



# Logan Water

**Drinking Water Quality Management Plan  
Annual report  
2020-21FY**





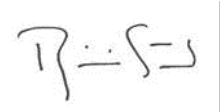
Logan Water is committed to managing its drinking water systems to provide a safe, high quality drinking water supply service that safeguards public health and supports our growing community.

# Document Control

## Document Revision and Modification Control

Date	Authors	Modification/Action	Revision	Key Reviewer	DM Ref#
02/08/2021	Craig Fox-Andrews Matthew Field	Creation/Draft	v1	Craig Fox-Andrews	DM#15194279(Word) DM#15324897(PDF)
10/12/2021	Craig Fox-Andrews Matthew Field	Draft	V2	Phil Wetherell Natasha Georgius	DM#15194279(Word) DM#15324897(PDF)
14/12/2021	Craig Fox-Andrews Matthew Field	Final	V3	Craig Fox-Andrews	DM#15194279(Word) DM#15324897(PDF)

## Final Document Approval for Issue

Date	Approver	Position	Signature
16/12/2021	Ben Steel	Manager Water Service Performance	

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# Notations and Abbreviations

Acronym	Definition
<b>ADWG</b>	Australian Drinking Water Guidelines, 2011. Published by the National Health and Medical Research Council of Australia
<b>AS</b>	Australian Standard
<b>BAU</b>	Business as Usual
<b>CCP</b>	Critical Control Point (as defined by HACCP)
<b>CGC</b>	City of Gold Coast
<b>CIS</b>	Common Information Service
<b>CRM</b>	Customer Relationship Management (system)
<b>DRDMW</b>	Department of Regional Development, Manufacturing and Water
<b>DSS</b>	Desired Standards of Service
<b>DWQMP</b>	Drinking Water Quality Management Plan
<b><i>E. coli</i></b>	Escherichia coliform, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
<b>EPI</b>	Eastern Pipeline Interconnector
<b>ERP</b>	Emergency Response Plan
<b>FY</b>	Financial Year
<b>Grid</b>	South East Queensland Water Supply Network Grid
<b>HACCP</b>	Hazard Analysis Critical Control Point
<b>HLZ</b>	High Level Zone
<b>IDM</b>	Infrastructure Demand Model
<b>IMP</b>	Incident Management Plan
<b>KPI</b>	Key Performance Indicator
<b>LIMS</b>	Laboratory Information Management System
<b>LLZ</b>	Low Level Zone
<b>LOD</b>	Limit of Detection
<b>LOR</b>	Limit of Reporting
<b>LWP</b>	Logan Water Partnership
<b>mg/L</b>	Milligrams per litre
<b>MPN/100mL</b>	Most Probable Number per hundred millilitres
<b>NATA</b>	National Association of Testing Authorities
<b>NMDP</b>	Network Maintenance Disinfection Program
<b>NO-DES</b>	Neutral Output Discharge Elimination System
<b>RMIP</b>	Risk Management Improvement Plan
<b>SAMMS</b>	Strategic Asset Maintenance Management Systems
<b>SCADA</b>	Supervisory Control and Data Acquisition
<b>SEQ</b>	South East Queensland
<b>SOP</b>	Standard Operating Procedure
<b>SRWP</b>	Southern Regional Water Pipeline
<b>THM</b>	Trihalomethane
<b>TIMS</b>	Temporary Integrated Managed Supply
<b>WGM</b>	Water Grid Manager
<b>WH&amp;S</b>	Workplace Health & Safety
<b>WSZ</b>	Water Supply Zone
<b>WTP</b>	Water Treatment Plant

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# 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.

Under the Act Logan Water is required to prepare a DWQMP annual report for each financial year. These reports must be submitted to the regulator within 120 business days from the end of the relevant financial year.

This Logan Water (SPID542) DWQMP Annual Report documents the following for the 2020-21 Financial Year (FY)<sup>1</sup>:

- Summary of activities undertaken of the financial year in operating our drinking water service
- The water quality performance of the drinking water supply; and
- Actions taken to implement the Drinking Water Quality Management Plan.

This report assists the Queensland Water Supply Regulator (Department of Regional Development and Manufacturing and Water) 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 [City of Logan website](#), and copies may be provided to members of the public upon request.

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<sup>1</sup> 1<sup>st</sup> July 2020 to 30<sup>th</sup> June 2021 relates to the 2020–21 FY.

## 2. Summary of Schemes Operated

### 2.1 Logan Water Drinking Water Supply System

Logan Water is a water service provider which distributes water that is sourced and treated by the bulk water supplier, Seqwater.<sup>2</sup>

Seqwater is the Queensland Government Bulk Water Supply Authority responsible for ensuring safe, secure, and reliable drinking water supply for the South East Queensland (SEQ) region. The key responsibilities of Logan Water and Seqwater are summarised in Table 1 - Key Seqwater and Logan Water responsibilities below.

Table 1 - Key Seqwater and Logan Water responsibilities

Seqwater's Responsibilities	Logan Water's Responsibilities
<ul style="list-style-type: none"><li>▪ Catchment Management</li><li>▪ Raw water treatment (including fluoridation).</li><li>▪ Clear Water Storage</li><li>▪ Bulk water transport to defined transfer points</li><li>▪ Monitoring of raw and treated water supply, including fluoridation</li></ul>	<ul style="list-style-type: none"><li>▪ Receipt of bulk treated water from Seqwater at defined transfer points</li><li>▪ Delivery to customers through Logan Water's distribution network</li><li>▪ Operation and maintenance of the distribution network, reservoirs, pump stations, and several secondary disinfection facilities</li><li>▪ Monitoring of drinking water quality performance throughout the distribution network</li></ul>

### 2.2 SEQ Water Supply Network Grid

Logan Water is supplied clean, treated drinking water through the SEQ Water Supply Network Grid (the Grid), which is managed and operated by Seqwater, as shown in Appendix B. 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 Water or East to supply Redlands City Council (refer Appendix B for a map of the Seqwater supply grid). In practice, most of Logan City Council's treated water is supplied from the Mt Crosby Water treatment Plant(WTP).

Both Seqwater and Logan Water undertake extensive water quality monitoring to verify that safe drinking water is supplied to the community.

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<sup>2</sup> Further information on Seqwater can be accessed at <http://www.seqwater.com.au/>



## 2.3 Logan Water’s Drinking Water Supply Network

An overview of Logan Water’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 Logan Water drinking water supply

Overview	Description
<b>Activities</b>	Delivery of clean, treated water from bulk supply points (transfer points) to customer meters.
<b>Area</b>	957 square kilometres
<b>Population</b>	341,985 <sup>3</sup>
<b>Population connected to water supply network</b>	340,543 <sup>4</sup>
<b>Seqwater’s primary WTP’s (and respective catchments)</b>	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)
<b>Logan Water’s Supply Network Schematic</b>	Indicating key water supply zones and supplying reservoirs, with latest updates in Logan Water’s SCADA and GIS systems.  Refer to Appendix A, <a href="#">Water Supply Service Strategy</a>
<b>Bulk Supply Points (transfer points)</b>	<ol style="list-style-type: none"> <li>1. Compton Road meter via Kuraby reservoir inlet main</li> <li>2. Trinder Park pump station via Kuraby Reservoir</li> <li>3. Illaweenaa bulk meters (3) via Kuraby Reservoir</li> <li>4. Eastern Pipeline Interconnector (EPI) supply via Kimberley Park Reservoir</li> <li>5. Southern Regional Water Pipeline (SRWP) supply via Teviot Road Offtake</li> <li>6. SRWP supply via New Beith Offtake (Pub Lane Offtake)</li> <li>7. Gold Coast supply via Stanmore Pump Station (contingency supply)</li> </ol>

## 2.4 Summary of Schemes Operated

Logan Water 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 (e.g. this annual report, a summary of water quality performance by WSZ is included in Appendix C).

A summary of the categorisation of the water supply is included in Table 3. A summary of Logan Water’s suburbs by WSZ is shown in Table 3 under general operating conditions.

<sup>3</sup> Population taken from [www.abs.gov.au](http://www.abs.gov.au) Logan LGA for 2020

<sup>4</sup> Population and demand forecast information, based on current Desired Standards of Service (DSS), and adopted [Infrastructure Demand Model](#) (IDM), current as of 30/06/2018

Table 3 - Logan Water's water supply zones by associated suburbs

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

## 2.5 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.

Chlorine and chloramine are the disinfectants of choice for Logan Water. One of the major benefits of using these two disinfectants is that after the initial dose to kill potential microbes at the water dosing facilities, both may provide a lasting residual barrier through the network. This 'barrier' continues to protect the health and well-being of our customers throughout the network.

Of course, a balanced approach is required in order to supply safe drinking water which is also aesthetically pleasing to consume. Logan Water manages and controls disinfectant levels within the drinking water network in accordance with our Drinking Water Quality Management Plan, which is approved by the Queensland Water Supply Regulator.

Key features of Logan Water's disinfection program include:

- Operation of chlorine 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 enough to protect customers against most microbial contaminants of concern and may assist to maintain the cleanliness of the network.
- Constant monitoring and review of operations and customer feedback related to chlorine taste and odour; 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 – some strains of *E. coli* are environmental in nature and not of faecal origin, meaning they may not necessarily be harmful to human health. 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 Logan Water detects *E. coli* within the water supply network an incident is declared, and immediate corrective actions are taken to protect public health. During the 2020-21FY, Logan Water complied with the *Public Health Act 2005* of nil *E. coli* detections in >98% of samples.

# 3. DWQMP Implementation

## 3.1 Risk Management Improvement Plan Process

Logan Water strives for continual improvement in Drinking Water Quality Management, in accordance with Industry *Best Practice* Principles. Logan Water's Risk Management Improvement Plan (RMIP) is the key register used to capture actions aimed at reducing contamination risks associated with the supply of drinking water.

Opportunities for improvements captured in the RMIP may originate from the following sources:

- Risk Assessments – *high risks*
- DWQMP Reviews and Audits - *non-conformances, opportunities for improvements and general improvements (if appropriate)*
- Drinking Water Incidents - *longer term improvement actions*
- Regulator feedback; and
- General improvements

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

## 3.2 Implementation of the Risk Management Improvement Plan

The following section summarises the progress of the key RMIP actions with details found in Appendix D.

This section is categorised according to the 12-element framework of the *National Health and Medical Research Council (NHMRC) Australian Drinking Water Guidelines (2011)*<sup>5</sup>. Logan Water aligns our Drinking Water Quality Management Systems with these 12 elements, in order to strive for best practice Drinking Water Management in a systematic, focussed, and measurable manner.

A summary of events and activities during the 2020-21FY which led to changes to the RMIP is also included below.

- The DWQMP was reviewed and submitted on the 20<sup>th</sup> of October 2020. This submission followed an internal review and included relevant findings from the May 2020 *Whole of System Risk Assessment* being incorporated into the RMIP.
- In January 2021, the QWSR requested further information relating to the DWQMP submission on the 20<sup>th</sup> of October 2020. The amended DWQMP was submitted on the 28<sup>th</sup> of February 2021. This included a review and update of the RMIP.
- The DWQMP was approved by the Queensland Water Supply Regulator on the 20<sup>th</sup> of May 2021<sup>6</sup>.
- A number of notifiable water quality 'events' occurred during the period, which required the mobilisation of the Incident Management Team. These are further discussed in Section **Error! Reference source not found.** and relevant long-term actions from each investigation were incorporated into the RMIP as required.

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<sup>5</sup> ~~To access a copy of the current ADWG~~ 2011 please refer <https://www.nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines>

<sup>6</sup> The DWQMP was approved, however required further information. Another DWQMP review was performed to include all requested information. Submission of the updated DWQMP occurred on 30 September 2021. This submission included a version of the RMIP with reference to all high risks identified during the 2020 Risk Assessment.

## Element 1 – Commitment to Drinking Water Quality Management

- The current [Drinking Water Quality Policy Statement](#) was reviewed during the 2019-20FY. An update of this policy is due in the 2021-22FY to reflect Logan Waters vision and organisational changes.
- The Seqwater Operating Protocol was reviewed and updated during the 2019-20FY. The protocol demonstrates the shared commitment between Seqwater (the bulk supplier) and Logan Water to manage Drinking Water Quality throughout the entire network.

## Element 2 – Assessment of the Drinking Water Supply System

- Online water quality monitoring systems were reviewed and updated to confirm all associated alarming via SCADA. Ongoing reviews occur via the regular Critical Control Point (CCP) review process.
- Outcomes from the whole of network *Drinking Water Risk Assessment* conducted in May 2020 have been incorporated into the RMIP during the 2020-21FY. It was noted by the independent workshop facilitator/water quality management expert that there has been an overall significant improvement in risk management at Logan Water from previous years.
- A project to implement a Water Information Management System (WIMS) has been initiated and continues during the 2020-21FY. This water quality database will improve Logan Water's ability to store data, review and provide insights into system performance. The database was commissioned in late 2020.
- The *Critical Infrastructure Security Upgrade Plan* activities continue during the 2020-21FY period. This project includes assessment and improvement of Logan Water's reservoir physical security and cyber security management systems. A cyber security review, SCADA review and strategy and the installation of video cameras at key sites were key developments during the reporting period. This project is long-term and ongoing.

## Element 3 – Preventative Measures for Drinking Water Quality

- Upgrades and improvements occurred at the following Water Dosing Facilities (WDF): Travis Road, Mundoolun and Woodhill reservoirs. These included site upgrades, SCADA programming and operating improvements. These upgrades were performed to ensure Logan Water continues to provide safe drinking water to the community.
- A project was conducted during the 2020-21FY to upgrade water dosing facilities at the Illaweena and Logan River sites. These major WDF upgrades have now been delivered and are operational.
- Review of the Critical Control Points (CCPs) process continued during the 2020-21FY. As part of this process, CCP limits were reviewed and updated, SCADA pages were developed for each dosing site which clearly listed CCPs with the relevant limits. CCP training for on-call employees was also undertaken.
- Operational Control Points (OCPs) have been implemented and early development of 'OCP' SCADA pages has commenced.
- A project was initiated to develop Operations and Maintenance manuals for each water dosing facility. The project first developed the manual for Woodhill dosing facility, and Logan Water will trial its effectiveness over the summer 2020/21FY before rolling out manuals to the other facilities during 20/21 and beyond.
- A project has been raised for FY20/21 to review all SCADA alarms for the water quality system and fit them to the new alarm standard.
- A project was initiated to install online water quality analysers at the outlet of every operational reservoir in the network. These have been installed at Majella reservoir, Old Bluff Road reservoir and Springwood High ground and elevated reservoirs (reservoir #1 and #3 respectively). New water quality analysers are planned at Razorback reservoir, to be installed in 2021-22FY.

- The reservoir renewals program continued during 2020-21 FY with improvement works performed at the following reservoir complexes: Springwood Low Level, Round Mountain and Mundoolun. 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.
- The backflow prevention maintenance program has continued during the 2020-21 financial year. All Logan Water-owned Backflow Prevention Devices (BFD) were reviewed and maintained as per regulatory requirements, and the cycle of annual maintenance has been aligned for ease of maintenance service delivery.

#### Element 4 – Operational Procedures and Process Control

- As mentioned in Element 3 above, CCP training occurred for on-call personnel. This is also included in Element 4 because of its relevance to Operational Procedures. Relevant CCP limits are now programmed into SCADA, available 24/7 including a summary of the relevant responsibilities, corrective actions, reporting requirements and other relevant activities. This improves the knowledge and abilities of key personnel and improves the monitoring and response time.
- Work continued on a procedure to manage accuracy of online monitoring, including calibration of analysers (WOP222). This procedure was implemented with relevant personnel during the 2020-21FY.
- Development of the *Healthy Networks Framework* for Drinking Water management in the 2020-21FY. Some actions identified in this framework like formalised mains cleaning programs are currently underway, with organisational changes in progress to allocate dedicated staff to the roll out and implementation of this framework.
- Ongoing management and improvement of the Water Quality Database (Aquantify) has occurred through the 2020-21FY. With progress made in identifying and addressing some abnormal data being imported, improved functionality and use of the notification system to alert staff of operational limit exceedances in a timely manner allowing for effective corrective actions to be undertaken. Information from Aquantify will feed forward to the Common Information Service (CIS) mentioned in Element 9 allowing appropriate data to be accessed by all areas of Logan Water and prioritise operational works or planned projects.

#### Element 5 – Verification of Drinking Water Quality

- Customer complaints monitoring is an important part of drinking water quality verification. Logan Water continued work on the Logan 2025 Strategy and supporting plans, including the Customer Management Model. The model would, amongst other things, improve how we manage and respond to water quality customer enquiries.
- Logan Water developed a Chlorate operating protocol in the 2020-21FY, with inclusion of Chlorate monitoring in the Verification Monitoring Program and updated DWQMP submitted in 2021.
- Customer enquiries are an important facet of verification monitoring of the system performance. The project continued in the 2020-21FY.
  - An online dashboard of water quality customer complaints was implemented to better track customer complaint clusters in the network. This includes a heat map of complaints, trending and performance information related to customer complaint management
  - Logan Water plans to integrate the numerous customer complaint systems into one Customer Relationship Management (CRM) system, as part of future works. The project timeline is dependent on whole of Logan Water implementation.
- As mentioned in *Element 4*, the Water Quality database (Aquantify) implementation continued in 2020-21FY. This database assists personnel in the interpretation and corrective actions undertaken in response to adverse water quality results. This includes automated notification of ADWG (health and aesthetic) limits breaches, as well as internal operation limits.

## Element 6 – Management of Incidents and Emergencies

- Logan Water participated in the Seqwater region All Agencies Emergency Management Group collaborative team training event called *Operation Hydra*, in November 2020. The team included members from the Logan Water Incident Management Team. The previous *Operation Hydra* took place in October 2019.
- Logan Water also undertook internal Incident Management training as part of our requirements under our Drinking Water Quality Management Plan in February 2021.
- Logan Water conducted an incident management scenario for the purposes of staff training and review of the overall process in April 2021. This involved having team members from all aspects of Logan Water and the Partnership responding to a hypothetical real world evolving scenario.

## Element 7 – Employee Awareness and Training

- Safe Drinking Water Quality Awareness Training was rolled out to Logan Water staff via the Logan Learning Hub in the 2020-21FY. This training was developed to provide all staff with an understanding of our drinking water management system and shared commitment to supply safe drinking water.
- *HACCP Monitoring training*: This training was developed and presented to all SCADA operators. The training involved HACCP alarms management and actions required of the operators whilst looking after the drinking water network.
- *Water Quality Site Overview training*: This training was developed and presented to all staff that may work on the water quality sites whilst on call. The training discussed the how all analyser and dosing panels operate with a discussion to how to deal with common recurring issues.

## Element 8 – Community Involvement and Awareness

- Logan Water continued to utilise our Water Wagon at various community events throughout the 2020-21FY. The Water Wagon provides free chilled tap water to customers with the staff providing education to the community on the benefits of choosing tap water both financially and environmentally.
- Logan Water underwent a rebranding in 2020-21FY, inclusive of new mailout and billing templates, informing our customers of our business aim of being Reliable – Sustainable - Committed.

## Element 9 – Research and Development

- Logan Water trialled the alternative mains cleaning technology Neutral Output Discharge Elimination System (NO-DES) in Bethania. This methodology accelerates the water through the network in a reverse directional flow and minimises water loss by filtering out biofilm and debris and returning the clean water to the network. The review into the effectiveness and feasibility of this technology is ongoing.
- Logan Water has engaged an external contractor for design and delivery of the CIS. This system is aimed at combining the various data sources across Logan Water into one user friendly environment allowing for simple trending and cross referencing of complimentary data sets leading to improved decision-making practices.

## Element 10 – Documentation and Record Keeping

- All of Logan Water's DWQMP Annual Reports and Water Quality Summaries are displayed on Council's public website. [About Logan Water – Logan City Council](#)
- Logan Water expanded our capabilities through the use of Office365 and the various applications available in conjunction with SharePoint to enhance collaboration with document reviews and development.

### **Element 11 – Evaluation and Audit**

- A regulatory audit was undertaken during the 2020-21FY with no major non-conformances identified, further details of this audit and associated findings can be found in Section 8
- Outcomes of the above audit have been included in the RMIP, with stakeholder reviews ongoing in the 2021-22FY to address actions.
- An internal audit will be due in the 2021-22FY.

### **Element 12 – Review and Continual Improvement**

- A significant review of the Drinking Water Quality Management plan was undertaken, with version 5.6 submitted to the regulator in February 2021, and after a request for further information version 5.7 submitted in September 2021.
- The review of the DWQMP also saw a significant review of the Risk Management Improvement Process and recommencement of process improvement meetings with various stakeholders to drive required actions identified in the RMIP



## 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 2018*.

During the 2020-21FY there was one positive *E. coli* detection in the verification monitoring program resulting in notification to the Regulator, and Logan Water maintained compliance with the requirements of the ADWG (Health) criteria and the *Public Health Regulation 2018*.<sup>7</sup>

### 4.2 Monitoring Program Overview

Monitoring of drinking water quality in Logan city is undertake 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
- Identify potential emerging water quality issues

Monitoring during the 2020-21FY was carried out in accordance with Logan Water's current [Verification Monitoring Program](#)

### 4.3 Laboratory Reporting Changes

During the 2020-21FY, there was an increase to the Limit of Reporting (LOR) for True and Apparent colour results from Logan Water's NATA laboratory, which may result in an increased average result. The data summary in Appendix C contains the current maximum and minimum values.

### 4.4 Data Analysis Methodology

Table 4 summarises the methodology employed to analyse the data used in the Water Quality Performance Summary for the 2020-21FY. This methodology is consistent with the *Australian Drinking Water Guidelines (2011)* guidance provided on statistical principles (Information sheet 3.3).

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<sup>7</sup> Please note that other reportable events occurred during the reportable period which were not related to verification monitoring. These are further discussed in Section **Error! Reference source not found.**

Table 4 - Data Analysis Methodology

<b>Data subject</b>	<b>Methodology</b>	<b>Reference</b>
<b>Outliers</b>	All outliers are included in the analysis.	ADWG information sheet 3.3
<b>Less than values (&lt;)</b>	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 chemical data analysis.	ADWG information sheet 3.3
<b>Data exclusions</b>	Data from repeat samples, project, emergency, or investigative sampling are not included in the data analysis.	DRDMW Drinking Water Quality Management Plan Report, Guidance Note 2018

The summary of water quality data, found in Appendix C, is represented in seven separate tables representing the whole of supply for Logan Water and each of the six water supply zones (WSZ).

Also included, in Table 20, is a summary of compliance results for *E. coli* sampling undertaken during drinking water quality verification monitoring. *E. coli* results are included for the whole of Logan Water network in Appendix C.

## 5. Notifications to the Regulator under sections 102 and 102A of *the ACT*

During the 2020-21FY period, there were eight instances where the Queensland Water Supply Regulator was formally notified under sections 102 and/or 102A of *the Act*. Notifiable events may include:

- A detection of *Escherichia coli* (*E. coli*)
- An exceedance of a health guideline value in the Australian Drinking Water Guidelines (ADWG)
- Detections of parameters with no guideline values in the ADWG
- Water quality events that a service provider cannot manage within existing processes and/or that may impact on the health of customers, for example, a large dirty water event, or environmental flood event that threatens water quality.

Upon receipt of results for ADWG health exceedances and for many other reportable events, Logan Water mobilises our *Incident Management Team* and works closely with Queensland Health and the Queensland Water Supply Regulator to ensure appropriate actions are undertaken to protect public health.

### 5.1 Notification events reported to the regulator

As mentioned in section 4.1 one reportable event occurred as a result of the drinking water quality verification monitoring program in the 2020-21FY period.

However, eight (8) total notifications were made to the Water Supply Regulator during the reporting period. Of the eight notifications:

- One was related to a positive *E. coli* detection in a verification monitoring sample
- Three were related to short term chlorine dosing exceedances detected via SCADA, with no measurable customer impact
- One was related to a positive *E. coli* detection by an external contractor working on Logan Water assets. Verification Monitoring within this area did not confirm this detection, but the Incident Management Team was mobilised to address this detection
- One was related to the detection of BTEX at a customer's property, with further investigation identifying that contamination had impacted the Logan Water owned service line to this property
- One was related to an elevated free chlorine result in an area expected to be receiving chloraminated water supply. This elevated result did not breach any ADWG limit
- One event was related to a main break in the vicinity of the Logan Hospital, and the potential for dirty water to be generated impacting a critical customer

A summary of the reported events detected in verification monitoring samples can be found in Table 5, and a summary of all other reportable events is provided in Table 6.

