

2005/2006 ANNUAL REPORT TO DEPARTMENT OF HUMAN SERVICES

1 INTRODUCTION

This report is provided by Melbourne Water to the Secretary of the Department of Human Services in accordance with Section 26 of the *Safe Drinking Water Act 2003* for the financial year 2005/2006.

Melbourne Water manages Melbourne's water supply catchments, removes and treats most of Melbourne's sewage, and manages rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region.

We are owned by the Victorian Government, with an independent Board of Directors responsible for governance. The responsible Minister is the Minister for Water. We are a significant business, responsible for managing \$8.4 billion in water supply, sewerage and drainage assets, and we are committed to looking after these in a way that protects and improves their environmental, social and financial values.

EPA Victoria and the Department of Human Services regulate the environmental and public health aspects of our business. The Essential Services Commission regulates prices and monitors service performance. We work across several arms of the Victorian Government, including the Department of Sustainability and Environment, and the Department of Treasury and Finance.

Our customers include the metropolitan retail water businesses - City West Water, South East Water, Yarra Valley Water - other water authorities, local councils, land developers and businesses that divert river water.

We work with a wide range of partners including the Port Phillip and Westernport Catchment Management Authority, the Municipal Association of Victoria and Sustainability Victoria. Research organisations (such as the CSIRO, Co-operative Research Centres and universities), engineering consultants and contractors also assist us to achieve our objectives. We are involved with a wide range of community stakeholders including "Friends of" groups, resident and environment groups, advisory bodies, rural landowners and the education sector.

1.1 Characterisation of the System

Melbourne Water manages the harvesting of water from catchments, the major transfer, storage and treatment of water and delivery of water to numerous interface points with the Melbourne retail water companies. There are approximately 440 GL of bulk water per year supplied to the customers of the retail water companies.

1.1.1 Source of Water

The majority of water is sourced from forested, protected catchments, which are closed to the public. Most of Melbourne's water is supplied via Silvan Reservoir which receives inflows from Thomson Reservoir, Upper Yarra Reservoir, O'Shannassy Reservoir and other small Yarra River tributaries. Cardinia and Greenvale Reservoirs are supplied by the Silvan system.

