City West Water

Drinking Water Quality Report 2016

Glossary of terms

ADWG 2011	Australian Drinking Water Guidelines 2011. Published by the National Health and Medical Research Council of Australia.
DHHS	Victorian Department of Health and Human Services
E. coli	*Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore, health risk.
HACCP	Hazard Analysis and Critical Control Points certification for protecting drinking water quality
mg/L	Milligrams per litre
MWC	Melbourne Water Corporation
NTU	Nephelometric Turbidity Units
orgs/100mL	Organisms per 100 millilitres
Regulations (2015)	Safe Drinking Water Regulations (2015) Victoria
Section 22 notification	Notification under Section 22 of the Safe Drinking Water Act 2003 of known or suspected water contamination
UCL	Upper confidence limit
<	"less than" symbol.
>	"greater than" symbol

Table of contents

From our Managing Director

Welcome to City West Water's 2016 Annual Drinking Water Quality Report. Each year we produce such a report to provide our customers and the community with details of the quality of drinking water that we are supplying throughout our service area. This 2016 Report addresses the 12 month period between 1 July 2015 and 30 June 2016.

Our service area encompasses the inner and western suburbs of Melbourne, as well as Melbourne's central business district. It is supplied with water via an extensive, largely underground network of over 4,700 km of water mains as well as associated valves, holding tanks, pumping stations and disinfection plants. Our priority is to manage and operate this network so that our customers continue to reliably receive the high quality, safe drinking water for which Melbourne has long been renowned. Our water quality management processes are endorsed through an uninterrupted history of successfully retaining drinking water HACCP certification and continuing compliance of our water quality Risk Management Plan with requirements of Victoria's Safe Drinking Water Act 2003.

In addition to having appropriate management systems in place, we arrange for comprehensive water quality monitoring throughout the year to check the quality of the drinking water supplied and verify it in terms of regulated standards considered in the Safe Drinking Water Act 2003 and associated Safe Drinking Water Regulations. In July 2015 the original 2005 Regulations were replaced by new 2015 Regulations. Impacts of this change are outlined in this report.

Throughout 2015-16 we tested some 4,000 water samples, most of which were obtained from the point of supply to customers' premises using special tap fittings adjacent to property water meters. I am pleased to report that the independent testing of a broad range of chemical and microbiological parameters has demonstrated that the quality of our drinking water supply has been consistently above that of the regulated quality standards. Details of the testing undertaken and results obtained, together with an analysis of spatial and temporal trends, form the bulk of this report.

Further to directly sampling and testing the supplied water quality, we also rely upon feedback from customers to advise of local issues that may arise. Such feedback is recorded as water quality related customer complaints which, during 2015-16, were at a low level of 0.06 complaints per 100 customers.

We recognise that reliably providing high quality and safe drinking water quality is the key priority for City West Water and its customers, and we have a strong commitment to continuing our efforts in this regard.

David Ryan
Managing Director

1. Introduction

City West Water is one of three metropolitan water retailers established under section 85(1A) of the *Water Act 1989* (Vic). Our Board of Directors is appointed by the Victorian Government and is responsible for setting and overseeing the implementation of the policies, objectives and strategies of the business. We provide drinking water, trade waste, recycled water, stormwater and sewerage services to approximately 429,000 residential and non-residential customers in Melbourne's inner and western suburbs and central business district.

Melbourne Water provides City West Water with a bulk water supply and a waste water treatment service. Melbourne Water manages the water catchments and dams, as well as a network of large water mains that interconnect with our own water supply network. This interconnection means that risks associated with water supply are shared between the wholesaler (Melbourne Water) and retailer (City West Water). To manage these risks and to clearly assign the rights and obligations of both parties, we have a contractual arrangement (the Bulk Water Supply Agreement) with Melbourne Water, as well as cross business contingency plans and operational arrangements.

Our management of the water supply system and drinking water quality is given the highest priority to reflect public health considerations and community expectations. Our management of the drinking water supply closely follows the risk management principles outlined in Victoria's *Safe Drinking Water Act 2003* and associated *Safe Drinking Water Regulations*. This commitment to safeguarding drinking water quality has continued to be independently recognised through consistent retention of our internationally recognised Hazard Analysis and Critical Control Points (HACCP) certification.

1.1 Characterisation of the system

1.1.1 Source water system

The water supply originates from Melbourne's well established water supply catchment and reservoir system, which has provided the city with a reliable, high quality water supply for many years. This extensive system, managed by Melbourne Water, lies mainly to the east of Melbourne and extends as far as Thomson Reservoir, approximately 120 kilometres from our service area.

More specifically, water is supplied to City West Water from three major storages within the system. Two of the storages, Silvan Reservoir (near Mount Dandenong) and Sugarloaf Reservoir (near Yarra Glen), are east of Melbourne. The third, Greenvale Reservoir, is to the north, near Somerton. The relative proportion of water supplied to us from the three reservoirs can vary, depending on factors such as local water demands, weather conditions, maintenance works and longer term population changes. Over the last decade or so, on average about 25 per cent of our bulk supply has come from Silvan, 25 per cent from Greenvale and 50 per cent from Sugarloaf. During 2015-16 these percentages were 23, 15 and 62, respectively.

The supply from Silvan Reservoir originates from protected, natural catchments (including the Thomson and Upper Yarra catchments) where activities such as industry, farming, urbanisation and tourism (which could pollute the water supply) are highly restricted. Greenvale Reservoir which does not have a catchment, receives its water supply from Silvan Reservoir. Long storage periods (ranging between months and years) in these pristine reservoirs enhance water quality. As a result, the only active water treatment process that is applied to this water is chlorination (gas) and pH correction with lime.

Sugarloaf Reservoir draws most of its water from the middle reaches of the Yarra River where the catchment is unprotected, containing urban areas, light industry and agricultural activities. A smaller proportion also comes from Maroondah Reservoir via the Maroondah Aqueduct. On average, the source waters pumped into Sugarloaf Reservoir are stored for months before being treated (via aluminium-based coagulation and flocculation, sand filtration, gas chlorination and pH correction with lime) at Melbourne Water's nearby Winneke water treatment plant.

Melbourne Water adds fluoride to all of City West Water's bulk water in line with the requirements of the *Victorian Health (Fluoridation) Act* (1973). This is in the form of fluorosilicic acid at both the Silvan Reservoir supply and Winneke water treatment plant.

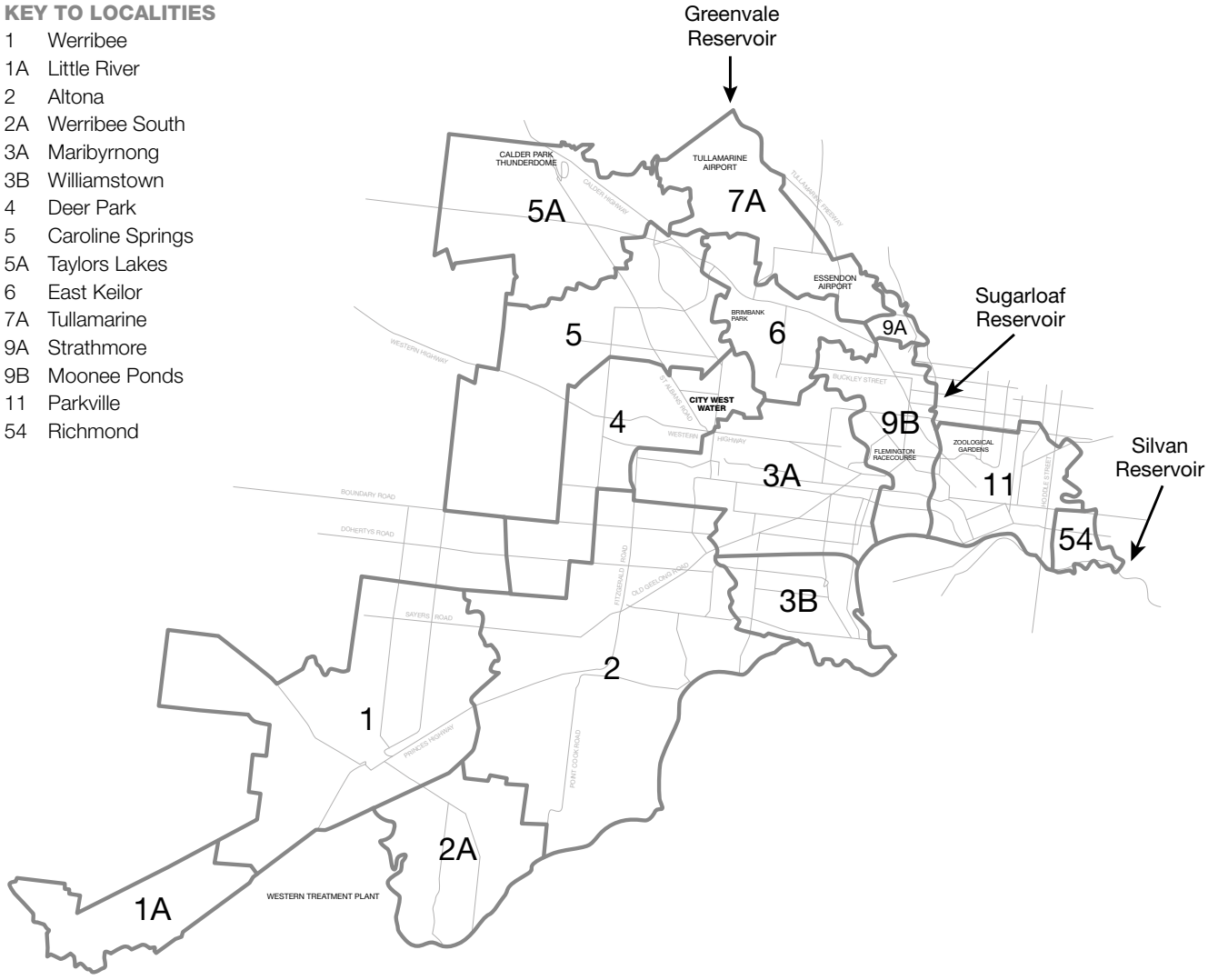
The quality of the bulk water supply is monitored by Melbourne Water before it enters City West Water's distribution system.

The overall water supply system and water delivery arrangements during the past year have continued unchanged from preceding years.

1.1.2 City West Water system

We distribute water to over 800,000 people and to businesses at some 429,000 properties. The water is distributed through an extensive network of over 4,700 kilometres of water mains, 10 pumping stations, eight holding tanks (or service reservoirs/tanks) and five secondary chlorination plants. This network encompasses central and western Melbourne, including inner suburbs such as Fitzroy, Collingwood, Richmond and the central business district, to outer western suburbs as far west as Little River. The network is fully enclosed, protecting the water from possible contamination during its delivery to customers. For the purpose of water quality monitoring our 714 square kilometre service area is divided into 15 water sampling localities (refer Figure 1.1) based on sources of water supply and similar pressure.

Figure 1.1 City West Water's water service area showing its 15 water sampling localities and sources of bulk water supply



The water supply source(s) for each of our 15 water sampling localities are shown in Table 1.1

Table 1.1 2015-16 supply sources for our water sampling localities

Water sampling locality	Source water	Treatment plant	Population serviced (2011 census)
Altona	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	97,611
Caroline Springs	Yarra River; Maroondah and Greenvale Reservoirs	Winneke, Greenvale	87,947
Deer Park	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	53,687
East Keilor	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	38,063
Little River	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	625
Maribyrnong	Yarra River; Maroondah and Silvan Reservoirs	Winneke, Silvan	101,272
Moonee Ponds	Yarra River; Maroondah and Silvan Reservoirs	Winneke, Silvan	68,395
Parkville	Yarra River; Maroondah and Silvan Reservoirs	Winneke, Silvan	111,305
Richmond	Yarra River; Maroondah and Silvan Reservoirs	Winneke, Silvan	20,646
Strathmore	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	8,917
Taylors Lakes	Yarra River; Maroondah and Greenvale Reservoirs	Winneke, Greenvale	63,394
Tullamarine	Yarra River; Maroondah and Greenvale Reservoirs	Winneke, Greenvale	9,833
Werribee	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	124,833
Werribee South	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke, Silvan, Greenvale	807
Williamstown	Yarra River; Maroondah and Silvan Reservoirs	Winneke, Silvan	35,996

2. Water treatment and quality management system

2.1 Water treatment

The water quality treatment processes used for City West Water's source or bulk water supply are outlined in Section 1.1.1.

Notwithstanding Melbourne Water's source or bulk water disinfection by chlorination, additional secondary chlorination (using liquid sodium hypochlorite) is undertaken within our service area by:

- Melbourne Water, with four secondary chlorination plants servicing the water sampling localities of Werribee, Deer Park, Caroline Springs and Altona
- City West Water, with a further five secondary chlorination plants servicing the water sampling localities of East Keilor, Little River, Richmond, Werribee and Werribee South.

In addition, the local water supply at Little River is dosed with gaseous carbon dioxide in order to assist with maintaining neutral pH levels.

2.2 Issues

No adverse water treatment issues originated within City West Water's service area during 2015-16.

3. Quality of drinking water in 2015-16

A significant part of our water supply activities involves monitoring the quality of the water being supplied to customers. We have a water monitoring program of day to day sampling and testing from many locations throughout the distribution network of 15 water sampling localities, including some 450 purpose built sampling fittings (referred to as 'customer taps') located at the point of supply, adjacent to water meters at properties across our service area. In addition, Melbourne Water monitors the quality of bulk water supplies at points upstream of delivery points to City West Water. The results of all these tests are scrutinised under the Bulk Water Supply Agreement between the two corporations.

Between 1 July 2015 and 30 June 2016, we routinely collected and tested over 3,000 microbiological and 900 physical/chemical water samples from customer taps, mains and service reservoirs/tanks. This was undertaken under contract by a government approved, specialised and quality certified laboratory. The extent of this monitoring was based on requirements of *Safe Drinking Water Regulations 2005* (1 to 17 July 2015) and *Safe Drinking Water Regulations 2015* (post 17 July 2015), as well as guidance from the *Australian Drinking Water Guidelines 2011 (ADWG 2011)*, including consideration of locality population numbers for bacterial monitoring.

As well as guiding the design of monitoring programs, *(ADWG 2011)* provides a basis for assessing the quality of drinking water. Microbiological assessment is based principally on the bacterium *Escherichia coli (E. coli)*, which is considered to definitively indicate the presence of faecal contamination and, therefore, health risk.

Physical/chemical assessment and monitoring is based on a combination of parameters that indicate physical/aesthetic characteristics, such as pH, colour and turbidity (the clarity of the water), as well as the chemical quality of the water (i.e. levels of chlorine, iron, fluoride, dissolved salts, aluminium, copper and other heavy metals). Contact information for obtaining further details of all water quality testing outlined in this report is provided in *Further Information* on page 30.

Since 1 July 2004, the management of drinking water in Victoria has been governed by the *Safe Drinking Water Act 2003*. Under this Act, *Safe Drinking Water Regulations* specifies scheduled water quality standards for a number of water quality parameters. Up until 17 July 2015, water quality performance was assessed in terms of the parameters, standards and sampling frequencies specified in *Safe Drinking Water Regulations 2005* for samples from customer tap sites only and were as follows:

Water quality parameter	Standard *(Regulations 2005)*	Relevant sampling frequency for each locality
Escherichia coli (E. coli)	at least 98% of samples collected in any 12 month period to contain no *E. coli* per 100mL of drinking water	one sample per week
Chloroacetic acid	must not exceed 0.15 mg/L of drinking water	one sample per month
Dichloroacetic acid	must not exceed 0.1 mg/L of drinking water	one sample per month
Trichloroacetic acid	must not exceed 0.1 mg/L of drinking water	one sample per month
Total trihalomethanes	must not exceed 0.25 mg/L of drinking water	one sample per month
Bromate	must not exceed 0.02 mg/L of drinking water	one sample per month
Formaldehyde	must not exceed 0.5 mg/L of drinking water	one sample per month
Aluminium (acid soluble)	must not exceed 0.2 mg/L of drinking water	one sample per month
Turbidity	95 per cent upper confidence limit of mean of drinking water samples collected in the preceding 12 month period must not exceed 5.0 Nephelometric Turbidity Units (NTU)	one sample per week

From 18 July 2015 *Safe Drinking Water Regulations 2015* came into effect, with a new set of parameters, standards and sampling frequencies for samples from all sampling sites (customer taps, mains, service reservoirs/tanks) as follows:

Water quality parameter	Standard *(Regulations 2005)*	Relevant sampling frequency for each locality
Escherichia coli (E. coli)	No *E. coli* per 100mL of drinking water, with the exception of any false positive sample	one sample per week
Trihalomethanes	Less than or equal to 0.25 mg/L of drinking water	one sample per month
Turbidity	The 95th percentile of results for samples in any 12 month period must be ≤5.0 NTU	one sample per week

The consideration of all sampling sites in water quality performance reporting by Safe Drinking Water Regulations 2015 (as compared with only customer tap sites by Safe Drinking Water Regulations 2005) has required a corresponding change to the reporting process. Under Safe Drinking Water Regulations 2005 all performance reporting related to each water sampling locality only in terms of its spatially contained customer tap sampling sites. Under Safe Drinking Water Regulations 2015 sample results from reticulation sites such as water mains and service reservoirs/tanks that are both spatially and hydraulically within individual water sampling localities, are required to be added to the associated customer tap data. This means that sampling locality based reporting can be complicated when service reservoirs/tanks are spatially located in one water sampling locality to which they do not supply water, whilst at the same time supplying water to customers in one or more other water sampling localities. Fortunately, this situation does not apply to each of City West Water's eight service reservoirs/tanks as they each supply only the single water sampling locality in which they are located and therefore water quality data for each service reservoir/tank is included with all other data pertaining to respective localities.

