

Overview

Melbourne Water Social and Environment Report 2003/04

Melbourne Water's Social and Environment Report 2003/04 provides detailed information on our performance in meeting social and environmental performance goals in 2003/04.

We are responsible for managing Melbourne's water resources in a way that aims to ensure that future generations enjoy one of the best urban environments in the world.

To achieve this, we have set high standards and goals to reflect our approach to working with government, retail water businesses and the community to achieve results over and above regulatory requirements.

We also play a significant role as public health and environment managers in the way we manage Melbourne's water supply, sewerage and drainage infrastructure and monitor the health of rivers and creeks.

We want the community and other stakeholders to gain a full understanding of our efforts to secure Melbourne's water future, which is why we conduct open and transparent reporting, particularly in regard to our two major sewage treatment plants.

Melbourne Water's *Annual Report 2003/04* provides an overall summary of our social, financial and environment performance.

The *Melbourne Water Social and Environment Report* supports the information contained in the *Annual Report 2003/04* through the provision of more detailed data. It includes information on how we met our responsibilities in delivering high quality water to the Melbourne community, worked with key stakeholders in planning and delivery, and responsibly managed our sewage treatment plants, rivers and creeks, and energy and greenhouse emissions. The data is sourced from Melbourne Water's environment monitoring programs.

Click on the links below for information on Melbourne Water's:

- [Waterways and Drainage Operating Charter](#)
- [Drinking water quality performance](#)
- [Environmental performance](#)
- [Consultative committees](#)

Waterways and Drainage Operating Charter

Melbourne Water's three core functions relating to waterways and drainage are:

Regional drainage and flood protection

Providing regional-scale facilities to accommodate stormwater flows, undertaking works to reduce the risks of flooding in priority areas, and preventing inappropriate development in floodplains.

Rivers and creeks management

Protecting, restoring and maintaining the physical condition and environmental health of creeks, rivers and wetlands, and regulating the volumes of water extracted for irrigation.

Water quality protection

Implementing controls, providing treatment facilities and working with other agencies, local councils, industries and community groups to improve stormwater quality and protect waterways, bays and beaches.

An Operating Charter was developed in 1999 and refined in August 2001 to define the objectives, goals, strategies and specific service commitments for these functions. The Charter was prepared in consultation with an external reference committee, taking into account:

- Community expectations
- Responsibilities assigned by legislation
- Financial resources available for waterways and drainage management.

The Charter sets out 34 service commitments covering specific activities to be undertaken and defining the outputs to be generated each year across the spectrum of rivers and creeks, and drainage responsibilities including annual monitoring of performance.

Twenty-seven commitments were achieved either fully ✓ or substantially (✓), four were only partly achieved ✗, and three were either not auditable or not applicable [NA].

John Kowarsky and Associates audited the detailed performance records for 2003/04 and Melbourne Water has summarised the audit results in the table below.

The 2001 Operating Charter has been reviewed in consultation with Melbourne Water's Waterways and Drainage Advisory Committee, the Department of Sustainability and Environment and EPA Victoria, resulting in some changes. The key areas of change reflect Regional River Health Strategy outcomes and stormwater quality targets.






2003/04 Operating Charter performance

Commitment as set out in the Charter	1999/00	2000/01	2001/02	2002/03	2003/04	Performance summary 2003/04
Asset Management There will be minimal instances of asset failure causing significant flooding, serious damage or personal injury.	✗	✓	✓	✓	✓	There were some minor instances, but these did not cause flooding, damage or personal injury.
Flood mitigation (progress) Annual expenditure on flood mitigation works will be sufficient to reduce the number of vulnerable properties by 800 over 10 years.	✓	✗	✓	✗	✓	The cumulative number of properties protected to the end of the year was 402 compared with the 2003/04 target of 400.
Flood mitigation (project management standards) All projects undertaken in any one year will fully comply with the project management requirements.	✓	✗	✓	✓	(✓)	Audit results indicate that projects were generally managed in accordance with the required standards. The relationship between performance and assessment criteria for this commitment is complex and will be reviewed during the next year.
Flood event monitoring The Bureau of Meteorology will receive the initial notification and subsequent forecast information for all notifiable events on the stipulated waterways.	✓	✓	✓	✓	(✓)	The rainfall and stream flow monitoring systems and flood warning duty officer arrangements operated as planned. Bureau notification requirements will be reviewed to align with current operational standards.
Property information statements All urban properties affected by flooding will have up-to-date flooding information available by June 2001 and continuously thereafter.	✓	✓	✓	✓	✓	Regular updates were carried out as circumstances changed or as new properties were created. The total number of records processed was for 34,918 properties.
Planning scheme updates All municipalities will have up-to-date flood related information in their planning schemes by June 2002.	✓	✓	✗	✗	✓	31 municipalities have now exhibited flood-related information in planning schemes. This means this target has been met.
Waterway works approvals No works will be approved unless appropriate measures are incorporated to protect waterway values.	✗	✓	✓	✓	✓	An internal audit of works approvals processes confirmed that this objective was achieved.
Unauthorised waterways works All significant instances of unauthorised works will be strenuously pursued.	✓	✓	✓	✓	✓	There were no new cases of unauthorised works on a waterway during 2003/04.
Waterway maintenance The maintenance program will be completed annually in accordance with targeted priorities and the project management requirements.	✗	✓	✓	✓	(✓)	Expenditure during 2003/04 for waterway maintenance exceeded the commitment target. This reflected the focus on de-silting and rehabilitation activities following the two major storms during the year.

<p>Stream frontage protection At least 50,000 plants and 25 kilometres of fencing will be established each year to protect rural waterways under the Stream Frontage Protection program.</p>	✓	✓	✓	✓	✓	We substantially exceeded the targets, with construction of 76.4 kilometres of fencing and establishment of 133,495 plants.
<p>Stream flow management plan preparation Stream flow management plans will be produced each year to achieve full coverage by July 2006.</p>	✓	✗	✗	✗	✓	The Diamond and Hoddles creeks and Plenty River plans have been completed according to schedule. A further three plans were started during the year.
<p>Stream flow management plan review From June 2003, sufficient previous plans will be revised each year to keep all plans up to date thereafter (ie none older than 5 years).</p>	-	-	-	-	✓	No plans have been in place long enough to require updating.
<p>Waterway capital works Full implementation of the annually budgeted program will be achieved in accordance with waterways and drainage project management requirements.</p>	✓	✗	✓	✓	✗	There was a shortfall of expenditure due to projects failing to be completed during the year. We spent \$4.2 million out of the target \$6.3 million. The shortfall was allocated to other significant Melbourne Water projects.
<p>Waterway condition reports The condition of a proportion of waterways will be re-assessed and the results will be published each year to cover all waterways every five years using the Victorian Index of Stream Condition.</p>	✓	✓	✓	✓	(✓)	Waterways classified as "urban" were assessed under the current ISC process. This will need to be reassessed when a more appropriate ISC classification for urban waterways has been developed.
<p>Waterway management plans New plans will be produced each year to complete the required coverage by 2002. Previous plans will be revised each year from 2002 to ensure that all waterways have up-to-date plans available.</p>	✓	✓	✓	✗	✗	To date, 75% of plans have been completed and it is planned to fully complete this program by the end of 2004/05. The commitment will be reviewed when the Operating Charter is revised.
<p>Codes of Practice - status review The status of Codes of Practice relevant to stormwater quality protection will be reviewed and reported each year.</p>	✗	✗	✗	✗	NA	It has been agreed that no further work will be done to meet this commitment, which will be discontinued as part of the review of the Operating Charter.
<p>Codes of Practice - preparation and revision Waterways and drainage will work with other agencies and industry bodies to complete new codes or revise old ones at the average rate of one each year to 2009.</p>	✓	✓	✓	✓	✓	The process of preparing and revising Codes of Practice was considered to result in excellent resource material, backed by good website support.

<p>Stormwater management plans Sufficient stormwater management plans will be produced each year to ensure all municipalities are covered by June 2003.</p>	✓	✓	✓	✗	(✓)	Melbourne Water has developed plans with all but one municipality, which is currently developing one independently. We will work with the municipality to ensure the plan meets appropriate standards.
<p>Toxicant control recommendations A technical report and recommendations will be provided on at least one new toxicity issue each year.</p>	✓	✓	✓	✓	✓	The commitment was met during the year by the preparation of a report on petroleum hydrocarbons as a major source of pollution in urban waterway sediments.
<p>Water quality improvement facilities New water quality improvement facilities will be constructed each year in accordance with the approved program and waterways and drainage project management standards.</p>	✓	✗	✗	✓	(✓)	Progress was made on projects during the year with a total expenditure of \$5.7 million against the planned amount of \$6.5 million. The shortfall was allocated to other significant Melbourne Water projects.
<p>Reports - ambient monitoring The results of the previous calendar year's ambient monitoring program and trend analysis will be published by the end of May each year.</p>	✓	✓	✓	✓	✗	The fact sheet reporting the results of this program was not published by the required target date, but has since been published.
<p>Reports - investigative monitoring Results of the previous calendar year's investigative monitoring will be published by the end of September each year.</p>	✓	✓	✓	✓	✗	Two of three reports due for completion were not published by the required target date, but have since been published.
<p>Data standards All specified scientific and quality control standards, as assessed by periodic independent audit, will be complied with.</p>	✓	✓	✓	✓	(✓)	Two data sets were not subject to independent audit. This data was checked internally and considered to be accurate, but the commitment requires independent audit.
<p>Waterwatch strategy A forward strategy will be developed by June 2000 in collaboration with stakeholders.</p>	✓	-	-	-	✓	The strategy was finalised in May 2000 and no action has been required since then.
<p>Waterwatch strategy implementation Implementation of the Waterwatch strategy will be reported annually.</p>	✓	✓	✓	✓	NA	This commitment will be reviewed when the Operating Charter is revised.
<p>Drainage schemes All new growth areas in development corridors will have drainage schemes in place within three years of significant subdivisional activity commencing.</p>	✓	✗	✓	✓	✓	The program is on schedule and is being kept up to date with changes to schemes made by scheme proponents.

