LOGAN CITY COUNCIL

DRINKING WATER QUALITY MANAGEMENT PLAN ANNUAL REPORT – 2012/13 FINANCIAL YEAR

SPID: 542
150 WEMBLEY RD
LOGAN CENTRAL QLD 4114
Phone: (07) 3412 3412
Email: council@logan.qld.gov.au

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NOTATIONS AND ABBREVIATIONS

AD	Average Day
ADWG	Australian Drinking Water Guidelines, 2011. Published by the National Health and Medical Research Council of Australia
ALARP	As low as reasonably practicable
CCP	Critical Control Point (as defined by HACCP)
DBP	Disinfection By-product
DERM	Department of Environment and Resource Management
DEWS	Department of Energy and Water Supply
DWQMP	Drinking Water Quality Management Plan
E. coli	Escherichia coli, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
EP	Equivalent Person
EPI	Eastern Pipeline Interconnector
ERP	Emergency Response Plan
FY	Financial Year
GC	Gold Coast
HACCP	Hazard Analysis Critical Control Point
HLZ	High Level Zone
KPI	Key Performance Indicator
LCC	Logan City Council
LGA	Local Government Area
LIMS	Laboratory Information Management System
LLZ	Low Level Zone
MD	Maximum Day
MDMM	Mean Day Maximum Month
NATA	National Association of Testing Authorities
NSI	North Stradbroke Island
OCP	Operational Control Point
O & M	Operations and Maintenance
OWSR	Office of the Water Supply Regulator
PWDS	Potable Water Distribution System
QCP	Quality Control Point
RMIP	Risk Management Improvement Plan
SCADA	Supervisory Control and Data Acquisition
SEQ	South East Queensland
SLA	Service Level Agreement
SRWP	Southern Regional Water Pipeline
T&O	Taste and Odour
THM	Trihalomethane
UMD	Utility Management Data
WGM	Water Grid Manager
WTP	Water Treatment Plant

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1 INTRODUCTION

Logan City Council (LCC) is governed by the Water Supply (*Safety and Reliability*) Act 2008 (The Act), with the key purpose to protect Public Health, detailed in Section 94 of The Act. LCC demonstrates this by:

- Having an approved Drinking Water Quality Management Plan (DWQMP) and;
- Undertaking drinking water quality monitoring and reporting in accordance with the DWQMP and Public Health Regulation 2005

This Drinking Water Quality Management Plan (DWQMP) Annual Report documents the performance of LCC's drinking water with respect to water quality and performance in implementing the actions detailed in the DWQMP Rev 4 for the 2012/13 Financial Year (FY), as required under The Act.

This report assists the Water Regulator, from the Office of the Water Supply Regulator (Department of Energy and Water Supply (DEWS)) to determine whether the approved DWQMP, and any approval conditions, have been complied with and provides a mechanism for water service providers to disclose information publicly on their performance in managing drinking water quality.

This report has been prepared in accordance with the Guidelines for Service Provider Annual Reports September 2010 and the Guidelines for Service Provider Annual Reports July 2013 published by the Department of Environmental Resource Management (now administered by Department of Energy and Water Supply (DEWS)), Queensland.

This report reflects some of the key aspects of the currently approved DWQMP Rev 4 however also incorporates some of the important revised changes included in the re-submitted DWQMP Rev 5.1.

The revised DWQMP Rev 5.1 uses the Australian Drinking Water Guidelines, 2011, (ADWG) published by the National Health and Medical Research Council of Australia to help meet The Act requirements. The ADWG consists of 12 Elements, 32 Components and 76 Actions, as shown in Figure 1.

