

Social and Environment Report 2004-05



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Overview

Melbourne Water's *Social and Environment Report* provides detailed information on our performance in meeting social and environment performance goals during 2004/05. The data contained in this report is sourced from Melbourne Water's environmental monitoring programs.

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 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 undertake open and transparent reporting, particularly in regard to our two major sewage treatment plants.

Melbourne Water's *Annual Report 2004/05* provides an overall summary of our social, financial and environment performance.

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

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

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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.
- Waterway 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.

The Operating Charter was originally developed in 1999, and refined in 2001 and 2004, to define the objectives, goals, strategies and specific service commitments for these functions. The Charter (referred to as the 2005 Charter) was prepared in consultation with an external reference committee (Waterways and Drainage Advisory Committee), taking into account the:

- expectations of the community;
- responsibilities assigned by legislation; and
- financial resources available for waterways and drainage management.

The 2005 Charter has 36 commitments. There are 11 new commitments to be reported against in the 2005 Charter. Of the 2001 Charter's commitments, 11 have been modified, 14 have remained largely unchanged and nine commitments have been removed.

Thirty-two commitments were either achieved fully or substantially achieved (shown by ✓ or ✓), two were partly achieved (shown by ✗), and two were either not auditable or not applicable. John Kowarsky and Associates audited the detailed performance records for 2004/05 and Melbourne Water has summarised the results in the table below.

A Steering Group comprising representatives from Melbourne Water's Waterways and Drainage Advisory Committee, the Department of Sustainability and Environment, EPA Victoria, the Port Phillip and Westernport Catchment Management Authority, the Municipal Association of Victoria, Department of Human Services and Environment Victoria is reviewing the 2005 Operating Charter. The review will ensure that Melbourne Water's new responsibilities outlined in the Government's strategic plan, Our Water Our Future are captured. These responsibilities include Melbourne Water becoming the caretaker of river health for the whole Port Phillip and Westernport region and manager of the environmental water reserve for the region.

2004/05 Operating Charter performance

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
DF1 Asset Management "There will be minimal instances of asset failure causing significant flooding, serious damage or personal injury."	✗	✓	✓	✓	✓	✓	No comments
DF2 (a) Flood Mitigation (in progress)	✓	✗	✓	✗	✓	N/A	MODIFIED COMMITMENT The terms of this commitment

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
"Annual expenditure on flood mitigation works will be sufficient to reduce the number of vulnerable properties by 500 over 10 years to June 2015. Planning controls will further reduce the number of vulnerable properties by 2500."							commence from July 2005 and therefore cannot be audited until next year
DF2 (b) Flood Mitigation (project management standards) "All projects undertaken in any one year will fully comply with the project management requirements".	✓	✗	✓	✓	(✓)	N/A	DISCONTINUED
DF3 Flood Event Monitoring "Effective flood warning information for the stipulated rivers and creeks will be provided punctually to the Bureau of Meteorology for all notifiable floods each year."	✓	✓	✓	✓	(✓)	✗	1. Target not achieved. 2. It would be useful to simplify the compliance statement.
DF4 (a) Property Information Statements "All future flood-related property encumbrance updates will be completed within one month of a change in the relevant circumstances."	✓	✓	✓	✓	✓	(✓)	MODIFIED COMMITMENT 1. It is noted that a very large proportion of the total properties had timely updates, and that those that were not tracked were (a) thus a very small proportion and (b) of low risk in terms of likelihood of having flood levels refined upwards. 2. Advice is provided that an appropriate tracking system is now being developed.
DF4 (b) Planning Scheme Updates "All municipalities will have up-to-date flood related information in their planning schemes by June 2002."	✓	✓	✗	✗	✓	N/A	DISCONTINUED
DF4(c) Changes to Planning Schemes "Changes to individual planning schemes will be updated on a needs and efficiency basis and the balance of completed and outstanding amendments for all planning schemes will be						✓	NEW COMMITMENT No comments

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
reported annually.”							
DF5 Hydrographic Data Reporting “Melbourne Water will annually update and publish a schedule setting out the quality and availability of rainfall and stream flow data and the fees for supplying it, and will meet all external requests for data within 10 working days.”						✓	NEW COMMITMENT Advice was provided that the database for tracking this commitment was found to be corrupted and that a new system would be implemented shortly.
WW1 (a) Waterway Works Approvals “All instances of known unauthorised works affecting rivers and creeks will be pursued, and a summary of proceedings will be reported annually.”	✗	✓	✓	✓	✓	✓	No comments
WW1 (b) Unauthorised Waterways Works “All significant instances of unauthorised works will be strenuously pursued.”	✓	✓	✓	✓	✓	✓	No comments
WW2 Waterway Maintenance “The annual maintenance program will be delivered in accordance with seasonal priorities and the approved business plan.”	✗	✓	✓	✓	(✓)	✓	No comments
WW3 Stream Frontage Protection “Assistance will be provided to protect and improve 50 kilometres of waterway frontage each year.”	✓	✓	✓	✓	✓	✓	MODIFIED COMMITMENT Exceeded target by about 20%
WW4 (a) Streamflow Management Plan Preparation “Streamflow Management Plans will be prepared at a rate sufficient to complete the required eight plans by December 2007.”	✓	✗	✗	✗	✓	✓	MODIFIED COMMITMENT Well on schedule

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
"Waterway Management Plans will be prepared and, from June 2006, Waterway Management Activity Plan reports will be reviewed at least every five years."							backlog of plans now requiring review.
WW8 Diversion Complaints "A process for managing complaints from diversion customers will be agreed with the Energy and Water Ombudsman by December 2005."						✓	NEW COMMITMENT Document preparation, meetings with the Ombudsman, and advice given demonstrate that this commitment is on target for completion by December 2005 as scheduled.
WQ1 (a) Codes of Practice - Status Review The status of Codes of Practice relevant to stormwater quality protection will be reviewed and reported each year.	✗	✗	✗	✗	N/A	N/A	DISCONTINUED
WQ1 (b) 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.	✓	✓	✓	✓	✓	N/A	DISCONTINUED
WQ2 Stormwater Management Plans Sufficient stormwater management plans will be produced each year to ensure all 32 municipalities are covered by June 2003.	✓	✓	✓	✗	(✓)	N/A	DISCONTINUED
WQ3 Toxicant Control Recommendations A technical report and recommendations will be provided on at least one new toxicity issue each year.	✓	✓	✓	✓	✓	N/A	DISCONTINUED
WQ4 Water Quality Improvement Facilities "Sufficient water quality improvement projects will be included in the Capital Works Plan to enable the nitrogen load	✓	✗	✗	✓	(✓)	(✓)	MODIFIED COMMITMENT 1. Expenditure reported as 88%, falling below the required 95%. 2. It is difficult from the produced report from CAPEX31 database to determine which projects would be

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
in urban stormwater runoff to be reduced by 100 tonnes by 2010."							categorised as "water quality projects". It would be useful to have these separately identified at the start of the period. 3. I am advised that the relevant nitrogen reduction target set for this commitment was in fact achieved at a lesser cost than anticipated and that the wording of the commitment is being reviewed.
WQ5 (a) WQ Reports - Ambient Monitoring "Water quality monitoring data, including annual summary statistics and trend analysis for the water quality monitoring program will be published annually."	✓	✓	✓	✓	✗	✓	No comments
WQ5 (b) WQ Reports - Investigative Monitoring "Results for one-off water quality investigations for individual rivers and creeks will be published annually."	✓	✓	✓	✓	✗	(✓)	1. It is acknowledged that considerable work has been undertaken, and that the range of topics are related to water quality. 2. The focus of the studies should be "to identify specific, local water quality problems, determine their causes and identify appropriate management measures". This sharp focus does not appear to be present in the example examined. 3. It is suggested consideration is given to including a specific section addressing this requirement in future reports.
WQ5(c) WQ Data Standards Annual compliance checks will be performed to ensure the water quality data conform to relevant scientific standards.	✓	✓	✓	✓	(✓)	(✓)	1. NATA registration for water quality testing is simply determined and compliance was demonstrated. 2. For data other than water quality, the standard is that specified in MW contracts. It was difficult to clearly see that contractors fully complied with this aspect. 3. It is noted that an undertaking of a contractor to provide MW with the results of its self-administered audit for its analytical and sampling programs was apparently not honoured.