<p>Property development controls</p> <ul style="list-style-type: none"> 95% of all referrals will be processed within the statutory 28-day period. 95% of all agreement applications will be processed within the 60-day period agreed with the development industry. 	✓	✓	✓	✓	✓	<p>The commitment target of 95% was exceeded. All referrals and agreement applications were responded to within the target timeframe.</p>
<p>Research expenditure Research expenditure will be maintained at a level of at least \$450,000 per annum.</p>	✓	✓	✓	✓	✓	<p>Expenditure during the year totalled \$612,168 including contributions to research undertaken through the Co-operative Research Centres for Catchment Hydrology and Freshwater Ecology.</p>
<p>Research implementation Two significant improvements to work methods will be achieved each year as a result of research findings.</p>	✓	✓	✓	✓	✓	<p>Research results were used to strengthen waterway stream flow management, application of effective imperviousness to drainage scheme development and improve streambed structure to increase stream biomass.</p>
<p>Community education The approved community education program will be fully implemented each year.</p>	✓	✓	✓	✓	NA	<p>While there was a diverse range of activities designed to increase community awareness of waterway issues, there was no defined program to audit against.</p>
<p>Community attitude surveys Community attitude survey results will be reported for at least one new topic each year.</p>	✓	✓	✓	✓	✓	<p>The issue of pollution in Melbourne's waterways was included in the Water Issues Study for the first time.</p>
<p>Incident response preparation A program of incident response training, and preparation and review of contingency plans will be fully implemented each year.</p>	✗	✓	✓	✓	(✓)	<p>Activities included training and review of emergency response management systems including the flood response plan. These were put into effect during the year's floods. The outcome was only substantially complete as there was no formal program to audit against.</p>
<p>Incident response performance In each year, the service will operate as planned for all incidents that require emergency response.</p>	✓	✓	✓	✓	✓	<p>Of the 12 incidents and subsequent debriefs all met the commitment target.</p>

<p>Innovation</p> <ul style="list-style-type: none">• Specific innovation targets will be developed and incorporated in each year's business plan.• Achievements against the previous year's innovation targets will be reported each year.						<p>Eight projects had been incorporated in the 2003/04 business plan and good progress was made on seven. The eighth was not progressed due to revised priorities.</p>
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Drinking Water Quality Performance

Melbourne Water is responsible for the distribution and supply of safe, high quality drinking water that consistently meets stringent requirements. We manage our system to ensure it works well today and into the future. Our water is safe and pleasant to drink and highly regarded by the Melbourne community. Our aim is that the community continues to rate our drinking water as good or very good.

While we are one of the few cities in the world that draws its water from protected forest catchments, we use a series of risk management systems to provide barriers to contamination and to ensure that our distribution and supply is reliable and efficient. We manage the drinking water system using the Hazard Analysis and Critical Control Point (HACCP) system which focuses on quality management from catchment to consumer.

Most of our water comes from some 140,000 hectares of protected catchments in the Yarra Ranges and Kinglake area that are closed to the public. This means that our water requires minimal treatment to assure its quality.

Normally about 10% of Melbourne's water is drawn from Sugarloaf Reservoir, which is mainly filled by pumping from the Yarra River, and about 5% is supplied from Yan Yean, Melbourne's oldest and shallowest water storage. Water from these reservoirs requires full filtration and disinfection.

Melbourne Water manages nine major reservoirs, with a total capacity of 1,773,000 million litres; 59 service reservoirs; 1000 kilometres of distribution water mains; more than 200 kilometres of aqueducts and tunnels; 18 pumping stations; five filtration plants and 42 disinfection plants.

The water we supply must be safe, pleasant to drink and meet the requirements of:

- National Health and Medical Research Council drinking water guidelines
- Victorian Government Health (Quality of Drinking Water) Regulations 2002
- *Health (Fluoridation) Act 1973*.

The results of drinking water quality tests are reported against recommended levels in either the joint National Health and Medical Research Council/Australian Water Resources Council 1987 Guidelines for Drinking Water Quality in Australia or the World Health Organization 1993 Guidelines for Drinking Water Quality. The Australian guidelines also recommend sampling frequencies for microbiological parameters related to the size of the population served by a particular zone.

This report provides more detailed information on our drinking water quality monitoring program, which is summarised in Melbourne Water's *Annual Report 2003/04*. Click on the links below for information on Melbourne Water's:

- [Public Health Policy](#)
- [Water quality - parameters and reporting levels](#)

- [Microbiological parameters](#)
- [Routine physical parameters](#)
- [Routine inorganic chemical parameters](#)
- [Chemical and radiological parameters](#)
- [Organic chemicals](#)
- [Routine pathogen monitoring](#)

Drinking Water Quality Performance

Public Health Policy

Purpose

To manage Melbourne Water's contribution to the protection of public health in a socially responsible manner.

Objective

To ensure that Melbourne Water meets its public health obligations and related community expectations.

Policy Statement

Melbourne Water will:

- Provide a cost effective, reliable supply of safe, high quality drinking water that consistently meets the *Safe Drinking Water Act 2003* and the Act's Regulations.
- Transfer and treat sewage, and ensure appropriate disposal, recycling or beneficial use of water and biosolids in a way that safeguards the health of the community.
- Minimise the impacts of stormwater and other discharges on receiving waters and thereby contribute to safe recreational opportunities for the community.
- Ensure that the public health benefits of achieving high drinking water quality, recycled water quality and receiving water quality, relative to the costs, can be demonstrated.
- Achieve the following key public health objectives:
 - Fully comply with our statutory and agreed public health requirements including:
 - All regulatory requirements for supplied drinking water
 - Bulk Water Supply Agreements with customers
 - All regulatory requirements for supplied recycled water and other non-potable water
 - All regulatory requirements for biosolids supplied for beneficial use
 - Achieve an 85% community rating of Melbourne's drinking water as good or very good

Melbourne Water will fulfil this policy by:

- Identifying, understanding and managing the risks associated with supplied water.
- Maintaining and implementing an independently certified drinking water quality management system incorporating Hazard Analysis Critical Control Point (HACCP) and ISO9001. This means adopting a multi-barrier approach to drinking water safety, including:
 - restricting human access to the water supply system including catchments, reservoirs and other assets

- detention in large storages
- closed distribution system
- appropriate treatment, monitoring and verification.
- Maintaining and implementing an independently certified quality management system incorporating HACCP and ISO9001 for supplied non-potable water.
- Managing public health issues other than those related to supplied water through a management system independently certified to ISO 14001.
- Ensuring reliable sewage collection and treatment using processes tailored to Melbourne's unique conditions.
- Managing the recycling of water and beneficial use of biosolids to minimise public health risks, while conforming to statutory requirements and optimising business opportunities.
- Providing safe and efficient stormwater and waterway services including:
 - working with local government and the development industry to implement best practice stormwater management
 - investigating and managing the public health impacts of discharges to waterways
 - monitoring for blue-green algae in recreational water bodies.
- Improving performance and optimising public health outcomes by:
 - remaining abreast of relevant international trends in public health policy, epidemiology studies, treatment technology and system management and operation
 - undertaking research on the relationship between water quality and public health.
- Understanding public health impacts and implications other than those related to supplied water through:
 - regular monitoring of treated sewage effluent, biosolids, stormwater and receiving water
 - assessing performance against regulatory requirements and stakeholder expectations.
- Establishing a good working relationship with public health regulatory agencies to ensure Melbourne Water contributes to the debate on the setting of statutory requirements, industry standards and guidelines, and other standards relevant to public health.
- Ensuring that our employees and contractors are equipped to anticipate and manage public health risks and responsibilities in their day-to-day work through appropriate contingency planning and incident response capability.
 - Consulting with customers, stakeholders and the community about public health issues and involving them when developing public health initiatives.
 - Providing relevant and timely information to customers, stakeholders and the community.

Responsible Person

General Manager, Research and Technology

Authority

Managing Director, August 2004

Drinking Water Quality Performance

Water quality - parameters and reporting levels

Parameter	Guideline Basis	Units	Reporting Level
<i>(i).1.1.1 Microbiological - routine</i>			
<i>E. coli</i>	NHMRC 1987	organisms/100mL	1
Total coliforms	NHMRC 1987	organisms/100mL	20 **
Plate counts	MWC Corporate	Colony forming units/100mL	1000
Physical - routine			
Colour	NHMRC 1987	True colour units (TCU)	15
Turbidity	NHMRC 1987	Nephelometric turbidity units (NTU)	5
pH	NHMRC 1987	pH units	6.5 to 8.5
Chemical - routine			
Aluminium	NHMRC 1987	milligrams/litre - mg/L	0.2
Iron	NHMRC 1987	mg/L	0.3
Manganese	NHMRC 1987	mg/L	0.1
Fluoride	Health Act	mg/L	0.7 - 1.2
Chemical - routine less frequent			
Arsenic	NHMRC 1987	milligrams/litre - mg/L	0.05
Cadmium	NHMRC 1987	mg/L	0.005
Chromium	NHMRC 1987	mg/L	0.05
Copper	NHMRC 1987	mg/L	1
Cyanide	NHMRC 1987	mg/L	0.1
Lead	NHMRC 1987	mg/L	0.05
Mercury	NHMRC 1987	mg/L	0.001

Selenium	NHMRC 1987	mg/L	0.01
Zinc	NHMRC 1987	mg/L	5
Chloride	NHMRC 1987	mg/L	400
Hardness	NHMRC 1987	mg/L	500
Nitrate (as N)	NHMRC 1987	mg/L	10
Sodium	NHMRC 1987	mg/L	300
Sulphate	NHMRC 1987	mg/L	400
Total alkalinity	*	mg/L	*
Calcium	*	mg/L	*
Magnesium	*	mg/L	*
Silica	*	mg/L	*
Total organic carbon	*	mg/L	*
Total phosphorus	*	mg/L	*
Total solids	*	mg/L	*
Radiological			
Radioactivity - alpha	NHMRC 1987	Becquerel/litre	0.1
Radioactivity - beta	NHMRC 1987	Becquerel/litre	0.1
Pesticides			
Aldrin	NHMRC 1987	micrograms/litre - µ/L	1
Dieldrin	NHMRC 1987	µ/L	1
Chlordane	NHMRC 1987	µ/L	6
DDT	NHMRC 1987	µ/L	3
Heptachlor	NHMRC 1987	µ/L	3
Heptachlor epoxide	NHMRC 1987	µ/L	3
Lindane	NHMRC 1987	µ/L	100
2,4-D	NHMRC 1987	µ/L	100
Industrial chemicals			
Carbon tetrachloride	NHMRC 1987	micrograms/litre - µ/L	3
Tetra chloroethene	NHMRC 1987	µ/L	10
Trichloroethene	NHMRC 1987	µ/L	30
1,1 Dichloroethene	NHMRC 1987	µ/L	0.3

