



Corporate Sustainable Water Management Plan

2005

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Glossary of Terms and Abbreviations

ML	Megalitre. 1 ML is equivalent to 1 million litres
KL	Kilolitre. 1 KL is equivalent to 1 thousand litres
ICLEI	International Council for Local Environmental Initiatives
SEPP	State Environment Protection Policy
SWMP	Sustainable Water Management Plan
Leachate	Liquid that percolates through waste and into groundwater transferring contaminants
Stormwater	Rainwater runoff from impervious surfaces
Potable water	Water supplied through the standard water supply network

Executive Summary

The Corporate Sustainable Water Management Plan (SWMP) sets out how Maroondah City Council will manage its own operations and assets to minimise water consumption and improve the water quality of Maroondah's waterways.

Increasing population and climate change will place additional pressure on Melbourne's already stressed water supply system and Maroondah's waterways. The development of this plan is intended to coincide with existing state strategies aimed at improving the management of water resources in Australia.

The plan was formulated in consultation and partnership with several internal departments and a number of external organisations, including Melbourne Water, the International Council for Local Environmental Initiatives (ICLEI) and Yarra Valley Water.

Maroondah City Council's total water consumption in the baseline measurement year of 2000/01 was 195,756KL and expenditure was \$130,266 (excluding sewerage and fixed charges). Two thirds of this water consumption was on sports grounds and at the Croydon and Ringwood Aquatic Facilities.

Council has set a target to reduce corporate water consumption from 2000/01 levels by 20% and to undertake water quality related actions equivalent to 60 points from the ICLEI Water Campaign™ points based measurement system. The target date for achieving these actions is 2015.

Council has already undertaken numerous actions to reduce water consumption and improve stormwater quality. Measures include, installing Micromet centralised irrigation control systems, reducing open space irrigation, installing water efficient fixtures, installing gross litter catchment devices and education programs.

Future proposed actions include upgrading and repair of irrigation systems, further stormwater reuse and stormwater treatment infrastructure and continued education programs, which will assist with achieving the 2015 target.

1 Introduction

Water is one of the most essential elements to the existence of all species on the earth. There is a growing awareness that previous attitudes to water as an infinite resource must change and our actions must reflect the importance of water to our environmental, social and economic wellbeing.

Council's are significant users of water and are also responsible for the planning and management of stormwater infrastructure, which means they can have a direct impact on the management of waterway health. Therefore, Council has an opportunity and responsibility to lead by example in the sustainable management of water resources.

Reducing water consumption and improving waterway health is the responsibility of all of the community. This plan sets out the Council's vision for ensuring that its own activities reflect responsible and sustainable water management practices.

The aim of the SWMP is to reduce Council's consumption of water, particularly potable (standard reticulated) water, and improve the water quality of receiving waterways throughout Maroondah and Melbourne. The SWMP addresses corporate use only, a community water management plan will be developed at a later date.

Council has developed a number of objectives to reflect a holistic approach to planning, management and development issues associated with sustainable water management.

Council's objectives for sustainable water management are:

Water conservation objectives

1. To improve the management and efficiency of existing water supply systems.
2. To reduce water demand through education and awareness raising.
3. To demonstrate leadership in the sustainable management of water resources.
4. To substitute the use of potable water supplies with alternative supplies where appropriate.
5. To seek opportunities for external partnership and funding to implement water saving initiatives.
6. To utilise new and alternative technologies and processes to reduce water consumption.
7. To ensure that all new Council developments and projects adopt best practices principles in water conservation.

Water quality objectives

1. To improve the water quality of Maroondah's waterways.
2. Reduce the impact of Council activities on stormwater quality.
3. Educate staff and councillors on water quality issues to raise awareness.
4. To monitor the water quality of Maroondah's waterways and ensure that program implementation is responsive to changes in quality.
5. To seek external partnerships and funding to improve the water quality of Maroondah's waterways.

2 Background

2.1 Environmental Context

2.1.1 *Water Supply and Consumption*

Melbourne has been experiencing drought conditions for the past 8 years and permanent water saving rules have now been put in place. The pressures on potable water supplies will increase as Melbourne's population grows a predicted 23.5 percent by 2031 (based on 2001 figures)¹. In addition, the impact of climate change from increased greenhouse gas concentrations is likely to result in reduced rainfall levels and increased evaporation levels in the catchments that Maroondah and Melbourne rely on for potable water supplies². Melbourne Water predicts that the 'mid range' scenario from the impact of climate change on water available to the water supply system will result in an 8% reduction in available supply by 2020 and a 20% reduction by 2050.

The State Government has indicated that developing new reservoirs is not an option for coping with such stresses and instead has focused on more sustainable use of our water resources³. This means reducing demand on potable supplies through measures such as installing water efficient appliances and fixtures, employing water sensitive urban design principles, installing water efficient irrigation systems, using alternative water supplies and recycling water. Reducing demand for potable water also requires changing our behaviour so we use less.

2.1.2 *Water Quality and Pollution*

Stormwater is rain that runs off hard (impervious) surfaces such as the roofs of buildings, roads and car parks. This run off enters the underground drainage system and then flows into creeks, rivers and eventually Port Phillip Bay.

Waterways within Maroondah have been significantly altered in response to the pressures of urbanisation, particularly as a flood mitigation measure. This has included redirecting and concrete lining of waterways and piping water flows underground to rapidly transport stormwater away from developed areas.

Increased urban densities and associated increases in commercial and industrial activity also result in additional pressures on waterways.

In addition to the direct impacts on the landscape and biological values, urbanisation and waterway modification results in increased pollution loads and erosion in the sections of waterways that have undergone minimal or no alteration. Lining and piping of waterways increases the velocity of water resulting in increased erosion in natural waterways.

1 Department of Sustainability and Environment, Victoria in Future 2004, Melbourne Statistical Division Figures

2 Department of Sustainability and Environment, 2004, "Adapting to Climate Change: Enhancing Victoria's Capacity", Consultation Paper

3 Victorian Government White Paper "Securing Our Water Future Together"

Stormwater pollution is collected as the water makes its way across impervious surfaces. Pollutants include:

- Litter in the form of plastic bottles, cigarette butts, plastic bags, etc.
- Hydrocarbons from oils and petrol.
- High Nutrient Loads in the form of Nitrogen and Phosphorus.
- Solvents and paints.
- Sediment from building activities.

Stormwater pollution has a number of negative effects on our waterways including:

- Reduced oxygen levels for plant growth caused by the decomposition of organic material.
- High sediment levels, reducing light available for the growth of plants and suffocating organisms.
- Increased human health risks from a variety of wastes.
- Poisoning of plants and fish from toxicants and heavy metals.
- Reduced aesthetic appeal.

2.1.3 An integrated approach

The purpose of the SWMP is to seek an integrated and holistic approach to water management, recognising the interrelated nature of water conservation and water quality issues.

Current approaches to water management have recognised that there are significant opportunities to reduce our reliance on potable water through the collection and reuse of stormwater and the recycling of wastewater. Toilet flushing, irrigation and vehicle wash down are examples of activities where potable water is commonly used, yet do not require such a high quality of water.

The substitution of potable water with alternative supplies will have positive benefits in terms of water quality, for example, reducing the amount of stormwater runoff through rainwater collection can improve stormwater quality and reduce erosion.

The SWMP incorporates both water quality and water conservation objectives. A number of the water quality objectives have been derived from the Maroondah Stormwater Management Plan (2001).