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
WQ6 (a) Waterwatch Strategy A forward strategy will be developed by June 2000 in collaboration with stakeholders.	✓	-	-	-	✓	N/A	DISCONTINUED
WQ6 (b) Waterwatch Strategy Implementation The Melbourne Waterwatch program will be supported and reported on annually.	✓	✓	✓	✓	N/A	(✓)	1. Evidence of substantial activity in this area. 2. The use of a due date of "ongoing" removes the capacity to accurately determine if specific targets for the year have been defined and met.
WQ7 Capacity Building Melbourne Water will work with the Municipal Association of Victoria, other agencies and industry bodies in building the capacity of industry and local councils to deliver best practice environmental management of stormwater.						(✓)	NEW COMMITMENT Annual Capacity Building Work Plan yet to be developed.
WQ8 Stormwater Management Plans - Implementation Melbourne Water will implement the actions identified for it in Municipal Stormwater Management Plans.						✓	NEW COMMITMENT 1. Documentation of commitment requires attention. 2. Report was provided, hence compliance score, but have some concern about this as a target.
WQ9 Stormwater Management Plans - Initiatives Melbourne Water will continue to work on initiatives and improvements in managing stormwater impacts at the local level in partnership with local councils, and will report progress annually.						(✓)	NEW COMMITMENT Council Initiatives Program yet to be developed.
MF1 (a) Greenfield Drainage Schemes All new growth areas in development corridors will have drainage schemes in place within three years of significant subdivisional activity commencing.	✓	✗	✓	✓	✓	✓	No comments

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
MF1 (b) Redevelopment Drainage Schemes Redevelopment drainage schemes will be progressively investigated for all at a rate of 10 per year with priority given to areas where new development activity is most concentrated.						✓	NEW COMMITMENT 1. While 10 “pilot studies” were reported as “completed”, it was not clear that all had been signed off by the Board. 2. The documentation of this commitment could usefully be simplified.
MF2 (a) Property Development Controls 100% of all statutory referrals will be processed within the specified 21 or 28-day period. 100% of non-works offers will be processed within 28 days 100% of works offers will be processed within 60 days 95% of third party works approvals will be processed within 28 days 97.5% of flood level requests will be processed within 10 days	✓	✓	✓	✓	✓	(✓)	MODIFIED COMMITMENT Minor non-compliance for small number of applications in April 2005.
MF2 (b) Business Systems “Business IT systems will be maintained and upgraded to maintain or improve efficiencies and deliver improved customer services.”						(✓)	NEW COMMITMENT Evidence of activity in this area, but some difficulty in auditing due to broad nature of commitment.
MF3 (a) Research Expenditure Research expenditure will be maintained at a level of at least \$550,000 per annum.	✓	✓	✓	✓	✓	✓	MODIFIED COMMITMENT Productive expenditure.
MF3 (b) Research Implementation Two significant improvements to work methods will be achieved each year as a result of research findings.	✓	✓	✓	✓	✓	✓	No comments
MF3(c) Research Communication A seminar involving external stakeholders will be held at least annually to communicate results and develop priorities for						(✓)	NEW COMMITMENT Documentation of activities and feedback was incomplete.

Commitment as set out in the 2005 Charter	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	Auditor Comments 2004/05
further research.							
MF4 (a) Community Education program The waterways and drainage components of each year's community education program will be discussed in advance with the Advisory Committee and the final program will be fully implemented.	✓	✓	✓	✓	Not Assessed	N/A	1. From material provided it is not clear what the target timetable has been for each of the programs listed. 2. It is noted that Melbourne Water decided in April 2005 to establish a River Health Community Education and Engagement Coordinating Group, which should provide a useful overview to formalising planning for this commitment.
MF4 (b) Community Attitude Surveys A survey of community attitudes and customer satisfaction related to Melbourne Water's waterways and drainage activities will be undertaken every two years.	✓	✓	✓	✓	✓	✓	MODIFIED COMMITMENT It appears that Waterways and Drainage issues were peripheral to the main thrust of the surveys undertaken.
MF5 (a) Incident Response Preparation A program of incident response training will be fully implemented each year and preparation and review of contingency plans will be undertaken as required.	✗	✓	✓	✓	(✓)	(✓)	1. Evidence is provided of substantial activity in this area. 2. It was not possible from the documentation to clearly audit the extent to which approved planned activities had been fully completed. 3. Auditing in future would be facilitated by the existence of an annual "approved program of training, preparation and review of contingency plans."
MF5 (b) Incident Response Performance In each year, the service will operate as planned for all incidents that require emergency response.	✓	✓	✓	✓	✓	✓	It is not easy to objectively identify which incidents should be included in the analysis both from point of view as to what determines "Waterways and Drainage" incidents, and which are "significant, major or an emergency".
MF6 Innovation 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.	✓	✓	✓	✓	(✓)	N/A	DISCONTINUED

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 well 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, originally designed for the food industry, which focuses on quality management from catchment to consumer.

Most of our water comes from some 156,000 hectares of mostly protected catchments in the Yarra Ranges and Kinglake areas 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. During drought, this can rise to about 25 % of water supplied to Melbourne.

Melbourne Water manages nine major reservoirs, with a total capacity of 1,773,000 million litres; 59 service reservoirs; 1029 kilometres of distribution water mains; more than 200 kilometres of aqueducts and tunnels; 18 pumping stations; five filtration plants and 42 disinfection plants.

This year, we supplied 440,982 million litres of drinking water to City West Water, Yarra Valley Water, South East Water and Western Water. These retail water businesses delivered this water to homes, businesses, hospitals and other consumers through the reticulated water system.

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

- National Health and Medical Research Council Australian Drinking Water Guidelines 2004
- Victorian Government Health (Quality of Drinking Water) Regulations 2002 (now superseded by the Victorian Safe Drinking Water Regulations 2005)
- Health (Fluoridation) Act 1973.

The results of drinking water quality tests are reported against recommended levels in the Australian Drinking Water Guidelines. 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 2004/05*. [Click here](#) for information on Melbourne Water's Public Health Policy.

