DRINKING WATER QUALITY MANAGEMENT PLAN

VERSION 5.1

APPROVED BY THE REGULATOR 28 NOV 2022

VERSION CONTROL

Version number	Details	Date
MP76 Version 1	Approved by the Delegate of the Regulator under the *Water Supply (Safety and Reliability) Act 2008*	17 January 2013
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REVIEW AND APPROVAL – INTERNAL AND EXTERNAL

The *Urban Utilities Drinking Water Quality Management Plan* (DWQMP) is reviewed every two years and is audited every four years to ensure the plan is relevant, accurate and current in terms of the operating environment and implementation; and to identify any improvements required to ensure the drinking water remains safe to drink and meets the water quality standards of the *Public Health Regulation 2018*.

This DWQMP is submitted to Office of Water Supply Regulation, Department of Regional Development, Manufacturing and Water.

APPROVAL		
Version number	**Details**	**Date**
MP76 Version 4	Department of Natural Resources, Mines and Energy	15 May 2020
MP76 Version 5	David Brooker Executive Leader Service Delivery	28 January 2022
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	Approved by the Delegate of the Regulator under the *Water Supply (Safety and Reliability) Act 2008*	28 November 2022

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1. REQUIREMENT FOR A DRINKING WATER QUALITY MANAGEMENT PLAN

1.1 Water Supply (Safety and Reliability) Act 2008

The supply of safe and reliable drinking water in Queensland is regulated by State and Commonwealth legislation, including the *Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act).[1]

Under the Water Supply Act, suppliers of water services must be registered as service providers for those water services. Water services include drinking water services. Drinking water services include "the treatment, transmission or reticulation of water for supply as drinking water".[2]

A drinking water service provider must not carry out a drinking water service unless there is an approved drinking water quality management plan (DWQMP or Plan).[3] In addition, a drinking water service provider that has an approved DWQMP must comply with the Plan and the conditions of the Plan.[4] Significant penalties apply in respect of non-compliance.[5]

The purpose of a DWQMP is to protect public health.[6] The Plan is approved by the Regulator,[7] and is subject to biennial reviews[8] and regular audits,[9] as prescribed by the Regulator.

2. APPLICATION OF OTHER RELEVANT LEGISLATION AND REGULATION

2.1 South East Queensland Water (Distribution and Retail Restructuring) Act 2009

Under the *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (the DR Act):

- The water and wastewater businesses of Brisbane City Council (BCC), Ipswich City Council (ICC), Lockyer Valley Regional Council (LVRC), Scenic Rim Regional Council (SRRC) and Somerset Regional Council (SRC) were transferred to Urban Utilities on 1 July 2010.
- The transferred water businesses included drinking water services.
- Urban Utilities was deemed to be a registered service provider for the purposes of the Water Supply Act from 1 July 2010, including for the transferred drinking water services.[10]
- The above councils ceased to be registered service providers under the Water Supply Act from 1 July 2010.[11]
- The existing customers, including drinking water customers, of the above councils prior to 1 July 2010, were deemed to be customers of Urban Utilities from 1 July 2010.[12]
- Each of the above councils became a participating local government of Urban Utilities (or shareholding council), and therefore entitled to participate in Urban Utilities' profits according to the value of the water and wastewater assets transferred to Urban Utilities.[13]

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[1] Other legislation includes: *Environmental Protection Act 1994* (Qld), *Water Act 2000* (Qld), *Public Health Act 2005* (Qld), *Planning Act 2016* (Qld) and *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld).
[2] Water Supply Act, Schedule 3
[3] Water Supply Act, section 92
[4] Water Supply Act, section 93
[5] Water Supply Act, sections 92 and 93.
[6] Water Supply Act, section 94.
[7] As at February 2020, the Director – General of the Department of Natural Resources, Mines and Energy (DNRME). The Director-General, as the Regulator has delegated certain powers to officers of the Office of Water Supply Regulation (OWSR).
[8] Water Supply Act, section 106
[9] Water Supply Act, section 108
[10] DR Act, section 53AA
[11] DR Act, section 53AB
[12] DR Act, section 53AD
[13] DR Act, sections 5(b) and 20.

2.2 Public Health Regulation 2018

Queensland Health set the standards for drinking water quality in the *Public Health Regulation 2018* (Qld). These legislative standards are currently limited to *Escherichia coli* (*E. coli*) and fluoride. The Queensland Water Regulator (Department of Regional Development, Manufacturing and Water (DRDMW)), incorporates these standards under the Water Supply Act and adopts the health guideline levels in the *Australian Drinking Water Guidelines* (ADWG) as water quality criteria for drinking water. Under the Water Supply Act, we are required to undertake water quality monitoring on the parameters in the Water Supply Act and report the outcomes in our annual *Drinking Water Quality Management Plan Report*.

2.3 Bulk Water Supply Code

In South East Queensland, the supply of bulk water and water services between Code-regulated Entities is regulated by the *Bulk Water Supply Code* (the Code). The Code binds the Queensland Bulk Water Supply Authority (trading as Seqwater), operator of the bulk water supply system and any South East Queensland service provider, including Urban Utilities.

Part A of the Code regulates operational matters where the activities of one of the entities could have an upstream or downstream impact on the operations of another Code-regulated Entity. With regards to water quality, the Code stipulates that:

- operating protocols must include notifications of changes to water quality,[14]
- coordinated network planning between the bulk and distribution sectors is encouraged to achieve infrastructure planning (including water quality outcomes improvements) on a best of value for money basis;[15] and
- information about bulk drinking water quality supplied by Seqwater is publicly available.[16]

The Plan ensures that Urban Utilities meets its obligations under the Code.

3. URBAN UTILITIES' DRINKING WATER QUALITY MANAGEMENT PLAN

For this review cycle, the DWQMP was prepared in accordance with the *Drinking Water Quality Management Plan Guideline 201*8 (the DWQMP Guideline).[17] In accordance with the Water Supply Act, the DWQMP must:

- state the registered services to which the plan applies,
- include details of the infrastructure for providing services,
- identify the hazards and hazardous events the drinking water service provider considers may affect drinking water quality to which the services relate,
- include an assessment of the risks posed by the hazard and hazardous events,
- demonstrate how the drinking water service provider intends to manage the risks posed by the hazards and hazardous events,
- include details of the operational and verification monitoring programs under the plan, including the parameters to be used for indicating compliance with the plan and the water quality criteria for drinking water, and

[14] the Code, 11(b)(v)
[15] the Code, 13(b)
[16] the Code, 16(a)
[17] Water Supply Act, section 95(3).

- additional information as requested by the Regulator.[18]

This Plan applies only to the drinking water distribution network owned and operated by the Central SEQ Distributor Retailer Authority trading as Urban Utilities. It applies to the geographic area serviced by Urban Utilities under the DR Act comprising the local government areas of BCC, ICC, LVRC, SRRC and SRC.[19] Urban Utilities' actual service area, including for drinking water, forms part of the broader geographic area (Urban Utilities' Service Area).

This DWQMP has been prepared after extensive internal stakeholder consultation, and in accordance with the Water Supply Act and the DWQMP Guideline. In addition, the *Australian Drinking Water Guidelines 6, 2011* (ADWG)[20] has been carefully considered to guide Urban Utilities in the adoption of leading industry practice as we continue the commitment to supply safe drinking water.

This Plan incorporates or references all the policies, procedures, plans and registers that are required to maintain drinking water quality for our drinking water supply schemes.

4. REVIEW AND CONTINUAL IMPROVEMENT

4.1 Regular reviews of the DWQMP

We are required to carry out reviews of the approved DWQMP on a biennial cycle, or as otherwise directed by the Regulator. The purpose of a regular review is to ensure the plan remains relevant, having regard for the current circumstances and operation of the water service. Specifically, the review is to:

- ensure the plan is relevant, accurate and current in terms of the operating environment and implementation,
- identify any improvements required to ensure the drinking water remains protective of public health and meets the water quality criteria, and
- fulfil the statutory requirements for undertaking the regular review.

A regular review was conducted in 2019/20. The outcome is captured in the *2019/20 Drinking Water Quality Management Plan Report*.

The most recent review, the basis of this DWQMP, was completed by 31 January 2022, as stipulated by the Regulator. Further reviews are required to be completed every two years.

The review in 2021/22 concluded that the DWQMP framework is being implemented and the commitment to continuous improvement is visible. We have complied with the DWQMP water quality criteria, indicating the delivery of safe, quality water to customers.

The improvement actions identified in the approved DWQMP are being implemented. The management of incidents has been effective, with lessons learned being used to improve processes, and the monitoring program remains relevant and representative.

[18] Water Supply Act, section 96(1)
[19] DR Act, section 6
[20] Version 3.6 Updated March 2021

4.2 Regular audits of the DWQMP

The purpose of the audit is to:

- verify the accuracy of the monitoring and performance data provided to the Regulator under the Plan,
- assess the service provider's compliance with the Plan, and
- assess the relevance of the Plan in relation to the provider's drinking water service.

The second regular audit of the Plan was conducted in December 2020. A summary of the audit outcome is in the *2020/21 Drinking Water Quality Management Plan Report*, available on Urban Utilities' website.

Further audits are required to be completed every four years from this date. The next audit must be conducted by 31 January 2025.

5. ABOUT URBAN UTILITIES

5.1 Service Provider details

Name of provider	Central SEQ Distributor-Retailer Authority Trading as Urban Utilities
Provider identification number (SPID)	0521
Chief Executive Officer	Louise Dudley Louise.Dudley@urbanutilities.com.au Phone 13 26 57
Address	Urban Utilities GPO Box 2765 Brisbane Queensland 4001

5.2 Who we are

On 1 July 2010, Urban Utilities (formerly known as Queensland Urban Utilities) was established as a statutory body under the DR Act, and a service provider under the Water Supply Act. Our shareholders are the councils of Brisbane, Ipswich, Lockyer Valley, Scenic Rim and Somerset. Urban Utilities is governed by an independent Board.

5.3 What we do

We provide drinking water services to 1.5 million customers residing within our 14,384km^2 geographic area. Our drinking water services are delivered through 12 drinking water schemes within our service territory. In 2020/21, we provided approximately 134,000 megalitres of drinking water to 621,000 residential properties, and 37,000 commercial properties.[21]

[21] Property figures are current as at 30 June 2021.

5.4 Our strategic framework

Our purpose

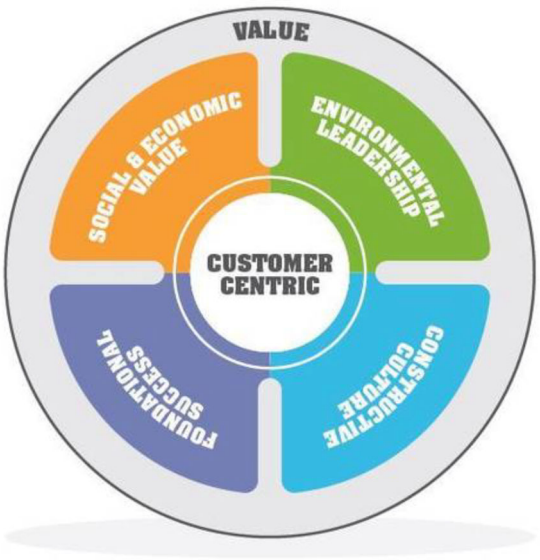
Enrich quality of life

Our vision

We play a valued role in enhancing the liveability of our communities.

Our strategic statement

Our strategic direction is underpinned by our commitment to customer-centricity and value creation; every decision we make is considered through the lens of our customer and the value it delivers. As we build on our solid foundations and our constructive culture, we will pursue growth through the development of partnerships that deliver environmental, economic and social benefits. These outcomes will be valued by our customers, communities and shareholders, and enhance the health and amenity of our region.



CONSTRUCTIVE CULTURE

Our constructive culture is aligned to our purpose and is the foundation of our service to customers and communities.

FOUNDATIONAL SUCCESS

We have the right foundations and smarter ways of working to deliver predicative and proactive services to our customers and agile and efficient work processes for our people.

ENVIRONMENTAL LEADERSHIP

We protect, rehabilitate and enhance our environment for our customers and communities by delivering healthy waterways, secure drinking water and resilient communities.

SOCIAL & ECONOMIC VALUE

We partner and innovate to deliver high-value economic, social and customer outcomes.

6. DRINKING WATER SUPPLY SCHEMES - DETAILS OF INFRASTRUCTURE

This section summarises the infrastructure used by Urban Utilities in the supply of drinking water to our customers, including the:

- South East Queensland Water Supply System (SEQWSS) arrangements relating to the supply of drinking water; and
- drinking water schemes through which drinking water is purchased and supplied by Urban Utilities.

6.1 Drinking water schemes

Our 12 drinking water supply schemes are the distribution systems within the five local government boundaries of Urban Utilities' shareholders. Each scheme begins at the bulk supply points owned by Seqwater and ends at the customer's meter. We buy bulk treated water from Seqwater and distribute it to our residential and business customers in each scheme. Information about each scheme is summarised in Table 6-1.

Table 6-1 Profile of our 12 water supply schemes

Scheme name	Centre	Centre population[22]	Scheme population	Water source	Treatment	Water treatment plant	Distribution disinfection
All water supply schemes are serviced by Seqwater, as the bulk water provider.							
All scheme components are reticulation							
Beaudesert	Beaudesert	7,600	7,600	Logan R.	Conventional	Beaudesert	Chlorination
Boonah–Kalbar	Boonah	3,020	4,900	Gough's Crossing Reynolds Ck	Conventional	Boonah Kalbar	Chlorination
	Kalbar	1,010					
	Aratula	4,50					
	Mt Alford	1,30					
	Other	290					
Canungra	Canungra	1,120	1,120	Canungra Ck	Conventional	Canungra	Chlorination
Esk- Toogoolawah	Esk	1,045	2,010	Wivenhoe Dam	Conventional	Esk	Chlorination
	Toogoolawah	965					
Kilcoy	Kilcoy	2,160	2,160	Somerset Dam	Conventional	Kilcoy	UV+ Chlorination
Kooralbyn	Kooralbyn	1,830	1,830	Logan R.	Conventional	Kooralbyn	Chlorination
Jimna	Jimna	70	70	Yabba Ck	Filtration	Jimna	Chlorination
Linville	Linville	140	140	Brisbane R. aquifer	Disinfection	Linville	Chlorination
Lowood	Fernvale Lowood	8,160	36,110	Brisbane R.	Conventional	Lowood	Chlorination
	Forest Hill, Gatton, Grantham, Helidon, Laidley, Plainland, Withcott	27,950					
Rathdowney	Rathdowney	170	170	Logan R.	Conventional	Rathdowney	Chlorination
SEQ Water Grid	Brisbane Ipswich Peak Crossing including Harrisville, Warrill View and	1,279,000 229,000 1,150	1,509,000	Wivenhoe Dam Brisbane River North Pine Dam Seawater	Conventional Conventional Conventional Desalination	Mt Crosby North Pine Gold Coast Desalination	Chloramination Chloramination Chloramination

[22] Estimated Residential Population as at 30 June 2019

Scheme name	Centre	Centre population[22]	Scheme population	Water source	Treatment	Water treatment plant	Distribution disinfection
	surrounding rural area			Hinze Dam Little Nerang Dam	Conventional Conventional	Plant Molendinar Mudgeeraba	Chlorinated but converted to chloramination
Somerset Dam Township	Somerset	160	160	Somerset Dam	Conventional	Somerset	Chlorination

Additional details of the 12 schemes managed and operated by Urban Utilities are stored in our document management and record management systems. Locations are listed in Table 6-2. Details include:

- water population serviced and bulk water demand forecasts,
- a description of each scheme,
- scheme schematics,
- service reservoirs,
- pipe material, age and proportional length of each material,
- a list of the components of each scheme, and
- a brief summary of the operational regime.

Our water services, the location of each scheme and distribution networks are referenced in *REF291 Water NetServ Plan Part A and an index map is available on the Urban Utilities website*. Specific maps can be requested via the Urban Utilities website.

Bulk supply points between Seqwater and Urban Utilities are listed in Schedule 5 of *REF210 Operating Protocol for the Urban Utilities Service Area*.

Table 6-2 Location of information relevant to our water supply schemes

Information type	Scheme	Location
Water population forecast and water demand predictions	All schemes	Qdox[23] D/19/134467
Bulk water demand forecasts	All schemes	Q-Pulse[24] - Doc ID *REF291 Water Netserv Plan – Part A*, Table D1, page 112
Schematic, scheme description and components	Beaudesert	Q-Pulse - Doc ID TMS285
	Boonah-Kalbar	Q-Pulse - Doc ID TMS286
	Canungra	Q-Pulse - Doc ID TMS288
	Esk-Toogoolawah	Q-Pulse - Doc ID TMS289
	Jimna	Q-Pulse - Doc ID TMS291
	Kilcoy	Q-Pulse - Doc ID TMS292
	Kooralbyn	Q-Pulse - Doc ID TMS293
	Linville	Q-Pulse - Doc ID TMS294
	Lowood	Q-Pulse - Doc ID TMS295
	Rathdowney	Q-Pulse - Doc ID TMS296
	Somerset Dam Township	Q-Pulse - Doc ID TMS297
	SEQ Water Grid: Brisbane - Ipswich (Urban Utilities Water Supply Schematics) Water Schematic – Reservoir Zones – Brisbane Water Schematic – Reservoir Zones – Ipswich	Q-Pulse - Doc ID TMS298 Q-Pulse - Doc ID TMS595 Q-Pulse - Doc ID TMS594
Water supply reservoirs	All schemes	*BI05-Water Control Assets* Power BI Report
Pipe Materials	All schemes	*In Service Asset Totals* Power BI Report

6.2 South East Queensland Water Supply System (SEQWSS)

The SEQWSS supplies the Urban Utilities council areas of Brisbane and Ipswich and into the northern region of the Scenic Rim council townships of Peak Crossing, Harrisville and Warrill View.

The SEQWSS delivers drinking water to Urban Utilities, Gold Coast City Council, Logan City Council, Redlands City Council, and Unitywater. As shown in Figure 6-1, the SEQWSS links multiple drinking water treatment plants across South East Queensland via a bulk supply network.

[23] The approved electronic document and records management system for transactional records.
[24] Management tool for controlled documents.

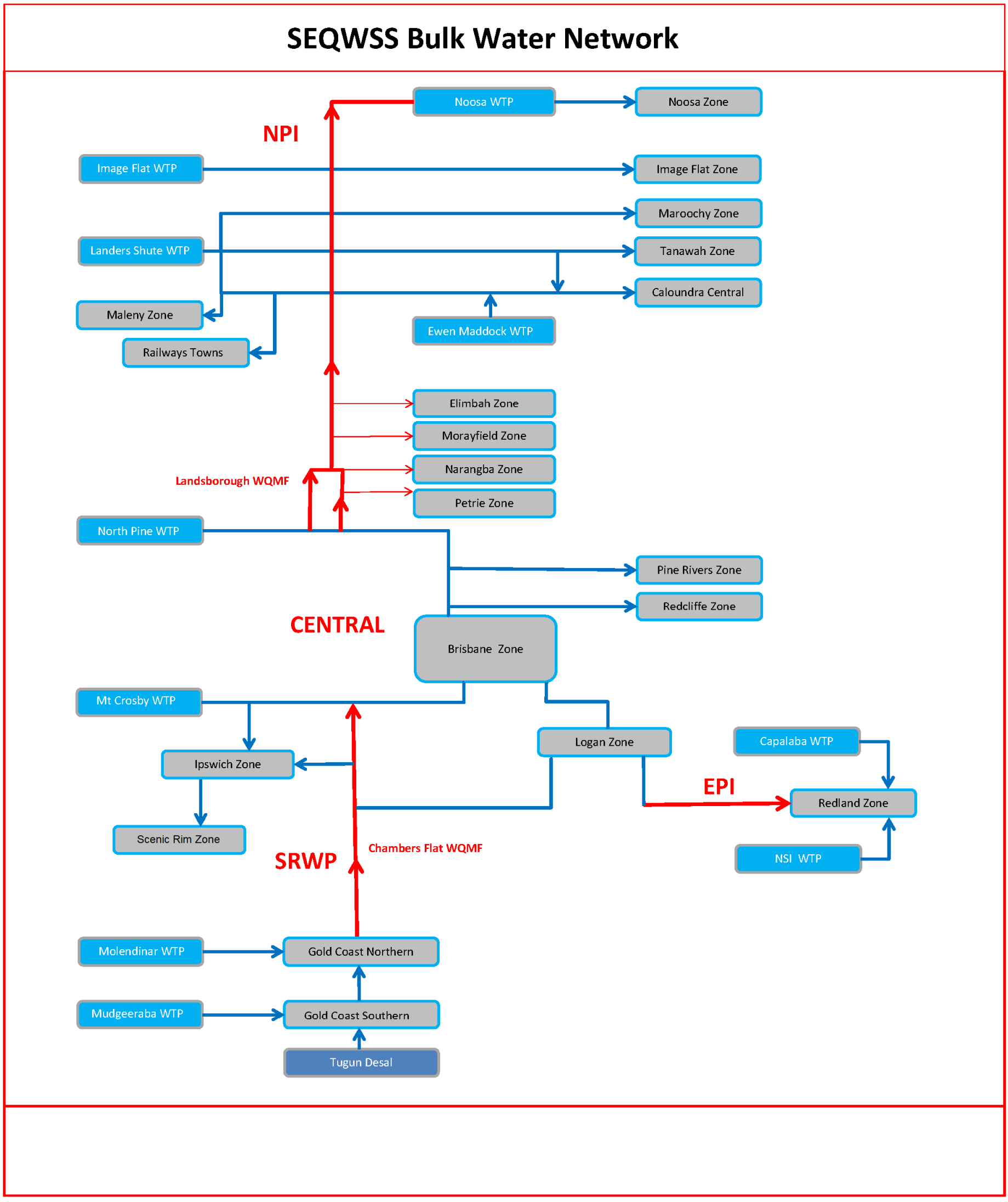


Figure 6-1 Seqwater Bulk Water Network

Urban Utilities considers the SEQWSS one scheme irrespective of the multiple treated drinking water sources. The rationale for this is:

- Urban Utilities' inclusion in the Code which regulates the supply of bulk services, specifically drinking water for the purposes of the DWQMP, between Code-regulated Entities for the benefit of businesses and residents in the SEQ region.
- The network configuration of the SEQWSS allows Seqwater to move water throughout the network as required by demand and source restrictions.
- The SEQWSS is complex and has over 300 bulk supply points to Urban Utilities' network, most of which are non-treatment plant interfaces. In comparison, the other schemes Urban Utilities manages have one or two bulk supply points located at treatment plant boundaries.
- Urban Utilities receives water from the SEQWSS bulk supply points containing monochloramine (chloramine) as the disinfectant. The other 11 schemes operated by Urban Utilities are supplied with water containing free chlorine as the disinfectant.

Urban Utilities is considered to operate in the central SEQWSS region. Key bulk water assets that comprise the SEQWSS and support our drinking water distribution networks are:

- Southern Regional Water Pipeline (SRWP). The SRWP enables water to be moved from the drinking water treatment plants of Molendinar and Mudgeeraba on the Gold Coast, as well as the Gold Coast Desalination Plant to central bulk water assets, and visa-versa. The SRWP has a water quality management facility at Chambers Flat which converts free chlorinated drinking water to chloraminated drinking water if flowing in a northerly direction towards Urban Utilities.
- Northern Pipeline Interconnector (NPI). The NPI enables water to be moved from drinking water treatment plants at Image Flat, Landers Shute and Noosa in the Sunshine Coast region to central bulk water assets, and visa-versa. The NPI has a water quality management facility at Landsborough which will convert free chlorinated drinking water to chloraminated drinking water if flowing in a southerly direction toward Urban Utilities.
- Eastern Pipeline Interconnector (EPI). Whilst not generally directly supplying to Urban Utilities, the EPI supports supply arrangements in Logan City Council and Redland City Council as needed. The EPI connects drinking water treatment plants in the Redlands region of Capalaba and North Stradbroke Island to the SEQWSS central region and has a water quality management facility to convert the disinfection regime dependant on flow direction.
- Centrally, the SEQWSS is connected via a series of trunk mains and bulk water reservoirs.

Treated water is sourced from surface water storages, except for North Stradbroke which sources water from ground water and the Gold Coast Desalination Plant which sources from water from the ocean. Each water source has different aesthetic characteristics and each treatment facility doses fluoride. Approximately 1.2 million of our customers are supplied by the SEQWSS, by far the largest drinking water scheme.

6.3 Provision of a drinking water service to other entities

We are responsible for supplying other registered water service providers and large water users, including:

- Brisbane Airport Corporation (BAC) - a registered water service provider with an existing DWQMP. We bill BAC for water services based on bulk water meter readings. BAC reads its tenants meters and bills their customers directly.
- Port of Brisbane (PoB) - a registered water service provider with an existing DWQMP. We supply drinking water to PoB, as well as providing a network maintenance and retail function to PoB and its tenants.
- Logan City Council (LCC) – a registered water service provider with an existing DWQMP. Urban Utilities and LCC networks are typically isolated via two closed valves in Underwood and Browns Plains. LCC provides water to a small section of the Brisbane City Council region off Wembley Road. *REF209 Operating Protocol for the Logan City Council Water Service Area,* a joint operating protocol amongst LCC, Urban Utilities and Seqwater is in place.
- Unitywater - a registered water service provider with an existing DWQMP. Urban Utilities can service the Redcliffe location from our Bracken Ridge reservoir, however typical operation is via the Seqwater owned bulk supply network. This supply line is managed by Seqwater. An additional connection between Urban Utilities and Unitywater in Everton Park is isolated with a closed valve. *REF210 Operating Protocol for the Queensland Urban Utilities Service Area,* a joint operating protocol amongst Unitywater, Urban Utilities and Seqwater is in place.

We also have some other drinking water service arrangements in place. These include:

- Preston is a location in the Lockyer Valley at the council border with Toowoomba Regional Council (TRC) in which TRC provides drinking water services, including maintenance of infrastructure, to Urban Utilities' customers. The water services are provided by TRC from the Hodgsonvale Reservoir and via the Wissemann Road pump station. We read the meters and bill the customers. Two small regions of Silver Ridge and Fifteen Mile operate in a similar manner
- Kilcoy Abattoir is a major water user in Kilcoy, accounting for approximately 75% of the total water supplied to the township. A supply agreement exists between Kilcoy Pastoral Company Limited and Urban Utilities.

7. WATER SUPPLY CHARACTERISTICS

This section provides information on water quality to help identify any potential hazards and hazardous events for each scheme during the risk assessment process. The assessment of the drinking water schemes used water quality data collected in accordance with *REF423 Drinking Water Quality Monitoring Program,* and other water quality vectors that provide insight into water quality condition. These matters include catchment-derived issues, loss of disinfection residual, disinfection by-products, reportable incidents, complaints, water age modelling and supply demand.

7.1 Methodology and general observations

Data sets were compiled for each scheme, including test results from sample points within the schemes. Data sets for each scheme were subject to basic statistical analysis to determine the mean, maximum, minimum, standard deviation and 95th percentile values for each parameter except for *E. coli* for which rolling 12-month compliance was used. Compliance of measurements with the recommended guideline criteria in the ADWG was determined and assessed in accordance with the principles described in ADWG Information Sheet 3.1. Each drinking water scheme overview and water quality assessment is presented in a single table covering catchment overviews, catchment risks,

treatment processes, and our drinking water quality data assessment. Refer sections 7.3-7.14.

The water quality data sets assessed are as follows:

- Assessment period one – long-term assessment of water quality for each scheme from 1 July 2012 to 30 June 2019, except Linville which used period 1 July 2013 – 30 June 2017 due to source water and treatment changes.
- Assessment period two – short-term assessment of water quality for each scheme from 1 July 2019 to 30 June 2021.

The intent of this approach is to review ongoing water quality performance, investigate emerging water quality hazards, and assess any changes to water quality between DWQMP revision periods. Additionally, some treatment processes have changed, and the short-term data assessment is used to determine if any tangible impacts have resulted.

The water quality data was also assessed in conjunction with:

- Drinking Water Quality Management Plan Reports 2012 – 2021,
- *SEQ Water Supply Partnership Water Quality Plan,*
- water quality complaints database and Power BI report (SR1088) data,
- incident and event investigations, and
- existing water quality management practices.

7.2 Water supply characteristics summary

The following sections provide an overview of each drinking water quality scheme by catchment, treatment, network and water quality data. The water quality data review was conducted over two time periods 01/07/2012 – 30/06/2017[25], and 01/07/2019 – 30/06/2021. The intent of this approach is to determine if new hazards are emerging and if the management of water quality has improved since approval of the Plan in May 2020.

The assessment demonstrated that while the treated water characteristics between period one and two varied slightly, the variances were not significant enough to raise mention or concern. If noticeable changes were exhibited between the two assessment periods, the changes and inferences are highlighted. For scheme specific detail refer sections 7.3-7.14.

In summary:

- All 12 schemes are compliant with the ADWG for health-related criteria 2017 – 2021.
- Most catchments have an increased protozoa and turbidity risk during and after rainfall events.
- The pH of the supplied water is mostly determined by the water treatment regime, which presently provides water with pH of 7.6 – 7.8 across all schemes. This level provides optimal conditions for chlorination, however at this pH level chloramine decay is rapid in the SEQWSS. The optimal pH for chloramination is 9.0.[26]

[25] The period covered in the DWQMP Version 3, approved by the Regulator on 18 March 2018. Note the Linville drinking water data assessment period one was 01/07/2013 – 30/06/2017 due to source water changes.

[26] The Regional Secondary Disinfection Optimisation Project (RSDOP) determined that, for the SEQWSS the preferred pH range should be 8.2 – 8.6 based on economics and on the precipitation of CaCO3. The RSDOP is a joint regional water supply partnership project of the City of Gold Coast, Logan City, Urban Utilities, Redland City, Seqwater and Unitywater.

- At the extremities of the SEQWSS network, pH levels up to 8.7 are measured due to lime leaching out of cement in the lining of the pipe.
- Trihalomethane (THM) is still a high risk in some free chlorine schemes, or locations break pointed to free chlorine. THM risk increases in some schemes during rainfall events in the associated catchment. The risk of a THM ADWG health limit exceedance in chloraminated drinking water is low.
- Average disinfection concentrations are similar in assessment period two compared to assessment period one for most schemes.
- There were reductions in heterotrophic plate counts (HPC) and coliform detections in most schemes between the two assessment periods.
- Average chlorates generally trend below 0.8mg/L, however there have been two samples in the Lowood scheme above this limit in the 2019-2021 assessment period.[27]
- Total chlorine as a measure of chloramine residual still varies seasonally in the SEQWSS and can be influenced by the operations of the Bulk Water Supply System.
- Greater fluctuations of disinfectant residual are generally experienced in supply zones that:
  - are not supplied directly from reservoirs, or
  - are supplied from reservoirs with a common inlet/outlet arrangement, and
  - do not have a disinfection management facility

  However, this did not necessarily translate to impacted performance of other parameters.
- Some schemes experienced aesthetic changes due to source water changes. However, Lowood and SEQWSS schemes aside, this does not result in significant customer impacts.
- Generally, when *E. coli* is detected it is linked to rainfall with most detections occurring in the SEQWSS. Improved investigation and corrective actions have enhanced control barriers at many sites where *E. coli* was detected. Relationships between physio-chemical parameters and *E. coli* detections are not apparent.

The RSDOP commenced in 2015 with a core driver of "optimising the existing secondary disinfection regime on a Southeast Queensland (SEQ) regional and sub-regional basis with the primary objective being lowering public health risks and secondly to lower cost".

[27] At the time of preparing this Plan, there is no requirement in the ADWG for Urban Utilities to monitor chlorate. However, we choose to monitor chlorate as this parameter is anticipated to be included in the next review of the ADWG.

