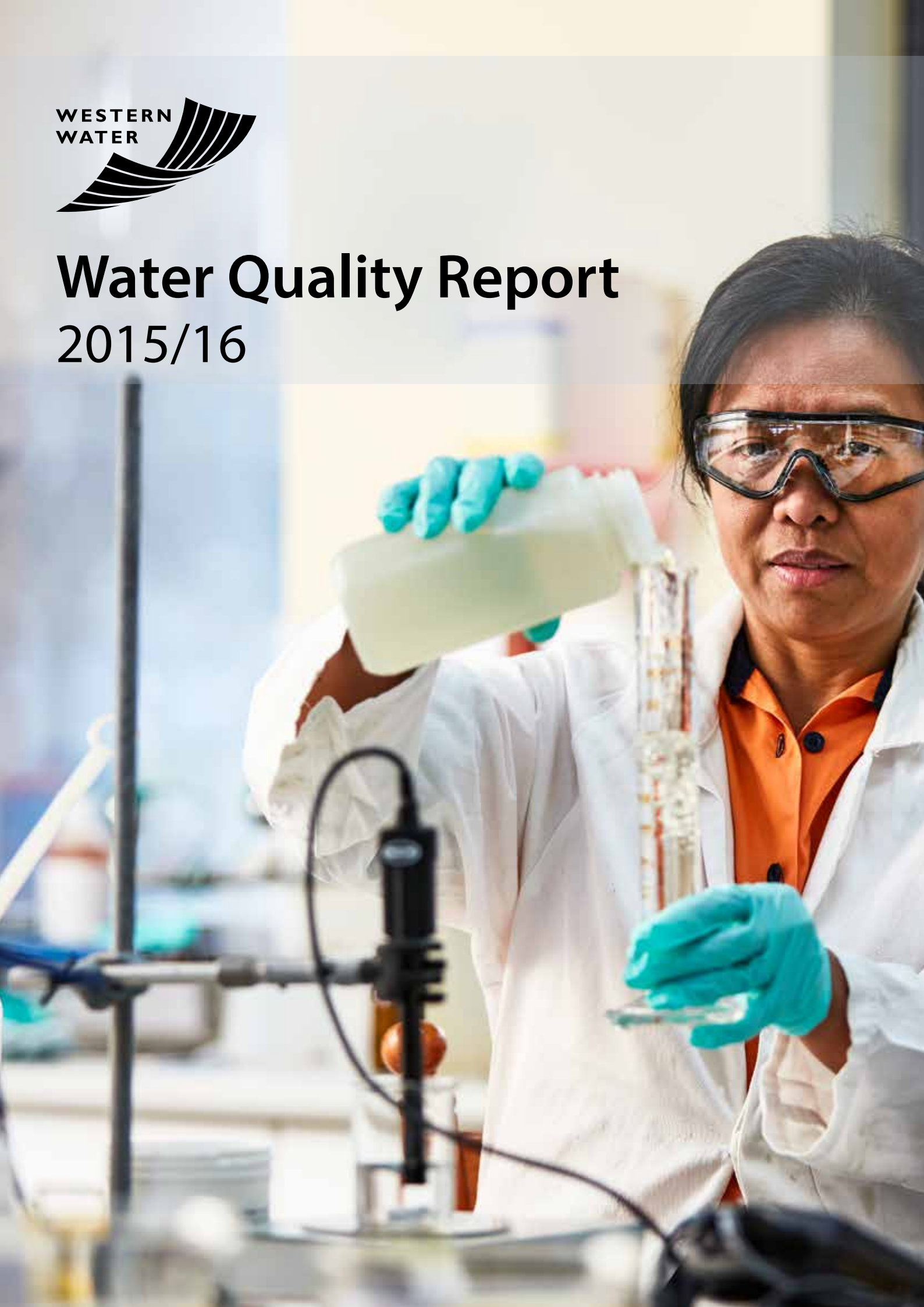
WESTERN WATER

Water Quality Report
2015/16



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Introduction

About Western Water

In 2015/16, Western Water provided water, recycled water and sewerage services to 63,200 properties across a region of 3,000 square kilometres to the north-west of Melbourne.

Serviced properties grew by 3.2% this year – particularly within the new residential estates in and around Melton and Sunbury. Average property growth rates of 4.1% per annum are expected over the next ten years.

Population growth has slowed in recent years, growing by 1.2% this year to reach 163,400. However, the higher growth in property numbers indicates a return to stronger population growth rates for the region.

Manner of establishment and responsible Minister

Established under the *Water Act 1989*, Western Region Water Corporation (trading as Western Water) is one of Victoria's 13 regional urban water corporations.

During the reporting period, 1 July 2015 to 30 June 2016, the relevant minister was:

- 1 July 2015 to 22 May 2016 –the Hon Lisa Neville MP, Minister for Environment, Climate Change and Water
- 23 May 2016 to 30 June 2016 –the Hon Lisa Neville MP, Minister for Water.

Western Water is responsible to the Minister for Water via the Department of Environment, Land, Water and Planning (DELWP). The Department of Treasury and Finance (DTF) also has a shareholder governance role.

The Department of Health and Human Services (DHHS) sets and supervises water quality standards, while the Environment Protection Authority (EPA) governs environmental standards, particularly for wastewater discharge, recycled water and biosolids management.

The Essential Services Commission (ESC), the Victorian Government's economic regulator for essential utility services, regulates Western Water's prices, service standards and market conduct. The Energy and Water Ombudsman Victoria (EWOV) receives, investigates and resolves escalated enquiries and complaints against electricity and water suppliers across Victoria.

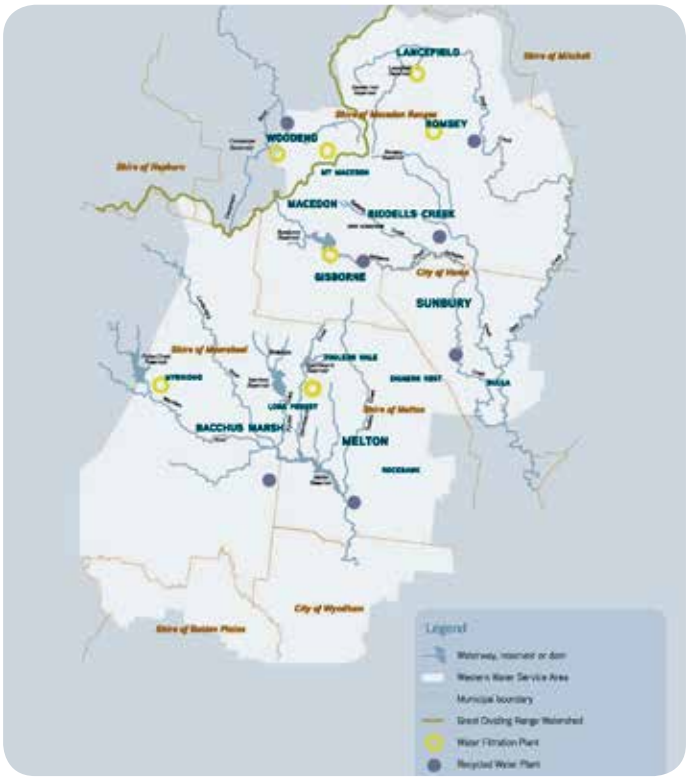
Drinking water regulations

Western Water is governed by Victoria's *Safe Drinking Water Act 2003* and Safe Drinking Water Regulations 2015, which provide a comprehensive regulatory framework for the provision of drinking water to customers.

The framework encompasses a risk-based approach to the management of drinking water from water catchment to the customer's tap, with linkages to the Australian Drinking Water Guidelines 2011 where applicable.

The DHHS Water Program in the Health Protection Branch is responsible for administering the regulatory framework.

Service area map



2015/16 Highlights

- Safely delivered 14,357 million litres of drinking water to 60,158 properties
- 100% compliance with the *Safe Drinking Water Act 2003* and all parameters specified in the Safe Drinking Water Regulations 2005 and the Safe Drinking Water Regulations 2015
- In June 2016, Western Water successfully passed its fifth Regulatory Audit for its Drinking Water Risk Management Plan under the *Safe Drinking Water Act 2003*, and continued independent certification of Western Water's Hazard Analysis and Critical Control Point system
- Resolved 251 water quality complaints, working with customers to understand the root cause and addressing issues identified
- In February 2016, Western Water successfully obtained recertification for the drinking water quality management system by external audit.

Table 1: Drinking water statistics - 2014/15 vs 2015/16

	2014/15	2015/16
Connected water customers	58,477	60,158
- Residential	55,418	57,062
- Non-residential	3,059	3,096
Water consumption (ML)	13,101	14,357
- Residential	9,836	11,022
- Non-residential	1,795	2,032
- Water losses	1,470	1,303
Water mains[#] (km)	1,924	1,960
Water filtration plants	7	7
Chlorination plants	14	14

[#] Total water mains (km) figure also includes 185km Class A recycled water mains.

Foreword from the Managing Director

The major challenges facing Western Water as the region's water supplier are the impact of climate change and addressing demand caused by continuing population growth.

Since Western Water began operations 21 years ago, we have developed a strong track record for meeting these challenges head on - delivering safe, quality and affordable water, sewerage and recycled water services and maintaining high levels of customer satisfaction.

During 2015/16, Western Water safely delivered more than 14,300 million litres of drinking water to a population of 163,700.

Securing water for the future

The dry conditions over spring and summer of 2015/16 significantly impacted local water supplies, with local reservoirs falling to a combined total of 12% capacity.

By June 2016, all major towns in the service region had been switched to Melbourne water supplies and the new Romsey-Lancefield pipeline had to be utilised to augment both towns with additional water supplies from Rosslynne Reservoir.

Across the year, 40% of drinking water supplied to the service region was sourced externally, compared to only 2% in the prior year. Aesthetics – particularly taste and odour – can differ greatly between local sources and Melbourne supplies and managing customer expectations around the changes in supply source remains an ongoing focus for the business.

Looking forward, Western Water will utilise the full range of available water sources to meet the requirements of the growing region. Property numbers are expected grow by 3-4% per year over the coming decade as new housing estates in and around Melton and Sunbury attract more people to the service area. Western Water's Integrated Water Management Strategy will ensure we address the combined impact of climate change and population growth, within a framework of maintaining affordable services.

Committed to drinking water quality

Western Water is aware of the responsibility it bears to provide safe, affordable drinking water to the people living and working in our service region. This report reflects our commitment to meeting this responsibility by addressing the twelve elements of the Framework for Management of Drinking Water Quality.

I am pleased to report that all 19 water sampling localities in Western Water's region continued to comply with the *Safe Drinking Water Act 2003* and all parameters specified in the Safe Drinking Water Regulations 2005 and the Safe Drinking Water Regulations 2015.

In June 2016, Western Water successfully passed its fifth Regulatory Audit for its Drinking Water RMP under the *Safe Drinking Water Act*. We also continued independent certification of our Hazard Analysis and Critical Control Point (HACCP) system during the year.

I would like to take this opportunity to thank all Western Water staff involved in the production and supply of our drinking water for their professional and committed approach over the past year. It is with pleasure that I submit Western Water's 2015/16 Water Quality Report to customers, stakeholders and regulators.

Neil Brennan, Managing Director

October 2016

1. Commitment to drinking water management

Western Water closely monitors the quality of drinking water supplies to ensure compliance with standards set out in the Safe Drinking Water Regulations 2015 (which replaced the Safe Drinking Water Regulations 2005 on 18 July 2015). We also adopt other industry guidelines associated with health and aesthetics of drinking water including the Australian Drinking Water Guidelines 2011 (ADWG).

Together, these are used to set the physical, chemical, radiological and microbiological performance targets ensuring our water quality targets are more than adequate.

Drinking water policy

Western Water's Drinking Water Policy, contained in Appendix 1, reflects current practice in the delivery of safe drinking water, with procedures and initiatives to support policy implementation. This includes the continual application of the Drinking Water Quality Management System (DWQMS), and associated HACCP Plans to manage and protect water quality.

The policy also outlines our aim to continuously improve processes and meet the requirements of the *Safe Drinking Water Act 2003* and subordinate legislation. It is displayed on noticeboards in the Sunbury office and at all water filtration plants, and is included in inductions for new staff.

Implementation

Western Water implements this policy through:

- Application of the DWQMS
- Delivery of Water Plan 2013-2018 actions and initiatives
- Communicating policy content and intent to our employees, customers and stakeholders
- Educating customers and stakeholders on use of water as a precious resource
- Maintaining a high standard of asset management practices, and
- Undertaking regulatory audits, certification audits and internal audits.

Regulatory and formal requirements

Western Water maintains a register of regulatory and other formal requirements for the delivery of drinking water through its DWQMS (refer to the full list in Appendix 2). This includes Federal and Victorian legislation, codes of practice, standards, service level agreements, contracts and operating agreements that are relevant to the delivery of safe drinking water.

Western Water ensures responsibilities in relation to drinking water are understood by referencing these regulatory and formal requirements in applicable policies, procedures, work instructions, position descriptions and individual performance reviews.

A review of requirements is conducted periodically by Western Water's Hazard Analysis and Critical Control Points (HACCP) team to ensure changes are reflected throughout all systems. This HACCP system was audited during the reporting period, validating our multi-barrier approach to protecting drinking water quality.

Engaging stakeholders

Ensuring Western Water has sustainable, resilient water services systems requires a consultative, collaborative approach with all stakeholders; engaging customers, the community and others in our integrated water management approach, and encouraging all to make the optimum use of the full range of water resources.

Community and stakeholder engagement

Western Water is committed to building positive, cooperative relationships with all stakeholders that have the potential to either affect or be affected by our operations. These are included in the corporation's emergency contact list, which is updated regularly.

Recognising that we must embrace customer-friendly channels, Western Water's customer advisory network now includes over 14,000 online consultation panel members. They are kept well informed of water quality issues and changes and, when required, participate in consultation and engagement.

Major external stakeholders include regulatory bodies such as the DHHS, EPA, DELWP and the ESC as well as suppliers, Melbourne Water and Southern Rural Water (SRW). These organisations are actively engaged through regular meetings and/or reporting. Other significant external stakeholders are those contractors who provide analytical services or water treatment chemical supplies.

Internal stakeholders including management, office, plant and field workers are engaged regularly through the HACCP team and the monthly reporting program.

2. Assessment of the drinking water supply system

Water supply system analysis

Western Water addresses multiple challenges to provide our customers with quality drinking water.

One of the most significant challenges we have faced in the past two decades has been ensuring water supply security. The impact of the Millennium Drought, combined with long term, sustained population growth, resulted in significant demand for water from dwindling local supplies. As a result, Western Water became reliant on water sourced from Melbourne's water system.

In recent years, the region has been able to return to local water supplies. However, during the very dry spring and summer of this reporting period, storages in local reservoirs fell to very low levels – a combined total of 12% - resulting in all major towns returning to Melbourne water supplies by June 2016.

Our Integrated Water Management Strategy will ensure long term sustainability of water supplies in the region, while the connection to the Melbourne supply system will remain critical for supply security.

Water supply system

Western Water utilises a cross-disciplinary team to develop the risk assessment of water supply systems including office and plant staff. Where significant changes to risks are identified, the assessment process is assisted by external consultants.

Flow diagrams have been constructed of all water supply systems and these are checked periodically to ensure they reflect actual system arrangements. The DWQMS includes key documentation developed from assessment and analysis of water supply systems with a periodic review of water supply systems.

Water sampling localities

There are six water supply systems in the Western Water region:

- Rosslynne/Sunbury
- Merrimu
- Romsey
- Lancefield
- Woodend, and
- Myrniong.

For water quality monitoring, these supply systems are divided into 19 water sampling localities, formally published by DHHS in the Government Gazette. Each locality is determined by the origin of the water, the location of treatment and storage facilities, and the associated delivery system. These localities form the basis of our water sampling program.

Table 2: Residential population by water sampling locality and town - 2014/15 vs 2015/16*

Water sampling locality	Towns	2014/15	2015/16
Bulla	Bulla, Oaklands Junction	760	750
Darley	Darley, Pentland Hills	8,730	8,770
Diggers Rest	Diggers Rest	2,980	3,190
Eynesbury	Eynesbury	2,500	2,560
Gisborne	Gisborne, New Gisborne, Bullengarook	11,000	11,120
Lancefield	Lancefield	2,240	2,240
Lerderderg	Bacchus Marsh, Merrimu, Coimadai	8,790	8,820
Macedon	Macedon	1,810	1,790
Maddingley	Maddingley, Parwan	3,680	3,890
Melton South	Melton, Melton South, Brookfield, Hopetoun Park, Toolern, Mount Cottrell, Plumpton	32,620	33,590
Merrimu	Melton West, Kurunjang, Long Forest	28,430	28,850
Mount Macedon	Mount Macedon	1,570	1,560
Myrniong	Myrniong	300	290
Riddells Creek	Riddells Creek	3,740	3,720
Rockbank	Rockbank	1,390	1,640
Romsey	Romsey, Kerrie, Monegeetta	4,720	4,780
Sunbury	Sunbury, Clarkefield, Wildwood	40,110	40,090
Toolern Vale	Toolern Vale	490	480
Woodend	Woodend	5,590	5,640
Total		163,770	161,450

** Population estimates are based on the number of water connections to residential properties multiplied by the average number of persons per residential property for each locality and rounded to the nearest 10.*

Drinking water sources

Most of Western Water's service region is supplied by two major local reservoirs – Rosslynne and Merrimu. Having recovered capacity significantly in recent years, these local water sources are used for drinking water supply whenever possible.

In 2015/16, 60% of all drinking water supplied was sourced from local catchments, compared to 98% the year before – with the balanced supplied by the Melbourne system.

The combined local reservoir storage levels dropped over the year from 33% to 12% capacity as inflows were much lower than demand. Refer to table 3 for annual capacity results for Western Water's major reservoirs. Future water supply security is dependent on Western Water remaining connected to Melbourne water supplies.

Melbourne water supplies

Western Water has a bulk entitlement with Melbourne Water to access water from the Melbourne Headworks system. This entitlement is critical during extended periods of high demand and/or low rainfall.

Water in the Melbourne system is sourced from protected natural catchments (Upper Yarra Thomson and the Yarra Valley tributaries) and transferred from the Silvan Reservoir to the Greenvale Reservoir. These sources feed the Sunbury/Rosslynne supply system from Loemans Road Pump Station, and the Merrimu supply system via the Hillside Pump Station.

Western Water applies the same level of water restrictions as Melbourne to all customers in our region. This is a condition of the bulk entitlement agreement with Melbourne Water. Details of supply systems for all towns are outlined in table 4.

Smaller town supply systems

The towns of Woodend, Romsey, Lancefield and Myrniong have their own supply systems with additional water supplemented from bulk entitlements in nearby systems. In times of drought, the bulk entitlement from Melbourne supplements these local supplies.

Woodend

Woodend receives treated water from two local sources: Campaspe Reservoir via the Marriages Water Filtration Plant, and the Macedon Ranges via Reservoir C Water Filtration Plant. During 2015/16, water was also diverted from the Maribyrnong and Macedon bulk entitlements to supplement the Woodend supply. 65ML was taken from Campaspe Reservoir. The Woodend supply was supplemented by an additional 160ML from the Macedon bulk entitlement and 347ML from Rosslynne Reservoir.

Myrniong

Myrniong receives its water supply from Pykes Creek Reservoir after treatment from the Myrniong Water Filtration Plant. A total of 51.2ML was taken from the storage during the reporting period in compliance with its bulk entitlement.

Romsey

Romsey receives treated water from the Romsey Water Filtration Plant, which is supplied with source water from Kerrie Reservoir, which in turn receives supplementary water from Wright Reservoir. During the reporting period, 503ML was taken from the local storage: 370ML of this was made up a transfer from the Riddells Creek and Maribyrnong BEs. A total of 41ML was also used from the Romsey Bore to supplement supply during the reporting period.

Lancefield

The Lancefield Water Filtration Plant can receive and treat surface water, bore water or a mixture of both. There were times during drought when all water supplied in Lancefield was from the bore. During the year, 64ML of water was taken from Garden Hut Reservoir at Lancefield with another 55ML taken from Lancefield's bore water supplies. Transfers of water from the Romsey, Riddells and Maribyrnong supply systems were in operation during the year and supplied 127ML to supplement Lancefield local sources.

Table 3: Major reservoir levels (% capacity) - 10 years

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Rosslynne Reservoir	4%	3%	3%	5%	66%	72%	85%	76%	44%	15%
Merrimu Reservoir	13%	13%	10%	9%	85%	78%	76%	63%	29%	10%

Table 4: Drinking water sources

Towns supplied	Reservoir	Catchment
Melton, Melton South, Eynesbury, Hopetoun Park, Rockbank, Toolern Vale, Bacchus Marsh and Long Forest, Darley, Pentland Hills, Merrimu Coimadai, Maddingley, Parwan, Balliang, Balliang East.	Greenvale Reservoir	Yan Yean ,Thomson and Upper Yarra Catchment
	Merrimu Reservoir	Lerderderg River, Goodman Creek, Pyrites Creek Catchments
	Djerriwarrh Reservoir	Djerriwarrh Catchment
Gisborne, New Gisborne, Gisborne South, Bullengarook, Mount Macedon, Macedon and Riddells Creek	Greenvale Reservoir	Yan Yean, Thomson and Upper Yarra Catchment
	Rosslynne Reservoir	Jacksons Creek Catchment
Sunbury, Goonawarra, Jacksons Hill, Clarkefield, Bulla, Oaklands Junction and Diggers Rest	Greenvale Reservoir	Yan Yean ,Thomson and Upper Yarra Catchment
	Rosslynne Reservoir	Upper Maribyrnong Catchment
Woodend	Graham Brock Reservoir and Reservoir C	Falls/Smokers Creek and Graham Brock Reservoir and Reservoir C Catchments
	Campaspe Reservoir	Campaspe River Catchment
	Rosslynne Reservoir	Upper Maribyrnong Catchment
	Greenvale Reservoir	Yan Yean ,Thomson and Upper Yarra Catchment
Myrniong	Pykes Creek Reservoir	Werribee River and Pykes Creek Catchment
	Greenvale Reservoir (when carting)	Yan Yean ,Thomson and Upper Yarra Catchment
	Merrimu Reservoir (when carting)	Lerderderg River, Goodman Creek, Pyrites Creek Catchments
Romsey, Kerrie, Monegeetta	Kerrie Reservoir	Upper Bolinda Creek
	Romsey Bore	Local aquifer
	Greenvale Reservoir	Yan Yean ,Thomson and Upper Yarra Catchment
	Rosslynne Reservoir	Upper Maribyrnong Catchment
Lancefield	Garden Hut Reservoir	Deep Creek Catchment
	Monument Creek Weir	Monument Creek Catchment
	Bore Numbers 3	Local aquifer
	Kerrie Reservoir	Upper Bolinda Creek
	Romsey Bore	Local aquifer
	Greenvale Reservoir	Yan Yean ,Thomson and Upper Yarra Catchment
	Rosslynne Reservoir	Upper Maribyrnong Catchment

Assessment of water quality data

Western Water collects extensive history of water quality at water source, treatment plants and customer taps. Samples are scheduled and collected by an independent NATA accredited laboratory with results sent directly to our Aquantify database to allow for investigation into trends and emerging water quality issues.

The water quality database Aquantify includes an automatic notification process for any results that are outside defined limits. The contracted laboratory is required to immediately notify Western Water of any health related exceedances detected in drinking water samples. In the case of drinking water samples, the limits are based upon the ADWG 2011.

Western Water uses water quality data obtained from the Aquantify database to monitor trends and data from SCADA to review trends of water systems on an as needed basis.

Hazard identification and risk management

Western Water uses an established risk criteria based upon AS/NZ 4360:1999 Risk Management Standards for water quality hazards and risk assessment. In accordance with the regulatory framework, Western Water has implemented a Drinking Water QMS, including HACCP plans, for drinking water supply.

3. Preventative measures for drinking water supply

Western Water operates its drinking water supply systems under the Victorian *Safe Drinking Water Act 2003*, administered by the Department of Health and Human Services. Western Water is required to manage health risks associated with drinking water, effectively monitor the water and undergo annual audits of our management systems.

A number of processes have been adopted to ensure delivery of safe, high quality drinking water supplies to customers. This is achieved through the multiple barrier from catchment to tap approach, including various water treatment methods, which are covered within the HACCP system.

The last independent external audit of Western Water's Risk Management Plan took place in June 2016 and confirmed Western Water is fully compliant with the *Safe Drinking Water Act 2003* risk management plan requirements. The next audit is expected to take place in mid 2018.

Preventative measures and multiple barriers approach

The adoption of preventative strategies for the protection of drinking water supplies is one of the key elements of the Framework for Management of Drinking Water Quality, developed under the ADWG. A key aspect of this risk-based approach to the production of safe drinking water is the use of multiple water treatment processes, also known as the multiple barrier approach.

At Western Water, drinking water provided to customers is subject to a multiple barrier approach to ensure safe and aesthetically acceptable supplies. This demands a highly skilled workforce and requires constant vigilance and attention to detail. Each water quality barrier in place at Western Water is discussed in detail below, including:

- implementation of the Guidelines for Planning Permits in Open Potable Water Supply Catchments and liaison with storage managers to support protection of catchments and reservoirs in accordance with DSC Guidelines, November 2012
- operation of water treatment and disinfection systems in order to meet water quality standards and improve aesthetics
- protection of water quality through a fully enclosed water distribution network to prevent possible contamination after treatment, including regular maintenance
- implementation of management systems (QMS, EMS, OH&S and HACCP) procedures that are audited and reviewed regularly, and followed by experienced operators, and
- delivery of training and competency assessment of operators through registered training organisations.

Catchment protection

Western Water works alongside storage managers, Southern Rural Water (SRW) and Melbourne Water, to support effective water quality management from catchment to customer.

Protected reservoirs and storage tanks

The amount of time water is held in surface water supply reservoirs is a key element to maintaining good water quality as longer detention time allows sediment to settle. This improves water clarity and enables longer exposure to solar radiation, which aids in the disinfection process.

In addition to the region's three major storage reservoirs - Rosslynne, Merrimu and Pykes Creek (managed by SRW), Western Water owns 17 smaller storages, most of which are located in or near the Macedon Ranges. Western Water's storages are protected through restricting access. Water quality at reservoirs is also monitored to ensure safety.

A total of 54 water storage tanks are used to supply water to customers throughout the water reticulation system. These tanks are typically constructed of concrete or metal and are fully enclosed. They are regularly tested to ensure water safety and security.

Alternative sources of supply

Western Water's extensive interconnection to the Melbourne supply system has ensured there is capacity in all the region's towns to access alternate water supply sources through the bulk entitlement. In the case of Myrniong, this access would involve carting water.

Water treatment practices

Drinking water sourced from unprotected catchments - such as the local source water storages available to Western Water - requires both filtration and disinfection due to the surrounding agricultural and urban activity. To ensure the provision of safe and healthy drinking water at customer taps, all water is disinfected at the point where it enters the supply system and again at specified points along the delivery system.

However, drinking water sourced from the Melbourne Headworks system comes from highly protected catchments which have long detention time in reservoirs. As a result disinfection alone is sufficient to ensure water quality. Melbourne Water carries out primary disinfection and Western Water booster chlorinates the water as it enters the Western Water network.

Filtration

Western Water operates seven water filtration plants (WFPs) and an additional 16 water treatment facilities which booster chlorinate the water. Five WFPs employ dissolved air flotation filtration (DAFF) while Merrimu WFP uses the traditional sedimentation-filtration process and Romsey uses microfiltration.

Each process efficiently removes potential pathogens and, coupled with disinfection, maintains a healthy drinking water supply with minimal impact on taste and odour. In addition, all filtration processes deliver high aesthetic water quality with minimal chemistry added. Typically they provide turbidity values of <0.3 NTU and true colour of <5 PCU.

Chemical treatment and disinfection

Western Water uses both chlorination and chloramination to disinfect water supplies. The method used depends on the supply system. This process kills any bacteria or viruses and provides disinfection residual to maintain water quality as it travels from the WFP through the distribution system. In addition, Melbourne Water adds fluoride to the supply from the Melbourne system.

Lime, carbon dioxide or sodium carbonate may also be added to the water to adjust the pH level. Powder Activated Carbon is also utilised to combat taste and odours produced by high concentrations of naturally occurring organic carbon.

Fluoridation

Fluoride is a naturally occurring element that is found in rocks, soils, water and plants. One milligram of fluoride for every litre of water has been shown to provide maximum dental benefits to the community and this is the 'optimal' level for temperate climates such as Victoria.

Western Water supplies fluoridated local water from both Merrimu and Rosslynne Water Filtration Plants. None of Western Water's smaller water filtration plants currently add fluoride to their water supply.

Fluoride (dosed as sodium hexafluorosilicate or hydro-fluorosilicacid) is added by Melbourne Water before delivery to Western Water's supply region in line with the requirements of the *Health (Fluoridation) Act 1973*.

The table below lists the towns which receive a fluoridated supply. Supplies to Lancefield, Myrniong, Romsey and Woodend are only fluoridated when local supplies are supplemented with water from Melbourne Water, Merrimu Reservoir or Rosslynne Reservoir. During the reporting period, some water from Rosslynne supply system was used to top up local supplies for Romsey and Lancefield resulting in low levels of fluoride present in their water supply.

Table 5: Fluoridated and non-fluoridated water supply by town

Fluoridated water supply	Non-fluoridated water supply
Bulla Darley Diggers Rest Eynesbury Gisborne Lerderderg Macedon Maddingley Melton South Merrimu Mount Macedon Riddells Creek Rockbank Sunbury Toolern Vale	Lancefield* Myrniong Romsey* Woodend*

**These towns received a small proportion of fluoridated water during 2015/16 when Rosslynne Reservoir water was mixed with local water supplies to ensure supply security.*

pH correction

Acidity in water is corrected to provide a neutral pH at different stages of the treatment process to ensure added chemicals are effective and that there are minimal impacts on pipes and associated fittings within the distribution network.