Water quality - parameters and reporting levels

Parameter	Guideline Basis	Units	Reporting Level
Microbiological – routine			
<i>E. coli</i>	ADWG 2004	organisms/100mL	1
Physical – routine			
Colour	ADWG 2004	True colour units (HU)	15
Turbidity	ADWG 2004	Nephelometric turbidity units (NTU)	5
pH	ADWG 2004	pH units	6.5 to 8.5
Chemical – routine			
Aluminium	ADWG 2004	milligrams/litre - mg/L	0.2
Iron	ADWG 2004	mg/L	0.3
Manganese	ADWG 2004	mg/L	0.1
Fluoride	Health Act	mg/L	0.7 - 1.2
Chemical – routine less frequent			
Arsenic	ADWG 2004	milligrams/litre - mg/L	0.007
Cadmium	ADWG 2004	mg/L	0.002
Chromium	ADWG 2004	mg/L	0.05
Copper	ADWG 2004	mg/L	1
Cyanide	ADWG 2004	mg/L	0.08
Lead	ADWG 2004	mg/L	0.01
Mercury	ADWG 2004	mg/L	0.001
Selenium	ADWG 2004	mg/L	0.01
Zinc	ADWG 2004	mg/L	3
Chloride	ADWG 2004	mg/L	250
Hardness	ADWG 2004	mg/L	200

Parameter	Guideline Basis	Units	Reporting Level
Nitrate (as N)	ADWG 2004	mg/L	50
Sodium	ADWG 2004	mg/L	180
Sulphate	ADWG 2004	mg/L	250
Total alkalinity	*	mg/L	*
Calcium	*	mg/L	*
Magnesium	*	mg/L	*
Silica	*	mg/L	*
Total organic carbon	*	mg/L	*
Total phosphorus	*	mg/L	*
Total solids	ADWG 2004	mg/L	500
Radiological			
Radioactivity – alpha	ADWG 2004	Becquerel/litre	0.1
Radioactivity – beta	ADWG 2004	Becquerel/litre	0.1
Pesticides			
Aldrin	ADWG 2004	milligrams/litre - mg/L	0.0003
Dieldrin	ADWG 2004	mg/L	0.0003
Chlordane	ADWG 2004	mg/L	0.001
DDT	ADWG 2004	mg/L	0.02
Heptachlor	ADWG 2004	mg/L	0.0003
Heptachlor epoxide	ADWG 2004	mg/L	0.0003
Lindane	ADWG 2004	mg/L	0.02
2,4-D	ADWG 2004	mg/L	0.03
Industrial chemicals			
Carbon tetrachloride	ADWG 2004	milligrams/litre - mg/L	0.003
Tetra chloroethene	ADWG 2004	mg/L	0.05

Parameter	Guideline Basis	Units	Reporting Level
1,1 Dichloroethene	ADWG 2004	mg/L	0.03
1,2-Dichloroethene	ADWG 2004	mg/L	0.06
1,2-Dichloroethane	ADWG 2004	mg/L	0.003
Benzene	ADWG 2004	mg/L	0.001
Polynuclear aromatic hydrocarbons (PAH's)			
Benzo-a-pyrene	ADWG 2004	milligrams/litre - mg/L	0.00001
Byproducts of disinfection			
Pentachlorophenol	*	milligrams/litre - mg/L	0.002
2,4,6-Trichlorophenol	ADWG 2004	mg/L	0.02
Trihalomethanes (THM's) Total			
	ADWG 2004	milligrams/litre - mg/L	0.25
Chloroacetic acids No limit set			
Chloroacetic acid	ADWG 2004	milligrams/litre - mg/L	0.15
Dichloroacetic acid	ADWG 2004	mg/L	0.1
Trichloroacetic acid	ADWG 2004	mg/L	0.1

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

Notes:

- ADWG 2004 - National Health and Medical Research Council/Australian Water Resources Council 2004: Australian Drinking Water Guidelines 2004
- milligrams/litre = mg/L or parts per million
- micrograms/litre = µg/L or parts per thousand million (billion)

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 2004 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	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
Colour (Pt/Co)														
ALL	15	65	2252	16	0.7	777	10	1.3	1342	6	0.4	676	1	0.1
YVW	15	35	1253	16	1.3	375	10	2.7	811	6	0.7	366	1	0.3
CWW	15	11	698	0	0	-	-	-	463	0	0	284	0	0
SEW	15	30	973	0	0	334	0	0	416	0	0	405	0	0
Turbidity (NTU)														
ALL	5	65	2253	0	0	778	0	0	1342	0	0	676	0	0
YVW	5	35	1253	0	0	375	0	0	811	0	0	366	0	0
CWW	5	11	698	0	0	-	-	-	463	0	0	284	0	0
SEW	5	30	973	0	0	334	0	0	416	0	0	405	0	0
pH (units)														
ALL	6.5-8.5	65	2248	0	0	777	0	0	1339	0	0	675	0	0
YVW	6.5-8.5	35	1248	0	0	374	0	0	808	0	0	365	0	0
CWW	6.5-8.5	11	697	0	0	-	-	-	463	0	0	283	0	0
SEW	6.5-8.5	30	972	0	0	334	0	0	416	0	0	404	0	0

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

Microbiological parameters

Exceeding reporting level and percentage in zones/population

The reporting levels for *E. coli* are based on National Health and Medical Research Council / Australian Water Resources Council 2004 guidelines. Sampling results are based on monitoring at locations in our agreements with the retail water companies. *E. coli* have been assessed using the defined substrate technology (Colilert) method and should not exceed the reporting level.

<i>E. Coli</i>			No. Exceeding Reporting Level (%) in Zones / Population											
Parameter / retail water companies	Reporting level org / 100mL	Total no. of zones	Total Exceedence			<10K			10K to 100K			>100K		
			No. Tests	Fails	% Fails	No. Tests	Fails	% Fails	No. Tests	Fails	% Fails	No. Tests	Fails	% Fails
All	1	65	5832	0	0	1878	0	0	3480	0	0	1760	0	0
YVW	1	35	3444	0	0	1405	0	0	1803	0	0	908	0	0
CWW	1	11	1550	0	0	-	-	-	1003	0	0	694	0	0
SEW	1	30	2409	0	0	461	0	0	1345	0	0	965	0	0

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

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 2004 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		
						Test s	Fails	% Fails	Test s	Fails	% Fails	Test s	Fails	% Fails
Iron (mg/L)														
ALL	0.3	65	2253	1	0	778	0	0	1342	1	0.1	676	0	0
YVW	0.3	35	1253	1	0.1	375	0	0	811	1	0.1	366	0	0
CWW	0.3	11	698	1	0.1	-	-	-	463	1	0.2	284	0	0
SEW	0.3	30	973	0	0	334	0	0	416	0	0	405	0	0
Aluminium (mg/L)														
ALL	0.2	65	297	0	0	144	0	0	146	0	0	72	0	0
YVW	0.2	35	253	0	0	130	0	0	116	0	0	59	0	0
CWW	0.2	11	89	0	0	-	-	-	43	0	0	46	0	0
SEW	0.2	30	85	0	0	13	0	0	39	0	0	59	0	0
Manganese (mg/L)														
ALL	0.1	65	1040	0	0	335	0	0	612	0	0	325	0	0
YVW	0.1	35	601	0	0	201	0	0	367	0	0	169	0	0
CWW	0.1	11	394	0	0	-	-	-	250	0	0	168	0	0
SEW	0.1	30	376	0	0	115	0	0	156	0	0	170	0	0

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		
						Test s	Fails	% Fails	Test s	Fails	% Fails	Test s	Fails	% Fails
Fluoride (mg/L)														
ALL	0.7-1.2	65	866	18	2.1	118	3	2.5	748	13	1.7	440	13	3
YVW	0.7-1.2	35	568	14	2.5	104	3	2.9	503	9	1.8	260	10	3.8
CWW	0.7-1.2	11	362	7	1.9	-	-	-	206	0	0	180	5	2.8
SEW	0.7-1.2	30	390	8	2.1	52	0	0	234	7	3	260	6	2.3

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

Chemical and radiological parameters

The reporting levels are based on National Health and Medical Research Council/ Australian Water Resources Council 2004 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	0.007	37	0
Cadmium	0.002	37	0
Chromium	0.05	37	0
Copper	1	37	0
Cyanide	0.08	37	0
Lead	0.01	37	0
Mercury	0.001	37	0
Selenium	0.01	37	0
Zinc	3	37	0
Chloride	250	37	0
Hardness	200	37	0
Nitrate (as N)	50	37	0
Sodium	180	37	0
Sulphate	250	37	0
Total Alkalinity	*	37	
Calcium	*	37	
Magnesium	*	37	
Silica	*	37	
Total Organic Carbon	*	37	

Parameter	Reporting Level mg/L	Total number of Analyses	Exceed Reporting Level No (%)
Total Phosphorus	*	37	
Total Solids	*	37	

Parameter	Reporting Level Bq/L	Total number of Analyses	Exceed Reporting Level No (%)
Radioactivity - alpha	0.1	14	0
Radioactivity - beta	0.1	14	0

Organic chemicals

The reporting levels are based on National Health and Medical Research Council/ Australian Water Resources Council 2004 guidelines. Results should not exceed the reporting levels. Sampling is conducted at headworks reservoirs.

