous over sewer mining on the basis of technical risk, capital cost and ongoing maintenance requirements.

## Waterway diversion

Waterway diversion from Melbourne's rivers and creeks is generally capped by Melbourne Water. However, some diversion of creek and river water is permissible for storm-flow events, subject to their approval. In this case, Melbourne Water determines the difference between normal low flows and higher stormwater flows so that diversion of the storm event occurs.

This type of alternative water source scheme is generally not encouraged by Melbourne Water, whose preference is that major piped drains be intercepted prior to entering the receiving waterways. This results in stormwater being extracted from the piped stormwater network and not the receiving waterways.

Elster Creek is located within the municipality and stretches from Bentleigh to Elwood, where it enters Elwood Canal and subsequently outfalls to Port Phillip Bay. It is a highly modified creek which previously drained a wetland area next to the bay. The development of its floodplain into an urban catchment has affected the health of the creek with Melbourne Water rating it as having very poor water quality.

### Aquifer storage and recovery

Aquifer Storage and Recovery (ASR) is the process whereby captured surface water is pumped into underground aquifers in the winter months and extracted during the summer months for reuse. A schematic outline of a typical ASR system and the processes involved is shown overleaf.

In order to successfully implement an ASR scheme there must be:

- a sustainable water supply
- a suitable aquifer with the required characteristics
- ultimately, a water demand.

The benefits that surround ASR include the following:

- can be situated close to the water source or demand
- no land is lost. For example, ASR can be installed directly below a sporting reserve with minimum impact to the existing surface and infrastructure
- provides storage and treatment
- low energy and capital costs
- no evaporation loss, algae or mosquitoes.

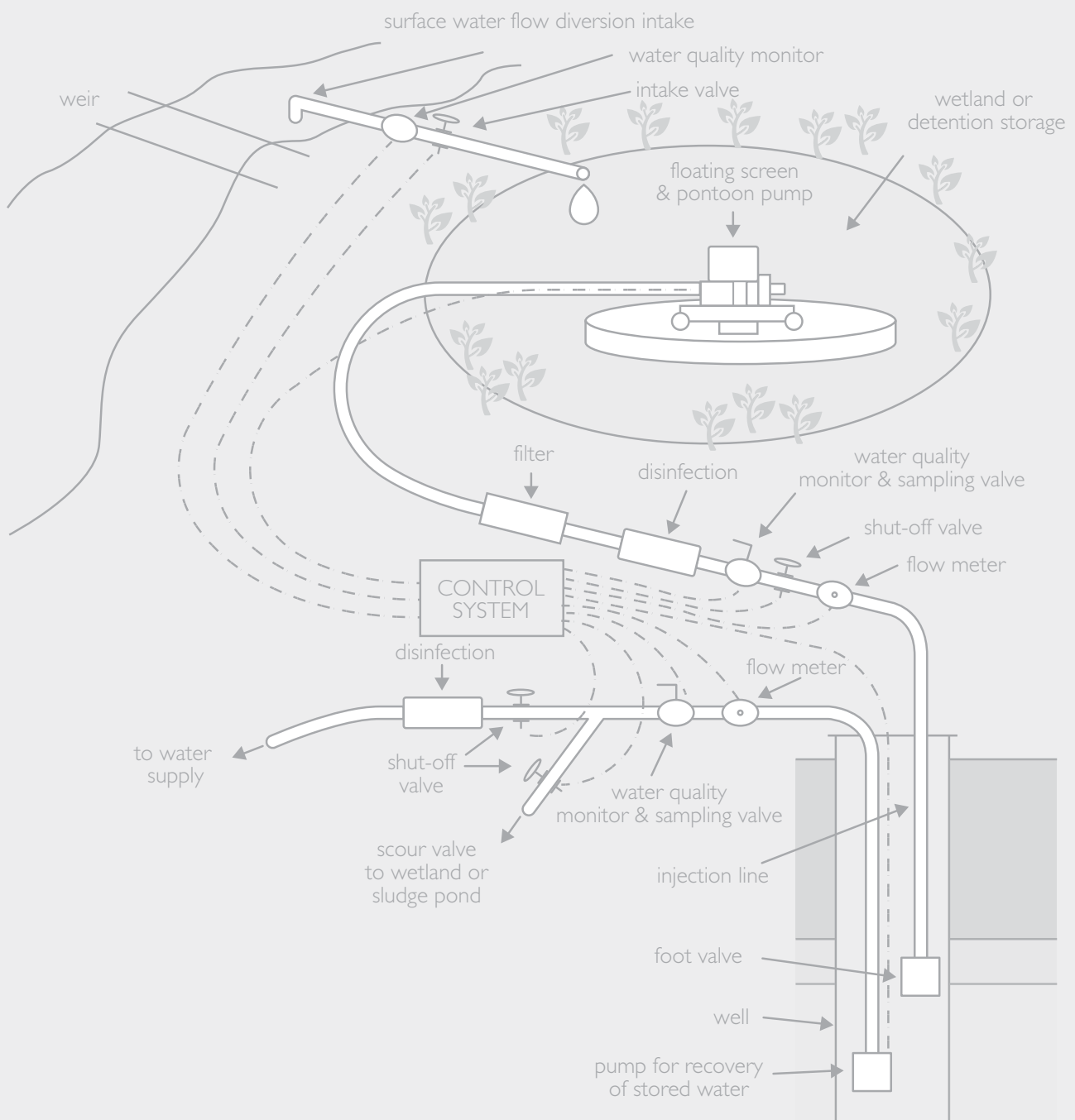
However, ASR schemes tend to have a number of technical, environmental and economical issues which require consideration. These issues include:

- clogging of wells
- stability of wells
- pollution of aquifers
- recovered water quality
- storage capacity and limiting pressure
- surface detention storage
- geotechnical changes
- monitoring requirements
- economics.

Typical costs to establish one aquifer site are in the order of \$200,000 per ASR scheme.

Often the controlling factors of implementing a successful ASR scheme rely on the availability of specific geological conditions to support confined aquifers, a comprehensive geotechnical investigation and approval from licensing authorities. In general, ASR opportunities are limited in the sand belt regions of Melbourne, are costly schemes to implement and have an inherent high degree of uncertainty and risk.

Components of well-configured ASR system showing barriers to pollution. Systems for irrigation supplies or taking treated water from pipelines will generally have fewer components.



### Groundwater extraction

Groundwater extraction involves the removal of bore water from an underlying aquifer. The quality of groundwater throughout Victorian aquifers is broadly ranked through the following reuse categories as shown in Table 23.

Typical chemical properties of the extracted bore water indicate high levels of sodium and chlorides which can be extremely harmful to turf growth, while bore water with a high bicarbonate concentration results in increased water hardness which can affect the operation of irrigation systems. The pH of the bore water appears moderately alkaline which can alter the pH of the soil.

At these levels, the groundwater is unsustainable for irrigating turf. Either desalination or mixing with a less saline water option would be required to make the captured water acceptable for irrigating open space.

Groundwater could be combined with a non-saline source such as stormwater (which has a low reliability for irrigation purposes) or potable mains water which has a high reliability but limits progress in reducing water consumption from the mains supply.

Desalination could be utilised to increase the quantity of groundwater available for reuse. This would be subject to agreement with the relevant authority for discharge of the brine waste stream. Desalinisation also relies upon an ongoing and regular maintenance regime and has a high energy demand, which does not align with the objective of a sustainable alternative water solution and council's water consumption hierarchy as outlined in Figure 5.

Certain grass types have a greater tolerance to salinity, namely couch, kikuyu and buffalo as indicated in Table 24.

The process and quantity of groundwater extraction would need to be compliant with the Department of Sustainability and Environment (DSE) regulations and a licence to extract groundwater is also required.

Table 22: Grass Tolerance to Salinity

Grass Type	Cool Season	Warm Season	Drought Resistance	Total Dissolved Solids [mg/L]
Buffalo		Yes	Good	1,670-8,330
Couch		Yes	Good	1,670-8,330
Kikuyu		Yes	Good	1,670-8,330
Tall fescue	Yes		Fair	500-1,330
Kentucky bluegrass	Yes		Fair	<500
Fine ryegrass	Yes		Fair	500-1,330
Fine fescue	Yes		Fair	500-1,330
Seashore paspalum		Yes	Good	16,670-50,000
Bermuda grass		Yes	Good	16,670-25,000