7.3 Beaudesert drinking water scheme

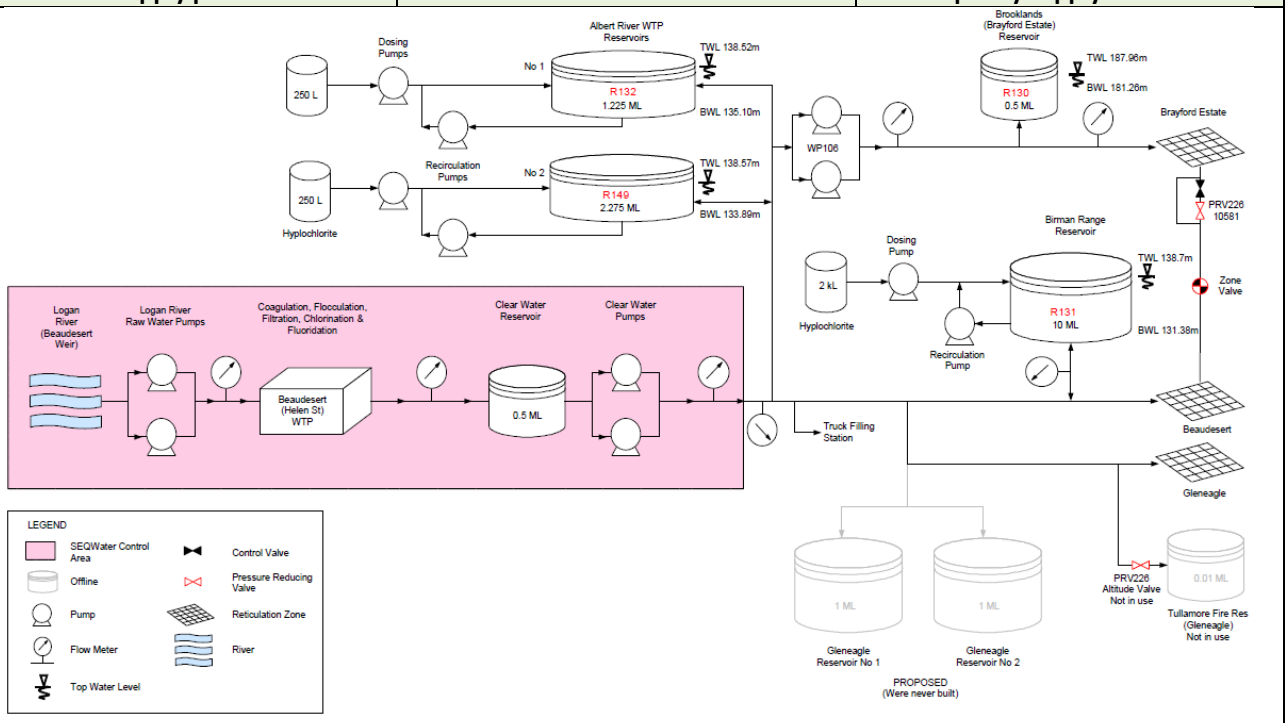
Beaudesert drinking water scheme

Raw water source, unmitigated risks and drinking water treatment

Water is sourced from the Logan River, Beaudesert and transported through approximately 1.5km of raw water mains to the treatment plant in Beaudesert. The catchment is dominated by agricultural activities, primarily livestock which have direct access to the river. The catchment has legacy cattle dips, domestic septic systems, dairies and cattle feedlots, and recreational activities at campgrounds. The local upstream Beaudesert catchment receives environmental run-off from a large-scale rendering plant and treated sewage effluent from Kooralbyn wastewater treatment plant (WWTP). The local Logan River is prone to high nutrient and ammonia loads as well as conductivity and turbidity during rain events which have caused treatment production issues on occasion. During rain events, protozoa risk is increased.

Key network characteristics

Bulk water supply points: 1	Urban Utilities reservoirs: 4	Water quality supply zones: 3



Beaudesert Water Treatment Plant (WTP) supplies direct to the Beaudesert township, Birnam Range reservoir, and Albert River reservoirs. The WTP uses the level sensors in Birnam Range reservoir as the primary control for transfer. Birnam Range reservoir (10ML) and Albert River reservoirs (3.3ML combined) have the same top water level which hydraulically balance via the reticulation network. Birnam Range is required to hold minimum volumes of 60% to maintain standards of service at some elevated locations and enough head pressure for a small transfer pump at the Albert River reservoir site which supplies a high-level reservoir. Typically, Birnam Range reservoir is operated close to top water level capacity as the WTP maximum production rate is approximately 20% higher than the townships peak usage. Given the WTP is susceptible to inability to treat some source waters during events, Birnam Range retains a large contingency supply volume. The northern and southern regions of Beaudesert have high water age, more so than the southern region which supplies to trickle fed properties. Chlorine dosing is applied at Birnam Range reservoir and the Albert River reservoirs.

Drinking water quality assessment 2012 – 2019

- Total hardness range is 69 – 280mg $CaCO_3$/L with 36% of samples exceeding ADWG aesthetic guideline c200mg $CaCO_3$/L,
- Total Dissolved Solids (TDS) has a large range 150 – 630mg/L with 95th percentile of 520mg/L
- THMs have exceeded ADWG health criteria three times each time requiring managed responses, with the 95th percentile of 220µg/L over the 491 samples taken,
- MIB and Geosmin has been detected in the last two years of the assessment period.

- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Transition elements are detected however are much lower than ADWG health limits,
- Chlorate was detected in 65% of samples with maximum concentrations detected of 0.56mg/L (95th percentile 0.36mg/L),
- LSI (Langelier Saturation Index) average was 0.09

Drinking water quality assessment 2019-2021

- Total hardness maximum range has decreased from 280mg $CaCO_3$/L to 200mg $CaCO_3$/L (95th percentile of 170mg $CaCO_3$/L) with no recorded samples exceeding aesthetic guideline 200mg $CaCO_3$/L,
- Similarly, TDS has maximum range has decreased from 630mg/L to 460mg/L, with 95th percentile of 410mg/L,
- Heavy metals and transition elements continue to follow similar concentration ranges
- THMs have exceeded ADWG health criteria once requiring managed responses, with the 95th percentile of 190µg/L over the 270 samples taken,
- MIB and Geosmin are being detected in approximately 50% of samples, with one occurrence being above 5ng/L. Mean values of both compounds are 2ng/L,
- HPC detections have decreased from 38% to 17% and free chlorine 95th percentiles have improved slightly from 1.7mg/L to 2mg/L between the two assessment periods,
- Sulphate mean has increased to 55mg/L,
- LSI average for 2019-2021 is -0.51

Comments

The drinking water in the Beaudesert scheme is considered hard. The hardness range is due to the variability of the Logan River water quality and influenced by rainfall and other environmental factors. Urban Utilities receives very low complaints related to hardness. Total hardness is lower on average in the 2019-2021 assessment period relative to 2012-2019. TDS remains <600mg/L for all 2019-2021 samples which is considered good quality by ADWG.

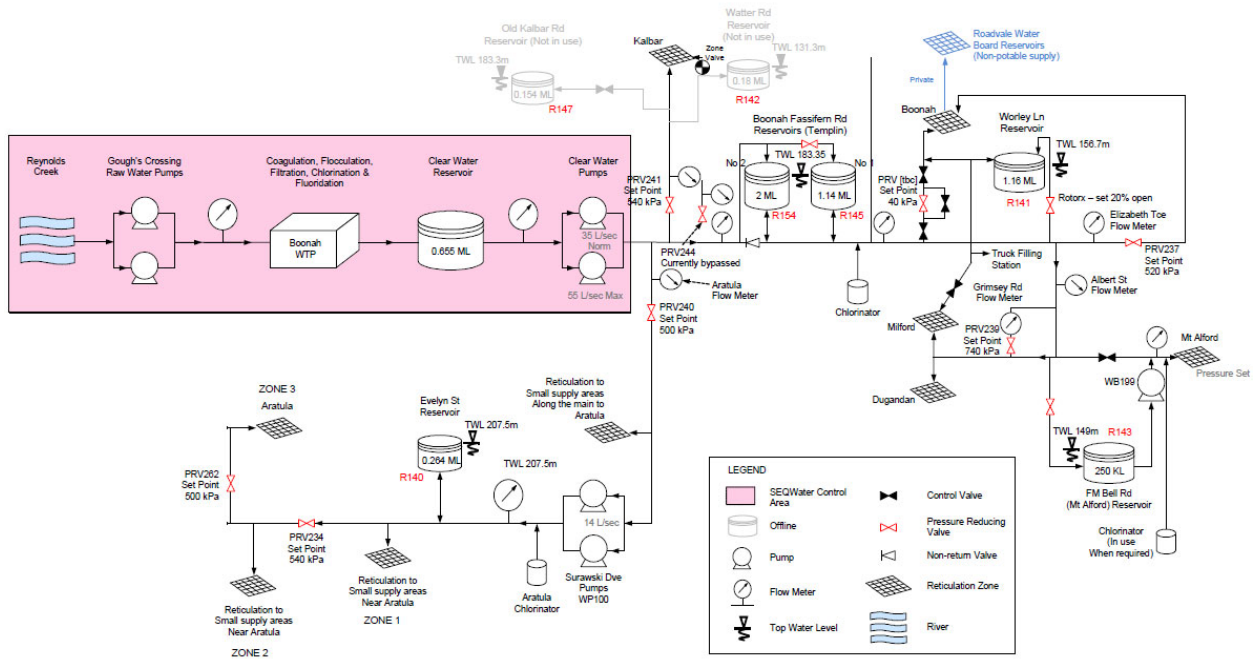
During 2018, Seqwater changed treatment coagulant to alum to improve organics removal for THM management. TOC of the treated water before and after this process change have not had a noticeable impact. However, coupled with Urban Utilities improved THM management, THMs are trending lower than historical when assessing 2019-2021 data. THM exceedance risk in this scheme remains high with the summer periods being the highest seasonal risk period. As such THM sampling has increased in frequency within the scheme between the two assessed periods.

Seqwater has the ability to assist network THM management with the inclusion of GAC through the treatment process. The introduction of alum has increased sulphate concentrations by approximately 50mg/L and has influenced LSI which is now trending negatively. Seqwater introduced pre-filtration oxidation to improve plant reliability during high turbidity and ammonia events. Although achieving the treatment objective, the pre-filtration oxidation quenched the filters ability to remove odour and taste compounds resulting in detections of MIB and geosmin in the assessed data. Seqwater has the option of using PAC to manage odour and taste.

Chlorate is detected due to the use of hypochlorite dosing in the Urban Utilities network. Chlorate is managed through Urban Utilities' Drinking Water Rechlorination Management process.

7.4 Boonah-Kalbar drinking water scheme

Boonah-Kalbar drinking water scheme		
Raw water source, unmitigated risks and drinking water treatment		
Water is sourced from Reynolds Creek, Goughs Crossing and transported through approximately 1.8km of raw water mains to the treatment plant in Kalbar. The upstream catchment, Lake Moogerah, has significant camping activities on the lake edges. The campground has a septic based toilet system which can overflow during heavy rain events. The lake is managed for recreational activities and has a history of closure due to high *Enterococci* detections. Reynolds Creek receives environmental run-off from agricultural activities and increases in conductivity during rain events. Turbidity is also increased during rain events; however, this does not typically have a significant impact on the treatment plant. Reynolds Creek can be managed via releases from Lake Moogerah if taste and odour, turbidity or other concerns with the raw water source arise that may impact treatment production or treated water quality. Protozoa risk is increased following high rainfall in catchment.		
Key network characteristics		
Bulk water supply points: 1	**Urban Utilities reservoirs: 5**	**Water quality supply zones: 5**



The Boonah-Kalbar scheme uses Templin reservoirs as the primary Urban Utilities drinking water storage location. The Boonah WTP uses the level telemetry in Templin reservoirs to control drinking water transfer to Urban Utilities. During Templin filling, the WTP supplies directly to the townships of Kalbar, Boonah and Aratula. The Aratula and Mount Alford regions of the Boonah-Kalbar scheme have high water age. Chlorine dosing is applied at a pump station upstream of Aratula and at the Mount Alford reservoir upstream of Mount Alford township. Mount Alford township has a large water using industrial customer which significantly influences local network flows.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 68 – 170mg $CaCO_3$/L,
- TDS has a range of 160 – 650mg/L with 95th percentile of 430mg/L
- THMs have approached ADWG health criteria with the 95th percentile of 170µg/L. Average THMs are 110µg/L
- MIB is detected in 15% of samples comparatively geosmin is detected in 78%. 14% of geosmin detections have exceeded 5ng/L (7.8ng/L max detected),
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,

- Transition elements are detected however are much lower than ADWG health limits,
- LSI average is -0.5

Drinking water quality assessment 2019-2021

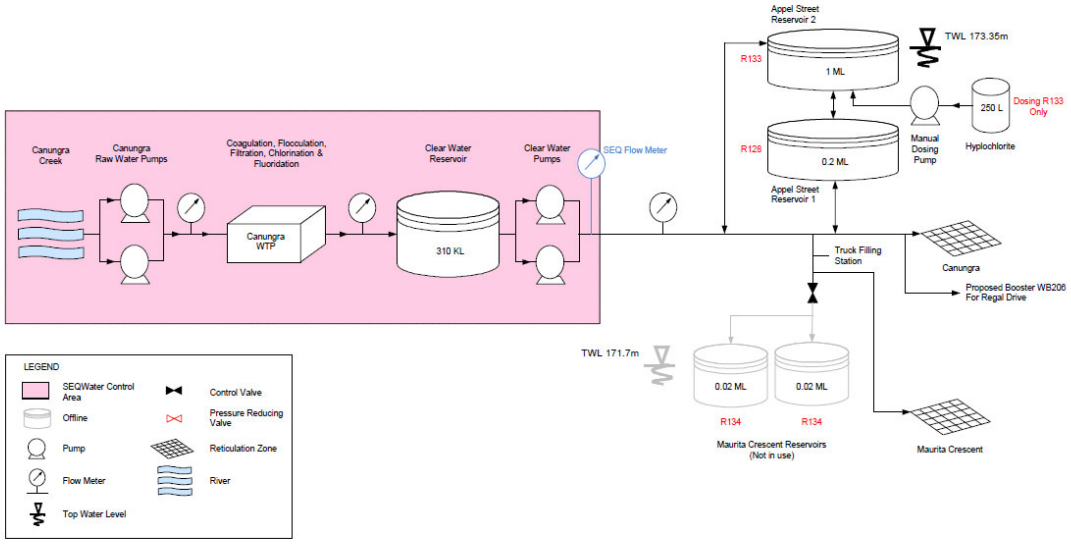
- The drinking water quality has remained largely similar across the two reporting periods,
- Total hardness maximum range has decreased from 170mg $CaCO_3$/L to 120mg $CaCO_3$/L (95th percentile of 110mg $CaCO_3$/L),
- Samples exhibiting free chlorine decreased from 88% to 75%,
- HPC detections have increased slightly 18% to 21%.

Comments

The drinking water in the Boonah-Kalbar scheme is hard and is prone to short term increased spikes after rain events. Conductivity has exhibited increasing baseline trends due to source water quality and drought conditions, however most recent data does exhibit higher variability, likely due to rainfall in the catchment.
Urban Utilities performs free chlorine dosing to manage disinfection within the scheme. Secondary dosing at Aratula and Mount Alford do not significantly influence THMs with an average THM increase of 30µg/L.

Urban Utilities have made network changes at Templin and Aratula reservoir sites which has improved flow paths and disinfection management options. During transition of the sites, disinfection management challenges were experienced which were associated to higher than normal water storage requirements during commissioning.

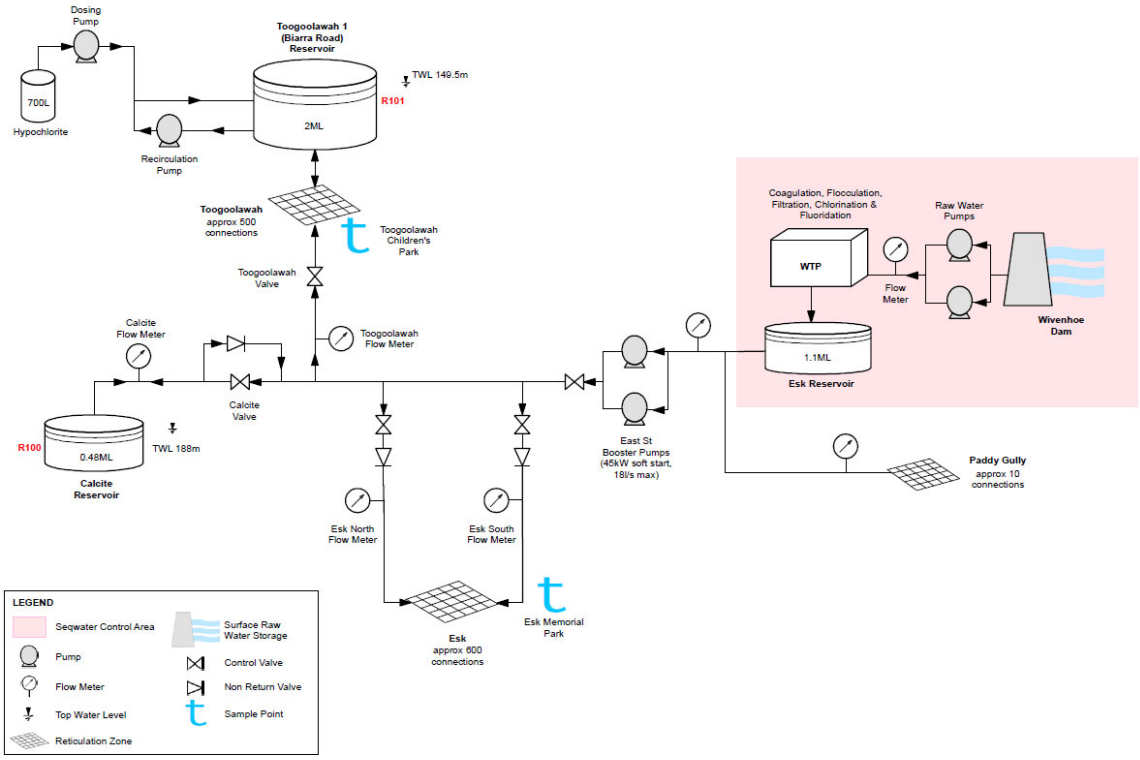
7.5 Canungra drinking water scheme

Canungra drinking water scheme		
Raw water source, unmitigated risks and drinking water treatment		
Canungra Creek catchment starts in Lamington National Park and flows downstream through the national park and agricultural properties to the Canungra township where the source water is abstracted for treatment. Canungra Creek has a small number of vehicle causeways and domestic septic systems in the catchment. The agricultural activities are small, crop-based industry and livestock which have direct access to the source water. Following rain events, the creek can increase turbidity which posed a problem for the previous WTP. However, the likelihood of production deficits at the new WTP is lower. The new Canungra WTP commenced service in early 2018 which reduced the likelihood of WTP shutdown during raw water changes, increased production capacity and increased on-site storage. The scheme is susceptible to drought conditions and no creek flow management is available due to the absence of upstream storage dams. Drought conditions can increase likelihood of algae blooms due to lower flows. Protozoa risk is increased following high rainfall in catchment.		
Key network characteristics		
Bulk water supply points: 1	**Urban Utilities reservoirs: 2**	**Water quality supply zones: 1**
		
The Canungra scheme uses Appel Street Reservoirs as the primary Urban Utilities drinking water storage location. The Canungra WTP uses the level telemetry in Appel Street reservoirs to control drinking water transfer to the reticulation network. The WTP supplies the Canungra township and the reservoirs concurrently. Urban Utilities can dose chlorine at Appel Street Reservoirs if required, however since the new WTP it has not activated dosing whilst the site disinfection performance is being evaluated.		

Drinking water quality assessment 2012 – 2019
• Total hardness has a range of 31 – 130mg $CaCO_3$/L, • TDS has a range of 60 – 430mg/L with 95th percentile of 210mg/L, • Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits, • Transition elements are detected however are much lower than ADWG health limits. • Iron has been detected above the ADWG aesthetic guideline value on four occasions. • LSI average is -0.5
Drinking water quality assessment 2019 – 2021
• The drinking water quality has remained largely similar across the two reporting periods, • Geosmin detections have increased from 7% to 63% with a 95th percentile of 4ng/L, • Iron 95th percentiles have decreased from 0.06mg/L to 0.01mg/L, • Free chlorine detections have decreased slightly from 99.7% of samples to 94.7% with 95th percentiles increasing slightly from 2.3mg/L to 2.7mg/L, • HPC detections have decreased from 31% to 10% and reduced 95th percentile to 2cfu/mL.
Comments
The drinking water quality in Canungra exhibits little trends of concern. Canungra Scheme is susceptible to supply issues due to the absence of a raw water storage. Water quality risks in this scheme are more heightened during drought responses. Although geosmin is being detected more often in sampling, this is not incurring increased geosmin-sourced customer complaints in the scheme.

7.6 Esk-Toogoolawah drinking water scheme

Esk-Toogoolawah drinking water scheme		
Raw water source, unmitigated risks and drinking water treatment		
Water is sourced from Wivenhoe Dam, Lake Wivenhoe at Glen Esk and transported through 10km of raw water mains to the Esk WTP. Wivenhoe Dam has a large catchment and has several risks associated with urban WWTPs, agricultural and recreational activities. The Esk township WTP discharges treated water effluent directly into Sandy Creek, whilst the Toogoolawah township WWTP uses surface flow over Vetiver grass to treat effluent, which can flow into Cressbrook Creek in wet weather. Agricultural activities in the Lake Wivenhoe catchment are typically related to grazing livestock which have direct access to the lake, and recreational activities on the lake and lakeside include camping, swimming and motorised watercraft. Protozoa risk is increased following high rainfall in this catchment. The dam also has risks associated with nutrient sources, algae blooms and stratification turn over which can increase raw water turbidity, and odour and taste issues. Wivenhoe Dam is downstream of Somerset Dam and therefore receives releases from Somerset Dam. All associated risks with Somerset Dam are potentially transferred to Wivenhoe Dam.		
Key network characteristics		
Bulk water supply points: 1	**Urban Utilities reservoirs: 2**	**Water quality supply zones: 2**



The drinking water is treated on the southern side of Esk and transferred through the Esk township to the Calcite Reservoir on the northern side of Esk. The water fills the Calcite Reservoir and can bypass the reservoir to directly supply Toogoolawah. Calcite Reservoir will back-feed to Esk and supply Toogoolawah as required. The Toogoolawah Reservoir fills from water transferred through the Toogoolawah township and back-feeds to the town. A backflow prevention device prevents the water in Toogoolawah supplying back towards Esk. Disinfection at the Toogoolawah Reservoir is managed using a chlorine dosing unit.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 81 – 130mg $CaCO_3$/L,
- TDS has a range of 210 – 350mg/L with 95th percentile of 310mg/L,
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Transition elements are detected however are much lower than ADWG health limits,

- THMs have exceeded the health limits once, 95th percentile of 180µg/L and a mean of 120µg/L,
- Chlorate has exceeded 0.8mg/L three times,
- LSI average is -0.35.

Drinking water quality assessment 2019 – 2021

- MIB 95th percentile is 5.1ng/L for the 2019-2021 assessment period,
- Geosmin has not been detected in this period compared to 29% of samples 2012 – 2019,
- TDS has been increasing since 2018 peaking at 345uS/cm in March 2021, since then has trended down to 218uS/cm June 2021. Total hardness followed a similar trend peaking at 130mg $CaCO_3$/L before adjusting to 80mg $CaCO_3$/L,
- HPC detections have remained comparable at 20% of samples,
- Chlorate has not exceeded 0.8mg/L,
- LSI average is -0.42 and is trending lower since mid-2020.

Comments

Generally, the water quality characteristics of the Esk-Toogoolawah scheme have remained similar. MIB is being detected more frequently since 2017 and Geosmin has not been detected.

7.7 Jimna drinking water scheme

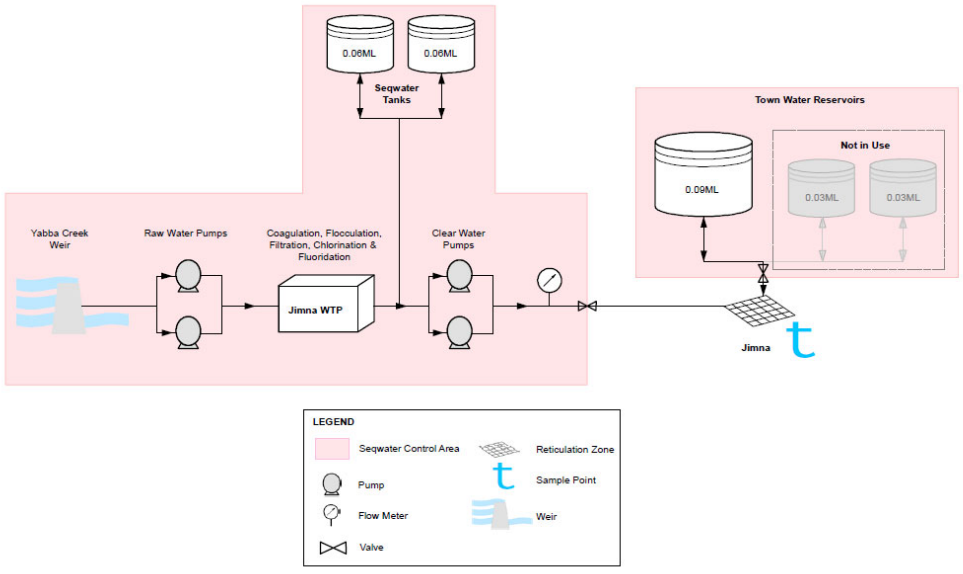
Jimna drinking water scheme

Raw water source, unmitigated risks and drinking water treatment

Water is sourced from Yabba Creek, Jimna and transferred to the Jimna WTP. Yabba Creek flows through state forest and agricultural lands to Big Hole where water is abstracted. Yabba Creek is susceptible to variations in flow and when at low flows can cause increased nutrients and algae in the source water. Yabba Creek has domestic septic systems and grazing livestock within the catchment and low-level recreational activities at Big Hole. There are legacy cattle dips in the catchment which are no longer in use and historical gold mining activities. The catchment has a four-wheel drive park and logging activities. Source water turbidity and protozoa risk are increased following high rainfall in catchment.

Key network characteristics

Bulk water supply points: 2	Urban Utilities reservoirs: 0	Water quality supply zones: 1



The drinking water for this scheme is treated at the Jimna WTP which is transferred through the Jimna township to Seqwater owned reservoirs. The network is very small consisting of less than 3km of Urban Utilities water main. The network will experience minor changes in water quality related to fresh water direct from the treatment plant and older water back feeding from the reservoirs. Seqwater control all supply arrangements in this scheme. Fluoride is not added to Jimna drinking water. Fluoride is not added to Jimna drinking water.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 32 – 96mg $CaCO_3$/L,
- TDS has a range of 170 – 340mg/L,
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Transition elements are detected however are much lower than ADWG health limits,
- LSI average is -0.95.

Drinking water quality assessment 2019 – 2021

- MIB and geosmin are being detected in similar frequency, with geosmin being detected in 75% of samples, more frequently than MIB (20% of samples). Both compounds are below 5ng/L for 95th percentiles in both assessment periods,
- TOC 95th percentiles have increased from 3.9mg/L to 5.2mg/L,
- THMs have exceeded ADWG health limits once and has an increased average of 140ug/L up from 94ug/L for the previous assessment period,
- HPC detections have remained consistent at 20%. Detections of free chlorine in samples decreased from 86% to 66% of samples.

Comments

The Jimna scheme drinking water quality is exhibiting high trending THMs coupled with reductions in free chlorine detections. The latter part of the 2019-2021 period both THMs and free chlorine had adjusted back to lower concentrations and more frequent free chlorine detections. It is likely a return to higher THM and lower free chlorine detections are more common in summer periods.

Although taste and odour compounds are detected and is identified in source water risk assessments, Urban Utilities has not received any water quality complaints in the scheme over the recent assessment period.

7.8 Kilcoy drinking water scheme

Kilcoy drinking water scheme

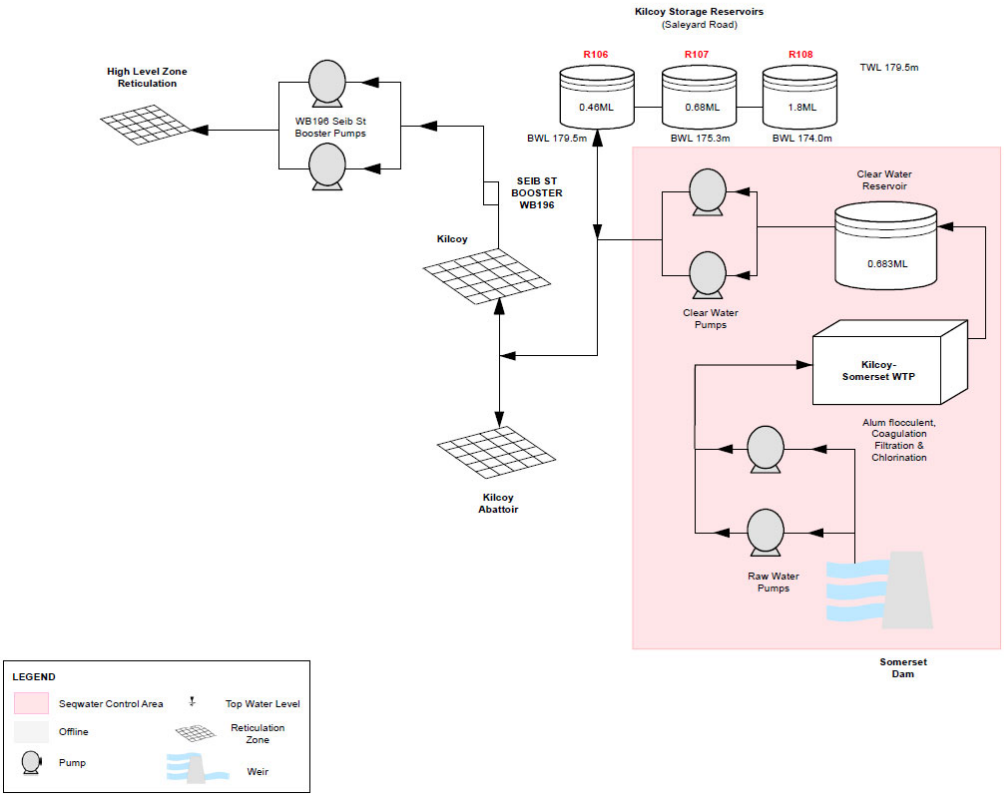
Raw water source, unmitigated risks and drinking water treatment

Water is sourced from Upper Somerset Dam, Lake Wivenhoe and transported along approximately 2.5km of raw water mains to the treatment plant in Kilcoy. The Upper Somerset Dam receives water from two major contributories of the Stanley River and Sandy Creek. The Stanley River is the receiving waterway for the Woodford wastewater treatment plant and other on-site wastewater treatment systems of the townships in the catchment. The Stanley catchment has high levels of grazing agricultural activities with direct access to the source water, a chicken farm and tertiary wastewater irrigation at the correctional facility. The Stanley River will also receive urban stormwater run-off. Sandy Creek has similar risks associated to on-site wastewater treatment systems of Kilcoy and direct livestock access. Sandy Creek also has risk associated with industry involved with fertilisers, an off-road motorbike club track, and holding pond runoff from a large-scale abattoir. Upper Somerset Dam has many on-site domestic wastewater treatment systems, camping grounds, direct livestock access to the lake and recreational activities such as motorised watercraft permitted. There are legacy cattle dips in the catchment which are no longer in use and wood treatment facilities that use

chromated copper arsenate.[28] Rainfall events can result in increased nutrients and algae blooms in the source water and protozoa risk. Turbidity is also a risk during Upper Somerset Dam turn over.

