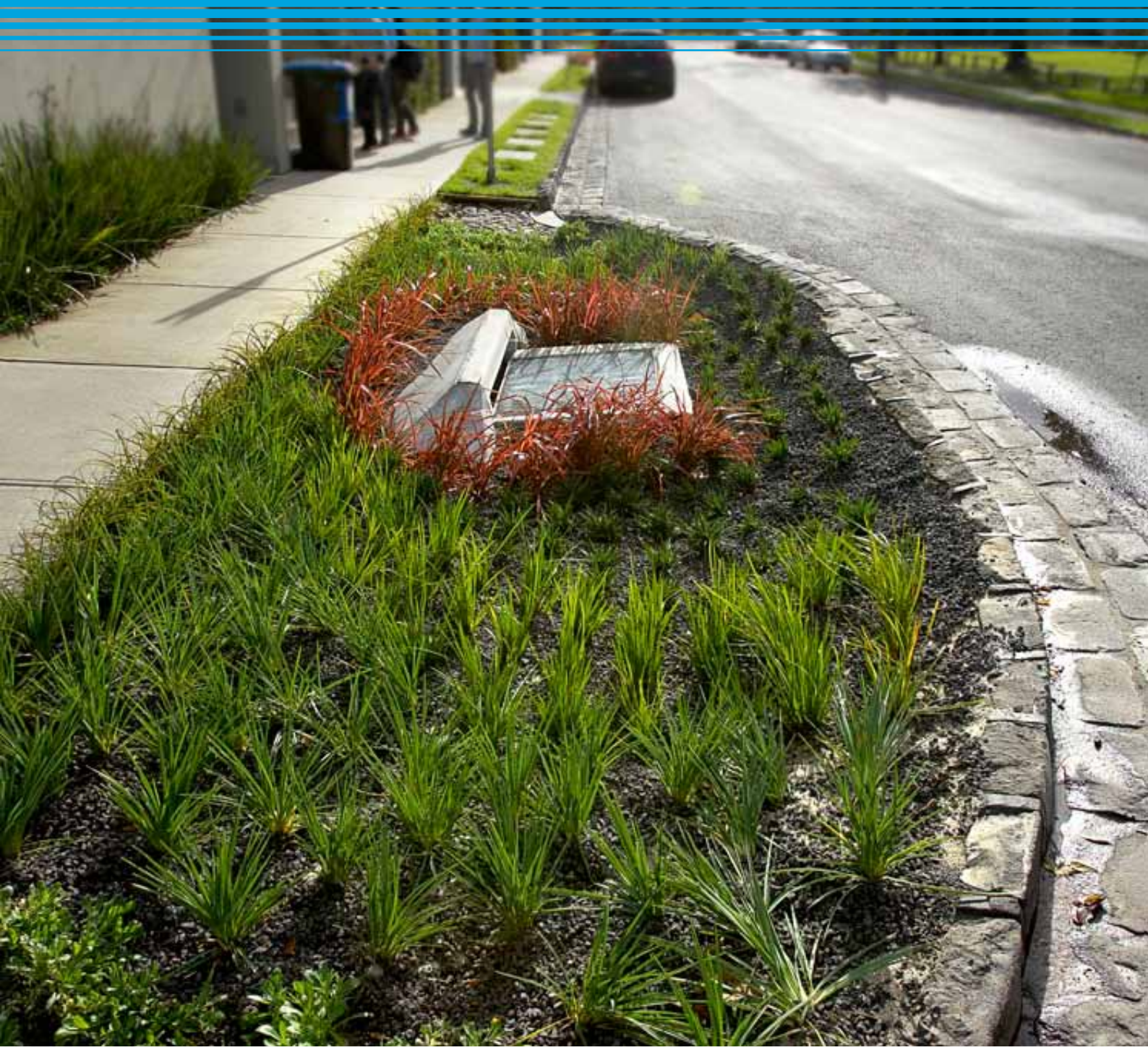
City of Melbourne WSUD Guidelines

Applying the Model WSUD Guidelines

An Initiative of the Inner Melbourne Action Plan



CITY OF MELBOURNE

Victoria
The Place To Be

Melbourne Water

Contents

Executive Summary

Water Sensitive Urban Design (WSUD) embraces a range of measures that are designed to avoid, or at least minimise, the environmental impacts of urbanisation in terms of the demand for water and the potential pollution threat to natural water bodies.

The *Model WSUD Guidelines* inform Council staff, developers and residents on how to apply WSUD principles to urban developments or local water reuse and treatment projects.

These 'model' guidelines are available for Councils to adapt and adopt as their own.

Part One – WSUD Policy Commitment

Module 1.1 – Local context

Local government is committed to sustainable water management to conserve water, improve waterway health and protect groundwater.

Module 1.2 – Melbourne's Urban Water System

Greater Melbourne is experiencing prolonged drought and requires a range of solutions at both the metropolitan and municipal scale to deliver water supply security and improved waterway health.

Module 1.3 – WSUD Guiding Principles

Sustainable water management needs to bring together water conservation, stormwater quality, wastewater reductions and groundwater quality to achieve the best long term results for Melbourne. WSUD provides the approach and tools to deliver these goals on the ground.

A sustainable water management hierarchy is set out that encompasses the city as a catchment approach of managing water within the local area before drawing from beyond local boundaries.

As a principle, all water saving projects should encompass stormwater treatment measures and vice versa.

Current best practice performance objectives are:

- 80% reduction in Total Suspended Solids
- 45% reduction in Total Nitrogen
- 45% reduction in Total Phosphorous
- 70% reduction in litter from typical urban loads.

Module 1.4 – Legislation and Policy Framework

There are an increasing range of Federal, State, regional and local legislative and policy requirements that apply to sustainable water management.

Part Two – Getting WSUD On The Ground

Module 2.1 – Starting the Project

To achieve the best results, set clear objectives. Consider existing targets associated with environmental, economic and social outcomes needed for your organisation. Visit your site and undertake a 'water balance' to understand it more holistically. Use the handy WSUD Checklist at this early stage.

Module 2.2 – Scoping WSUD Options

There are a range of different WSUD treatments available to use. Use the sustainable water management hierarchy to consider options for a site. Firstly reduce water demand, then consider rainwater harvesting, stormwater harvesting and water recycling. Beyond this, water can be sourced beyond the immediate surrounds. Alternative water sourcing projects can be measured for improvements to stormwater quality and further enhanced where possible.

Stormwater quality works can be modelled to show how different solutions and treatment trains can contribute to local stormwater quality targets and hence waterway health improvements.