City West Water's sampling sites (other than customer taps) and the water sampling locality to which they are associated for water quality reporting purposes are as follows:

Sampling site	Sampling site location and water sampling locality to which water quality data are included
Little River elevated tank	Little River
Little River ground level tank no. 1	Little River
Little River ground level tank no. 2	Little River
Cowies Hill elevated tank	Werribee
Ballan Road tank	Werribee
Hillside elevated tank	Taylors Lakes
Werribee South elevated tank	Werribee South
Werribee South ground level tank	Werribee South
Werribee South main at Maltby bypass	Werribee South

The tables in parts 3.1 to 3.5 report the 1 to 17 July 2015 and overall 2015-16 compliance of water quality standard parameters against the water quality scheduled standards specified in Victoria's Safe Drinking Water Regulations 2005 and *Safe Drinking Water Regulations 2015*, respectively.

3.1 *Escherichia coli (E. coli)*

3.1a Results: 1 to 17 July 2015

Table 3.1a ***E. coli*** **summary results in drinking water samples obtained from customer taps sites only between 1 and 17 July 2015**

Water sampling locality (locality number)	No. of samples	Sampling frequency	No. of samples containing *E. coli*	Standard met
Altona (2)	16	>weekly	0	yes
Caroline Springs (5)	14	>weekly	0	yes
Deer Park (4)	10	>weekly	0	yes
East Keilor (6)	7	>weekly	0	yes
Little River (1A)	4	>weekly	0	yes
Maribyrnong (3A)	18	>weekly	0	yes
Moonee Ponds (9B)	11	>weekly	0	yes
Parkville (11)	17	>weekly	0	yes
Richmond (54)	5	>weekly	0	yes
Strathmore (9A)	3	>weekly	0	yes
Taylors Lakes (5A)	12	>weekly	0	yes
Tullamarine (7A)	5	>weekly	0	yes
Werribee (1)	19	>weekly	0	yes
Werribee South (2A)	3	>weekly	0	yes
Williamstown (3B)	7	>weekly	0	yes

E. coli data demonstrate compliance with the standard (at least 98% samples with no E. coli) in each of City West Water's 15 water sampling localities between 1and 17 July 2015.

Sampling frequencies in each locality exceeded that prescribed by the Safe Drinking Water Regulations 2005 (i.e. one sample per week in each locality). This was done in order to meet the more intense surveillance of internationally recognised population based frequencies, as advocated in ADWG 2011.

3.1b Results: 1 July 2015 to 30 June 2016

Table 3.1b ***E. coli*** **summary results in drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, service reservoirs/tanks) tested between 1 July 2015 and 30 June 2016**

Water sampling locality (locality number)	No. of samples	Sampling frequency	No. of samples containing E. coli	Standard met
Altona (2)	305	>weekly	0	yes
Caroline Springs (5)	278	>weekly	0	yes
Deer Park (4)	184	>weekly	0	yes
East Keilor (6)	147	>weekly	0	yes
Little River (1A)	122	>weekly	0	yes
Maribyrnong (3A)	358	>weekly	0	yes
Moonee Ponds (9B)	226	>weekly	0	yes
Parkville (11)	367	>weekly	0	yes
Richmond (54)	104	>weekly	0	yes
Strathmore (9A)	78	>weekly	0	yes
Taylors Lakes (5A)	235	>weekly	0	yes
Tullamarine (7A)	78	>weekly	0	yes
Werribee (1)	446	>weekly	0	yes
Werribee South (2A)	117	>weekly	0	yes
Williamstown (3B)	144	>weekly	0	yes

E. coli reticulation system data demonstrate compliance with the standard (100% samples with no E. coli) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

Sampling frequencies in each locality exceeded that prescribed by the Safe Drinking Water Regulations 2015 (i.e. one sample per week in each locality). This was done in order to meet the more intense surveillance of internationally recognised population based frequencies, as advocated in ADWG 2011.

3.2 Chlorine based disinfection by-product chemicals

Two classes of chlorine based disinfection by-product chemicals have been considered in the *Safe Drinking Water Regulations*. – chloroacetic acids and trihalomethanes. Under *Safe Drinking Water Regulations 2005*, monitoring of these chlorine based disinfection by-products in each water sampling locality was undertaken on a monthly basis until 17 July 2015. However, as the chloroacetic acids are no longer water quality standards in *Safe Drinking Water Regulations 2015*, from February 2016 they are being monitored annually, in line with City West Water's modified routine monitoring program. Monthly monitoring for total trihalomethanes has continued as they have been retained as a standard in *Safe Drinking Water Regulations 2015*.

3.2.1a Results: (Mono) Chloroacetic acid 1 to 17 July 2015

Table 3.2.1a Chloroacetic acid summary results in drinking water samples obtained from customer taps tested between 1 and 17 July 2015

Water sampling locality (locality number)	Sampling frequency	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes / no)
Altona (2)	monthly	1	0	<0.005	yes
Caroline Springs (5)	monthly	1	0	<0.005	yes
Deer Park (4)	monthly	1	0	<0.005	yes
East Keilor (6)	monthly	1	0	<0.005	yes
Little River (1A)	monthly	1	0	<0.005	yes
Maribyrnong (3A)	monthly	1	0	<0.005	yes
Moonee Ponds (9B)	monthly	1	0	<0.005	yes
Parkville (11)	monthly	1	0	<0.005	yes
Richmond (54)	monthly	1	0	<0.005	yes
Strathmore (9A)	monthly	1	0	<0.005	yes
Taylors Lakes (5A)	monthly	1	0	<0.005	yes
Tullamarine (7A)	monthly	1	0	<0.005	yes
Werribee (1)	monthly	1	0	<0.005	yes
Werribee South (2A)	monthly	1	0	<0.005	yes
Williamstown (3B)	monthly	1	0	<0.005	yes

Chloroacetic acid data demonstrate compliance with the standard (0.15 mg/L) in each of City West Water's 15 water sampling localities between 1and 17 July 2015.

3.2.1b (Mono) Chloroacetic acid 1 July 2015 to 30 June 2016

As chloroacetic acid is no longer a water quality standard in *Safe Drinking Water Regulations 2015*, summary results for 2015-16 are not presented here as in Table 3.2.1a. Summary results with respect to each water sampling locality's reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) are contained in Appendix A. The data show compliance with the ADWG 2011 guideline (0.15 mg/L) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

3.2.2a Results: Dichloroacetic acid 1 to 17 July 2015

Table 3.2.2a Dichloroacetic acid summary results in drinking water samples obtained from customer taps tested between 1 and 17 July 2015

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes / no)
Altona (2)	monthly	1	0	<0.005	yes
Caroline Springs (5)	monthly	1	0	<0.005	yes
Deer Park (4)	monthly	1	0	<0.005	yes
East Keilor (6)	monthly	1	0	<0.005	yes
Little River (1A)	monthly	1	0	<0.005	yes
Maribyrnong (3A)	monthly	1	0	<0.005	yes
Moonee Ponds (9B)	monthly	1	0	<0.005	yes
Parkville (11)	monthly	1	0	<0.005	yes
Richmond (54)	monthly	1	0	<0.005	yes
Strathmore (9A)	monthly	1	0	<0.005	yes
Taylors Lakes (5A)	monthly	1	0	0.006	yes
Tullamarine (7A)	monthly	1	0	<0.005	yes
Werribee (1)	monthly	1	0	<0.005	yes
Werribee South (2A)	weekly	1	0	<0.005	yes
Williamstown (3B)	monthly	1	0	<0.005	yes

Dichloroacetic acid data demonstrate compliance with the standard (0.15 mg/L) in each of City West Water's 15 water sampling localities between 1and 17 July 2015.

3.2.2b Dichloroacetic acid 1 July 2015 to 30 June 2016

As dichloroacetic acid is no longer a water quality standard in *Safe Drinking Water Regulations 2015*, summary results for 2015-16 are not presented here as in Table 3.2.2a. Summary results with respect to each water sampling locality's reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) are contained in Appendix A. The data show compliance with the ADWG 2011 guideline (0.1 mg/L) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

3.2.3a Results: Trichloroacetic acid 1 to 17 July 2015

Table 3.2.3a Trichloroacetic acid summary results in drinking water samples obtained from customer taps tested between 1 and 17 July 2015

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes / no)
Altona (2)	monthly	1	0	0.028	yes
Caroline Springs (5)	monthly	1	0	0.005	yes
Deer Park (4)	monthly	1	0	<0.005	yes
East Keilor (6)	monthly	1	0	<0.005	yes
Little River (1A)	monthly	1	0	0.016	yes
Maribyrnong (3A)	monthly	1	0	0.025	yes
Moonee Ponds (9B)	monthly	1	0	0.011	yes
Parkville (11)	monthly	1	0	0.026	yes
Richmond (54)	monthly	1	0	0.031	yes
Strathmore (9A)	monthly	1	0	<0.005	yes
Taylors Lakes (5A)	monthly	1	0	0.007	yes
Tullamarine (7A)	monthly	1	0	<0.005	yes
Werribee (1)	monthly	1	0	0.015	yes
Werribee South (2A)	weekly	1	0	0.020	yes
Williamstown (3B)	monthly	1	0	0.027	yes

Trichloroacetic acid data demonstrate compliance with the standard (0.15 mg/L) in each of City West Water's 15 water sampling localities between 1and 17 July 2015.

3.2.3b Trichloroacetic acid 1 July 2015 to 30 June 2016

As trichloroacetic acid is no longer a water quality standard in *Safe Drinking Water Regulations 2015*, summary results for 2015-16 are not presented here as in Table 3.2.3a. Summary results with respect to each water sampling locality's reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) are contained in Appendix A. The data show compliance with the ADWG 2011 guideline (0.1 mg/L) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

3.2.4a Results: Total trihalomethanes 1 to 17 July 2015

Table 3.2.4a Total trihalomethanes summary results in drinking water samples obtained from customer taps tested between 1 and 17 July 2015

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes / no)
Altona (2)	monthly	1	0	0.071	yes
Caroline Springs (5)	monthly	1	0	0.029	yes
Deer Park (4)	monthly	1	0	0.028	yes
East Keilor (6)	monthly	1	0	0.028	yes
Little River (1A)	monthly	1	0	0.063	yes
Maribyrnong (3A)	monthly	1	0	0.073	yes
Moonee Ponds (9B)	monthly	1	0	0.054	yes
Parkville (11)	monthly	1	0	0.074	yes
Richmond (54)	monthly	1	0	0.079	yes
Strathmore (9A)	monthly	1	0	0.069	yes
Taylors Lakes (5A)	monthly	1	0	0.017	yes
Tullamarine (7A)	monthly	1	0	0.018	yes
Werribee (1)	monthly	1	0	0.054	yes
Werribee South (2A)	weekly	1	0	0.069	yes
Williamstown (3B)	monthly	1	0	0.075	yes

Total trihalomethanes data demonstrate compliance with the standard (0.25 mg/L) in each of City West Water's 15 water sampling localities between 1and 17 July 2015.

3.2.4b Results: Total trihalomethanes 1 July 2015 to 30 June 2016

Table 3.2.4b Total trihalomethanes summary results in drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, service reservoirs/tanks) tested between 1 July 2015 and 30 June 2016

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes / no)
Altona (2)	monthly	13	0	0.088	yes
Caroline Springs (5)	monthly	13	0	0.065	yes
Deer Park (4)	monthly	13	0	0.065	yes
East Keilor (6)	monthly	13	0	0.062	yes
Little River (1A)	weekly	52	0	0.076	yes
Maribyrnong (3A)	monthly	13	0	0.076	yes
Moonee Ponds (9B)	monthly	13	0	0.074	yes
Parkville (11)	monthly	13	0	0.074	yes
Richmond (54)	monthly	13	0	0.094	yes
Strathmore (9A)	monthly	13	0	0.077	yes
Taylors Lakes (5A)	fortnightly	26	0	0.063	yes
Tullamarine (7A)	monthly	13	0	0.039	yes
Werribee (1)	>fortnightly	39	0	0.069	yes
Werribee South (2A)	weekly	52	0	0.076	yes
Williamstown (3B)	monthly	13	0	0.077	yes

Total trihalomethanes data demonstrate compliance with the standard (0.25 mg/L) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

3.3 Ozone based disinfection by-product chemicals

Safe Drinking Water Regulations 2005 refers to two ozone based disinfection by-product chemicals as standards - bromate and formaldehyde. However, these two chemicals were not monitored on a regular basis for compliance purposes as our water supply is not treated with ozone (refer Section 2.1). Nevertheless, in past years an annual customer tap water sample from each of the 15 water sampling localities was tested during May/June. As *Safe Drinking Water Regulations 2015* does not consider bromate and formaldehyde as water quality standards and, since they have never been detected in City West Water's service area, monitoring for these parameters was disbanded (in line with City West Water's modified routine monitoring program), with no results available for 2015-16.

3.4 Aluminium

3.4a Results: Aluminium (acid soluble) 1 to 17 July 2015

Under *Safe Drinking Water Regulations 2005*, monitoring of aluminium in each water sampling locality was undertaken on a fortnightly basis until 17 July 2015. However, as aluminium is no longer a water quality standard in *Safe Drinking Water Regulations 2015*, from July 2016 it has been monitored at specific sites on a fortnightly basis, in line with City West Water's modified routine monitoring program.

Table 3.4a Aluminium (acid soluble) summary results in drinking water samples obtained from customer taps tested between 1 and 17 July 2015

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes / no)
Altona (2)	fortnightly	1	0	0.02	yes
Caroline Springs (5)	fortnightly	1	0	0.02	yes
Deer Park (4)	fortnightly	1	0	0.02	yes
East Keilor (6)	fortnightly	1	0	0.01	yes
Little River (1A)	fortnightly	1	0	<0.01	yes
Maribyrnong (3A)	fortnightly	1	0	0.02	yes
Moonee Ponds (9B)	fortnightly	1	0	0.02	yes
Parkville (11)	fortnightly	1	0	0.02	yes
Richmond (54)	fortnightly	1	0	0.02	yes
Strathmore (9A)	fortnightly	1	0	0.02	yes
Taylors Lakes (5A)	fortnightly	1	0	0.02	yes
Tullamarine (7A)	fortnightly	1	0	0.02	yes
Werribee (1)	fortnightly	1	0	0.02	yes
Werribee South (2A)	fortnightly	1	0	0.02	yes
Williamstown (3B)	fortnightly	1	0	0.02	yes

Acid soluble aluminium data demonstrate compliance with the standard (0.2 mg/L) in each of City West Water's 15 water sampling localities between 1 and 17 July 2015.

3.4b Aluminium 1 July 2015 to 30 June 2016

As aluminium is no longer a water quality standard, summary results for 2015-16 are not presented here as in Table 3.4a. Summary results with respect to each water sampling locality's reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) are contained in Appendix A. The data show compliance with the *ADWG 2011* guideline (0.2 mg/L) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

3.5 Turbidity

3.5a Results: Turbidity 1 to 17 July 2015

Table 3.5a Turbidity summary results in drinking water samples obtained from customer taps tested between 1 and 17 July 2015

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	Max. NTU	95% UCL of mean	Complying (yes / no)
Altona (2)	weekly	2	0.9	*	yes
Caroline Springs (5)	weekly	2	1.2	*	yes
Deer Park (4)	weekly	2	0.3	*	yes
East Keilor (6)	weekly	2	0.3	*	yes
Little River (1A)	weekly	3	0.3	*	yes
Maribyrnong (3A)	weekly	2	0.8	*	yes
Moonee Ponds (9B)	weekly	2	0.6	*	yes
Parkville (11)	weekly	2	0.9	*	yes
Richmond (54)	weekly	2	1.0	*	yes
Strathmore (9A)	weekly	2	1.0	*	yes
Taylors Lakes (5A)	weekly	2	1.3	*	yes
Tullamarine (7A)	weekly	3	0.1	*	yes
Werribee (1)	weekly	2	0.4	*	yes
Werribee South (2A)	weekly	2	0.3	*	yes
Williamstown (3B)	weekly	2	0.7	*	yes

**Insufficient results to calculate 95% UCL of mean.*

Turbidity data demonstrate compliance with the standard (5 NTU) in each of City West Water's 15 water sampling localities between 1 and 17 July 2016.

3.5b Results: Turbidity 1 July 2015 to 30 June 2016

Table 3.5b Turbidity summary results in drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, service reservoirs/tanks) tested between 1 July 2015 and 30 June 2016

Water sampling locality (locality number)	Sampling frequency (minimum)	No. of samples	Max. NTU	95th percentile	Complying (yes / no)
Altona (2)	weekly	52	1.8	0.7	yes
Caroline Springs (5)	weekly	52	1.3	1.2	yes
Deer Park (4)	weekly	52	0.6	0.5	yes
East Keilor (6)	weekly	52	4.2	0.9	yes
Little River (1A)	>weekly	93	4.9	0.6	yes
Maribyrnong (3A)	weekly	52	0.9	0.8	yes
Moonee Ponds (9B)	weekly	52	1.3	0.9	yes
Parkville (11)	weekly	52	1.0	0.9	yes
Richmond (54)	weekly	52	1.0	0.9	yes
Strathmore (9A)	weekly	52	1.4	0.9	yes
Taylors Lakes (5A)	>weekly	65	2.6	1.6	yes
Tullamarine (7A)	weekly	52	4.6	0.9	yes
Werribee (1)	>weekly	77	1.1	0.6	yes
Werribee South (2A)	>weekly	97	1.9	0.7	yes
Williamstown (3B)	weekly	52	4.0	0.7	yes

Turbidity data demonstrate compliance with the standard (95th percentile ≤ 5 NTU) in each of City West Water's 15 water sampling localities between 1 July 2015 and 30 June 2016.