Source: GHD (2007). Original table shows salinity in microseimens, this has been converted for this report based on EC (mS/cm) = 0.6 TDS (mg/L) as presented on the website <http://www.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/water-ground-res> (State of Victoria, Victoria's Groundwater Resource, 2009, accessed 1/7/09)



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ANNEXE 2:  
OPEN SPACE SITE INFORMATION SUMMARY

## Open Space site information summary

Name	Area (sqm)	Water Application Rate (mm/m <sup>2</sup> /wk)	Optimum Water Usage (kL/year)	Optimum Water Usage (Summer 5 months)	Water Consumption (kL)		Grass Type (Warm /Cool Season)
					2009/10	2005	
Open Space							
Ada Mary A'beckett Grounds	1,410	5	367	148	0	0	Warm
Alfred Square	4,251	5	1,105	446	4	2,681	Warm
Alma Park	73,539	10	38,240	15,443	3,041	0	Warm, Cool
Anzac Gardens	1,732	5	450	182	422	0	Warm
Ashworth St Reserve	240	0	0	0	0	0	N/A
Australis Court Gardens	2730	0	0	0	0	0	Warm
Beach Street Foreshore Reserve	5,594	5	1,454	587	327	0	Warm
Beacon Cove Linear Light Rail (North)	2,625	0	0	0	0	0	N/A
Beacon Cove Linear Light Rail (South)	3,312	0	0	0	0	0	Cool
Beacon Vista Reserve	4,438	5	3,462	1,398	6	3,632	Warm
Bowen Crescent Reserve	1,362	5	354	143	138	620	N/A
Broadway Reserve	780	0	0	0	0	0	Warm
Buckingham Reserve	15,129	0	0	0	0	0	Warm
Burnett Grey	2,547	5	662	267	0	128	Warm
Byrne St Reserve	2,500	0	0	0	0	0	N/A
Canterbury Rd Urban Forest	27,800	0	0	0	0	0	N/A
Catani Gardens	40,514	10	21,067	8,508	2,163	9,126	Warm
Cecil/Bridport Reserve	3,860	0	0	0	0	0	Cool
Cecil/Park St Reserve	3,885	0	0	0	0	0	Cool
Centenary Park	2,200	0	0	0	0	0	Cool
Church Square Reserve Playground	1,150	0	0	0	0	0	Cool
Clarke Reserve	8,167	0	0	0	0	0	Warm
Cleve Gardens	3,518	15	2,744	1,108	644	465	Warm
Coogee Place Park	1,963	0	0	0	0	0	Warm
Cook Reserve	300	0	0	0	0	0	Warm
Crichton Reserve	3,814	0	0	0	0	0	Warm
Crimea St Reserve	1,531	0	0	0	0	0	Warm
Cyril Letts Reserve	9,084	0	0	0	0	0	Cool
Eastern Reserve	5,676	5	1,511	611	597	0	Cool
Ec Mitty Reserve	430	0	0	0	0	0	Warm
Edina Close Park	1,215	0	0	0	0	0	Cool
Edwards Park	17,940	5	4,664	1,884	135	692	Warm
Elder Smith Reserve	11,586	0	0	0	0	0	Cool
Elwood Canal Nature Area	4,700	0	0	0	0	0	Cool
Elwood Park And Foreshore	35,622	0	0	0	0	0	Cool
Elwood Playspace	2,016	0	0	0	0	0	Cool
Elwood School Reserve	12,051	0	0	0	0	0	Cool

Patronage Sporting Groups	Heritage Protected Site (Yes/No)	Frequency (annual)	Other Comment
Childcare grounds	No		
War memorial days, St Kilda festival, General public	Yes	3 War service events per annum. St Kilda Festival annually.	Heritage garden with mature lawns, predominantly used for war memorial services
General public	Yes		
General public	Yes		Heritage garden with limited botanical significance
Playground, General public	No		
General public	No		
General public	No		
General public	No		
General public	No		
Playground, General public	No	Green space and high-use playground	
General public	Yes	Large number of office workers per day	Heritage garden of botanical significance
General public	No		
General public	No		
Excessive pedestrian movement from train station, Playground, general public	No	High-use pedestrian area due to location next to Ripponlea Station	
General public	No		
General public	No		
Triathlons, St Kilda Festival, Fun runs, Pony rides, General public	Yes	6 major events per annum	Heritage garden with mature lawns
General public	No		
General public	No		
Playground, General public	No		
Playground, General public	No		
Playground, General public	no		Irrigated via passive storm water system
General public	No	St Kilda Festival once per annum	Popular garden with significant fig tree
General public	No		
General public	No		
Playground, General public	No		
Playground, General public	No		
Playground, General public	No		
Playground, General public	No		
General public	No		
General public	no		
Trugo, Playground, General public	No	High-use playground	
General public	No		
General public	No		
General public	No		
Playground, General public	No		
school. Playground, sports oval	No		Public use agreement for this school site

