City West Water™

Drinking Water Quality Report

2019

Glossary of Terms

ADWG 2011	Australian Drinking Water Guidelines 6, 2011. Published by the National Health & Medical Research Council of Australia, version 3.5 August 2018.
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, is a health risk.
'False Positive' *E. coli* result	*E. coli* detection in a routine water quality sample considered non representative of the water supplied to customers. A 'false positive' result is not considered a failure of the water quality standards in the *Regulations 2015*.
HACCP	Hazard Analysis and Critical Control Points risk management certification for protecting drinking water quality.
HU	Hazen Units
mg/L	Unit of measure milligrams per litre.
NTU	Unit of measure Nephelometric Turbidity Units.
orgs/100mL	Unit of measure organisms per 100 millilitres.
Regulations (2015)	*Safe Drinking Water Regulations 2015*.
<	"less than" mathematical symbol.
>	"greater than" mathematical symbol.

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From our Managing Director

Welcome to City West Water's annual Drinking Water Quality Report 2019. Each year we produce this report in order to update our customers and the community on the quality of the drinking water that we have supplied throughout our service area. This 2019 Report addresses the 12-month period between 1 July 2018 and 30 June 2019.

Our corporate strategy is to be an exceptional service provider that puts customers first and benefits the community. The safety of our people and of the community we serve is our highest priority. We put safety first. We are committed to ensuring that our water is clean and safe to drink. We strive to deliver our services in a reliable and affordable way that is accessible to everyone in our community.

Our service area is growing, and encompasses the inner and western suburbs of Melbourne, including Melbourne's central business district. We supply drinking water to our customers via an extensive, largely underground network of over 5,000 km of water mains, as well as associated valves, holding tanks, pumping stations and secondary disinfection plants. Our priority as an exceptional service provider 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.

The information presented in this report explains the sources of our drinking water, and how it is treated so that it is safe to consume without further treatment. It demonstrates in detail how the quality consistently meets and surpasses drinking water quality standards and targets. The quality of the drinking water supply is independently verified via a comprehensive monitoring program that also allows us to identify potential improvements to benefit our customers and community.

Throughout 2018-19, we routinely tested over 3,000 water samples, most of which were obtained from customer premises. I am pleased to report that this independent chemical and microbial testing continued to determine that the quality of our drinking water supply meets standards in Victoria's *Safe Drinking Water Act 2003* and associated *Safe Drinking Water Regulations 2015*, as well as Australian Drinking Water Guidelines 2011. Details of the testing undertaken, and results obtained, form a major part of this report.

Further to monitoring the supplied water quality, we also rely upon feedback from customers to assist in advising of local issues that may arise. Such feedback is recorded as water quality related customer complaints. During 2018-19 we received 117 complaints per 100,000 customers.

Our drinking water quality management processes are endorsed through a consistent history of successfully retaining drinking water risk management certification and compliance of our water quality 'Risk Management Plan' with Victoria's *Safe Drinking Water Act 2003*.

City West Water is committed to continuing its record of reliably providing high quality, safe drinking water to all our customers and community. I am confident that you will find the information contained in this report helpful in better understanding the great quality of our drinking water supply.

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 473,000 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, dams and primary treatment, 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, 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 afforded the highest priority to reflect public health considerations and community expectations. In this regard, we closely follow the risk management principles outlined in Victoria's *Safe Drinking Water Act 2003* and associated *Safe Drinking Water Regulations 2015*. This commitment to safeguarding drinking water quality has continued to be independently recognised through our consistent retention of the internationally recognised HACCP certification.

With this publicly available report, City West Water complies with Section 26 of the *Safe Drinking Water Act 2003*, which requires public disclosure of all water quality monitoring information.

1.1. Characterisation of the system

1.1.1. Source water system

Our 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. This extensive system, managed by Melbourne Water, lies primarily to the east of Melbourne and extends as far as Thomson Reservoir, approximately 120 kilometres from our service area.

Drinking 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 north, near Somerton. The relative proportion of water supplied 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, approximately 25 per cent of our bulk supply originates from Silvan, 25 per cent from Greenvale and 50 per cent from Sugarloaf. During 2018-19 these percentages were 14, 20 and 66, respectively.

The supply from Silvan Reservoir comes 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 (chlorine gas at Silvan; sodium hypochlorite at Greenvale) and pH correction with lime.

Sugarloaf Reservoir draws most of its water from the mid-point 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 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. This monitoring has two components:

- Sites upstream of treatment, comprising rivers, streams, aqueducts and reservoirs. These sites are monitored at varying frequencies, largely to characterise overall long-term background water quality and to monitor for seasonal and possible longer-term changes. Parameters tested include organic chemicals, nutrients and microbes.
- Sites downstream of water treatment, where the monitoring is more intense than at upstream sites and is largely focussed on verifying the quality of post-treatment product water. Frequencies of this monitoring range between continuous at chlorine dosing points and daily or weekly, depending on the sites and parameters measured (for example, testing for water clarity and purity, as well as microbial levels).

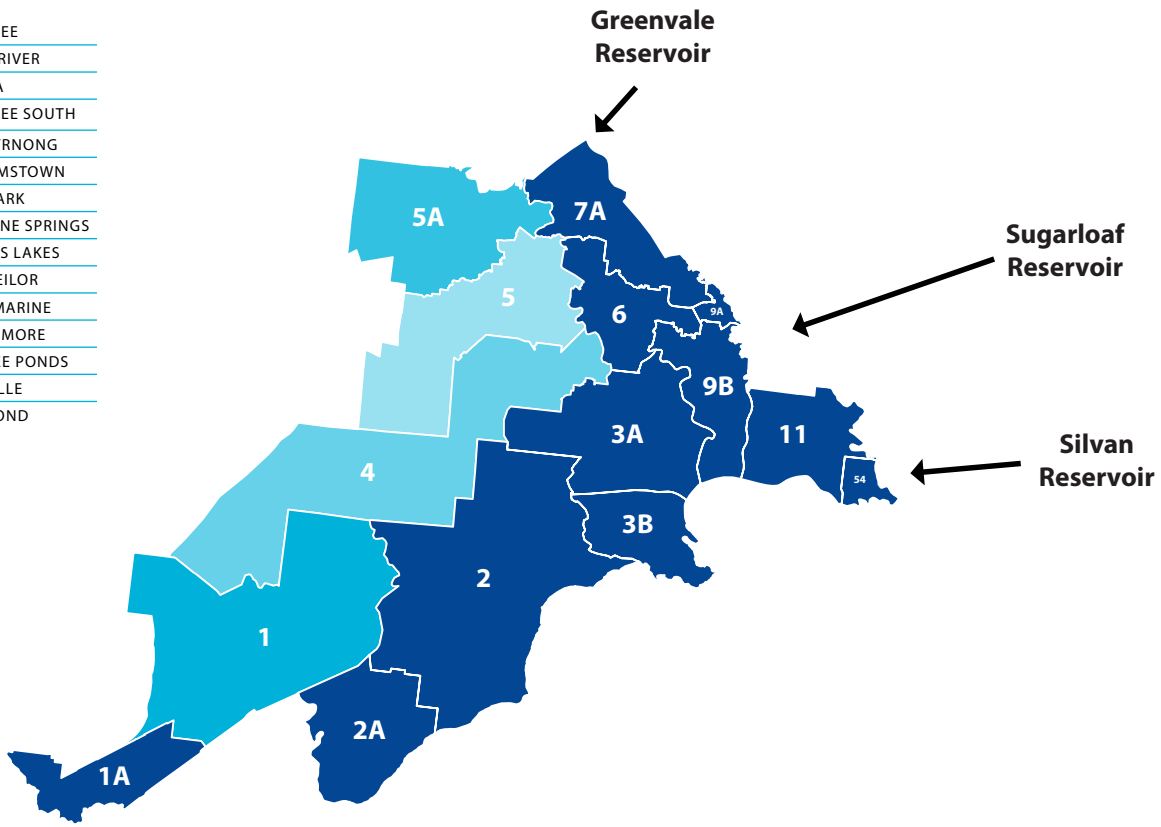
The overall water supply system and water delivery arrangements during the past year have continued unchanged from preceding years. City West Water did not receive any desalinated water in 2018-19 via Silvan or Greenvale Reservoirs.

1.1.2. City West Water system

We distribute water to over 950,000 people and to businesses across 473,000 properties. The water is distributed through an extensive network of over 5,000 kilometres of water mains, 10 pumping stations, 8 holding tanks (or service tanks) and 5 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**) based on sources of water supply and similar pressure.

Figure 1: City West Water's water service area, including 15 water sampling localities and sources of bulk water supply.

1	WERRIBEE
1A	LITTLE RIVER
2	ALTONA
2A	WERRIBEE SOUTH
3A	MARIBYRNONG
3B	WILLIAMSTOWN
4	DEER PARK
5	CAROLINE SPRINGS
5A	TAYLORS LAKES
6	EAST KEILOR
7A	TULLAMARINE
9A	STRATHMORE
9B	MOONEE PONDS
11	PARKVILLE
54	RICHMOND



The water supply source(s) for each of our 15 water sampling localities are shown in **Table 1**. The bulk water transfer arrangements with Melbourne Water are routinely varied for supply purposes. In this reporting period there were no changes to water sampling locality names or boundaries from previous years.

Table 1: 2018-19 supply sources for our water sampling localities

Water sampling locality	Source water	Treatment plant	Population supplied (2016 census)
Altona	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	117,900
Caroline Springs	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Greenvale	103,800
Deer Park	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	58,000
East Keilor	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	41,300
Little River	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	670
Maribyrnong	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan	120,900
Moonee Ponds	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan	73,500
Parkville	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan	157,600
Richmond	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan	24,900
Strathmore	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	8,100
Taylors Lakes	Yarra River; Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Greenvale	67,800
Tullamarine	Yarra River; Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Greenvale	10,500
Werribee	Yarra River; Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	136,700
Werribee South	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan Greenvale	2,000
Williamstown	Yarra River, Sugarloaf; Maroondah, Silvan & Greenvale Reservoirs	Winneke Silvan	50,000

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 4 secondary chlorination plants servicing the water sampling localities of Werribee, Deer Park, Caroline Springs and Altona; and
- City West Water, with a further 5 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.

Melbourne Water provides treated water as a bulk supply to City West Water to store and distribute to customers. **Table 2** summarises the water treatment processes used on the bulk water source by Melbourne Water that is supplied to City West Water. Refer to Melbourne Water's annual water quality report for further details.

Table 2: Drinking water treatment processes provided by Melbourne Water's treatment plants

Water Sampling Locality	Treatment Plant	Treatment Process	Added substance/s	Comments
Altona **Caroline Springs** **Deer Park** **East Keilor** **Little River** **Strathmore** **Taylors Lakes** **Tullamarine** **Werribee** **Werribee South**	Greenvale (transfer from treatment plant Silvan to Greenvale Reservoir)	Disinfection • Chlorination	Sodium Hypochlorite Refer to Silvan information below	No additional fluoridation at Greenvale as it receives fluoridated water from Silvan (refer **Section 1.1.1**). Refer to Melbourne Water's annual water quality report for further details.
Altona **Deer Park** **East Keilor** **Little River** **Maribyrnong** **Moonee Ponds** **Parkville** **Richmond** **Werribee** **Werribee South** **Williamstown**	Silvan	Disinfection • Chlorination Other • pH Correction • Fluoridation	Chlorine gas Lime Fluorosilicic acid	Refer to Melbourne Water's annual water quality report for further details.

Water Sampling Locality	Treatment Plant	Treatment Process	Added substance/s	Comments
Altona **Caroline Springs** **Deer Park** **East Keilor** **Little River** **Maribyrnong** **Moonee Ponds** **Parkville** **Richmond** **Strathmore** **Taylors Lakes** **Tullamarine** **Werribee** **Werribee South** **Williamstown**	Winneke	Clarification • Coagulation & flocculation Filtration • Sand filtration Disinfection • Chlorination Other • pH Correction • Fluoridation	Alum Chorine gas Lime Fluorosilicic acid	Refer to Melbourne Water's annual water quality report for further details.

2.2. Issues

No adverse water treatment issues originated within City West Water's service area during 2018-19.

3. Emergency, incident and event management

This section of the document is for reporting emergencies, incidents and events related to drinking water quality. Water quality information is also reported quarterly to the City West Water Board, Health, Environment and Safety subcommittee. This includes events that may have led to known or suspected contamination of the drinking water supply, including those that were reported to DHHS in line with Section 22 of the *Safe Drinking Water Act 2003*. We submitted two such reports to DHHS in 2018-19, and a further report was provided by Melbourne Water related to water quality complaints received by City West Water customers:

- On 20 November 2018, City West Water field auditing identified that a newly occupied dual supply residential property in Werribee had a cross-connection between its drinking and recycled water supplies. The cross-connection, which was immediately removed and reported to DHHS had been caused by unauthorised removal of a sealing device, isolating the recycled water supply prior to occupation of the new property. Under guidance and review by DHHS, City West Water undertook a comprehensive health risk assessment for this event which determined that possible adverse health outcomes caused by the temporary consumption of recycled water at this property were unlikely.

  City West Water thoroughly reviewed the process for commissioning dual supply systems and is implementing process improvements with regulators, contractors, builders, developers and plumbers in order to reduce the risk of inadvertent cross-connections between drinking and recycled water within customers' properties.

- On 18 December 2018, City West Water reported to DHHS that there had been an *E. coli* detection (1 organism per 100mL) in a routine water sample from Werribee South ground level water supply tank (part of the supply to Werribee South water sampling locality) on 17 December 2018. On 18 December 2018, the following actions were undertaken including: isolating the Werribee South tank, confirming that there were no upstream water treatment plant or water quality supply issues and undertaking further water quality samples, in line with Schedule 2 of *Regulations 2015*.

  In addition, on the 19 December 2018, a tank inspection was completed with no issues found, and the tank was dosed with chlorine. The outcome from these actions indicated no evidence, apart from the initial *E. coli* detection, to support that the water supply had been contaminated. In line with Schedule 2 of the *Regulations 2015*, it was concluded that the detection of *E. coli* was a "false positive".

- Greenvale reservoir supplies approximately 66% of our service area. From 26 February 2019, customers in the northwest areas of Melbourne such as Tullamarine, Taylors Hill, Taylors Lakes and Sydenham, which were being supplied with Greenvale water, experienced higher instances of discoloured water. This contributed to a considerable increase in the annual number of dirty water complaints. DHHS were notified and a Section 22 notification under the *Safe Drinking Water Act 2003* was also submitted to DHHS for an event with potential widespread customer complaints by Melbourne Water. After investigations were completed jointly by City West Water, Melbourne Water and other impacted metropolitan water retailers, it was concluded that the discoloured water was due to an underwater lower gate at the Greenvale Reservoir outlet tower (operated by Melbourne Water) not being fully closed, allowing water with higher concentrations of natural iron and manganese to enter into City West Water's distribution network.

  The incident was de-escalated on 5 April 2019, however, the leftover sediments in the network continued to contribute to an increased number of dirty water complaints. All monitoring conducted during this time found that the water supplied to customers was safe and suitable for drinking, despite some discolouration.

4. Drinking water quality monitoring

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. This includes 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. The number of customer taps sites in each water sampling locality is distributed in proportion to locality populations.

We also have a program of regular sampling and testing of water quality in each of our 8 service tanks. 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 reviewed as part of the Bulk Water Supply Agreement between the two water businesses.

Between 1 July 2018 and 30 June 2019, we routinely collected and tested over 3,000 microbiological and 900 physical and chemical water samples, predominantly from customer taps sites, but also from mains and service tanks. Monitoring was undertaken under contract by a government approved, specialised and quality-certified laboratory. The extent of this monitoring is based on requirements of *Regulations 2015* as well as guidance from ADWG 2011, including consideration of locality population numbers for bacterial monitoring.

In addition to 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 *E. coli*, which is considered to indicate the presence of faecal contamination and, therefore, is a health risk.

Physical and chemical assessment and monitoring is based on a combination of parameters that indicate physical and 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 contained in **Section 15**.

In line with *Regulations 2015*, sample results from reticulation sites such as water mains and service tanks both spatially and hydraulically within individual water sampling localities, are added to the associated customer tap data.

City West Water's sampling sites (other than customer taps), and the water sampling locality to which they are associated for water quality performance reporting purposes, are listed below in **Table 3**.

