DRINKING WATER QUALITY MANAGEMENT PLAN

2018 to 2019
FINANCIAL YEAR

ANNUAL REPORT

LOGAN
CITY COUNCIL

DOCUMENT CONTROL

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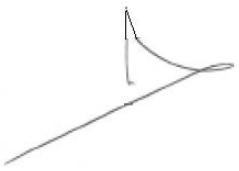
19/12/2019	Darren Moore	*Acting* Water Business Manager	

NOTATIONS AND ABBREVIATIONS

Acronym	Definition
ADWG	Australian Drinking Water Guidelines, 2011. Published by the National Health and Medical Research Council of Australia
AS	Australian Standard
BAU	Business As Usual
CCP	Critical Control Point (as defined by HACCP)
CGC	City of Gold Coast
Council	Logan City Council
CRM	Customer Relationship Management (system)
DEWS	Department of Energy and Water Supply, *now known as Department of Natural Resources, Mines & Energy (DNRM&E)*
DNRM&E	Department of Natural Resources, Mines and Energy
DSS	Desired Standards of Service
DWQMP	Drinking Water Quality Management Plan
E. coli	Escherichia coliform, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
EPI	Eastern Pipeline Interconnector
ERP	Emergency Response Plan
FY	Financial Year
Grid	South East Queensland Water Supply Network Grid
HACCP	Hazard Analysis Critical Control Point
HLZ	High Level Zone
IDM	Infrastructure Demand Model
IMP	Incident Management Plan
KPI	Key Performance Indicator
LIMS	Laboratory Information Management System
LLZ	Low Level Zone
LOD	Limit of Detection
LOR	Limit of Reporting
LWIA	Logan Water Infrastructure Alliance
mg/L	Milligrams per litre
MPN/100mL	Most Probable Number per hundred millilitres
NMDP	Network Maintenance Disinfection Program
NATA	National Association of Testing Authorities
RMIP	Risk Management Improvement Plan
SAMMS	Strategic Asset Maintenance Management Systems
SCADA	Supervisory Control and Data Acquisition
SEQ	South East Queensland
SOP	Standard Operating Procedure
SRWP	Southern Regional Water Pipeline
THM	Trihalomethane
WGM	Water Grid Manager
WH&S	Workplace Health and Safety
WOP	Work Operating Procedure
WPR	Water Planning and Regulation (formally QLD Office of the Water Supply Regulator)

WSZ	Water Supply Zone
WTP	Water Treatment Plant
WWETT	Water and Wastewater Event Tracking Tool

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TABLES

FIGURES

1 INTRODUCTION

This Drinking Water Quality Management Plan (DWQMP) Annual Report has been developed to meet the requirements of section 95 of the *Water Supply (Safety and Reliability) Act 2008 (the Act)*. The purpose of *the Act* is to provide safe and reliable drinking water supply throughout Queensland.

This DWQMP Annual Report documents the following for the 2018-19 Financial Year (FY)[1]:

- The water quality performance of Logan City Council's (Council) drinking water supply; and
- Actions taken to implement the Drinking Water Quality Management Plan.

This report assists the Queensland Water Supply Regulator (Department of Natural Resources, Mines and Energy -DNRM&E) to determine compliance with the currently approved DWQMP and relevant approval conditions.

This report has been prepared in accordance with the Drinking Water annual report template and the Drinking Water Quality Management Plan report guide – September 2018.

This report is available to the public via the Logan City Council website, and copies may be provided to members of the public upon request.

[1] 1st July 2018 to 30th June 2019 relates to the 2018–19 FY.

2 SUMMARY OF SCHEMES OPERATED

2.1 Council's Drinking Water Supply System

Logan City Council (Council) is a water service provider which distributes water that is sourced and treated by the bulk water supplier, Seqwater.[2]

Seqwater is the Queensland Government Authority responsible for ensuring safe, secure and reliable drinking water supply for South East Queensland (SEQ). Key responsibilities of Council and Seqwater are summarised in Table 1.

Table 1 – Key Seqwater and Council Responsibilities

Seqwater's Responsibilities	*Logan City Council's Responsibilities*
▪ Catchment management. ▪ Raw water treatment (including fluoridation). ▪ Clear water storage. ▪ Bulk water transport to defined transfer points. ▪ Monitoring of raw and treated water supply, including fluoridation.	▪ Receipt of bulk treated water from Seqwater at defined transfer points. ▪ Delivery to customers through Council's water distribution network. ▪ Operation and maintenance of the distribution network, reservoirs, pump stations and a number of secondary disinfection facilities. ▪ Monitoring of drinking water quality performance throughout the distribution network.

2.2 SEQ Water Supply Network Grid

Logan City Council is supplied treated drinking water through the SEQ Water Supply Network Grid (the Grid), which is managed and operated by Seqwater, as shown in Figure 1. Water may be sourced from various sources throughout the Grid, dependent on operational supply requirements. For example; treated water may be supplied via the Eastern Pipeline Interconnector (EPI) and may flow west to supply Logan City Council or east to supply Redlands City Council.

Both Seqwater and Council undertake extensive water quality monitoring to confirm that safe drinking water is supplied to the community.

[2] Further information on Seqwater can be accessed at http://www.se qwater.com.au/

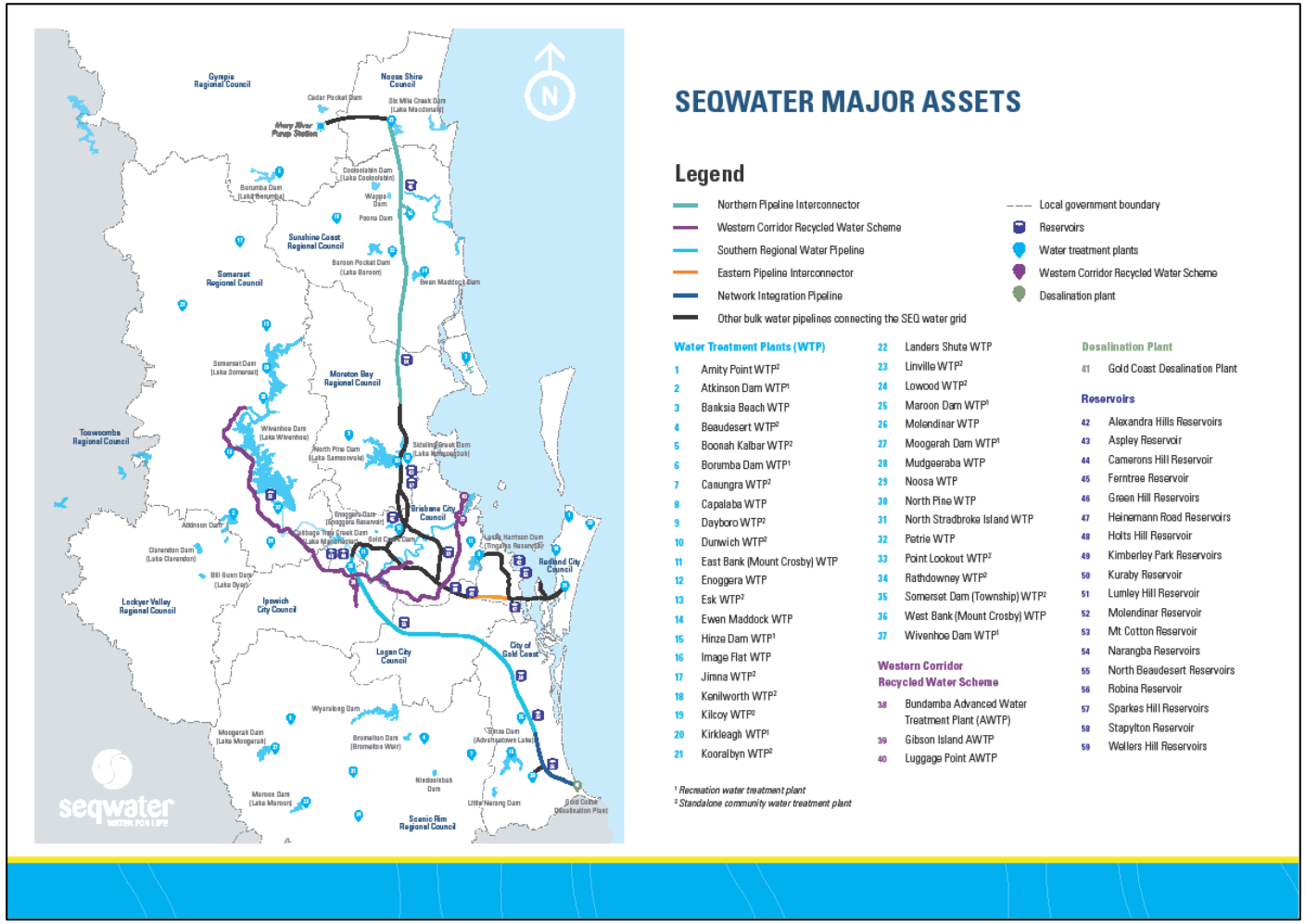

Figure 1 - South East Queensland Water Grid

2.3 Council's Drinking Water Supply Network

An overview of Council's drinking water supply network key features is provided in Table 2, including the number of water supply connections and treated source water.

Table 2 – Overview of the Logan City Council's Drinking Water Supply

Overview	*Description*
City Area	957 square kilometres
City Population	326,615[3]
Population connected to the drinking water supply network	313,019[4]
Seqwater's Primary Water Treatment Plants (WTP) & respective water catchments[5].	Mt Crosby (Wivenhoe Dam via Brisbane River), North Stradbroke Island (North Stradbroke Island Bores), Capalaba (Tingalpa Dam), Molendinar (Hinze Dam), Gold Coast desalination plant (seawater off Tugun, Gold Coast)
Bulk Supply Points (transfer points)	**1.** Compton Road meter via Kuraby Reservoir inlet main; **2.** Trinder Park pump station via Kuraby Reservoir; **3.** Eastern Pipeline Interconnector (EPI) supply via Kimberly Park Reservoir; **4.** Southern Regional Water Pipeline (SRWP) supply via Teviot Road Offtake; **5.** SRWP supply via New Beith Offtake (Pub Lane offtake); and **6.** Gold Coast Supply via Stanmore Pump Station (contingency supply only).

2.4 Drinking Water Disinfection

The Australian Drinking Water Guidelines (ADWG) emphasise the importance of preventing microbial contamination of the drinking water supply. An effective way to achieve this is by chemical disinfection, such as chlorination. Disinfection may kill or inactivate a wide range of harmful micro-organisms, and has been used in the water industry for over 80 years.

Council manages and controls disinfectant levels within the drinking water network in accordance with our approved Drinking Water Quality Management Plan.

Key features of Council's disinfection program include:

- Either chloramine or chlorine can be used as the disinfectant;
- Operation of secondary disinfection facilities (i.e. boosters and breakpoint dosing facilities) to consistently maintain optimal levels of disinfectant throughout the network;
- Constant management and control of effective disinfectant levels throughout its network, which aims to maintain levels between 0.2 and 2 mg/L (mg/L = parts per million). This is

[3] Source: Logan City Council Community Profile (https://profile.id.com.au/logan/home)

[4] Population and demand forecast information, based on current Desired Standards of Service (DSS) and adopted Infrastructure Demand Model (IDM), current as of 24/10/2019.

[5] This refers to the Seqwater WTPs that may commonly supply Logan City Council water supply network only. For information on all of the Seqwater WTPs please visit www.seqwater.com.au

sufficient to protect customers against most microbial contaminants of concern, and may assist to maintain the cleanliness of the network; and

- Extensive monitoring of disinfectant levels within the water supply and monitoring of Escherichia coli (*E. coli*) to confirm that disinfection is effective.

E. coli monitoring is used in the water industry as an indicator of recent faecal contamination of the water supply. Of itself, a positive *E. coli* detection does not necessarily indicate that the water supply is unsafe.

However, as human pathogens are often associated with faecal contamination, it is likely that if pathogens were present that *E. coli* would also be detected.

If Council detects *E. coli* within the water supply network an incident is declared and immediate corrective action is taken to protect public health.

2.5 Council's Drinking Water Supply Zones

Council operates six defined Water Supply Zones (WSZ). A WSZ can be defined as an area of the water distribution network with shared bulk water supply sources. The next level of categorisation below WSZ are the Water Quality Zones (WQZ). WQZ share the same disinfectant type (i.e. chloramine or chlorine). These categories are used when undertaking medium to long term water quality trend analysis and regulatory reporting.

A summary of Council's suburbs by WSZ is shown in Table 3, under general operating conditions. A summary of both WSZ and WQZ is included in Table 4.

Table 3 – Logan City Council's Water Supply Zones and Associated Suburbs

WSZ	*Main Suburbs*	*Partial Suburbs*
Greenbank	Browns Plains, Boronia Heights, Forestdale Greenbank, Heritage Park, Hillcrest, Park Ridge Regents Park	Berrinba, Chambers Flat, Crestmead, Logan Reserve, Munruben, Park Ridge South
Kimberley Park	Carbrook, Cornubia, Loganholme, Shailer Park, Tanah Merah	Slacks Creek
Marsden	Crestmead, Logan Reserve, Loganlea, Marsden, Meadowbrook, Waterford West	Berrinba, Heritage Park, Kingston, Park Ridge
Springwood	***Springwood High Level Zone*** Priestdale, Rochedale South, Underwood	
	Springwood Low Level Zone Berrinba, Daisy Hill, Eagleby, Kingston, Logan Central Slacks Creek, Springwood, Woodridge	Loganholme, Marsden, Shailer Park, Tanah Merah, Underwood
Logan East	Bannockburn, Bahrs Scrub, Beenleigh, Belivah, Bethania, Edens Landing, Holmview, Windaroo, Waterford, Wolffdene, Mount Warren Park	Eagleby
Logan South	Cedar Grove, Cedar Vale, Chambers Flat, Jimboomba Logan Village, Mundoolun, Munruben, New Beith North Maclean, Park Ridge South, Maclean, Stockleigh, Veresdale Scrub, Woodhill, Yarrabilba	Greenbank

The SEQ water supply network grid, described in Section 2.2, may supply Council from a number of Water Treatment Plants (WTPs) operated by Seqwater. In practice, the vast majority of treated water is supplied from the Mt Crosby WTP. An overview of the Council's supply sources, disinfection type, WQZ and WSZs is provided in Table 4.

Table 4 - Logan City Council Water Source Summary

WSA	WQZ	WSZ	Disinfection Type	Blended	Approximate Water Supply from each Source			
					Mt Crosby (Kuraby)	Mt Crosby (SRWP)	Redland City (EPI)	City of Gold Coast (SRWP)
Logan North	Greenbank	Greenbank	Chlorinated	Yes	85%	10%	-	5%
	Kimberly Park	Kimberly Park	Chloraminated[A]	Yes	90%	-	10%	-
	Marsden	Marsden	Chloraminated[A]	No	100%	-	-	-
	Springwood High	Springwood	Chloraminated	No	100%	-	-	-
	Springwood Low		Chloraminated	No	100%	-	-	-
Logan East	Logan East	Logan East	Chloraminated (winter) Chlorinated (summer)	No	100%	-	-	-
Logan South	Round Mountain	Logan South	Chloraminated (winter) Chlorinated (summer)	Yes	-	90%	-	10%
	Spring Mountain		Chloraminated (winter) Chlorinated (summer)					
	Travis Road		Chlorinated					
	Woodhill		Chlorinated					

^ Chlorinated during Network Maintenance Disinfection Program (generally occurs every 2 years). Also, note that Greenbank (only) is chlorinated permanently from October 2018 onwards.

3 DWQMP IMPLEMENTATION

3.1 Progress in Implementing the Risk Management Improvement Plan

3.1.1 Risk Management Improvement Plan Process

Council strives for continual improvement in Drinking Water Quality Management, in accordance with *Best Practice* Principles. Council's Risk Management Improvement Plan (RMIP) is the key document used to capture opportunities for improvements to reduce contamination risks associated with the supply of drinking water.

Opportunities for improvements are captured in the RMIP and are identified from the following:

- Risk Assessments – *high risks;*
- DWQMP Reviews and Audits – *non-conformances and general improvements;*
- Drinking Water Incidents – *long term actions*; and
- Regulator feedback*.*

To ensure the RMIP is communicated, implemented and monitored for effectiveness, Council conducts annual reviews of the RMIP progress.

3.1.2 Implementation of the RMIP

The following section summarises the progress of the key RMIP actions with details found in Appendix B. This section is categorised according to the 12 element framework of the National Health and Medical Research Council (NHMRC) Australian Drinking Water Guidelines (2011).

During the reporting period, the Drinking Water Quality Operations Team was created. A fundamental responsibility of this team based in the Network Operations Program is facilitate operational implementation water quality projects and initiatives as described in the DWQMP. The team consists of three positions:

- Drinking Water Quality Operations Team Leader
- Two Water Quality Field Officers

Relevant staff are made aware of the DWQMP during the key water quality personnel meeting fortnightly to discuss water quality issues. This provided the opportunity to refer to the approved DWQMP and emphasise the importance of using the plan. The meetings are chaired by the Drinking Water Quality Operations Team Leader.

In addition, significant training was undertaken in the following areas:

- Hygienic works practices
- Safe drinking water reservoir design, and maintenance

Over 100 staff members have been trained as part of these two courses. Both courses contained general awareness information about the DWQMP and how it relates to our personal responsibilities to maintain safe drinking water for the community.

In addition, internal audit presentations to management also included a DWQMP awareness component. These presentations were attended by stakeholders from across the business, and management.

Element 1 – Commitment to Drinking Water Quality Management

Action Status:

- The current Drinking Water Quality Policy Statement was reviewed during the 2018-19FY. A copy of the current policy is included in Appendix A. In particular, the new policy reflects Logan City Council's commitment to training our staff and contractors in best practice water quality management techniques.

  Logan City Council will [sic]:

  '*Ensure our staff, delivery partners and contractors have appropriate skills and knowledge by providing ongoing training and industry best practice resources*'

Element 2 – Assessment of the Drinking Water Supply System

Action Status:

- Online water quality monitoring systems now have associated alarming via SCADA. Reviews occur via the regular Critical Control Point (CCP) review process.
- Drinking water risk assessments are undertaken for each major system change, such as a new dosing system being planned and commissioned. The next 'whole of system' risk assessment, from catchment to tap, is currently scheduled for February 2020.
- Development of a *Critical Infrastructure Security Plan* commenced during the 2018-19FY, with implementation to commence during the 2019-20FY. This project includes assessment and improvement of Council's reservoir physical security and also cyber security management systems.