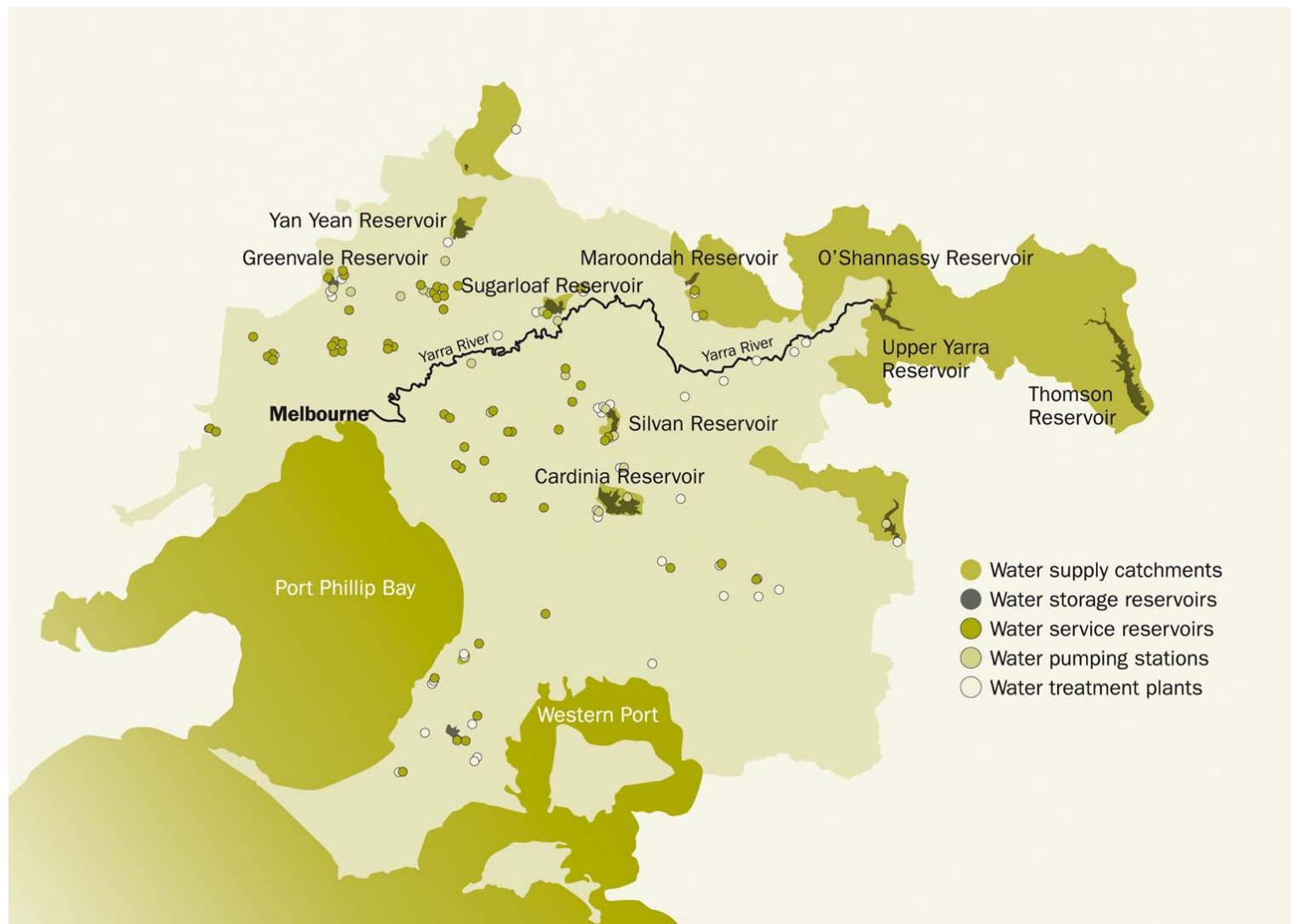
These sources are supplied to the Retail Water Companies unfiltered because of the high quality of water from the catchments and large storages.

In contrast, water from Sugarloaf Reservoir is filtered at Winneke Treatment Plant and is derived from a combination of the unprotected Yarra River catchment and protected catchment water from Maroondah Reservoir. Because of the drought, supply to Melbourne from Winneke has increased in recent years to meet about 25% of the total consumption.

Yan Yean Reservoir receives water from protected catchments but is filtered to reduce colour and turbidity. Healesville and Yarra Glen systems receive water from protected catchments but with variable water quality that requires filtration.

Tarago Reservoir receives water from both protected and unprotected catchment areas. Raw water is supplied to Gippsland Water, which treats this source before supplying to their customers.

Figure 1.1 Melbourne Water's Supply Area



2 QUALITY MANAGEMENT SYSTEM

2.1 Water Treatment

Disinfection of source water supplied from open storages is carried out when this water initially enters the distribution system, along with fluoridation and pH correction of the major supplies. At locations where source water comes from unprotected catchments or sources that have no detention time, filtration plants treat this source to maintain quality. Secondary disinfection and secondary pH correction are applied to specific zones (usually remote from the initial treatment).

Long detention time in storages and primary disinfection plants help to inactivate microorganisms (pathogenic bacteria, protozoa and viruses). These plants also provide, to some extent, control of bacterial regrowth downstream. The purpose of secondary disinfection is to control bacterial regrowth and potential contamination within the closed distribution system where the water has already been treated by primary disinfection. Chlorine residual limits are set to minimise disinfection by-products and taste and odour problems.

Chlorination, chloramination and ultra violet (UV) irradiation are the methods of disinfection used by Melbourne Water. Melbourne Water operates four UV irradiation disinfection plants. Ultra violet irradiation works best in cold, very clear water, which will reach the customer quickly. It provides effective initial disinfection but does not provide a disinfection residual for protection against regrowth of bacteria. At Warburton (Martyr Road) and Yarra Junction, UV plants provide an initial kill and the sodium hypochlorite dosing plants provide a residual to control regrowth.