2.2 Water Management Programs

Council has identified water conservation as a priority as reflected by the adoption of a number of water conservation actions to date and becoming a member of the International Council for Local Environmental Initiatives (ICLEI) Water Campaign™.

ICLEI is an internationally based not for profit organisation that assists local government in environmental programs, particularly water resource management and greenhouse gas reduction.

The aims of the Water Campaign™ are to improve water quality and promote water conservation at the corporate, community and catchment levels. To achieve these aims a structured milestone framework has been developed to enable councils to systematically approach water quality and conservation issues.

The five milestones are:

1. Develop an inventory of water consumption and water quality issues.
2. Establish goals for water conservation and improvement in water quality.
3. Develop a local action plan.
4. Implement water conservation and water quality actions.
5. Monitor and report progress.

The Victorian Government's *Melbourne Water Resources Strategy – 21st Century Melbourne: A WaterSmart City* also identified as a priority the need for local government to develop Integrated Water Management Plans. Subsequently, Melbourne Water offered funding to assist Councils in developing a Sustainable Water Management Plan for corporate water consumption. Maroondah City Council entered into an agreement with Melbourne Water in July 2004 to complete this process.

The ICLEI Water CampaignTM and Melbourne Water program are compatible and complementary. The development of the Sustainable Water Management Plan will satisfy the corporate component of Milestones 2 and 3 of the ICLEI Water CampaignTM.

2.3 Economic context

The current price paid by Council for potable water is 80c per kilolitre (KL) and the sewerage disposal charge is 94c per KL. The recent State Government White Paper: *Securing Our Water Future Together* introduced a tiered system of pricing for residential water users with overall increases in prices per KL. YVW water prices and sewerage disposal charges to Council will increase by between 4.55% and 4.85% per year for the period between 2005 and 2008. This will result in the water charge increasing to 93c per KL by 2008 and the sewerage charge increasing to \$1.08 by 2008⁴.

The White Paper acknowledges that current pricing does not incorporate the true value of water to the environment and the community and changes in pricing structures have been muted to encourage more sustainable use⁵.

Water conservation results in cost savings and many actions to reduce water consumption also result in significant energy savings. For example, AAA showerheads can result in up to 1/3 savings in energy consumption in addition to water savings.

2.4 Study Area

2.4.1 Social and economic profile

Maroondah covers a geographical area of 61.3 sq km and is located 25 kms east of Melbourne CBD. It comprises a mixture of new and established neighbourhoods and is valued for its natural assets, particularly the presence of established trees, gardens and views to surrounding ridgelines.

The population of Maroondah was 100,935 in 2002 and this is predicted to increase to 127,993 by 2031. The majority of the growth in population will be in older age groups with population in many of the younger age groups declining⁶.

⁴ Yarra Valley Water, Water Plan Overview 2005-06 to 2007-08

⁵ Victorian Government White Paper "Securing Our Water Future Together"

The majority of economic activity in Maroondah is derived from Ringwood and Croydon activity centres and industrial areas to the south of the municipality.

2.4.2 Waterways profile

There are approximately 34km of waterways in Maroondah, the largest of which are the Dandenong Creek forming much of the southern boundary of the municipality and the Mullum Mullum Creek, a tributary of the Yarra River.

Maroondah also contains the headwaters to a number of waterways, including Heatherdale Creek, Andersons Creek and Jumping Creek, placing added responsibility in managing waterway health.

A number of the creeks have been modified through underground piping, channel diversion or concrete lining due to urban development and flood considerations. In conjunction with local environment groups, Council has been involved in numerous programs aimed at improving the condition of Maroondah's waterways.

2.4.3 Maroondah Rainfall

Maroondah has relatively higher rainfall compared to other parts of metropolitan Melbourne. Average annual rainfall is approximately 800mm throughout Maroondah⁷.

3 Strategic Context

Water conservation and improving water quality has been identified by the State Government as a priority, as outlined in the strategies detailed below. These strategies and the measures and priorities contained within them provide the strategic basis for this plan.

3.1 Victorian Policy

3.1.1 Victorian Government White Paper: Securing Our Water Future Together

The Victorian Government White Paper, "Securing Our Water Future Together", outlines strategies and actions to progress toward sustainable use of Victoria's water resources into the future.

⁶ Department of Sustainability and Environment, *Victoria in Future 2004*

⁷ Bureau of Meteorology

The White Paper sets a target of reducing per capita drinking water consumption in Melbourne by 15 percent by 2010 compared with 1990 average consumption levels. The White Paper also contains a number of actions with relevance to local government, including:

- The introduction of permanent water saving measures (Action 5.4).
- The introduction of mandatory water efficient plumbing measures for new buildings (Action 5.10).
- The Water Smart Gardens and Homes Rebate Scheme will be made available for not-for-profit organizations eligible for the water and sewerage rebate on service charges (e.g. sporting clubs, preschools and kindergartens) (Action 5.12).
- A target to achieve a 25% reduction in water use for all new developments (Action 5.13).
- The preparation of Water Sensitive Urban Design Guidelines and funding to support smart urban water use initiatives (Action 5.14 and 5.15).
- The requirement for improved water efficiency in new government buildings (Action 5.17).
- Funding support for water conservation and recycling demonstration projects (Action 5.23).
- Alignment of statutory planning and building approvals systems to support water conservation and enable the use alternative water supplies and recycled water (Action 5.41).

3.1.2 Melbourne 2030

The Metropolitan Strategy Melbourne 2030 is the strategic planning document for the greater Melbourne metropolitan area. It includes several Directions and strategies that are relevant to the SWMP. Initiatives in relation to water resource management reflect those of the *Securing Our Water Future Together* White Paper in ensuring that demand for potable water supplies is reduced, alternative supply options are utilised and the quality and quantity of stormwater is managed sustainably.

3.1.3 Environment Protection Act 1970

The Environment Protection Act 1970 is the main piece of legislation governing environmental protection in Victoria. The Environment Protection Authority is responsible for the administration of the Environment Protection Act, including the provision of trade waste licences and responding to pollution events.

3.1.4 State Environment Protection Policy's (SEPP)

The State Environment Protection Policies are established under the Environment Protection Act 1970. The SEPP's outline the beneficial uses to be protected within Victoria's waterways and the associated water quality and environmental objectives. Additionally, they may provide a management framework for achieving the objectives.

3.2 Catchment Strategies

The Port Phillip and Western Port Regional Catchment Strategy 2004 – 2009 contains a suite of targets and associated actions with implications for the health of Maroondah's waterways. The strategy also contains water conservation and recycling actions.

The following targets and actions have been identified:

Targets

- Improve the condition of the regions waterways so that:
 - At least 50% of all the natural waterways will be in good or excellent condition by 2015.
 - All natural waterways will be in good or better condition by 2025.
- Progressive improvement in the condition of waterways across the region, as measured by the index of stream condition.
- Improve water quality in rivers and streams so that:
 - At least 80% of monitoring sites attain State Environmental Protection Policy objectives or regional targets by 2009.
 - All monitoring sites attain State Environmental Protection Policy objectives or regional targets by 2030.

Actions

- Design and implement schemes for recycling water from the Eastern and Western Treatment Plants and smaller plants in the region.
- Complete an audit of stormwater management plan implementation for all municipalities and design and implement a program to address key gaps.
- Meet best practice standards in urban stormwater discharges in new urban areas.