Table 3: City West Water's sampling sites (other than customer taps) and associated water sampling localities

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
Hillside elevated tank	Taylors Lakes
Cowies Hill elevated tank	Werribee
Ballan Road tank	Werribee
Werribee South elevated tank	Werribee South
Werribee South ground level tank	Werribee South
Werribee South main at Maltby bypass (water supply main)	Werribee South

5. Drinking water quality standards

Since 1 July 2004, the management of drinking water in Victoria has been governed by the *Safe Drinking Water Act 2003*. Under this Act, the drinking water must comply with quality standards. The *Regulations 2015* specifies scheduled water quality standards for several water quality parameters. The standards currently in place are listed in **Table 4**:

Table 4: Water quality parameters, standards and frequency of sampling

Water quality parameter	Standard (*Regulations 2015*)	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
Total Trihalomethanes (Total THMs)	Less than or equal to 0.25 mg/L of drinking water	one sample per month
Turbidity	The 95th percentile of results for samples any 12-month period must be ≤5.0 NTU	one sample per week

The tables in **Section 5.1** to **Section 5.3** of this report outline the 2018-19 compliance of water quality parameters against the water quality scheduled standards specified in the *Regulations 2015*.

5.1. *E. coli*

Standard: All samples of drinking water collected are found to contain no ***E. coli*** per 100 millilitres of drinking water, with the exception of any false positive sample.

Results: ***E. coli*** 1 July 2018 to 30 June 2019

Table 5: *E. coli* summary results in drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, service tanks) tested between 1 July 2018 and 30 June 2019

Water sampling locality (locality number)	Sampling frequency	Number of samples	Maximum detected (orgs/100mL)	Average	Number of detections & investigations conducted (s. 22#)	Number of samples where standard was not met (s. 18##)
Altona (2)	>weekly	323	0	0	0	0
Caroline Springs (5)	>weekly	338	0	0	0	0
Deer Park (4)	>weekly	195	0	0	0	0
East Keilor (6)	>weekly	156	0	0	0	0
Little River (1A)	>weekly	117	0	0	0	0
Maribyrnong (3A)	>weekly	364	0	0	0	0
Moonee Ponds (9B)	>weekly	234	0	0	0	0
Parkville (11)	>weekly	403	0	0	0	0
Richmond (54)	>weekly	104	0	0	0	0
Strathmore (9A)	>weekly	78	0	0	0	0
Taylors Lakes (5A)	>weekly	247	0	0	0	0
Tullamarine (7A)	>weekly	91	0	0	0	0
Werribee (1)	>weekly	465	0	0	0	0
Werribee South (2A)	>weekly	112	1*	0	1*	0
Williamstown (3B)	>weekly	169	0	0	0	0

#s.22: as per Section 22 of the ***Safe Drinking Water Act 2003***
##s.18: as per Section 18 of the ***Safe Drinking Water Act 2003***
*Refer to **Section 3** of this report for details

The reticulation system results for *E. coli* monitoring demonstrate compliance with the standard (100% of samples with no *E. coli*) in each of City West Water's 15 water sampling localities, between 1 July 2018 and 30 June 2019.

Sampling frequencies in each locality exceeded that prescribed by the *Regulations 2015* (i.e. one sample per week in each locality; refer **Table 4**). This was done in order to meet the more intensive surveillance of internationally recognised population based frequencies, as advocated in ADWG 2011.

5.2. Total trihalomethanes

Standard: Total trihalomethanes less than or equal to 0.25 milligrams per litre of drinking water.

Results: **Total trihalomethanes** 1 July 2018 to 30 June 2019.

Table 6: Total trihalomethanes summary results in drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, service tanks) tested between 1 July 2018 and 30 June 2019

Water sampling locality (locality number)	Frequency of Sampling	Number of samples	Drinking water quality standard (mg/L)	Maximum (mg/L)	Average (mg/L)	Number of samples where standard was not met (s. 18#)
Altona (2)	>monthly	13	0.25	0.073	0.048	0
Caroline Springs (5)	>monthly	13	0.25	0.058	0.034	0
Deer Park (4)	>monthly	13	0.25	0.050	0.037	0
East Keilor (6)	>monthly	13	0.25	0.055	0.034	0
Little River (1A)	>monthly	52	0.25	0.107	0.057	0
Maribyrnong (3A)	>monthly	13	0.25	0.073	0.054	0
Moonee Ponds (9B)	>monthly	13	0.25	0.068	0.050	0
Parkville (11)	>monthly	13	0.25	0.066	0.048	0
Richmond (54)	>monthly	13	0.25	0.097	0.073	0
Strathmore (9A)	>monthly	13	0.25	0.086	0.065	0
Taylors Lakes (5A)	>monthly	26	0.25	0.056	0.028	0
Tullamarine (7A)	>monthly	13	0.25	0.067	0.031	0
Werribee (1)	>monthly	39	0.25	0.096	0.055	0
Werribee South (2A)	>monthly	50	0.25	0.077	0.027	0
Williamstown (3B)	>monthly	13	0.25	0.072	0.046	0

#s.18: as per Section 18 of the *Safe Drinking Water Act 2003*

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 2018 and 30 June 2019.

5.3. Turbidity

Standard: The 95th percentile of results for samples in any given 12-month period must be less than or equal to 5.0 Nephelometric Turbidity Units (NTU).

Results: **Turbidity** 1 July 2018 to 30 June 2019

Table 7: Turbidity summary results in drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, service tanks) tested between 1 July 2018 and 30 June 2019

Water sampling locality (locality number)	Frequency of Sampling	Number of samples	Maximum turbidity in a sample (NTU)	95th percentile of turbidity results in any 12 months (NTU)	Number of 95th percentile results in any 12 months above standard (s.18#)
Altona (2)	weekly	52	1.2	0.8	0
Caroline Springs (5)	weekly	52	1.2	1	0
Deer Park (4)	weekly	52	1.0	0.8	0
East Keilor (6)	weekly	52	1.1	1	0
Little River (1A)	> weekly	91	1.4	0.8	0
Maribyrnong (3A)	weekly	52	1.1	0.9	0
Moonee Ponds (9B)	weekly	52	1.2	0.9	0
Parkville (11)	weekly	52	1.2	1.1	0
Richmond (54)	weekly	52	1.3	1.1	0
Strathmore (9A)	weekly	52	1.2	1	0
Taylors Lakes (5A)	> weekly	65	1.8	1.3	0
Tullamarine (7A)	weekly	52	1.5	1.2	0
Werribee (1)	> weekly	79	1.1	0.8	0
Werribee South (2A)	> weekly	89	3.3	0.9	0
Williamstown (3B)	weekly	52	1.2	0.6	0

#s.18: as per Section 18 of the *Safe Drinking Water Act 2003*

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 2018 and 30 June 2019.

5.4. Summary performance against water quality standards

During 2018-19, City West Water met the monitoring and water quality requirements of *Regulations 2015* for drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service tanks).

6. Other water quality standards

(algae toxin, pathogen, chemical or substance that may pose a risk to human health)

In addition to the water quality parameters designated as standards by *Regulations 2015*, we have also monitored a range of other chemical parameters that provide further information on the overall quality of our drinking water supply. Among such other parameters that were monitored in 2018-19, those for which there is a health-related ADWG 2011 guideline are listed in **Table 8**. Furthermore, data on aesthetic and other parameters that provide an additional comprehensive characterisation of the water, as well as assisting the needs of customers (e.g. industry, students and researchers) are contained in **Section 7** and **Appendix A** and **Appendix B** of this report.

Table 8: Other water quality standards (chemical or substance that may pose a risk to human health) monitored in drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service tanks) and tested between 1 July 2018 and 30 June 2019

Parameter	ADWG 2011 guideline (mg/L unless specified)		Frequency of testing*	Met the guideline Yes/No
	Health	Aesthetic		
Arsenic	0.01			Yes
Cadmium	0.002		annually per locality	Yes
Chlorine	5	0.6	>weekly per locality	Yes
Chromium	0.05		annually per locality	Yes
Copper	2	1	annually per locality	Yes
Cyanide	0.08		annually per locality	Yes
Fluoride	1.5		fortnightly per locality	Yes
Lead	0.01		annually per locality	Yes
Manganese	0.5	0.1	fortnightly per locality	Yes
Mercury	0.001		annually per locality	Yes
Nitrate	50		annually per locality	Yes
Sulphate	[c]	250	annually per locality	Yes
Zinc	[c]	3	annually per locality	Yes

*sample numbers, maximum/average/minimum levels and compliance details for each sampling locality are shown in **Appendix A** tables.
[c] ADWG 2011 note that there is insufficient data to set a guideline value based on health conditions

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 chemicals (including pesticides) and radioactive substances 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) in the bulk water supply were reported (by Melbourne Water) during 2018-19.

7. Aesthetic characteristics

The ADWG 2011 outlines the health and aesthetic water quality guideline values, that are associated with the acceptability of drinking water to the customer to be pleasing, regarding appearance, taste and odour. Monitoring results for aesthetic water quality parameters comprising of pH, colour, hardness, alkalinity and iron are shown in **Table 9**. Note that our colour tests are reported as apparent colour, which is representative of colour visible to our customers. The ADWG 2011, has an aesthetic guideline value for true colour of 15 Hazen Units (HU). True colour tests require the water sample to be filtered to remove suspended particles. The apparent colour test is not filtered.

As a result, City West Water has analysed and reviewed our apparent colour results against the true colour results of Melbourne's water supply so that a comparison against the ADWG 2011 value can be made in **Table 9**. An apparent colour result of 25Pt/Co units is equivalent to a true colour result of 15HU.

Table 9: 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 tanks) and tested between 1 July 2018 and 30 June 2019

Water Sampling Locality (locality number)	Parameter	Frequency of Sampling	Number of samples	Minimum*	Maximum*	Aesthetic operating range (ADWG)
Altona (2)	pH#	fortnightly	25	6.7	7.7	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	2	6	<25Pt/Co**
	Hardness	annually	1	19	19	<200mg/L
	Alkalinity	annually	1	11	11	NA
	Iron	fortnightly	26	<0.01	0.06	<0.3mg/L
Caroline Springs (5)	pH	fortnightly	25	6.7	8.3	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	2	12	<25Pt/Co**
	hardness	annually	1	15	15	<200mg/L
	alkalinity	annually	1	14	14	NA
	Iron	fortnightly	26	<0.01	0.09	<0.3mg/L
Deer Park (4)	pH	fortnightly	26	6.9	8.1	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	<2	8	<25Pt/Co**
	hardness	annually	1	17	17	<200mg/L
	alkalinity	annually	1	13	13	NA
	Iron	fortnightly	26	<0.01	0.1	<0.3mg/L

Water Sampling Locality (locality number)	Parameter	Frequency of Sampling	Number of samples	Minimum*	Maximum*	Aesthetic operating range (ADWG)
East Keilor (6)	pH	fortnightly	26	6.7	8.4	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	<2	8	<25Pt/Co**
	hardness	annually	1	16	16	<200mg/L
	alkalinity	annually	1	16	16	NA
	Iron	fortnightly	26	<0.01	0.09	<0.3mg/L
Little River (1A)	pH	>fortnightly	65	6.5	9.5^	6.5-8.5 or 6.5-9.2#
	apparent colour	>fortnightly	65	<2	8	<25Pt/Co**
	hardness	annually	1	22	22	<200mg/L
	alkalinity	annually	1	20	20	NA
	Iron	>fortnightly	65	0.02	0.11	<0.3mg/L
Maribyrnong (3A)	pH	fortnightly	25	6.8	7.4	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	2	6	<25Pt/Co**
	hardness	annually	1	16	16	<200mg/L
	alkalinity	annually	1	13	13	NA
	Iron	fortnightly	26	<0.01	0.13	<0.3mg/L
Moonee Ponds (9B)	pH	fortnightly	26	6.7	7.5	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	2	8	<25Pt/Co**
	hardness	annually	1	16	16	<200mg/L
	alkalinity	annually	1	12	12	NA
	Iron	fortnightly	26	0.01	0.13	<0.3mg/L
Parkville (11)	pH	fortnightly	25	6.8	7.4	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	<2	10	<25Pt/Co**
	hardness	annually	1	19	19	<200mg/L
	alkalinity	annually	1	11	11	NA
	Iron	fortnightly	26	<0.01	0.11	<0.3mg/L
Richmond (54)	pH	fortnightly	26	6.7	7.5	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	4	10	<25Pt/Co**
	hardness	annually	1	14	14	<200mg/L
	alkalinity	annually	1	14	14	NA
	Iron	fortnightly	26	0.05	0.11	<0.3mg/L
Strathmore (9A)	pH	fortnightly	26	6.8	8.1	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	2	10	<25Pt/Co**
	hardness	annually	1	15	15	<200mg/L
	alkalinity	annually	1	13	13	NA
	Iron	fortnightly	26	<0.01	0.08	<0.3mg/L

Water Sampling Locality (locality number)	Parameter	Frequency of Sampling	Number of samples	Minimum*	Maximum*	Aesthetic operating range (ADWG)
Taylors Lakes (5A)	pH	>fortnightly	39	6.7	8.2	6.5-8.5 or 6.5-9.2#
	apparent colour	>fortnightly	39	2	16	<25Pt/Co**
	hardness	annually	1	15	15	<200mg/L
	alkalinity	annually	1	14	14	NA
	Iron	>fortnightly	39	0.05	0.21	<0.3mg/L
Tullamarine (7A)	pH	fortnightly	26	6.8	8.5	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	<2	12	<25Pt/Co**
	hardness	annually	1	17	17	<200mg/L
	alkalinity	annually	1	14	14	NA
	Iron	fortnightly	26	<0.01	0.15	<0.3mg/L
Werribee (1)	pH	>fortnightly	52	6.7	8.8^^	6.5-8.5 or 6.5-9.2#
	apparent colour	>fortnightly	52	2	8	<25Pt/Co**
	hardness	annually	1	15	15	<200mg/L
	alkalinity	annually	1	14	14	NA
	Iron	>fortnightly	52	0.01	0.07	<0.3mg/L
Werribee South (2A)	pH	>fortnightly	63	6.7	7.8	6.5-8.5 or 6.5-9.2#
	apparent colour	>fortnightly	63	2	8	<25Pt/Co**
	hardness	annually	1	16	16	<200mg/L
	alkalinity	annually	1	15	15	NA
	Iron	>fortnightly	63	0.02	0.16	<0.3mg/L
Williamstown (3B)	pH	fortnightly	26	6.8	7.5	6.5-8.5 or 6.5-9.2#
	apparent colour	fortnightly	26	<2	4	<25Pt/Co**
	hardness	annually	1	15	15	<200mg/L
	alkalinity	annually	1	13	13	NA
	Iron	fortnightly	26	<0.01	0.04	<0.3mg/L

*Units: pH (units); apparent colour (platinum cobalt units); hardness (mg/L as calcium carbonate); alkalinity (mg/L as calcium carbonate); iron (mg/L).
tolerable upper value of 9.2 where there are cement lined water mains.
**Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co units).
^ a maximum pH result of 9.5 pH units was received from 1 Little River sampling location during the reporting period
^^ a maximum pH result of 8.8 pH units was received from 1 Werribee sampling location during the reporting period

All 2018-19 water colour, hardness and iron monitoring data complied with the respective aesthetic operating ranges of 25 Pt/Co units, 200 mg/L and 0.3 mg/L. There is no guideline value for alkalinity. Of the 501 samples tested for pH, there were 9 instances where pH readings were not within the ADWG 2011 guideline range of 6.5 to 8.5. Seven of these results were measured in Little River and two results were measured in Werribee. A single result exceeded the tolerable upper value of 9.2(maximum 9.5 measured at Little River), there were no samples below 6.5. Little River pH is being managed by dosing the local water supply with carbon dioxide gas. According to ADWG 2011, variations in pH values are typical, especially in the cement lined water mains and present no adverse health impacts at the levels reported. Adverse health effects may occur at pH levels less than 4 or greater than 11. City West Water did not have any results less than 4 or greater than 11.

8. Analysis of results

This section of the report examines:

- Trends over time (three years) of water quality parameters tested that are designated as standards in the ***Regulations 2015*** at section 8.1.
- Trends over time (three years) and between localities, of parameters listed in **Appendix A** tables that have a corresponding Victorian standard or ADWG 2011 at **Section 8.2**.

Data analysed in this section is based on drinking water samples obtained from reticulation system sampling sites (customer taps, water mains, and service tanks).

8.1. Historical compliance of standard parameters

Trends for the previous two financial years and the current reporting period (and extent of compliance) of water quality parameters that are scheduled standards in *Regulations 2015* are summarised in **Table 10**.