Table 5 - Summary of Verification Monitoring Program Reportable Events 2020-21FY

#	Date	Scheme/Location	Parameter/Issue	Description	Corrective and Preventative Actions
1	17/03/21	Kimberley Park Water Supply Zone – DSP093 Billiluna Street	<i>E. coli</i> detection	<i>E. coli</i> detection of 2 MPN/100mL at network sample tap in Kimberley Park WSZ verification monitoring sample. Low chlorine residual present at time of sampling with recent adverse weather conditions. No adverse customer impact was associated with this event and no there were no further <i>E. coli</i> detections because of the corrective actions.	<ul style="list-style-type: none"> <li>Incident Management Team was mobilised to manage the incident</li> <li>Immediate manual chlorine dosing of the supplying reservoir</li> <li>Inspection of Reservoir for potential contamination or ingress opportunities</li> <li>Testing of the Reservoir and sites within WSZ by Logan NATA laboratory</li> <li>All results returned met ADWG (Health) guidelines.</li> <li>There is an ongoing investigation into options to improve disinfection across the high-level zone.</li> </ul>

Table 6 - Summary of Non-Verification Monitoring Program Reportable Events 2020-21FY

#	Date	Scheme/Location	Parameter/Issue	Description	Corrective and Preventative Actions
1	13/07/2020	Logan East Water Supply Zone - Bethania	<i>E. coli</i> detection	A sub-contractor sampling company working for the mains commissioning project in Bethania took hydrant samples from an existing Logan Water main, and the main being commissioned with both samples returning positive <i>E. coli</i> results of 1 MPN/100mL. Verification monitoring within the DMA had not confirmed the results, however flushing was conducted to remove potentially contaminated water and bring fresh water through. Follow up sampling events confirmed that water supplied meets ADWG.	<ul style="list-style-type: none"> <li>Incident Management team was mobilised to manage the incident</li> <li>Analysis of verification monitoring samples within the WSZ collected on 13/07/2020 and 14/07/2020 did not confirm the sub-contract laboratory results</li> <li>Immediate closure of customer tanker fill point in area</li> <li>Extensive flushing of the network was performed across 3 days</li> <li>Sampling by Logan NATA laboratory of the original locations and upstream/downstream network sites</li> <li>Investigation of contractor mains commissioning process including flushing and sampling</li> </ul>
2	22/10/2020	Marsden Water Supply Zone – Logan Hospital	<i>Potential dirty water ingress into critical customer</i>	Operations became aware of a mains break involving a section of 100mm Asbestos Cement (AC) main located across the road from the Logan Hospital. With concern for the potential this event to generate dirty water and proximity to a critical customer, an Incident was declared, and notification provided to QWSR. Communications and actions between Logan Water and Hospital staff were able to minimise any potential impact to the hospital to a short-term turbidity peak of 3.5NTU.	<ul style="list-style-type: none"> <li>Due to the proximity of the main to the Logan Hospital, the Incident Management Team was mobilised immediately</li> <li>Logan Hospital staff isolated the feed from Loganlea Road</li> <li>Logan Water deployed TIMS units to site as a precaution</li> <li>Logan Water crews isolated the section of broken main allowing for normal supply returned to all hospital inlets</li> <li>In consultation with Logan Water, Hospital staff re-opened the Loganlea Road feed and monitored turbidity levels via online analysers. A momentary peak of 3.5NTU was detected in the early afternoon before reducing to 0.8 NTU</li> <li>Logan NATA laboratory conducted sampling in the vicinity to confirm water quality is within ADWG</li> </ul>
3	14/01/2021	Logan South Water Supply Zone – Travis Road Chlorine Dosing Facility	<i>SCADA detection of elevated Free Chlorine at outlet of Dosing Facility</i>	Online free chlorine analyser recorded a critical limit breach of 4.8mg/L on the outlet of the dosing facility for a 5-minute period from 11:32pm to 11:37pm. The dosing unit worked as designed by faulting when the analyser detected a result above the high high limit configured & paging the on-call supervisor. Investigation and review of flow, valving configurations, and cross-connections arrangements at this site. Isolation of dosing unit for the following weekend while investigations still underway, with chlorine residual monitored to ensure disinfection barrier remains in place.	<ul style="list-style-type: none"> <li>Automatic isolation of the chlorine dosing unit</li> <li>The on-call supervisor was paged for the critical alert</li> <li>Review of SCADA determined the chlorine result was above the high high limit for a period of 5 minutes</li> <li>Downstream analysers within the network showed increase in chlorine residual from when the incident occurred or in the 12 hours post limit breach</li> <li>Continued monitoring of Travis Road outlet, downstream analyser, and customer complaints within the WSZ</li> <li>Ongoing training and review of Critical Control Point protocols</li> <li>Development of Operational &amp; Maintenance Manuals for all CDFs underway</li> </ul>
4	03/02/2021	Logan East Water Supply Zone – Logan River Pump Station	<i>SCADA detection of elevated Total Chlorine at outlet of Dosing Facility</i>	Online total chlorine analyser recorded a critical limit breach of 5mg/L on the outlet of the dosing facility for a 9-minute period from 5:20pm to 5:29pm. A recent network configuration change intended to reduce pressure spikes meant that around 5pm valves began closing to change supply feed over. It appears that during the closure of this valve, chlorine dosing had continued for approximately 9 minutes. A review of the breach found that the usual CCP breach page was not triggered, and that the on-call supervisor had acknowledge the alarm but not followed the CCP procedure for this site.	<ul style="list-style-type: none"> <li>Review and investigation of SCADA to confirm details of the breach</li> <li>Review of SCADA analysers downstream of dosing facility</li> <li>Logan Water personnel attended site to check CDF online instrumentation and conduct testing using hand-held analysers to confirm chlorine results returned to within ADWG</li> <li>Review of verification monitoring data and customer complaints in zone supplied by this dosing facility.</li> <li>Application of timer to shut-off dosing immediately when the valve arrangement begins to close</li> <li>Ongoing training and review of Critical Control Point protocols</li> </ul>

				It was determined that there was no detectable customer impact from this event, however the on-call operator did not follow procedure leading to a review of processes and improvement in on-call alarm management.	<ul style="list-style-type: none"> <li>▪ Development of Operational &amp; Maintenance Manuals for all CDFs underway</li> <li>▪ Upgrade of Logan River Pump Station, inclusive of chlorine analysers</li> </ul>
5	18/02/2021	Springwood Water Supply Zone – Woodridge	<i>Benzene &amp; Copper ADWG Health Limit Exceedance at customer property and Logan Water service line</i>	<p>Logan Water collected samples from a customer property and Hydrant in relation to a strong petrol/chemical smell. The customer sample only returned results above ADWG limits for Benzene and Copper. After further communication with the customer advising that the service line from the meter to the house had recently been replaced with copper pipe, concerns were held that contamination may have occurred to Logan Water infrastructure.</p> <p>Extensive sampling was conducted at the water meter, and hydrant locations within the vicinity, with Benzene results above ADWG limits present at the customer meter, but not elsewhere in the network. Identifying that the contamination was isolated to the customer service line, Logan Water took action to replace this service from the main to the meter with copper pipe and excavating potentially contaminated soil where possible.</p>	<ul style="list-style-type: none"> <li>▪ Customer was immediately advised not to drink water until further notice</li> <li>▪ Sampling conducted at the customer property and nearest Hydrant returned exceedances at customer property but not within network</li> <li>▪ Desktop review of water quality results in area, and any other customer complaints within the supply zone</li> <li>▪ Elevated copper results attributed to customer service line recently being replaced by private plumber in relation to petrol smell at property</li> <li>▪ Constant ongoing communication with customer informing them of the situation and actions occurring</li> <li>▪ Further investigation &amp; sampling able to prove that contamination was isolated to customer service line only.</li> <li>▪ Logan Water took action to replace entire customer service line with copper</li> <li>▪ Excavation and removal of potentially contaminated soil where possible</li> <li>▪ Additional sampling to verify that water quality being supplied to the property was within the ADWG health limits</li> </ul>
6	01/06/2021	Logan South Water Supply Zone – Spring Mountain WQZ – DSP047 Spinebill Drive	<i>Verification Monitoring detection of elevated Free Chlorine in a Chloraminated WSZ</i>	Logan Water NATA laboratory detected and advised of an elevated free chlorine result of 3.7mg/L at a designated sample point in the Spring Mountain Water Supply Zone which is typically chloraminated. Additional sampling did not detect elevated free chlorine in the WSZ, no dirty water or chlorine customer complaints were received in the days after the detection. Ongoing verification monitoring confirmed water quality returned to normal.	<ul style="list-style-type: none"> <li>▪ Sample point was analysed as a duplicate to confirm elevated result</li> <li>▪ Confirmed that manual dosing of reservoir had not occurred</li> <li>▪ Partial IMT formed for coordinating investigation and response</li> <li>▪ Additional monitoring conducted within WSZ with no additional elevated results</li> <li>▪ SEQ Water contacted for advice on any dosing faults or interruptions</li> <li>▪ Customer service team advised of event and communication response prepared</li> <li>▪ No customer complaints received related to dirty water or chlorine in WSZ</li> <li>▪ Short term slug of chlorinated water passed through network quickly with no measurable impact to customers</li> </ul>
7	04/06/2021	Logan South Water Supply Zone – Woodhill Chlorine Dosing Facility	<i>SCADA detection of elevated Free Chlorine at outlet of Dosing Facility</i>	Online free chlorine analyser recorded a critical limit breach of 5mg/L on the outlet of the dosing facility for a 19-minute period from 00:44am to 01:03am. The reason for the elevated chlorine event appears to be the sudden drop of flow rate during filling of a downstream reservoir. The automated CCP response breach was initiated with the dosing unit isolated, however the pages were not received by the on-call operator as they are in a known communications network black spot. The total chlorine critical alarm did not activate and page to the on-call supervisor due to it being an analogue probe spanned between 0 and 5mg/L where a result >5mg/L faults as an “out of range” error, showing a null data point instead of the high high alarm.	<ul style="list-style-type: none"> <li>▪ Automatic isolation of the chlorine dosing unit</li> <li>▪ Escalation of paging protocol after no response from on-call operator to back up on-call operator</li> <li>▪ Desktop review of water quality analysers downstream of dosing facility showed no increase in chlorine residual</li> <li>▪ Logan Water personnel sent to site to monitor chlorine readings within the affected DMAs</li> <li>▪ Adjustment of maximum flow-based dose rate on chlorine dosing unit from 40l/s to 10l/s to mitigate issue</li> <li>▪ Woodhill CDF upgraded with new digital probe, tested to ensure the CCP’s work as designed</li> <li>▪ Celfi booster installed at the on-call operators’ residence</li> <li>▪ Downstream pump station put forward as a capital works upgrade to mitigate unexpected flow changes in reservoir filling</li> <li>▪ Long term action to have OCP’s installed on all reservoirs to alarm in the event of low chlorine coming from the reservoir prior to the outlet dosing system</li> </ul>

# 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 Water’s drinking water quality verification program. Furthermore, it is simply good business practice to respond to customer feedback and work towards maintaining community customer satisfaction.

General water quality information is available via the City of Logan website for customers to peruse<sup>8</sup>. Furthermore, communications campaigns are often run with the community during water quality projects, to better manage community expectations.

At all times, Logan Water 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

During the 2020-21FY the Customer Complaint Dashboard was used as a tool for visual tracking of complaints to aid in identifying clusters or hotspots where remedial actions should be focused. Customer calls are logged and transferred to a GIS platform, with the dashboard updated in real time with the primary display as a rolling fortnight, but historical complaints also stored. This dashboard is available via Logan Waters internal *SharePoint* platform. The image below is an example of two customer complaint clusters. These clusters are linked to a necessary unplanned operational change where the water supply was temporarily changed from chloramine to chlorine, generating some dirty water and taste and odour issues for customers.

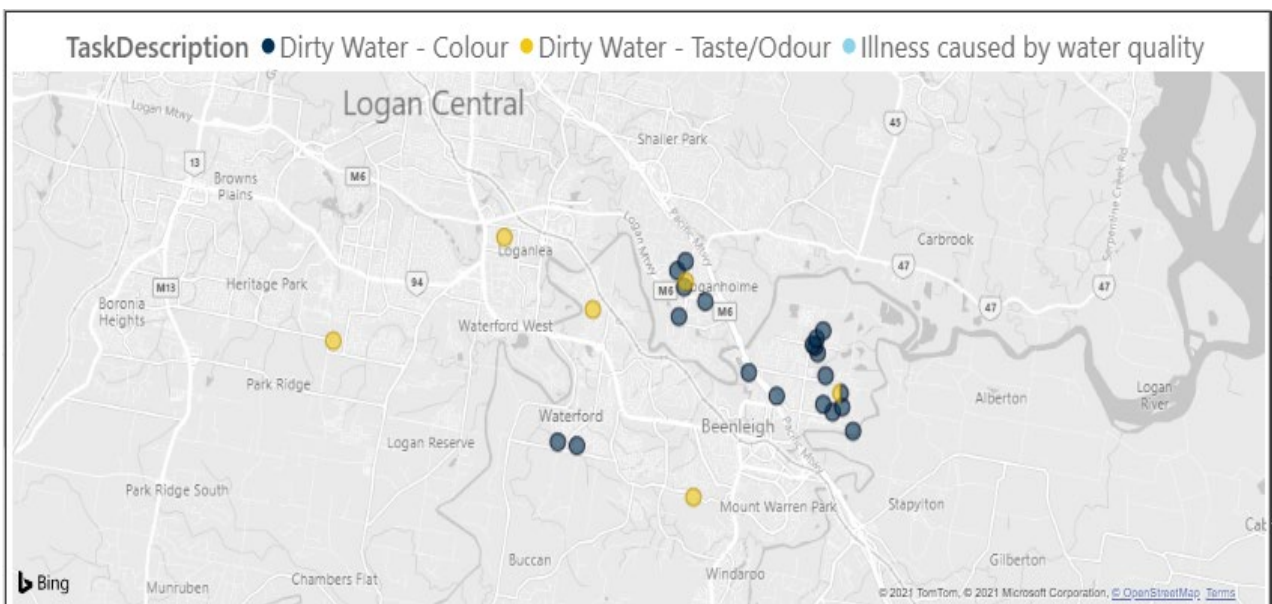


Figure 1 - Customer Complaint Dashboard example<sup>9</sup>

<sup>8</sup> Please refer to the City of Logan website for further information: <https://www.logan.qld.gov.au/waterquality>

<sup>9</sup> Please note customer information has been removed for privacy reasons

## 6.2 Customer Complaints

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

Logan Water 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 Logan Water's process improvement activities.

Logan Water classifies customer complaints according to the following categories:

- Water Quality - Suspected Health
- Water Quality - Appearance
- Water Quality - Taste and Odour
- Water Quality - Other<sup>10</sup>

Logan Water received a total of 279 drinking water complaints during the 2020-21FY. And although this is an increase of 26 complaints from the previous 2019-20FY, a significant historic improvement is still maintained.

In summary:

- This equates to 2.25 complaints per 1000 water connections
- This was composed of 156 *Appearance*, 79 *Taste and Odour*, 39 *Suspected Health* and 5 *Other* complaints. A breakdown of customer complaints categorised by % per category is shown in Figure 2

The number of customer complaints received by Logan Water per category for each Water Supply Zone (WSZ) is shown in Figure 3 and Table 7, with complaints per connection shown in Table 8.

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

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<sup>10</sup> This category refers to those whose description does not readily fit in the other three categories. For example, fish owners who have had fish unwell/die, owners who believe the water makes their clothes more susceptible to mould etc.

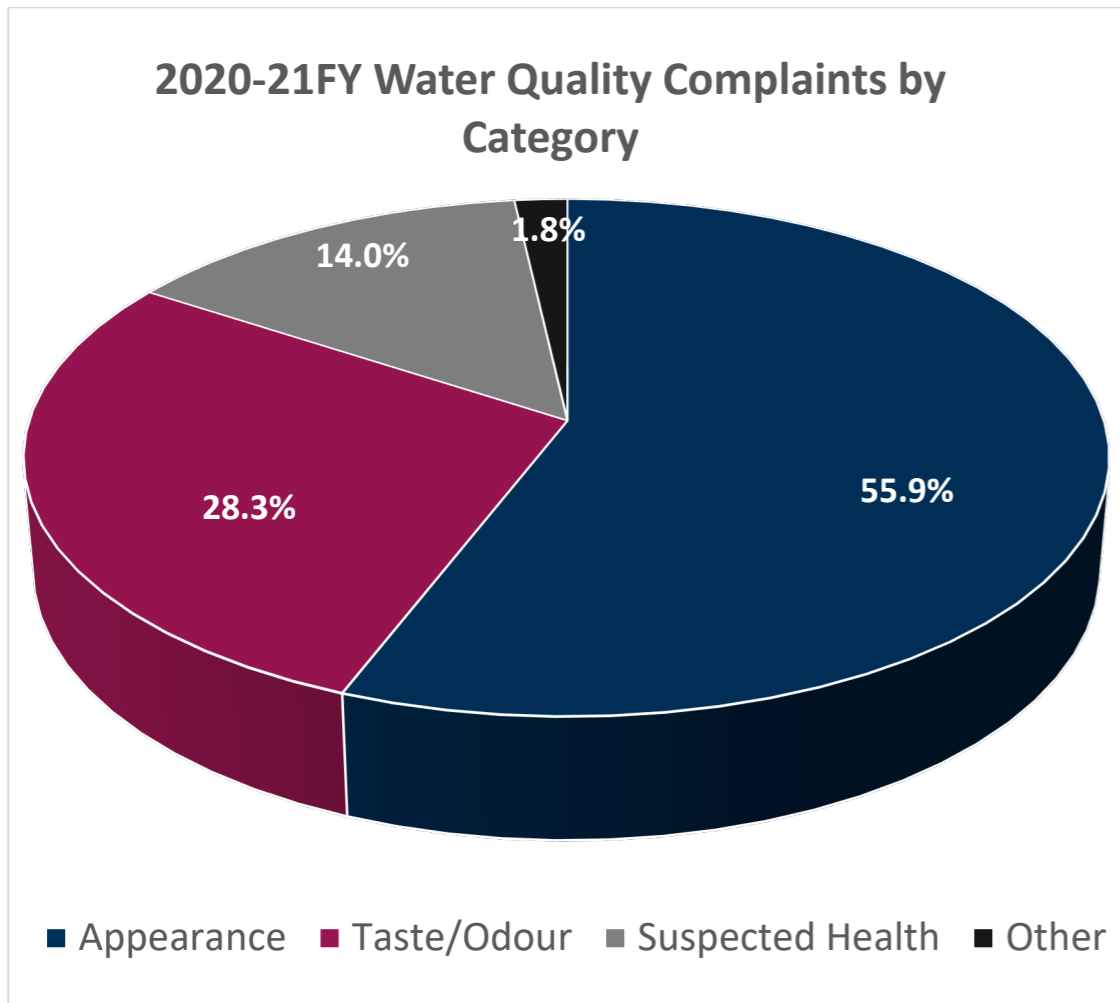


Figure 2 - Water Quality complaints by Category 2020-21FY

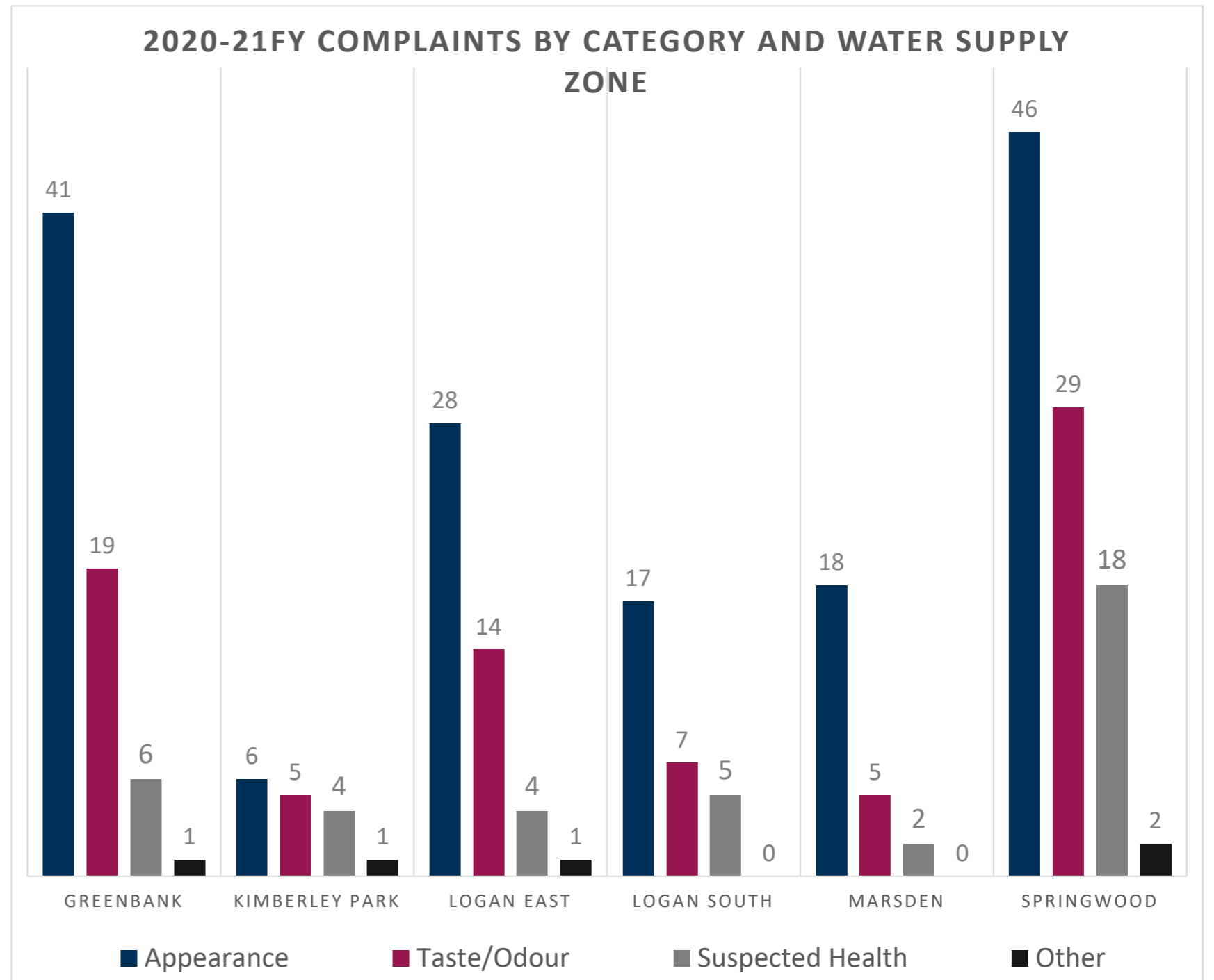


Figure 3 - Water Quality Complaints by Category and Water Supply Zone 2020-21FY



Table 7 - Water Quality complaints summary 2020-21FY

2020 21FY Total Water Quality Complaints					
Water Supply Zone	Appearance	Taste/Odour	Suspected Health	Other	Total
Greenbank	41	19	6	1	67
Kimberley Park	6	5	4	1	16
Logan East	28	14	4	1	47
Logan South	17	7	5	0	29
Marsden	18	5	2	0	25
Springwood	46	29	18	2	95
<b>Total</b>	<b>156</b>	<b>79</b>	<b>39</b>	<b>5</b>	<b>279</b>
<b>% of Total</b>	<b>55.9%</b>	<b>28.3%</b>	<b>14.0%</b>	<b>1.8%</b>	<b>100%</b>

Table 8 - Water Quality Complaints per 1000 connections

2020 21FY Customer Complaints per 1000 Connections						
Water Supply Zone	Number of Connections	Appearance	Taste/Odour	Suspected Health	Other	Total
Greenbank	19612	2.09	0.97	0.31	0.05	3.42
Kimberley Park	7789	0.77	0.64	0.51	0.13	2.05
Logan East	17997	1.56	0.78	0.22	0.06	2.61
Logan South	17089	0.99	0.41	0.29	0.00	1.70
Marsden	19856	0.91	0.25	0.10	0.00	1.26
Springwood	41758	1.10	0.69	0.43	0.05	2.28
<b>Total</b>	<b>124101</b>	<b>1.26</b>	<b>0.64</b>	<b>0.31</b>	<b>0.04</b>	<b>2.25</b>

### 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 2020-21FY, Logan Water received a total of 39 suspected health complaints.