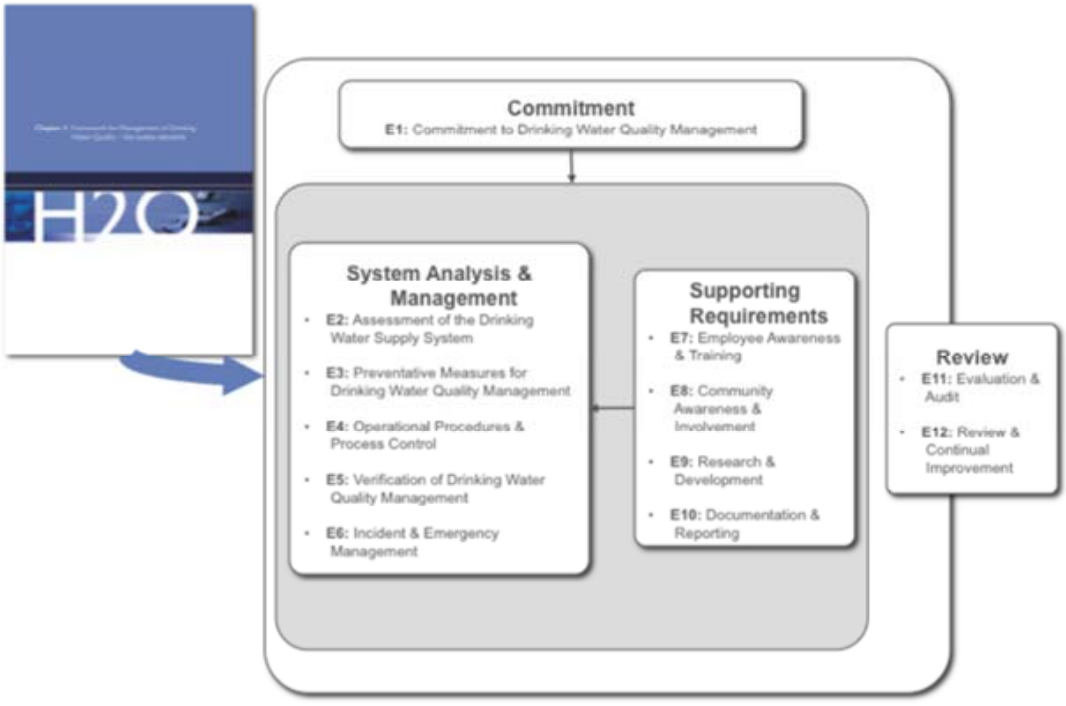

Figure 1 - ADWG Framework

The DWQMP Rev 5.1 was submitted to the Water Regulator September 2013 and is currently under review for approval.

2 OVERVIEW OF OPERATIONS

2.1 Water Service Provider Change

The currently approved DWQMP Rev 4 was approved (July 2012), when the Water Supply Service Provider for LCC was Allconnex Water. During June 2012, Allconnex Water dissassociated and LCC established three new Water Branches within the Roads & Water Infrastructure Stream. The three new branches included:

- Water Business;
- Water Operations; and
- Water Infrastructure.

Thus the currently approved DWQMP Rev 4 has since been totally revised to reflect this change including the following:

- Merging of the Bulk Water Manager, Producer and Transporter (i.e. Grid Manager, SEQ Water and Linkwater) to form Seqwater; and
- Key network & system changes including bulk water source supply changes such as:
  - South Maclean WTP ceased operation and was decommissioned by December 2012;
  - Higher percentage of water sourced from Mt Crosby rather than from Redland's via EPI;
  - Cease regular supply from Gold Coast via Stanmore Pump Station and reclassified this site as an emergency supply connection with occasional flows from this site to ensure assets are in operational readiness;
  - The commissioning of Logan River Pump Station Breakpoint chlorination system to supply Logan East; and
  - Changing from three to seven water supply schemes/zones for Verification Monitoring.

2.2 Logan City Council Network Description Overview

LCC covers an area of approximately 933 square kilometres and has a population of approximately 250,000 people.

LCC is bounded by Underwood in the North, Mundoolun in the South, and the Albert River and Greenbank in the East and West respectively. There are significant areas of bushland, National Parks and waterways. LCC is the water service provider to Logan City's residential, non-residential, commercial and industrial users connected to the reticulated water supply.

LCC is responsible for receiving bulk water from Seqwater and delivering it to residents through its distribution network. This is done whilst ensuring that the water meets the ADWG water quality requirements. LCC manages, operates, and maintains reservoirs, pumping stations, re-chlorination facilities and mains as part of its distribution network.