Key network characteristics

Bulk water supply points: 1	Urban Utilities reservoirs: 3	Water quality supply zones: 1



The drinking water for this scheme is treated at the Kilcoy WTP which is then transferred to three reservoirs on Saleyard Road. The supply to these reservoirs is controlled by Seqwater who use the level in Saleyard Reservoir 1 as the primary control. The Saleyard Road Reservoir 1 has a lower top water level than the other two reservoirs and balance out via gravity. Slightly more storage can be accommodated on site if reservoir 1 is isolated and the top water level of the other two, which are equal, is utilised. The network is supplied from this reservoir site. Kilcoy has a large-scale abattoir in the township which uses approximately 75% of the total supply to the township.

Drinking water quality assessment 2012 – 2019

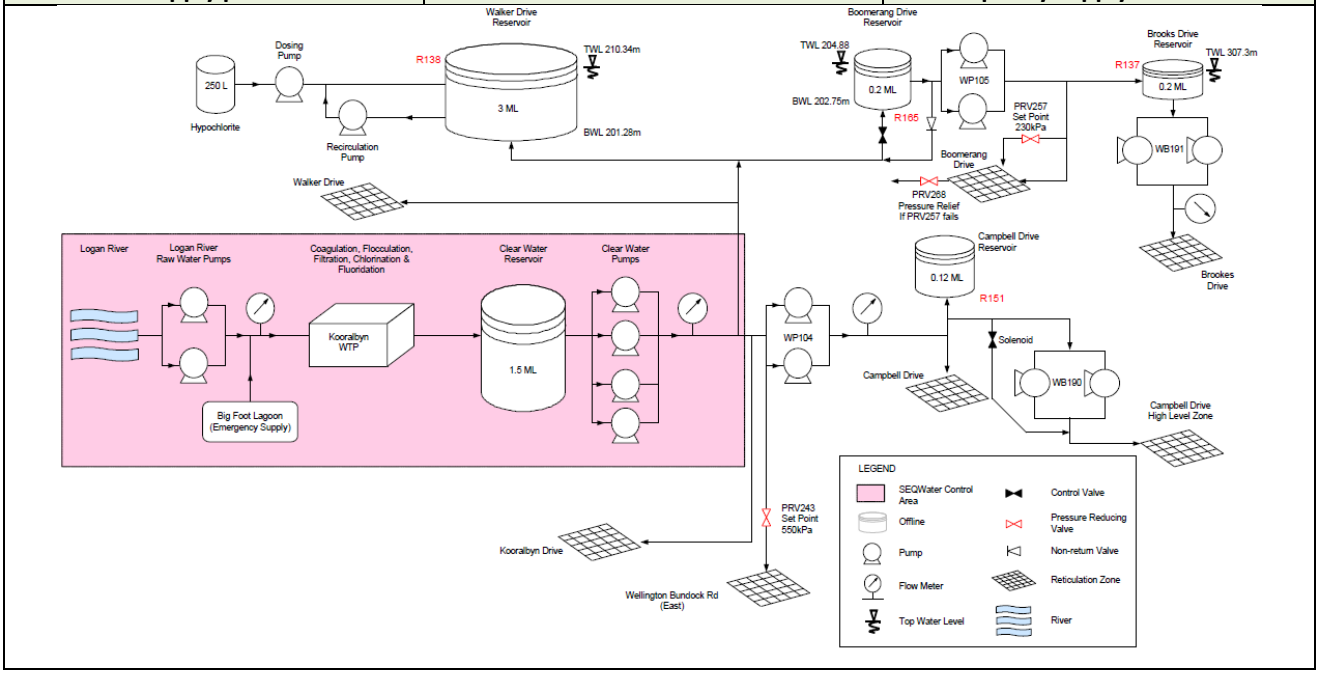
- Total hardness had a range of 58 – 120mg $CaCO_3$/L,
- TDS had a range of 170 – 320mg/L,
- Heavy metals were rarely detected and if detected are typically very close to the limit of reporting and order of 10 magnitude lower than ADWG limits,
- Transition elements are detected however are much lower than ADWG health limits,
- LSI average is -0.66.

[28] Chromated copper arsenate is a wood preservative containing compounds of chromium, copper, and arsenic, in various proportions. It is used to impregnate timber and other wood products, especially those intended for outdoor use, in order to protect them from attack by microbes and insects.

Drinking water quality assessment 2019 – 2021
• The drinking water quality has remained largely similar across the two reporting periods, • MIB is being detected in similar frequency (50% of samples) whilst geosmin hasn't been detected in this assessment period, • THMs have remained below ADWG health limits with 95th percentiles remaining consistent, • Free chlorine statistics are similar across the period exhibiting 85% detection in samples and averaging around 1.0mg/L for both periods. • HPC detections have remained constant at around 17% of samples for both periods.
Comments
Kilcoy had a new treatment plant commissioned in 2014 which improved treatment capacity and increased treatment barriers, most notably UV disinfection.

7.9 Kooralbyn drinking water scheme

Kooralbyn drinking water scheme		
Raw water source, unmitigated risks and drinking water treatment		
Water is sourced from Logan River, Tamrookum and transported through approximately 8km of raw water mains to the treatment plant in Kooralbyn. Kooralbyn can also source water from Bigfoot Lagoon, Kooralbyn which is filled with raw water from the Logan River. The Logan River catchment is dominated by agricultural activities primarily livestock which also have direct access to the river. The catchment has some disused legacy cattle dips, domestic septic systems, dairies and cattle feedlots, and recreational activities at campgrounds. The Logan River is prone to high nutrient loads, conductivity and turbidity events. Protozoa risk is increased following high rainfall in catchment. Kooralbyn WTP can switch from the preferred Logan River abstraction point to Bigfoot Lagoon if the Logan River water quality is experiencing an event. Bigfoot Lagoon is a storage location in a disused airfield and has no catchment. Bigfoot Lagoon is susceptible to algal blooms in warmer months and attracts high bird activity.		
Key network characteristics		
Bulk water supply points: 1	**Urban Utilities reservoirs: 4**	**Water quality supply zones: 3**



Water is produced at the WTP in Kooralbyn and transferred to the township of Kooralbyn using the level control of Walker Drive reservoir. During the fill transfers, both Walker Drive reservoir and Boomerang Drive reservoirs are filled with water controlled via an altitude valve. Walker Drive reservoir will gravity feed Boomerang Drive through the network. Kooralbyn scheme has a large topography range of 85–335mAHD and uses pumps in the Walker Drive and Boomerang reservoir supply zones to supply either the Campbell Drive or Brooks Drive reservoirs, these two reservoir zones each have small high-level boosted locations. The Kooralbyn scheme has locations of high-water age. We manage disinfection at Walker Drive reservoir using continuous recirculation dosing.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 77 – 260mg CaCO3/L, 14% of samples exceeding ADWG aesthetic guideline 200mg CaCO3/L,
- TDS has a range of 100 – 530mg/L with 95th percentile of 470mg/L,
- THMs have exceeded ADWG health criteria twice with the 95th percentile of 190µg/L,
- Turbidity and iron have been detected above the ADWG aesthetic value three times,
- MIB has not been detected whilst geosmin was detected 5 times in 42 samples,
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Transition elements are detected however are much lower than ADWG health limits,
- LSI average is 0.16.

Drinking water quality assessment 2019 – 2021

- The drinking water quality has remained largely similar across the two reporting periods,
- Both MIB and geosmin have been detected once,
- THMs have not exceeded ADWG health limits and 95th percentile has decreased to 150µg/L. A maximum THM concentration of 200ug/L has been recorded,
- Free chlorine statistics are similar across the period exhibiting 95% detection in samples and averaging +0.4mg/L higher in the second assessment period of 1.4mg/L. HPC detections have improved from 33% to 12% of samples,
- Chlorate has a maximum detected concentration of 0.75mg/L with 95th percentile 0.25mg/L,
- LSI average is -0.37 and is now consistently negative.

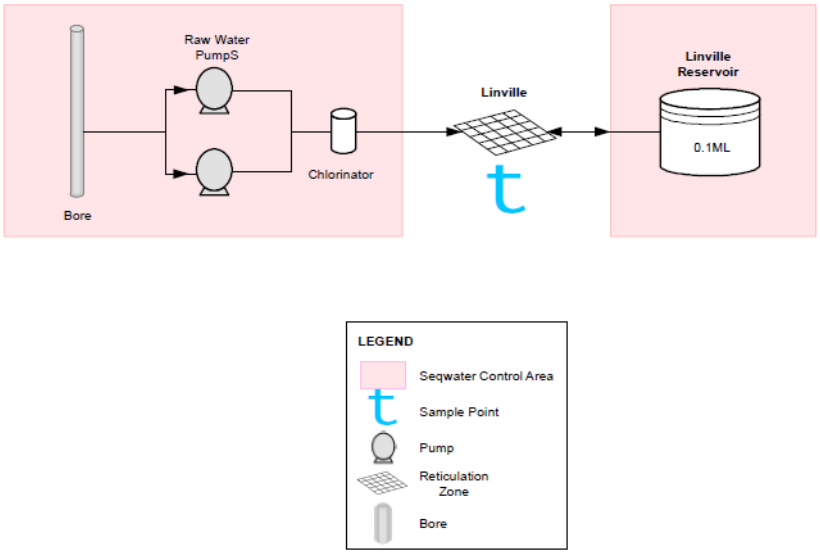
Comments

The drinking water in Kooralbyn is considered hard on average. The variability of the water hardness is due to the variability of the Logan River water quality and influenced by rainfall and other environmental factors. Urban Utilities received very low complaints related to hardness in Kooralbyn. Total hardness is lower on average through the most recent 2019-2021 dataset, TDS remains <600mg/L for all 2019-2021 samples which is considered good quality by ADWG.

Improvements have been made to the management of THM in the supply scheme since 2012. Whilst THMs exceedences are a lower likelihood than historically, THMs are still exhibiting relatively high concentrations at times in the scheme, particularly after rain events in the catchment. Kooralbyn scheme uses chlorine gas for primary disinfection and sodium hypochlorite for network disinfection management. Chlorate in the network is managed by REF201 Drinking Water Rechlorination Management.

Kooralbyn treatment plant can dose PAC to control taste and odour. This would be a considered treatment option if abstraction from Bigfoot was required.

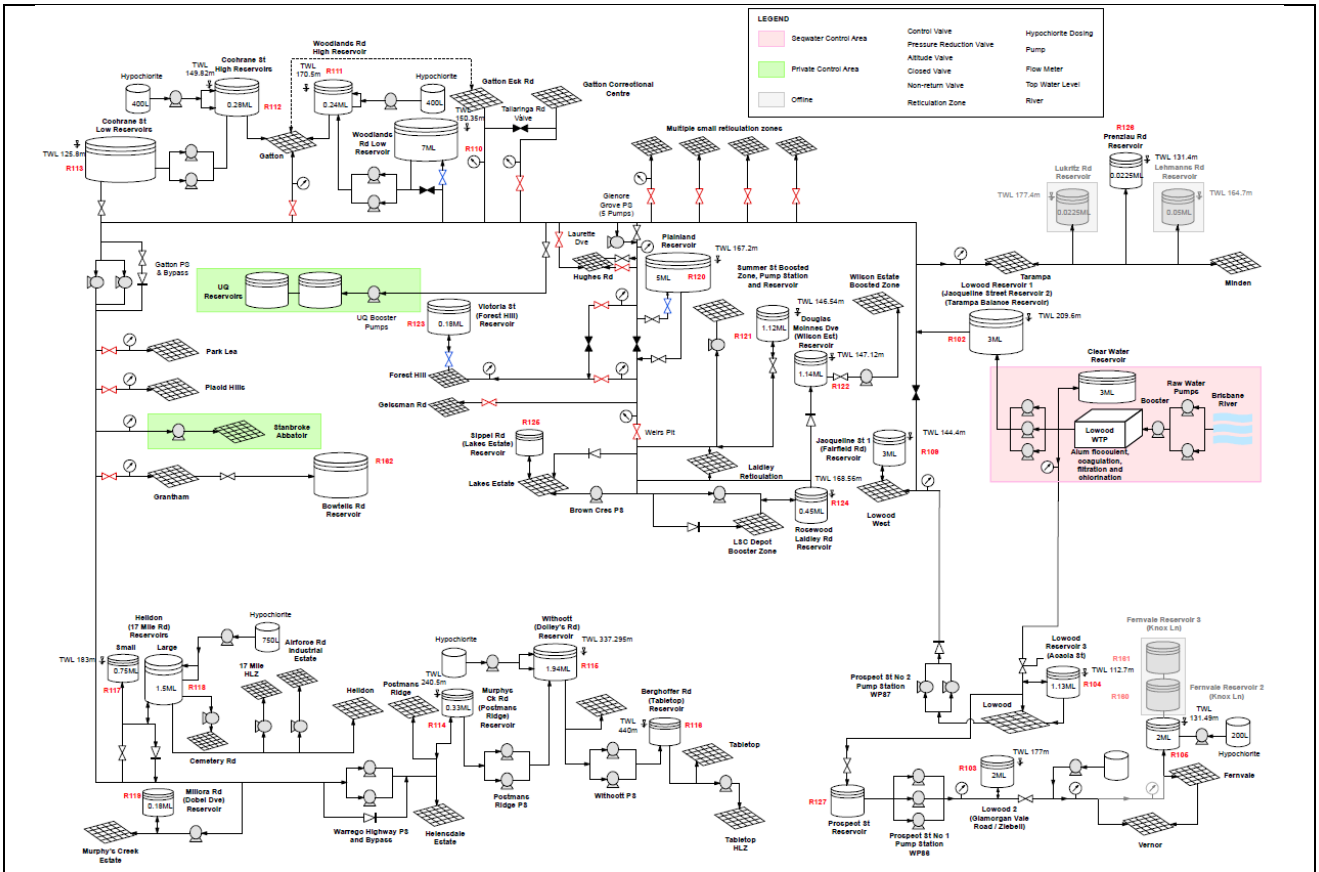
7.10 Linville drinking water scheme

Linville drinking water scheme		
Raw water source, unmitigated risks and drinking water treatment		
The Linville scheme takes water from the Upper Brisbane River Aquifer. The Upper Brisbane River Aquifer catchment area is approximately 2,000km^2 which has 80+ septic systems, livestock grazing, and irrigated crops. Blackbutt creek connects at the bore location which also has a local swimming hole. High rainfall is the greatest risk to the bore. The drinking water for this scheme is treated at the Linville WTP. Sodium hypochlorite is used for primary disinfection. The contact tank transfers drinking water through the township to the Seqwater owned Linville reservoir.		
Key network characteristics		
Bulk water supply points: 1	**Urban Utilities reservoirs: 0**	**Water quality supply zones: 1**
		
The network is very small consisting of less than 4km of Urban Utilities reticulated water mains. The network experiences large fluctuations in chlorine related to fresh water direct from the WTP supply and older water back feeding from the reservoir. The variability of the chlorine is an outcome of the network configuration. Fluoride is not added to Linville drinking water.		
Drinking water quality assessment 2013 – March 2020		
• Total hardness has a range of 59 – 120mg $CaCO_3$/L, • TDS has a range of 170 – 290mg/L, • Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits, • Transition elements are detected however are much lower than ADWG health limits, • LSI average is -0.52.		
Drinking water quality assessment April 2020 – 2021		
• Total hardness has a range of 92 – 230mg $CaCO_3$/L, 30% of samples exceeding ADWG aesthetic guideline 200mg $CaCO_3$/L, • TDS has a range of 220 – 470mg/L, • Heavy metals have not been detected, • Transition elements are detected however are much lower than ADWG health limits,		

• THMs have not exceeded ADWG health limits and 95th percentile is 99µg/L. A maximum THM concentration of 140ug/L has been recorded, • Free chlorine exhibits 97% detection in samples and averaging 2.1mg/L. HPC detections are exhibited in 5% of samples, • LSI average is -0.02.
Comments
Linville has experienced significant change in drinking water quality since the new Linville plant commenced operation in April 2020. The change in water quality is due to the change in water source from tankered Kilcoy treated water to bore water abstraction from the Upper Brisbane River Aquifer. The change in water quality was well planned and communicated by both Seqwater and Urban Utilities without any complaints being recorded by Urban Utilities. The drinking water quality will continue to be monitored according the REF423 with data assessed for emerging risks.

7.11 Lowood drinking water scheme

Lowood drinking water scheme		
Raw water source, unmitigated risks and drinking water treatment		
Water is sourced from the mid-Brisbane River, and pumped through 1.3km of raw water pipes and approximately 100m elevation to the Lowood WTP. The Lowood mid-Brisbane River abstraction point receives water from the local catchment area, Lake Wivenhoe releases and flows from the Lockyer Creek. The abstraction point has the same raw water risks associated with Lake Wivenhoe as mentioned in the Esk-Toogoolawah scheme and, specifically to the local Brisbane River catchment, risks associated with agricultural industry such as chicken farms, a dairy, an abattoir, grazing livestock and proximity to Lowood WWTP. The Lockyer Creek has catchment risks associated with large scale crop based agricultural activities, livestock, agricultural research activities and urban WWTP treated effluent discharges from Helidon, Gatton, Forest Hill, Laidley. During rain events in the Lockyer Creek catchment there is increased risk of contributions of treated wastewater effluent from Grantham, Hatton Vale, Regency Downs and other smaller on-site wastewater treatment facilities at campgrounds. Typically, rainfall in the Lockyer Creek catchment will increase raw water nutrient concentrations and conductivity of the mid Brisbane River. Protozoa and turbidity risk are increased following high rainfall in catchment as is treated water taste/odour and THM risks.		
Key network characteristics		
Bulk water supply points: 2	**Urban Utilities reservoirs: 20**	**Water quality supply zones: 17**



The drinking water for this scheme is treated in Lowood and transferred through to two primary reservoirs; Acacia Street as the upstream feed to Lowood township and east to Fernvale. The second on Jacqueline Street as the upstream feed for supply heading west through Lockyer Valley and south western Somerset Council regions to Minden. Approximately 70% of the treated water produced at Lowood travels to Jacqueline Street to the fourteen western water quality supply zones. The dominating feature of the western Lowood scheme is the 60km trunk main backbone. The Lockyer Valley townships and localities are provided drinking water services through trunk main offtakes connected to pressure reducing valves, water pressure boosters or reservoirs. Most of the Lowood scheme gets standard pressure from the network with some pockets being trickle fed. In Lockyer Valley major customers such as a university, correctional facility and meat works, can heavily influence network usage. The Lowood scheme is quite large geographically with high water age in some locations. Urban Utilities utilises disinfection dosing in several locations and as such monitors DBPs.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 96 – 260mg $CaCO_3$/L, with 3% of samples exceeding ADWG aesthetic guideline 200mg $CaCO_3$/L,
- TDS has a range of 120 – 570mg/L with 95th percentile of 390mg/L,
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Transition elements are detected however are much lower than ADWG health limits,
- Total organic carbon averages 3.4mg/L
- MIB is detected in 70% of samples with 36% of samples collected exhibiting concentrations >5ng/L,
- Geosmin is detected in 37% of samples with 3% of samples collected exhibiting concentrations >5ng/L,
- Chlorine exceeded ADWG health criteria 3 times,

- THMs 95th percentiles are 200µg/L with a mean of 130µg/L. THMs are a higher risk in the Tabletop supply zone,
- Iron has been detected above 0.3mg/L on 7 occasions. Aluminium above 0.2mg/L on 8 occasions,
- LSI average is -0.34.

Drinking water quality assessment 2019 – 2021

- Total hardness maximum range has decreased from 260mg $CaCO_3$/L to 160mg $CaCO_3$/L (95th percentile of 150mg $CaCO_3$/L) with no recorded samples exceeding aesthetic guideline 200mg $CaCO_3$/L,
- Similarly, TDS has maximum range has decreased from 570mg/L to 370mg/L, with 95th percentile of 340mg/L,
- MIB and geosmin are being detected at similar frequencies,
- THMs have exceeded ADWG health limits on 4 occasions,
- Chlorate has exceeded 0.8mg/L on 2 occasions,
- Free chlorine statistics are similar across the period exhibiting 85% detection in samples. HPC detections have decreased from 26% to 17% of samples.

Comments

The drinking water quality of the Lowood supply scheme remains consistent across the two assessment periods with decreases in total hardness and TDS range. The supply scheme is susceptible to high THM concentrations after catchment rainfall and in the Tabletop zone. Ongoing requirements of disinfection and disinfection by-product management are still required in the network.

7.12 Rathdowney drinking water scheme

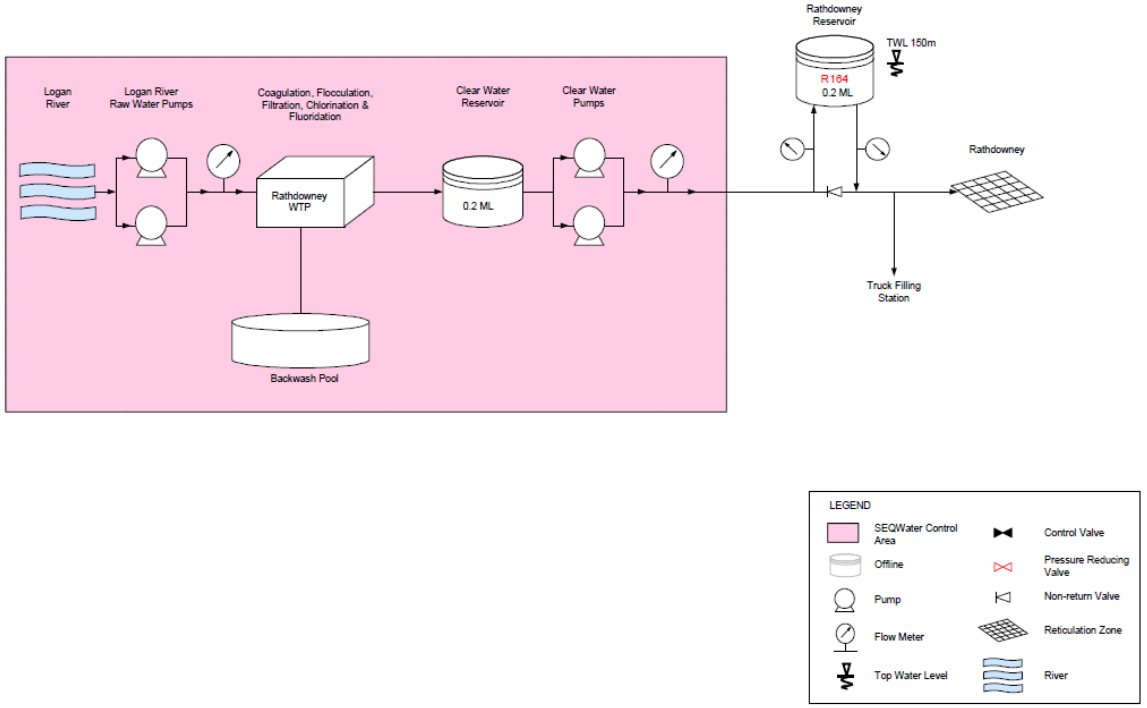
Rathdowney drinking water scheme

Raw water source, unmitigated risks and drinking water treatment

Water is sourced from Upper Logan River, Rathdowney approximately 40km downstream of Maroon Pocket Dam and treated at the Rathdowney WTP. The Logan River catchment is dominated by agricultural activities primarily livestock which also have direct access to the river. The catchment has some disused legacy cattle dips, domestic septic systems, dairies and cattle feedlots, and recreational activities at campgrounds. Pallen Creek is a contributory catchment source which joins the Logan river about 3km upstream of the abstraction point. Pallen Creek correctional facility wastewater treatment plant discharges into Pallen Creek which can contribute to algal blooms and nutrient loads. The Logan River is prone to conductivity and turbidity events. Protozoa risk is increased following high rainfall in catchment

Key network characteristics

Bulk water supply points: 1	**Urban Utilities reservoirs: 1**	**Water quality supply zones: 1**



Water is produced at the WTP in Rathdowney and transferred through the township using the level controls of the Rathdowney Reservoir (0.2ML) off the Mount Lyndsay Highway on the other side of town. Rathdowney is a small distribution network of approximately 5km of reticulated mains. The Rathdowney reservoir fills from the WTP via a direct rising main. The reservoir has a separate inlet and outlet, with the reservoir being the primary network supply point. Fluoride is not added to Rathdowney drinking water.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 46 – 220mg $CaCO_3$/L with 5% of samples exceeding ADWG aesthetic guideline 200mg $CaCO_3$/L,
- TDS has a range of 130 – 600mg/L with 95th percentile of 520mg/L,
- MIB and geosmin have been detected on occasion,
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Iron and aluminium have been detected once above the ADWG aesthetic guideline value,
- Transition elements are detected however are much lower than ADWG health limits,
- LSI average is 0.14.

Drinking water quality assessment 2019 – 2021

- The drinking water quality has remained largely similar across the two reporting periods,
- One total hardness sample exhibited 210mg $CaCO_3$/L. No other aesthetic guidelines have been exceeded,
- MIB and geosmin have not been detected,
- THM average concentrations have decreased from 130ug/L to 76ug/L,
- Free chlorine statistics are similar across the period exhibiting 100% detection in samples. HPC detections have decreased from 22% to 7% of samples.

Comments
The drinking water in Rathdowney is considered hard on average. The variability of the water hardness is due to the variability of the Logan River water quality and influenced by rainfall and other environmental factors. Urban Utilities received very low complaints related to hardness in Rathdowney. The Rathdowney scheme drinking water quality is exhibiting consistency across the reporting periods. Notably, THMs are trending in lower concentration and concentration range over the second assessment period.

7.13 Somerset drinking water scheme

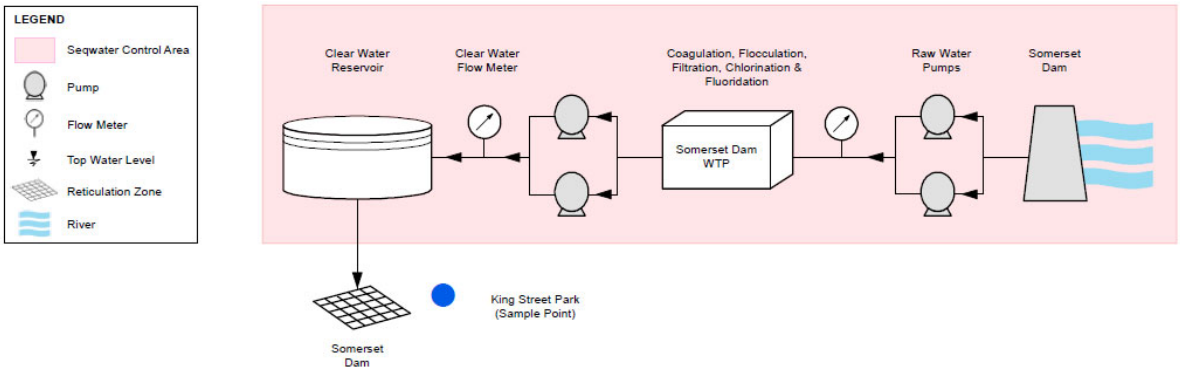
Somerset drinking water scheme

Raw water source, unmitigated risks and drinking water treatment

Water is sourced from Lower Somerset Dam, Lake Wivenhoe and treated at the Somerset Township WTP. The Lower Somerset Dam has all the associated risks as the Kilcoy scheme as they both share the same source. The scheme can experience fluctuations in usage between holiday and non-holiday periods which requires ongoing management of sodium hypochlorite stocks for chlorate and management of clearwater retention times to minimise THM formation.

Key network characteristics

Bulk water supply points: 1	Urban Utilities reservoirs: 0	Water quality supply zones: 1



The drinking water for this scheme is treated at the Somerset Township WTP which is then transferred directly from the clearwater storage to the reticulation network. The reticulation network is small consisting of approximately 3km of water mains, some mains with internal diameter of 25mm. The town has a low permanent population however experiences large increases of recreational land users and campers during holidays periods. The supply to the township is controlled by Seqwater. Fluoride is not added to Somerset Township drinking water.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 34 – 77mg $CaCO_3$/L,
- TDS has a range of 140 – 270mg/L,
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits,
- Iron has exceeded 0.3mg/L on two occasions,
- Other transition elements are detected however are much lower than ADWG health limits,
- MIB and geosmin is detected in around 50% of samples. 28% of MIB samples and 10% of geosmin samples taken have exceeded 5ng/L,
- THMs have exceeded ADWG health limits on one occasion and have a 95th percentile of 190µg/L,
- LSI average is -0.82.

Drinking water quality assessment 2019 – 2021

- The drinking water quality has remained largely similar across the two reporting periods,

- THMs are trending lower than the latter part of assessment period one,
- Free chlorine statistics are similar across the period exhibiting 100% detection in samples. HPC detections have decreased from 19% to 5% of samples,
- Chlorate has decreased 95th percentiles from 0.56mg/L to 0.24mg/L.

Comments

The network and treatment process at Somerset township have remained largely unchanged between assessment period. Seqwater have improved sodium hypochlorite management practices which is demonstrated in the reduction of chlorate between the two periods.

A single THM exceedance was recorded 07/03/2018 after heavy rain event in early March 2018 demonstrating environmental factors can influence THMs in the scheme. Urban Utilities uses THM management practises for Somerset.

7.14 South East Queensland Water Supply System

SEQWSS drinking water scheme

Raw water source, unmitigated risks and drinking water treatment

The SEQWSS has potentially many sources. In this section the two primary supplies of Mount Crosby and North Pine WTPs and source water will be discussed.

Mount Crosby

Water is abstracted from the Mount Crosby weir Brisbane River and pumped through 1.3km of raw water pipes and approximately 100m elevation to the Mount Crosby WTP. The abstraction point receives water from the local catchment area, Lake Wivenhoe releases, flows from the Lockyer Creek, Blacksnake Creek and Lake Manchester. The abstraction point has the same raw water risks associated with the mid-Brisbane as mentioned in the Lowood scheme. Specifically, the local Mount Crosby weir Brisbane River catchment risks are associated with Lowood and Fernvale treated wastewater discharges, turf farms, domestic wastewater treatment facilities, and multiple use connectivity direct with the Brisbane River.

Blacksnake creek typically does not flow, except for short periods after rainfall in the catchment. Flow from Blacksnake creek is typically extremely high in salinity due to salt uptake during periods of no flow. Flows from Blacksnake significantly contribute to conductivity in treated water. During rain events in the Lockyer Creek catchment there is increased risk of contributions of treated effluent from Grantham, Hatton Vale, Regency Downs and other on-site wastewater treatment facilities at campgrounds.