1,2-Dichloroethane	NHMRC 1987	µ/L	10
Benzene	NHMRC 1987	µ/L	10
Polynuclear aromatic hydrocarbons (PAH's)			
Benzo-a-pyrene	NHMRC 1987	micrograms/litre - µ/L	0.01
By-products of disinfection			
Pentachlorophenol	NHMRC 1987	micrograms/litre - µ/L	10
2,4,6-Trichlorophenol	NHMRC 1987	µ/L	10
Trihalomethanes (THM's) Total		micrograms/litre - µ/L	200
Bromoform		µ/L	
Dibromochloromethane		µ/L	
Bromodichloromethane		µ/L	
Chloroform		µ/L	
Chloroacetic acids No guidelines set			
Chloroacetic acid		micrograms/litre - µ/L	N/A
Dichloroacetic acid		µ/L	50
Trichloroacetic acid		µ/L	100

* Items marked with an asterisk have not had a reporting level set but are monitored for operational purposes.

** Total coliforms is the guideline at customer taps. The Melbourne water requirement is 10 total coliforms at interface monitoring points

Notes:

- NHMRC 1987 - National Health and Medical Research Council/Australian Water Resources Council 1987: Guidelines for Drinking Water Quality in Australia
- milligrams/litre = mg/L or parts per million
- micrograms/litre = µ/L or parts per thousand million (billion)

Drinking Water Quality Performance

Microbiological parameters

Exceeding reporting level and percentage in zones/population

The reporting levels for *E. coli* and total coliforms are based on National Health and Medical Research Council 1987 guidelines. There is no corresponding guideline for plate counts so the reporting level for that parameter is a corporate target adopted to reflect the conditions of protected catchments and Melbourne's generally unfiltered water supplies. Sampling results are based on monitoring at locations in our agreements with the retail water companies. *E. coli* and total coliforms have been assessed using the defined substrate technology (Colilert) method. The *E. coli*, total coliform and plate count numbers should not exceed the reporting level.

Parameter / retail water companies	Reporting level	Total zones	Total Exceedence			Below 10K			10K to 100K			Above 100K		
			Total tests	Fails	% Fails	Tests	Fails	% Fails	Tests	Fails	% Fails	Tests	Fails	% Fails
<i>E. coli</i> (org/100mL)														
All	1	65	5785	0	0.00	1779	0	0.00	3504	0	0.00	1810	0	0.00
YVW	1	35	3459	0	0.00	1412	0	0.00	1808	0	0.00	915	0	0.00
CWW	1	11	1558	0	0.00	-	-	-	1012	0	0.00	703	0	0.00
SEW	1	30	2459	0	0.00	418	0	0.00	1358	0	0.00	998	0	0.00
Total coliforms (org/100mL)														
All	10	65	5785	19	0.33	1779	0	0.00	3504	19	0.54	1810	1	0.06
YVW	10	35	3459	4	0.12	1412	1	0.07	1808	4	0.22	915	1	0.11
CWW	10	11	1558	13	0.83	-	-	-	1012	13	1.28	703	1	0.14
SEW	10	30	2459	5	0.20	418	0	0.00	1358	5	0.37	998	0	0.00
Plate count (cfu/mL)														
All	1000	65	5785	2	0.03	1779	0	0.00	3504	2	0.06	1810	0	0.00
YVW	1000	35	3459	1	0.03	1412	0	0.00	1808	1	0.06	915	0	0.00
CWW	1000	11	1558	1	0.06	-	-	-	1012	1	0.10	703	0	0.00
SEW	1000	30	2459	0	0.00	418	0	0.00	1358	0	0.00	998	0	0.00

Note: The results have been calculated using the interface monitoring locations as listed in the BWSA 1999 for each retail water company.

Drinking Water Quality Performance

Routine physical parameters

Exceeding reporting level and percentage in zones/population

The reporting levels are based on National Health and Medical Research Council/Australian Water Resources Council 1987 guidelines. Sampling results are based on monitoring at locations listed in our agreements with the retail water companies. Target levels are at equal to or less than the reporting level or, in the cases of pH, within the range shown. The physical reporting levels are based on aesthetic rather than health considerations. Values that would be a concern for health are well beyond the reporting levels. The testing for colour is done as "apparent colour" rather than "true colour"; the latter test involves a filtered sample and would not be representative of Melbourne's water supply. "Apparent colour" gives a higher number than would be obtained for "true colour" for the same sample.

Parameter / retail water companies	Report- ing level	Total zones	Total tests	Total Exceed- ence	% Fails	No. Exceeding Reporting Level (& %) in Zones/Population									
						Below 10K			10K to 100K			Above 100K			
						Tests	Fails	% Fails	Tests	Fails	% Fails	Tests	Fails	% Fails	
Colour (Pt/Co)															
All	15	65	2178	1	0.0	680	0	0.0	1352	1	0.1	695	0	0.0	
YVW	15	35	1260	1	0.1	383	0	0.0	814	1	0.1	367	0	0.0	
CWW	15	11	702	0	0.0	-	-	-	468	0	0.0	286	0	0.0	
SEW	15	30	999	0	0.0	287	0	0.0	422	0	0.0	421	0	0.0	
Turbidity (NTU)															
ALL	5	65	2177	0	0.0	680	0	0.0	1352	0	0.0	694	0	0.0	
YVW	5	35	1259	0	0.0	383	0	0.0	814	0	0.0	366	0	0.0	
CWW	5	11	701	0	0.0	-	-	-	468	0	0.0	285	0	0.0	
SEW	5	30	998	0	0.0	287	0	0.0	422	0	0.0	420	0	0.0	
pH (units)															
ALL	6.5-8.5	65	2178	1	0.0	680	0	0.0	1352	0	0.0	695	1	0.1	
YVW	6.5-8.5	35	1260	1	0.1	383	0	0.0	814	0	0.0	367	1	0.3	
CWW	6.5-8.5	11	702	1	0.1	-	-	-	468	0	0.0	286	1	0.3	
SEW	6.5-8.5	30	999	1	0.1	287	0	0.0	422	0	0.0	421	1	0.2	

Note: Some monitoring locations cover multiple zones, different population groups or more than one retail water company.

Drinking Water Quality Performance

Routine inorganic chemical parameters

Exceeding reporting level and percentage in zones/population

The reporting levels for iron, aluminium and manganese are based on National Health and Medical Research Council/Australian Water Resources Council 1987 guidelines. The level for fluoride is based on the *Health (Fluoridation) Act 1973*. Target levels are equal to or less than the reporting level or, in the cases of fluoride, within the range shown. The reporting levels for iron, aluminium and manganese have been established on aesthetic grounds rather than health considerations. The range for fluoride is that recommended for the control of dental caries. The guideline/reporting level for aluminium is for acid soluble form. Sampling results are based on monitoring at the locations listed in our agreements with the retail water companies. Fluoride concentrations at the points of introduction into the system comply with the calculated annual and short-term averages required under the Standards for Fluoridation of Public Water Supplies. Values outside the reporting range tend to be low rather than high and zones where fluoride is not added or is incidentally reduced by further treatment influence results.

Parameter / retail water companies	Reporting level	Total zones	Total tests	Total Exceedence	% Fails	No. Exceeding Reporting Level (& %) in Zones/Population								
						Below 10K			10K to 100K			Above 100K		
						Tests	Fails	% Fails	Tests	Fails	% Fails	Tests	Fails	% Fails
Iron (mg/L)														
All	0.3	65	2178	1	0.0	680	0	0.0	1352	1	0.1	695	1	0.1
YVW	0.3	35	1260	1	0.1	383	0	0.0	814	0	0.0	367	1	0.3
CWW	0.3	11	702	0	0.0	-	-	-	468	0	0.0	286	0	0.0
SEW	0.3	30	999	1	0.1	287	0	0.0	422	1	0.2	421	0	0.0
Aluminium (mg/L)														
All	0.2	65	280	0	0.0	144	0	0.0	136	0	0.0	65	0	0.0
YVW	0.2	35	238	0	0.0	131	0	0.0	107	0	0.0	28	0	0.0
CWW	0.2	11	80	0	0.0	-	-	-	41	0	0.0	39	0	0.0
SEW	0.2	30	78	0	0.0	13	0	0.0	39	0	0.0	52	0	0.0
Manganese (mg/L)														
All	0.1	65	1013	0	0.0	300	0	0.0	613	0	0.0	334	0	0.0
YVW	0.1	35	602	0	0.0	203	0	0.0	366	0	0.0	170	0	0.0
CWW	0.1	11	396	0	0.0	-	-	-	252	0	0.0	170	0	0.0

SEW	0.1	30	387	0	0.0	104	0	0.0	157	0	0.0	178	0	0.0
Fluoride (mg/L)														
All	0.7-1.2	65	868	3	0.3	117	1	0.9	751	2	0.3	443	0	0.0
YVW	0.7-1.2	35	568	2	0.4	107	0	0.0	503	2	0.4	166	0	0.0
CWW	0.7-1.2	11	367	0	0.0	-	-	-	211	0	0.0	182	0	0.0
SEW	0.7-1.2	30	392	1	0.3	52	1	1.9	235	0	0.0	261	0	0.0

Note: Some monitoring locations cover multiple zones or more than one retail water company.