Element 3 – Preventative Measures for Drinking Water Quality

Action Status:

- *Dosing Facilities*:

  The commissioning of the Greenbank Chlorine Dosing facility was completed in 2018-19 FY, to enable continuous operation throughout the year, supplying chlorinated water to the entire Greenbank Water Supply Zone. Dosing improvements also included Travis Road, Mundoolun and Woodhill reservoirs, to ensure Council continues to provide safe drinking water to the community.

  The renewal and commissioning of the Woodhill chlorine dosing facility was completed in the 2018-19 FY. This dosing station has the functionality to breakpoint and trim dose chlorine.

- *Improvement in drinking water monitoring:*

  Review of the Critical Control Points (CCPs) process continued during the 2018-19FY, as new dosing systems were commissioned, including improved corrective action reporting.

  This has addressed one of the external audit recommendations.

- *Reservoir renewals*

  The reservoir renewals program continued during 2018-19 FY with improvement works performed at the following reservoir complexes:

  - Greenbank
  - Illaweena
  - Hideaway Mountain
  - Mt Warren Park
  - Travis Road
  - Wuraga Road

- Springwood High Level

The improvements at each site culminated in a general improvement in network operational capability and water quality performance. In addition reservoir security enhancements continued as part of the *Critical Infrastructure Security Plan* development.

These activities will continue during the 2019-20FY at other reservoir sites across the network.

Element 4 – Operational Procedures & Process Control

Action status:

- *Training and procedure implementation*
  - *Hygienic works practices*: Disinfection of tools is well established and operational procedures have been updated to incorporate disinfection of parts, and improved hygiene practises. These actions address the risk of contamination and dirty water ingress during main repairs. Formalised 'Hy5' hygienic work practices training took place during 2018-19FY, with the majority of Council staff who plan, supervise or undertake works on the drinking water network trained. Further training of staff, contractors and delivery partners will occur during the 2019-20 FY
  - *Reservoir design and inspection for water quality:* training was undertaken by over 40 staff including management, operations, asset management and deliver partners, with the aim to prevent contamination through improved design, maintenance and inspection practices. This training was preceded by an independent audit into Council's reservoir inspection and maintenance activities.

The following procedural updates and projects were undertaken during the 2018-19FY:

- Council undertook a review of procedures in relation to recommissioning assets (i.e. network mains & reservoirs) that have been off line for extended periods, which will improve contamination control in these key areas of operation.
- Work continued on implementing the Water Quality database (Aquantify), which will further improve the response time to address ADWG (Health) exceedances, detected during verification monitoring.
- Investigation into a new 'Drinking Water Corrective Action system' continues, including assessment of the Intelex system capabilities.
- Improvements in the development and implementation of a hypochlorite procurement system.

The training, associated procedural updates and reservoir renewal programs (Element 3) will enable safe access to inspect reservoirs, enhance secure storage and delivery of safe drinking water to the community.

Element 5 – Verification of Drinking Water Quality

Action status:

- Council plans to integrate the numerous customer complaint systems into one Customer Relationship Management (CRM) system, likely post implementation of the Strategic Asset Maintenance Management System (SAMMS). Timeline is dependent on whole of Council implementation.

- Improved notification of drinking water health exceedances was implemented, by automating ADWG health limit alerts in Council's Lab Information Management System (LIMS). This has addressed one of the external audit recommendations.
- As part of Aquantify, procedures were developed to assist personnel in the interpretation and corrective actions undertaken in response to adverse water quality results. This includes ADWG (health and aesthetic) limits, as well as internal operation limits.

Element 6 – Management of Incidents & Emergencies

Action status:

- Internal Incident Management Plan training was held in the 2018-19 FY which included an internal incident simulation. This training was facilitated by an external provider.

Element 7 – Employee Awareness & Training

Action status:

- Drinking water awareness training is now captured via the Water Operations certificate training. The DWQMP and *Water Supply (Safety & Reliability) Act 2008* awareness training will continue to be delivered annually to senior staff and management, as part of internal audit review process.
- Formalised and WH&S safety training is well captured however a system to best capture and record 'on-the-job' training is still to be developed.
- Additional to the 'Hy5' hygienic work practices training, drinking water safety awareness training will continue to be developed and implemented across Council's water branches, delivery partners and contractors, during the 2019-20FY.

Element 8 – Community Involvement & Awareness

Action status:

- Council continues to provide drinking water fact sheets and useful drinking water information via the public website (www.logan.qld.gov.au). Examples include updated information on water hardness settings for dishwashers, upcoming network maintenance disinfection works, and our '*Don't Rush to Flush*' campaign. In addition, Council will continue the ongoing development of critical customer notification systems throughout the 2019-20 FY.

Element 9 – Research & Development

Action status:

- To help address long term effective disinfection residual throughout SEQ, a *Disinfection Optimisation Strategy* team was established, including key stakeholders from a number of water service providers including Seqwater and Logan City Council. This specialist team identified two areas within Logan where priority chlorine dosing facilities were required. These were installed during 2018-19 FY.
- Appropriate maintenance scheduling of drinking water assets will be integrated with the new Strategic Asset Maintenance Management System (SAMMS), currently under development. This will continue into the 2019-20 FY. This will also address one of the external audit recommendations.
- Council initiated the commencement to develop a 'Healthy Water Networks framework. The aim is to identify and address key water quality performance challenges faced now and into the future, which will continue during the 2019-20 FY and beyond.

Element 10 – Documentation & Record Keeping

Action status:

- All of Council's DWQMP Annual Reports are displayed on Council's public website.
- A document control system framework is still being investigated, which will continue during the 2019-20 FY, as part of an integrated management system. This will also address one of the external audit recommendations.

Element 11 – Evaluation & Audit

Action status:

- The Process Improvement Team continues to focus on reviewing long term trends and effectiveness of implemented drinking water quality improvement projects. Progress on long-term action status continues, captured in the RMIP.
- Council will continue to aim for best practice by undertaking annual internal audits to help identify non-conformances and opportunities for improvement captured in the RMIP.

Element 12 – Review & Continual Improvement

Action status:

- Aspects of the RMIP have now been integrated into the Business Planning process.
- Identification and management of any new high risks from the whole of system risk assessment and recent audit findings will continue during the 2019-20 FY.

4 VERIFICATION MONITORING – WATER QUALITY INFORMATION AND SUMMARY

4.1 Compliance Summary

To determine drinking water compliance, the verification monitoring program results are assessed against:

- Water quality criteria specified by the Regulator in the Water Quality and Reporting Guideline for a Drinking Water Service;
- Health guideline values in the Australian Drinking Water Guidelines (ADWG) 2011; and
- Drinking water quality criteria from the *Public Health Regulation 2005.*

During the 2018–19 FY there were:

- Six (6) instances of non-compliance with the water quality criteria for Council's verification monitoring program. The six verification monitoring non-compliances are summarised below in Table 5 and described in more detail in Section 50.
- One (1) additional non-compliance, however it was detected during sampling for a network disinfection clean. The one (1) non-verification monitoring non-compliance is described in section 5.1.2.
- And finally, three (3) non-verification drinking water events or detection of a parameters with no water quality guidelines are described in section 5.1.3.

Table 5 - Verification Monitoring Program Non-compliance Events Summary 2018-19 FY

#	Date	Location	WSZ	Parameter	Result	ADWG (health) limit	Units
1	15/10/2018	Illaweena Trunk (DSP029)	*Greenbank*	*E. coli*	12	<1	MPN/100mL
2	16/10/2018	Bamboo Drive, Cedar Vale (DSP004)	*Logan South*	*E. coli*	9	<1	MPN/100mL
3	10/11/2018	Spring Mountain Reservoir (DSP079)	*Logan South*	*E. coli*	2	<1	MPN/100mL
4	17/12/2018	Wuraga Elevated Reservoir (DSP088)	*Logan East*	*E. coli*	31	<1	MPN/100mL
5	04/02/2019	Kimberley Park Elevated Reservoir (DSP033)	*Kimberley Park*	*E. coli*	14	<1	MPN/100mL
6	19/03/2019	Spinebill Drive, Greenbank (DSP047)	*Logan South*	Nickel	0.096	0.02	mg/L

4.2 Monitoring Program Overview

Monitoring of drinking water quality in Logan City is undertaken to:

- Verify drinking water quality meets regulatory requirements;
- Verify the safety of the drinking water along with the effectiveness of the network operation and system integrity;
- Facilitate review of water quality performance; and
- Identify potential emerging water quality issues.

Monitoring during the 2018 – 19 FY was carried out in accordance with Council's current Verification Monitoring Plan (DM#9486600).

4.3 Lab reporting changes

During the 2018-19 FY, there were no changes in reporting methodology implemented with Council's NATA laboratory. The data summary in Appendix A contains the current maximum and minimum values.

4.4 Data Analysis Methodology

Table 6 summarises the methodology employed to analyse the data used in the Water Quality Performance Summary for 2018–19 FY. This methodology is consistent with the ADWG guidance provided on statistical principles (Information sheet 3.3).

Table 6 - Data Analysis Methodology

Data subject	*Methodology*	*Reference*
Outliers	All outliers are included in the analysis.	ADWG information sheet 3.3
Less than values (<)	Less than values (<) are substituted with a value equivalent to half the Limit of Reporting (LOR). For example a result of <1 is considered 0.5 for the purposes of data analysis.	ADWG information sheet 3.3
Data exclusions	Data from repeat samples, project, emergency or investigative sampling are not included in the data analysis.	DEWS Water Quality Reporting Guideline 2010

The summary of water quality data, found in Appendix A, is presented in six separate tables representing each of the six Water Supply Zones (WSZ).

Also included, is a summary of compliance results for *E. coli* undertaken during drinking water verification monitoring. *E. coli* results are also displayed in this report for the whole of Logan City refer to Appendix A (Table 19 and Table 20).

5 NOTIFICATIONS TO THE REGULATOR UNDER SECTIONS 102 AND 102A OF THE ACT

During the 2018-19 FY, there were ten (10) instances where the Regulator was notified under sections 102 and/or 102A of *the Act*.

Notifications include any limits exceeding the ADWG Health Limits or those which may not have exceeded a defined limit, but there was reason to believe public health was potentially at risk.

Upon receipt of ADWG health exceedances, Logan City Council mobilises the Incident Management team and works closely with Qld Health and the DNRM&E to ensure actions undertaken protect public health.

5.1 Notification events reported to the Regulator

Of the ten notifications:

- Six were detected via Council's routine Verification Monitoring program:
  - Five involved the detection of *E.coli* and
  - One involved the detection of nickel.
- Four were non-verification monitoring notifications, drinking water events or detection of a parameter with no water quality guidelines notifications. These included:
  - a Network Disinfection Clean (lead);
  - a Mains Replacement Program and subsequent change of supply direction (Dirty Water); and
  - Two security breaches of drinking water reservoirs.

A summary of the reported events in included in Table 7 and Table 8.

5.1.1 Non-compliant Events - Verification Monitoring Program

Table 7 – Summary of verification program non-compliant events: 2018-19 FY

#	Incident date	Scheme/Location	Parameter/Issue	Preventative Actions
1	15/10/18	Greenbank WSZ/Illaweena trunk sample tap	*E. coli* detection	• Review of standard laboratory and hygienic work practices during all times with sampling team • Trained staff and contractors in hygienic work practices (Hy5s)
2	16/10/2018	Logan South WSZ/Bamboo Drive	*E. coli* detection	• New sample tap installed • Trained staff and contractors in hygienic work practices (Hy5s) • Review of standard laboratory and hygienic work practices during all times with sampling team • Independent Water Quality consultant conducted investigation. Recommendations for improvement are being followed up.
3	10/12/2018	Logan South WSZ/Spring Mountain Reservoir	*E. coli* detection	• Trained staff and contractors in hygienic work practices (Hy5s) • Reservoir roof maintenance • Dosing monitoring and control improvements • Review of reservoir inspections program • Maintenance of roof and guttering to improve reservoir integrity • Training in reservoir design, inspection and maintenance
4	17/12/2018	Logan East WSZ/Wuraga elevated reservoir	*E. coli* detection	• New sample tap installed • Trained staff and contractors in hygienic work practices (Hy5s) • Internal clean and maintenance activities • Dosing monitoring and control improvements • Review of reservoir inspections program • Maintenance of roof and guttering to improve reservoir integrity • Training in reservoir design, inspection and maintenance
5	04/02/2019	Kimberley Park WSZ/Kimberley Park Elevated Reservoir	*E. coli* detection	• Network disinfection clean for the Kimberley Park WQZ. • Trained staff and contractors in hygienic work practices (Hy5s) • Review of reservoir inspections program • Internal clean and maintenance activities • Maintenance of roof and guttering to improve reservoir integrity • Training in reservoir design, inspection and maintenance
6	19/03/2019	Greenbank WSZ/Spinebill Drive	Nickel detection	• Review of materials used for sample tap design and fabrication • Confirmation of sample tap commissioning testing procedures and testing parameters

5.1.2 Non-compliant Events – Non Verification Monitoring

Table 8 - Summary of non-verification monitoring program reportable events: 2018-19 FY

#	Incident date	Scheme/Location	Parameter/Issue	Preventative Actions
1	14//08/2018	Marsden WSZ/Illaweena Reservoir #3	Security breach	• Maintenance activities • Review of reservoir inspections program • Training in reservoir design, inspection and maintenance • Reported to police. • Review of all reservoir sites security and implementation of recommended upgrades as part of the Critical Infrastructure Security Plan (ongoing).
2	17/08/2018	Marsden WSZ/Logan Hospital	Dirty water	• Independent Water Quality consultant conducted investigation. Recommendations for improvement are being followed up. • Governance program improvements • Critical customer procedures reviewed
3	15/10/2018	Greenbank WSZ/Crest Road	Lead detection	• Review of materials used for sample tap design and fabrication • Confirmation of sample tap commissioning testing procedures and testing parameters
4	23/04/2018	Logan East WSZ/Mt Warren Park	Security breach	• Maintenance activities • Review of reservoir inspections program • Training in reservoir design, inspection and maintenance • Reported to police. • Review of all reservoir sites security and implementation of recommended upgrades as part of the Critical Infrastructure Security Plan (ongoing).

6 CUSTOMER COMPLAINTS RELATED TO DRINKING WATER QUALITY

6.1 Community Engagement

Consumer satisfaction is a critical aspect in the verification of drinking water quality. The monitoring and analysis of customer complaints is considered a key part of Logan City Council's (Council) drinking water quality verification program. At all times, Council encourages customers to lodge complaints about their water quality if they feel their drinking water is unsatisfactory or if they believe their health is at risk.

Encouraging customers to lodge complaints establishes a link between the service provider and the customer and may provide a real time indicator of water quality performance.

6.1.1 Key Projects

Council commissioned and upgraded a number of chlorine dosing facilities throughout Logan during the 2018-19 FY. This has resulted in permanent supply of chlorinated water for Greenbank and a number of areas in Logan South which previously had limited protection against microbial contamination. Effective chlorinated water is important to ensure the supply of safe drinking water to protect the public against microbial contamination, especially during the summer months.

As part of informing the community of these changes, a letter-box drop was carried out, which included fact sheets and notifications was also made available via Council's website the social media site.

In addition, a new breakpoint chlorination facility was commissioned in the Logan South WQZ during October 2018. Based in Mundoolun, the CDF supplied free chlorine into the suburb October onwards. Many parts of the Logan South WQZ received chlorinated water for the first time, so the project included a communication strategy to advise customer of changes to their water supply. No customer complaints were received as part of this project.

6.2 Customer Complaints

Customer complaints are closely linked to the performance of the water supply system.

Council aims to:

- Respond directly to the customer making the complaint;
- Investigate the complaint;
- Rectify the condition;
- Address the root cause; and
- Mitigate risks to public health effectively.

During this process, information is collected which assists with future improvement activities. Establishment of this process is crucial in driving Council's process improvement activities.

Council classifies customer complaints according to the following categories:

- Water Quality - Suspected Health
- Water Quality – Appearance
- Water Quality - Taste and Odour

Council received a total of 434 drinking water complaints for the 2018-19 FY, equating to 3.75 complaints per 1000 water connections.

Of the complaint types, Appearance (312) was the highest followed by Taste and Odour (85) and Suspected Health (37).

A breakdown percent of customer complaints by category is shown in Figure 2.

The number of customer complaints received by Council per category for each Water Supply Zone (WSZ) is shown in Figure 3 and Table 9 with complaints per connection shown in Table 10.

The calculation of complaints per 1000 connections allows for comparisons to be made between Water Supply Zones (WSZs). The number of connections is based on the number of properties currently connected to Council's drinking water network by WSZ.