Table 10: Compliance trends over time of scheduled standard parameters at our 15 water sampling localities

Parameter	Standard (2015 Regulations)	Localities compliant (% of customers supplied with compliant water)		
		2018-19	2017-18	2016-17
E. coli	0 per 100mL	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Total Trihalomethanes	≤ 0.25 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Turbidity	95th percentile ≤ 5.0 NTU	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)

A comprehensive outline of our monitoring data for individual localities, together with monitoring frequencies, *Regulations 2015* 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 contained in **Section 15**.

8.2. Parameter trends over time and between localities

Analysis of parameter trends over three years and between localities is used as a tool to better understand and possibly highlight water quality issues throughout our service area.

This section 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:

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.

E. coli (refer **Figure B1** in **Appendix B**)
E. coli performance in our drinking water has consistently complied with the *Regulations 2015* in all water sampling localities. Refer **Section 3** for details of the false positive result.

Free chlorine (refer **Figure B2** 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 health 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 near primary chlorination facilities at Greenvale Reservoir, while the Little River, East Keilor 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 B3** in **Appendix B**)
Overall aluminium levels in the water supply are low and meet the standard. 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.

Chloride (refer **Figure B4** in **Appendix B**)
Chloride levels are quite low, well within guideline levels and relatively consistent amongst the water sampling localities.

Colour (refer **Figure B5** in **Appendix B**)
The apparent colour results continue to be below the benchmark guideline. Higher colour levels in the Richmond locality are associated with its traditional bulk supply source from Silvan Reservoir. Slightly higher 2018-19 average colour levels may have been related to the Greenvale Reservoir discoloured water issue that occurred early 2019, refer **Section 3** for details.

Copper (refer **Figure B6** 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 B7** 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 monitored by City West Water continue to be well below the guideline value and relatively consistent within each water sampling locality.

Fluoride (refer **Figure B8** in **Appendix B**)
Fluoride levels in the water supply are the result of fluoridation of the bulk water supply (refer report **Section 1.1.1**). Dosing is normally controlled such that levels are generally maintained between approximately 0.9 and 1.0 mg/L. The results indicate that the fluoride levels meet the guideline value of 1.5 mg/L.

Hardness (refer **Figure B9** in **Appendix B**)
Water hardness levels are well below the guideline value of 200mg/L and relatively consistent within each water sampling locality.

Iron (refer **Figure B10** in **Appendix B**)
Overall, slightly higher iron levels in the 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. The slight increase in iron levels when compared with previous years may be related to Greenvale Reservoir discoloured water issue in early 2019 (refer **Section 3**). The results received are well within the guideline value.

Manganese (refer **Figure B11** in **Appendix B**)
Manganese levels in the water supply are low and consistently well within the guideline value. The slight increase in manganese levels when compared with previous years maximums may be related to Greenvale Reservoir discoloured water issue in early 2019 (refer **Section 3**). The mean and maximum results reported are well within the guideline value.

Nitrate (refer **Figure B12** in **Appendix B**)
Nitrate levels in the water supply are low and consistently well within the guideline value.

pH (refer **Figure B13** in **Appendix B**)
Average pH levels in all localities are within guideline levels. The slightly higher levels in Werribee and Werribee South are consistent with the presence of cement lined mains. Little River pH is being managed by dosing the local water supply with carbon dioxide gas.

Sodium (refer **Figure B14** in **Appendix B**)
Sodium levels are quite low and relatively consistent among the water sampling localities and consistently well within the guideline value.

Sulphate (refer **Figure B15** in **Appendix B**)
Sulphate levels are quite low and relatively consistent within each water quality locality and consistently well within the guideline value.

Total trihalomethanes (refer **Figure B16** 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 or secondary chlorination.

Turbidity (refer **Figure B17** in **Appendix B**)
Turbidity levels measured in all localities continue to be within 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 and Winneke, while higher turbidity localities tend to be supplied to a greater extent from Silvan and Greenvale reservoirs.

9. Complaints relating to water quality

During 2018-19, City West Water received a total of 555 complaints related to water supply quality. It is estimated that approximately 100 of these complaints resulted from the discoloured water incident at Greenvale reservoir in early 2019 (refer Section 3). The various categories of complaints were distributed as shown in Table 11.

Table 11: Water quality related customer complaints received over the last three years

Type of complaints	Number of complaints			Comparison with previous reporting periods	Comments
	2018-19	2017-18	2016-17		
Discoloured water	426	210	338	Increase of 216 from previous reporting period.	Increased number due to: a) Greenvale Reservoir discoloured water issue in early 2019 (refer Section 3); and b) elevated number of maintenance works on water mains in 2019.
Taste/odour	83 (29 chlorine)*	92 (21 chlorine)*	43 (5 chlorine)*	Decrease of 9 from previous reporting period.	No specific cause for the decrease was identified.
Air in water	27	11	47	Increase of 16 from previous reporting period.	No specific cause for the increase was identified.
Other **(alleged illness)** **(blocked filter)** **(blue-green water)** **(staining)**	19 (2) (4) (6) (7)	17 (2) (3) (6) (6)	7 (1) (3) (1) (2)	No significant change (increase of 2).	Nil.
Total	555	330	435	Increase of 225 from previous reporting period.	Operational actions that have been undertaken in response to the discoloured drinking water event by City West Water included: targeted mains flushing, customer site visits, and provision of information to the customers that there was no health risk from the discolouration noticeable in their water supply.
No. of properties	473,000	459,000	445,000	-	-
Complaints per 100 properties	0.117	0.072	0.098	-	-

* Number of complaints received of chlorine taste or odour.

The water quality complaints received during 2018-19 in each water sampling locality are shown in **Table 12**.

Table 12: Water quality related customer complaints received during 2018-19 per water sampling locality.

Water sampling locality (Locality number)	Numbers received				
	Discoloured water	Taste/odour	Air in water	Other (alleged illness) (blocked filter) (blue-green water) (staining)	Total complaints
Altona (2)	60	15	1	3 (2 alleged illness) (1 staining)	79
Caroline Springs (5)	44	3	2	2 (2 blue-green water)	51
Deer Park (4)	29	10	1	2 (2 staining)	42
East Keilor (6)	29	5	1	3 (1 blocked filter) (1 blue-green water) (1 staining)	38
Little River (1A)	0	0	0	0	0
Maribyrnong (3A)	28	13	6	1 (1 blue-green water)	48
Moonee Ponds (9B)	20	2	1	0	23
Parkville (11)	39	7	1	1 (1 blue-green water)	48
Richmond (54)	0	2	1	0	3
Strathmore (9A)	1	1	1	0	3
Taylors Lakes (5A)	89	6	1	3 (3 blocked filter)	99
Tullamarine (7A)	11	0	0	1 (1 staining)	12
Werribee (1)	52	15	7	1 (1 staining)	75
Werribee South (2A)	6	0	2	0	8
Williamstown (3B)	18	4	2	2 (1 blue-green water) (1 staining)	26

Complaints and responses
We provide individual responses to water quality related complaints. If customers are experiencing water quality concerns, they can contact City West Water on 132 642 for further information and advice. Responses to complaints 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, analysed and investigated. Customers may be advised to seek medical advice.

White water (air in water)
White water is water with a cloudy appearance that clarifies within a few minutes and indicates the presence of tiny, harmless air bubbles. It tends to be associated with maintenance and repair works, when air can enter water pipes when the supply mains are recharged. As the aerated water is used by customers, the appearance returns to normal.

Blue-green water
Blue-green water is 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 nausea and 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. A permanent solution to such blue-green water instances would involve the replacement of the property's internal copper pipes.

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.

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 taste or odour. Fluctuations in chlorine levels (and hence, the perception of chlorine taste or odour) occurs from time to time, largely due to changed water demands and flow rates. Our response to customers reporting chlorine taste and odour involves providing an explanation, as well as considering changes to chlorine dosing.

Other tastes and 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.

10. Risk management plan audit results

Pursuant to the *Safe Drinking Water Act 2003*, we have a documented water quality 'Risk Management Plan' that is subject to independent audit (at approximately two-year intervals) in terms of its content and implementation. Our plan was audited for the sixth time in March 2018, 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 met all the specifications in the Act (Section 9) and its Regulations in an effective manner;
- inspected all documents specified in the Regulations; and
- 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 *Safe Drinking Water Act 2003* during the audit period March 2016 to April 2018. A copy of the audit certificate is included in **Appendix C**. Notwithstanding the plan's compliance with the *Act*, the audit identified several opportunities for improvement, and an outline of these, together with actions to address them is below in **Table 13**.

Table 13: City West Water 2018 Drinking Water Risk Management Plan audit response progress summary

No.	Opportunity for Improvement	Response to opportunities for improvement	2019 Status
1	Drone or camera on rafts could be used to assist with, for example, tank inspections. There are many advances in technology which may be now more viable for implementation.	City West Water is currently investigating and trialling the use of camera drones for water tank condition inspections. We will implement the recommendations of our trial by 30 December 2018.	Investigation in the use of drones for tank inspections is still underway.
2	With storage tanks it may be worth considering the latest industry best practice. For example, investigate if solid steel roofs may increase reliability and simplify ongoing maintenance.	City West Water will undertake a review and gap analysis of our current practice for tank design and construction to ensure that best practice is considered in the materials selected. Recommendations will be adopted in the Risk Management Plan for future tanks.	Completed

No.	Opportunity for Improvement	Response to opportunities for improvement	2019 Status
3	For sampling taps, a yearly audit, and replacement where required.	Our current practice involves regular inspection of water sampling taps during water sampling activities by our laboratory contractor. On average, individual sampling taps are checked six times annually. We also maintain a register to track tap conditions, and the condition of tap is reported on a weekly basis by the by the laboratory to City West Water for rectification. We believe that the intent of this audit finding is being met and do not intend to take any further action.	Closed out
4	Further updating website to highlight drinking water quality with advice from HACCP technical team.	City West Water's website is currently being reviewed and enhanced with regard to providing information on drinking water quality. HACCP team members are being consulted to provide technical accuracy. Any updates to the website will be implemented by 30 December 2018.	Completed
5	The HACCP team to integrate especially closely, for example common work areas. This will help to reduce the chances of technical 'silos' developing.	City West Water will establish an arrangement for co-locating drinking water quality staff in our Footscray Head Office once per week to facilitate closer communication with the rest of the HACCP team and operational staff. This is an addition to the regular HACCP team meetings. This will commence in July 2018.	Completed
6	CTech are managing the chlorine dosing system. CTech to graph both pH and free active chlorine residual. Other parameters could also be considered to optimize water chemistry. A yearly chemistry performance review with suggestion for upgrades and Key Performance Indicators.	City West Water will hold a discussion with CTech to explore opportunities for improving monitoring of the dosing systems. This will occur in July 2018, with any outcomes implemented immediately.	Ongoing in terms of planned upgrade of City West Water's telemetry system to provide continuous graphical representations of chlorine dosing. Information on overall water quality is provided by City West Water's routine monitoring program.

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 employee training and development, calibration of equipment, and maintenance and inspections of assets. Each of these is examined during the independent annual audits. The HACCP system is highly regarded in the food industry for protecting the welfare and safety of consumers. It is based on the identification and management of risks (to drinking water quality) at key points within a production or product delivery process.

The HACCP certification demonstrates that City West Water attends 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 risk management framework requirements.

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

City West Water has not entered into any undertakings with the DHHS, pursuant to Section 30 of the *Safe Drinking Water Act 2003*.

12. 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.

13. 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.

14. 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 supply water from our water distribution mains to customers with privately owned offtakes. 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 offtake point, albeit that we endeavour to maintain these. City West Water has embarked on a program to reduce the number of such private supplies.

15. Further Information

This report is available on City West Water's website: **citywestwater.com.au**

For further information on this report please email: **enquiries@citywestwater.com.au**

For water quality issues please contact 132 642

Written enquiries can be addressed to: City West Water, Locked Bag 350, Sunshine, Victoria, 3020

Appendix A - Water quality data by locality

Population data is based on the 2016 Census and the results of tests on drinking water samples obtained from reticulation system sampling sites (water mains, customer taps, service tanks) tested between 1 July 2018 and 30 June 2019

WATER SAMPLING LOCALITY	Altona	LOCALITY NO.	2
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	117,900

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.2	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	323	323	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	1,600	>weekly	323	322	99.69%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	29	>weekly	323	N	N
Free Chlorine	mg/L	5	<0.01	0.22	0.54	>weekly	323	323	100%
Total Chlorine	mg/L	5	<0.05	0.33	0.62	>weekly	323	323	100%
Colour	Pt/Co Units	25**	2	3	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	75	103	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.03	0.06	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.002	0.006	fortnightly	26	26	100%
pH	units	6.5-8.5	6.7	7.2	7.7	fortnightly	25	25	100%
pH	units	6.5-9.2	6.7	7.2	7.7	fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.52	0.78	0.88	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.04	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.035	0.048	0.073	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	15	-	15	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.006	-	0.006	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	19	-	19	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.11	-	1.11	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.1	-	3.1	annually	1	1	100%
Sodium	mg/L	180	7.9	-	7.9	annually	1	1	100%
Sulphate	mg/L	250	7.5	-	7.5	annually	1	1	100%
Total Dissolved Solids	mg/L	600	42	-	42	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.008	-	0.008	annually	1	1	100%
Zinc	mg/L	3	0.003	-	0.003	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.018	0.029	0.059	>monthly	13	N	N
Dibromochloromethane	mg/L	N	0.002	0.005	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.010	0.013	0.018	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	11	-	11	annually	1	N	N
Calcium	mg/L	N	4.6	-	4.6	annually	1	N	N
Magnesium	mg/L	N	1.7	-	1.7	annually	1	N	N
Potassium	mg/L	N	1.1	-	1.1	annually	1	N	N
Total Organic Carbon	mg/L	N	1.1	-	1.1	annually	1	N	N
Total Phosphorus	mg/L	N	<0.005	-	<0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.8 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Caroline Springs	LOCALITY NO.	5
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	103,800

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.2	weekly	52	52	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	338	338	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	1,700	>weekly	338	337	99.7%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	32	>weekly	338	N	N
Free Chlorine	mg/L	5	<0.05	0.22	0.75	>weekly	338	338	100%
Total Chlorine	mg/L	5	<0.05	0.34	0.92	>weekly	338	338	100%
Colour	Pt/Co Units	25**	2	5	12	fortnightly	26	26	100%
Conductivity	µS/cm	~900	56	77	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.06	0.09	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.005	0.014	fortnightly	26	26	100%
pH	units	6.5-8.5	6.7	7.2	8.3	fortnightly	25	25	100%
pH	units	6.5-9.2	6.7	7.2	8.3	fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.71	0.81	0.88	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.05	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.023	0.034	0.058	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	10	-	10	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.011	-	0.011	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	15	-	15	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.19	-	0.19	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.2	-	3.2	annually	1	1	100%
Sodium	mg/L	180	5.2	-	5.2	annually	1	1	100%
Sulphate	mg/L	250	1.7	-	1.7	annually	1	1	100%
Total Dissolved Solids	mg/L	600	48	-	48	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.007	-	0.007	annually	1	1	100%
Zinc	mg/L	3	0.004	-	0.004	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.007	0.023	0.052	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	0.003	0.006	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.005	0.008	0.015	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	14	-	14	annually	1	N	N
Calcium	mg/L	N	3.7	-	3.7	annually	1	N	N
Magnesium	mg/L	N	1.4	-	1.4	annually	1	N	N
Potassium	mg/L	N	0.7	-	0.7	annually	1	N	N
Total Organic Carbon	mg/L	N	1.6	-	1.6	annually	1	N	N
Total Phosphorus	mg/L	N	0.009	-	0.009	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Deer Park	LOCALITY NO.	4
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	58,000