Water's pH level may be corrected by adding lime and carbon dioxide or sodium carbonate at the start of the treatment process to assist with coagulation. The pH may be adjusted again at the end of the process to ensure effective disinfection and limit final water corrosiveness. The pH of water should be maintained within the ADWG specified range of 6.5-8.5 pH units for aesthetic purposes.

Preventative measures for drinking water supply cont.

Table 6: Water treatment chemicals and processes by sampling locality

Locality	Population supplied	System	Treatment process	Added substances	Comments
Melton South, Lerderderg, Maddingley, Darley, Merrimu, Rockbank, Toolern Vale, Eynesbury	88,600	Merrimu system (Merrimu Reservoir via Merrimu Water Filtration Plant)	Coagulation Clarification/ filtration pH correction Fluoridation Chlorination Additional chlorination by booster chlorinators along reticulation system as required	Aluminium Sulphate, Polyelectrolyte, Lime, Chlorine gas, Sodium Silicofluoride, Sodium Hypochlorite[3]	The locality returned to mainly Merrimu supply in December 2010. However, water source may vary between Melbourne water and a blend with Merrimu Reservoir. Booster chlorinators exist in Merrimu, Darley, Maddingley and Lerderderg localities.
		Merrimu system (Greenvale Reservoir via Hillside Pump Station)	Fluoridation and primary chlorination by Melbourne Water Secondary chlorination at Hillside Pump Station Additional chlorination by booster chlorinators along reticulation system as required	Sodium Hexafluorosilicate[1], Chlorine gas[1], Sodium Hypochlorite[2 3]	
Gisborne, Macedon, Mount Macedon, Riddells Creek	18,190	Rosslynne system (Rosslynne Reservoir via Rosslynne Water Filtration Plant)	Oxidation Adsorption Coagulation pH correction Dissolved Air Flotation Filtration Fluoridation Chlorination Additional chlorination	Aluminium Sulphate, Potassium Permanganate (as required), Powder Activated Carbon, Polyelectrolyte, Lime[2], Carbon Dioxide[2], Fluorosilicic Acid, Chlorine Gas, Sodium Hypochlorite[3]	Water for the most part is sourced from Rosslynne. At times this can vary between Melbourne Water and a Rosslynne Reservoir/ Melbourne Water blend to ensure that the Rosslynne Water Filtration Plant and associated infrastructure are maintained. This supply is further chlorinated at Macedon, Mount Macedon and Riddells Creek. Rosslynne WFP provided full production of drinking water into the Sunbury system from March 2014 to June 2016.
			Fluoridation and primary chlorination by Melbourne Water Secondary disinfection (Chloramination) at Loemans Rd Pump Station Additional chlorination by booster chlorinators along reticulation system as required	Sodium Hexafluorosilicate[1], Chlorine Gas[1], Lime[2], Carbon Dioxide[2], Sodium Hypochlorite[2 3], Aqueous Ammonia[2]	
Sunbury, Bulla, Diggers Rest	44,030	Sunbury system (since March 2014, the majority of customers were returned to Rosslynne Reservoir and Rosslynne WTP supply)	Fluoridation and primary chlorination by Melbourne Water or at Rosslynne WTP Secondary disinfection (Chloramination) at Loemans Rd Pump Station/ Riddell Rd tank	Sodium Hexafluorosilicate[1], Lime, Carbon Dioxide, Sodium Hypochlorite[2] , Aqueous Ammonia	
Woodend	5,640	Woodend system (Campaspe Reservoir via Marriages Water Filtration Plant and Graham Brock Reservoir, Reservoir C & Greenvale Reservoir via Reservoir C Water Filtration Plant)	Coagulation pH correction Dissolved Air Flotation Filtration Chlorination Fluoridation by Melbourne Water[4]	Powdered Activated Carbon (as required at Marriages Water Filtration Plant), Aluminium Sulphate, Polyelectrolyte, Sodium Carbonate ('Soda Ash'), Sodium Hypochlorite	Supply is fully treated at the Marriages Water Filtration Plant and Reservoir C Water Filtration Plant. Drinking water is supplied from two ends of the system - the Marriages Basin and Reservoir C Contact tank. Prior to extensive mains cleaning in 2011, disinfection regime was switched from chloramination to chlorination. At times, supply to Woodend is sourced from Rosslynne or Melbourne, particularly during drought periods.
Romsey	4,780	Romsey system (Kerrie Reservoir, Romsey Bore & Greenvale Reservoir via Romsey Water Filtration Plant)	Microfiltration Chloramination Fluoridation by Melbourne Water[5]	Poly Aluminium Chlorohydrate (as required), Sodium Hypochlorite, Sodium Hydroxide, Aqueous Ammonia	Changes to the disinfection mode in this locality are planned for 2016. During drought periods, Romsey can be supplied via transfer from Rosslynne and Melbouren supplies into Kerrie Reservoir.
Lancefield	2,240	Lancefield system (Garden Hut Reservoir, Lancefield Basin and groundwater)	Coagulation pH Correction Filtration Dissolved Air Flotation Chlorination Fluoridation by Melbourne Water[6]	Aluminium Chlorohydrate (as required), Sodium Hydroxide (Caustic Soda), Potassium Permanganate, Powdered Activated Carbon (PAC), Sodium Hypochlorite	The Lancefield system is connected to Romsey via a source water pipeline which will see the transfer of water from Kerrie Reservoir into the Lancefield basin.
Myrniong	290	Pykes Creek Reservoir	Coagulation Oxidation pH correction Dissolved Air Floatation Filtration Chlorination Fluoridation by Melbourne Water[7]	Powdered Activated Carbon (as required), Potassium Permanganate, Aluminium Sulphate, Polyelectrolyte, Sodium Carbonate ('Soda Ash'), Chlorine gas, Sodium Hexafluorosilicate	Due to an improvement in water storage levels in Pykes Creek reservoir, no water carting from Bacchus Marsh has been required in over 24 months.

1 Chemicals may be added by Melbourne Water for treatment and chlorination.
2 Chemicals added by Western Water for additional disinfection at entry point from Melbourne Water mains.
3 Chemicals added by Western Water throughout the distribution system to increase chlorine residual levels.
4 When receiving water from the Mount Macedon system, and that water has been supplemented with Melbourne Water or Rosslynne Reservoir.
5 When receiving water from Melbourne Water or Rosslynne system through transfer to Wright Reservoir.
6. When receiving water for the Romsey/Lancefield pipeline, and that water has been supplemented with Melbourne Water supply or Rosslynne system water supply via Wright Reservoir.
7 When receiving water from Melbourne Water through water carting from Bacchus Marsh (Merrimu System).

Water distribution network maintenance

The maintenance of the water distribution network, particularly pipes and tanks, is essential to ensure water quality from source to customer taps.

Distribution pipe cleaning and maintenance

In 2015/16, Western Water supplied 60,158 connected properties with drinking water through 1,960km of water mains.

The extensive reticulation system is maintained through renewals, repairs and operational actions such as valve exercising, mains flushing, and flow and condition monitoring and assessment. These actions help reduce water losses through leakage and bursts and assist in maintaining water quality and the number of water main bursts during 2015/16 remains at low levels.

Table 7: Water main bursts per 100km - 5 years

	2011/12	2012/13	2013/14	2014/15	2015/16
Bursts per 100km of water main	18.0	18.8	14.0	12.1	13.3

Storage tank integrity and cleaning

Western Water has a routine cleaning program for storage tanks in the distribution system involving the use of specialised underwater cleaning equipment by scuba divers to remove any sediment accumulated at the bottom of the tank. All storage tanks are covered and checked regularly to minimise contamination from birds or animals as well as dirt, leaves and other matter.

Backflow prevention

A dedicated backflow prevention officer helps target and reduce the likelihood of backflow occurrences in the system. This backflow role is part of Western Water's HACCP team and potential detections are assessed by a risk based process within the HACCP system. Backflow auditing is performed by Western Water staff.

Critical control points

Western Water utilises Hazard Analysis and Critical Control Point (HACCP), an internationally recognised food industry standard based on risk prevention and management in food processing applications. The HACCP system is used to manage significant risks at key points in harvesting, treatment and distribution of drinking water, using the developed Victorian legislative RMPs and QMP as supporting tools.

Western Water's HACCP system provides comprehensive documentation and a framework for field monitoring and maintenance, with a number of HACCP plans relating to each system providing critical and alert limits for system controls, monitoring audits and maintenance guides for disinfection equipment, maintenance and inspection of plants, pump stations and tanks, equipment calibration and staff accountability. The certificate from February 2016 is included in Appendix 3.

4. Operational procedures and process control

Operational procedures

Western Water understands that formal operational procedures are critical to ensure the consistent delivery of quality drinking water across the region. Standard operating procedures (SOPs) and work instructions (WIs) can be used and referenced for maintenance tasks, specific or more complex tasks, or may exist as a standalone single reference for the agreed best practice for undertaking routine operational tasks. Whenever necessary, SOPs are reviewed and updated in line with risk management requirements.

Current procedures and work instructions available at Western Water include:

- Powder Activated Carbon Loading
- Fluoride Handling
- Fluoride Dosing System Maintenance
- Fluoride Chemical Delivery Procedure
- Clean In Place Procedure
- Flow Tests for Chemical Dosing Pumps
- Chlorine Strength Test Work Instructions
- Calibration Procedures and Schedules
- Laboratory Test Work Instructions
- Internal Auditing Procedure and Scheduling, and
- Non Conformance Procedures.

Western Water's Integrated Management System (IMS) addresses and links various business practices including Occupational Health & Safety (OHS), QMS, HACCP, Environmental Management System (EMS) and Risk Management. As issues, events, audits, incidents or improvement actions are required, they are captured to a common system for coordinated monitoring and follow up.

Operational monitoring and process control

Operational monitoring is conducted at all water filtration plants across the region. Section 5 details the results of microbiological water quality monitoring in 2015/16.

Western Water employs online monitoring equipment which includes chlorine, fluoride, conductivity, turbidity and pH sensors. All WFPs use fully automated, continuously operating Supervisory Control and Data Acquisition (SCADA) technology to remotely monitor and control the processes.

Alert and critical limits obtained from HACCP plans are integrated into treatment plant control systems. This results in plants automatically shutting down and triggering alarms to plant operators if water quality is outside set limits.

5. Verification of drinking water quality

The Drinking Water Regulatory Unit at DHHS regulates the safety of drinking water supplied by all Victorian water corporations. No undertakings, exemptions or variations apply to Western Water potable supply.

Drinking water quality monitoring

Western Water closely monitors the quality of drinking water to ensure compliance with the Safe Drinking Water Regulations 2005 (from the 1 July to 17 July 2015) and the Safe Drinking Water Regulations 2015 (from the 17 July 2015 onwards).

In addition to meeting standards for the key water quality parameters highlighted in the Safe Drinking Water legislation, Western Water also aims to ensure that the water provided to customers meets the ADWG. These guidelines provide a benchmark for a large range of biological, physical and chemical parameters and also detail the use and development of Western Water's Drinking Water RMP.

The health and aesthetic quality of drinking water supplied to customers is ensured through a rigorous process of water quality monitoring and reporting. Monitoring includes continuous measurement of key parameters via online instruments (linked to alarm systems and graphic displays), daily operational checks by filtration plant staff and also external independent monitoring.

To assess the quality of our water supplies, daily routine monitoring is undertaken, validating compliance with the Safe Drinking Water legislation. Water samples are collected in each of our 19 water sampling localities, at the reservoir, WFPs and various points throughout the supply system including water storage tanks and customer taps.

Samples are tested for a range of microbiological, physical, chemical, algal and radiological parameters. All regulatory testing is undertaken through an independent laboratory accredited by the National Association of Testing Authorities (NATA).

In addition to testing methods being NATA accredited, the parameters listed in the table in Schedule 2 of the Safe Drinking Water Regulations 2005 are to be analysed by DHHS approved Drinking Water Analysts. The recent changes to the Regulations now exempt the analyst from NATA accreditation but require the testing laboratory to be NATA accredited.

Non-routine testing is also used to investigate water quality trends, source variation issues, customer complaints or any suspected water quality issues. Non-routine testing may either be done by external NATA accredited laboratories or by operational testing, depending on the nature of the issue and the water quality information required.

The water treatment chemicals used to treat our drinking water are all delivered by approved chemical suppliers. Chemical quality is verified through the quality systems built into the chemical supply contract, which ensures the approved chemicals are used throughout the treatment process within specifications.

Drinking water quality compliance

During 2015/16, all 19 water sampling localities complied with the microbiological requirement that at least 98% of the drinking water samples collected in a 12 month period must have zero *Escherichia coli* (*E.coli*) organisms per 100 millilitres, as determined by the Safe Drinking Water Regulations 2005 and the ADWG.

The recent changes to the Regulations now require 100% of samples collected in a 12 month period to have zero *Escherichia coli* (*E.coli*) organisms per 100 millilitres (Safe Drinking Water Regulations 2015).

Table 8 provides a summary of Western Water's compliance on key health and aesthetic parameters for drinking water quality. *E.coli* and turbidity are core indicators of drinking water health and turbidity, pH level and true colour are core indicators of drinking water aesthetics.

In June 2016, Western Water successfully passed its fifth Regulatory Audit for its Drinking Water RMP under the *Safe Drinking Water Act 2003*. The audit certificate is included in Appendix 3. The next audit is expected to take place in mid 2018.

Full details of Western Water's drinking water quality compliance are contained in Appendix 4, with all parameters measured compliant during the year including:

- *Escherichia coli (E. coli)*
- Chlorine-based disinfection by-product chemicals
  - Trihalomethanes
  - Chloroacetic acid
  - Dichloroacetic acid
  - Trichloroacetic acid
- Other parameters
  - Aluminium
  - Turbidity
  - Fluoride
- Other chemicals not specified in the standards but which may pose a risk to human health: manganese, lead, copper, arsenic, chlorine dioxide, nickel, total chlorine, chromium, cyanide, mercury, nitrate, nitrite, selenium, carbon tetrachloride, and cadmium.

For ease of reporting, a section of Appendix 4 will reflect the Safe Drinking Water Regulations 2005 for the month of July 2015 while – for completeness - the remainder of that appendix will report against the Safe Drinking Water Regulations 2015 for the full financial year.

Verification of drinking water quality cont.

Table 8: Drinking water quality compliance

Parameter	2013/14	2014/15	2015/16
1,1-Dichloroethene	100%	100%	100%
1,2-Dichloroethane	100%	100%	100%
1.1-Dichloropropylene	100%	100%	100%
1.1.1.2- Tetrachloroethane	100%	100%	100%
1.1.1-Trichloroethane	100%	100%	100%
1.1.2.2-Tetrachloroethane	100%	100%	100%
1.1.2-Trichloroethane	100%	100%	100%
1.1-Dichloropropylene	100%	100%	100%
1.2.3-Trichlorobenzene	100%	100%	100%
1.2.3-Trichloropropane	100%	100%	100%
1.2.4-Trichlorobenzene	100%	100%	100%
1.2.4-Trimethylbenzene	100%	100%	100%
1.2-Dibromo-3-chloropropane	100%	100%	100%
1.2-Dibromoethane (EDB)	100%	100%	100%
1.2-Dichlorobenzene	100%	100%	100%
1.2-Dichloropropane	100%	100%	100%
1.3.5 - Trimethylbenzene	100%	100%	100%
1.3-Dichlorobenzene	100%	100%	100%
1.3-Dichloropropane	100%	100%	100%
1.4-Dichlorobenzene	100%	100%	100%
2,4,6-Trichlorophenol	100%	100%	100%
2,4-D	100%	100%	100%
2.3.4.6-Tetrachlorophenol	100%	100%	100%
2.4.5-T	100%	100%	100%
2.4.5-Trichlorophenol	100%	100%	100%
2.4-Dichlorophenol	100%	100%	100%
2.6-Dichlorophenol	100%	100%	100%
2-Chlorophenol	100%	100%	100%
2-Chlorotoluene	100%	100%	100%
4,4'-DDT	100%	100%	100%
4.4'-DDD	100%	100%	100%
4.4'-DDE	100%	100%	100%
4-Chloro-3-Methylphenol	100%	100%	100%
4-Chlorotoluene	100%	100%	100%
Aldrin	100%	100%	100%
Alkalinity, Total as CaCO3	100%	100%	100%
Aluminium, filtered	100%	100%	100%
Aluminium, Total as Al	100%	100%	100%
Ammonia	100%	100%	100%
Antimony	100%	100%	100%
Antimony, Filtered	100%	100%	100%
Arsenic	100%	100%	100%

Table 8 cont.

Parameter	2013/14	2014/15	2015/16
Arsenic, Filtered	100%	100%	100%
Barium, as Ba	100%	100%	100%
Barium, Filtered	100%	100%	100%
Benzo(a)pyrene	100%	100%	100%
Berylium, Filtered	100%	100%	100%
Beryllium, as Be	100%	100%	100%
BHC (alpha)	100%	100%	100%
BHC (beta)	100%	100%	100%
BHC (delta)	100%	100%	100%
Bicarbonate Alkalinity as CaCO3	100%	100%	100%
Boron	100%	100%	100%
Boron, Filtered	100%	100%	100%
Bromate	100%	100%	100%
Bromobenzene	100%	100%	100%
Bromodichlormethane	100%	100%	100%
Bromoform	100%	100%	100%
Cadmium	100%	100%	100%
Cadmium, Filtered	100%	100%	100%
Calcium	100%	100%	100%
Carbon tetrachloride	100%	100%	100%
Carbonate Alkalinity as CaCO3	100%	100%	100%
Chlordane, Total	100%	100%	100%
Chlorine	100%	100%	100%
Chlorine, Free	100%	100%	100%
Chloroacetic acid	100%	100%	100%
Chlorobenzene	100%	100%	100%
Chloroform	100%	100%	100%
Chromium	100%	100%	100%
Chromium, Filtered	100%	100%	100%
cis-1.2-Dichloroethene	100%	100%	100%
cis-1.3-Dichloropropylene	100%	100%	100%
cis-Chlordane	100%	100%	100%
Cobalt, as Co	100%	100%	100%
Cobalt, Filtered	100%	100%	100%
Coliforms, Total	100%	100%	100%
Colour, true	100%	100%	100%
Copper	100%	100%	100%
Copper, Filtered	100%	100%	100%
Cyanide	100%	100%	100%
Dibromochloromethane	100%	100%	100%
Dibromomethane	100%	100%	100%
Dichloroacetic acid	100%	100%	100%

Table 8 cont.

Parameter	2013/14	2014/15	2015/16
Dissolved Organic Carbon	100%	100%	100%
Dissolved Oxygen (Field)	100%	100%	100%
Electrical Conductivity @ 25C	100%	100%	100%
Endosulfan I	100%	100%	100%
Endosulfan II	100%	100%	100%
Endosulfan sulfate	100%	100%	100%
Endrin	100%	100%	100%
Endrin aldehyde	100%	100%	100%
Endrin ketone	100%	100%	100%
Enterococci	100%	100%	100%
Escherichia coli	99.1%	100%	100%
Ethylbenzene	100%	100%	100%
Faecal Streptococci	100%	100%	100%
Fluoride	100%	100%	100%
Formaldehyde	100%	100%	100%
Hardness, as CaCO3	100%	100%	100%
Heptachlor	100%	100%	100%
Heptachlor Epoxide	100%	100%	100%
Heterotrophic Plate Count, 22C	100%	100%	100%
Heterotrophic Plate Count, 37C	100%	100%	100%
Hexachlorobenzene	100%	100%	100%
Hydroxide Alkalinity as CaCO3	100%	100%	100%
Iron, Filtered (Soluble)	100%	100%	100%
Iron, total as Fe	100%	100%	100%
Lead	100%	100%	100%
Lead, Filtered	100%	100%	100%
Lindane	100%	100%	100%
Magnesium, as Mg	100%	100%	100%
Manganese, Filtered (Soluble)	100%	100%	100%
Manganese, total as Mn	100%	100%	100%
MCPA	100%	100%	100%
Mercury, as Hg	100%	100%	100%
meta- & para-Xylene	100%	100%	100%
Methoxychlor	100%	100%	100%
Methylene chloride	100%	100%	100%
Molybdenum, as Mo	100%	100%	100%
Monochloramine	100%	100%	100%
n-Butylbenzene	100%	100%	100%
Nickel	100%	100%	100%
Nickel, Filtered	100%	100%	100%
Nitrate	100%	100%	100%
Nitrite	100%	100%	100%

Table 8 cont.

Parameter	2013/14	2014/15	2015/16
n-Propylbenzene	100%	100%	100%
ortho-Xylene	100%	100%	100%
Pentachlorophenol	100%	100%	100%
pH	100%	89.5%	100%
Phosphorus, Reactive as P	100%	100%	100%
p-Isopropyltoluene	100%	100%	100%
Potassium, as K	100%	100%	100%
sec-Butylbenzene	100%	100%	100%
Selenium	100%	100%	100%
Selenium, Filtered	100%	100%	100%
Silica, Non Reactive	100%	100%	100%
Silica, Reactive	100%	100%	100%
Silver, Filtered as Ag	100%	100%	100%
Silver, Total as Ag	100%	100%	100%
Simazine	100%	100%	100%
Sodium	100%	100%	100%
Strontium, Filtered	100%	100%	100%
Strontium, Total	100%	100%	100%
Styrene	100%	100%	100%
Sulfate	100%	100%	100%
tert-Butylbenzene	100%	100%	100%
Tetrachloroethene	100%	100%	100%
Thallium, Total	100%	100%	100%
Tin, Filtered	100%	100%	100%
Tin, Total as Sn	100%	100%	100%
Titanium, Filtered	100%	100%	100%
Titanium, Total	100%	100%	100%
Toluene	100%	100%	100%
trans-1.2-Dichloroethene	100%	100%	100%
trans-1.3-Dichloropropylene	100%	100%	100%
trans-Chlordane	100%	100%	100%
Trichloroacetic acid	100%	100%	100%
Trichloroethene	100%	100%	100%
Trihalomethanes	100%	100%	100%
Turbidity	100%	100%	100%
UV Transmission@254nm	100%	100%	100%
Vanadium, as V	100%	100%	100%
Vanadium, Filtered	100%	100%	100%
Zinc	100%	100%	100%
Zinc, Filtered	100%	100%	100%

Drinking water aesthetics

Western Water tests for parameters in the drinking water supply that may affect appearance or taste and odour as well as those that may interact with pipes and fittings within the distribution system and hot water services. Routine measurement parameters for drinking water aesthetics include pH level, iron, hardness, calcium, magnesium, ammonia, true colour, sodium, total dissolved solids, and sulphate.

These results are measured in accordance with the aesthetic and health measures in the ADWG. Compliance calculations hereafter are based on mean results for samples taken throughout the year, as outlined in the ADWG. Further descriptions of the aesthetic parameters can be found in Appendix 4. The majority of drinking water aesthetics parameters were compliant during 2015/16.

Source water monitoring

One of the key components of Western Water's Drinking Water Risk Management Plan is the extensive source water monitoring program aimed at increasing the understanding of the source water quality in reservoirs, bores and basins. It involves monitoring and identifying hazards, sources and events which could compromise drinking water quality in a catchment to consumer, multiple barrier approach.

Through an independent NATA accredited laboratory, a comprehensive source water monitoring program was undertaken during 2015/16. An overview of the parameters tested, frequency of testing at each sampling location for pesticides, chemicals (organics and in-organics), metals, physical and radiological parameters and their results are enclosed in Appendix 4.

Microbiological monitoring

In addition to the source water monitoring conducted by an independent NATA accredited laboratory, source water samples at various sampling locations were taken routinely for physical microbiological analysis by specialist biological scientists. This involves the determination of any flagellates, diatoms, algae and cyanobacteria (blue green algae) that were present in the source water sources.

General observations provided by these assessments in relation to any water discolouration, the levels of detritus and the presence of any odour in the source water provided valuable information in assessing the quality of the source water at various times during 2015/16. This information allows Western Water to monitor the changes in conditions of source water sources and their potential impacts towards drinking water quality.

Blue green algae

For Merrimu, Rosslynne and Pykes Creek Reservoirs, blue green algae (BGA) monitoring was conducted by Western Water and data was shared with water storage manager SRW. Regular results on BGA numbers in the three reservoirs allowed for the timely assessment of adverse impacts on our ability to treat and provide safe drinking water to customers.

Melbourne Water monitors water prior to the off-take entry point to Western Water's region. Monthly water quality reports are provided by Melbourne Water for Greenvale Reservoir. These include information on algal populations. Melbourne Water is required to notify Western Water of any major changes in treated water quality for supplies from the Melbourne system. These changes include any that have potential to impact on our ability to supply safe drinking water to customers and meet the ADWG.

During the reporting period, Western Water did not report any BGA blooms as a section 22 notification to the Department of Health and Human Services.

Customer satisfaction

Western Water undertakes a major customer satisfaction study each May with more than 650 customers randomly selected from across our service area in 2016. The most recent survey found that water quality remains a major driver of customer satisfaction.

Scoring a weighted average of 8.1 out of 10, customers' overall satisfaction with water quality remains high and has been stable over many years. Satisfaction with water taste is lower - scoring 7.5 out of 10. Smell was also below the overall level – at 7.8 out of 10.

These results were mainly driven by customers in the Melton area who had issues with the water sourced from local reservoirs when switched back from Melbourne water supply during the survey period. This system has now returned to Melbourne water supply. There were also taste and odour issues from the Rosslynne supply system in August and September 2015 - due to the falling reservoir levels. Plant treatment was improved to resolve these issues.

Customers in Lancefield continue to be the least satisfied with all aspects of water quality, which is attributed to a long term perception of poor water quality which is gradually improving. In addition, there have been some taste concerns regarding the use of bore water in the town's supply and the addition of chlorine to the drinking water supply. Lancefield customers' level of satisfaction is improving over time (now at 6.6 out of 10).

Water quality complaints

Western Water's holistic approach to complaints management ensures any complaint is fully addressed from receipt to resolution, ensuring fast and effective resolution and minimal adverse customer impact. A range of actions are undertaken for water quality related complaints including verbal advice, further investigation, on-site inspection and testing, and works to improve water supply.

In accordance with the ADWG, Western Water adopted a benchmark for water quality complaints of 0.400 complaints per 100 customer properties. This benchmark was met again in 2015/16 with Western Water receiving 0.397 complaints per 100 customer properties as per DHHS reporting requirements.

During 2015/16, customer complaints about water quality increased by 36% compared to last year. This was primarily due to times when Sunbury and Melton South customers received local water supplies and commented on the different taste and odour profiles. Planned maintenance include air scouring of mains also resulted in a high number of complaints in Merrimu and Melton South.

Water quality complaints by locality

During the reporting period, 6 localities recorded 10 or more complaints. The highest level of complaints per 100 customers was recorded in Eynesbury due to taste and odour which was resolved through improved treatment.

The Lancefield and Macedon localities rated second and third highest for water quality complaints. These were largely due to the taste and odour issues with the Rosslynne supply and sediments in the mains, and was resolved through improved treatment and flushing.

Table 9: Customer complaints FY15 vs FY16

Complaint category	2014/15	2015/16
Water quality	185	251
Other complaints	37	81
Total	222	332

Table 10: Water quality complaints per 100 customers - 5 years

	2011/12	2012/13	2013/14	2014/15	2015/16
Complaints per 100 customers	0.307	0.325	0.368	0.316	0.397

[1] *For this reporting format, a customer is one customer property. Complaints are tracked through internal business performance reporting.*

Table 11: Water quality complaints by type and locality

Complaint type	Complaints	Complaints per 100 properties	Localities by highest no. complaints		
			1st	2nd	3rd
Taste/ odour	103	0.163	Sunbury	Melton South	Merrimu
Dirty/ discoloured	114	0.180	Merrimu	Melton South	Sunbury
Illness	4	0.006	Merrimu	Lancefield	Melton South
Other	30	0.047	Sunbury	Gisborne	Darley
Total	251	0.397			

Table 12: Water quality complaints by locality

Locality	Complaints	Complaints per 100 customer properties[1]
Bulla	1	0.346
Darley	15	0.443
Diggers Rest	6	0.487
Eynesbury	7	0.709
Gisborne	23	0.536
Lancefield	6	0.694
Lerderderg	5	0.147
Macedon	4	0.579
Maddingley	3	0.200
Melton South	49	0.378
Merrimu	43	0.386
Mount Macedon	2	0.332
Myrniong	0	0.000
Riddells Creek	2	0.139
Rockbank	2	0.316
Romsey	3	0.163
Sunbury	70	0.452
Toolern Vale	0	0.000
Woodend	10	0.459

[1] *Based on the number of complaints per 100 customer properties supplied.*

6. Incident management and emergency response

Communication protocols

Western Water's incident response procedures describe the protocols for communication to the public and other stakeholders in the event of a significant water quality event, such as the need to issue a boil water notice.

This is further supported by a Boil Water Notice Procedure which identifies the key stakeholders to be contacted and provides information on the appropriate communication methods for each stakeholder.

Incident and emergency management

As an essential service provider, incident and emergency management is vital to Western Water. We have systems and resources ready to respond to emergencies 24 hours a day, seven days a week with crews strategically located across our region.

Each year several situations are escalated to an incident, in which case the Australian inter-service incident management systems aims are followed to resolution.

Once the incident has been de-escalated, it is analysed in detail via an incident debrief session to minimise any repeat. This process is particularly vital for large scale incidents that present major risks and/or offer useful learnings.

All *E.coli* detections reported to the Department of Health are investigated using the guidelines published by the Secretary's office in the Safe Drinking Water Regualtions 2005 and the Safe Drinking Water Regulatons 2015 under Schedule 2 Appendix 1.

Incidents reported under Section 22 Safe Drinking Water Act 2003

a. South Gisborne Tank, 4 February 2016 (Gisborne)

Issue – Routine sampling at the tank resulted in a detection of 3org/100ml of *E.coli* in the presence of 0.10mg/L total chlorine.