Melbourne Water operates one large sand filtration plant that treats water on the outlet of the Sugarloaf Reservoir. The Winneke water treatment plant has a variety of processes including coagulation, clarification, filtration and chemical dosing. The Yan Yean water treatment plant is privately owned and operated by United Utilities and supplies treated water into the water supply system under direction from Melbourne Water.

The three small membrane filtration plants at Healesville (Frogley, Cresswell) and Yarra Glen remove particles in the raw water from their respective aqueduct sources. This ensures that parameters such as turbidity and colour are reduced to acceptable levels, particularly during storm events. In addition, pathogens attached to particles are removed. Reducing the turbidity to below 0.1 NTU also ensures more effective disinfection of the filtered water.

Eight fluoridation plants are operated on behalf of the Department of Human Services (DHS) to protect the dental health of the people of Melbourne. The operation of the fluoridation plants is a statutory requirement under the Health (Fluoridation) Act 1973. Three fluoride slurry plants operate at Silvan and one slurry plant operates on the Winneke to Preston main at Research. One fluoride solution plant doses water at Monbulk and two fluoride acid plants dose water at Cardinia. The plant located at Yan Yean is operated by United Utilities.

Melbourne Water operates 12 pH correction plants to maintain a balanced pH level in reticulation systems. Low pH can cause corrosion to pipework. High pH levels can cause taste problems and also reduce the effectiveness of chlorine disinfection. The lime pH

correction plants at Silvan, Cardinia, Winneke and Monbulk and the caustic soda pH correction plant at Kallista are designed to increase the pH of treated water to meet Bulk Water Supply Agreement (BWSA) requirements with the retail companies. The carbon dioxide pH correction plants at Bunyip, Garfield, Tynong and Koo Wee Rup are designed to decrease the pH of water in the Tarago-Westernport pipeline to fulfil BWSA requirements. United Utilities also operates an alkalinity plant at the same site on behalf of Melbourne Water for supply to Whittlesea.

Table 2.1 illustrates the water treatment processes applied to each element of the Melbourne Water Supply System, including the chemicals associated with these processes and the locality supplied.

2.1.1 Issues

A UV disinfection plant is to be added to the existing sodium hypochlorite plant at Lusatia Park (supplying the Woori Yallock area) to provide more reliable primary disinfection. This work is included in the current Water Plan and is to be constructed within the next two years.

Works are also planned within the current Water Plan period for the Silvan-Seville system, to improve taste and odour within this system associated with the existing chloramination of the water and the need to obtain better control of pH levels.

Table 2.1 Water Treatment Processes

Water Supply System	Source Water / Catchment	Storage	Treatment Process	Added Substances	Area Supplied (Retail Water Company Supplied)
Cardinia	Transfer from Silvan Reservoir	Cardinia Reservoir	Chlorination (disinfection)	Chlorine gas	Mornington Peninsula and south eastern suburbs (South East Water, Yarra Valley Water)
			Fluoridation	Hydrofluosilicic acid	
			pH correction	Lime	
			Secondary chlorination	Chlorine gas or sodium hypochlorite	
			Secondary pH correction	Carbon dioxide	
Greenvale	Transfer from Silvan Reservoir	Greenvale Reservoir	Chlorination (disinfection)	Chlorine gas	Western suburbs and Sunbury/Melton (City West Water, Yarra Valley Water, Western Water)
			Secondary chlorination	Sodium hypochlorite	
Lower Yarra Valley Townships	Maroondah Catchment	Maroondah Reservoir	Membrane filtration	Memclean EXA2 (membrane cleaning) Aluminium chlorhydrate (ACH) (coagulation)	Yarra Glen (Yarra Valley Water)
			Chlorination (disinfection)	Sodium hypochlorite	
	Coranderrk Catchment		Membrane filtration	Memclean EXA2 (membrane cleaning) Aluminium chlorhydrate (ACH) (coagulation)	Healesville (Yarra Valley Water)
			Chlorination (disinfection)	Sodium hypochlorite	
Silvan	Thomson Catchment Upper Yarra Catchment O'Shannassy Catchment Armstrong Catchment McMahons Catchment Starvation Catchment Coranderrk Catchment	Silvan Reservoir	Chlorination (disinfection)	Chlorine gas	Eastern, central, northern and western suburbs (City West Water, South East Water, Yarra Valley Water)
			Fluoridation	Sodium fluosilicate	
			pH correction	Lime	
			Secondary chlorination	Sodium hypochlorite	
Silvan Area	Thomson Catchment Upper Yarra Catchment O'Shannassy Catchment Armstrong Catchment McMahons Catchment Starvation Catchment Coranderrk Catchment	Silvan Reservoir	Chloramination (disinfection)	Chlorine gas Ammonia	Monbulk, Silvan, Kallista, Sherbrooke, Sassafras, Ferny Creek, Olinda, Mount Dandenong (Yarra Valley Water)
			Fluoridation	Sodium fluosilicate	
			pH correction	Lime	
			Chloramination (disinfection)	Chlorine gas Ammonia	Emerald, Menzies Creek, Cockatoo (Yarra Valley Water)
			pH correction	Caustic soda	
			Chloramination (disinfection)	Sodium hypochlorite Ammonia	Seville, Wandin (Yarra Valley Water)