3.3 Maroondah Council Strategies

Maroondah City Council has several strategies that incorporate environmental sustainability objectives. Council has made a clear commitment to water conservation and water quality issues through its involvement in the ICLEI Water CampaignTM and the Melbourne Water Sustainable Water Use Program. The sections of the strategies that provide the basis for the development of the Sustainable Water Management Plan are included as follows.

3.3.1 Maroondah 2025: A Community Planning Together

Maroondah 2025: A Community Planning Together encompasses the long term strategic direction for Maroondah and was developed through an extensive community consultation process.

The Vision for Maroondah 2025 states:

*Maroondah will be a vibrant city. It will have an active community, a strong local economy and a diverse cultural life in a prosperous and **sustainable environment**.*

The actions within the strategy that relate to the Sustainable Water Management Plan include:

- Protect and actively manage the quality of the municipality's air and water.
- Encourage and promote the use of new technology which will improve environmental sustainability.

3.3.2 Maroondah Council Plan 2004-2008

The Maroondah Council Plan outlines the ongoing strategies and commitments adopted to achieve the objectives identified in *Maroondah 2025: A Community planning together*. The Council Plan is reviewed and updated every 4 years.

A commitment for 2004/2005 in the Council Plan is to implement Milestone 2 of the ICLEI Water Campaign™. Milestone 2 requires Council to establish a goal for water conservation and improvement in water quality for corporate and community sectors. The development of the SWMP will achieve the corporate aspect of this commitment.

3.3.3 Parks and Works Water Use Policy

The Parks and Works Department developed a water use policy in late 2000. The aims of this policy are complementary to those of the Sustainable Water Management Plan. The policy's aims are to reduce use of potable water, promote efficient use of water in Council buildings, promote use of water conserving plants and gardening methods, increase use of recycled and alternative supplies of water and promote use of water efficient methods of irrigation.

3.3.4 Maroondah Planning Scheme: State Policy Planning Framework

The State Policy Planning Framework (SPPF) within the Maroondah Planning Scheme refers to waterway and catchment protection in relation to land use and development proposals in Clause 15.01-2 General Implementation: Water Quality Protection primarily through reference to the Best Practice Environmental Management Guidelines for Urban Stormwater (1999). The Maroondah Planning Scheme will be particularly relevant to the development of a community water conservation and water quality action plan, focusing on water sensitive urban development principles and application.

3.3.5 Maroondah Planning Scheme: Municipal Strategic Statement

The Municipal Strategic Statement (MSS) is contained within the Maroondah Planning Scheme. The purpose of the MSS is "to provide a vision for the future development of the municipality and to express overall strategic directions" (Clause 21-01, MSS).

It is important that the corporate activities that Council undertakes are consistent with, and supportive of the objectives expressed within the MSS. Under Clause 21.11-3 Environment, objectives include:

- To minimise the physical impact and stress of development and land use on the natural environment.
- To encourage the preservation and enhancement of the natural environment including the maintenance of clean air and water and protection of canopy vegetation.

Clause 21.11-3 Strategies include:

- Improve the treatment of waterways and drainage systems, in particular through the North West Area Drainage Master Plan
- Investigate the feasibility and effectiveness of introducing litter traps in appropriate areas to restrict the flow of waste debris into waterways
- Develop wetlands and retarding basins where possible, to capture and filter stormwater, while creating habitat for aquatic life
- Identify land with drainage and flood constraints and ensure development responds to these constraints

Clause 21.11-3 Other actions include:

- Providing the community with education and training regarding environmental protection and the concept of environmental resource management
- Providing water quality improvement ponds and other devices as opportunities arise and as a result of the municipal stormwater agreement. These measures will enhance local waterways through the protection of the quality of stormwater transferred to permanent waterways

3.3.6 Maroondah Stormwater Management Plan 2001

The Stormwater Management Plan is the main Council document responding to water quality issues in Maroondah. The Maroondah Stormwater Management Plan highlights the threats to Maroondah's waterways from the stormwater system and recommends a series of prioritised actions to improve the quality of stormwater runoff.

While the impact of Council's own activities will be small in comparison to the community as a whole, actions that Council undertakes can provide demonstration and leadership value in water resource management. In addition, Council's role in the management of the stormwater system and open space provide significant opportunities for infrastructure based solutions to pollution problems, such as the installation of Gross Pollutant Traps.

The major stormwater threats identified in the SWMP are:

- Runoff from poorly managed building sites.
- Industrial, commercial and residential land uses.
- Waterway degradation.

3.3.7 Waterways of Maroondah Strategy 1999

The Waterways Strategy was a precursor to the Stormwater Management Plan and contains actions pertaining to the objectives of enhancing recreational, amenity, habitat and open space values along Maroondah's waterways and waterway reserves and assisting in the enhancement of water quality in Maroondah's waterways.

4 Method

The data collection in relation to water consumption and water quality was collected from a number of sources including Yarra Valley Water billing databases and Melbourne Water publications.

The following is an outline of the data collection process to provide consistency with future monitoring.

4.1 Water Consumption

Data for community and corporate consumption was supplied by Yarra Valley Water. The corporate data was categorised into subgroups developed by ICLEI (outlined in Table 2) to allow a more detailed analysis of water use and conservation and reuse potential.

Indicator information was also collected to transform the 'absolute' data into 'relative' data. For example, information on the area of ovals irrigated was collected in addition to water consumption on ovals to determine the amount of water consumed per square metre.

4.1.1 Data Limitations

Data for some facilities were not included in the Yarra Valley Water database and were not available within the data collection time frame. A number of these facilities have still been included to be investigated as a future action.

Some Council sites have multiple facilities at one site and not all facilities are separately metered. In these situations an assumption was made as to the largest user and this was the categorisation utilised. Council has installed additional metering at some sites (e.g. Jubilee Park) enabling more accurate measurement and billing. It is existing Council policy to continue to provide additional metering where necessary.

The data included comprises the following broad type of billing arrangement:

1. Facilities owned by Council and where the water bill is also paid by Council
2. Facilities owned by Council and where the water bill is paid by a committee of management.
 - This type of entry required a subjective assessment as to the level of involvement and influence Council had over the management and maintenance of the facility. Generally if the property was under a short to medium term lease and/or Council had maintenance responsibilities for the property then the property was included in the corporate database.

4.2 Water Quality

Information on water quality within Maroondah has been compiled using the Stormwater Management Plan, Melbourne Water data and Port Phillip and Westernport Catchment Management Authority data. Water quality data is not available for all creeks and is often tested at sites outside of Maroondah. The Maroondah Stormwater Management Plan has been used to give a description of the specific threats identified for each of Maroondah's waterways.

An internal review of stormwater issues undertaken as a requirement of the ICLEI Water Campaign™ also identified three priority areas to be addressed in the action plan, these are detailed in the Maroondah Water Quality section.

4.2.1 Data Limitations

Water quality data in Maroondah's waterways is limited due to the following:

- Small number of test sites.
- Water quality is highly dependent on weather conditions and upstream conditions.
- Low frequency of testing.

5 Maroondah's Water Quality

Three priority areas were identified as the main contributors to reduced water quality in Maroondah through an internal review conducted as part of Milestone 1 of the ICLEI Water Campaign™, these are as follows:

- *Gross litter and pollution management*

Gross litter is manufactured material ranging in size from cigarette butts to shopping trolleys. The term pollution refers to gross litter and also chemical and toxic substances from vehicle emissions, industrial, commercial and residential activities. Gross litter and pollution presents significant management problems due to the diffuse nature of the problem. Council has responded to this issue through education programs and infrastructure in the form of wetlands, Gross Pollutant Traps and stormwater pit litter collection baskets.