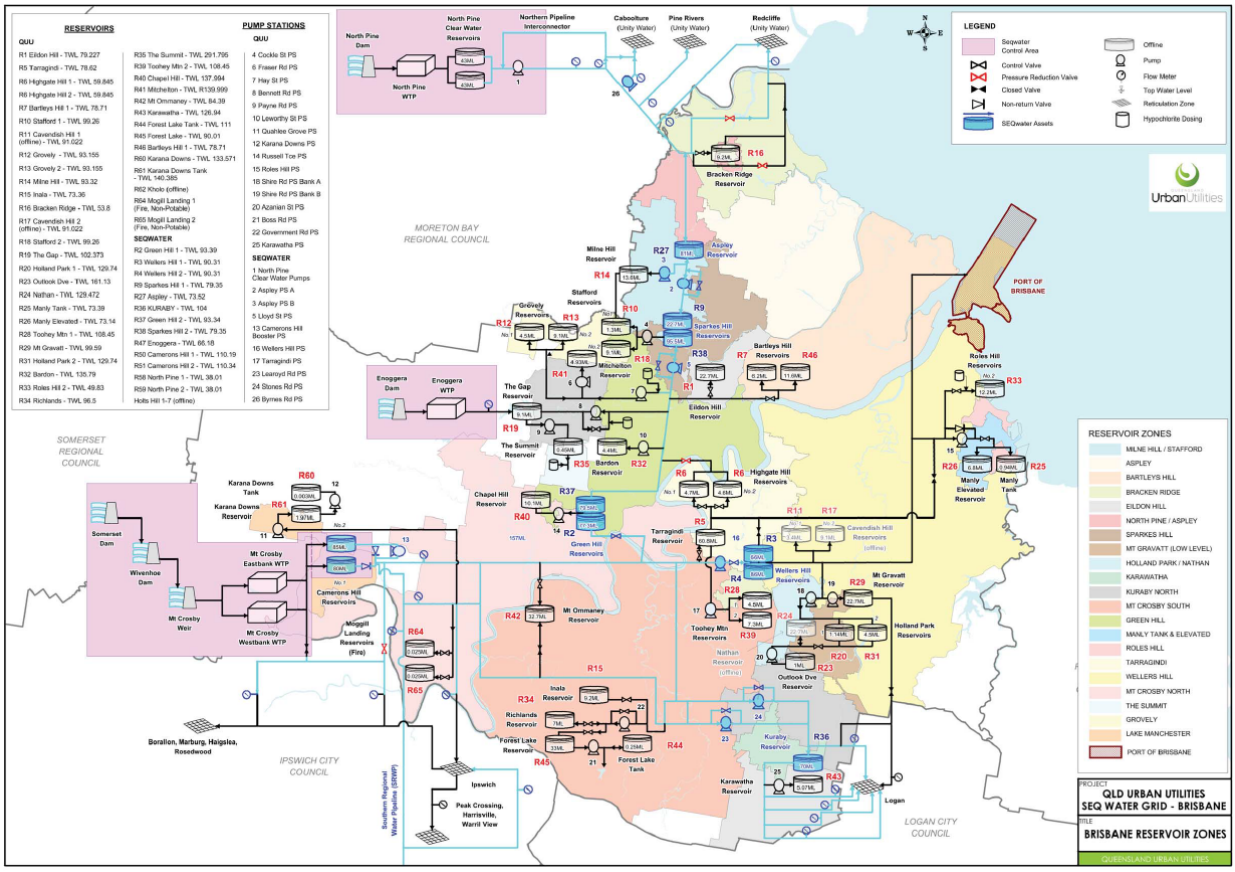
Typically, rainfall in the Lockyer Creek catchment will increase raw water nutrient concentrations and conductivity of the mid Brisbane River. Lake Manchester flows can contribute to cyanobacteria loading of the source water. Raw water temperatures can be high leading to risk of Legionella and Naegleria. Protozoa and turbidity risk are increased following high rainfall in catchment with treated water risks associated with taste/odour and THMs.

North Pine

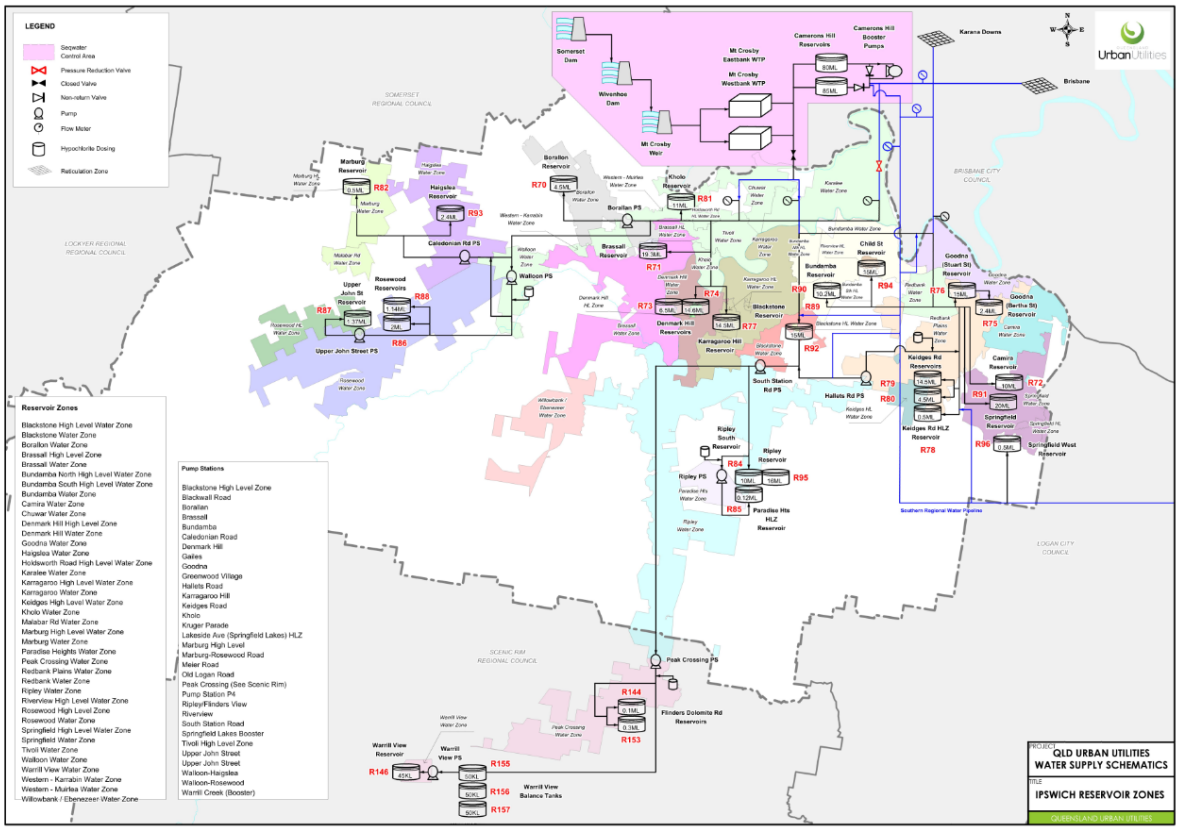
Water is sourced from Lake Samsonvale and treated at the North Pine WTP in Joyner. Lake Samsonvale catchment has on-site wastewater treatment facilities; Dayboro treated effluent discharge, agricultural and livestock activities with direct access to the source water and many creek crossings. Lake Samsonvale experiences algal blooms as the water is nutrient rich and will stratify with potential for very warm top water temperatures. The catchment also has a quarry, legacy cattle dips and number of urban areas which can present hydrocarbon, leachate, and other run off associated risks. Taste and odour of the source water is a high likelihood. Protozoa risk is increased following high rainfall in catchment.

Key network characteristics		
Bulk water supply points: 304	**Urban Utilities reservoirs: 57**	**Water quality supply zones: 47**

Brisbane reservoir zones



Ipswich reservoir zones



The central SEQWSS is dominated by the supply arrangement origins from Mount Crosby WTP south into Ipswich, and east into Brisbane. Ipswich is supplied primarily from Mount Crosby trunk mains direct to Urban Utilities network infrastructure or Ipswich reservoirs with some connectivity from the Southern Regional Water Pipeline. Brisbane is supplied in a similar manner however most of the water will pass through the bulk water reservoirs of Green Hill, Wellers Hill, Sparkes Hill and Aspley before either direct supply to Urban Utilities network or reservoirs. North Pine WTP supplies Aspley bulk water reservoir or direct to Urban Utilities' infrastructure and customers. North Pine WTP typically supplies far northern suburbs of Brisbane however is tending to supply the northern parts of the SEQWSS during drier conditions and less frequently into Brisbane. The metropolitan reservoirs typically have dedicated inlet and outlet trunk infrastructure which typically mitigates bi-directional water flow. Some small zones of Brisbane, regional areas of Ipswich and Peak Crossing (Scenic Rim) experience bi-directional water flows. Central SEQWSS is highly interconnected and uses extensive pressure management techniques such as water boosters, pressure reducing valves, boundary valves and district area metering. Urban Utilities doses free chlorine in five locations of the central SEQWSS.

Drinking water quality assessment 2012 – 2019

- Total hardness has a range of 44 – 270mg $CaCO_3$/L with 1% of samples exceeding ADWG aesthetic guideline 200mg $CaCO_3$/L,
- TDS has a range of 110 – 870mg/L with 95th percentile of 370mg/L
- Heavy metals are rarely detected and if detected have been below the limit of laboratory reporting and order of 10 magnitude lower than ADWG limits, apart from lead which has been detected above ADWG health limits 6 times,
- Iron, aluminium and turbidity occasionally exceed the ADWG aesthetic guideline. Manganese has exceeded ADWG health limits 5 times,
- Other transition elements are detected however are much lower than ADWG health limits,

- Total organic carbon averages 3.4mg/L,
- MIB is detected in 65% of samples with 11% of samples collected exhibiting concentrations greater than 5ng/L,
- Geosmin is detected in 47% of samples with 4% of samples collected exhibiting concentrations greater than 5ng/L,
- pH can approach 8.7 in the northern Scenic Rim townships and averages 8.2,
- Drinking water temperatures have been exhibited at 40^{o}C,
- THMs 95th percentiles are 130µg/L, with maximum exhibiting 200ug/L,
- Average LSI is -0.29 with a range of -1.2 to 0.37.

Drinking water quality assessment 2019 – 2021

- Total hardness maximum concentration exhibited 140mg $CaCO_3$/L with 95th percentile decreasing by 50mg $CaCO_3$/L to 130mg $CaCO_3$/L,
- TDS maximum concentration exhibited 510mg/L with 95th percentile of 330mg/L,
- Lead has not exceeded the ADWG health limits since 2015,
- MIB and geosmin are being detected at similar frequencies with only 2% of MIB samples exhibiting concentrations greater than 5ng/L,
- Total chlorine statistics are similar across the period exhibiting an increase of 79% to 83% detection in samples and averaging +0.4mg/L higher in the second assessment period of 1.2mg/L. HPC detections have improved from 48% to 38% of samples.

Comments

The total hardness and TDS range is attributed to the different sources of water. North Pine treated water is quite consistent typically trending approximately 60±10 mg CaCO3/L total hardness (TDS 150±15mg/L). Mount Crosby is typically twice the total hardness and TDS of North Pine treated water and is susceptible to source water changes with environmental conditions. Urban Utilities has customers sensitive to these water quality changes and uses 600µS/cm as a communications trigger to inform these customers. Although the SEQWSS is connected to multiple WTPs, the central SEQWSS was supplied primarily from North Pine or Mount Crosby during the first period. Dec 2019 saw the change of direction of the Southern Regional Pipeline predominantly flowing in a northern direction in response to managing water levels in Wivenhoe. This has resulted in more variability of water characteristics in the Ipswich region with water from the Molendinar WTP supplementing water from Mount Crosby in the region. Molendinar treated water is typically trending approximately TDS 125±25mg/L.

Lead detections in assessment period prior to 2015 are due to a combination of contaminated samples from non-standard sample points and legacy sample points that used brass components. As of July 2015, Urban Utilities uses standard sample points and is continuing to transition away from samples points with brass components through renewal programs in this scheme. All other schemes use standard sample points without brass components.

The treated water from Mount Crosby WTP presents higher THM risk in the Manly/Roles, Summit, Ripley High Level and northern Scenic Rim zones due to a combination of relatively high TOC, THM precursor risks in raw water after sudden environmental change and free chlorine dosing. Typically, the addition of free chlorine to these supply zones increases chloroform concentrations by 60±10µg/L. Urban Utilities manages the THM risks associated with raw water quality through Operating Protocols with Seqwater.

The central SEQWSS uses chloramine as the secondary disinfectant and is prone to disinfection losses influenced in through relatively high-water temperatures and nitrification. Many factors such as system complexity and chloramine stability create challenges in managing microbiological and disinfection targets. More recently, coordinated collaboration studies and system trials have been ongoing to improve disinfection across the central

SEQWSS scheme. Chloramine stability, site configurations and chloramine dosing options are being assessed. SEQWSS water demands have a significant influence on total chlorine concentrations in the system, reducing distribution water age through usage improves total chlorine in locations which may appear underperforming otherwise.

8. VERIFICATION MONITORING

Water quality verification monitoring is used as final confirmation that the barriers and preventative measures implemented to protect the public from drinking water risks are performing effectively. Our comprehensive water quality verification monitoring program (VMP) is documented in *REF423 Drinking Water Quality Monitoring Program*. The VMP is designed in accordance with ADWG recommendations for operational and verification monitoring and ensures compliance with Queensland legislation.

The VMP is used to support operational monitoring programs and verify the quality of drinking water supplied to our customers. The VMP is designed to have flexibility for change if new monitoring requirements are identified outside scheduled revision timeframes. During June 2018, the program was reviewed against recent drinking water risk assessments, the 2016 census population data, and data collected between 2015 and 2018. In July 2018, the most recent revision of the VMP was implemented with more focus on chloramine decomposition species at reservoirs and additional DBP monitoring in the non-SEQWSS connected schemes. The VMP maintains consistency in monitoring packages across our service territory, DBP monitoring and seasonal monitoring frequency changes, and a four-week-month, thirteen-month-year for program management simplicity.

The VMP is executed by the Scientific Analytical Services Laboratory (SAS Lab or SAS) in accordance with the sample packages and schedule managed by Network Engineering[29] SAS Lab, a wholly-owned subsidiary of Urban Utilities, is approved by the National Association of Testing Authorities (NATA) for microbiology, chemistry and sampling.

8.1 VMP – Sample Points and Sampling

The VMP includes over 300 standard design sample points located throughout our service territory ranging from metropolitan to rural areas. SAS undertakes water quality sampling from specified sample points across our water supply zones. All sample points are secured using sealed lockable cabinets, have direct connection to our drinking water network, and are safe to access. Generally, scheduled sample points are sampled for microbiological parameters (*E. coli*, coliforms, HPC). We also undertake an onsite field analysis of:

- total chlorine in chloraminated supply zones, and
- free and total chlorine in non-chloraminated supply zones is undertaken.

Other parameters such as metals, general chemistry, or DBP packages are sampled at specific sample points with the analysis undertaken at the SAS lab.

SAS has trained and experienced staff who, upon identifying any abnormal findings, can contact the Network Engineering team directly to discuss observations. This facilitates timely feedback to both parties and can drive immediate investigations. At times, sample points can be found inaccessible or faulty. In these cases, the Network Engineering team and SAS utilise electronic forms to report faults or inability to sample. The electronic form is a powerful mechanism to drive corrective actions if required. The electronic forms also serve as a traceable document for records management and auditing.

[29] This team is in Operations Maintenance & Planning - Service Delivery.

8.2 VMP – Sample Analysis, Data Storage and Corporate Platforms

All data collected through the VMP is managed in the SAS Laboratory's Information Management System (LIMS). We use database connections to access and present this data through business intelligence and enterprise historian platforms. This IT architecture facilitates corporate wide access to the data for trending, statistical assessment, reporting and dashboards, whilst supporting SAS NATA accreditation requirements.

8.3 Notification of Events and Non-Conformance

The ADWG aesthetic guidelines and health limits are setup in LIMS so that the SAS data entry or reporting delegate can clearly identify if a drinking water parameter is non-conforming. SAS will inform the Water Quality team of any health-based, non-conformance via phone initially, followed by the submission of *SAS201 Water Quality Incident Notification Form (Internal).* The Water Quality team will then enact *PRO93 Drinking Water Quality Incident Reporting, Investigation and Corrective Actions Procedure* to respond to the event. In a similar manner, where a drinking water parameter meets an internal trigger, this occurrence will be notified to the Water Quality team to action. Internal triggers are used to alert to the possibility of a water quality issue which may require network management.[30] Using this protocol negates any time delay between LIMS and our corporate systems.

8.4 VMP – Continuous Assurance (Auditing)

We run a Continuous Assurance (CA) program which audits business practices for conformance and drives continuous improvement. The CA is a rolling quarterly audit program which subjects each assessment criteria to a non-conformance risk rating. The results, produced as a dashboard, are accessible by the Executive Leadership Team (ELT) and the Urban Utilities Board. The VMP falls under the CA program and is audited by collecting sample point data in LIMS and referencing that against the VMP program schedule. Any non-conformances or anomalies found are referred to SAS and the Water Quality team for investigation. If there are traceable communications for a sample point (see section 8.1) that was not sampled as per the schedule, the findings are noted as expected and those untraceable will drive process improvement opportunities. The CA program is an important management tool for ensuring conformance to the extensive and complex VMP.

9. OPERATIONAL MONITORING

9.1 Operational Monitoring

We are committed to providing safe reliable drinking water that enriches the quality of life. To support our commitment, a philosophy of continual improvement and optimisation is embedded in how we operate. In line with community and stakeholder expectations, we continue to collaborate and investigate industry leading practices and technologies to improve our value to the community whilst utilising traditional procedures to complement proactive optimisation activities.

Our operational monitoring of the distribution system:

- assesses the performance of the multiple barriers in the drinking water system,
- informs and influences the network operation,
- collects baseline data to improve and maintain system knowledge,
- supports the effectiveness of corrective and improvement actions through data collection,

[30] An example of this is Urban Utilities THM management plan *CER395 Trihalomethane (THM) Management in Drinking Water*.

- is used to identify issues or hazards by examination of gradual changes or cumulative effects, and
- triggers corrective actions.

Our operational monitoring program focuses on those aspects highlighted in the ADWG for a distribution network which are within our control, and for which we have the most significant influence over day-to-day water quality performance. Four key components of our operational monitoring program are:

- disinfection performance,
- Disinfection By-Products (DPBs),
- asset integrity, and
- customer feedback.

Our operational monitoring program is overseen by the Network Engineering team and incorporates several processes across multiple business units.

We have adopted the targets developed in the *Partnership Water Quality Plan 2017* (PWQP 2017) and are in the process of building robust management practices to achieve and maintain leading practice against these targets.

9.2 Disinfection Performance

In the distribution system, secondary disinfection is a control barrier used to minimise biological growth and mitigate survival of introduced microbiological contamination. Bulk water supplied to Urban Utilities by Seqwater is disinfected with either chloramine or chlorine. Distribution disinfection concentrations can vary, typically influenced by water age, temperatures and demand. We have adopted the targets developed in the PWQP 2017 and are in the process of building robust management practices to achieve and maintain leading practice. Table 9-1, an extract from the PWQP 2017, details disinfection performance targets.

Table 9-1 Disinfection performance parameters and targets as per PWQP 2017

Parameter	Location	Values		
		Leading Practice	***Monitor***	***Action***
Free Chlorine	WTP & KIP (Key Interface Points)	>1.5 mg/L	<1.0 mg/L	<90% of verification samples for a scheme have ≥0.7 mg/L over 12-month reporting period
	Retic Reservoir	>1.0 mg/L	<0.5 mg/L	<90% of verification samples for a scheme have ≥0.5 mg/L over 12-month reporting period
	End of system	>0.2 mg/L	<0.2 mg/L	<90% of verification samples for a scheme have ≥0.2 mg/L over 12-month reporting period
Chloramine (expressed as total chlorine)	WTP & KIP	>3.0 mg/L	<2.5 mg/L	<90% of verification samples for a scheme have ≥2.0 mg/L over 12-month reporting period
	Retic Reservoir	>2.5 mg/L	<1.0 mg/L	<90% of verification samples for a scheme have ≥1.0 mg/L over 12-month

Parameter	Location	Values		
				reporting period
	End of system	>0.5 mg/L	<0.5 mg/L	<90% of verification samples for a scheme have ≥0.2 mg/L over 12-month reporting period

We use operational monitoring of disinfection concentrations to support this initiative. The primary document detailing how we manage disinfection is *REF201 Drinking Water Rechlorination Management* . A summary of how we manage disinfection is provided below.

9.3 Disinfection Management

9.3.1 Disinfection management - dosing

Chlorine dosing is implemented in some locations where operational targets would otherwise not be met. We typically use disinfection dosing units to targeted chlorine residual in a delivery main during flow, or at a reservoir on a continuous dosing arrangement via recirculation. Most dosing units have data feeds to software platforms for operator management, those without are identified for upgrades.

We use an enterprise historian[31] platform to collect data from dosing units, downstream online monitoring devices, LIMS and other relevant sources to create a single data page. The data pages are simple process mimic diagrams that give the operator a comprehensive near-time overview of operational performance. The enterprise historian platform is a powerful management tool, independent of SCADA[32], enabling more customisable and sophisticated alarming than a traditional SCADA system. The dosing units typically operate to a process set point which can be adjusted by the operator, dependent on target downstream disinfection residuals. Alarms and trending analysis generated and monitored via the enterprise historian platform are used to initiate corrective actions to mitigate dosing related risks and improve performance.

Disinfection dosing is supported by the following processes and activities:

- a maintenance and monitoring program,
- chemicals received are required to have a certificate of conformity which is reviewed before acceptance of the chemical and then stored in Qdox,
- dosing chemicals stored in bulk transfer locations and at individual units are tested routinely for strength and impurities of concern, and
- in the event of an incident or dosing unit failure, manual chlorine dosing into reservoirs is possible.

9.3.2 Disinfection Management – reservoirs

Our reservoirs are optimised to balance water supply requirements and water quality performance. However, ongoing monitoring and tuning are required to account for elements such as climate fluctuations, received bulk water quality, and temporary operational changes. Our supply engineers and Water Quality team regularly collaborate to achieve best outcomes. Through our drinking water quality monitoring program, and via traditional methods of laboratory sampling and analysis we monitor reservoir outlets or nearby network sample stations for disinfection residuals. Reservoirs at

[31] Enterprise Historian is a platform to acquire and store large volumes of information generated from process applications.

[32] SCADA is an acronym for supervisory control and data acquisition, a computer system for gathering and analysing real time data. SCADA systems are used to monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation.

risk of failing target criteria will have an in-line continuous disinfection monitoring device installed to increase data collection and enable more frequent performance evaluations, facilitating shorter lead times to optimisation actions. Actions may involve:

- assessment of the reservoir and network data against disinfection performance for tuning opportunities,
- temporary dosing,
- reservoir deep cycling in which the reservoir operates temporarily outside of typical profile in a controlled and monitored manner to improve disinfection, and
- reservoirs that are required to operate differently for project work may be monitored more frequently or use a continuous analyser so that mitigating actions may be applied.

We are maturing our data platforms to achieve efficient management of reservoir sites. The use of the enterprise historian and business intelligence platforms will facilitate effective management of reservoir sites, assisting our conformance to disinfection targets outlined in the PWQP.

9.3.3 Disinfection management – microbiological performance

We monitor HPCs, total coliforms and system disinfectant residuals as indicators of system cleanliness and regrowth potential. The data is trended and assessed to identify emerging issues or significant system events. Data acquired may prompt corrective actions, assist incident investigations and drive flushing.

We have adopted the targets developed in the PWQP 2017 and are in the process of building robust management practices to achieve and maintain leading practice. Table 9-2, an extract from the PWQP 2017, details performance targets.

Table 9-2 Total coliforms/HPC performance parameters and targets as per PWQP 2017

Parameter	Location	Values		
		Leading Practice	***Monitor***	***Action***
Total coliforms or HPC	WTP & KIP Total coliforms	<1 CFU/100mL	>10 CFU/100mL	<97% of verification samples for a scheme have < 10 CFU/100 mL over 12-month reporting period.
	KIP HPC	<100 CFU/mL	>100 CFU/100mL	>100 CFU/mL in 4 out of 5 consecutive samples.
	Retic Reservoir Total coliforms	<1 CFU/100mL	<10 CFU/100mL	<97% of verification samples for a scheme have < 10 CFU/100 mL over 12-month reporting period.
	Retic Reservoir HPC	<100 CFU/mL	>500 CFU/100mL	HPC Investigation trigger. 4 out of 5 consecutive samples exceed 100 CFU/mL.
	End of system Total coliforms	<1 CFU/100mL	>10 CFU/100mL	<97% of verification samples for a scheme have < 10 CFU/100 mL over 12-month reporting period.

Parameter	Location	Values		
	End of system HPC	<100 CFU/mL	>500 CFU/100mL	HPC Investigation trigger. 4 out of 5 consecutive samples exceed 100 CFU/mL.

9.4 Disinfection by-products (DBPs)

We monitor DBPs as part of the VMP in locations identified as high risk of elevated DBPs. We also monitor dosing chemicals for impurities of concern in the chlorine dosing unit management process. More detail can be found in *REF423 Drinking Water Quality Monitoring Program* and *REF201 Drinking Water Rechlorination Management*.

9.4.1 DBPs – Trihalomethanes (THMs)

In networks with increased risk of THMs, we increase the frequency of THM monitoring in the VMP. We have an elevated likelihood of THMs in network locations where secondary disinfection is free chlorine, has high water age, and has variable source water quality. During the October to March period the frequency of THM monitoring increases as the likelihood of THM health criteria breach is elevated. We use a tiered responsive plan based on THM concentrations detected. Actions may involve:

- reduction of water age via flushing, reservoir operating profile changes,
- increased monitoring,
- aeration of the water column in reservoirs,
- dosing changes,
- utilisation of an alternate supply, and
- communications to stakeholders, including Queensland Health Public Health Unit (PHU).

More details of how we manage THMs can be found in *CER395 Trihalomethane (THM) Management in Drinking Water*.

We have adopted the targets developed in the PWQP 2017 and are in the process of building robust management practices to achieve and maintain leading practice. Table 9-3, an extract from the PWQP 2017, details performance targets.

Table 9-3 tTHMs performance parameters and targets as per PWQP 2017

Parameter	Location	Values		
		Leading Practice	***Monitor***	***Action***
tTHMs	WTP & KIP	<0.10 mg/L	>0.13 mg/L	>1 verification sample for a scheme has >0.16 mg/L over 12-month reporting period.
	End of system	<0.18 mg/L	>0.18 mg/L	>1 verification sample for a scheme has >0.25 mg/L over 12-month reporting period.

9.4.2 DBPs – Dosing Chemical Testing

We manage the procurement and delivery of dosing chemicals through contractual and procurement arrangements to ensure ongoing quality of product. A certificate of conformance is provided with each chemical delivery received. Routine in-house quality assurance of dosing chemicals stored at bulk transfer locations and at chlorine dosing sites is performed to assess dosing chemical strength and formation of by-products, such as chlorates. This information is stored in LIMS and is being investigated for incorporation into the dosing unit mimic page so that theoretical DPB masses introduced to the distribution system are visible to the operator. Through the VMP we monitor network chlorates at downstream locations of all dosing units. If chlorates, or other DBPs associated with the dosing chemical, are detected approaching or exceeding concentrations of concern, corrective actions will be actioned which in this case would likely be rejection and removal of the chemical from the process.

9.5 Asset Integrity

Water quality requirements are embedded in the way we approach asset management. We understand that asset design, functionality, and maintenance activities influence water quality. Two major components of operational monitoring of assets are site security and routine asset maintenance inspections.

9.5.1 Asset Integrity – Security of Assets

We have developed a Security Risk Tool to determine how our Security Capital Works program is delivered. The tool utilises several factors including security incidents, installed security devices, current security threat level, water specific threats and asset criticality to give us an overall security risk score. Two primary security initiatives we use to support operational monitoring of our assets are:

- Master keying system - all Urban Utilities sites and locks utilise a master key system in which asset keys are housed in secure cabinets and managed by the Gallagher Access control system. Gallagher allows key accessibility to be managed from a single point. Access to key types is based on competency and authorisation. The system provides enhanced security controls around how the keys are being used and is auditable.
- Human detection – We have implemented a cloud-based CCTV system with advanced technology which only detects human movement as it occurs on our sites. The cameras are positioned to detect movement around the reservoirs, entrances to huts, access ladders and reservoir hatches. Cameras are monitored in real-time and can, depending on the threat level, be responded to by police or security contractor. Cameras are also equipped with sirens which can be remotely triggered to deter trespassers and graffiti vandals. Footage is stored for 30 days and can be accessed remotely.
- SCADA Alarm Monitoring – We have alarm activated access points (stairwells, doors, reservoir hatches) which are linked to our SCADA system. The sensors detect when an access points is opened and trigger SCADA alarms notifying our Control Room Operators of a potential threat on site.

9.5.2 Asset Integrity – operational improvements program

We manage several asset-focused, operational improvement programs to ensure the quality and safety of the drinking water supply. These programs include reservoir rehabilitation, renewal of water mains, condition assessments, routine reservoir security inspections, reservoir roof flood testing, a targeted mains flushing program, and water quality modelling.

We undertake routine security inspections of reservoirs to assess general site and asset condition. Importantly, each security inspection involves assessment of the assets ability to prevent access and contamination. Asset elements such as vermin proofing, roof and gutters, hatches and electrical boxes are all inspected for ability to mitigate contaminant entry, for damage and for changes in the context of drinking water security. Inspectors conduct assessments in a manner that challenges the asset's ability to prevent vermin and stormwater run-off entry to the asset whilst assessing the general civil maintenance aspects.

In addition, we have robust asset maintenance and condition assessment programs. Every inspection performed has a component of water quality hazard identification and risk assessment. Where a water quality hazard or risk is identified a water quality representative is advised and will coordinate assessment and corrective action.

We continue to undertake a scheduled reservoir flood testing program. Flood tests involve exposing the reservoir roof structure to extreme volumes of water to simulate a 1 in 100-year rainfall event. The flood tests identify points of stormwater ingress that routine inspections may not uncover. Points of ingress are identified, fixed, and flood tested again until the ingress is prevented or reduced as much as acceptable. A final report is submitted to the asset management team with details of works performed and components used that may require a specific monitoring change. The Water Quality team uses the same report for current risk scoring.

9.6 Customer Interactions

Customer interactions regarding the quality of drinking water are captured, recorded and monitored to help identify any trends and possible areas of improvement in the operation, maintenance and management of our water networks. We investigate every customer complaint, and we have customer interaction event triggers for urgent investigations. Our approach to managing customer interactions is detailed in Section 17.

10. EVALUATION OF DATA

We utilise several mechanisms to evaluate water quality data, including across business system platforms and industry involvement.

10.1 SAS Laboratory and LIMS

The SAS Lab is at the forefront of the management of water quality data. SAS performs the water quality analysis in accordance with their NATA endorsed methodology. SAS is accountable for the quality of the water quality data that we use for evaluation. In addition to the standard quality control aspects that SAS uses under their NATA accreditation, LIMS is setup in a way that historical parameter results for a sample location is automatically trended. This enables the SAS technician or reporting delegate to quickly evaluate laboratory results and, by applying their industrial knowledge, identify if the result is not within expectations, even if it has passed laboratory quality control. This short-term data evaluation tool enables us to investigate water quality anomalies promptly.

10.2 Treatment Plant Licence Compliance System (TPLC)

All verification monitoring results are checked for compliance using the TPLC. The TPLC compliance checking module runs automatically every day to transfer finalised analyses data from the SAS Lab.

TPLC compares each finalised analytical result for compliance with the ADWG health and aesthetic criteria. When a result received by TPLC is above a trigger concentration, TPLC sends an email out to the relevant officers to alert them to the exceedance. TPLC will apply the same alerts to ADWG health

exceedances, however this is normally 12 hours after the Water Quality Officer has been notified.[33] At this time, Urban Utilities is transitioning away from TPLC to Power BI (PBI) platforms which is providing readily available insights through easier access to data and visualisation reports. The Power BI reports continue to evolve and will eventually replace TPLC as the primary drinking water quality data tool.

10.3 Enterprise Historian Platform (eDNA)

Our eDNA is the corporate platform for high frequency time series data. eDNA was introduced in 2019 to provide a platform for assessment and evaluation of multiple data sources. eDNA currently receives data from our SCADA and radio telemetry systems, Bureau of Meteorology and SAS LIMS, with more data sources to be included in the future. eDNA allows us to evaluate water quality parameters against network operating conditions. Laboratory data can be trended against the time series data of the network for resource efficient evaluation of water quality versus how the network was operating at the time of sampling. eDNA also facilitates a more detailed network oversight of water quality through the creation of:

- process mimics which are used to evaluate disinfection unit performance, or
- network mimics for geographical water quality presentation, giving the user.