Water Supply System	Source Water / Catchment	Storage	Treatment Process	Added Substances	Area Supplied <i>(Retail Water Company Supplied)</i>
Tarago	Tarago Catchment	Tarago Reservoir	Reservoir aeration		Neerim South, Drouin/Warragul <i>(Gippsland Water)</i>
Upper Yarra Valley Townships	Thomson Catchment Upper Yarra Catchment		Chlorination (disinfection)	Sodium hypochlorite	Woori Yallock, Launching Place <i>(Yarra Valley Water)</i>
			UV irradiation and secondary chlorination (disinfection)	Sodium hypochlorite	Yarra Junction, Warburton <i>(Yarra Valley Water)</i>
			UV irradiation		East Warburton <i>(Yarra Valley Water)</i>
Winneke	Transfer from Maroondah Reservoir Yarra River	Sugarloaf Reservoir	Reservoir aeration		North eastern, central and western suburbs <i>(City West Water, South East Water, Yarra Valley Water)</i>
			Clarification/filtration	Polyelectrolyte (filter aid) Alum (coagulation)	
			Chlorination (disinfection)	Chlorine gas	
			Fluoridation	Sodium fluosilicate	
			pH correction	Lime	
			Secondary chlorination	Sodium hypochlorite	
Yan Yean	Wallaby Creek Catchment Toorourrong Catchment Yan Yean Catchment Transfer from Silvan Reservoir	Yan Yean Reservoir	Filtration	Polyelectrolyte (filter aid) Alum (coagulation)	Northern suburbs <i>(Yarra Valley Water)</i>
			Chlorination (disinfection)	Chlorine gas	
			Fluoridation	Fluosilicic acid	
			pH correction	Lime	
			Secondary chlorination	Sodium hypochlorite	

3 EMERGENCY / INCIDENT MANAGEMENT

3.1 Emergencies

3.1.1 Actions

The incidents within Table 3.1 below were reported by Melbourne Water to the Environmental Health Unit of DHS under Section 22 of the Safe Drinking Water Act 2003. Emergency dosing points have been installed to prevent undisinfected water reaching customers in the event of primary disinfection plant failure at Winneke, Greenvale, Silvan and Cardinia. The installation of injection points, sampling taps and on-line chlorine analysers downstream of these major disinfection plants were completed in June 2006 and will allow Melbourne Water to better manage disinfection failure events.

Under Melbourne Water's draft protocol for reporting in accordance with Section 22 of the Safe Drinking Water Act 2003, the retail water companies are the lead agent for notifying DHS of water quality incidents which may cause widespread public complaint. Refer to the annual reports of the metropolitan retail water companies for details of such incidents in 2005/06.