3.6 Summary performance against water quality standards

The preceding Part 3 information presented demonstrates that during 2015-16, City West Water met the monitoring requirements of both the 2005 and 2015 *Safe Drinking Water Regulations* for drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) tested between 1 July 2015 and 30 June 2016 and that the drinking water quality complied with the quality standards. *No Section 22* notifications were required or made with regard to known or suspected contamination.

3.7 Other algae, pathogen, chemical or substance not specified above that may pose a risk to human health

In addition to the water quality parameters designated as standards by the *Safe Drinking Water Regulations*, we also monitor a range of other microbiological and chemical parameters that provide further information on the overall quality of our drinking water supply. Among such other parameters that were monitored in 2015-16, those for which there is a health-related *ADWG 2011* guideline and that could potentially represent a health risk (if present above the *ADWG 2011* guideline level) are listed in Table 3.7. In addition, data on aesthetic and other parameters that provide a more comprehensive characterisation of the water, as well as assisting the needs of customers (e.g. industry, students and researchers) are contained in Part 3.8,as well as Appendices A and B.

Table 3.7 Potential health risk water quality parameters monitored in drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) and tested between 1 July 2015 and 30 June 2016

Parameter	ADWG 2011 health guideline	Frequency of testing	Met the guideline?
Microbiological *Vibrio* spp. *Shigella* spp. *Yersinia* spp. *Salmonella* spp. *Campylobacter* spp. *Giardia* spp. *Cryptosporidium* spp. Enterococci Coliphage	these parameters should not be present in drinking water)	3 to 4 samples per month (3 samples per locality per year)	yes (none detected)
Chemical*	(mg/L)		
Arsenic	0.01	annually per locality	yes (not detected)
Cadmium	0.002	annually per locality	yes (not detected)
Chlorine	5	>weekly per locality	yes
Chromium	0.05	annually per locality	yes (not detected)
Copper	2	annually per locality	yes
Cyanide	0.08	annually per locality	yes (not detected)
Fluoride	1.5	fortnightly per locality	yes
Lead	0.01	annually per locality	yes (not detected)
Manganese	0.5	fortnightly per locality	yes
Mercury	0.001	annually per locality	yes (not detected)
Nitrate	50	annually per locality	yes
Sulphate	500	annually per locality	yes
Zinc	3 (aesthetic only)	annually per locality	yes

**sample numbers, maximum/average/minimum levels and compliance details are shown in Appendix A tables.*

Since levels of all health-related parameters tested satisfied *ADWG 2011* guideline values for samples from reticulation system sampling sites, no related remedial water quality actions were necessary.

As our water supply distribution network is completely enclosed, any monitoring for organic industrial chemicals, pesticides and radioactivity is undertaken at locations upstream of this network. Melbourne Water tests for these substances with respect to its major storage reservoirs such as Silvan and Sugarloaf, where the potential for contamination is greater. Results of this monitoring are provided to City West Water. No significant detections (with respect to *ADWG 2011* guidelines) in the bulk water supply took place during 2015-16.

3.8 Aesthetic characteristics

Monitoring results for the aesthetic water quality parameters comprising pH, colour, hardness, alkalinity and iron are shown in Table 3.8. Note that our colour tests are reported as apparent colour while the *ADWG 2011* guideline of 15 platinum cobalt units (PCU) refers to true colour. Due to the omission of a filtering step in the test for apparent colour, the subsequent result values are at least equal to, but not less than, the equivalent true colour values. As a result, true colour compliance with respect to the *ADWG 2011* guideline is assured in all cases where apparent colour levels are within the guideline. Past investigations have shown that for Melbourne's water supply, an apparent colour level of 25 PCU is equivalent to a true colour level of 15 PCU.

Table 3.8 Detailed monitoring results for pH, apparent colour, hardness, alkalinity and iron in drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) and tested between 1 July 2015 and 30 June 2016

Water sampling locality (locality number)	Parameter	Sampling frequency	No. of samples	Max*	Min*	Average*
Altona (2)	pH	fortnightly	26	8.8	6.9	7.3
	apparent colour	fortnightly	26	10	<2	4
	hardness	annually	1	19	19	19
	alkalinity	annually	1	12	12	12
	iron	fortnightly	26	0.12	0.01	0.04
Caroline Springs (5)	pH	fortnightly	26	7.6	6.7	7.1
	apparent colour	fortnightly	26	6	<2	4
	hardness	annually	1	21	21	21
	alkalinity	annually	1	17	17	17
	iron	fortnightly	26	0.12	<0.01	0.05
Deer Park (4)	pH	fortnightly	26	8.5	6.9	7.3
	apparent colour	fortnightly	26	6	<2	3
	hardness	annually	1	18	18	18
	alkalinity	annually	1	13	13	13
	iron	fortnightly	26	0.07	<0.01	0.03
East Keilor (6)	pH	fortnightly	26	7.9	6.6	7.2
	apparent colour	fortnightly	26	6	<2	3
	hardness	annually	1	18	18	18
	alkalinity	annually	1	13	13	13
	iron	fortnightly	26	0.06	<0.01	0.03
Little River (1A)	pH	fortnightly	65	7.8	6.2	6.9
	apparent colour	fortnightly	65	14	<2	3
	hardness	annually	1	27	27	27
	alkalinity	annually	1	21	21	21
	iron	fortnightly	65	0.3	0.01	0.04
Maribyrnong (3A)	pH	fortnightly	26	7.7	6.8	7.2
	apparent colour	fortnightly	26	8	2	4
	hardness	annually	1	21	21	21
	alkalinity	annually	1	13	13	13
	iron	fortnightly	26	0.07	0.01	0.05
Moonee Ponds (9B)	pH	fortnightly	26	7.5	6.4	7.2
	apparent colour	fortnightly	27	8	<2	5
	hardness	annually	1	18	18	18
	alkalinity	annually	1	13	13	13
	iron	fortnightly	26	0.08	0.01	0.05

Water sampling locality (locality number)	Parameter	Sampling frequency	No. of samples	Max*	Min*	Average*
Parkville (11)	pH	fortnightly	26	7.3	6.9	7.2
	apparent colour	fortnightly	26	10	2	4
	hardness	annually	1	19	19	19
	alkalinity	annually	1	12	12	12
	iron	fortnightly	26	0.15	<0.01	0.06
Richmond (54)	pH	fortnightly	26	7.6	6.7	7.2
	apparent colour	fortnightly	26	10	2	6
	hardness	annually	1	16	16	16
	alkalinity	annually	1	13	13	13
	iron	fortnightly	26	0.08	0.04	0.07
Strathmore (9A)	pH	fortnightly	26	7.8	6.7	7.2
	apparent colour	fortnightly	26	9	<2	6
	hardness	annually	1	17	17	17
	alkalinity	annually	1	14	14	14
	iron	fortnightly	26	0.07	0.03	0.06
Taylors Lakes (5A)	pH	fortnightly	39	7.8	6.6	7.0
	apparent colour	fortnightly	39	8	2	5
	hardness	annually	1	17	17	17
	alkalinity	annually	1	13	13	13
	iron	fortnightly	39	0.16	0.04	0.09
Tullamarine (7A)	pH	fortnightly	26	9.1	6.6	7.3
	apparent colour	fortnightly	26	8	<2	4
	hardness	annually	1	16	16	16
	alkalinity	annually	1	13	13	13
	iron	fortnightly	26	0.11	<0.01	0.04
Werribee (1)	pH	fortnightly	52	8.9	6.6	7.3
	apparent colour	fortnightly	52	6	<2	3
	hardness	annually	1	20	20	20
	alkalinity	annually	1	14	14	14
	iron	fortnightly	49	0.06	<0.01	0.03
Werribee South (2A)	pH	fortnightly	65	8.4	6.7	7.5
	apparent colour	fortnightly	65	6	<2	3
	hardness	annually	1	20	20	20
	alkalinity	annually	1	14	14	14
	iron	fortnightly	65	0.14	0.01	0.06
Williamstown (3B)	pH	fortnightly	26	7.7	6.8	7.2
	apparent colour	fortnightly	26	8	<2	4
	hardness	annually	1	20	20	20
	alkalinity	annually	1	12	12	12
	iron	fortnightly	26	0.08	0.01	0.05

** Units:* *pH (units); apparent colour (platinum cobalt units); hardness (mg/L as calcium carbonate); alkalinity (mg/L as calcium carbonate); iron (mg/L).*

All 2015-16 water colour, hardness and iron monitoring data complied with the respective ADWG 2011 guideline levels of 15 PCU, 200 mg/L and 0.3 mg/L. There is no guideline for alkalinity. Of the 403 samples tested for pH, there were eight instances where pH readings were not within the ADWG 2011 guideline range of 6.5 to 8.5. Four of these exceeded 8.5 (maximum 9.1) but not the tolerable upper value of 9.2, whilst another four were marginally below 6.5 (minimum 6.3). Such minor variations do not have health implications as, according to ADWG 2011, adverse health effects may occur at pH levels less than 4 or greater than 11.

4. Analysis of results – trends

This part of the report examines:

(a) trends over time of water quality parameters tested that are designated as standards in *Safe Drinking Water Regulations (2005 and 2015)*.

(b) trends over time and between localities of parameters listed in Appendix A tables that have a corresponding Victorian standard or *ADWG 2011* guideline.

Data based on drinking water samples obtained from reticulation system sampling sites (customer taps only to 30 June 2015; customer taps, water mains and service reservoirs/ tanks post 30 June 2015).

4.1 Historical compliance of standard parameters

Table 4.1 summarises trends over time (and extent of compliance) of water quality parameters that are scheduled standards in *Safe Drinking Water Regulations (2005* and *2015)*.

Table 4.1 Compliance time trends of scheduled standard parameters

Parameter	Standard (2005 and 2015 Regulations)	Localities compliant (% of customers supplied with compliant water)			
		2015-16	2014-15	2013-14	2012-13
E. coli	#	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Chloroacetic acid	0.15 mg/L	15 / 15^ (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Dichloroacetic acid	0.1 mg/L	15 / 15^ (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Trichloroacetic acid	0.1 mg/L	15 / 15^ (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Trihalomethanes	0.25 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Bromate	0.02 mg/L	15 / 15^ (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Formaldehyde	0.5 mg/L	15 / 15^ (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Aluminium	0.2 mg/L	15 / 15^ (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Turbidity	*	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)

 # <1 per 100mL in 98% of customer tap samples to 17 July 2015; <1 per 100mL in 100% of all samples post 17 July 2015.
^ applies only to 17 July 2015.
** 95% UCL of mean not to exceed 5.0 NTU to 17 July 2015; 95th percentile not to exceed 5.0 NTU post 17 July 2015.*

A comprehensive outline of our monitoring data for individual localities, together with monitoring frequencies, Victorian standards and *ADWG 2011* guidelines for both health-related and aesthetic water quality data, is contained in Appendix A tables. Contact information for obtaining further details of all water quality testing outlined in this report is provided in the Further Information section on page 30.

4.2 Parameter trends over time and between localities

Analysis of parameter trends over time and between localities is used as a tool to better understand and possibly highlight water quality issues throughout our service area. This part of the report looks at such trends over the past three years in terms of the key parameters listed in Appendix A tables. Graphical representations of trends are contained in Appendix B and briefly discussed below.

E. coli (refer Figure B.1 in Appendix B)

E. coli performance in our drinking water has consistently complied with both the 2005 (98% absence) and 2015 (100% absence) Victorian standards in all water sampling localities.

Free chlorine (refer Figure B.2 in Appendix B)

All of our drinking water supply is disinfected with chlorine. The more active form (free chlorine) is present in all water sampling localities, with levels well within the maximum *ADWG 2011* guideline of 5 mg/L. Nevertheless, average levels amongst individual localities can be markedly different; this being largely due to relative proximity to chlorine dosing points. For example, the Taylors Lakes and Tullamarine localities are situated close to primary chlorination at Greenvale Reservoir, while the Little River and Werribee South localities are served by secondary re-chlorination plants. Year-to-year variations within water sampling localities reflect changes to chlorine dosing rates and bulk water sources.

Aluminium (refer Figure B.3 in Appendix B)

Overall aluminium levels in the water supply are low. Apparent variations at these levels are considered to be related to natural differences in the catchments rather than from artificial treatment dosing. For example, aluminium is only used in water treatment at the Winneke Treatment Plant, yet the water sampling localities more likely to receive water from this source (Moonee Ponds, Parkville, Altona, Werribee) do not exhibit markedly higher aluminium levels as compared with other localities.

Arsenic, cadmium, chromium, cyanide, lead, mercury, zinc

These substances have been monitored on an annual basis. As shown in the Appendix A tables, test results have consistently been either well within guideline levels or below analytical detection limits.

Chloride (refer Figure B.4 in Appendix B)

Chloride levels are quite low and relatively consistent amongst the water sampling localities.

Colour (refer Figure B.5 in Appendix B)

ADWG 2011 refers to 'true colour' of water; however we have continued the historical practice of measuring the more conservative 'apparent colour', which gives higher readings. Nevertheless, our average apparent colour levels have been within the *ADWG 2011* True Colour guideline of 15 PCU. Higher colour levels in the Richmond locality are associated with its traditional bulk supply source from Silvan Reservoir.

Copper (refer Figure B.6 in Appendix B)

Copper levels in the water supply are low and consistently well within the *ADWG 2011* health and aesthetic guidelines.

Electrical conductivity (EC) (refer Figure B.7 in Appendix B)

We measure EC as a surrogate for total dissolved solids (TDS). *ADWG 2011* advises that its TDS guideline level of 600 mg/L can be substituted by an EC level of approximately 900 µs/cm. EC levels are quite low and relatively consistent within each water sampling locality.

Fluoride (refer Figure B.8 in Appendix B)

Fluoride levels in the water supply are the result of fluoridation of the bulk supply (see Section 1.1.1). Dosing is normally controlled such that levels are generally maintained between approximately 0.9 and 1.0 mg/L. However, due to a malfunction in fluoridation at Winneke treatment plant in March 2016 most water sampling localities experienced lower average fluoride levels for 2015-16 (refer part 5 of this report).

Hardness (refer Figure B.9 in Appendix B)

Water hardness levels are quite low and relatively consistent within each water sampling locality.

Iron (refer Figure B.10 in Appendix B)

Overall, slightly higher iron levels in the Caroline Springs, Taylors Lakes and Richmond water sampling localities are consistent with their source water comprising more of the relatively greater iron containing water from Silvan and Greenvale reservoirs. Nevertheless, variations occur due to changes in bulk water sources.

Manganese (refer Figure B.11 in Appendix B)

Manganese levels in the water supply are low and consistently well within the guidelines.

Nitrate (refer Figure B.12 in Appendix B)

Nitrate levels in the water supply are low and consistently well within the guidelines.

pH (refer Figure B.13 in Appendix B)

Average pH levels in all localities are within guideline levels.

Sodium (refer Figure B.14 in Appendix B)

Sodium levels are quite low and relatively consistent among the water sampling localities.

Turbidity (refer Figure B.15 in Appendix B)

Turbidity levels in all localities continue to be less than the standard. Variations between individual water sampling localities are a reflection of their source waters. For example, localities with lower turbidity tend to be supplied more from Sugarloaf/Winneke, while higher turbidity localities tend to be supplied to a greater extent from Silvan and Greenvale reservoirs. Note that comparisons of 2015-16 levels with previous years may be inappropriate due to the changed standard.

Sulphate (refer Figure B.16 in Appendix B)

Sulphate levels are quite low and relatively consistent within each water quality locality. Lower sulphate (as well as sodium, hardness, conductivity and chloride – as per earlier Figures) levels in Caroline Springs, Richmond, Strathmore and Taylors Lakes localities are a reflection of the Silvan reservoir source. At the same time, higher turbidity, iron and colour in these localities also reflects Silvan as the source of the water.

Total trihalomethanes (refer Figure B.17 in Appendix B)

Total trihalomethanes concentrations are relatively low (in comparison with the Victorian standard) and consistent among water sampling localities. Localities with higher levels tend to be more remote from primary chlorination.

Chloroacetic acids

Levels in the water supply are low and consistently well within the Victorian standards (refer part 3.2).

5. Emergency and incident management

This part of the report is for reporting emergencies, incidents and events that may have led to actual or potential hazardous or adverse changes in water supply quality, including those that were reported to Victoria's Department of Health and Human Services in line with Section 22 of the Safe Drinking Water Act 2003.

It is pleasing to note no such events originated within City West Water's area of supply during 2015-16.

However with respect to the bulk water supply, Melbourne Water reported that in March 2016 its Winneke fluoride dosing plant was rendered inoperative due to mechanical failure. Extensive repairs were required and undertaken, with the plant scheduled for recommissioning in mid July 2016. As City West Water receives a significant portion of its bulk water supply from Winneke Treatment Plant (see Part 1.1.1), most water sampling localities experienced lower average fluoride levels for 2015-16, as can be seen in Figure B.8 of Appendix B.

6. Complaints relating to water quality

In 2015-16, City West Water received 243 complaints related to water supply quality. The various categories of complaints were distributed as shown in Table 6.1.

Table 6.1 Water quality related customer complaints received between 1 July 2015 and 30 June 2016

Complaint category	Number of complaints	No. of complaints per 100 customers supplied*	
Discoloured water	187	0.044	(0.052 in 2014-15)
Taste/odour	31	0.007	(0.009 in2014-15)
Air in water	19	0.004	(0.002 in 2014-15)
Other (alleged illness) (blocked filter) (blue-green water)	6 (0) (6) (0)	0.001	(<0.001 in 2014-15)

** Number of customers (properties) at 30 June 2016 determined as 429,000.*

A historical comparison of water quality related complaints received over the last five years is contained in Table 6.2.