Data from eDNA can be pushed into MS Excel for common usage, or the business intelligence platform to create live report dashboards.

10.4 Business Intelligence

Our Power BI platform (PBI) is the corporate platform for reporting and dashboarding business data. We are transitioning from TPLC to PBI as the primary water quality data processing tool. PBI facilitates efficient evaluation of water quality data with the ability to, for example, quickly assess a scheme, supply zone, or sample point for 12-month rolling *E. coli* compliance, against system performance metrics, and alert the user to adverse trending. Leveraging PBI, we are able to identify locations with performance issues, better inform improvement initiatives and maintain continuously updated reports and dashboards for internal and external use. Some drinking water quality Power BI reports are importing time series data from eDNA (e.g. asset and maintenance data) with ability to create a single powerful source for drinking water data appraisal. This provides opportunities to report on maintenance of disinfection systems, reservoirs and other critical assets involved in maintaining water quality, providing business wide visibility of these critical activities.

10.5 Partnership Water Quality Plan

We perform six-month rolling evaluations of water quality data collected in the VMP and report on this in accordance with our obligations under the PWQP 2017. The evaluation involves comparison of sampled locations at drinking water reservoirs and network locations in respect to targets of “leading practice, monitor, and action” and these are shared amongst the partnership group. The PWQP is a mechanism to assess how the SEQWSS partners are performing and facilitates idea sharing or system wide initiatives that may be needed to achieve objectives.

10.6 Drinking Water Quality Management Plan Report

The Drinking Water Quality Management Plan Report is prepared annually to meet legislative requirements and to demonstrate our performance with respect to drinking water quality. It also shows how we have been implementing the risk improvement actions detailed in our DWQMP.

[33] *Via SAS201 Water Quality Incident Notification Form Internal*

10.7 Customer complaints

These occur almost in real time and are used as lead indicators of potential drinking water quality issues. Customer complaints are managed as described in Section 17.

10.8 Long Term Evaluation of Results

Chapter 7 of this Plan provides information on long term evaluation of water quality data to inform identification of hazards and hazardous events for each scheme.

11. OPERATIONAL AND MAINTENANCE PROCEDURES

Operational procedures, developed along functional lines, are stored within Q-Pulse. Q-Pulse is a business application that enables us to manage:

- controlled documents (refer section 19.1),
- non-conformities and the actions to address and prevent them,
- audit programs and capture audit findings, and
- incidents (e.g. water quality incidents) and the actions to address and prevent them.

The use of Q-Pulse ensures that all documents and records are current, retrievable, protected, accessible by relevant staff and appropriately retained or disposed of in accordance with statutory requirements.

We use Q-Pulse to maintain and manage all procedures, including those related to water quality. Procedures in this system include, but are not limited to, manuals, standard operating procedures, processes, work instructions and guiding principles for drinking water treatment, distribution and delivery.

All procedures require reviewing at set intervals. When a procedure is due for review, Q-Pulse will notify the document owner and responsible manager by e-mail. *PRO103 Controlled Documents Procedure* sets out the requirements for reviewing, approving and making available the procedures to users.

Operational arrangements with external stakeholders are set out in, but not limited to the following documents:

- *Seqwater-Urban Utilities Bulk Water Supply Agreement*
- *REF209 Operating Protocol for the Logan City Council Water Service Area*
- *REF210 Operating Protocol for the Queensland Urban Utilities Water Service Area*
- *CER5 Seqwater Bulk Water Emergency Plan*
- *CER7 Urban Utilities Emergency Management Plan* and supporting plans and procedures.

We continue to build our operational maintenance procedures aligned to the 12 elements of the ADWG (Qdox D/21/983258).

12. HAZARD IDENTIFICATION AND RISK ASSESSMENT

12.1 Risk assessment methodology

Risk assessments were conducted for all 12 drinking water schemes within our service area.

The drinking water quality risk assessment is based on our Risk and Opportunity Management Framework, as documented in *PRO84 Risk and Opportunity Management Procedure.* The Framework is an enterprise wide risk management process with a governance structure and processes that are based on *AS/NZS ISO 31000 Risk Management - Principles and guidelines*.

The purpose of the drinking water quality risk assessment is to identify the hazards, hazardous events and risks associated with the water distribution system and its ability to successfully deliver safe drinking water to our customers and communities.

The approach used in the drinking water quality risk assessment differs slightly from PRO84 in that the relevant matrices have been tailored to more accurately reflect water quality scenarios. This approach is supported by Urban Utilities' Risk Services team.

12.1.1 Step 1 - Information gathering

We undertook a review of hazardous events that are pertinent to a distribution supply scheme (as is operated and managed by Urban Utilities). Hazardous events are incidents or situations that can lead to the presence of a hazard. The limiting hazard is the hazard that carries the greatest risk.

For a distribution supply, maintaining **System Integrity** is the main objective. This leads to the goal of protecting public health in relation to water quality, as per the goal of a DWQMP.

For the Urban Utilities supply system, the four (4) categories of **System Integrity** established are as follows:

1. Water quality integrity – situations that could cause a loss of water quality e.g. incoming bulk water quality, chlorine levels, temperature, water age, stagnation.
2. Physical integrity – breaks in the physical barrier of the distribution system that allow external contamination to affect water quality e.g. cross connections, backflow, pipe repairs, new installations, reservoirs.
3. Hydraulic integrity – factors that could cause a water distribution system to lose or impact upon its hydraulic integrity e.g. changes in flow and pressure fluctuations.
4. Supporting programs integrity – key relevant programs which ensure that the system will maintain water quality e.g. trained staff, qualified contractors, approved chemicals and materials, sampling and testing, customer complaint management. Cyber security, a new consideration for the DWQMP, is also captured in this category.

Although listed as discrete categories, the four categories are interrelated, and each supports the effectiveness of the others. To ensure a safe and reliable drinking water supply, all categories need to be addressed together because most water quality problems are attributable to a combination of factors.

The main supply components - bulk water, dosing, networks, and reservoirs were addressed in the risk assessment. Details are in the risk assessment (Qdox D/21/1059040).

The above approach ensures that all relevant hazardous events related to a distribution system are considered. It also helps consolidate the hazardous events and make the risk assessment process more

manageable.

Under this step, relevant hazardous events were reviewed and included under each System Integrity category. World Health Organisation guidance, regulator expectations and the ADWG were also considered.

12.1.2 Step 2 - Determine the likelihood of risk

As shown in Table 12-1, likelihood can be described as the probability or possibility of an incident occurring. Some events are rare, others are almost certain. Judgement is required to determine the possibility and frequency that the specific risk will occur.

Table 12-1 Risk assessment – likelihood matrix

Likelihood					
	Rare (1)	**Unlikely (2)**	**Possible (3)**	**Likely (4)**	**Almost certain (5)**
Definition (Qualitative estimates of probability)	Will occur in exceptional circumstances; highly unexpected event	Will occur in specific range of circumstances; surprised if it happened	Will occur in a narrow range of circumstances	Will occur in most circumstances; not surprised if it happened	Is expected to occur; almost inevitable
Probability (1-year horizon)	< 5%	5 to 10%	10 to 50%	50 to 95%	> 95%
Frequency	Less frequent than once every 20 years	Once every 10 to once every 20 years	Once every 2 to once every 10 years	Once a year to once every 2 years	More frequent than once a year

12.1.3 Step 3 – Determine the consequence of risk

Consequence, as listed in Table 12-2, can be defined as the result or outcome of an action or incident. There are five categories used to define consequence.

Table 12-2 Risk assessment – consequence categories

Consequence - the action or activities of Urban Utilities affect the health and well-being of customers and community.		
Level	**Descriptor**	**Definition**
1	Least significant	No illness expected, standard water quality complaints, no chronic health criteria exceeded.
2	Minor significance	Isolated illness or minor illness where people will recover, isolated breach of chronic health criteria.
3	Moderate significance	Localised illness, breach of chronic health criteria. Note: Localised is a single catchment or pressure zone.
4	High significance	Widespread or multiple clusters of illness with some hospitalisation of customers, repeated breach of chronic health criteria.
5	Most significant	Fatalities or widespread hospitalisation of many customers. Note: Widespread is regional, multiple catchments or pressure zones.

12.1.4 Step 4 – Determine the overall risk rating

After the **consequence** and **likelihood** ratings have been determined they are combined in a matrix to determine the overall risk rating for each risk. The magnitude of the consequences and the extent of the likelihood of risks were assessed in a range between Low and Extreme. Table 12-3 illustrates how the combination of the consequence and likelihood generates the overall risk rating.

Table 12-3 Risk score matrix

Consequence		Likelihood				
		1. Rare	2. Unlikely	3. Possible	4. Likely	5. Almost certain
	E. Most significant	Medium 12	High 17	High 21	Extreme 24	Extreme 25
	D. High significance	Medium 8	Medium 14	High 19	High 22	Extreme 23
	C. Moderate significance	Low 5	Medium 10	Medium 15	High 18	High 20
	B. Minor significance	Low 3	Low 6	Medium 9	Medium 13	High 16
	A. Least Significant	Low 1	Low 2	Low 4	Medium 7	Medium 11

12.1.5 Step 6 – Assess uncertainty

Uncertainty scores, listed in Table 12-4, were allocated to each hazard. Where uncertainty is present, a precautionary approach is adopted when rating the risk. Where required, treatment actions are identified to alleviate this uncertainty and provide better information on the performance of the system.

Table 12-4 Risk assessment – uncertainty categories

Level of uncertainty	Descriptor	Definition	Hazards
1	Confident	• Sound body of information available • Monitoring is robust • Event or hazard have happened before at our organisation or within the system	*E. coli*, disinfectant residual, pH, iron, manganese, aluminium, colour, turbidity, TDS, conductivity, THMs, nitrite, nitrate, hardness, heavy metals, bromide, fluoride
2	Estimate	• Some data available • Monitoring could be improved • Event or hazard have happened before to another organisation or industry but not yet to us	Haloacetic acids, geosmin, MIB
3	Uncertain	• No or limited data available • Ad hoc, or no monitoring in place or hazard not yet possible to monitor, even with surrogates • Event or hazard has just 'appeared on the radar'	Viruses, protozoa, opportunistic pathogens (other pathogens), toxins, pesticides, herbicides, toxic chemicals, solvents, asset related compounds e.g. plastizisers/asbestos

12.1.6 Step 6 – Evaluate the risk

The level of response, tolerability, and level of action for each risk was determined. Risk controls were balanced with the level of risk. For example, an extreme or high risk requires higher level controls. Refer Table 12-5.

Table 12-5 Risk assessment – tolerability

	Low	Medium	High	Extreme	Any risk category
Risk Tolerability	Tolerable	Conditionally Tolerable If all reasonably practical measures to treat the risk are implemented.	Conditionally Tolerable If all reasonably practical measures to treat the risk are implemented.	Intolerable	Can be tolerable or otherwise
Management Action	Monitor risk for any change	Further Treat the risk where all reasonably and practical measures to treat the risk have not been implemented, OR continue to monitor risk for any change	Further Treat the risk where all reasonably and practical measures to treat the risk have not been implemented.	Immediately Treat the risk to reduce the risk to a tolerable level. For safety risks cease the activity until the risk is reduced to a tolerable level.	Further Improve to decrease uncertainty rating, OR to ensure all controls are working effectively (e.g. from audits or spot checks)

12.2 Identification of hazards and hazardous events

12.2.1 Stakeholders

In 2019/20, Urban Utilities undertook an extensive review and redevelopment of the Risk Management Improvement Plan (RMIP). The result of that review was submitted to the Regulator and approved on 14 October 2020.

For the 2021/22 review of the DWQMP and the associated RMIP, a decision was made to confirm the status of the 2020 Risk Management Improvement Plan. This review was undertaken by Urban Utilities' water quality specialists, the Operational Standards team and the Permit Activation & Coordination Leader who is accountable for the management of water quality incidents.

This group reviewed the "hazards" or "hazardous events" that may occur within each water supply scheme and re-assessed the likelihood and potential consequences of the risk associated with each of these hazards. Where appropriate, and if the risk assessment required review, the relevant business units were consulted. In regard to Seqwater's involvement, the bulk water provider's risks are managed primarily through the Bulk Water Supply Agreement and Operating Protocols with Seqwater.

12.2.2 Hazards and hazardous events

The working group confirmed the potential hazards that may affect the quality of Urban Utilities' drinking water supply. The hazards were then assigned a System Integrity Category (Refer 12.1.1), and limiting hazard identified. The summary outcome is at Appendix B, with the detail captured in the drinking water quality risk register (Qdox D/21/1059040).

In considering the System Integrity Categories and hazards, the water distribution system hazards at each process step were also considered. Refer to Appendix C.

12.3 Determination of maximum and current risks

The maximum level of risk in an uncontrolled environment was determined using the methodology detailed in Section 12.1. Existing preventative measures and barriers currently used to control each hazard were then considered to determine the current risk.

The hazard profile is:

- No hazards with a current risk of “Extreme”, therefore immediate or urgent action is not required.
- Nine hazards with a current risk of “High”. While these are conditionally tolerable, we will be implementing additional controls to reduce the risk within a reasonable timeframe.
- Twenty-eight remain with a current risk level of “Medium”, which may require the implementation of additional controls to reduce risk within a reasonable timeframe.

The outcomes of the risk assessment are documented and detailed in the Risk Register. Proposed actions (or treatments) to reduce high current risks are also included in the Risk Register, with timeframes and accountability attached.

12.4 Risk Management Improvement Plan

We use the risk assessment process to identify the items that are essential to ensure risks to the service are lowered to acceptable levels. These items are included in the risk management improvement program (RMIP). The RMIP is considered to be a highly changeable part of the DWQMP as items will be added and removed from the RMIP as necessary (for example, new items are added when identified, and any old items can be removed when completed, or when alternate solutions have been implemented that achieve the intended outcome). The RMIP is at Appendix D.

Additional columns after the current risk rating include the proposed treatments (or improvement actions) as required, the timeframe for completion and risk owner. The risk owner is identified through internal consultation and is accountable for the completion of the treatment or action, within the required timeframe.

All water quality risks are entered into Q-Pulse (Occurrence module). The risk is reviewed and assigned to the relevant business unit which triggers an ‘investigation’ through the Investigations module in Q-Pulse. The proposed controls are added and assigned to an individual in the appropriate business unit. The risk owner, and the proposed control owner are alerted through an auto e-mail notification generated from Q-Pulse.

The coordination of the DWQMP RMIP was transferred to a new DWQMP Coordinator in late-2021. As a result, the governance arrangements are being reviewed.

Annually, the DWQMP Coordinator collates information from the individual risk owners on the progress and completion of the actions. The progress on all actions is then reported in our *Drinking Water Quality Management Plan Report*.

13. PROTECTIVE SECURITY

As a critical infrastructure[34] owner operator and essential service provider, it is critical that we have a robust approach to the management of security risks. Our Protective Security framework outlines the governance arrangements for the management of security risks to people, infrastructure, operations, information and our customers and stakeholders.

We regularly assess the security risks, threats, and vulnerabilities to all elements of its business which includes the management of People, Physical and Information/Cyber security risks that relate to water quality.

These risk assessments identified a series of security improvements that are being addressed through investment programs and improvement projects, as we continue to progress towards an ideal level of maturity for our security controls. These are prioritised through a risk-based approach to implement controls and target investment. One of the highest priorities for the implementation of security improvements relates to water quality and product safety.

13.1 Physical security

Physical security controls are implemented across our water networks to aid water quality management and reduce the likelihood of intentional or malicious attacks that breach water quality parameters. These controls aim to prevent, deter, detect and/or delay unauthorised access to our water network, infrastructure and supporting systems.

Controls include physical barriers, physical and electronic access control, security detection devices and supporting monitoring and responsive services.

13.2 People security

While less direct, people security controls are implemented to minimise risk of unauthorised access to restricted areas, infrastructure or systems and minimise the risk of actors with malicious intent, gaining access to Urban Utilities employment, workplaces and systems.

Controls include employment screening, security awareness training/exercises and regular staff engagement to improve awareness of security risks and build a strong security culture.

13.3 Cyber Security

Cyber security controls are implemented to minimise risk of ICT service/system disruption through the unintentional/accidental misuse or direct/malicious cyber-attack against our ICT systems. As this is an ever present and evolving risk environment for organisations like Urban Utilities, there has been a series of detailed assessments into cyber security risk in both the Information Technology (IT) and Operational Technology (OT) environments. These assessments have been used to shape a multi-year program of work focused on risk mitigations and control improvements.

As the program of work is implemented, we will continue to improve our ability to detect and prevent most potential cyber-attacks and limit the impact of those that do eventuate. While this implementation substantially reduces cyber risk, it will not eliminate it. This program of work provides a solid foundation, but cyber threat management is an iterative process, and reaching an ideal state requires continued focus.

[34] Those physical facilities, supply chains, information technologies and communication networks which, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact the social or economic wellbeing of Queensland and / or Australia by impeding continuity of essential services (refer POL88 Protective Security Policy).

We have implemented an Information Security Management System (ISMS) aligned to *ISO/IEC 27001 Information Security Management*, which applies to both IT and OT environments. The development of the ISMS is based on a detailed cyber security risk and vulnerability assessment and builds upon previous cyber security risk assessments in both IT and OT environments.

To support the continuity of business operations in response to a major cyber related incident if it eventuates, we have developed *TCP9 Cyber Security Emergency Management Sub Plan*. This plan supports our corporate Emergency Management Framework and outlines the key preparedness and response triggers and actions to support the business manage the impacts on any potential cyber security-related event.

Finally, cyber security is fully integrated into our Protective Security Framework (along with physical and personnel security), allowing us to maintain a strong approach to security controls that minimise risk to water quality and customer service.

14. INCIDENT AND EMERGENCY MANAGEMENT

14.1 Emergency Management Framework and Plan

Incident and emergency management is governed by our Emergency Management Framework, underpinned by *CER7 Emergency Management Plan* (EMP).

The EMP outlines the monitoring, preparatory and responsive actions we undertake for a potential/actual event, including:

- threat monitoring and assessment,
- assessment of event severity,
- notification, activation and escalation of an incident/emergency,
- command and control structure, providing guidance on actions, accountabilities, roles and responsibilities during an incident/emergency,
- facilitation of recovery operations in a timely and orderly manner, and
- facilitation of lessons learnt as part of continuous improvement and resilience building.

This EMP is intentionally flexible to allow adaption across a broad range of potential deviations from normal business, by utilising an 'All Hazards Approach' to event management; this includes both the management of operational events and corporate events.

14.2 Identify and assess event severity

The classification of an event provides an indication of its potential consequence and the severity or the impact that has eventuated or has the potential to eventuate. The severity of the event will determine the potential response activities required, outside of normal operating procedures. For more information refer Appendix E.

For drinking water quality and/or water supply incidents, where Seqwater and at least one of the SEQ service providers are impacted, Seqwater will work under the incident severity classifications, outlined in Appendix F.

14.3 Water quality incidents

We have established dedicated processes for threat monitoring and assessment that provides consultative analysis of pending or approaching threats. This enables early warning and planning

activities to occur that will support a more effective incident/event response. The loss of water quality is an operational event threat type that we monitor on a regular basis.

A water quality incident may include:

- any exceedance of the quality limits in Section 52 of the P*ublic Health Regulation 2018*, specifically the detection of *E. coli*;
- detection of a pathogen,
- detection of fluoride greater than 1.5mg/L,
- detection of radiologicals that exceeds gross alpha and gross beta screening values in the ADWG,
- detection of a parameter for which there is no guideline value in the ADWG,
- an event or series of events that has the potential to compromise the ability to adequately treat or provide drinking water,
- notification from Seqwater of an incident under the Operating Protocol, or
- multiple customer aesthetic water quality complaints which appear to be connected.

14.3.1 Water quality incident/emergency management

We investigate water quality events arising from drinking water monitoring, bulk water supply notifications, escalated consumer complaints or other issues having the potential to impact supply integrity. All incidents or notifications of significant events are investigated through a process of desktop investigation into planned/responsive work, asset condition reports, and historical laboratory data and may lead to corrective actions such as flushing, diver inspections, temporary/permanent rectification work and likely water quality sampling.

All notifiable incidents, such as an ADWG health limit breach, are reported to the Regulator, and notification will be sent to all internal stakeholders detailing type of incident, location, and immediate corrective actions.

We choose to manage issues based on the level of resources required. To guide this, we have developed a series of threat specific Emergency Management Sub Plans that relate to water quality events as follows:

- *TCP6 Drinking Water Contamination Emergency Management Sub Plan*, and
- *TCP14 Water Quality Event Emergency Management Sub Plan*.

Table 14-1 outlines the pre-agreed triggers and actions to be carried out as water quality events transition from BAU management by the Operations & Maintenance Planning team into the Emergency Management Framework. For example, a single *E. coli* detection in the presence of enough chlorine may be managed by a subject matter expert (SME), field and laboratory staff. If, however, at the outset or following initial investigations, the *E. coli* is detected or suspected to arisen following a significant event and a larger incident team is required to manage the response, we may choose to activate an IMT/EMT. We may also decide to raise an incident if it is deemed necessary to utilise resources to manage and event or emerging issue, even though no public health impact has been detected.

These plans are also supported by a suite of service disruption and network asset contingency plans that assist in rapid assessment and action for managing changes to the network or asset isolation during water quality events. These plans aim to assist with rapidly containing water quality risks when

detected and minimising service disruptions to the customers.

Table 14-1 Our drinking water quality event triggers

Stage	Trigger/s
Watching Brief (Alert)	• Bureau of Meteorology (BoM) issues a severe weather alert requiring a review of water quality risk management controls for known vulnerable areas of the network.
Preparedness (Lean Forward)	• Notification from Seqwater regarding a water treatment plant failure in which HACCP[35] limits may have been breached. • Initial *E. coli* is detected, or a chemical parameter exceeds the maximum allowable concentration. • An event that will or is likely to adversely affect drinking water quality. • Urban Utilities receives 10 or more related ADWG aesthetic based complaints within any 24-hour period[36] within a local service area. For example, the complaints are potentially linked by a network node, such as reservoir, PRV, work order or trunk main.
Operational Incident Response	• An event in which Water Quality Officer (WQO) has assessed initial mitigation actions for an event may fail and require significant resources to resolve or the event may be prolonged.
Tactical Incident Response (IMT)	• Water treatment plant failure with prolonged aesthetic impacts to customers. • *E. coli* or a chemical parameter exceeds the maximum allowable concentration is detected in repeat sample and rezoning is not possible. • Responsive sampling has detected the continued exceedance of ADWG health values. • Multiple zones are exhibiting an initial detection of water quality parameters exceeding ADWG health-based limits during routine sampling.
Organisational Wide Emergency Response (EMT)	• Major impact for a population above 10,000 persons, or systems significantly compromised, and operation ceased or abnormal. • Suspected public health risk caused by excessive chemical/water contamination and/or suspected outbreak of a water borne disease. • Queensland Health has issued a Water Quality Advisory directive to Urban Utilities. • Repeated exceedences of a chronic health guideline where Queensland Health determines there may be/is a risk to public health.

14.3.2 Water quality incident/emergency management steps

Table 14-2 outlines our emergency management steps specific to drinking water quality.

Table 14-2 Our emergency management steps

Step	Description	Details
1	Identify and Assess Incident Severity	The EMP outlines an escalation process following the notification and assessment of incident severity. This escalation includes an alert level for potable water incidents.

[35] HACCP – Hazard analysis and critical control points

[36] In accordance with *REF210 Operating Protocol for Urban Utilities Service Area*

Step	Description	Details
		For water quality issues arising from the source water, Seqwater is required to notify Urban Utilities of any known water quality incident or events which may lead to an incident under the Operating Protocols and *CER5 Seqwater Emergency Response Plan*. Seqwater will coordinate response and recovery actions including incident reporting for water quality events broader than the Urban Utilities service region.
2	Notify, Escalate and Activate	The EMP outlines the Notification, Escalation and Activation Structure for business hours and after hours (fulfilled by a Duty Water Quality Officer). The EMP is further supported by *PRO93 Water Quality Incident Reporting, Investigation and Corrective Action Procedure* outlining the responsibility for identifying the triggers for escalation in support of a continuous risk assessment process and notification requirements. Following a detection of a drinking water quality exceedance Urban Utilities is required to immediately notify (within three hours) the Queensland Water Supply Regulator under section 102 of the *Water Supply (Safety and Reliability) Act 2008* (a Notice of Non-compliance).
3	Establish Command & Control	The type and severity of the incident indicates the relevant Command and Control structure required to achieve the response and recovery objectives. The structure is outlined in the EMP which consists of skilled personnel supporting the elements of planning, operations, logistics, communications, customer and stakeholder management.
4	Manage the response	Once the relevant command and control structure is activated, key responsive actions are undertaken as per the EMP. **Communication** Based on the level of incident assessment, varying levels of internal and external communications are required to ensure stakeholder awareness of the incident and key responsibilities for communications activities are set. For water quality events involving one or more water service providers, DRDMW's Department Emergency Communications Arrangement Plan (DECAP) outlines key principles and actions to assist in the effective management of an event that involves one or more water providers. **Situation Reports** During an event, situation reports are distributed to internal and external stakeholders as outlined in the Urban Utilities EMP as a record of key decisions and actions.
5	Manage recovery	When there is no longer a requirement to respond to the event and the threat is no longer present, Urban Utilities undertakes recovery actions as per *PRO447 Recovery Planning Procedure*.
6	Improvement actions	At the conclusion of all declared incidents or emergencies, a formal post event review process is carried out to determine

Step	Description	Details
		lessons learnt from the event. This process focuses on the identification of key lessons and corrective actions, to support the continued improvement of Urban Utilities' preventive controls and emergency manage response capabilities. All water quality incidents are investigated to determine the cause of the water quality exceedance and address any systemic issues as per *WI93 Water Quality Investigation Work Instruction*. All incidents are analysed to ensure risk registers are accurate and relevant improvements are included as part of the continual improvement process. As required, the outcomes of the investigations and resolutions for a reportable water quality incident, should be reported to the Regulator.

14.3.3 Communication process for water quality incidents/emergencies

Urban Utilities operates a geographically large 24-hour business and recognises that incidents, which put at risk the quality of water supplied to customers can generate from many areas. An effective communication protocol for these events is necessary to ensure effective escalation and actioning.

The procedure *PRO93: Drinking Water Quality – Incident Reporting, Investigation & Corrective Actions* outlines the communication process used by Urban Utilities during water quality incidents.

Incidents and emergencies are managed through an Emergency Management System (EMS) called Guardian IMS. The EMS is a web-based system that provides all the tools required to manage an incident including running logs, situation report development, workflows to support decision making and a powerful communications tool. The EMS assist in providing real time situation awareness and informs timeless and effective emergency management decisions.

Following investigation and resolution of the incident, and removal of immediate threat, medium and long-term corrective and preventative actions are logged within Q-Pulse for ongoing management.

15. REVIEW OF WATER QUALITY INCIDENTS

The Water Supply Act requires water service providers to report and investigate water quality incidents[37]. Incidents are triggered by a laboratory result, which exceeds the ADWG guideline value, detection of a parameter for which no ADWG value exists or an event which may affect water quality or cause difficulty in adequately treating or supplying safe drinking water. These include detection of *E. coli,* pathogens, health-related chemical parameters, fluoride greater than 1.5mg/L, radiological compounds and events. Examples of events are floods, bushfire, equipment or infrastructure failure or malfunction, contamination of water, terrorism or natural disaster.

[37] A summary of water quality incidents is included in the annual *Drinking Water Quality Management Plan Report*.

15.1 Water quality incidents – observations

In summary, from 1 July 2012 to 30 June 2021[38]:

- 77% of all water quality incidents involved the detection of *E. coli*.,
- 12% of all water quality incidents were due to a chemical exceedance,
- 10% of all water quality incidents involved a THM exceedance,
- 2% of all water quality incidents were due to an event falling outside of an exceedance of the ADWG health guidelines and/or the relevant Public Health Act[39],
- *E. coli* detections and chemical exceedances were most prevalent in the SEQWSS, this is because of the size and complexity of the scheme, and
- THM exceedances have varied since 1 July 2012, with all incidents occurring in our free chlorine schemes.

15.1.1 *E. coli* detections

E. coli incidents from 1 July 2012 to 30 June 2021 demonstrated a declining trend, except for the 2017/18 financial year, which showed a slight increase in water quality incidents from the previous years. During 2020/21, the SEQWSS recorded its highest number of *E. coli* detections historically, forming 69% of the reported water quality incidents for 2020/21.

The SEQWSS result for 2017/18 generated a collaborative response between the SEQ grid partners to conduct a trial for increased chlorine from Seqwater's SEQWSS treatment processes. This trial occurred during the summer period with the objective to minimise *E. coli* detections within the SEQWSS. Initially, the increased chlorine trial occurred over the 2018/19 and 2019/20 summer periods. However, the trial did not meet key success measures and it is unlikely future trials will be conducted.

From 1 July 2012 to 30 June 2021, the SEQWSS recorded 73 detections (72% of the total *E. coli* detections).

15.1.2 Chemical exceedances

Generally, the water quality incidents involving chemical exceedances of the ADWG has decreased since 2012. Lead and chlorine exceedances decreased due to replacement of corroded sampling taps and better control of chlorine dosing. On the other hand, manganese exceedances have increased. Manganese was detected above the ADWG value in 44% of the total reported chemical exceedances (6.5% of all water quality incidents), with most detections in SEQWSS.

15.1.3 THM exceedances

In summary:

- Schemes sourcing water from either the Logan (Kooralbyn, Rathdowney, and Beaudesert) or Brisbane (Lowood, Somerset Township and Esk-Toogoolawah) Rivers seem more vulnerable to elevated THMs.
- THMs peak seasonally from November to February for schemes taking water from the Logan River whilst schemes taking water from the Brisbane River peak between December and March.

[38] Percentages may not add to 100% due to rounding.
[39] The two events occurred in 2012/13 and 2013/14.

- Chloramination in the SEQWSS (Brisbane and Ipswich) generally limits the formation disinfection by-products but does not entirely prevent them forming.

THMs are an identified risk in all 12 drinking water schemes. The locations in the schemes with the greatest likelihood of a THM exceedance are those that are free chlorinated, have high water age and require additional chlorine dosing to maintain disinfection targets. In these locations, THMs are managed to mitigate THM ADWG health criteria breaches through CER395 *Urban Utilities THM Management Plan*. The plan uses three THM concentration ranges as triggers for action; applying a combination of operational responses that include disinfection dosing changes, water displacement (flushing), aeration of storages (stripping), and increased sampling.

Our highest risk locations are:

- Beaudesert Supply Scheme – has a population of 7000 and has a history of THM exceedances (2015 and 2017). At the heart of the scheme is Birnam Range reservoir in which water age is excessive requiring additional chlorine dosing. Beaudesert consistently records 95th percentiles statistic approaching the ADWG criterion i.e. between 200ug/L and 250ug/L.

- Six Mile Creek Road, Postmans Ridge Supply Zone, Lowood Supply Scheme – the sample point in this supply zone is at the most disadvantaged location, a 1.3km main supplying six rural properties. The main is fed from the reservoir and has had additional chlorine dosing upstream at Helidon reservoir.