Actions - The tank was isolated from supply and spot-dosed with chlorine to return a residual of 0.60mg/L total chlorine. The freshly chlorinated water was pumped into the reticulation system via pump station. Resampling was conducted for three consecutive days with all results clear of *E.coli*. The reported routine result was declared as a false positive.

The tank was inspected and some ingress at the inspection hatch was suspected to be the root cause, however resampling did demonstrate no contaminated water was supplied to customers.

Outcome - During early 2016, the tank was assessed by external consultants for refurbishment and a booster chlorinator will be installed in 2016.

b. Stamford Hill Tank, 4 February 2016 (Bacchus Marsh)

Issue - Routine sampling at the tank resulted in a detection of 1org/100ml of *F.strep* in the presence of 0.17mg/L total chlorine.

Actions - The tank was isolated from supply and spot-dosed with chlorine to return a residual of 0.82mg/L total chlorine. The freshly chlorinated water was pumped into the reticulation system via pump station.

Resampling was conducted for three consecutive days with all results clear of *F.strep*. The reported routine result was declared as a false positive. The tank was inspected and some ingress at the inspection hatch was suspected as the root cause, however resampling demonstrated no contaminated water was supplied to customers.

Outcome - During early 2016, the tank was assessed by external consultants for refurbishment and a booster chlorinator was installed in 2016.

c. 411 Avenue of Honour Customer Site, 21 March 2016 (Bacchus Marsh)

Issue - Routine sampling at the tank resulted in a detection of 1org/100ml of *E.coli* in the presence of 0.18mg/L total chlorine.

Actions - The mains and customer tap were flushed, and the Stamford Hill Tank was isolated from supply and spot-dosed with chlorine to return a residual of 1.2mg/L total chlorine. The freshly chlorinated water was pumped into the reticulation system via pump station.

Resampling was conducted for three consecutive days with all results clear of *E.coli*. The reported routine result was declared as a false positive. The tank and the customer tap were inspected and a fault at with the sample point of the tap was suspected as the root cause.

Outcome - Along with improvement actions at the tank (see Stamford Hill Tank above), a customer tap refurbishment program is underway for 2016/17 to maintain and replace some customer tap sample points.

d. Res C contact tank, 28 April 2016 (Woodend)

Issue – Routine sampling at the tank resulted in a detection of 1org/100ml of *E.coli* in the presence of 0.51mg/L total chlorine.

Actions - the tank was isolated from supply and spot-dosed with chlorine to return a residual of 0.82mg/L total chlorine. The freshly chlorinated water was pumped into the reticulation system via the pump station. Resampling was conducted for three consecutive days with all results clear of *E.coli*. The reported routine result was declared as a false positive The tank was inspected with no issue detected, and sampler error was suspected as the root cause due to wet and windy conditions while sampling.

Outcome – The decontamination process used to clean the tap prior to sampling was optimised as part of consultation with analyst sampling. The tap at this tank was added to the tap refurbishment program currently underway for 2016/17.

e. Williams Rise Tank, 5 May 2016 (Sunbury)

Issue – Routine sampling at the tank resulted in a detection of 0.5org/100ml of *E.coli* in the presence of 0.20mg/L total chlorine.

Actions - The tank was isolated from supply and spot-dosed with chlorine to return a residual of 0.42mg/L total chlorine. The freshly chlorinated water was pumped into the reticulation system via the pump station.

Resampling was conducted for three consecutive days with all results clear of *E.coli*. The reported routine result was declared as a false positive. The tank was inspected and while some ingress at the inspection hatch may have been an issue, an error made by the external laboratory was suspected as the root cause.

Outcome - In early 2016, the tank was assessed by external consultants for refurbishment and booster chlorinator to be installed in 2016/17.

f. Minns Rd Tank B, 24 June 2016 (Melton)

Issue – Routine sampling at the tank resulted in a detection of 1org/100ml of *E.coli* in the presence of 0.09mg/L total chlorine.

Actions - The tank was offline at the time, and not supplying water into the reticulation network. The tank was kept offline for the entire week.

Resampling was conducted for three consecutive days with all results clear of *E.coli*. The reported routine result was declared as a false positive. The tank was inspected and laboratory and/or sampler error was suspected as the root cause.

When the tank was brought back online, spot-dosing and additional sampling of the water was performed prior to connection to the reticulation network.

Outcome - During early 2016, the tank was assessed by external consultants for refurbishment and to have a booster chlorinator tinstalled in 2016/17.

Incidents not reported under Section 22 Safe Drinking Water Act 2003

a. Rossylnne Water Filtration Plant, 27 July 2015 (various)

Issue – Increase in organic compounds in the Rosslynne Reservoir affected the taste of the water supplied to Gisborne, Sunbury, Diggers Rest, Riddells Creek, Bulla, Macedon, and Mount Macedon. This resulted in multiple customer complaints about the taste and odour of the water.

Action – The Rosslynne Water Filtration Plant was optimised to treat the organic compounds and remove the taste and odour issue.

b. Rosslynne Water Filtration Plant, 5 January 2016 (Gisborne)

Issue - The fluoride dosing system at the filtration plant ceased due to load cell fault. As a result, the plant continued to produce treated water without fluoridation.

Action - The load cell was repaired. Notification to DHHS was provided as the outage of the fluoridation plant was greater than 72 hours in duration.

c. Merrimu Water Filtration Plant, 17 May 2016 (Melton)

Issue - As Merrimu Reservoir's level dropped, there was an increase in electrical conductivity and hardness in the source water. This resulted in multiple customer complaints about scaling and taste issues.

Action – An alternative source water was supplied from the Melbourne Water network, using the Greenvale Reservoir. Further investigation on long-term weather trends was done to manage usage of local and Melbourne supplies into the future.

Excursions not reported under Section 22 Safe Drinking Water Act 2003

a. Loemans Rd and Hillside pump stations, December 2015 to February 2016

Issue – Due to water quality issues at Greenvale Reservoir (Melbourne supply), the offtake level was changed and delivered a lower pH water to Western Water. The pH in the reticulation network was within the limits specified by the ADWG.

Action – Online monitoring at both sites was maintained and Melbourne supply was minimised. Subsequently, a pH correction unit will be installed at both sites, to maintain optimal pH.

b. Romsey Water Filtration Plant, Romsey Water Filtration Plant, January to July 2016 (Romsey)

Issue – Due to the ongoing dry period, it was necessary to transfer source water from Romsey to Lancefield. When the transfer is performed, the Romsey bore cannot be operated. The bore water is blended with surface water at Romsey to maintain an optimal pH. Without the bore operating, this resulted in a slight pH rise at the Romsey plant.

Action – Operations were optimised to maintain transfer and bore operation as interval operations, and provide drinking water with pH in the limits specified by ADWG. Subsequently, a second pipeline from the Romsey bore is to be constructed in late 2016 to enable Romsey-Lancefield transfers to occur while also operating the Romsey bore.

Blue green algae (BGA)

During 2015/16, there were no blue green algae notifications that impacted drinking water quality at Rosslynne, Pykes or Merrimu Reservoirs.

Notifications of water blooms were received from the independent external laboratory as part of the biological monitoring at the treatment plants. However, numbers detected in the samples were very low, if present, and confirmed by online monitoring at the treatment plants.

7. Employee awareness and training

Western Water's water quality team are a significant asset to the business with their experience, skills and training, ensuring the ongoing safe delivery of drinking water across the region. We are committed to ensuring all employees are fully aware of their responsibilities and trained appropriately for our water supply systems.

During 2015/16, the water quality team consisted of ten staff with two based in the Sunbury office, five based at Rosslynne Water Filtration Plant and another three based at Merrimu Water Filtration Plant.

Employee awareness and involvement

Staff attend regular site/team meetings to remain up to date with the latest developments. Changes to existing policies and the introduction of new ones are also included in meeting agendas, and can be accessed on our intranet.

Western Water reinforces key safety messages via safety alerts, the intranet and site/toolbox meetings. All water systems staff as well as the Board and Executive are considered accountable for implementation of Western Water's Drinking Water Policy.

Employee training

All water quality team members undertook training during the year with some attending the Water Industry Training Centre, Geelong. In addition to formal training, ongoing training and reskilling is required as procedures are revised due to new equipment or techniques. This ensures the safety of both employees and the community.

Western Water's water quality team members took part in 50 different training opportunities during 2015/16. Courses covered a range of specialised water treatment and general workplace training including:

- Asbestos surveillance assessments
- Certificate III in Water Industry Operations
- Confined space entry
- First aid
- Manual handling, and
- Safe working at heights.

Water industry operations

Western Water strongly encourages operational staff to obtain their certificate qualifications in water industry operations through the provision and funding of training opportunities, as well as linking the achievement of Certificate III to banding progression opportunities. Four employees from the water quality and outdoor teams were enrolled in Certificate III Water Operations in the reporting period. The training system is undergoing review to assess other requirements to ensure continuous improvements to Western Water's systems.

Western Water continues its commitment to employee learning and development through a range of training advisory bodies, including:

- VicWater Industry Training Consultative Committee
- National Water Industry Training Forum
- Victorian Employers' Chamber of Commerce and Industry (VECCI), and
- Water Services Association of Australia Water Quality Network
- Water Industry Training Centre
- Water Industry Operators Association of Australia, and
- Victorian Water Industry Advisory Committee.

8. Community involvement and awareness

Western Water aims to engage and educate the community about the safe delivery of its quality water supply.

Community involvement

Western Water strives to be recognised as a responsible corporate citizen within the community and considers its community sponsorship program to be an important element of this strategy.

Western Water is committed to improving the biodiversity value of its properties and enhancing the environment across the region. Longstanding partnerships with Pinkerton Landcare and Environment Group, Deep Creek Landcare and Friends of Toolern Creek are testimony to this commitment.

Consultation

Western Water's customer advisory network has expanded to include a new Community Engagement Reference Group, made up of key community representatives, as well as our online customer panel which provides a significant additional resource for community consultation and totals almost 13,400 members.

In July 2015, Western Water undertook a short online survey about tap water quality gathering feedback from 173 customers. Customers were asked to taste their tap water as they completed the survey. While not a representative sampling approach, this type of interaction is a good indicative tool for Western Water and allows customers an easy way to test and report back on their water at a single point in time.

Just over three quarters agreed that the quality was acceptable or higher. For those who reported a low result for quality, the issues were with chlorine taste and smell and some earthiness. Western Water used this information – combined with participant location - to help assess whether complaints information was consistent with general customer feedback, and to help pinpoint areas where concerns were high.

An important facet of delivering Western Water's capital investment program is consultation with our community. Consultation processes are carefully designed to engage, establish the issues and ensure the optimum community outcome with consideration to a triple bottom line approach.

Education

Western Water recognises that educating young people on crucial issues such as climate variability and water conservation creates a ripple effect reaching far beyond the classroom. Presentations, programs and teacher resources for children are offered at the preschool, prep, primary and secondary school levels.

Close to 8,000 students from across the region attended Western Water preschool and primary school education presentations during the year. We also introduced a community education presentation program aimed at migrants and adults with low literacy about the benefits of drinking tap water.

Tours and presentations

Western Water offers free tours and presentations to schools and community groups. Free guided tours are offered at our largest treatment plants at Gisborne, Sunbury and Melton. In 2015/16, educational tours and community presentations were conducted for a range of groups including primary, secondary, tertiary and community groups.

Sponsorship and grants

Western Water builds and strengthens local community relations through sponsorships and offering grants across the service region. We attended numerous events in 2015/16 and Western Water promotes the health benefits and quality of our drinking water at all events. In addition, our mobile water tanks are made available free of charge to various community activities across the region.

We are also strongly supporting the Choose Tap program through local cafés, businesses, sporting groups and via drinking water fountains in public places. Western Water also takes its H2O Water Café to community events to offer tap water to attendees and engage in detail in discussions about water supply and quality.

Publications

Apart from the annual Water Quality Report, Western Water's other current water treatment publications include the following factsheets:

- Bore water for drinking
- Fish and your water supply
- Drinking water for health
- Rosslynne WFP treatment
- Water by agreement
- Melton's water supply
- Sunbury's water supply.

Community awareness and communications

To ensure the community fully comprehends our issues and actions, Western Water produces a range of planned and reactive communication materials including the newsletter, H2Info, factsheets, brochures, media stories and customer letters.

Typically these are delivered through mail or the media but, when required, communications are supported through direct contact either by phone or in person. In addition, copies of all publications are located on our website.

Western Water's new social media communication channels and online consultation panel have increased our means of communicating with customers about critical water quality issues and go beyond traditional channels by offering very timely, direct, two way communication.

Our Facebook page has more than 4,000 friends and the reach is far greater when updates are shared. Facebook has become a significant communication channel for Western Water – particularly when customers have issues with their water quality or supply.

9. Research and development

Western Water is committed to improving understanding and delivery of quality drinking water. To this end, we have invested in a number of new technologies specifically aimed at better water quality monitoring and delivery. In addition, we have created a link with WSAA and the American Water Research Foundation to access best practice water industry research on both a national and international scale.

Research

In July 2016, an online profile sampler was installed and commissioned at Merrimu Reservoir. Western Water continues to optimise water filtration plant operations, and this starts with the untreated water in the reservoir. The online profile sampler will test for a number of chemicals at different heights to provide data on quality changes. This will assist with predictive operation activities to prevent future and potential water quality issues.

The sampler will provide a better understanding of the source water characterization and allow predictive actions to prevent potential water quality issues. The long term capture of this data will influence how we can better manage the reservoirs. Following the success of this project, further samplers are planned for other storages.

Intelligent Water Networks

Western Water has taken a lead role in the Intelligent Water Networks program, a partnership between VicWater, the 19 water corporations and the Department of Environment, Land, Water and Planning.

The IWN program is part of a new era of innovation in the Victorian water industry focusing on increased collaboration and information-sharing across the industry. The program is investigating new technologies and innovations to meet common challenges such as population growth, ageing infrastructure and climate variability.

Several projects are now under way as part of the IWN program, designed to drive efficiency and system-wide cost reductions including maintenance of water mains and leak detection programs.

Industry knowledge

In addition to the IWN program, Western Water maintains active membership of industry groups such as Australian Water Association (AWA), Water Industry Operators Association (WIOA), Water Services Association of Australia (WSAA), VicWater and the Institute of Water Administration (IWA) to ensure awareness, communication and involvement with our broader stakeholder groups.

As part of Western Water's membership of the Water Services Association of Australia (WSAA), we actively support the WSAA research program, including international collaborative research with the American Water Research Foundation. Working cooperatively with other WSAA members provides significant leverage in research dollars in a range of important water research areas including customer service, water quality, recycling and environmental impacts.

Staff actively participate in key industry associations with committee representation in the AWA Victoria Branch Committee and the Institute of Water Administration. Western Water staff also attend seminars and conferences to access up to date industry knowledge. This includes those run by the Australian Water Association (AWA), Water Quality Research Australia (WQRA), Institute of Water Administration (IWA), VicWater and the Water Industry Operators Association (WIOA).

Western Water also participates in the state-wide Drinking Water Quality Network and the metropolitan retailers' network. These foster good working relationships across the industry.

Western Water has a small library of 170 core reference texts and research papers on water quality and other matters.

10. Documentation and reporting

Management of documentation

Reporting water quality data and performance is an integral component of Western Water's Water QMS. All documentation is regularly reviewed and updated in line with HACCP for water supply systems and the internal water QMS. This is part of our IMS.

HACCP documents reviewed and/or rewritten in 2015/16 include:

- Rosslynne WFP HACCP plan
- Lancefield WFP HACCP plan
- Customer Tap HACCP plan
- Product specification.

An annual review of the following sites was carried out:

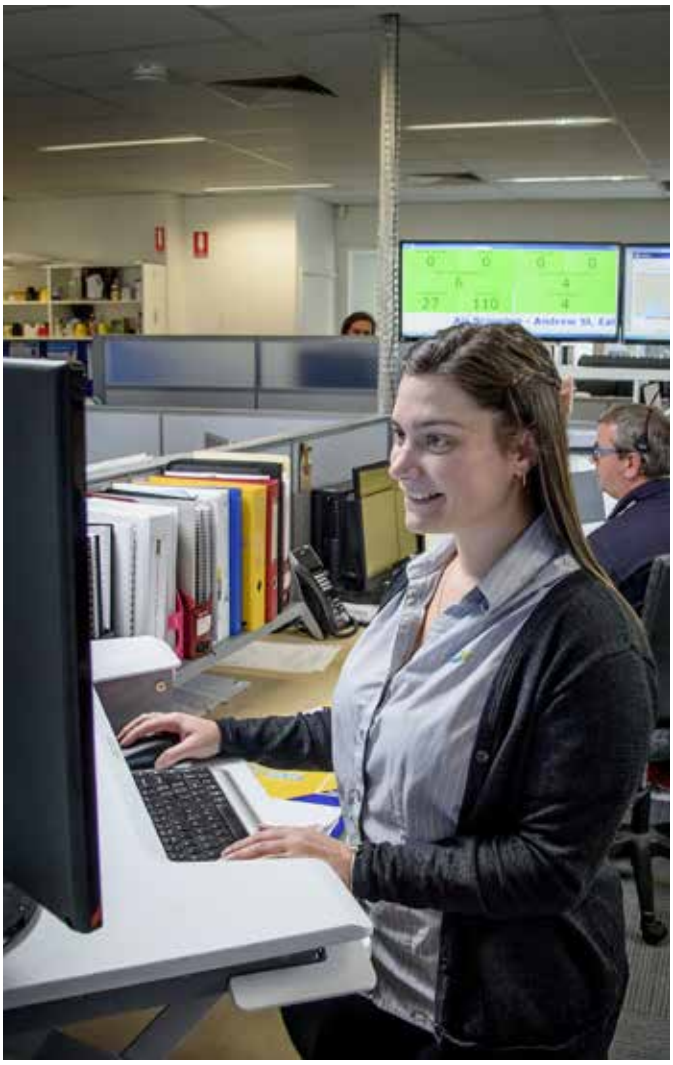
- Swans Rd Booster Chlorinator
- Darley High Chlorinator
- Gisborne Rd Chlorinator
- Underbank Chlorinator
- Settlement Rd Booster Chlorinator
- Sandy Creek Booster Chlorinator
- Merrimu Water Filtration Plant
- Lancefield Water Filtration Plant
- Romsey Water Filtration Plant
- Loemans Rd Entry Point
- Norton Rd Booster Chlorinator
- Salisbury Rd Booster Chlorinator
- Hillside Entry Point
- Marriages Water Filtration Plant
- Reservoir C Water Filtration Plant
- Rosslynne Water Filtration Plant
- Myrniong Water Filtration Plant
- Shepherds Rd Tank and pump station
- McDonalds Rd Booster Chlorinator
- Greens Hill Tank
- Aitken St Chlorinator
- Customer tap.

Water quality excursions/non-conformances and incidents are reviewed by the HACCP team on a monthly basis, and are tracked and closed out using the IMS database. Western Water's centralised water quality database is provided by Aquantify. This system ensures automated data storage and generates automated emails advising of any water quality exceedances.

Reporting

Western Water uses the Balanced Scorecard (BSC) to manage and report on strategic business performance and ensure the business is progressing toward its vision "to provide safe secure, healthy and reliable water and sewerage services to meet the current and future needs of our community, and to do so in an efficient and sustainable manner".

Through BSC reporting, key objectives, actions and system performance are monitored by the Board and Management on a monthly basis. Providing quality water services is a key objective of the BSC with actions including maintaining water quality practices and managing water main assets



11. Evaluation and audit

Evaluating and auditing water quality management systems ensures the successful management of water quality data and processes. This report is an integral part of the review and evaluation process.

Long term evaluation

Water quality data has been collected from various sites across Western Water's service area for over ten years including catchments, reservoirs, plants and customer taps.

This data is used to develop trends of long term changes to water quality, which is essential to identify and understand risks to water quality. It also assists in identifying possible solutions.

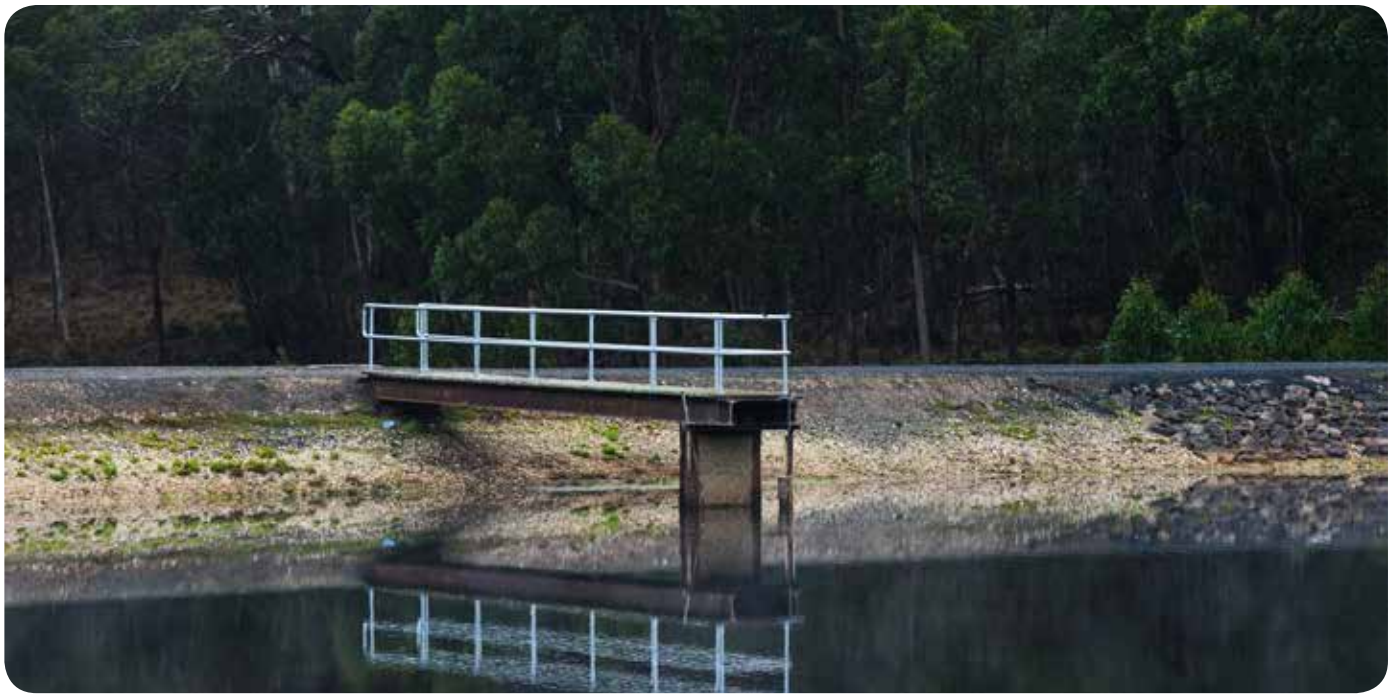
Audit of drinking water quality management

Audits ensure that operational procedures and processes are in place so that accurate water quality data is collected and appropriate management systems are maintained. One external surveillance audit was conducted by a certified auditor in February 2016 achieving confirmation of the ongoing HACCP certification.

In 2015/16, 22 internal audits on the Drinking Water HACCP System were undertaken by members of Western Water's HACCP team. The internal audits included review of Western Water's internal procedures and practices to ensure compliance with the requirements for ADWG and HACCP certification. The reports were noted in monthly HACCP meeting minutes and reported in the BSC and to the IMS Committee on a monthly basis. Reports were also registered in the IMS database to ensure efficient close out of any opportunities for improvement in the HACCP system. An audit schedule is maintained and reviewed by the HACCP team to ensure ongoing compliance.

Department of Health and Human Services (DHHS) regulatory audit

Western Water successfully passed its fifth Regulatory Audit for Drinking Water Risk in June 2016. This result confirms Western Water's commitment to delivering quality and safe drinking water to customers. The audit was based directly on the ADWG and the *Safe Drinking Water Act 2003*. The next audit is expected to be mid- 2018.



12. Review and continual improvement

Management reviews

Water quality is viewed as a vital performance issue for Western Water at the most senior level. The performance of the Drinking Water QMS is reviewed monthly by the management team which includes the Managing Director and four General Managers. All audit outcomes are assessed and resources allocated as necessary to resolve critical issues.

All water quality complaints logged in our customer database are assigned to the relevant staff member who then follows the complaint from receipt to resolution in accordance with Western Water's Correspondence and Complaints Management Procedure. Should the customer be dissatisfied with the initial outcome, an internal dispute resolution process is introduced whereby the complaint is reviewed by management with appropriate actions taken as necessary. If a customer remains dissatisfied, they may be directed to an external dispute resolution forum such as the Energy and Water Ombudsman of Victoria (EWOV).

Drinking water quality management improvement plan

Western Water already has in place an extensive Drinking Water QMS. It is framed around the twelve elements of the Australian Drinking Water Guidelines. This assessment will ensure continual improvement measures are identified, and strengths and weaknesses in water quality risk management are well understood, by the Board, senior management and staff.

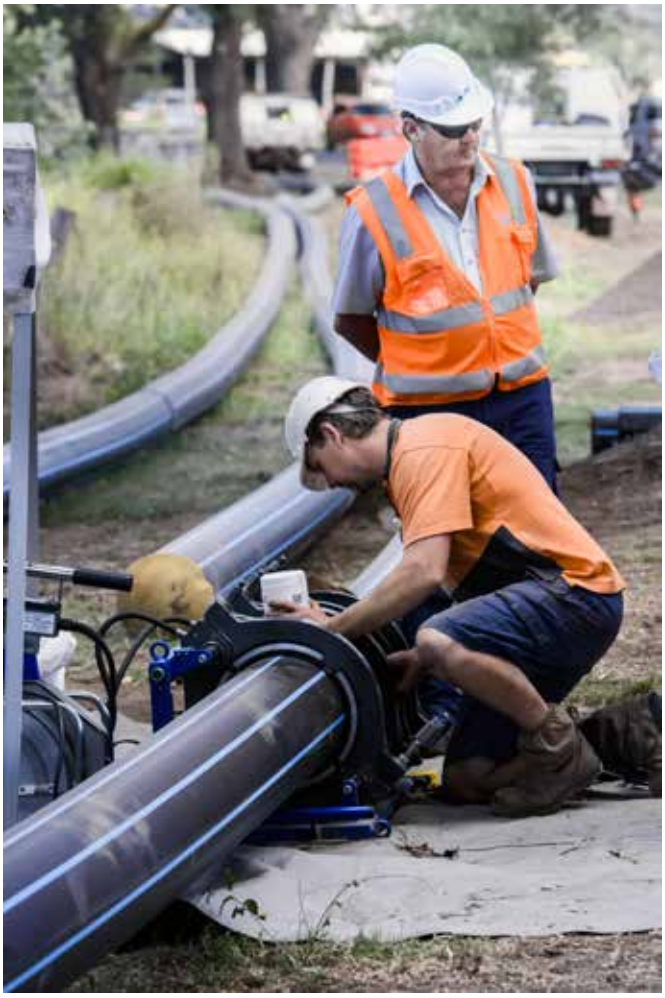
Water supply – capital works improvement

The major water supply works undertaken by Western Water in 2015/16 were:

- $1.6 million on Leakes Road water main for Rockbank, and
- $1.2 million on replacement water main for Avenue of Honour in Bacchus Marsh.

A number of smaller water main replacement projects also occurred including:

- High Street in Lancefield ($90k)
- Station Road in Melton ($500k)
- Swans/Links Road in Darley ($100k)
- Station Road, in Gisborne ($45k), and
- Jeffreys Street in Woodend ($75k).



Non-potable supply

Non-potable water is water that has not been treated to the standards considered acceptable for drinking water under the *Safe Drinking Water Act 2003*. It can include source (untreated) water direct from reservoirs as well as partially treated water. There are no regulated water declarations regarding the non-potable water supply customers of Western Water.

Western Water manages the supply of non-potable water through water by agreement contracts with individual customers. During 2015/16, Western Water had 15 non-potable water by agreement customers located across our system. Typically, they are customers who have made special arrangements for connection to Western Water's system between untreated source water and the treatment plant.

Western Water advises that this water is not suitable for either drinking or food preparation through the individual contracts as well as ongoing notification on all applicable customer bills in accordance with Section 25 of the Act.

Appendix 1 - Drinking water policy

Western Water will continue to meet the requirements of the *Safe Drinking Water Act 2003* and subordinate legislation, as well as the Western Water Customer Service Charter.

Customers will be provided with safe (biologically, chemically, radiologically and physically), cost effective and reliable drinking water and associated services throughout our area of operations. Drinking water is defined as water intended for human consumption or purposes connected with human consumption.

Western Water will provide adequate resources for ongoing implementation and improvement of the Drinking Water Quality Management System (DWQMS). The DWQMS is based on sound risk management principles of AS4360.

Certification of its Hazard Analysis and Critical Control Point (HACCP) system will be maintained in order to provide a catchment-to-tap multi-barrier approach in line with international best practice.

Supply by Agreement customers will regularly be provided with advisory notices in order to ensure customers understand the fit-for-purpose implications.

Western Water will enhance the sustainability of drinking water supply through initiatives outlined in the Victorian Government's Our Water Our Future strategy.

Western Water supports Government policy regarding the introduction to fluoridation to all water supplies. Fluoridation of water will be maintained to all areas supplied from the Melbourne Water entitlement and intermittent fluoridated areas will be appropriately managed.

Western Water will communicate with customers to support the maintaining of public confidence in the safety of drinking water supply. This includes information on the impact of drought on water sources, water quality and water system maintenance.

Appendix 2 – Regulatory and formal requirements for drinking water

Related legislation, policies, systems and procedures include:

- *Safe Drinking Water Act 2003,* and Safe Drinking Water Regulations
- *Health (Fluoridation) Act 1973*
- *Food Act 1984*
- *Essential Services Commission Act 2001*
- *Environmental Protection Act 1970*
- *Water Efficiency Labelling and Standards Act 2005*
- Dangerous Goods (Storage and Handling) Regulations 2000
- NHMRC/ARMCANZ Australian Drinking Water Guidelines 2011
- Risk Management (AS4360)
- Relevant State Environment Protection Policies (SEPPs)
- Environmental Management System - ISO 14001
- Quality Management System – ISO 9001
- Occupational Health & Safety Management System - AS 4801
- Drinking Water Quality Management System
- HACCP Principles & Systems Procedures
- Integrated Management System procedures
- All relevant policies contained in the Policy Manual.