Whilst this number is elevated compared to the 2019-2020FY, it is worth noting that our definition of suspected health complaints was widened to include adverse health effects such as a rash or itching where the water quality was suspected as the cause.

In all cases, the customer's property and the nearest network sample point within the Logan Water network were tested. All investigations confirmed that the water supplied to customers' homes were within ADWG health limits. All complaints were actioned and then closed out following appropriate consultation with the customer.<sup>11</sup>

<sup>11</sup> Please note that fuel/chemical tasting complaints (i.e., hydrocarbon related) may be received either as a Suspected Health or Taste & Odour complaint. These are both categorised with Priority 1 status – meaning they are dealt with promptly and efficiently. In this report they have been categorised in the Taste & Odour section (Section 6.2.3.2).

## 6.2.2 Appearance

Appearance of drinking water (*Appearance*) was the most frequently recorded complaint type for the 2020-21FY reporting period. Of the 279 total complaints received, 156 were related to the appearance of the water (55.9% of total complaints received).

Springwood WSZ returned the most *Appearance* complaints (46 complaints, 1.10 complaints per 1,000 connections) representing 26.3% of all appearance complaints received. Analysis of complaints per 1000 connections showed that Greenbank WSZ had the next highest rate of complaints (41 complaints, 2.09 complaints per 1,000 connections), followed by Logan East WSZ (28 complaints, 1.56 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)

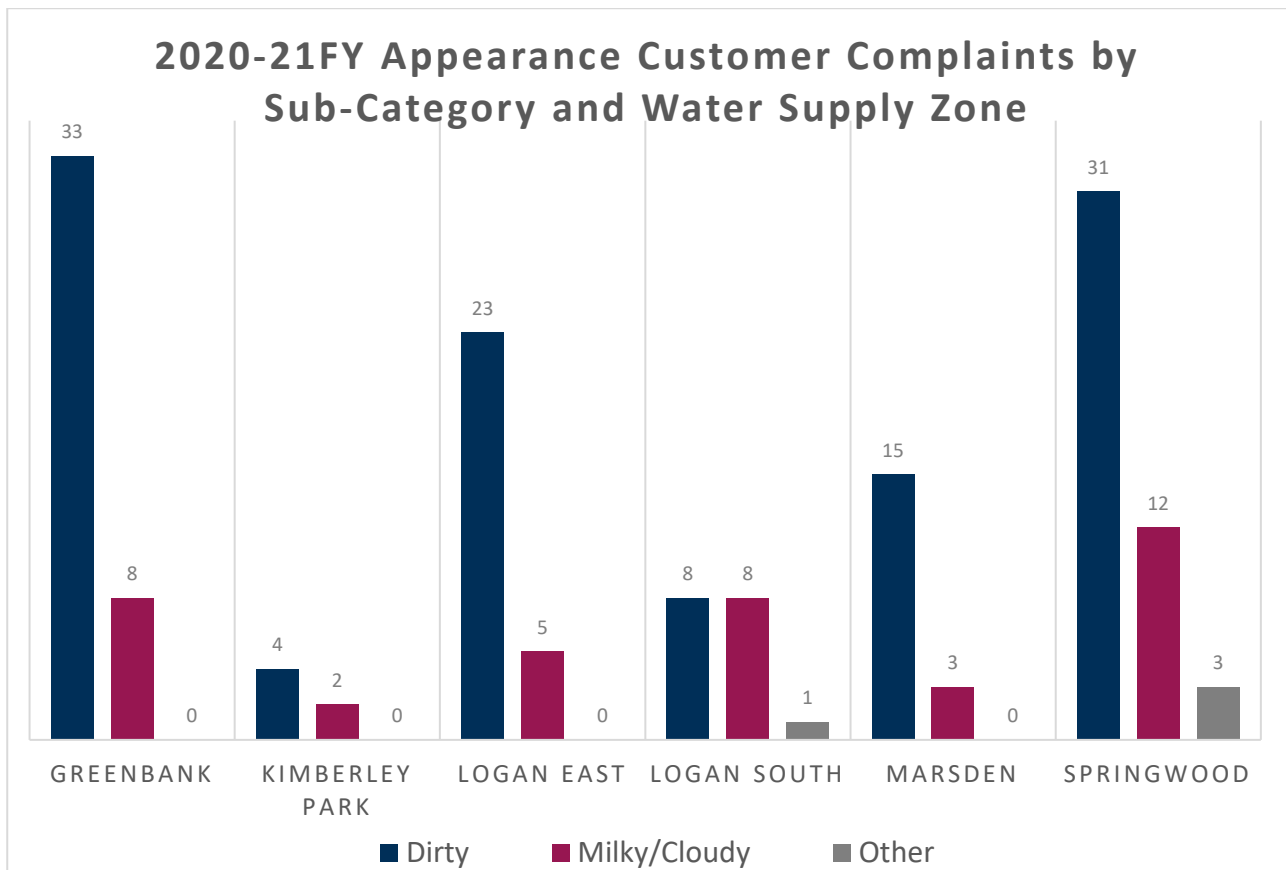


Figure 4 - Appearance complaints by sub-category and Water Supply Zone 2020-21FY

### 6.2.2.1 Dirty Water

Dirty Water is a sub-category of *Appearance* complaints and is typically associated with brown or turbid water. In total, there were 114 dirty water complaints, contributing to 73.1% of all *Appearance* complaints.

As can be seen in **Error! Reference source not found.**, Greenbank WSZ returned the highest number of dirty water complaints (33).

Dirty water complaints may be related to a variety of causes for example network configuration reasons (e.g., customers in cul-de-sacs), unplanned broken mains, other planned works or flow velocity and directional changes.

Logan Water aims to manage dirty water in the network by:

- A public health risk assessment process associated with major network interventions, such as planned works or network configuration changes.
- Implementation of the Hy5 hygienic work practices program includes training on minimising ingress and adequate flushing techniques when working on the network.
- the Water Service Delivery branch conducts regular pro-active mains flushing in order to minimise dirty water. This is targeted for areas with known historical issues on a rolling schedule. Turbidity is tested before and after flushing by trained and experienced personnel. The program is responsive to changing patterns in water quality complaints and incorporates known areas of likely dirty water such as dead-ends and cul-de-sacs.
- Reactive mains flushing is undertaken in response to elevated verification monitoring results, customer complaints, or trending of data showing quality decreasing.
- In the 2020-21FY Logan Water trialled the use of an alternative mains cleaning technology NO-DES. The technology is designed to provide a more effective scouring of the main, whilst minimising impacting to customers and wastage of water. Assessment of the effectiveness of this trial is ongoing.

A planned Network Disinfection Clean within the Marsden WSZ in early 2021 was required to be postponed due to unexpected operational issues. This planned maintenance activity has now been rescheduled for 2022.

### 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 38 *Milky and/or White Water* complaints were received during the reporting period, accounting for 24.3% of the *Appearance* complaints.

Springwood WSZ returned the highest number (12) as shown in **Error! Reference source not found.**

As part of the customer complaint management process, complaints lodged by customers for white or milky water are first investigated to see if air entrapment 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.

In addition, the Hy5 hygienic works practices program which encourages appropriate flushing during works on mains repairs may lead to less aerated water in the network.

### 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 placed into one of three sub-categories:

- Chlorine
- Hydrocarbons / Chemical / Petrol
- Other (Musty / Earthy / Metallic / not specified)

The second sub-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. These complaints are a high priority and treated in a very similar manner as “*Suspected health*” related complaints consisting of further investigation and testing.

During the 2020-21FY period, there were 79 *Taste and Odour* complaints received. Figure 5 shows the *Taste and Odour* complaints per WSZ by sub-category, with Springwood WSZ having the highest number of complaints (29).

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.

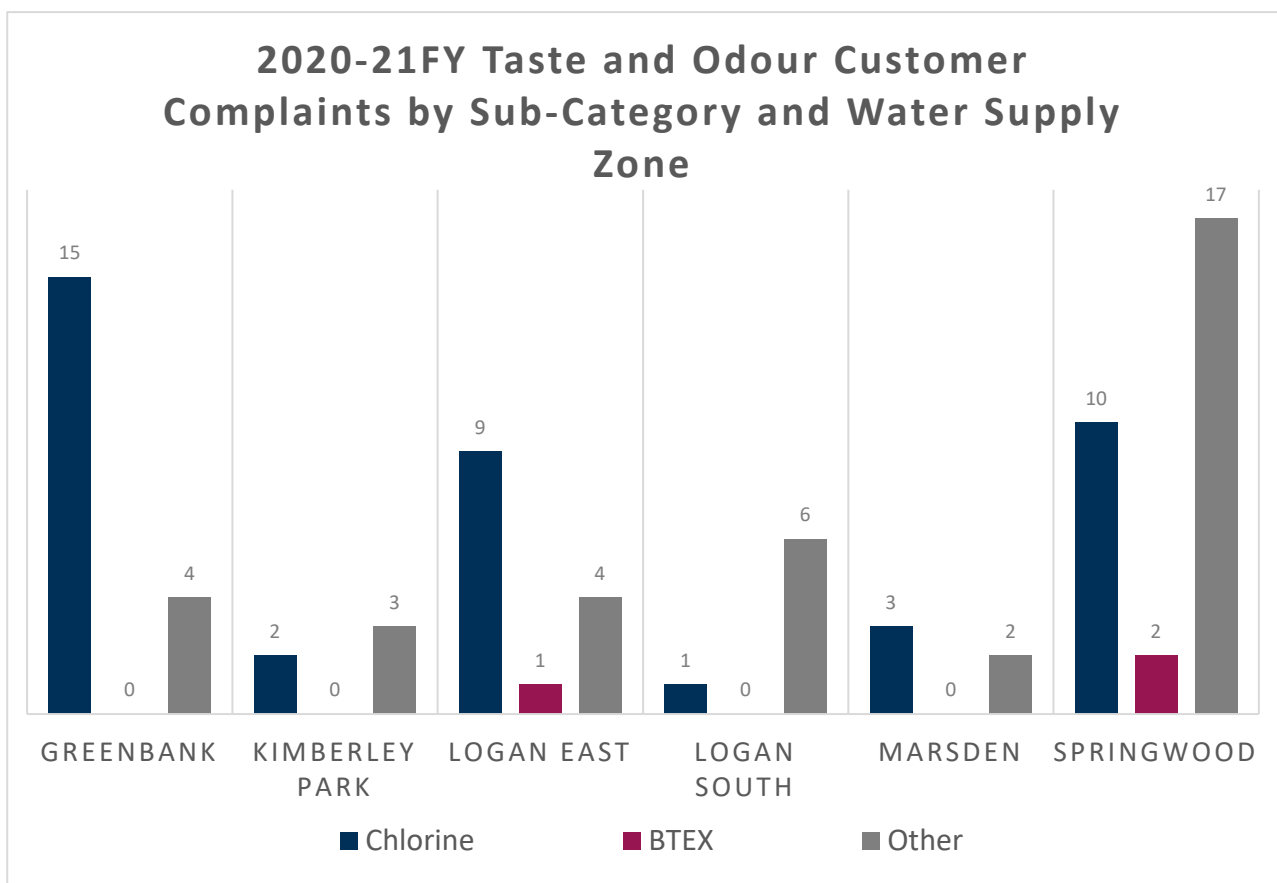


Figure 5 - Taste and Odour Customer Complaints by Category and Water Supply Zone 2020-21FY

### 6.2.3.1 Chlorine

While most of Logan City has chloramine as the residual disinfectant, some WQZ's have free chlorine in the water as the residual disinfectant all year round. Furthermore, some WQZ's may be seasonally chlorinated or chloraminated 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 Logan Water operates well below this limit. We aim to manage network chlorine levels which provide customers with safe treated drinking water that is also pleasant to drink.

During the reporting period, 40 of the *Taste and Odour* complaints were associated with a chlorine (50.6%).

As can be seen in **Error! Reference source not found.**, most *Chlorine* complaints were from the Greenbank WSZ (15) followed by Springwood WSZ (5). These chlorine complaints appear to be related to the:

- Ongoing operation of the Greenbank reservoir water dosing facility required for disinfection
- A short-term change to network configuration within Springwood WSZ resulting in some customers receiving chlorinated water, compared to historical chloraminated supply
- Furthermore, the operation of the Logan River water dosing facility during summer continues to cause chlorine-related complaints, as some customers detect the change in their water, especially those living in proximity to the dosing site.<sup>12</sup>

Logan Water 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.

### 6.2.3.2 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 polyethylene service line, contaminating their water supply.

During the 2020-21FY, Logan Water investigated 3 hydrocarbon / chemical *Taste & Odour* complaints<sup>13</sup>. Investigations were undertaken, including thorough sampling, and testing from both Logan Water'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 3 complaints were confirmed by laboratory testing as containing the common hydrocarbon chemicals benzene, toluene, ethylbenzene, and xylene (commonly referred to as *BTEX*).

In all *BTEX* investigations, the customers are advised not to drink the water, to present to a medical professional if they feel unwell and to engage a licence plumber to investigate their onsite services.

In one of these investigations, it was confirmed that the contamination event had also impacted the Logan Water owned service line feeding to the customers property only, further information can be found in Table 6 Item #5.

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<sup>12</sup> A current disinfection modelling project is scheduled for 2020-21 in order to better inform network dosing practices and optimise disinfectant levels throughout the network. This will address some of the issues which may cause chlorine-related customer complaints.

<sup>13</sup> 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).

Logan Water provides 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, customers may maintain 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.

### **6.2.3.3 Other (Musty / Earthy / Metallic / Not specified)**

*Musty, Earthy or Metallic* tasting water can be due to several 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 number of organics and minerals in the raw water which can impact taste even after water treatment.

As shown in Figure 5 - Taste and Odour Customer Complaints by Category and Water Supply Zone, 36 *Other* taste/odour complaints were received in the whole of Logan for the 2020-21FY. The high number of these type of complaints compared to previous years is due to the majority of them being unspecified by the customer and unable to be categorised accordingly.

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.

## 7. Drinking Water Quality Management Plan Review Outcomes

The purpose of the DWQMP review is to ensure that the DWQMP remains relevant, in regard to the operation of the drinking water service. In accordance with Section 99 (2)(b) and Section 106 of the *Water Supply (Safety and Reliability) Act*, Logan Water undertook a review of the approved DWQMP rev5.4. This process began in July 2020 involving key stakeholders, with submission of the amended DWQMP rev5.5 in October 2020.

*Table 9 - Key Staff involved in DWQMP Review*

<b>Name</b>	<b>Position</b>	<b>Branch</b>
Ajnesh Achal	Maintenance Planner	Water Service Delivery
Angus Heares	A/ Water Quality Program Leader	Water Service Performance
Cassandra Mai	Process Engineer	Water Infrastructure Solutions
Craig Fox-Andrews	A/ Senior Water Quality Officer	Water Service Performance
Daniel Truong	Electrical and Telemetry Officer	Water Service Delivery
Denver Pollock	Drinking Water Quality Operations Team Leader	Water Service Delivery
Jeremy Thomas	Project Manager	Water Infrastructure Solutions
Kim Fitzpatrick	Laboratory Technical Services and Business Lead	Water Service Performance
Michael Armstrong	Business Performance Analyst	Water Service Performance
Murray Evans	Senior Water Operations Coordinator	Water Service Delivery
Nicola Currie	Customer Experience and Engagement Officer	Water Service Performance
Nishendra Attygalla	Senior Hydraulics Engineer	Water Infrastructure Solutions
Phil Wetherell	A/ Drinking Water Quality Coordinator	Water Service Performance
Rob Howes	Customer Experience and Engagement Lead	Water Service Performance
Rowland Wicks	Water Grid and Operations Support Coordinator	Water Service Delivery
Scott Emmonds	Metering and Customer Connections Lead	Water Service Performance
Scott Smith	Mechanical Maintenance Supervisor	Water Service Delivery
Troy Kasper	Senior Asset Management Engineer	Water Service Delivery

Following this review, amendments were identified with updates and changes made to the approved DWQMP. Rev5.5 of the DWQMP was submitted for approval in October 2020. Following submission, Logan Water received an Information Requirement Notice (IRN) from the Regulator on the 20<sup>th</sup> of January 2021, primarily related to missing appendices. Rev5.6 of the DWQMP, which included the additional information required as part of the IRN, was submitted on the 26<sup>th</sup> of February of 2021 and received formal approval with conditions on the 20<sup>th</sup> of May 2021. These conditions were addressed in Rev5.7 of the DWQMP and submitted on the 30<sup>th</sup> of September 2021. Rev5.7 of the DWQMP is currently under review and assessment by the Regulator.

The key changes from the review process, Information Requirement Notice and approval Conditions have been included below, including actions taken by Logan Water to address the requirements.

Table 10 - Summary of changes to the DWQMP

<b>Version</b>	<b>Item</b>	<b>Actions</b>
Rev5.4b	DWQMP Review required as part of approval Rev5.4b in 2019	Minor amendments all sections. Organisational structural changes captured and cosmetic update. Update of document references
	<i>DWQMP Review: Network Configuration</i>	Updated to reflect current Water Supply Zones and inclusion of
	<i>DWQMP Review: Preventative measures for Drinking Water Quality Management</i>	Inclusion of CCP and OCP information, management and charts
	<i>DWQMP Review: Drinking Water Quality Management</i>	Updated to reflect current Verification Monitoring program, and implementation of Water Information Management System
Rev5.5	Provide a finalised copy of the risk assessment tables in Appendix I of the plan	Copy of the required document attached appropriately and submitted in Rev5.6
	Provide a copy of the Incident Management Plan in Appendix N in the plan	Copy of the required document attached appropriately and submitted in Rev5.6
	Provide a copy of the Verification Monitoring Plan in Appendix M of the plan	Copy of the required document attached appropriately and submitted in Rev5.6
Rev5.6	Provide water quality data for all bulk water supply points identified in the DWQMP	Water quality performance data for all Bulk Supply Points included in Appendix H, submitted in Rev5.7
	Provide details of personnel who participated in the hazard identification and risk assessment process	Complete version included in Appendix J, submitted in Rev5.7
	Assess the risks of potential chlorate formation	Added in Section 3.1.7.2, and Chlorate Operating Protocol Flowchart added in Appendix S, submitted in Rev5.7
	Operation and maintenance procedures must be listed along with date last revised	Complete version included in Appendix K, submitted in Rev5.7
	The Incident Management Plan must include an exceedance action plan	Exceedance action plan flowchart included in Appendix T, submitted in Rev5.7
	The RMIP must include preventative measures for all unacceptable residual risks	Complete RMIP including all unacceptable risks identified in the risk assessment in Appendix R, submitted in Rev5.7



# 8. Drinking Water Quality Management Plan Audit Findings

One of the conditions of having an approved DWQMP is to undertake an external DWQMP audit every 4 years. In May 2021 an auditor, engaged on behalf of the Queensland Water Supply Regulator, conducted an audit of Logan Waters approved Drinking Water Quality Management Plan.

This audit involved interviews with key stakeholders throughout Logan Water, covering various aspects regarding reservoir security, upgrades and repairs, customer experiences, complaints and monitoring as well as some site visits to two reservoir compounds, and inspection of newly implemented dosing facilities at Greenbank Water Supply Facility.

## 8.1 Summary of Audit Findings and Recommendations

The audit report provided serves additional purposes outside of being a regulatory requirement:

- Assessing the compliance of the approved DWQMP
- Highlighting the current practices that are working well
- Noting areas that can be improved in line with best practice guidance

A summary of the audit findings is in Table 9 below, highlighting the high level of compliance with the approved DWQMP and importantly no major non-conformances were identified during the audit.

Table 11 - Summary of DWQMP Audit Findings

Compliance Code		Number of Findings
<b>Compliant</b>	<b>C</b>	101
<b>Minor Non-Compliance</b>	<b>NC</b>	4
<b>Major Non-Compliance</b>	<b>M</b>	0
<b>Opportunity for Improvement</b>	<b>OFI</b>	22

The auditor made the following comment in the final report.

*Logan Water is clearly doing a number of things very well, which the auditor thought it important to recognise. Examples of this include:*

- *A marked reduction in the number of E. coli detections since 2018*
- *Well designed chemical dosing facilities which mitigate the risks associated with multiple potential modes of failure*
- *A number of key positions with core responsibilities relating to water quality management, and the high level of commitment shown by these individuals*
- *Rigorous well practiced process around the preparation for Network Disinfection Cleans*
- *Transparent and traceable information relating to asset maintenance*
- *Evidence of significant expenditure in capital works to improve water quality outcomes*

*The organisation should be commended and recognised for these (and other) achievements.*

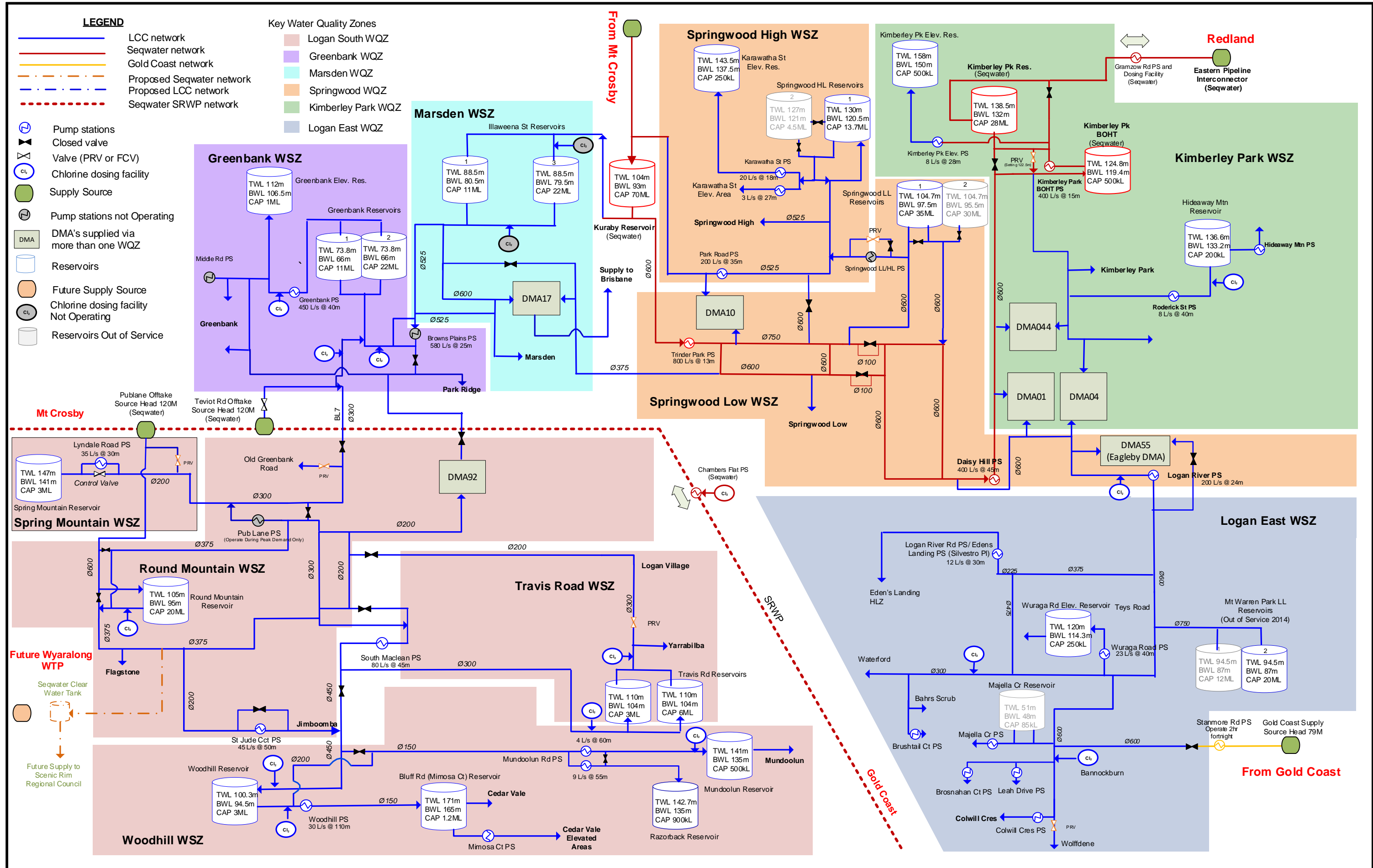
A more detailed summary of the non-conformances identified during the audit is provided below, including current and planned actions by Logan Water to address these findings.