The Logan Water Alliance (LWA) is the collaborative initiative of Logan City Council, Tenix, Cardno and Parsons Brinkerhoff. The Alliance was established in August 2009 to plan, design, construct and commission new and improved water and wastewater infrastructure across the Logan City. This includes projects directly relating to water quality improvements.

2.3 SEQ Water – Bulk Water Supply Grid to Logan

LCC is part of the South East Queensland (SEQ) Water Grid, managed and operated by Seqwater. The SEQ Water Grid is an extensive drinking water distribution system that includes the Sunshine Coast, the Gold Coast Brisbane, Ipswich, Somerset and Scenic Rim Regions as shown in Figure 2.

Figure 2 – Seqwater Water Supply

Seqwater is the Queensland Government Statutory Authority responsible for ensuring a safe, secure and reliable water supply for SEQ, as well as managing catchment health and providing recreational facilities to the community.

LCC does not treat any raw water for drinking purposes. It relies solely on the supply of treated drinking water supplied by Seqwater from various sources including Mt Crosby Water Treatment Plant (WTP), North Stradbroke Island WTPs, Molendinar WTP, and at times the Gold Coast desalination plant. This treated drinking water can be delivered from the Kuraby Reservoir, Southern Regional Water Pipeline (SRWP) and Eastern Pipeline Interconnector (EPI). Water can flow to the north or south via the SRWP and from east or west through the EPI.

Water was previously received from South Maclean WTP to supply Logan South, sourcing raw water from the Logan River; however that plant ceased operation in December 2012.

LCC can receive both chloraminated and chlorinated disinfected water from Seqwater. LCC also converts chloraminated water to chlorinated water via its breakpoint chlorination system located at the Logan River Pump Station. This converted water has been supplied to Logan East, since December 2012, to ensure continued effective disinfection of water supply to this area.

Prior to Allconnex dissolution, Logan considered it's water supply as three water supply schemes, being Logan North, Logan East (ex-Gold Coast City Council) and Logan South (ex-Beaudesert Shire Council). The water quality analysis for this report is based on these three supply schemmes.

DWQMP Rev 5.1 now takes into account the various water supply sources, mixed supply zones and two disinfection types present to establish seven discrete water supply zones. The zones supplied from each water source, under general operating conditions, are shown in Table 1. This indicates general water disinfection type is being either chlorinated and chloraminated. Blending of water characterisitcs from diffferent sources can occur within some of the zones.

Table 1 - Logan City Council Water Source Summary

MAJOR ZONE		TYPE	BLENDED	APPROXIMATE SUPPLY FROM EACH SOURCE			
				MT CROSBY (KURABY)	MT CROSBY (SRWP)	REDLAND CITY (EPI)	GOLD COAST (SRWP)
Logan North	Greenbank	Chloraminated	Yes	60%	20% (Summer)	-	20% (Winter)
	Kimberly Park	Chloraminated	Yes	70%	-	30%	-
	Marsden	Chloraminated	No	100%	-	-	-
	Springwood High	Chloraminated	No	95%	-	-	5%
	Springwood Low[A]	Chloraminated	No	95%	-	-	5%[A]
Logan East[B]		Chlorinated	No	100%	-	-	B
Logan South		Chloraminated	Yes	-	50% (Summer)	-	50% (Winter)

Note: (A) Changes since July 2012; (B) Logan East was previously supplied via the Gold Coast Stanmore Pump Station, which is now only used in times of emergency and/or network cleaning via disinfection.

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

During the 2012/13 FY, there were three instances were the Regulator was notified under sections 102 or 102A of The Act. Notifications included any limits exceeding the ADWG Health Limits and/or if there is reason to believe public health was at risk. Limits exceeding aesthetic limits are not reportable unless there is reason to believe that public health is at risk.

None of the notifications involved the detection of *E.Coli*, an indicator organism for faecal contamination, often associated with the presence of other harmful pathogens from warm blooded organisms.

3.1 Non Compliances with the Water Quality Criteria

The three incidents reported to the Regulator were, in order of occurrence:

- Insufficient disinfection;
- The detection of Disinfection By Products (DBP); and
- The detection of lead.