Drinking Water Quality Performance

Chemical and radiological parameters

The reporting levels are based on National Health and Medical Research Council 1987 guidelines. Results should not exceed the reporting levels. Items marked with an asterisk have not had a reporting level set but are monitored for operational purposes.

Sampling is conducted at headworks reservoirs.

Parameter	Reporting Level mg/L	Total number of Analyses	Exceed Reporting Level No (%)
Arsenic	0.05	36	0
Cadmium	0.005	36	0
Chromium	0.05	36	0
Copper	1	36	0
Cyanide	0.1	36	0
Lead	0.05	36	0
Mercury	0.001	36	0
Selenium	0.01	36	0
Zinc	5	36	0
Chloride	400	36	0
Hardness	500	36	0
Nitrate (as N)	10	36	0
Sodium	300	36	0
Sulphate	400	36	0
Total Alkalinity	*	36	
Calcium	*	36	
Magnesium	*	36	
Silica	*	36	
Total Organic Carbon	*	36	
Total Phosphorus	*	36	

Total Solids	*	36	
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Parameter	Reporting Level Bq/L	Total number of Analyses	Exceed Reporting Level No (%)
Radioactivity - alpha	0.1	17	0
Radioactivity - beta	0.1	17	0

Drinking Water Quality Performance

Organic chemicals

The reporting levels are based on National Health and Medical Research Council 1987 guidelines. Results should not exceed the reporting levels. Sampling is conducted at headworks reservoirs.

Parameter	Reporting Level µg/L	No. of Analyses	Exceed Reporting Level No (%)
PESTICIDES			
Aldrin	1	21	0
Dieldrin	1	21	0
Chlordane	6	21	0
DDT	3	21	0
Heptachlor	3	21	0
Heptachlor epoxide	3	21	0
Lindane	100	21	0
2,4-D	100	21	0
INDUSTRIAL CHEMICALS			
Carbon tetrachloride	3	21	0
Tetrachloroethene	10	21	0
Trichloroethene	30	21	0
1,1-Dichloroethene	0.3	21	0
1,2-Dichloroethane	10	21	0
Benzene	10	21	0
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)			
Benzo-a-pyrene	0.01	21	0

BYPRODUCTS OF DISINFECTION			
Pentachlorophenol	10	21	0
2,4,6-Trichlorophenol	10	21	0
TRIHALOMETHANES (THMs)			
	0.2*	42	0
Bromoform	#	42	
Dibromochloromethane	#	42	
Bromodichloromethane	#	42	
Chloroform	#	42	
CHLOROACETIC ACIDS			
Chloroacetic acid	#	42	0
Dichloroacetic acid	#	42	0
Trichloroacetic acid	#	42	0

Notes:

- * Guideline refers to all THMs present
- # No guideline value set

Drinking Water Quality Performance

Routine pathogen monitoring

Parameter	Reporting Level	No. of Analyses	Detection Rate No (%)
Should not be detected			
<i>Yersinia</i> spp	Detected (per 2 litres)	129	0
<i>Salmonella</i> spp	Detected (per 2 litres)	129	0
<i>Campylobacter</i> spp	Detected (per 2 litres)	129	0
<i>Vibrio</i> spp	Detected (per 2 litres)	129	0
Enteroviruses by PCR			
adenovirus	Detected (per 20 litres)	129	0
rotavirus	Detected (per 20 litres)	129	0
hepatitis A	Detected (per 20 litres)	129	0
norwalk virus G1 Genotype	Detected (per 20 litres)	129	0
Norwalk virus G2 Genotype	Detected (per 20 litres)	129	0
Norwalk like virus	Detected (per 20 litres)	129	0
No guideline set			
<i>Faecal Streptococci</i>	Detected (per 100mL)	129	0
<i>Legionella</i> species	Detected (per 2 litres)	129	0
<i>Legionella</i> PN SG 1	Detected (per 2 litres)	129	0
<i>Legionella</i> PN SG2-14	Detected (per 2 litres)	129	0
<i>Clostridium perfringens</i>	Detected (per 100mL)	129	0
<i>Pseudomonas aeruginosa</i>	Detected (per 100mL)	129	0
<i>Aeromonas</i>	Detected (per 100mL)	129	6 (4.7)

Note: *Pseudomonas aeruginosa* and *Aeromonas* are present to some degree in all water systems and are a measure of the health of the systems. They can grow on the inside of the distribution pipes and are only considered a problem if numbers are very high or many samples are positive, which has not been the case here.

Environmental Performance

Melbourne Water aims to manage Melbourne's water resources in a sustainable manner, and we are committed to protecting and improving the environment beyond our compliance requirements. Our strategy includes consultation, education and transparent reporting, particularly in regard to the operation of our two major sewage treatment plants. A key objective is to effectively balance environmental protection with economic development in delivering a sustainable water supply for future generations.

The following data provides detailed information on our performance in 2003/04 in regards to the inputs and discharges from our treatment plants. Melbourne Water's sewerage system includes Melbourne's two major sewage treatment plants and some 400 kilometres of sewers. We also provide detailed information on the state of the almost 5200 kilometres of rivers and creeks, which Melbourne Water is responsible for managing, including 1200 kilometres in forested areas and closed water supply catchments. This report also details our progress in meeting our objectives to reduce our greenhouse gas emissions by 35% by 2005/06 and cut our use of electricity from the grid by 10% compared to 2000/01 levels.

Melbourne Water also has detailed information in our *2003/04 Annual Report* on our water recycling initiatives, which form a key part of Melbourne Water's future and will play a major role in reducing the amount of treated effluent being discharged into the marine environment.

Click on the following links for information on Melbourne Water's:

- [Environment Policy](#)
- [Eastern Treatment Plant inputs and discharges](#)
- [Western Treatment Plant inputs and discharges](#)
- [Rivers and creeks water quality monitoring](#)
- [Energy and greenhouse data](#)
- [Water recycling initiatives \(466kb .pdf file\)](#)

Environmental Performance

Environment Policy

Purpose

To manage Melbourne's water resources and the environment in a sustainable manner.

Objective

To ensure that Melbourne Water meets its environmental obligations and community expectations.

Policy Statement

Melbourne Water will:

- Comply with statutory and corporate requirements.
- Develop strategies consistent with broader community expectations which contribute to a more sustainable water industry
- Involve customers, stakeholders and the community in current activities, new projects and strategies through consultation and education programs.
- Integrate environmental management with decision making, business planning and economic evaluation processes.
- Apply an integrated water cycle approach to our water resource management.
- Achieve the following key environmental objectives:

100% compliance with statutory and agreed environmental requirements	Continuously
Implement best-practice stormwater performance objectives for urban development	Continuously
Contain all sewage flows during a 1-in-5-year rainfall event and have no sewage spills due to the operational failure of Melbourne Water's systems from either equipment breakdown or human error	Continuously
Generate the same amount of green energy as grid imported electricity	2006
Achieve a 35% reduction in the organisation's greenhouse gas emissions	2006
Reduce the annual nitrogen load entering Port Phillip Bay from Western Treatment Plant by 500 tonnes and contribute to a reduction of 500 tonnes from catchment sources	2006
No offensive odour from any Melbourne Water site	2007

Eliminate the discharge of litter in treated effluent from Melbourne Water sewage treatment plants	2008
Recycle 20% of effluent from sewage treatment plants	2010
Recycle 100% of biosolids produced at our sewage treatment plants	2010
Contribute to the Government's target for a 15% reduction in water consumption	2010
Ensure all of greater Melbourne's natural waterways are in good condition	2025

Melbourne Water will fulfil this policy by:

- Balancing environmental protection and economic development in the interests of both the present and future generations.
- Implementing this policy and procedures within the framework of an environmental management system certified to ISO 14001.
- Applying Melbourne Water's risk management framework by targeting areas of highest environmental risk
- Minimising the environmental impact of the organisation's activities and ensuring that its people and contractors:
 - are equipped to anticipate and manage the environmental risks and responsibilities of day-to-day work as well as more infrequent work such as construction activities; and
 - take all reasonable care to address the environmental aspects of business activities.
- Undertaking research and development and contributing to the transfer of environmentally sound technology and management methods throughout the water industry.
- Applying the waste management hierarchy when identifying and implementing waste minimisation strategies (including the recycling and reuse of products) to minimise risk and add value to the business.

Related Policies/Procedures

Public Health Policy
 Risk Management Policy

Responsible Person

Group Manager, Research and Technology

Authority

Managing Director

Last Review Date

January 2004

Next Review Date

January 2005

Environmental Performance

Eastern Treatment Plant inputs and discharges

Raw sewage monitoring

The quality of raw sewage entering the plant is described in the following table. (All data in mg/L unless otherwise indicated)

Parameter, Units	Median	90th Percentile	Maximum
BOD ₅	400	630	870
Suspended Solids	385	790	790
pH (pH units)	6.9	7.1	7.1
Ammonia as N	34	40	41
Total Combined Nitrogen	73	95	120
Total Phosphorus	17	27	29
Anionic Surfactants MBAS	5.7	9.5	12
Cadmium	0.0009	0.0013	0.0017
Chromium	0.066	0.13	0.21
Copper	0.15	0.3	0.42
Lead	0.011	0.022	0.038
Mercury	0.00025 ₁	0.0006 ₁	0.0011 ₁
Phenol (µg/L)	2.5 ₁	16 ₁	21 ₁
Toluene (µg/L)	4 ₁	6 ₁	6 ₁
Benzene (µg/L)	0.5 ₁	0.5 ₁	3 ₁
PAH's total (µg/L)	4 _{1,2}	4 _{1,2}	4 _{1,2}

Notes to Table:

¹ 1/2 Limit of Detection Values used. All results found to be less than the detection limits were taken as half the given value i.e. <2 = 1.

² Total PAH's are calculated using the sum of the following PAH's:

(acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo (k) fluoranthene, 1,12-benzoperylene, benzo(a) pyrene, chrysene, dibenzo(a,h)anthracene, fluorene and indeno(1.2.3-cd)pyrene. All results were less than the detection limit and were calculated at half the given value i.e. <2 = 1).