Table 6.2 Water quality related customer complaints received over the last five years

Complaint category	Number received				
	2015-16	2014-15	2013-14	2012-13	2011-12
Discoloured water	187	215	102	204	159
Taste/odour	31 (6 chlorine)*	37 (9 chlorine)*	67 (19 chlorine)*	49 (16 chlorine)*	92 (20 chlorine)*
Air in water	19	9	6	10	5
Other (alleged illness) (blocked filter) (blue-green water) (staining)	6 (0) (6) (0) (0)	1 (0) (1) (0) (0)	5 (0) (2) (3) (0)	5 (0) (0) (4) (1)	11 (1) (2) (7) (1)
Total	**243**	**262**	**180**	**268**	**267**
No. of properties	429,000	414,000	403,000	389,000	379,000
Complaints per 100 properties	0.057	0.063	0.045	0.069	0.070

** Number of complaints received of chlorine taste or odour.*

Complaints and responses

We provide individual responses to water quality related complaints. These can range between verbal clarification of perceived issues to onsite investigations and remedial action. In terms of the major complaint categories, our responses are as follows.

Discoloured (e.g. brown) water

Discoloured water is generally caused by the suspension of accumulated natural sediments in water mains. It can be triggered by the opening or closing of valves and reinstatement of mains into service following repairs. Discoloured water can also result from older, rusting internal galvanised iron pipes. Calls to City West Water are assessed by trained staff and, where the discoloured water is deemed to be originating from the water main, targeted mains flushing is generally undertaken.

Alleged illness

Complaints of water related illness are referred to our Water Quality Scientist for detailed discussion, analysis and investigation. Customers may be advised to seek medical advice.

White water (air in water)

White water (water with a cloudy appearance that clarifies within a few minutes) indicates the presence of tiny, harmless air bubbles. It tends to be associated with maintenance and repair works, when air can enter water pipes. As the aerated water is used by customers, its appearance returns to normal. In the past we often responded to customers' concerns with targeted mains flushing, however with increasing emphasis on the need to conserve water, we spend more time on explaining the phenomenon and obtaining customer agreement to not flush water mains.

Blue-green water

On a seemingly random basis, customers at a small number of properties report blue-green water (water that has a cloudy to blue-green appearance, possibly containing blue-green particles, and having an unpleasant bitter taste). This is caused by accelerated corrosion of customers' internal copper water pipes and appears to be restricted to cold water pipes.

Blue-green water must not be consumed (by drinking or in the preparation of food) because it can cause vomiting. The prolonged consumption of water containing elevated copper levels can have adverse health effects.

As blue-green water originates from a property's internal copper pipes, customers can manage the problem by flushing their tap with fresh mains water. This means running their tap until the water becomes clear.

In certain cases, corrosion of copper pipes can lead to perforation and leakage.

Neither the cause(s) of, nor solution to this international and Australia wide copper corrosion phenomenon are well known (apart from replacement of corroding pipes).

We assist customers experiencing copper pipe corrosion by testing copper levels in their water and providing advice on how to best manage the issue of blue-green water. If customers are experiencing blue-green water or have other water quality concerns, they are asked to call us on 132 642 for further information and advice.

Taste or odour

A change in taste or odour of tap water can occur occasionally and is generally apparent as a chlorine-like or earthy, musty sensation. Fluctuations in chlorine levels (and hence, the perception of chlorine taste or odour) occur from time to time, largely due to changed water demands and flow rates. Our response to customers reporting chlorine taste/odour involves providing an explanation, as well as considering changes to chlorine dosing.

Other tastes/odours can result when water flows are slower and during flow reversals in large pipes. In such cases the cause is identified and, where appropriate, a combination of targeted flushing and/or changes to flow regimes are implemented.

7. Findings of the most recent risk management plan audit

Pursuant to the *Safe Drinking Water Act 2003*, we have a documented water quality Risk Management Plan that is subject to independent audit in terms of its content and implementation. Our Plan was audited for the fifth time in March 2016, during which it was examined to determine compliance with the obligations imposed by Section 7(1) of the *Safe Drinking Water Act 2003*. In this regard, the audit:

- determined whether City West Water met all the requirements described under Section 7(1);
- determined whether the Risk Management Plan that met all the specifications in the Act (Section 9) and its Regulations in an effective manner;
- inspected all documents specified in the Regulations;
- determined whether the identified water quality control measures and control measure combinations are in place operationally and are adequate to control water safety risks.

The audit concluded that the water quality Risk Management Plan complies with the obligations imposed by Section 7(1) of the SDWA during the audit period (March 2014 to March 2016). No suggested opportunities for improvement were identified. A copy of the audit certificate is in Appendix C.

Significant portions of the Risk Management Plan are based on our pre-existing HACCP plan which itself is audited internally on a quarterly basis, as well as annually by an external, independent auditor. The HACCP plan specifically addresses issues such as staff training and development, calibration of equipment and maintenance and inspections of assets. Each of these is examined during independent annual audits. The HACCP system is highly regarded and well known in the food industry for protecting the welfare and safety of consumers. It is based on the identification and management of risks (to quality) at key points within a production or product delivery process.

The HACCP certification demonstrates that we attend to those parts of our network and operations that have an impact on water quality. Maintenance of HACCP certification requires continual vigilance and improvements to our water quality management operations. We aim to continue meeting the HACCP requirements.

8. Undertakings under Section 30 of the *Safe Drinking Water Act 2003*

City West Water has not entered into any undertakings with the Department of Health and Human Services, pursuant to section 30 of the Safe Drinking Water Act 2003.

9. Exemptions from water quality standards under Section 20 and conditions imposed under Section 21 of the *Safe Drinking Water Act 2003*

City West Water did not have any Section 20 or Section 21 exemptions in place.

10. Variation to aesthetic standards under Section 19 of the Act and conditions imposed under Section 21 of the *Safe Drinking Water Act 2003*

City West Water did not have any Section 19 variations.

11. Regulated water

Regulated water is water that is the subject of a declaration made by the Minister for Health concerning water that is not drinking water. We do not manage any water supplies that have been declared as 'regulated water'.

In certain cases however, we do supply water from our water distribution mains to customers with privately owned off-takes. Such supplies are provided under a private agreement between City West Water and the customer. The agreement does not guarantee the pressure or quality of the supply downstream of the off-take point, albeit that we endeavour to maintain these. City West Water has embarked on a program to reduce the number of such private supplies.

12. Further Information

For further information on the details of this report or on general water quality matters can be obtained by contacting our Water Quality Scientist, Georges Ruta directly on (03) 9313 8388 or email george.ruta@citywestwater.com.au. Written enquiries can be addressed to Mr Georges Ruta, City West Water, Locked Bag 350, Sunshine, Victoria, 3020

Appendix A Water quality data by locality

Based on results in drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service reservoirs/tanks) tested between 1 July 2015 and 30 June 2016.

Water Sampling Locality	Altona	Locality No.	2
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	97,611

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	170	>weekly	304	304	100%
Total Coliforms	orgs/100mL	N	<1	<1	6	>weekly	305	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	305	305	100%
Free Chlorine	mg/L	5	<0.01	0.14	0.55	>weekly	305	305	100%
Total Chlorine	mg/L	5	<0.05	0.22	0.67	>weekly	305	305	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.07	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.8	4.8	4.8	annually	1	-	-
Chloride	mg/L	250	13	13	13	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	4	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	66	94	130	fortnightly	26	26	100%
Copper	mg/L	1	0.003	0.003	0.003	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.40	0.80	0.95	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	19	19	19	annually	1	1	100%
Iron	mg/L	0.3	0.01	0.04	0.12	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.7	1.7	1.7	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.004	0.020	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.62	0.62	0.62	annually	1	1	100%
pH	units	6.5-8.5	6.9	7.3	8.8	fortnightly	26	25	96%
pH	units	6.5-9.2	6.9	7.3	8.8	fortnightly	26	26	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	2.7	2.7	2.7	annually	1	1	100%
Sodium	mg/L	180	6.9	6.9	6.9	annually	1	1	100%
Sulphate	mg/L	250	5.1	5.1	5.1	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	52	52	52	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.7[1]	1.8	weekly	52	-	within standard
Zinc	mg/L	3	0.002	0.002	0.002	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.005	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.008	0.013	0.019	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.026	0.043	0.066	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.045	0.061	0.088	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.005	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	0.011	0.021	0.028	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Caroline Springs	Locality No.	5
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	87,947

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	5900	>weekly	278	277	99.6%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	278	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	278	278	100%
Free Chlorine	mg/L	5	<0.01	0.19	0.71	>weekly	278	278	100%
Total Chlorine	mg/L	5	<0.05	0.29	0.81	>weekly	278	278	100%
Alkalinity (as $CaCO_3$)	mg/L	N	17	17	17	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.01	0.02	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	6.7	6.7	6.7	annually	1	-	-
Chloride	mg/L	250	11	11	11	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	4	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	57	85	130	fortnightly	26	26	100%
Copper	mg/L	1	0.021	0.021	0.021	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.17	0.88	0.97	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	21	21	21	annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.05	0.12	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.1	1.1	1.1	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.003	0.009	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.28	0.28	0.28	annually	1	1	100%
pH	units	6.5-8.5	6.7	7.1	7.6	fortnightly	26	26	100%
pH	units	6.5-9.2	6.7	7.1	7.6	fortnightly	26	26	100%
Potassium	mg/L	N	0.8	0.8	0.8	annually	1	-	-
Silica (SiO_2)	mg/L	80	1.9	1.9	1.9	annually	1	1	100%
Sodium	mg/L	180	5.4	5.4	5.4	annually	1	1	100%
Sulphate	mg/L	250	2.7	2.7	2.7	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	44	44	44	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	1.2[1]	1.3	weekly	52	-	within standard
Zinc	mg/L	3	0.002	0.002	0.002	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.003	0.008	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.003	0.008	0.014	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.010	0.020	0.054	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.015	0.031	0.065	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.007	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.005	0.012	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU).
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Deer Park	Locality No.	4
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	53,687

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	85	>weekly	184	184	100%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	184	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	184	184	100%
Free Chlorine	mg/L	5	<0.01	0.19	0.54	>weekly	184	184	100%
Total Chlorine	mg/L	5	<0.05	0.28	0.66	>weekly	184	184	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.02	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.7	4.7	4.7	annually	1	-	-
Chloride	mg/L	250	12	12	12	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	74	104	130	fortnightly	26	26	100%
Copper	mg/L	1	0.008	0.008	0.008	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.18	0.82	0.96	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	18	18	18	annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.03	0.07	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.7	1.7	1.7	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.002	0.009	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.41	0.41	0.41	annually	1	1	100%
pH	units	6.5-8.5	6.9	7.3	8.5	fortnightly	26	26	100%
pH	units	6.5-9.2	6.9	7.3	8.5	fortnightly	26	26	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	1.7	1.7	1.7	annually	1	1	100%
Sodium	mg/L	180	6.0	6.0	6.0	annually	1	1	100%
Sulphate	mg/L	250	3.6	3.6	3.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	48	48	48	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.5[1]	0.6	weekly	52	-	within standard
Zinc	mg/L	3	0.005	0.005	0.005	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.006	0.010	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.007	0.013	0.018	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.011	0.021	0.043	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.025	0.040	0.065	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.005	0.014	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	East Keilor	Locality No.	6
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	38,063

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	41	>weekly	147	147	100%
Total Coliforms	orgs/100mL	N	<1	<1	3	>weekly	147	-	-
E. coli	orgs/100mL	100%<1#	<1	<1	<1	>weekly	147	147	100%
Free Chlorine	mg/L	5	<0.01	0.28	0.78	>weekly	147	147	100%
Total Chlorine	mg/L	5	<0.05	0.36	0.82	>weekly	147	147	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.03	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.5	4.5	4.5	annually	1	-	-
Chloride	mg/L	250	11	11	11	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	70	103	130	fortnightly	26	26	100%
Copper	mg/L	1	0.007	0.007	0.007	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.12	0.83	0.97	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	18	18	18	annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.03	0.06	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.002	0.008	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.39	0.39	0.39	annually	1	1	100%
pH	units	6.5-8.5	6.6	7.2	7.9	fortnightly	26	26	100%
pH	units	6.5-9.2	6.6	7.2	7.9	fortnightly	26	26	100%
Potassium	mg/L	N	0.8	0.8	0.8	annually	1	-	-
Silica (SiO_2)	mg/L	80	1.8	1.8	1.8	annually	1	1	100%
Sodium	mg/L	180	5.4	5.4	5.4	annually	1	1	100%
Sulphate	mg/L	250	3.1	3.1	3.1	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.1	2.1	2.1	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	28	28	28	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.9[1]	4.2	weekly	52	-	within standard
Zinc	mg/L	3	0.003	0.003	0.003	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.005	0.011	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.005	0.011	0.018	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.007	0.020	0.047	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.020	0.036	0.062	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.006	0.015	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Little River	Locality No.	1A
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	625

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37oC)	orgs/mL	1000*	<1	<1	2700	>weekly	122	121	99.2%
Total Coliforms	orgs/100mL	N	<1	<1	3	>weekly	122	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	122	122	100%
Free Chlorine	mg/L	5	<0.05	0.21	0.59	>weekly	122	122	100%
Total Chlorine	mg/L	5	<0.05	0.29	0.70	>weekly	122	122	100%
Alkalinity (as $CaCO_3$)	mg/L	N	21	21	21	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.12	>weekly	64	64	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	8.5	8.5	8.5	annually	1	-	-
Chloride	mg/L	250	14	14	14	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	14	>weekly	65	65	100%
Conductivity	µS/cm	~900	78	113	160	>weekly	65	65	100%
Copper	mg/L	1	0.015	0.015	0.015	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.29	0.82	1.0	>weekly	67	67	100%
Hardness (as $CaCO_3$)	mg/L	200	27	27	27	annually	1	1	100%
Iron	mg/L	0.3	0.01	0.04	0.3	>weekly	65	65	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.003	0.052	>weekly	65	65	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.66	0.66	0.66	annually	1	1	100%
pH	units	6.5-8.5	6.2	6.9	7.8	>weekly	65	60	92.3%
pH	units	6.5-9.2	6.2	6.9	7.8	>weekly	65	60	92.3%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	3.0	3.0	3.0	annually	1	1	100%
Sodium	mg/L	180	7.0	7.0	7.0	annually	1	1	100%
Sulphate	mg/L	250	4.1	4.1	4.1	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.5	2.5	2.5	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	48	48	48	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.6[1]	4.9	>weekly	93	-	within standard
Zinc	mg/L	3	0.002	0.002	0.002	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.006	0.011	weekly	52	-	-
Dichlorobromomethane	mg/L	N	0.090	0.015	0.023	weekly	52	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	weekly	52	-	-
Chloroform	mg/L	N	0.022	0.032	0.059	weekly	52	-	-
Total Trihalomethanes	mg/L	0.25	0.042	0.054	0.076	weekly	52	52	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	>fortnightly	32	32	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.007	>fortnightly	32	32	100%
Trichloroacetic acid	mg/L	0.1	0.009	0.015	0.024	>fortnightly	32	32	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Maribyrnong	Locality No.	3A
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	101,272

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	72	>weekly	358	358	100%
Total Coliforms	orgs/100mL	N	<1	<1	1	>weekly	358	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	358	358	100%
Free Chlorine	mg/L	5	<0.01	0.19	0.50	>weekly	358	358	100%
Total Chlorine	mg/L	5	<0.1	0.28	0.61	>weekly	358	358	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.04	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	5.8	5.8	5.8	annually	1	-	-
Chloride	mg/L	250	15	15	15	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	2	4	8	fortnightly	26	26	100%
Conductivity	µS/cm	~900	67	85	120	fortnightly	26	26	100%
Copper	mg/L	1	0.016	0.016	0.016	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.36	0.80	0.96	>fortnightly	29	29	100%
Hardness (as $CaCO_3$)	mg/L	200	21	21	21	annually	1	1	100%
Iron	mg/L	0.3	0.01	0.05	0.07	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.004	0.008	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.15	1.15	1.15	annually	1	1	100%
pH	units	6.5-8.5	6.8	7.2	7.7	fortnightly	26	26	100%
pH	units	6.5-9.2	6.8	7.2	7.7	fortnightly	26	26	100%
Potassium	mg/L	N	1.0	1.0	1.0	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.0	4.0	4.0	annually	1	1	100%
Sodium	mg/L	180	7.5	7.5	7.5	annually	1	1	100%
Sulphate	mg/L	250	6.3	6.3	6.3	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	55	55	55	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.8[1]	0.9	weekly	52	-	within standard
Zinc	mg/L	3	0.003	0.003	0.003	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.004	0.008	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.007	0.012	0.016	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.018	0.048	0.066	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.043	0.064	0.076	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	0.018	0.024	0.032	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Moonee Ponds	Locality No.	9B
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	68,395