Module 2.3 – Considering Environmental Impacts

Sustainable water projects delivered through WSUD need to provide a net environmental benefit. Be sure to avoid or mitigate any biosolids, sodicity, salinity, nutrient, odours and greenhouse gases that could arise from projects if not planned carefully.

Module 2.4 – Being Carbon Sensitive

Be sure to model the greenhouse gas emissions that could occur from different WSUD treatments. These could be emitted from energy use, biological processes or through embodied energy. Use our specially developed Carbon Calculator for WSUD Treatments to model the emissions and follow our more detailed WSUD Carbon Sensitive Framework to 'neutralise' emissions.

Module 2.5 – Considering Life Cycle Costs

Assess the financial implications of a WSUD project by considering the full life cycle costs. This will take into account capital expenditure, installation, operation, ongoing maintenance and labour costs, replacement costs and timing for significant expenditure, life span, and decommissioning costs.

Module 2.6 – Assessing the Risks

Protecting public health and the environment is paramount when alternative water sources are being used. Careful planning, construction and monitoring are required to make sure reused water is safe. Use the more detailed WSUD Risk Management Guidelines with its straightforward risk management for simple projects, and a comprehensive approach for more complex projects and those that carry higher risks.

Module 2.7 – Site Design and Approvals

Water sensitive urban design can be integrated into the design and construction of different urban development sites, large and small. Consider a range of ideas and applications whilst taking into account approvals and compliance issues.

Module 2.8 – Maintaining WSUD Assets

Plan and fund for maintenance to ensure the projects goals are met over the long term.

Part Three – Case Studies

These case studies help show how WSUD can be implemented.

Part Four – Fact Sheets

For further detail, refer to these fact sheets covering everything from rainwater tanks to wetlands to gross pollutant traps. If you are still seeking further detail, go to the State Government's Engineering Procedures Manual.

Part Five – Glossary

And to be sure we are talking the same language, here is a WSUD glossary.

Part 1
WSUD Policy Commitment

Module 1
Introduction

Leadership and commitment

The City of Melbourne is committed to providing leadership in sustainable water management. Its *Total Watermark* program has achieved local improvements in both water saving and water quality.

The City of Melbourne provides support and assistance in delivering Water Sensitive Urban Design (WSUD) solutions as part of its commitment to seek sustainable water solutions locally under a *city as a catchment* approach, adopted in September 2008 as the *Total Watermark City as a Catchment* policy.

Purpose of the *WSUD Guidelines*

The *WSUD Guidelines* inform Council staff, developers and residents on how to apply Water Sensitive Urban Design (WSUD) principles to urban developments or local water reuse projects.

These guidelines provide information, strategic advice and practical tips on implementing WSUD in a structured way.

The WSUD Guidelines will be used:

- To apply the *city as a catchment* approach of local sustainable water management
- As a basis for Council to require sites to incorporate Water Sensitive Urban Design (WSUD)
- To inform and guide Council's decision making for urban water management
- To help Council staff, developers and others to apply WSUD
- As a demonstration of WSUD using innovative examples from within Council.

WSUD guiding principles

WSUD embraces a range of measures that are designed to avoid, or at least minimise, the environmental impacts of urbanisation in terms of the demand for water and the potential pollution threat to natural waterways.

WSUD recognises that all water streams in the urban water cycle are a resource, not just drinking water. This includes:

- Rainwater
- Stormwater
- Potable mains drinking water
- Greywater (water from the bathroom sinks, shower, and laundry)
- Blackwater (toilet and kitchen)
- Water mining (sewer).

The following goals of WSUD will be explained in detail in this guide:

- Reduce potable water consumption
- Maximise water reuse
- Reduce wastewater discharge
- Minimise stormwater pollution before it is discharged to the aquatic environment
- Maximise groundwater protection.

Structure of the *WSUD Guidelines*

The guidelines have five parts. Each part is broken down into a series of modules that cover specific topics.

Part 1 is aimed at Council staff and covers the policy commitment needed to achieve WSUD. It introduces the principles of WSUD, with a focus on integrated water cycle management. It also covers the legislation and policy framework surrounding WSUD at Council, State and Federal level.

Part 2 is aimed mainly at Council designers and developers. It explains how to implement a WSUD system through a project management framework. The modules cover design, risk, climate change impacts, construction and maintenance. Householders may also be interested in some of these modules if they are thinking about building or retrofitting a water reuse project.

Part 3 showcases the practical application of WSUD through a series of case studies spanning the breadth of local demographics and stakeholders. Examples demonstrate innovative and practical applications of WSUD principles through different building types found within the Council area.

Part 4 includes a series of fact sheets to help people understand WSUD elements and treatment technologies.

Part 5 includes a WSUD glossary and other sources of information.

Part 1
WSUD Policy Commitment

Module 1.2

Melbourne's Urban Water System

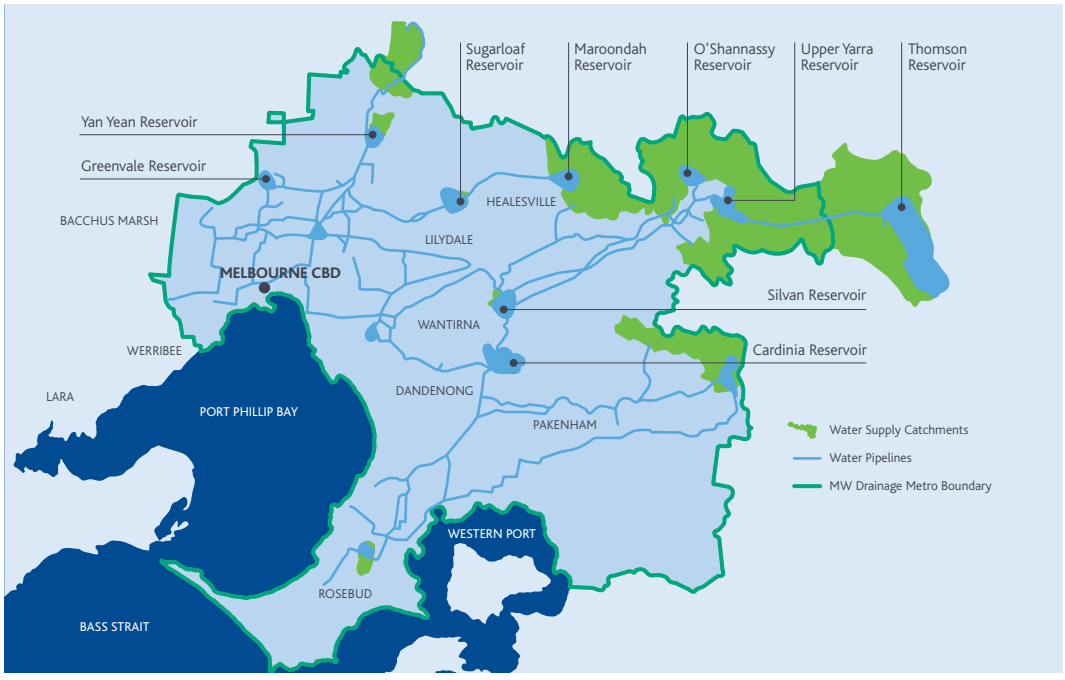
Greater Melbourne

Melbourne's water is sourced from catchments to its north and east, mostly in the Yarra Ranges. The water quality is high because the catchment is mainly natural forests in pristine condition. The water is stored in nine reservoirs (Thomson, Upper Yarra, O'Shannassy, Maroondah, Sugarloaf, Yan Yean, Greenvale, Silvan and Cardinia reservoirs) as shown in Figure 1.