Discharge to water

The following results represent samples taken from the final effluent sample point and flow measurements at the Eastern Treatment Plant from 1 July 2003 to 30 June 2004.

Parameter, Units	Median		90th Percentile		Maximum	
	Licence Limit	Result	Licence Limit	Result	Licence Limit	Result
BOD ₅ (mg/L)	NS ₅	23	NS ₅	36		44
CBOD ₅ (mg/L)	20	5	40	8		13
Suspended Solids (mg/L)	30	10	60	26		52
pH (pH units)		7.2		7.5	6 - 9	6.3-7.6
Ammonia as N (mg/L)	30	14		22.5	40	27
Total Combined Nitrogen (mg/L)		24.5		28		34
Total Phosphorus (mg/L)		6.3	15	8.3		9.6
Anionic Surfactants (mg/L)	0.4	0.2	0.7	0.4		0.5
Cadmium (mg/L)		0.0001 ₁	0.005	0.0001 ₁	0.01	0.0001 ₁
Chromium (mg/L)		0.006	0.075	0.011	0.15	0.024
Copper (mg/L)		0.013	0.05	0.02	0.1	0.026
Lead (mg/L)		0.001 ₁	0.05	0.002 ₁	0.1	0.002 ₁
Mercury (mg/L)		0.00005	0.0005	0.000075	0.001	0.0001
Phenol (µg/L)		0.5		0.5	100	0.5
Toluene (µg/L)		0.5		1.0	50	1
Benzene (µg/L)		0.5		0.5	25	0.5
PAH's total (µg/L) ₂		4		4	15	4
ETP Final Effluent Flow (ML/day) ₃		340		444		612
Outfall Flow (ML/day) ₄	540	358		468	770	643
Total Residual Chlorine (mg/L)		0.05		0.08	1.0	0.79
<i>E. coli</i> (org/100mL)	200	18	1000	138		400
Dissolved Oxygen (mg/L)		6.8		7.3	>6.0	6.8-7.3

Notes to Table:

¹ All results found to be less than the detection limit were taken as half the limit of detection (LOD) i.e. <8 = 4.

² Total Poly Aromatic Hydrocarbons (PAH's) are calculated using the sum of the following PAH's: (acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo (k) fluoranthene, 1,12-benzoperylene, benzo (a) pyrene, chrysene, dibenzo (a,h) anthracene, fluorene and indeno (1.2.3-cd) pyrene.

³ ETP outflow data corrected for median daily internal plant usage. The flow data is measured at the Eastern Treatment Plant.

⁴ Calculated Total Outfall flow is the actual flow to the Outfall. Includes local South East Water Treatment Plant inputs and (average per quarter)

recycled water usages.

⁵ NS = No specified limit

Discharge to land

The following results detail the quality of effluent discharged to land at the Eastern Treatment Plant (for irrigation purposes) as sampled from the final effluent sample point and the Eastern Treatment Plant reuse sample point from 1 July 2003 to 30 June 2004.

Parameter, Units	Unit	Median	90th Percentile
<i>E. coli</i> ¹	Org/100mL	17	277
Electrical Conductivity ²	µS/cm	925	990
BOD ₅₂	mg/L	32	60
CBOD ₅₂	mg/L	6	11

¹ Sample taken from the reuse sample point

² Sample taken from the final effluent sample point

Effluent flow to the outfall

Daily and monthly median and maximum flows (ML/day) were measured during 2003/04. Monthly median and maximums are shown below. The total outfall flows for 2003/04 are as follows:

Description	Flow (ML)	Comment
ETP Outflow	130,516	Total OPS flow minus internal plant recycle
Calculated Outfall flow	137,943	Boags Rocks Outfall flow (ETP plus South East Water treatment plant flows, less water recycling)

Month	Median (ML)	Maximum (ML)
July 2003	357	612
August 2003	434	604
September 2003	376	463
October 2003	409	506
November 2003	377	528
December 2003	350	494
January 2004	315	432
February 2004	326	357

March 2004	309	361
April 2004	322	452
May 2004	329	419
June 2004	391	580

Bacteriological monitoring - beach samples

Samples of receiving waters were taken throughout the year at six locations along the Gunnamatta and St Andrews beaches as detailed below:

- Beach 1 - The first bluff east of the discharge point
- Beach 2 - Gunnamatta West beach opposite the amenities block
- Beach 3 - Gunnamatta West beach opposite the Surf Life Saving Club house
- Beach 4 - Gunnamatta East beach approximately 350 metres east of Beach 2
- Beach 5 - Le Lievres beach 110 metres west of the discharge point
- Beach 6 - Rye back beach - main swimming area.

The results are as follows:

42-day period ending	Geometric (Log) Mean (org/100mL) ¹ SEPP (Waters of Victoria) Objective: <200 org/100mL					
	Beach 1	Beach 2	Beach 3	Beach 4	Beach 5	Beach 6
14 August 2003	1.4	1.4	1.1	1.1	1.3	1.1
25 September 2003	1.4	1.3	1.1	1.0	6.5	1.1
5 November 2003	2.1	1.1	2.0	4.0	21.0	3.2
17 December 2003	2.5	1.3	1.9	1.2	5.5	1.1
29 January 2004	2.3	1.0	1.0	2.0	5.6	1.4
9 March 2004	1.3	1.0	1.0	2.8	2.3	1.8
20 April 2004	1.4	1.1	1.0	1.1	2.0	1.6
4 June 2004	3.2	1.9	1.3	1.7	2.9	1.1
28 June 2004	3.1	1.3	1.3	1.6	2.4	1.0

¹ samples of zero *E. coli* were assumed to have a level of 1.0 to determine the geometric mean

42-day period ending	80th Percentile (org/100mL) SEPP (Waters of Victoria) Objective: <400 org/100mL					
	Beach 1	Beach 2	Beach 3	Beach 4	Beach 5	Beach 6

14 August 2003	2	2	0	0	2	0
25 September 2003	2	2	0	0	10	0
5 November 2003	4	0	0	0	12	4
17 December 2003	4	0	2	0	10	0
29 January 2004	4	0	0	2	14	2
09 March 2004	0	0	0	0	0	2
20 April 2004	2	0	0	0	4	2
04 June 2004	8	2	0	2	18	0
28 June 2004	14	2	2.4	4	10	0

Discharges to air

Gas emissions from one of the engines in the outfall pumping station were sampled for nitrogen oxides, carbon monoxide, sulphur dioxide, hydrogen sulphide and volatile organic compounds as required by the discharge licence. The following table contains a comparison between the test results and the licence limits.

Parameter	Maximum Rate (g/min)		Maximum Concentration (mg/m ³)	
	Limit	Result	Limit	Result
Nitrogen oxides	500	49	2600	670
Carbon Monoxide	300	135	2600	470
Sulphur Dioxide	7.5	1.3	40	18
Hydrogen Sulphide	0.5	<0.006	2	<0.08
Volatile organic compounds	20	1.34	100	18.81

Biological Odour Control Facility

The Biological Odour Control Facility on Eastern Treatment Plant's return activated sludge channel operated during 2003/04. The previous licence limit for odour discharge from the stack was removed in March 2004 on the basis that:

- The stack licence requirement was inconsistent with the off-site no odour requirement
- A well performing biofilter will have its own inherent odour of approximately 500-1,000 odour units adjacent to the stack.

Since the commissioning of the facility, the odour performance in the vicinity of the plant has improved. The plant was sampled once during 2003/04, with results as follows:

Parameter	Licence Limit (Max Conc.)	Sample Result 13/5/2004
Outlet Odour (av., OU)	Not specified	12,000
Outlet H2S (av., mg/m ³ NTP)	Not specified	0.39

Environmental Performance

Western Treatment Plant inputs and discharges

Raw sewage monitoring

(All data in mg/L unless otherwise indicated)

Parameter	Median	90th Percentile	Maximum
Flow (ML/day)	468	519	845
BOD ₅	400	540	1,100
Suspended Solids	350	450	720
Ammonia as N	34	37	69
Total Nitrogen	71	82	100
Total Phosphorus	14	16	20
Colour (Pt/Co units)	95	100	120
Anionic Surfactants	5.5	7.1	8.2
Silicate	14	15	21
Electrical Conductivity (µS/cm)	1,900	2,100	2,500
TDS	1,000	1,200	1,500
Cadmium	0.0004	0.00069	0.0009
Chromium	0.036	0.0485	0.05
Copper	0.13	0.159	0.16
Lead	0.0155	0.0262	0.029
Mercury	0.0003	0.0005	1.5
Nickel	0.0275	0.042	0.05
Zinc	0.185	0.284	0.67
pH (pH units)	7.1	7.3	7.6
Benzene	0.003	0.0097	0.011
Toluene	0.002	0.0084	0.013
Phenol (total)	0.16	0.341	0.69
Total PAHs	0.0105	0.0272	0.03

Licence compliance

The following tables show the plant's compliance performance. Plant wide limits for all discharge parameters in the licence are based on a weighted average calculated using the formula:

$$\sum \frac{\text{Flow from each discharge point multiplied by the concentration of the waste indicator}}{\text{Flow from each discharge point}}$$

There is a plant wide limit of 700 million litres a day averaged over the year. The environment improvement plan has a target of 3200 tonnes a year of nitrogen by 2005. The Western Treatment Plant complied with licence waste discharge limits for all parameters.