Table 12 - Detailed summary of non-conformances

Non conformance area	Non conformance	Audit Recommendation	Logan Water Actions
ADWG Element 3: Preventive measures and multiple barriers (Relevance of the DWQMP)	Intermittent manual dosing of chloraminated reservoirs with free chlorine is not an effective preventive measure to justify the lowering of residual risk	Re-examine the effectiveness of this preventive measure, and either re-evaluate the residual risk or identify an alternative preventive measure.	<ul style="list-style-type: none"> <li>▪ Item already existed on RMIP and reviewed</li> <li>▪ Expected uptake of Desired Service Standards between SEQ Water and Logan Water in 2022</li> <li>▪ Ongoing consultation with SEQ water regarding a long-term disinfection residual improvement options in key areas of the network.</li> </ul>
ADWG Element 3: Preventive measures and multiple barriers (Compliance with the DWQMP)	Issues were identified with reservoir vermin proofing and the lack of timely rectification of failures, such as at Mount Warren Park Reservoir	It is recommended that the reservoir inspection and reactive/corrective maintenance process be reviewed to ensure minimal passage of time between a failure being identified, and the rectification works.	<ul style="list-style-type: none"> <li>▪ Item added to the RMIP</li> <li>▪ Reservoir Inspection, maintenance, and renewals process to be reviewed.</li> <li>▪ Investigation of improvement opportunities in existing maintenance processes and contractor terms of engagement</li> </ul>
ADWG Element 10: Documentation and Reporting (Accuracy of monitoring and performance data given to the regulator)	Data extracted from Aquantify and provided to the auditor differed from data reported in Annual DWQMP Reports	Logan Water should continue engaging with the database vendor to ensure the Aquantify system is reliable, and potentially implement a process of periodic data validation to ensure this remains the case.	<ul style="list-style-type: none"> <li>▪ Ongoing stakeholder meetings to drive improvements and resolve identified issues</li> <li>▪ Implementation of additional data separation utilities</li> <li>▪ Improvement to existing scripting processes</li> <li>▪ Software updates rolled out to users</li> <li>▪ Cleanse &amp; reupload of historic data set that has been checked for validity</li> </ul>
ADWG Element 12: Review and Continual Improvement (Compliance with the DWQMP)	A number of RMIP actions have not been addressed within the required timeframe over the years (e.g. implementation of the CRM system)	Carefully consider the process of committing to RMIP actions, ensuring that effective yet realistic actions are planned within achievable timeframes. If there is uncertainty around the effectiveness of a particular proposed action, consider committing to "undertaking an investigation..." or "prepare a cost-benefit analysis..." rather than committing to the action which may be later found to be unsuitable.	<ul style="list-style-type: none"> <li>▪ Review of RMIP in 2021 to align with most recent DWQMP submission for approval</li> <li>▪ Process improvement meetings with stakeholders to be held in 2021/22FY to ensure outcomes are being achieved in a timely manner</li> </ul>

# Appendix A – Logan Water Supply Network Schematic

[Logan Water Supply Network Schematic](#)



REV. No	DESCRIPTION	DRAWN	CHECKED	APPR.	DATE
AA	Simplify the Kimberley Park supply arrangement	NA	JT		27/08/21
Z	Change the location of dosing points, Change the operating status of few reservoirs, Change the supply strategy near Pub Lane PS	NA	JT		09/09/20
X	Add new boosters PSs in Logan East	JT	JT		31/08/20
V	Improve Logan East network representation & Review CL2 dosing facilities	NA	JT		06/08/19
U	Includes DMA44 as DMA Supplied via more than one WQ zone	NA	JT		01/05/19
T	Recent Operational Changes and Activation of several reservoirs	NA	JT		01/02/19
S	Recent Operational Changes	NA	JT		06/03/18

DESIGNED BY		LWA REFERENCES	
Name	Grant Gabriel	PROJECT No.	
UPDATED BY		FILE REFERENCE	
Name	Nishendra Attygalla	SHEET SIZE	A3
CHECKED BY		DATUM	AHD
Name	Jeremy Thomas	GDA 94 ZONE 56	
APPROVED BY			
Name			

LOGAN CITY COUNCIL

PROJECT: Logan Water Supply Network Schematic		DATE:
DRAWING TITLE: Water Supply Servicing Strategy (2021 August)		17/09/2021
WIPA DRAWING No.	FIGURE 6	
DESIGN COMPANY:	WIPA	REV. AA
TECH SERVICES DRG No. DM# 9553933		

# Appendix B – Seqwater Grid Map

[Seqwater Grid Map – as at Sept 2021](#)

# South East Queensland Water Grid

## Legend

- Northern Pipeline Interconnector
- Western Corridor Recycled Water Scheme
- Southern Regional Water Pipeline
- Eastern Pipeline Interconnector
- Network Integration Pipeline
- Other bulk water pipelines connecting the SEQ Water Grid
- Local Government boundary
- Bulk Water Storage Reservoirs
- Water Treatment Plants (WTP) - connected to grid
- Water Treatment Plants (WTP) - off-grid
- Water Treatment Plants (WTP) - other
- Purified Recycled Water Treatment Plants
- Desalination Plant
- Power Stations

### Water Treatment Plants (WTP)

- 1 Amity Point
- 2 Beaudesert
- 3 Boonah Kalbar
- 4 Canungra
- 5 Capalaba
- 6 Dayboro
- 7 Dunwich
- 8 Esk
- 9 Ewen Maddock
- 10 Hinze Dam
- 11 Image Flat
- 12 Jimna
- 13 Kenilworth
- 14 Kilcoy
- 15 Kirkleagh
- 16 Kooralbyn
- 17 Landers Shute
- 18 Linville
- 19 Lowood
- 20 Maroon Dam
- 21 Molendinar
- 22 Moogerah

- 23 Mount Crosby East Bank
- 24 Mount Crosby West Bank
- 25 Mudgeeraba
- 26 Noosa
- 27 North Pine
- 28 North Stradbroke (Minjerribah)
- 29 Point Lookout
- 30 Rathdowney
- 31 Somerset Dam (Township)
- 32 Wivenhoe Dam

### Desalination Plant

- 33 Gold Coast

### Purified Recycled Water Treatment Plants

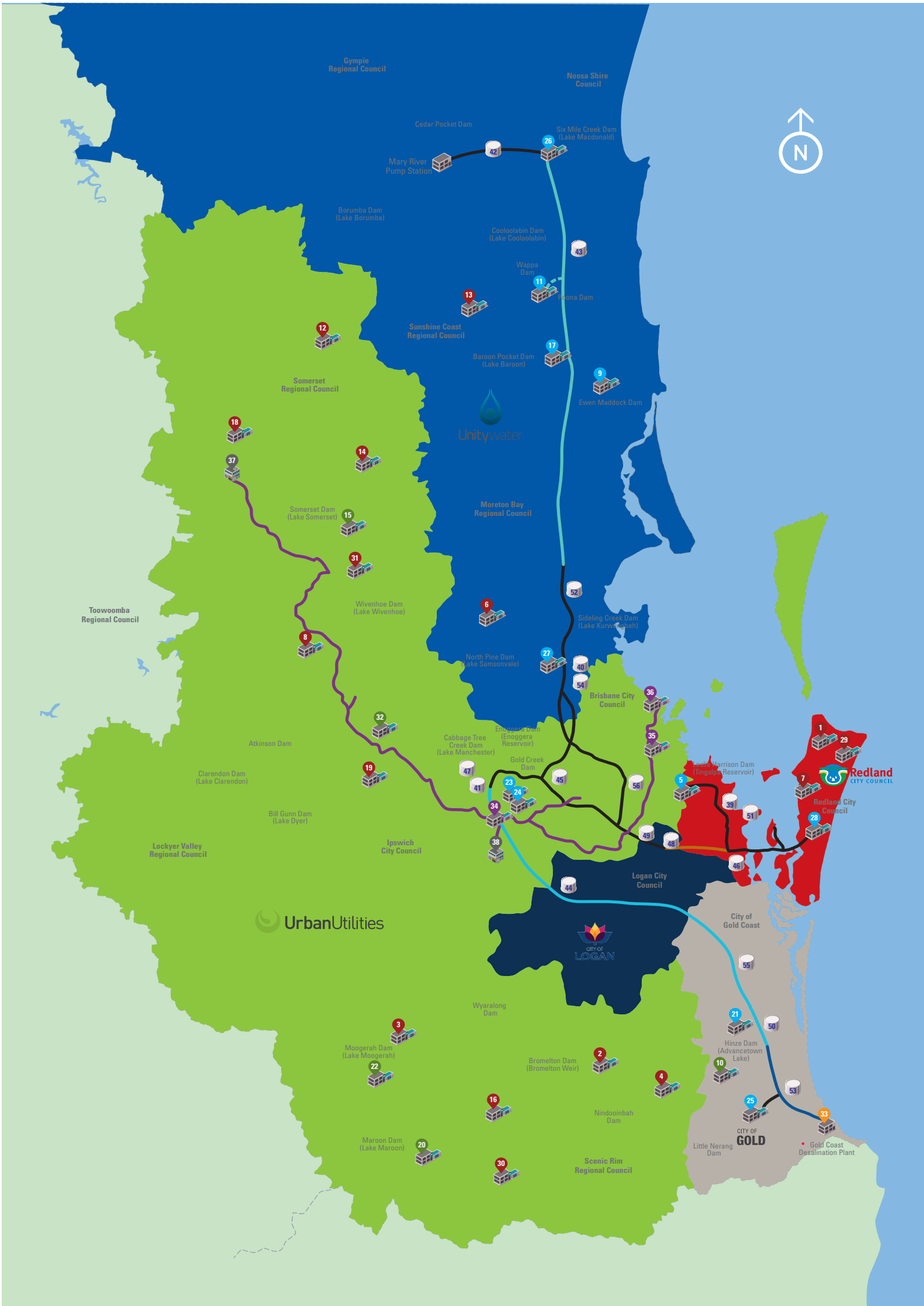
- 34 Bundamba
- 35 Gibson Island
- 36 Luggage Point

### Power Stations

- 37 Tarong
- 38 Swanbank

### Reservoirs

- 39 Alexandra Hills
- 40 Aspley
- 41 Camerons Hill
- 42 Cooroola
- 43 Ferntree
- 44 Greenbank
- 45 Green Hill
- 46 Heinemann Road
- 47 Holts Hill
- 48 Kimberley Park
- 49 Kuraby
- 50 Molendinar
- 51 Mt Cotton
- 52 Narangba
- 53 Robina
- 54 Sparkes Hill
- 55 Stapylton
- 56 Wellers Hill



# Appendix C – 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 1<sup>st</sup> July 2020 – 30<sup>th</sup> June 2021 (2020–21FY). A summary of performance by Water Quality Zone is included on the proceeding pages.

Please refer to Section 4 for further descriptions of the monitoring program regime and statistical analysis principles adopted for the analysis.



**Table 13 - All Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	2514	1		99.96%		98.00%		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO <sub>3</sub>	2288	39	99	70	ns	ns	b	b	b
Aluminium, Total	590	0.014	0.15	0.04	0.2	0	b	b	b
Ammonia-N	2457	<0.1	0.3	0.1	0.5	0	b	b	b
Arsenic, Total	590	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	590	0.004	0.051	0.023	ns	ns	2	0	✓
Beryllium, Total	590	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	590	<0.001	0.05	<0.001	ns	ns	b	b	b
Boron, Total	590	0.02	0.64	0.18	ns	ns	4	0	✓
Bromodichloromethane	1702	<0.005	0.061	0.027	ns	ns	b	b	b
Bromoform	1702	<0.005	0.051	0.008	ns	ns	b	b	b
Cadmium, Total	590	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	590	35.8	88.1	61.7	ns	ns	b	b	b
Calcium Total	590	14.3	35.3	24.7	ns	ns	b	b	b
Chloride	590	5.7	150	49.8	250	0	b	b	b
Chlorine, Free	2514	<0.05	3.7	0.45	0.6	876	5	0	✓
Chlorine, Total	2514	<0.05	4.2	1.11	0.6	1791	5	0	✓
Chloroform	1702	0.006	0.102	0.039	ns	ns	b	b	b
Chromium, Total	590	<0.001	0.002	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	590	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	590	<1	31	2	ns	ns	b	b	b
Colour, True	590	<1	2	<1	15	0	b	b	b
Conductivity	2514	163	787	362	ns	ns	b	b	b
Copper, Total	590	<0.001	0.057	0.003	1	0	2	0	✓
Dibromochloromethane	1702	<0.005	0.068	0.025	ns	ns	b	b	b
Fluoride	590	0.2	1	0.7	ns	ns	1.5	0	✓
Heterotrophic Plate Count	1433	<10	301	13	ns	ns	b	b	b
Iron, Total	590	<0.003	0.427	0.016	0.3	3	b	b	b
Lead, Total	590	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	590	<0.001	0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	590	<1.0	19.9	9	ns	ns	b	b	b
Manganese, Total	590	<0.001	0.062	0.003	0.1	0	0.5	0	✓
Molybdenum, Total	590	<0.001	0.003	<0.001	ns	ns	0.05	0	✓
Nickel, Total	590	<0.001	0.004	<0.001	ns	ns	0.02	0	✓
Nitrate-N	590	<0.1	1	0.4	ns	ns	11.3	0	✓
Nitrite-N	590	<0.1	0.5	0.1	ns	ns	0.9	0	✓
pH	2514	6.7	9.1	7.7	8.5	23	b	b	b
Potassium, Total	590	<1.0	5.4	3	ns	ns	b	b	b
Selenium, Total	590	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	590	12.2	84.8	37	180	0	b	b	b
Sulphate	590	<1	62	23	250	0	500	0	✓
TDS, Calculated	2403	99	477	221	600	0	b	b	b
Temperature	2504	16	30.6	23.0	ns	ns	b	b	b
Thallium, Total	590	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	2514	0	180	0	ns	ns	b	b	b
Total Hardness	590	47.1	164	99	200	0	b	b	b
Total THM	1702	<0.02	0.21	0.10	ns	ns	0.25	0	✓
Turbidity	2514	<0.1	3.1	0.1	5	0	b	b	b
Zinc	590	<0.01	<0.01	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 14 - Greenbank Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	342	0		100.00%		98.00		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO <sub>3</sub>	313	41	98	71	ns	ns	b	b	b
Aluminium, Total	79	0.017	0.1	0.04	0.2	0	b	b	b
Ammonia-N	337	<0.1	0.3	<0.1	0.5	0	b	b	b
Arsenic, Total	79	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	79	0.005	0.041	0.023	ns	ns	2	0	✓
Beryllium, Total	79	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	79	<0.001	0.004	<0.001	ns	ns	b	b	b
Boron, Total	79	0.03	0.34	0.19	ns	ns	4	0	✓
Bromodichloromethane	318	0.017	0.058	0.034	ns	ns	b	b	b
Bromoform	318	<0.005	0.021	0.009	ns	ns	b	b	b
Cadmium, Total	79	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	79	46.7	84.5	61.9	ns	ns	b	b	b
Calcium Total	79	18.7	33.8	24.8	ns	ns	b	b	b
Chloride	79	27	86.4	51.5	250	0	b	b	b
Chlorine, Free	342	<0.05	1.96	0.80	0.6	228	5	0	✓
Chlorine, Total	342	<0.05	3.2	1.26	0.6	297	5	0	✓
Chloroform	318	0.015	0.101	0.047	ns	ns	b	b	b
Chromium, Total	79	<0.001	0.002	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	79	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	79	<1	10	1	ns	ns	b	b	b
Colour, True	79	<1	1.5	<1	15	0	b	b	b
Conductivity	342	188	520	380	ns	ns	b	b	b
Copper, Total	79	<0.001	0.014	0.002	1	0	2	0	✓
Dibromochloromethane	318	0.006	0.063	0.032	ns	ns	b	b	b
Fluoride	79	0.3	1	0.7	ns	ns	1.5	0	✓
Heterotrophic Plate Count	239	<10	301	8	ns	ns	b	b	b
Iron, Total	79	<0.003	0.106	0.011	0.3	0	b	b	b
Lead, Total	79	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	79	<0.001	0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	79	2	18.8	10	ns	ns	b	b	b
Manganese, Total	79	<0.001	0.024	0.002	0.1	0	0.5	0	✓
Molybdenum, Total	79	<0.001	0.001	<0.001	ns	ns	0.05	0	✓
Nickel, Total	79	<0.001	0.001	<0.001	ns	ns	0.02	0	✓
Nitrate-N	79	<0.1	0.6	0.3	ns	ns	11.3	0	✓
Nitrite-N	79	<0.1	0.4	<0.1	ns	ns	0.9	0	✓
pH	342	7.1	9.1	7.8	8.5	18	b	b	b
Potassium, Total	79	1.3	5	3	ns	ns	b	b	b
Selenium, Total	79	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	79	20.5	56.6	39	180	0	b	b	b
Sulphate	79	11	49	22	250	0	500	0	✓
TDS, Calculated	332	114	316	230	600	0	b	b	b
Temperature	342	16.7	28.9	22.7	ns	ns	b	b	b
Thallium, Total	79	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	342	0	1	0	ns	ns	b	b	b
Total Hardness	79	59.6	160	102	200	0	b	b	b
Total THM	318	0.06	0.2	0.12	ns	ns	0.25	0	✓
Turbidity	342	<0.1	0.6	0.1	5	0	b	b	b
Zinc	79	<0.01	<0.01	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 15 - Kimberley Park Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	193	1		99.48%		98.00%		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO <sub>3</sub>	178	39	96	85	ns	ns	b	b	b
Aluminium, Total	46	0.022	0.068	0.05	0.2	0	b	b	b
Ammonia-N	190	<0.1	0.3	<0.1	0.5	0	b	b	b
Arsenic, Total	46	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	46	0.026	0.048	0.035	ns	ns	2	0	✓
Beryllium, Total	46	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	46	<0.001	0.014	<0.001	ns	ns	b	b	b
Boron, Total	46	0.03	0.12	0.06	ns	ns	4	0	✓
Bromodichloromethane	102	0.019	0.06	0.033	ns	ns	b	b	b
Bromoform	102	<0.005	0.022	0.014	ns	ns	b	b	b
Cadmium, Total	46	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	46	51.2	81.5	71.3	ns	ns	b	b	b
Calcium Total	46	20.5	32.6	28.6	ns	ns	b	b	b
Chloride	46	48.5	138	72.1	250	0	b	b	b
Chlorine, Free	193	<0.05	3.1	0.29	0.6	42	5	0	✓
Chlorine, Total	193	<0.05	3.8	0.74	0.6	97	5	0	✓
Chloroform	102	0.015	0.059	0.031	ns	ns	b	b	b
Chromium, Total	46	<0.001	<0.001	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	46	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	46	1	4	2	ns	ns	b	b	b
Colour, True	46	<1	1.5	<1	15	0	b	b	b
Conductivity	193	349	745	483	ns	ns	b	b	b
Copper, Total	46	0.001	0.01	0.003	1	0	2	0	✓
Dibromochloromethane	102	0.016	0.066	0.039	ns	ns	b	b	b
Fluoride	46	0.3	0.9	0.7	ns	ns	1.5	0	✓
Heterotrophic Plate Count	130	<10	301	17	ns	ns	b	b	b
Iron, Total	46	0.004	0.04	0.014	0.3	0	b	b	b
Lead, Total	46	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	46	<0.001	0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	46	9.6	17.8	15	ns	ns	b	b	b
Manganese, Total	46	0.001	0.007	0.003	0.1	0	0.5	0	✓
Molybdenum, Total	46	<0.001	0.003	0.001	ns	ns	0.05	0	✓
Nickel, Total	46	<0.001	0.001	<0.001	ns	ns	0.02	0	✓
Nitrate-N	46	0.2	1	0.6	ns	ns	11.3	0	✓
Nitrite-N	46	<0.1	0.4	0.1	ns	ns	0.9	0	✓
pH	193	7.1	7.9	7.6	8.5	0	b	b	b
Potassium, Total	46	3.4	4.7	4	ns	ns	b	b	b
Selenium, Total	46	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	46	41.2	84.6	49	180	0	b	b	b
Sulphate	46	18	60	31	250	0	500	0	✓
TDS, Calculated	187	212	452	293	600	0	b	b	b
Temperature	193	16.6	29.3	23.3	ns	ns	b	b	b
Thallium, Total	46	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	193	0	34	0	ns	ns	b	b	b
Total Hardness	46	90.6	151	133	200	0	b	b	b
Total THM	102	0.07	0.2	0.12	ns	ns	0.25	0	✓
Turbidity	193	<0.1	0.4	0.1	5	0	b	b	b
Zinc	46	<0.01	0.05	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 16 - Logan East Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	508	0		100.00%		98.00%		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO3	459	41	98	70	ns	ns	b	b	b
Aluminium, Total	119	0.014	0.087	0.04	0.2	0	b	b	b
Ammonia-N	494	<0.1	0.3	0.1	0.5	0	b	b	b
Arsenic, Total	119	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	119	0.005	0.051	0.024	ns	ns	2	0	✓
Beryllium, Total	119	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	119	<0.001	0.008	0.001	ns	ns	b	b	b
Boron, Total	119	0.04	0.64	0.18	ns	ns	4	0	✓
Bromodichloromethane	368	0.013	0.061	0.028	ns	ns	b	b	b
Bromoform	368	<0.005	0.051	0.009	ns	ns	b	b	b
Cadmium, Total	119	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	119	38.1	88.1	61.9	ns	ns	b	b	b
Calcium Total	119	15.3	35.3	24.8	ns	ns	b	b	b
Chloride	119	12.9	150	52.1	250	0	b	b	b
Chlorine, Free	508	<0.05	1.62	0.34	0.6	116	5	0	✓
Chlorine, Total	508	<0.05	2.9	0.79	0.6	283	5	0	✓
Chloroform	368	0.013	0.078	0.034	ns	ns	b	b	b
Chromium, Total	119	<0.001	0.001	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	119	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	119	<1	5	2	ns	ns	b	b	b
Colour, True	119	<1	1.5	<1	15	0	b	b	b
Conductivity	508	163	787	365	ns	ns	b	b	b
Copper, Total	119	<0.001	0.057	0.005	1	0	2	0	✓
Dibromochloromethane	368	0.006	0.068	0.028	ns	ns	b	b	b
Fluoride	119	0.3	1	0.7	ns	ns	1.5	0	✓
Heterotrophic Plate Count	250	<10	301	18	ns	ns	b	b	b
Iron, Total	119	<0.003	0.12	0.011	0.3	0	b	b	b
Lead, Total	119	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	119	<0.001	0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	119	1.3	19.9	10	ns	ns	b	b	b
Manganese, Total	119	<0.001	0.017	0.002	0.1	0	0.5	0	✓
Molybdenum, Total	119	<0.001	0.003	<0.001	ns	ns	0.05	0	✓
Nickel, Total	119	<0.001	0.004	<0.001	ns	ns	0.02	0	✓
Nitrate-N	119	<0.1	0.9	0.4	ns	ns	11.3	0	✓
Nitrite-N	119	<0.1	0.5	<0.1	ns	ns	0.9	0	✓
pH	508	6.7	8.1	7.6	8.5	0	b	b	b
Potassium, Total	119	<1	5.4	3	ns	ns	b	b	b
Selenium, Total	119	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	119	12.2	84.8	37	180	0	b	b	b
Sulphate	119	5	62	24	250	0	500	0	✓
TDS, Calculated	481	99	477	225	600	0	b	b	b
Temperature	508	17	29.9	23.1	ns	ns	b	b	b
Thallium, Total	119	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	508	0	16	0	ns	ns	b	b	b
Total Hardness	119	49.7	164	103	200	0	b	b	b
Total THM	368	0.04	0.21	0.10	ns	ns	0.25	0	✓
Turbidity	508	<0.1	1.4	0.1	5	0	b	b	b
Zinc	119	<0.01	<0.01	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 17 - Logan South Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	758	0		100.00%		98.00%		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO3	689	40	92	51	ns	ns	b	b	b
Aluminium, Total	179	0.016	0.15	0.04	0.2	0	b	b	b
Ammonia-N	742	<0.1	0.2	<0.1	0.5	0	b	b	b
Arsenic, Total	179	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	179	0.004	0.04	0.007	ns	ns	2	0	✓
Beryllium, Total	179	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	179	<0.001	0.002	<0.001	ns	ns	b	b	b
Boron, Total	179	0.02	0.6	0.31	ns	ns	4	0	✓
Bromodichloromethane	648	<0.005	0.059	0.023	ns	ns	b	b	b
Bromoform	648	<0.005	0.021	<0.005	ns	ns	b	b	b
Cadmium, Total	179	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	179	35.8	80.1	52.4	ns	ns	b	b	b
Calcium Total	179	14.3	32.1	21.0	ns	ns	b	b	b
Chloride	179	5.7	78.6	23.7	250	0	b	b	b
Chlorine, Free	758	<0.05	3.7	0.70	0.6	469	5	0	✓
Chlorine, Total	758	<0.05	4.2	1.18	0.6	639	5	0	✓
Chloroform	648	0.006	0.102	0.045	ns	ns	b	b	b
Chromium, Total	179	<0.001	0.001	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	179	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	179	<1	31	2	ns	ns	b	b	b
Colour, True	179	<1	1.5	<1	15	0	b	b	b
Conductivity	758	175	498	222	ns	ns	b	b	b
Copper, Total	179	<0.001	0.007	0.002	1	0	2	0	✓
Dibromochloromethane	648	<0.005	0.065	0.014	ns	ns	b	b	b
Fluoride	179	0.5	1	0.8	ns	ns	1.5	0	✓
Heterotrophic Plate Count	447	<10	301	<10	ns	ns	b	b	b
Iron, Total	179	<0.003	0.32	0.019	0.3	1	b	b	b
Lead, Total	179	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	179	<0.001	0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	179	<1	15.9	2	ns	ns	b	b	b
Manganese, Total	179	<0.001	0.062	0.002	0.1	0	0.5	0	✓
Molybdenum, Total	179	<0.001	0.001	<0.001	ns	ns	0.05	0	✓
Nickel, Total	179	<0.001	0.001	<0.001	ns	ns	0.02	0	✓
Nitrate-N	179	<0.1	0.8	0.5	ns	ns	11.3	0	✓
Nitrite-N	179	<0.1	0.3	<0.1	ns	ns	0.9	0	✓
pH	758	7	8.5	7.9	8.5	5	b	b	b
Potassium, Total	179	<1	4.2	2	ns	ns	b	b	b
Selenium, Total	179	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	179	14.7	54.2	22	180	0	b	b	b
Sulphate	179	<1	30	13	250	0	500	0	✓
TDS, Calculated	726	106	303	135	600	0	b	b	b
Temperature	748	16.6	30.1	22.5	ns	ns	b	b	b
Thallium, Total	179	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	758	0	12	0	ns	ns	b	b	b
Total Hardness	179	47.1	136	60	200	0	b	b	b
Total THM	648	<0.02	0.2	0.08	ns	ns	0.25	0	✓
Turbidity	758	<0.1	2.8	0.1	5	0	b	b	b
Zinc	179	<0.01	<0.01	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 18 - Marsden Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	243	0		100.00%		98.00%		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO <sub>3</sub>	222	39	97	85	ns	ns	b	b	b
Aluminium, Total	57	0.023	0.075	0.05	0.2	0	b	b	b
Ammonia-N	237	<0.1	0.3	0.1	0.5	0	b	b	b
Arsenic, Total	57	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	57	0.017	0.045	0.035	ns	ns	2	0	✓
Beryllium, Total	57	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	57	<0.001	0.007	<0.001	ns	ns	b	b	b
Boron, Total	57	0.04	0.16	0.07	ns	ns	4	0	✓
Bromodichloromethane	106	0.017	0.036	0.027	ns	ns	b	b	b
Bromoform	106	<0.005	0.02	0.013	ns	ns	b	b	b
Cadmium, Total	9	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	57	47.6	87.2	70.2	ns	ns	b	b	b
Calcium Total	57	19.1	34.9	28.1	ns	ns	b	b	b
Chloride	57	43.6	123	70.0	250	0	b	b	b
Chlorine, Free	243	<0.05	1.98	0.14	0.6	8	5	0	✓
Chlorine, Total	243	<0.05	3.3	1.39	0.6	165	5	0	✓
Chloroform	106	0.012	0.043	0.024	ns	ns	b	b	b
Chromium, Total	57	<0.001	<0.001	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	57	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	57	<1	5	2	ns	ns	b	b	b
Colour, True	57	<1	1.5	<1	15	0	b	b	b
Conductivity	243	348	688	472	ns	ns	b	b	b
Copper, Total	57	<0.001	0.007	0.002	1	0	2	0	✓
Dibromochloromethane	106	0.013	0.051	0.035	ns	ns	b	b	b
Fluoride	57	0.2	1	0.7	ns	ns	1.5	0	✓
Heterotrophic Plate Count	137	<10	270	25	ns	ns	b	b	b
Iron, Total	57	<0.003	0.033	0.010	0.3	0	b	b	b
Lead, Total	57	<0.001	<0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	57	<0.001	<0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	57	6.5	18.8	15	ns	ns	b	b	b
Manganese, Total	57	<0.001	0.009	0.004	0.1	0	0.5	0	✓
Molybdenum, Total	57	<0.001	0.001	0.001	ns	ns	0.05	0	✓
Nickel, Total	57	<0.001	0.001	0.001	ns	ns	0.02	0	✓
Nitrate-N	57	<0.1	0.9	0.4	ns	ns	11.3	0	✓
Nitrite-N	57	<0.1	0.4	0.2	ns	ns	0.9	0	✓
pH	243	7.1	8.1	7.7	8.5	0	b	b	b
Potassium, Total	57	2.1	5	4	ns	ns	b	b	b
Selenium, Total	57	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	57	33.1	73.6	48	180	0	b	b	b
Sulphate	57	18	56	32	250	0	500	0	✓
TDS, Calculated	232	211	418	287	600	0	b	b	b
Temperature	243	16	28.9	23.0	ns	ns	b	b	b
Thallium, Total	57	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	243	0	180	3	ns	ns	b	b	b
Total Hardness	57	83.5	160	131	200	0	b	b	b
Total THM	106	0.07	0.13	0.10	ns	ns	0.25	0	✓
Turbidity	243	<0.1	0.9	0.1	5	0	b	b	b
Zinc	57	<0.01	<0.01	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 19 - Springwood Water Supply Zone Water Quality Summary 2020-21FY**