The water is treated to meet drinking water standards. The majority (90%) needs minimal treatment because the catchment is pristine catchment. The remaining 10% needs filtering.

The treated water is piped to the urban area shown in Figure 1. This water is used for a range of purposes. Only a small fraction (approximately 4%) is used for human consumption.

Figure 1. Water supply catchment and main water pipelines for the City of Melbourne (Melb Water[1])



[1] Melbourne Water http://www.melbournewater.com.au/ date accessed 1/08/06

Wastewater is collected by a separate network of underground pipes to the Western (Werribee) and Eastern (Bangholme) treatment plants. Sewage can take as long as 12 hours to reach the treatment plants. Once treated, effluent from the Western wastewater treatment plant is discharged to Port Phillip Bay and the Eastern treatment plant to Westernport Bay.

Melbourne Water aims to recycle 20% of all effluent by 2010. Recycling schemes are being developed to minimise effluent discharge to the Bay to meet this goal.

Rainfall on urban catchments (urban stormwater) is collected by a separate network of underground pipes. The majority of the catchment area discharges directly to Port Phillip Bay or nearby receiving waters that eventually discharge to the Bay.

Melbourne's geology is primarily a basalt shelf. It is not well suited to groundwater extraction, with the water quantity and quality being typically low and saline.

City of Melbourne

The City's catchment

The City of Melbourne is located in the centre of Melbourne and covers 36.5 km^2, situated within three catchments:

- The Yarra River
- The Maribyrnong River
- Moonee Ponds Creek.

The Maribyrnong River and Moonee Ponds Creek flow into the Yarra River, which enters Port Phillip Bay at Port Melbourne.

The City of Melbourne is located at the 'bottom of the catchment' where waterways are saline, groundwater is shallow, and pollution occurs from upstream sources. The City welcomes opportunities for the whole catchment to improve water quality management together, to help improve the water bodies on a regional scale.

Demographics and characteristics

The residential population in the City of Melbourne is growing quickly. It's forecast to grow from 89,759 in 2008 to 123,000 people in 2020 – an increase of 52%. The central district, Southbank and West Melbourne are the fastest growing suburbs in the City of Melbourne. High rise apartment developments are increasingly built in these areas. Residents are generally younger, 52% are aged 18 to 34 years, and there are a high proportion of students.

It is estimated that the number of daily city workers grew at the fastest rate, by 18 per cent to 380,000 between 2004 and 2008.

Most importantly, city use by non-residents is projected to increase significantly, with visitation forecast to grow from 771,000 city users (comprising workers, students, and day trippers) in 2008 to over 1 million city users by 2020 – an annual increase of 1.8%.

The city's water consumption

An increasing residential population in the City of Melbourne means a greater demand for water. Table 1 below shows the estimated water consumption per sector: [2]

Table 1 Summary of water consumption for the City of Melbourne

Base Year	Water Saving Targets (Total Watermark – City as a Catchment)	Progress	Comments
99/00	50% reduction in potable water consumption *per employee* by 2020	48% reduction per employee. Water use down from 181 litres/person/day to 109/p/d. 20% reduction in commercial water use from 18,243 ML/yr to 14,593 ML/yr.	Target recently increased as previous target of 40% has been exceeded.
99/00	40% reduction in potable water consumption *per resident* by 2020	45.5% reduction per resident. Water use down from 296 l/p/d to 161 l/p/d. 0.5% reduction in residential water use from 5,541 ML/yr to 5,087 ML/yr.	Previous target retained due to uncertain impact of water restrictions being lifted.
99/00	90% reduction in potable water consumption *by Council* by 2020	70% reduction in Council use. Water use down from 1,544 megalitres per year to 458 ML/yr.	Changes in watering patterns will occur again with lifting of restrictions due to horticultural needs. Commitment to zero potable water use in parks.
99/00	25% 'absolute' water saving target by 2020	15.5% absolute water saving.	The challenge remains to keep absolute savings while the population grows by 120%.

Rainfall patterns and water storage volumes

Melbourne has a relatively dry climate with an average evaporation of 3.4mm per day, or 1241mm per year. Melbourne's average annual rainfall is approximately 650mm[3]. Rainfall pattern is remarkably even, with the lowest month (February) having 45 mm and the highest month (October) having 65mm.

The current drought has highlighted the importance of water to the economy, community and environment. For more than 10 years, a large part of Victoria has struggled with rainfall significantly below the long-term average. Its severity has been unprecedented, and its impact has been widespread across the State.

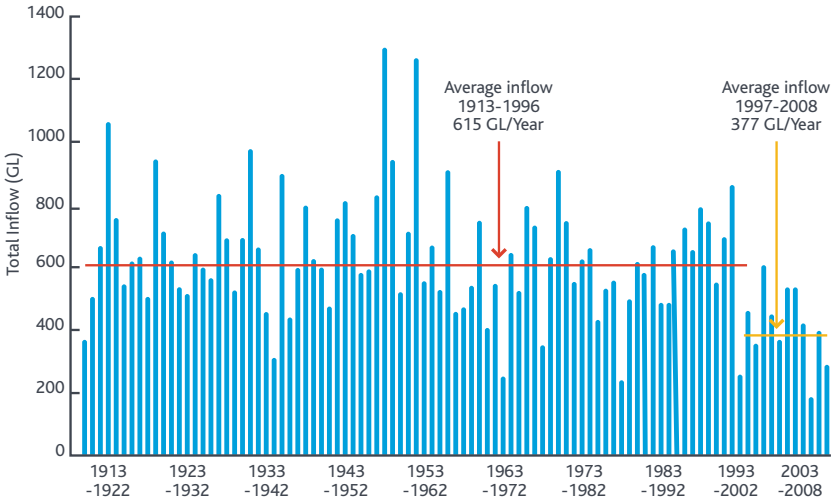
For Melbourne, inflows into our water storages over the past 10 years present a similar picture. Melbourne and surrounding centres had relatively reliable rain for one hundred years, until the mid 1990s. This was the basis for confident planning of future water supplies. However the situation has changed and the past decade has been
one of sustained drought.