Name	Area (sqm)	Water Application Rate (mm/m2/wk)	Optimum Water Usage (kL/year)	Optimum Water Usage (Summer 5 months)	Water Consumption (kL)		Grass Type (Warm /Cool Season)
					2009/10	2005	
Open Space							
Elwood Tea Tree	153,000	0	0	0	0	0	N/A
F.L Dawkins Reserve	2,800	0	0	0	0	0	Warm
Fawkner Reserve	3,876	0	0	0	0	0	Warm
Fennell Reserve	5,556	0	0	0	0	0	Warm
Foundary Site Park	478	0	0	0	0	0	Cool
Frank And Mary Crean Reserve	1,145	5	298	120	0	0	Warm
Fraser St Dune	6,200	0	0	0	0	0	N/A
Fred Jackson Reserve	7443	0	0	0	0	0	Cool
Garden City Reserve	33,513	15	26,140	10,557	4,474	5,642	Warm
Gasworks Park	25,336	15	19,762	7,981	7,665	11,347	Warm
Gill Reserve	5,688	0	0	0	0	0	Warm
Glen Eira Road Reserve	4,993	0	0	0	0	0	Cool
H.R Johnson Reserve	5230	0	0	0	0	0	Warm
Head St Reserve	9792	0	0	0	0	0	Warm
Hester Reserve	17,200	10	8,944	3,612	1,607	2	Warm
Hewinson Reserve	4,493	5	1,168	472	0	2	Warm
Howe Reserve	17,797	0	0	0	0	0	Cool
J.T Berkeley Reserve	2,300	0	0	0	0	0	Warm
Jacoby Reserve	2,922	10	1,519	614	6	1,210	Warm
Jim Duggan Reserve	3,796	0	0	0	0	0	Cool
Lagoon Reserve Surrounds	14,848	0	0	0	0	0	Warm
Linden Gallery	425	0	0	0	0	0	Cool
Little Finlay Reserve	204	0	0	0	0	0	Cool
Little Page Reserve	242	0	0	0	0	0	N/A
Ludwig Stamer Reserve	1,826	0	0	0	0	0	Warm
Lyall/Iffla Reserve	2,026	0	0	0	0	0	Cool
Marina Reserve	14,913	10	7,755	3,132	3	3,618	Warm
Middle Park Dunes	648	0	0	0	0	0	N/A
Mo Moran Reserve	45,828	0	0	0	0	0	Warm
Narooma Place	242	0	0	0	0	0	Cool
Neville St Reserve	250	0	0	0	0	0	Warm
Newton Court Reserve	1,902	0	0	0	0	0	Cool
O'Donnell Gardens	5,223	10	2,716	1,097	383	2,568	Warm
Olives Comer	517	0	0	0	0	0	Cool
Orcades Mews Park	650	0	0	0	0	0	Warm
Orion Mews Park	3,008	0	0	0	0	0	Warm
Page Reserve	4,980	0	0	0	0	0	Warm
Pakington St Reserve	783	0	0	0	0	0	Warm
Park Square	2,418	0	0	0	0	0	Warm
Perce White Reserve	51,345	0	0	0	0	0	Cool