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.0	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	195	195	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	15	>weekly	195	195	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	21	>weekly	195	N	N
Free Chlorine	mg/L	5	<0.05	0.24	0.64	>weekly	195	195	100%
Total Chlorine	mg/L	5	0.10	0.36	0.79	>weekly	195	195	100%
Colour	Pt/Co Units	25**	<2	4	8	fortnightly	26	26	100%
Conductivity	µS/cm	~900	58	91	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.04	0.10	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.003	0.013	fortnightly	26	26	100%
pH	units	6.5-8.5	6.9	7.2	8.1	fortnightly	26	26	100%
pH	units	6.5-9.2	6.9	7.2	8.1	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.54	0.79	0.87	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.028	0.037	0.050	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	11	-	11	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.001	-	0.001	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	17	-	17	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.41	-	0.41	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.1	-	3.1	annually	1	1	100%
Sodium	mg/L	180	6.4	-	6.4	annually	1	1	100%
Sulphate	mg/L	250	3.6	-	3.6	annually	1	1	100%
Total Dissolved Solids	mg/L	600	45	-	45	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.007	-	0.007	annually	1	1	100%
Zinc	mg/L	3	0.002	-	0.002	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.013	0.022	0.034	>monthly	13	N	N
Dibromochloromethane	mg/L	N	0.001	0.004	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.005	0.010	0.018	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	13	-	13	annually	1	N	N
Calcium	mg/L	N	4.1	-	4.1	annually	1	N	N
Magnesium	mg/L	N	1.6	-	1.6	annually	1	N	N
Potassium	mg/L	N	0.8	-	0.8	annually	1	N	N
Total Organic Carbon	mg/L	N	1.2	-	1.2	annually	1	N	N
Total Phosphorus	mg/L	N	0.006	-	0.006	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.8 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	East Keilor	LOCALITY NO.	6
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	41,300

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.1	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	156	156	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	290	>weekly	156	156	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	2	>weekly	156	N	N
Free Chlorine	mg/L	5	<0.05	0.39	1.10	>weekly	156	156	100%
Total Chlorine	mg/L	5	0.12	0.52	1.20	>weekly	156	156	100%
Colour	Pt/Co Units	25**	<2	4	8	fortnightly	26	26	100%
Conductivity	µS/cm	~900	53	88	130	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.04	0.09	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.004	0.010	fortnightly	26	26	100%
pH	units	6.5-8.5	6.7	7.4	8.4	fortnightly	26	26	100%
pH	units	6.5-9.2	6.7	7.4	8.4	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.56	0.80	0.92	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.020	0.034	0.055	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	9	-	9	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.001	-	0.001	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	16	-	16	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.19	-	0.19	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.1	-	3.1	annually	1	1	100%
Sodium	mg/L	180	5.2	-	5.2	annually	1	1	100%
Sulphate	mg/L	250	1.7	-	1.7	annually	1	1	100%
Total Dissolved Solids	mg/L	600	35	-	35	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Zinc	mg/L	3	<0.001	-	<0.001	annually	1	1	100%
Bromoform	mg/L	N	<0.001	0.001	0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.011	0.021	0.045	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	0.004	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.004	0.009	0.017	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	16	-	16	annually	1	N	N
Calcium	mg/L	N	4.5	-	4.5	annually	1	N	N
Magnesium	mg/L	N	1.2	-	1.2	annually	1	N	N
Potassium	mg/L	N	0.7	-	0.7	annually	1	N	N
Total Organic Carbon	mg/L	N	1.6	-	1.6	annually	1	N	N
Total Phosphorus	mg/L	N	0.007	-	0.007	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1.0 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Little River	LOCALITY NO.	1A
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	670

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	0.1	-	1.4	>weekly	91	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	117	117	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	130	>weekly	117	117	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	2	>weekly	117	N	N
Free Chlorine	mg/L	5	<0.01	0.19	0.57	>weekly	117	117	100%
Total Chlorine	mg/L	5	<0.05	0.29	0.74	>weekly	117	117	100%
Colour	Pt/Co Units	25**	<2	4	8	>fortnightly	65	65	100%
Conductivity	µS/cm	~900	72	102	140	>fortnightly	65	65	100%
Fluoride	mg/L	1.5	0.39	0.79	1.20	>fortnightly	66	66	100%
Iron	mg/L	0.3	0.02	0.05	0.11	>fortnightly	65	65	100%
Manganese	mg/L	0.1	<0.001	0.004	0.015	>fortnightly	65	65	100%
pH	units	6.5-8.5	6.5	7.4	9.5	>fortnightly	65	58	89%
pH	units	6.5-9.2	6.5	7.4	9.5	>fortnightly	65	64	98%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.12	>monthly	52	52	100%
Total Trihalomethanes	mg/L	0.25	0.034	0.057	0.107	>monthly	52	52	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	12	-	12	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.021	-	0.021	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	22	-	22	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.62	-	0.62	annually	1	1	100%
Silica (SiO_2)	mg/L	80	4.1	-	4.1	annually	1	1	100%
Sodium	mg/L	180	6.5	-	6.5	annually	1	1	100%
Sulphate	mg/L	250	3.6	-	3.6	annually	1	1	100%
Total Dissolved Solids	mg/L	600	40	-	40	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.018	-	0.018	annually	1	1	100%
Zinc	mg/L	3	0.006	-	0.006	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	52	N	N
Chloroform	mg/L	N	0.019	0.038	0.087	>monthly	52	N	N
Dibromochloromethane	mg/L	N	0.001	0.005	0.008	>monthly	52	N	N
Dichlorobromomethane	mg/L	N	0.006	0.014	0.019	>monthly	52	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	20	-	20	annually	1	N	N
Calcium	mg/L	N	7.0	-	7.0	annually	1	N	N
Magnesium	mg/L	N	1.1	-	1.1	annually	1	N	N
Potassium	mg/L	N	0.8	-	0.8	annually	1	N	N
Total Organic Carbon	mg/L	N	1.4	-	1.4	annually	1	N	N
Total Phosphorus	mg/L	N	<0.005	-	<0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.8 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Maribyrnong	LOCALITY NO.	3A
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	120,900

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.1	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	364	364	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	20	>weekly	364	364	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	6	>weekly	364	N	N
Free Chlorine	mg/L	5	<0.05	0.26	0.56	>weekly	364	364	100%
Total Chlorine	mg/L	5	<0.05	0.37	0.77	>weekly	364	364	100%
Colour	Pt/Co Units	25**	2	4	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	65	89	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.04	0.13	fortnightly	26	26	100%
Manganese	mg/L	0.1	0.001	0.003	0.007	fortnightly	26	26	100%
pH	units	6.5-8.5	6.8	7.2	7.4	fortnightly	25	25	100%
pH	units	6.5-9.2	6.8	7.2	7.4	fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.59	0.77	0.85	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.02	0.03	0.04	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.038	0.054	0.073	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	10	-	10	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.009	-	0.009	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	16	-	16	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.62	-	0.62	annually	1	1	100%
Silica (SiO_2)	mg/L	80	4.7	-	4.7	annually	1	1	100%
Sodium	mg/L	180	5.3	-	5.3	annually	1	1	100%
Sulphate	mg/L	250	2.9	-	2.9	annually	1	1	100%
Total Dissolved Solids	mg/L	600	52	-	52	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.016	-	0.016	annually	1	1	100%
Zinc	mg/L	3	0.003	-	0.003	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.021	0.037	0.057	>monthly	13	N	N
Dibromochloromethane	mg/L	N	0.002	0.004	0.009	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.009	0.012	0.019	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	13	-	13	annually	1	N	N
Calcium	mg/L	N	3.8	-	3.8	annually	1	N	N
Magnesium	mg/L	N	1.5	-	1.5	annually	1	N	N
Potassium	mg/L	N	0.8	-	0.8	annually	1	N	N
Total Organic Carbon	mg/L	N	1.4	-	1.4	annually	1	N	N
Total Phosphorus	mg/L	N	0.005	-	0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.9 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Moonee Ponds	LOCALITY NO.	9B
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	73,500

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.2	weekly	52	-	within standard
E. coli	orgs/100mL	zero (0)	0	0	0	>weekly	234	234	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	160	>weekly	234	234	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	170	>weekly	234	N	N
Free Chlorine	mg/L	5	<0.05	0.24	1.00	>weekly	234	234	100%
Total Chlorine	mg/L	5	<0.05	0.36	1.20	>weekly	234	234	100%
Colour	Pt/Co Unit	25**	2	5	8	fortnightly	26	26	100%
Conductivity	µS/cm	~900	52	81	120	fortnightly	26	26	100%
Iron	mg/L	0.3	0.01	0.05	0.13	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.006	0.051	fortnightly	26	26	100%
pH	units	6.5-8.5	6.7	7.2	7.5	fortnightly	26	26	100%
pH	units	6.5-9.2	6.7	7.2	7.5	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.22	0.77	0.87	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.02	0.03	0.08	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.029	0.050	0.068	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	11	-	11	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.009	-	0.009	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	16	-	16	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	0.0001	-	0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.89	-	0.89	annually	1	1	100%
Silica (SiO_2)	mg/L	80	5.2	-	5.2	annually	1	1	100%
Sodium	mg/L	180	5.9	-	5.9	annually	1	1	100%
Sulphate	mg/L	250	4.4	-	4.4	annually	1	1	100%
Total Dissolved Solids	mg/L	600	35	-	35	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.017	-	0.017	annually	1	1	100%
Zinc	mg/L	3	0.005	-	0.005	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.018	0.036	0.062	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	0.003	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.005	0.010	0.017	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	3.9	-	3.9	annually	1	N	N
Calcium	mg/L	N	12	-	12	annually	1	N	N
Magnesium	mg/L	N	1.5	-	1.5	annually	1	N	N
Potassium	mg/L	N	0.9	-	0.9	annually	1	N	N
Total Organic Carbon	mg/L	N	1.5	-	1.5	annually	1	N	N
Total Phosphorus	mg/L	N	0.008	-	0.008	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.9 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Parkville	LOCALITY NO.	11
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	157,600

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.2	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	403	403	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	4,500	>weekly	403	402	99.75%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	200	>weekly	403	N	N
Free Chlorine	mg/L	5	<0.01	0.31	0.83	>weekly	403	403	100%
Total Chlorine	mg/L	5	<0.05	0.43	1.10	>weekly	403	403	100%
Colour	Pt/Co Unit	25**	<2	4	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	56	94	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.04	0.11	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.005	0.069	fortnightly	26	26	100%
pH	units	6.5-8.5	6.8	7.1	7.4	fortnightly	25	25	100%
pH	units	6.5-9.2	6.8	7.1	7.4	fortnightly	25	25	100%
Fluoride	mg/L	1.5	0.55	0.79	0.87	>fortnightly	27	27	100%
Aluminium (acid soluble)	mg/L	0.2	0.02	0.04	0.10	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.033	0.048	0.066	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	15	-	15	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.017	-	0.017	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	19	-	19	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	0.0002	-	0.0002	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.06	-	1.06	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.3	-	3.3	annually	1	1	100%
Sodium	mg/L	180	8.0	-	8.0	annually	1	1	100%
Sulphate	mg/L	250	8.0	-	8.0	annually	1	1	100%
Total Dissolved Solids	mg/L	600	52	-	52	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.011	-	0.011	annually	1	1	100%
Zinc	mg/L	3	0.014	-	0.014	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.015	0.031	0.054	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	0.004	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.006	0.012	0.018	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	11	-	11	annually	1	N	N
Calcium	mg/L	N	4.6	-	4.6	annually	1	N	N
Magnesium	mg/L	N	1.8	-	1.8	annually	1	N	N
Potassium	mg/L	N	1.0	-	1.0	annually	1	N	N
Total Organic Carbon	mg/L	N	1.2	-	1.2	annually	1	N	N
Total Phosphorus	mg/L	N	<0.005	-	<0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1.1 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Richmond	LOCALITY NO.	54
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	24,900

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	0.4	-	1.3	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	104	104	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	14	>weekly	104	104	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	2	>weekly	104	N	N
Free Chlorine	mg/L	5	<0.01	0.26	0.57	>weekly	104	104	100%
Total Chlorine	mg/L	5	0.05	0.38	0.70	>weekly	104	104	100%
Colour	Pt/Co unit	25**	4	6	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	54	59	62	fortnightly	26	26	100%
Iron	mg/L	0.3	0.05	0.08	0.11	fortnightly	26	26	100%
Manganese	mg/L	0.1	0.004	0.005	0.007	fortnightly	26	26	100%
pH	units	6.5-8.5	6.7	7.2	7.5	fortnightly	26	26	100%
pH	units	6.5-9.2	6.7	7.2	7.5	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.23	0.74	0.84	>fortnightly	27	27	100%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.05	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.054	0.073	0.097	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	7	-	7	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.009	-	0.009	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	0.005	-	0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	14	-	14	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.75	-	0.75	annually	1	1	100%
Silica (SiO_2)	mg/L	80	6.3	-	6.3	annually	1	1	100%
Sodium	mg/L	180	4.0	-	4.0	annually	1	1	100%
Sulphate	mg/L	250	1.6	-	1.6	annually	1	1	100%
Total Dissolved Solids	mg/L	600	38	-	38	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.030	-	0.030	annually	1	1	100%
Zinc	mg/L	3	0.002	-	0.002	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.042	0.063	0.085	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	<0.001	0.001	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.006	0.009	0.011	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	14	-	14	annually	1	N	N
Calcium	mg/L	N	3.6	-	3.6	annually	1	N	N
Magnesium	mg/L	N	1.3	-	1.3	annually	1	N	N
Potassium	mg/L	N	0.6	-	0.6	annually	1	N	N
Total Organic Carbon	mg/L	N	1.6	-	1.6	annually	1	N	N
Total Phosphorus	mg/L	N	0.006	-	0.006	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1.1 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Strathmore	LOCALITY NO.	9A
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	8,100

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.2	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	78	78	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	4,900	>weekly	78	77	98.72%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	200.0	>weekly	78	N	N
Free Chlorine	mg/L	5	0.03	0.09	0.39	>weekly	78	78	100%
Total Chlorine	mg/L	5	0.03	0.18	0.53	>weekly	78	78	100%
Colour	Pt/Co unit	25**	2	6	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	50	69	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.06	0.08	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.004	0.009	fortnightly	26	26	100%
pH	units	6.5-8.5	6.8	7.3	8.1	fortnightly	26	26	100%
pH	units	6.5-9.2	6.8	7.3	8.1	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.45	0.76	0.85	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.03	0.06	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.045	0.065	0.086	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	9	-	9	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.008	-	0.008	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	15	-	15	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.80	-	0.80	annually	1	1	100%
Silica (SiO_2)	mg/L	80	6.3	-	6.3	annually	1	1	100%
Sodium	mg/L	180	4.0	-	4.0	annually	1	1	100%
Sulphate	mg/L	250	2.0	-	2.0	annually	1	1	100%
Total Dissolved Solids	mg/L	600	45	-	45	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.023	-	0.023	annually	1	1	100%
Zinc	mg/L	3	0.004	-	0.004	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.020	0.053	0.072	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	0.002	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.006	0.010	0.016	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	13	-	13	annually	1	N	N
Calcium	mg/L	N	3.7	-	3.7	annually	1	N	N
Magnesium	mg/L	N	1.4	-	1.4	annually	1	N	N
Potassium	mg/L	N	0.7	-	0.7	annually	1	N	N
Total Organic Carbon	mg/L	N	1.5	-	1.5	annually	1	N	N
Total Phosphorus	mg/L	N	<0.005	-	<0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Taylors Lakes	LOCALITY NO.	5A
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	67,800

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	0.5	-	1.8	>weekly	65	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	247	247	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	2[G]	10,000	>weekly	247	246	99.6%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	1,600	>weekly	247	N	N
Free Chlorine	mg/L	5	<0.01	0.35	0.80	>weekly	247	247	100%
Total Chlorine	mg/L	5	<0.05	0.48	0.97	>weekly	247	247	100%
Colour	Pt/Co Units	25**	2	6	16	>fortnightly	39	39	100%
Conductivity	µS/cm	~900	59	66	73	>fortnightly	39	39	100%
Fluoride	mg/L	1.5	0.75	0.80	0.86	>fortnightly	41	41	100%
Iron	mg/L	0.3	0.05	0.09	0.21	>fortnightly	39	39	100%
Manganese	mg/L	0.1	0.002	0.010	0.080	>fortnightly	39	39	100%
pH	units	6.5-8.5	6.7	7.2	8.2	>fortnightly	39	39	100%
pH	units	6.5-9.2	6.7	7.2	8.2	>fortnightly	39	39	100%
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.01	0.03	>monthly	26	26	100%
Total Trihalomethanes	mg/L	0.25	0.015	0.028	0.056	>monthly	26	26	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	9	-	9	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.003	-	0.003	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	15	-	15	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.20	-	0.20	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.0	-	3.0	annually	1	1	100%
Sodium	mg/L	180	4.9	-	4.9	annually	1	1	100%
Sulphate	mg/L	250	1.6	-	1.6	annually	1	1	100%
Total Dissolved Solids	mg/L	600	48	-	48	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.005	-	0.005	annually	1	1	100%
Zinc	mg/L	3	0.002	-	0.002	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	26	N	N
Chloroform	mg/L	N	0.010	0.021	0.045	>monthly	26	N	N
Dibromochloromethane	mg/L	N	<0.001	0.001	0.002	>monthly	26	N	N
Dichlorobromomethane	mg/L	N	0.004	0.006	0.009	>monthly	26	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	14	-	14	annually	1	N	N
Calcium	mg/L	N	3.9	-	3.9	annually	1	N	N
Magnesium	mg/L	N	1.4	-	1.4	annually	1	N	N
Potassium	mg/L	N	0.7	-	0.7	annually	1	N	N
Total Organic Carbon	mg/L	N	1.4	-	1.4	annually	1	N	N
Total Phosphorus	mg/L	N	0.006	-	0.006	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1.3 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Tullamarine	LOCALITY NO.	7A
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	10,500