3.1.1 Insufficient Disinfection (i.e. low free chlorine residual)

Non-Compliance Description

This non compliance occurred on the 2nd November 2012 when drinking water supplied directly from the South Maclean WTP to Logan South residents, had low free chlorine residual hence potentially ineffective disinfection. Due to low chlorine residual water leaving directly from the WTP, it was considered a potential risk to public health and hence a non-compliance was declared and the Water Regulator was notified.

The incident occurred during changeover from the Southern Regional Water Pipeline (SRWP) to the South Maclean WTP water supply.

Immediate Corrective Action

Seqwater ceased supply of low chlorine water and action was taken to disinfect the distribution water supply system with a free chlorine residual of > 2.0 mg/L. This also included moving any water with low chlorine residual into the Travis Rd and Woodhill reservoirs, thus allowing control and monitoring of potentially low chlorine residual water.

Monitoring of free chlorine and *E.coli* in the Logan South system was conducted and test results indicated that there were no positive *E.coli* results and there was effective disinfection, thus indicating the water was safe for consumption.

Long Term Corrective Action

LCC's Emergency Response Plan (ERP) was updated after this incident to improve incident response measures, resources and internal / external communication in the event of a similar incident occurring in the future. LCC has since instigated an improved communication protocol to ensure all stakeholders are included in all communications.

A future whole of system risk assessment will incorporate any risks associated with water supply changes including routine and non routine events. This task has been incorporated into the revised DWQMP Rev 5.1 Risk Management Improvement Plan (RMIP). A formal notification process has also been implemented where Seqwater notifies water entities of upcoming water supply changes via its Water Quality Notification group email process.

The South Maclean WTP plant has since been decommissioned and was removed from service by December 2012.

3.1.2 Detection of Disinfection by Products (DBP)

Non-Compliance Description

On the 19th December 2012, chloraminated water from Logan North was being supplied into Eagleby and was undergoing break-point chlorination to become free chlorinated drinking water. Due to this, LCC was undertaking the monitoring of trihalomethanes (THMs) in the area to observe if break point chlorination was contributing to the formation of DBPs. A total of ten sites were nominated to be monitored for full microbial and chemical assessment.

Analytical testing for THMs was conducted by the Smart Water Laboratory on the Gold Coast, since LCC's laboratory does not have the instrumentation to undertake this testing. All parameters observed during this monitoring met the requirements of the ADWG, except for one sample which indicated a breach of the ADWG limit for total trihalomethanes (THM). Testing indicated that 0.26 mg/L THM was present in a sample taken at Devron Crt Eagleby, which was in excess of the allowable ADWG limit of 0.25 mg/L.

Immediate Corrective Action

Upon receiving the result, LCC reduced the level of free chlorine within the system as a preventative approach to minimise possible THM formation whilst an investigation was undertaken.This was managed to ensure adequate disinfection was maintained.

A request was made by LCC to check the quality control on this suspect result. Smart Water Laboratory found that the reading was not reliable and should not be considered a reliable result. A report was subsequently re-issued by the laboratory indicating that results were an approximate only and not correct.

Ongoing extra monitoring for the presence of THMs was conducted as a precautionary measure during the month of December 2012, to rule out the possibility of DBPs exceeding ADWG limits in the network. During this monitoring, there were no detection of THMs in exceedance of the ADWG limit. A supplementary sample taken from Devron Crt on the 7th January 2013 returned a result of 0.12 mg/L total THMs. This was within the ADWG and no other monitoring during this time indicated THM exceedences.

Long term Corrective Action

As a result of instrumentation error, LCC requested that the Smart Water Laboratory on the Gold Coast review and improve their testing procedures and processes to avoid similar occurrences in the future. Smart Water Laboratory management agreed to make changes to their procedures.

3.1.3 Detection of Lead

Non-Compliance Description

Lead was detected (0.03mg/L) as part of routine Verification monitoring at Federation Park Reserve, Bethania. This exceeded the ADWG health limits (<0.01 mg/L), and was reported to the Regulator 4th April 2012.