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	6	>weekly	226	226	100%
Total Coliforms	orgs/100mL	N	<1	<1	<1	>weekly	226	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	226	226	100%
Free Chlorine	mg/L	5	<0.01	0.14	0.51	>weekly	226	226	100%
Total Chlorine	mg/L	5	<0.05	0.22	0.57	>weekly	226	226	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.04	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.5	4.5	4.5	annually	1	-	-
Chloride	mg/L	250	12	12	12	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	5	8	fortnightly	27	27	100%
Conductivity	µS/cm	~900	66	80	120	fortnightly	26	26	100%
Copper	mg/L	1	0.007	0.007	0.007	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.59	0.85	0.96	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	18	18	18	annually	1	1	100%
Iron	mg/L	0.3	0.01	0.05	0.08	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.005	0.011	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.97	0.97	0.97	annually	1	1	100%
pH	units	6.5-8.5	6.4	7.2	7.5	fortnightly	26	25	96%
pH	units	6.5-9.2	6.4	7.2	7.5	fortnightly	26	25	96%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.7	4.7	4.7	annually	1	1	100%
Sodium	mg/L	180	6.0	6.0	6.0	annually	1	1	100%
Sulphate	mg/L	250	4.2	4.2	4.2	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.8	1.8	1.8	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	42	42	42	annually	1	1	100%
Turbidity	NTU	5[1]	0.3	0.9[1]	1.3	weekly	52	-	within standard
Zinc	mg/L	3	0.003	0.003	0.003	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.001	0.003	0.008	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.006	0.011	0.016	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.018	0.045	0.063	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.043	0.059	0.074	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.006	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	0.011	0.024	0.033	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Parkville	Locality No.	11
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	111,305

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	71	>weekly	366	366	100%
Total Coliforms	orgs/100mL	N	<1	<1	1	>weekly	367	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	367	367	100%
Free Chlorine	mg/L	5	<0.01	0.21	0.68	>weekly	367	367	100%
Total Chlorine	mg/L	5	<0.05	0.31	0.75	>weekly	367	367	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.05	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.7	4.7	4.7	annually	1	-	-
Chloride	mg/L	250	14	14	14	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	2	4	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	58	83	120	fortnightly	26	26	100%
Copper	mg/L	1	0.013	0.013	0.013	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.30	0.80	0.95	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	19	19	19	annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.06	0.15	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.8	1.8	1.8	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.005	0.015	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.20	1.20	1.20	annually	1	1	100%
pH	units	6.5-8.5	6.9	7.2	7.3	fortnightly	26	26	100%
pH	units	6.5-9.2	6.9	7.2	7.3	fortnightly	26	26	100%
Potassium	mg/L	N	1.0	1.0	1.0	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.0	4.0	4.0	annually	1	1	100%
Sodium	mg/L	180	7.2	7.2	7.2	annually	1	1	100%
Sulphate	mg/L	250	5.6	5.6	5.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.8	1.8	1.8	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	45	45	45	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.9[1]	1.0	weekly	52	-	within standard
Zinc	mg/L	3	0.005	0.005	0.005	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.004	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.007	0.012	0.017	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.021	0.045	0.061	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.048	0.061	0.074	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.008	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	0.014	0.024	0.035	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Richmond	Locality No.	54
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	20,646

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	64	>weekly	104	104	100%
Total Coliforms	orgs/100mL	N	<1	<1	8	>weekly	104	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	104	104	100%
Free Chlorine	mg/L	5	<0.01	0.15	0.52	>weekly	104	104	100%
Total Chlorine	mg/L	5	<0.05	0.23	0.62	>weekly	104	104	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.02	0.03	0.04	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.0	4.0	4.0	annually	1	-	-
Chloride	mg/L	250	8	8	8	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	2	6	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	56	62	90	fortnightly	26	26	100%
Copper	mg/L	1	0.010	0.010	0.010	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.82	0.88	0.93	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	16	16	16	annually	1	1	100%
Iron	mg/L	0.3	0.04	0.07	0.08	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Manganese	mg/L	0.1	0.003	0.006	0.012	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.66	0.66	0.66	annually	1	1	100%
pH	units	6.5-8.5	6.7	7.2	7.6	fortnightly	26	26	100%
pH	units	6.5-9.2	6.7	7.2	7.6	fortnightly	26	26	100%
Potassium	mg/L	N	0.7	0.7	0.7	annually	1	-	-
Silica (SiO_2)	mg/L	80	5.8	5.8	5.8	annually	1	1	100%
Sodium	mg/L	180	4.3	4.3	4.3	annually	1	1	100%
Sulphate	mg/L	250	1.7	1.7	1.7	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.8	1.8	1.8	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	31	31	31	annually	1	1	100%
Turbidity	NTU	5[1]	0.3	0.9[1]	1.0	weekly	52	-	within standard
Zinc	mg/L	3	0.004	0.004	0.004	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	<0.001	0.004	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.006	0.010	0.013	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.050	0.062	0.084	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.060	0.074	0.094	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.006	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	0.010	0.029	0.043	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Strathmore	Locality No.	9A
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	8,917

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	41	>weekly	78	78	100%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	78	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	78	78	100%
Free Chlorine	mg/L	5	<0.01	0.05	0.18	>weekly	78	78	100%
Total Chlorine	mg/L	5	<0.05	0.11	0.27	>weekly	78	78	100%
Alkalinity (as $CaCO_3$)	mg/L	N	14	14	14	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.04	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.7	4.7	4.7	annually	1	-	-
Chloride	mg/L	250	32	32	32	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	6	9	fortnightly	26	26	100%
Conductivity	µS/cm	~900	61	71	100	fortnightly	26	26	100%
Copper	mg/L	1	0.003	0.003	0.003	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.60	0.85	0.96	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	17	17	17	annually	1	1	100%
Iron	mg/L	0.3	0.03	0.06	0.07	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Manganese	mg/L	0.1	0.003	0.005	0.013	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.71	0.71	0.71	annually	1	1	100%
pH	units	6.5-8.5	6.7	7.2	7.8	fortnightly	26	26	100%
pH	units	6.5-9.2	6.7	7.2	7.8	fortnightly	26	26	100%
Potassium	mg/L	N	0.8	0.8	0.8	annually	1	-	-
Silica (SiO_2)	mg/L	80	5.3	5.3	5.3	annually	1	1	100%
Sodium	mg/L	180	4.5	4.5	4.5	annually	1	1	100%
Sulphate	mg/L	250	2.3	2.3	2.3	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.7	1.7	1.7	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	34	34	34	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.9[1]	1.4	weekly	52	-	within standard
Zinc	mg/L	3	0.003	0.003	0.003	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.002	0.005	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.007	0.010	0.014	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.034	0.052	0.068	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.053	0.064	0.077	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.006	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.016	0.028	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Taylors Lakes	Locality No.	5A
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	63,394

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	3900	>weekly	235	229	97.5%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	235	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	235	235	100%
Free Chlorine	mg/L	5	<0.01	0.43	0.87	>weekly	235	235	100%
Total Chlorine	mg/L	5	<0.01	0.53	1.00	>weekly	235	235	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.01	0.02	>fortnightly	38	38	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	4.7	4.7	4.7	annually	1	-	-
Chloride	mg/L	250	9	9	9	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	2	5	8	>fortnightly	39	39	100%
Conductivity	µS/cm	~900	59	67	86	>fortnightly	39	39	100%
Copper	mg/L	1	0.007	0.007	0.007	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.66	0.92	1.0	>fortnightly	41	41	100%
Hardness (as $CaCO_3$)	mg/L	200	17	17	17	annually	1	1	100%
Iron	mg/L	0.3	0.04	0.09	0.16	>fortnightly	39	39	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.009	0.044	>fortnightly	39	39	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.12	0.12	0.12	annually	1	1	100%
pH	units	6.5-8.5	6.6	7.0	7.8	>fortnightly	39	39	100%
pH	units	6.5-9.2	6.6	7.0	7.8	>fortnightly	39	39	100%
Potassium	mg/L	N	0.7	0.7	0.7	annually	1	-	-
Silica (SiO_2)	mg/L	80	1.5	1.5	1.5	annually	1	1	100%
Sodium	mg/L	180	4.3	4.3	4.3	annually	1	1	100%
Sulphate	mg/L	250	1.6	1.6	1.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.8	1.8	1.8	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	38	38	38	annually	1	1	100%
Turbidity	NTU	5[1]	0.4	1.6[1]	2.6	>weekly	65	-	within standard
Zinc	mg/L	3	0.003	0.003	0.003	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	<0.001	0.002	fortnightly	26	-	-
Dichlorobromomethane	mg/L	N	0.002	0.005	0.010	fortnightly	26	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	fortnightly	26	-	-
Chloroform	mg/L	N	0.009	0.019	0.052	fortnightly	26	-	-
Total Trihalomethanes	mg/L	0.25	0.012	0.025	0.063	fortnightly	26	26	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	17	17	100%
Dichloroacetic acid	mg/L	0.1	<0.005	0.004	0.009	^	17	17	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.005	0.013	^	17	17	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ fortnightly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Tullamarine	Locality No.	7A
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	9,833

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	200	>weekly	78	78	100%
Total Coliforms	orgs/100mL	N	<1	<1	10	>weekly	78	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	78	78	100%
Free Chlorine	mg/L	5	<0.05	0.29	0.60	>weekly	78	78	100%
Total Chlorine	mg/L	5	0.05	0.38	0.68	>weekly	78	78	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.03	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	4.1	4.1	4.1	annually	1	-	-
Chloride	mg/L	250	9	9	9	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	4	8	fortnightly	26	26	100%
Conductivity	µS/cm	~900	59	96	130	fortnightly	26	26	100%
Copper	mg/L	1	0.003	0.003	0.003	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.03	0.76	0.96	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	16	16	16	annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.04	0.11	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.5	1.5	1.5	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.003	0.029	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.12	0.12	0.12	annually	1	1	100%
pH	units	6.5-8.5	6.6	7.3	9.1	fortnightly	26	25	96%
pH	units	6.5-9.2	6.6	7.3	9.1	fortnightly	26	26	100%
Potassium	mg/L	N	0.7	0.7	0.7	annually	1	-	-
Silica (SiO_2)	mg/L	80	1.5	1.5	1.5	annually	1	1	100%
Sodium	mg/L	180	4.3	4.3	4.3	annually	1	1	100%
Sulphate	mg/L	250	1.4	1.4	1.4	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	35	35	35	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.9[1]	4.6	weekly	52	-	within standard
Zinc	mg/L	3	0.007	0.007	0.007	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.003	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.003	0.007	0.015	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.007	0.015	0.022	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.013	0.026	0.039	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.006	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.006	0.012	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually..

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Werribee	Locality No.	1
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	124,833

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	2600	>weekly	446	444	99.6%
Total Coliforms	orgs/100mL	N	<1	<1	9	>weekly	446	-	-
E. coli	orgs/100mL	100%<1#	<1	<1	<1	>weekly	446	446	100%
Free Chlorine	orgs/mL	5	<0.01	0.21	0.62	>weekly	446	446	100%
Total Chlorine	orgs/100mL	5	<0.05	0.29	0.73	>weekly	446	446	100%
Alkalinity (as $CaCO_3$)	orgs/100mL	N	14	14	14	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.03	>weekly	57	57	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	5.2	5.2	5.2	annually	1	-	-
Chloride	mg/L	250	13	13	13	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	mg/L	25**	<2	3	6	weekly	52	52	100%
Conductivity	µS/cm	-900	74	102	130	weekly	52	52	100%
Copper	mg/L	1	0.003	0.003	0.003	annually	1	1	100%
Cyanide	Pt/Co	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mS/cm	1.5	0.30	0.82	0.95	weekly	54	54	100%
Hardness (as $CaCO_3$)	mg/L	200	20	20	20	annually	1	1	100%
Iron	mg/L	0.3	<0.01	0.03	0.06	weekly	49	49	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.003	0.007	weekly	52	52	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.62	0.62	0.62	annually	1	1	100%
pH	mg/L	6.5-8.5	6.6	7.3	8.9	fortnightly	52	50	96.2%
pH	mg/L	6.5-9.2	6.6	7.3	8.9	fortnightly	52	52	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	units	80	2.7	2.7	2.7	annually	1	1	100%
Sodium	units	180	6.7	6.7	6.7	annually	1	1	100%
Sulphate	mg/L	250	4.2	4.2	4.2	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	55	55	55	annually	1	1	100%
Turbidity	mg/L	5[1]	<0.1	0.6[1]	1.1	>weekly	77	-	within standard
Zinc	mg/L	3	0.004	0.004	0.004	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.006	0.011	>fortnightly	39	-	-
Dichlorobromomethane	NTU	N	0.009	0.014	0.021	>fortnightly	39	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	>fortnightly	39	-	-
Chloroform	mg/L	N	0.021	0.030	0.050	>fortnightly	39	-	-
Total Trihalomethanes	mg/L	0.25	0.037	0.050	0.069	>fortnightly	39	39	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	fortnightly	23	23	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.005	fortnightly	23	23	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.011	0.022	fortnightly	23	23	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Werribee South	Locality No.	2A
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	807

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	13	>weekly	117	117	100%
Total Coliforms	orgs/100mL	N	<1	<1	78	>weekly	117	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	>weekly	117	117	100%
Free Chlorine	mg/L	5	<0.01	0.25	0.73	>weekly	117	117	100%
Total Chlorine	mg/L	5	<0.05	0.32	0.85	>weekly	117	117	100%
Alkalinity (as $CaCO_3$)	mg/L	N	14	14	14	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.01	0.03	>weekly	64	64	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	5.3	5.3	5.3	annually	1	-	-
Chloride	mg/L	250	13	13	13	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	6	>weekly	65	65	100%
Conductivity	µS/cm	~900	76	103	130	>weekly	65	65	100%
Copper	mg/L	1	0.009	0.009	0.009	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.30	0.85	0.95	>weekly	67	67	100%
Hardness (as $CaCO_3$)	mg/L	200	20	20	20	annually	1	1	100%
Iron	mg/L	0.3	0.01	0.06	0.14	>weekly	65	65	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.002	0.013	>weekly	65	65	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.62	0.62	0.62	annually	1	1	100%
pH	units	6.5-8.5	6.7	7.5	8.4	>weekly	65	65	100%
pH	units	6.5-9.2	6.7	7.5	8.4	>weekly	65	65	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	2.6	2.6	2.6	annually	1	1	100%
Sodium	mg/L	180	6.9	6.9	6.9	annually	1	1	100%
Sulphate	mg/L	250	4.1	4.1	4.1	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	42	42	42	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.7[1]	1.9	>weekly	97	-	within standard
Zinc	mg/L	3	0.001	0.001	0.001	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.003	0.011	weekly	52	-	-
Dichlorobromomethane	mg/L	N	0.001	0.008	0.024	weekly	52	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	weekly	52	-	-
Chloroform	mg/L	N	<0.001	0.018	0.052	weekly	52	-	-
Total Trihalomethanes	mg/L	0.25	0.002	0.029	0.076	weekly	52	52	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	>fortnightly	32	32	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	>fortnightly	32	32	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.009	0.025	>fortnightly	32	32	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	Williamstown	Locality No.	3B
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	35,996

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	10	>weekly	144	144	100%
Total Coliforms	orgs/mL	N	<1	<1	2	>weekly	144	-	-
E. coli	orgs/mL	100%<1[#]	<1	<1	<1	>weekly	144	144	100%
Free Chlorine	mg/L	5	<0.01	0.20	0.58	>weekly	144	144	100%
Total Chlorine	mg/L	5	<0.05	0.28	0.65	>weekly	144	144	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.05	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	5.0	5.0	5.0	annually	1	-	-
Chloride	mg/L	250	15	15	15	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	4	8	fortnightly	26	26	100%
Conductivity	µS/cm	~900	66	87	120	fortnightly	26	26	100%
Copper	mg/L	1	0.009	0.009	0.009	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.32	0.77	0.95	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	20	20	20	annually	1	1	100%
Iron	mg/L	0.3	0.01	0.05	0.08	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.9	1.9	1.9	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.004	0.011	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.33	1.33	1.33	annually	1	1	100%
pH	units	6.5-8.5	6.8	7.2	7.7	fortnightly	26	26	100%
pH	units	6.5-9.2	6.8	7.2	7.7	fortnightly	26	26	100%
Potassium	mg/L	N	1.0	1.0	1.0	annually	1	-	-
Silica (SiO_2)	mg/L	80	3.7	3.7	3.7	annually	1	1	100%
Sodium	mg/L	180	7.9	7.9	7.9	annually	1	1	100%
Sulphate	mg/L	250	6.6	6.6	6.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	45	45	45	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.7[1]	4.0	weekly	52	-	within standard
Zinc	mg/L	3	0.008	0.008	0.008	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.004	0.008	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.008	0.012	0.017	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.024	0.047	0.064	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.050	0.064	0.077	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	^	9	9	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.007	^	9	9	100%
Trichloroacetic acid	mg/L	0.1	0.017	0.025	0.032	^	9	9	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.
^ monthly to January 2016, hence annually.