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.5	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	91	91	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	1,400	>weekly	91	90	98.9%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	200	>weekly	91	N	N
Free Chlorine	mg/L	5	<0.05	0.48	1.10	>weekly	91	91	100%
Total Chlorine	mg/L	5	0.16	0.62	1.30	>weekly	91	91	100%
Colour	Pt/Co Units	25**	<2	5	12	fortnightly	26	26	100%
Conductivity	µS/cm	~900	54	80	130	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.06	0.15	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.005	0.021	fortnightly	26	26	100%
pH	units	6.5-8.5	6.8	7.3	8.5	fortnightly	26	26	100%
pH	units	6.5-9.2	6.8	7.3	8.5	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.58	0.80	0.87	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.05	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.018	0.031	0.067	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	11	-	11	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.003	-	0.003	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	17	-	17	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.41	-	0.41	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.0	-	3.0	annually	1	1	100%
Sodium	mg/L	180	6.0	-	6.0	annually	1	1	100%
Sulphate	mg/L	250	3.3	-	3.3	annually	1	1	100%
Total Dissolved Solids	mg/L	600	70	-	70	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Zinc	mg/L	3	0.002	-	0.002	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.009	0.020	0.061	>monthly	13	N	N
Dibromochloromethane	mg/L	N	<0.001	0.003	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.004	0.007	0.013	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	14	-	14	annually	1	N	N
Calcium	mg/L	N	4.4	-	4.4	annually	1	N	N
Magnesium	mg/L	N	1.5	-	1.5	annually	1	N	N
Potassium	mg/L	N	0.8	-	0.8	annually	1	N	N
Total Organic Carbon	mg/L	N	1.4	-	1.4	annually	1	N	N
Total Phosphorus	mg/L	N	<0.005	-	<0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1.2 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Werribee	LOCALITY NO.	1
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	136,700

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	0.1	-	1.1	>weekly	79	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	465	465	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	54	>weekly	465	465	100%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	200	>weekly	465	N	N
Free Chlorine	mg/L	5	<0.05	0.30	0.65	>weekly	465	465	100%
Total Chlorine	mg/L	5	0.05	0.41	0.77	>weekly	465	465	100%
Colour	Pt/Co Units	25**	2	4	8	>fortnightly	52	52	100%
Conductivity	µS/cm	~900	72	97	120	>fortnightly	52	52	100%
Fluoride	mg/L	1.5	0.34	0.79	0.88	>fortnightly	53	53	100%
Iron	mg/L	0.3	0.01	0.04	0.07	>fortnightly	52	52	100%
Manganese	mg/L	0.1	<0.001	0.004	0.013	>fortnightly	52	52	100%
pH	units	6.5-8.5	6.7	7.3	8.8	>fortnightly	52	50	96%
pH	units	6.5-9.2	6.7	7.3	8.8	>fortnightly	52	52	100%
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.03	0.05	>monthly	39	39	100%
Total Trihalomethanes	mg/L	0.25	0.033	0.055	0.096	>monthly	39	39	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	12	-	12	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.009	-	0.009	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	15	-	15	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	0.0001	-	0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.66	-	0.66	annually	1	1	100%
Silica (SiO_2)	mg/L	80	5.0	-	5.0	annually	1	1	100%
Sodium	mg/L	180	3.9	-	3.9	annually	1	1	100%
Sulphate	mg/L	250	1.5	-	1.5	annually	1	1	100%
Total Dissolved Solids	mg/L	600	28	-	28	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.016	-	0.016	annually	1	1	100%
Zinc	mg/L	3	0.001	-	0.001	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	39	N	N
Chloroform	mg/L	N	0.021	0.036	0.065	>monthly	39	N	N
Dibromochloromethane	mg/L	N	0.001	0.005	0.008	>monthly	39	N	N
Dichlorobromomethane	mg/L	N	0.006	0.014	0.024	>monthly	39	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	14	-	14	annually	1	N	N
Calcium	mg/L	N	4.0	-	4.0	annually	1	N	N
Magnesium	mg/L	N	1.2	-	1.2	annually	1	N	N
Potassium	mg/L	N	0.6	-	0.6	annually	1	N	N
Total Organic Carbon	mg/L	N	1.6	-	1.6	annually	1	N	N
Total Phosphorus	mg/L	N	<0.005	-	<0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.8 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Werribee South	LOCALITY NO.	2A
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	2000

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	0.1	-	3.3	>weekly	89	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	112	112	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	1[G]	10,000	>weekly	112	104	92.86%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	200	>weekly	112	N	N
Free Chlorine	mg/L	5	<0.01	0.35	0.96	>weekly	112	112	100%
Total Chlorine	mg/L	5	<0.05	0.45	1.10	>weekly	112	112	100%
Colour	Pt/Co Units	25**	2	4	8	>fortnightly	63	63	100%
Conductivity	µS/cm	~900	70	106	130	>fortnightly	63	63	100%
Fluoride	mg/L	1.5	0.37	0.81	0.94	>fortnightly	65	65	100%
Iron	mg/L	0.3	0.02	0.08	0.16	>fortnightly	63	63	100%
Manganese	mg/L	0.1	<0.001	0.003	0.027	>fortnightly	63	63	100%
pH	units	6.5-8.5	6.7	7.4	7.8	>fortnightly	63	63	100%
pH	units	6.5-9.2	6.7	7.4	7.8	>fortnightly	63	63	100%
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.04	>monthly	50	50	100%
Total Trihalomethanes	mg/L	0.25	0.002	0.027	0.077	>monthly	50	50	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	13	-	13	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.001	-	0.001	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	0.005	-	0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	16	-	16	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	0.0002	-	0.0002	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.71	-	0.71	annually	1	1	100%
Silica (SiO_2)	mg/L	80	4.7	-	4.7	annually	1	1	100%
Sodium	mg/L	180	5.1	-	5.1	annually	1	1	100%
Sulphate	mg/L	250	2.3	-	2.3	annually	1	1	100%
Total Dissolved Solids	mg/L	600	28	-	28	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.019	-	0.019	annually	1	1	100%
Zinc	mg/L	3	0.001	-	0.001	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	50	N	N
Chloroform	mg/L	N	<0.001	0.017	0.063	>monthly	50	N	N
Dibromochloromethane	mg/L	N	<0.001	0.002	0.008	>monthly	50	N	N
Dichlorobromomethane	mg/L	N	<0.001	0.007	0.018	>monthly	50	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	15	-	15	annually	1	N	N
Calcium	mg/L	N	4.0	-	4.0	annually	1	N	N
Magnesium	mg/L	N	1.4	-	1.4	annually	1	N	N
Potassium	mg/L	N	0.7	-	0.7	annually	1	N	N
Total Organic Carbon	mg/L	N	1.4	-	1.4	annually	1	N	N
Total Phosphorus	mg/L	N	0.005	-	0.005	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.9 NTU for reporting period)

- not applicable

WATER SAMPLING LOCALITY	Williamstown	LOCALITY NO.	3B
FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	50,000

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of Samples		Performance against standard / guideline
			Min	Mean	Max		Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	1.2	weekly	52	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	>weekly	169	169	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	2,900	>weekly	169	168	99.41%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	10	>weekly	169	N	N
Free Chlorine	mg/L	5	<0.01	0.30	0.59	>weekly	169	169	100%
Total Chlorine	mg/L	5	0.07	0.41	0.71	>weekly	169	169	100%
Colour	Pt/Co Units	25**	<2	3	4	fortnightly	26	26	100%
Conductivity	µS/cm	~900	72	108	120	fortnightly	26	26	100%
Iron	mg/L	0.3	<0.01	0.02	0.04	fortnightly	26	26	100%
Manganese	mg/L	0.1	<0.001	0.002	0.011	fortnightly	26	26	100%
pH	units	6.5-8.5	6.8	7.1	7.5	fortnightly	26	26	100%
pH	units	6.5-9.2	6.8	7.1	7.5	fortnightly	26	26	100%
Fluoride	mg/L	1.5	0.50	0.81	0.88	>fortnightly	28	28	100%
Aluminium (acid soluble)	mg/L	0.2	0.02	0.03	0.03	>monthly	13	13	100%
Total Trihalomethanes	mg/L	0.25	0.033	0.046	0.072	>monthly	13	13	100%
Arsenic	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	-	<0.0002	annually	1	1	100%
Chloride	mg/L	250	11	-	11	annually	1	1	100%
Chloroacetic acid	mg/L	0.15	<0.005	-	<0.005	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	-	<0.001	annually	1	1	100%
Copper	mg/L	1	0.007	-	0.007	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	-	<0.005	annually	1	1	100%
Dichloroacetic acid	mg/L	0.1	<0.005	-	<0.005	annually	1	1	100%
Hardness (as $CaCO_3$)	mg/L	200	15	-	15	annually	1	1	100%
Lead	mg/L	0.01	<0.001	-	<0.001	annually	1	1	100%
Mercury	mg/L	0.001	<0.0001	-	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.66	-	0.66	annually	1	1	100%
Silica (SiO_2)	mg/L	80	3.6	-	3.6	annually	1	1	100%
Sodium	mg/L	180	5.7	-	5.7	annually	1	1	100%
Sulphate	mg/L	250	4.6	-	4.6	annually	1	1	100%
Total Dissolved Solids	mg/L	600	35	-	35	annually	1	1	100%
Trichloroacetic acid	mg/L	0.1	0.012	-	0.012	annually	1	1	100%
Zinc	mg/L	3	0.002	-	0.002	annually	1	1	100%
Bromoform	mg/L	N	<0.001	<0.001	<0.001	>monthly	13	N	N
Chloroform	mg/L	N	0.015	0.025	0.043	>monthly	13	N	N
Dibromochloromethane	mg/L	N	0.004	0.006	0.008	>monthly	13	N	N
Dichlorobromomethane	mg/L	N	0.010	0.014	0.021	>monthly	13	N	N
Alkalinity (as $CaCO_3$)	mg/L	N	13	-	13	annually	1	N	N
Calcium	mg/L	N	3.6	-	3.6	annually	1	N	N
Magnesium	mg/L	N	1.4	-	1.4	annually	1	N	N
Potassium	mg/L	N	0.8	-	0.8	annually	1	N	N
Total Organic Carbon	mg/L	N	1.6	-	1.6	annually	1	N	N
Total Phosphorus	mg/L	N	0.006	-	0.006	annually	1	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 0.6 NTU for reporting period)

- not applicable

ALL WATER SAMPLING LOCALITIES

FOR PERIOD	1 July 2018 to 30 June 2019	POPULATION	973,670

Parameter	Unit	Guideline Value (ADWG 2011)	Concentration or value (all samples)			No. of Samples		Performance against standard / guideline
			Min	Mean	Max	Total	Passing	
Turbidity	NTU	5[1]	<0.1	-	3.3	896	-	within standard
E. coli	orgs/100mL	Zero (0)	0	0	0	3396	3396	100%
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1[G]	10,000	3396	3385	99.68%*
Total Coliforms	orgs/100mL	N	<1	<1[G]	1600	3396	N	N
Free Chlorine	mg/L	5	<0.01	0.28	1.10	3396	3396	100%
Total Chlorine	mg/L	5	<0.05	0.39	1.30	3396	3396	100%
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.12	310	310	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%
Chloride	mg/L	250	7	11	15	15	15	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	15	15	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	15	15	100%
Colour	Pt/Co Units	25**	<2	4	16	505	505	100%
Conductivity	µS/cm	~900	50	90	140	505	505	100%
Copper	mg/L	1	0.001	0.008	0.021	15	15	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	15	15	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.005	15	15	100%
Fluoride	mg/L	1.5	0.22	0.79	1.20	531	531	100%
Hardness (as CaCO3)	mg/L	200	14	16	22	15	15	100%
Iron	mg/L	0.3	<0.01	0.05	0.21	505	505	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	15	15	100%
Manganese	mg/L	0.1	<0.001	0.004	0.080	505	505	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	0.0002	15	15	100%
Nitrate (NO3)	mg/L	50	0.19	0.62	1.11	15	15	100%
pH	units	6.5-8.5	6.5	7.3	9.5	501	492	98.2%
pH	units	6.5-9.2	6.5	7.3	9.5	501	500	99.8%
Silica (SiO2)	mg/L	80	3.0	4.1	6.3	15	15	100%
Sodium	mg/L	180	3.9	5.6	8.0	15	15	100%
Sulphate	mg/L	250	1.5	3.4	8.0	15	15	100%
Total Dissolved Solids	mg/L	600	28	43	70	15	15	100%
Total Trihalomethanes	mg/L	0.25	0.002	0.045	0.107	309	309	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.013	0.030	15	15	100%
Zinc	mg/L	3	<0.001	0.003	0.014	15	15	100%
Alkalinity (as $CaCO_3$)	mg/L	N	11	14	20	15	N	N
Bromoform	mg/L	N	<0.001	<0.001	0.001	310	N	N
Calcium	mg/L	N	3.6	4.2	7.0	15	N	N
Chloroform	mg/L	N	<0.001	0.030	0.087	310	N	N
Dibromochloromethane	mg/L	N	<0.001	0.003	0.009	310	N	N
Dichlorobromomethane	mg/L	N	<0.001	0.010	0.024	310	N	N
Dissolved Oxygen	mg/L	N	7.2	9.6	11.3	26	N	N
Magnesium	mg/L	N	1.1	1.4	1.8	15	N	N
Potassium	mg/L	N	0.6	0.8	1.1	15	N	N
Temperature	°C	N	11.2	17.3	23.6	26	N	N
Total Organic Carbon	mg/L	N	1.1	1.4	1.6	15	N	N
Total Phosphorus	mg/L	N	<0.005	0.005	0.009	15	N	N

* Internal City West Water target value.

** Guideline set for "True Colour" (15 HU) however "Apparent Colour" is measured (with a benchmark guideline of 25 Pt/Co Units).

N No guideline/standard set for this parameter.

G Geometric means shown for bacterial parameters.