Upon investigation, the tap which supplied this sample was located approximately 200m from the water distribution system and appeared to be a very old style public tap and a potential lead source with a tap head making it difficult for the lab sampler to collect routine samples for verification monitoring. A new drinking bubbler type tap was also located nearby. Re-sampling of both taps was undertaken to confirm if lead contamination was an isolated incident or not. A review of recent works undertaken confirmed only works to polyethylene pipes had been performed and there had been no works involving metal. A review of previous sampling results of the area indicated no lead had previously been detected.

Immediate Corrective Action

The suspect tap (located near BBQ) was isolated until re-testing of that tap and nearby bubbler tap could be undertaken. Results confirmed that the source of lead contamination was associated with the tap located near the BBQ only. This tap and its associated fittings were

removed and replaced. Repeat testing post tap replacement indicated no lead in the water sample.

Long term Corrective Action

The Logan Water Business advised LCC Parks division to identify similar taps in public parks, specifically newly acquired Gold Coast assets, and inform the Product Quality Team and the Laboratory so similar sampling and testing could be undertaken. Any taps and associated fittings with lead contamination were to be replaced. An additional new anti-vandal sampling tap was installed near the park and closer to the main water distribution system to get a more represent water sample as part of verification monitoring.

4 ACTIONS TAKEN TO IMPLEMENT THE DWQMP

4.1 Summary of Amendments Made to the Drinking Water Quality Management Plan (DWQMP)

The dissolution of Allconnex Water June 2012 and the re-establishment of the water service provider role with Logan City Council in July 2012 (LCC), has created the need to completely re-write the previous DWQMP and undertake substantial implementation actions. Some of the key business and system changes have already been discussions in Section 2.1. This has resulted in considerable amendments to the previous DWQMP Rev 4, in order to reflect various updates and improvements made in the way in which LCC manages the supply of safe drinking water. The most recently amended version is known as LCC DWQMP Rev 5.1.

Most of the amendments to this document have been initiated internally and are currently under review with the Water Regulator awaiting approval. They are not the result of a directive from the Water Regulator. Submission of the DWQMP by the new water service provider (DWQMP Rev 5.1), was also a requirement from the Regulator post the dissolution of Allconnex Water.

DWQMP Rev 5.1, along with form WSR506 DWQMP Amendment Application, was submitted to the Water Regulator for review on the 26th of September 2013 in accordance with the requirement of Section 100 of the The Act.

The amendments submitted to the Regulator are covered by the following sections. Specific details of these amendments, and the relevant sections within the DWQMP Rev 5.1, can also be found in Section 6.1.5 Table 8.

Summary of Key Amendments

- Registered Service Details.
- Details of Infrastructure for providing the service.
- Identification of hazards and hazardous events.
- Information gathering – water quality and catchment characteristics.
- Assessment of risks.
- Risk management measures.
- Operation and maintenance procedures.
- Management of incidents and emergencies.
- Risk Management Improvement Plan.
- Service Wide Support – Information management.
- Operational Monitoring.
- Verification Monitoring.

4.2 Risk Management Improvement Plan

LCC's Risk Management Improvement Plan (RMIP) is the key document used to identify opportunities and actions to improve water quality issues/risks identified. Key issues may be identified from the following:

- **Risk Assessment Process** - where current Preventative Measures do not reduce the residual risk to an acceptable level (i.e. include any Risk > 10 High) thus additional Preventative Measures (i.e. controls) need to be investigated and implemented;
- **Internal Reviews/Audits** - which identify key non-conformances which need to be addressed or general DWQMP improvements. This includes both the content within the DWQMP as per The Act requirements and also the implementation of the DWQMP;

- **Incidents** – long term improvement actions from incidents, near misses and non-compliance incidents; and
- **Water Regulator feedback**.

To help priorities Key Actions, each issue/risk has been designated a priority level, which can be categorised as follows:

- **Priority 1** - Short Term management measures, requiring action within 12 months of approval (eg. Procedure reviews, enhanced flushing programs, development of awareness and training programs, etc);
- **Priority 2** - Medium Term management measures, requiring action within the next budget cycle; and
- **Priority 3** - Long Term management measures, requiring action within the 5 year strategic plan (eg. CAPEX programs).