Appendix A Water quality data by locality (cont'd)

Water Sampling Locality	ALL WATER SAMPLING LOCALITIES		
For period	1 July 2015 to 30 June 2016	Population (2011 Census)	823,331

Parameter	Unit	Guideline Value *(ADWG 2011)*	Concentration or value (all samples)			No. of Samples		Performance against standard / guideline
			Min	Mean[G]	Max	Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	5,900	3162	3152	99.7%
Total Coliforms	orgs/100mL	N	<1	<1	200	3164	-	-
E. coli	orgs/100mL	100%<1[#]	<1	<1	<1	3164	3164	100%
Free Chlorine	mg/L	5	<0.01	0.21	0.87	3164	3164	100%
Total Chlorine	mg/L	5	<0.01	0.30	1.0	3164	3164	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	14	21	15	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.12	492	492	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	15	15	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	15	15	100%
Calcium	mg/L	N	4.0	5.2	8.5	15	-	-
Chloride	mg/L	250	8.0	13.4	32.0	15	15	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	15	15	100%
Colour	Pt/Co	25**	<2	4	14	507	507	100%
Conductivity	µS/cm	~900	56	92	160	507	507	100%
Copper	mg/L	1	0.003	0.009	0.02	15	15	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	15	15	100%
Dissolved Oxygen	mg/L	N	5.2	9.7	11.8	26	-	-
Fluoride	mg/L	1.5	<0.05	0.83	1.0	533	533	100%
Hardness (as $CaCO_3$)	mg/L	200	16	19	27	15	15	100%
Iron	mg/L	0.3	0.01	0.05	0.33	507	507	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	15	15	100%
Magnesium	mg/L	N	1.1	1.6	1.9	15	-	-
Manganese	mg/L	0.1	<0.001	0.004	0.052	507	507	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	15	15	100%
Nitrate (NO_3)	mg/L	50	0.12	0.68	1.28	15	15	100%
pH	units	6.5-8.5	6.2	7.2	9.1	507	497	98.0%
pH	units	6.5-9.2	6.2	7.2	9.1	507	501	98.8%
Potassium	mg/L	N	0.7	0.9	1.0	15	-	-
Silica (SiO_2)	mg/L	80	1.5	3.2	5.8	15	15	100%
Sodium	mg/L	180	4.3	6.0	7.9	15	15	100%
Sulphate	mg/L	250	1.4	3.8	6.6	15	15	100%
Temperature	°C	N	10.9	17.6	25.3	26	-	-
Total Organic Carbon	mg/L	N	1.4	1.8	2.5	15	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	15	-	-
Total Dissolved Solids	mg/L	600	28	43	55	15	15	100%
Turbidity	NTU	5[1]	<0.1	0.9[1]	4.9	898	-	within standard
Zinc	mg/L	3	0.001	0.004	0.008	15	15	100%
Dibromochloromethane	mg/L	N	<0.001	0.004	0.011	312	-	-
Dichlorobromomethane	mg/L	N	<0.001	0.011	0.024	312	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	312	-	-
Chloroform	mg/L	N	<0.001	0.031	0.084	312	-	-
Total Trihalomethanes	mg/L	0.25	0.002	0.046	0.094	312	312	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	203	203	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.009	203	203	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.014	0.043	203	203	100%

* Internal City West Water guideline.
** Guideline set for "True Colour" (15 PCU) however "Apparent Colour" is measured (with a benchmark guideline of 25 PCU)
N No guideline/standard set for this parameter.
Victorian standard: 100% of samples must not contain any *E. coli*/100mL.
G Geometric means shown for bacterial parameters.
[1] Victorian standard: 95th percentile (shown) less than or equal to 5 NTU.

Appendix B Spatial and time-based water quality summaries

(based on drinking water samples obtained from reticulation system sampling sites (customer taps only to 30 June 2015; customer taps, water mains and service reservoirs/tanks post 30 June 2015)

Figure B.1 ***E. coli* performance in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**

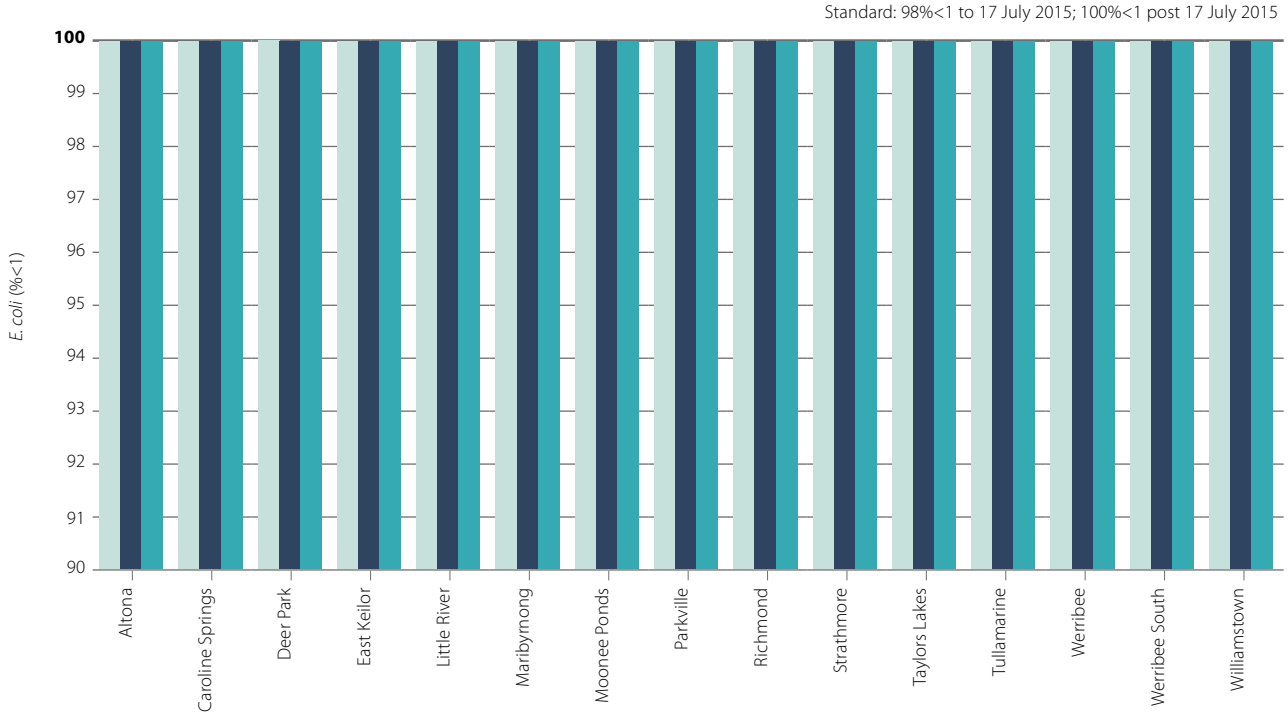
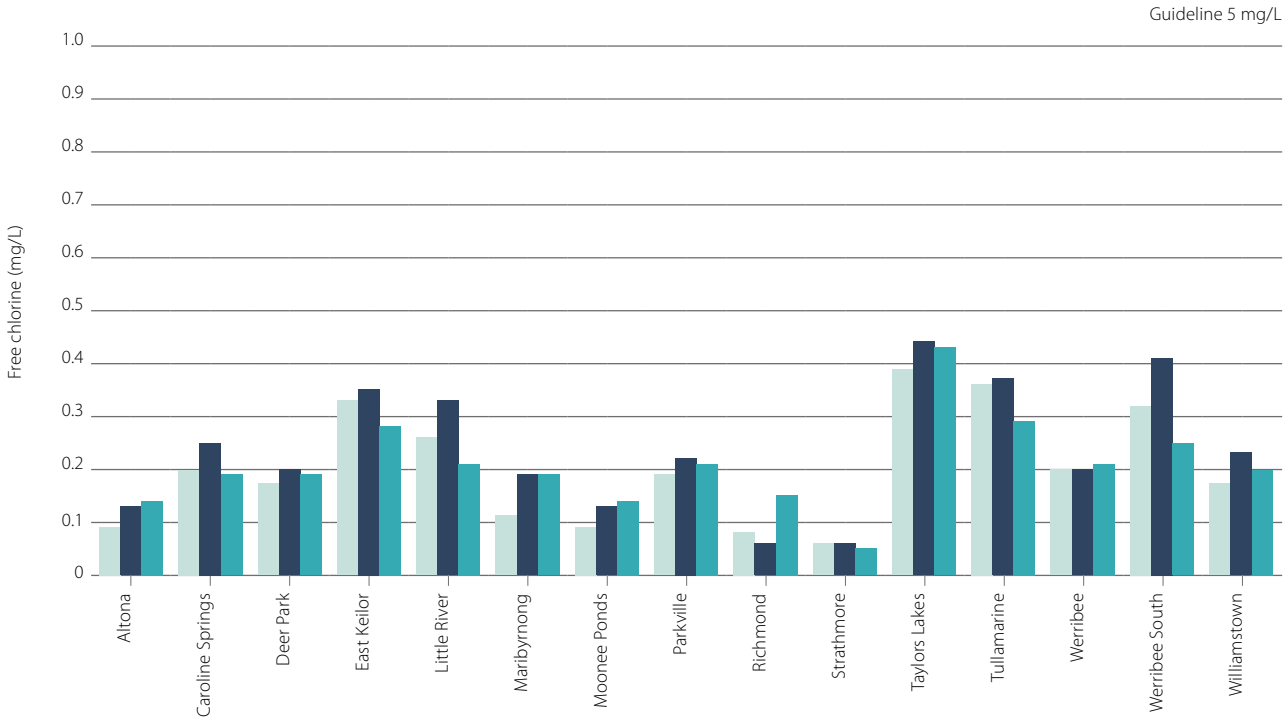


Figure B.2 **Annual average free chlorine concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.3 **Average aluminium concentrations in water sampling localities (between 2013-2014 and 2015-2016, from left to right within each locality)**

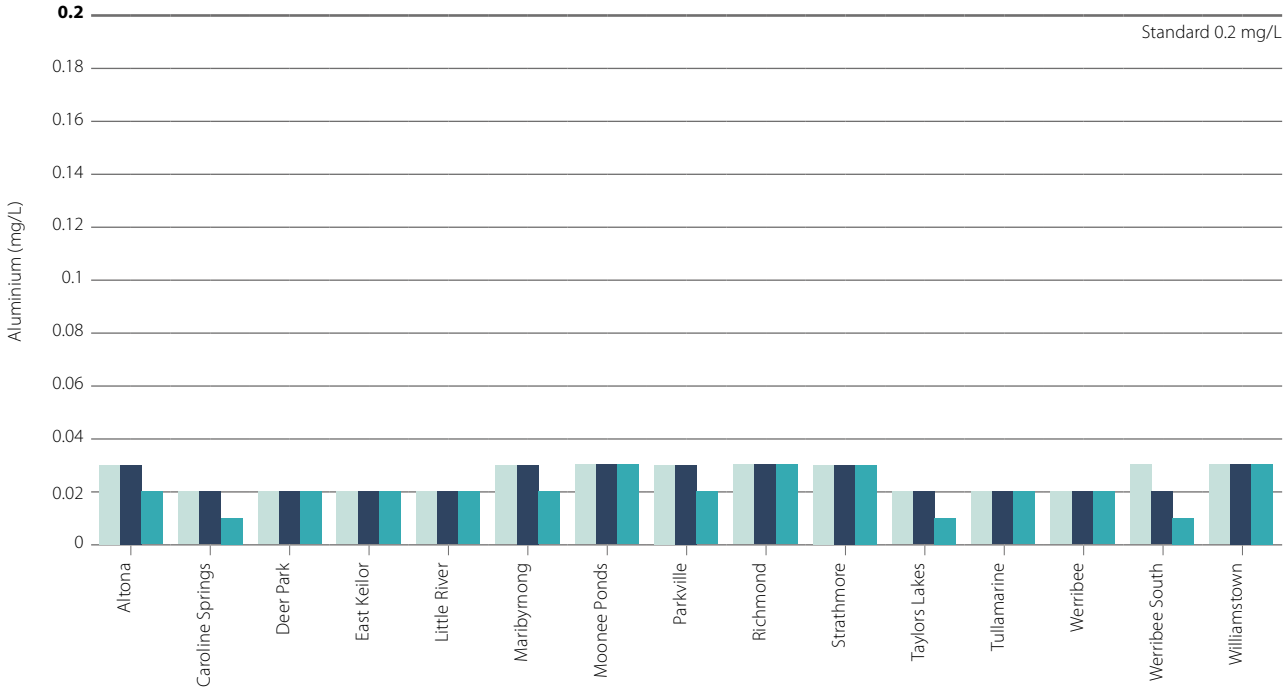
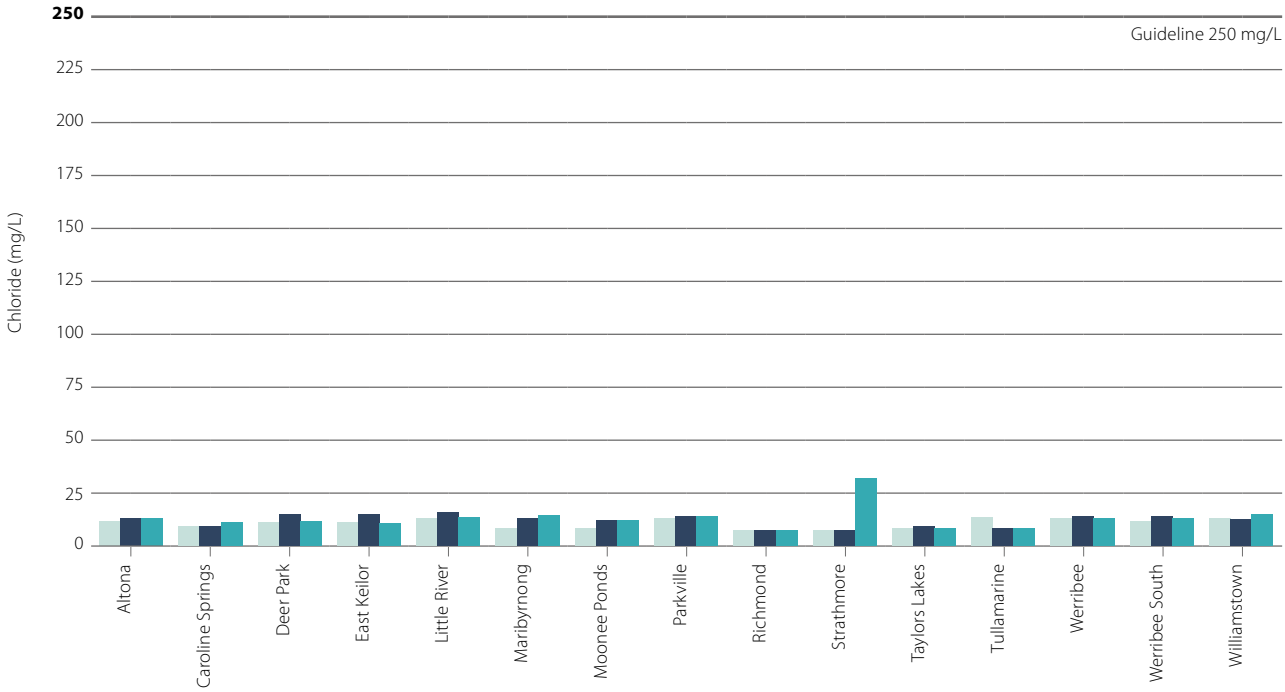


Figure B.4 **Chloride concentrations in water sampling localities (between 2013-2014 and 2015-2016, from left to right within each locality)**



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.5 **Average apparent colour levels in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**

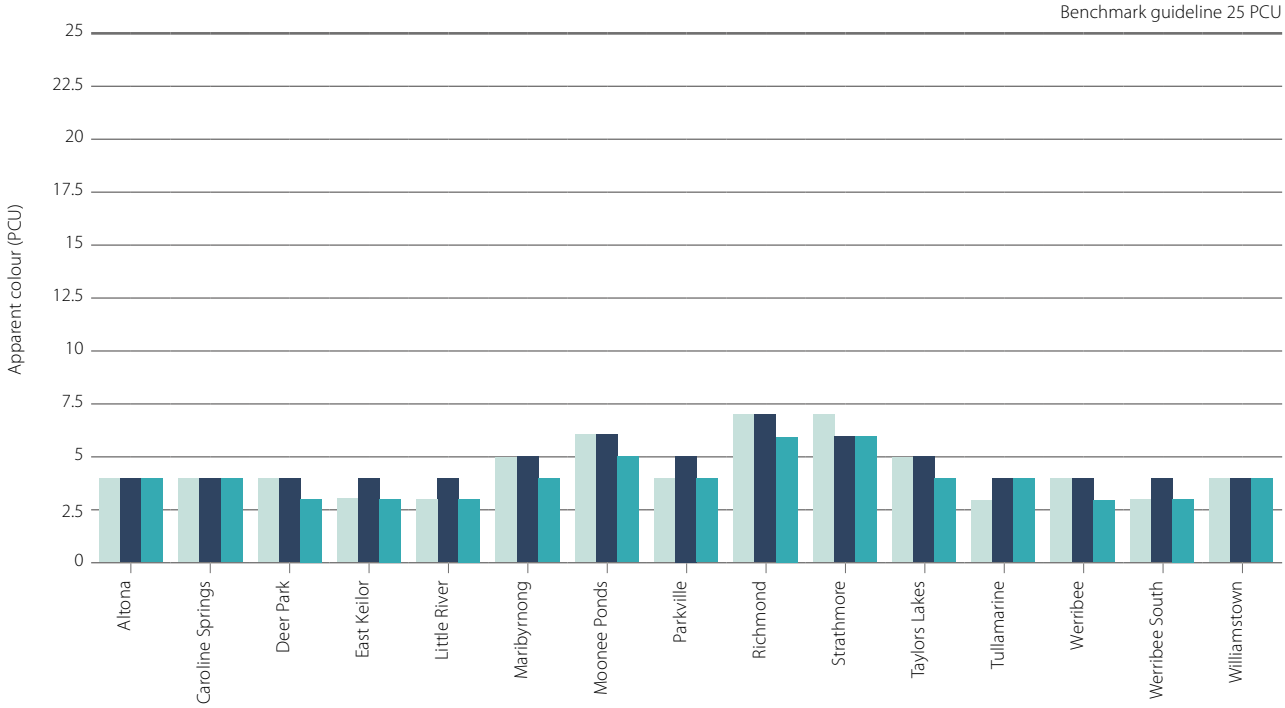
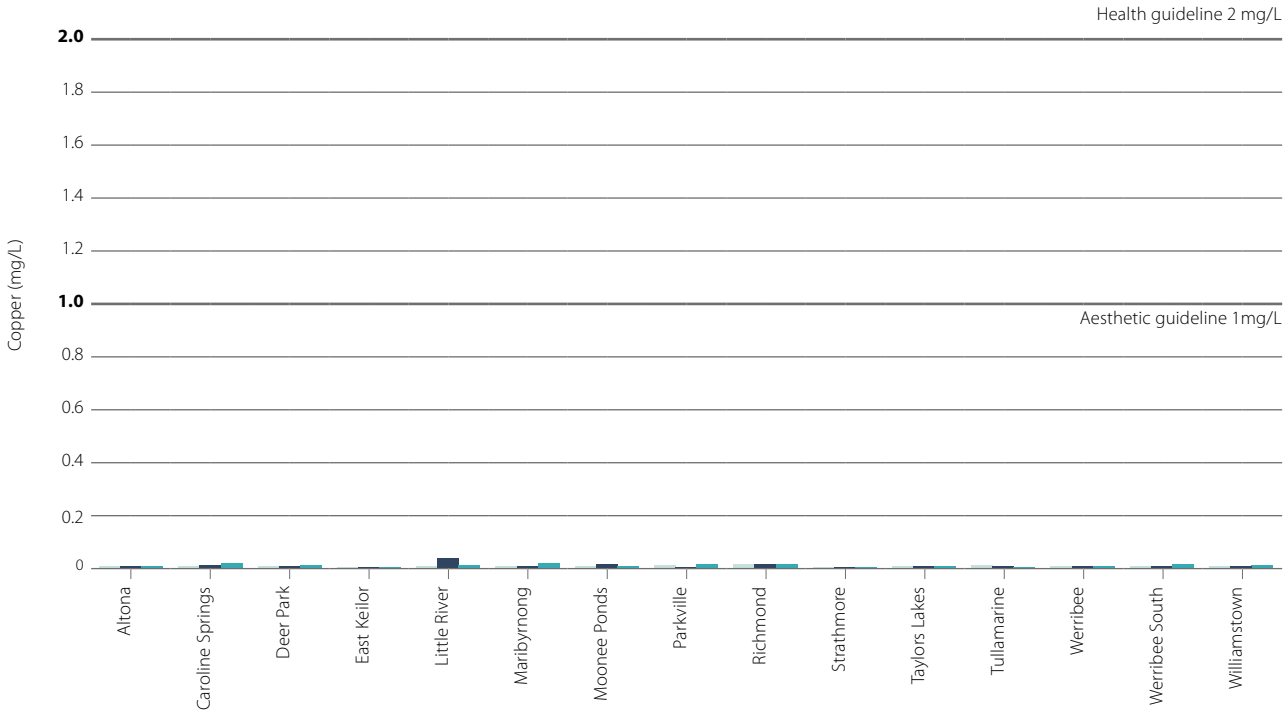