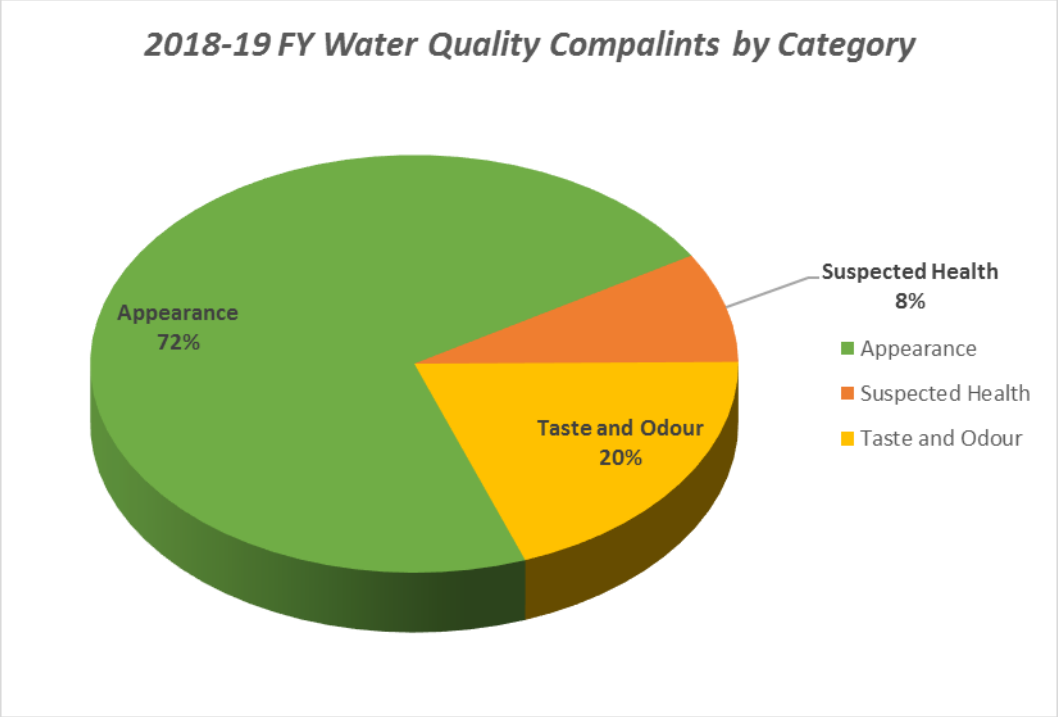

Figure 2 – Water Quality Complaints by Category

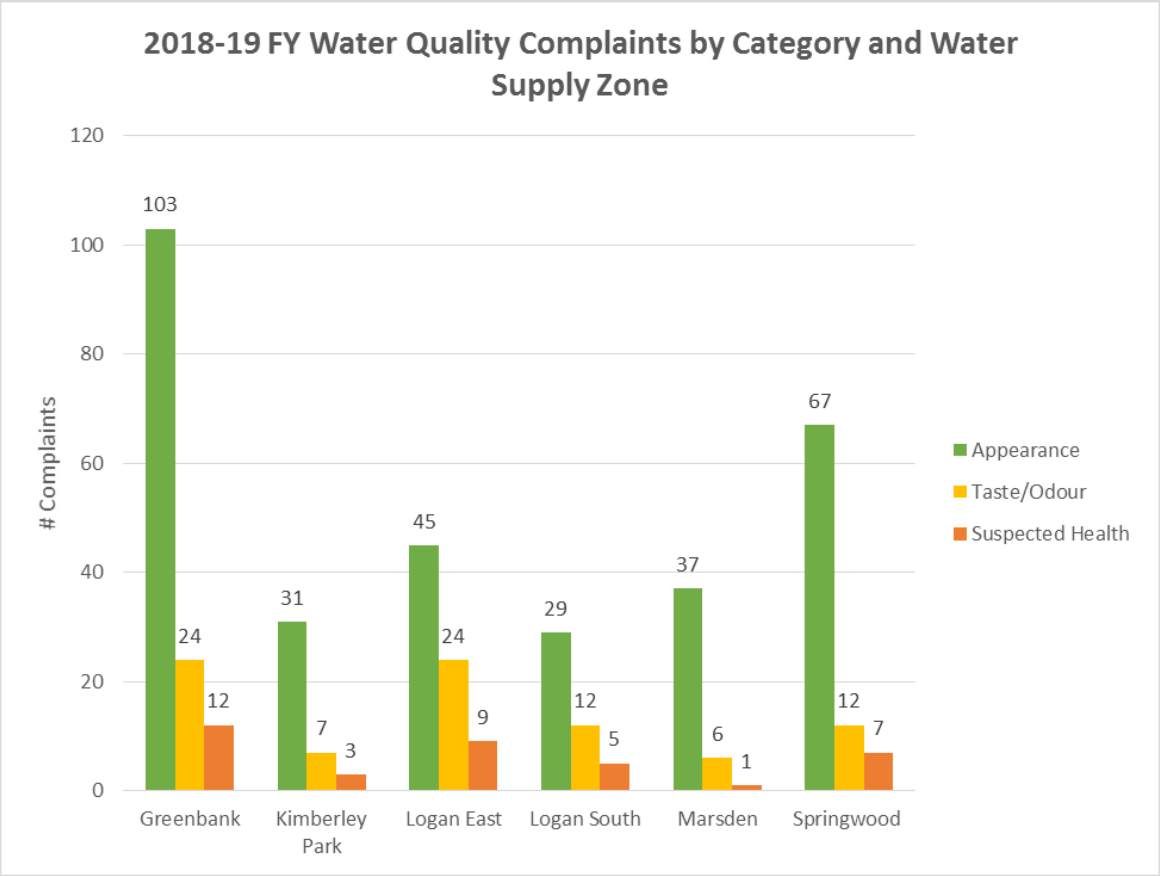

Figure 3 - Water Quality Customer Complaints by Category and Zone

Table 9 - Water Quality Complaints Summary 2018-19FY

2018-19 FY Total Water Quality Complaints				
Water Supply Zone	***Appearance***	***Taste/Odour***	***Suspected Health***	***Total***
Greenbank	103	24	12	139
Kimberley Park	31	7	3	41
Logan East	45	24	9	78
Logan South	29	12	5	46
Marsden	40	6	1	44
Springwood	67	12	7	86
Total	315	85	37	434
% of Total	71.9%	19.6%	8.5%	100%

Table 10 - Water Quality Customer Complaints per 1000 connections

2018-19 FY Customer complaints/1000 connections					
Water Supply Zone	***# Connections[6]***	***Appearance***	***Taste/Odour***	***Suspected Health***	***Total***
Greenbank	17,441	5.91	1.38	0.69	***7.97***
Kimberley Park	9041	3.43	0.77	0.33	***4.53***
Logan East	17,983	2.50	1.33	0.50	***4.34***
Logan South	12,399	2.34	0.97	0.40	***3.71***
Marsden	18,343	2.02	0.33	0.05	***2.40***
Springwood	40,379	1.66	0.30	0.17	***2.13***
All Zones Total	115,586	2.70	0.74	0.32	***3.75***

6.2.1 Suspected Health

Complaints are occasionally received from customers concerned that their drinking water may be causing illness and these are thus categorised as *Suspected Health* complaints.

During the 2018-19 FY, Council received a total of 37 suspected health complaints. Test results confirmed that the drinking water supplied to the customer's homes met the ADWG health related guideline limits and regulated values.

[6] Number of connections based on water connected property GIS layer extracted 24/07/2018.

All complaints were actioned and closed out following appropriate consultation with the customer. No operational changes were implemented as a result of the suspected health complaints during the 2018-19 FY.

Fuel/chemical tasting complaints (i.e. hydrocarbon related) can be received either as a Suspected Health or Taste & Odour complaint. In this report they have been categorised in the Taste & Odour section (Section 6.2.3.3).

6.2.2 Appearance

Appearance of drinking water (*Appearance*) was the most frequently recorded complaint type for the 2018-19 FY reporting period. Of the 434 total complaints received, 315 were related to the appearance of the water (76% of total complaints received).

Greenbank WSZ returned the most *Appearance* complaints (103 complaints, 5.91 complaints per 1,000 connections) representing 33% of all appearance complaints received. Analysis of complaints per 1000 connections showed that Kimberley Park WSZ had the next highest rate of complaints (31 complaints, 3.43 complaints per 1,000 connections), followed by Logan East WSZ (45 complaints, 2.50 complaints per 1,000 connections)

All water *Appearance* complaints received were investigated with the most common remedial action being flushing of water mains.

There are three sub-sets to Appearance, being the following, with further descriptions below:

- Dirty Water;
- Milky and/or White Water; and
- Other (e.g. customer complained water quality was creating streaks on shower recess)

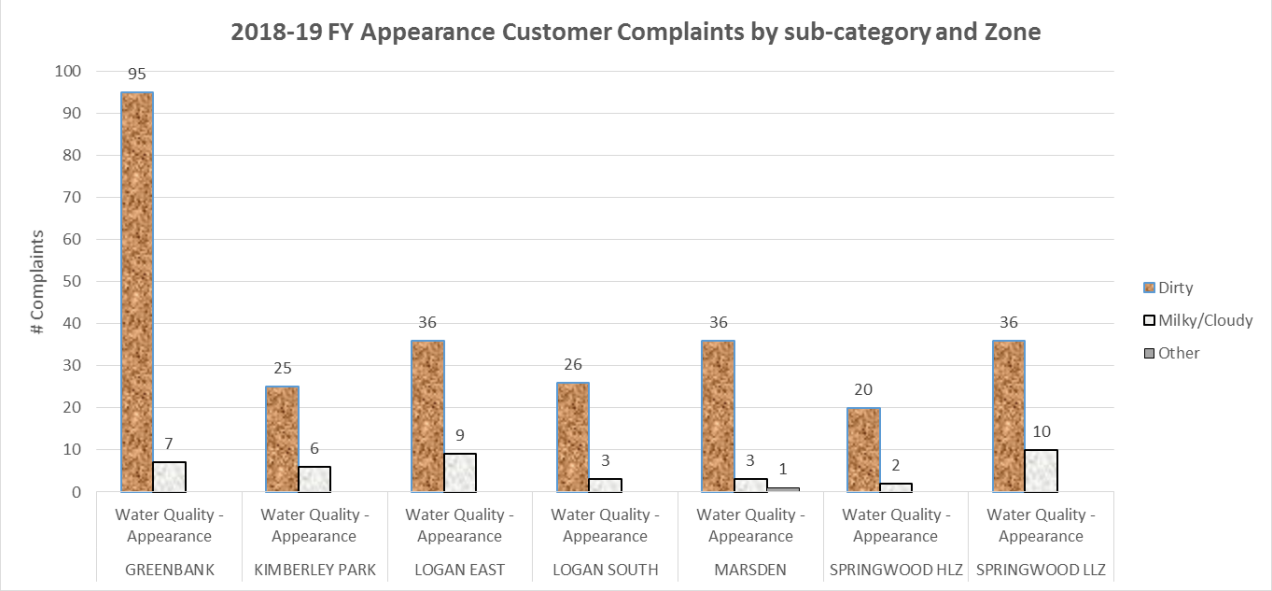

Figure 4 - *Appearance* Customer Complaints by Sub-Category and Zone

6.2.2.1 Dirty Water

Dirty Water is a sub-set of water appearance complaints and is typically associated with brown or turbid water. In total, there were 270 dirty water complaints, contributing to 85% of all *Appearance* complaints.

As can be seen in Figure 4, Greenbank WQZ returned the highest number of dirty water complaints (95). The majority of these occurred after the zone became chlorinated in October 2018. The presence of chlorine in the network created some dirty water which led to increased complaints. Increased flushing helped reduce the dirty water, with proactive routine flushing initiated.

Kimberley Park WQZ network maintenance disinfection project was undertaken from 21 May 2018 – 9 July 2018 (i.e. 9 days within the 2018-19 FY). Only one dirty water complaint was received in that zone during this period. While there is sometimes an increased number of customer complaints during these projects, the benefits in terms of network health and resulting water quality performance are considerable.

The remaining complaints in other zones may be generally related to network configuration reasons (i.e. customers in cul de sacs), unplanned broken mains, or velocity or directional changes in the network flows or main repairs.

Implementation of the Hy5 hygienic work practices program continued during the 2018-19FY. This program includes training on minimising ingress and adequate flushing techniques when working on main repairs (refer to Section 3.1.2 – Element 4). This activity will help reduce dirty water events occurring.

6.2.2.2 Milky and/or White Water

The majority of *Milky and/or White Water* complaints were suspected to be associated with mains repairs, resulting in air in the line.

A total of 40 *Milky and/or White Water* complaints were received during the reporting period, 12.7% of the Appearance complaints.

Springwood WSZ returned the highest number (10) as shown in Figure 4.

As part of the customer complaint management process, complaints lodged by customers for white or milky water are first investigated to see if air entrainment is the cause. This is done by requesting the customer to perform a settling test and observing if the water clears after a defined time period, which resolved the majority of complaints. All complaints that were not rectified by a settling test, had nearby mains flushed along with additional testing undertaken, of which all testing results met all ADWG health requirements

No operational changes were implemented as a result of investigations into these complaints over the 2018-19 FY.

6.2.3 Taste and Odour

Taste and Odour complaints are characterised by an objectionable taste or odour noticed by customers. Typical descriptions from customers include earthy, metallic, chlorine or a chemical / petrol taste in the water. Thus Taste and Odour complaints are generally categorised into the following sub-sets:

- Chlorine;
- Musty / Earthy / Stale; and
- Hydrocarbons / Chemical / Petrol

The third category, *Hydrocarbons / Chemical*, is included to account for water quality complaints where the water reportedly “smells or tastes like petrol or chemicals”. Occasionally, a taste and odour complaint may accompany a claim of illness, thus these complaints are often treated in the same manner as “suspected health” related complaint types.

During the 2018-19 FY reporting period, there were 84 *Taste & Odour* complaints received. **Error! Reference source not found.** shows the Taste and Odour subset complaints per WSZ, with Greenbank WSZ having the highest number of complaints (28).

All these complaints were attended to and flushed with customers on occasion being supplied bottled water (in the event of a hydrocarbons / chemical / petrol complaint), whilst investigation and remedial activities were undertaken.

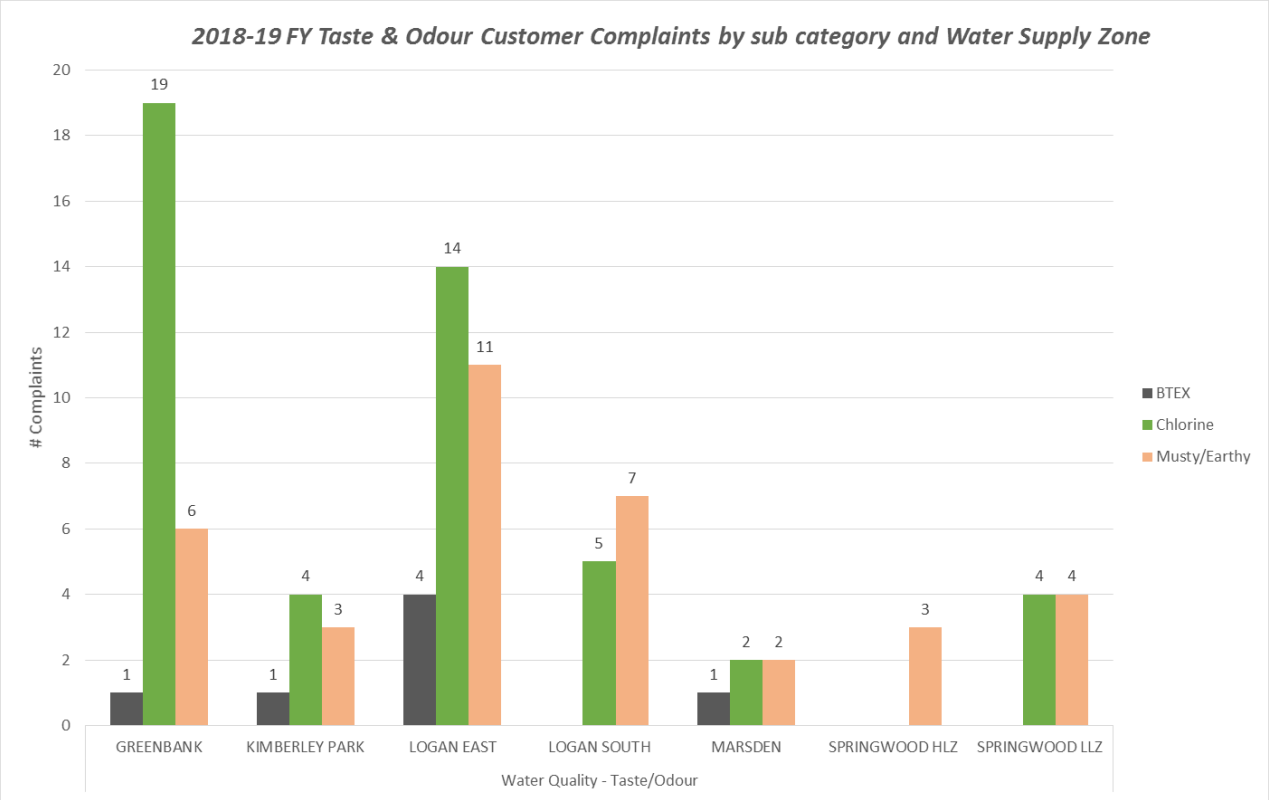

Figure 5 - Taste and Odour Complaints by Sub-Category and Zone

6.2.3.1 Chlorine

While most of Logan City has chloramine as the residual disinfectant, some WQZs have free chlorine in the water as the residual disinfectant all year round. Furthermore, some WQZs may be seasonally chlorinated or chlorinated as part of routine maintenance works (e.g. network disinfection cleaning projects).

When consuming water, customers typically detect chlorine more easily than chloramine. The ADWG advises that customers may notice the taste of chlorine at levels as low as 0.6 mg/L however this will vary between people. The ADWG health limit for chlorine is 5 mg/L (as total chlorine) however Council operates well below this limit. Council aims to manage network chlorine levels which provide customers with safe treated drinking water that is also pleasant to drink.

During the reporting period, 48 of the Taste and Odour complaints were associated with a chlorine taste or odour (52%).

As can be seen in Figure 5, the majority of *Chlorine* complaints were from the Greenbank WSZ (12) followed by Logan East WSZ (10). These chlorine complaints appear to be related to the:

- commissioning of the Greenbank reservoir complex chlorine dosing facility discussed in Section 3.1.2 Element 3; and
- seasonal chlorine disinfection (i.e. summer breakpoint) activities in the Logan East WSZ.

Council considers customer complaints as central to their activities and continues to review their processes to ensure a balance to the aesthetic taste of their water and the supply of safe drinking water.

6.2.3.1 Musty / Earthy / Stale

Musty, Earthy or Stale tasting water can be due to a number of factors including:

- Odours from sink drains being mistaken for odour from taps;
- Stale water in the pipes in areas of low water usage or stale water in residence's pipes when they have been away for a long period; or
- High rainfall in the Seqwater catchment area which can increase the amount of organics and minerals in the raw water which can impact taste even after water treatment.

As shown in Figure 5, the majority of the 36 total *Musty, Earthy or Stale* complaints were from the Logan East WSZ (11), followed by Logan South (7).

All complaints were investigated, where the water quality results analysed, including additional testing met the ADWG health guidelines. In some cases additional flushing was also undertaken.

6.2.3.2 Hydrocarbons / Chemical / Petrol

Whilst not common, residents do occasionally use pesticides or have leaking petrol / oil on their property which seeps through the soil into their service line, contaminating their water supply.

During the 2018-19 FY, Council investigated 7 hydrocarbon / chemical *Taste & Odour* complaints[7]. Investigations were undertaken, including thorough sampling and testing from both Council's water supply to the property and directly from the affected property (i.e. customer's onsite taps), and in some cases neighbouring properties. The 7 complaints were confirmed by laboratory testing as containing the common hydrocarbon chemicals benzene, toluene, ethylbenzene and xylene (commonly referred to as *BTEX*). In each case the results concluded:

- That Council's water supply met ADWG health guideline requirements and there was no detection of hydrocarbons in the water supply to the property; and
- That contamination occurred within the owner's property, impacting their drinking water and exceeding the ADWG limits.