[1] Victorian standard: 95th percentile less than or equal to 5 NTU(95%ile result is 1.1 NTU for reporting period)

- not applicable

Appendix B - Spatial and time-based water quality summaries

A comparison of water quality results from the reticulation system sampling sites (water mains, customer taps, service tanks) obtained from the previous two financial years and the reporting period (2018/19)

Figure B1: *E. coli* performance in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

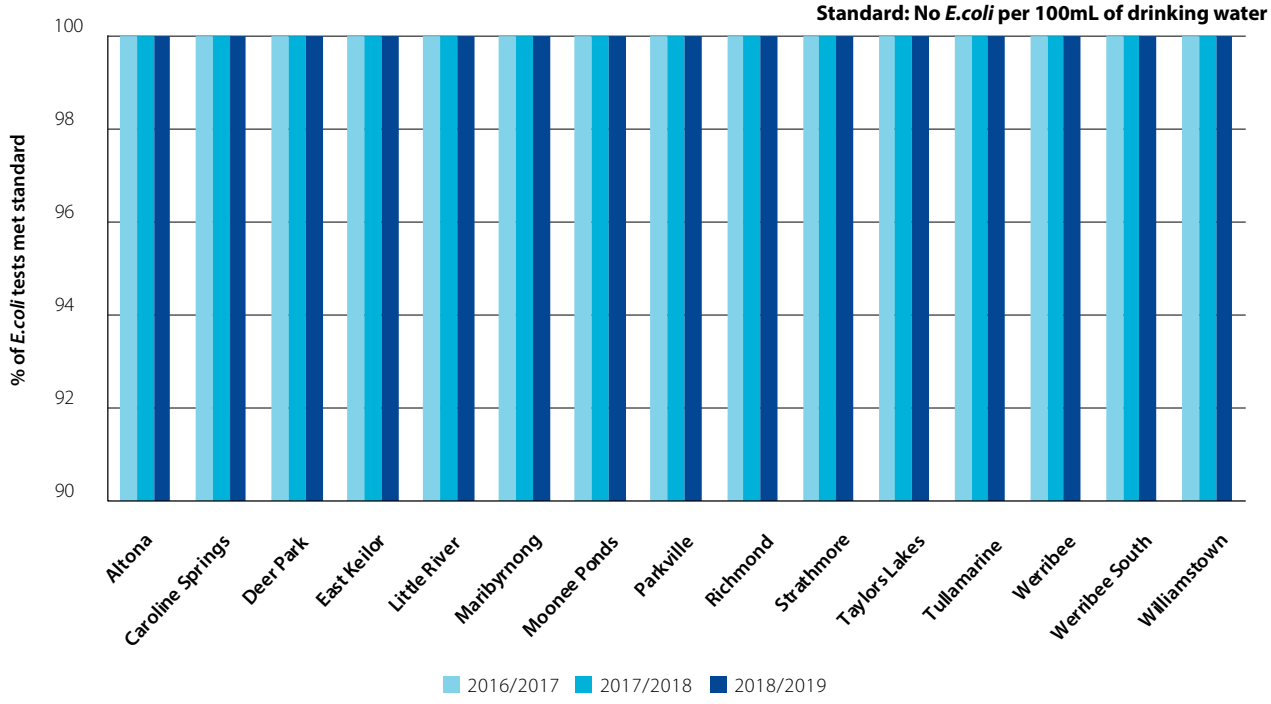


Figure B2: Annual average free chlorine concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

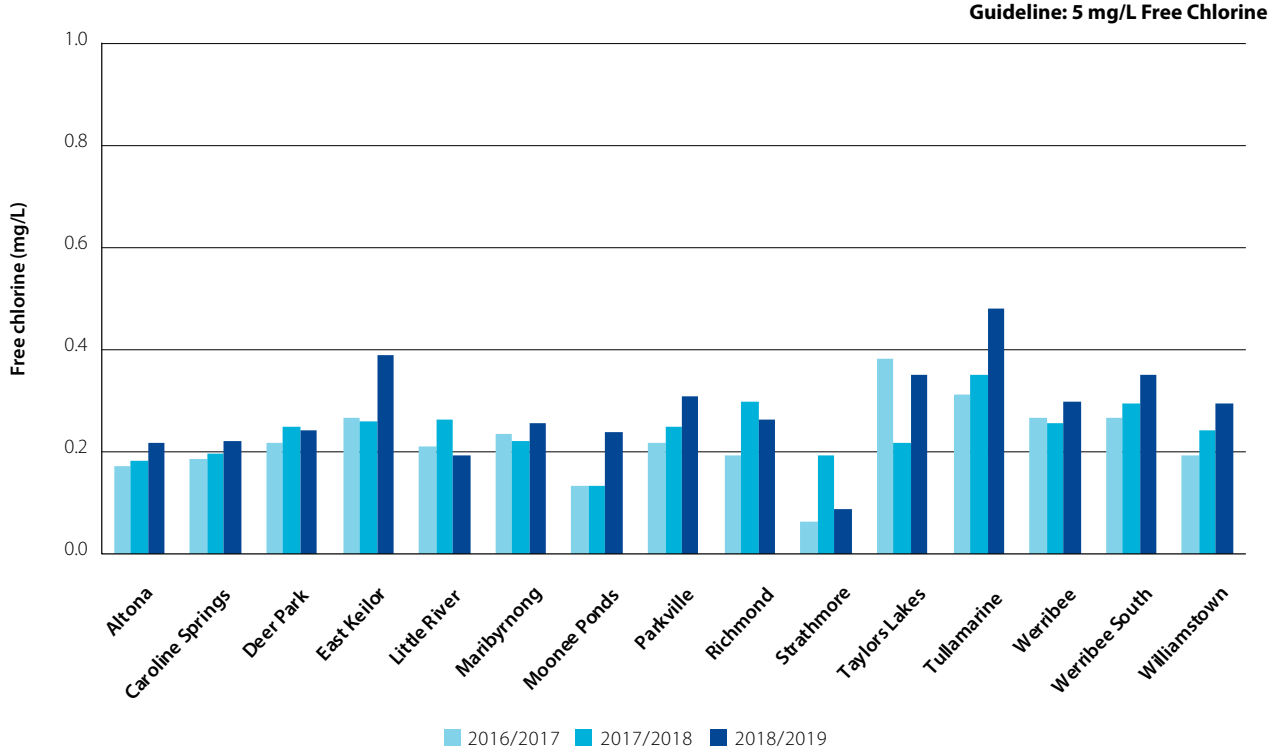


Figure B3: Average aluminium concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

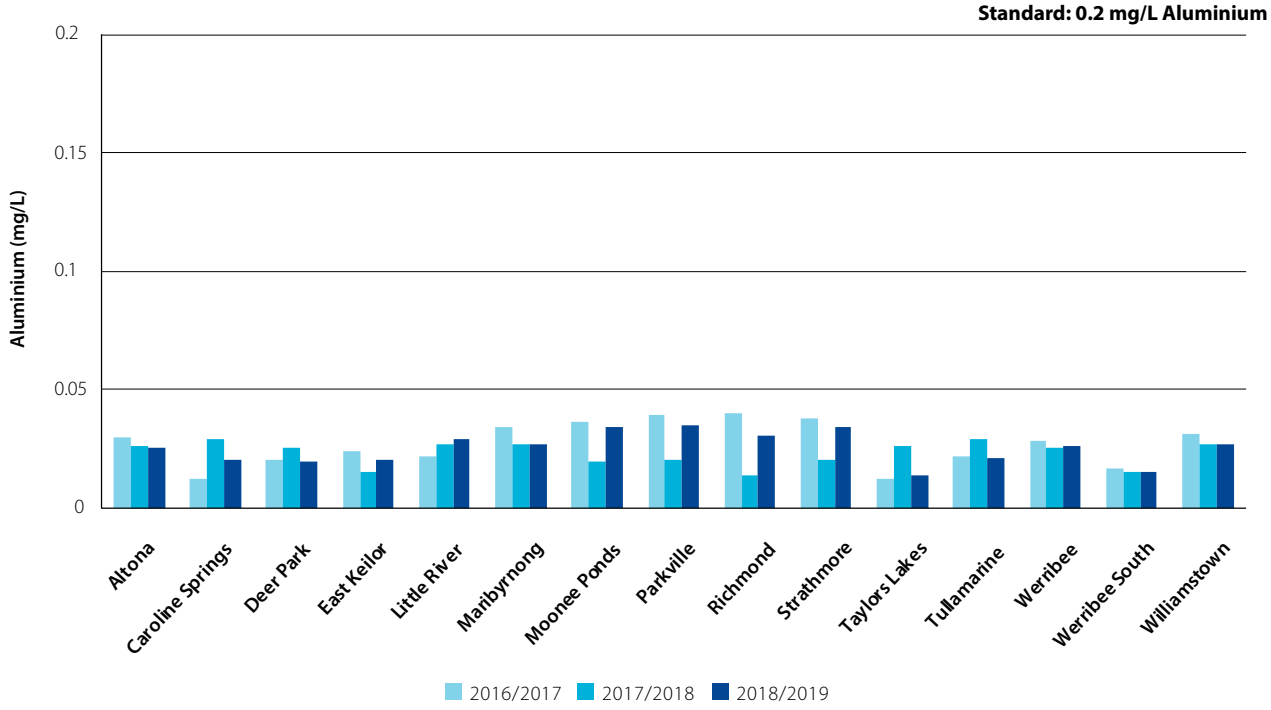


Figure B4: Chloride concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

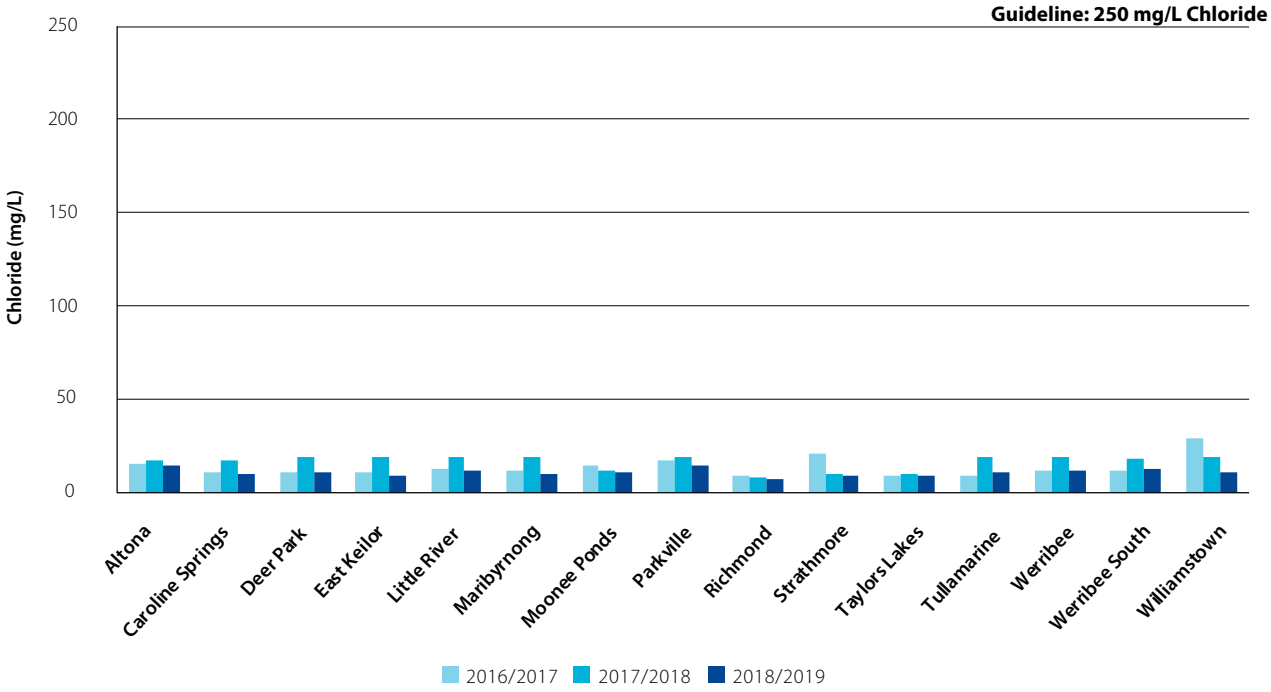


Figure B5: Average apparent colour levels in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

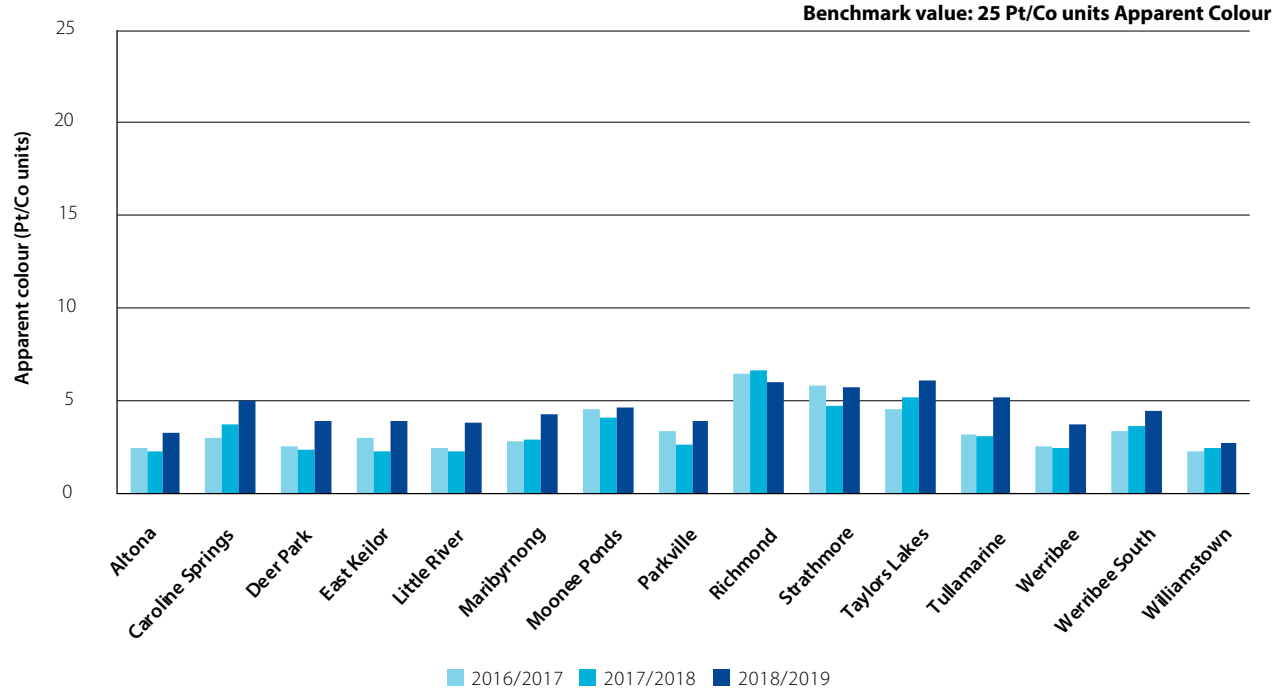


Figure B6: Copper concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

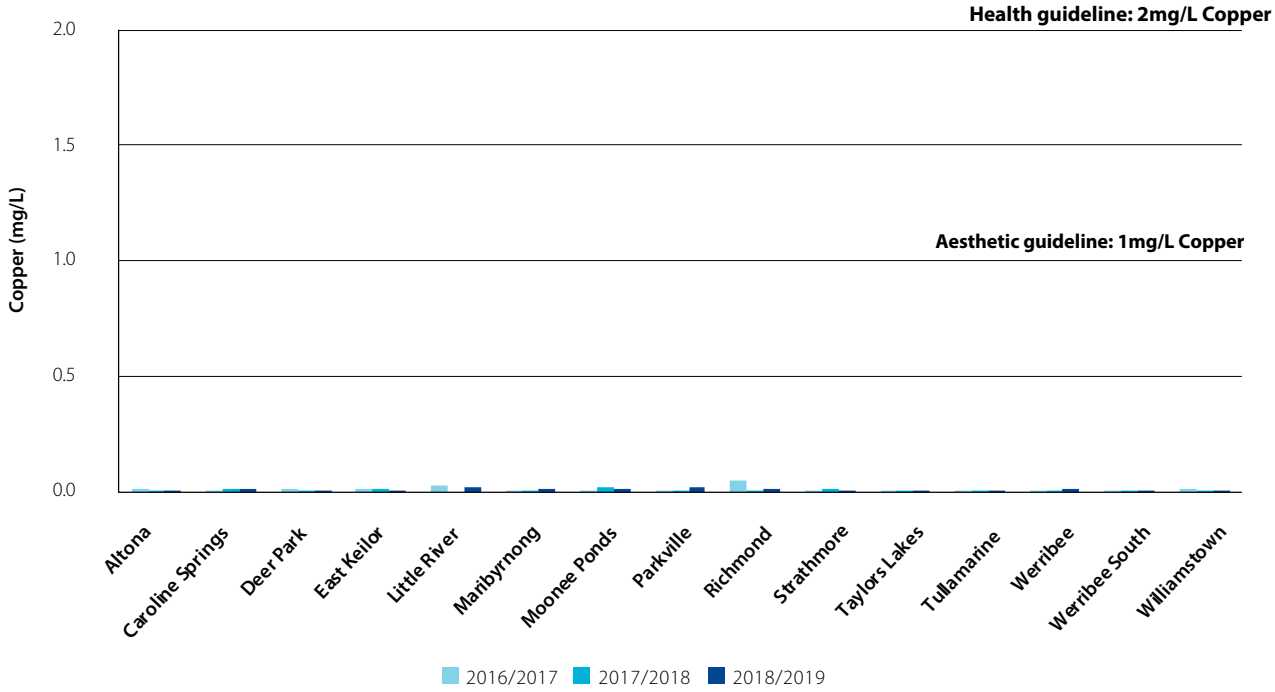


Figure B7: Average electrical conductivity levels in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