- *Erosion and sediment control*

Erosion results in soil and other fine particles entering waterways reducing light and oxygen availability and often with other pollutants such as hydrocarbons attached to them. Sediment is also deposited via the stormwater system as a result of construction activities. To date Council has undertaken bank restoration works, education programs, and developed wetland treatment systems.

- *Waste water treatment*

The inclusion of wastewater treatment as a priority area was in response to concerns over leachate from Dorset Golf Course. Subsequently, Council has undertaken works to manage the leachate that are due for completion in early 2005.

Each waterway throughout the municipality has specific threats and water quality condition. Water quality is also highly variable and fluctuates in response to changing flows as a result of changes to rainfall levels. Table 1 summarises the main threats to Maroondah's waterways as identified in the Maroondah Stormwater Management Plan and the latest water quality ratings for the wider catchment.

Table 1 Water quality assessment of waterways within Maroondah

Waterway	Threats	Water quality assessment*
Andersons Creek	Infill building site development – litter, sediment, nutrients and toxicants	Overall Condition: Moderate to Poor
Dandenong Creek	Upper Dandenong Creek Residential land use – sediment, litter and nutrient loads during runoff events Pollution events from illegal dumping and oil and surfactants Lower Dandenong Creek As with Upper Dandenong Creek Illegal discharges from industrial areas in tributaries such as Bungalook and Old Joes Creek	Overall condition: Poor
Tarralla Creek	Commercial land use, particularly from Croydon Shopping Centre – litter, putrescent waste, surfactants and particulate matter High nutrient and pathogens loads from Dorset Golf Course, particularly leachate from former landfill areas discharging to the surface Industrial runoff – paint, solvents, oils and surfactants	No data, tributary to Dandenong Ck
Bungalook Creek	Upper Bungalook Creek Residential Runoff – sediment and nutrients Lower Bungalook Creek Industrial runoff including illegal discharges – paint, surfactants, oil and toxicants Commercial activities – litter.	No data, tributary to Dandenong Ck
Heatherdale Creek	Industrial discharges directly to the creek generating high loads of hydrocarbons and toxicants Sediment runoff from site redevelopment	No data, tributary to Dandenong Ck
Mullum Mullum Creek	Commercial runoff from Maroondah highway and Eastland shops Industrial pollution from adjacent business such as panel beaters – paints, hydrocarbons, toxicants and surfactants	Overall condition: Poor
Brushy Creek	Upstream catchments contributing commercial runoff (litter and putrescent material), particularly from Mooroolbark shopping centre and high sediment loads Brushy Creek treatment plant discharges Class B waste water	Overall condition: Poor

Waterway	Threats	Water quality assessment*
Jumping Creek	Residential development – sediment, nutrients and litter Residential development resulting in altered hydrological cycles contributing to increased erosion	No data

*Information from Port Phillip and Westernport Regional River Health Strategy Draft, Port Phillip and Westernport CMA and Melbourne Water, 2004; Melbourne Water, Waterway Management Activity Plans for Dandenong Ck (draft) (2003), Andersons Ck (1998); Melbourne’s Rivers and Creeks 2004, Melbourne Water, 2004.

Testing sites do not necessarily fall within Maroondah Council boundaries.

6 Water Consumption

Different water supply types are suitable for different uses. It is not necessary to use the highest quality potable water for all applications. Council has already begun to collect and use rainwater for irrigation and toilet flushing at some sites and there is significant opportunity to expand its use.

Potable water is supplied entirely by Yarra Valley Water within Maroondah and constitutes the majority of water used by Council. Both of Maroondah’s Council owned golf courses store and use a significant amount of stormwater. Ringwood Golf course also has a license to extract water from the Dandenong Creek for irrigation purposes and uses water collected from the neighbouring basketball stadium. In addition, a small amount of bore water has been extracted to fill the pond at McAlpin reserve.

6.1 Water consumption in Maroondah

The distribution of potable water consumption across the entire Maroondah municipality, including both corporate and community consumption, is shown in Figure 1. A comparison with the consumption of greater Melbourne as a whole (Figure 2) shows Maroondah having a greater proportion of total use from the residential sector throughout the municipality. This demonstrates that a focus on influencing residential water users will have a greater effect on reducing Maroondah’s potable water consumption than in other municipalities.

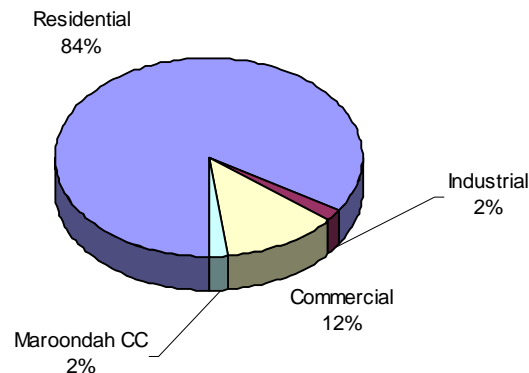


Figure 1 Maroondah Water Consumption by Sector

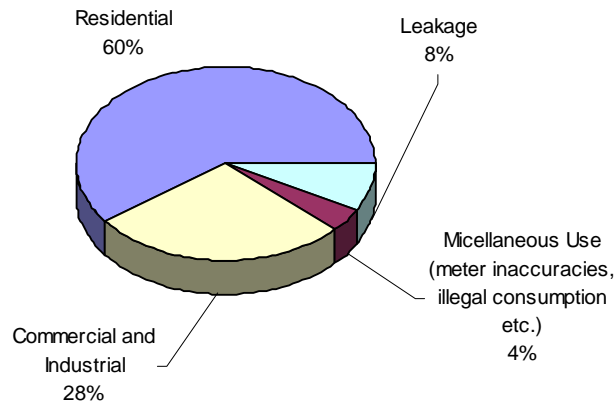


Figure 2 Greater Metropolitan Melbourne Water Consumption by Sector

6.2 Corporate Water Consumption

Data supplied by Yarra Valley Water has been categorised into specific property types based on those developed by ICLEI, these are listed in Table 2.

Table 2 ICLEI property categories

Property Type	Description
Administration Buildings	Council offices and customer service centres
Childcare Centres	Kindergartens, preschools and maternal child health centres
Community Centres	Includes community halls, senior citizens centres, community resource centres and youth centres
Cultural Buildings	Includes libraries, theatres etc.
Depots	
Facilities and toilets	Public toilets
Gardens and planter boxes	
Miscellaneous*	Properties not able to be placed into other categories
Nurseries	
Open Space	Includes median strips, reserves (not used for sport) and roundabouts
Playing fields	Includes golf courses, football, soccer, baseball and cricket fields
Recreation centres	Includes leisure centres, basketball stadiums and pavilions

Property Type	Description
Residences	
Swimming pools	

* Tennis Courts have been placed into the miscellaneous category and form the greatest component. They have not been categorised as playing fields as the water is not used for irrigation purposes but for the maintenance of the red porous surfaces.

Table 3 Council water consumption and cost

	2000/01 (Baseline year)	2001/02
Water Use KL	195,756	165,942
Water Expenditure (\$)*	130,266	115,522

*Does not include sewerage charges or fixed service charges

Total corporate potable water use in the baseline year of 2000/01 was 195ML and total expenditure (excluding sewerage charges) was \$130,266 (Table 3).