As a result, Council provided the water quality results together with advice on appropriate corrective and preventative actions that should be undertaken, including a fact sheet (How to Avoid Chemical Contamination of Your Water Supply) to all affected customers. This fact sheet can also be found on Council's website. Furthermore Council maintains awareness of good disposal practices through additional fact sheets and as part of the Don't Rush to Flush campaign - '*Don't be a fool when disposing fuel*'. These are also available via Council's website.

No operational changes have been implemented by Council as a result of these complaints.

[7] Please note that all hydrocarbon complaints have been classified 'Taste and Odour' for the purposes of this report (i.e. none are classified in the health complaints category).

7 DRINKING WATER QUALITY MANAGEMENT PLAN REVIEW OUTCOMES

7.1 DWQMP Review

The purpose of the DWQMP review is to ensure that the DWQMP remains relevant and current, with regards to the operation of the drinking water service. In accordance with the requirement of Section 99 (2)(b) and 106 of the Act, Council undertook a review of the approved DWQMP Rev5.3 during the 2018-19FY. This review was based on outcomes from an internal audit and staff internal review to ensure the DWQMP reflected current business and operational systems. The DWQMP was reviewed and amended during the 2018-19FY with submission and approval of the DWQMP Rev5.4 during the 2019-20FY.

Table 11 - DWQMP review outcomes: 2018-19 FY

Review component	Change Details
Service description	Minor updates.
Details of infrastructure	Updated schematics, stakeholders and disinfection descriptions including new dosing systems.
Water quality and catchment characteristics	Minor updates to reflect current supply characteristics.
Risk assessment	No changes. Next whole of catchment risk assessment will occur during 2019-20 FY.
Operations and maintenance procedures	Updated to reflect current procedures.
Management of incidents and emergencies	Updated to reflect current Incident Management Plan and procedures.
Risk management improvement program	Updated to reflect status of actions in current RMIP.
Service wide information management	Minor cosmetic updates.
Operational monitoring	Updated to reflect changes in online monitoring configuration and procedures.
Verification monitoring	Updated to reflect current verification management plan and practices.
Other	Many cosmetic improvements have been made with information being presented more succinctly.

7.2 DWQMP internal audit

An internal audit was conducted on behalf of council on the DWQMP during the 2018-19 FY through the engagement of Bligh Tanner Pty Ltd, who are Exemplar Global certified drinking water quality management system auditors. The auditor submitted the audit report to Council and presented to management and stakeholders on DWQMP awareness and audit findings. The purpose of the audit was to improve the implementation of the DWQMP throughout Council.

The independent auditor found that:

'Overall, LCC has a high level of compliance with their DWQMP, with only technical non-compliances occurring, which can be rectified with either wording changes to the DWQMP, or closer focus on these areas to ensure full compliance.'

During the audit it became apparent to the auditor that staff awareness regarding their roles and responsibilities in implementing the DWQMP was at a high level, and so the audit was able to shift the focus from purely compliance towards process (continual) improvement and implementation improvements. A figure summarising the findings of the audit is included in Figure 6. Table 12 summarises the findings (note that Opportunities for Improvement and Non-conformances are only included – compliant items are not).

A management and stakeholder presentation of the audit outcomes occurred after the audit. Opportunities for Improvement and non-compliances were assessed and if they were not already being addressed by existing activities, they were assigned and communicated to relevant responsible task owners.

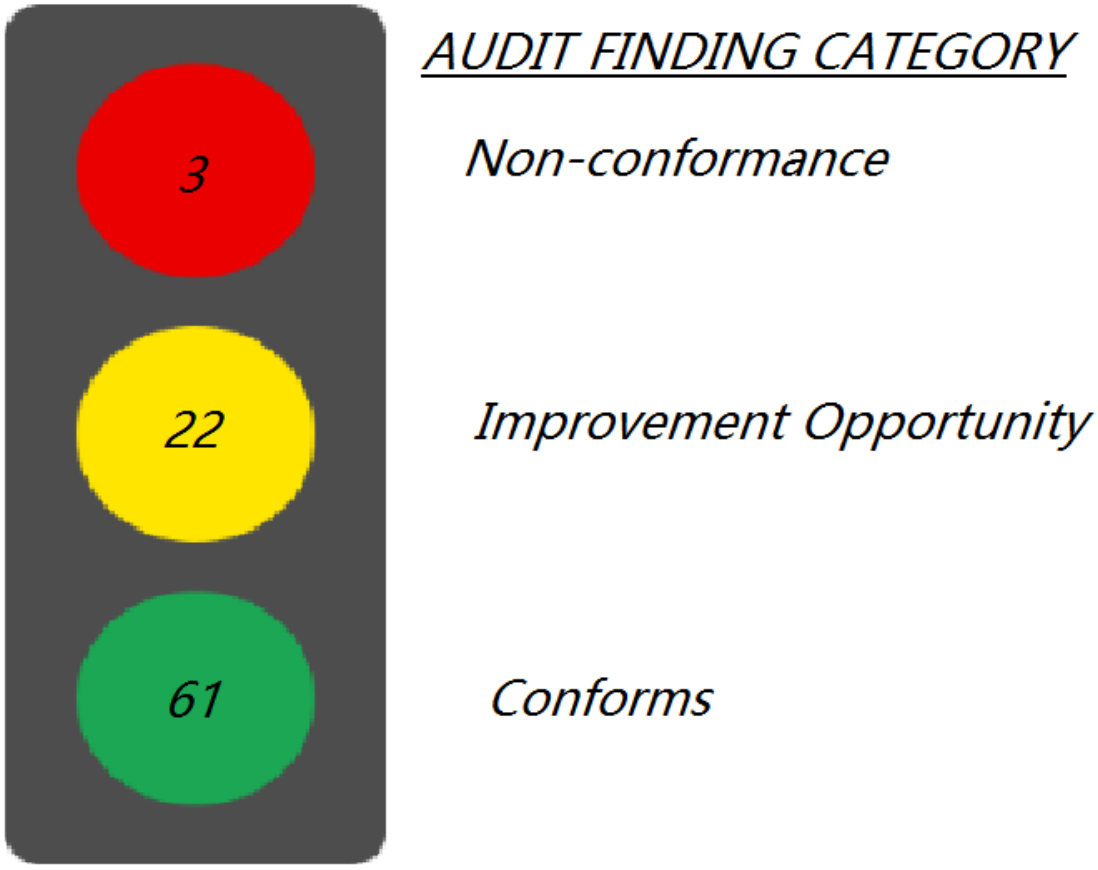

Figure 6 - Summary of findings from the internal audit conducted during 2018-19 FY

Table 12 – DWQMP review outcomes[8]

Item reference #	Finding Category	Findings	Outcomes	Status of actions
Element 1 – Commitment to Drinking Water Quality Management				
1.2 **1.4**	Improvement Opportunity	1. Policy is outdated. 2. Council may consider including key water quality statements in position descriptions	1. Policy updated and endorsed by management. Displayed in key areas throughout the business and updated on Council website 2. Council is considering recommendation number 2.	1. Completed 2. Ongoing
1.7	Improvement Opportunity	Develop appropriate mechanisms and documentation for stakeholder commitment and involvement.	1. Governance process related to planned works projects was reviewed and improved. This includes a significant stakeholder engagement component, especially with critical customers	1. Completed
Element 3: Preventive Measures for Drinking Water Quality Management				
3.6 **3.7.5**	Improvement Opportunity	1. Need to better clarify which CCP limits apply and when they apply to operating chlorine dosing facilities. 2. Need to ensure onsite limits programmed into SCADA are consistent with what is written in the CCP	1. CCP charts reviewed and updated to indicate when CCP limits apply (allows for seasonal operation of dosing facilities) 2. CCPs have been updated and the updated versions are being implemented amongst the business. SCADA limits have been programmed to align with reviewed CCP limits	1. Completed 2. Ongoing
3.7.1 **3.7.3** **3.7.5**	Improvement Opportunity	1. Some rubbish found near reservoir (Springwood Low) 2. Valve key left in valve (remove to prevent unauthorised access)(Springwood Low) 3. Minor maintenance required on roof (Round Mountain) 4. Noted security concerns in area (Round Mountain)	1. Rubbish removed at the time of audit 2. Valve key removed 3. Maintenance performed at time of audit 4. Security Review of all reservoir sites security and implementation of recommended upgrades as part of the Critical Infrastructure Security Plan.	1. Completed 2. Completed 3. Completed 4. Ongoing

[8] Only opportunities for improvement and non-conformances summarised in this table

3.7.4	Improvement Opportunity	1. Access to some roofs of reservoirs is difficult – may hinder effective inspections	1. Reservoir renewal program - reservoir design has been updated to included improved access platforms.	1. Ongoing
Element 4: Operational Procedures and Process Control				
4.1 **9.5**	Improvement Opportunity	SOPs should be developed for all dosing stations Learnings from operators should be documented	1. A project to develop dosing station functional descriptions has been initiated. The functional descriptions developed as part of these are reviewed by Operations and will be handed to them upon completion for ongoing use.	1. Ongoing
4.2 **4.3**	Improvement Opportunity	1. Develop CCPs for reservoir sites 2. Need to improve records of corrective actions performed on analysers	1. Training in reservoir design, inspection and maintenance improved awareness of reservoir integrity issues 2. HACCP implementation project will be initiated in 2019 -20 FY 3. SAMMs project will capture corrective maintenance activities for Network Operations	1. Completed 2. Ongoing 3. Ongoing
4.4	Improvement Opportunity	1. Contract drone operator used for inspections requires basic water quality awareness training	1. Training in reservoir design, inspection and maintenance improved awareness of reservoir integrity issues – Contract drone operator trained as part of program	1. Completed
4.8 **4.9**	Improvement Opportunity	1. Ensure only approved chemicals and materials are used	1. Procedure on chemical procurement developed 2. Procurement process confirms only materials consistent with SEQ Design and Construction Code and Plumbing Code are used	1. Completed 2. Completed
Element 5: Verification of Drinking Water Quality				
5.2	Non-conformance	1. Update DWQ verification monitoring program to document the process around missed samples	1. DWQ verification monitoring plan updated	1. Completed
5.5	Improvement Opportunity	1. Improve works notification process	1. SAMMS implementation improves the visibility of all works 2. City disruptions website available for use by Water Operations and Water Business. Website shows activities in the network	1. Ongoing 2. Completed
5.7	Improvement Opportunity	1. Improve customer complaint process	1. Customer complaint process is undergoing review. Processes have been mapped and improved with roles and responsibilities clarified	2. Ongoing
Element 6: Management of Incidents and Emergencies				
6.4	Improvement Opportunity	1. Improve knowledge and awareness of Incident Management triggers	1. Incident Management training held with numerous stakeholders from across Logan City Council. 2. Representatives from Logan City Council participated in SEQ grid incident training (Exercise Hydra)	1. Completed 2. Completed
Element 7: Employee Awareness and Training				

7.2	Improvement Opportunity	1. Ensure personnel involved in maintaining assets critical to safe drinking water maintain the appropriate experience and qualifications.	1. Creation of Drinking Water Quality Operations Team. Position Descriptions revised and updated	1. Completed
7.4	Improvement Opportunity	1. Training records should be centralised	1. Ongoing improvements in training record management continue	1. Ongoing
Element 10: Documentation and Reporting				
10.1	Improvement Opportunity	1. Include all relevant water operations procedures in DWQMP	1. Reviewed and approved version of the DWQMP contains complete list of relevant procedures	1. Complete
10.2 **10.4**	Improvement Opportunity/Non-conformance	1. Improve document control practices 2. Review documents in accordance with review cycles	1. Creation of an Integrated Management System team has commenced. This team will assist the business to meet document control requirements	1. Ongoing
Element 12: Review and Continual Improvement				
12.3.1	Non-conformance	1. Review and improve current system to address RMIP actions in a timely manner 2. Develop a comprehensive continuity plan for reservoir shutdown	1. Development of a RMIP action dashboard to be regularly presented to management and stakeholders is underway 2. Project underway to develop reservoir continuity, including ability to take reservoirs offline to maintain and in the event of an incident	1. Ongoing 2. Ongoing

8 DRINKING WATER QUALITY MANAGEMENT PLAN AUDIT FINDINGS

No external regulatory audit was conducted during the reporting period 1/7/18 to 30/6/19.

Council is required to undertake an external regulatory DWQMP audit within 4 years of an approved DWQMP. Council's DWQMP was originally approved December 2013, which has had several amendments since then. The last external regulatory audit was undertaken of the DWQMP Rev 5.2 during the 2016-17FY with the next external regulatory audit due 30th June 2021[9].

[9] It should be noted that Council conducts internal audits on the implementation of the DWQMP on an annual basis. These non-regulatory audits have been conducted by an independent and highly experienced DWQMP auditor. This is aligned with Council's commitment to best practice drinking water management.

APPENDIX A - SUMMARY OF COMPLIANCE WITH WATER QUALITY CRITERIA

The results from the verification monitoring program have been assessed against the water quality criteria specified by the Regulator in the Water Quality and Reporting Guideline for a Drinking Water Service. The reporting period was 1st July 2018 – 30th June 2019 (2018 – 19 FY). A summary of performance by Water Quality Zone is included on the proceeding pages.

Please refer to Section 4.2 for further descriptions of the monitoring program regime and statistical analysis principles adopted for the analysis.

Reticulation Verification Monitoring

Table 13 – Greenbank water quality zone verification monitoring summary

Greenbank Water Quality Zone														
#	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA (HEALTH)	MIN	MAX	MEAN	95th PERCENTILE	AUSTRALIAN DRINKING WATER GUIDELINE (HEALTH)	MET ADWG HEALTH LIMIT	LOR	LABORATORY NAME
MICROBIAL														
1	*E. coli*	MPN/100mL	WEEKLY	272	1	**1**	<1	12	<1	<1	<1	✓c	1	LCC
2	Heterotrophic Plate Count	CFU/mL	WEEKLY	185	8	0	<10	170	<10	<10	a	a	10	LCC
3	Total Coliforms	MPN/100mL	WEEKLY	272	10	0	<1	54	<1	<1	a	a	1	LCC
CHEMICAL / PHYSICAL														
4	Alkalinity as CaCO3	mg/L	Each Period	36	36	0	86	97	92	96	a	a	1	LCC
5	Aluminium, Total	mg/L	Each Period	63	63	0	0.03	0.16	0.07	0.10	a	a	0.01	LCC
6	Ammonia-N	mg/L	Each Period	185	50	0	<0.1	0.3	0.1	0.2	a	a	0.1	LCC
7	Arsenic, Total	mg/L	Each Period	63	56	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
8	Barium, Total	mg/L	Each Period	63	63	0	0.025	0.035	0.030	0.034	2	✓	0.001	LCC
9	Beryllium, Total	mg/L	Each Period	63	0	0	<0.001	<0.001	<0.001	<0.001	0.06	✓	0.001	LCC
10	Bismuth	mg/L	Each Period	63	1	0	<0.001	0.001	<0.001	<0.001	a	a	0.001	LCC
11	Boron, Total	mg/L	Each Period	63	63	0	0.03	0.04	0.03	0.04	4	✓	0.01	LCC
12	Cadmium, Total	mg/L	Each Period	63	0	0	<0.001	<0.001	<0.001	<0.001	0.002	✓	0.001	LCC
13	Calcium Hardness	mg/L	Each Period	63	63	0	62	72	67	71	a	a	1	LCC
14	Calcium, Total	mg/L	Each Period	63	63	0	25	29	27	28	a	a	1	LCC
15	Chloride	mg/L	Each Period	63	63	0	54.3	130.0	72.0	83.0	a	a	0.1	LCC
16	Chlorine, Free	mg/L	WEEKLY	272	254	0	<0.05	1.52	0.50	1.24	5	✓	0.05	LCC
17	Chlorine, Total	mg/L	WEEKLY	272	272	0	0.08	2.60	1.11	1.79	5	✓	0.05	LCC
18	Chromium, Total	mg/L	Each Period	63	0	0	<0.001	<0.001	<0.001	<0.001	0.05	✓	0.001	LCC
19	Cobalt, Total	mg/L	Each Period	63	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
20	Colour, Apparent	Hazen	Each Period	63	49	0	<1	46	3	6	a	a	1	LCC
21	Colour, True	Hazen	Each Period	63	1	0	<1	1	<1	<1	a	a	1	LCC
22	Conductivity	µS/cm	Each Period	242	242	0	181	750	485	527	a	a	1	LCC
23	Copper, Total	mg/L	Each Period	63	61	0	<0.001	0.054	0.005	0.020	2	✓	0.001	LCC
24	Fluoride	mg/L	Each Period	63	50	0	<0.1	0.8	0.3	0.7	1.5	✓	0.1	LCC
25	Iron, Total	mg/L	Each Period	63	61	0	<0.003	0.250	0.021	0.063	a	a	0.003	LCC
26	Lead, Total	mg/L	Each Period	63	9	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
27	Lithium, Total	mg/L	Each Period	63	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
28	Magnesium, Total	mg/L	Each Period	63	63	0	12	17	14	16	a	a	1	LCC
29	Manganese, Total	mg/L	Each Period	63	63	0	0.001	0.080	0.005	0.012	0.5	✓	0.001	LCC
30	Molybdenum, Total	mg/L	Each Period	63	63	0	0.001	0.001	0.001	0.001	0.05	✓	0.001	LCC
31	Nickel, Total	mg/L	Each Period	63	9	0	<0.001	0.001	<0.001	0.001	0.02	✓	0.001	LCC
32	Nitrate (NO3-N)	mg/L	Each Period	63	53	0	<0.1	0.5	0.2	0.4	50	✓	0.1	LCC