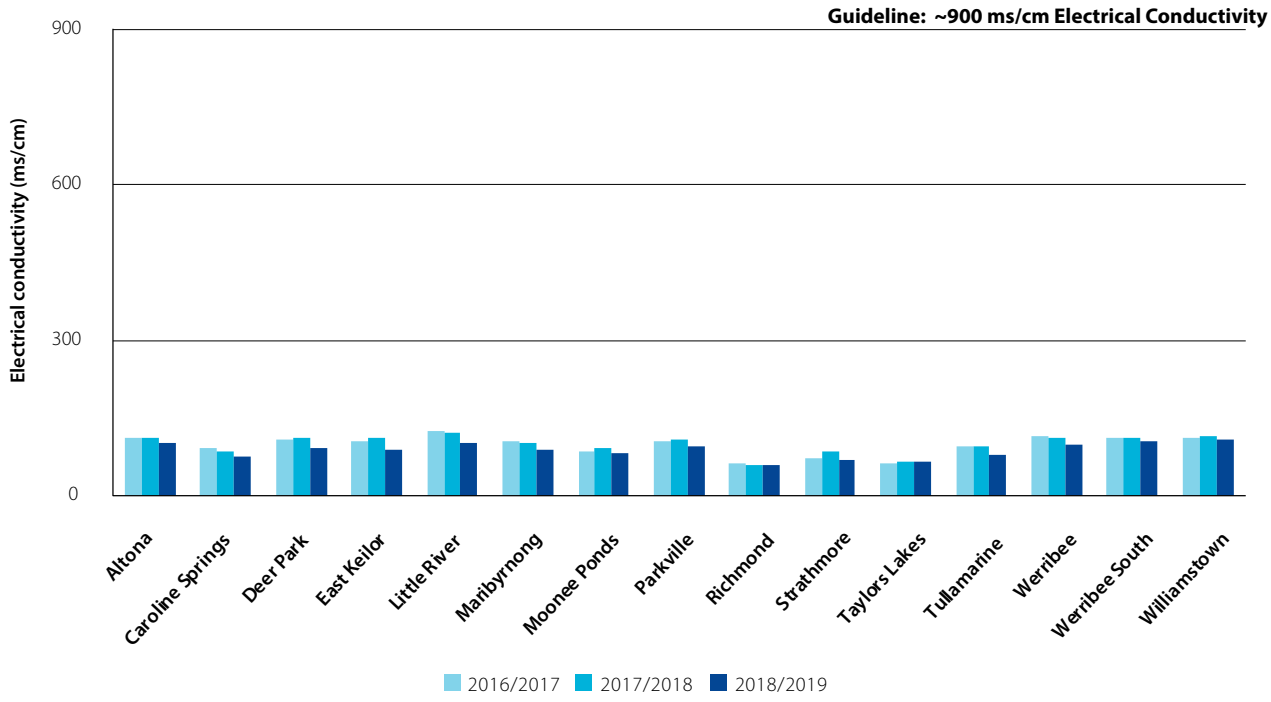


Figure B8: Average fluoride concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

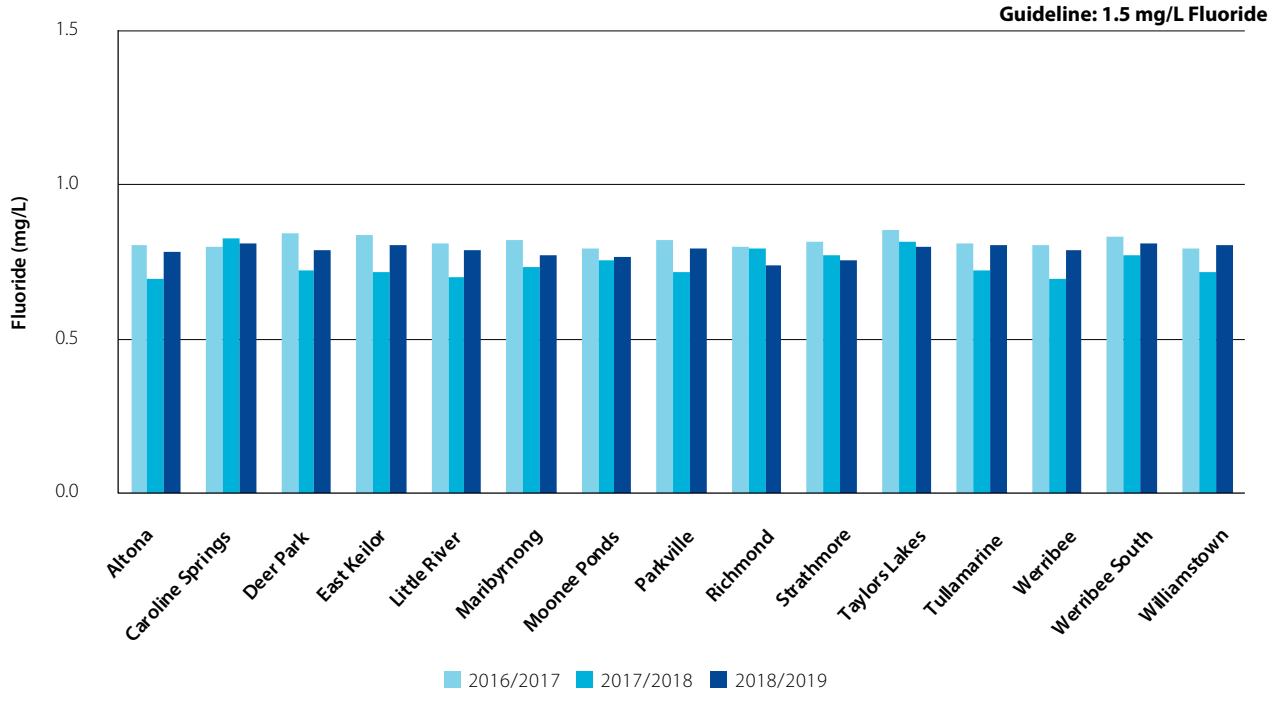


Figure B9: Hardness concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

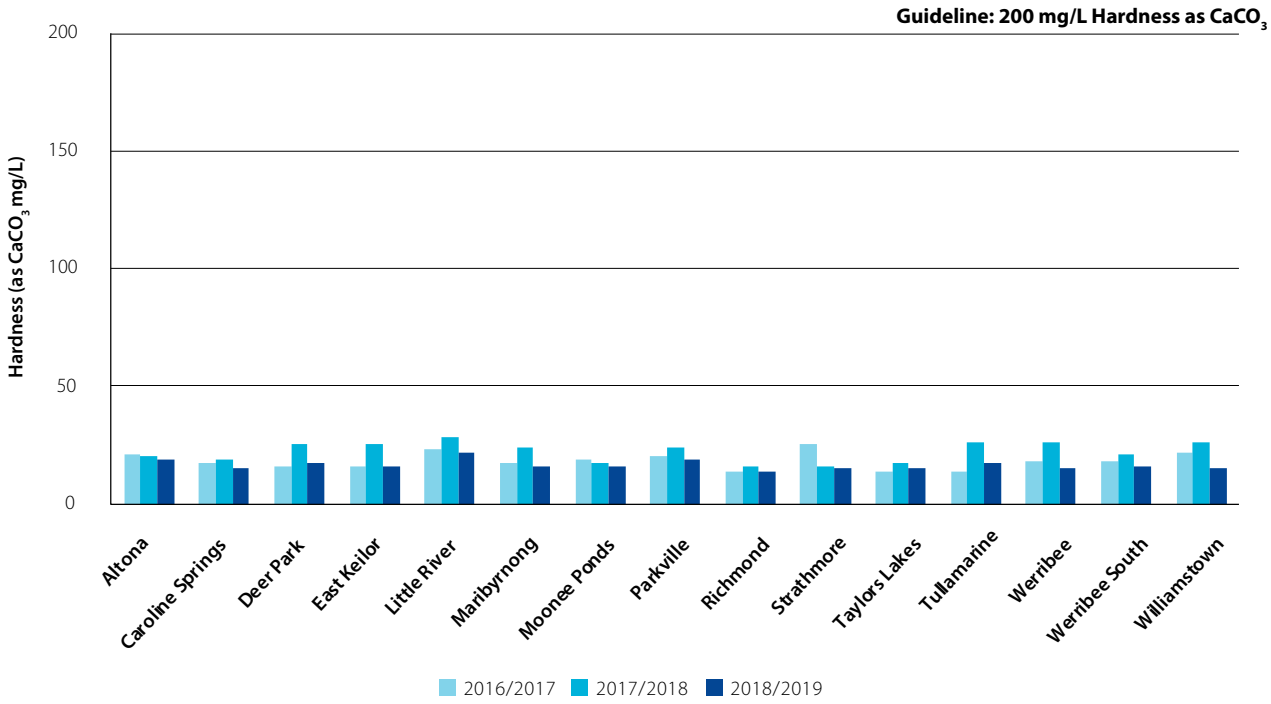


Figure B10: Average iron concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

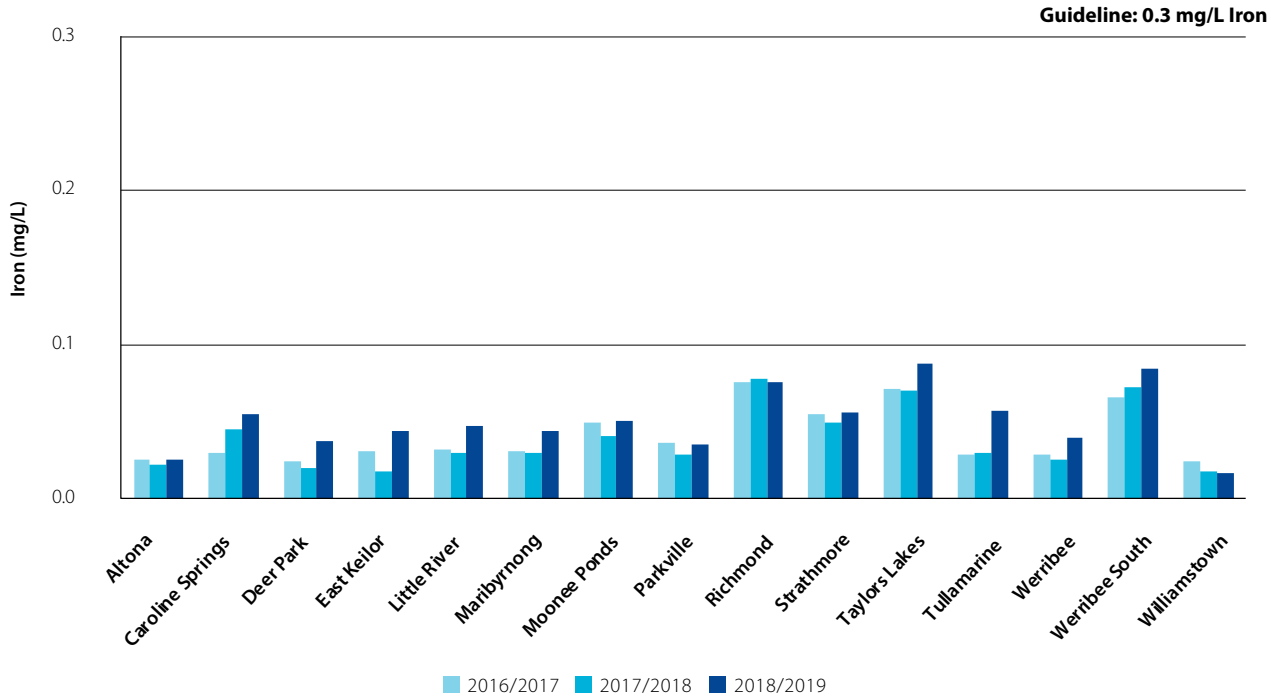


Figure B11: Average manganese concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

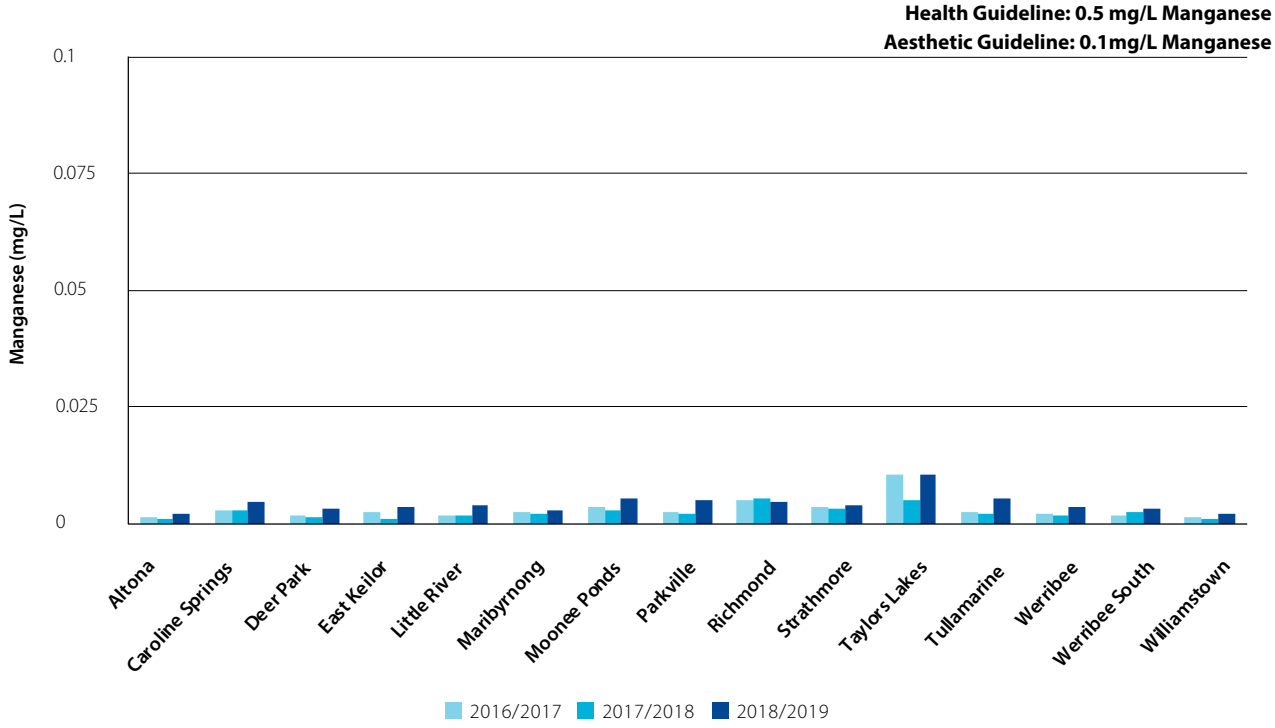


Figure B12: Nitrate concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

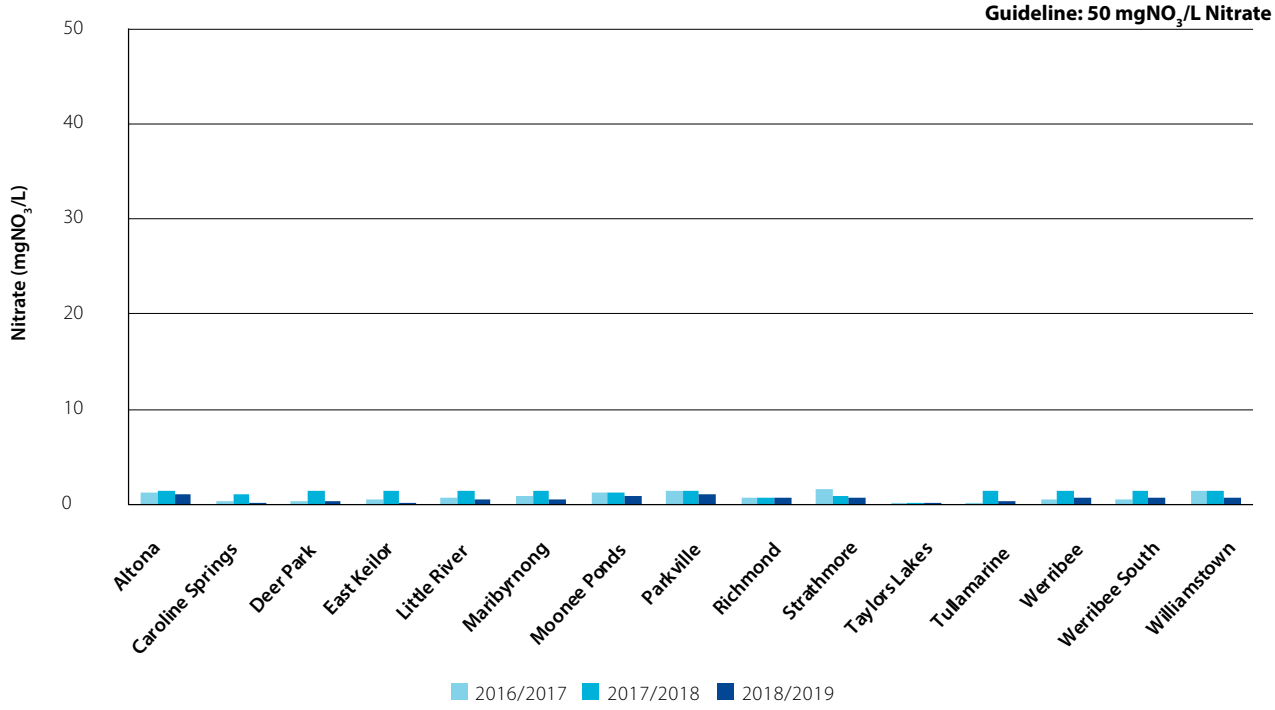


Figure B13: Average pH values in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