The consumption for different property types is shown in Figure 3. Playing fields (42% of total use) and Maroondah's two public swimming pools (20% of total use) constitute the highest corporate water users. These two property types alone represent almost two thirds of Council's potable water use.

Much of the water consumption attributed to 'open space' has now ceased, including irrigation of the grounds around the Ringwood Civic Centre and Karralyka Centre and watering of lawns at the Ringwood Aquatic Centre. Council had also stopped the watering of median strips prior to the baseline years in this report.

Overall there was a 15% reduction in water use between the 2000/01 and 2001/02 financial years. The majority of this reduction is attributable to a reduction in water consumption for the irrigation of sports ovals in response to the introduction of stage one water restrictions. Subsequent years have shown an increase to consumption levels marginally below those of 2000/01.

Public tennis courts have been included as they are on Council land. Although Council does not pay the water bills for these facilities, the high water use on the red porous surface is of concern. The data has been included to highlight the high levels of water use on the courts and to encourage improved water management in the short term and investigation of options to change surfaces in the medium to long term.

6.2.1 Dorset and Ringwood Golf Course stormwater use

Both Dorset and Ringwood Golf Courses use approximately 75 to 80 ML of stormwater per course per year for irrigation purposes.

Each course has an onsite dam for storage of stormwater. The Ringwood Golf Course dam is filled from the neighbouring basketball stadium roof and carpark. Up to 15ML of the total irrigation for the Ringwood Golf Course is extracted from the Dandenong Creek through a diversion agreement with Southern Rural Water.

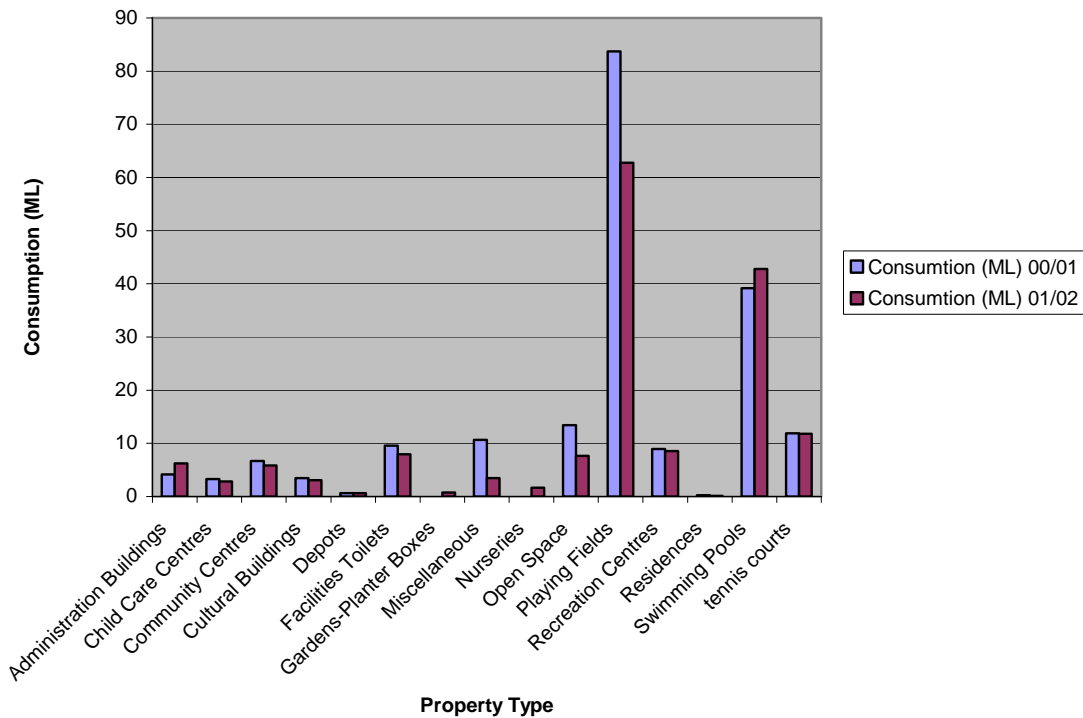


Figure 3 Corporate consumption (ML) by property type

6.3 Forecasting Council water use

If no further actions are undertaken to reduce water consumption by Council it is forecasted that there will be approximately a 25% increase in water demand. Population increases of approximately 22% over the next thirty years will increase demand on the water supply throughout the whole of the municipality, however, the translation of this to an increase in Council water supply demand would not be as marked.

Increases in Council employee numbers will marginally increase water use in only a small amount of facilities. The major corporate water users, swimming pools and sports grounds, are where changes in demand for supply of services is likely to have the biggest impact on corporate water demand due to the expansion of services.

While the provision of additional services by Council presents the possibility of an increase in demand for potable water, adequate forward planning will ensure that maximum efficiency is incorporated and alternative water sources to potable water are sought.

Swimming pools

Currently Council operates two swimming pools. The Ringwood aquatic centre is an indoor and outdoor facility that operates over the entire year and the Croydon Memorial pool is an outdoor facility that operates over the summer period (November to March). Council is currently in the planning stages of a new pool development – The Croydon Aquatic Facility. Therefore, this will result in an increase in water use (up to a 30% increase) for this property type unless best practice water conservation, water reuse and water recycling design elements are incorporated into the development.

Sports grounds

Council intends to expand the amount of irrigated ovals. Current utilisation of sports grounds is restricted due primarily to the hardness of the playing surfaces and poor turf condition. Up to 10 additional ovals will be upgraded with the possible installation of irrigation systems in the next ten-year period. The installation of irrigation systems and upgrade of the sports grounds could potentially increase water consumption in this property type by over 60%⁸ unless a best practice approach to water conservation is incorporated into the planning and management of these facilities.

7 Water Conservation Target

The establishment of an overall target for water conservation has been arrived at through an analysis of the potential savings from various actions and the acknowledgement of the need to set a target that motivates and challenges Council to provide innovative responses to water management. Estimates of savings from actions are included in Appendix 2.

Quantification of potential savings presents a number of difficulties. These include variability in rainfall in relation to reuse projects and irrigation requirements, variability in demand for facilities, knowledge and availability of new technologies and legislative and cost impacts on potable water demand. For this reason the targets that have been set will be reviewed as implementation of the SWMP progresses.

The target has also taken into account the projected increase in demand on potable water supplies from installation of new irrigation systems and the new Croydon Aquatic Facility.

7.1 Target and Time Frame

Council's target is to achieve a 20% reduction in water use from 2000/01 water consumption by 2015.

A 20% reduction on the 2000/01 baseline water use represents approximately a 42% reduction on estimated projected water consumption for 2015 as a result of the projected increase in water demand through the new pool development and installation of additional irrigation systems.

⁸ Based on current average annual water consumption of existing irrigated ovals

8 Water Conservation Actions

Council has already undertaken a number of actions to conserve water as detailed in Table 4. Future actions (Table 5) build on this activity and ensure that actions completed are continued where appropriate.