Patronage Sporting Groups	Heritage Protected Site (Yes/No)	Frequency (annual)	Other Comment
General public	No		
General public	No		
General public	No		
General public	No		
General public	No		
Playground, General public	No		
General public	No		
General public	No		
Trugo, Dog off-leash, General public, Regional playground	No	Daily high use in dog off-leash area	Popular large garden site, developed for regional use
Dog off-leash, General public	No	Daily high use in dog off-leash area. Monthly farmers market	Popular dog-off leash area, Contamination issues mean that the site must be irrigated to provide a grass cover from contaminated soil
General public	No		
General public	No		
Playground, General public	No		
General public	No		
Dog-off leash, General public	No		High use dog-off leash site
Playground, General public	No		
General public	No		
General public	No		
Playground, General public	No	High-use playground	
Playground, General public	No		
General public	No		
General public	No		
Playground, General public	No		
Playground, General public	No		Mulched reserve
Playground, General public	No		
Playground, General public	No		
Skate park, General public	No		Expected increase in use when skate park has been built
General public	No		
Sky diving, general public	No		
General public	No		
Playground, General public	No		
General public	No		Access to St Kilda Adventure playground
St Kilda Festival, Small events, Night market, General public	Yes	12 major events per annum	Heritage garden with mature Iwans. Popular destination year round
General public	No		
General public	No		
General public	No		
General public	No		
Playground, General public	No		
General public	No		
General public	No		

Name	Area (sqm)	Water Application Rate (mm/m2/wk)	Optimum Water Usage (kL/year)	Optimum Water Usage (Summer 5 months)	Water Consumption (kL)		Grass Type (Warm /Cool Season)
					2009/10	2005	
Open Space							
Point Ormond Park	59,278	0	0	0	0	0	Cool
Point Ormond Promenade	32,820	0	0	0	0	0	Cool
Port Melbourne Foreshore	69,887	0	0	0	0	0	Warm
Princes Street Dunes	3,808	0	0	0	0	0	N/A
R F Julier Reserve	10,815	5	1,812	1,136	195	5,366	Warm
Rats Of Tobruk	573	0	0	0	0	0	Cool
Renfrey Gardens	12,543	0	0	0	0	0	Warm
Robinson Reserve	10,675	0	0	0	0	0	Cool
Sandridge Beach	5,000	0	0	0	0	0	Cool
Sangster Reserve	1,300	0	0	0	0	0	Warm
See Yup (Joss House)	642	5	167	67	0	0	Warm
Slopes Lawns	6,974	0	0	0	0	0	Warm
Smith Reserve	10,749	0	0	0	0	0	Warm
Sol Green Reserve	10,036	5	2,609	1,054	27	2,249	Warm
South African War Memorial Gardens	5,095	10	2,649	1,070	535	2,227	Warm
South Melbourne Town Hall Forecourt	988	5	257	104	0	0	Cool
South Melbourne Trugo And Senior Citizens Centre Grounds	1,138	5	296	119	0	0	Warm
St Kilda Botanical Gardens	41,954	15	32,724	13,216	13,645	23,220	Warm
St Kilda Childcare Centre Grounds	300	5	78	32	0	0	Warm
St Kilda Foreshore	45,686	10	23,757	9,594	2,376	5,568	Warm
St Kilda Pier Reserve	7,304	0	0	0	0	0	Warm
St Kilda Town Hall Gardens	5,032	5	1,308	528	2,370	4,473	Warm
St Vincent Gardens	28,722	15	22,403	9,047	2,507	15,274	Warm and Cool
Station Pier Linear Park	1,554	0	0	0	0	0	N/A
Strathaird Mews	270	0	0	0	0	0	Cool
Talbot Reserve	9,428	0	0	0	0	0	Warm
Te Arai Reserve	1,883	0	0	0	0	0	Cool
Tumer Reserve	20,766	10	10,798	4,361	576	215	Warm
Turville Place Park	5,058	0	0	0	0	0	Cool
W.E Dickeson Reserve	850	0	0	0	0	0	Warm
Walter Reserve	10,372	0	0	0	0	0	Warm
Waterfront Place	426	0	0	0	0	0	N/A
Waterloo Crescent Res	915	0	0	0	0	0	Warm
Webb Dock	19,968	0	0	0	0	0	N/A
West Beach	8,100	0	0	0	0	0	N/A
William St Reserve	3,120	0	0	0	0	0	Cool