Parameter (Microbial)	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED		% SAMPLED COMPLIED		ADWG GUIDELINE (Health)		ADWG Compliance (Health)	
<i>E. coli</i> by Colilert	470	0		100.00%		98.00%		✓	
PARAMETER (Physical / Chemical)	Number of samples	Min	Max	Average	ADWG Guideline (Aesthetic)	No. over Aesthetic Limit	ADWG Guideline (Health)	No. over Health Limit	Regulatory Status
Alkalinity as CaCO <sub>3</sub>	427	39	99	84	ns	ns	b	b	b
Aluminium, Total	110	0.021	0.081	0.05	0.2	0	b	b	b
Ammonia-N	457	<0.1	0.3	0.1	0.5	0	b	b	b
Arsenic, Total	110	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Barium, Total	110	0.02	0.043	0.035	ns	ns	2	0	✓
Beryllium, Total	110	<0.001	<0.001	<0.001	ns	ns	0.06	0	✓
Bismuth, Total	110	<0.001	0.05	0.001	ns	ns	b	b	b
Boron, Total	110	0.04	0.17	0.07	ns	ns	4	0	✓
Bromodichloromethane	160	0.017	0.038	0.028	ns	ns	b	b	b
Bromoform	160	<0.005	0.02	0.013	ns	ns	b	b	b
Cadmium, Total	110	<0.001	<0.001	<0.001	ns	ns	0.002	0	✓
Calcium Hardness	110	37.5	81.6	68.4	ns	ns	b	b	b
Calcium Total	110	15	32.7	27.4	ns	ns	b	b	b
Chloride	110	43.8	129	68.7	250	0	b	b	b
Chlorine, Free	470	<0.05	1.09	0.13	0.6	13	5	0	✓
Chlorine, Total	470	0.06	3.7	1.24	0.6	310	5	0	✓
Chloroform	160	0.014	0.059	0.026	ns	ns	b	b	b
Chromium, Total	110	<0.001	<0.001	<0.001	ns	ns	0.05	0	✓
Cobalt, Total	110	<0.001	<0.001	<0.001	ns	ns	b	b	b
Colour, Apparent	110	<1	17	3	ns	ns	b	b	b
Colour, True	110	<1	2	<1	15	0	b	b	b
Conductivity	470	181	706	466	ns	ns	b	b	b
Copper, Total	110	<0.001	0.02	0.005	1	0	2	0	✓
Dibromochloromethane	160	0.007	0.053	0.034	ns	ns	b	b	b
Fluoride	110	0.2	1	0.7	ns	ns	1.5	0	✓
Heterotrophic Plate Count	230	<10	301	11	ns	ns	b	b	b
Iron, Total	110	<0.003	0.427	0.023	0.3	2	b	b	b
Lead, Total	110	<0.001	0.001	<0.001	ns	ns	0.01	0	✓
Lithium, Total	110	<0.001	<0.001	<0.001	ns	ns	b	b	b
Magnesium, Total	110	6.7	18.3	15	ns	ns	b	b	b
Manganese, Total	110	0.001	0.046	0.005	0.1	0	0.5	0	✓
Molybdenum, Total	110	<0.001	0.001	<0.001	ns	ns	0.05	0	✓
Nickel, Total	110	<0.001	0.001	<0.001	ns	ns	0.02	0	✓
Nitrate-N	110	<0.1	0.8	0.4	ns	ns	11.3	0	✓
Nitrite-N	110	<0.1	0.5	0.2	ns	ns	0.9	0	✓
pH	470	7	8.1	7.6	8.5	0	b	b	b
Potassium, Total	110	2.6	4.9	4	ns	ns	b	b	b
Selenium, Total	110	<0.01	<0.01	<0.01	ns	ns	0.01	0	✓
Sodium, Total	110	37.3	74.6	47	180	0	b	b	b
Sulphate	110	6	60	31	250	0	500	0	✓
TDS, Calculated	445	210	429	286	600	0	b	b	b
Temperature	470	16.2	30.6	23.5	ns	ns	b	b	b
Thallium, Total	110	<0.001	<0.001	<0.001	ns	ns	b	b	b
Total Coliforms	470	0	120	0	ns	ns	b	b	b
Total Hardness	110	64.9	156	128	200	0	b	b	b
Total THM	160	0.07	0.14	0.10	ns	ns	0.25	0	✓
Turbidity	470	<0.1	3.1	0.2	5	0	b	b	b
Zinc	110	<0.01	<0.01	<0.01	3	0	b	b	b

ns - no ADWG (2011) aesthetic guideline specified

b - no ADWG (2011) health guideline specified

Please note that ADWG (2011) guidelines only list a health limit for Total THMs (i.e., not the individual THM species listed in the table above).

✓ = Results meet ADWG (Health) criteria compliance limits

**Table 20 - Whole of Logan 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)
<i>E. coli</i>	MPN/100mL	2514	1	99.96%	100%	✓

**Table 21 - Logan Water E. coli Verification Monitoring 2020-21FY**

E. coli Verification Monitoring												
WHOLE OF LOGAN CITY ALL ZONES 2020 21 FY												
Month	Jul'20	Aug'20	Sep'20	Oct'20	Nov'20	Dec'20	Jan'21	Feb'21	Mar'21	Apr'21	May'21	Jun'21
No. of samples collected 2020-21FY	199	217	221	198	233	194	205	196	239	193	209	210
No. of samples collected in which E. coli is detected	0	0	0	0	0	0	0	0	1	0	0	0
No. of samples collected in previous 12-month period	2555	2595	2618	2605	2638	2619	2592	2578	2561	2553	2559	2514
No. of failures in previous 12-month period	0	0	0	0	0	0	0	0	1	1	1	1
% compliance in previous 12-month period	100%	100%	100%	100%	100%	100%	100%	100%	99.96%	99.96%	99.96%	99.96%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
% compliance for month	100%	100%	100%	100%	100%	100%	100%	100%	99.58%	100%	100%	100%



# Appendix D – 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	DWQMP Section	Risk Source					Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA	IA	EA	II	GI													
1.1.	2	E1 : Commitment to Drinking Water Quality Management						3.6 3.9.1	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.	<b>Long Term:</b> Incorporate THM Notification alert limits for events which may affect LCC with next Operating Protocol update.	<b>Short Term:</b> Seqwater will notify LCC of increase changes in THMs as per current GC limits in Operating Protocol - <b>completed</b>  <b>Long Term:</b> LCC has incorporated new THM alerts into updated Operating Protocol accepted by Seqwater (DM#10300400) - <b>completed</b> ✓	Water Operations	PL - Network Maintenance	PL - Network Maintenance	Jan-15	Jun-17	Jun-17	100%	COMPLETED	
1.2.	3	E1 : Commitment to Drinking Water Quality Management						3.6 3.9.1	Ensure Policy is reviewed on a regularly basis to remain relevant.	Review and update Drinking Water Policy Statement.	Reviewed & updated to incorporate training (July 2019) (DM#12980466) - <b>completed</b>	All Branches	All Program Leaders	All Managers	Jan-19	Jun-19	Jun-19	100%	COMPLETED	
2.1.	1	E2: Assessment of Drinking Water Supply Systems	RA					3.7.2 3.8	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.	Monitoring prioritisation - Preliminary Planning & Design and Installation - <b>completed</b> ✓  SCADA alarming & validation to be completed 2017/18FY-	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Jun-17	Jun-18	100%	COMPLETED	
2.2.	2	E2: Assessment of Drinking Water Supply Systems			EA				Ensure Risk Assessment maintains currency. #1 Reservoir Security Plan to be updated.	Undertake whole of system Risk Assessment during 2019/20FY to include monitoring in Reservoirs	of. List key hazards to be incorporated into next whole of system risk assessment, <b>completed</b>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-18	Jun-19	Jun-20	100%	COMPLETED	
2.3.	2	E2: Assessment of Drinking Water Supply Systems	RA		EA				There has been evidence of security breaches at a number of reservoir facilities.	<b>a) Investigate</b> the requirements for a Infrastructure Security Plan. <b>b) Develop</b> Infrastructure Security Plan (reservoirs). <b>c) Implement</b> Infrastructure Security Plan (reservoirs).	<b>a) Investigate</b> - Project work facilitated two key stakeholder sessions in October 2019. Tenders are now out (which include cyber security also - refer RMIP item 2.4). <b>b) Develop</b> - Once tender has been returned, plan will be developed. <b>c) Implement - update:</b> Loganwater aims to complete and deliver all security and access arrangements for reservoirs will be addressed through 2021 on a priority basis.  December 2021 calendar project construction underway. Priority list developed. By the end of FY2021-22 completed. In forward Capital Works Plan 2021-22 is programmed there. This includes fences and access controls.  Work packages: Mt Warren Park, Illaweena, Springwood High, Greenbank (including Wineglass)(Commencing Sept). Then smaller reservoirs (Commencing Dec)	Water Business	PL - Water Asset Management	CISUP Project Director (Lee B)	Jun-18	TBC	Dec-21	80%	ON TRACK	

Item No.	Priority	DWQMP Section	Risk Source RA Risk Assessment IA Internal Audit EA External Audit II Incident Investigation GI General Improvement				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
2.4.	2	E2: Assessment of Drinking Water Supply Systems						Cyber security risks which may affect the Drinking Water Management System	a) Investigate requirements of the cyber security KPIs to be included as part of the DWQMP annual reports <b>Done</b> b) Develop a Cyber security gap analysis is part of the scope of works for the CISUP project and also scope to develop implementation plans for the five Cyber security KPIs required to be included as part of the DWQMP annual reports. <b>Done</b> c) Implement CISUP project across Logan	a) Investigate Addressed as part of CISUP project. Two key stakeholder sessions have been held in October 2019. b) Develop gap analysis has been performed and recommendations have been reviewed and accepted. Implementation discussion is ongoing. In addition, a cyber security audit was commissioned by ISS. This covered GeoSCADA, Cytec and ClearSCADA. c) Implement First recommendation is to Commencement of IS asset register compilation. Works on other recommendations are ongoing.	Water Business	PL - Water Asset Management	CISUP Project Director (Lee B)	Nov-19	Jun-21	Dec-21	70%	ON TRACK	
2.5.	3	E2: Assessment of Drinking Water Supply Systems						Assessment of Water Quality Data - List and examine water quality data Internal Audit identified that there may be value in considering causes of exceedances - especially recent (past 18-24 months), as this may bring systemic issues to light. For example, repeated incidents with...	1. List and examine exceedances 2. Review exceedances 3. Confirm any strategic interventions required to respond to trends and clusters	1. All exceedances were reviewed as part of the 2020 DW Risk Assessment. <b>Complete</b> 2. Ibid. <b>Complete</b> 3. Health Networks project will review recommended strategic interventions required to respond to clusters and trends.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	Jun-20	Jun-20	100%	COMPLETED	
2.6.	2	E2: Assessment of Drinking Water Supply Systems						Assessment of Water Quality Data - Assess data using tools such as control charts and trends analysis to identify trends and potential problems Internal Audit identified that there is trending for chlorine, microbial and THM performance, however trends for other parameters should be conducted. Also, there is no trending for trace metals.	a) Investigate trending and reporting options for Aquantify b) Develop dashboard and reporting scripts to enhance performance trending capability c) Implement Aquantify dashboard reporting throughout Loganwater stakeholder group	a) Investigate: trending and reporting functionality now operational in Aquantify. b) Develop: Dashboard and reporting scripts requirements are being developed for each group (trade waste, waste water, drinking water) in Aquantify. c) Implement: Project was delivered in December 2021. Ongoing testing and commissioning continues with external Thinking Windows consultant. The next task is to	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	Dec-20	Dec-21	70%	ON TRACK	
3.1.	3	E3: Preventive Measures for Drinking Water Quality	RA					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	b) Develop: Dashboard and reporting scripts requirements are being developed for each group (trade waste, waste water, drinking water) in Aquantify.	Water Business	PL - Water Product Quality	PL - Water Product Quality	Jun-15	Dec-16	May-18	100%	COMPLETED	
3.2.	3	E3: Preventive Measures for Drinking Water Quality	RA					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.	c) Implement: Project was delivered in December 2021. Ongoing testing and commissioning continues with external Thinking Windows consultant. The next task is to develop PowerBI dashboards which source data from Aquantify.	Water Business	PL - Water Product Quality	PL - Water Product Quality	Jun-15	Dec-17	Mar-18	100%	COMPLETED	

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS	
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation														GI General Improvement
3.3.	1	E3: Preventive Measures for Drinking Water Quality	RA					Dis 16.2 Net 1.1 & 1.2	3.9.1 3.9.2	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 - <b>completed Aug'15</b> ✓ (& re-scheduled Aug'17).  Greenbank WSZ network disinfection clean - <b>completed Sep'16</b> ✓  Network disinfection cleans scheduled every 2 years alternate for Kimberley Park & Logan North - <b>completed Jun'17</b> ✓	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Jun-17	Jun-17	100%	COMPLETED
3.4.	1	E3: Preventive Measures for Drinking Water Quality	RA					DIS 3.1 DIS 5.5 RA-DIS3.2	3.9.2	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	a). CCP & Operational workshops commenced with Logan River breakpoint dosing systems CCP charts & associated SCADA updated - <b>completed</b> ✓  b). Remaining dosing CCPs identified & charts developed - <b>completed</b> ✓	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Jun-17	Jun-17	100%	COMPLETED
3.5.	2	E3: Preventive Measures for Drinking Water Quality	RA	IA	EA			NC DIS 3.1 DIS 5.5 Ext Audit (2,3)	3.9.2	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 - <b>completed</b> ✓  b). Procedures to be updated & associated training implemented, post procedure audit review - <b>Re-allocate to Task Brief project and HACCP development (Ref. Item #3.05-19 &amp; #4.25).</b>  c). Undertaken annual audit review of CCP vs SCADA - <b>completed</b> ✓	Water Operations	PL - Network Operations	PL - Network Operations	Jun-15	Jun-18	Jun-19	100%	COMPLETED
3.6.	2	E3: Preventive Measures for Drinking Water Quality	RA	IA	EA			NC DIS 3.1 DIS 5.5 Ext Audit (2,3)	3.9.2	<b>Preventive Measure and Multiple Barriers - Reservoir inspections.</b>  <b>Springwood High</b> - The reservoir is externally in good condition, however there is a large tree root under one side of the reservoir, near the largest tree (off site).	a) Investigate Reservoir renewal activities to address issues identified, for Springwood High to monitor leak b) Develop items to be added to the renewal works project c) Implement undertake items required to address	a) Investigate Reservoir renewal team addressed the leak issues b) Develop Ongoing reservoir inspections will monitor for the leaks c) Implement Leak is being repaired at the moment (June-July 2020).	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Mar-20	Jun-20	Jun-20	100%	COMPLETED
3.7.	2	E3: Preventive Measures for Drinking Water Quality	RA	IA	EA			NC DIS 3.1 DIS 5.5 Ext Audit (2,3)	3.9.2	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.	a) Investigate HACCP gap analysis to be performed into the current DWQMS b) Develop HACCP plan and review c) Implement HACCP implementation project including developing CCP WOPs and associated training to ensure effective	a) Investigate HACCP review gap analysis project scope of works to be generated in 2019/20 financial year (see Item 3.6) b) Develop: Not commenced - to be evaluated and potentially commenced in FY2020/2021 & 2022/23. Business case to be raised for business and then	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Jun-21	Jun-21	20%	ON TRACK

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
3.10.	1	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Evaluate alternative or additional preventive measures where improvement is required.</b></p> <p><b>Critical Infrastructure Security Upgrade Project</b> - Internal Audit identified improvement to cages around stairs. Minor OFI to include the escalation process into the into</p>	<p>a) <b>Investigate</b> Lock and Key management - looking at cyber key (will allow access and permissions)</p> <p>b) <b>Develop</b> Lock and Key management plan</p> <p>c) <b>Implement</b> lock and key management solutions project</p>	<p>a) Addressed as part of CISUP project</p> <p>b) Addressed as part of CISUP project</p> <p>c) Addressed as part of CISUP project</p>	Water Business	PL - Water Asset Management	CISUP Project Director (Lee B)	Mar-20	Dec-21	Dec-21	100%	Complete	
3.11.	1	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Evaluate alternative or additional preventive measures where improvement is required.</b></p> <p><b>Backflow Prevention</b> - Internal Audit identified LWIA and operations appear not to be following the Plumbing Act requirements (requirements for maintaining a register). Testable backflow prevention devices were sighted with out of date tags.</p>	<p>1. Plumbing and Operations review and update list of LCC BFDs. <b>completed ✓</b></p> <p>2. Operations confirm with contractor status of BFDs currently listed as out of date and all BFDs maintained and up to date <b>completed ✓</b></p> <p>3. Development of a new BFD management procedure - ensures testing is undertaken and recorded annually.</p> <p>4. Development of procedure to confirm new BFDs installed by Capital Delivery partners and</p>	<p>3. Development of BFD management procedure underway:</p> <p>* Mex to be updated with BFD info</p> <p>* RPZs organised in maintenance 'runs' and maintained according to these runs.</p> <p>* All BFDs now up to date with their maintenance requirements</p> <p>4. Procedure referenced above to include section on receipt of BFDs from Capital Delivery partners and</p>	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Mar-20	Jun-20	Aug-20	100%	COMPLETED	
3.12.	3	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Evaluate alternative or additional preventive measures where improvement is required.</b></p> <p><b>Document preventative measures and Strategies into a plan addressing each significant risk</b> - Internal Audit identified that the RMIP is dated with most items complete from</p>	<p>a) <b>Investigate</b> appropriate review process for RMIP</p> <p>b) <b>Develop</b> RMIP management plan (dashboard and review management plan)</p> <p>c) <b>Implement</b> RMIP management plan</p> <p>The risk items should be reassessed to ensure that the effectiveness of the completed actions is</p>	<p>a) <b>Investigate</b> Completed</p> <p>b) <b>Develop</b> Completed</p> <p>c) <b>Implement</b> - Procedure/workflow to review and update RMIP (DWQ) has now been implemented</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	Jun-20	Aug-20	100%	COMPLETED	
3.13.	2	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Critical Control Points</b></p> <p><b>Establish mechanisms for operational control</b> - Operational philosophy of the CCPs is not currently consistent across sites. Recommend a clearer articulation as to when applicable e.g. offline.</p>	<p>a) <b>Investigate</b> appropriate requirements for operation and maintenance manuals for WQS.</p> <p>b) <b>Develop</b> O &amp; M manuals</p> <p>c) <b>Implement</b> O &amp; M manuals</p>	<p>a) <b>Investigate</b> completed</p> <p>b) <b>Develop ongoing</b> - Operations and Maintenance manuals developed and are in draft for <b>Woodhill</b>. Stakeholder review finalised.</p> <p>c) <b>Implement</b> Woodhill almost ready and then implementation phase and test. Needs to run for a while for maintenance tasks and also over summer. Then others can be developed and</p>	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Mar-20	Jan-21	Dec-21	50%	ON TRACK	
3.14.	2	E3: Preventive Measures for Drinking Water Quality	RA	IA				<p><b>Preventive Measure and Multiple Barriers - Reservoir inspections.</b></p> <p>Is reservoir integrity appropriate for the level of risk?</p>	<p>a) <b>Investigate</b> reservoir integrity review and training requirements including a 3 year period review.</p> <p>b) <b>Develop</b> Reservoir Integrity review and training package</p> <p>c) <b>Implement</b> training package and consider findings of reservoir integrity package - Conduct reservoir integrity training, standardise reservoir inspections and implement</p>	<p>Reservoir integrity training delivered</p> <p>Reservoir inspections performed by WOPs personnel are consistent. External providers also trained (Aerial drone solutions) - more evidence of consistent inspections.</p>	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Mar-20	Jun-20	Jun-22	100%	COMPLETED	