Figure B.6 **Copper concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.7 **Average electrical conductivity levels in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**

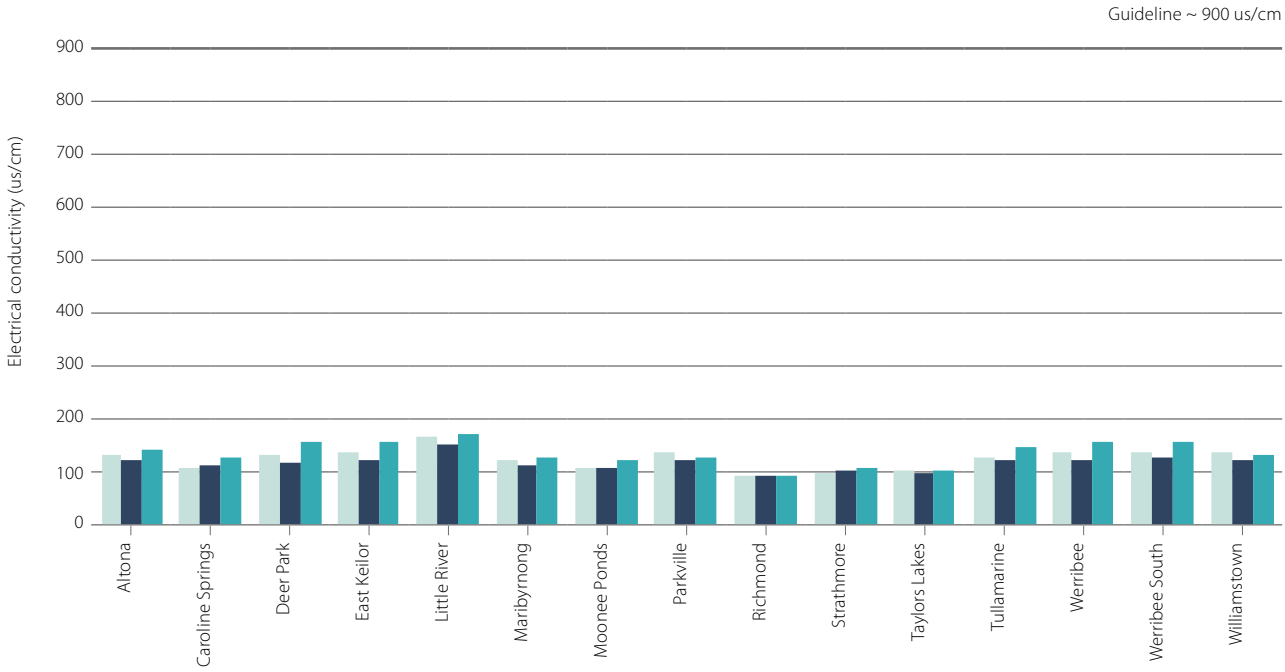
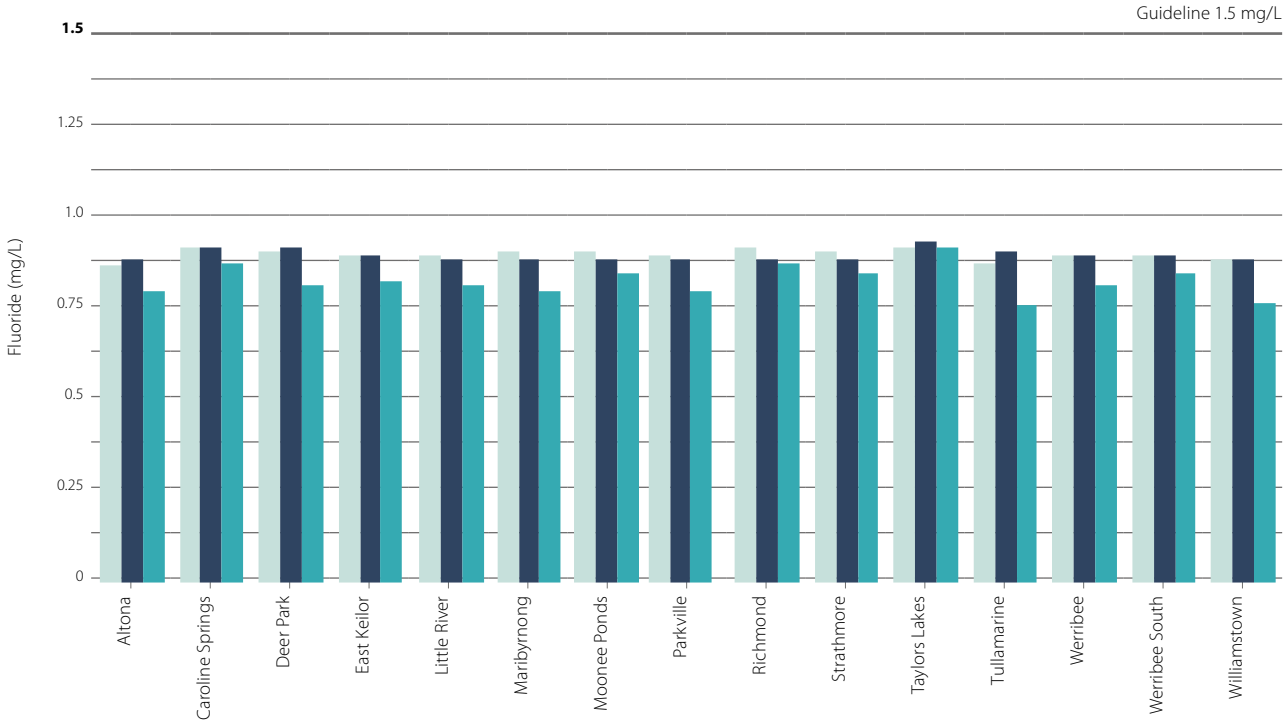


Figure B.8 **Average fluoride concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.9 **Hardness concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**

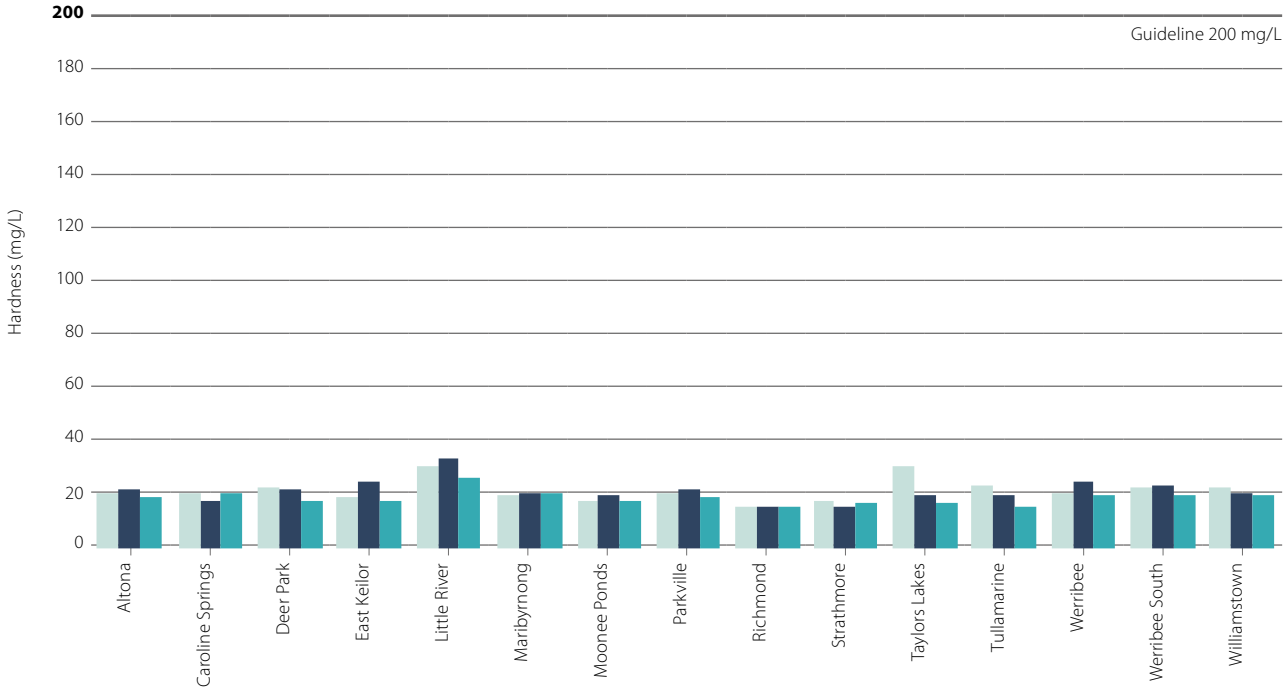
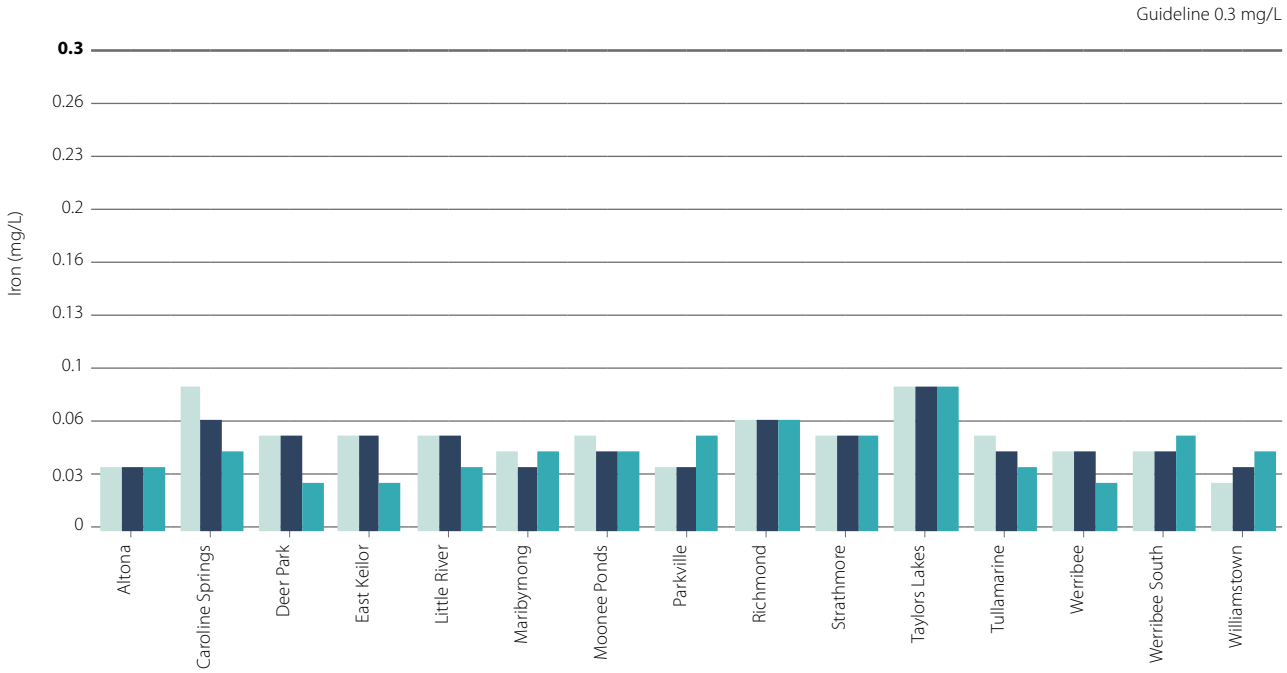


Figure B.10 **Average iron concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)**



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.11 Average manganese concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)

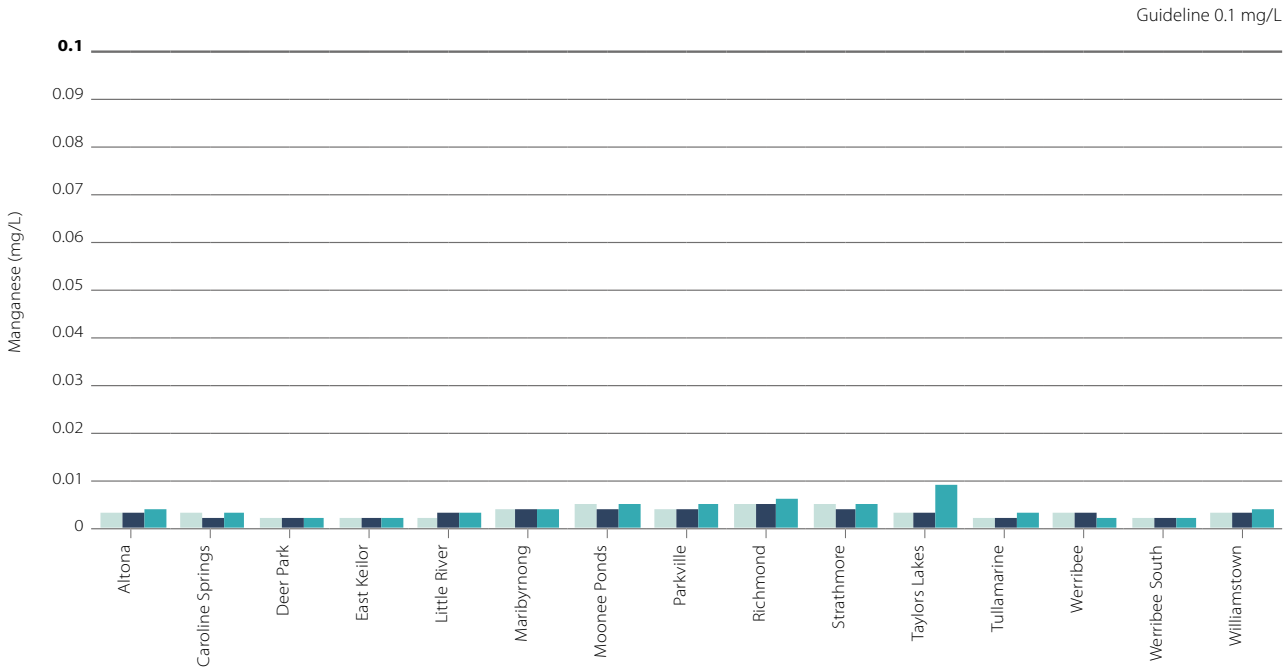
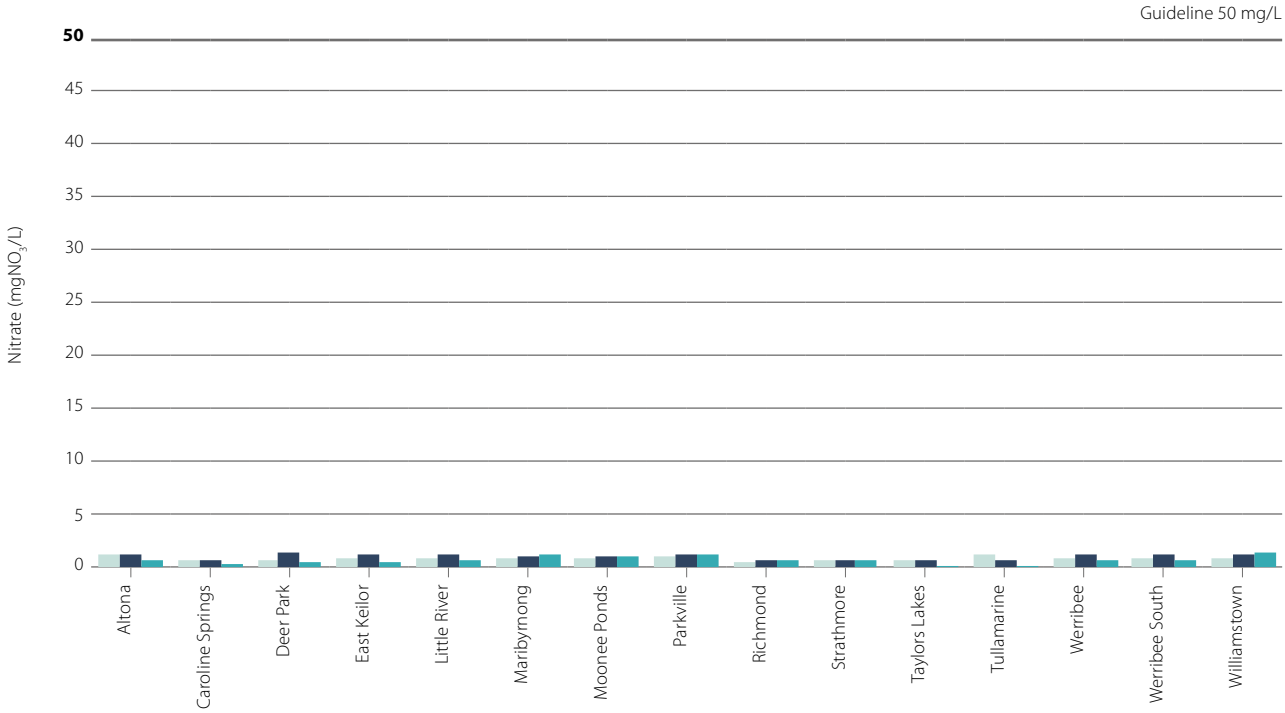