Appendix 3 - Audit and HACCP certification

Risk Management Plan Audit Certificate

SCHEDULE 1

Regulation 10

Safe Drinking Water Regulations 2015

Risk Management Plan Audit Certificate

Certificate Number: 120

(insert a number to specifically identify this certificate from any other audit certificate issued by the approved auditor)

Audit period: 23rd April 2014 to 10th June 2016

(insert period of audit relevant to this certificate)

To: Mr. Neil Brennan, Managing Director,

(insert full name and address of person who commissioned the audit)

Western Region Water Corporation, P.O. Box 2371, Sunbury DC Vic. 3429

Australian Business Number (ABN): 67 433 835 375

(insert the business number of the water supplier or water storage manager)

I, Dr. Pararajasegram (Dharma) Dharmabalan, after conducting a risk management plan audit of the

(print full name of approved auditor)

water supplied by, Western Water Region Water Corporation, am of the opinion that—

(insert name of the water supplier or water storage manager)

Western Water Region Water Corporation has complied with the obligations

*(insert name of water supplier)

imposed by section 7(1) of the *Safe Drinking Water Act 2003* during the audit period.

Western Water Region Water Corporation has complied with the obligations

*(insert name of water storage manager)

imposed by section 8(1) of the *Safe Drinking Water Act 2003* during the audit period.

*The details of the reasons for non-compliance are—

Not applicable

*insert/attach the details of the reasons for non-compliance

Signature of approved auditor: 

Date: 10/06/2016

Dr. P.(Dharma) Dharmabalan, Exemplar Global Certified Auditor, Drinking Water QMS Scheme, Certificate Number 14555

* *Delete if not applicable.*

Department of Health & Human Services

State Government Victoria

Lloyd's Register
LRQA

CERTIFICATE OF APPROVAL

This is to certify that the HACCP System of:

Western Region Water Corporation
Trading as Western Water
36 Macedon Street
Sunbury, Victoria
Australia

has been approved by Lloyd's Register Quality Assurance Limited to the following Management System Standard:

HACCP Codex Alimentarius Annex to CAC/RCP 1-1969 (2009)

This certificate is applicable to:

Storage, treatment and distribution of drinking water.

Approval
Certificate No: MEL6029027

Inspection Date: 08 December 2015
Issue Date: 28 March 2016
Certificate Expiry: 21 March 2019

M. T. Lovato

Issued by: Lloyd's Register Quality Assurance Limited

Level 16, 461 Bourke Street, Melbourne, Vic, 3000
This approval is carried out in accordance with the LRQA assessment and certification procedures and monitored by LRQA.
To confirm the validity of the accreditation for this certificate please visit www.jas-anz.org/register

Appendix 4 - Water quality compliance results

For ease of reporting, a section of Appendix 4 will reflect the Safe Drinking Water Regulations 2005 for the month of July 2015 while – for completeness - the remainder of this appendix will report against the Safe Drinking Water Regulations 2015 for the full financial year.

Section 4.1 reports on 2015/16 compliance with the Safe Drinking Water Regulations 2005, for the period 1 to 31 July 2015. The water quality standards specified in the regulations are outlined below, in table A1.

Table A1: Drinking water quality standards

Parameter	Sampling frequency	Water quality standard
Escherichia coli	Weekly	At least 98% of all samples collected in any 12 month period to contain no *Escherichia coli* per 100mL
Chloroacetic acid	Monthly	Must not exceed 0.15 mg/L
Dichloroacetic acid	Monthly	Must not exceed 0.1 mg/L
Trichloroacetic acid	Monthly	Must not exceed 0.1 mg/L
Trihalomethanes	Monthly	Must not exceed 0.25 mg/L
Aluminium	Monthly	Must not exceed 0.2 mg/L
Turbidity	Weekly	95% upper confidence limit of the mean of drinking water samples collected in the preceding 12 months must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU)

Appendix 4 - Water quality compliance results cont.

The Safe Drinking Water Regulations 2015 came into effect on 18 July 2015. Section 4.2 onwards of this appendix reports on 2015/16 compliance with the revised regulations, for the full year period from 1 July 2015 to 30 June 2016. The new water quality standards in the updated regulations are outlined below, in table A2.

Table A2: Drinking water quality compliance

Parameter	Sampling frequency	Water quality standard
1,1-Dichloroethene	Various, see Tables	should not exceed 0.03mg/L.
1,2-Dichloroethane	Various, see Tables	should not exceed 0.06mg/L.
1.1-Dichloropropylene	Various, see Tables	currently no recommended health guideline value set
1.1.1.2- Tetrachloroethane	Various, see Tables	should not exceed 1mg/L.
1.1.1-Trichloroethane	Various, see Tables	currently no recommended health guideline value set
1.1.2.2-Tetrachloroethane	Various, see Tables	should not exceed 1mg/L
1.1.2-Trichloroethane	Various, see Tables	currently no recommended health guideline value set
1.1-Dichloropropylene	Various, see Tables	currently no recommended health guideline value set
1.2.3-Trichlorobenzene	Various, see Tables	should not exceed 0.005mg/L
1.2.3-Trichloropropane	Various, see Tables	should not exceed 0.007mg/L
1.2.4-Trichlorobenzene	Various, see Tables	should not exceed 0.005mg/L
1.2.4-Trimethylbenzene	Various, see Tables	currently no recommended health guideline value set
1.2-Dibromo-3-chloropropane	Various, see Tables	currently no recommended health guideline value set
1.2-Dibromoethane (EDB)	Various, see Tables	should not exceed 40mg/L
1.2-Dichlorobenzene	Various, see Tables	should not exceed 0.001mg/L
1.2-Dichloropropane	Various, see Tables	should not exceed 75mg/L
1.3.5 - Trimethylbenzene	Various, see Tables	should not exceed 25mg/L
1.3-Dichlorobenzene	Various, see Tables	currently no recommended health guideline value set
1.3-Dichloropropane	Various, see Tables	currently no recommended health guideline value set
1.4-Dichlorobenzene	Various, see Tables	should not exceed 0.0003mg/L
2,4,6-Trichlorophenol	Various, see Tables	currently no recommended health guideline value set
2,4-D	Various, see Tables	should not exceed 0.03mg/L.
2.3.4.6-Tetrachlorophenol	Various, see Tables	currently no recommended health guideline value set
2.4.5-T	Various, see Tables	should not exceed 0.1mg/L.
2.4.5-Trichlorophenol	Various, see Tables	should not exceed 0.02mg/L

Table A2 cont.

Parameter	Sampling frequency	Water quality standard
2.4-Dichlorophenol	Various, see Tables	should not exceed 0.2mg/L
2.6-Dichlorophenol	Various, see Tables	should not exceed 0.02mg/L
2-Chlorophenol	Various, see Tables	should not exceed 0.2mg/L
2-Chlorotoluene	Various, see Tables	should not exceed 1mg/L.
4,4'-DDT	Various, see Tables	should not exceed 0.009mg/L.
4.4'-DDD	Various, see Tables	currently no recommended health guideline value set
4.4'-DDE	Various, see Tables	currently no recommended health guideline value set
4-Chloro-3-Methylphenol	Various, see Tables	currently no recommended health guideline value set
4-Chlorotoluene	Various, see Tables	should not exceed 1mg/L.
Aldrin	Various, see Tables	should not exceed 0.0003mg/L.
Alkalinity, Total as CaCO3	Various, see Tables	Asthetic limit is 200mg/L
Aluminium, filtered	Various, see Tables	currently no recommended health guideline value set
Aluminium, Total as Al	Various, see Tables	currently no recommended health guideline value set
Ammonia	Various, see Tables	Asthetic limit is 0.5 mg/L
Antimony	Various, see Tables	should not exceed 0.003mg/L.
Antimony, Filtered	Various, see Tables	should not exceed 0.003mg/L.
Arsenic	Various, see Tables	should not exceed 0.01mg/L
Arsenic, Filtered	Various, see Tables	should not exceed 0.01mg/L
Barium, as Ba	Various, see Tables	should not exceed 2mg/L.
Barium, Filtered	Various, see Tables	should not exceed 2mg/L.
Benzo(a)pyrene	Various, see Tables	should not exceed 0.00001mg/L.
Berylium, Filtered	Various, see Tables	should not exceed 0.06mg/L
Beryllium, as Be	Various, see Tables	should not exceed 0.06mg/L
BHC (alpha)	Various, see Tables	should not exceed 1.2mg/L
BHC (beta)	Various, see Tables	should not exceed 1.2mg/L

Table A2 cont.

Parameter	Sampling frequency	Water quality standard
BHC (delta)	Various, see Tables	should not exceed 1.2mg/L.
Bicarbonate Alkalinity as CaCO3	Various, see Tables	Asthetic limit is 200mg/L
Boron	Various, see Tables	should not exceed 4mg/L.
Boron, Filtered	Various, see Tables	should not exceed 4mg/L.
Bromate	Various, see Tables	should not exceed 0.02mg/L
Bromobenzene	Various, see Tables	should not exceed 50mg/L
Bromodichlormethane	Various, see Tables	should not exceed 0.25mg/L
Bromoform	Various, see Tables	should not exceed 0.25mg/L
Cadmium	Various, see Tables	should not exceed 0.002mg/L
Cadmium, Filtered	Various, see Tables	should not exceed 0.002mg/L
Calcium	Various, see Tables	currently no recommended health guideline value set
Carbon tetrachloride	Various, see Tables	should not exceed 0.003mg/L.
Carbonate Alkalinity as CaCO3	Various, see Tables	Asthetic limit is 200mg/L
Chlordane, Total	Various, see Tables	should not exceed 0.002mg/L
Chlorine	Various, see Tables	should not exceed 5 mg/L
Chlorine, Free	Various, see Tables	should not exceed 4 mg/L
Chloroacetic acid	Various, see Tables	should not exceed 0.15 mg/L
Chlorobenzene	Various, see Tables	should not exceed 0.01mg/L
Chloroform	Various, see Tables	should not exceed 0.25mg/L
Chromium	Various, see Tables	should not exceed 0.05mg/L
Chromium, Filtered	Various, see Tables	should not exceed 0.05mg/L
cis-1.2-Dichloroethene	Various, see Tables	should not exceed 0.06mg/L.
cis-1.3-Dichloropropylene	Various, see Tables	should not exceed 0.03mg/L.
cis-Chlordane	Various, see Tables	should not exceed 0.002mg/L
Cobalt, as Co	Various, see Tables	should not exceed 0.02mg/L
Cobalt, Filtered	Various, see Tables	should not exceed 0.02mg/L
Coliforms, Total	Various, see Tables	currently no recommended health guideline value set

Table A2 cont.

Parameter	Sampling frequency	Water quality standard
Colour, true	Various, see Tables	should not exceed 15 HU
Copper	Various, see Tables	should not exceed 1mg/L
Copper, Filtered	Various, see Tables	should not exceed 1mg/L
Cyanide	Various, see Tables	should not exceed 0.08 mg/L
Dibromochloromethane	Various, see Tables	should not exceed 0.25mg/L
Dibromomethane	Various, see Tables	should not exceed 0.04mg/L
Dichloroacetic acid	Various, see Tables	should not exceed 0.1mg/L
Dissolved Organic Carbon	Various, see Tables	currently no recommended health guideline value set
Dissolved Oxygen (Field)	Various, see Tables	currently no recommended health guideline value set
Electrical Conductivity @ 25C	Various, see Tables	aesthetic limit of 940µS/cm.
Endosulfan I	Various, see Tables	should not exceed 0.02mg/L
Endosulfan II	Various, see Tables	should not exceed 0.02mg/L
Endosulfan sulfate	Various, see Tables	currently no recommended health guideline value set
Endrin	Various, see Tables	should not exceed 0.00002mg/L
Endrin aldehyde	Various, see Tables	should not exceed 0.01mg/L
Endrin ketone	Various, see Tables	should not exceed 0.005mg/L
Enterococci	Various, see Tables	100% of all samples collected in any 12 month period to contain no Enterococci per 100mL
Escherichia coli	Weekly	100% of all samples collected in any 12 month period to contain no Escherichia coli per 100mL (reference Safe Drinking Water Regualtions 2015)
Ethylbenzene	Various, see Tables	should not exceed 0.003mg/L.
Faecal Streptococci	Various, see Tables	100% of all samples collected in any 12 month period to contain no *Faecal Streptococci* per 100mL
Fluoride	Various, see Tables	should exceed the limit of 1.5 mg/L
Formaldehyde	Various, see Tables	should not exceed 0.5mg/L
Hardness, as CaCO3	Various, see Tables	Aesthetic limit is 200 mg/L
Heptachlor	Various, see Tables	should not exceed 0.0003mg/L

Appendix 4 - Water quality compliance results cont.

Table A2 Drinking water quality compliance cont.

Parameter	Sampling frequency	Water quality standard
Heptachlor Epoxide	Various, see Tables	should not exceed 0.0003mg/L
Heterotrophic Plate Count, 22C	Various, see Tables	currently no recommended health guideline value set
Heterotrophic Plate Count, 37C	Various, see Tables	currently no recommended health guideline value set
Hexachlorobenzene	Various, see Tables	currently no recommended health guideline value set
Hydroxide Alkalinity as CaCO3	Various, see Tables	Aesthetic limit is 200mg/L
Iron, Filtered (Soluble)	Various, see Tables	should not exceed 0.3 mg/L
Iron, total as Fe	Various, see Tables	should not exceed 0.3 mg/L
Lead	Various, see Tables	should not exceed 0.01 mg/L
Lead, Filtered	Various, see Tables	should not exceed 0.01 mg/L
Lindane	Various, see Tables	should not exceed 0.01mg/L.
Magnesium, as Mg	Various, see Tables	currently no recommended health guideline value set
Manganese, Filtered (Soluble)	Various, see Tables	should not exceed 0.1mg/L
Manganese, total as Mn	Various, see Tables	should not exceed 0.1mg/L
MCPA	Various, see Tables	should not exceed 0.04 mg/L
Mercury, as Hg	Various, see Tables	should not exceed 0.001 mg/L
meta- & para-Xylene	Various, see Tables	should not exceed 0.02mg/L.
Methoxychlor	Various, see Tables	should not exceed 0.3mg/L
Methylene chloride	Various, see Tables	should not exceed 0.004mg/L.
Molybdenum, as Mo	Various, see Tables	should not exceed 0.05mg/L
Monochloramine	Various, see Tables	should not exceed 3 mg/L
n-Butylbenzene	Various, see Tables	currently no recommended health guideline value set
Nickel	Various, see Tables	should not exceed 0.02 mg/L
Nickel, Filtered	Various, see Tables	should not exceed 0.02 mg/L
Nitrate	Various, see Tables	Aesthetic limits should not exceed 50 mg/L
Nitrite	Various, see Tables	Aesthetic limits should not exceed 3mg/L
n-Propylbenzene	Various, see Tables	currently no recommended health guideline value set
ortho-Xylene	Various, see Tables	should not exceed 0.02mg/L

Table A2 cont.

Parameter	Sampling frequency	Water quality standard
Pentachlorophenol	Various, see Tables	should not exceed 0.01mg/L.
pH	Various, see Tables	Aesthetic limits are no less than 6.5, and no greater than 8.5
Phosphorus, Reactive as P	Various, see Tables	should not exceed 1mg/L
p-Isopropyltoluene	Various, see Tables	currently no recommended health guideline value set
Potassium, as K	Various, see Tables	currently no recommended health guideline value set
sec-Butylbenzene	Various, see Tables	currently no recommended health guideline value set
Selenium	Various, see Tables	should not exceed 0.01mg/L
Selenium, Filtered	Various, see Tables	should not exceed 0.01mg/L
Silica, Non Reactive	Various, see Tables	currently no recommended health guideline value set
Silica, Reactive	Various, see Tables	currently no recommended health guideline value set
Silver, Filtered as Ag	Various, see Tables	should not exceed 0.1mg/L.
Silver, Total as Ag	Various, see Tables	should not exceed 0.1mg/L.
Simazine	Various, see Tables	should not exceed 0.02mg/L
Sodium	Various, see Tables	Aesthetic limit should not exceed 180 mg/L.
Strontium, Filtered	Various, see Tables	should not exceed 1.5mg/L
Strontium, Total	Various, see Tables	should not exceed 1.5mg/L
Styrene	Various, see Tables	should not exceed 0.004mg/L
Sulfate	Various, see Tables	Aesthetic limit should not exceed 250 mg/L.
tert-Butylbenzene	Various, see Tables	currently no recommended health guideline value set
Tetrachloroethene	Various, see Tables	should not exceed 0.05mg/L
Thallium, Total	Various, see Tables	should not exceed 2mg/L
Tin, Filtered	Various, see Tables	currently no recommended health guideline value set
Tin, Total as Sn	Various, see Tables	currently no recommended health guideline value set
Titanium, Filtered	Various, see Tables	currently no recommended health guideline value set
Titanium, Total	Various, see Tables	currently no recommended health guideline value set
Toluene	Various, see Tables	should not exceed 0.025mg/L
trans-1.2-Dichloroethene	Various, see Tables	should not exceed 0.06mg/L

Table A2 cont.

Parameter	Sampling frequency	Water quality standard
trans-1.3-Dichloropropylene	Various, see Tables	should not exceed 0.03mg/L
trans-Chlordane	Various, see Tables	should not exceed 0.002mg/L.
Trichloroacetic acid	Various, see Tables	should not exceed 0.1mg/L
Trichloroethene	Various, see Tables	currently no recommended health guideline value set
Trihalomethanes	Monthly	Must not exceed 0.25 mg/L (reference Safe Drinking Water Regualtions 2015)
Turbidity	Weekly	95% ile limit drinking water samples collected in the preceding 12 months must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU) (reference Safe Drinking Water Regualtions 2015)
UV Transmission@254nm	Various, see Tables	currently no recommended health guideline value set
Vanadium, as V	Various, see Tables	should not exceed 0.021mg/L
Vanadium, Filtered	Various, see Tables	should not exceed 0.021mg/L
Zinc	Various, see Tables	should not exceed 3mg/L
Zinc, Filtered	Various, see Tables	should not exceed 3mg/L

A4.1 Safe Drinking Water Regulations 2005 reporting

Section 4.1 reports on 2015/16 compliance with the Safe Drinking Water Regulations 2005, from 1 to 31 July 2015.

E.Coli

Escherichia coli (E.coli) is abundant in human and animal faeces and is tested as a specific indicator of faecal contamination in the drinking water supply. Detection of *E.coli* can indicate a failure in water treatment, contamination of a water storage facility or possible infiltration of the enclosed system.

Treatment through disinfection removes *E.coli*. Western Water applies chemical disinfection by chlorination or chloramination in all its supply systems. A level of disinfection residual is maintained within the distribution system to prevent potential regrowth of microorganisms before reaching customer taps.

Table A3: Escherichia coli *results*

Water sampling locality	Sampling frequency*	No. of samples	No. of samples containing *E.coli*	Max. result (orgs/mL)	% Samples with no *E.coli*	Complying (Yes/No)
Bulla	Weekly	5	0	0	100%	Yes
Darley	Weekly	4	0	0	100%	Yes
Diggers Rest	Weekly	5	0	0	100%	Yes
Eynesbury	Weekly	4	0	0	100%	Yes
Gisborne	Weekly	9	0	0	100%	Yes
Lancefield	Weekly	4	0	0	100%	Yes
Lerderderg	Weekly	5	0	0	100%	Yes
Macedon	Weekly	4	0	0	100%	Yes
Maddingley	Weekly	4	0	0	100%	Yes
Melton South	Weekly	9	0	0	100%	Yes
Merrimu	Weekly	5	0	0	100%	Yes
Mount Macedon	Weekly	4	0	0	100%	Yes
Myrniong	Weekly	4	0	0	100%	Yes
Riddells Creek	Weekly	5	0	0	100%	Yes
Rockbank	Weekly	4	0	0	100%	Yes
Romsey	Weekly	4	0	0	100%	Yes
Sunbury	Weekly	9	0	0	100%	Yes
Toolern Vale	Weekly	4	0	0	100%	Yes
Woodend	Weekly	5	0	0	100%	Yes

** Some localities received extra sampling for* E.coli *in response to localised water quality issues in the reporting period.*

Aluminium

Aluminium can be present in water through the natural leaching of soils and the use of aluminium salts as coagulants during the water treatment process. Acid-soluble aluminium concentrations in excess of 0.2 mg/L, caused by post-flocculation may lead to aesthetic problems such as 'milky coloured' water in the distribution system which may result in the precipitation of aluminium hydroxide depending on the pH level.

Total aluminium is measured monthly at customer taps at all 19 localities whether or not aluminium is added as a coagulant as part of the water treatment process. If the result for total aluminium exceeds 0.2 mg/L, an automatic retest of sampling is conducted by our contracted NATA-accredited laboratory. Where aluminium is not used in the treatment process, any detection of aluminium will likely be due to naturally-occurring microscopic clay particles.

Table A4: Aluminium results

Water sampling locality	Frequency of sampling	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying* (Yes/No)
Bulla	Monthly	1	0	0.02	0.02	Yes
Darley	Monthly	1	0	0.03	0.03	Yes
Diggers Rest	Monthly	1	0	0.04	0.04	Yes
Eynesbury	Monthly	1	0	0.02	0.02	Yes
Gisborne	Monthly	1	0	0.04	0.04	Yes
Lancefield	Monthly	1	0	0.01	0.01	Yes
Lerderderg	Monthly	1	0	0.02	0.02	Yes
Macedon	Monthly	1	0	0.06	0.06	Yes
Maddingley	Monthly	1	0	0.02	0.02	Yes
Melton South	Monthly	1	0	0.02	0.02	Yes
Merrimu	Monthly	1	0	0.02	0.02	Yes
Mount Macedon	Monthly	1	0	0.06	0.06	Yes
Myrniong	Monthly	1	0	0.01	0.01	Yes
Riddells Creek	Monthly	1	0	0.04	0.04	Yes
Rockbank	Monthly	1	0	0.02	0.02	Yes
Romsey	Monthly	1	0	0.01	0.01	Yes
Sunbury	Monthly	1	0	0.04	0.04	Yes
Toolern Vale	Monthly	1	0	0.02	0.02	Yes
Woodend	Monthly	1	0	0.04	0.04	Yes

** Compliance as measured against the guideline values set out in ADWG for acid soluble aluminium in drinking water based on health considerations should not exceed 0.2mg/L.*

Appendix 4 - Water quality compliance results cont.

Chlorine-based disinfection by-product chemicals

Western Water disinfects its drinking water supplies by either chlorination or chloramination. Chlorine-based disinfection by-products measured under the Safe Drinking Water Regulations include total trihalomethanes, chloroacetic acid, dichloroacetic acid and trichloroacetic acid. The following section reports the results for the 2015/16 monitoring program.

Total trihalomethanes

Trihalomethanes are present in drinking water principally as a by-product of disinfection from chlorination or chloramination, where chlorine reacts with organic material.

Trihalomethanes

Table A5: Trihalomethanes

Water sampling locality	Sampling frequency	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying (Yes/No)*
Bulla	Monthly	1	0	0.099	0.099	Yes
Darley	Monthly	1	0	0.120	0.120	Yes
Diggers Rest	Monthly	1	0	0.100	0.100	Yes
Eynesbury	Monthly	1	0	0.093	0.093	Yes
Gisborne	Monthly	3	0	0.130	0.104	Yes
Lancefield	Monthly	1	0	0.089	0.089	Yes
Lerderderg	Monthly	1	0	0.099	0.099	Yes
Macedon	Monthly	1	0	0.100	0.100	Yes
Maddingley	Monthly	1	0	0.120	0.120	Yes
Melton South	Monthly	1	0	0.110	0.110	Yes
Merrimu	Monthly	1	0	0.100	0.100	Yes
Mount Macedon	Monthly	1	0	0.130	0.130	Yes
Myrniong	Monthly	1	0	0.083	0.083	Yes
Riddells Creek	Monthly	2	0	0.110	0.098	Yes
Rockbank	Monthly	1	0	0.110	0.110	Yes
Romsey	Monthly	1	0	0.001	0.001	Yes
Sunbury	Monthly	3	0	0.100	0.089	Yes
Toolern Vale	Monthly	1	0	0.110	0.110	Yes
Woodend	Monthly	1	0	0.027	0.027	Yes

** Compliance as measured against the guideline values set out in ADWG for total trihalomethanes in drinking water based on health considerations should not exceed 0.25mg/L.*

Chloroacetic Acid

Table A6: Chloroacetic Acid

Water sampling locality	Sampling frequency	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying (Yes/No)*
Bulla	Monthly	1	0	0.002	0.002	Yes
Darley	Monthly	1	0	0.002	0.002	Yes
Diggers Rest	Monthly	1	0	0.002	0.002	Yes
Eynesbury	Monthly	1	0	0.002	0.002	Yes
Gisborne	Monthly	1	0	0.002	0.002	Yes
Lancefield	Monthly	1	0	0.002	0.002	Yes
Lerderderg	Monthly	1	0	0.002	0.002	Yes
Macedon	Monthly	1	0	0.002	0.002	Yes
Maddingley	Monthly	1	0	0.002	0.002	Yes
Melton South	Monthly	1	0	0.002	0.002	Yes
Merrimu	Monthly	1	0	0.002	0.002	Yes
Mount Macedon	Monthly	1	0	0.002	0.002	Yes
Myrniong	Monthly	1	0	0.002	0.002	Yes
Riddells Creek	Monthly	1	0	0.002	0.002	Yes
Rockbank	Monthly	1	0	0.002	0.002	Yes
Romsey	Monthly	1	0	0.002	0.002	Yes
Sunbury	Monthly	1	0	0.002	0.002	Yes
Toolern Vale	Monthly	1	0	0.002	0.002	Yes
Woodend	Monthly	1	0	0.002	0.002	Yes

** Compliance as measured against the guideline values set out in ADWG for total chloroacetic acid in drinking water based on health considerations should not exceed 0.15mg/L.*

Appendix 4 - Water quality compliance results cont.

Dichloroacetic acid

Dichloroacetic acid is a by-product of the reaction between chlorine and naturally occurring humic and fulvic acids in the drinking water supply.

Dichloroacetic Acid

Table A7: Dichloroacetic Acid

Water sampling locality	Sampling frequency	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying (Yes/No)*
Bulla	Monthly	1	0	0.005	0.005	Yes
Darley	Monthly	1	0	0.004	0.004	Yes
Diggers Rest	Monthly	1	0	0.009	0.009	Yes
Eynesbury	Monthly	1	0	0.002	0.002	Yes
Gisborne	Monthly	1	0	0.005	0.005	Yes
Lancefield	Monthly	1	0	0.005	0.005	Yes
Lerderderg	Monthly	1	0	0.004	0.004	Yes
Macedon	Monthly	1	0	0.010	0.010	Yes
Maddingley	Monthly	1	0	0.003	0.003	Yes
Melton South	Monthly	1	0	0.004	0.004	Yes
Merrimu	Monthly	1	0	0.002	0.002	Yes
Mount Macedon	Monthly	1	0	0.005	0.005	Yes
Myrniong	Monthly	1	0	0.002	0.002	Yes
Riddells Creek	Monthly	1	0	0.009	0.009	Yes
Rockbank	Monthly	1	0	0.002	0.002	Yes
Romsey	Monthly	1	0	0.005	0.005	Yes
Sunbury	Monthly	1	0	0.007	0.007	Yes
Toolern Vale	Monthly	1	0	0.003	0.003	Yes
Woodend	Monthly	1	0	0.004	0.004	Yes

** Compliance as measured against the guideline values set out in ADWG for total dichloroacetic acid in drinking water based on health considerations should not exceed 0.1mg/L.*
 # A result of <0.005 mg/L is a result less than the detection limit for total dichloroacetic acid.

Trichloroacetic acid

Trichloroacetic acid is a by-product of the reaction between chlorine and naturally occurring humic and fulvic acids in the drinking water supply.

Table A8: Trichloroacetic Acid

Water sampling locality	Sampling frequency	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying (Yes/No)*
Bulla	Monthly	1	0	0.002	0.002	Yes
Darley	Monthly	1	0	0.010	0.010	Yes
Diggers Rest	Monthly	1	0	0.013	0.013	Yes
Eynesbury	Monthly	1	0	0.002	0.002	Yes
Gisborne	Monthly	1	0	0.013	0.013	Yes
Lancefield	Monthly	1	0	0.005	0.005	Yes
Lerderderg	Monthly	1	0	0.006	0.006	Yes
Macedon	Monthly	1	0	0.010	0.010	Yes
Maddingley	Monthly	1	0	0.004	0.004	Yes
Melton South	Monthly	1	0	0.006	0.006	Yes
Merrimu	Monthly	1	0	0.002	0.002	Yes
Mount Macedon	Monthly	1	0	0.004	0.004	Yes
Myrniong	Monthly	1	0	0.002	0.002	Yes
Riddells Creek	Monthly	1	0	0.016	0.016	Yes
Rockbank	Monthly	1	0	0.002	0.002	Yes
Romsey	Monthly	1	0	0.002	0.002	Yes
Sunbury	Monthly	1	0	0.013	0.013	Yes
Toolern Vale	Monthly	1	0	0.002	0.002	Yes
Woodend	Monthly	1	0	0.003	0.003	Yes

** Compliance as measured against the guideline values set out in ADWG for total trichloroacetic acid in drinking water based on health considerations should not exceed 0.1mg/L*

 # A result of <0.005 mg/L is a result less than the detection limit for total trichloroacetic acid.

Appendix 4 - Water quality compliance results cont.