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
3.15.	1	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Reservoir inspections.</b></p> <p><b>Mt Warren Park</b> - The fence integrity is compromised. Evidence has been provided demonstrated there have been trespassers on site, with some access to the reservoir roof.</p>	<p><b>a) Investigate</b> a reservoir security management system across all reservoirs</p> <p><b>b) Develop</b> a reservoir security management system across all reservoirs</p> <p><b>b) Implement</b> a reservoir security management system across all reservoirs</p>	<p>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.</p>	Water Business	PL - Water Asset Management	CISUP Project Director (Lee B)	Mar-20	TBC		100%	COMPLETE	
3.16.	2	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Reservoir inspections.</b></p> <p><b>Springwood High</b> - The reservoir is externally in good condition, however there is a large tree root under one side of the reservoir, near the largest tree (off site). A number of plugs are missing or coming out. Tree was a wet spot identified near the drain that needs to be monitored to determine if there is a leak. Centre box gutter in good condition, however not certain that there are foam inserts under the ridges.</p>	<p><b>a) Investigate</b> Reservoir renewal activities to address issues identified. for Springwood High to monitor leak</p> <p><b>b) Develop</b> items to be added to the renewal works project</p> <p><b>c) Implement</b> undertake items required to address issues as part of the renewal project. Include items in ongoing reservoir inspections</p>	<p><b>a) Investigate</b> Reservoir renewal team addressed the leak issues</p> <p><b>b) Develop</b> Ongoing reservoir inspections will monitor for the leaks</p> <p><b>c) Implement</b> Leak is being repaired at the moment (June-July 2020).</p>	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Mar-20	Jun-20	Jun-20	100%	COMPLETE	
3.17.	3	E3: Preventive Measures for Drinking Water Quality		IA				<p><b>Preventive Measure and Multiple Barriers - Reservoir inspections.</b></p> <p><b>Illaweena Reservoirs</b> - Clear from design features that vermin proofing is key design criteria. However, there were some gaps under the roof of Illaweena 1 &amp; 2. Also identified that the electrician potentially compromised integrity by running cables internally (in and up through), rather than external to the reservoir. Although cable</p>	<p><b>a) Investigate</b> adding item to the 'Reservoir Design Philosophy'</p> <p><b>b) Develop</b> procedures to implement in Electrical and Telemetry group</p> <p><b>c) Implement</b> procedures and provide electricians with Hy5 training and additional information <b>(completed)</b></p>	<p>a) To be added during next review of Reservoir Design philosophy</p> <p>b) Hy5 training completed by LCC Network Operations electricians</p> <p>c) Online Water Quality Awareness module completed by electricians</p>	Water Operations	PL - Network Operations	Electrical and Telemetry Coordinator	Mar-20	Sep-20	Sep-20	100%	COMPLETE	

Item No.	Priority	DWQMP Section	Risk Source RA Risk Assessment IA Internal Audit EA External Audit II Incident Investigation GI General Improvement	Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
3.18.	1	E3: Preventive Measures for Drinking Water Quality	RA			Inadvertent reservoir contamination incident (except for Springwood Low - which has 'controlled' public access to the roof) via authorised access (including Telco's). This can be caused by damage to the roof of reservoirs, allowing ingress.	<ol style="list-style-type: none"> <li>1. Review lease agreement with third party to ensure it covers any damage occurring from a result of any work undertaken and subsequent actions and communications required.</li> <li>2. QLD Water Directorate developed standard approach for access protocol. Work towards fully implementing - incorporate into Critical Infrastructure Plan.</li> <li>3. <del>Ensure no 3rd parties have access to locks.</del> Taken out of this item and placed in RMIP Item 2.3</li> <li>4. Investigate separate pole for telecoms equipment.</li> <li>5. Require induction/contractor training prior to access.</li> <li>6. <del>Require Aqua card to undertake work on infrastructure.</del></li> </ol>	<ol style="list-style-type: none"> <li>1. Currently recommendation is before Executive to close public access to Springwood Low reservoir. This is currently closed to the public. Ongoing works to be performed to the Springwood Low reservoir complex. <b>Currently before Council Executive. remove this item from this action and open in another item.</b></li> <li>2. Access protocol work: a training session with telco subcontractors was held in January 2020 to remind them of their responsibilities, and the process for accessing site was confirmed. All teleco subcontractors have completed Aquacard training now. <b>Completed</b></li> <li>4. Separate poles are included at some reservoirs now. Individual reservoirs are assessed for ability to remove telecoms equipment <b>Completed</b></li> <li>5. Hy5 training has been completed for many contractors (Dec 2019), and online training is available.</li> </ol>	Water Business	PL - Water Asset Management	TBA		Dec-21	Dec-21	100%	COMPLETED
3.19.	3	E3: Preventive Measures for Drinking Water Quality	RA			Unusual raw water quality in Mt Crosby catchment (Lockyer catchment) due to high flow or unforeseen circumstances - THMs	<ol style="list-style-type: none"> <li>1. Critical customer GIS layer, split by criticality. (WAM)</li> <li>2. Investigate updates to the Operational Protocol to formally proceduralise how THM increases detected in monitoring are communicated to Seqwater.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per item 8.2 (closed in this item)</li> <li>2. Not started. Once completed, the recommendation to be given to Rolly for next Operational protocol review and update.</li> </ol> <p>Item raised in Water Quality Desired Standards draft and</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	Jun-21	Dec-20	90%	ON TRACK
3.20.	3	E3: Preventive Measures for Drinking Water Quality	RA			Algal blooms in Seqwater catchments/Taste and Odour complaints	<ol style="list-style-type: none"> <li>a) Investigate updates to the Operational Protocol to formally proceduralise how increases in THMs in the network are communicated to Seqwater.</li> <li>b) Develop THM communications triggers to send to Seqwater</li> <li>c) Implement THM comms triggers in next review of</li> </ol>	<ol style="list-style-type: none"> <li>a) Not started. Once completed, the recommendation to be given to Rolly for next Operational protocol review and update</li> <li>b) THM management protocol identifies when to communicate with Seqwater</li> <li>c) To be included in the next Operations Protocol</li> </ol>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	Jun-21	Dec-20	10%	ON TRACK
3.21.	3	E3: Preventive Measures for Drinking Water Quality	RA			Chambers Flat and Gramzow Rd chlorination break-point - taste and odour	<ol style="list-style-type: none"> <li>a) Investigate updates to the Operational Protocol to formally proceduralise how increases in reported taste and odour complaints are communicated to Seqwater.</li> <li>b) Develop Taste and Odour communications triggers to send to Seqwater</li> <li>c) Implement Taste and Odour comms triggers in next review of the Operations Protocol</li> </ol>	<ol style="list-style-type: none"> <li>a) Investigate</li> <li>b) Develop</li> <li>c) Implement</li> </ol>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	Jun-21	Dec-20	10%	ON TRACK

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
3.23	1	E3: Preventive Measures for Drinking Water Quality	RA					Protozoan contamination from ingress into the Springwood Low reservoir (currently public access to roof)	a) Investigate options to prevent public access to the roof of Springwood Low reservoir b) Develop plan to prevent public access to the roof c) Implement reservoir renewal works to address sealing issues at Springwood Low reservoir complex and also to prevent public access to the roof.	a) and b) Proposal currently before Council executive to close public access to Springwood Low. The proposal for complete prevention of access was denied. Instead, repair works are to be undertaken by Council to maintain the integrity of the reservoir and protect <i>Public Health</i> . c) Sealing works to be scheduled in the as part of the	Water Business	PL - Water Asset Management	TBA	Mar-20	Jan-21	Dec-21	50%	ON TRACK	
3.24	2	E3: Preventive Measures for Drinking Water Quality		IA				Protozoan contamination from ingress into the Bluff Road reservoir (currently public access to roof)	1. Develop roof rain testing procedure 2. Test Bluff Road Roof	1. Completed 2. Completed	Water Business	PL - Water Asset Management	TBA	Oct-19	Aug-20	Aug-20	100%	COMPLETED	
3.25	2	E3: Preventive Measures for Drinking Water Quality		IA				Evaluate alternative or additional preventive measures where improvement is required.	1. Review and update IOP process to incorporate risk assessment for Critical Customers 2. Create and implement a GIS layer of critical customers which is regularly reviewed and updated.	1. Risk Assessment requirements for Water Interruptions memo has been completed. Risk assessment process now implemented into IOP. <b>(completed) DM#13310191</b> 2. Customer GIS layer is available for use via CityMaps web. The new layer should be available as a corporate GIS layer in June 2020 (ongoing)	Water Operations	PL - Network Operations	Network Operations Supervisor	Oct-19	Jun-20	Jun-20	100%	COMPLETED	
3.26	1	E3: Preventive Measures for Drinking Water Quality					GI	Unauthorised access to Razorback reservoir	a) Investigate additional capital works onsite to enhance security (possible CCTV, reinforced security around hatch, gates and stairwell cage). b) Develop plan to install additional security items c) Implement/install items as per plan	CISUP - covers the enhanced security, prevention items have been implemented. Ongoing reservoir security issues are addressed under CISUP plan (RMIP item 2.3)	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Dec-20	Jul-20	Jul-20	100%	COMPLETED	
3.27	2	E3: Preventive Measures for Drinking Water Quality	RA	IA	EA			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. Consistent review is required to	a) Investigate appropriate CCP review workshop process. b) Develop CCP review workshop process c) Implement CCP review workshop process	a) Investigation: First review undertaken by TL WQ Operations b) Ongoing: first one held, in the process of designing FY2021-22 onwards c) Ongoing: to be implemented for next review after FY2021-22	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jun-20	Dec-20	Dec-21	20%	ON TRACK	
3.28	2	E3: Preventive Measures for Drinking Water Quality						Preventive Measure and Multiple Barriers - Evaluate alternative or additional preventive measures where improvement is required. Backflow Prevention - Internal Audit identified LWIA and operations appear not to be following the Plumbing Act requirements (requirements for maintaining a register).	1. Development of a new BFD management procedure - ensures testing is undertaken and recorded annually. 2. Development of procedure to confirm new BFDs installed by Capital Delivery partners on behalf of LCC meet regulatory plumbing - ensures registration of new pump	1. Note that process exists for each stakeholder group 2. Not started	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-21	Oct-21	Oct-21	0%	NOT STARTED	



Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS	
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation														GI General Improvement
4.1.	1	E4: Operational Procedures and Process Control					GI	5.2 (G)	3.9.2	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 Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Dec-17	Jun-17	100%	COMPLETED
4.2.	2	E4: Operational Procedures and Process Control	RA					NC Net 4.1	3.9.2	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 - <b>completed</b> ✓	Water Business	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Jun-17	Jun-17	100%	COMPLETED
4.3.	2	E4: Operational Procedures and Process Control	RA					NC Net 4.1	3.9.2	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 - <b>completed</b> ✓  <b>Implement with the mains break "hands-on" training Ref. 4.03b.</b>	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Dec-18	Jun-18	100%	COMPLETED
4.4.	1	E4: Operational Procedures and Process Control	RA					NC Net 4.1	3.9.2	Risk Assessment: Need to confirm what flushing system is used when main has been not used for some time <b>and can result in E.coli incident if not effectively implemented.</b>	Undertake further <b>WOP review</b> 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.	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jun-15	Mar-17	Mar-17	100%	COMPLETED
4.5.	2	E4: Operational Procedures and Process Control	RA	IA				NC Net 4.1	3.9.2	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 <b>"on-the-job" training</b> 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 - <b>completed</b> ✓  b). "On-the-job" training material developed & trailed with supervisors - <b>completed Aug'18</b> ✓  c). Implementation of "on-the-job" training to be rolled-out during 2018/19FY - <b>completed May'19</b> ✓	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Dec-18	May-19	100%	COMPLETED
4.6.	2	E4: Operational Procedures and Process Control	RA	IA				NC Net 4.1 RA-EMG1.18	3.9.2	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) Investigate Aquacard and hygienic works practices requirements b) Develop refresher training for Hy5 - internal staff and contractors - including online training c) Implement all training packages across the business	a) Investigate: Completed Scope of works being developed for an online training module in FY2019/20 b) Develop: Completed Hy5/Aquacard training to be delivered to all relevant personnel and contractors by December 2019 c) Develop: Completed launched refresher training online training module and upload onto the training system during September 2020. Implementing in accordance with implementation plan	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Jun-20	Nov-20	100%	COMPLETED

Item No.	Priority	DWQMP Section	Risk Source RA Risk Assessment IA Internal Audit EA External Audit II Incident Investigation GI General Improvement				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS	
4.7.	1	E4: Operational Procedures and Process Control	RA					NC Net 4.3	3.9.2	Risk Assessment: Need to confirm what flushing system is used when mains has been not used for some time and can result in <i>E.coli</i> 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) - <b>under final review</b> . b). Recommissioning reservoirs that have been out of service for a period (> 4 weeks) - <b>under final review</b> . c) WOP is due to be reviewed and updated. New testing menu developed by the lab allow easier testing for recommissioned reservoirs (this has been implemented).	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jun-15	Jun-17	Dec-19	100%	COMPLETE
4.8.	2	E4: Operational Procedures and Process Control	RA	IA				NC Net 4.3	3.9.2	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. <b>Completed May'19</b> .  <i>Investigate technologies available (refer to 4.05c).</i>	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jun-15	Jun-19	Jun-19	100%	COMPLETE
4.9.	2	E4: Operational Procedures and Process Control	RA	IA				NC Net 4.3	3.9.2	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.	a) Investigate framework to ensure drinking water infrastructure (e.g. Investigate other technologies available for maintaining clean networks). b) Develop framework to ensure drinking water infrastructure (e.g. Investigate other technologies available for maintaining clean networks). c) Implement framework	a) & b) Healthy Networks Project has been delivered c) To be implemented - ongoing (this item to be rolled into another item)	Water Business	PL - Water Product Quality	Asset Strategy Lead	Jun-15	Jun-19	Feb-20	100%	COMPLETE
4.10.	1	E4: Operational Procedures and Process Control		IA				NC	3.9.3	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.  <b>Also refer to Items 4.4, 4.5, 4.6, 4.7 &amp; 4.13 which are related.</b>	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 <b>Ref 4.03. completed</b> ✓	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Jun-17	Jun-17	100%	COMPLETE
4.11.	1	E4: Operational Procedures and Process Control		IA				NC	3.9.3	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.  <b>Also refer to Items 4.4, 4.5, 4.6, 4.7 &amp; 4.13 which are related.</b>	Review Verification Sampling Tap installation & repair WOP to ensure disinfection of all parts and best practise Tap design, to minimise contamination risks.	Investigated best practise Verification Sampling Tap design which is to be incorporated into 2017/18FY CAPEX <b>completed</b> ✓	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Jun-17	Jun-17	100%	COMPLETE

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS	
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation														GI General Improvement
4.12.	3	E4: Operational Procedures and Process Control		IA				NC	3.9.3	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 4.4, 4.5, 4.6, 4.7 & 4.13 which are related.	Submit CAPEX 2017/18FY Plan for new sampling tap and ensure design to fabricate and install for 2017/18FY.	a). CAPEX submitted - <b>completed ✓</b>  b). Installation commenced 2017/18FY with completion expected 2018/19FY- <b>completed ✓</b>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Jun-18	Jun-19	100%	COMPLETE
4.13.	2	E4: Operational Procedures and Process Control		IA	EA			NC Ext Audit (6)	3.9.3	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 <i>E.coli</i> health exceedance to key internal stakeholders. <b>Ref Item 4.14 - linked.</b>	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) <b>Completed</b> Lab systems & procedures updated to ensure prompt reporting of 'health' exceedances and unusual sampling observations ( <b>addressed Ext Audit (6)</b> )  b) <b>Completed</b> - Internal limits implemented at the lab aligned with DM#12929898 DW Corrective Action procedure. Implementation of Aquantify will automate this 'alert' process in the event of internal limit breaches (This action is closed here and refer RMIP item 2.6 for Aquantify actions)  <b>Notification automation to initiated with WQ IMS implementation (Ref. 11.00).</b>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Dec-17	Jun-20	100%	COMPLETE
4.14.	1	E4: Operational Procedures and Process Control		IA				NC	3.9.3	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 4.4, 4.5, 4.6, 4.7 & 4.13 which are related.	Investigate formalised drinking water sampling NATA accreditation, currently undertaken by NATA accredited laboratory to ensure consistency & key observations reported.	Sampling proposal submitted to NATA approved.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Dec-17	Dec-17	100%	COMPLETE
4.15.	2	E4: Operational Procedures and Process Control	RA					Net 4.4	3.9.2	<b>2012RMIP (G6)</b> To reduce the risk of contamination from properties without backflow prevention devices.  Investigate if project still required.	<b>2012RMIP (G6)</b> Residual project from Allconnex period where existing properties were mainly located in Gold Coast areas.  Investigate if project still required.	All new properties require backflow prevention and there is a regulatory requirement for commercial operations.  All new properties are now metered with compliant backflow prevention - <b>completed ✓</b>	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Jan-12	Jun-14	Jun-18	100%	COMPLETE
4.16.	2	E4: Operational Procedures and Process Control				GI		5.2 (G)	3.10.1	No clear <b>operational monitoring</b> program currently in place. Develop and show how to link to <b>corrective actions</b> 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 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. <b>Action moved to refer to Item 3.05 &amp; 4.25.</b>  b). Implementation will be assisted with the development of Water Quality Information Management System ( ) which requires development and implementation <b>Action moved to refer to Item 3.05, 4.25 &amp; 11. Pending implementation</b>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Jun-18	Jun-19	100%	COMPLETE

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
4.17.	3	E4: Operational Procedures and Process Control					GI	5.2 (G)	3.9.3	TBA	<p>Drinking water health incidents currently managed via IMP, with reporting to Regulator and long term actions captured via RMIP ✓</p> <p>Intelex recently implemented for WH&amp;S incidents ✓</p> <p>Establish effective drinking water Corrective Action system with associated responsibilities and WOP to be developed.</p> <p>Commenced development of Intelex Audit tool however delays due to provider Gabba ceased operations. Investigator new provider. <b>Audit module completed</b></p> <p>Consider implementation process across all 3 Water Branches required.</p> <p><b>Intelex system</b> investigated as best tool for <b>Corrective Actions</b>, including drinking water near miss incidents, to allow for communication trail &amp; status reporting. Investigate corporate support required <b>Ref #12.00b</b></p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jan-17	Dec-17	TBC	100%	COMPLETE
4.18.	2	E4: Operational Procedures and Process Control	RA	IA				Res 1.5, 1.6 & 1.7	3.9.2	<p>Internal Audit (2013) - large gaps and dirt close to vent holes found at reservoir.</p> <p>Gaps were repaired.</p> <p>Investigate on-going refresher training.</p>	<p>Water Quality Distribution training workshop delivered by QLD Water Directorate, including reservoir inspections - <b>Jul'15</b> ✓</p> <p>"on-the-job" reservoir inspection training undertaken - <b>Nov'16</b> ✓</p> <p>Formalised reservoir inspection training undertaken - <b>Apr'19</b> ✓.</p> <p>Investigate Reservoir Inspection "refresher" training for <b>2019/20FY</b>.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	May-13	Dec-17	Jun-20	100%	COMPLETE
4.19.	1	E4: Operational Procedures and Process Control	RA					NC Res 1.5, 1.6 & 1.7 Res 4.4	3.9.2	<p><b>E.coli</b> incidents were a result of poor reservoir condition &amp; design with <b>low chlorine residual</b>.</p> <p>Also investigate other alternatives (see Item</p>	<p>Trial chlorine tablets as safer alternative to liquid hypochlorite dosing to maintain chlorine residual for smaller reservoirs (short term).</p> <p>Chlorine tablet trial completed with findings indicating effective for smaller reservoirs, though increased monitoring required if no online system exists.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Dec-16	Mar-17	100%	COMPLETE
4.20.	1	E4: Operational Procedures and Process Control	RA	IA				NC Dis 4.1, 4.2 & 4.3	3.9.2	<p>Internal audit review highlighted improvements required in the process to evaluate the quality of chemicals &amp; products supplied (i.e. hypochlorite) to ensure AS4020 compliance, suitable for use in drinking water.</p> <p>a) Develop new hypochlorite WOP for procurement, which includes quality criteria.</p>	<p>Testing for salt impurities was undertaken as part of Round Mt dosing facility commissioning (salt chlorinator).</p> <p>Draft completed with sign-off required.</p>	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Jun-18	Dec-19	100%	COMPLETE
4.21.	2	E4: Operational Procedures and Process Control	RA	IA				NC Dis 4.1, 4.2 & 4.3		<p>Internal audit review highlighted improvements required in the process to evaluate the quality of chemicals &amp; products supplied (i.e. hypochlorite) to ensure AS4020 compliance, suitable for use in drinking water.</p> <p>a) Investigate requirements for hypochlorite procedure b) Develop hypochlorite procedure c) Implement new hypochlorite WOP for procurement, which includes quality criteria</p>	<p>Procedure developed (WOP-How we order when we order and how we take deliver.</p>	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jul-16	Jun-18	Jun-19	100%	COMPLETE