Figure B.12 Nitrate concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.13 Average pH values in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)

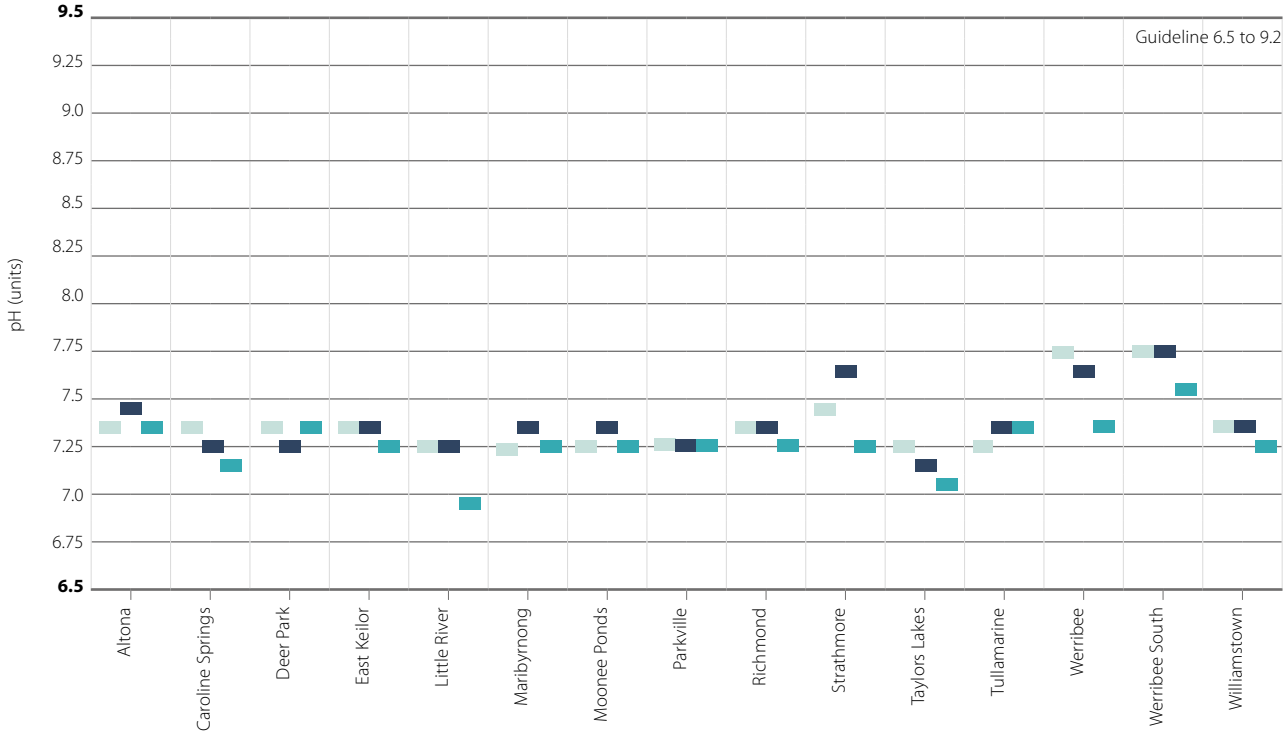
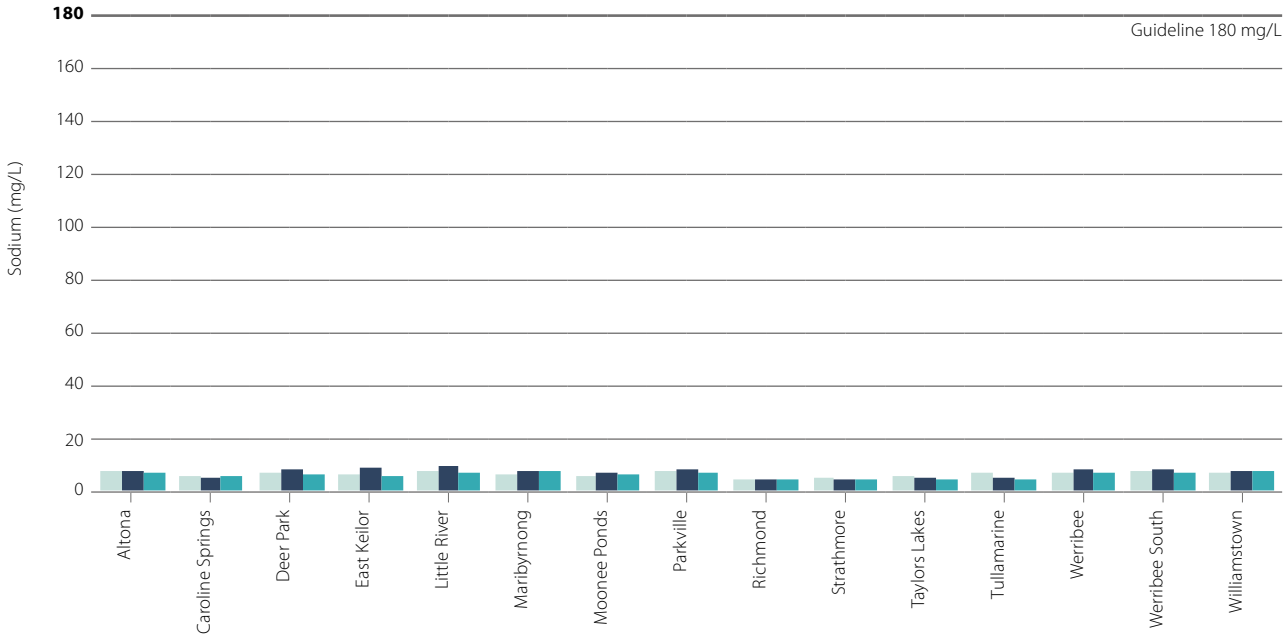


Figure B.14 Sodium concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.15 Summary turbidity levels in water sampling zones (between 2013-14 and 2015-16, from left to right within each locality)

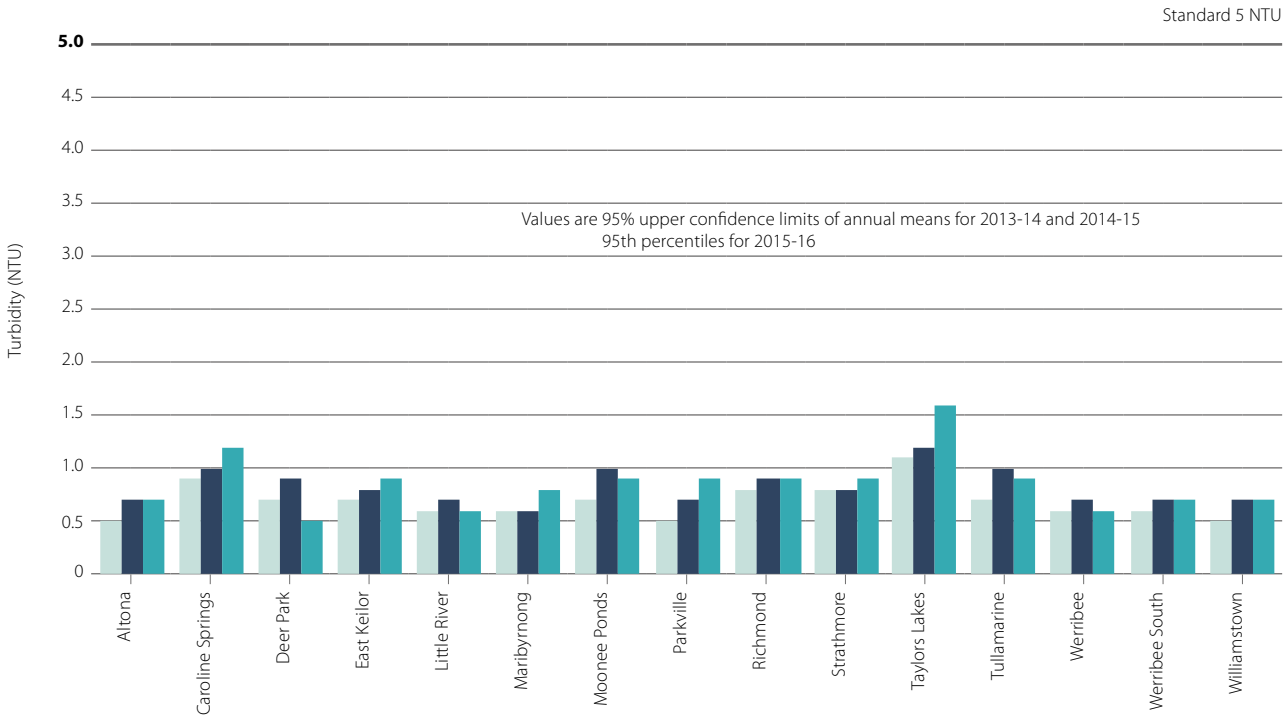
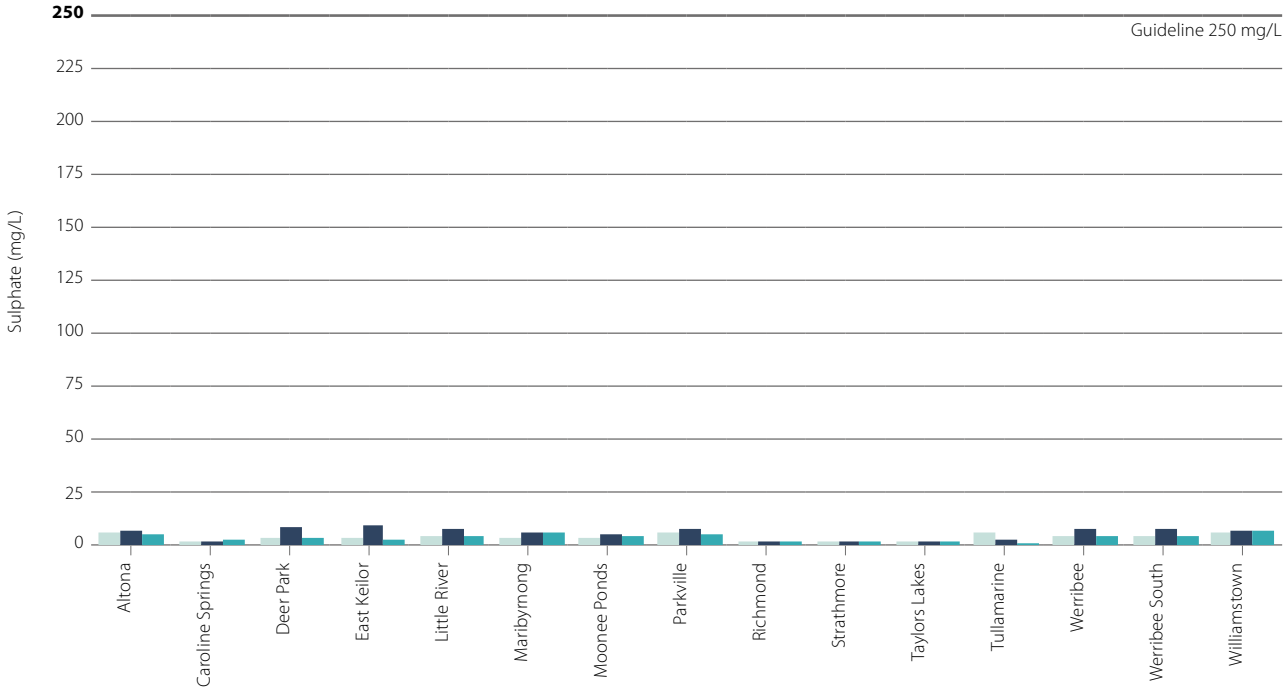
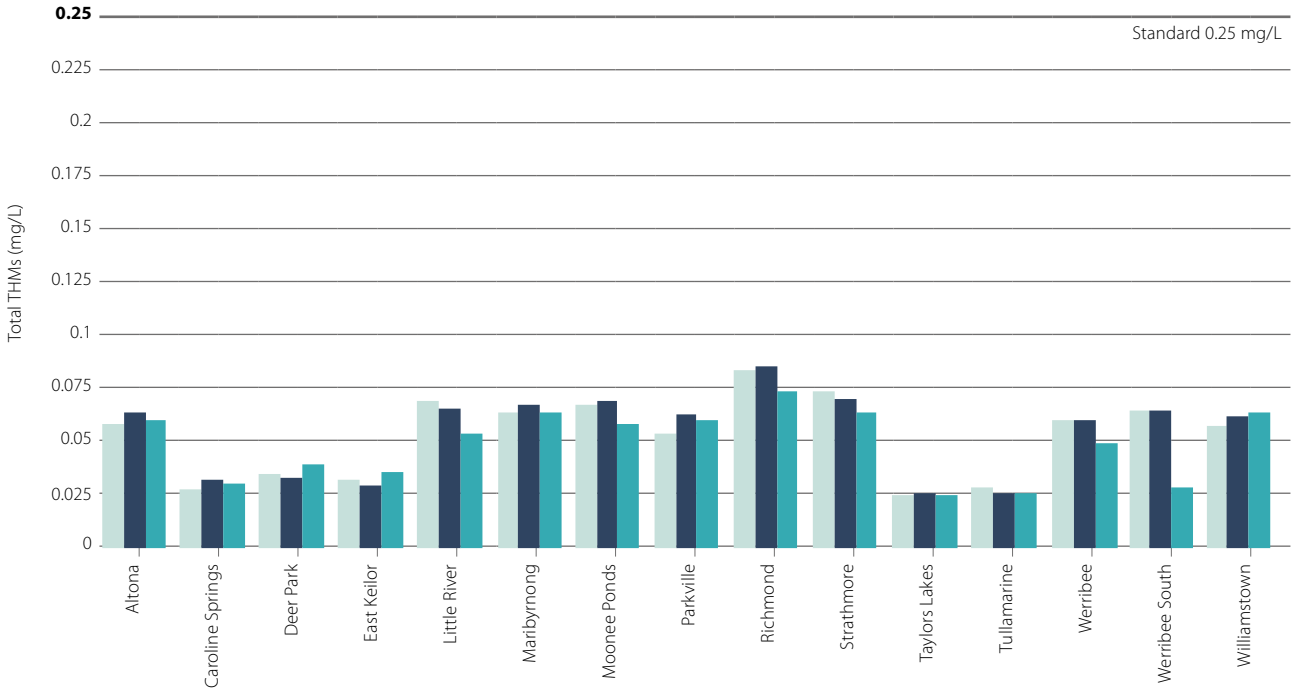


Figure B.16 Sulphate concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)



Appendix B Spatial and time-based water quality summaries (cont'd)

Figure B.17 Average total trihalomethane concentrations in water sampling localities (between 2013-14 and 2015-16, from left to right within each locality)



Appendix C 2016 Risk Management Plan regulatory audit certificate

ABN 46 122 146 767

Schedule 1

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Safe Drinking Water Regulations 2015 – Regulation 10

Certificate Number: 108

Audit Period: 15th March 2014 to 15th March 2016

To: Ms Anne Barker
Managing Director
City West Water Limited
Locked Bag 350
Sunshine VIC 3020

Australian Business Number (ABN): 70 066 902 467

I, Tom Teunissen, after conducting a risk management plan audit of the water supplied by City West Water Limited, am of the opinion that:

City West Water Limited has complied with the obligations imposed by Section 7(1) of the ***Safe Drinking Water Act 2003*** during the audit period.

Signature of approved auditor:

Tom Teunissen

Date: 22nd June 2016

RMP Systems, Suite 3, Ground Floor, 24 Albert Road, South Melbourne, 3205.
Mobile: 0410 624 604 Tel: 03 9694 3231 Fax: 03 864 00 581
Email: tom@rmpsystems.com

City West Water™

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