Parameter	Reporting Level mg/L	Number of Analyses	Exceed Reporting Level No (%)
PESTICIDES			
Aldrin	0.0003	22	0
Dieldrin	0.0003	22	0
Chlordane	0.001	22	0
DDT	0.02	22	0
Heptachlor	0.0003	22	0
Heptachlor epoxide	0.0003	22	0
Lindane	0.02	22	0
2,4-D	0.03	22	0
INDUSTRIAL CHEMICALS			
Carbon tetrachloride	0.003	22	0
Tetrachloroethene	0.05	22	0
Trichloroethene		22	
1,1-Dichloroethene	0.03	22	0
1,2-Dichloroethene	0.06	22	0
1,2-Dichloroethane	0.003	22	0
Benzene	0.001	22	0
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)			
Benzo-a-pyrene	0.00001	22	0

Parameter	Reporting Level mg/L	Number of Analyses	Exceed Reporting Level No (%)
BYPRODUCTS OF DISINFECTION			
Pentachlorophenol	0.002	22	0
2,4,6-Trichlorophenol	0.02	22	0
TRIHALOMETHANES (THMs)	0.25	50	0
CHLOROACETIC ACIDS			
Chloroacetic acid	0.15	46	0
Dichloroacetic acid	0.1	46	0
Trichloroacetic acid	0.1	46	0

Notes:

- Guideline refers to total THMs present
- No guideline value set

Routine pathogen monitoring

Parameter	Reporting Level	No of Analyses	Detection Rate No (%)
Should not be detected			
<i>Yersinia</i> spp	Detected (per 2 litres)	115	0
<i>Salmonella</i> spp	Detected (per 2 litres)	115	0
<i>Campylobacter</i> spp	Detected (per 2 litres)	115	0
<i>Vibrio</i> spp	Detected (per 2 litres)	115	0
Enteroviruses by PCR			
adenovirus	Detected (per 20 litres)	115	0
rotavirus	Detected (per 20 litres)	115	0
hepatitis A	Detected (per 20 litres)	115	0
norwalk virus G1 Genotype	Detected (per 20 litres)	115	0
Norwalk virus G2 Genotype	Detected (per 20 litres)	115	0
Norwalk like virus	Detected (per 20 litres)	115	0
No guideline set			
<i>Faecal Streptococci</i>	Detected (per 100mL)	115	0
<i>Legionella</i> species	Detected (per 2 litres)	115	0
<i>Legionella</i> PN SG 1	Detected (per 2 litres)	115	0
<i>Legionella</i> PN SG2-14	Detected (per 2 litres)	115	1 (0.9)
<i>Clostridium perfringens</i>	Detected (per 100mL)	115	0
<i>Pseudomonas aeruginosa</i>	Detected (per 100mL)	115	0
<i>Aeromonas</i>	Detected (per 100mL)	115	3 (2.6)

Note: *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

In working to protect and improve the environment, Melbourne Water aims to both meet and exceed our compliance requirements. A number of environmental improvement programs were undertaken during 2004/05 to achieve this objective.

We substantially completed a \$160 million upgrade to our Western Treatment Plant, ending land and grass filtration so that all sewage is now treated in lagoon systems. The upgrade has enabled us to reduce odours and greenhouse gas emissions, produce more renewable energy from biogases, reduce nitrogen entering Port Phillip Bay and provide more water recycling opportunities to the west of Melbourne.

We are also spending \$87 million at the Eastern Treatment Plant to reduce ammonia in the treated effluent discharged to Port Phillip Bay. Research has shown that ammonia is impacting on the marine environment at Boags Rocks, where the effluent is discharged.

The following data provide detailed information on our environmental management performance during 2004/05. They include information relating to the management of our two sewage treatment plants and some 400 kilometres of sewers and 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 *2004/05 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 here](#) for information on Melbourne Water's Environment Policy

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	310	460	580
Suspended Solids	360	570	570
PH (pH units)	7	7.3	7.3
Ammonia as N	34.5	39	40
Total Combined Nitrogen	58.5	74	83
Total Phosphorus	13.5	18.4	24
Anionic Surfactants MBAS	5.7	8.2	130
Cadmium	0.0005	0.0008	0.0015
Chromium	0.038	0.06	0.076
Copper	0.11	0.14	0.2
Lead	0.0075	0.012	0.018
Mercury	0.0002 ¹	0.0003 ¹	0.0003 ¹
Phenol (µg/L)	1.5 ¹	31 ¹	65 ¹
Toluene (µg/L)	2.5 ¹	4 ¹	10 ¹
Benzene (µg/L)	0.5 ¹	0.5 ¹	1 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 at Trueman's Rd and flow measurements at the Eastern Treatment Plant from 1 July 2004 to 30 June 2005. (All data in mg/L unless otherwise indicated)

Parameter, Units	Median		90th Percentile		Maximum	
	Licence Limit	Result	Licence Limit	Result	Licence Limit	Result
BOD ₅	NS ⁵	28	NS ⁵	52	NS	74
CBOD ₅	20	5	40	8	NS	31
Suspended Solids	30	15	60	28	NS	42
pH (pH units)	NS	7.4	NS	7.6	6-Sep	6.3-7.6
Ammonia as N	30	17.5	NS	22	40	26
Total Combined Nitrogen	NS	26.5	NS	30	NS	40
Total Phosphorus	NS	6.1	15	8.4	NS	11
Anionic Surfactants	0.4	0.3	0.7	0.4	NS	0.7
Cadmium	NS	0.0001	0.005	0.0001 ¹	0.01	0.0002 ¹
Chromium	NS	0.005	0.075	0.01	0.15	0.013
Copper	NS	0.013	0.05	0.019	0.1	0.027
Lead	NS	0.001 ¹	0.05	0.002 ¹	0.1	0.004 ¹
Mercury	NS	0.00005	0.0005	0.00005	0.001	0.0001
Phenol (µg/L)	NS	0.5	NS	0.5	100	0.5
Toluene (µg/L)	NS	0.5	NS	1	50	1
Benzene (µg/L)	NS	0.5	NS	0.5	25	0.5
PAH's total (µg/L) ²	NS	4	NS	4	15	4
ETP Final Effluent Flow (ML/day) ³	NS	379	NS	384	NS	610
Outfall Flow (ML/day) ⁴	540	398	NS	554	770	635
Total Residual Chlorine	NS	0.05	NS	0.2	1	0.31

Parameter, Units	Median		90th Percentile		Maximum	
	Licence Limit	Result	Licence Limit	Result	Licence Limit	Result
<i>E. coli</i> (org/100mL)	200	21	1000	70	NS	300
Dissolved Oxygen	NS	6.6	NS	7.4	>6.0	6.8-7.4

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 2004 to 30 June 2005.