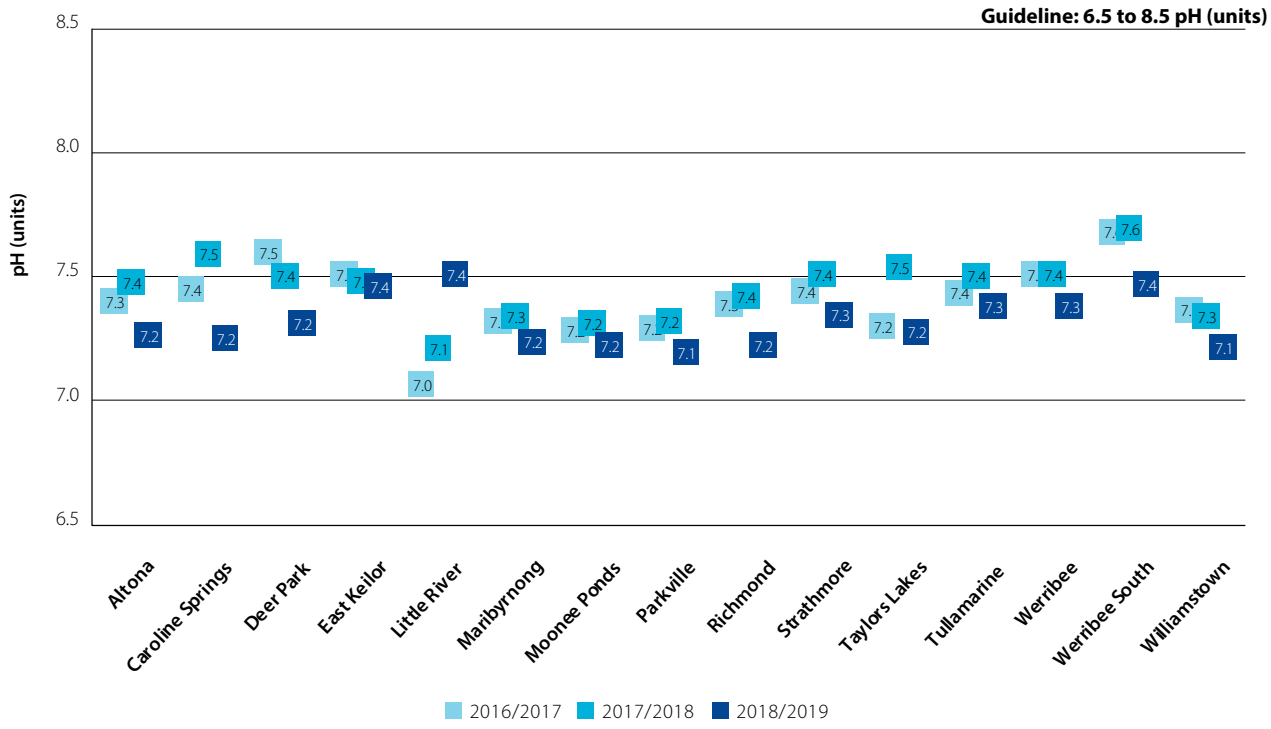


Figure B14: Sodium concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

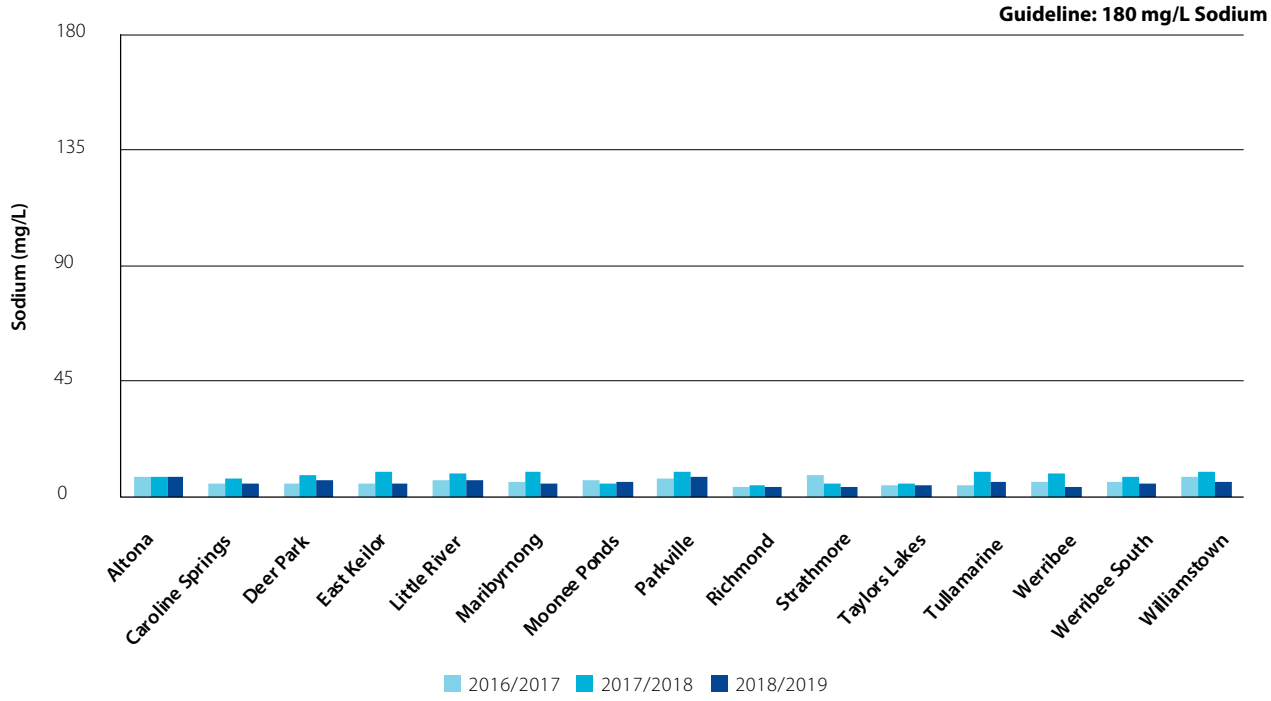


Figure B15: Sulphate concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

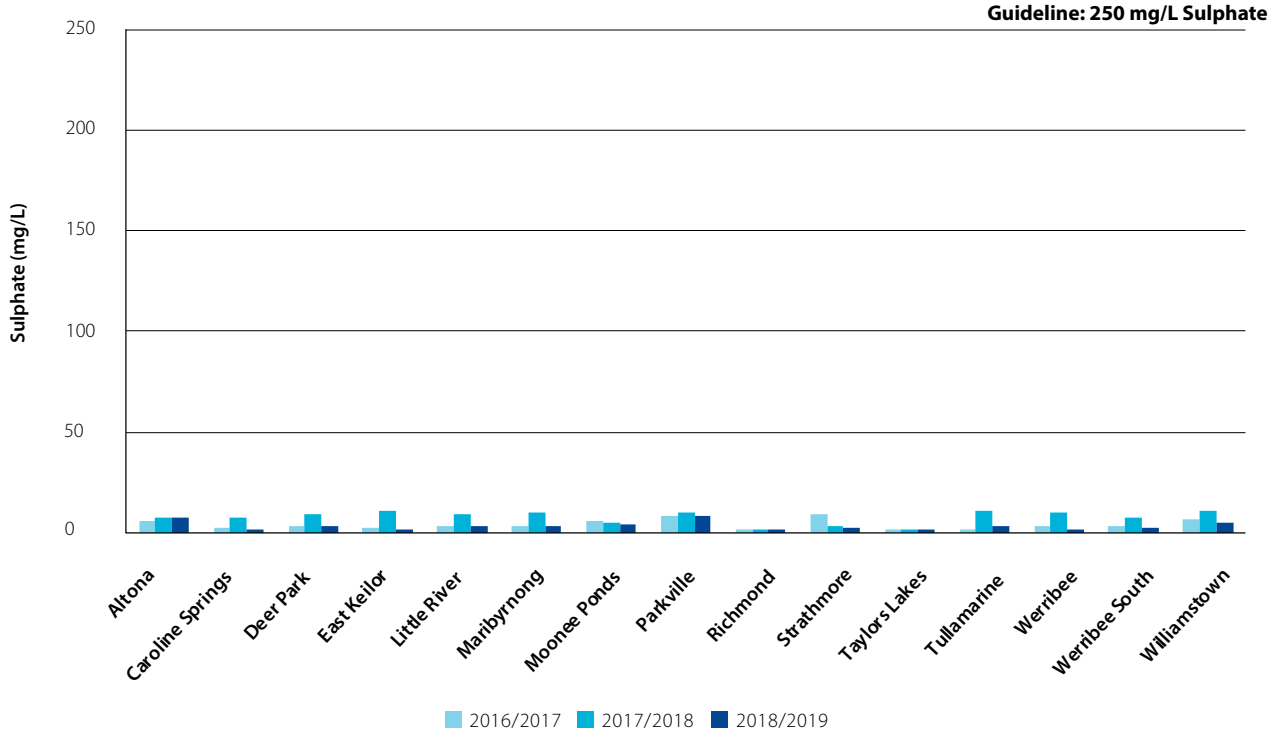


Figure B16: Average total trihalomethane concentrations in water sampling localities (between 2016-17 and 2018-19, from left to right within each locality)

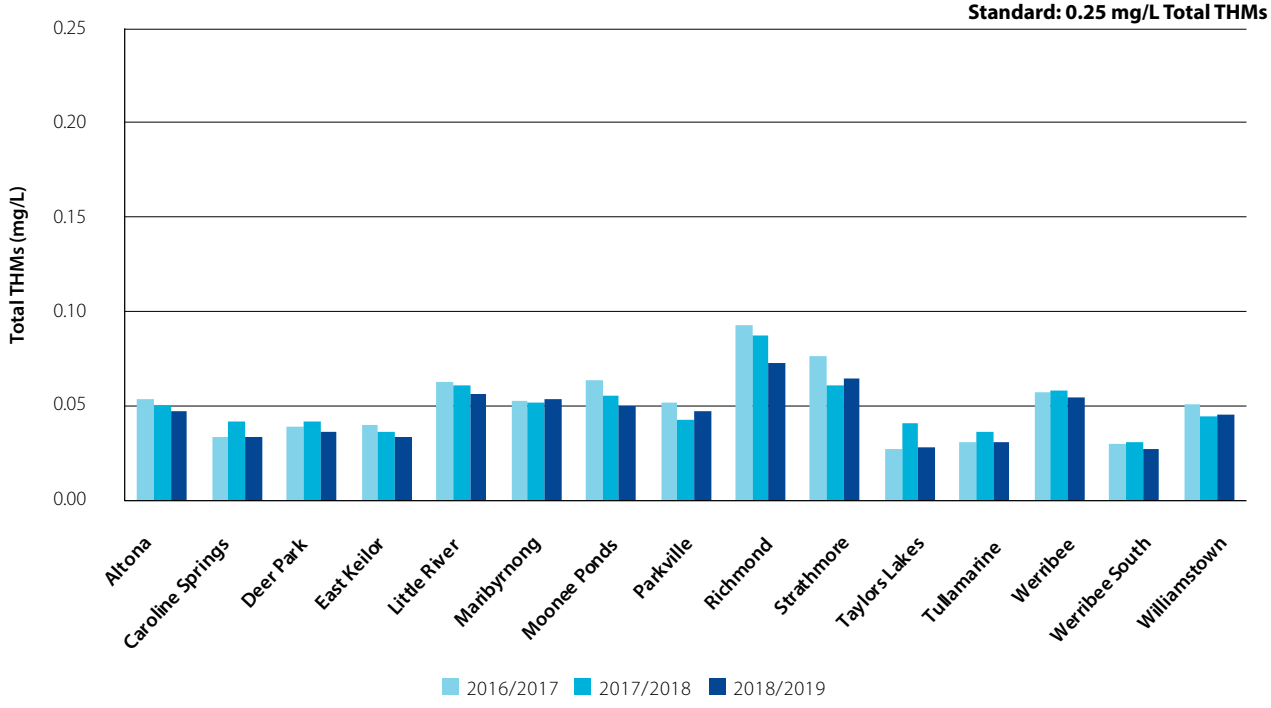
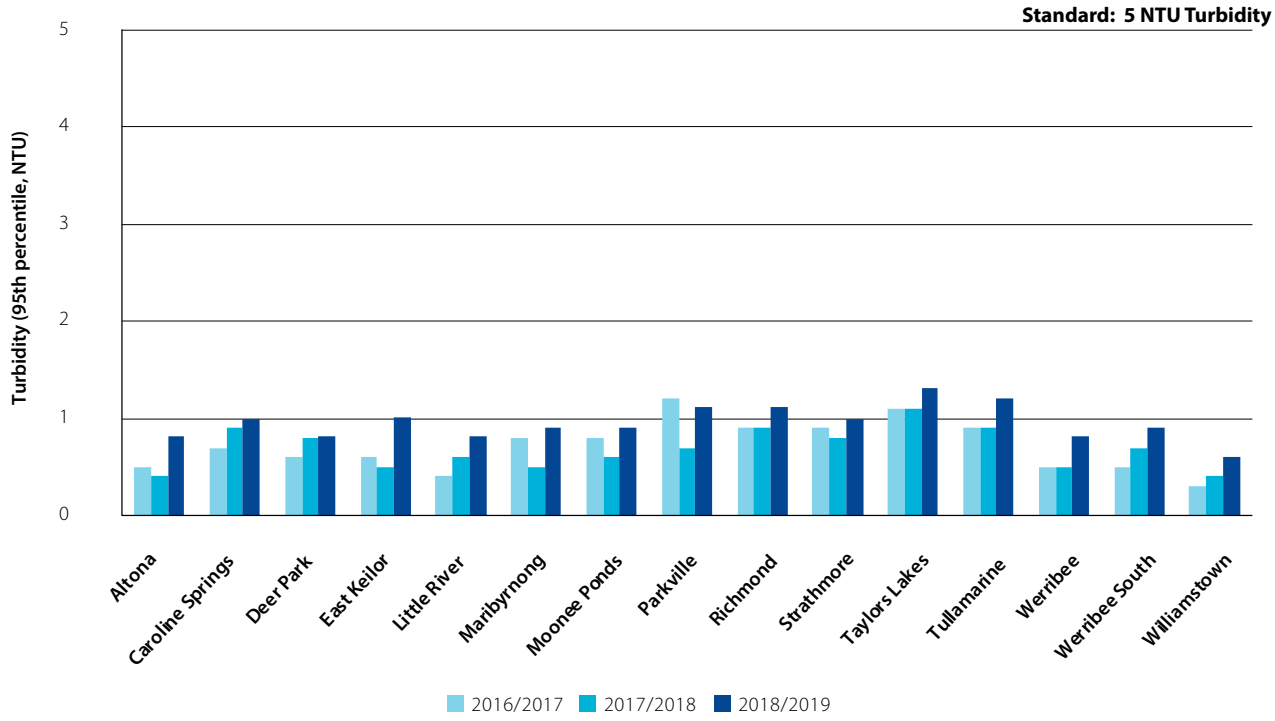


Figure B17: Summary turbidity levels in water sampling zones (between 2016-17 and 2018-19, from left to right within each locality)



Appendix C - 2018 Risk Management Plan regulatory audit certificate

ABN 46 122 146 767

Regulation 10

Schedule 1 - Risk Management Plan Audit Certificate

Safe Drinking Water Regulations 2015

Certificate Number: 148

Audit Period: 15th March 2016 to 16th April 2018

To: Mr David Ryan
Managing Director
City West Water Corporation
Locked Bag 350
Sunshine VIC 3020

Australian Business Number (ABN): 70 066 902 467

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

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

Date: 16th April 2018

Signature of approved auditor:

Thomas Teunissen

Level 27, 101 Collins St, Melbourne VIC 3000
Mobile: 0410 624 604 Tel: 03 8609 1429 Fax: 03 864 00 581
Email: tom@rmpsystems.com

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