Annual and average daily discharges for 2003/04

Outlet	Total Flow (ML)	Average Daily Flow (ML)
15 East	81,418	222
145 West	20,847	57
Lake Borrie	8,939	24
Murtcaim	9,389	26
Total	120,593	329

Annual discharge to Port Phillip Bay

The results for 2003/04 are shown below:

Flow weighted parameters (All data in mg/L unless otherwise indicated)

Parameter	Median		90th Percentile		Maximum	
	Limit	Result	Limit	Result	Limit	Result
CBOD	25	4		8		10
BOD ₅		12		26		48
Suspended Solids	100	23	130	39		51
Ammonia as N	25	14		19	40	23
Total Nitrogen		23		29		33
Total Phosphorus		10	15	11		13
Dissolved oxygen		7.5		8.7		10.8
pH units		7.9		8.0		8.2
Colour (Pt/Co units)		78	600	129		137
Anionic Surfactants	0.05	0.24		0.39	1	0.41

Silicate		16		17		17
Electrical Conductivity ($\mu\text{S}/\text{cm}$)		2,874		4,355		5,381
Cadmium	0.005	0.0002		0.0004	0.01	0.0010
Chromium	0.05	0.009		0.017	0.15	0.019
Copper	0.05	0.011		0.017	0.1	0.024
Lead	0.05	0.003		0.007	0.1	0.009
Mercury	0.0005	0.00007		0.00011	0.001	0.00024
Nickel	0.05	0.018		0.025	0.15	0.026
Zinc	0.1	0.020		0.030	0.25	0.055
Benzene		0.001		0.001		0.001
Toluene		0.001		0.001		0.001
Total Phenol		0.007		0.008		0.011
Total PAHs		0.004		0.004		0.004
<i>E. coli</i> (org/100mL)		795		5,494		13,415

Annual nitrogen load to Port Phillip Bay

Total nitrogen discharged from the Western Treatment Plant is below the target of 3100 tonnes per year. The increase during 2003/04, compared with 2002/03, is as a result of process adjustments from construction activities to enhance the 25 West lagoon. With the commissioning of this project and with increased use of recycled water, the total nitrogen levels are expected to decrease further.

Annual nitrogen load from Western Treatment Plant - four-year summary

Year	2003/04	2002/03	2001/02	2000/01	3 Year Average	2001 EIP Target	January 2005 EIP Target
Total N Load (tonnes/annum)	2,769	2,160	2,661	3,740	2,530	3,500	3,100

Dioxins and furans

Melbourne Water monitors polychlorinated dibenzo dioxins and furans as toxic equivalents of 2,3,7,8 tetrochloro-dibenzo-p-dioxin. Sampling is carried out at the 15 East outlet in January, 145 West outlet in April, Lake Borrie outlet in July and Murtcaim Outlet in October each year. Raw sewage is sampled each time an outlet is sampled.

Toxic equivalent (TEQ) are calculated for each sample using the World Health Organization's toxic equivalency factors (WHO98-TEQ) method and are represented below. Results for preceding years are also presented for comparison.

World Health Organization total toxic equivalents of 2,3,7,8 TCDD (All results in pg/L)

SITE	WHO 98-TEQ - Excluding LOD Values			WHO98-TEQ - Including Half LOD Values		
	2003/04	2002/03	2001/02	2003/04	2002/03	2001/02
Lake Borrie (July)	7.1	16.39	0.26	11	24.57	14.59
Murtcaim (October)	0.64	2.72	0.79	2.3	5.60	26.1
15E (January)	0.07	0.03	0.00	1.1	0.28	7.61
145W (April)	7.3	0.99	1.19	9.0	3.87	18.63
Raw Sewage (July)	1.7	7.35	6.38	3.2	12.12	13.03
Raw Sewage (October)	3.9	4.17	11.43	6.9	6.84	32.01
Raw Sewage (January)	2.7	2.24	1.04	3.4	2.61	7.29
Raw Sewage (April)	10	5.78	3.36	13	6.76	26.61

Bacteriological monitoring

Melbourne Water conducts bacteriological monitoring by collecting a sample of seawater in 60 centimetre depth of water off-shore from the public access points to Port Phillip Bay at Beach Road and 160 South Road every seven days. Samples are analysed to determine the concentration of *E. coli* in the sample.

The State Environment Protection Policy Waters of Victoria has a requirement for the 42-day geometric mean to be less than 1000 *E. coli* organisms/100ml. The results are detailed in the table below:

42-Day Geometric Means and 80th Percentiles for 2003/04 (All results orgs/100 ml)

42 Day Period Ends	Geometric Mean		80th percentile	
	160 South Rd	Beach Rd	160 South Rd	Beach Rd
30 Jul 2003	4	2	81	11
9 Sept 2003	8	10	8	4
21 Oct 2003	32	220	10	2
2 Dec 2003	14	4	14	4
13 Jan 2004	0	0	14	4
24 Feb 2004	0	20	20	8
7 April 2004	28	70	3	20
19 May 2004	0	20	28	20

Environmental Performance

Rivers and creeks water quality monitoring

Melbourne Water monitors the water quality of rivers and creeks at over 70 sites throughout the Melbourne and metropolitan area, which are highlighted on the following map. The data collected from these sites assists Melbourne Water in determining the priorities for rehabilitation of rivers and creeks. The following information outlines Melbourne Water's compliance with the State Environment Protection Policy from 1 July 2003 to 30 June 2004; the results of our monitoring of rivers and creeks and our performance in meeting EPA Victoria requirements to alert the agency to problem spots in rivers and creeks.

Please note: the following tables refer to the monitoring sites depicted in the map.



Please note: for explanations of the terms below, [click here](#).

State Environment Protection Policy (SEPP) objectives for greater Melbourne's rivers and creeks

SEPP	DO mg/L min	Turb NTU/FTU Median	SS mg/L Median	TN mg/L Max	TP mg/L max	<i>E. coli</i> org/100mL Geomean	Pb mg/L max	Zn mg/L max
Waters of the Yarra Catchment								
Rural eastern waterways	>6.0	<15	<20	<0.60	<0.05	<200	<0.002	<0.005
Rural western waterways	>6.0	<25	<25	<0.60	<0.05	<200	<0.002	<0.005
Yarra tributaries - southern	>6.0	<25	<25	<1.00	<0.10	<1000	<0.002	<0.005
Yarra tributaries - northern	>6.0	<25	<25	<1.00	<0.10	<1000	<0.002	<0.005
Urban waterways - Yarra mainstream	>6.0	<25 _a /30 _b	<25 _a /50 _b	<0.90	<0.08	<200	<0.002	<0.005
Waters of Western Port and catchment								
Western Port waterways - peninsula	>6.0	<25*	<25*	<0.75	<0.1	<1000	<0.01	<0.005
Western Port waterways - eastern	>6.5	<25*	<25*	<0.75	<0.1	<200	<0.01	<0.005

SEPP	DO % saturation 25th %	Turb NTU 75th %	SS	TN mg/L 75th %	TP mg/L 75th %	<i>E. coli</i> org/100 mL median of 5 samples within 30 days	Pb mg/L ANZECC Trigger Level	Zn mg/L ANZECC Trigger Level
Waters of Victoria								
Balcombe Creek	≥ 85	≤ 10	NS	≤ 0.6	≤ 0.045	≤ 150	≤ 0.034	≤ 0.08
Maribyrnong River and tributaries	≥ 85	≤ 10	NS	≤ 0.6	≤ 0.045	≤ 150	≤ 0.034	≤ 0.08
Maribyrnong River - estuarine	≥ 85	≤ 10	NS	≤ 0.6	≤ 0.045	≤ 150	≤ 0.034	≤ 0.08
Dandenong Creek and major tributaries	≥ 85	≤ 10	NS	≤ 0.6	≤ 0.045	≤ 150	≤ 0.034	≤ 0.08
Mordialloc and Kananook creeks	≥ 85	≤ 10	NS	≤ 0.6	≤ 0.045	≤ 150	≤ 0.034	≤ 0.08

Mordialloc and Kananook Creek tributaries	≥ 85	≤ 10	NS	≤ 0.6	≤ 0.045	≤ 150	≤ 0.034	≤ 0.08
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Note:

(a) - Yarra mainstream u/s of Diamond Creek confluence

(b) - Yarra mainstream d/s of Diamond Creek confluence.

* The State Environment Protection Policy does not stipulate an objective, therefore this report has assumed a commonly accepted figure for the catchment. Policies for the south eastern and western waterways do not stipulate an objective for total nitrogen or total phosphorus. Therefore, ANZECC figures have been used (<0.75 mg/L and <0.1 mg/L respectively).

Rivers and creeks water quality monitoring results

Site No.	Description	DO % saturation 25th %	DO mg/L	Turb NTU	SS mg/L	Total-N mg/L	Total P mg/L	<i>E. coli</i> org/100 mL	Pb mg/L	Zn mg/L
Maribyrnong River and tributaries and other western waterways										
66	Maribyrnong River at Brimbank Park Ford, Keilor	66	8.90	9.5	9.00	1.32	0.057	120.0	0.003	0.009
68	Steele Creek at Rose Avenue, Niddrie	68	9.65	12.5	5.50	0.92	0.066	460.0	0.005	0.081
67	Maribyrnong River at Canning Street Ford, Avondale Heights	67	8.50	10.5	15.50	1.37	0.057	150.0	0.004	0.014
71	Kororoit Creek at Racecourse Road Ford, Altona	71	8.20	31.0	34.50	1.57	0.170	430.0	0.009	0.036
70	Kororoit Creek at Millbank Drive, Deer Park	70	7.55	9.5	6.00	0.86	0.044	70.0	0.005	0.017
72	Skeleton Creek at Ayr Street, Laverton	72	7.45	25.5	18.50	0.91	0.155	610.0	0.006	0.025
69	Stony Creek at Bena Street, Yarraville	69	9.10	9.0	15.00	3.89	0.200	960.0	0.013	0.195
Mordialloc and Kananook creeks and Mornington Peninsula waterways										
43	Mordialloc Creek at Wells Road, Mordialloc	77	8.70	52.0	31.00	1.60	0.180	300.0	0.005	0.092
44	Kananook Creek at Wells Street, Frankston	84	8.50	5.0	15.50	0.97	0.096	120.0	0.005	0.036

52	Warrangine Creek at Frankston-Flinders Road, Hastings	78.5	8.20	10.0	10.00	1.46	0.051	130.0	0.006	0.017
50	Watsons Creek at Dandenong-Hastings Road, Somerville	77.5	8.50	41.0	14.00	17.32	0.450	700.0	0.003	0.040
46	Balcombe Creek at Uralla Dve footbridge, Mt Martha	78.5	8.70	12.0	3.00	1.44	0.046	110.0	0.003	0.037
48	Chinamans Creek at Eastbourne Road, Rosebud West	50.5	4.80	8.0	6.00	0.99	0.061	1100.0	0.003	0.021
49	Main Creek at Boneo Road, Flinders	91.5	9.20	5.0	4.00	0.66	0.018	240.0	0.002	0.007
47	Dunns Creek at Marine Drive, Safety Beach	86.5	8.90	7.0	4.00	1.24	0.052	820.0	0.004	0.011