33	Nitrite (NO2-N)	mg/L	Each Period	63	8	0	<0.1	0.3	<0.1	0.2	3	✓	0.1	LCC
34	pH	pH Units	Each Period	241	241	0	7.4	8.4	7.8	8.0	a	a	1	LCC
35	Potassium, Total	mg/L	Each Period	63	63	0	3	4	3	4	a	a	1	LCC
36	Selenium, Total	mg/L	Each Period	63	0	0	<0.01	<0.01	<0.01	<0.01	0.01	✓	0.01	LCC
37	Sodium, Total	mg/L	Each Period	63	63	0	34	51	44	49	a	a	1	LCC
38	Sulphate	mg/L	Each Period	63	63	0	18	46	26	29	a	a	1	LCC
39	TDS, Calculated	mg/L	Each Period	173	173	0	110	455	291	317	a	a	1	LCC
40	Temperature	˚C	WEEKLY	272	272	0	16.8	31.7	24.5	30.0	a	a		LCC
41	Thallium, Total	mg/L	Each Period	63	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
42	THM Total	mg/L	Each Period	171	171	0	0.05	0.21	0.13	0.17	0.25	✓	0.02	LCC
43	Total Hardness	mg/L	Each Period	63	63	0	110	138	124	134	a	a	1	LCC
44	Turbidity	mg/L	Each Period	241	8	0	<0.5	16.0	0.4	<0.5	a	a	0.5	LCC
45	Zinc, Total	mg/L	Each Period	63	2	0	<0.01	0.01	<0.01	<0.01	a	a	0.01	LCC

a - An Australian Drinking Water Guidelines 2001 health guideline does not exist for this parameter

b - Temperature does not have a limit of reporting

c - *The Public Health Regulation 2005* requires that at least 98% of samples contain no *E. coli* over a 12 month period

Table 14 – Kimberley Park water quality zone verification monitoring summary

Kimberley Park Water Quality Zone														
#	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA (HEALTH)	MIN	MAX	MEAN	95th PERCENTILE	AUSTRALIAN DRINKING WATER GUIDELINE (HEALTH)	MET ADWG HEALTH LIMIT	LOR	LABORATORY NAME
MICROBIAL														
1	*E. coli*	MPN/100mL	WEEKLY	180	1	**1**	<1	14	<1	<1	<1	✓c	1	LCC
2	Heterotrophic Plate Count	CFU/mL	WEEKLY	122	17	0	<10	300	13	54	a	a	10	LCC
3	Total Coliforms	MPN/100mL	WEEKLY	180	6	0	<1	130	<1	<1	a	a	1	LCC
CHEMICAL / PHYSICAL														
4	Alkalinity as CaCO3	mg/L	Each Period	24	24	0	43	94	86	92	a	a	1	LCC
5	Aluminium, Total	mg/L	Each Period	45	45	0	0.03	0.09	0.06	0.08	a	a	0.01	LCC
6	Ammonia-N	mg/L	Each Period	122	39	0	<0.1	0.2	<0.1	0.2	a	a	0.1	LCC
7	Arsenic, Total	mg/L	Each Period	45	39	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
8	Barium, Total	mg/L	Each Period	45	45	0	0.007	0.034	0.028	0.033	2	✓	0.001	LCC
9	Beryllium, Total	mg/L	Each Period	45	0	0	<0.001	<0.001	<0.001	<0.001	0.06	✓	0.001	LCC
10	Bismuth	mg/L	Each Period	45	0	0	<0.001	0.001	<0.001	<0.001	a	a	0.001	LCC
11	Boron, Total	mg/L	Each Period	45	45	0	0.01	0.04	0.03	0.04	4	✓	0.01	LCC
12	Cadmium, Total	mg/L	Each Period	45	0	0	<0.001	<0.001	<0.001	<0.001	0.002	✓	0.001	LCC
13	Calcium Hardness	mg/L	Each Period	45	45	0	47	75	66	74	a	a	1	LCC
14	Calcium, Total	mg/L	Each Period	45	45	0	19	30	26	30	a	a	1	LCC
15	Chloride	mg/L	Each Period	45	45	0	21.0	89.6	64.0	76.3	a	a	0.1	LCC
16	Chlorine, Free	mg/L	WEEKLY	180	102	0	<0.05	1.25	0.14	0.70	5	✓	0.05	LCC
17	Chlorine, Total	mg/L	WEEKLY	180	179	0	<0.05	1.92	0.68	1.63	5	✓	0.05	LCC
18	Chromium, Total	mg/L	Each Period	45	4	0	<0.001	0.001	<0.001	0.001	0.05	✓	0.001	LCC
19	Cobalt, Total	mg/L	Each Period	45	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
20	Colour, Apparent	Hazen	Each Period	45	39	0	<1	5	2	4	a	a	1	LCC
21	Colour, True	Hazen	Each Period	45	1	0	<1	1	<1	<1	a	a	1	LCC
22	Conductivity	µS/cm	Each Period	162	162	0	174	662	466	507	a	a	1	LCC
23	Copper, Total	mg/L	Each Period	45	44	0	<0.001	0.025	0.005	0.015	2	✓	0.001	LCC
24	Fluoride	mg/L	Each Period	45	34	0	<0.1	0.8	0.4	0.8	1.5	✓	0.1	LCC
25	Iron, Total	mg/L	Each Period	45	45	0	0.003	0.057	0.017	0.031	a	a	0.003	LCC
26	Lead, Total	mg/L	Each Period	45	9	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
27	Lithium, Total	mg/L	Each Period	45	4	0	<0.001	0.001	<0.001	0.001	a	a	0.001	LCC
28	Magnesium, Total	mg/L	Each Period	45	45	0	2	16	13	15	a	a	1	LCC
29	Manganese, Total	mg/L	Each Period	45	45	0	0.001	0.009	0.003	0.005	0.5	✓	0.001	LCC
30	Molybdenum, Total	mg/L	Each Period	45	41	0	<0.001	0.001	<0.001	0.001	0.05	✓	0.001	LCC
31	Nickel, Total	mg/L	Each Period	45	4	0	<0.001	0.001	<0.001	0.001	0.02	✓	0.001	LCC
32	Nitrate (NO3-N)	mg/L	Each Period	45	39	0	<0.1	0.7	0.3	0.6	50	✓	0.1	LCC
33	Nitrite (NO2-N)	mg/L	Each Period	45	22	0	<0.1	0.3	0.1	0.3	3	✓	0.1	LCC

34	pH	pH Units	Each Period	162	162	0	7.0	8.1	7.6	7.9	a	a	1	LCC
35	Potassium, Total	mg/L	Each Period	42	42	0	1	4	3	4	a	a	1	LCC
36	Selenium, Total	mg/L	Each Period	45	0	0	<0.01	<0.01	<0.01	<0.01	0.01	✓	0.01	LCC
37	Sodium, Total	mg/L	Each Period	45	45	0	13	47	39	46	a	a	1	LCC
38	Sulphate	mg/L	Each Period	45	45	0	4	30	23	29	a	a	1	LCC
39	TDS, Calculated	mg/L	Each Period	115	115	0	105	402	283	309	a	a	1	LCC
40	Temperature	˚C	WEEKLY	180	180	0	17.1	32.0	23.8	29.8	a	a		LCC
41	Thallium, Total	mg/L	Each Period	45	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
42	THM Total	mg/L	Each Period	74	72	0	<0.02	0.15	0.09	0.13	0.25	✓	0.02	LCC
43	Total Hardness	mg/L	Each Period	45	45	0	54	133	119	133	a	a	1	LCC
44	Turbidity	mg/L	Each Period	162	2	0	<0.5	0.8	<0.5	<0.5	a	a	0.5	LCC
45	Zinc, Total	mg/L	Each Period	45	3	0	<0.01	0.01	<0.01	<0.01	a	a	0.01	LCC

a - An Australian Drinking Water Guidelines 2001 health guideline does not exist for this parameter

b - Temperature does not have a limit of reporting

c - *The Public Health Regulation 2005* requires that at least 98% of samples contain no *E. coli* over a 12 month period

Table 15 – Logan East water quality zone verification monitoring summary

Logan East Water Quality Zone

#	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA (HEALTH)	MIN	MAX	MEAN	95th PERCENTILE	AUSTRALIAN DRINKING WATER GUIDELINE (HEALTH)	MET ADWG HEALTH LIMIT	LOR	LABORATORY NAME
MICROBIAL														
1	*E. coli*	MPN/100mL	WEEKLY	501	1	**1**	<1	31	<1	<1	<1	✓c	1	LCC
2	Heterotrophic Plate Count	CFU/mL	WEEKLY	222	49	0	<10	300	17	118	a	a	10	LCC
3	Total Coliforms	MPN/100mL	WEEKLY	501	29	0	<1	180	2	2	a	a	1	LCC
CHEMICAL / PHYSICAL														
4	Alkalinity as CaCO3	mg/L	Each Period	32	32	0	86	94	90	93	a	a	1	LCC
5	Aluminium, Total	mg/L	Each Period	119	119	0	0.02	0.10	0.06	0.09	a	a	0.01	LCC
6	Ammonia-N	mg/L	Each Period	222	48	0	<0.1	0.2	<0.1	0.2	a	a	0.1	LCC
7	Arsenic, Total	mg/L	Each Period	119	104	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
8	Barium, Total	mg/L	Each Period	119	118	0	<0.001	0.034	0.029	0.033	2	✓	0.001	LCC
9	Beryllium, Total	mg/L	Each Period	119	0	0	<0.001	<0.001	<0.001	<0.001	0.06	✓	0.001	LCC
10	Bismuth	mg/L	Each Period	119	3	0	<0.001	0.001	<0.001	<0.001	a	a	0.001	LCC
11	Boron, Total	mg/L	Each Period	119	119	0	0.03	0.32	0.04	0.04	4	✓	0.01	LCC
12	Cadmium, Total	mg/L	Each Period	119	0	0	<0.001	<0.001	<0.001	<0.001	0.002	✓	0.001	LCC
13	Calcium Hardness	mg/L	Each Period	119	119	0	41	80	68	75	a	a	1	LCC
14	Calcium, Total	mg/L	Each Period	119	119	0	16	32	27	30	a	a	1	LCC
15	Chloride	mg/L	Each Period	119	119	0	17.2	85.1	68.2	80.2	a	a	0.1	LCC
16	Chlorine, Free	mg/L	WEEKLY	501	313	0	<0.05	1.53	0.19	0.85	5	✓	0.05	LCC
17	Chlorine, Total	mg/L	WEEKLY	501	501	0	0.05	2.00	0.58	1.49	5	✓	0.05	LCC
18	Chromium, Total	mg/L	Each Period	119	1	0	<0.001	0.001	<0.001	<0.001	0.05	✓	0.001	LCC
19	Cobalt, Total	mg/L	Each Period	119	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
20	Colour, Apparent	Hazen	Each Period	119	92	0	<1	8	2	4	a	a	1	LCC
21	Colour, True	Hazen	Each Period	119	4	0	<1	1	<1	<1	a	a	1	LCC
22	Conductivity	µS/cm	Each Period	419	419	0	295	794	489	543	a	a	1	LCC
23	Copper, Total	mg/L	Each Period	119	118	0	<0.001	0.090	0.006	0.016	2	✓	0.001	LCC
24	Fluoride	mg/L	Each Period	119	89	0	<0.1	1.2	0.4	0.8	1.5	✓	0.1	LCC
25	Iron, Total	mg/L	Each Period	119	118	0	<0.003	0.088	0.016	0.043	a	a	0.003	LCC
26	Lead, Total	mg/L	Each Period	119	34	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
27	Lithium, Total	mg/L	Each Period	119	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
28	Magnesium, Total	mg/L	Each Period	119	119	0	2	17	13	15	a	a	1	LCC
29	Manganese, Total	mg/L	Each Period	119	119	0	0.001	0.016	0.003	0.006	0.5	✓	0.001	LCC
30	Molybdenum, Total	mg/L	Each Period	119	118	0	<0.001	0.001	0.001	0.001	0.05	✓	0.001	LCC
31	Nickel, Total	mg/L	Each Period	119	10	0	<0.001	0.001	<0.001	0.001	0.02	✓	0.001	LCC
32	Nitrate (NO3-N)	mg/L	Each Period	119	100	0	<0.1	0.8	0.3	0.5	50	✓	0.1	LCC
33	Nitrite (NO2-N)	mg/L	Each Period	119	29	0	<0.1	0.3	<0.1	0.3	3	✓	0.1	LCC

34	pH	pH Units	Each Period	414	414	0	7.0	8.1	7.8	8.0	a	a	1	LCC
35	Potassium, Total	mg/L	Each Period	119	119	0	2	4	3	4	a	a	1	LCC
36	Selenium, Total	mg/L	Each Period	119	0	0	<0.01	<0.01	<0.01	<0.01	0.01	✓	0.01	LCC
37	Sodium, Total	mg/L	Each Period	119	119	0	18	57	43	48	a	a	1	LCC
38	Sulphate	mg/L	Each Period	119	119	0	14	30	25	28	a	a	1	LCC
39	TDS, Calculated	mg/L	Each Period	203	203	0	253	412	293	311	a	a	1	LCC
40	Temperature	˚C	WEEKLY	501	501	0	17.1	32.3	24.5	29.9	a	a		LCC
41	Thallium, Total	mg/L	Each Period	119	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
42	THM Total	mg/L	Each Period	402	402	0	0.06	0.20	0.12	0.18	0.25	✓	0.02	LCC
43	Total Hardness	mg/L	Each Period	119	119	0	49	138	124	135	a	a	1	LCC
44	Turbidity	mg/L	Each Period	414	10	0	<0.5	1.7	<0.5	<0.5	a	a	0.5	LCC
45	Zinc, Total	mg/L	Each Period	119	5	0	<0.01	0.02	<0.01	<0.01	a	a	0.01	LCC

a - An Australian Drinking Water Guidelines 2001 health guideline does not exist for this parameter

b - Temperature does not have a limit of reporting

c - *The Public Health Regulation 2005* requires that at least 98% of samples contain no *E. coli* over a 12 month period

Table 16 – Logan South water quality zone verification monitoring summary

Logan South Water Quality Zone														
#	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA (HEALTH)	MIN	MAX	MEAN	95th PERCENTILE	AUSTRALIAN DRINKING WATER GUIDELINE (HEALTH)	MET ADWG HEALTH LIMIT	LOR	LABORATORY NAME
MICROBIAL														
1	*E. coli*	MPN/100mL	WEEKLY	747	2	**2**	<1	9	<1	<1	<1	✓c	1	LCC
2	Heterotrophic Plate Count	CFU/mL	WEEKLY	449	112	0	<10	300	37	300	a	a	10	LCC
3	Total Coliforms	MPN/100mL	WEEKLY	747	17	0	<1	210	<1	<1	a	a	1	LCC
CHEMICAL / PHYSICAL														
4	Alkalinity as CaCO3	mg/L	Each Period	83	83	0	48	99	87	98	a	a	1	LCC
5	Aluminium, Total	mg/L	Each Period	176	176	0	0.01	0.16	0.07	0.11	a	a	0.01	LCC
6	Ammonia-N	mg/L	Each Period	449	54	0	<0.1	0.2	<0.1	0.1	a	a	0.1	LCC
7	Arsenic, Total	mg/L	Each Period	176	139	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
8	Barium, Total	mg/L	Each Period	176	176	0	0.005	0.035	0.027	0.034	2	✓	0.001	LCC
9	Beryllium, Total	mg/L	Each Period	176	0	0	<0.001	<0.001	<0.001	<0.001	0.06	✓	0.001	LCC
10	Bismuth	mg/L	Each Period	176	5	0	<0.001	0.001	<0.001	<0.001	a	a	0.001	LCC
11	Boron, Total	mg/L	Each Period	176	176	0	0.03	0.11	0.04	0.10	4	✓	0.01	LCC
12	Cadmium, Total	mg/L	Each Period	176	0	0	<0.001	<0.001	<0.001	<0.001	0.002	✓	0.001	LCC
13	Calcium Hardness	mg/L	Each Period	176	176	0	38	82	68	79	a	a	1	LCC
14	Calcium, Total	mg/L	Each Period	176	176	0	15	33	27	32	a	a	1	LCC
15	Chloride	mg/L	Each Period	176	176	0	16.3	93.3	66.4	88.5	a	a	0.1	LCC
16	Chlorine, Free	mg/L	WEEKLY	747	595	0	<0.05	1.77	0.50	1.24	5	✓	0.05	LCC
17	Chlorine, Total	mg/L	WEEKLY	747	737	0	<0.05	2.90	0.94	1.98	5	✓	0.05	LCC
18	Chromium, Total	mg/L	Each Period	176	15	0	<0.001	0.001	<0.001	0.001	0.05	✓	0.001	LCC
19	Cobalt, Total	mg/L	Each Period	176	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
20	Colour, Apparent	Hazen	Each Period	176	132	0	<1	12	2	5	a	a	1	LCC
21	Colour, True	Hazen	Each Period	176	8	0	<1	2	1	<1	a	a	1	LCC
22	Conductivity	µS/cm	Each Period	675	675	0	177	744	470	543	a	a	1	LCC
23	Copper, Total	mg/L	Each Period	176	175	0	<0.001	0.112	0.0039801	0.009	2	✓	0.001	LCC
24	Fluoride	mg/L	Each Period	176	134	0	<0.1	0.9	0.4	0.8	1.5	✓	0.1	LCC
25	Iron, Total	mg/L	Each Period	176	163	0	<0.003	0.140	0.019	0.073	a	a	0.003	LCC
26	Lead, Total	mg/L	Each Period	176	25	0	<0.001	0.007	<0.001	0.001	0.01	✓	0.001	LCC
27	Lithium, Total	mg/L	Each Period	176	5	0	<0.001	0.001	<0.001	<0.001	a	a	0.001	LCC
28	Magnesium, Total	mg/L	Each Period	176	176	0	2	23	12	15	a	a	1	LCC
29	Manganese, Total	mg/L	Each Period	176	167	0	<0.001	0.021	0.004	0.008	0.5	✓	0.001	LCC
30	Molybdenum, Total	mg/L	Each Period	176	150	0	<0.001	0.001	<0.001	0.001	0.05	✓	0.001	LCC
31	Nickel, Total	mg/L	Each Period	176	14	**1**	<0.001	0.096	0.001	0.001	0.02	✓	0.001	LCC
32	Nitrate (NO3-N)	mg/L	Each Period	176	171	0	<0.1	0.7	0.4	0.7	50	✓	0.1	LCC
33	Nitrite (NO2-N)	mg/L	Each Period	176	42	0	<0.1	0.4	<0.1	0.3	3	✓	0.1	LCC