In 2006, inflows to Melbourne Water's major water storages were the lowest on record. Average inflows to Melbourne's four major harvesting storages for the period 1997/98 to 2006/07 were about 35% less than the long term average (1913/14 to 2006/07), as shown in Figure 2. Melbourne's water storages have a total capacity of 1,773,000 megalitres.

Questions about the impact of climate change on our water resources have been prompted by the severity of the drought over the past 10 years. It is possible that Victoria is suffering a major long-term reduction in average rainfall – a step-change in water availability due to climate change.

[2] Refer to Total Watermark 2004, Section 6.1.2, page 14.
[3] Australian Government Bureau of Meterology Climate Statistics for Melbourne 2-008

Figure 2 Melbourne Average Annual Inflow 1913 to 2008



The City's water quality

Many water pollution issues confront the City of Melbourne's rivers and creeks, as well as Port Phillip Bay. These issues are caused by problems including:

- Pollution from urban stormwater run-off
- Channelling of watercourses from inappropriate land and water management
- Erosion of banks caused by loss of vegetation alongside waterways.

Melbourne Water's Index of River Condition rates the Yarra River as 'very poor', and the Maribyrnong River and Moonee Ponds Creek as 'poor', an integrated measure based on an assessment of water quality, natural flow regime, waterway condition and diversity of invertebrate communities living in the river[4]. Water quality assessment parameters include pH, dissolved oxygen, water clarity, nutrients, *E.Coli* and heavy metals amongst others. *E.coli* counts in City of Melbourne rivers and creeks are generally low enough to allow activities like boating and fishing.

New, long-term management approaches are needed to improve waterway health. Stream life, when assessed using fish numbers, is rated as 'good'. However, this probably reflects the estuarine nature of the lower Yarra which is likely to attract fish. Macro invertebrate populations and diversity in the Yarra River are poor. An assessment of vegetation and stream flow in 2004 demonstrated that the Yarra River, Maribyrnong River and Moonee Ponds Creek all rated 'poor'.

WSUD reduces pollution from the city reaching local waterways, and offers solutions to improve the health and aesthetics of our water bodies.

Water management drivers

There are a number of inter-related drivers for sustainable management of water resources. Water supply, demand, quality and transport are all driven by and influenced by:

- Population
- Climate change and human health
- Environmental impacts.

Melbourne's demand for water is increasing with population growth. At the same time, changing climatic patterns and environmental flow commitments of water supply catchments could reduce water availability.

Port Phillip Bay receives the city's stormwater and wastewater. This means that the Bay's aquatic ecology is inherently linked to this water. Integrated water management solutions are needed to keep our ecosystems healthy through secure and reliable water supply and appropriate water control and treatment.

For current and future generations in the City of Melbourne, the key issues for sustainable water management practices are:

- Protection of public health when people come into contact with water bodies, and water treatment and reuse schemes
- Protection of the environment, with a specific emphasis on the aquatic ecosystem including rivers, riparian zones and wetlands
- Ensuring reliable provision of water services to the community including:
  - sustainable water supply
  - safe and reliable wastewater disposal
  - landscape amenity supplied by irrigation, with a preference for alternative water supplies
- Reduction of the City's environmental footprint. Being efficient with our energy, materials, oil, and other resources at the same time as meeting our sustainable water objectives.

[4] Melbourne Water, (2004) Index of River Condition (IRC) ratings for the 5 years to 30th June, 2004, available at: http://www.melbournewater.com.au/content/rivers_and_creeks/river_health/index_of_river_condition.asp

Part 1
WSUD Policy Commitment

Module 1.3
WSUD guiding principles

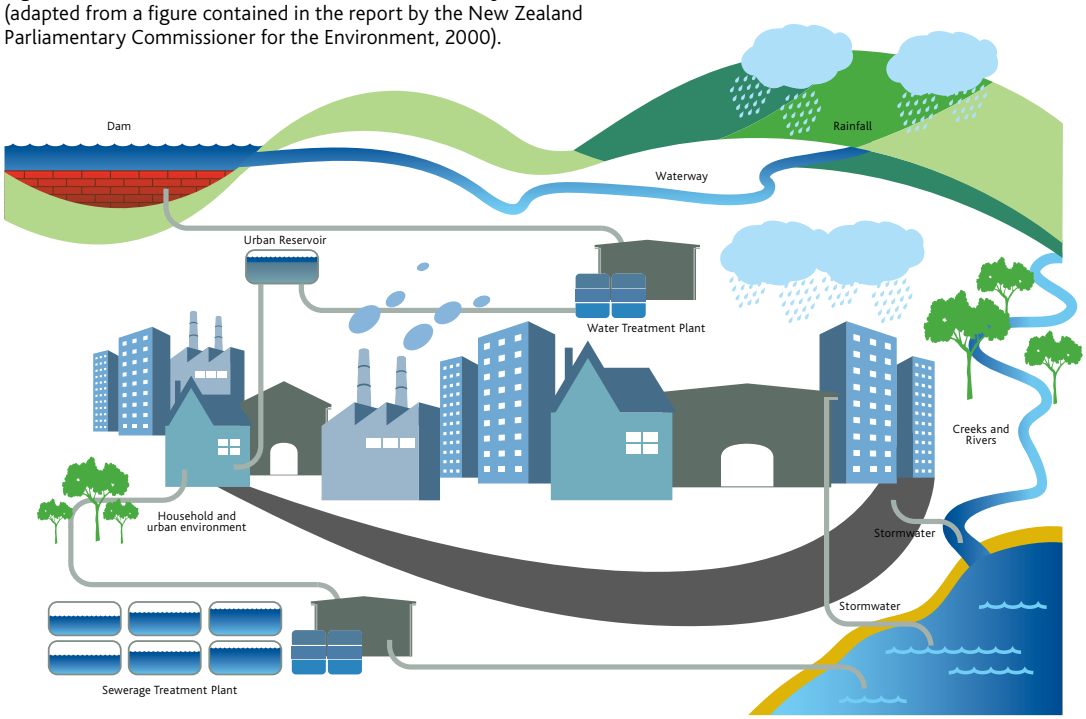
Conventional urban water management

There are three separate water systems operating in Melbourne's urban areas:

- Potable mains water supply – piped system treating and delivering drinking quality water from catchments outside of the urban area
- Sewerage system – piped system collecting and transporting residential and commercial wastewater to treatment plants before it is discharged to Port Phillip Bay and Westernport Bay
- Stormwater system – natural flowpaths, waterways and underground piped systems transporting stormwater and other natural sources of water to Port Phillip Bay and Westernport Bay.