Waters of Dandenong Valley

39	Mile Creek at Cheltenham Road, Keysborough		8.40	11.0	7.00	1.41	0.061	780.0	0.003	0.270
42	Eumemmerring Creek at Worsley Road, Bangholme	77	8.60	22.0	16.00	2.01	0.140	200.0	0.003	0.045
40	Patterson River at National Water Sports Centre outlet, Bangholme	86	10.30	51.0	30.00	1.62	0.140	100.0	0.005	0.073
35	Dandenong Creek at Boronia Road, Wantirna	65	8.50	9.0	15.25	1.01	0.096	200.0	0.005	0.064
41	Hallam Main Drain at South Gippsland Highway Hampton Park	75	7.50	15.0	11.00	1.24	0.071	240.0	0.003	0.017
36	Dandenong Creek at Stud Road, Dandenong North	86.5	8.90	23.0	14.00	1.37	0.076	400.0	0.003	0.074
37	Dandenong Creek at Pillars Crossing, Dandenong South	87	10.70	30.0	20.00	1.45	0.087	700.0	0.005	0.110
38	Corhanwarrabul Creek at Wellington Road, Rowville	86.5	10.10	22.0	10.00	1.13	0.070	220.0	0.003	0.043
34	Dandenong Creek at Sheffield Road, Doongalla Forest	77	9.70	11.0	8.00	1.38	0.023	60.0	0.001	0.006

45	Elster Creek at Cochrane Street, Elwood	101.75	10.45	9.0	5.50	1.79	0.115	770.0	0.003	0.285
Western Port waterways										
55	Toomuc Creek at Princes Highway, Pakenham		9.70	32.5	10.50	1.21	0.063	540.0	0.006	0.015
54	Cardinia Creek at Ballarto Road, Cardinia		10.20	19.0	12.00	0.71	0.044	140.0	0.005	0.012
57	Deep Creek at Ballarto Road, Rythdale		8.60	110.0	84.00	2.22	0.400	320.0	0.004	0.027
65	Lang Lang River at Douin-Poowong Road, Athlone		9.60	17.0	8.00	1.52	0.086	580.0	0.009	0.007
61	Bunyip River at Little Road, Iona		9.60	15.0	9.00	0.57	0.027	660.0	0.007	0.007
58	Tarago River at Morrisons Road, Labertouche		9.80	11.0	7.00	0.55	0.032	360.0	0.005	0.008
64	Lang Lang River at South Gippsland Highway, Lang Lang		8.95	47.5	40.50	2.12	0.140	260.0	0.007	0.007
63	Yallock Outfall at South Gippsland Highway, Monomeith		7.80	75.5	60.50	4.07	0.135	410.0	0.004	0.012
59	Bunyip River at North Labertouche Road, Tonimbuk		10.10	21.0	12.00	0.69	0.021	40.0	0.004/td>	0.006
60	Bunyip River downstream Cannibal Creek, Longwarry North		9.70	19.0	7.00	0.80	0.029	460.0	0.005	0.006
62	Bunyip River at Healesville-Koo Wee Rup Road, Koo Wee Rup		10.50	15.0	7.00	0.53	0.027	200.0	0.008	0.010
53	Cardinia Creek at Cadwick Road, Upper Beaconsfield		9.00	12.0	5.00	0.67	0.033	140.0	0.003	0.009
56	Toomuc Creek at Ballarto Road, Rythdale		9.05	32.0	18.00	1.86	0.099	80	0.001	0.015

Yarra Catchment - northern urban tributaries

32	Merri Creek at Roseneath Street, Yarra Bend		9.85	15.0	8.50	1.31	0.089	380.0	0.006	0.059
33	Moonee Ponds Creek at Mt Alexander Road, Parkville		9.15	11.5	10.50	2.09	0.082	550.0	0.005	0.054
31	Darebin Creek at Clark Road footbridge, Ivanhoe		10.50	17.0	6.00	1.33	0.091	460.0	0.004	0.084
30	Plenty River at Henty Road, Lower Plenty		8.50	47.0	20.00	1.28	0.073	420.0	0.005	0.034
29	Diamond Creek at Main Road, Eltham		8.70	61.0	22.00	1.31	0.090	440.0	0.005	0.056

Yarra Catchment - rural eastern and western waterways

16	Watsons Creek at Henley Road, Kangaroo Ground		10.00	3.0	3.50	0.51	0.011	80.0	0.006	0.005
20	Merri Creek at Summerhill Road, Craigieburn		9.10	8.0	8.00	0.99	0.095	60.0	0.004	0.009
19	Plenty River at Plenty Gorge, South Morang		8.50	22.0	5.00	1.32	0.062	40.0	0.002	0.008
17	Arthurs Creek at Burkes Bridge, Hurstbridge		8.60	31.0	9.00	1.22	0.051	190.0	0.003	0.010
18	Diamond Creek at Cottles Bridge-Strathewen Road, Cottles Bridge		9.45	27.0	4.00	1.59	0.049	200.0	0.003	0.014
14	Steels Creek at Healesville Road, Yarra Glen		7.85	33.0	5.00	1.19	0.040	80.0	0.002	0.030
13	Watts River at Healesville-Kinglake Road, Healesville		9.90	8.0	3.00	0.76	0.021	270.0	0.003	0.009
12	Wandin Yallock Creek at Killara Road, Gruyere		10.10	12.0	6.00	1.23	0.021	170.0	0.004	0.008
9	Woori Yallock Creek at Warburton Highway, Woori Yallock		10.10	19.0	10.00	1.35	0.025	120.0	0.001	0.006
10	Woori Yallock Creek at Macclesfield Road, Yellingbo		8.90	21.0	9.00	1.20	0.023	60.0	0.002	0.006

11	Cockatoo Creek at Tschampions Road, Macclesfield		9.90	16.0	17.00	1.82	0.026	30.0	0.002	0.008
8	Little Yarra River at Corduroy Road, Yarra Junction		10.60	10.0	9.00	0.71	0.019	200.0	0.002	0.005

Yarra Catchment - southern urban tributaries

28	Gardiners Creek at South Eastern Freeway, Hawthorn		10.25	20.0	9.00	1.92	0.104	810.0	0.006	0.100
27	Koonung Creek at Bulleen Road, Bulleen			17.0	11.00	1.62	0.100	1800.0	0.004	0.084
25	Mullum Mullum Creek at Deep Creek Reserve, Warrandyte		9.60	23.0	11.00	3.47	0.350	700.0	0.004	0.039
24	Andersons Creek at Everard Drive, Warrandyte		10.20	28.0	19.00	3.07	0.240	480.0	0.004	0.020
22	Brushy Creek at Lower Homestead Road, Wonga Park		7.90	12.0	9.00	7.51	0.690	340.0	0.002	0.042
23	Jumping Creek at Jumping Creek Road, Wonga Park		9.40	9.0	6.00	1.23	0.046	300.0	0.001	0.015
26	Ruffey Creek at Parker Street, Templestowe		10.50	6.0	3.00	2.12	0.150	720.0	0.003	0.054
21	Olinda Creek at Macintyre Lane, Coldstream		9.20	16.0	10.00	2.93	0.100	260.0	0.002	0.014
21	Stringybark Creek at Melba Highway, Yering		8.70	13.0	5.00	1.28	0.028	160.0	0.006	0.009

Yarra Catchment - Yarra mainstream and estuary

6	Yarra River at Chandler Highway, Kew		9.70	39.5	27.00	1.37	0.071	170.0	0.005	0.023
7	Yarra River at Princes Bridge, South Melbourne		8.95	16.0	20.00	1.23	0.100	400.0	0.004	0.024
5	Yarra River at Kangaroo Ground-Warrandyte Road, Warrandyte		10.90	9.0	6.00	1.14	0.047	120.0	0.003	0.006

4	Yarra River at Spadonis Reserve, Coldstream		9.85	15.5	11.50	1.19	0.033	180.0	0.001	0.009
3	Yarra River at Maroondah Highway, Healesville		10.50	10.0	7.00	0.77	0.021	180.0	0.003	0.006
2	Yarra River at Don Road, Launching Place		10.30	6.0	4.00	0.67	0.014	220.0	0.002	0.006
1	Yarra River at McKenzie-King Drive, Millgrove		11.30	7.0	3.00	0.56	0.010	100.0	0.003	0.006

Terms used

DO : Dissolved Oxygen

E. coli : Escherichia coli

Pb : Total Lead

SS : Total Suspended Solids

TN : Total Nitrogen

TP : Total Phosphorus

Turb : Turbidity

Zn : Total Zinc

Alerting EPA Victoria to problem spots in rivers and creeks

Alert levels are generally well above water quality objectives specified in relevant State environment protection policies, representing instances of particularly undesirable water quality. Melbourne Water is required to report all alert-level exceedances that occur within our operating area to EPA Victoria. The notifications identify sites that often experience poor water quality and also provide a mechanism for locating and mitigating chronic pollution problems.

During 2003/04, there were a total of 395 alert level exceedances reported to EPA Victoria, or approximately 2% of the 18,000 analyses performed.

The key problem sites for the year included:

- Watsons Creek at Dandenong-Hastings Road, Somerville, most probably due to fertiliser run-off from market gardens upstream
- Brushy Creek at Lower Homestead Road bridge, Wonga Park, showed elevated nutrient levels due to the sewage treatment plant upstream
- Stony Creek at Bena Street, Yarraville, due to the highly urbanised and industrial catchment of Stony Creek.

The following table shows how alert level exceedances have varied over the past five years.