Table 3.1 Failure to Disinfect Incidents 2005/06

Plant	Date Time	Duration (hours:min)	Volume of undisinfected water reaching consumers (ML)	Description	Corrective Action
Silvan - Preston	17 Jul 05 16:30 – 17:31	1:01	Small volume in the Olinda area*	In June a manual valve on the chlorine manifold was left shut on a drum bank and when the control system switched to that bank, chlorine flow ceased.	A manual changeover of the drum banks got chlorine dosing started again. The undisinfected water was transferred to storage reservoirs and spot dosed, although a small volume entered supply at Olinda. Actions have been taken to ensure all valves are thoroughly checked following isolations for maintenance.
Cardinia 1700	10 Sep 05 8:45 - 9:15	0:30	Small volume in the Officer /Berwick areas*	The plant had a loss of power to the plant flow meter, resulting in the plant shutting down.	The plant was attended and run in manual mode until the flow signal was restored. Most of the unchlorinated water was monitored and transferred to service reservoirs that were subsequently spot dosed. The plant backup systems were modified to ensure the plant would remain operational during similar events. Similar systems at other plants were also checked.

Plant	Date Time	Duration (hours:min)	Volume of undisinfecting water reaching consumers (ML)	Description	Corrective Action
Greenvale - St Albans	20 Oct 05 10:49 – 11:10	0:21	Nil	During the re-commissioning of the Yuroke Pump Station the power to the St Albans Chlorinator was cut, causing the disinfection plant to fail. A previous chlorinator failure at the Greenvale site occurred on 14 October 2005, but was of a duration less than the 10 minute critical limit for primary disinfection.	The plant was reset. Future maintenance or capital work upgrades on primary chlorination plants will have senior operators on site to go through agreed shutdown procedures before any assets are operated or isolated.
Silvan - Olinda & Waverley	03 Nov 05 7:22 - 7:47	0:25	Nil	A transient electrical event caused various parts of the treatment plant to stop functioning.	The plant was manually restarted at 7:45. Silvan, Preston and Waverley inlets were slowed. The plant's power supply was modified and the system tested.
Silvan - Olinda & Waverley	09 Nov 05 23:30 - 00:10	0:40	Nil	The power supply to the battery charger failed which eventually caused the power in the batteries to drain and the plant to shut down.	The circuit breaker was reset to re-establish power and the disinfection plant was restarted. The slug of undisinfecting water was managed and spot dosing was carried out at Olinda Reservoir. The plant was modified to improve the power supply to the batteries and an investigation into the alarm generated was made.
Greenvale - Yuroke & St Albans	25 Nov 05 8:06 - 8:47	0:41	Nil	The plant lost suction pressure during the process of flushing the Greenvale Yuroke injection line required to be isolated for upgrade works.	The water supply transfer network was reconfigured to change the source of supply from Winneke to Silvan. The undisinfecting water was pushed back up the Greenvale St Albans outlet main into Greenvale Reservoir. Future maintenance or capital work upgrades on primary chlorination plants will have senior operators on site to go through agreed shutdown procedures before any assets are operated or isolated.
Silvan - Olinda & Waverley	12 Dec 05 21:05 - 22:45	1:40	Nil	Mains power supply failure, generator started but the plant did not restart.	Generator signal status fault to the PLC rectified. Extensive power failure testing of the plant was carried out, including the alarms, signals, the plant shutdown and start-up.
Lusatia Park	14 Jan 06	1:00	Yarra Valley Water – 0.09	The probable cause of the low residual was gassing at a metering pump. After the plant was set to the standby system, the booster pump started but shut down shortly after because of a pressure switch on the booster pump which had been isolated during maintenance work the previous day.	The operator arrived at the site shortly after to resolve the problem. The pressure switch was reinstated and the plant restarted. Modifications to the pipe work to prevent gassing have been planned.

Plant	Date Time	Duration (hours:min)	Volume of undisinfected water reaching consumers (ML)	Description	Corrective Action
Lusatia Park	24 Jan 06	0:15	Yarra Valley Water – 0.02	The cause of the low residual was gassing a metering pump. The plant recovered automatically by switching to the standby system.	The UV plant is scheduled for construction within 2006/07 to improve primary disinfection at this site.

* No flow metering available to determine the volume.

4 UNDERTAKINGS UNDER SECTION 30 OF THE ACT

Nil

5 FINDINGS OF THE MOST RECENT RISK MANAGEMENT PLAN AUDIT

Nil. No regulatory audits were held during the 2005-06 reporting period.

6 EXEMPTIONS UNDER SECTION 8 OF THE ACT AND CONDITIONS IMPOSED

Nil. No Section 8 exemptions in place during the reporting period.