Parameter, Units	Unit	Median	90th Percentile
<i>E. coli</i> ¹	Org/100mL	45	295
Electrical Conductivity ²	µS/cm	905	929
BOD52	mg/L	42	65
CBOD52	mg/L	5	10

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 2004/05. Monthly median and maximums are shown below. The total outfall flows for 2004/05 are as follows:

Description	Flow (ML)	Comment
ETP Outflow	137,797	Total outfall pump station flow minus internal plant use
Calculated Outfall flow	145,336	Boags Rocks Outfall flow (ETP plus South East Water treatment plant flows, less water recycled)

Month	Median (ML)	Maximum (ML)
July 2004	392	443
August 2004	415	522
September 2004	484	594
October 2004	346	469
November 2004	548	610
December 2004	387	521
January 2005	313	402
February 2005	426	580
March 2005	364	409
April 2005	308	422
May 2005	330	417
June 2005	337	410

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 Clubhouse
- 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
12 August 2004	5.5	1.5	1.9	2	1.6	1
22 September 2004	2.7	1.1	1.1	1.1	2	1
3 November 2004	1.9	1.4	1.4	1.8	7.4	1.3
14 December 2004	4.3	1.8	1.8	1.1	9.5	1.7
28 January 2005	2.6	1.4	1.9	1.6	13.3	1.5
9 March 2005	2.2	3.8	1.3	1.4	34.5	1.6
19 April 2005	2.4	1.1	1.1	1	3.3	2.7
3 June 2005	1.9	1.4	1.6	1.9	2.6	1.1
27 June 2005	8.4	2.3	4	2.4	1.4	1.9

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
12 August 2004	10	2	2	8	2	0
22 September 2004	4	0	0	0	2	0
3 November 2004	2	2	2	2	8	0
15 December 2004	10	4	0	0	36	4
28 January 2005	9.6	1.2	2.8	3.2	54.8	1.4
9 March 2005	2	12	0	2	74	2
19 April 2005	5	2	0	0	13	4
3 June 2005	4	1.6	2	1.6	4	1.6
27 June 2005	11.6	6.8	11.2	8.4	1.6	3.6

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. Due to a timing oversight one of the engines in the outfall pumping station was sampled late on 9 August 2005. EML Air sampled the gas emissions and tested for Nitrogen Oxides, Carbon Monoxide, Sulphur Dioxide, Hydrogen Sulphide and VOC's.

The following table contains a comparison between the test results and the licence limits in Table 2 of Licence EM 35642, with all results demonstrating compliance.

Parameter	Maximum Rate (g/min)		Maximum Concentration (mg/m ³)	
	Limit	Result	Limit	Result
Sulphur Dioxide	7.5	0.033	40	0.48
Hydrogen Sulphide	0.5	0.0077	2	0.11
Nitrogen oxides	500	110	2600	1700
Carbon Monoxide	300	80	2600	1200
VOC	20	0.51	100	7.5

Given that three of the five outfall pumping engines are likely to be upgraded to convert them to electric drives, Melbourne Water will be effectively eliminating emissions from the outfall pumping station in the future. However, these engines will continue to be in use until Melbourne Water completes the Eastern Green Energy project.

Biological Odour Control Facility

The Biological Odour Control Facility on the RAS Channel was operated throughout 2004/2005. The previous licence limit for odour discharge from this source was removed from the amended licence (March 2004), on the basis that:

- The stack licence requirement was inconsistent with the off-site odour requirement, which is the appropriate control for a large complex multisource facility, such as the Eastern Treatment Plant;
- A well performing biofilter will have its own inherent odour of approximately 500-1,000 odour units;
- With the proposed replacement of the media, the facility would be expected to continue to exceed the licence parameter, as would any biofilter (due to inherent odour).

Western Treatment Plant inputs and discharges

Raw sewage monitoring (All data in mg/L unless otherwise indicated)

Parameter (unit)	2004/05 Median	90th Percentile	Maximum
Flow (ML/day)	468	555	1685
BOD ₅	400	560	740
Suspended Solids	370	440	590
Ammonia as N	34	37	40
Total Nitrogen	61	69	82
Total Phosphorus	12	14	20
Colour (Pt/Co units)	120	160	200
Anionic Surfactants	5.6	7.3	7.9
Silicate	13	14	14
Electrical Conductivity (µS/cm)	1800	1990	3800
TDS	980	1100	2200
Cadmium	0.0003	0.0004	0.0005
Chromium	0.0265	0.0473	0.068
Copper	0.1	0.138	0.14
Lead	0.0105	0.0149	0.018
Mercury	0.0003	0.00067	0.0007
Nickel	0.026	0.1024	0.63
Zinc	0.195	0.285	0.34
pH (pH units)	7.1	7.4	7.7
Benzene	0.00075	0.004	0.004
Toluene	0.0025	0.008	0.012
Total Phenols	0.215	0.392	0.42
Total PAHs	0.0064	0.01	0.014

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 flow weighted average calculated using the formula:

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

Conditions 1.8 and 1.9 of the EPA Licence outline the performance limits of effluent discharged to Port Phillip Bay via the four discharge points at Western Treatment Plant. The performance limits for the treatment plant changed from those presented in Condition 1.8, table 1B to the more stringent limits of Condition 1.9, table 1C on the 1st of January 2005.

The treatment plant's compliance to the EPA licence is assessed against table 1B for the full financial year to demonstrate the treatment plant's performance against the licence requirements. A further assessment of the plant's performance, using the table 1C limits, was also undertaken over the 6 months that they were in force during the months of January 2005 through June 2005.

The licence states that compliance to all licence parameters limits in Table 1B and 1C are to be calculated on a flow-weighted basis.

There is a plant wide limit of 700 million litres a day averaged over the year. The environment improvement plan has a target of 3100 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)
15East	92,402	253
145West	22,964	63
Lake Borrie	7687	21
Muircam	8823	24
Total	131,876	361

Annual discharge to Port Phillip Bay

The results for 2004/05 are shown below:

The treatment plant's performance against the EPA licence limits of Condition 1.8, table 1B for 2004/2005 are shown below. It shows that the Western Treatment Plant complied with the effluent discharge limits for all parameters.

Parameter	Median		90th Percentile		Maximum	
	Limit	Result	Limit	Result	Limit	Result

Parameter	Median		90th Percentile		Maximum	
	Limit	Result	Limit	Result	Limit	Result
CBOD ₅	25	3				
Suspended Solids	100	23	130	38		
Ammonia as N	25	9			40	32
Total Phosphorus			15	11		
Colour (Pt/Co units)			600	124		
Anionic Surfactants	0.05	0.24			1	0.41
Cadmium	0.005	0.0001			0.01	0.0003
Chromium	0.05	0.005			0.15	0.011
Copper	0.05	0.007			0.1	0.011
Lead	0.05	0.003			0.1	0.005
Mercury	0.0005	0.00006			0.001	0.00017
Nickel	0.05	0.019			0.15	0.022
Zinc	0.1	0.017			0.25	0.022

The following table compares the flow weighted performance results for the period during which the limits of Condition 1.9, table 1C were in force from January 2005. It shows that the Western Treatment Plant complied with the effluent discharge limits for all parameters.

Parameter	Median		90th Percentile		Maximum	
	Limit	Result	Limit	Result	Limit	Result
CBOD ₅	15	2.3	30	5.5		

Parameter	Median		90th Percentile		Maximum	
	Limit	Result	Limit	Result	Limit	Result
Suspended Solids	30	21.5	60	36.7		
Ammonia as N	10	3.5			30	10.2
Total Phosphorus			15	8.5		
Colour (Pt/Co units)	200	43	400	54		
Anionic Surfactants			0.8	0.28	1	0.32
Cadmium			0.002	0.0002	0.01	0.0003
Chromium			0.05	0.009	0.1	0.0108
Copper			0.05	0.008	0.1	0.0087
Lead			0.025	0.004	0.1	0.0052
Mercury			0.0005	0.00007	0.001	0.000078
Nickel			0.05	0.019	0.1	0.0197
Zinc			0.1	0.021	0.2	0.0218
Benzene					0.6	0.0005
Toluene					0.6	0.0005
Total Phenol					0.1	0.007
Total PAHs					0.006	0.00008

Annual nitrogen load to Port Phillip Bay

With the completion of the 55E and 25W Activated Sludge Plants, the nitrogen output from the Western Treatment Plant was 2713 tonnes per annum for 2004/05, which is consistent with expectations. This complies with the EIP target for January 2005 of 3100 tonnes per annum and provides an allowance for future growth in sewage load.