- Tabletop Supply Zone, Withcott, Lowood Supply Scheme – this small supply zone, with a population of 110, is at the very end of the Lowood drinking water scheme receiving water from Tabletop reservoir. The water in the supply zone is dosed three times (Helidon, Dolleys Road, and Tabletop) and has high water age. Catchment source quality and management as well as the treatment process have an immense influence on drinking water THMs in the distribution network. These are beyond our authority and rely on protocols and joint plans with Seqwater. It must be noted that network THM spikes do occur in our schemes can be related to changes in source water after and during environmental events (i.e. typically rainfall events). THM spikes after specific rain events have occurred in our schemes in the Lake Wivenhoe/Brisbane and Logan River catchments in 2017/18. In addition, changing source water quality due to onset of drought conditions is resulting in Jimna experiencing higher than historical norm THM averages. We continue to work with Seqwater on data sharing, WTP operational changes during events and long-term treatment improvements to manage elevated THM concentrations of the supply schemes.

15.1.4 'Other' exceedances

Historically, two events were reported from 1 July 2012 to 30 June 2019, one occurred in February 2013 as the result of elevated turbidity levels from the Linville WTP, and the other in November 2013 as a result of dead vermin detected in a reservoir. No uncontrolled or unforeseen events resulting in a water quality incident have been reported since 2013.

15.2 Water quality incidents – all schemes

Table 15-1,

Table 15-2, and Table 15-3, and the corresponding graphs, provide a snapshot of the number of water quality incidents that have occurred in our service area from 1 July 2012 to 30 June 2019.

Table 15-1 Total water quality incidents by type - 1 July 2012 to 30 June 2021

Exceedance type	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	TOTAL
E. coli	11	15	16	10	10	14	5	7	13	101
Chemical	4	5	2	3	1	0	1	0	0	16
THM	3	1	0	1	0	3	0	2	3	13
Other	1	1	0	0	0	0	0	0	0	2
Total	**19**	**22**	**18**	**14**	**11**	**17**	**6**	**9**	**16**	**132**

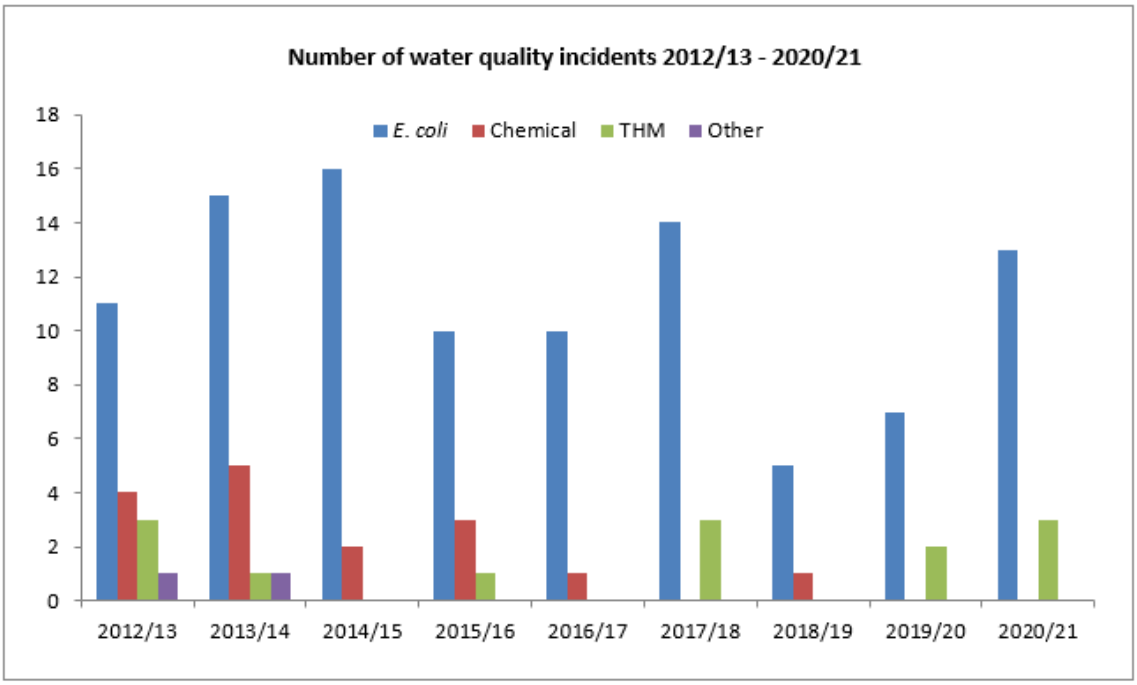


Figure 15-1 Number of water quality incidents by type - 1 July 2012 to 30 June 2021

Table 15-2 Water quality incidents by scheme and type - 1 July 2012 to 30 June 2021

Supply Scheme	*E. coli*	Chemical	THM	Other	Total
Beaudesert	1	1	4	0	6
Boonah-Kalbar	2	0	0	0	2
Canungra	2	0	0	0	2
Esk-Toogoolawah	1	0	1	0	2
Jimna	1	0	1	0	2
Kilcoy	1	0	1	0	2
Kooralbyn	1	0	2	1	4
Linville	0	0	0	1	1
Lowood	17	3	3	0	23
Rathdowney	1	0	0	0	1
Somerset	1	0	1	0	2
SEQWSS	73	12	0	0	85
Total	**101**	**16**	**13**	**2**	**132**

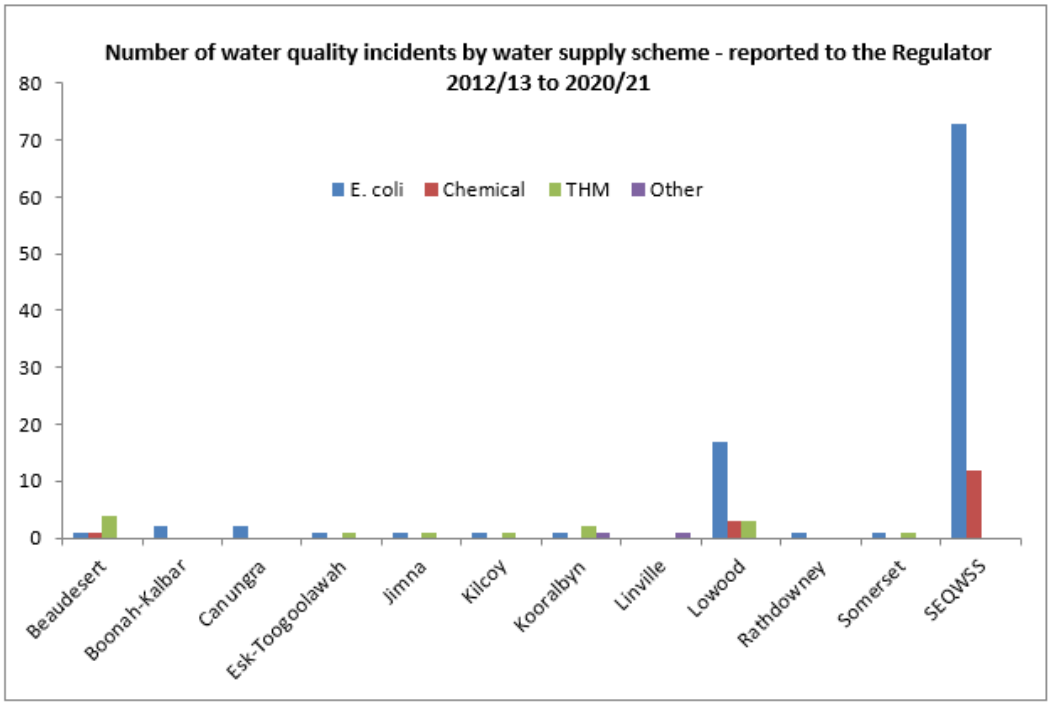


Figure 15-2 Number of water quality incidents by scheme and type - 1 July 2013 to 30 June 2021

Table 15-3 Number of water quality incidents by type SEQWSS - 1 July 2013 to 30 June 2021

Exceedance type	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	TOTAL
E. coli	9	6	11	7	7	12	5	5	11	73
Chlorine		1								1
Lead	2	1	2							5
Manganese	2	2			1		1			6
Other		1						2	0	3
Total	**13**	**11**	**13**	**7**	**8**	**12**	**6**	**7**	**11**	**88**

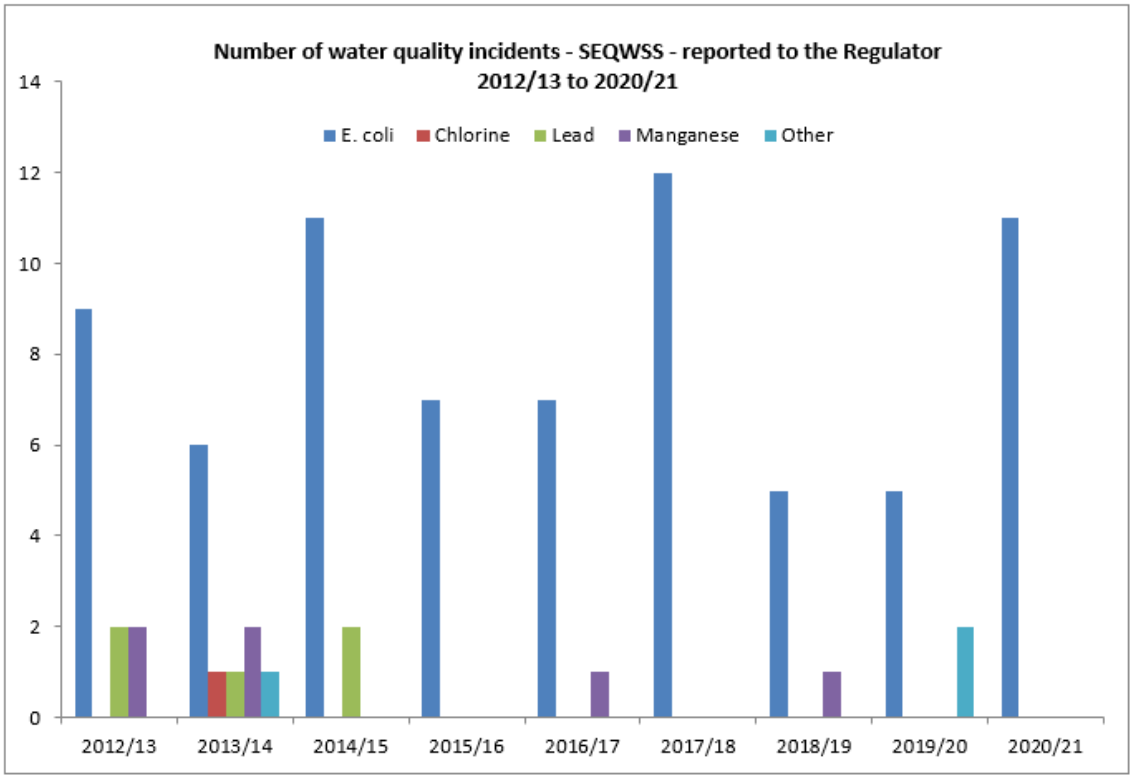


Figure 15-3 Water quality incidents SEQWSS by type - 1 July 2012 to 30 June 2021

16. DEMONSTRATING CONTINUING CARE FOR OUR COMMUNITIES

The DWQMP demonstrates our constant care for our communities and commitment to always deliver on our core business - safe drinking water. We demonstrate this commitment through:

- our Drinking Water Quality Policy,
- interactions with our communities,
- the maturing of our employee training and awareness programs,
- research and development,
- innovation, and
- focus on continuous improvement.

16.1 Drinking Water Quality Policy

POL38 Drinking Water Quality Policy underpins our commitment to the effective management of drinking water and the associated distribution system to provide responsible, safe and sustainable drinking water that meets the evolving needs of our customers, shareholders and communities. The policy is available on our intranet and is accessible to the public via our website.

16.2 Interaction with our communities

16.2.1 Forums

Our strategic direction is underpinned by our commitment to customer-centricity; every decision we make is considered through the lens of the customer. Community consultation is undertaken via public discussion documents, public forums, and through the groups/forums described below.

Table 16-1 Our customer focused forums

Group/Forum	Purpose
Developer Services (DS) - Commercial Customer Group	This team delivers high quality services for our development industry customers for connection, disconnection or alteration of water and sewerage infrastructure to new or existing properties. DS connects with customers through Developer Connect, a quarterly update covering development policy changes, process improvements, news and events. On an as required basis, the team also hosts: • development industry breakfasts, • endorsed consultant forums, • contractor forums
Customer and Community Reference Group (CCRG)	As part of our broader approach to engaging with customers and the communities Urban Utilities live and work in, we formed a CCRG to gain feedback and explore opportunities on a range of water and sewerage related issues. The CCRG consists of up to 10 members from a range sectors and meets quarterly.

16.2.2 Raising community awareness

We recognise that our customers may experience localised issues with the quality of their drinking water. In response, we provide information on our website regarding common drinking water quality issues and some simple tests that our customers can perform to help identify possible causes, and potential solutions. These issues include:

- appearance,
- fish keeping,
- sickness and irritation,
- taste and odour, and
- water hardness.

The Customer & Community team develops specialised communications for customers reliant on appropriate water quality. This includes commercial customers, and customers with special needs such as at-home patients using dialysis.

We continue to promote Turn-to-Tap encouraging our customers and communities to drink tap water. We underpin this campaign by informing our customers that our drinking water supply is subjected to over 10,000 tests each month to ensure it meets the ADWG.

We also engage with our customers and communities through *In the Pipeline*, a quarterly newsletter that accompanies the quarterly water and sewerage account.

In addition, our *Drinking Water Quality Management Report* showcases our performance with respect to drinking water quality and demonstrates how we have been implementing actions detailed in our DWQMP. This report is available on our website, and at the corporate head office.

16.3 Employee training and awareness

16.3.1 Training and competency

Under s104 of the Water Supply Act, the Regulator can prescribe the minimum qualifications or experience necessary for an operator of a drinking water service. At the time of preparing this Plan, the Regulator has not mandated competencies. Nevertheless, the employment of qualified or suitably experienced operators is best practice and our priority.

We recognise the actions of operators (employees and contractors) who interact with our water distribution network can have a direct impact on the quality of the drinking water provided to consumers. We ensure that operators:

- have the skills and knowledge to manage drinking water quality, and
- can identify and respond to water quality hazards and incidents, and
- can ensure the protection of consumers.

Knowledge, skills and competencies will also be attained through various methods, including:

- face-to-face training (classroom and in-field),
- online awareness/training packages,
- recognised prior learning, and
- verification of competency.

As required, our employees are trained in procedures relevant to their role, and it is the responsibility of employees, and in particular team leaders/managers, to ensure that the procedures are understood and implemented.

16.3.2 Employee awareness

Drinking water quality information is contained in several documents which employees can access via our intranet (TAP):

- Drinking Water Quality Policy,
- Drinking Water Quality Management Plan,
- Drinking Water Quality Management Plan Report,
- Urban Utilities Annual Report.

We also use a variety of communication methods to raise employee awareness, discuss new procedures, and address drinking water quality issues, including:

- employee inductions,
- toolbox talks,
- team meetings,
- education sessions, for example cauldrons, and

- UrbanPeople (employee newsletter).

16.4 Research and development

We recognise that our capacity to create new knowledge, find new ways of doing business and transform great ideas into great results is essential to maintaining a modern and sustainable business. We use innovation as a catalyst to adapt to changes in our environment. Our research and development (R&D) strategy ensures the relationship between science, economic, social and other inputs are embedded into the decision-making process.

We continue to build our program of investigative studies targeting focus areas regarding water quality monitoring, dosing and enhanced product and reliability. These investigations will continue to complement the current research and monitoring conducted daily as part of the continual improvement program embedded into the existing drinking water quality continual improvement programs.

The aim of these programs is to mature our understanding of each water supply scheme, to identify and characterise potential hazards, and to further enhance the current knowledge base. Improved understanding of the factors affecting drinking water quality characteristics allows us to anticipate when potential drinking water quality issues may occur, and how best to respond in a prudent and effective way based on the most current water industry information that is available at the time. Tools and methods include:

- Conducting systematic reviews of baseline monitoring of drinking water quality to understand the changes to drinking water quality during distribution; to identify emerging problems and trends and to assist in determining priorities for improving drinking water quality.
- Undertaking sampling and chemical analysis for new measurements of concern.
- Trialling in-line monitoring equipment to improve the management of drinking water quality.
- Undertaking event-based monitoring to determine the magnitude of events on the quality of drinking water supplied to customers.
- Reviewing the long-term trends and nature of water quality contacts we receive to identify rising concerns by customers about water quality.
- Undertaking modelling and full-scale studies to investigate ways to improve mixing of water storages and reservoirs.
- Investigating water quality issues to improve understanding of the loss of chlorine residual during disinfection using chloramination.
- Using hydraulic and water quality models to estimate water age throughout the distribution system so that water age is minimised, and disinfection is optimised.
- Participating in grid partners' research and development activities by providing information and data as requested.
- Developing strategic partnerships, networks and collaborations with research providers such as Water Services Association Australia (WSAA), Water Environment Research Foundation (WERF) and American Water Works Association Research Foundation (AWWARF).
- Maturing our strategic relationship with WaterStart, a Nevada-based company that brings global leaders together to accelerate water technology, research and expertise.
- Attending relevant conferences and seminars.

- Setting up alerts and key word searches using Elsevier Sci Verse ScienceDirect web-based services (http://www.sciencedirect.com/) to maintain awareness of emerging technologies and industry best practice.

To keep abreast of emerging issues at the national and local levels, we actively participate in:

- WSAA – Water Quality and Health network. The objective of the network is to identify, discuss and collaborate on water quality and health policy and research within the context of the vision for urban water services, and
- the South East Queensland Water Quality forum.

17. CUSTOMER SATISFACTION

17.1 Customer Service Standards

The drinking water quality customer service standards, as show in Table 17-1, are published in our Residential and Business Customer Charters. These service standards are linked to key performance indicators, as shown in Table 17-2.

Table 17-1 Customer Service Standard for drinking water quality

Commitment	Urban Utilities will supply you with safe and clean drinking water.
Standard	Safe and clean drinking water that continually complies with *Australian Drinking Water Guidelines*.
Standard	Less than or equal to six water quality complaints per 1,000 properties per year.

Table 17-2 Key performance indicators linked to the service standards

Key Performance Indicator
Quality of drinking water supplied to customers (number of water quality incidents reported to the Regulator) amended on 1 July 2021 to 'Quality of drinking water supplied to customers *(% compliance)'*
Water Supply Scheme chemical compliance with the ADWG health limits (12/12 schemes)
Water Supply Scheme bacteriological compliance with the *Public Health Act 2005* (12/12 schemes)
Water Supply Scheme chemical compliance with the *Public Health Act 2005* (8[40] of 12 schemes)
Water quality complaints per 1,000 properties[41]

17.2 Assessing customer satisfaction

We use two processes to assess customer satisfaction: water quality complaints received from our customers, and complaints received via dispute resolution bodies such as the Energy and Water Ombudsman Queensland (EWOQ), the Queensland Ombudsman (QO) and the Queensland Civil and Administrative Tribunal (QCAT). The EWOQ, QO and QCAT provide independent avenues for review of our decisions or actions and resolving customer complaints.

[40] This measure is related to fluoride. Low levels of fluoride occur naturally in many water sources. Fluoride is also added to drinking water in many parts of the world, including South East Queensland, to help reduce tooth decay. Seqwater's fluoridation protocol impacts eight of our twelve water supply schemes. For this reason, Urban Utilities are required to test for fluoride in these eight schemes - Beaudesert, Boonah-Kalbar, Canungra, Esk-Toogoolawah, Kilcoy, Kooralbyn, Lowood, and the SEQWSS.

[41] Results are reported in the Urban Utilities Annual Report, Annual Performance Report and Drinking Water Quality Management Plan Report. All are available on Urban Utilities' website and for viewing at our corporate reception.

17.3 Customer complaints handling

We recognise that community engagement is an integral component of the planning for, and delivery of, service excellence. We recognise that customers or members of the community may need to provide feedback if a service or product fails to meet their expectations or our standards. This feedback is captured, recorded and monitored to help identify any trends and possible areas of improvement in the operation, maintenance and management of our water networks. This commitment is a key component of our continued pursuit of innovative ways of doing business, and our transformation into a customer-centric organisation.

Customers can lodge a complaint:

- over the telephone,
- via the online enquiry form,
- in writing,
- in person in the field, or
- at our corporate reception.

We are committed to treating complaints promptly, fairly, equitably, confidentially and professionally, in accordance with the *South East Queensland Customer Water and Wastewater Code* issued by the Regulator. Complaints are accepted and managed with a view to improving our services, products, decisions and actions to increase satisfaction for our customers.

POL74 Complaints Management Policy is published on our website, and our employees are guided by *MAN85 Complaints Management Framework*[42].

17.4 Water quality complaints

Water quality complaints are categorised as:

- discoloured water,
- taste/odour,
- stained washing,
- air,
- illness, and
- other.

While we receive various water quality enquiries throughout the year, a 'water quality complaint' is registered when a person contacts us and expresses dissatisfaction regarding the quality of our drinking water. This includes water quality complaints resulting from our own operational practices.

We receive, acknowledge, investigate, direct remedial action and respond to complaints promptly. Where a response and/or remedy can be provided immediately, our employees and management provide the information to, or take the necessary action for, the complainant and close the complaint if the customer is satisfied with the remedy or explanation. We record the details of all complaints. Water quality investigations are conducted in accordance with *SJP8 Investigating Water Quality Complaints Standard Job Procedure*.

[42] Compliant with AS ISO 10002-2014 Guidelines for complaint management in organizations

Customer complaints are analysed regularly and, where appropriate, actions (such as flushing, mains renewal, etc.) are taken to improve drinking water quality and reduce the number of customer complaints. Event-based sampling may also be initiated.

17.5 Water quality complaints performance 1 July 2014 to 30 June 2021

17.5.1 Total water quality complaints

Over the reporting period, as shown in Figure 17-1, we received 5,824 water quality complaints.

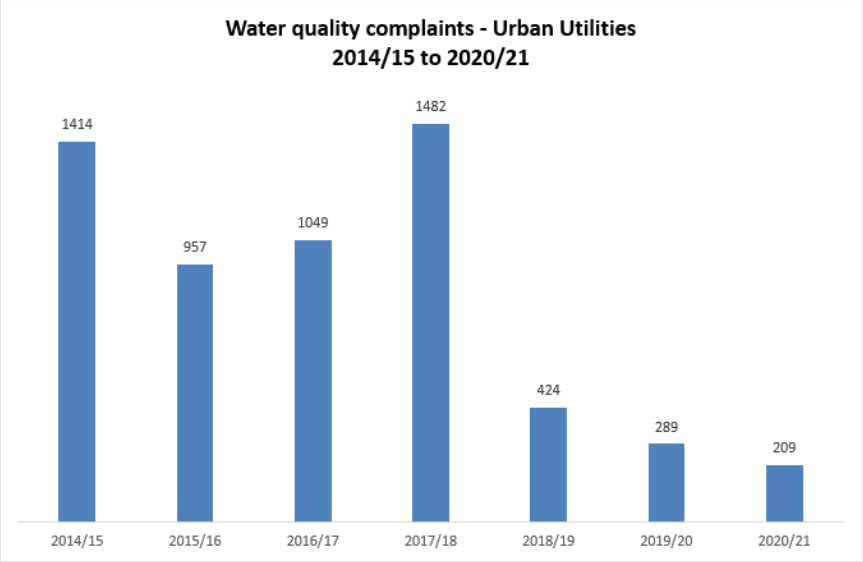


Figure 17-1 Total water quality complaints – 1 July 2014 to 30 June 2021

The decrease in water quality complaints in 2018/19 is, in part, attributable to the new reporting regime introduced on 1 July 2018. The change to the way we classified and reported water quality complaints ensures alignment with the *Australian/International Standard 10002-2006 Customer satisfaction – guidelines for complaints handling in organizations*, and consistency with other water utilities. The change to the methodology was foreshadowed in our *2017/18 Drinking Water Quality Management Plan Report* and reported in our *2018/19 Drinking Water Quality Management Plan Report*.

While this change in reporting resulted in a decrease in the reported water quality complaints, it does not change our commitment to investigate instances where our service or product fails to meet customer expectations or our service standards. We value all customer feedback as it helps to identify any trends and possible areas of improvement in the operation, maintenance and management of our water networks.

17.5.2 Total water quality complaints by local government area

Table 17-3 shows the breakdown of total water complaints by local government area.

Table 17-3 Total water quality complaints by local government area – 1 July 2014 to 30 June 2019

Local Government Area	Number of complaints	Percentage of total complaints	Percentage of population
Brisbane City Council	4601	79%	83%
Ipswich City Council	771	13%	13%
Lockyer Valley Regional Council	161	3%	2%
Scenic Rim Regional Council	122	2%	1%
Somerset Regional Council	169	3%	1%

Figure 17-2, Figure 17-3, Figure 17-4, Figure 17-5, and Figure 17-6 show the total water complaints for each local government area for the reporting period.

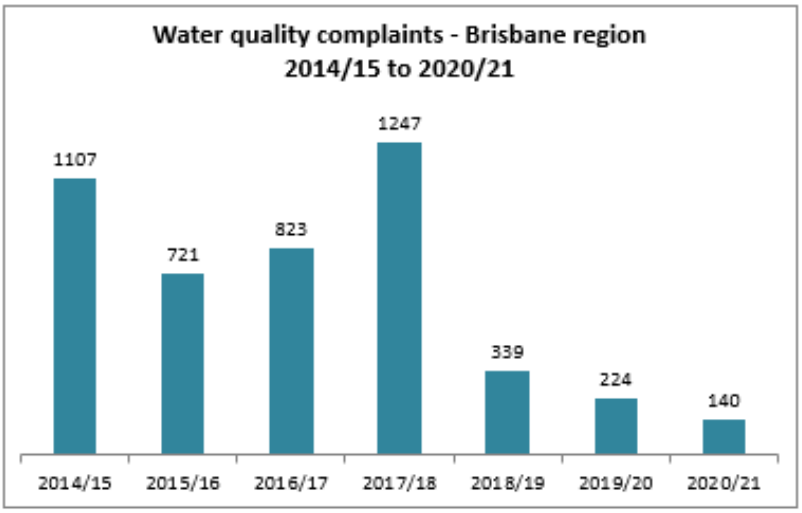


Figure 17-2 Brisbane region water quality complaints – 1 July 2014 to 30 June 2021

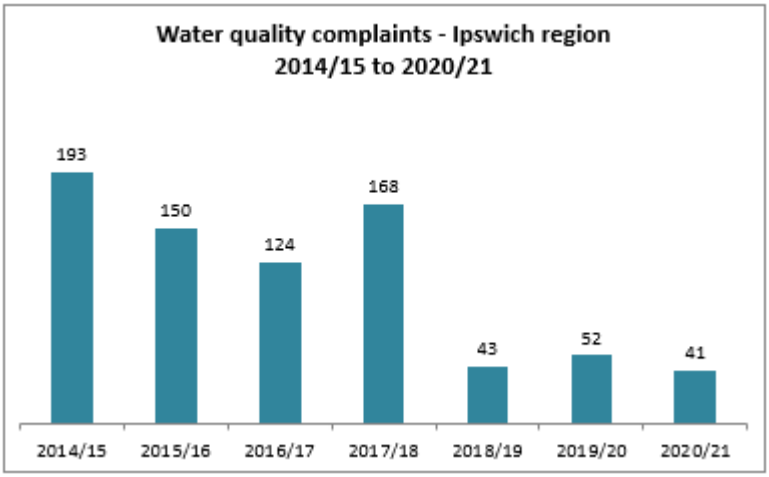


Figure 17-3 Ipswich region water quality complaints – 1 July 2014 to 30 June 2021

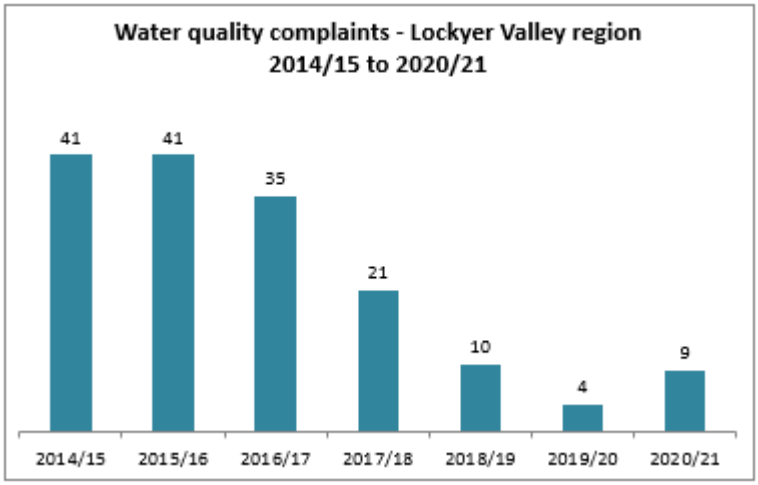


Figure 17-4 Lockyer Valley region water quality complaints – 1 July 2014 to 30 June 2021

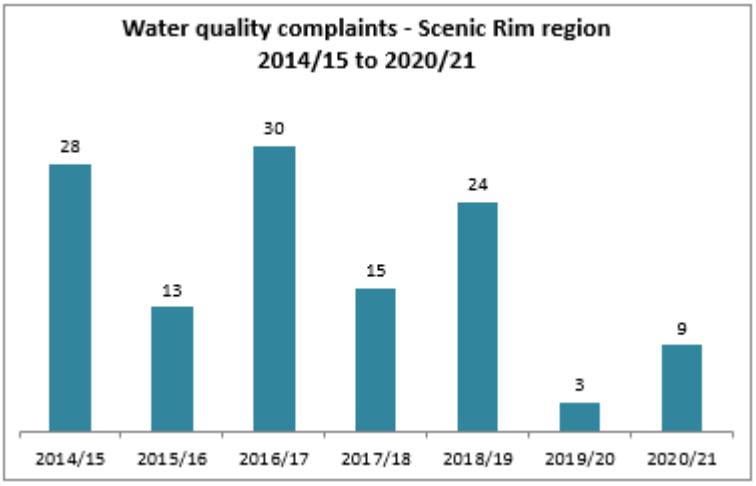


Figure 17-5 Scenic Rim region water quality complaints – 1 July 2014 to 30 June 2021

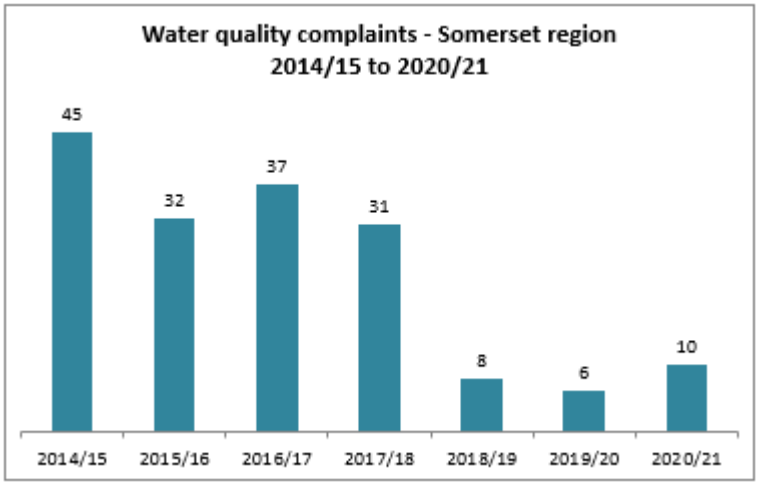


Figure 17-6 Somerset region water quality complaints – 1 July 2014 to 30 June 2021

17.5.3 Total water quality complaints by type

Table 17-4 shows the total water quality complaints by type over the reporting period. Figure 17-7 shows the trend over the same period.