8.1 Water Conservation Objectives

1. To improve the management and efficiency of existing water supply systems
2. To reduce water demand through education and awareness raising
3. To demonstrate leadership in the sustainable management of water resources
4. To substitute the use of potable water supplies with alternative supplies where appropriate
5. To seek opportunities for external partnership and funding to implement water saving initiatives
6. To utilise new and alternative technologies and processes to reduce water consumption
7. To ensure that all new Council developments and projects adopt best practices principles in water conservation

8.2 Methodology for Prioritisation

The methodology for the prioritisation is based on the following criteria:

- Amount of water consumed by the particular category type (e.g. actions to reduce water use on ovals generally are ranked as high priority as oval irrigation comprises the highest water use)
- Cost effectiveness of action in relation to savings achieved
- Demonstrative and leadership influence – certain actions might have a relatively longer payback period yet present greater demonstrative opportunities to the community
- Accessibility of an action from a technological perspective

Table 4 Water conservation actions undertaken

Action	Description	Date implemented
Installation of Micromet oval irrigation management system	Installation of Micromet sensors at 15 ovals currently irrigated	2002/03
Cessation of watering of median strips and open space	Council ceased watering of all median strips and the majority of open space areas and garden beds – only a few small sites are now irrigated. Drought tolerant plants are also used at these sites	2002/03
Reuse of outdoor swimming pool water for backwash of indoor pool filters and filling of pool	Approximately 250,000 litres of water saved annually for the past two years.	Ongoing
Installation of 3/6 dual flush toilets at Ringwood pool and new facilities		2003 for pool

Action	Description	Date implemented
Installation of rainwater tanks at Peter Vergers and McAlpin Reserve toilets	Rainwater used for toilet flushing Cost of system an extra \$3500 to standard design	Installed between 2002 and 2004
Planting of drought tolerant species of plants in garden beds	Trend towards the use of indigenous drought tolerant plant species	Ongoing
Use of mulch on garden beds	Reduces evaporation and weed growth	Ongoing
Cutting lawns to an appropriate height to reduce watering requirements	Reduces plant demand for water by increasing root depth	From 2002/03, Ongoing
Planting of similar water requirement plants together (hydrozones)	Allows for greater efficiency of application	Ongoing
Efficient application of irrigation water	Apply at times of low evaporation Apply accurately (i.e. reduce overspray and runoff)	Ongoing
Changes to wash down practices at Ringwood Pool	Includes the use of blower vac and floor cleaning machine to wash down and collect water and cessation of washing down of paths	Ongoing
Push button taps installed at Ringwood pool in mens toilets	To be expanded to women's toilets and also variations to showers (timed showers etc.) to be scheduled in with upgrade of change rooms	2004
Reuse of rainwater collected from Ringwood Basketball Stadium to irrigate Ringwood Golf Course		2000

Table 5 Water conservation action plan

	Action	Priority	Relevant Objectives	Cost	Savings	Responsibility
All buildings						
1.1	Install dual flush 4.5/3 or 6/3 toilets in all facilities	A	1	\$500 per toilet	Min 50% saving per toilet from 12 litre cisterns	Building Maintenance
1.2	Trial the installation of waterless urinals at a key site	B	1,3,6	Approximately \$2500 per unit	100% savings per unit	TBD
1.3	Install water efficient fixtures such as AAA shower roses or flow restrictors in all facilities	A	1,3	\$88 per shower rose, less for flow restrictors	Over 50% per unit	Building Maintenance
1.4	Install rainwater tanks for substitution of potable water use (e.g. toilets and irrigation) where appropriate	A	1,3,4	Varied cost depending on size of application	TBD	TBD
1.5	Ensure design and construction of new buildings incorporates best practice water conservation through the development of water conservation guidelines for contractors	B	3,4,6,7	TBD	TBD	Strategic Planning, Building Department
1.6	Investigate the integration of water conservation options into asset management assessment	B	1	N/A	N/A	Asset Management, Building
1.7	Investigate the opportunities for reusing water at the depot truck wash	B	3,4,6	TBD	TBD	Depot, Strategic Planning

	Action	Priority	Relevant Objectives	Cost	Savings	Responsibility
Sports grounds and open space						
2.1	Increase use of warm season grass species in sports grounds and golf courses	A	3,6	\$8000-\$10,000 per sports ground*	Over 30%	Sports and Projects
2.2	Continue to investigate the feasibility of using treated waste water from the Brushy Creek treatment plant for Hughes Park, Griff Hunt Reserve, Barneong Reserve and possible future re-development at the Croydon Golf Course	A	3,4,5,6	N/A	TBD	Sports and Projects, Strategic Planning, open space, YVW, CMA
2.3	Conduct audit of oval irrigation systems and oval conditions to prioritise actions and integrate this into the oval renovation plan (also identify changes to irrigation procedures)	A	1,2	\$500 per ground.	N/A	Sports and Projects, Strategic Planning
2.4	Repair or replace ageing irrigation systems with newer efficient systems incorporating efficient design and layout principles	A	1,6,7	Dependent on oval (TBD)	Approximately 40%	Sports and Projects
2.5	Investigate the opportunity for using stormwater for oval irrigation at appropriate sites	B	3,4	Dependant on individual oval requirements	Dependant on individual oval	Sports and Projects
2.6	Ensure roll out of new irrigation systems in currently unirrigated ovals incorporates a comprehensive approach to water conservation reflecting best practice principles	A	7	Dependant on individual oval requirements	Dependant on individual oval	Sports and Projects
2.7	Ensure all new irrigation systems and Jubilee oval number 1 are connected to the Micromet irrigation management system	A	1,6,7	Approximately \$600 per site	TBD	Sports and Projects
2.8	Maintain current Council policy of non irrigation of open space areas and median strips	A	1,3	No cost	N/A	Open Space

	Action	Priority	Relevant Objectives	Cost	Savings	Responsibility
Swimming pools						
3.1	Investigate options for using pool backwash for irrigation	C	1,4,6	TBD	TBD	Major Leisure, Sports and Projects
3.2	Install pool covers on outdoor pools	A	1	TBD	TBD	Major Leisure
3.3	Develop water efficient design guidelines for Croydon Aquatic Facility development (for contractors and design)	A	7	TBD	TBD	Major Leisure
3.4	Croydon Aquatic Facility to incorporate design features to maximise water reuse and recycling and minimise use of potable water	A	3,4,5,6,7	3% of pool budget allocation	TBD	Major Leisure
3.5	Continue to reuse pool water from outdoor pool at the end of summer operations (used for filter backwash)	A	4	No additional cost	250KL per annum	Major Leisure
All facilities						
4.1	Investigate opportunities for grey water treatment and reuse projects	C	1,6	TBD	TBD – dependent on individual facilities	TBD
Monitoring						
5.1	Improve monitoring of water use through the use of Utility Tracking software	A	1	TBD	N/A	Strategic Planning, Asset, Management, Finance
5.2	Report water use to individual sites to increase awareness of water consumption	A	1,2	Undertaken internally	N/A	Strategic Planning

	Action	Priority	Relevant Objectives	Cost	Savings	Responsibility
5.3	Conduct water audits of Council buildings, particularly high use facilities	B	1,5	Utilise YVW efficiency program. \$1000 - \$4500 per site	N/A	Strategic Planning
5.4	Continue to install check meters where there are currently multiple users from one meter	B	1	\$600 per meter	N/A	Depot
Education						
6.1	Distribute educational information to tenants of all Council owned buildings (i.e. posters/stickers etc.) to improve water conservation	B	2	TBD	N/A	Strategic Planning
6.2	Provide updates on Smartnet internal email of current water conservation projects	A	2,3	N/A	N/A	Strategic Planning
6.3	Develop an internal education program to assist employees in improving water conserving behaviour	B	2	TBD	N/A	Strategic Planning
6.4	Develop generic guidelines for water conscious decision making across Council activities	A	2	TBD	N/A	Strategic Planning

*Costing from Council notice of 04/08/03, Priority A (high), B (medium), C (low)

9 Water Quality Target

The Target for water quality actions has been developed through the identification of a range of actions that reflect the priority issues identified in Milestone 1 of the ICLEI Water Campaign™ and in the Stormwater Management Plan.