To ensure the plan is communicated, implemented and monitored for effectiveness, RMIP reviews with key stakeholders are undertaken at least annually.

The RMIP will be updated based on internal reviews, internal and external audit results, non-conformances, incident & emergency feedback, and outcomes from regular review meetings with key stakeholders regarding actions.

Actions from the DWQMP Rev 4 RMIP have been reviewed and any outstanding actions consolidated into the revised DWQMP Rev 5.1 comprehensive RMIP.

Details from the DWQMP Rev 4 RMIP implementation outcomes, can be found in Appendix B.

4.3 Implementation of the DWQMP and RMIP

The following sections detail the key programs initiated and implemented in relation to a review of the DWQMP Rev 4 and development of the DWQMP Rev 5.1.

4.3.1 Risk Assessment and Methodology

Since the submission of the last DWQMP (DWQMP Rev4 (Allconnex Water) approved July 2012), additional risk assessments have been undertaken. These risk assessments specifically focused on disinfection and considered some of the key changes since 2012, including system changes such as water source changes and the commissioning of Logan River Pump Station Breakpoint Chlorination System. Hazards were analysed during a Risk Assessment Workshop conducted on the 28 th May 2013 by a Risk Assessment / HACCP Team, the members of which are outlined in Table 24 of LCC's current DWQMP Rev 5.1. The same methodology was used as per the previous risk assessments undertaken and is consistent with the tools adapted from the SEQ Water Grid Risk Management Plan.

LCC will need to review and consolidate the current and previous risk assessments (as per DWQMP Rev 4) for the entire LCC system. This will be undertaken once Seqwater risk assessments have been updated to determine any new or changed residual risks entering the LCC distribution system. This has been included in the DWQMP Rev 5.1 RMIP as an entire system risk assessment review.

Undertaking this review has been recognised as a Priority 1, meaning that it shall be actioned within a 12 month period and is currently targeted to occur at end of Q4 2013/14.

4.3.2 Preventative Measures – Operational, Quality and Critical Control Points

Activities Over 2012/13 Financial Year (FY) Period

Two workshops were undertaken to determine which control points in the LCC network are defined as Critical Control Points (CCP) and also to determine the associated operating limits for the CCP. These workshops were a follow on from the outcomes from the risk assessment workshops held 28th May 2013.

The first CCP Workshop, held 30th May 2013, reviewed all chlorine dosing systems within the LCC distribution network and reservoirs. Both manual and automatic dosing systems were assessed using the CCP Decision Tree to determine which control points met the definition of a CCP. The outcomes resulted in one CCP being identified, that being the chlorine dosing at the Logan River Pump Station Breakpoint Chlorination System (Logan East water supply zone).

The outcomes from the CCP decision tree workshop helped development of a draft Operational Control Point Register for online monitoring. This includes the current CCPs, Quality Control Points (QCP) and Operational Control Points (OCP). The establishment of the newly recognised CCP in Workshop 1 provided the necessary information to allow Workshop 2 to be conducted.

This second workshop, conducted on the 10th July 2013, focused on setting the operational limits for the Logan River Pump Station CCP, so formal documentation could begin on this control point and the limits could be incorporated into daily operation.

Overlap of Activities into 2013/14 FY Period

Since this initial workshop, a number of meetings have been held regarding the performance of Logan River Pump Station CCP and the verification of its projected performance.

Planning reports from the 2012/13 financial period, and earlier, have highlighted the need of two additional chlorination systems in the Logan North region. The study has also proposed booster stations in Logan East and parts of Logan North. Review of these control points are planned for the 2013/14 financial year.

4.3.3 Preventative measures – Operational and Maintenance Procedures

Activities Over 2012/13 FY Period

A review of operational procedures had been underway since the dissolution of Allconnex Water and the re-establishment of the water service provider role with LCC in June 2012. This review has been led by Logan Water Operations and ranges from minor re-formatting to completely new procedures being developed.