These artificial systems sit within the natural catchment system and are shown in Figure 3.

Figure 3. Illustration of a conventional urban water cycle
(adapted from a figure contained in the report by the New Zealand Parliamentary Commissioner for the Environment, 2000).



Traditionally, urban water management in Australia has primarily meant:

- Quickly moving urban stormwater to the nearest natural waterway for flood protection
- Safely removing and treating wastewater through centralised infrastructure
- Supplying safe, good quality drinking water through centralised piped infrastructure.

WSUD marks a shift in thinking towards integrated water management where all water streams are considered a resource. The integrated water management cycle considers:

- Rainwater
- Stormwater
- Groundwater
- Potable mains drinking water
- Greywater (water from the bathroom taps, shower, and laundry)
- Blackwater (toilet and kitchen)
- Water mining (sewer).

Managing the city as a catchment

All city sites, including buildings, roads, footpaths and open space can contribute to sustainable water resource management across the municipality. This means that water can be increasingly managed from the local catchment and rely less on external catchments. For example:

- Roads can be sources of water via stormwater harvesting
- Buildings can be sites for reducing stormwater pollution through rain gardens.

Over time, this approach will build the resilience of water resources and aquatic environments under the pressures of urban consolidation and climate change.

Community engagement is an integral component of all projects, from the project conception onwards.

Incorporating local, decentralised solutions that are 'sensitive' to the issues of water and energy sustainability for environmental protection is a fundamental part of achieving community engagement.

All city sites, planning or building proposals, and council managed projects need to:

- Identify a site as a water source or sink (that is, a site water budget) and identify opportunities on the site itself and on nearby sites that could use surplus water or provide deficit water
- Account for costs and benefits of decentralised water options in terms of water, energy, building materials/infrastructure/technology, and risks
- Consider habitat enhancement for biodiversity, birdlife and microclimate benefits.

The guiding principles below promote the adoption of sustainable water management practices across council managed assets, residential and commercial/industrial land uses. These align with the WSUD options discussed in Part 2 of these guidelines.

WSUD guiding principles

WSUD seeks to achieve integrated water management by:

- Reducing potable water consumption
- Maximising water reuse
- Reducing wastewater discharge
- Minimising stormwater pollution before it is discharged to the aquatic environment
- Maximising groundwater protection.

These principles are achieved through:

- Managing the demand for water by reducing it
- Assessing the appropriate potable or alternative supply of water for the end purpose
- Applying best practice to stormwater management.

Integrated water cycle management matches available water sources with the most appropriate uses ("fit-for-purpose"). This is a way to reduce the demand on the highest quality potable mains water.

Drinking quality water isn't needed for uses such as irrigation and toilet flushing and alternative sources (possibly from reuse) should be found. For example, in Melbourne there are three major water sources:

Potable mains water
drinking water

Water harvesting
Rainwater (roofs)
Stormwater (surface runoff including roads, parks, footpaths)

Wastewater
greywater (bathroomand laundry)
blackwater (toilet and kitchen)
water mining (sewer)

WSUD in highly built up urban environments

It's commonly thought that WSUD is only effective in large 'greenfield' sites because of the limited space available in the inner city. However research and experience show that inner urban areas contribute to stormwater pollution and therefore have an equal responsibility to improve water quality.

The continued regeneration of our city provides an ongoing opportunity to continually improve water quality measures. WSUD elements can be designed to various scales, and treatment can be applied to any site. WSUD can be continuously incorporated into Melbourne's cityscape during urban regeneration and renewal works.

In Module 2.2, a *sustainable water management hierarchy* is set out to help users step through the WSUD options available for different sites (such as rainwater, stormwater and water recycling). The hierarchy applies a general preference:

- To reduce pollution at the same time as reducing potable water demand
- To use smaller, localised and modular treatment technologies over a reliance on a single, large and centralised treatment facility covering much of the metropolitan area and
- To protect the environment by minimising greenhouse emissions and other forms of pollution.

How does WSUD relate to other concepts?

'Water Sensitive Urban Design' (WSUD) is often confused with the terms 'Ecologically Sustainable Development (ESD)' and 'Water Cycle Management' (WCM). The three terms are distinct but linked, as shown in Figure 4.

ESD is the environmental component of sustainable development that maintains and protects ecological processes. WSUD sits under ESD as an application of its themes into the urban design area. WSUD is considered in the area of urban design and built form, integrating and protecting all aspects of the urban water cycle.

Figure 4. Interactions between ESD, WSUD and the Urban Water Cycle[5]

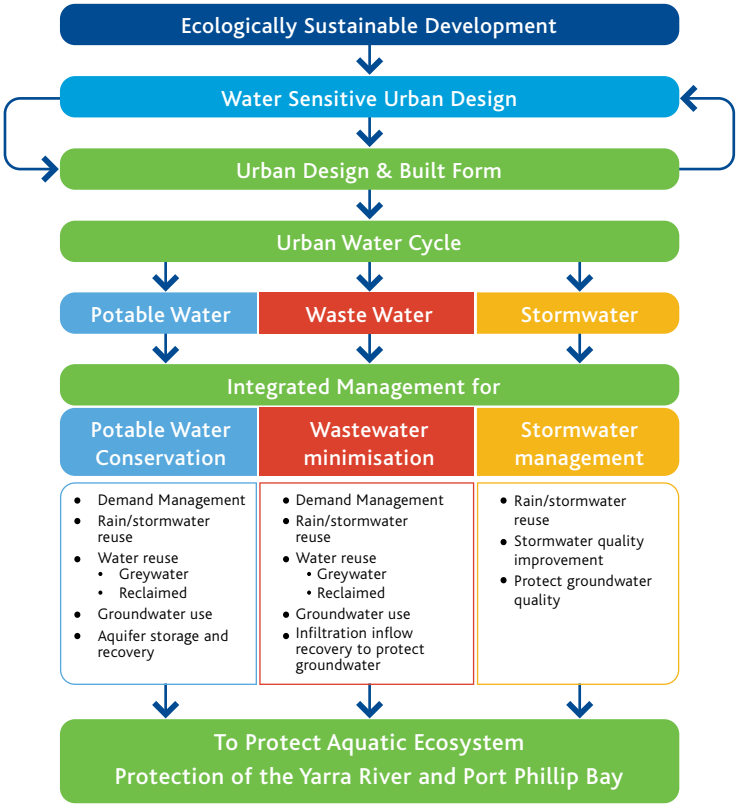


Figure 4. Interactions between ESD, WSUD and the Urban Water Cycle shows the close relationship between WSUD elements. Often links between the urban water streams are developed when one element is adopted, for example rainwater harvesting will conserve potable mains water and reduce stormwater discharges.