Table 17-4 Total water quality complaints by type – 1 July 2014 to 30 June 2021

Type	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total	Percentage of all complaints
Stained washing	26	26	17	33	9	1	3	115	2%
Discoloured	833	544	583	1046	209	122	59	3396	58%
Air	188	139	120	144	26	36	14	667	11%
Taste/Odour	271	164	218	192	110	64	44	1063	18%
Illness[43]	38	36	43	18	42	49	72	298	5%
Other	58	48	68	49	28	17	17	285	5%
Total	**1414**	**957**	**1049**	**1482**	**424**	**289**	**209**	**5824**	

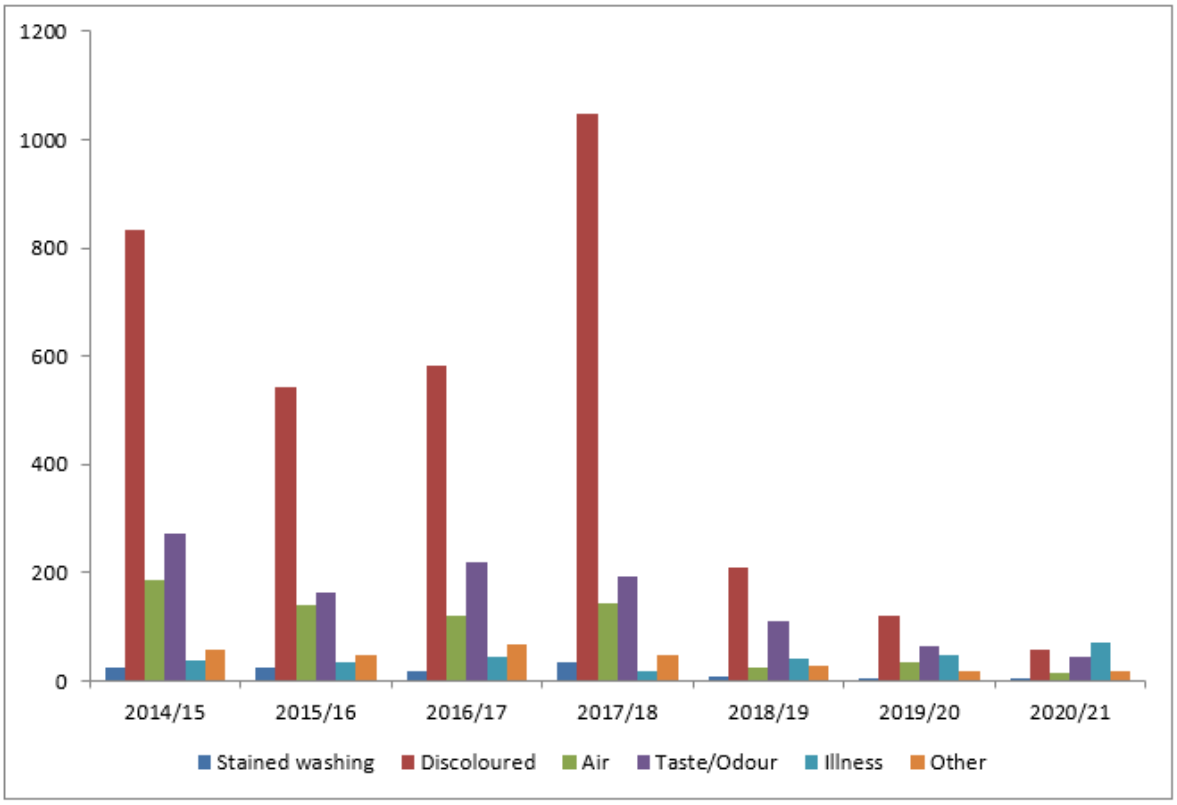


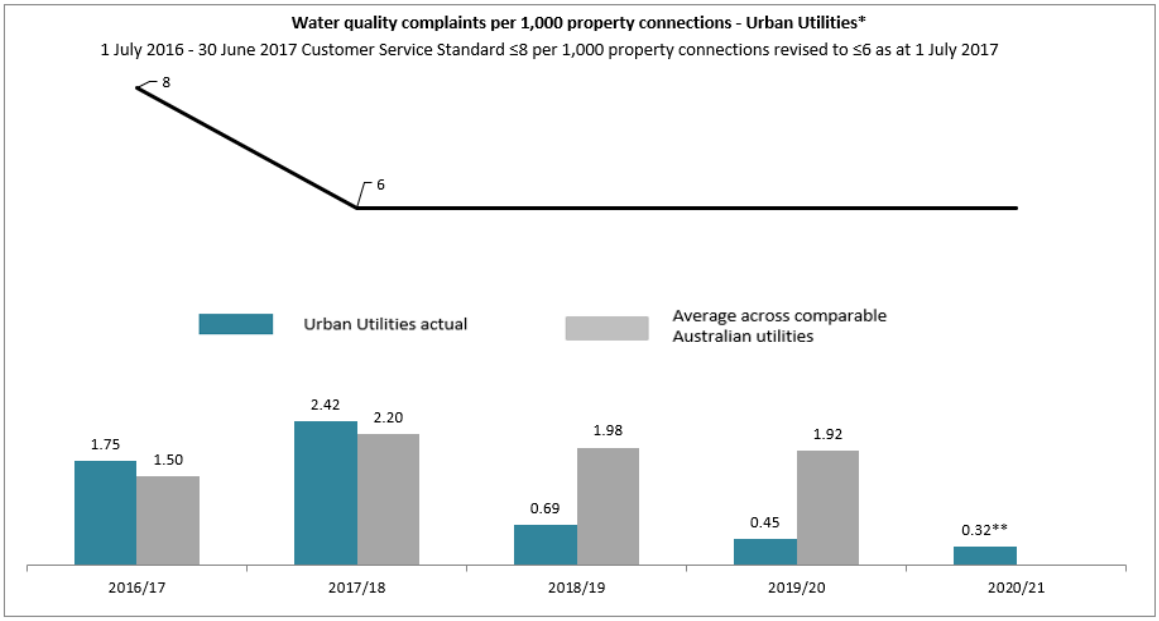
Figure 17-7 Water quality complaints by type – 1 July 2014 to 30 June 2021

[43] We investigate each complaint related to alleged illness from our drinking water, typically by testing the customer's tap and closest reticulation sampling point. During the reporting period, there were no confirmed cases of illness arising from the water supply system.

17.5.4 Water quality complaints performance – customer service standard

Figure 17-8 shows our water quality complaints performance against the customer service standard (less than six per 1,000 properties) as published in the Residential and Business Customer Charters, and a comparison with comparable water service providers across Australia with similar complexities and risks related to the supply of drinking water.

Figure 17-8 Water quality complaints performance against Customer Service Standard



*The value for comparable Australian Utilities is sourced from the Bureau of Meteorology's National performance report (NPR) 2019-20: urban water utilities: Indicator Code C9 – Number of water quality complaints per 1,000 properties: water supply, by utility size group (100,000+ size group).
**The NPR data for 2020/21 is expected to be available in March/April 2022.

17.5.5 Water quality complaints observations

Over the reporting period there was fluctuation in our water quality complaints result, with no clear trends. However, the following observations are made:

Water quality complaints followed a typical pattern, with 58% related to discoloured water. These complaints usually followed maintenance activity on our water distribution network. The relevant areas were flushed to remove the discoloured water, and customers who reported a complaint were advised of the reasons for the discoloured water and were requested to allow the water main a short period of time to settle.

Taste and odour complaints were the next prevalent at 18% and can vary widely based on a customer's perception. The most common complaint descriptions included chlorine, metallic and chemical tastes. These were addressed by flushing the water main when required. Investigation of each complaint found no public health risks. Further conclusions about taste and odour complaints are difficult to determine without detailed analysis.

A small percentage of complaints (5%) were received from customers who suspected their drinking water may be associated with an illness they were experiencing. We investigated each complaint related to alleged illness from our drinking water, typically by testing the customer's tap and closest

reticulation sampling point. During the reporting period, there were no confirmed cases of illness arising from our water supply system.

18. ENGAGING STAKEHOLDERS

We place great importance on engaging with stakeholders who rely on our services and contribute to the way we do business. We continue to strengthen our relationships with our customers, the community, developers, regulators, industry and government bodies.

At a strategic level, our affiliations with local and state government departments allow us to keep abreast of policy, legislation and regulations, and ensure we continually fulfil our responsibility to protect the environment and public health and support sustainable practices.

We also maintain a strong relationship with our shareholders by regularly reporting on our performance, consulting on our strategic direction, and engaging at all levels on operational matters of importance.

Our CCRG is pivotal in providing us with insight and understanding about how our services benefit our customers and communities.

18.1 Key internal stakeholders

Table 18-1 captures our key internal stakeholders, their responsibility/area of interest.

Table 18-1 Key internal stakeholders and relevance as it pertains to drinking water quality

Team	Business Unit	Responsibility/are of interest
Network Engineering	Operations & Maintenance Planning	Coordinate the DWQMP Coordinate the risk assessment and Risk Management Improvement Plan Manage DWQMP audits Address knowledge gaps Lead and coordinate water quality activities and decision making Ensure practices comply with legislation Identify and manage emerging risks Manage the Operational Monitoring Program Manage the Verification Monitoring Program Manage the security and continuity of the water supply
Permit Activation & Coordination - Operations Hub	Operations & Maintenance Planning	Manage drinking water quality incidents Manage drinking water quality customer complaints
Program Delivery	Field Services	Deliver services and deploy resources in response to customer service requests.

Team	Business Unit	Responsibility/are of interest
Maintenance Management	Operations & Maintenance Planning	Deliver the maintenance program Develop tactical asset maintenance strategies, maintenance methodologies, and maintenance schedules Develop asset reliability measures, and tactical programs.
Service Solutions	Operations & Maintenance Planning	Performance monitoring and maintenance management for chlorine dosing units (CDU).
	Integrated Solutions	Manage the delivery of capital works program Strategic asset management and planning Long-term planning of water assets Development of Integrated Zone Plans Identify emerging risks
Scientific Analytical Services (SAS)	Environmental & Industrial	Analytical support, interpretative scientific reports and accredited water quality sampling services delivering effective bacteriological and chemical monitoring programs. Scheduled and corrective maintenance of chlorine dosing units (CDU).
Customer Contact Centre	Customer Delivery	Responsible for receiving customer enquiries, and where possible resolving at first contact. Register water complaints if issues cannot be resolved at first contact. Manage water quality complaints that are escalated through the Urban Utilities Complaints Management Framework.
Marketing and Communications	Experience	Responsible for the management and delivery of marketing and communication services.
Public Relations & Media	Corporate Affairs	Responsible for the management and delivery media services.
Security & Resilience	Legal & Risk	Designs and implements appropriate processes and frameworks to manage opportunities and mitigate business threats. Emergency Management Framework.

Team	Business Unit	Responsibility/are of interest
Strategy	Corporate Affairs	Leads the corporate planning cycles.
Corporate Assurance & Performance	Corporate Affairs	Manages the corporate business reporting functions, and internal & external audit function.
Innovation Research & Development	Governance	Manages the innovation, research and development function.
Leadership & Talent	Experience	Consults, develops and implements programs to facilitate business improvement through skill and capability development. Engages Registered Training Organisations.

18.2 Key external stakeholders

18.2.1 Office of Water Supply Regulation (OWSR)

The Office of Water Supply Regulation (OWSR), Department of Regional Development, Manufacturing and Water, is responsible for ensuring that drinking water service providers across Queensland comply with the regulatory requirements under the Water Supply Act. OWSR will notify Queensland Health if a monitored water quality parameter is determined as requiring a high-level response, such as an incident.

18.2.2 Queensland Health

Queensland Health provides strategic public health advice and direction in response to water quality and areas of concern in public health. Queensland Health can direct Urban Utilities to make alterations to the drinking water quality monitoring program in areas in which it requires data to satisfy its requirements and to issue a water quality advisory under regulatory powers granted by the *Public Health Act 2005* (Qld), if they deem that this action is necessary.

Table 18-2 Key external stakeholders and relevance as it pertains to drinking water quality

Stakeholder	Relationship to Urban Utilities	Relevance to DWQMP
Local government – BCC, ICC, LVRC, SRRC, SRC	Urban Utilities' shareholders, and local government areas where Urban Utilities supplies drinking water.	Interested in: • hazards and risks and planned management measures, • water quality complaints, and • raise awareness of water quality within their communities and how private infrastructure can impact water quality.
Suppliers of infrastructure components and chemicals.	Suppliers of products and equipment for operation of Urban Utilities' drinking water network.	Hazards and risks posed by the products or operations of these suppliers considered in DWQMP.
Dialysis services providers Dialysis patients – in-home care	Customer supplied water by Urban Utilities	Interest in drinking water quality and its components in relation to dialysis patient care
Hospitals and other health care facilities	Customer supplied water by Urban Utilities	Interest in drinking water quality and its components in relation to dialysis patient care, and other health care services that are reliant on appropriate water

Stakeholder	Relationship to Urban Utilities	Relevance to DWQMP
		quality.
Property owners' associations	End customer for water product (payer of water bills)	Interest in any increase in water supply charged due to management of water quality.
Commercial and industrial customers – key accounts. Examples include: • refineries, • major facilities such as universities & airports, • breweries, • shopping complexes, • soft drink manufacturers, • food manufacturers, and • sensitive receivers – restaurants and catering services.	Major customers, many with specific water quality requirements or who are sensitive to any change in water quality.	Interest in water quality hazards and their management.
Utilita	Planned maintenance provider. A joint venture between Broadspectrum and Downer Utilities	Conduct planned maintenance on Urban Utilities' water and sewerage infrastructure.

19. INFORMATION MANAGEMENT

We have three broad categories of information management: controlled documents, transactional records, and IT systems application records.

19.1 Controlled documents

Controlled document are reference documents which may provide instruction in some form or other. Through the course of its lifecycle a controlled document may be reviewed, modified and distributed several times and archived. Examples of a controlled document include: manuals, policies, procedures, work instructions, specifications, forms and checklists.

PRO103 Controlled Document Procedure describes the process for staff and contractors directing how all controlled documents are to be developed, authorised, uniquely identified, distributed, reviewed and archived in a controlled manner, utilising the business application Q-Pulse.

This procedure articulates the requirement to:

- control, revise and maintain documentation,
- assign ownership and responsibilities for creation, modification and approval of documents prior to release.

Documents are assigned a regular review cycle, according to the type of document. The document is reviewed for currency, legislative compliance, accuracy, relevance, consistency and continual improvement.

All controlled documents are available on TAP via a connection with Q-Pulse. This ensures staff can

access the approved and up to date versions of documents.

Current versions of documents are available and accessible at necessary and relevant locations. System administrators can track the history of controlled documents and identify the source of the change in the event of a significant change being made without prior approval.

This procedure supports the requirements of:

- *AS/NZS 4801:2001 Occupational Health and Safety Management Systems,*
- *ISO 9001:2015 Quality Management Systems,*
- *ISO 14001:2015 Environmental Management Systems,*
- *ISO 17025 Testing and Calibration for Laboratories,*
- *ISO 45001:2018 Occupational Health and Safety Management Systems,*
- *ISO 55001:2014 Asset Management System,* and
- *OHSAS 1800:2007 Occupational Health and Safety Management Certification, and*
- *the ADWG.*

19.2 Transactional records

A transactional record is information created, received, and maintained as evidence by an organisation or person in the transaction of business, or in the pursuance of legal obligations. Examples of transactional records include test results, investigations, contracts, invoices, expense reports, correspondence, business cases, reports, meeting minutes. Records always document what has happened in the past. A record can be in any form of media (e.g. electronic or physical). These records are managed via Qdox, the approved electronic document and records management system.

The management of these records is stipulated *MP180 Records Management Framework*, which sets out the requirements for the storage and management of records by establishing and maintaining recordkeeping practices that meet business needs, legislative requirements and the protection of the rights and interests of government, Urban Utilities, its employees, shareholders, customers and the community.

19.3 IT systems application records

IT systems application records are managed by the specific business rules of each application. These include, but are not limited to:

- Treatment Plant Licence Compliance (TPLC) system,
- Laboratory Information Management System (LIMS),
- Supervisory Control and Data Acquisition (SCADA),
- eDNA (Enterprise Data Historian Historian),
- Geographic Information System (GIS),
- Customer Relationship Management (CRM) system, and
- ULearn (learning management system).

19.4 Performance and audit reports

Performance reports, including those to the Regulator, and audit reports are in Qdox.

19.5 Water quality data

Refer to Section 8 – Verification Monitoring Program

19.6 Reporting

There are several water quality reports that we are required to produce and submit on a regular basis. These can be categorised as Regulatory, Internal and External. The primary reference point for reporting is *PRO251 Drinking Water Quality Reporting*.

19.6.1 Regulatory – water quality incidents

We are required to report non-conformances against the following four points:

- any exceedance of the quality limits in Section 52 of the *Public Health Regulation 2018*;
- an exceedance of any health guidelines in the ADWG;
- detection of a parameter with no guideline value in the ADWG; or
- notification from Seqwater of a Seqwater incident under the Operating Protocol.

For each water quality incident, an event must be recorded in OCA[44] to notify South East Queensland integrated water network participants of the event. OCA is administered by Seqwater and we are required to update details of the event and then close it out once the incident has been resolved.

19.6.2 Regulatory – Drinking Water Quality Management Plan Report

The *Drinking Water Quality Management Plan Report* showcases our operational performance with respect to drinking water quality and shows how we are implementing key improvement actions detailed in our DWQMP.

This report informs the Regulator on how we comply with our DWQMP and its approval conditions. It also allows us to meet our legislative obligations under the Water Supply Act. It is to be provided to the Regulator on an annual basis, and within 120 business days after the end of each financial year to which it relates.[45]

This report, available on our website and at our corporate reception, provides our customers with information about the quality of their drinking water.

19.6.3 Regulatory – Annual Performance Report

The *Urban Utilities Annual Performance Report* documents our water quality performance against:

- key performance indicators, including National Performance Reporting indicators and indicators as advised by the Regulator.
- our Customer Service Standards.[46]

This report, available on our website and at our corporate reception, provides our customers with information about our performance against the drinking water quality performance measures.

[44] Seqwater incident and emergency management system (developed by Noggin). OCA is an abbreviation for 'Organise, Communicate, Act'.
[45] Urban Utilities' financial year runs from 1 July to 30 June.
[46] Published in our Residential and Business Customer Charters.

19.6.4 External/internal reporting and frequency

Table 19-1 External/internal reporting and frequency

Key Performance Indicator		Bureau of Meteorology[47]	Board[48]	Strategic Asset Management Committee	Executive Leadership Team[49]	General public[50]
Quality of drinking water supplied to customers *(% compliance)*[51]	Annually		Monthly Quarterly Annually	Bi-annually	Monthly Annually	Annually
Quality of drinking water supplied to customers (number of water quality incidents reported to the Regulator)[52]	Annually		Monthly Quarterly Annually	Bi-annually	Monthly Annually	Annually
Water Supply Scheme chemical compliance with the ADWG health limits (all schemes)	Annually		Monthly Annually	Bi-annually	Monthly Annually	Annually
Water Supply Scheme bacteriological compliance with the *Public Health Act 2005* (all schemes)	Annually		Monthly Annually	Bi-annually	Monthly Annually	Annually
Water Supply Scheme chemical compliance with the *Public Health Act 2005* (8[53] of 12 schemes)	Annually		Monthly Annually	Bi-annually	Monthly Annually	Annually
Water quality complaints per 1,000 properties[54]	Annually	Annually	Monthly Annually	Bi-annually	Monthly Annually	Annually

[47] National Performance Report, published annually and prepared independently by the Bureau, State and Territory governments, and the Water Services Association of Australia

[48] Report and dashboards available on intranet (TAP), source data in Qdox.

[49] Report and dashboards available on intranet (TAP), source data in Qdox.

[50] Urban Utilities Annual Report and Drinking Water Quality Management Plan Report. Both are available on Urban Utilities' website and for viewing at our corporate reception.

[51] The measure came into effect on 1 July 2021 and represents compliance with Regulatory reporting timeframes for drinking water quality incidents.

[52] This measure was in effect until 30 June 2021.

[53] This measure is related to fluoride. Low levels of fluoride occur naturally in many water sources. Fluoride is also added to drinking water in many parts of the world, including South East Queensland, to help reduce tooth decay. Seqwater's fluoridation protocol impacts eight of our twelve water supply schemes. For this reason, Urban Utilities are required to test for fluoride in these eight schemes - Beaudesert, Boonah-Kalbar, Canungra, Esk-Toogoolawah, Kilcoy, Kooralbyn, Lowood, and the SEQWSS.

[54] Urban Utilities Annual Report, Annual Performance Report and Drinking Water Quality Management Plan Report. All are available on Urban Utilities' website and for viewing at our corporate reception.

APPENDIX A – ACRONYMS AND DEFINITIONS

<	Less than
>	Greater than
2-Methyl isoborneol (2-MIB)	A compound produced from algae or bacteria in catchments contributing to taste and odour of water typically described as earthy, musty, swampy or metallic. May become noticeable at greater than 5ng/L.
ADWG	See *Australian Drinking Water Guidelines 2011*
Ammonia (NH3)	A highly soluble compound resulting from the decomposition of organic matter containing nitrogen. Ammonia will be detected in chloraminated water as it is a component of chloramine.
AS	Australian Standards
Australian Drinking Water Guidelines 2011	The guidelines were developed by the National Health and Medical Research Council (NHMRC) and undergo rolling revision to ensure they represent the latest scientific evidence on good quality drinking water.
Bulk supply point	The point at which water leaves infrastructure owned by a Grid Service Provider for supply to infrastructure owned by another Grid Service Provider or a Grid Customer or Distribution Service Provider
Bulk water	The treated water supplied from the Queensland Bulk Water Authority (Seqwater) to distributor retailers, including Urban Utilities.
CaCO3	Calcium carbonate
CCRG	Customer and Community Reference Group
CFU/100mL	Colony Forming Units per 100 millilitres.
Chloramination / chloramine	The application of chlorine and ammonia to create monochloramine (NH2Cl), a stable disinfectant that is added to drinking water to inactivate bacteria or to oxidise undesirable compounds. Chloramines persist for a longer time than chlorine and as a result, are used in longer water distribution systems.
Chlorate	A disinfection by-product resulting from the use of chlorine dioxide as a disinfectant and for odour/taste control in water.
Chlorine – Free	The residual formed with chlorine dosage once all the chlorine demand has been satisfied. This chlorine is free to inactivate microorganisms.
Chlorine – Total	Total chlorine is the sum of combined and free chlorine including chloramine.
Coliforms	Coliform bacteria are organisms that are present in the environment and in the faeces of all warm-blooded animals and humans. Coliform bacteria will not likely cause illness. However, their presence in drinking water indicates that disease-causing organisms (pathogens) could be in the water system.
Colour (True)	Colour is mainly due to the presence of dissolved substances from organic matter in water, such as decaying leaves and vegetation. True colour refers to the colour of water after particles of organic matter have been removed through filtration and is the measurement of the extent to which light is absorbed by the water.
Department of Regional Development, Manufacturing and Water (DRDMW)	The Queensland Government department responsible for overseeing Queensland's water industries to ensure these essential services are provided to Queenslanders in a safe, efficient and reliable way.

Disinfectant	An agent that inactivates microorganisms which cause disease. Urban Utilities uses either chlorine or chloramine.
Disinfection by-products (DBPs)	Products of reactions between disinfectants, particularly chlorine and naturally occurring organic material.
DR Act	*South East Queensland Water (Distribution and Retail Restructuring) Act 2009*
Drinking water	Water that is suitable for human consumption.
Drinking Water Quality Management Plan	Drinking Water Quality Management Plan as required by the *Water Supply (Safety and Reliability) Act 2008*. The purpose of a DWQMP is to protect public health by implementing a risk-management system to manage the quality of drinking water.
Ellipse	Urban Utilities' asset management, maintenance records and work orders system.
EMT	Emergency Management Team
EWOQ	Energy and Water Ombudsman Queensland
Escherichia coli (E. coli)	A bacterium when present in water indicates that the water may be contaminated by faecal matter and therefore there is the potential to cause illness when people drink the water. *E. coli* can be killed by standard disinfection practices.
Flocculant	Used in water treatment processes to improve the sedimentation or filterability of small particles.
Fluoride (F)	Fluoride is regarded as a useful constituent of drinking water, particularly for the prevention of tooth decay. Concentration is maintained within the recommended levels set by QHealth.
Granular Activated Carbon (GAC)	Granular activated carbon (GAC) is a black, solid, extremely porous material that can adsorb impurities and contaminants from air and water. GAC is generally used as a filter medium with the water being treated as it passes through the filter.
Geosmin	A compound produced from algae or bacteria in catchments contributing to taste and odour of water typically described as earthy, musty, swampy or metallic. May become noticeable at greater than 5ng/L.
IMT	Incident Management Team
Haloacetic acids	A group of disinfectant by-products that are formed when disinfectants, such as chlorine or chloramine, are used to treat water and react with naturally occurring organic and inorganic matter present in source waters.
Heterotrophic Plate Count (HPC)	Heterotrophs are a group of microorganisms (bacteria, moulds and yeasts) that use organic carbon sources to grow and can be found in all types of water. In fact, most bacteria found in drinking water systems are considered heterotrophs. Heterotrophic plate count (HPC) is a method that measures colony formation on culture media of heterotrophic bacteria in drinking water. Thus, the HPC test (also known as Standard Plate Count) can be used to measure the overall bacteriological quality of drinking water in public, semi-public and private water systems.
Iron (Fe)	An element which, when found in water, can cause a brownish discolouration. Limits on the amount of iron in water are usually due to taste and appearance factors rather than any detrimental health effects.
KIP (Key Interface Point)	Key Interface Points (KIP) are where water transfers between service providers. These are at nominated bulk water supply points in the bulk water transport system for grid connected supplies and the WTP discharge point for off-grid supplies (Seqwater);
km	A kilometre, which is 1,000 metres

LIMS	Laboratory Information Management System
Langelier Saturation Index (LSI)	The Langelier Saturation Index is an approximate indicator of the degree of saturation of calcium carbonate in water.
Manganese (Mn)	Manganese in a water supply may affect taste, cause staining of clothes, produce deposits in pipes and contribute to turbidity.
Megalitre (ML)	One million litres or 1,000 kilolitres
mg/L	milligrams per litre
Methylisoborneol (MIB)	2-Methyl isoborneol (2-MIB)
MPN/100mL	Most Probable Number per 100 millilitres
ng/L	Nanograms per millilitre
NATA	National Association of Testing Authorities
Nephelometric Turbidity Unit (NTU)	A measure of turbidity which is the cloudiness or haziness of water caused by particles that are generally invisible to the naked eye. The measurement of turbidity is a key test of water quality
Network	An arrangement or system of pipes, pumps and reservoirs used for distributing water.
Nitrate (NO_3)	The most stable form of combined nitrogen in water. Present in surface waters in small amounts generally not removed through treatment. Nitrate can be found in chloraminated water supplies as a result of chloramine breakdown.
Power BI (PBI)	Business intelligence reporting platform.
pH	The pH value indicates if a substance is acidic, neutral or alkaline. It is calculated from the number of hydrogen ions present and is measured on a scale from zero to 14. A pH greater than seven is alkaline, less than seven is acidic and seven is neutral. The pH of public water supplies should be slightly alkaline to minimise corrosion and stabilise disinfection.
Polyaluminium chloride (PAC)	Polyaluminium chloride (PAC) is manufactured in both liquid and powder form. The product is used as a flocculant in the treatment of drinking/potable water.
QCAT	Queensland Civil and Administrative Tribunal
QO	Queensland Ombudsman
Reservoir	A water tower or tank used for the storage of treated water within the water distribution system.
Current risk rating	The risk rating with all current controls in place
RMIP	Risk Management Improvement Plan
SAS Lab	See Scientific Analytical Services Laboratory
Scheme	The system distributing drinking water to customers.
Scientific Analytical Services Laboratory	A wholly-owned subsidiary of Urban Utilities, is approved by the National Association of Testing Authorities for microbiology, chemistry and sampling
SEQ	South East Queensland

Seqwater	Queensland Bulk Water Supply Authority, trading as Seqwater. The bulk drinking water provider for Urban Utilities.
Shareholders	Brisbane and Ipswich City Councils, and the Lockyer Valley, Scenic Rim and Somerset Regional Councils.
Stakeholder	All those who are either affected by or who can affect the activities of an organisation, namely customers, governments, regulators, the media, non-government organisations, residents and employees.
The Regulator	See Department of Regional Development, Manufacturing and Water (DRDMW).
Total Organic Carbon (TOC)	Total organic carbon is a measure of the amount of organic compounds contained in a water sample. Organic carbon-containing compounds can either be dissolved in water or exist in water as undissolved, suspended material, or liquid. This organic matter can enter water naturally and through man-made sources/processes
Total dissolved solids (TDS)	A measure of inorganic salts and small amounts of organic matter that are dissolved in water. Usually determined by converting electrical conductivity to TDS values.
Total hardness	Total hardness is the sum of the concentrations of calcium and magnesium ions expressed as calcium carbonate (CaCO3) equivalent. Waters with a high mineral content (a total hardness in excess of 200 mg/L) are considered hard.
Total Trihalomethanes (tTHMs)	A group of disinfection by-products that generally form when chlorine is used to disinfect drinking water.
Turbidity	Refers to the presence of suspended solids in water causing a muddy or discoloured appearance. Turbidity is measured in Nephelometric Turbidity Units (NTU).
Verification Monitoring Program (VMP)	Water quality verification monitoring is used as the final check that the barriers and preventive measures used in protecting the public health from drinking water risks are performing effectively. Verification monitoring is used to verify the quality of drinking water supplied to Urban Utilities' customers as well as collecting data to complement future operational monitoring programs.
Water Treatment Plant (WTP)	A plant that improves water quality by removing impurities through filtration and disinfection.
Water Supply Act	*Water Supply (Safety and Reliability) Act 2008*

APPENDIX B – DISTRIBUTION SYSTEM-INTEGRITY CATEGORY-LIMITING HAZARD

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard
Water Quality	Bulk Water	Bulk Water	Out-of-specification water quality received from Seqwater.	All ADWG hazards	Protozoa
Water Quality	Network	Network	Poor water quality due to accumulation of particles (e.g. sediments), particularly at dead ends, due to long stagnation	Aesthetics / Physical	Manganese
Water Quality	Network	Network	Poor water quality due to water age (e.g. loss of chlorine), tends to exacerbate leaching and corrosion.	Chemicals	Chemical (e.g. metal impurity)
Water Quality	Network	Network	Growth of opportunistic pathogens due to suitable conditions, which may lead to water quality and public health impact	Pseudomonas aeruginosa, species of Klebsiella and Aeromonas, certain slow-growing mycobacteria, Legionella, Naegleria and Acanthamoeba.	Naegleria Opportunistic pathogens (e.g. Legionella)
Water Quality	Network	Network	Elevated disinfection by-products due to water age, chlorine management	DBPs	DBPs
Water Quality	Dosing	Rechlorination	Excessive chlorine above health-based guideline value (5 mg/L)	Chlorine, taste and odour, pH	Chlorine
Water Quality	Network	Network	Lack of protection from chlorine residual for minor contamination events where bacteria may enter the system.	Bacteriological Pathogens	Pathogens
Water Quality	Network	Network	Onset of nitrification with the chloraminated systems which can impact water quality.	Nitrites, nitrates, pH, pathogens (from disinfectant depletion)	Pathogens
Water Quality	Dosing	Rechlorination	Failure of the re-chlorination dosing systems leading to under or overdosing of chlorine.	Chemical Contamination	Chlorine
Physical	System wide	Asset	Ageing and deteriorating underground infrastructure pipes/mains/valves/reservoirs.	All ADWG hazards	Pathogens
Physical	System wide	Asset	Ageing and deteriorating above ground infrastructure pipes/mains/valves, reservoirs and dosing systems.	All ADWG hazards	Pathogens
Physical	Network	Network	Contamination due to improper practices during pipe repairs and installation of new mains, including storage of spare pipes and hygiene of repair tools.	Pathogens	Pathogens
Physical	Network	Network	Cross connection between drinking water and non-drinking water assets e.g. sewerage systems	Pathogens	Pathogens
Physical	Network	Network	Backflow from residential/industrial/commercial customers due to lack of prevention device or failure of device	Chemical Contamination	Chemical (e.g. metal impurity)