Ozone-based disinfection by-product chemicals

The ozone-based disinfection by-products bromate and formaldehyde are not deemed to be a significant risk in drinking water supplied by Western Water as the largest potential risk for the presence of these by-products in drinking water exceeding compliance levels is through ozonation.

Western Water does not use ozone-based chemicals for disinfection of drinking water. Accordingly, sampling and analyses for bromate and formaldehyde were not undertaken in the 2015/16 reporting period.

Turbidity

Turbidity is the measurement of the light scattering properties of water and is caused by the presence of fine suspended matter in the supply. Based on aesthetic considerations, the turbidity standard is set at 5 nephelometric turbidity units (NTU), which is the point where water may appear slightly discoloured in a glass.

A summary of the turbidity results for samples taken at customer taps is listed below. It includes the statistical measure of the 95th percentile for samples taken for turbidity.

Table A9: Turbidity

Water sampling locality	Frequency of sampling	No. of samples	Max. NTU	Min. NTU	95th percentile	Complying (Yes/No)
Bulla*	Min. Weekly	5	1.3	0.4	0.9	Yes
Darley	Min. Weekly	4	0.3	0.2	0.3	Yes
Diggers Rest	Min. Weekly	5	1.0	0.3	0.7	Yes
Eynesbury	Min. Weekly	4	0.4	0.2	0.3	Yes
Gisborne	Min. Weekly	10	0.4	0.2	0.3	Yes
Lancefield	Min. Weekly	4	0.1	0.1	0.1	Yes
Lerderderg*	Min. Weekly	4	0.2	0.2	0.2	Yes
Macedon	Min. Weekly	4	0.3	0.2	0.3	Yes
Maddingley	Min. Weekly	4	0.2	0.2	0.2	Yes
Melton South	Min. Weekly	4	0.2	0.1	0.2	Yes
Merrimu	Min. Weekly	4	0.1	0.1	0.1	Yes
Mount Macedon	Min. Weekly	4	0.3	0.3	0.3	Yes
Myrniong	Min. Weekly	4	0.1	0.1	0.1	Yes
Riddells Creek	Min. Weekly	6	0.3	0.2	0.3	Yes
Rockbank	Min. Weekly	4	0.1	0.1	0.1	Yes
Romsey	Min. Weekly	4	0.1	0.4	0.1	Yes
Sunbury*	Min. Weekly	6	1.3	0.2	0.8	Yes
Toolern Vale	Min. Weekly	4	0.4	0.3	0.3	Yes
Woodend	Min. Weekly	4	0.1	0.2	0.1	Yes

NTU: nephelometric turbidity unit UCL: upper confidence limit

** Several localities received extra sampling for turbidity in response to localised water quality issues in the reporting period Additional samples because 2016 was a leap year..*

A4.2 Safe Drinking Water Regulations 2015 reporting

Section 4.2 reports on compliance with Safe Drinking Water Regulations 2015, effective from 18 July 2015 to 30 June 2016.

All localities are tested for most chemical. However, there are some tables showing fewer than Western Water's 19 water sampling localities. In these tables, testing has been undertaken for those localities assessed as the most likely to have water quality issues if the limit for this chemical was not met. The assessment is based on the water source and types of activities that could interact with the water.

Escherichia coli

Table A10: Escherichia coli

Water sampling locality	Sampling frequency*	No. of samples	No. of samples detecting *E.coli*	No. of *E.coli* investigations completed	No. of false detections of *E.coli*	Max. result (true result) (orgs/mL)	% Samples with no *E.coli* (true result)	Complying (Yes/No)
Bulla	Weekly	53	0	0	0	0	100%	Yes
Darley	Weekly	52	0	0	0	0	100%	Yes
Diggers Rest	Weekly	53	0	0	0	0	100%	Yes
Eynesbury	Weekly	52	0	0	0	0	100%	Yes
Gisborne	64/year	64	1	1	1	0	100%	Yes
Lancefield	Weekly	52	0	0	0	0	100%	Yes
Lerderderg	64/year	64	1	1	1	0	100%	Yes
Macedon	Weekly	52	0	0	0	0	100%	Yes
Maddingley	Weekly	52	0	0	0	0	100%	Yes
Melton South	112/year	113	1	1	1	0	100%	Yes
Merrimu	64/year	65	0	0	0	0	100%	Yes
Mount Macedon	Weekly	52	0	0	0	0	100%	Yes
Myrniong	Weekly	52	0	0	0	0	100%	Yes
Riddells Creek	Weekly	52	0	0	0	0	100%	Yes
Rockbank	Weekly	52	0	0	0	0	100%	Yes
Romsey	Weekly	52	0	0	0	0	100%	Yes
Sunbury	112/year	112	1	1	1	0	100%	Yes
Toolern Vale	Weekly	52	0	0	0	0	100%	Yes
Woodend	64/year	64	1	1	1	0	100%	Yes

** Some localities received extra sampling for* E.coli *in response to localised water quality issues in the reporting period. Refer to Section 6. Incident Management and Emergency Response for details of* E.coli *investigations.*

Appendix 4 - Water quality compliance results cont.

Trihalomethanes

Table A11: Trihalomethanes

Water sampling locality	Sampling frequency	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying (Yes/No)*
Bulla	Monthly	12	0	0.099	0.009	Yes
Darley	Monthly	13	0	0.200	0.090	Yes
Diggers Rest	Monthly	12	0	0.078	0.100	Yes
Eynesbury	Monthly	13	0	0.150	0.036	Yes
Gisborne	Monthly	14	0	0.130	0.031	Yes
Lancefield	Monthly	12	0	0.110	0.057	Yes
Lerderderg	Monthly	13	0	0.170	0.071	Yes
Macedon	Monthly	12	0	0.150	0.068	Yes
Maddingley	Monthly	14	0	0.180	0.092	Yes
Melton South	Monthly	14	0	0.150	0.015	Yes
Merrimu	Monthly	13	0	0.150	0.038	Yes
Mount Macedon	Monthly	12	0	0.160	0.097	Yes
Myrniong	Monthly	12	0	0.130	0.029	Yes
Riddells Creek	Monthly	12	0	0.180	0.071	Yes
Rockbank	Monthly	13	0	0.170	0.013	Yes
Romsey	Monthly	12	0	0.008	0.001	Yes
Sunbury	Monthly	12	0	0.170	0.013	Yes
Toolern Vale	Monthly	13	0	0.140	0.060	Yes
Woodend	Monthly	12	0	0.170	0.019	Yes

** Compliance as measured against the guideline values set out in ADWG for total trihalomethanes in drinking water based on health considerations should not exceed 0.25mg/L.*

Turbidity

Table A12: Turbidity

Water sampling locality	Frequency of sampling	No. of samples	Max. NTU	Min. NTU	95th percentile	Complying (Yes/No)
Bulla*	Min. Weekly	53	1.6	0.1	1.0	Yes
Darley	Min. Weekly	52	4.8	0.1	0.3	Yes
Diggers Rest	Min. Weekly	53	1.3	0.1	0.8	Yes
Eynesbury	Min. Weekly	52	1.5	0.1	0.8	Yes
Gisborne	Min. Weekly	54	0.6	0.1	0.3	Yes
Lancefield	Min. Weekly	52	0.5	0.1	0.1	Yes
Lerderderg*	Min. Weekly	52	1.4	0.1	0.3	Yes
Macedon	Min. Weekly	52	1.4	0.1	0.7	Yes
Maddingley	Min. Weekly	52	0.9	0.1	0.2	Yes
Melton South	Min. Weekly	52	2.6	0.1	0.9	Yes
Merrimu	Min. Weekly	52	0.7	0.1	0.6	Yes
Mount Macedon	Min. Weekly	52	0.5	0.1	0.4	Yes
Myrniong	Min. Weekly	52	0.3	0.1	0.2	Yes
Riddells Creek	Min. Weekly	53	0.7	0.1	0.3	Yes
Rockbank	Min. Weekly	52	1.6	0.1	1.2	Yes
Romsey	Min. Weekly	52	0.3	0.1	0.1	Yes
Sunbury*	Min. Weekly	52	1.6	0.1	1.0	Yes
Toolern Vale	Min. Weekly	52	0.6	0.1	0.2	Yes
Woodend	Min. Weekly	52	1.0	0.1	0.3	Yes

NTU: nephelometric turbidity unit UCL: upper confidence limit

** Several localities received extra sampling for turbidity in response to localised water quality issues in the reporting period. Hence these have more than 52 samples.*

Fluoride

Both the *Health (Fluoridation) Act 1973* and the Victorian Department of Health and Human Services (DHHS) require that the annual average fluoride in fluoridated drinking water supplied by Western Water must not exceed a level of 1.0 mg/L. Fluoride levels in any individual sample from drinking water supplied must also not exceed 1.5 mg/L.

Fluoride is added to the drinking water to improve dental health. In supplies where fluoride is not added, naturally occurring sources, such as soils and rock, may impart fluoride to the water. For further information on water fluoridation, please visit the DHHS's website for water fluoridation http://www.health.vic.gov.au/environment/fluoridation.

Table A13: Fluoride

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying (Yes/N0)
(Yes/ No)	Monthly	12	0	0.010	0.002	Yes
Bulla#	Fortnightly	27	1.10	0.44	0.91	Yes
Darley	Fortnightly	28	0.94	0.67	0.84	Yes
Diggers Rest	Fortnightly	27	1.00	0.42	0.87	Yes
Eynesbury	Fortnightly	27	0.99	0.80	0.95	Yes
Gisborne	Fortnightly	26	1.00	0.05	0.77	Yes
Lancefield*	Quarterly	4	0.35	0.09	0.20	Yes
Lerderderg	Fortnightly	28	0.95	0.58	0.84	Yes
Macedon	Fortnightly	28	0.95	0.07	0.83	Yes
Maddingley	Fortnightly	28	0.92	0.67	0.84	Yes
Melton South	Fortnightly	26	1.00	0.76	0.91	Yes
Merrimu	Fortnightly	27	1.00	0.61	0.86	Yes
Mount Macedon	Fortnightly	27	0.90	0.16	0.82	Yes
Myrniong*	Quarterly	4	0.14	0.05	0.09	Yes
Riddells Creek	Fortnightly	28	0.94	0.07	0.86	Yes
Rockbank	Fortnightly	26	1.00	0.59	0.90	Yes
Romsey*	Quarterly	4	0.53	0.22	0.33	Yes
Sunbury	Fortnightly	27	0.98	0.23	0.87	Yes
Toolern Vale	Fortnightly	26	0.96	0.65	0.86	Yes
Woodend*	Quarterly	4	0.91	0.05	0.36	Yes

** Non-fluoridated supplies.*

 # The maximum recorded for Bulla was an individual sample and did not exceed the limit of 1.5 mg/L..

N.B. Several localities received extra sampling for fluoride in response to localised water quality issues in the reporting period.

A4.3 Other chemicals not specified in Schedule 2 but which may pose a risk to human health

Besides those parameters tested under the Safe Drinking Water Regulations 2015, Western Water also tests for other substances that may pose a risk to human health. These results are measured in accordance with the ADWG to ensure compliance with recommended industry standards. All results presented in this report are available to customers on request. Any further explanation on any parameters of concern is provided as required.

The following reports 2015/16 compliance against the health-related guideline values set out in ADWG - or other cited guidelines - for other parameters measured at customers' taps that may pose a risk to human health. All samples complied with the health-related guideline values for ADWG or other cited guidelines.

Total Coliforms

Table A14: Total Coliforms

Water sampling locality	Frequency of sampling	No. of samples	Max. org/100ml	Min. org/100ml	Ave. org/100ml
Bulla	Weekly	53	210	0	3
Darley	Weekly	52	22	0	0
Diggers Rest	Weekly	53	3	0	0
Eynesbury	Weekly	52	1	0	0
Gisborne	64/year	64	440	0	2
Lancefield	Weekly	52	23	0	1
Lerderderg	64/year	64	340	0	3
Macedon	Weekly	52	49	0	1
Maddingley	Weekly	52	40	0	0
Melton South*	112/year	113	2000	0	15
Merrimu	64/year	65	22	0	0
Mount Macedon	Weekly	52	65	0	3
Myrniong	Weekly	52	99	0	1
Riddells Creek	Weekly	52	5	0	0
Rockbank	Weekly	52	22	0	1
Romsey	Weekly	52	210	0	2
Sunbury	112/year	112	610	0	3
Toolern Vale	Weekly	52	0	0	0
Woodend	64/year	64	1400	0	8

There is currently no recommended guideline value set out for total coliforms in drinking water; however Western Water internal limits are 10org/100ml.

** Melton South had a high coliform result in February 2016, however there was no other bacterial presence reported. The coliforms are indicative of inert biofilm presence which was flushed out of the system. Drinking water supplied to customers during this time was safe.*

Enterococci

Table A15: Enterococci

Water sampling locality	Frequency of sampling	No. of samples	Max. org/100ml	Min. org/100ml	Ave. org/100ml
Lerderderg	N/A	4	0	0	0

Compliance as measured against the health related guideline value set out in ADWG for enterococci in drinking water should not exceed 0orgs/100ml. Sampling for this parameter is performed as part of a water quality investigation, therefore there is no set frequency for sampling.

Faecal Streptococci

Table A16: Faecal Streptococci

Water sampling locality	Frequency of sampling	No. of samples	Max. org/100ml	Min. org/100ml	Ave. org/100ml
Lerderderg	monthly	12	0	0	0

Compliance as measured against the health related guideline value set out in ADWG for faecal streptococci in drinking water should not exceed 0orgs/100ml.

Heterotrophic Plate Count

Table A17: Heterotrophic plate count, 22C

Water sampling locality	Frequency of sampling	No. of samples	Max. org/100ml	Min. org/100ml	Ave. org/100ml
Bulla	Monthly	12	25	0	8
Darley	Monthly	12	3	0	1
Diggers Rest	Weekly	52	150	0	6
Eynesbury	Weekly	52	440	0	22
Gisborne	Weekly	52	450	0	6
Lancefield	Monthly	12	12	0	1
Lerderderg	Weekly	64	190	0	17
Macedon	Monthly	12	80	0	10
Maddingley	Weekly	64	58	0	3
Melton South	Monthly	12	150	0	15
Merrimu	Weekly	64	110	0	5
Mount Macedon	Monthly	12	22	0	4
Myrniong	Weekly	64	35	0	1
Rockbank	Monthly	12	940*	0	142
Romsey	Weekly	52	72	0	4
Sunbury	Weekly	52	270	0	12
Toolern Vale	Monthly	12	9	0	1
Woodend	Weekly	52	10000**	0	190

Current Water Industry Operator Association Practice Guide recommends for management of distribution systems that Heterotrophic Plate Count be minimised to less than 100orgs/ml in drinking water, with an upper limit of 500orgs/ml. However ,Western Water internal limits are set at 100orgs/ml.
**Rockbank had a high Heterotrophic Plate Count 22C result in May 2016, however there was no other bacterial presence reported. The Heterotrophic Plate Count 22C is indicative of inert biofilm presence which was flushed out of the system. Drinking water supplied to customers during this time was safe.*
***Woodend had a high Heterotrophic Plate Count 22C result in April 2016, other Plate Count types were also detected however there was no other bacterial presence reported. The Heterotrophic Plate Count 22C is indicative of inert biofilm presence which was flushed out of the system. Drinking water supplied to customers during this time was safe.*

Table A18: Heterotrophic plate count, 37C

Water sampling locality	Frequency of sampling	No. of samples	Max.org/100ml	Min. org/100ml	Ave. org/100ml
Lerderderg	N/A	6	20	0	5
Sunbury	N/A	3	0	0	0
Woodend	N/A	11	7900*	0	718

There is currently no recommended guideline value set out for Heterotrophic Plate Count in drinking water; however Western Water internal limits are 100orgs/ml. Sampling for this parameter is performed as part of a water quality investigation, therefore there is no set frequency for sampling.
**Woodend had a high Heterotrophic Plate Count 22C result in April 2016, other Plate Count types were also detected however there was no other bacterial presence reported. The Heterotrophic Plate Count 22C is indicative of inert biofilm presence which was flushed out of the system. Drinking water supplied to customers during this time was safe.*

Appendix 4 - Water quality compliance results cont.

Aluminium

Table A19: Total Aluminium

Water sampling locality	Frequency of sampling#	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)**	Complying* (Yes/No)
Bulla	Quarterly	8	0	0.19	0.02	Yes
Darley^	Quarterly	8	0	0.05	0.02	Yes
Diggers Rest	Quarterly	8	0	0.19	0.02	Yes
Eynesbury^	Quarterly	8	0	0.13	0.01	Yes
Gisborne	Quarterly	8	0	0.10	0.02	Yes
Lancefield^	Quarterly	8	0	0.09	0.01	Yes
Lerderderg^	Quarterly	8	0	0.04	0.02	Yes
Macedon	Quarterly	8	0	0.06	0.04	Yes
Maddingley^	Quarterly	8	0	0.11	0.01	Yes
Melton South^	Quarterly	8	0	0.14	0.01	Yes
Merrimu^	Quarterly	8	0	0.09	0.01	Yes
Mount Macedon	Quarterly	8	0	0.06	0.03	Yes
Myrniong^	Quarterly	8	0	0.06	0.01	Yes
Riddells Creek	Quarterly	7	0	0.06	0.03	Yes
Rockbank	Quarterly	8	0	0.19	0.01	Yes
Romsey	Quarterly	8	0	0.08	0.01	Yes
Sunbury	Quarterly	8	0	0.09	0.02	Yes
Toolern Vale^	Quarterly	8	0	0.03	0.02	Yes
Woodend^	Quarterly	8	0	0.10	0.01	Yes

** Compliance as measured against the guideline values set out in ADWG for acid soluble aluminium in drinking water based on health considerations should not exceed 0.2mg/L.*
 # Scheduled for monthly sampling under Safe Drinking Water Regulations 2005. During review of monitoring program in August 2015 this was reduced to quarterly in accordance with Safe Drinking Water Regulations 2015.
*** A result of <0.01 mg/L is a result less than the detection limit for total aluminium.*
^ Alum is added to these supplies.

Chlorine-based disinfection by-product chemicals

Chloroacetic Acid

Table A20: Chloroacetic Acid

Water sampling locality	Frequency of sampling#	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Quarterly	7	0	0.002	0.002	Yes
Darley	Quarterly	7	0	0.002	0.002	Yes
Diggers Rest	Quarterly	7	0	0.002	0.002	Yes
Eynesbury	Quarterly	7	0	0.002	0.002	Yes
Gisborne	Quarterly	7	0	0.002	0.002	Yes
Lancefield	Quarterly	7	0	0.002	0.002	Yes
Lerderderg	Quarterly	7	0	0.002	0.002	Yes
Macedon	Quarterly	7	0	0.002	0.002	Yes
Maddingley	Quarterly	7	0	0.002	0.002	Yes
Melton South	Quarterly	7	0	0.002	0.002	Yes
Merrimu	Quarterly	7	0	0.002	0.002	Yes
Mount Macedon	Quarterly	7	0	0.002	0.002	Yes
Myrniong	Quarterly	7	0	0.002	0.002	Yes
Riddells Creek	Quarterly	6	0	0.002	0.002	Yes
Rockbank	Quarterly	7	0	0.002	0.002	Yes
Romsey	Quarterly	7	0	0.002	0.002	Yes
Sunbury	Quarterly	7	0	0.002	0.002	Yes
Toolern Vale	Quarterly	7	0	0.002	0.002	Yes
Woodend	Quarterly	7	0	0.002	0.002	Yes

** Compliance as measured against the guideline values set out in ADWG for total chloroacetic acid in drinking water based on health considerations should not exceed 0.15mg/L.*
 # Scheduled for monthly sampling under Safe Drinking Water Regulations 2005. During review of monitoring program in August 2015 this was reduced to quarterly in accordance with Safe Drinking Water Regulations 2015.

Appendix 4 - Water quality compliance results cont.

Dichloroacetic Acid

Table A21: Dichloroacetic Acid

Water sampling locality	Frequency of sampling**	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying* (Yes/No)
Bulla	Quarterly	7	0	0.002	0.002	Yes
Darley	Quarterly	7	0	0.007	0.003	Yes
Diggers Rest	Quarterly	7	0	0.006	0.009	Yes
Eynesbury	Quarterly	7	0	0.010	0.002	Yes
Gisborne	Quarterly	7	0	0.012	0.002	Yes
Lancefield	Quarterly	7	0	0.011	0.005	Yes
Lerderderg	Quarterly	7	0	0.008	0.002	Yes
Macedon	Quarterly	7	0	0.010	0.004	Yes
Maddingley	Quarterly	7	0	0.007	0.003	Yes
Melton South	Quarterly	7	0	0.010	0.002	Yes
Merrimu	Quarterly	7	0	0.008	0.002	Yes
Mount Macedon	Quarterly	7	0	0.005	0.004	Yes
Myrniong	Quarterly	7	0	0.004	0.002	Yes
Riddells Creek	Quarterly	6	0	0.010	0.005	Yes
Rockbank	Quarterly	7	0	0.015	0.002	Yes
Romsey	Quarterly	7	0	0.007	0.002	Yes
Sunbury	Quarterly	7	0	0.009	0.003	Yes
Toolern Vale	Quarterly	7	0	0.008	0.002	Yes
Woodend	Quarterly	7	0	0.014	0.004	Yes

**Compliance as measured against the guideline values set out in ADWG for total dichloroacetic acid in drinking water based on health considerations should not exceed 0.1mg/L*

 # A result of <0.005 mg/L is a result less than the detection limit for total dichloroacetic acid.

*** Scheduled for monthly sampling under Safe Drinking Water Regulations 2005. During review of monitoring program in August 2015 this was reduced to quarterly in accordance with Stage Drinking Water Regulations 2015.*

Trichloroacetic Acid

Table A22: Trichloroacetic Acid

Water sampling locality	Frequency of sampling**	No. of samples	No. of non-complying samples	Max. (mg/L)	Min. (mg/L)#	Complying* (Yes/No)
Bulla	Quarterly	7	0	0.002	0.002	Yes
Darley	Quarterly	7	0	0.010	0.003	Yes
Diggers Rest	Quarterly	7	0	0.007	0.013	Yes
Eynesbury	Quarterly	7	0	0.015	0.002	Yes
Gisborne	Quarterly	7	0	0.013	0.002	Yes
Lancefield	Quarterly	7	0	0.006	0.003	Yes
Lerderderg	Quarterly	7	0	0.006	0.002	Yes
Macedon	Quarterly	7	0	0.012	0.008	Yes
Maddingley	Quarterly	7	0	0.006	0.004	Yes
Melton South	Quarterly	7	0	0.019	0.002	Yes
Merrimu	Quarterly	7	0	0.019	0.002	Yes
Mount Macedon	Quarterly	7	0	0.013	0.004	Yes
Myrniong	Quarterly	7	0	0.002	0.002	Yes
Riddells Creek	Quarterly	6	0	0.016	0.008	Yes
Rockbank**	Quarterly	7	0	0.018	0.002	Yes
Romsey	Quarterly	7	0	0.002	0.002	Yes
Sunbury	Quarterly	7	0	0.013	0.005	Yes
Toolern Vale	Quarterly	7	0	0.005	0.002	Yes
Woodend	Quarterly	7	0	0.013	0.003	Yes

** Compliance as measured against the guideline values set out in ADWG for total trichloroacetic acid in drinking water based on health considerations should not exceed 0.1mg/L*

 # A result of <0.005 mg/L is a result less than the detection limit for total trichloroacetic acid.

*** Scheduled for monthly sampling under Safe Drinking Water Regulations 2005. During review of monitoring program in August 2015 this was reduced to quarterly in accordance with Stage Drinking Water Regulations 2015.*

Manganese

Table A23: Manganese

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Eynesbury	Quarterly	12	0.006	0.002	0.005	Yes
Lancefield	Quarterly	11	0.001	0.001	0.001	Yes
Lerderderg	Quarterly	12	0.012	0.001	0.004	Yes
Maddingley	Quarterly	4	0.019	0.001	0.005	Yes
Merrimu	Quarterly	12	0.013	0.001	0.003	Yes
Myrniong	Quarterly	12	0.027	0.001	0.005	Yes
Romsey	Quarterly	11	0.007	0.001	0.002	Yes
Sunbury	Quarterly	12	0.008	0.001	0.003	Yes

** Compliance as measured against the health related guideline values set out in ADWG for manganese in drinking water should not exceed 0.1 mg/L.*

Appendix 4 - Water quality compliance results cont.

Lead

Table A24: Lead (total as Pb)

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Quarterly	4	0.001	0.001	Yes
Darley	Quarterly	4	0.001	0.001	Yes
Diggers Rest	Quarterly	4	0.001	0.001	Yes
Eynesbury	Quarterly	4	0.001	0.001	Yes
Gisborne	Quarterly	4	0.001	0.001	Yes
Lancefield	Quarterly	4	0.001	0.001	Yes
Lerderderg	Quarterly	4	0.001	0.001	Yes
Macedon	Quarterly	4	0.001	0.001	Yes
Maddingley	Quarterly	4	0.001	0.001	Yes
Melton South	Quarterly	4	0.001	0.001	Yes
Merrimu	Quarterly	4	0.001	0.001	Yes
Mount Macedon	Quarterly	4	0.001	0.001	Yes
Myrniong	Quarterly	4	0.001	0.001	Yes
Riddells Creek	Quarterly	4	0.001	0.001	Yes
Rockbank	Quarterly	4	0.001	0.001	Yes
Romsey	Quarterly	4	0.001	0.001	Yes
Sunbury	Quarterly	4	0.001	0.001	Yes
Toolern Vale	Quarterly	4	0.001	0.001	Yes
Woodend	Quarterly	4	0.001	0.001	Yes

** Compliance as measured against the health related guideline values set out in ADWG for lead in drinking water should not exceed 0.01 mg/L.*

Copper

Table A25: Copper (total as Cu) result

Water sampling locality	Frequency of sampling	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Quarterly	4	0.013	0.002	Yes
Darley	Quarterly	4	0.004	0.003	Yes
Diggers Rest	Quarterly	4	0.033	0.002	Yes
Eynesbury	Quarterly	4	0.018	0.006	Yes
Gisborne	Quarterly	4	0.010	0.002	Yes
Lancefield	Quarterly	4	0.008	0.001	Yes
Lerderderg	Quarterly	4	0.004	0.002	Yes
Macedon	Quarterly	4	0.016	0.001	Yes
Maddingley	Quarterly	4	0.005	0.002	Yes
Melton South	Quarterly	4	0.012	0.004	Yes
Merrimu	Quarterly	4	0.006	0.002	Yes
Mount Macedon	Quarterly	4	0.010	0.001	Yes
Myrniong	Quarterly	4	0.130	0.018	Yes
Riddells Creek	Quarterly	4	0.011	0.001	Yes
Rockbank	Quarterly	4	0.019	0.002	Yes
Romsey	Quarterly	4	0.008	0.001	Yes
Sunbury	Quarterly	4	0.014	0.007	Yes
Toolern Vale	Quarterly	4	0.010	0.002	Yes
Woodend	Quarterly	4	0.008	0.001	Yes

** Compliance as measured against the guideline values set out in ADWG for copper in drinking water should not exceed 2 mg/L based on health considerations, and 1mg/L base on aesthetic considerations.*

Arsenic

Table A26: Arsenic

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.001	0.001	Yes
Darley	Annually	1	0.001	0.001	Yes
Diggers Rest	Annually	1	0.001	0.001	Yes
Eynesbury	Annually	1	0.001	0.001	Yes
Gisborne	Annually	1	0.001	0.001	Yes
Lancefield	Annually	1	0.001	0.001	Yes
Lerderderg	Annually	1	0.001	0.001	Yes
Macedon	Annually	1	0.001	0.001	Yes
Maddingley	Annually	1	0.001	0.001	Yes
Melton South	Annually	1	0.001	0.001	Yes
Merrimu	Annually	1	0.001	0.001	Yes
Mount Macedon	Annually	1	0.001	0.001	Yes
Myrniong	Annually	1	0.001	0.001	Yes
Riddells Creek	Annually	1	0.001	0.001	Yes
Rockbank	Annually	1	0.001	0.001	Yes
Romsey	Annually	1	0.001	0.001	Yes
Sunbury	Annually	1	0.001	0.001	Yes
Toolern Vale	Annually	1	0.001	0.001	Yes
Woodend	Annually	1	0.001	0.001	Yes

**Compliance as measured against the health related guideline value set out in ADWG for arsenic in drinking water should not exceed 0.01 mg/L. The detection limit for arsenic is 0.001 mg/L.*

Chlorite

Chlorite is a by-product of chlorine dioxide disinfection. Western Water does not use chlorine dioxide as a disinfectant for drinking water. For this reason, is unlikely to be present in the drinking water supplied by Western Water as it does not occur naturally. As a result, sampling for chlorite was not undertaken in the 2015/16 reporting period.

Appendix 4 - Water quality compliance results cont.

Monochloramine

Sampling for monochloramine was conducted in all localities receiving water supply disinfected by chloramination. Routine sampling for monochloramine in some localities that are chlorinated occurred as the disinfection mode had changed, but the sampling regime had not.

Table A27: Monochloramine

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Weekly	53	0.2	0.1	0.1	Yes
Diggers Rest	Weekly	53	0.6	0.1	0.2	Yes
Romsey	Weekly	52	1.0	0.1	0.5	Yes
Sunbury	110 per year	112	1.1	0.1	0.4	Yes

** Compliance as measured against the health related guideline value set out in ADWG for monochloramine in drinking water should not exceed 3 mg/L*

N.B. Several localities received extra sampling for monochloramine in response to localised water quality issues in the reporting period. Hence these have more than 52 samples.