The larger amount of nitrogen discharged in 2003/04 and 2004/05 when compared to 2002/03 is due to lower sewage flows and absence of major wet weather flow events received at the treatment plant during the drought period. This resulted in improved lagoon and treatment plant performance in terms of nitrogen removal in 2002/03. It is anticipated that as the raw sewage flows into the treatment plant return to normal (non drought) the total nitrogen discharged to Port Phillip Bay will remain at approximately 2700 tonnes per annum.

The annual loads for the last three years are shown in Table 7. It demonstrates that Melbourne Water has complied with the maximum target of 3100 tonnes per annum.

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

Year	2004/05	2003/04	2002/03	3 Year Average	EIP Target January 2005
Total N Load (tonnes/annum)	2713	2769	2160	2547	3100

Dioxins and furans

Melbourne Water monitors polychlorinated dibenzo dioxins and furans (PCDD/F), as toxic equivalents of 2,3,7,8 tetrachloro-dibenzo-p-dioxin. Sampling of PCDD/F is carried out at the 15 East Outlet in the month of January, 145 West outlet in April, Lake Borrie outlet in July and Murtcaim Outlet in October each year. The raw sewage is sampled for PCDD/F each time an outlet is sampled (i.e. 4 times a year). This monitoring was a condition of Melbourne Water's previous Western Treatment Plant EPA discharge licence.

The toxic equivalent (TEQ) are calculated for each sample using the World Health Organisations toxic equivalency factors (WHO98-TEQ) method and are represented in Table 6. Results for preceding years are also presented for comparison.

PCDD/F as World Health Organisation Total Toxic Equivalents of 2,3,7,8 TCDD for 2004/05 (All results in picogram/L)

SITE	WHO98-TEQ - Excluding LOD Values			WHO98-TEQ - Including Half LOD Values		
	2004/05	2003/04	2002/03	2004/05	2003/04	2002/03
Lake Borrie (July)	16	7.1	16.39	16	11	24.57
Murtcaim (October)	0.08	0.64	2.72	2	2.3	5.6
15E (January)	0.13	0.07	0.03	7	1.1	0.28

SITE	WHO98-TEQ - Excluding LOD Values			WHO98-TEQ - Including Half LOD Values		
	2004/05	2003/04	2002/03	2004/05	2003/04	2002/03
145W (April)	0.62	7.3	0.99	3.6	9	3.87
Raw Sewage (July)	1.8	1.7	7.35	3.6	3.2	12.12
Raw Sewage (October)	1.5	3.9	4.17	4.1	6.9	6.84
Raw Sewage (January)	2.4	2.7	2.24	7.3	3.4	2.61
Raw Sewage (April)	15	10	5.78	19	13	6.76

Whilst the best techniques available in Australia are used for the testing of dioxins and furans, many of the results are less than the level of detection and the detection limits achieved in the analytical procedures vary, even for a single sample site. Hence it is difficult to make any substantive interpretation of trends in the results.

Bacteriological monitoring

Melbourne Water conducts bacteriological monitoring by collecting a sample of seawater in 60 centimetre depth of water off-shore from Beach Road and 160 South Road every seven days and analysed to determine the concentration of *Escherichia coli* (*E. coli*) in the sample. These two points are public access points to Port Phillip Bay within Western Treatment Plant and outside of the designated mixing zones for *E. coli*.

The State Environment Protection Policy (Waters of Victoria) schedule F6 for the Werribee segment requires the 42 day geometric mean *E. coli* values to be less than 1000 orgs/100ml. Melbourne Water has calculated the 42 day geometric mean and 42 day 80th percentile for the *E. coli* at the two sites.

The maximum of *E. coli* recorded for each site during 2004/05 was 370 orgs/100ml and 1600 orgs/100ml for 160 South Rd and Beach Rd respectively.

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

Day Period Ends	Geometric Mean		80th percentile	
	160 South Rd	Beach Rd	160 South Rd	Beach Rd
10/08/2004	3	0	10	0
21/09/2004	1	3	2	8
3/11/2004	5	2	20	6
14/12/2004	9	17	28	30
25/01/2005	4	3	8	28
9/03/2005	14	8	18	20

Day Period Ends	Geometric Mean		80th percentile	
	160 South Rd	Beach Rd	160 South Rd	Beach Rd
19/04/2005	0	3	0	10
8/06/2005	3	2	14	8

The above results indicate that the two sites within the Werribee segment achieve the State Environment Protection Policy (Waters of Victoria), Schedule F6, Werribee Segment, bacteriological organisms quality objective of <1000 *E-coli* organisms / 100ml.

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 (SEPP) from 1 July 2004 to 30 June 2005, and 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.

Melbourne Water has been publishing water quality data regularly in our annual reports for several years. Data from our long-term monitoring program varies little over the years. Key features are:

- Water quality varies considerably across the Port Phillip and Westernport Region. While some sites are in excellent condition, others will have very poor quality
- Typically water quality reflects the catchment and as such, tends to be poorer within urban rivers and creeks subject to excessive stormwater volumes and associated pollutants. For example, in 2004/05, *E.coli* and nitrogen levels were higher than the SEPP standard in Watsons Creek at Dandenong-Hastings Road, Somerville most probably due to fertiliser run-off from market gardens upstream. On the other hand, rivers and creeks flowing through forested catchments within the region tend to have very good water quality
- Many sites do not currently meet State Environment Protection Policy (SEPP) objectives, although waterway and catchment management aims to meet them over the life of the SEPP. Such activities include the treatment of urban stormwater through Water Sensitive Urban Design and uptake of environmental best practice land management in rural areas, and through the investigation and mitigation of point sources of pollution
- Currently Melbourne Water, in conjunction with a range of stakeholders (including EPA Victoria, Department of sustainability and Environment, Department of Primary Industry, Department of Human Services, Municipal Association of Victoria and the Port Phillip and Westernport Catchment Management Authority) and part funding from the Department of Environment and Heritage, is developing a Water Quality Improvement Plan for the Port Phillip and Westernport catchments. This plan will provide important direction for the on-going improvement and protection of water quality in the region.

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	<25a/30b	<25a/50b	<0.90	<0.08	<200	<0.002	<0.005
Waters of Western Port and catchment								
Western Port	>6.0	<25*	<25*	<0.75	<0.1	<1000	<0.01	<0.005

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
waterways – peninsula								
Western Port waterways – eastern	>6.5	<25*	<25*	<0.75	<0.1	<200	<0.01	<0.005
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

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

The following tables show results from the river and creek monitoring sites in annual medians except for dissolved oxygen that shows the 25th percentile result. The map on the previous page shows site locations.