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
4.22.	2	E4: Operational Procedures and Process Control	RA					<p><b>NC</b> Res 1.5 &amp; 1.6 RA-RES1.1 RA-RES1.13 RA-RES1.14 RA-RES1.6 RA-RES4.1 RA-RES6.1 RA-RES6.3 RA-DIS4.1</p>	<p><i>E.coli</i> incident was a result of <b>poor reservoir condition &amp; design</b> with low chlorine residual.</p>	<p><b>a) Investigate</b> Best Practice design requirements <b>b) Develop</b> Reservoir design philosophy <b>c) Implement</b> Reservoir design philosophy via the CAPEX Asset Renewals Program</p>	<p>Capital Works Asset Renewals Program (<i>subject to funding to Yr2022</i>)  - Mt Warren Park, Woodhill, Greenbank &amp; Wuraga elevated roof replacement (2017-2019FY) - <b>completed</b> ✓</p>	Water Business	PL - Water Asset Management	PL - Water Asset Management	Jul-16	Jun-22	Jun-22	90%	MONITOR
4.23.	2	E4: Operational Procedures and Process Control	RA				3.9.2	<p><b>NC</b> Res 1.6 Res 4.4 Dis 12.1 &amp; 12.2</p>	<p><i>E.coli</i> incident was a result of poor reservoir condition &amp; design with <b>low chlorine residual</b>.</p>	<p>Chlorine tablets were trialled however deemed only effective for small reservoirs. Auto dosing system required.</p>	<p>Designed, built and installed new dosing system at Hideaway Mt reservoir. <b>Completed</b> ✓</p>	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jul-16	Jun-17	Jun-17	100%	COMPLETED
4.24.	2	E4: Operational Procedures and Process Control	RA	IA	EA		3.9.2	<p>No clear operational monitoring program currently in place. Develop and show how to link to corrective actions by operations. Also relate to SCADA.</p> <p>Informal operational monitoring occurs as part of the Lab's routine Verification Monitoring program (i.e. HPC, etc.) and ad hoc SCADA trend reviews.</p> <p>Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded.</p> <p>Inconsistency of CCP SCADA limits vs CCP chart limits.</p>	<p><b>NC</b> DIS 3.1 DIS 5.5 Ext Audit (2,3) RA-EMG1.23</p>	<p><b>a) Develop</b> formal operational monitoring with training in CCPs and also use of Water Information Management System (WIMS). <b>Use of WIMS to be discussed as not agreed by all parties.</b></p> <p><b>b) Develop</b> function specifications of all existing dosing systems and develop associated R&amp;M and operational manuals and system to ensure currency. Also develop monitoring procedures within Network Maintenance team</p> <p><b>c) Implement</b> both O &amp; M manuals and procedures throughout team</p>	<p><b>a) Informal</b> CCP internal training of on-call personnel has taken place. Aquantify training of some operations personnel has occurred <b>b) O &amp; M</b> manual project completed in September 2020 for Woodhill. Next program of work is to roll out to other WDF. <b>c) To be implemented</b> by December 2021 (Woodhill WDF only - then rolled out to rest following successful summer trial)</p>	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jun-19	Dec-20	Dec-22	70%	ON TRACK
4.25.	2	E4: Operational Procedures and Process Control	RA	IA	EA		3.9.2	<p>No clear operational monitoring program currently in place. Develop and show how to link to corrective actions by operations. Also relate to SCADA.</p> <p>Internal audit identified that not all CCPs are easily visible on SCADA system to confirm limits. CCP limits are hard coded.</p> <p>Inconsistency of CCP SCADA limits vs CCP chart limits.</p>	<p><b>NC</b> DIS 3.1 DIS 5.5 Ext Audit (2,3)</p>	<p>Implement procedures associated with R&amp;M and operational manuals.</p> <p>Update role statements for personnel who monitor network to include monitoring and implementation CCP for water dosing facilities</p>	<p><b>NEW</b> Implementation to commence once #4.25a completed.</p> <p>Note that Service Model review will mean that this will likely be delayed later. Roles and responsibilities are being reviewed as part of a larger process. This can be raised as part of this process.</p>	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jun-19	Jul-21	Jul-21	0%	NOT STARTED
4.26.	2	E4: Operational Procedures and Process Control				GI	G	<p><b>Operational Procedures and Process Control - Operational procedures</b></p> <p><b>Document all procedures and compile into an operations manual</b> - The intent of this criteria is met with site specific WOPs. However, some of the WOPs are outdated - e.g. customer service requests and completion of WWETT forms appear to be outdated as SAMMS has now replaced WWETT. WOP 216 is a 2015 version and could also be updated to include trigger for re-calibration</p>	<p><b>a) Investigate</b> document control system which covers Water Operations procedures needs to be defined with responsibilities assigned for document update. <b>b) Develop</b> process to confirm Water Operations documents are reviewed and updated to meet review cycle requirements <b>c) Implement</b> review system</p>	<p><b>a) Investigate</b> Currenty Water Grid and Operations Support Coordinator manages Written Direction for WOPs via spreadsheet: DM#8414293. An interim process on Sharepoint also exists for Loganwater documents, managed by Quality Management System Team in Water Business. <b>b) Develop</b> Water Grid and Operations Support Coordinator to develop procedure to document the Written Direction register management and associated</p>	Water Operations	Water Grid and Operations Support Coordinator	Water Grid and Operations Support Coordinator	Mar-20	Dec-20	Dec-20	40%	ON TRACK	

Item No.	Priority	DWQMP Section	Risk Source RA Risk Assessment IA Internal Audit EA External Audit II Incident Investigation GI General Improvement				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
4.27.	3	E4: Operational Procedures and Process Control				GI	G		Operational Procedures and Process Control - Operational procedures  Are there sufficient effective SOPs to support work orders? - As above - calibration of instruments is based on the operator to determine the appropriate level for recalibration rather than an explicit statement. It was stated that recalibration is triggered at somewhere	a) Investigate recalibration trigger limits for chlorine meters used within Network Operations WQ team and if they are aligned with best practice requirements. Investigate key training required and ensure appropriately resourced and equipped . pH calibration is also to be added to the WOP. b) Develop a process for recalibration process for online chlorine monitoring	a) Recalibration limits developed and to be discussed with the team b) WOP222 Started (80%) c) not started	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Mar-20	Oct-20	Dec-22	60%	ON TRACK
4.28.	3	E4: Operational Procedures and Process Control				GI	G		Operational Procedures and Process Control - Corrective action  Establish and document procedures for corrective action to control excursions in operational parameters - Monthly review of work orders identified outstanding work orders. For key tasks, this	a) Investigate review process for Corrective Action (TL WQ corrective action emails - are they reviewed and how) 2) Develop review management system 3) Implement review management system	a) Develop a WOP procedure how to conduct a CCP review parameters (WQ Operations procedure) b) Then update the CCP charts	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Mar-20	TBC	Jun-21	100%	COMPLETED & C
4.29.	2	E4: Operational Procedures and Process Control				GI	G		Operational Procedures and Process Control - Corrective action  Establish rapid communication systems to deal with unexpected events There is a reliance on individuals to report and respond to issues. For example, the reservoir inspection may include recommended and required rectification actions, but the	a) Investigate SAMMS has the capability to raise priority issues and initiate the appropriate response to reservoir inspection 'red flags' b) Develop these 'red flags' as for the inspection checklists c) Implement procedures amongst team who conduct inspections	a) BAU - recognise the criticality of the issue, training. At the moment still awaiting SAMMS (in the absence of release 6). If items are noticed during inspections and it can be fixed immediately, the inspections team will do so. Current system allows for mobility. Will allow it to escalate as a Pr1 job	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Mar-20	TBC	Jul-20	100%	COMPLETE
4.31.	2	E4: Operational Procedures and Process Control				GI	G		Operational Procedures and Process Control - Equipment capability and maintenance.  Establish a program for regular inspection and maintenance of all equipment, including monitoring equipment - Network non return valves - Internal audit identified at Greenbank that there are RPZs that are not tested annually. This is further addressed below.	a) Investigate requirements for inspection and maintenance program b) Develop and document inspection and maintenance system c) Implement BFD inspection and maintenance system	This item is also related to the risk item 4.29. and risk item 3.11. This action is to be consolidated within those other two actions.	Water Operations	PL - Network Operations	Mechanical Maintenance Supervisor	Mar-20	TBC		100%	CONSOLIDATED & COMPLETED

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
4.32.	2	E4: Operational Procedures and Process Control				GI	G		Dirty water complaints and associated issues related to suspended matter or biofilm in pipes	<p><b>a) Investigate</b> requirements for an effective mains cleaning strategy</p> <p><b>b) Develop</b> ongoing strategic mains cleaning strategy (including a flushing program).</p> <p><b>c) Implement</b> ongoing mains cleaning strategy</p>	<p><b>a)</b> Ongoing flushing occurs and is reviewed during the WQ fortnightly meeting <b>(completed)</b></p> <p><b>b)</b> Healthy network project developed an ongoing main cleaning strategy. <b>Completed</b></p> <p><b>c)</b> To be implemented (separate item - operations strategy and maintenance strategy). Healthy Networks project articulated this in a strategic manner. The Maintenance Planning workshops commenced in May 2021. This includes mains cleaning.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	TBC	Jun-21	80%	ON TRACK
4.33.	3	E4: Operational Procedures and Process Control	RA				RA-DIS1.1		Bacteria - Inadvertent closing/opening of connection to unused supply point	<p><b>a) Investigate</b> unused connections with other Water Service Providers</p> <p><b>b) Develop</b> plan to remove unused connections with other WSPs</p> <p><b>c) Implement</b> plan to remove unused connections with other</p>	Part of the trunk main isolation and recharging procedure that Senior Operations Coordinator is working on Related to the mains commissioning and recommissioning procedure.	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	TBA	TBC		0%	NOT STARTED
4.34.	2	E4: Operational Procedures and Process Control	RA				RA-RES1.14		Bringing contaminated reservoir online/Bacteria	<p><b>a) Investigate</b> reservoir commissioning procedure requirements - review literature and other utility procedures</p> <p><b>b) Develop</b> design, and distribute for review and confirm the procedure dealing with recommissioning of offline reservoirs</p> <p><b>c) Implement</b> procedure amongst stakeholders</p>	<p><b>a) Investigate</b> the offline reservoir report has detailed procedures and checklists for implementation. Also note that</p> <p><b>b) Develop</b> Checklists have been developed as part of the offline reservoir report. New PM has been assigned and will continue to build upon work (including procedure delivery)</p> <p><b>c) Implement</b> Not commenced</p>	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	Jun-20	Dec-20	Dec-21	70%	ON TRACK

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
4.35.	2	E4: Operational Procedures and Process Control	RA					Protozoan risk from backflow into network	<p>a) <b>Investigate</b> backflow prevention management strategy requirements - including monitoring</p> <p>b) <b>Develop</b> brief for development of a brief for online conductivity analyser review project</p> <p>c) <b>Implement</b> project findings as appropriate</p>	This project has been delayed until FY2021/22 budget	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-21	Dec-21	Dec-21	0%	NOT STARTED	
4.36.	2	E4: Operational Procedures and Process Control	RA					Protozoan risk from backflow into network	<p>a) <b>Investigate</b> review tanker management program</p> <p>b) <b>Develop</b> improvement plan based on findings of review</p> <p>c) <b>Implement</b> improvement plan to improve tanker customer management system.</p> <p>Formerly - Review and implement procedure for auditing water carrier compliance with user permits (include confirmation of backflow prevention device on truck) Compliance monitoring of high-use hydrant controls - standard design of tanker supply sites</p>	<p>a) <b>Investigate</b> - gap analysis underway (reviewing of BF certifications, current training requirements, auditing and compliance program). This will inform future <i>Standpipe/Tanker Customer Management System</i>. In addition, and holistic review of service delivery to tanker standpipe is required.</p> <p>b) <b>Develop</b> - Register has now been reviewed. Some outstanding training is required.</p> <p>c) <b>Implement</b> - not commenced</p>		Water Business	PL - Customer Experience & Business Performance	Metering and Customer Connections Lead	Jun-20	TBC		40%	ON TRACK



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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
4.37.	1	E4: Operational Procedures and Process Control	RA					Fatigue of workforce leading to bacterial contamination (e.g. CDF alarm mismanagement)	<p><b>a) Investigate</b> requirements for Alarm rationalisation project implementation</p> <p><b>b) Develop</b> Alarm management review process as part of project</p> <p><b>c) Implement</b> Alarm MGMT review system</p> <p>Also</p> <p>Investigate establishment of a dedicated Operations Centre (with dedicated telemetry team)</p>	<p><b>a) Implemented</b></p> <p><b>b) Develop</b> Process occurs as part of the project, still be implemented as part of BAU (i.e. when project ceases and review activity becomes BAU).</p> <p><b>c) Implement</b> transition from project MGMT review to BAU MGMT review will be addressed</p>	Water Operations	PL - Network Operations	Project Manager	Jul-20	Jul-21	Jul-21	100%	COMPLETED	
4.39.	2	E4: Operational Procedures and Process Control	RA					Ingress causing bacterial contamination	<p><b>a) Investigate</b> project to install online analysers at all reservoirs (CCPs and operational alarms)</p> <p><b>b) Develop</b> project plan to install online analysers at all reservoirs (CCPs and operational alarms)</p> <p><b>c) Implement</b> plan to install online analysers at all reservoirs (CCPs and operational alarms)</p>	<p><b>a) Investigate</b> completed</p> <p><b>b) Develop</b> Completed</p> <p><b>c) Implement</b> All but one site remaining</p>	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jul-20	Jul-21	Jul-21	90%	ON TRACK	
4.40.	2	E4: Operational Procedures and Process Control	RA	IA			Res 1.5, 1.6 & 1.7	3.9.2	Internal Audit (2013) - large gaps and dirt close to vent holes found at reservoir.  Gaps were repaired.	<p><b>a) Investigate</b> options to perform 'reservoir inspection refresher training'</p> <p><b>b) Develop</b> plan to perform refresher training</p> <p><b>c) Implement</b> plan to perform ongoing refresher training</p>	Investigate Reservoir Inspection "refresher" training for 2021/22FY.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	Jun-21	Jun-22	0%	NOT STARTED
4.41.	2	E4: Operational Procedures and Process Control	RA						Incorrect reading from instrumentation - leading to bacterial contamination	<p><b>a) Implement</b> removal of ChemScans from dosing equipment, not appropriate for purpose.</p> <p><b>b) Implement</b> Procedures for calibration of instrumentation-taken out of this action and placed into item 4.27</p> <p><b>c) Investigate</b> system to track trends and predict issues (Takado). (Removed from this item and placed in 4.44)</p> <p><b>d) Investigate</b> key training required and ensure</p>	<p><b>a) Implement</b> The removal of chemscans has been completed</p> <p><b>b) Implement</b> - task taken out of this item</p> <p><b>c) Investigate</b> - Task has been taken out of this item</p>	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jun-20	Jul-21		100%	COMPLETED

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation														GI General Improvement
4.42.	2	E4: Operational Procedures and Process Control		IA				RA-DIS3.2		<p><b>Ensure that equipment performs adequately and provides sufficient flexibility and process control.</b></p> <p>External calibrations are scheduled externally every 6 months; internal checks either weekly or fortnightly. On site operational calibration was stated to be undertaken if the difference between online and handheld instruments is greater than 0.2 to 0.3 mg/L. This is not robust and potentially becomes an issue as the low and high alerts only require a response within 1 week. Analysers should be far more accurate than this otherwise the CCP is compromised. Priority is to visit dosing sites weekly, and analyser sites fortnightly. Analysers are watched, but not reacted to immediately - could be operated as OCPs.</p>	<p>1. Review and update calibration of analysers procedures to confirm they are more robust and address accuracy issues</p> <p>2. Implement newly reviewed procedures with the WO WQ teams</p> <p><i>This item is closed and incorporated into item 4.27</i></p>	TBA	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader		TBC		100%	COMPLETED
4.43.	1	E4: Operational Procedures and Process Control							<p>Inadvertent reservoir contamination incident (excepting Springwood Low) via authorised access (including Telco's). This can be caused by damage to the roof of reservoirs, allowing ingress.</p>	<p><b>a) Investigate</b> identify and investigate those reservoirs which require online analysers</p> <p><b>b) Implement</b> raise tasks for installation</p> <p><b>c) Implement</b> install and incorporate in related systems and processes (e.g. those for maintenance, review and monitoring)</p>	This item is a duplicate of item 4.39	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jun-20	TBC	Dec-21	100%	ATED & C	
4.44.	2	E4: Operational Procedures and Process Control							<p>Incorrect reading from instrumentation - leading to bacterial contamination</p>	<p><b>a) Investigate</b> system used to calibrate instrumentation</p> <p><b>b) develop</b> procedures to calibrate instruments</p> <p><b>c) Implement</b> procedure</p> <p><i>Removed from item 4.41 and placed here)</i></p>	This item is a duplicate of item 4.27	Water Operations	PL - Network Operations	Drinking Water Quality Operations Team Leader	Jun-20	TBC	Jun-20	100%	ATED & C	
4.45	3	E4: Operational Procedures and Process Control				GI		5.2 (G) RA-DIS1.1	3.9.3	<p>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.</p>	<p>Establish effective drinking water Corrective Action system with associated responsibilities and WOP to be developed.</p> <p>Consider implementation process across all 3 Water Branches required.</p>	<p>a) Investigate - effective Corrective Actions Management system to manage actions on the RMIP and also incident actions and WQ improvement actions</p> <p>b) Develop MGMT system. <b>Ongoing</b></p> <p>c) Implement MGMT system</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jan-17	Dec-21	Dec-22	70%	ON TRACK

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
4.45	3	E4: Operational Procedures and Process Control	RA			GI	Res1.11	3.9.3	Microbial growth in tank Loss of chlorine residual Nitrification	Establish effective Network Disinfection Clean procedures	a) Investigate - Establish effective Work plans to conduct an Network Disinfection Clean (NDC) b) Develop Maintenance System schedules to program in NDCs in required WSZ c) Implement Maintenance System	Water Operations	PL - Network Operations	Senior Water Operations Coordinator	May-21	Dec-22	Dec-22	50%	ON TRACK
5.1.	3	E5: Verification of Drinking Water Quality				GI	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  Current status: active investigations on a customer data MGMT system. Loganwater 2025 project feedback project.	Water Business	PL - Customer Experience & Business Performance	PL - Customer Experience & Business Performance	Jun-15	Dec-17	Jun-25	30%	MONITOR
5.2.	1	E5: Verification of Drinking Water Quality	RA				Res 1.5 Res 1.6		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	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-17	Jun-17	Jun-17	100%	COMPLETED
5.3.	3	E5: Verification of Drinking Water Quality				GI	TBA		Limited sampling parameters and limits of reporting can make diagnosis of incident causes difficult to determine	Investigate potential for a sensitive turbidity test reporting limit and use of field turbidity meters with 0.1 NTU resolution.	a) Laboratory team to investigate potential for a more sensitive turbidity reporting limit. Completed ✓ b) Purchase, train and implement operators on the use of field turbidity meters. Completed ✓	Water Product Quality	PL - Water Product Quality	Laboratory Technical Service and Business Lead	Mar-20	Dec-20		100%	COMPLETED

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
5.4.	2	E5: Verification of Drinking Water Quality				GI	G RA-NET1.1		<p><b>Verification Drinking Water Quality - Consumer satisfaction</b></p> <p><b>Establish a consumer complaint and response program, including appropriate training of employees</b> - Complaints process 90% through phone calls (tracking of customer complaints). External BCC out of hours, and internal staff at Smith Rd. WOP 401 identifies the work process it was updated in 2019; it still refers to Pathway. Minor OFI - DWQMP identifies WWETT as still operational.</p>	<p>1. Establish Customer complaint procedure, including assigning actions where appropriate <b>Completed ✓</b></p> <p>2. Establish a customer complaint training program for front of line personnel and those involved with responding to customer complaints</p> <p>3. Remove reference to WWETT within DWQMP as part of 2020 update <b>Completed ✓</b></p>	<p>1. <b>Completed</b> Updated procedure WOP 401 completed in January 2021</p> <p>2. To be developed and delivered in July 2021</p> <p>3. <b>Completed</b></p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	TBC	Jul-21	75%	ON TRACK
5.5.	2	E5: Verification of Drinking Water Quality		IA				Delays in reporting ADWG Health exceedances from the lab to stakeholders	1. Review and update Council's Lab reporting and training processes to ensure prompt reporting of drinking water test results that breach ADWG health limits to key internal stakeholders.	Completed review and implemented ADWG Health alert limits and Operational at lab	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Dec-19	Jun-20	Jun-20	100%	COMPLETED	
5.6.	2	E5: Verification of Drinking Water Quality		IA				Establish a consumer complaint and response program, including appropriate training of employees.	<p><b>a) Investigate</b> an overarching Customer Complaint Management System - which covers all teams involved in process</p> <p><b>b) Develop</b> overarching Customer Complaint Management System</p> <p><b>c) Implement</b> overarching Customer Management System (includes Complaint MGMT system)</p>	<p><b>a) Investigate</b> - current overarching process is being captured under WOP 401. WOP 401 captures current (disjointed) systems in the absence of a CRM (refer RMIP item 5.1). This procedure is to be referred to in the current customer management system, managed by CEBP team.</p> <p><b>b) Develop</b> - Not started - to be developed as part of RMIP item 5.1</p> <p><b>c) Implement</b> - Not started</p>	Water Business	PL - Customer Experience & Business Performance	PL - Customer Experience & Business Performance	Nov-19	Dec-20	Dec-21	30%	MONITOR	
5.7	1	E5: Verification of Drinking Water Quality	RA			GI	RADIS5.0	Contaminated water supplied from bulk supplier	<p><b>a) Investigate</b> current bulk supply point arrangements and review existing sites. Determine if they are appropriate. Propose and identify new sites if required to install new taps</p> <p><b>b) Develop</b> new verification sampling runs for the new bulk supply points</p> <p><b>c) Implement</b> - install new taps, update DW verification monitoring plan, DWQMP, GIS layers, sample tap master list and Aquantify</p>	<p><b>a) Investigate:</b> task commenced February 2021. Identifying sites.</p> <p><b>b) Develop:</b> not commenced</p> <p><b>c) Implement:</b> not commenced</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Feb-21	Jun-21	Jun-21	10%	NEW	

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
5.8	2	E5: Verification of Drinking Water Quality	RA			GI		Formation of Disinfection-By-Products (DBPs) - chlorates	<p><b>a) Investigate</b> chlorate monitoring requirements and laboratory ability</p> <p><b>b) Develop</b> new verification sampling runs for the new bulk supply points</p> <p><b>c) Implement</b> - install new taps, update DW verification monitoring plan, DWQMP, GIS layers, sample tap master list and Aquantify. Add chlorate to monitoring. Develop strategy and rollout monitoring further in future.</p>	<p><b>a) Investigate:</b> task commenced February 2021. Identifying sites. <b>COMPLETED</b></p> <p><b>b) Develop:</b> not commenced <b>UNDERWAY</b></p> <p><b>c) Implement:</b> not commenced</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Feb-21	Jun-21	Jul-21	10%	NEW	
6.1.	2	E6: Management of Incidents and Emergencies			EA		3.9.3	Audit highlighted requirement for regular review of IMP & associated training requirements.	<p>Update incident response tools website to include <i>E.coli</i> incident flow chart and key stakeholder contacts.</p> <p>Ensure IMP review and updates undertaken</p>	<p>incident response website updated to include additional tools &amp; contact details - <b>completed ✓</b></p> <p>IMP review and associated training undertaken <b>completed ✓</b></p>	Water Business	PL - Customer Experience & Business Performance	Customer Experience and Engagement Officer	Jun-17	Jun-18	Jun-18	100%	COMPLETED	
6.2.	2	E6: Management of Incidents and Emergencies				GI		Sample taps layers are not accurately displayed on GIS, e.g. which main the sample is connected to. Opportunity to improve and develop GIS layer/s and maps for incident response.	<p><b>a) Investigate</b> options to represent sample taps as a corporate layer</p> <p><b>b) Confirm</b> all sample tap layers so that they are accurately displayed on the GIS corporate layer.</p> <p><b>c) Implement</b> GIS layer for sample taps into the corporate GIS system</p>	<p>More accurate coordinates to be provided to the GIS team to update on the GIS layer. <b>completed ✓</b></p> <p>Need to confirm a few remaining sample tap connections to mains that require further meetings and investigations.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Oct-18	Apr-20	Jun-20	100%	COMPLETED	
6.3.	2	E6: Management of Incidents and Emergencies				GI		Sample taps layers are not accurately displayed on GIS, e.g. which main the sample is connected to. Opportunity to improve and develop GIS layer/s and maps for incident response.	<p><b>a) Investigate</b> system of location for GIS layer/s and maps downstream of sample taps &amp; supply reservoir to include ID references, flushing plans, and follow-up sample locations. Ensure maps are easily available for incident team.</p> <p><b>b) Develop</b> plan</p> <p><b>c) Implement</b> system</p>	<p><b>a) Sample tap master list</b> contains register of downstream taps, associated reservoirs and related DMAs. A general flushing process has been developed, which is more useful than developing individual flushing plans (these are decided upon during the incident response). A GIS layer exists with current and up to date sample taps. This layer will be included in the corporate layer.</p> <p><b>b) Develop</b> task notice / scope of works to be delivered through LWIA to</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Oct-18	Mar-20	Jul-21	50%	MONITOR	