Council will implement actions that will achieve a minimum of 60 points worth of actions based on the ICLEI point system (Appendix 5) by 2015.

10 Water Quality Actions

10.1 Water Quality Objectives

1. To improve the water quality of Maroondah's waterways
2. Reduce the impact of Council activities on stormwater quality
3. Educate staff and councillors on water quality issues to raise awareness
4. To monitor the water quality of Maroondah's water ways and ensure that program implementation is responsive to changes in quality
5. To seek external partnerships and funding to improve the water quality of Maroondah's waterways

Table 6 Water quality actions undertaken

Action	Description	Date implemented
Installation of 75 side entry litter baskets	Installed into drainage pits to collect gross litter	2002-2004
Installation of gross pollutant traps	Installation of two Gross Pollutant traps along Mullum Mullum creek and one at the Narr Maen Wetland	2000 - 2004
Wetland developments	Development of water quality treatment wetlands Narr Maen reserve, Tarralla Creek and HE Parker reserve	2000 - 2004
Education and awareness raising	Several education programs have been conducted with funding support from the EPA's VSAP program including school education, automotive industry and building site education based programs	Ongoing
Implementation of Chemical Use Policy	Ensures minimization of impacts of herbicides, pesticides, fertilizers and other chemicals on waterways	Ongoing
Revegetation and bank stabilisation works	Reduces erosion and improves water quality	Ongoing

Table 7 Water quality action plan

	Action	Priority	Relevant Objectives	Cost	SWMP Action	Responsibility
Sediment and erosion control						
1.1	Require use of environmental specifications or formal site specific management plans as appropriate for Council contracts and program activities to reflect best practice stormwater management	A	1,2	N/A	YES (p.110, Vol.2)	Contracts, Engineering, Strategic Planning
1.2	Develop and implement erosion and sediment control guidelines for contractors and Council employees to assist in the development of site management plans	A	1,2	\$5000	YES	Strategic Planning, Engineering, Depot
1.3	Undertake Council employee education program for project managers and/or contractor supervisors to assess and enforce erosion and sediment control guidelines.	A	1,2,3	\$5000	YES	Strategic Planning, Engineering, Depot
1.4	Restore riparian vegetation using plant selection which responds to urban drainage issues. This can involve the removal of exotics (many deciduous), bank stabilization and revegetation with indigenous plants	B	1,2	Council contribution to Rehabilitation works along waterways approximately \$25,000-\$30,000 per annum	YES	Melbourne Water, Bushland and Weed Management, Open Space
1.5	Undertake footpath maintenance works which prevents the creation of concrete slurry	A	1,2	TBD	NO	Engineering, Depot
Litter, Waste and Pollution Management						
2.1	Develop litter training package for appropriate in house staff to improve understanding of rubbish generation, bin selection and placement	A	1,2,3	Training provided by Regional Waste Group	NO	Waste Management
2.2	Review placement and maintenance schedules of public place rubbish bins.	B	1,2	N/A	NO	Waste Management

	Action	Priority	Relevant Objectives	Cost	SWMP Action	Responsibility
2.3	Review current street sweeping programs, and implement best practice management practices in street sweeping	B	1,2	N/A	NO	Depot
2.4	Undertake litter hot spot audits, which identify locations of high gross litter generation.	B	1,2,4	TBD	YES	Waste Management
2.5	Collect and collate data on the quantity and type of litter trapped for use in education and awareness raising.	B	1,2,3	TBD	NO	Waste Management, Open Space
2.6	Review the type of gross litter device that provide best addresses Council's litter reduction needs	A	1,2,4	N/A	NO	Waste Management, Open Space
2.7	Review ongoing monitoring program for gross litter trapping devices – GPT's and side entry litter baskets	A	1,2,4	GPT report provided when emptied (current maintenance costs \$1000 to \$2000 annually per GPT)	NO	Strategic Planning, Building Maintenance, Response and Inspections
2.8	Explore potential sites for further installation of gross litter trapping devices and wetlands based on Stormwater Management Plan and litter audits	A	1,2	Side entry baskets \$415 each to supply and install GPT \$50,000 to \$100,000 to install	YES	Strategic Planning
2.9	Trial an appropriate Water Sensitive Urban Design (WSUD) technology as part of Councils capital works program	A	1,2,3	TBD	NO	Strategic Planning, Engineering, Maintenance
2.10	Review Household waste collection procedures to ensure minimal spillage	B	1,2,3,4	N/A	NO	Waste Management

	Action	Priority	Relevant Objectives	Cost	SWMP Action	Responsibility
2.11	Investigate the provision of bags and additional bins for the collection and disposal of dog faeces	B	1	TBD	NO	Open Space, Waste Management
2.12	Continue to implement the Chemical Use Policy	A	1,2,3	N/A	NO	All Departments
2.13	Dispose of Ringwood pool backwash to sewer	A	1,2	TBD	NO	Major Leisure
Groundwater						
3.1	Review monitoring of disused landfill sites across the municipality	B	1,2,4	TBD	NO	Major Leisure, Sports and Projects, Strategic Planning
Monitoring						
4.1	Conduct review the SWMP – determine effectiveness of actions undertaken to date	A	1,2,3,4	Undertaken internally	NO	Strategic Planning
4.2	Develop waterway quality monitoring program in conjunction with Waterwatch, Melbourne Water and local environment groups	A	1,3,4	Current Waterwatch funding \$3000 per annum	NO	Waterwatch, Friends Groups, Melbourne Water

11 Monitoring and Review

Monitoring the implementation of the Sustainable Water Management Plan will be undertaken on an annual basis. This will allow prioritised actions to be incorporated into the development of the Council Plan and reported on in the Annual Report.

Regular reviewing of the Plan will ensure that the actions and targets remain relevant to current conditions and reflect changes in best practice and technology.

In addition to reporting on actions undertaken, Council will continue to monitor water consumption through data collected from Yarra Valley Water and monitor water quality through the development of a water-testing regime and utilising data collected by Melbourne Water using the Indicators of Stream Condition (ISC) data.

A full review of the Plan will be undertaken in 2008 in order to reassess the progress of the implementation of the action plan and review the targets.

12 Funding the Strategy

The implementation of the target is dependent on Council seeking external partnerships and funding to implement the action plan.

Internal funding will largely be sought through the annual capital works budget application process and ongoing budgetary allocations.

It is recommended that Council sets up an environmental fund focused on greenhouse gas reduction, water conservation and stormwater initiatives that can be utilised for individual projects and also to provide matched funding when applying for external grant funding.