There are numerous ways to incorporate WSUD in a redevelopment project to meet water targets. Strategies depend on factors such as:

- Individual site conditions (e.g. location, geography)
- Building function and occupancy (e.g. residential, commercial, industrial)
- Development or redevelopment scale
- Water use and demand (e.g. garden irrigation demand, industrial use)
- Water sources available, including local climate (rainfall seasonality)
- On-site catchment area (roof and surface)
- Urban landscape design (architectural and landscape).

To produce an innovative and optimal solution, the WSUD approach will need input from a range of disciplines, including architects, landscape architects, engineers, planners, regulators, maintenance personnel and local community members with an appreciation of WSUD.

Benefits of WSUD

WSUD benefits the environment in a number of ways including:

- Increased water conservation
- Improved stormwater quality, therefore improved water quality in waterways, bays and catchments
- Improved habitat and biodiversity through the establishment of wetlands and other 'natural' treatment alternatives
- Reduced greenhouse gas emissions by reducing water consumption and increasing rainwater harvesting and 'natural' treatment alternatives.
- Providing an adoption measure to address climate change impacts such as flooding and heat island effect.

The urban setting also benefits in a number of ways including:

- Replacement of pipes with natural elements for drainage, such as wetlands
- Enhanced aesthetics through increased vegetation, aquatic elements and landscaping
- 'Visible infrastructure' combining functionality and natural elements
- Linked urban and natural environments
- Flood mitigation by slowing down water movement through urban areas to streams.

[5] Ecological Engineering (2005) Landcom's Water Sensitive Urban Design strategy

Part 1
WSUD Policy Commitment

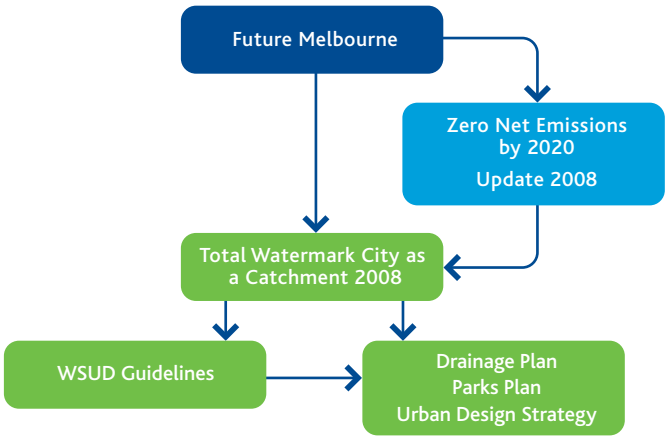
Module 1.4

Legislation and Policy Framework

Water Sensitive Urban Design (WSUD) and the principles of sustainable water management are supported by the Commonwealth, Victorian and local Governments. This section covers the main legislation and policy tools related to WSUD principles and associated targets set by Council. It also includes a list of relevant codes, standards and guidelines from EPA Victoria and Standards Australia.

City of Melbourne legislation and policy framework

Water policy for the City of Melbourne



Future Melbourne

Future Melbourne is the community's vision for the management, development and direction of our city to 2020 and beyond. The WSUD Guidelines are in accordance with community objectives set out in the Eco-City section of the plan, which requires the city to deliver to a range of sustainable water management goals, indicators and outcomes. This is encapsulated in the plan's environmental direction of the 'City as a Healthy, Water Efficient Catchment'.

Total Watermark City as a Catchment

In September 2008, the City of Melbourne released its *Total Watermark City as a Catchment* policy. Through *Total Watermark City as a Catchment* the City of Melbourne has applied the 'city as a catchment' approach to move towards becoming a 'water sensitive city'. Viewing the city as a catchment enables water management decisions to be made with an understanding of the flow-on water impacts across the localised area. This means that Council now has total water management goals for water conservation, stormwater quality, alternative water use, wastewater reduction and groundwater quality. These targets are set for 2020 and include the following:

Water conservation

- 40% reduction in water consumption per resident by 2020 from 2000 levels
- 50% reduction in water consumption per employee by 2020 from 2000 levels
- 90% reduction in total water consumption by Council by 2020 from 2000 levels.

Stormwater management: non-Council land

- 20% reduction in total suspended solids (TSS) by 2020 from 2005 levels
- 25% reduction in total phosphorus (TP) by 2020 from 2005 levels
- 40% reduction in total nitrogen (TN) by 2020 from 2005 levels
- 30% reduction in litter by 2020 from 2005 levels.

Stormwater management: Council land

- 20% reduction in total suspended solids (TSS) by 2020 from 2005 levels
- 15% reduction in total phosphorus (TP) by 2020 from 2005 levels
- 30% reduction in total nitrogen (TN) by 2020 from 2005 levels
- 30% reduction in litter by 2020 from 2005 levels.

Alternative water source targets

- 30% of Council's water needs to be sourced from alternative water by 2020
- 9% of non-Council water needs to be sourced from alternative water by 2020.

Wastewater Reduction Target

- 30% reduction in wastewater across the municipality by 2020 from 2000 levels.

Groundwater Quality Target

- Where groundwater needs to be re-injected to prevent land subsidence, it needs to be of equal or better quality to the water in the aquifer.

Drainage Plan 2004-2009

The Drainage Plan sets out the management of Council's stormwater drainage assets, specifically with the development and maintenance of the infrastructure and measures to improve stormwater quality. This Plan is currently being updated.

Parks Water Management Plan

A Parks Water Management Plan has recently been completed. It provide a policy and action framework for sustainable water management in parks around the themes of landscape adaptation, water efficiency, open space usage, alternative sources and offset opportunities.

Zero Net Emissions by 2020 – Update 2008

The City of Melbourne has recently updated its *Zero Net Emissions by 2020 – A roadmap to a climate neutral city* strategy. The strategy seeks to become carbon neutral through:

- Sustainable building design
- Greening the power supply
- Offsets.

Federal Government legislation and policy framework

Water sensitive urban design (WSUD) and the principles of sustainable water management are supported by the State and Commonwealth Governments. Relevant legislation and policy tools are outlined in *Total Watermark 2008* Appendix B.

The National Water Initiative (NWI)

The NWI is Australia's blueprint for national water reform and was signed by the Council of Australian Governments (COAG) between 2004 and 2006. The National Water Commission is the body responsible for driving water reform at the national level and has accredited the Victoria Implementation Plan.

The NWI is made up of approximately 70 actions. One of its expected outcomes is "better and more efficient management of water in urban environments, for example through the increased use of recycled water and stormwater".