Nickel

Table A28: Nickel

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.001	0.001	Yes
Darley	Annually	1	0.001	0.001	Yes
Diggers Rest	Annually	1	0.001	0.001	Yes
Eynesbury	Annually	1	0.001	0.001	Yes
Gisborne	Annually	1	0.001	0.001	Yes
Lancefield	Annually	1	0.001	0.001	Yes
Lerderderg	Annually	1	0.001	0.001	Yes
Macedon	Annually	1	0.001	0.001	Yes
Maddingley	Annually	1	0.001	0.001	Yes
Melton South	Annually	1	0.001	0.001	Yes
Merrimu	Annually	1	0.001	0.001	Yes
Mount Macedon	Annually	1	0.001	0.001	Yes
Myrniong	Annually	1	0.002	0.001	Yes
Riddells Creek	Annually	1	0.001	0.001	Yes
Rockbank	Annually	1	0.001	0.001	Yes
Romsey	Annually	1	0.001	0.001	Yes
Sunbury	Annually	1	0.001	0.001	Yes
Toolern Vale	Annually	1	0.001	0.001	Yes
Woodend	Annually	1	0.001	0.001	Yes

** Compliance as measured against the health related guideline value set out in ADWG for nickel in drinking water should not exceed 0.02 mg/L.*

Chlorine

Table A29: Total Chlorine

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Weekly	53	1.1	0.1	0.4	Yes
Darley	Weekly	52	3.0	0.1	0.5	Yes
Diggers Rest	Weekly	53	0.9	0.1	0.3	Yes
Eynesbury	Weekly	52	1.5	0.1	1.0	Yes
Gisborne	64/year	66	1.7	0.1	0.6	Yes
Lancefield	Weekly	52	1.2	0.1	0.8	Yes
Lerderderg	64/year	64	1.4	0.1	0.3	Yes
Macedon	Weekly	52	1.6	0.1	0.6	Yes
Maddingley	Weekly	52	1.8	0.1	0.5	Yes
Melton South	112/year	113	1.2	0.1	0.5	Yes
Merrimu	64/year	65	2.0	0.1	0.6	Yes
Mount Macedon	Weekly	52	1.2	0.1	0.4	Yes
Myrniong	Weekly	52	2.3	0.1	0.4	Yes
Riddells Creek	Weekly	53	1.4	0.1	0.7	Yes
Rockbank	Weekly	52	1.4	0.1	0.6	Yes
Romsey	Weekly	52	1.2	0.1	0.8	Yes
Sunbury	112/year	112	4.9	0.1	0.6	Yes
Toolern Vale	Weekly	52	1.9	0.1	0.5	Yes
Woodend	64/year	64	1.3	0.1	0.7	Yes

** Compliance as measured against the health related guideline value set out in ADWG for chlorine in drinking water should not exceed 5 mg/L. Western Water has an internal benchmark of maximum 1.10 mg/L for total chlorine at its customer taps.*

N.B. Several localities received extra sampling for chlorine in response to localised water quality issues in the reporting period.

Appendix 4 - Water quality compliance results cont.

Chromium

Table A30: Chromium (total as Cr)

Water sampling locality	Sampling frequency	No. of Samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.001	0.001	Yes
Darley	Annually	1	0.001	0.001	Yes
Diggers Rest	Annually	1	0.001	0.001	Yes
Eynesbury	Annually	1	0.001	0.001	Yes
Gisborne	Annually	1	0.001	0.001	Yes
Lancefield	Annually	1	0.001	0.001	Yes
Lerderderg	Annually	1	0.001	0.001	Yes
Macedon	Annually	1	0.001	0.001	Yes
Maddingley	Annually	1	0.001	0.001	Yes
Melton South	Annually	1	0.001	0.001	Yes
Merrimu	Annually	1	0.001	0.001	Yes
Mount Macedon	Annually	1	0.001	0.001	Yes
Myrniong	Annually	1	0.001	0.001	Yes
Riddells Creek	Annually	1	0.001	0.001	Yes
Rockbank	Annually	1	0.001	0.001	Yes
Romsey	Annually	1	0.001	0.001	Yes
Sunbury	Annually	1	0.001	0.001	Yes
Toolern Vale	Annually	1	0.001	0.001	Yes
Woodend	Annually	1	0.001	0.001	Yes

** Compliance as measured against health related guideline value set out in ADWG for chromium in drinking water should not exceed 0.05 mg/L.*

Cyanide

Table A31: Cyanide

Water sampling locality	Sampling frequency	No. of Samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.005	0.005	Yes
Darley	Annually	1	0.005	0.005	Yes
Diggers Rest	Annually	1	0.005	0.005	Yes
Eynesbury	Annually	1	0.005	0.005	Yes
Gisborne	Annually	1	0.005	0.005	Yes
Lancefield	Annually	1	0.005	0.005	Yes
Lerderderg	Annually	1	0.005	0.005	Yes
Macedon	Annually	1	0.005	0.005	Yes
Maddingley	Annually	1	0.005	0.005	Yes
Melton South	Annually	1	0.005	0.005	Yes
Merrimu	Annually	1	0.005	0.005	Yes
Mount Macedon	Annually	1	0.005	0.005	Yes
Myrniong	Annually	1	0.005	0.005	Yes
Riddells Creek	Annually	1	0.005	0.005	Yes
Rockbank	Annually	1	0.005	0.005	Yes
Romsey	Annually	1	0.005	0.005	Yes
Sunbury	Annually	1	0.005	0.005	Yes
Toolern Vale	Annually	1	0.005	0.005	Yes
Woodend	Annually	1	0.005	0.005	Yes

** Compliance as measured against the health related guideline value set out in ADWG for cyanide in drinking water should not exceed 0.08 mg/L.*

Mercury

Table A32: Mercury

Water sampling locality	Sampling frequency	No. of Samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.0001	0.0001	Yes
Darley	Annually	1	0.0001	0.0001	Yes
Diggers Rest	Annually	1	0.0001	0.0001	Yes
Eynesbury	Annually	1	0.0001	0.0001	Yes
Gisborne	Annually	1	0.0001	0.0001	Yes
Lancefield	Annually	1	0.0001	0.0001	Yes
Lerderderg	Annually	1	0.0001	0.0001	Yes
Macedon	Annually	1	0.0001	0.0001	Yes
Maddingley	Annually	1	0.0001	0.0001	Yes
Melton South	Annually	1	0.0001	0.0001	Yes
Merrimu	Annually	1	0.0001	0.0001	Yes
Mount Macedon	Annually	1	0.0001	0.0001	Yes
Myrniong	Annually	1	0.0001	0.0001	Yes
Riddells Creek	Annually	1	0.0001	0.0001	Yes
Rockbank	Annually	2	0.0001	0.0001	Yes
Romsey	Annually	1	0.0001	0.0001	Yes
Sunbury	Annually	1	0.0001	0.0001	Yes
Toolern Vale	Annually	1	0.0001	0.0001	Yes
Woodend	Annually	1	0.0001	0.0001	Yes

** Compliance as measured against health related guideline value set out in ADWG for mercury in drinking water should not exceed 0.001 mg/L.*

Nitrate

Table A33: Nitrate

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Monthly	12	0.440	0.280	Yes
Darley	Monthly	12	0.160	0.018	Yes
Diggers Rest	Monthly	12	0.410	0.130	Yes
Eynesbury	Monthly	12	0.180	0.012	Yes
Gisborne#	Annually	3	0.190	0.110	Yes
Lancefield	Monthly	12	0.077	0.008	Yes
Lerderderg	Monthly	12	0.140	0.015	Yes
Macedon#	Annually	1	0.140	0.140	Yes
Maddingley	Monthly	12	0.170	0.020	Yes
Melton South	Monthly	12	0.160	0.008	Yes
Merrimu	Monthly	12	0.140	0.019	Yes
Mount Macedon#	Annually	1	0.150	0.120	Yes
Myrniong	Monthly	12	0.120	0.013	Yes
Riddells Creek#	Annually	2	0.140	0.130	Yes
Rockbank	Monthly	12	0.160	0.007	Yes
Romsey	Monthly	12	0.110	0.008	Yes
Sunbury	Monthly	12	0.220	0.014	Yes
Toolern Vale	Monthly	12	0.100	0.013	Yes
Woodend	Monthly	12	0.180	0.003	Yes

** Compliance as measured against the health related guideline value set out in ADWG for nitrate in drinking water should not exceed 50 mg/L.*
 # Disinfection mode changes from chloramination to chlorination meant that sampling for nitrate in these localities was reduced.
N.B. Several localities received extra sampling for nitrate in response to localised water quality issues in the reporting period.

Appendix 4 - Water quality compliance results cont.

Nitrite

Table A34: Nitrite

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Monthly	12	0.011	0.002	Yes
Darley	Monthly	12	0.002	0.002	Yes
Diggers Rest	Monthly	12	0.160	0.002	Yes
Eynesbury	Monthly	12	0.013	0.002	Yes
Gisborne#	Annually	3	0.003	0.002	Yes
Lancefield	Monthly	12	0.002	0.002	Yes
Lerderderg	Monthly	12	0.002	0.002	Yes
Macedon#	Annually	1	0.002	0.002	Yes
Maddingley	Monthly	12	0.002	0.002	Yes
Melton South	Monthly	12	0.002	0.002	Yes
Merrimu	Monthly	12	0.004	0.002	Yes
Mount Macedon#	Annually	1	0.002	0.002	Yes
Myrniong	Monthly	12	0.008	0.002	Yes
Riddells Creek#	Annually	2	0.002	0.002	Yes
Rockbank	Monthly	12	0.002	0.002	Yes
Romsey	Monthly	12	0.100	0.002	Yes
Sunbury	Monthly	12	0.190	0.002	Yes
Toolern Vale	Monthly	12	0.003	0.002	Yes
Woodend	Monthly	12	0.002	0.002	Yes

** Compliance as measured against the health related guideline value set out in ADWG for nitrite in drinking water should not exceed 3 mg/L.*
 # Disinfection mode changes from chloramination to chlorination meant that sampling for nitrite in these localities was reduced.
N.B. Several localities received extra sampling for nitrite in response to localised water quality issues in the reporting period.

Selenium

Table A35: Selenium

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.001	0.001	Yes
Darley	Annually	1	0.001	0.001	Yes
Diggers Rest	Annually	1	0.001	0.001	Yes
Eynesbury	Annually	1	0.001	0.001	Yes
Gisborne	Annually	1	0.001	0.001	Yes
Lancefield	Annually	1	0.001	0.001	Yes
Lerderderg	Annually	1	0.001	0.001	Yes
Macedon	Annually	1	0.001	0.001	Yes
Maddingley	Annually	1	0.001	0.001	Yes
Melton South	Annually	1	0.001	0.001	Yes
Merrimu	Annually	1	0.001	0.001	Yes
Mount Macedon	Annually	1	0.001	0.001	Yes
Myrniong	Annually	1	0.001	0.001	Yes
Riddells Creek	Annually	1	0.001	0.001	Yes
Rockbank	Annually	1	0.001	0.001	Yes
Romsey	Annually	1	0.001	0.001	Yes
Sunbury	Annually	1	0.001	0.001	Yes
Toolern Vale	Annually	1	0.001	0.001	Yes
Woodend	Annually	1	0.001	0.001	Yes

** Compliance as measured against health related guideline value set out in ADWG for selenium in drinking water should not exceed 0.01 mg/L.*

Cadmium

Table A36: Cadmium

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	0.0002	0.0002	Yes
Darley	Annually	1	0.0002	0.0002	Yes
Diggers Rest	Annually	1	0.0002	0.0002	Yes
Eynesbury	Annually	1	0.0002	0.0002	Yes
Gisborne	Annually	1	0.0002	0.0002	Yes
Lancefield	Annually	1	0.0002	0.0002	Yes
Lerderderg	Annually	1	0.0002	0.0002	Yes
Macedon	Annually	1	0.0002	0.0002	Yes
Maddingley	Annually	1	0.0002	0.0002	Yes
Melton South	Annually	1	0.0002	0.0002	Yes
Merrimu	Annually	1	0.0002	0.0002	Yes
Mount Macedon	Annually	1	0.0002	0.0002	Yes
Myrniong	Annually	1	0.0002	0.0002	Yes
Riddells Creek	Annually	1	0.0002	0.0002	Yes
Rockbank	Annually	1	0.0002	0.0002	Yes
Romsey	Annually	1	0.0002	0.0002	Yes
Sunbury	Annually	1	0.0002	0.0002	Yes
Toolern Vale	Annually	1	0.0002	0.0002	Yes
Woodend	Annually	1	0.0002	0.0002	Yes

** Compliance as measured against health related guideline value set out in ADWG for cadmium in drinking water should not exceed 0.002 mg/L.*

Appendix 4 - Water quality compliance results cont.

Dichloroethene

Table A37: 1,1 - Dichloroethene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 1,1-Dichloroethene in drinking water should not exceed 0.03mg/L.*

Table A38: 1,2 - Dichloroethene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 1,2-Dichloroethane in drinking water should not exceed 0.06mg/L.*

Tetrachlor-types

Table A40: 1.1.1.2 - Tetrachloroethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in National Institute for Occupaional Safety and Health for in drinking water should not exceed 1mg/L.*

Table A41: 1.1.2.2 - Tetrachlorine

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in National Institute for Occupaional Safety and Health for in drinking water should not exceed 1mg/L*

Table A42: 1.1.1 - Trichlorethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 1.1.1-Trichloroethane in drinking water.*

Table A43: 1.1.2 - Trichloroethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 1.1.2-Trichloroethane in drinking water.*

Table A44: 1.2.3 - Trichloropropane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in Office of Environmental Health Hazard Assessment for 1.2.3-Trichloropropane in drinking water should not exceed 0.007mg/L.*

Dibromo-3-chloropropane

Table A45: 1.2 - Dibromo-3-chloropropane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 1.2-Dibromo-3-chloropropane in drinking water.*

Dichloropropane

Table A46: 1.2 - Dichloropropane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against aesthetic related guideline value set out in ADWG for 1.3-Dichlorobenzene in drinking water should not exceed 0.02mg/L. There is currently no recommended health guideline value set for the concentration of 1.2-Dichloropropane in drinking water.*

Appendix 4 - Water quality compliance results cont.

Trichlorobenzene

Table A47: 1.2.3 - Trichlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 1.2.3-Trichlorobenzene in drinking water should not exceed 0.005mg/L. Triclorobenzenes would not be a health concern unless the concentration exceeded 0.03mg/L.*

Table A48: 1.2.4 - Trichlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 1.2.4-Trichlorobenzene in drinking water should not exceed 0.005mg/L. Triclorobenzenes would not be a health concern unless the concentration exceeded 0.03mg/L.*

Trimethylbenzene

Table A49: 1.2.4 - Trimethylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 1.2.4-Trimethylbenzene in drinking water.*

Table A50: 1.3.5 - Trimethylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in National Institute for Occupaional Safety and Health for in drinking water should not exceed 25mg/L.*

Dichlorobenzene

Table A51: 1.2 - Dichlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 1.2-Dichlorobenzene in drinking water should not exceed 0.001mg/L. 1.2-Dichlorobenzene would not be a health concern unless the concentration exceeded 1.5mg/L*

Table A52: 1.3 - Dichlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 1.3-Dichlorobenzene in drinking water should not exceed 0.02mg/L. There is currently no recommended guideline value set out for the concentration of 1.3-Dichlorobenzene in drinking water.*

Table A53: 1.4 - Dichlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 1.4-Dichlorobenzene in drinking water should not exceed 0.0003mg/L. 1.2-Dichlorobenzene would not be a health concern unless the concentration exceeded 0.04mg/L.*

Appendix 4 - Water quality compliance results cont.

Trichlorophenol

Table A54: 2,4,6 - Trichlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	6 Monthly	2	0.001	0.001	0.001
Darley	Annually	1	0.001	0.001	0.001
Diggers Rest	Annually	1	0.001	0.001	0.001
Eynesbury	Annually	1	0.001	0.001	0.001
Gisborne	Annually	1	0.001	0.001	0.001
Lancefield	Annually	1	0.001	0.001	0.001
Lerderderg	Annually	1	0.001	0.001	0.001
Macedon	Annually	1	0.001	0.001	0.001
Maddingley	Annually	1	0.001	0.001	0.001
Melton South	Annually	1	0.001	0.001	0.001
Merrimu	Annually	1	0.001	0.001	0.001
Mount Macedon	Annually	1	0.001	0.001	0.001
Myrniong	Annually	1	0.001	0.001	0.001
Riddells Creek	Annually	1	0.001	0.001	0.001
Rockbank	6 Monthly	2	0.001	0.001	0.001
Romsey	Annually	1	0.001	0.001	0.001
Sunbury	6 Monthly	2	0.001	0.001	0.001
Toolern Vale	Annually	1	0.001	0.001	0.001
Woodend	6 Monthly	2	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 2,4,6-Trichlorophenol in drinking water should not exceed 0.002mg/L. 2,4,6-Trichlorophenol would not be a health concern unless the concentration exceeded 0.02mg/L.*

Tetrachlorophenol

Table A55: 2.3.4.6 - Tetrachlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 2.3.4.6-Tetrachlorophenol in drinking water.*

Trichlorophenol

Table A56: 2.4.5 - Trichlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 2,4,5-Trichlorophenol in drinking water should not exceed 0.002mg/L. 2,4,5-Trichlorophenol would not be a health concern unless the concentration exceeded 0.02mg/L.*

Dichlorophenol

Table A57: 2.6 - Dichlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 2.6-Dichlorophenol in drinking water should not exceed 0.002mg/L. 2.6-Dichlorophenol would not be a health concern unless the concentration exceeded 0.02mg/L. Action to reduce chlorophenols is encouraged, but must not compromise disinfection of the drinking water.*

Table A58: 2.4 - Dichlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 2.4-Dichlorophenol in drinking water should not exceed 0.0003mg/L. 2.4-Dichlorophenol would not be a health concern unless the concentration exceeded 0.2mg/L. Action to reduce chlorophenols is encouraged, but must not compromise disinfection of the drinking water.*

Chlorophenol

Table A59: 2 - Chlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for 2-Chlorophenol in drinking water should not exceed 0.0001mg/L. 2-Chlorophenol would not be a health concern unless the concentration exceeded 0.03mg/L. Action to reduce chlorophenols is encouraged, but must not compromise disinfection of the drinking water.*

Chloro-Methylphenol

Table A60: 4-Chloro-3-Methylphenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 4-Chloro-3-Methylphenol in drinking water.*

Appendix 4 - Water quality compliance results cont.

Dichloropropylene

Table A61: 1.1 - Dichloropropylene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for the concentration of 1.1-Dichloropropylene in drinking water.*

Chlorotoluene

Table A62: 2-Chlorotoluene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 2-Chlorotoluene in drinking water should not exceed 1mg/L.*

Table A63: 4-Chlorotoluene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 4--Chlorotoluene in drinking water should not exceed 1mg/L.*

Chloroform

Table A64: Chloroform

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Monthly	12	0.044	0.007	0.021
Darley	Monthly	12	0.088	0.01	0.023
Diggers Rest	Monthly	12	0.038	0.011	0.024
Eynesbury	Monthly	12	0.071	0.014	0.030
Gisborne	Monthly	12	0.051	0.009	0.024
Lancefield	Monthly	12	0.023	0.004	0.013
Lerderderg	Monthly	12	0.057	0.009	0.019
Macedon	Monthly	12	0.054	0.02	0.039
Maddingley	Monthly	12	0.026	0.011	0.018
Melton South	Monthly	12	0.048	0.011	0.024
Merrimu	Monthly	12	0.050	0.011	0.021
Mount Macedon	Monthly	12	0.055	0.031	0.045
Myrniong	Monthly	12	0.015	0.003	0.009
Riddells Creek	Monthly	12	0.078	0.017	0.041
Rockbank	Monthly	12	0.062	0.009	0.024
Romsey	Monthly	12	0.003	0.001	0.002
Sunbury	Monthly	12	0.038	0.008	0.022
Toolern Vale	Monthly	12	0.022	0.009	0.014
Woodend	Monthly	12	0.062	0.004	0.030

** Compliance as measured against the health related guideline value set out in ADWG for chloroform in drinking water should not exceed 0.25mg/L.*

Benzo(a)pyrene

Table A65: Benzo(a)pyrene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.000002	0.000002	0.000002
Darley	Annually	1	0.000002	0.000002	0.000002
Diggers Rest	Annually	1	0.000002	0.000002	0.000002
Eynesbury	Annually	1	0.000002	0.000002	0.000002
Gisborne	Annually	1	0.000002	0.000002	0.000002
Lancefield	Annually	1	0.000002	0.000002	0.000002
Lerderderg	Annually	1	0.000002	0.000002	0.000002
Macedon	Annually	1	0.000002	0.000002	0.000002
Maddingley	Annually	1	0.000002	0.000002	0.000002
Melton South	Annually	1	0.000002	0.000002	0.000002
Merrimu	Annually	1	0.000002	0.000002	0.000002
Mount Macedon	Annually	1	0.000002	0.000002	0.000002
Myrniong	Annually	1	0.000002	0.000002	0.000002
Riddells Creek	Annually	1	0.000002	0.000002	0.000002
Rockbank	Annually	1	0.000002	0.000002	0.000002
Romsey	Annually	1	0.000002	0.000002	0.000002
Sunbury	Annually	1	0.000002	0.000002	0.000002
Toolern Vale	Annually	1	0.000002	0.000002	0.000002
Woodend	6 Monthly	2	0.000002	0.000002	0.000002

** Compliance as measured against the health related guideline value set out in ADWG for Benzo(a)pyrene in drinking water should not exceed 0.00001mg/L.*

Appendix 4 - Water quality compliance results cont.

Bromodichlormethane

Table A66: Bromodichlormethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Monthly	12	0.038	0.002	0.015
Darley	Monthly	12	0.050	0.029	0.040
Diggers Rest	Monthly	12	0.039	0.009	0.029
Eynesbury	Monthly	12	0.039	0.006	0.016
Gisborne	Monthly	12	0.049	0.01	0.029
Lancefield	Monthly	12	0.035	0.016	0.023
Lerderderg	Monthly	12	0.055	0.023	0.035
Macedon	Monthly	12	0.055	0.024	0.042
Maddingley	Monthly	12	0.051	0.033	0.038
Melton South	Monthly	12	0.050	0.003	0.017
Merrimu	Monthly	12	0.043	0.007	0.027
Mount Macedon	Monthly	12	0.056	0.033	0.044
Myrniong	Monthly	12	0.036	0.001	0.013
Riddells Creek	Monthly	12	0.057	0.023	0.039
Rockbank	Monthly	12	0.043	0.003	0.013
Romsey	Monthly	12	0.003	0.001	0.002
Sunbury	Monthly	12	0.039	0.003	0.022
Toolern Vale	Monthly	12	0.038	0.018	0.030
Woodend	Monthly	12	0.058	0.005	0.028

** Compliance as measured against the health related guideline value set out in ADWG for bromodichloromethane in drinking water should not exceed 0.25mg/L.*

Bromobenzene

Table A67: Bromobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for bromobenzene in drinking water should not exceed 50mg/L.*

Bromate

Table A68: Bromate

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.01	0.01	0.01
Darley	Annually	1	0.01	0.01	0.01
Diggers Rest	Annually	1	0.01	0.01	0.01
Eynesbury	Annually	1	0.01	0.01	0.01
Gisborne	Annually	1	0.01	0.01	0.01
Lancefield	Annually	1	0.01	0.01	0.01
Lerderderg	Annually	1	0.01	0.01	0.01
Macedon	Annually	1	0.01	0.01	0.01
Maddingley	Annually	1	0.01	0.01	0.01
Melton South	Annually	1	0.01	0.01	0.01
Merrimu	Annually	1	0.01	0.01	0.01
Mount Macedon	Annually	1	0.01	0.01	0.01
Myrniong	Annually	1	0.01	0.01	0.01
Riddells Creek	Annually	1	0.01	0.01	0.01
Rockbank	Annually	1	0.01	0.01	0.01
Romsey	Annually	1	0.01	0.01	0.01
Sunbury	Annually	1	0.01	0.01	0.01
Toolern Vale	Annually	1	0.01	0.01	0.01
Woodend	6 Monthly	2	0.01	0.01	0.01

** Compliance as measured against the health related guideline value set out in ADWG for bromate in drinking water should not exceed 0.02mg/L.*

Bromoform

Table A69: Bromoform

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Monthly	12	0.004	0.001	0.002
Darley	Monthly	12	0.037	0.008	0.019
Diggers Rest	Monthly	12	0.007	0.001	0.004
Eynesbury	Monthly	12	0.030	0.001	0.006
Gisborne	Monthly	12	0.009	0.002	0.005
Lancefield	Monthly	12	0.020	0.006	0.011
Lerderderg	Monthly	12	0.029	0.007	0.016
Macedon	Monthly	12	0.009	0.002	0.006
Maddingley	Monthly	12	0.034	0.009	0.020
Melton South	Monthly	12	0.029	0.001	0.007
Merrimu	Monthly	12	0.028	0.001	0.012
Mount Macedon	Monthly	12	0.008	0.004	0.006
Myrniong	Monthly	12	0.031	0.001	0.011
Riddells Creek	Monthly	12	0.008	0.003	0.005
Rockbank	Monthly	12	0.033	0.001	0.005
Romsey	Monthly	12	0.002	0.001	0.001
Sunbury	Monthly	12	0.007	0.001	0.003
Toolern Vale	Monthly	12	0.030	0.007	0.017
Woodend	Monthly	12	0.008	0.001	0.004

** Compliance as measured against the health related guideline value set out in ADWG for bromoform in drinking water should not exceed 0.25mg/L.*

Appendix 4 - Water quality compliance results cont.

Carbon Tetrachloride

Table A70: Carbon Tetrachloride

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for carbon tetrachloride in drinking water should not exceed 0.003mg/L.*

Chlorobenzene

Table A71: Chlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for chlorobenzene in drinking water should not exceed 0.01mg/L. Chlorobenzene would not be a health concern unless the concentration exceeded 0.3mg/L.*

cis-1.2-Dichloroethene

Table A72: cis-1.2-Dichloroethene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for cis-1.2-Dichloroethene in drinking water should not exceed 0.06mg/L.*

Dibromochloromethane

Table A73: Dibromochloromethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Monthly	12	0.024	0.001	0.009
Darley	Monthly	12	0.084	0.038	0.054
Diggers Rest	Monthly	12	0.028	0.005	0.022
Eynesbury	Monthly	12	0.067	0.001	0.015
Gisborne	Monthly	12	0.035	0.008	0.024
Lerderderg	Monthly	12	0.076	0.031	0.048
Macedon	Monthly	12	0.041	0.020	0.031
Maddingley	Monthly	12	0.082	0.040	0.055
Melton South	Monthly	12	0.068	0.001	0.019
Merrimu	Monthly	12	0.067	0.001	0.035
Mount Macedon	Monthly	12	0.041	0.024	0.032
Myrniong	Monthly	12	0.052	0.001	0.020
Riddells Creek	Monthly	12	0.039	0.019	0.028
Rockbank	Monthly	12	0.075	0.001	0.012
Romsey	Monthly	12	0.003	0.001	0.002
Sunbury	Monthly	12	0.032	0.001	0.015
Toolern Vale	Monthly	12	0.063	0.026	0.047
Woodend	Monthly	12	0.041	0.003	0.019

** Compliance as measured against the health related guideline value set out in ADWG for dibromochloromethane in drinking water should not exceed 0.25mg/L.*

Dibromomethane

Table A74: Dibromomethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for Dibromomethane in drinking water should not exceed 0.04mg/L.*

Ethylbenzene

Table A75: Ethylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the aesthetic related guideline value set out in ADWG for Ethylbenzene in drinking water should not exceed 0.003mg/L. Ethylbenzene would not be a health concern unless the concentration exceeded 0.3mg/L.*

Appendix 4 - Water quality compliance results cont.