34	pH	pH Units	Each Period	672	672	0	7.3	8.8	8.1	8.4	a	a	1	LCC
35	Potassium, Total	mg/L	Each Period	176	176	0	1	6	3	4	a	a	1	LCC
36	Selenium, Total	mg/L	Each Period	176	0	0	<0.01	<0.01	<0.01	<0.01	0.01	✓	0.01	LCC
37	Sodium, Total	mg/L	Each Period	176	176	0	12	67	42	53	a	a	1	LCC
38	Sulphate	mg/L	Each Period	176	176	0	11	33	24	28	a	a	1	LCC
39	TDS, Calculated	mg/L	Each Period	429	429	0	109	452	276	323	a	a	1	LCC
40	Temperature	˚C	WEEKLY	747	747	0	15.6	33.8	23.7	29.0	a	a		LCC
41	Thallium, Total	mg/L	Each Period	176	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
42	THM Total	mg/L	Each Period	492	492	0	0.03	0.21	0.12	0.18	0.25	✓	0.02	LCC
43	Total Hardness	mg/L	Each Period	176	176	0	47	160	119	138	a	a	1	LCC
44	Turbidity	mg/L	Each Period	672	15	0	<0.5	2.3	<0.5	<0.5	a	a	0.5	LCC
45	Zinc, Total	mg/L	Each Period	176	3	0	<0.01	0.57	<0.01	<0.01	a	a	0.01	LCC

a - An Australian Drinking Water Guidelines 2001 health guideline does not exist for this parameter

b - Temperature does not have a limit of reporting

c - *The Public Health Regulation 2005* requires that at least 98% of samples contain no *E. coli* over a 12 month period

Table 17 - Marsden water quality zone verification monitoring summary

Marsden Water Quality Zone														
#	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA (HEALTH)	MIN	MAX	MEAN	95th PERCENTILE	AUSTRALIAN DRINKING WATER GUIDELINE (HEALTH)	MET ADWG HEALTH LIMIT	LOR	LABORATORY NAME
MICROBIAL														
1	*E. coli*	MPN/100mL	WEEKLY	272	0	0	<1	<1	<1	<1	<1	✓c	1	LCC
2	Heterotrophic Plate Count	CFU/mL	WEEKLY	124	30	0	<10	300	10	41	a	a	10	LCC
3	Total Coliforms	MPN/100mL	WEEKLY	272	4	0	<1	7	<1	<1	a	a	1	LCC
CHEMICAL / PHYSICAL														
4	Alkalinity as CaCO3	mg/L	Each Period	18	18	0	87	98	92	95	a	a	1	LCC
5	Aluminium, Total	mg/L	Each Period	60	60	0	0.03	0.10	0.07	0.09	a	a	0.01	LCC
6	Ammonia-N	mg/L	Each Period	124	98	0	<0.1	0.4	0.1	0.2	a	a	0.1	LCC
7	Arsenic, Total	mg/L	Each Period	60	54	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
8	Barium, Total	mg/L	Each Period	60	60	0	0.026	0.035	0.030	0.034	2	✓	0.001	LCC
9	Beryllium, Total	mg/L	Each Period	60	0	0	<0.001	<0.001	<0.001	<0.001	0.06	✓	0.001	LCC
10	Bismuth	mg/L	Each Period	60	2	0	<0.001	0.001	<0.001	<0.001	a	a	0.001	LCC
11	Boron, Total	mg/L	Each Period	60	60	0	0.03	0.04	0.03	0.04	4	✓	0.01	LCC
12	Cadmium, Total	mg/L	Each Period	60	0	0	<0.001	<0.001	<0.001	<0.001	0.002	✓	0.001	LCC
13	Calcium Hardness	mg/L	Each Period	60	60	0	59	74	66	71	a	a	1	LCC
14	Calcium, Total	mg/L	Each Period	60	60	0	23	30	26	29	a	a	1	LCC
15	Chloride	mg/L	Each Period	60	60	0	35.5	74.7	65.5	73.7	a	a	0.1	LCC
16	Chlorine, Free	mg/L	WEEKLY	272	226	0	<0.05	1.55	0.16	0.42	5	✓	0.05	LCC
17	Chlorine, Total	mg/L	WEEKLY	272	272	0	0.05	2.90	1.29	2.18	5	✓	0.05	LCC
18	Chromium, Total	mg/L	Each Period	60	1	0	<0.001	0.001	<0.001	<0.001	0.05	✓	0.001	LCC
19	Cobalt, Total	mg/L	Each Period	60	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
20	Colour, Apparent	Hazen	Each Period	60	51	0	<1	8	2	4	a	a	1	LCC
21	Colour, True	Hazen	Each Period	60	2	0	<1	1	<1	<1	a	a	1	LCC
22	Conductivity	µS/cm	Each Period	221	221	0	430	835	475	511	a	a	1	LCC
23	Copper, Total	mg/L	Each Period	60	60	0	0.001	0.019	0.006	0.017	2	✓	0.001	LCC
24	Fluoride	mg/L	Each Period	60	41	0	<0.1	0.8	0.3	0.7	1.5	✓	0.1	LCC
25	Iron, Total	mg/L	Each Period	60	58	0	<0.003	0.041	0.015	0.038	a	a	0.003	LCC
26	Lead, Total	mg/L	Each Period	60	29	0	<0.001	0.006	0.001	0.003	0.01	✓	0.001	LCC
27	Lithium, Total	mg/L	Each Period	60	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
28	Magnesium, Total	mg/L	Each Period	60	60	0	12	16	14	15	a	a	1	LCC
29	Manganese, Total	mg/L	Each Period	60	60	0	0.001	0.010	0.003	0.006	0.5	✓	0.001	LCC
30	Molybdenum, Total	mg/L	Each Period	60	60	0	0.001	0.001	0.001	0.001	0.05	✓	0.001	LCC
31	Nickel, Total	mg/L	Each Period	60	10	0	<0.001	0.004	<0.001	0.001	0.02	✓	0.001	LCC
32	Nitrate (NO3-N)	mg/L	Each Period	60	47	0	<0.1	0.8	0.2	0.5	50	✓	0.1	LCC
33	Nitrite (NO2-N)	mg/L	Each Period	60	24	0	<0.1	0.4	0.1	0.3	3	✓	0.1	LCC

34	pH	pH Units	Each Period	221	221	0	7.4	8.3	7.7	7.9	a	a	1	LCC
35	Potassium, Total	mg/L	Each Period	60	60	0	3	4	3	4	a	a	1	LCC
36	Selenium, Total	mg/L	Each Period	60	0	0	<0.01	<0.01	<0.01	<0.01	0.01	✓	0.01	LCC
37	Sodium, Total	mg/L	Each Period	60	60	0	34	46	41	45	a	a	1	LCC
38	Sulphate	mg/L	Each Period	60	60	0	17	28	24	27	a	a	1	LCC
39	TDS, Calculated	mg/L	Each Period	110	110	0	261	507	288	305	a	a	1	LCC
40	Temperature	˚C	WEEKLY	272	272	0	16.1	31.4	23.9	29.5	a	a		LCC
41	Thallium, Total	mg/L	Each Period	60	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
42	THM Total	mg/L	Each Period	84	84	0	0.05	0.13	0.09	0.11	0.25	✓	0.02	LCC
43	Total Hardness	mg/L	Each Period	60	60	0	110	133	123	131	a	a	1	LCC
44	Turbidity	mg/L	Each Period	221	8	0	<0.5	0.6	<0.5	<0.5	a	a	0.5	LCC
45	Zinc, Total	mg/L	Each Period	60	6	0	<0.01	0.06	<0.01	0.02	a	a	0.01	LCC

a - An Australian Drinking Water Guidelines 2001 health guideline does not exist for this parameter

b - Temperature does not have a limit of reporting

c - *The Public Health Regulation 2005* requires that at least 98% of samples contain no *E. coli* over a 12 month period

Table 18 – Springwood water quality zone verification monitoring summary

Springwood Water Quality Zone														
#	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA (HEALTH)	MIN	MAX	MEAN	95th PERCENTILE	AUSTRALIAN DRINKING WATER GUIDELINE (HEALTH)	MET ADWG HEALTH LIMIT	LOR	LABORATORY NAME
MICROBIAL														
1	*E. coli*	MPN/100mL	WEEKLY	363	0	0	<1	<1	<1	<1	<1	✓c	1	LCC
2	Heterotrophic Plate Count	CFU/mL	WEEKLY	163	20	0	<10	300	11	45	a	a	10	LCC
3	Total Coliforms	MPN/100mL	WEEKLY	363	9	0	<1	58	0	<1	a	a	1	LCC
CHEMICAL / PHYSICAL														
4	Alkalinity as CaCO3	mg/L	Each Period	24	24	0	86	95	91	94	a	a	1	LCC
5	Aluminium, Total	mg/L	Each Period	84	84	0	0.03	0.16	0.07	0.09	a	a	0.01	LCC
6	Ammonia-N	mg/L	Each Period	163	114	0	<0.1	0.3	0.1	0.2	a	a	0.1	LCC
7	Arsenic, Total	mg/L	Each Period	84	77	0	<0.001	0.001	<0.001	0.001	0.01	✓	0.001	LCC
8	Barium, Total	mg/L	Each Period	84	84	0	0.022	0.035	0.030	0.034	2	✓	0.001	LCC
9	Beryllium, Total	mg/L	Each Period	84	0	0	<0.001	<0.001	<0.001	<0.001	0.06	✓	0.001	LCC
10	Bismuth	mg/L	Each Period	84	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
11	Boron, Total	mg/L	Each Period	84	84	0	0.03	0.04	0.03	0.04	4	✓	0.01	LCC
12	Cadmium, Total	mg/L	Each Period	84	0	0	<0.001	<0.001	<0.001	<0.001	0.002	✓	0.001	LCC
13	Calcium Hardness	mg/L	Each Period	84	84	0	58	89	67	74	a	a	1	LCC
14	Calcium, Total	mg/L	Each Period	84	84	0	23	36	27	30	a	a	1	LCC
15	Chloride	mg/L	Each Period	84	84	0	43.2	93.3	66.8	77.1	a	a	0.1	LCC
16	Chlorine, Free	mg/L	WEEKLY	363	276	0	<0.05	1.76	0.17	0.43	5	✓	0.05	LCC
17	Chlorine, Total	mg/L	WEEKLY	363	360	0	<0.05	2.80	1.26	2.30	5	✓	0.05	LCC
18	Chromium, Total	mg/L	Each Period	84	2	0	<0.001	0.004	<0.001	<0.001	0.05	✓	0.001	LCC
19	Cobalt, Total	mg/L	Each Period	84	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
20	Colour, Apparent	Hazen	Each Period	84	74	0	<1	60	3	5	a	a	1	LCC
21	Colour, True	Hazen	Each Period	84	6	0	<1	2	<1	1	a	a	1	LCC
22	Conductivity	µS/cm	Each Period	290	290	0	421	822	474	507	a	a	1	LCC
23	Copper, Total	mg/L	Each Period	84	84	0	0.001	0.102	0.012	0.044	2	✓	0.001	LCC
24	Fluoride	mg/L	Each Period	84	61	0	<0.1	0.7	0.3	0.7	1.5	✓	0.1	LCC
25	Iron, Total	mg/L	Each Period	84	82	0	<0.003	1.080	0.038	0.061	a	a	0.003	LCC
26	Lead, Total	mg/L	Each Period	84	18	0	<0.001	0.007	<0.001	0.001	0.01	✓	0.001	LCC
27	Lithium, Total	mg/L	Each Period	84	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
28	Magnesium, Total	mg/L	Each Period	84	84	0	10	16	14	15	a	a	1	LCC
29	Manganese, Total	mg/L	Each Period	84	84	0	0.001	0.025	0.003	0.007	0.5	✓	0.001	LCC
30	Molybdenum, Total	mg/L	Each Period	84	84	0	0.001	0.001	0.001	0.001	0.05	✓	0.001	LCC
31	Nickel, Total	mg/L	Each Period	84	12	0	<0.001	0.001	<0.001	0.001	0.02	✓	0.001	LCC
32	Nitrate (NO3-N)	mg/L	Each Period	84	62	0	<0.1	0.7	0.3	0.6	50	✓	0.1	LCC
33	Nitrite (NO2-N)	mg/L	Each Period	84	26	0	<0.1	0.4	0.1	0.2	3	✓	0.1	LCC

34	pH	pH Units	Each Period	290	290	0	7.3	8.5	7.7	7.9	a	a	1	LCC
35	Potassium, Total	mg/L	Each Period	84	84	0	3	4	3	4	a	a	1	LCC
36	Selenium, Total	mg/L	Each Period	84	0	0	<0.01	<0.01	<0.01	<0.01	0.01	✓	0.01	LCC
37	Sodium, Total	mg/L	Each Period	84	84	0	34	46	41	46	a	a	1	LCC
38	Sulphate	mg/L	Each Period	84	84	0	15	32	25	29	a	a	1	LCC
39	TDS, Calculated	mg/L	Each Period	143	143	0	256	499	286	298	a	a	1	LCC
40	Temperature	˚C	WEEKLY	363	363	0	16.4	34.1	24.1	30.2	a	a		LCC
41	Thallium, Total	mg/L	Each Period	84	0	0	<0.001	<0.001	<0.001	<0.001	a	a	0.001	LCC
42	THM Total	mg/L	Each Period	99	99	0	0.05	0.12	0.09	0.11	0.25	✓	0.02	LCC
43	Total Hardness	mg/L	Each Period	84	84	0	109	135	123	132	a	a	1	LCC
44	Turbidity	mg/L	Each Period	290	22	0	<0.5	21.0	0.5	0.8	a	a	0.5	LCC
45	Zinc, Total	mg/L	Each Period	84	9	0	<0.01	0.03	<0.01	0.01	a	a	0.01	LCC

a - An Australian Drinking Water Guidelines 2001 health guideline does not exist for this parameter

b - Temperature does not have a limit of reporting

c - *The Public Health Regulation 2005* requires that at least 98% of samples contain no *E. coli* over a 12 month period

WATER QUALITY SUMMARY: *E. coli*

Council's verification monitoring performance for key microbial indicator *E. coli* is summarised in Table 1 below.

Table 19 – Whole of Logan region *E. coli* water quality summary

Water Quality Summary: *E.coli*						
MICROBIAL PARAMETER	**UNITS**	**NUMBER OF SAMPLES COLLECTED**	**NUMBER OF DETECTIONS**	**% SAMPLES WHICH MET COMPLIANCE**	**ADWG GUIDELINE (HEALTH)**	**ADWG COMPLIANCE (HEALTH)**
E. coli	MPN/100mL	2335	**5**	99.79%	98.0%	✓[8]

E. coli Verification Monitoring

Table 20 – Logan City Council *E. coli* Verification Monitoring 2018-19

***E. coli* Verification Monitoring**												
WHOLE OF LOGAN CITY - ALL ZONES	**2018-19 FY**											
Month	**Jul'18**	**Aug'18**	**Sep'18**	**Oct'18**	**Nov'18**	**Dec'18**	**Jan'19**	**Feb'19**	**Mar'19**	**Apr'19**	**May'19**	**Jun'19**
No. of samples collected	186	162	144	206	185	183	149	205	188	270	198	194
No. of samples collected in which *E. coli* is detected (i.e. a failure)	0	0	0	**2**	0	**2**	0	**1**	0	0	0	0
No. of samples collected in previous 12 month period	1941	1932	1924	1950	1990	2049	2007	2062	2108	2227	2259	2270
No. of failures in previous 12 month period	4	4	4	6	6	7	7	7	5	5	5	5
% compliance in previous 12 month period	99.79%	99.79%	99.79%	99.69%	99.70%	99.66%	99.65%	99.66%	99.76%	99.78%	99.78%	99.78%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
% compliance for a month	100.00%	100.00%	100.00%	99.03%	100.00%	98.91%	100.00%	99.51%	100.00%	100.00%	100.00%	100.00%

APPENDIX B - IMPLEMENTATION OF THE RISK MANAGEMENT IMPROVEMENT PROGRAM

The Risk Management Improvement Plan (RMIP) summarises the progress of the proposed actions undertaken as part of the current RMIP.