Year	Alert level exceedances
1998/99	462
1999/00	492
2000/01	511
2001/02	246
2002/03	343
2003/04	395

Environmental Performance

Energy and greenhouse data

Melbourne Water has established an inventory of its greenhouse gas emissions to better understand the impact our operations have on the global climate. Melbourne Water has selected 2000/01 as a baseline year for performance comparisons. The inventory can include planned changes to assets and operational management and it is used to forecast how these changes will affect our emission performance. Each year, the actual operational data related to energy use and greenhouse emissions is added to the inventory so that annual performance can be calculated and compared with forecast performance. The following tables show Melbourne Water's performance for 2003/04.

Total emissions (carbon dioxide equivalent, tonnes)

	Actual				Forecast			
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Electricity (purchased from grid)	272,416	278,415	260,657	288,394	290,711	244,616	258,258	247,575
Natural gas (for general)	82	90	90	90	90	90	90	90
Natural gas (for electricity, shaft power and heat)	3,856	1,764	4,947	5,889	6,039	17,259	17,307	17,357
Diesel transport	169	201	475	839	201	201	201	201
Diesel (for electricity, shaft power and heat)	3,790	3,920	3,849	3,880	3,587	60	60	60
Liquefied petroleum gas (LPG)	73	106	97	109	106	106	106	106
Petrol	2,020	2,133	2,267	2,314	2,014	2,014	2,014	2,014
Methane (Total direct emissions)	274,634	190,563	188,463	203,819	40,390	41,253	42,117	42,117
Nitrous oxide	6,504	6,523	7,535	6,485	4,683	4,868	5,052	5,052
Carbon dioxide sink (trees)	-3,560	-4,260	-4,960	-5,660	-6,360	-7,460	-8,560	-9,660
Emissions from biogas methane use at ETP	0	0	0	0	0	0	0	0
Total	559,986	479,454	463,421	506,160	341,461	303,006	316,644	304,911

Energy consumption by type of fuel (terrajoules)

	Actual				Forecast			
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Electricity imported from grid	669	694	650	719	725	610	644	617
Natural gas imported	67	29	78	93	95	270	271	272
Diesel imported	51	51	50	50	46	1	1	1

Carbon dioxide emissions per million litres of water supplied	1,109	1,030	958	1,153	687	596	609	574
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Consultative Committees

This year, Melbourne Water consulted with, and received advice from, a wide range of professional committees, organisations and boards including:

Committee	Melbourne Water status
Land Development	
Association of Land Development Engineers (ALDE) Liaison Committee	Observer
ALDE - Western Region Council Committee	Member
ALDE - Northern Region Council Committee	Member
ALDE - Southern Region Council Committee	Member
Urban Development Institute of Australia Liaison Committee	Occasional invitee
Development Industry - Water Industry Liaison Committee	Member
Growth Area Technical Committee for Casey/Cardinia	Member
Growth Area Technical Committee for Wyndham	Member
Commonwealth Games Village Environmental Design Review Group	Member
Commonwealth Games Village - Royal Park Wetlands Technical Review Group	Member
Commonwealth Games Village - Royal Park Wetlands Advisory Committee	Member
Sustainability for the Built Environment Reference Group	Member
Sustainability and the Building Code Reference Group	Member
Melbourne Water/Vic Roads Liaison Committee	Member
Special Rating Arrangements	
Yallock Drainage and River Improvement Rates Advisory Committee	Convenor
Koo Wee Rup and Longwarry Drainage and Flood Mitigation Advisory Committee	Convenor
Patterson Lakes Advisory Committee	Convenor
Diversions/Flow Management	
Keilor Diverters Advisory Group	Convenor

Maribyrnong Bulk Entitlements Committee	Convenor/member
Diversions Management Advisory Committee	Convenor
Sustainable Diversions Limits Steering Group	Member
Victorian Stream flow Management Plans Working Group	Member
Gippsland Regional Monitoring Partnership Working Group	Member
Gippsland Research, Development and Co-ordination Committee	Member
Thompson/Macalister Environmental Flow Working Group	Member
Hoddles Creek Stream flow Management Plan Working Group	Convenor
Diamond Creek Stream flow Management Plan Working Group	Convenor
Plenty River Stream flow Management Plan Working Group	Convenor
Olinda Creek Stream Flow Management Plan Committee	Convenor
Stringybark Creek Stream Flow Management Plan Committee	Convenor
Steels, Pauls & Dixons Creeks Stream Flow Management Plan Committee	Convenor
Licensing Steering Committee	Member
Wandin Yallock Groundwater Supply Protection Area Management Plan Working Group	Member
Koo Wee Rup Groundwater Supply Protection Area Management Plan Working Group	Member
Water Market and Irrigation Reforms Steering Committee	Member
Gippsland Research Co-ordination Group	Member
Environmental Working Group - Yarra Bulk Entitlements Process	Member
Environmental Working Group - Tarago Bulk Entitlements Process	Member
Metropolitan Drought Response Plan (MDRP) Co-ordination committee	Member
MDRP Monitoring sub committee	Member
MDRP Communications sub team	Member
MDRP Operations sub team	Member
Waterway Management	
Port Phillip and Westernport Regional River Health Strategy Steering Committee	Convenor
Port Phillip and Westernport Regional River Health Strategy Working group	Convenor
Kananook Creek Association	Occasional Attendee
Merri Creek Management Committee	Occasional Attendee
Moonee Ponds Creek Coordination Committee	Observer
Moonee Ponds Creek - Cleanup Project	Member
Bunyip Main Drain Project Coordinating Committee	Convenor
Friends of Groups (various)	Attends on request

Wetlands/Water Quality Management	
Carrum Lowlands Wetlands Community Forum	Attendee
Ruffey Lake Park Advisory Committee	Member
Lillydale Lake Landcare Consultative Committee	Member
State/National Policy / Advisory Committees or Boards	
Waterways and Drainage Advisory Committee	Convenor
Trade Waste Acceptance Advisory Committee	Member
Region 4 Division 2 Emergency Response Planning Committee	Member
Shire of Yarra Ranges Municipal Emergency Management Planning Committee	Member
Municipal Emergency Management Planning Committee	Member
City of Maribyrnong Municipal Emergency Management Committee	Member
Western Port Portfolio Coordinating Group	Member
Index of Stream Condition Steering Committee	Member
State Fishway Implementation Committee	Member
State Flood Policy Committee	Member
Victorian Flood Warning Consultative Committee (Met Bureau)	Member
Flood Liaison Committee	Invitee
Victorian Stormwater Advisory Committee	Member & Principal Support
Victorian Stormwater Action Program Working Group	Member and Principal Support
Victorian Stormwater Action Program Technical Group	Member and Principal Support
Water Services Association of Australia (WSAA)	Board Member
WSAA Water Health Environment and Sustainability (WHES) Reference Group	Member
WSAA Regulation Assets and Performance (RAP) Reference Group	Member
WSAA WHES Committee	Member
WSAA RAP Committee	Member
National Codes Reference Group	Member
Water Efficient Appliance Group	Member
Regulatory Control of Water Meters	Member
Painting Contractors Certification Program Technical Committee	Member
Australian Water Association	Member

International Water Association	Member
Victorian Water Industry Association	Member (Chairman)
Water Environment Federation	WEF
Co-operative Research Centre (CRC) for Water Quality and Treatment	Board Member
CRC for Catchment Hydrology	Board member
CRC for Freshwater Ecology	Board member
Catchment and Land Protection	
State Water Quality Monitoring and Assessment Committee	Member
Waterways and Drainage Advisory Committee	Convenor
Tarago Integrated Catchment Management Plan Committee	Convenor
Yarra Valley Environmental Best Practice Working Group	Member
State Waterway Managers Forum	Member
Waterway Rehabilitation Working Group	Member
Floodplain Managers Network	Member
Neerim District Landcare Group	Member
Port Phillip and Westernport Catchment Management Authority (PPWPCMA) Board	Observer
Port Phillip and Westernport Regional Catchment Strategy Steering Committee	Member
Dandenong Catchment Committee	Member
Maribyrnong Catchment Committee	Member
Yarra Catchment Committee	Member
Western Port Catchment Committee	Member
Werribee Catchment Implementation Committee	Member
Galada Tamboore Working Group	Chair
Monbulk Creek Retarding Basin / Birdland Reserve Working Group	Member
Yarra Valley and Dandenong Ranges Environmental Weed Working Group	Member
Knox Regional Pest Plant and Animal Management Group	Member
Regional Issue Committees	
Eastern Treatment Plant Community Liaison Committee	Convenor
Western Treatment Plant Community Liaison Committee	Convenor
Western Treatment Plant Wildlife Consultative Committee	Convenor
Western Treatment Plant Spits Forum	Convenor
Devilbend Reference Group	Convenor

Christmas Hills Working Group	Convenor
Northern Suburbs Sewerage Strategy Consultation Committee	Member
Eastern Freeway Extension Community Activity Group	Member
Geelong Freeway Extension Liaison Group	Member
Yarra Glen By-Pass Environmental Effects Consultative Committee	Member
Monash Freeway - Hallam By-Pass Project	Member
Waterwatch	
Melbourne Waterwatch Coordinators' Committee	Convenor
Melbourne Waterwatch Boonerwung Region Steering Committee	Attendee
Melbourne Waterwatch Werribee Catchment Steering Committee	Attendee
Professional Organisations	
Stormwater Industry Association (SIA) - Victorian Committee	Members
Emergency Response and Fire Prevention	
Region 13 Regional Fire Prevention Committee	Member
Regions 12 and 14 Fire Prevention Committees	Member
Region 4 Division 3 Regional Emergency Response Committee.	Member
Shire of Yarra Ranges Fire Prevention Committee	Member
Cardinia Shire Fire Prevention Committee	Member
City of Whittlesea Fire Prevention Committee	Member
Shire Yarra Ranges Municipal Emergency Response Management Committee	Member
Shire of Nillumbik Fire Prevention Committee	Member
Victorian State Emergency Service/Melbourne Water/Municipal Association Victoria Emergency Issues Committee	Convenor
Bureau of Meteorology/Vic SES, Melbourne Water Steering Group	Convenor
Recycled Water	
Recycled Water Advisory Committee	Convenor