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	54		11		1.109	0.052	140	0.0035	0.0085
68	Steele Creek at Rose Avenue, Niddrie	75.75		7		0.9635	0.062	400	0.006	0.0565
67	Maribyrnong River at Canning Street Ford, Avondale Heights	64		10		1.075	0.059	160	0.002	0.0075
71	Kororoit Creek at Racecourse Road Ford, Altona	57		26.5		1.6925	0.155	130	0.01	0.0235
70	Kororoit Creek at Millbank Drive, Deer Park	57		14.5		1.0865	0.068	140	0.005	0.016
72	Skeleton Creek at Ayr Street, Laverton	63.56		13		1.171	0.12	1400	0.007	0.14
69	Stony Creek at Bena Street, Yarraville	66.87		13		3.321	0.29	4300	0.0095	0.195
Mordialloc and Kananook creeks and Mornington Peninsula waterways										
43	Mordialloc Creek at Wells Road, Mordialloc	57.5		43		1.776	0.295	400	0.0055	0.07
44	Kananook Creek at Wells Street, Frankston	50.75		6		0.899	0.13	270	0.005	0.04
52	Warrangine Creek at Frankston-Flinders Road, Hastings	51.47		13.5		1.4885	0.047	290	0.003	0.017
50	Watsons Creek at Dandenong-Hastings Road	55		14		15.31	0.585	620	0.003	0.021

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
	Somerville									
46	Balcombe Creek at Uralla Dve footbridge, Mt Martha	56.75		13		1.2505	0.0475	560	0.004	0.0205
48	Chinamans Creek at Eastbourne Road, Rosebud West	34.25		8		2.1665	0.072	330	0.0055	0.014
49	Main Creek at Boneo Road, Flinders	87.75		5		0.784	0.02	130	0.0025	0.004
47	Dunns Creek at Marine Drive, Safety Beach	62.5		8.5		0.6195	0.0395	340	0.004	0.0075
Waters of Dandenong Valley										
39	Mile Creek at Cheltenham Road, Keysborough	68.5		12.5		1.975	0.0875	630	0.003	0.18
42	Eumemmerring Creek at Worsley Road, Bangholme	65		24.5		2.1025	0.235	250	0.0035	0.0375
40	Patterson River at National Water Sports Centre outlet, Bangholme	75.25		51		1.574	0.15	200	0.006	0.0495
35	Dandenong Creek at Boronia Road, Wantirna	52.5		26		2.313	0.1015	360	0.0035	0.115
41	Hallam Main Drain at South Gippsland Highway Hampton Park	49		17.5		1.6995	0.092	250	0.002	0.023
36	Dandenong Creek at Stud Road, Dandenong North	72		37		1.211	0.0785	250	0.0035	0.046

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
37	Dandenong Creek at Pillars Crossing, Dandenong South	76		32.5		1.35	0.091	400	0.0095	0.0885
38	Corhanwarrabul Creek at Wellington Road, Rowville	73.75		35.5		1.628	0.085	320	0.0035	0.0325
34	Dandenong Creek at Sheffield Road, Doongalla Forest	84		13.5		1.569	0.0215	40	0.0005	0.005
45	Elster Creek at Cochrane Street, Elwood	89.78		8.5		2.414	0.105	2100	0.0025	0.265
Western Port waterways										
55	Toomuc Creek at Princes Highway, Pakenham		8.8	35	10	1.048	0.058	220	0.002	0.01
54	Cardinia Creek at Ballarto Road, Cardinia		9.76	24	10	0.938	0.048	120	0.002	0.01
57	Deep Creek at Ballarto Road, Rythdale		5.5	104	52	1.996	0.42	140	0.004	0.019
51	Merricks Creek, Bridge Street, Merricks		5.91	10.5	12	1.232	0.0505	410	0.005	0.0115
65	Lang Lang River at Douin-Poowong Road, Athlone		8.1	22	7	1.158	0.1	420	0.0005	0.009
61	Bunyip River at Little Road, Iona		8.2	18	12	0.895	0.045	220	0.001	0.011
58	Tarago River at Morrisons Road, Labertouche		8.6	19	9	0.715	0.049	380	0.0005	0.005
64	Lang Lang River at South Ginnsland		9	24	19	1.268	0.11	160	0.0005	0.007

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
	Highway, Lang Lang									
63	Yallock Outfall at South Gippsland Highway, Monomeith		7.5	49	33.5	1.43	0.086	110	0.002	0.007
59	Bunyip River at North Labertouche Road, Tonimbuk		8.8	15	9	0.675	0.019	60	0.0005	0.006
60	Bunyip River downstream Cannibal Creek, Longwarry North		8.6	22	8	0.863	0.034	120	0.001	0.007
62	Bunyip River at Healesville-Koo Wee Rup Road, Koo Wee Rup		9	25	16	0.775	0.045	200	0.001	0.008
53	Cardinia Creek at Cadwick Road, Upper Beaconsfield		8.7	27	8	0.888	0.034	280	0.002	0.009
56	Toomuc Creek at Ballarto Road, Rythdale		5.3	33	10	1.035	0.083	60	0.002	0.009
Yarra Catchment - northern urban tributaries										
32	Merri Creek at Roseneath Street, Yarra Bend		8.85	8.5	3.5	1.762	0.135	650	0.0045	0.063
33	Moonee Ponds Creek at Mt Alexander Road, Parkville		8.25	11	14	2.328	0.14	1200	0.0045	0.046
31	Darebin Creek at Clark Road footbridge, Ivanhoe		8.7	12	8.5	1.527	0.12	1850	0.0055	0.1065
30	Plenty River at Hentv Road.		6.605	43	26	1.48	0.115	1400	0.008	0.0425

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
	Lower Plenty									
29	Diamond Creek at Main Road, Eltham		7.075	40	16	1.221	0.0845	900	0.006	0.049
Yarra Catchment - rural eastern and western waterways										
16	Watsons Creek at Henley Road, Kangaroo Ground		8.15	8	3	0.517	0.0155	130	0.0025	0.0065
20	Merri Creek at Summerhill Road, Craigieburn		6.7	8.5	8	1.087	0.057	90	0.003	0.007
19	Plenty River at Plenty Gorge, South Morang		6.84	25	10	1.49	0.084	90	0.004	0.0105
17	Arthurs Creek at Burkes Bridge, Hurstbridge		6.94	23	6	0.738	0.048	120	0.005	0.008
18	Diamond Creek at Cottles Bridge-Strathewen Road, Cottles Bridge		5.71	32	8	1.267	0.059	140	0.004	0.013
14	Steels Creek at Healesville Road, Yarra Glen		7.35	30	5.5	1.14	0.0485	420	0.0015	0.01
13	Watts River at Healesville-Kinglake Road, Healesville		8.55	10.5	4.5	0.803	0.022	70	0.0015	0.007
12	Wandin Yallock Creek at Killara Road, Gruyere		8.4	13.5	5	1.743	0.0255	240	0.00125	0.0055
9	Woori Yallock Creek at Warburton Highway, Woori Yallock		8.35	31.5	13	1.4	0.0375	120	0.00125	0.006
10	Woori Yallock		8.4	30	11	1.36	0.0325	270	0.0005	0.0065

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
	Creek at Macclesfield Road, Yellingbo									
11	Cockatoo Creek at Tschampions Road, Macclesfield		9.25	36	21.5	1.671	0.036	90	0.0015	0.0075
8	Little Yarra River at Corduroy Road, Yarra Junction		8.55	23	15	0.7665	0.027	70	0.00075	0.0065
15	Stringybark Creek at Melba Highway, Yering		7.35	16.5	6.5	1.042	0.032	275	0.0005	0.0065
Yarra Catchment - southern urban tributaries										
28	Gardiners Creek at South Eastern Freeway, Hawthorn		8.9	12.5	9.5	1.79	0.104	1800	0.006	0.1095
27	Koonung Creek at Bulleen Road, Bulleen		6.96	26	13.5	1.2	0.089	1400	0.0055	0.0825
25	Mullum Mullum Creek at Deep Creek Reserve, Warrandyte		7.85	44	26	2.88	0.305	1925	0.0065	0.0405
24	Andersons Creek at Everard Drive, Warrandyte		8.3	31.5	15.5	3.879	0.25	1600	0.006	0.0195
22	Brushy Creek at Lower Homestead Road, Wonga Park		7.26	22.5	11	6.811	0.26	570	0.0025	0.044
23	Jumping Creek at Jumping Creek Road, Wonga Park		8.605	14	11	1.22	0.0525	380	0.0035	0.0145
26	Ruffey Creek at Parker Street		8.13	12	6.5	1.717	0.175	830	0.007	0.054