Item No.	Priority (1, 2 or 3)	G-General Improvement (Review or Audit OFI) R-Risk Assesssment NC-Non-conformance(*health exceedance or Audit finding) Regulator requirement®* DWQMP SECTION	ADWG Element & Component Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS COMMENTS (Nov 2019)	PROGRAM LEADER RESPONSIBLE (Branch)	LEAD	TARGET DATE	REVISED TARGET DATE	% COMPLETE (JUN'19)	STATUS Nov-19
												Column1
		E1 : Commitment to Drinking Water Quality Management										
1.01	2	**2.3 (R)**	1.3	LCC not formally notified by Seqwater of high THM experienced in bulk water supply to Gold Coast early 2015. This notification not in current SEQ Operating Protocol hence update required.	**Long Term**: Incorporate THM Notification alert limits for events which may affect LCC with next Operating Protocol update.	**Short Term:** Seqwater will notify LCC of increase changes in THMs as per current GC limits in Operating Protocol - **completed**✓ **Long Term:** LCC has incorporated new THM alerts into updated Operating Protocol accepted by Seqwater **- completed** ✓	Nework Operations Program Leader	Darshan U	Jun-17	Jun-17	100%	**COMPLETE**
1.02_19	3	**G**	1.3	Ensure Policy is reviewed on a regularly basis to remain relevant.	Review and update Drinking Water Policy Statement.	Reviewed & updated to incoporporate training (July 2019) - **completed**✓	All Managers	Natasha G	Jun-19	Jun-19	100%	**COMPLETE**
		E2: Assessment of Drinking Water Supply Systems										
2.00	1	**Res 1.10 Res 1.11 Dis 8.1 Dis 9.1 & 9.2 Net 4.1**	2.3	Backup online chlorine monitoring system required if Seqwater disinfection systems failed (i.e. dosing and monitoring).	Undertake "Online Water Quality Monitoring Strategy" - online instrumentation with SCADA alarms as backup to Seqwater system.	Online Water Quality Monitoring prioritisation - Preliminary Planning & Design and Installation - **completed** ✓ SCADA alarming & validation to be completed 2017/18FY**- completed** ✓	Product Quality Program Leader (Water Business)	Chris PM	Jun-17	Jun-18	100%	**COMPLETE**
2.01_18	2	**Ext Audit (1,8)**		#8 Ensure Risk Assessment maintains currencey. #1 Reservoir Security Plan to consider exceptions, as each site is different.	Undertake whole of system Risk Assessment during 2018/19FY to include exceptions in Reservoir Security Plan and include new hazards to be managed.	a). Listed key hazards to be incorporated into next whole of system risk assessment, including reservoir security (ref. DWQMP) **completed** ✓ b). As part of the Reservoir Security Plan, a corporate risk assessment is scheduled for 2019/20FY. c) A whole of system risk assessment will be scheduled as part of HACCP development & implementation.	Water Product Quality Program Leader (Water Business)	Natasha G	Jun-19	Jun-20	10%	**ON TRACK**
2.02_19a	2	**NC**		There has been evidence of security breaches at a number of reservoir facilities.	a). Develop Infrastructure Security Plan (reservoirs). b). Implement Infrastructure Security Plan (reservoirs).	**NEW** Security cameras installed at key reservoir sites together with development of escalation protocol with key stakeholders.	Water Asset Management Program Leader (Water Business)	Darren Moore (Lee B)	TBC		20%	**NEW**

Item No.	Priority (1, 2 or 3)	G-General Improvement (Review or Audit OFI) R-Risk Assesssment NC-Non-conformance*(health exceedance or Audit finding)* *Regulator requirement®*	ADWG Element & Component	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS COMMENTS (Nov 2019)	PROGRAM LEADER RESPONSIBLE (Branch)		TARGET DATE	REVISED TARGET DATE	% COMPLETE (JUN'19)	STATUS
2.02_19b	2	**R**		Cyber security risks which may affect the Drinking Water Management System	Critical infrastructure Security Upgrades Project (CISUP). This project incorporates the key actions listed in Item no. 2.02_19a above. Specifically, a Cyber security gap analysis is part of the scope of works and also scope to develop implementation plans for the five Cyber security KPIs required to be included as part of the DWQMP annual reports.	Two key stakeholder sessions have been held in October 2019.	Water Asset Management Program Leader (Water Business)	Darren Moore (Lee B)	Jun-21		5%	**NEW**
		Element 3: Preventive Measures for Drinking Water Quality										
3.00	3	**4.1 (G)** **Net 1.1 & 1.2**	3.1	Poor disinfection residual, particularly during Summer periods.	**Strategy & Planning Investigation outcome** to help with implementation of routine network chlorination and chlorine dosing systems as required. Install two chlorine booster stations in Logan East.	CAPEX approved for two booster stations in Logan East 2015/16FY- **completed** ✓ Delivery & construction (end 2016) - **completed** ✓ Commissioned summer **2017/18 - completed** ✓	Water Product Quality Program Leader (Water Business)	Chris PM	Dec-16	May-18	100%	**COMPLETE**
3.01	3	**Net 1.1 & 1.2**	3.1	Poor disinfection residual, particularly during Summer periods.	**Strategy & Planning Investigation outcome** to help with implementation of routine network chlorination and chlorine dosing systems as required. Install chlorination system at Round Mt Reservoir. Requires construction of additional outlet main.	CAPEX approved and planning completed for electro-chlorinator system at Round Mt Reservoir 2015/16FY- **completed** ✓ Constructed & commenced commissioning **Oct'17.** **- completed** ✓	Product Quality Program Leader (Water Business)	Chris PM	Dec-17	Mar-18	100%	**COMPLETE**
3.02	1	**Dis 16.2** **Net 1.1 & 1.2**	3.1	Poor disinfection residual, particularly during Summer periods.	**Implement** LWA 90-12-98 & LWA 90-12-98 Network Water Quality Maintenance & Operating Strategies to help improve network chlorine residual in the network systems. Develop associated Plans (i.e. valving, monitoring, communication, etc) & SOPs. Need to ensure business Plans capture associated costs, as now part of BAU.	Kimberley Park WSZ network disinfection clean - **completed Aug'15** ✓ **(& re-scheduled Aug'17).** Greenbank WSZ network disinfection clean - **completed Sep'16** ✓ Network disinfection cleans scheduled every 2 years alternate for Kimberley Park & Logan North - **completed Jun'17** ✓	Product Quality Program Leader & Senior Water Quality Scientist (Water Business)	Chris PM & Natasha G	Jun-17	Jun-17	100%	**COMPLETE**
3.03	1	**DIS 3.1** **DIS 5.5**	3.2	Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded. Inconsistency of CCP SCADA limits vs CCP chart limits.	**Undertake workshop to ensure CCP limits are relevant, SCADA updated to reflect this and ensure visibility of CCP limits on SCADA.** Associated WOPs to be updated & training undertaken, to ensure effective implementation.	a). CCP & Operational workshops commenced with Logan River breakpoint dosing systems CCP charts & associated SCADA updated **- completed** ✓ b). Remaining dosing CCPs identified & charts developed - **completed** ✓	Water Quality Coordinator (Water Business) & Mech & Elec Operations Program Leader (Water Operations)	Natasha G & Darshan U	Jun-17	Jun-17	100%	**COMPLETE**

Item No.	Priority (1, 2 or 3)	G-General Improvement (Review or Audit OFI) R-Risk Assesssment NC-Non-conformance*(health exceedance or Audit finding)* *Regulator requirement®*	ADWG Element & Component	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS COMMENTS (Nov 2019)	PROGRAM LEADER RESPONSIBLE (Branch)		TARGET DATE	REVISED TARGET DATE	% COMPLETE (JUN'19)	STATUS
3.04	2	**NC** **DIS 3.1** **DIS 5.5** **Ext Audit (2,3)**	3.2	Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded. Inconsistency of CCP SCADA limits vs CCP chart limits.	Undertake workshop to ensure CCP limits are relevant, SCADA updated to reflect this and ensure visibility of CCP limits on SCADA.	a). Dosing site procedure gap analysis tool developed with audit review to commence, including importance of record keeping - **completed** ✓ b). Procedures to be updated & associated training implemented, post procedure audit review - **Re-allocate to Task Brief project and HACCP development (Ref. Item #3.05-19 & #4.25).** c). Undertaken annual audit review of CCP vs SCADA - **completed** ✓	Water Product Quality Program Leader (Water Business)	Natasha G & Denver P	Jun-18	Jun-19	100%	
3.05a_19	2	**NC** **DIS 3.1** **DIS 5.5** **Ext Audit (2,3)**	3.2	Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded. Inconsistency of CCP SCADA limits vs CCP chart limits.	Develop HACCP principles to identify key CCPs and work towards effective implementation.	**NEW**	Water Product Quality Program Leader (Water Business)	Phil W	TBC		**NEW**	**NEW**
3.05b_19	2	**NC** **DIS 3.1** **DIS 5.5** **Ext Audit (2,3)**	3.2	Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded. Inconsistency of CCP SCADA limits vs CCP chart limits.	**Associated CCP WOPs to be updated & training undertaken, to ensure effective record keeping & implementation.** Implement HACCP principles to develop CCP WOPs and associated training to ensure effective record keeping & implementation.	**NEW**	Water Product Quality Program Leader (Water Business)	Phil W	TCB		**NEW**	
		Element 4: Operational Procedures and Process Control										
4.00	1	**5.2 (G)**	4.2 & 9.2	Poor residual disinfection in Marsden and Greenbank water supply zones during Summer periods.	Breakpoint chlorination systems to be instigated at Illaweena & Greenbank Reservoirs - Marsden/Greenbank Water Supply Zone (WSZ) Disinfection Maintenance Program. LWA 90-12-97 Network Water Quality Maintenance Strategy. Once implemented, review effectiveness.	Initial review indicated that routine Network Disinfection Program provided a 50-75% reduction in dirty water customer complaints indicating, generally, greater effectiveness than routine flushing.	Water Product Quality Program Leader (Water Business)	Chris PM & Natasha G	Dec-17	Jun-17	100%	**COMPLETE**

Item No.	Priority (1, 2 or 3)	G-General Improvement (Review or Audit OFI) R-Risk Assesssment NC-Non-conformance*(health exceedance or Audit finding)* *Regulator requirement®*	ADWG Element & Component	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS COMMENTS (Nov 2019)	PROGRAM LEADER RESPONSIBLE (Branch)		TARGET DATE	REVISED TARGET DATE	% COMPLETE (JUN'19)	STATUS
4.02	2	**NC** **Net 4.1**	4.1	Risk Assessment: No formal potable water hygiene practises WOP exists.	Review & potentially develop formal Potable Water Hygiene Practises WOP and incorporate into future inductions and sign off (Staff & Contractors).	Hygiene practises incorporated into WOP as part of document review process to align with 5xC's philosophy **- completed** ✓	Network Maintenance Program Leader & Senior Water Operations Engineer (Water Operations)	Angus H & Murray E	Jun-17	Jun-17	100%	**COMPLETE**
4.02b	2	**NC** **Net 4.1**	4.1	Risk Assessment: No formal potable water hygiene practises WOP exists.	Review & potentially develop formal Potable Water Hygiene Practises WOP and incorporate into future inductions and sign off (Staff & Contractors).	Develop awareness training material and implement hygiene practises training to align with 5xC's philosophy - **completed** ✓ **Implement with the mains break "hands-on" training Ref. 4.03b.**	Network Maintenance Program Leader & Senior Water Operations Engineer (Water Operations)	Angus H & Murray E	Dec-18	Jun-18	100%	**COMPLETE**
4.03a	1	**NC** **Net 4.1**	4.1	Risk Assessment: Need to confirm what flushing system is used when main has been not used for some time and can result in *E.coli* incident if not effectively implemented.	Undertake further **WOP review** in light of incident & internal audit findings: a). Flushing & Scouring of mains; b). Mains Repairs; and c). Minor Works (incl. Sampling Taps).	Further review included "key improvements" to WOPs such as improved valve isolation identification processes, hygiene practises and equipment disinfection, incorporating 5xCs philosophy. Changes communicated via toolbox meetings.	Network Maintenance Program Leader & Senior Water Operations Engineer (Water Operations)	Angus H & Murray E	Mar-17	Mar-17	100%	**COMPLETE**
4.03b	2	**NC** **Net 4.1**	4.1	Risk Assessment & Audit: Need to confirm what flushing system is used when main has been not used for some time, or not effectively disinfected during mains repairs or reporting of significant events, and can result in *E.coli* incident if not effectively implemented.	Develop and **implement "on-the-job" training** for the following WOPs to ensure effective implementation: a). Flushing & Scouring of mains; b). Mains Repairs; and c). Minor Works (incl. Sampling Taps). d). Reporting of 'Events' that could impact customers health.	a). WOPs updated & tool box meetings undertaken regarding revised WOPs - **completed** ✓ b). "On-the-job" training material developed & trailled with supervisors -**completed Aug'18**✓ c). Implementation of "on-the-job" training to be rolled-out during 2018/19FY - **completed May'19**✓	Network Maintenance Program Leader	Murray E & Phil W	Dec-18	May-19	100%	
4.03c	2	**NC** **Net 4.1**	4.1	Risk Assessment & Audit: Need to confirm what flushing system is used when main has been not used for some time, or not effectively disinfected during mains repairs or reporting of significant events, and can result in *E.coli* incident if not effectively implemented.	a). Develop refresher training for Hy5 - internal staff. b). Develop Aquacard requirements - external contractors.	**NEW**	Water Product Quality Program Leader (Water Business)	Phil W	Jun-20		**NEW**	

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4.04	1	**NC** **Net 4.3**	4.1	Risk Assessment: Need to confirm what flushing system is used when mains has been not used for some time and can result in *E.coli* incident if not effectively implemented.	Undertake further WOP review in light of incident: a). Recommissioning assets such as mains that have been out of service for a period (> 4 weeks), including both planned and 'hot standby' due to emergency re-instatement. Includes Flushing & Scouring of mains that have been offline for some time. b). Recommissioning reservoirs that have been out of service for a period (> 4 weeks), including both planned and 'hot standby' due to emergency re-instatement.	a). Recommissioning assets such as mains that have been out of service for a period (> 4 weeks) **- under final review.** b). Recommissioning reservoirs that have been out of service for a period (> 4 weeks) **- under final review.**	Network Operations Program Leader	Murray E & Bhavin	Jun-17	Dec-19	90%	**MONITOR**
4.05b	2	**NC** **Net 4.3**	4.2	Internal audit identified that routine flushing ceased 2014 post Marsden/Greenbank Disinfection project. This was a preventative measure in the previous Risk Assessment hence needs review. Additionally, with network changes since 2012 a review is warranted to identify changed/new hot spots.	Finalise analysis to help develop an appropriate flushing program for hot spots.	Initial analysis, post network disinfection cleans, identified hot spots which continued to experience dirty water complaints, noting a 50-75% reduction in dirty water complaints post network cleans. Flushing program implemented based on known problem areas. **Completed May'19✓.** ***Investigate technologies available (refer***	Network Operations Program Leader	Murray E	2018/19FY	2018/19FY	100%	
4.05c	3	**NC** **Net 4.3**	4.2	Internal audit identified that routine flushing ceased 2014 post Marsden/Greenbank Disinfection project. This was a preventative measure in the previous Risk Assessment hence needs review. Additionally, with network changes since 2012 a review is warranted to identify changed/new hot spots.	Develop framework to ensure drinking water infrastructure (eg Investigate other technologies available for maintaining clean networks).	**NEW** Task brief developed & approved "Healthy Networks Strategy"	Product Quality Program Leader (Water Business)	Troy Kasper	2018/19FY	2018/19FY	NEW	
4.06a	1	**NC**	4.1	There have been a number of non-conformances relating to re-instatement of sampling taps which have either been newly installed or been out of service for some time. **Also refer to Items 4.03, 4.04 & 4.08 which are related.**	Review Verification Sampling Tap installation & repair WOP to ensure disinfection of all parts and best practise Tap design, to minimise contamination risks.	Tap installation process including disinfection of parts, incorporated into Minor Works WOP, to ensure no accidental contamination of parts **Ref 4.03. completed** ✓	Network Operations Program Leader	Murray E	Jun-17	Jun-17	100%	**COMPLETE**
4.06b	1	**NC**	4.1			Investigated best practise Verification Sampling Tap design which is to be incorporated into 2017/18FY CAPEX **completed** ✓	Network Operations Program Leader	Murray E	Jun-17	Jun-17	100%	**COMPLETE**

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4.07	3	**NC**	4.4		Submit CAPEX 2017/18FY Plan for new sampling tap and ensure design to fabricate and install for 2017/18FY.	a). CAPEX submitted - **completed** ✓ b). Installation commenced 2017/18FY with completion expected 2018/19FY- **completed** ✓	Water Product Quality Program Leader (Water Business)	Natasha G, Phil W & Murray E	2017/18FY	Jun-19	100%	
4.08a	2	**NC** **Ext Audit (6)**	4.3	Internal audit identified slow response to alert Water Operations &/or WPQ of unusually high turbidity &/or metals, delaying prompt response to address unexpected events. External audit found inadequate timely reporting of *E.coli* health exceedance to key internal stakeholders. **Ref Item 4.08b - linked.**	a). Review & update procedures to ensure prompt reporting of health exceedance to key internal stakeholders. b). Improve response time from Verification Monitoring to promptly inform Water Operations &/or WPQ of "unusual results" for "lead indicators" such as high turbidity, colour, pH or key metals.	a). Lab systems & procedures updated to ensure prompt reporting of 'health' exceedances and unusual sampling observations - **completed** ✓ **(addressed Ext Audit (6))** b). Key aesthetics parameters to follow including associated procedures. Requires LIMS upgrade to automate. **Notification automation to initiated with WQIMS implementation (Ref. 11.00).**	Water Product Quality Program Leader (Water Business)	Phil W	Dec-17	Jun-20	80%	**ON TRACK**
4.08b	1	**NC**	4.3	There have been two non-conformances relating to re-instatement of sampling taps which have either been newly installed or been out of service for some time. **Also refer to Items 4.03, 4.04, 4.06, 4.07 & 4.08a which are related.**	Investigate formalised drinking water sampling NATA accredication, currently undertaken by NATA accredited laboratory to ensure consistencey & key observations reported.	Sampling proposal submitted to NATA approved.	Product Quality Program Leader (Water Business)	Chris PM	Dec-17	Dec-17	100%	**COMPLETE**
4.09	2	**Net 4.4**	4.4	**2012RMIP (G6)** To reduce the risk of contamination from properties without backflow prevention devices.	**2012RMIP (G6)** Residual project from Allconnex period where exisiting properties were mainly located in Gold Coast areas. Investigate if project still required. Undertake project to identify the unmetered properties & install a meter with backflow prevention (ongoing project).	All new propeties require backflow prevention and there is a regulatory requirement for commercial operations. All new properties are now metered with compliant backflow prevention - **completed** ✓ **Post 2015 amalgamation**	Network Maintenance Program Leader (Water Operations)	Angus H	Jun-14	Jun-18	100%	**COMPLETE**
4.11	2	**5.2 (G)**	4.2	No clear **operational monitoring** program currently in place. Develop and show how to link to **corrective actions** by operations. Also relate to SCADA. Informal operational monitoring occurs as part of the Lab's routine Verification Monitoring program (i.e. HPC, etc) and ad hoc SCADA trend reviews.	Establish Process Improvement team to commence review of medium/long term trends & identify opportunities for improvements. Investigate an integrated Water Information Quality Management System (WQIMS) with links to other systems (i.e. LIMS, SCADA, field data, etc) to enable effective long term trends.	**a).**CCP & OCP reviewed with associated WOP to be developed and implemented. **Action moved to refer to Item 3.05 & 4.25.** b). Implementation will be assisted with the development of Water Quality Information Management Sy+J64stem (WQIMS) which requires development and implementation **Action moved to refer to Item 3.05, 4.25 & 11.** **Pending WQIMS implementation (Ref. 11.00) and TechOne (SAMMS project)**	Product Quality Program Leader (Water Business)	Chris PM	2017/18 FY	Jun-19	100%	