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			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation	GI General Improvement													
6.4.	2	E6: Management of Incidents and Emergencies					GI	G		Management of Incidents and Emergencies - Communication.  Define communication protocols with the involvement of relevant agencies and prepare a contact list of key people, agencies and businesses - There is a list, but key contact numbers are not	a) Develop 1 - communication protocol with up to date list of agencies and stakeholders to be contacted (with #numbers) - <b>completed</b> ✓ b) Develop 2 - critical customer register management procedure. This register informs the critical customer layer in	1. Develop 1 - Register of key agency contacts is kept up to date by Customer Experience team <b>Completed</b> 2. Develop 2 - Interim layer and draft workflow has been developed. This will be implemented in June 2020. <b>Completed</b>	Water Business	PL - Customer Experience & Business Performance	TBA	Mar-20	Aug-20	Aug-20	100%	COMPLETE
6.5.	2	E6: Management of Incidents and Emergencies					GI	G		Management of Incidents and Emergencies - Communication.  Investigate any incidents or emergencies and revise protocols as necessary - Intelix is being developed for tracking incident and audit outcomes, but not yet implemented. This is OFI until this is developed.  De-escalation of incidents back to BAU is currently limited in its scope in the incident response plan.  During Hospital Incident	a) Investigate alternatives for Incidents and Emergencies tracking system b) Develop plan for system to track incident management actions (an action tracking system) c) Implement incident management actions tracking system	a) Investigate - not started b) Develop - not started c) Implement - not started	Water Business	PL - Customer Experience & Business Performance	TBA	Mar-20	TBC	Jun-22	0%	NOT STARTED
6.6.	2	E6: Management of Incidents and Emergencies					GI	G		Management of Incidents and Emergencies - Communication.  Investigate any incidents or emergencies and revise protocols as necessary - Intelix is being developed for tracking incident and audit outcomes, but not yet implemented.  De-escalation of incidents back to BAU is currently limited in its scope in the incident response plan.  During Hospital Incident debrief, it was identified that information exchange between different sites was a concern.	a) Investigate de-escalation strategies and processes that could be included in the IMP. Consider inclusion in next version once revised. b) Investigate alternative communication platforms for IMT use during incidents. To allow for multiple users across different sites.	a) Investigate - PL CE & BP to develop de-escalation process prior to review. IMT documentation to be reviewed internally, and then external consultant to deliver independent review. Updated processes to be used in upcoming planned IMT training. Included as part of the recent review in Feb 2021. Deescalation is now included as part of IMT process - <b>Completed</b> b) Investigate - MS teams used. <b>Completed</b>	Water Business	PL - Customer Experience & Business Performance	TBA	Mar-20	TBC	Sep-20	100%	COMPLETE
6.7.	2	E6: Management of Incidents and Emergencies	RA					6.7 RA-EMG1.1 RA-EMG1.4		Power failure and loss of critical systems	a) Investigate electrical redundancy requirements at critical assets b) Develop gap analysis of critical sites in terms of minimum requirements to manage power failure and loss c) Implement plan - task brief for retrofitting of	a) Investigate undertaken by Elec coordinator and TL DWQ. This included review of all sites at high level. b) Develop to be commenced c) Implement to be commenced dependent on a) b)	Water Operations	PL - Network Operations	Electrical and Telemetry Coordinator	Jul-20	TBC	Dec-21	50%	ON TRACK

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6.8.	2	E6: Management of Incidents and Emergencies				II		<b>Boil Water Notice</b> – review process to ensure customer concerns alleviated and initiated & lifted in a timely manner.	<b>a) Investigate</b> protocol for calling boil water notices <b>b) Develop</b> review process for boil water notices <b>b) Develop</b> de-escalation protocols for incidents - include in IMT processes and procedures	Health/Regulator what the protocol for implementing boil water notices (i.e. who has the final say on these events) - it is noted that Council would make this decision, if not otherwise directed. In practice, Council would make this decision in joint with Chief Medical Officer, etc. <b>b) Boil water notice updated.</b> Current version is available on Incident Management intranet page: <a href="https://logancity.sharepoint.com/sites/LCCIntranet/org-structure/wb/KB/Pages/Templates.aspx">https://logancity.sharepoint.com/sites/LCCIntranet/org-structure/wb/KB/Pages/Templates.aspx</a> .	Water Business	PL - Customer Experience & Business Performance	Customer Experience and Engagement Officer	Dec-19	Feb-20	Feb-20	100%	COMPLETED	
6.9.	2	E6: Management of Incidents and Emergencies		IA				<b>Define communication protocols with the involvement of relevant agencies and prepare a contact list of key people, agencies and businesses.</b> There is a list, but contact numbers are not included. These customers should also be recorded as a key layer in GIS.	<b>a) Develop</b> review process for the list of key stakeholder contacts. <b>b) Develop</b> record of Critical Customer key details in a register and have them available via the Critical Customer GIS layer	<b>a) Develop - completed.</b> Regular review and update ongoing - this action is completed. <b>b) Develop</b> - Critical Customer register management procedure developed <b>c) Implementation</b> - Critical register management procedure and workflow amongst relevant CE & BP personnel (to provide a back-up to Business Performance Analyst)	Water Business	PL - Customer Experience & Business Performance	Business Performance Analyst		Jun-21	Sep-20	70%	ON TRACK	
6.10.	2	E6: Management of Incidents and Emergencies		IA				<b>Communication</b> Develop an active two-way communication program to inform consumers and promote awareness of drinking water quality issues.	<b>a) Develop</b> a method of communication that allows convenient communication between locations during an incident (ongoing) <b>b) Develop</b> SMS notification capabilities for tanker customers to advise in the event of emergencies	<b>a) Develop</b> - MS Teams has been identified as the most likely medium for inter-location communications. To be incorporated into IMT processes during review and update (item removed from this action and placed in RMIP item 6.6) - Closed here. <b>b) Develop</b> - SMS notification available via tanker MGMT	Water Business	PL - Customer Experience & Business Performance	PL - Customer Experience & Business Performance	Nov-19	Jun-20	Jun-20	100%	COMPLETED	
7.1.	3	E7: Employee Awareness and Training		IA		GI	8.1 (G)	3.11.1 BP	Internal audit review highlighted that some staff were still unsure of the DWQMP & clarity of Drinking Water Policy.	<b>a) Develop</b> & deliver DWQMP & Policy awareness/toolbox training to all Water Branch staff and possibly include in future Induction Program.	a). Policy endorsed & displayed <b>Completed</b> ✓ b). Annually awareness training delivered to senior management <b>Completed</b> c). Investigate DWQMP & Policy awareness training material to be developed & implemented to all Water Branch staff, eventually via inductions./Online training module <b>Completed</b>  Note: Policy updated 2019 with WPQ to develop material.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jul-16	Jun-20		100%	COMPLETED
7.2.	3	E7: Employee Awareness and Training		IA			8.1 (G)	3.9.1	Recent audit identified external & OH&S training well documented however internal "on-the-job" training is not, to incorporate employee awareness of drinking water	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.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Mar-17		100%	COMPLETED

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
7.3.	3	E7: Employee Awareness and Training		IA			8.1 (G) RA-EMG1.20	3.9.1	Recent audit identified external & OH&S training well documented however internal "on-the-job" training is not.	a) <b>Develop</b> and implement appropriate tool to document "on-the-job" training.	An improved software based solution is being considered corporately.  In the interim, Water Operations has advertised for a Water Project Support Coordinator. Part of the role will be the development of a operations training schedule that incorporates all types of required training. The role will manage the coordination of branch training to ensure the qualifications and	All Branches	All Managers	All Managers	Jun-15	Dec'17		5%	CONCERN
7.4.	2	E7: Employee Awareness and Training					G RA-EMG1.20		<b>Employee Awareness and Training - Employee awareness and involvement.</b>  <b>Develop mechanisms and communication procedures to increase employees' awareness of and participation in drinking water quality management -</b> As highlighted during the reservoir inspections, electrical work on reservoirs indicates that understanding of water quality issues is not front of mind in these trades.	a) <b>Develop and implement</b> Water Quality awareness training module	Module completed. Implementation plan developed. Launched to Loganwater in September 2020.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	Jun-20	Aug-20	90%	COMPLETE
7.5.	2	E7: Employee Awareness and Training					G RA-EMG1.20		<b>Employee Awareness and Training - Employee training.</b>  <b>Ensure that employees, including contractors, maintain appropriate experience and qualifications</b> - As highlighted during the reservoir inspections, electrical work on reservoirs indicates that understanding of water quality issues is not front of mind in these trades. Ensure that Aquacard training is rolled out for all work units. The intent should be that all internal	Rollout Hy5/Aquacard training to all relevant employees and contractors	Released to LWIA contractors and Water Operations contractors in December 2019	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-18	Jun-20	Jun-20	100%	COMPLETE
7.6	2	E7: Employee Awareness and Training	RA				RA-EMG1.23 RA-EMG1.20		Knowledge retention and knowledge resilience	Operator training to ensure GIS being appropriately updated - require identification of responsible roles  Improved handover process and cross training  Clearly defined role responsibilities and training matrix.  Prepare procedures for all	a) <b>Investigate</b> this task is related to training requirements. The task is currently assigned to PL - WPQ until we can determine what actions are required to address and by whom.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	TBC		20%	NEW
8.1.	2	E8: Community Involvement & Awareness					9.2 (G)	3.11.1	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	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 Question (FAQ).	Water Business	PL - Water product Quality	Drinking Water Quality Coordinator	Nov-15	Feb-17	May-17	100%	COMPLETE



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8.2.	2	E8: Community Involvement & Awareness				GI	G		<p><b>Community Involvement and Awareness - Communication.</b></p> <p>Develop an active two-way communication program to inform consumers and promote awareness of drinking water quality issues - Critical customer list exists, but potentially does not capture all key customers. For example, Schools, dialysis, aged care, are included, but not other medical such as doctors and dental surgeries etc., nor all cooling towers.</p> <p>Critical customer list has list of businesses, but not contact details. The process to ensure</p>	<p><b>a) Develop</b> Critical customer register management process Incorporate Critical Customer Register/GIS layer review as part of the Incident Management response process. <b>b) Implement</b> Critical customer register/GIS layer review as part of works planning procedures <b>c) Develop</b> actions to respond/communicate to Critical Customers in the event of works being planned that may have an effect on those customers. - <i>this has been removed from this action and placed</i></p>	<p><b>a. &amp; b.</b> Are addressed in RMIP action item 5.4 <b>(completed here)</b> Critical customer types are already part of reviews performed during works planning. Once formal GIS layer is implementation is complete, this will be used by personnel planning works. <b>4. Completed ✓</b></p>	Water Business	PL - Customer Experience & Business Performance	Business Performance Analyst	Mar-20	TBC		100%	COMPLETE
8.3	1	E8: Community Involvement & Awareness						<p><b>Community Involvement and Awareness - Communication.</b></p> <p>Develop an active two-way communication program to inform consumers and promote awareness of drinking water quality issues - Critical customer list exists, but potentially does not capture all key customers. For example, Schools, dialysis, aged care, are included, but not other medical such as doctors and dental surgeries etc., nor all cooling towers.</p> <p>Critical customer list has list of businesses, but not contact details. The process to ensure</p>	<p><b>a) Develop</b> actions to respond/communicate to Critical Customers in the event of works being planned that may have an effect on those customers. - <i>this has been placed here from Action 8.2)</i> <b>b) Develop</b> comms process and materials to engage with critical customers (in conjunction with WOs) <b>c) Implement</b> Critical Customer comms process</p>	<p><b>a) Develop</b> Water Critical Customer layer developed and implemented (Corporate layer) <b>b) Develop</b> Communications project specific <b>c) Implement</b> Critical customer comms process is developed under the Critical Customer memo developed by Bhavin</p>	Water Business	PL - Customer Experience & Business Performance	TBA	Jul-20	Dec-20	Dec-20	100%	COMPLETE	
9.1.	3	E9: Research & Development				GI	10.3 (G)	3.11.3 BP	<p>Document the design approaches used to ensure appropriate equipment deployed.</p>	<p>Document the design approaches used to ensure appropriate equipment deployed.</p>	<p>Dosing system design standardisation specification commenced. Workshop identified key requirements. <b>Completed</b></p> <p>Task brief generated. <b>Completed</b></p> <p>Work commenced - Adrian Hards project for O &amp; M manuals covers <b>(close to completion)</b> From this, we may be able to define a WDF design spec if required. <b>Completed for Woodhill.</b> <b>One summer of operation required and then will review and rollout to other dosing stations. TO be incorporated as a new item.</b></p>	Water Business	PL - Water Product Quality	PL - Water Product Quality	Jun-15	Jun-17	Jun-20	100%	COMPLETE

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			RA	IA	EA	GI														
9.2.	3	E9: Research & Development		IA				5.4 (G) RA-RES6.1	3.9.2	Recent internal audit found reservoir inspections and cleans were overdue (i.e. 2 yearly cleans up to one year overdue).	1. Reconcile reservoir inspections so they are up to date and aligned with required cycle. <b>(Completed by WOPs)</b> 2. Strategic Maintenance Management System (SAMMS) to have effective schedule systems to ensure associated escalations if due dates not met. (Note that whole of business decision not to implement <b>Test in Network</b> )	The Water Branch as part of the whole of Council's approach to implement SAMMS hence timeline dependant on Corporate progress.  Works order management for reservoir cleaning is up to date. Scheduling performed by MEX for the foreseeable future.	Water Business	PL - Water Asset Management	PL - Water Asset Management	Jun-15	Jun-18	Jun-20	100%	COMPLETED
9.3.	2	E9: Research & Development	RA					NC Res 1.12 & 1.13	3.9.2	<i>E.coli</i> incidents were a result of <b>poor reservoir condition &amp; design</b> with low chlorine residual.	<b>RESERVOIRS</b> 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 Business	PL - Water Asset Management	PL - Water Asset Management	Jul-16	Mar-17	Jun-17	100%	COMPLETED
9.4.	2	E9: Research & Development	RA					NC Res 1.7 & 1.8	3.9.2	<i>E.coli</i> incidents were a result of <b>poor reservoir condition &amp; design</b> with low chlorine residual.	<b>RESERVOIRS</b> LWIA to investigate replacement of Brosnahan reservoir.	Investigation to replace Brosnahan reservoir completed. ✓	Water Business	PL - Water Asset Management	Senior Asset Management Engineer	Jul-16	Jun-17	May-17	100%	COMPLETED
9.5.	3	E9: Research & Development	RA					NC Res 1.7 & 1.8	3.9.2	<i>E.coli</i> incidents were a result of <b>poor reservoir condition &amp; design</b> with low chlorine residual.	<b>RESERVOIR</b> Brosnahan reservoir to be decommissioned and replaced with suitable pumps.	Design for reservoir replacement with new pumps completed. ✓  Reservoir demolition planned 2018/19FY.	Water Business	PL - Water Asset Management	Senior Asset Management Engineer	Jul-16	Jun-17	Jun-18	100%	COMPLETED
9.6.	2	E9: Research & Development	RA					BUL 1.2 & 1.3 Res 1.14 Res 4.1, 4.2 & 4.3 Dis 2.1, 2.2 & 2.3	3.9.2	<i>E.coli</i> incidents were a result of poor reservoir condition & design with <b>low chlorine residual</b> .	Develop SEQ Disinfection Strategy to investigate long term solution to improve network residuals for Logan.	SEQ Disinfection Strategy developed to investigate long term solution to improve network residuals for Logan♦  Breakpoint dosing identified for Greenbank reservoir site. ✓	Water Business	PL - Water Product Quality	PL - Water Product Quality	Jul-16	Dec-16	May-17	100%	COMPLETED
9.7.	3	E9: Research & Development	RA					BUL 1.2 & 1.3 Res 1.14 Res 4.1, 4.2 & 4.3 Dis 2.1, 2.2 & 2.3	3.9.2	<i>E.coli</i> incidents were a result of poor reservoir condition & design with <b>low chlorine residual</b> .	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. <b>Complete</b> ✓ b). Greenbank breakpoint dosing facility designed <b>Complete</b> ✓	Water Business	PL - Water Product Quality	PL - Water Product Quality	Jul-16	Jun-18	Dec-18	100%	COMPLETED
9.3	2	E9: Research & Development	RA							Contamination when bringing mains back online	a) Investigate innovative technologies related to mains recommissioning (e.g. Sydney Water's mobile Ozonation) b) Develop plans to trail technologies recommended c) Implement trial in Loganwater network	a) Trial of NO-DES mains cleaning asset commencing in May.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	TBC	Jul-21	90%	ON TRACK

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9.4	3	E9: Research & Development	RA					RA-EMG1.3		Chemical contamination of pipes and mains	a) Investigate potential of other chemicals (e.g. pesticides) contaminating pipes b) Develop memo to PL regarding chemical contamination of pipes c) Implement recommendations of the memo	Not started	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-20	TBC	Dec-21	0%	NOT STARTED
10.1.	3	E10: Documentation & Reporting		IA	EA		GI	11.1 (G) NC Ext Audit (4)	3.9.5	Internal audit identified changed or out dated document DM# used. Various doc mgmt approaches exist across the various Water Branches since Allconnex dissolution.  DWQMP has documented WOPs known to date.	a) Investigate Document Control Framework Principles. (Currently underway) b) Develop framework c) Implement Document Control framework throughout business	IMS team has recently formed. This team will be responsible for the development of the Integrated 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. Current SharePoint	Water Business	PL - Water Product Quality	Quality Lead	Jun-15	Dec-17	Ongoing	45%	MONITOR
10.2.	1	E10: Documentation & Reporting					GI	11.2 (G)		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.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Feb-17	May-17	100%	COMPLETED

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation	GI General Improvement												
10.4.	2	E10: Documentation & Reporting					GI	G		<p><b>Documentation and Reporting - Management of documentation and records.</b></p> <p><b>Establish a records management system and ensure that employees are trained to fill out records - DM</b> is a document storage system, not a document management system. There are issues finding documents if they are not appropriately saved and referenced.</p> <p><b>a) Investigate</b> Document Control Framework Principles. (Currently underway)  <b>b) Develop</b> framework  <b>c) Implement</b> Document Control framework throughout business</p>	<p>Investigation, review and gap analysis underway.</p> <p>Review and investigation phase is still underway. An interim doc solution is available via Sharepoint.</p>	Water Business	PL - Water Product Quality	Quality Lead	Mar-20	TBC		10%	ON TRACK
10.5.	2	E10: Documentation & Reporting					GI	G		<p><b>Documentation and Reporting - Management of documentation and records.</b></p> <p><b>Periodically review documentation and revise as necessary</b> - There are WOPs that appear to be outdated and should be reviewed. For example, WOP 216 (and WOPs for other reservoir sites) appear outdated as the work orders now being issued include a different table for recording results.</p> <p>That is, working documentation is updated, but not reflected</p>	<p>Project currently underway to review current status of procedure management system</p> <p>Actions as per item RMIP action item 10.1</p>	Water Business	PL - Water Product Quality	Quality Lead	Mar-20	TBC		10%	NEW

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
11.1.	2	E11: Evaluation of Audit				GI	12.1 (G)	3.10.1	Long term data is not fully evaluated or documented.	<p>Establish Process Improvement team to commence review of medium/long term trends &amp; identify opportunities for improvements.</p> <p>Investigate an integrated Water Information Quality Management System with links to other systems (i.e. LIMS, SCADA, field data, etc.) to enable effective long term trends.</p>	<p>a). Process Improvement team established reviewing trends, improvement opportunities &amp; action effectiveness ✓</p> <p>b). tender awarded. Development and implementation required to broaden trend analysis capability. ✓</p> <p>c). Software purchased. Server requirements finalised. ✓</p> <p>d). Stakeholder development commenced with implementation 2019/20FY. Database commissioned, training provided to key stakeholders., operations and maintenance manuals designed, Aquantify Sharepoint page launched Final presentation completed and database is live.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Dec-17	Dec-20	95%	ON TRACK
11.2.	3	E11: Evaluation of Audit				GI	12.2 (G)	3.11.4 BP	Internal audit undertaken & presented 2013, however processes for annual audit not yet established.	<p>Establish internal annual audit review process. Investigate use of Intellex system and (No Suggestions) audit tool.</p>	<p>Established annual internal audits over next 4 years using external provider ✓</p> <p>Investigate capacity &amp; capability to undertake internal audits by LCC staff by 2018. ✓</p> <p>Decision to continue to engage external provider to undertake annual internal audits. Ad-hoc audits can be undertaken by internal staff. ✓</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jan-13	Jun-18	Jun-18	100%	COMPLETED
11.3.	2	E11: Evaluation of Audit				GI	12.2 (G)	3.10	External audit to be undertaken as per Regulator's "condition" of an approved DWQMP.	<p>Arrange external audit &amp; report findings as per Regulator's conditions.</p>	<p>Regulatory external audit was conducted <b>June 2017</b>.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Jun-17	Jun-17	100%	COMPLETED

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation	GI General Improvement												
11.4.	3	E11: Evaluation of Audit					GI	G		<p><b>Evaluation and Audit - Long-term evaluation of results.</b></p> <p><b>Document and report results</b> - Trending of data is not currently included in the DWQMP. There is internal reporting through the performance meetings, but this is limited in the number of parameters.</p> <p><b>a) Investigate</b> inclusion of longer term trends as part of DWQMP conditions. Determine by consulting SEQ utility partners (Seqwater, UU, Unitywater, GC, Redlands) what level of information they provide with their submissions, and whether that meets DWQMP criteria guidelines released by WSR.</p> <p><b>b) Develop</b> section to be included in next DWQMP submission (November 2020)</p> <p><b>c) Implement</b> - include in DWQMP and submit</p>	<p>a) Investigation of longer term trends as part of the whole of system risk assessment. Aquantify is almost implemented, so will use Aquantify to further develop longer term trends and gradually include in future versions of the DWQMP as appropriate.</p> <p>b) DWQMP submitted. Some improvement to include data trending and analysis including. Significant trend analysis performed as part of the whole of system risk assessment. Aquantify is almost implemented, so will use Aquantify to further develop longer term trends and gradually include in future versions of the DWQMP as appropriate.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	Aug-20	Aug-20	50%	ON TRACK
12.1.	2	E12: Review & Continual Improvement		EA			GI	13.1 (G)	3.11.4 BP	<p>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.</p> <p>PLs responsible to ensure RMIP actions implemented such as incorporation into appropriate Water Branch Plans.</p> <p>DWQMP (ADWG Component) facilitators assigned to help PLs facilitate actions - completed ü</p> <p>Intelex investigated as the most appropriate tool to assist with RMIP action implementation and status reporting - completed ü</p>	<p>Evidence of some RMIP actions incorporated into Water Branch Plans - completed ü</p> <p>DWQMP (ADWG Component) facilitators assigned to help PLs facilitate actions - completed ü</p> <p>Intelex investigated as the most appropriate tool to assist with RMIP action implementation and status reporting - completed ü</p>	All Branches	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-15	Jun-17	Jun-18	100%	COMPLETED

Item No.	Priority	DWQMP Section	Risk Source				Risk Reference	Water Supply Act Guideline BP Best Practise	ISSUES / RISKS	KEY ACTIONS	CURRENT STATUS	BRANCH	OWNER	LEAD	START DATE	TARGET DATE	REVISED TARGET DATE	% COMPLETE	STATUS
			RA Risk Assessment	IA Internal Audit	EA External Audit	II Incident Investigation													
12.2.	2	E12: Review & Continual Improvement			EA	GI	13.1 (G) Ext Audit (7)	3.11.4 BP	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.	<p>a) Investigate system to assist with RMIP reporting</p> <p>b) Develop system</p> <p>c) Implement system</p> <p>PLs responsible to ensure RMIP actions implemented such as incorporation into appropriate Water Branch Plans.</p>	<p>Audit &amp; Inspection module development commenced.</p> <p><b>Corrective Action in telex module required</b> once Audit module implemented.</p> <p>Delays - due to Intellex provider ceased operation, continue with current excel system until further notice. Liaise with Corporate stakeholders.</p> <p>IMS team has commenced investigating an actions management system. Review of current systems is took place in 2020/2021.</p>	Water Business	PL - Water Product Quality	Quality Lead	Jun-15	Dec-18	Jun-21	30%	MONITOR
12.3.	2	E12: Review & Continual Improvement			EA		13.2 (G)	3.11.4 BP	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.	<p>Incorporate any newly identified high risks from whole of system Risk Assessment undertaken 2016 into RMIP.</p> <p>Communicate changes with key stakeholders to ensure effective implementation</p>	Completed	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	May-17	Jun-17	Jun-17	100%	COMPLETED
12.4.	2	E12: Review & Continual Improvement			EA		13.2 (A)		Ensure RMIP is kept up to date by incorporating any new actions to address risks or non-conformances identified via external Regulatory Audit.	Update RMIP to include actions to address non-conformances from Regulatory Audit and address any outstanding items from Risk	RMIP updated.	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-17	Jun-18	Jun-18	100%	COMPLETED
12.5.	2	E12: Review & Continual Improvement			EA		13.2 (A)		Ensure RMIP is kept up to date by incorporating any new actions to address risks or non-conformances identified via external Regulatory Audit.	Update RMIP to address recommendations from Bamboo Drive E.coli Incident and Logan Hospital Dirty Water Event.	<p><b>NEW</b></p> <p>Meeting with key stakeholders to review recommendations commenced.</p>	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Jun-17	Jun-20	Jun-20	100%	COMPLETED
12.6.	2	E12: Review & Continual Improvement				GI	G		Review and Continual Improvement - Drinking water quality management improvement plan	<p>a) Develop RMIP dashboard</p> <p>b) Implement dashboard to WTRC and communicate</p>	RMIP dashboard developed and implemented. Dashboard updating procedure developed and implemented	Water Business	PL - Water Product Quality	Drinking Water Quality Coordinator	Mar-20	Aug-20	Aug-20	100%	COMPLETED