Patronage Sporting Groups	Heritage Protected Site (Yes/No)	Frequency (annual)	Other Comment
Playground, General public	No		
General public	No		
General public	No		
General public	No		
Passive sports space, Playground, general public	No		
General public	No		
Playground, General public	No		
General public	No		
Playground, General public	No		
Playground, General public	No		
Japanese garden	No		Valuable japanese collection garden and provides a green space within 400 meters of residents
General public	No		
General public	No		
Netball court, Community centre, Playground, General public	No	Green space and high-use playground	
Large volume of school children traffic from tram stops, General public	Yes		Heritage garden with mature trees
General public	No		
Trugo and community centre	No	6 Month season for trugo games	
Weddings, General public	Yes	120 weddings and minor events per annum	Heritage garden of botanical significance
Childcare grounds	No		
St Kilda Festival, Small events, General public	No	1 major event per annum. 10 minor events per annum	High use foreshore area with large numbers of sun bathers and recreation in summer
General public	No		
General public	Yes	10 minor events per annum	Heritage garden of botanical significance
Lawn bowls, Tennis courts, General public	Yes	30 weddings and minor events per year	Heritage garden of botanical significance. Has a bowling club and tennis court
General public	No		
General public	No		
Playground, General public	No		
Playground, General public	No		
General public	No		
BMX track, general public	No		
General public	No		
Playground, General public	No		
General public	No		High use in cruise ship season
Playground, General public	No		
General public	No		
General public	No		
Playground, General public	No		

Name	Area (sqm)	Water Application Rate (mm/m2/wk)	Optimum Water Usage (kL/year)	Optimum Water Usage (Summer 5 months)	Water Consumption (kL)		Grass Type (Warm /Cool Season)
					2009/10	2005	
Road medians and small sites							
Albert Rd Bike Track	2,700	0	0	0	0	0	Warm
Albert Rd Medians	15,926	5	4,141	1,672	100	926	Warm
Bay St/Crockford St Medians	3,403	5	885	357	56	2,395	N/A
Beach St Median (Princes St to Pier St)	2,236	0	0	0	0	0	Warm
Beach St Medians	3,052	5	794	320	99	7,396	N/A
Beach Street Medians	3,096	0	0	0	0	0	Cool
Beacon Road Medians at Willy Road	286	0	0	0	0	0	Cool
Beaconsfield Pde medians	9,998	0	0	0	0	0	Warm
Beaconsfield Pde Foreshore	34,226	0	0	0	0	0	Warm
Bothwell St Medians	1,448	0	0	0	0	0	N/A
Bridge St Medians	689	0	0	0	0	0	Warm
Brighton Rd Medians	22,732	0	0	0	0	0	Warm
Broadway Reserve	500	10	260	105	0	0	Warm
Canterbury Road Medians	7,380	0	0	0	0	0	Cool
Cecil St Medians	1,752	0	0	0	0	0	Warm
Centre Ave Medians	2,116	0	0	0	0	0	N/A
Cummings Reserve	15,899	0	0	0	0	0	Warm
Danks St Medians	11,052	0	0	0	0	0	Cool
Dorcas St Medians	1,885	0	0	0	0	0	Warm
Esplanade East Medians	1,366	0	0	0	0	0	Cool
Ferrars St Medians	3,096	0	0	0	0	0	Cool
Graham St Median	2,270	0	0	0	0	0	N/A
Howe Pde Medians	17,797	0	0	0	0	0	N/A
Jacka Boulevard Medians	924	0	0	0	0	0	Cool
Kerferd Road Median	17,536	5	4,559	1,841	0	26	Warm
Lairdet St Medians	1,175	0	0	0	0	0	Cool
Marina Lawns and carpark	3,042	0	0	0	0	0	Warm
Marine Parade Medians	3,964	0	0	0	0	0	Cool
Moray St Medians	713	0	0	0	0	0	Cool
Normanby Rd Medians	3,091	0	0	0	0	0	Cool
Ormond Esplanade Medians	2,740	0	0	0	0	0	Cool
Pickle St Medians	600	0	0	0	0	0	N/A
St Kilda Library gardens court yard	292	5	76	31	0	0	Warm
St Kilda Road Medians	29,049	15	22,658	9,150	0	640	Cool
St Vincent St Medians	3,133	0	0	0	0	0	Cool
Station Pier Medians	1,430	5	372	150	300	3,700	Warm
Stenhouse Reserve	4,546	0	0	0	0	0	Warm
The Boulevard Medians	6,939	0	0	0	0	0	Warm
White Street Depot grounds	938	5	244	98	220	0	N/A
Williamstown Rd Medians	812	0	0	0	0	0	Warm