Victorian Government legislation and policy framework

***Environment Protection Act 1970* (the Act)**

Administered by the Environment Protection Authority (EPA), the Act aims to protect the environment from pollutants by limiting activities of industry and business to an environmentally acceptable level. This is done through primary mechanisms such as licensing, works approvals, inspections, pollution abatement notices and land use planning referrals.

The Act assists policy development, for example State Environment Protection Policies.
Specific requirements have been developed by EPA including:

- Best Practice Environmental Guidelines for Major Construction Sites Publication No. 480
- Construction Techniques for Sediment Pollution Control – Publication No. 275.

Melbourne 2030 – planning for sustainable growth

Melbourne 2030 is a 30-year plan to manage growth and change across metropolitan Melbourne and the surrounding region. It was released in October 2002.

State Environment Protection Policies (SEPPs)

A SEPP:

- Sets out the beneficial uses and values of the environment
- Defines environmental quality objectives
- Describes the attainment and management programs that will ensure the necessary environmental quality is maintained.

Most relevant to the City of Melbourne and the management of its stormwater are:

- *SEPP (Waters of the Port Phillip Bay)* – Schedule F6 defines requirements for nutrient management within Port Phillip Bay.

SEPP (Ground Waters of Victoria) also sets out requirements for protecting groundwater.

Local Government Act 1989

The *Local Government Act 1989* gives Victorian Councils the power to create local laws to assist in delivering democratic, efficient and effective local government. Particular reference to the protection of stormwater is contained within the *Environment Local Law 1999* and the *Activities Local Law 1999*.

Local laws

Councils have various responsibilities and powers under both State and Federal laws. Where appropriate, councils may make local laws to exercise these powers.

Local laws are often adopted to protect public health, safety or amenity in a municipality. They are designed to stop the actions of an individual or group having a negative or undesirable impact on the rest of the community.

Local laws only apply within a particular municipality and complement or implement other legislation.

They often deal with waste and stormwater management issues.

The City of Melbourne's *Environment Local Law 1999* adopts a Municipal Environment Management Plan to control wastes and emissions and protect stormwater drains.

Under the *Activities Local Law 1999*, Council has the power to request a construction management plan including stormwater management considerations.

Building Act 1993

The *Building Act 1993* controls the safety and quality of building works. Under Part 2 Section 8 of the Act, Council has the power to make local laws with respect to requirements for building work and the preparation of land for building works.

However the Act does not make any specific reference to environmental matters and Council has no obligations under this legislation to consider stormwater management.

Planning and Environment Act 1987

The *Planning and Environment Act 1987* provides a "framework for planning the use, development and protection of land in Victoria in the present and long term interests of all Victorians". The framework requires planning to encompass and integrate relevant environmental, social and economic factors.

Council has an obligation (as a planning authority and responsible authority) to:

- Administer the Act
- Consider the potential impacts that land uses and developments may have on stormwater discharges.

State Planning Policy Framework

The State Planning Policy Framework provides a context for spatial planning and decision making by planning and responsible authorities. It contains a statement of general principles for land use and development planning and specific policies dealing with sectoral issues.

The clauses related to WSUD principles include:

- Clause 11.01 – net community benefit and sustainable development
- Clause 11.03 – adopt a best practice environmental management and risk management approach
- Clause 12.07 – manage water resources, reduce the impact of stormwater on bays and catchments using stormwater management (Melbourne 2030)
- Clause 14.01 'Settlement' – "Decision making by planning and responsible authorities must be consistent with any relevant requirements of State environment protection policies as varied from time to time, including the Air Environment, Waters of Victoria and specific catchment policies..."
- Clause 15.01 – decision-making to be consistent with SEPP (Waters of Victoria and specific catchment policies)
- Clauses 15.01 and 18.09 – consideration of Urban Stormwater Best Practice Environmental Management Guidelines.

The Municipal Strategic Statement (MSS)

The MSS is a statement of the key strategic planning, land use and development objectives for municipalities. It provides the strategic basis for:

- The application of the zones, overlays and particular provisions in the planning scheme
- Decision-making by the responsible authority.

Objectives of the MSS relate to improving water quality and enhancing environmental values of local water bodies.

The Metropolitan Strategy sets objective for water management in two policies:

- Policy 7.1
- Policy 7.4.

Policy 7.1 "ensures that water resources are managed in a sustainable way". It sets out broad objectives on how to achieve this including the promotion of water efficiency practices and adopting guidelines to encourage the use of alternative water sources such as rainwater tanks and water recycling. Targets have been set for:

- 15% per capita reduction in water consumption by 2010
- An increase in waste-water recycling from 1% to 20% by 2010 for non-potable uses such as in agriculture, industry and recreation.

Policy 7.4 "reduces the impact of stormwater on bays and catchments". Water sensitive urban design and groundwater management are promoted in this policy. A goal of 20% of waste water at the treatment plants is to be recycled by 2010. Targets are also set for stormwater quality including:

- 45% reduction in nitrogen load
- 45% reduction in phosphorus load
- 80% reduction in suspended solid loads.

Melbourne @ 5 million is the 2008 update on projections contained within Melbourne 2030. It forecasts that Melbourne will reach 5 million before 2030, growth figures which will need to be considered when implementing the Strategy's objectives for water management.

Clause 54 and 55 for residential development

Clause 54.03-4 and 55.03-4 set permeability objectives and standards to reduce the impact of increased stormwater runoff on the drainage system and to facilitate on site stormwater filtration through the design and use of open and permeable spaces. The standard requires that at least 20% of the surface should not be covered by impermeable surfaces. Decision guidelines for assessing an application include a site specific design response, consideration of existing conditions, the capacity of the drainage network, the capacity of the site to absorb runoff and the practicality of achieving 20% coverage of pervious surfaces on a site less than 300 sqm. At the discretion of the Council the standard in Clause 54 can be varied through a schedule to a zone or overlay in the planning scheme.

Clause 56 for residential subdivisions

Clause 56.07 of the State Planning Policy is a new provision introduced in October 2006. It requires new residential subdivisions of two lots or more to meet best practice water flow and treatment requirements and incorporate integrated water management principles.

Clause 56.07 requires the provision of:

- Drinking water systems, waste water systems and urban stormwater management systems to the boundaries of all lots, where required by the relevant water authority, sewerage authority or drainage authority
- Reused and recycled water systems to the boundary of all lots, where a site is in one of the areas where the water authority requires a dual water reticulation system. Reused and recycled water systems could be provided in other locations where agreed by the relevant water authority.

Clause 56.07 has the following provisions:

- 56.07-1 Drinking water supply objectives and Standard C22
- 56.07-2 Reused and recycled water objective and Standard C23
- 56.07-3 Wastewater management objective and Standard C24
- 56.07-4 Urban run-off management objectives and Standard C25.