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard
Physical	Reservoirs	Reservoirs	Loss of reservoir integrity (e.g. Hatch opening, breach at fenced sites, or collapsed air vent). [NOTE: separate to terrorism or intentional security breach].	All ADWG hazards	Pathogens
Physical	System wide	Reservoirs and Dosing Plants	Act of terrorism causing contamination	All ADWG hazards	Toxins
Physical	Network	Filling stations and hydrants	Backflow from filling stations/standpipes and fire-fighting hydrants (e.g. chemical introduced by QFFS), which may compromise water quality	Microbial contamination	Pathogens
Hydraulic	Network	Network	Pressure fluctuations leading to burst pipes, valves etc which may compromise water quality	All ADWG hazards	Pathogens
Hydraulic	Network	Network	Pressure fluctuations leading to loss of positive pressure and contaminant ingress, including planned and unplanned shutdowns.	All ADWG hazards	Pathogens
Hydraulic	Network	Network	Mixing of water from different sources impacting water quality.	Physiochemical	Conductivity
Hydraulic	Network	Network	Changes in water flow direction leading to water quality issues (e.g. sloughing, dislodgement of biofilms).	All ADWG hazards	Pathogens
Hydraulic	Reservoirs	Reservoirs	Lack of reservoir water level management impacts water quality	All ADWG hazards	Pathogens
Supporting Program	System wide	Materials	The use of inappropriate materials, that can lead to impurities, including use of metallic products that are incompatible with existing materials in the system, causing corrosion	All ADWG hazards	Chemical (e.g. metal impurity)
Supporting Program	System wide	Chemicals	Wrong chemicals or incorrect specification of chemicals, which may impact water quality	All ADWG hazards	Chemical (e.g. metal impurity)
Supporting Program	System wide	System wide	Staff training is not kept up to date resulting in potential for poor water quality (e.g. with operations, formal tickets, incident management training etc)	All ADWG hazards	Pathogens
Supporting Program	System wide	Communications	Failure of the telemetry system, SCADA resulting in delayed response and poor water quality	Chlorine, taste and odour, pH	Chlorine
Supporting Program	System wide	Maintenance and Calibration	Failure of online monitoring devices, due to lack of maintenance and calibration, resulting in inability to pick up water quality issues	Aesthetics/Physical	Chlorine
Supporting Program	System wide	Contractors	Contractor qualifications and skills are not appropriate, ongoing engagement is not monitored – these lead to contractor error with potential to cause breaches of guideline values	All ADWG hazards	Pathogens
Supporting Program	System wide	System wide	Power failure leading to supply, re-dosing and online monitoring/telemetry issues	Lack of disinfection residual	Chemical (e.g. underdosing)
Supporting Program	System wide	Monitoring	Contamination of samples during collection, transport or testing, leads to false results	Microbial contamination	Pathogens
Supporting Program	System wide	System wide	Actions by disgruntled employees or contractors leading to malicious damage resulting in poor water quality.	All ADWG hazards	Toxins

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard
Supporting Program	System wide	System wide	Loss of information and data (no back up) causes inability to undertake any needed corrective action (based on trends).	All ADWG hazards	Pathogens
Supporting Program	System wide	System wide	Cyber security compromised leading to inability to control management and operation of the system leading to a water quality incident.	All ADWG hazards	Chlorine
Supporting Program	System wide	System wide	Strategy and long-term planning fail to consider water quality aspects	All ADWG Hazards	Chemical (e.g. metal impurity)
Supporting Program	System wide	System wide	Network Planning does not engineer for drinking water quality objectives	All ADWG hazards	Water Age
Supporting Program	System wide	Incident Management	Failure to react to a water quality incident or emergency in a timely and coordinated manner, which may lead to compromised water quality supplied to customers	All ADWG hazards	Pathogens
Supporting Program	System wide	System wide	Ineffective customers complaints programs leading to delayed identification of water quality issues	Pathogens (illness complaints), turbidity, colour, Taste and Odour	Pathogens
Supporting Program	System wide	Customers	Lack of education and awareness of customers on their responsibilities in relation to internal plumbing (general public health).	Metals, turbidity, colour, Taste and Odour	Metals

APPENDIX C - DISTRIBUTION SYSTEM HAZARDS AT EACH PROCESS STEP

Process Step	Hazard Grouping	Hazards
Bulk Water	Microbiological	Faecal derived pathogens, environmental pathogens
	Chemical	Anions, cations, DBP's, TPH, BTEX, metals, pesticides, pharmaceuticals, geosmin, MIB, ammonia, natural organic matter (NOM), toxins
	Physical	Acid, alkali, dissolved oxygen, hardness, stability, TDS
	Radiological	Natural uranium series, natural thorium series, strontium-90, iodine-131, potassium-40, tritium
Reservoirs	Microbiological	Faecal derived pathogens, environmental pathogens, ammonia oxidizing bacteria (nitrification)
	Chemical	Metals
	Physical	Acid, alkali, dissolved oxygen, stability
	Radiological	Nil
Pumping Stations	Microbiological	Nil
	Chemical	Metals
	Physical	Nil
	Radiological	Nil
Sodium Hypochlorite Dosing	Microbiological	Nil
	Chemical	DBP's, total chlorine residual
	Physical	Alkali
	Radiological	Nil
Uncompromised Network Pipes, Valves and Fittings	Microbiological	Environmental pathogens
	Chemical	Plasticizers, metals
	Physical	Asbestos
	Radiological	Nil
Compromised Network Pipes, Valves and Fittings	Microbiological	Faecal derived pathogens, environmental pathogens
	Chemical	TPH, BTEX, metals, pesticides
	Physical	Solids

Process Step	Hazard Grouping	Hazards
	Radiological	Nil
Water Sampling Infrastructure	Microbiological	Nil
	Chemical	Metals
	Physical	Nil
	Radiological	Nil
Water Meter Assembly	Microbiological	Faecal derived pathogens, environmental pathogens
	Chemical	TPH, BTEX, metals, pesticides
	Physical	Acid, Alkali
	Radiological	Nil
System Wide Intentional contamination of water	Microbiological	Faecal derived pathogens, biohazards
	Chemical	TPH, BTEX, metals, pesticides, pharmaceuticals, toxins, biohazards
	Physical	Acid, alkali, TDS
	Radiological	Natural uranium series, natural thorium series, strontium-90, iodine-131, potassium-40, tritium
System Wide Non-intentional contamination of water	Microbiological	Faecal derived pathogens, environmental pathogens
	Chemical	TPH, BTEX, metals, pesticides, pharmaceuticals, toxins
	Physical	Acid, alkali, TDS
	Radiological	Natural uranium series, natural thorium series, strontium-90, iodine-131, potassium-40, tritium

APPENDIX D – RISK MANAGEMENT IMPROVEMENT PLAN

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
Water Quality	Bulk Water	Bulk Water	Out-of-specification water quality received from Seqwater.	All ADWG hazards	Protozoa	Operations & Maintenance Planning	Extreme 25	Medium 15	Further improve utilisation of data from water sampling and verification monitoring program to access lead indicators and respond early to potential out of spec water. Work with Seqwater and advocate for improved water chemistry that enables ADWG water quality throughout the Urban Utilities Network (including RSDOP). Improved process around briefing Seqwater on water quality incidents in the Urban Utilities specifically those attributed to raw water quality (e.g. tTHM, MIB, Geosmin) to enable shared understanding of customer and DRE impact.	Medium
Water Quality	Network	Network	Poor water quality due to accumulation of particles (e.g. sediments), particularly at dead ends, due to long stagnation	Aesthetics / Physical	Manganese	Operations & Maintenance Planning Field Services	Medium 13	Medium 9	Investigate the need for mains cleaning program or complete schedule of planned/routine flushing program with frequency based on risk for the entire network.	Medium
Water Quality	Network	Network	Poor water quality due to water age (e.g. loss of chlorine), tends to exacerbate leaching and corrosion.	Chemicals	Chemical (e.g. metal impurity)	Operations & Maintenance Planning Infrastructure Maintenance	High 22	High 19	Complete a review of water age model for areas supplied by Seqwater with prioritisation given to any reservoirs that do not have mixers. Refine network configuration and improve active operation of the Urban Utilities network to maintain optimum water chemistry. Work with Seqwater to ensure treatment process and Seqwater storage levels are refined to provide an optimised balance between supply requirements and water quality. Investigate increased operational flexibility for reservoirs to reduce water age (e.g. through a deep cycle plan) and develop a program for all schemes to control the reservoir levels for water quality, as possible. If there is a lack of control then develop trigger levels for particular schemes e.g. Lockyer Valley, Summerset, Lowood (part) and Withcott where DBPs are an issue. Implement a Disinfection Management Strategy. Ensure network planning considers water age via Integrated zone planning.	High
Water Quality	Network	Network	Growth of opportunistic pathogens due to suitable conditions, which may lead to water quality and public health impact	Pseudomonas aeruginosa, species of Klebsiella and Aeromonas, certain slow-growing mycobacteria, Legionella, Naegleria and Acanthamoeba.	Naegleria	Operations & Maintenance Planning	High 22	High 19	Initiate and support R&D projects to further understand risk profile and control measures (e.g. having chlorine levels, free chlorine and chloramines at 0.5 mg/L or higher throughout supply network, especially during summer and increasing temperatures due to climate change). Continue to discuss appropriate methods on managing opportunistic pathogens throughout the network inclusive of the Regional Secondary Disinfection Optimisation Program (RSDOP).	High

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
					Opportunistic pathogens (e.g. Legionella)		High 22	High 19	Implement a Disinfection Management Strategy.	High
Water Quality	Network	Network	Elevated disinfection by-products due to water age, chlorine management	DBPs	DBPs	Operations & Maintenance Planning	Extreme 23	Medium 15	Investigate increased operational flexibility for reservoirs to reduce water age (e.g. through a deep cycle plan) and develop a program for all schemes to control the reservoir levels for water quality, as possible. If there is a lack of control then develop trigger levels for particular schemes e.g. Lockyer Valley, Summerset, Lowood (part) and Withcott where DBPs are an issue. Undertake relevant discussions through the Regional Secondary Disinfection Optimisation Program (RSDOP) on water age reduction. Implement a Disinfection Management Strategy. Develop and implement a chlorate management protocol	Medium
Water Quality	Dosing	Rechlorination	Excessive chlorine above health-based guideline value (5 mg/L)	Chlorine, taste and odour, pH	Chlorine	Operations & Maintenance Planning	High 18	Medium 15	Install chlorine online analysers downstream of all chlorine dosing units (underway).	Medium
Water Quality	Network	Network	Lack of protection from chlorine residual for minor contamination events where bacteria may enter the system.	Pathogens	Pathogens	Operations & Maintenance Planning	Extreme 23	High 19	Work with Seqwater to ensure chlorine performance objectives defined by Service Level Agreements are met. Install chlorine online analysers downstream of all chlorine dosing units (underway). Regional Secondary Disinfection Optimisation Program (RSDOP). Establish a formal reservoir cleaning program. Implement a Disinfection Management Strategy.	High
Water Quality	Network	Network	Onset of nitrification with the chloraminated systems which can impact water quality.	Nitrites, nitrates, pH, pathogens (from disinfectant depletion)	Pathogens	Operations & Maintenance Planning	High 22	High 19	Install chlorine online analysers downstream of all chlorine dosing units (underway). Establish a formal reservoir cleaning program. pH increase of supplied water by Seqwater from Mt Crosby aiming to produce a flatter nitrification curve and extend chloramine decay period. Implement a Disinfection Management Strategy.	High
Water Quality	Dosing	Rechlorination	Failure of the re-chlorination dosing systems leading to under or overdosing of chlorine.	Chemical Contamination	Chlorine	Operations & Maintenance Planning / SAS Laboratory	High 19	Medium 14	Complete the SCADA upgrade project. IOT Strategy – chlorine monitoring	Medium
Physical	System wide	Asset	Ageing and deteriorating underground infrastructure pipes/mains/valves/reservoirs.	All ADWG hazards	Pathogens	Field Services Operations & Maintenance Planning	Extreme 23	Medium 15	CI - Managed through Urban Utilities BAU approach to asset management including maintenance and renewal programs.	Medium
Physical	System wide	Asset	Ageing and deteriorating above ground infrastructure pipes/mains/valves, reservoirs and dosing systems.	All ADWG hazards	Pathogens	Field Services Operations & Maintenance Planning	High 22	Medium 10	Develop renewals strategy for dosing units.	Medium

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
Physical	Network	Network	Contamination due to improper practices during pipe repairs and installation of new mains, including storage of spare pipes and hygiene of repair tools.	Pathogens	Pathogens	Field Services Operations & Maintenance Planning	High 22	Medium 14	Check the requirement for contractors to disinfect and appropriately store segments of mains prior to installation. Establish an internal audit process to check contractors and staff hygiene practices when working on drinking water mains.	Medium
Physical	Network	Network	Cross connection between drinking water and non-drinking water assets e.g. sewerage systems	Pathogens	Pathogens	Field Services Developer Services Operations & Maintenance Planning	High 22	Medium 15	Identify all areas of possible cross connection and backflow and review control measures. Identify infrastructure previously set for recycled water use (now being used as potable water), and process for maintenance and use in future (conversion), possibly a separate GIS Layer.	Medium
Physical	Network	Network	Backflow from residential/industrial/commercial customers due to lack of prevention device or failure of device	Chemical Contamination	Chemical (e.g. metal impurity)	Operations & Maintenance Planning Integrated Solutions	High 19	Medium 10	Clearly identify backflow prevention requirements, roles and responsibilities within Urban Utilities and where the responsibility is with councils, including compliance monitoring of the backflow prevention devices. Check existing information sharing agreements with Councils to see if backflow prevention devices can be added to Urban Utilities GIS layers. Develop a backflow register (ID schedule) of all backflow devices in the Urban Utilities network (Urban Utilities owned with servicing details, council register and other areas (e.g. air gap at filling stations) including risk rating.	Medium
Physical	Reservoirs	Reservoirs	Loss of reservoir integrity (e.g. Hatch opening, breach at fenced sites, or collapsed air vent). [NOTE: separate to terrorism or intentional security breach].	Microbial Contamination	Pathogens	Integrated Solutions Field Services Operations & Maintenance Planning	Extreme 23	High 18	Finalise update of MP55 Water Quality Reservoir Maintenance Strategy. Continued expansion of CCTV and Lighting capital investment project across reservoirs (Q-Pulse action - OR_INV1368-5) Investigate means to improve the understanding of water maintenance workers on the link between maintenance and water quality issues.	High
Physical	System wide	Reservoirs and Dosing Plants	Act of terrorism causing contamination	All ADWG hazards	Toxins	Security and Resilience Operations & Maintenance Planning	High 21	Medium 12	Continued expansion of CCTV and Lighting capital investment project across reservoirs (Q-Pulse action - OR_INV1368-5)	Medium
Physical	Network	Network	Backflow from filling stations/standpipes and fire-fighting hydrants (e.g. chemical introduced by QFES), which may compromise water quality	Microbial Contamination	Pathogens	Operations & Maintenance Planning Environmental Solutions	High 19	Medium 10	Develop training package on risks associated with connecting assets to Urban Utilities water network.	Medium
Hydraulic	Network	Network	Pressure fluctuations leading to burst pipes, valves etc which may compromise water quality	All ADWG hazards	Pathogens	Operations & Maintenance Planning Field Services	High 22	Medium 8	Investigate the value in TaKaDu and if replacement or upgrading is required.	Medium

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
Hydraulic	Network	Network	Pressure fluctuations leading to loss of positive pressure and contaminant ingress, including planned and unplanned shutdowns.	All ADWG hazards	Pathogens	Operations & Maintenance Planning Field Services	High 22	Medium 14	Review relevant procedures to include the need to increase surveillance in areas where there are frequent breaches of integrity (e.g. recurring pipe breakages in one area).	Medium
Hydraulic	Network	Network	Mixing of water from different sources impacting water quality.	Chlorine, taste and odour, pH	Conductivity	Operations & Maintenance Planning	Medium 15	Low 6	Assess the need for an enhanced monitoring program including risk-based assessment of locations in the network that would benefit from online conductivity data. Work to better understand the water quality impacts of rezones so allow better control and management of associated water quality risks. Optimise network configurations and isolations aiming to avoid or mitigate the water quality impacts of bi-directional flow. Continue to work with Seqwater around how operational grid changes impact on water quality parameters and opportunities to improve.	Low
Hydraulic	Network	Network	Changes in water flow direction leading to water quality issues (e.g. sloughing, dislodgement of biofilms).	All ADWG hazards	Pathogens	Operations & Maintenance Planning	High 18	Medium 10	Assess the need for an enhanced monitoring program including risk based assessment of locations in the network that would benefit from online conductivity data. Work to better understand the water quality impacts of rezones so allow better control and management of associated water quality risks. Optimise network configurations and isolations aiming to avoid or mitigate the water quality impacts of bi-directional flow. Continue to work with Seqwater around how operational grid changes impact on water quality parameters and opportunities to improve.	Medium
Hydraulic	Reservoirs	Reservoirs	Lack of reservoir water level management impacts water quality	Chlorine, taste and odour, pH	Pathogens	Operations & Maintenance Planning Field Services	High 22	High 19	Investigate increased operational flexibility for reservoirs to reduce water age (e.g. through a deep cycle plan) and develop a program for all schemes to control the reservoir levels for water quality, as possible. If there is a lack of control then develop trigger levels for particular schemes e.g. Lockyer Valley, Summerset, Lowood (part) and Withcott where DBPs are an issue. Install chlorine online analysers downstream of all chlorine dosing units (underway). Investigate if passive mixing could be used for reservoirs that are <1 ML in capacity. Implement a Disinfection Management Strategy Work with Seqwater to ensure treatment process and Seqwater storage levels are refined to provide an optimised balance between supply requirements and water quality.	High

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
Supporting Program	System wide	Materials	The use of inappropriate materials, that can lead to impurities, including use of metallic products that are incompatible with existing materials in the system, causing corrosion	All ADWG hazards	Chemical (e.g. metal impurity)	Field Services Developer Service Operations Maintenance and Planning	High 19	High 19	Review procurement and contractor documentation to include checks that products in contact with drinking water conform to AS4020:2005. Where infrastructure is to be connected to the drinking water network, checklists should be included in infrastructure checks (& contracts) to confirm materials conform to AS4020:2005, including appropriate materials being used for the site soil type.	High
Supporting Program	System wide	Chemicals	Wrong chemicals or incorrect specification of chemicals, which may impact water quality	All ADWG hazards	Chemical (e.g. metal impurity)	Operations & Maintenance Planning/ SAS Laboratories	High 18	Medium 10	Refine the process/procedure to evaluate the quality of the chlorine tablet and the tablet supplier.	Medium
Supporting Program	System wide	System wide	Staff training is not kept up to date resulting in potential for poor water quality (e.g. with operations, formal tickets, incident management training etc)	All ADWG hazards	Pathogens	All Business Groups	High 22	Medium 8	Build capacity in the Operations Maintenance and Planning team Formalise the training and mentoring program to develop water quality management staff Develop a corporate training matrix e.g. based on positions and PDs to enable identification of employee training and certifications required to deliver their job, including renewal requirements. This should ensure a consistent approach to training and needs analysis and learning requirements across Urban Utilities. Investigate mechanisms to ensure staff are available to undertake and complete the required / identified training. Investigate improvements to the resourcing limitations which can hinder the development and/or review of training materials (e.g. staff time, workload, competing requirements).	Medium
Supporting Program	System wide	Communications	Failure of the telemetry system, SCADA resulting in delayed response and poor water quality	Chlorine, taste and odour, pH	Chlorine	Operations & Maintenance Planning Field Services	High 22	Medium 15	Complete the SCADA improvement program for Clear SCADA across the entire Urban Utilities network. In the interim, develop procedure(s) to make changes between systems, adjustment to operational set points (or forms to record and track changes).	Medium
Supporting Program	System wide	Maintenance and Calibration	Failure of online monitoring devices, due to lack of maintenance and calibration, resulting in inability to pick up water quality issues	Aesthetics / Physical	Chlorine	Operations & Maintenance Planning/ SAS Laboratories	High 16	Medium 9	Continue to improve calibration schedules for online monitoring equipment. Manage online monitoring equipment via Asset Management System - consideration required for relocatable assets; Introduce better platforms to ensure on-line analyser performance.	Medium
Supporting Program	System wide	Contractors	Contractor qualifications and skills are not appropriate, ongoing engagement is not monitored – these lead to contractor error with potential to cause breaches of guideline values	All ADWG hazards	Pathogens	Operations & Maintenance Planning Field Services	High 22	High 19	Review process for contractor performance monitoring, including to ensure contractor staff maintain ongoing qualification and skills. As part of this process, establish compliance checks or audits. Ensure the procedures used by contractor staff (e.g. Utilita) are acceptable by Urban Utilities, including use of approved	High

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
									materials and chemicals as per Urban Utilities specifications, and any reviewed/updated procedure by the contractor should be submitted and accepted by Urban Utilities.	
Supporting Program	System wide	System wide	Power failure leading to supply, re-dosing and online monitoring/telemetry issues	Lack of disinfection residual	Chemical (e.g. underdosing)	Operations & Maintenance Planning Field Services SAS Laboratories	High 19	Medium 14	Develop a program to review all switchboards can restart automatically after a power failure. Check Energex and all energy supplier contracts to ensure that they contain conditions to notify Urban Utilities of any planned outages or unplanned outages when they occur.	Medium
Supporting Program	System wide	Monitoring	Contamination of samples during collection, transport or testing, leads to false results	Microbial Contamination	Pathogens	SAS Laboratories Operations & Maintenance Planning	High 22	Medium 10	CI - Ensure samples are collected and analysed following the correct procedure. Managed through Urban Utilities BAU approach to managing performance	Medium
Supporting Program	System wide	System wide	Actions by disgruntled employees or contractors leading to malicious damage resulting in poor water quality.	All ADWG hazards	Toxins	Security and Resilience, All Business Groups	High 17	Medium 12	Continue increasing use of existing (smart) technology for identification of an issue. Gallagher security system being integrated with SCADA to improvement security alarm management.	Medium
Supporting Program	System wide	System wide	Loss of information and data (no back up) causes inability to undertake any needed corrective action (based on trends).	All ADWG hazards	Pathogens	Digital & Information	Medium 14	Medium 8	Continue technology improvements in data backups.	Medium
Supporting Program	System wide	System wide	Cyber security compromised leading to inability to control management and operation of the system leading to a water quality incident.	All ADWG hazards	Chlorine	Security and Resilience Digital & Information	Medium 14	Medium 8	Continue to improve cyber security controls Continue to improve calibration schedules for online monitoring equipment. Utilise asset management system to manage the online monitoring equipment calibration workflow considering relocatable assets. Introduce better platforms to ensure on-line analyser performance	Medium
Supporting Program	System wide	System wide	Network Planning doesn't engineer for drinking water quality objectives	All ADWG hazards	Water Age	Integrated Solutions	High 19	Medium 14	Further refine the new Integrated Planning process in line with water quality objectives.	Medium
Supporting Program	System wide	Incident Management	Failure to react to a water quality incident or emergency in a timely and coordinated manner, which may lead to compromised water quality supplied to customers	All ADWG hazards	Pathogens	Operations & Maintenance Planning Risk & Resilience	Extreme 23	Medium 14	Further refine accountabilities and processes for incident response to ensure a targeted and effective incident response can be made without delay. Review the incident de-brief process/procedure to include a requirement to re-visit the drinking water quality risk assessment register (relevant row/s), following an incident to assess if the risk profile, control measures and improvement actions require any updating. Work with Seqwater to ensure communication guidelines and triggers are followed for Seqwater to provide early	Medium

Integrity Category	Main Supply Component	Supply Sub Component	Hazardous Event (or Risk Description)	WQ Hazards	Limiting Hazard	Main Relevant Business Group or Section	Maximum Risk Rating	Current Risk Rating (with current controls)	Proposed Treatments or Actions	Priority (based on residual rating)
									notification to Urban Utilities of any water chemistry changes (including aethetics) that may impact on water quality and potentially lead to a water quality incident or emergency.	
Supporting Program	System wide	System wide	Ineffective customers complaints programs leading to delayed identification of water quality issues	Pathogens (illness complaints), turbidity, colour, Taste and Odour	Pathogens	Customer Delivery, Operations & Maintenance Planning	Medium 14	Medium 10	CI - Ensure complaints are managed in accordance with Urban Utilities customer charter. Managed through Urban Utilities BAU approach to managing performance	Medium
Supporting Program	System wide	Customers	Lack of education and awareness of customers on their responsibilities in relation to internal plumbing (general public health).	Metals, turbidity, colour, Taste and Odour	Metals	Customer Delivery, Experience, Operations & Maintenance Planning	Medium 15	Medium 10	Develop communication package for residential customers to increase awareness of their responsibilities in relation to internal plumbing.	Medium

APPENDIX E – EVENT SEVERITY RATING GUIDELINE

Level	Triggers	Customer Impact	Reputational Risk	Response Management
Alert **Watching Brief**	• Threat of potential event in the coming hours or days identified where Urban Utilities could be impacted • Threats may include severe weather warnings, emergency services warnings, intelligence from law enforcement and other agencies including operational issues • Heightened level of awareness and vigilance with the situation to be closely monitored by relevant staff capable of assessing escalation of the threat with some key preparedness actions implemented by relevant business groups	• No direct customer impacts at this stage • Review of potential customer impacts to be carried out should the threat be realised	• Some media attention about the pending threat may be in place • No direct media attention for Urban Utilities	Is declared by the • Business Resilience Team or Responsible Team Situation Reporting by: • Business Resilience or Responsible Team
Lean Forward	Tactical Preparedness Group activation • Threat or potential event identified where Urban Utilities will likely be impacted but the extent of impact is unclear • Threats may include severe weather / emergency services warnings, intelligence from law enforcement agencies and degradation or impacts to the operation of Urban Utilities assets, systems or services • A heightened state of situational awareness is required and key preparedness activities are to be carried out • Key staff from all relevant areas of the business to come together and determine required preparedness activities to be carried out, including monitoring triggers for escalation and mitigations to expediate recovery	• No direct or minimal customer impacts at this stage • Review of potential customer impacts should the threat be realised	• Some media attention about the pending threat may be in place • No direct media attention for Urban Utilities	Is declared by the • Business Resilience or Responsible Team Situation Reporting by: • Business Resilience or Responsible Team with support from Resilience Team (as required)
STAND UP – DETERMINE APPROPRIATE RESPONSE				
Operational Incident Response	Operational Response Team or Business Group Response Team activation • Unplanned operational or business disruption affecting a localised area of customers • Requires additional resources or support from other areas of the business • The incident has no impact to continuity of service outside of the affected business or service delivery area • All services are expected to be restored within 5 hours • This incident can be managed with available Urban Utilities / Contractor operational resources	• Event is likely to impact less than 200 residential customers – could be even less in regional areas • Disruption expected to last < 5 Hours • Minimal or no impact to key account / commercial customers	• None / minor current media attention • Low likelihood of adverse media coverage	Is declared by the • Service Delivery / Control Centre Manager or Business Line Manager Incident managed by • Operational Response Team / Business Group ResponseTeam Situation Reporting by: • Control Centre /Business Group
Tactical Incident Response	Incident Management Team Activation • Major operational or business disruption that is affecting a large local area or multiple sizeable areas of customers • This incident has caused impacts to continuity of services outside of the directly affected area, and affected customers are likely to rise • The incident has the potential to create secondary issues more damaging than the actual incident • The incident will require significant off-site coordination and external resourcing • The incident will require direct customer and media liaisons	• Event is likely to impact more than 300 and less than 10,000 residential customers • Disruption for some customers expected to last >10 Hours • Moderate impacts for multiple commercial customer • Single Key Account service disruption	• Short-term local adverse media coverage • Potential adverse community concern • Short term loss of confidence among some key stakeholders	Is declared by the • Tier 2 Manager / Operation Duty Manager (In consultation with Customer and Comms Duty managers) Incident managed by • Incident Management Team Situation Reporting by: • Incident Management Team
Organisational Wide Emergency Coordination	Emergency Management Team Activation • This is a catastrophic operational or business disruption that has widespread service and/or busienss impacts across Urban Utilities, rendering multiple services inoperable. • It is expected disruption will last an extended period and t services may potentially not be fully restored for weeks in some areas • This emergency will require organsiation wide coordination of all aspects of the response including management of business and reputational impacts	• Disruption for majority of customers expected to last < 24hours • Potential displacement of people • Major to impacts to multiple commercial or multiple Key Account Customers shutdown	• Some community action / protest • Some state and national adverse media coverage relating to the event in general and possibly directed at Urban Utilities • Medium term loss of confidence among key stakeholders	Is declared by the • Executive Leader / Duty Executive Emergency managed by • Emergency Management Team Situation Reporting by: • Emergency Management Team

APPENDIX F – SEQWATER INCIDENT SEVERITY CLASSIFICATION

SEQWATER ALERT LEVELS				
Whole of Supply System Alert	This is a Seqwater notification alert level A System Alert is declared following an assessment of: • Any developing threat or hazard that may result in an emergency (e.g. cyclone, source water quality) • Any incident initially managed internally by Seqwater or an SEQ Service Provider that may escalate to an emergency • Emergency coordination is not yet required but preparedness actions may be undertaken. • SEQ Service Providers are to maintain a heightened level of vigilance due to assess escalation to a Level 1 or 2	• No customer impacts higher than Level 2 response (as above) parameters have been realised • If the incident occurs, there is potential for moderate to major customer impacts	• Potential for future local or adverse media attention	Is declared by the • Relevant Business Area (e.g. Water Quality) • Seqwater Incident Management Team Incident managed by • Operations & Maintenance Planning Team/ Operational Response Team
Seqwater Level 1 Emergency	• Single or multiple incidents that materially impact on the continuity of drinking water supply within the SEQ Water Supply System. • Emergency requires co-ordination between Seqwater and one or more SEQ Service Providers. • Managed jointly by impacted SEQ Service Providers and with endorsement by relevant regulators. • Local Disaster Management Group(s) informed and the Local Disaster Coordination Centre may be stood-up • Seqwater Emergency Management Team Activation	• Loss of supply to single supply zone • Short term loss of major WTP facility (unplanned) • Water quality issues within the bulk network	• Media attention extended inquiries for more information from media outlets relating to Seqwater and other service providers • Managed jointly by impacted SEQ Service Providers and with endorsement by relevant regulators.	Is declared by • Seqwater Emergency managed by • Collaboratively with Seqwater Emergency Management Team and Urban Utilities IMT or EMT. Situation Reporting by: • Urban Utilities IMT or EMT.
Seqwater Level 2 Emergency	• Single or multiple incidents that materially impact on the continuity of drinking water supply within the SEQ Water Supply System. • Emergency is being actively managed by a legislatively-empowered Regulator or Authority. • State, one or more District and /or multiple impacted Local Disaster Coordination Centre(s) stood up • Seqwater Emergency Management Team Activation	• Loss of supply to multiple supply zones • Extended loss of major WTP facility • Water borne disease outbreak with regional health concerns	• Sustained state and national adverse media coverage relating to the event in general and possibly directed at Seqwater and other service providers • State or Local Government led/coordinated messaging commenting on SEQ water supply	Is declared by • Seqwater Emergency managed by • Collaboratively with Seqwater Emergency Management Team and Urban Utilities EMT. Situation Reporting by: • Urban Utilities EMT.