Patronage Sporting Groups	Heritage Protected Site (Yes/No)	Frequency (annual)	Other Comment
Nil	No		
General Public	No		Mature trees in median
General Public	No		
Nil	No		
General Public	No		
Nil	No		
Nil	No		
Nil	No		
General Public	No		
Nil	No		
Nil	No		
Nil	No		
General Public	No	High-use open space in major shopping strip	
Nil	No		
Nil	No		
General Public	No		
General Public	No		
Nil	No		
Nil	No		
Nil	No		
Nil	No		
General Public	No		
General Public	No		
General Public	No		Mature trees in median
Nil	No		
General Public	No		
Nil	No		
Nil	No		
Nil	No		
Nil	No		
Nil	No		
General Public	No		
Nil	No		Heritage boulevard with significant trees
Nil	No		
General Public	No	36 cruise ships berths per year	Shipping berths result in excess pedestrian movements within this area
General Public	No		
Nil	No		
General Public	No		
Nil	No		

Name	Area (sqm)	Water Application Rate (mm/m2/wk)	Optimum Water Usage (kL/year)	Optimum Water Usage (Summer 5 months)	Water Consumption (kL)		Grass Type (Warm /Cool Season)
					2009/10	2005	
<b>Sports Reserves</b>							
Alma Park Oval	10,652	10	5,539	2,237	1,140	12,617	Warm
Elwood Park Esplanade Ground	10,500	15	8,190	3,307	0	0	Warm
Elwood Park Head Street Ground A	6,500	15	5,070	2,047	0	0	Warm
Elwood Park Head Street Ground B	6,500	15	5,070	2,047	0	0	Warm
Elwood Park Wattie Watson Oval	11,244	15	8,770	3,541	4,196	21,658	Warm
J L Murphy Reserve A T Aanensen Oval	11,450	10	5,954	2,405	0	0	Warm
J L Murphy Reserve Anderson Oval 1	15,314	15	11,945	4,824	2,336	2,030	Warm
J L Murphy Reserve Anderson Oval 2	9,676	15	7,547	3,048	0	0	Cool
J L Murphy Reserve J W Woodruff Oval	12,900	15	10,062	4,064	2,773	2,030	Warm
Lagoon Reserve Oval	12,524	10	6,512	2,630	0	62	Warm
Peanut Farm Oval	15,330	15	11,957	4,829	8,385	9,356	Warm
Peanut Farm Reserve	17,276	15	13,475	5,442	0	0	Cool
Port Melbourne Cricket Ground	16,286	15	12,703	5,130	11,444	11,182	Cool

Patronage Sporting Groups	Heritage Protected Site (Yes/No)	Frequency (annual)	Other Comment
Cricket, soccer	No	278 uses annually	Local sports site
Touch football, Cricket, Soccer	No	220 uses annually	Local sports site
Touch Football	No	185 uses annually	Local sports site
Touch Football	No	142 uses annually	Local sports site
Football, Cricket, Soccer	No	287 uses annually	Local sports site
Football, Cricket	No	135 uses annually	Local sports site
Soccer	No	131 uses annually	State sports facility
Soccer	No	130 uses annually	Local sports site
Football, Cricket	No	129 uses annually	Local sports site
Cricket, soccer	No	250 uses annually	Local sports site
Football, Cricket	No	367 uses annually	Local sports site
Farmers market, General public	No	12 uses annually	Areas used for farmers market once per month
Football, Cricket	No	194 uses annually	State sports facility

## Translation Information

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### Translation information

This information is provided by the council to inform residents about council services and responsibilities.

For a translation of this information contact the council's interpreter service.

Cantonese	(03) 9679 9810
Greek	(03) 9679 9811
Polish	(03) 9679 9812
Russian	(03) 9679 9813
Other languages	(03) 9679 9814

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Эта информация предоставлена Муниципальным Советом Port Phillip в целях ознакомления жителей района с услугами и обязательствами муниципального совета. Чтобы получить перевод этой информации, обратитесь в переводческую службу муниципального совета. Чтобы получить перевод на русский язык, позвоните по номеру 9679 9813.

Informacja ta została przygotowana przez Radę Dzielnicę Port Phillip w celu powiadomienia mieszkańców o









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