Formaldehyde

Table A76: Formaldehyde

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.1	0.1	0.1
Darley	Annually	1	0.1	0.1	0.1
Diggers Rest	Annually	1	0.1	0.1	0.1
Eynesbury	Annually	1	0.1	0.1	0.1
Gisborne	Annually	1	0.1	0.1	0.1
Lancefield	Annually	1	0.1	0.1	0.1
Lerderderg	Annually	1	0.1	0.1	0.1
Macedon	Annually	1	0.1	0.1	0.1
Maddingley	Annually	1	0.1	0.1	0.1
Melton South	Annually	1	0.1	0.1	0.1
Merrimu	Annually	1	0.1	0.1	0.1
Mount Macedon	Annually	1	0.1	0.1	0.1
Myrniong	Annually	1	0.1	0.1	0.1
Riddells Creek	Annually	1	0.1	0.1	0.1
Rockbank	Annually	1	0.1	0.1	0.1
Romsey	Annually	1	0.1	0.1	0.1
Sunbury	Annually	1	0.1	0.1	0.1
Toolern Vale	Annually	1	0.1	0.1	0.1
Woodend	6 Monthly	2	0.1	0.1	0.1

** Compliance as measured against the health related guideline value set out in ADWG for formaldehyde in drinking water should not exceed 0.5mg/L*

Dissolved Organic Carbon

Table A77: Dissolved Organic Carbon

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Darley	Monthly	12	16	5.3	6.7
Diggers Rest	Monthly	12	5.4	2.5	4.3
Eynesbury	Monthly	13	6.7	1.1	2.7
Gisborne	Weekly	52	8.5	3.6	5.1
Lancefield	Monthly	12	3.3	1.9	2.7
Lerderderg	Monthly	12	8.0	5.2	6.6
Macedon	Annually	1	4.6	4.6	4.6
Maddingley	Monthly	12	7.7	5.2	6.5
Melton South	6 Monthly	2	7.0	6.7	6.9
Merrimu	Monthly	13	7.4	4.4	6.1
Mount Macedon	Monthly	12	6.4	3.9	5.0
Myrniong	Monthly	12	4.9	2.3	4.0
Riddells Creek	Annually	1	5.3	4.6	5.1
Rockbank	Annually	1	6.5	6.5	6.5
Romsey	Monthly	12	4.3	2.7	3.5
Sunbury	Monthly	12	5.8	4.0	5.0
Toolern Vale	Annually	1	7.1	7.1	7.1
Woodend	Monthly	12	6.3	1.5	3.3

** There is currently no recommended guideline value set out for dissolved organic carbon in drinking water; however the concentration is minimised to prevent interference with drinking water disinfection.*

Xylene

Table A78: Xylene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.002	0.002	0.002
Rockbank	Annually	1	0.002	0.002	0.002
Sunbury	Annually	1	0.002	0.002	0.002
Woodend	Quarterly	4	0.002	0.002	0.002

** Compliance as measured against the health related guideline value set out in ADWG for xylenes in drinking water should not exceed 0.02mg/L. Xylenes would not be a health concern unless the concentration exceeded 0.6mg/L.*

Methylene

Table A79: Methylene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline values set out in ADWG for Methylene chloride in drinking water should not exceed 0.004mg/L.*

n-Butylbenzene

Table A80: n-Butylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for n-Butylbenzene in drinking water.*

n-Propylbenzene

Table A81: n-Propylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for n-Propylbenzene in drinking water.*

Ortho-Xylene

Table A82: Ortho-Xylene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for xylenes in drinking water should not exceed 0.02mg/L. Xylenes would not be a health concern unless the concentration exceeded 0.6mg/L.*

Pentachlorophenol

Table A83: Pentachlorophenol

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	6 Monthly	2	0.001	0.001	0.001
Darley	Annually	1	0.001	0.001	0.001
Diggers Rest	Annually	1	0.001	0.001	0.001
Eynesbury	Annually	1	0.001	0.001	0.001
Gisborne	Annually	1	0.001	0.001	0.001
Lancefield	Annually	1	0.001	0.001	0.001
Lerderderg	Annually	1	0.001	0.001	0.001
Macedon	Annually	1	0.001	0.001	0.001
Maddingley	Annually	1	0.001	0.001	0.001
Melton South	Annually	1	0.001	0.001	0.001
Merrimu	Annually	1	0.001	0.001	0.001
Mount Macedon	Annually	1	0.001	0.001	0.001
Myrniong	Annually	1	0.001	0.001	0.001
Riddells Creek	Annually	1	0.001	0.001	0.001
Rockbank	6 Monthly	2	0.001	0.001	0.001
Romsey	Annually	1	0.001	0.001	0.001
Sunbury	6 Monthly	2	0.001	0.001	0.001
Toolern Vale	Annually	1	0.001	0.001	0.001
Woodend	6 Monthly	2	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for Pentachlorophenol in drinking water should not exceed 0.01mg/L.*

Isopropyltoluene

Table A84: Isopropyltoluene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for p-Isopropyltoluene in drinking water.*

Butylbenzene

Table A85: Butylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for Butylbenzene in drinking water.*

Toluene

Table A86: Toluene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	6 Monthly	2	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for toluene in drinking water should not exceed 0.025mg/L. Toluene would not be a health concern unless the concentration exceeded 0.8mg/L.*

Styrene

Table A87 Styrene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for styrene in drinking water should not exceed 0.004mg/L. Styrene would not be a health concern unless the concentration exceeded 0.03mg/L.*

Tert-Butylbenzene

Table A88: tert-Butylbenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for tert-Butylbenzene in drinking water.*

Tetrachloroethane

Table A89: Tetrachloroethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for Tetrachloroethene in drinking water should not exceed 0.05mg/L.*

Appendix 4 - Water quality compliance results cont.

Dichloroethane

Table A90: Dichloroethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for trans-1,2-Dichloroethene in drinking water should not exceed 0.06mg/L.*

Trichloroethane

Table A91: Trichloroethane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** There is currently no recommended guideline value set out for Trichloroethene in drinking water.*

Chlordane

Table A92: Chlordane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00001	0.00001	0.00001
Rockbank	Annually	1	0.00001	0.00001	0.00001
Sunbury	Annually	1	0.00001	0.00001	0.00001

** Compliance as measured against the health related guideline value set out in ADWG for chlordane in drinking water should not exceed 0.002mg/L.*

1.2-Dibromoethane (EDB)

Table A93: 1.2-Dibromoethane (EDB)

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out by Agency for Toxic Substances and Disese Registry (U.S. Public Health Service) for 1.2-Dibromoethane in drinking water should not exceed 40mg/L.*

1.2-Dichloropropane

Table A94: Dichloropropane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in National Institute for Occupaional Safety and Health for in drinking water should not exceed 75mg/L.*

2,4-D

Table A95: 2,4-D

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 2,4-D in drinking water should not exceed 0.03mg/L.*

2.4.5-T

Table A96: 2.4.5-T

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for 2.4.5 -T (2,4,5-Trichlorophenoxyacetic acid) in drinking water should not exceed 0.1mg/L.*

4,4'-DDT

Table A97: 4,4'-DDT

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L))
Bulla	Annually	1	0.00006	0.00006	0.00006
Rockbank	Annually	1	0.00006	0.00006	0.00006
Sunbury	Annually	1	0.00006	0.00006	0.00006

** Compliance as measured against the health related guideline value set out in ADWG for 4,4'-DDT in drinking water should not exceed 0.009mg/L.*

Appendix 4 - Water quality compliance results cont.

4,4'-DDD

Table A98: 4,4'-DDD

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00006	0.00006	0.00006
Rockbank	Annually	1	0.00006	0.00006	0.00006
Sunbury	Annually	1	0.00006	0.00006	0.00006

** There is currently no recommended guideline value set out for the concentration of 4.4'-DDD (dichlorodiphenyldichloroethane) in drinking water.*

4,4'-DDE

Table A99: 4,4'-DDE

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00006	0.00006	0.00006
Rockbank	Annually	1	0.00006	0.00006	0.00006
Sunbury	Annually	1	0.00006	0.00006	0.00006

** There is currently no recommended guideline value set out for the concentration of 4.4'-DDE (dichlorodiphenyldichloroethylene) in drinking water.*

Aldrin

Table A100: Aldrin

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00001	0.00001	0.00001
Rockbank	Annually	1	0.00001	0.00001	0.00001
Sunbury	Annually	1	0.00001	0.00001	0.00001

** Compliance as measured against the health related guideline value set out in ADWG for aldrin in drinking water should not exceed 0.0003mg/L.*

BHC alpha

Table A101: BHC alpha

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in U.S. EPA for BHC alpha (alpha-Hexachlorocyclohexane) in drinking water should not exceed 1.2mg/L.*

BHC (beta)

Table A102: BHC (beta)

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in U.S. EPA for BHC beta (beta-Hexachlorocyclohexane) in drinking water should not exceed 1.2mg/L.*

BHC (delta)

Table A103 BHC (delta)

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in U.S. EPA for BHC delta (delta-Hexachlorocyclohexane) in drinking water should not exceed 1.2mg/L.*

cis-1.3-Dichloropropylene

Table A104: cis-1.3-Dichloropropylene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in U.S. EPA for cis-1.3-Dichloropropylene in drinking water should not exceed 0.03mg/L.*

cis-Chlordane

Table A105: cis-Chlordane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00001	0.00001	0.00001
Rockbank	Annually	1	0.00001	0.00001	0.00001
Sunbury	Annually	1	0.00001	0.00001	0.00001

** Compliance as measured against the health related guideline value set out in ADWG for cis-chlordane in drinking water should not exceed 0.002mg/L.*

Edosulfan I

Table A106: Endosulfan I

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in ADWG for Endosulfan I in drinking water should not exceed 0.02mg/L.*

Edosulfan II

Table A107: Endosulfan II

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in ADWG for Endosulfan II in drinking water should not exceed 0.02mg/L.*

Edosulfan Sulfate

Table A108: Endosulfan Sulfate

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** There is currently no recommended guideline value set out for Endosulfan sulfate in drinking water.*

Endrin

Table A109: Endrin

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.0001	0.0001	0.0001
Rockbank	Annually	1	0.0001	0.0001	0.0001
Sunbury	Annually	1	0.0001	0.0001	0.0001

** Compliance as measured against the health related guideline value set out in U.S. EPA for Endrin in drinking water should not exceed 0.00002mg/L.*

Endrin Aldehyde

Table A110: Endrin Aldehyde

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.0001	0.0001	0.0001
Rockbank	Annually	1	0.0001	0.0001	0.0001
Sunbury	Annually	1	0.0001	0.0001	0.0001

** Compliance as measured against the health related guideline value set out in U.S. EPA for Endrin aldehyde in drinking water should not exceed 0.01mg/L.*

Endrin Ketone

Table A111: Endrin Ketone

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in U.S. EPA for Endrin ketone in drinking water should not exceed 0.005mg/L.*

Heptachlor

Table A112: Heptachlor

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in ADWG for heptachlor in drinking water should not exceed 0.0003mg/L.*

Heptachlor Epoxide

Table A113: Heptachlor Epoxide

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00005	0.00005	0.00005
Rockbank	Annually	1	0.00005	0.00005	0.00005
Sunbury	Annually	1	0.00005	0.00005	0.00005

** Compliance as measured against the health related guideline value set out in ADWG for heptachlor epoxide in drinking water should not exceed 0.0003mg/L.*

Hexachlorobenzene

Table A114: Hexachlorobenzene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.000002	0.000002	0.000002
Rockbank	Annually	1	0.000002	0.000002	0.000002
Sunbury	Annually	1	0.000002	0.000002	0.000002

** There is currently no recommended guideline value set out for Hexachlorobenzene in drinking water; however Western Water refers to the limit set for chlorobenzene by ADWG as 0.01mg/L for aesthetic limit and 0.3mg/L for health limit.*

Lindane

Table A115: Lindane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	6 Monthly	2	0.00005	0.00001	0.00003
Rockbank	6 Monthly	2	0.00005	0.00001	0.00003
Sunbury	6 Monthly	2	0.00005	0.00001	0.00003

** Compliance as measured against the health related guideline value set out in ADWG for lindane in drinking water should not exceed 0.01mg/L.*

MCPA

Table A116: MCPA

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.01	0.01	0.01
Rockbank	Annually	1	0.01	0.01	0.01
Sunbury	Annually	1	0.01	0.01	0.01

** Compliance as measured against the health related guideline values set out in ADWG for MCPA in drinking water should not exceed 0.04 mg/L.*

Methoxychlor

Table A117: Methoxychlor

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.0002	0.0002	0.0002
Rockbank	Annually	1	0.0002	0.0002	0.0002
Sunbury	Annually	1	0.0002	0.0002	0.0002
Woodend	Quarterly	4	0.0010	0.0010	0.0010

** Compliance as measured against the health related guideline values set out in ADWG for methoxychlor in drinking water should not exceed 0.3mg/L.*

Simazine

Table A118: Simazine

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.002	0.002	0.002
Rockbank	Annually	1	0.002	0.002	0.002
Sunbury	Annually	1	0.002	0.002	0.002

** Compliance as measured against the health related guideline value set out in ADWG for simazine in drinking water should not exceed 0.02mg/L.*

Trans-1.3-Dichloropropylene

Table A119: Trans-1.3-Dichloropropylene

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.001	0.001	0.001
Rockbank	Annually	1	0.001	0.001	0.001
Sunbury	Annually	1	0.001	0.001	0.001
Woodend	Quarterly	4	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in U.S. EPA for trans-1.3-Dichloropropylene in drinking water should not exceed 0.03mg/L.*

Trans-Chlordane

Table A120: Trans-Chlordane

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.00001	0.00001	0.00001
Rockbank	Annually	1	0.00001	0.00001	0.00001
Sunbury	Annually	1	0.00001	0.00001	0.00001

** Compliance as measured against the health related guideline value set out in ADWG for trans-chlordane in drinking water should not exceed 0.002mg/L.*

A4.4 Drinking water aesthetics results

Western Water tests for parameters in the drinking water supply that may affect appearance or taste and odour, as well as those that may interact with pipes and fittings within the distribution system and within hot water services.

These results are measured in accordance with the aesthetic measures in the ADWG or other cited guidelines. Compliance calculations hereafter are based on mean results for samples taken throughout the year, as outlined in ADWG or other cited guidelines.

The following tables reflect the reporting period, effective from 18 July 2015 to 30 June 2016, under the Safe Drinking Water Regulations 2015.

pH

Table A121: pH

Water sampling locality	Sampling frequency	No. of Samples	Max	Min.	Ave.	Complying* (Yes/No)
Bulla	Weekly	53	9.4	6.2	7.3	Yes
Darley	Weekly	52	8.7	7.2	7.7	Yes
Diggers Rest	Weekly	53	7.8	6.6	7.3	Yes
Eynesbury	Weekly	52	8.2	6.6	7.9	Yes
Gisborne	Weekly	54	9.1	6.8	7.3	Yes
Lancefield	Weekly	52	8.5	7.0	7.8	Yes
Lerderderg	Weekly	52	8.1	7.0	7.6	Yes
Macedon#	Weekly	52	8.7	6.9	7.6	Yes
Maddingley	Weekly	52	8.1	7.2	7.6	Yes
Melton South	Weekly	52	7.7	6.6	7.1	Yes
Merrimu	Weekly	52	8.0	6.8	7.4	Yes
Mount Macedon#	Weekly	52	8.5	7.1	7.8	Yes
Myrniong	Weekly	52	7.9	7.0	7.4	Yes
Riddells Creek	Weekly	53	8.6	6.8	7.5	Yes
Rockbank	Weekly	52	9.5	6.6	7.1	Yes
Romsey	Weekly	52	8.9	7.0	7.7	Yes
Sunbury	Weekly	52	7.9	6.7	7.3	Yes
Toolern Vale	Weekly	52	7.8	7.1	7.4	Yes
Woodend	Weekly	52	9.4	6.7	7.6	Yes

** Compliance as measured against the aesthetic guideline range set out in ADWG for pH in drinking water of 6.5-8.5, based on the mean result in each locality for the reporting period.*
 # Several localities received extra sampling for pH in response to localised water quality issues in the reporting period.

Appendix 4 - Water quality compliance results cont.

Iron

Table A122: Iron (total)

Water sampling locality	Sampling frequency	No. of Samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Quarterly	4	0.13	0.02	0.05	Yes
Darley	Quarterly	4	0.04	0.01	0.01	Yes
Diggers Rest	Quarterly	4	0.18	0.01	0.03	Yes
Eynesbury	Quarterly	4	0.21	0.01	0.09	Yes
Gisborne	Quarterly	4	0.10	0.01	0.02	Yes
Lancefield	Quarterly	4	0.01	0.01	0.01	Yes
Lerderderg	Quarterly	4	0.03	0.01	0.01	Yes
Macedon	Quarterly	4	0.15	0.01	0.04	Yes
Maddingley	Quarterly	4	0.08	0.01	0.01	Yes
Melton South	Quarterly	4	0.24	0.01	0.09	Yes
Merrimu	Quarterly	4	0.06	0.01	0.02	Yes
Mount Macedon	Quarterly	4	0.05	0.01	0.03	Yes
Myrniong	Quarterly	4	0.05	0.01	0.02	Yes
Riddells Creek	Quarterly	4	0.13	0.01	0.02	Yes
Rockbank	Quarterly	4	0.12	0.01	0.05	Yes
Romsey	Quarterly	4	0.02	0.01	0.01	Yes
Sunbury	Quarterly	4	0.14	0.01	0.02	Yes
Toolern Vale	Quarterly	4	0.05	0.01	0.02	Yes
Woodend	Quarterly	4	0.07	0.01	0.02	Yes

** Compliance as measured against the aesthetic related guideline value set out in ADWG for the mean concentration of iron in drinking water not exceeding 0.3 mg/L.*

Total Hardness

Table A123: Total Hardness

Water sampling locality	Sampling frequency	No. of Samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Quarterly	12	100	19	57	Yes
Darley	Quarterly	4	210	120	155	Yes
Diggers Rest	Quarterly	12	100	31	84	Yes
Eynesbury	Quarterly	4	110	18	116	Yes
Gisborne	Quarterly	4	110	68	93	Yes
Lancefield	Quarterly	4	120	65	88	Yes
Lerderderg	Quarterly	4	200	120	156	Yes
Macedon	Quarterly	4	110	75	98	Yes
Maddingley	Quarterly	4	200	130	156	Yes
Melton South	Quarterly	4	130	18	48	Yes
Merrimu	Quarterly	4	160	19	80	Yes
Mount Macedon	Quarterly	4	110	75	95	Yes
Myrniong	Quarterly	4	180	130	158	Yes
Riddells Creek	Quarterly	4	100	80	94	Yes
Rockbank	Quarterly	4	130	15	32	Yes
Romsey	Quarterly	4	110	47	86	Yes
Sunbury	Quarterly	12	99	17	70	Yes
Toolern Vale	Quarterly	4	210	110	160	Yes
Woodend	Quarterly	4	100	11	64	Yes

** Compliance as measured against the aesthetic guideline value set out in ADWG for hardness as calcium carbonate in drinking water of 200 mg/L based on the mean result for the reporting period 2015/16. Note, the unit milligrams per litre (mg/L) is equivalent to parts per million (ppm). For conversion from mg/L to °dH (German Hardness), multiply mg/L by 0.056. Conversely, multiply °dH by 17.9 for conversion to mg/L or ppm.*

Appendix 4 - Water quality compliance results cont.

Calcium

Table A124: Calcium

Water sampling locality	Sampling frequency#	No. of Samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Quarterly	12	26	5	13
Darley	Quarterly	4	31	17	22
Diggers Rest	Quarterly	12	20	7	17
Eynesbury	Quarterly	4	16	5	16
Gisborne	Quarterly	4	24	12	18
Lancefield	Quarterly	4	19	10	14
Lerderderg	Quarterly	4	25	17	21
Macedon	Quarterly	4	28	15	21
Maddingley	Quarterly	4	25	19	22
Melton South	Quarterly	4	18	5	8
Merrimu	Quarterly	4	27	5	14
Mount Macedon	Quarterly	4	22	15	20
Myrniong	Quarterly	4	27	18	22
Riddells Creek	Quarterly	4	21	16	19
Rockbank	Quarterly	4	20	4	7
Romsey	Quarterly	4	22	9	17
Sunbury	Quarterly	12	20	4	14
Toolern Vale	Quarterly	4	28	15	23
Woodend	Quarterly	4	21	2	13

** There is currently no recommended guideline value set out for the concentration of calcium in drinking water.*
 # Scheduled for monthly sampling during review of monitoring program in January 2013, subsequent review conducted in February 2014 reduced sampling frequency to quarterly.

Magnesium

Table A125: Magnesium

Water sampling locality	Sampling frequency#	No. of Samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Quarterly	12	12.0	0.9	5.9
Darley	Quarterly	4	34.0	19.0	24.4
Diggers Rest	Quarterly	12	13.0	3.3	10.4
Eynesbury	Quarterly	4	18.0	1.4	18.8
Gisborne	Quarterly	4	14.0	9.1	11.7
Lancefield	Quarterly	4	21.0	9.0	13.1
Lerderderg	Quarterly	4	34.0	19.0	24.6
Macedon	Quarterly	4	13.0	9.0	10.6
Maddingley	Quarterly	4	34.0	20.0	24.9
Melton South	Quarterly	4	20.0	1.5	6.3
Merrimu	Quarterly	4	22.0	1.5	10.6
Mount Macedon	Quarterly	4	13.0	9.1	11.0
Myrniong	Quarterly	4	28.0	20.0	25.8
Riddells Creek	Quarterly	4	12.0	10.0	11.5
Rockbank	Quarterly	4	20.0	1.4	3.9
Romsey	Quarterly	4	14.0	5.8	10.8
Sunbury	Quarterly	12	12.0	1.6	8.6
Toolern Vale	Quarterly	4	33.0	18.0	25.1
Woodend	Quarterly	4	12.0	1.4	7.9

** There is currently no recommended guideline value set out for the concentration of magnesium in drinking water.*
 # Scheduled for monthly sampling during review of monitoring program in January 2013. Subsequent review conducted in February 2014 reduced sampling frequency to quarterly.

Appendix 4 - Water quality compliance results cont.

Ammonia

Table A126: Ammonia

Water sampling locality	Sampling frequency	No. of Samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Monthly	12	0.010	0.002	0.004	Yes
Darley	Monthly	12	0.023	0.002	0.004	Yes
Diggers Rest	Monthly	12	0.240	0.014	0.119	Yes
Eynesbury	Monthly	12	0.010	0.002	0.007	Yes
Gisborne	Annually#	1	0.004	0.002	0.002	Yes
Lancefield	Monthly	12	0.020	0.002	0.004	Yes
Lerderderg	Monthly	12	0.032	0.002	0.005	Yes
Macedon	Annually#	1	0.003	0.003	0.003	Yes
Maddingley	Monthly	12	0.018	0.002	0.004	Yes
Melton South	Monthly	12	0.010	0.002	0.003	Yes
Merrimu	Monthly	12	0.008	0.002	0.004	Yes
Mount Macedon	Annually#	1	0.005	0.002	0.003	Yes
Myrniong	Monthly	12	0.013	0.002	0.004	Yes
Riddells Creek	Annually#	1	0.005	0.005	0.005	Yes
Rockbank	Monthly	12	0.006	0.002	0.003	Yes
Romsey	Monthly	12	0.260	0.093	0.188	Yes
Sunbury	Monthly	12	0.310	0.002	0.146	Yes
Toolern Vale	Monthly	12	0.015	0.002	0.004	Yes
Woodend	Monthly	12	0.008	0.002	0.002	Yes

** Compliance as measured against the aesthetic guideline value set out in ADWG for the mean concentration of ammonia in drinking water should not exceed 0.5 mg/L. There is no health-based guideline for ammonia. The aesthetic consideration is to limit the corrosion of pipe and fittings and to reduce any nuisance growth of micro-organisms.*

 # Sampling for ammonia in these localities was reduced due to the change in disinfection method from chloramination to chlorination.

True Colour

Table A127: True Colour

Water sampling locality	Sampling frequency	No. of samples#	Max. (TCU)	Min. (TCU)	Ave. (TCU)	Complying* (Yes/No)
Bulla	Weekly	53	6	2	3	Yes
Darley	Weekly	52	4	2	2	Yes
Diggers Rest	Weekly	53	4	2	2	Yes
Eynesbury	Weekly	52	8	2	3	Yes
Gisborne	Weekly	52	4	2	2	Yes
Lancefield	Weekly	52	4	2	2	Yes
Lerderderg	Weekly	52	4	2	2	Yes
Macedon	Weekly	52	4	2	2	Yes
Maddingley	Weekly	52	6	2	2	Yes
Melton South	Weekly	52	4	2	2	Yes
Merrimu	Weekly	52	4	2	2	Yes
Mount Macedon	Weekly	52	4	2	2	Yes
Myrniong	Weekly	52	4	2	2	Yes
Riddells Creek	Weekly	52	4	2	2	Yes
Rockbank	Weekly	52	4	2	2	Yes
Romsey	Weekly	52	5	2	2	Yes
Sunbury	Weekly	52	4	2	2	Yes
Toolern Vale	Weekly	52	4	2	2	Yes
Woodend	Weekly	52	4	2	2	Yes

** Compliance as measured against the aesthetic guideline value set out in ADWG for true colour in drinking water should not exceed 15 HU (True Colour Units - TCU).*

 # Several localities received extra sampling for true colour in response to localised water quality issues in the reporting period. Additional samples tested as 2015/16 was a leap year.

Sodium

Table A128: Sodium

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	7	7	7	Yes
Darley	Annually	1	48	48	48	Yes
Diggers Rest	Annually	1	25	25	25	Yes
Eynesbury	Annually	1	6	6	6	Yes
Gisborne	Annually	1	35	35	35	Yes
Lancefield	Annually	1	49	49	49	Yes
Lerderderg	Annually	1	50	50	50	Yes
Macedon	Annually	1	34	34	34	Yes
Maddingley	Annually	1	52	52	52	Yes
Melton South	Annually	1	5	5	5	Yes
Merrimu	Annually	1	54	54	54	Yes
Mount Macedon	Annually	1	34	34	34	Yes
Myrniong	Annually	1	52	52	52	Yes
Riddells Creek	Annually	1	30	30	30	Yes
Rockbank	Annually	1	5	5	5	Yes
Romsey	Annually	1	30	30	30	Yes
Sunbury	Annually	1	10	10	10	Yes
Toolern Vale	Annually	1	55	55	55	Yes
Woodend	Annually	1	31	31	31	Yes

** Compliance as measured against the aesthetic guideline value set out in ADWG for the mean concentration of sodium in drinking water should not exceed 180 mg/L. No health-related guideline has been set for sodium. (Note: people who suffer from severe hypertension or congestive heart failure need to be aware the sodium concentration in their drinking water should not exceed 20 mg/L).*

Zinc

Table A129: Zinc

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Quarterly	4	0.003	0.001	0.002	Yes
Darley	Quarterly	4	0.005	0.002	0.004	Yes
Diggers Rest	Quarterly	4	0.005	0.002	0.003	Yes
Eynesbury	Quarterly	4	0.013	0.003	0.007	Yes
Gisborne	Quarterly	4	0.026	0.002	0.007	Yes
Lancefield	Quarterly	4	0.007	0.004	0.004	Yes
Lerderderg	Quarterly	4	0.004	0.002	0.003	Yes
Macedon	Quarterly	4	0.003	0.002	0.002	Yes
Maddingley	Quarterly	4	0.004	0.002	0.003	Yes
Melton South	Quarterly	4	0.008	0.001	0.004	Yes
Merrimu	Quarterly	4	0.005	0.002	0.004	Yes
Mount Macedon	Quarterly	4	0.026	0.002	0.009	Yes
Myrniong	Quarterly	4	0.008	0.001	0.003	Yes
Riddells Creek	Quarterly	4	0.010	0.001	0.004	Yes
Rockbank	Quarterly	4	0.010	0.001	0.005	Yes
Romsey	Quarterly	4	0.008	0.001	0.004	Yes
Sunbury	Quarterly	4	0.007	0.004	0.005	Yes
Toolern Vale	Quarterly	4	0.005	0.002	0.004	Yes
Woodend	Quarterly	4	0.010	0.001	0.003	Yes

** Compliance as measured against the aesthetic guideline value set out in ADWG for the mean concentration of zinc in drinking water should not exceed 3 mg/L. No health-related guideline limits was set for zinc.*

Sulfate

Table A130: Sulfate

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)	Complying* (Yes/No)
Bulla	Annually	1	3	3	3	Yes
Darley	Annually	1	79	79	79	Yes
Diggers Rest	Annually	1	38	38	38	Yes
Eynesbury	Annually	1	1	1	1	Yes
Gisborne	Annually	1	49	49	49	Yes
Lancefield	Annually	1	14	14	14	Yes
Lerderderg	Annually	1	77	77	77	Yes
Macedon	Annually	1	50	50	50	Yes
Maddingley	Annually	1	76	76	76	Yes
Melton South	Annually	1	2	2	2	Yes
Merrimu	Annually	1	76	76	76	Yes
Mount Macedon	Annually	1	50	50	50	Yes
Myrniong	Annually	1	45	45	45	Yes
Riddells Creek	Annually	1	48	48	48	Yes
Rockbank	Annually	1	2	2	2	Yes
Romsey	Annually	1	16	16	16	Yes
Sunbury	Annually	1	10	10	10	Yes
Toolern Vale	Annually	1	78	78	78	Yes
Woodend	Annually	1	39	39	39	Yes

** Compliance as measured against the aesthetic guideline value set out in ADWG for the mean concentration of sulfate in drinking water should not exceed 250 mg/L.*

Appendix 4 - Water quality compliance results cont.

Aluminium, total as Al

Table A131: Aluminium, total as Al

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	52	0.19	0.02	0.07
Darley	Monthly	12	0.05	0.02	0.03
Diggers Rest	Monthly	12	0.19	0.02	0.04
Eynesbury	Monthly	12	0.13	0.01	0.05
Gisborne	Weekly	52	0.10	0.02	0.05
Lancefield	Weekly	52	0.09	0.01	0.01
Lerderderg	Monthly	12	0.04	0.02	0.03
Macedon	Quarterly	4	0.06	0.04	0.05
Maddingley	Monthly	12	0.11	0.01	0.03
Melton South	Quarterly	4	0.14	0.01	0.06
Merrimu	Monthly	12	0.09	0.01	0.03
Mount Macedon	Quarterly	4	0.06	0.03	0.05
Myrniong	Monthly	12	0.06	0.01	0.02
Riddells Creek	Quarterly	4	0.06	0.03	0.04
Rockbank	Weekly	52	0.25	0.01	0.06
Romsey	Weekly	52	0.08	0.01	0.02
Sunbury	Weekly	52	0.19	0.02	0.07
Toolern Vale	Monthly	12	0.03	0.02	0.03
Woodend	Weekly	52	0.10	0.01	0.03

** Compliance as measured against the aesthetic related guideline value set out in ADWG for aluminium in drinking water should not exceed 0.2mg/L. There is currently no recommended health guideline value set out for the concentration aluminium in drinking water.*

Antimony

Table A132: Antimony

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for antimony in drinking water should not exceed 0.003mg/L.*

Antimony, filtered

Table A133: Antimony, filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for antimony in drinking water should not exceed 0.003mg/L.*

Arsenic

Table A134: Arsenic

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for arsenic in drinking water should not exceed 0.01mg/L.*

Barium, as Ba

Table A135: Barium

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.013	0.013	0.013

** Compliance as measured against the health related guideline value set out in ADWG for barium in drinking water should not exceed 2mg/L.*

Barium, filtered

Table A136: Barium, filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.013	0.013	0.013

** Compliance as measured against the health related guideline value set out in ADWG for barium in drinking water should not exceed 2mg/L.*

Beryllium, filtered

Table A137: Beryllium, filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	6 Monthly	2	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for beryllium in drinking water should not exceed 0.06mg/L.*

Boron

Table A138: Boron

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.02	0.02	0.02

** Compliance as measured against the health related guideline value set out in ADWG for boron in drinking water should not exceed 4mg/L.*

Boron, filtered

Table A139: Boron, filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.02	0.02	0.02

** Compliance as measured against the health related guideline value set out in ADWG for boron in drinking water should not exceed 4mg/L.*

Cadmium, filtered

Table A140: Cadmium, filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.0002	0.0002	0.0002

** Compliance as measured against the health related guideline value set out in ADWG for cadmium in drinking water should not exceed 0.002mg/L.*

Appendix 4 - Water quality compliance results cont.