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4.12	3	**5.2 (G)**	4.3	Identify RMIP "none actions" which could impact the Business by RMIP annual review, which includes high risks, internal audit non-conformances and long term actions to address drinking water health incidents.	Establish effective drinking water Corrective Action system with associated responsibilties and WOP to be developed. Consider implementation process across all 3 Water Branches required.	Drinking water health incidents currently managed via IMP, with reporting to Regulator and long term actions captured via RMIP ✓ Intelex recently implemented for WH&S incidents ✓ Commenced development of Intelex Audit tool however delays due to provider Gabba ceased operations. Investigator new provider. **Audit module completed**✓ **Intelex system** investigated as best tool for **Corrective Actions**, including drinking water near miss incidents, to allow for communication trail & status reporting. Investigate coorporate support required **Ref #12.00b**	Product Quality Program Leader (Water Business)	Chris PM	Dec-17	TBC	80%	**MONITOR**
4.15	2	**Res 1.5, 1.6 & 1.7**	4.1 TR	Internal Audit (2013) - large gaps and dirt close to vent holes found at reservoir. Gaps were repaired.	**Long Term:** Develop and implement Reservoir Inspection training to operational staff. Investigate on-going refresher training.	Water Quality Distribution training workshop delivered by QLD Water Directorate, including reservoir inspections **- Jul'15** ✓ "on-the-job" reservoir inspection training undertaken - **Nov'16** ✓ Formalised reservoir inspection training undertaken - **Apr'19 ✓.** Investigate Reservoir Inspection "refresher" training for **2019/20FY.**	Water Quality Coordinator (Water Business)	Natasha G	Dec-17	Jun-20	90%	**ON TRACK**
4.17	1	**NC** **Res 1.5, 1.6 & 1.7** **Res 4.4**	4.4	*E.coli* incidents were a result of poor reservoir condition & design with **low chlorine residual.**	**RESERVOIRS** Trial chlorine tablets as safer alternative to liquid hypochlorite dosing to maintain chlorine residual for smaller reservoirs (short term). Also investigate other alternatives **(see Item 4.24).**	Chlorine tablet trial completed with findings indicating effective for smaller reservoirs, though increased monitoring required if no online system exists.	Product Quality Program Leader & Nework Operations Program Leader (Water Operations)	Darshan U & Chris PM	Dec-16	Mar-17	100%	**COMPLETE**
4.21	1	**NC** **Dis 4.1, 4.2 & 4.3**	4.4	Internal audit review highlighted improvements required in the process to evaluate the quality of chemicals & products supplied (i.e. hypochlorite) to ensure AS4020 compliance, suitable for use in drinking water.	a) Develop new hypochlorite WOP for procurement, which includes quality criteria.	Testing for salt impurities was undertaken as part of Round Mt dosing facility commissioning (salt chlorinator). Draft complteted with sign-off required.	Network Operations Program Leader	Darshan U	Jun-18	Dec-19	95%	**MONITOR**

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4.22	2	**NC** **Dis 4.1, 4.2 & 4.3**		Internal audit review highlighted improvements required in the process to evaluate the quality of chemicals & products supplied (i.e. hypochlorite) to ensure AS4020 compliance, suitable for use in drinking water.	b) Implement new hypochlorite WOP for procurement, which includes quality criteria.	Implementation commenced.	Network Operations Program Leader	Darshan U	Jun-18	Jun-19	95%	
4.23	3	**NC** **Res 1.5 & 1.6**		*E.coli* incident was a result of **poor reservoir condition & design** with low chlorine residual.	CAPEX Asset Renewals Program Reservoir renewals program (roof, hatches, ingress preventation).	Capital Works Asset Renewals Program (*subject to funding to Yr2022)* - Mt Warren Park, Woodhill, Greenbank & Wuraga elevated roof replacement (2017-2019FY) **- completed** ✓ Kimberley Park elevated, Illaweena, Springwood High & Bluff Rd **planned 2019/20FY.**	Water Asset Management Program Leader (Water Business)	Darren M	2017-2022FY	Ongoing	50%	**ON TRACK**
4.24	2	**NC** **Res 1.6** **Res 4.4** **Dis 12.1 & 12.2**	4.4	*E.coli* incident was a result of poor reservoir condition & design with **low chlorine residual.**	Chlorine tablets were trialled however deemed only effective for small reservoirs. Audto dosing system required.	Designed, built and installed new dosing system at Hideaway Mt reservoir. **Completed** ✓	Nework Operations Program Leader	Darshan U	Jun-17	Jun-17	100%	**COMPLETE**
4.25a_19	2	**NC** **DIS 3.1** **DIS 5.5** **Ext Audit (2,3)**	3.2	No clear operational monitoring program currently in place. Develop and show how to link to corrective actions by operations. Also relate to SCADA. Informal operational monitoring occurs as part of the Lab's routine Verification Monitoring program (i.e. HPC, etc) and ad hoc SCADA trend reviews. Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded. Inconsistency of CCP SCADA limits vs CCP chart limits.	**Formalise operational monitoring with training and use of Water Information Management System (WIMS).** Develop function specifications of all exsiting dosing systems and develop associated R&M and operational manuals and system to ensure currency.	**NEW** Task brief approved.	Water Asset Management Program Leader (Water Business)	Natasha G & Darshan U	Jun-18	TBC	**NEW**	
4.25b_19	2	**NC** **DIS 3.1** **DIS 5.5** **Ext Audit (2,3)**	3.2	No clear operational monitoring program currently in place. Develop and show how to link to corrective actions by operations. Also relate to SCADA. Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded. Inconsistency of CCP SCADA limits vs CCP chart limits.	Implement procedures assocaited with R&M and operational manuals.	**NEW** Implementation to commence once #4.25a completed.	Nework Operations Program Leader	Murray E	TCB	TBC	**NOT STARTED**	
		E5: Verification of Drinking Water Quality										

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5.01	3	**6.2 (G)** **6.4 (G)**		Various "disjointed" customer complaint systems exist (i.e. pathways, WWETT, various CM database (emails/letters), etc). Internal audit found incorrect Priority assignment to health related customer complaints in WWETT.	**Short term:** WWETT system developed to replace UMD. **Long term:** investigation is taking place to look at "one" Customer Relationship Management System (CRM) integrated with other systems such as SAMMS.	WWETT system implemented **- completed** ✓ Water Branch CRM system now to be **investigated & developed** as **interim** solution, until SAMMS implemented (limited by Corporate initiatives) - **SAMMS Ref Item 9.02.** Delays as Council wide CRM system now being investigated hence Water Branch investigate interim solution such as Power-BI. **Proposed development & implementation TBC**	Business & Customer Mgt Program Leader (Water Business)	Ben S	Dec-17	2019/20 FY	TBC	**MONITOR**
5.01	1	**Res 1.5** **Res 1.6**	5.2 5.4	Not all reservoirs are included in the Verification Monitoring Program hence no visibility of chlorine residual nor other parameters.	Incorporate all on-line reservoirs into the Verification Monitoring Program.	**Completed**	Senior Water Quality Scientist (Water Business)	Natasha G	Jun-17	Jun-17	100%	COMPLETE
		Element 6: Management of Incidents and Emergencies										
6.03	2	**NC**	6	Audit highlighted requirement for regular review of IMP & associated training requirements.	Update incident response tools website to include *E.coli* incident flow chart and key stakeholder contacts. Ensure IMP review and updates undertaken including training requirements implemented.	Incident response website updated to include additional tools & contact details - **completed** ✓ IMP reivew and associated training undertaken **completed** ✓	Business & Customer Mgt Program Leader (Water Business)	Ben S	Jun-18	Jun-18	100%	**COMPLETE**
		Element 7: Employee Awareness and Training										
7.00	3	**8.1 (G)**	7.1	Internal audit review highlighted that some staff were still unsure of the DWQMP & clarity of Drinking Water Policy.	Develop & deliver DWQMP & Policy awareness/toolbox training to all Water Branch staff and possibly include in future Induction Program.	a). Policy endorsed & displayed.✓ b). Annually awareness training delivered to senior management .✓ c). Investigate DWQMP & Policy awareness training material to be developed & implemented to all Water Branch staff, eventually via inductions. Note: Policy updated 2019 with WPQ to develop material.	Business & Customer Mgt Program Leader (Water Business)	Ben S	2019/20 FY	TBC	20%	**ON TRACK**
7.01	3	**8.1 (G)**	7.2	Recent audit identified external & OH&S training well documented however internal "on-the-job" training is not, to incorporiate employee awareness of drinking water quality management.	Investigate capture of drinking water quality awareness via formalised training, which will be captured via current training systems.	Water Operations certificate training now includes a drinking water quality component.	Network Maintenance Program Leader (Water Operations)	Angus H	TBC	Mar-17	100%	**COMPLETE**

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7.02	3	**8.1 (G)**	7.2	Recent audit identified external & OH&S training well documented however internal "on-the-job" training is not.	Develop and implement appropriate tool to document "on-the-job" training.	An improved software based solution is being considered corporately.	Water Branch Managers	All Managers	Dec'17	TBC	5%	
		Element 8: Community Involvement & Awareness										
8.00	2	**9.2 (G)**	8.2	Limited drinking water quality information currently exists on LCC website, like what some of the other water service providers have. On rare occasions, customers have contaminated their own water supply such as tipping old fuel/chemicals onto their lawn.	Develop and upload on LCC's public website helpful information about drinking water quality such as disinfection type, rainwater tanks, water hardness for dishwashers, avoiding contamination of own water supply.	Useful drinking water quality information for customers has been developed and uploaded onto LCC's website, including Fact Sheets and Frequently Asked Quesiont (FAQ).	Business & Customer Mgt Program Leader & Senior Water Quality Scientist (Water Business)	Ben S & Natasha G	Feb-17	May-17	100%	COMPLETE
		Element 9: Research & Development										
9.01	3	**10.3 (G)**	9.3	Document the design approaches used to ensure appropriate equipment deployed.	Document the design approaches used to ensure appropriate equipment deployed.	Dosing system design standardisation specification commenced. Workshop identified key requirements.✓ Generate task brief to develop.	Product Quality Program Leader (Water Business)	Chris PM	Jun-17	Jun-20	20%	**MONITOR**
9.02	3	**5.4 (G)**	4.4	Recent internal audit found reservoir inspections and cleans were overdue (i.e. 2 yearly cleans up to one year overdue).	Strategic Maintenance Management System (SAMMS) to have effective schedule systems to ensure associated escalations if due dates not met.	The Water Branch as part of the whole of Council's approach to implement **SAMMS** hence timeline dependant on Cooperate progress. Works order management in development to be tested 2018-2020.	Water Asset Management Program Leader (Water Business)	Darren M	Jun-18	Jun-20	85%	**MONITOR**
9.03	2	**NC** **Res 1.12 & 1.13**	4.4	*E.coli* incidents were a result of **poor reservoir condition & design** with low chlorine residual.	**RESERVOIRS** Development of Reservoir Strategy & Functional Specification by LWIA to address appropriate design, asset condition audits, functional specifications and optimal use.	Reservoir Strategy and Function Specification documents developed and adopted.	Water Asset Management Program Leader (Water Business)	Darren M	Mar-17	Jun-17	100%	COMPLETE
9.04a	2	**NC** **Res 1.7 & 1.8**	4.4	*E.coli* incidents were a result of **poor reservoir condition & design** with low chlorine residual.	**RESERVOIRS** LWIA to investigate replacement of Brosnahan reservoir.	Investigation to replace Brosnahan reservoir completed. ✓	Water Asset Management Program Leader (Water Business)	Darren M	Jun-17	May-17	100%	**COMPLETE**

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9.04b	3	**NC** **Res 1.7 & 1.8**	4.4	*E.coli* incidents were a result of **poor reservoir condition & design** with low chlorine residual.	**RESERVOIR** Brosnahan reservoir to be decommissioned and replaced with suitable pumps.	Design for reservoir replacement with new pumps completed. ✓ Reservoir demolition planned 2018/19FY.	Water Asset Management Program Leader (Water Business)	Darren M	Jun-17	Jun-18	100%	**COMPLETE**
9.05a	2	**BUL 1.2 & 1.3** **Res 1.14** **Res 4.1, 4.2 & 4.3** **Dis 2.1, 2.2 & 2.3**	4.4	*E.coli* incidents were a result of poor reservoir condition & design with **low chlorine residual.**	Develop SEQ Disinfection Strategy to investiate long term solution to improve network residuals for Logan.	SEQ Disinfection Strategy developed to investiate long term solution to improve network residuals for Logan.✓ Breakpoint dosing identified for Greenbank reservoir site. ✓	Product Quality Program Leader (Water Business)	Chris PM	Dec-16	May-17	100%	**COMPLETE**
9.05b	3	**BUL 1.2 & 1.3** **Res 1.14** **Res 4.1, 4.2 & 4.3** **Dis 2.1, 2.2 & 2.3**	4.4	*E.coli* incidents were a result of poor reservoir condition & design with **low chlorine residual.**	Implement SEQ Disinfection Strategy long term solution to improve network residuals for Logan.	a). Seqwater engaged consultant to develop delivery package to improve Logan's network residuals. **Complete** ✓ b). Greenbank breakpoint dosing facility designed **Complete** ✓ c). Constructed and commissioned 2018/19FY **Complete** ✓	Product Quality Program Leader (Water Business)	Chris PM	Jun-18	Dec-18	100%	
		Element 10: Documentation & Reporting										
10.00	3	**11.1 (G)** **NC** **Ext Audit (4)**	10.1	Internal audit identified changed or out dated document DM# used. Various doc mgt approaches exist across the various Water Branches since Allconnex dissolution. DWQMP has documented WOPs known to date.	Establish Document Control Framework Principles. Water Ops & Lab have an established but different system.	IMS coordinator recently engaged to develop Intergrated Management system plan (IMS) . ✓ Current Document Control system reviewed with recommendations to be presented to management.✓ Document Control to be further investigated for cost effective solution. Part of IMS functions.	Product Quality Program Leader (Water Business)	Chris PM	Dec-17	2019/20FY	45%	**MONITOR**
10.02	1	**11.2 (G)**	10.2	Public display of DWQMP annual report will be a Regulatory requirement for 2014/15FY onwards.	Upload LCC's DWQMP annual report onto LCC website.	DWQMP Annual Report uploaded to LCC's website.	Business & Customer Mgt Program Leader & Senior Water Quality Scientist (Water Business)	Ben S & Natasha G	Feb-17	May-17	100%	**COMPLETE**
		Element 11: Evaluation of Audit										

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11.00	2	**12.1 (G)**	11.1	Long term data is not fully evaluated or documented.	Establish Process Improvement team to commence review of medium/long term trends & identify opportunities for improvements. Investigate an integrated Water Information Quality Management System (WQIMS) with links to other systems (i.e. LIMS, SCADA, field data, etc) to enable effective long term trends.	a). Process Improvement team established reviewing trends, improvement opportunities & action effectiveness ✓ b). WQIMS tender awarded. Development and implementation required to broaden trend analysis capability.✓ c). Software purchased. Server requirements finalised.✓ d). Stakeholder development commenced with implementation planned for 2018/19FY however delays due to platform system enablement more complex than anticipated.	Product Quality Program Leader (Water Business)	Chris PM	Dec-17	Jun-20	95%	**MONITOR**
11.01	3	**12.2 (G)**	11.2	Internal audit undertaken & presented 2013, however processes for annual audit not yet established.	Establish internal annual audit review process. Investigate use of Intellex system and **WSA-AQuality** audit tool.	Established annual internal audits over next 4 years using external provider ✓ Investigate capacity & capability to undertake internal audits by LCC staff by 2018.✓ Decision to continue to engage external provider to undertake annual internal audits. Ad-hoc audits can be undertaken by internal staff. ✓	Water Quality Coordinator (Water Business)	Natasha G	Jun-18	Jun-18	100%	**COMPLETE**
11.03	2	**12.2 (G)**	11.2	External audit to be undertaken as per Regulator's "condition" of an approved DWQMP.	Arrange external audit & report findings as per Regulator's conditions.	Regulatory external audit was conducted **June 2017**.	Senior Water Quality Scientist (Water Business)	Natasha G	Jun-17	Jun-17	100%	COMPLETE
		Element 12: Review & Continual Improvement										
12.00a	2	**13.1 (G)**	12.1	Identify RMIP "none actions" which could impact the Business by RMIP annual review, which includes high risks, internal audit non-conformances and long term actions to address drinking water health incidents.	Program Leaders responsible to ensure RMIP actions implemented such as incorporation into appropriate Water Branch Plans.	Evidence of some RMIP actions incorporated into Water Branch Plans **- completed** ✓ DWQMP (ADWG Component) facilitators assigned to help Program Leaders facilitate actions **- completed** ✓ Intelex investigated as the most appropriate tool to assist with RMIP action implementation and status reporting **- completed** ✓	Water Branch Managers	Natasha G	Jun-17	Jun-18	100%	**COMPLETE**
12.00b	3	**13.1 (G)** **Ext Audit (7)**	12.1	Identify RMIP "none actions" which could impact the Business by RMIP annual review, which includes high risks, internal audit non-conformances and long term actions to address drinking water health incidents.	Program Leaders responsible to ensure RMIP actions implemented such as incorporation into appropriate Water Branch Plans. Intelex tool to be developed to assist with RMIP status reporting.	Audit & Inspection module development commenced. **Corrective Action intelex module required** once Audit module implemented. Delays - due to Intelex provider ceased operation, continue with current excel system until further notice. Liaise with Corporate stakeholders.	Water Branch Managers	Chris PM	Dec-18	2019/20FY	30%	**MONITOR**

Item No.	Priority (1, 2 or 3)	G-General Improvement (Review or Audit OFI) R-Risk Assesssment NC-Non-conformance*(health exceedance or Audit finding)* *Regulator requirement®*	ADWG Element & Component	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS COMMENTS (Nov 2019)	PROGRAM LEADER RESPONSIBLE (Branch)		TARGET DATE	REVISED TARGET DATE	% COMPLETE (JUN'19)	STATUS
12.01	2	**13.2 (G)**	12.2	Ensure RMIP is kept up to date by incorporating any new actions to address risks identified via risk assessments, incidents or internal audit findings. Communicate and implement improvements, monitoring effectiveness.	Incorporate any newly identified high risks from whole of system Risk Assessment undertaken 2016 into RMIP. Communicate changes with key stakeholders to ensure effective implementation.	**Completed**	Senior Water Quality Scientist (Water Business)	Natasha G	Jun-17	Jun-17	100%	**COMPLETE**
12.02	2	**13.2 (A)**		Ensure RMIP is kept up to date by incorporating any new actions to address risks or non-conformances identified via external Regulagory Audit.	Update RMIP to include actions to address non-conformances from Regulatory Audit and address any outstanding items from Risk Assessment.	RMIP updated.	Water Quality Coordinator (Water Business)	Natasha G	Jun'18	Jun-18	100%	**COMPLETE**
12.03_19	2	**13.2 (A)**		Ensure RMIP is kept up to date by incorporating any new actions to address risks or non-conformances identified via external Regulagory Audit.	Update RMIP to address recommendations from Bamboo Drive *E.coli* Incident and Logan Hospital Dirty Water Event.	**NEW** Meeting with key stakeholders to review recommendations commenced.	Water Quality Coordinator (Water Business)	Natasha G	2019/20FY		NEW	