The specific objectives of Clause 56.07-4 are to:

- Minimise damage to properties and inconvenience to residents from urban run-off
- Ensure that the street operates adequately during major storm events and provides for public safety
- Minimise increases in stormwater run-off and protect the environmental values and physical characteristics of receiving waters from degradation by urban run-off.

Standard C25 sets out the normal way to meet the objectives of Clause 56.07-4. Among other requirements, Standard C25 requires that urban stormwater management systems 'must' be designed to:

- Meet current best practice performance objectives for stormwater quality, as outlined in the Urban Stormwater: Best Practice Environmental Management Guidelines (Victorian Stormwater Committee 1999) as amended
- Ensure that flows downstream of the subdivision site are restricted to predevelopment levels unless increased flows are approved by the relevant drainage authority and there are no detrimental downstream impacts.

Standard C25 requires that urban stormwater management systems must be designed and managed to the requirements of the relevant drainage authority. This authority is typically Council, with the exception of catchments of 60ha or more within the Melbourne Water drainage boundary, when it is Melbourne Water.

Securing Our Water Future Together

Securing Our Water Future Together is a white paper that was released in June 2004. It sets out 110 actions to secure Victoria's water future for the next 50 years covering reform in all aspects of water management – water allocation, markets, urban demand and supply, meeting environmental needs, pricing and institutional reform.

As part of the Our Water Our Future action plan, four regional Sustainable Water Strategies are being created to plan for water security across Victoria. Each Sustainable Water Strategy sets out a long-term regional plan to supply water for local growth, while maintaining the balance of the area's water system and safeguarding the future of its rivers and other natural water sources.

Each regional Sustainable Water Strategy will:

- Provide a stock-take of all the water resources available within a region
- Outline the planning and actions needed to ensure we have secure and affordable water for our communities, business, industry and the environment into the future.

The strategies are being developed by the Department of Sustainability and Environment in partnership with Catchment Management Authorities, Rural and Urban Water Authorities, and their key regional stakeholders and communities.

The four regional strategies cover:

- Northern Victoria Region (the River Murray system and its tributaries – Loddon, Goulburn, Broken, Campaspe, Kiewa and Ovens systems) – Discussion paper written in February 2008
- Central Region (West Gippsland, Port Phillip, Westernport, Western, Central Highlands and Barwon Regions) – Strategy written and individual plans developed
- Western Victoria – to be developed
- Eastern Region (Gippsland) – to be developed.

Yarra River Action Plan

The Yarra River Action Plan was launched by the Victorian Government in 2006 and outlines:

- Projects that will meet the challenge of managing water quality in the Yarra River over the long-term
- How the Government will protect and improve the health and amenity of the Yarra
- How the community can get involved in the process.

Government priority projects include:

- Tackling sources of pollution
- Monitoring and communicating the health of the river
- Involving the community
- Healthy river flows
- Managing river water quality.

Victorian River Health Strategy (VRHS)

The Victorian River Health Strategy (VRHS) was released in August 2002. It outlines the Government's long-term direction for the management of Victoria's rivers. It provides:

- A clear vision for the management of rivers in Victoria
- Comprehensive policy direction on issues affecting river health
- A blueprint for integrating all our efforts on rivers and for ensuring that we get the most effective river health benefits for the effort and resources invested.

The VRHS provides the framework for regional communities to make decisions on river protection and restoration and to find the balance between using our rivers and maintaining their ecological condition.

It has been developed in close consultation with key stakeholder groups.

Codes, standards and guidelines relevant to WSUD

Department of Environment and Conservation (NSW) (2004) *Environmental guidelines – use of effluent by irrigation*.

EPA Victoria (1991) Publication 168: *Guidelines for wastewater irrigation*.

EPA Victoria (1993) Publication 384: *Enforcement policy*.

EPA Victoria (1999) Publication 441: *A guide to the sampling and analysis of water, wastewaters, soils and wastes*.

EPA Victoria (2003) Publication 464.2: *Guidelines for environmental management: Use of reclaimed water*.

EPA Victoria (1997) Publication 500: *Code of practice for small wastewater treatment plants*.

EPA Victoria (2002) Publication 730: *Guidelines for environmental management: Disinfection of treated wastewater*.

EPA Victoria (2001) Publication 812: *Domestic wastewater management series: Reuse options for household wastewater*.

EPA Victoria (2005) Publication 865.2: *Environmental auditor guidelines for appointment and conduct*.

EPA Victoria (June 2004) Publication 952: *Environmental auditor guidelines for the preparation of environmental audit reports on risk to the environment*.

EPA Victoria (June 2004) Publication 953: *Environmental auditor guidelines for conducting environmental audits*.

Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (2000) *National Water Quality Management Strategy*.

Paper No. 14 – *Guidelines for Sewerage Systems – Use of Reclaimed Water*.

Paper No. 4 – *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

WSA 03–2002, Dual Water Supply Systems, First Edition, Version 1.1, A Supplement to the Water Supply Code of Australia, Water Services Association of Australia.

CFA (2004) Requirements For Water Supplies and Access For Subdivisions In Residential 1 and 2 and Township Zones.

CFA, MFB and DSE Fire Services Guidelines – Identification of Street Hydrants for Firefighting Purposes.

AS/NZS ISO 19011:2003 *Guidelines for quality and/or environmental management systems auditing*.

AS/NZS 4360:2004 *Risk Management*.

AS/NZS 3500:2003 *National Plumbing and Drainage Code*.

AS 1345 *Identification of the Contents Of Piping, Conduits and Ducts*.

AS 1319 *Safety Signs for the Occupational Environment*.

AS 2845.1 *Water Supply – Backflow Prevention Devices*.

AS 2845.3 *Water Supply – Backflow Prevention Devices – Field Testing and Maintenance*.

AS 2031 *Sample Collection and Preservation Techniques*.

AS 2419-1 *Fire Hydrant Installations*.

Plumbing Industry Commission & Water Authorities (2005) *Recycled Water Plumbing Guide*.

NHRMC Australian Drinking Water Guidelines 2004.

Department of Sustainability and Environment Circular No. 287 *Blue-green algae coordination arrangements for 2004/2005* and related matters, as updated.

Natural Resource Management Ministerial Council , Environment Protection and Heritage Council and the National Health and Medical Research Council (2006) Australian Guidelines for Water Recycling: Health and Environmental Risks.

Natural Resource Management Ministerial Council, Environment Protection and Heritage Council and the National Health and Medical Research Council (2009) Australian Guidelines for Water Recycling: Stormwater Harvesting and Reuse.