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14 Appendices

14.1 Appendix 1 – Maroondah City Council corporate water use

2000/01

Sector	Consumption (kl)	%	Cost (\$)	%
Administration Buildings	4,109	2.10	\$2,752	2.11
Child Care Centres	3,293	1.68	\$2,197	1.69
Community Centres	6,678	3.41	\$4,466	3.43
Cultural Buildings	3,475	1.78	\$2,327	1.79
Depots*	612	0.31	\$410	0.31
Facilities Toilets	9,583	4.90	\$6,408	4.92
Miscellaneous	22,511	11.50	\$14,555	11.17
Nurseries	0.00	0.00	\$0.00	0.00
Open Space	13,440	6.87	\$8,617	6.61
Playing Fields	83,741	42.78	\$56,097	43.06
Recreation Centres	8,933	4.56	\$5,976	4.59
Residences	201	0.10	\$137	0.11
Swimming Pools	39,180	20.01	\$26,324	20.21
Total	195,756		\$130,266	

2001/02

Sector	Consumption (kl)	%	Cost (\$)	%
Administration Buildings	6,204	3.74	\$4,321	3.74
Child Care Centres	2,839	1.71	\$1,971	1.71
Community Centres	5,821	3.51	\$3,962	3.43
Cultural Buildings	3,066	1.85	\$2,134	1.85
Depots*	628	0.38	\$439	0.38
Facilities Toilets	7,915	4.77	\$5,507	4.77
Miscellaneous	15,252	9.19	\$10,733	9.29
Nurseries	1,630	0.98	\$1,137	0.98
Open Space	7,662	4.62	\$4,818	4.17
Playing Fields	62,801	37.85	\$44,022	38.11
Recreation Centres	8,524	5.14	\$5,934	5.14
Residences	101	0.06	\$71	0.06
Swimming Pools	42,794	25.79	29,979	25.95
Total	165,942		\$115,522	

*Inaccurate values – change in metering has resulted in an annual consumption value of 3154KL and \$2,375.29 (2003/04 figures)

14.2 Appendix 2 – Potential savings calculations

Initiative	Comments	Potential reduction (%)	Justification of target
Install water saving devices in buildings	Installation of dual flush toilets, water saving shower heads (or flow controls), flow restriction valves in taps in kitchens and bathrooms	25-30% from council buildings	Replacement of old toilets with >10L cisterns with 6/3 cisterns. Replacement of old >15L/min showers with AAA (<9L/min). Flow restriction valves on taps and
Leakage management	Develop a regular program of pipe inspection to ensure prevention and early detection of leaks	2%	Estimation based on anecdotal evidence. Unable to accurately quantify (conservative estimate when compared with YVW leakage figures). Reduced leakage as result of YVW pressure reduction program
In house education of Council employees	Conduct information sessions with different departments to inform and gain suggestions on behavioural changes that can be undertaken. Also general awareness changes	2%	Conservative estimate. No data, based on household estimates of behavioural change potential
Stormwater reuse in Council buildings	Installation of Rainwater tanks on major Council facilities for reuse in toilets, taps, showers etc. and also larger applications such as depot truck wash.	30%	Rainwater harvesting can potentially be used for up to 100% of water requirements. The estimation is a conservative reduction taking into account limitations on individual properties such as limited catchment areas and limited reuse opportunities. Experience of other councils suggests approximately 20% savings from greywater and 55% from rainwater
Greywater reuse	Installation of greywater collection and recycling system	15%	See above
Implement water efficient gardening practices and Xeriscape gardening	Practices such as mulching, planting of drought resistant plant species, efficient irrigation systems		Limited future reduction as Council have already ceased irrigating the majority of open space and gardens
Use of stormwater for irrigation of ovals	Substitution of potable water use	30%	No data, estimate only
Reuse of pool backwash for oval irrigation			TBD
Resurfacing of ovals with low water use grass species and improved soil types	Particularly the sowing of warm season couch grasses (e.g. as in Monash, Banyule and many other councils)	30%	Estimations from turf companies, other Councils and "Efficient Irrigation: A reference Manual for Turf and Landscape", Connellan, Burnley College.
Repair or replace ageing irrigation systems	Audit of systems will identify specific requirements for individual sites	40%	No data estimation only (based on consultation with Sports and Projects). Actual amount will depend on individual ovals, i.e. pressure, systems watering requirements.
Installation of 'on-ground' moisture sensing or rain gauge equipment to complement existing micromet system	Increase the control and responsiveness of irrigation application in relation to rainfall		Unknown
Ensure correct mowing heights	Ensures maximum efficiency of water use through increased root depth		Unknown
Reuse of pool backwash for pool refill		15%	Based on calculations for installation of reverse osmosis filtration system
Installation of pool covers for outdoor pools	Reduces evaporation		Unknown

14.3 Appendix 3 – Potential savings calculations by property type

	Action 1	Action 2	Action 3	Action 4	Action 5	Action 6	Action 7	Action 8	Min potential savings	Max potential savings
	Education	Water saving devices (domestic)	Rainwater reuse buildings	Grey water reuse buildings	Stormwater for ovals/open space	Replace turf	Upgrade irrigation	Reuse pool backwash		
Property type	% Saving	% Saving	% Saving	% Saving	% Saving	% Saving	% Saving	% Saving		
Administration building	2	25	30	15					2	56
Childcare centres	2	25	30	15					2	56
Community centres	2	25	30	15					2	56
Cultural buildings	2	25	30	15					2	56
Depots	2	15	30	15					2	50
Facilities and toilets	2	25	30	15					2	56
Miscellaneous	2				15				2	
Nurseries	2	5	30				20		2	
Open Space	2								2	
Playing fields	2				30	30	40		2	70
Recreation centres	2	25	30	15					2	56
Residences	2	25	30	15					2	56
Swimming pools	2	30	30					15	2	60

14.4 Appendix 4 – Projected water consumption and savings

Property type	Predicted potential savings	Total number of facilities	Total water use 2000/01 (KL)	Total water use 2000/01 (\$)	Total sewerage charges (\$)	Savings from 2000/01 data (KL)	Savings from 2000/01 data (\$)	Savings from sewerage charge (\$)	Total projected number of facilities	Total projected water use (no efficiency improvements)	Savings from projected data (KL)
Administration buildings	35	2	4109	2752	2800	1438	963	980	No change	No change	No change
Childcare centres	35	19	3293	2197	2200	1153	769	770	No change	No change	No change
Community centres	35	13	6678	4466	4500	2337	1563	1575	No change	No change	No change
Cultural buildings	35	2	3475	2327	2400	1216	814	840	No change	No change	No change
Depots	22	1	612	410	450	135	90	99	No change	No change	No change
Facilities and toilets	35	24	9583	6408	6500	3354	2243	2275	No change	No change	No change
Miscellaneous	2	21	22511	14555	0	0	0	0	No change	No change	No change
Nurseries	22	1	N/A	0	0	N/A	0	0	No change	No change	No change
Open Space	100		13440	8617	0	13440	8617	0	No change	No change	No change
Playing fields	50	15	83741	56097	0	41870	28049	0	10 additional irrigation systems to 2015	135000	67500
Recreation centres	35	20	8933	5976	6000	3127	2092	2100	No change	No change	No change
Residences	35	2	201	137	140	70	48	49	No change possible reduction	No change	No change
Swimming pools	30	2	39180	26324	20300	11754	7897	6090	New Croydon Aquatic Facility	60000	18000
Totals			195756	130266		79894	53436	14778		267835	111700

- Predicted potential savings based on assumption of 100% take up of basic actions (e.g. Actions 1,2,6 and 7) and partial take up of more complex actions (e.g. Actions 3,4,5 and 8) (See Appendix 3 for details of Actions)
- Additional 4 childcare sites without data
- Figure for Depots is incorrect. Metering was changed after baseline year.
- Figure for Miscellaneous contains tennis courts. See Council water use section for explanation
- The majority of the water use attributed to open space has subsequently ceased.
- Approximate value for projected water use on ovals was calculated by extrapolating out the baseline average for each ground