Chlorine, Free

Table A141: Chlorine, Free

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	53	1.10	0.01	0.27
Darley	Weekly	52	2.90	0.05	0.25
Diggers Rest	Weekly	53	0.40	0.01	0.06
Eynesbury	Weekly	52	1.50	0.01	0.42
Gisborne	64/year	66	1.30	0.05	0.41
Lancefield	Weekly	52	0.89	0.05	0.50
Lerderderg	64/year	64	1.70	0.05	0.16
Macedon	Weekly	52	1.20	0.05	0.33
Maddingley	Weekly	52	1.50	0.05	0.27
Melton South	112/year	113	1.00	0.05	0.31
Merrimu	64/year	65	1.70	0.01	0.36
Mount Macedon	Weekly	52	1.00	0.05	0.24
Myrniong	Weekly	52	1.90	0.01	0.17
Riddells Creek	Weekly	53	0.91	0.01	0.47
Rockbank	Weekly	52	1.20	0.05	0.51
Romsey	Weekly	52	0.95	0.05	0.13
Sunbury	112/year	112	4.60	0.01	0.17
Toolern Vale	Weekly	52	1.60	0.05	0.28
Woodend	64/year	64	1.10	0.05	0.42

** Compliance as measured against the health related guideline value set out in ADWG for chlorine, free in drinking water should not exceed 4 mg/L. Western Water has an internal benchmark of 1.10 mg/L for chlorine, free at its customer taps. N.B. Several localities received extra sampling for chlorine, free in response to localised water quality issues in the reporting period.*

Chromium, filtered

Table A142: Chromium, filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for chromium in drinking water should not exceed 0.05mg/L.*

Cobalt, as Co

Table A143: Cobalt, as Co

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in National Institute for Occupational Safety and Health for in drinking water should not exceed 0.02mg/L.*

Cobalt, Filtered

Table A144: Cobalt, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in National Institute for Occupaional Safety and Health for in drinking water should not exceed 0.02mg/L.*

Copper, Filtered

Table A145: Copper, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.005	0.005	0.005

** Compliance as measured against the aesthetic related guideline value set out in ADWG for copper in drinking water should not exceed 1mg/L. Copper would not be a health concern unless the concentration exceeded 2mg/L.*

Dissolved Oxygen

Table A146: Dissolved Oxygen

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Monthly	12	10.5	5.1	8.1
Darley	Monthly	12	11.2	8.3	9.5
Diggers Rest	Monthly	12	11.4	7.1	9.2
Eynesbury	Monthly	12	11.2	7.8	9.4
Gisborne	Monthly	12	11.5	7.9	9.5
Lancefield	Monthly	12	13.2	8.0	9.6
Lerderderg	Monthly	12	11.2	8.3	9.5
Macedon	Monthly	12	11.6	6.8	9.7
Maddingley	Monthly	12	11.2	8.4	9.6
Melton South	Monthly	12	11.3	5.0	9.2
Merrimu	Monthly	12	11.2	7.2	9.3
Mount Macedon	Monthly	12	11.6	7.8	9.5
Myrniong	Monthly	12	11.1	7.7	9.3
Riddells Creek	Monthly	12	11.5	8.2	9.5
Rockbank	Monthly	12	12.4	5.0	9.5
Romsey	Monthly	12	12.2	8.1	10.0
Sunbury	Monthly	12	10.9	5.7	8.9
Toolern Vale	Monthly	12	11.2	7.9	9.5
Woodend	Monthly	12	12.9	8.1	9.6

** There is currently no recommended guideline value set out for dissolved oxygen in drinking water; however the concentration is maintained to greater than 85% saturation depending on the water source to prevent aesthetic issues.*

Appendix 4 - Water quality compliance results cont.

Iron, Filtered

Table A147: Iron, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.03	0.03	0.03
Darley	Monthly	12	0.01	0.01	0.01
Diggers Rest	Monthly	12	0.05	0.01	0.01
Eynesbury	Monthly	12	0.08	0.01	0.03
Gisborne	Weekly	52	0.02	0.01	0.01
Lancefield	Monthly	12	0.01	0.01	0.01
Lerderderg	Monthly	12	0.01	0.01	0.01
Macedon	Monthly	12	0.01	0.01	0.01
Maddingley	Monthly	12	0.01	0.01	0.01
Melton South	Quarterly	4	0.03	0.01	0.02
Merrimu	Monthly	12	0.03	0.01	0.01
Mount Macedon	Monthly	12	0.01	0.01	0.01
Myrniong	Monthly	12	0.04	0.01	0.01
Riddells Creek	Monthly	12	0.01	0.01	0.01
Rockbank	Weekly	52	0.04	0.01	0.02
Romsey	Weekly	52	0.01	0.01	0.01
Sunbury	Weekly	52	0.07	0.01	0.02
Toolern Vale	Quarterly	4	0.01	0.01	0.01
Woodend	Weekly	52	0.03	0.01	0.01

** Compliance as measured against the aesthetic related guideline value set out in ADWG for the mean concentration of iron in drinking water not exceeding 0.3 mg/L.*

Lead, Filtered

Table A148: Lead, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline values set out in ADWG for lead in drinking water should not exceed 0.01 mg/L.*

Manganese, Filtered

Table A149: Manganese, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	52	0.006	0.001	0.001
Darley	Monthly	12	0.006	0.001	0.001
Diggers Rest	Monthly	12	0.005	0.001	0.002
Eynesbury	Monthly	12	0.004	0.001	0.002
Gisborne	Weekly	52	0.018	0.001	0.005
Lancefield	Monthly	12	0.001	0.001	0.001
Lerderderg	Monthly	12	0.007	0.001	0.002
Macedon	Quarterly	4	0.002	0.001	0.002
Maddingley	Monthly	12	0.002	0.001	0.001
Melton South	Monthly	12	0.008	0.001	0.002
Merrimu	Quarterly	4	0.001	0.001	0.001
Mount Macedon	Monthly	12	0.004	0.001	0.002
Myrniong	Quarterly	4	0.003	0.001	0.001
Riddells Creek	Monthly	12	0.003	0.001	0.001
Rockbank	Monthly	12	0.006	0.001	0.002
Romsey	Weekly	52	0.006	0.001	0.002
Sunbury	Quarterly	4	0.001	0.001	0.001
Toolern Vale	Weekly	52	0.002	0.001	0.001
Woodend	Weekly	52	0.03	0.01	0.01

** Compliance as measured against the health related guideline value set out in ADWG for manganese in drinking water should not exceed 0.1mg/L. Manganese would not be a health concern unless the concentration exceeded 0.5mg/L.*

Molybdenum

Table A150: Molybdenum

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	6 Monthly	2	0.001	0.001	0.001

** Compliance as measured against the health related guideline values set out in ADWG for Molybdenum in drinking water should not exceed 0.05mg/L.*

Nickel, Filtered

Table A151: Nickel, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for nickel in drinking water should not exceed 0.02 mg/L.*

Appendix 4 - Water quality compliance results cont.

Phosphorus, Reactive as P

Table A152: Phosphorus, Reactive as P

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	0.003	0.003	0.003
Darley	Annually	1	0.003	0.003	0.003
Diggers Rest	Annually	1	0.003	0.003	0.003
Eynesbury	Annually	1	0.003	0.003	0.003
Gisborne	Annually	1	0.003	0.003	0.003
Lancefield	Annually	1	0.003	0.003	0.003
Lerderderg	Annually	1	0.007	0.007	0.007
Macedon	Annually	1	0.005	0.005	0.005
Maddingley	Annually	1	0.003	0.003	0.003
Melton South	Annually	1	0.003	0.003	0.003
Merrimu	Annually	1	0.003	0.003	0.003
Mount Macedon	Annually	1	0.005	0.005	0.005
Myrniong	Annually	1	0.003	0.003	0.003
Riddells Creek	Annually	1	0.004	0.004	0.004
Rockbank	Annually	1	0.003	0.003	0.003
Romsey	Annually	1	0.003	0.003	0.003
Sunbury	Annually	1	0.003	0.003	0.003
Toolern Vale	Annually	1	0.003	0.003	0.003
Woodend	6 Monthly	2	0.006	0.004	0.005

** Compliance as measured against the health related guideline value set out in ADWG for phosphorus in drinking water should not exceed 1mg/L.*

Potassium, as K

Table A153: Potassium, as K

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Annually	1	1.0	1.0	1.0
Darley	Annually	1	4.0	4.0	4.0
Diggers Rest	Annually	1	2.0	2.0	2.0
Eynesbury	Annually	1	0.8	0.8	0.8
Gisborne	Annually	1	3.2	3.2	3.2
Lancefield	Annually	1	3.8	3.8	3.8
Lerderderg	Annually	1	4.0	4.	4.
Macedon	Annually	1	3.4	3.4	3.4
Maddingley	Annually	1	4.0	4.0	4.0
Melton South	Annually	1	0.8	0.8	0.8
Merrimu	Annually	1	5.0	5.0	5.0
Mount Macedon	Annually	1	3.4	3.4	3.4
Myrniong	Annually	1	3.0	3.0	3.0
Riddells Creek	Annually	1	3.0	3.0	3.0
Rockbank	Annually	1	0.8	0.8	0.8
Romsey	Annually	1	2.4	2.4	2.4
Sunbury	Annually	1	1.3	1.3	1.3
Toolern Vale	Annually	1	5.1	5.1	5.1
Woodend	6 Monthly	2	3.5	3.4	3.45

** There is currently no recommended guideline value set out for potassium in drinking water.*

Selenium, Filtered

Table A154: Selenium, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for selenium in drinking water should not exceed 0.01mg/L.*

Silica, Non-Reactive

Table A155: Silica, Non-Reactive

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Gisborne	6 Monthly	2	0.05	0.05	0.05
Lancefield	6 Monthly	2	0.05	0.05	0.05
Woodend	Quarterly	4	0.05	0.05	0.05

**Compliance as measured against the aesthetic related guideline value set out in ADWG for silica in drinking water should not exceed 80mg/L.*

Silica, Reactive

Table A156: Silica, Reactive

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Gisborne	6 Monthly	2	1.1	0.98	1.04
Lancefield	6 Monthly	2	5.0	2.4	3.7
Woodend	Quarterly	4	8.3	1.9	5.05

**Compliance as measured against the aesthetic related guideline value set out in ADWG for silica in drinking water should not exceed 80mg/L.*

Silver, Filtered as Ag

Table A157: Silver, Filtered as Ag

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for silver in drinking water should not exceed 0.1mg/L.*

Silver, Total as Ag

Table A158: Silver, Total as Ag

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in ADWG for silver in drinking water should not exceed 0.1mg/L.*

Strontium, Filtered

Table A159: Strontium, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.025	0.025	0.025

** Compliance as measured against the health related guideline value set out in U.S EPA for strontium in drinking water should not exceed 1.5mg/L.*

Appendix 4 - Water quality compliance results cont.

Strontium, Total

Table A160: Strontium, Total

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.024	0.024	0.024

** Compliance as measured against the health related guideline value set out in U.S EPA for strontium in drinking water should not exceed 1.5mg/L.*

Thallium, Total

Table A161: Strontium, Total

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	6 Monthly	2	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in U.S EPA for thallium in drinking water should not exceed 2mg/L.*

Tin, Filtered

Table A162: Tin, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** There is currently no recommended guideline value set out for tin in drinking water.*

Tin, Total as Sn

Table A163: Tin, Total as Sn

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** There is currently no recommended guideline value set out for tin in drinking water.*

Titanium, Filtered

Table A164: Titanium, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** There is currently no recommended guideline value set out for titanium in drinking water.*

Titanium, Total

Table A165: Titanium, Total

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** There is currently no recommended guideline value set out for titanium in drinking water.*

Vanadium, as V

Table A166: Vanadium, as V

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in U.S. EPA for Vanadium in drinking water should not exceed 0.021mg/L.*

Vanadium, Filtered

Table A167: Vanadium, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.001	0.001	0.001

** Compliance as measured against the health related guideline value set out in U.S. EPA for Vanadium in drinking water should not exceed 0.021mg/L.*

Zinc, Filtered

Table A168: Zinc, Filtered

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Rockbank	Annually	1	0.003	0.003	0.003

** Compliance as measured against the aesthetic related guideline value set out in ADWG for zinc in drinking water should not exceed 3mg/L.*

Alkalinity, Total as $CaCO_3$

Table A169: Alkalinity, Total as $CaCO_3$

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	53	750	8	26
Darley	Monthly	12	120	58	83
Diggers Rest	Weekly	52	660	24	50
Eynesbury	Monthly	12	68	29	48
Gisborne	Monthly	12	110	58	79
Lancefield	Quarterly	4	120	60	823
Lerderderg	Monthly	12	120	11	61
Macedon	Quarterly	4	33	31	32
Maddingley	Monthly	12	89	59	74
Melton South	Quarterly	4	32	26	29
Merrimu	Monthly	12	19	9	12
Mount Macedon	Monthly	12	48	26	40
Myrniong	Weekly	52	760	8	34
Riddells Creek	Quarterly	4	120	62	83
Rockbank	Weekly	52	35	12	25
Romsey	Annually	1	2.4	2.4	2.4
Sunbury	Annually	1	1.3	1.3	1.3
Toolern Vale	Annually	1	5.1	5.1	5.1
Woodend	6 Monthly	2	3.5	3.4	3.45

** Compliance as measured against the aesthetic related guideline value set out in ADWG for total alkalinity as calcium carbonate drinking water should not exceed 200mg/L.*

Appendix 4 - Water quality compliance results cont.

Bicarbonate Alkalinity as $HCaCO_3$

Table A170: Bicarbonate Alkalinity as $HCaCO_3$

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	53	750	8	26
Darley	Monthly	12	120	58	83
Gisborne	Weekly	52	660	24	50
Lancefield	Monthly	12	68	29	48
Lerderderg	Monthly	12	110	58	79
Maddingley	Quarterly	4	120	60	83
Merrimu	Monthly	12	120	11	61
Mount Macedon	Quarterly	4	33	31	32
Myrniong	Monthly	12	89	59	73
Riddells Creek	Quarterly	4	32	26	29
Rockbank	Monthly	12	19	9	12
Romsey	Monthly	12	48	26	40
Sunbury	Weekly	52	760	8	34
Toolern Vale	Quarterly	4	120	62	83
Woodend	Weekly	52	35	12	25

** Compliance as measured against the aesthetic related guideline value set out in ADWG for total alkalinity as calcium bicarbonate drinking water should not exceed 200mg/L.*

Carbonate Alkalinity as $CaCO_3$

Table A171: Carbonate Alkalinity as $CaCO_3$

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	53	2	2	2
Darley	Monthly	12	2	2	2
Gisborne	Weekly	52	2	2	2
Lancefield	Monthly	12	2	2	2
Lerderderg	Monthly	12	2	2	2
Maddingley	Quarterly	4	2	2	2
Merrimu	Monthly	12	2	2	2
Mount Macedon	Quarterly	4	2	2	2
Myrniong	Monthly	12	7	2	3
Riddells Creek	Quarterly	4	2	2	2
Rockbank	Monthly	12	2	2	2
Romsey	Monthly	12	2	2	2
Sunbury	Weekly	52	2	2	2
Toolern Vale	Quarterly	4	2	2	2
Woodend	Weekly	52	2	2	2

** Compliance as measured against the aesthetic related guideline value set out in ADWG for total alkalinity as calcium bicarbonate drinking water should not exceed 200mg/L.*

Hydroxide Alkalinity as $CaCO_3$

Table A172: Hydroxide Alkalinity as $CaCO_3$

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	53	2	2	2
Darley	Monthly	12	2	2	2
Gisborne	Weekly	52	2	2	2
Lancefield	Monthly	12	2	2	2
Lerderderg	Monthly	12	2	2	2
Maddingley	Quarterly	4	2	2	2
Merrimu	Monthly	12	2	2	2
Mount Macedon	Quarterly	4	2	2	2
Myrniong	Monthly	12	7	2	3
Riddells Creek	Quarterly	4	2	2	2
Rockbank	Monthly	12	2	2	2
Romsey	Monthly	12	2	2	2
Sunbury	Weekly	52	2	2	2
Toolern Vale	Quarterly	4	2	2	2
Woodend	Weekly	52	2	2	2

** Compliance as measured against the aesthetic related guideline value set out in ADWG for Hydroxide Alkalinity as calcium carbonate drinking water should not exceed 200mg/L.*

Electrical Conductivity at 25C

Table A173: Electrical Conductivity at 25C

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Bulla	Weekly	52	380	58	131
Darley	Weekly	52	830	65	635
Diggers Rest	Weekly	52	410	68	296
Eynesbury	Weekly	52	840	70	226
Gisborne	Weekly	52	420	200	376
Lancefield	Weekly	52	510	310	443
Lerderderg	Weekly	52	810	260	627
Macedon	Weekly	52	430	220	384
Maddingley	Weekly	52	810	510	635
Melton South	Weekly	52	820	58	201
Merrimu	Weekly	52	850	61	555
Mount Macedon	Weekly	52	420	360	394
Myrniong	Weekly	52	720	580	658
Riddells Creek	Weekly	52	420	79	375
Rockbank	Weekly	52	830	58	119
Romsey	Weekly	52	470	200	362
Sunbury	Weekly	52	420	58	243
Toolern Vale	Weekly	52	840	280	640
Woodend	Weekly	52	440	130	322

** There is currently no recommended guideline value set out for electrical conductivity in drinking water; however this parameter is closely related to total dissolved solids as such should not exceed the ADWG aesthetic limit of 940µS/cm.*

Appendix 4 - Water quality compliance results cont.

UV Transmission at 254nm

Table A174: UV Transmission at 254nm

Water sampling locality	Sampling frequency	No. of samples	Max. (mg/L)	Min. (mg/L)	Ave. (mg/L)
Gisborne	Annually	1	89	89	89
Macedon	Annually	1	90	90	90
Mount Macedon	Annually	1	89	89	89
Riddells Creek	Annually	1	89	89	89

**There is currently no recommended guideline value set out for UVT254 in drinking water.*

Appendix 5 - Source water monitoring

Western Water uses the principles of the 12 elements of the ADWG framework for the management of its drinking water quality. This framework is incorporated within Western Water's Drinking Water Risk Management Plan (DWRMP), and is part of the business' strategic approach to providing quality drinking water to customers and protecting public health.

One of the key components of Western Water's DWRMP is the extensive source water monitoring program aimed at increasing the understanding of source water quality in the reservoirs, bores and basins. It involves the monitoring and identification of hazards, sources and events which could compromise drinking water quality in a catchment-to-consumer multiple barrier approach.

The source water monitoring program for 2015/16 allows for the assessment of source water quality at water storages for key chemicals with health-related guidelines, physical features such as turbidity and colour, impacts of rainfall events, organic matter and common waterborne disease pathogens.

This continual monitoring of source water quality enables Western Water to conduct historical trending analysis, review individual system risk assessment plans, identify new hazards and review risk at each source water. This information better positions Western Water to appropriately select the type of disinfectant to use for each water system and provide the most effective water treatment.

Through an independent NATA-accredited laboratory, a comprehensive source water monitoring program at reservoirs, bores and final source water entry points to water filtration plants was undertaken during 2015/16.

An overview of the parameters tested and the frequency of testing at each sampling location for pesticides, chemicals (organics and in-organics), metals, physical and radiological parameters and their results is contained in this appendix. The following table is a list of all parameters monitored during 2015/16.

In addition to the source water monitoring conducted by a contracted, independent NATA-accredited laboratory, source water samples at various sampling locations were taken routinely for physical microbiological analysis by qualified microbiologists. This involves the determination of any flagellates, diatoms, algae and cyanobacteria (blue green algae) present in the source water sources.

General observations provided by microbiologists in relation to any water discolouration, the levels of detritus and the presence of any odour in the source water provided valuable information in assessing the quality of the source water. This information allows Western Water to monitor changes in conditions of source water sources and their potential impacts on drinking water quality.

For Merrimu, Rosslynne and Pykes Creek Reservoirs, BGA monitoring was conducted by water storage manager, Southern Rural Water. Western Water received regular results on BGA numbers in the three reservoirs during the reporting period, which allowed for Western Water to assess the adverse impacts on its ability to treat and provide safe drinking water to customers.

Water sourced from Melbourne Water prior to the off-take entry point to Western Water's region was monitored by Melbourne Water during 2015/16. Western Water receives monthly water quality reports from Melbourne Water for Greenvale and Silvan reservoirs, which include information on algal populations.

Melbourne Water is required to notify Western Water of any major changes in treated water quality that could potentially impact the ability to supply safe drinking water to customers and to meeting the ADWG.

Table A175: List of all source water parameters monitored during 2015/16

Parameter		Parameter	
Type		Type	
Chemical organics	1,1-Dichloroethane	Physical	Alkalinity, total as $CaCO_3$
	1,2-Dichloroethane		Colour, true
	Benzene		Dissolved oxygen
	Dissolved organic carbon		Electrical conductivity @ 25°C
	Heptachlor		Hardness, as $CaCO_3$
	Heptachlor epoxide		pH
	Hexachlorobenzene		Total dissolved solids
	Methoxychor		Turbidity
	Pentachlorophenol		
	Tetrachloroethene	Metals	
	Trichloroethene		Aluminium, filtered
Chemical inorganics	Ammonia		Aluminium, filtered
	Arsenic		Iron, filtered
	Calcium*		Iron, total as Fe
	Chloride*		Magnesium, as Mg
	Cyanide		Manganese, filtered
	Fluoride*		Manganese, total as Mn
	Nitrate		Mercury, as Hg
	Nitrite		
	Phosphorus, reactive as P	Microbiological	Amoebae, total
	Selenium		Coliforms, total
	Silica, total as SiO_2*		Cryptosporidium spp.
	Silicon*		*Escherichia coli*
	Silica, total as SiO_2*		Giardia spp.
	Silicon*		Heterotrophic plate count, 37°C
Pesticides	2,4 D		Naegleria Fowleri
	4,4' – DDT		*Faecal streptococci**
	Aldrin		Helminth (Ascaris ova)*
	Atrazine		Helminth (Taenia ova)*
	BHC (gamma)		
	Chlordane, total	Radiological	Gross alpha activity
	Dieldrin		Gross beta activity

** These parameters were only measured at some of the sampling locations where appropriate.*

Glossary

Algae	Simple types of plant with no root, stems of leaves. They occur mostly in freshwater and marine environments.
Algal bloom	A rapid growth of algae in aquatic environments often triggered by an input of high levels of nutrients and an increase in temperature. Blue-green algae (or cyanobacteria) are of most concern.
Alum	An aluminium sulphate based chemical used as a coagulant in the water treatment process.
Aluminium (Al)	A naturally occurring element in soils which can enter water from catchments.
Ammonia (NH_3)	A highly soluble compound resulting from the decomposition of organic matter containing nitrogen. Usually only found in small concentrations in surface waters.
Aquifer	A layer or section of earth or rock that contains freshwater (known as groundwater), any water that is stored naturally underground or that flows through rock or soil, supplying springs and wells.
ADWG	National Health and Medical Research Council's Australian Drinking Water Guidelines 2004
Blue-green algae (cyanobacteria) (BGA)	Single celled, filamentous or colony-forming organisms which are widely distributed in the freshwater and marine environments. Under favourable conditions of light, temperature and nutrient supply, extensive growth of blue green algae may occur, leading to blooms. These can result in environmental problems and can create challenges for water treatment.
Bulk entitlement (BE)	An agreement that outlines the conditions for supply of bulk drinking water from reservoirs managed by Southern Rural Water and drinking water supplied by the Melbourne Water Corporation to Western Water.
Calcium (Ca)	A naturally occurring element which can enter water from catchments. It may also be added to water in the treatment process to reduce the acidity levels or increase the capacity of water to buffer pH changes.
Catchment	An area of land surrounding a water storage. The runoff water from rain falling over the catchment drains into the storage and may collect nutrients, minerals and other contaminants including microorganisms from the surface of the land.
Chlorination	The disinfection of water, wastewater and industrial waste through the application of chlorine (Cl) as part of the water treatment process. Chlorination kills microorganisms and oxidises undesirable compounds.
Chloramination	The application of the chlorine followed by ammonia to create monochloramine (NH_2Cl), a stable disinfectant that is added to drinking water to kill bacteria or to oxidise undesirable compounds. Chloramines persist for a longer time than chlorine and as a result are used in longer water distribution systems.
Coliforms	Coliform bacteria are used as one of the indicators of the quality of drinking water and the possible presence of disease-causing microorganisms. These bacteria are killed by chlorine.
Cryptosporidium	A parasitic protozoan (microorganism) which causes gastroenteritis in humans. These organisms occur in the gut of infected warm-blooded animals and can be introduced into source water through faecal contamination.
Disinfection	Inactivation (killing) of pathogens or organisms capable of causing infectious disease by chemical or physical processes, including chlorination.
Drinking Water Quality Management System (DWQMS)	Western Water's DWQMS is used to ensure our drinking water supplies are managed effectively to provide high quality drinking water and to ensure the protection of public health.
Escherichia coli (E.coli)	The most common heat tolerant coliform present in faeces, which is regarded as the most specific indicator of recent faecal contamination. *E.coli* can be killed by standard disinfection practices.
Filtration	A process for removing particles from water by passing through a porous barrier, such as a screen, membrane, sand or gravel. Often used in conjunction with a coagulant to settle contaminants.
Fluoride (F)	Fluoride is regarded as a useful constituent of drinking water, particularly for the prevention of tooth decay. Fluoride is added to the water supply at Merrimum WFP, Rosslynne WFP and all water supplied from the Melbourne system.
Groundwater	Water beneath the earth's surface (often between saturated soil and rock) that supplies bores, wells and springs.
HACCP	Hazard Analysis and Critical Control Point. A system that identifies, evaluates and controls hazards that are significant for food safety (Codex 1997).
Incident	Any event or circumstance that causes or is likely to cause: a) threat to community health or safety; or b) creation of the need for urgent action under statute or legislation.
Inflows	Water flowing from the catchment to the reservoirs through streams, rivers and creeks.
Iron (Fe)	An element which when found in water leads to brownish discolouration. Limits on the amount of iron in water are usually due to taste and appearance factors rather than any detrimental health effects.
IWA	Institute of Water Administration
kL	kilolitres (thousand litres)
Manganese (Mn)	Manganese in a water supply may affect taste, cause staining of clothes, produce deposits in pipes and contribute to turbidity.
mg/L	milligrams per litre

ML	megalitres (million litres)
µg/L	micrograms per litre
National Association of Testing Authorities (NATA)	NATA is Australia's national laboratory accreditation authority. NATA accreditation recognises and promotes facilities competent in specific types of testing, measurement, inspection and calibration.
National Health and Medical Research Council (NHMRC)	NHMRC is Australia's peak body for supporting health and medical research for developing health advice for the Australian community, health professionals and governments.
Nitrogen (N)	Nitrogen is an essential nutrient for plant growth. It is used in fertilisers and is present in sewage effluent. High levels of nutrients can lead to excessive algal growth.
Nitrate ($N0_3$)	The most stable form of combined nitrogen in water. Present in surface waters in small amounts, the major sources are from human and animal wastes.
Nephelometric turbidity unit (NTU)	A measure of the turbidity in water.
Nutrients	Compounds required for growth by plants and other organisms. Major nutrients for plant growth are phosphorous and nitrogen.
Pathogens	Disease causing organisms such as bacteria and viruses.
pH	The pH value indicates if a substance is acidic, neutral or alkaline. It is calculated from the number of hydrogen ions present and is measured on a scale of 0 to 14. A pH greater than 7 is alkaline, less than 7 is acidic and 7 is neutral.
Phosphorous (P)	Phosphorous is an essential nutrient for plant growth. High levels of phosphorous can lead to excessive algal growth and can be due to inputs from human activity such as fertiliser run-off and land clearing.
Potable water (drinking water)	Water that is intended for human consumption or for purposes connected with human consumption (e.g. food preparation, making of ice, preservation of unpackaged food).
Reservoir	A natural or artificial body of water used as storage for water supply.
Risk assessment	A scientifically based process consisting of the following steps: i) hazard identification; ii) hazard characterisation; iii) exposure assessment; and, iv) risk characterisation.
Risk management	The process of weighing policy alternatives in the light of the results of risk assessment and, if required, selecting and implementing an appropriate control option, including regulatory measures.
Risk management plan	As set out in Section 9 of the *Safe Drinking Water Act 2003.*
SCADA	Supervisory Control and Data Acquisition system
Source water	Water that has not been treated in any way.
SRW	Southern Rural Water, bulk water supplier responsible for Merrimu, Rosslynne and Pyke Creek Reservoirs
Total dissolved solids	A measure of organic salts and small amounts of organic matter that are dissolved in water.
Total hardness	Total hardness is the sum of the concentrations of calcium and magnesium ions expressed as calcium carbonate equivalent. Waters with a total hardness in excess of 200mg/L are considered hard.
Treatment (water)	The filtration and disinfection processes employed to produce drinking water.
Trihalomethanes	Compounds that may occur in a chlorinated water supply as a by-product of organic materials present in the water reacting with chlorine.
True colour	True colour refers to the colour of water after particles of organic matter have been removed through filtration and is the measurement of the extent to which light is absorbed by the water. Measured in Hazen Units (HU).
Turbidity	Refers to the presence of suspended solids in water causing a muddy or discoloured appearance. Turbidity is measured in Nephelometric Turbidity Units (NTUs).
Water Filtration Plant	Drinking water treatment plant.
Water quality standard	A quality standard specified for drinking water by regulations made for the purposes of Section 17 of the *Safe Drinking Water Act 2003.*
Water supply system	The complete system that provides a water supply to customers. It includes all infrastructure from the water source to the customer including the catchment, water storage, treatment and delivery systems and networks.
WIOA	Water Industry Operators Association
WSAA	Water Services Association of Australia

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