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
	Templestowe									
21	Olinda Creek at Macintyre Lane, Coldstream		7.59	34	13	3.072	0.135	260	0.0035	0.0125
Yarra Catchment - Yarra mainstream and estuary										
6	Yarra River at Chandler Highway, Kew		8.4	23	21.5	1.062	0.055	210	0.0055	0.0185
7	Yarra River at Princes Bridge, South Melbourne		7.35	8	21	0.959	0.0675	530	0.0065	0.023
5	Yarra River at Kangaroo Ground-Warrandyte Road, Warrandyte		8.77	18	8	0.9905	0.039	135	0.004	0.008
4	Yarra River at Spadonis Reserve, Coldstream		8.4	19	9	0.961	0.034	200	0.0005	0.007
3	Yarra River at Maroondah Highway, Healesville		8.05	14.5	8	0.694	0.025	220	0.0005	0.0065
2	Yarra River at Don Road, Launching Place		9.2	14	6	0.605	0.02	220	0.0005	0.006
1	Yarra River at McKenzie-King Drive, Millgrove		10.35	8	5	0.5695	0.0145	190	0.0005	0.0055

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 2004/05, there were a total of 431 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
- 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
2004/05	431

Energy and greenhouse data

Most of Melbourne Water's energy use is related to pumping and treating water and sewage. During 2004/5, we contributed to the Victorian Greenhouse Strategy by reducing our greenhouse gas emissions by about 113,000 tonnes of carbon dioxide equivalent during the year. This is 30% lower than our 2001 emission levels, representing a total saving since then of 167,000 tonnes of carbon dioxide equivalent.

Melbourne Water has established an inventory of its greenhouse gas emissions to better understand the impact our operations have on the global climate. 2000/01 has been chosen 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 2004/05.

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	261,093	288,410	301,705	242,760	256,402	245,720
Natural Gas (for General)	82	90	90	90	90	90	90	90
Natural Gas (for Electricity, Shaft Power & Heat)	3856	1764	4947	5889	6979	17,259	17,307	17,357
Diesel Transport	169	201	475	953	845	201	201	201
Diesel (for Electricity, Shaft Power & Heat)	3790	3920	3849	3880	4980	60	60	60
LPG	73	106	97	107	89	106	106	106
Petrol	2020	2133	2267	2356	2416	2014	2014	2014
Methane (Total Direct Emissions)	274,634	190,563	188,463	203,926	77,892	40,064	40,927	40,927
Nitrous Oxide	6504	6523	7535	6513	4530	4756	4941	4941
Sink CO2 from Trees	-3560	-4260	-4960	-5660	-6360	-7460	-8598	-9736
Biogas Methane (Total Captured)	0	0	0	0	0	0	0	0
Total Liable CO2e Emissions	559,986	479,454	463,857	506,464	393,165	299,849	313,449	301,679

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	651	719	752	605	639	613
Natural gas imported	67	29	78	93	110	270	271	272
Diesel imported	51	51	50	50	64	1	1	1
Biogas used	360	597	565	582	626	1015	1027	1158
Vehicle fuels	32	31	36	43	42	29	29	29
Total energy used	1178	1401	1380	1488	1595	1921	1968	2072
Increase on 2000/01		119%	117%	126%	135%	163%	167%	176%

Energy consumption by operation (terrajoules)

	Actual					Forecast		
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Eastern Treatment Plant	681	709	696	719	750	859	910	931
Western Treatment Plant	121	316	337	350	434	662	667	760
Winneke water treatment plant	153	170	139	204	165	140	118	107
Water – other	37	33	34	33	33	34	35	36
Sewage transfer	134	128	121	120	123	124	125	126
Vehicle fuels	32	31	36	43	42	29	29	29
Recycle	0	0	0	0	26	51	63	63
Minor sites	7	3	4	5	8	8	8	8
Other	13	12	13	13	14	13	13	13
Total	1178	1401	1380	1488	1595	1921	1968	2072

Renewable electricity generation (gigawatt hours per annum)

	Actual					Forecast		
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Eastern Treatment Plant	0.6	0.8	1.1	0.3	-1.2	32.0	32.0	32.0
Western Treatment Plant	3.4	16.1	18.1	19.2	21.7	41.1	41.1	49.3
Existing hydro-electricity plants	28.6	25.1	31.8	26.5	29.0	27.0	30.6	36.1
Proposed hydro-electricity plants	0.0	0.0	0.0	0.0	0.0	0.0	5.9	26.4
<i>Total Renewable electricity generation</i>	32.6	42.0	51.0	46.0	49.5	100.1	109.5	143.8
Total Melbourne Water electricity consumption	185.7	192.9	180.9	199.8	209.0	168.2	177.6	170.2
<i>Renewable electricity key performance indicator</i>	18%	22%	28%	23%	24%	60%	62%	84%

Emissions per million litres of water supplied (kilograms)

	Actual					Forecast		
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Carbon dioxide emissions in kilograms per million litres of water supplied	1109	1030	959	1154	892	647	644	568

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

Committee	Melbourne Water status
Diversion Management Advisory Committee	Convenor
Sustainable Diversion 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 and associated working committees	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 and associated working committees	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
Yarra River Environmental Flows Steering Committee and Advisory Group	Convenor

Committee	Melbourne Water status
Werribee River Environmental Flows Steering Committee and Advisory Group	Convenor
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
Bunyip Main Drain Project Coordinating Committee	Convenor
Friends of Groups (various)	Attends on request
Wetlands/Water Quality Management	
Edithvale-Seafood Wetlands Community Liaison Committee	Attendee
Ruffey Lake Park Advisory Committee	Member
Lillydale Lake Landcare Consultative Committee	Member
Yarra Task Team	Member
Floodplain Management	
Gisborne Flood Study Steering Committee	Member
Bacchus Marsh Flood Steering Committee	Member
Victorian Flood Plain Managers Forum	Member
Bunyip Tenement Control Working Group	Member
Victorian Flood Warning Consultative Committee (Met Bureau).	Member
Nillumbik Municipal Emergency Management Plan Committee.	Member
Federal - Natural Disaster Relief and Regional Flood Mitigation Programs – Assessment Committee	Member
DSE/CMA/Melbourne Water Caravan Park Flood Risk Review Committee	Member

Committee	Melbourne Water status
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
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
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

Committee	Melbourne Water status
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
Operating Charter Review Steering Committee	Convenor
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
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 Committee	Member
Galada Tamboore Working Group	Chairs
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

Committee	Melbourne Water status
Truganina Coastal Parklands Coordinating 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
Northern Suburbs Sewerage Strategy Consultation Committee	Member
Yarra Glen By-Pass Environmental Effects Consultative Committee	Member
Smart Growth (DSE)-Casey Cardinia Growth Corridor	Member
Smart Growth (DSE)-Plenty Corridor	Member
Werribee West Infrastructure Group	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

Committee	Melbourne Water status
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
Victorian Emergency Management Council	Agency Role
Road Construction	
VicRoads - Barnes Rd Bridge Consultative Committee	Member
DSE - Craigieburn By-Pass Environs Coordination Group	Member
VicRoads - Craigieburn By-Pass Local Community Advisory Group	Member
VicRoads - Pakenham By-Pass Community Consultation Committee	Member
VicRoads - Greensborough By-Pass Government Agency Briefing Group	Member
EastLink - TJH fortnightly waterways & drainage liaison working group	Member
SEITA technical group	Member
Recycled Water	
Recycled Water Advisory Committee	Convenor