Currently, there are 160 operational procedures that are registered and recorded in a status report managed by Logan Water Operations. This status report acts as a mechanism to manage updates and track changes to these procedures. At this time, there are 16 procedures for Water Network Operation and Maintenance, of which 10 are under review. There are also 11 site based operating manuals for water pump stations, owned by the Mechanical and Electrical department, that are currently under review and receiving formatting changes to ensure they are current.

Overlap of Activities into 2013/14 FY Period

In addition, two major operating protocols extended into 2013/14; the 2013 Operating Protocol between Seqwater, Logan City Council, Gold Coast City Council and QLD Urban Utilities and the Seqwater Emergency Response Plan. Work is also ongoing on Standard Operating procedures (SOP) for both the operation of the Logan River Pump Station Breakpoint Chlorination facility and also the calibration of associated instruments, including the calibration of devices used to calibrate the control equipment.

Planning investigations conducted in 2012/13 indicate that more Operational and Maintenance (O&M) SOPs will be developed as CAPEX changes are implemented within the LCC network

and added to the status report as per the requirement of Logan water Operations document management policies.

4.3.4 Preventative Measures – Water Quality Monitoring and Service Improvements

Activities Over 2012/13 FY Period

Investigative work undertaken by the Logan Water Alliance (LWA), in the form of the Logan North Water Quality planning study, showed that stratification was prevalent in the active reservoirs compartments of four major reservoirs. Subsequently, this was noted as a water quality problem and included to be addressed in the Risk Management Improvement Plan. Due to this stratification, it was advised that mixing be introduced by the installation of mechanical mixers to increase water circulation and reduce stagnation.

This activity was completed by the LWA who, by late 2012, had provided the planning, delivery and installation of mechanical mixers to the Greenbank, Illaweena, Springwood High Level and Springwood Low Level reservoirs. It was discovered shortly after installation that additional research needed to be conducted into the method of operation of the mixers, as during early stages of operation the units were frequently experiencing high temperature alarms, which required the units to shut down.

Further investigative work undertaken by the LWA also indicated that the Logan South region had varying levels of inadequate disinfection throughout parts of the network, in particular the extremities. These issues were highlighted in the Logan South Disinfection Scoping Project carried out mid 2012 and as a result, operational modifications were made to sampling in the area.

It was a recommendation to modify the water quality monitoring program to include existing sampling sites at all Logan South reservoirs into the verification program. This recommendation was implemented as well as adding some additional sampling points to both the current verification and operational monitoring programs.

Overlap of Activities into 2013/14 FY Period

Investigation into early operational issues with the mixers installed in the active compartments of Logan North reservoirs to maintain water quality is ongoing. Early investigations indicate that an examination into the available water level kept in the reservoir for motor cooling is necessary. A solution will be devised that will be integrated with the current reservoir operating windows and demand management strategies. Outcomes will feed into 2013/14 actions.

In addition, the Logan South Disinfection Project scoping, completed mid 2012, highlighted additional water quality monitoring instrumentation is necessary. Though preliminary work on this has started earlier in the year, outcomes will feed into 2013/14 actions.

Details of additional projects can be found in Appendix B.

5 CUSTOMER COMPLAINTS RELATED TO DRINKING WATER QUALITY

5.1 Customer Complaints

Customer feedback in the form of a complaint is seen as a valuable source of information necessary to identify areas for improvement. Customer complaints drive process improvement activities and often serve as an indicator of network performance. Over the 2012/13 year, Logan City Council recorded customer complaints and categorised them according to Suspected Health, Appearance, Taste and Odour, and also Other complaints. Complaints designated to the Other category are reserved for complaints that are of an enquiry nature but still may require action, for example a stain in a kettle. A total of 381 complaints were received for the 2012/13 year equating to around 4 complaints on average for all possible complaint types across the whole of Logan City.

Out of 381, most of the complaints where related to Appearance (77%) with Taste and Odour second (15%) followed by 4% for Suspected Health and also 4% for Other. Customer complaints per category for water supply scheme/zone are shown in Table 2.

Table 2 – Customer Complaints

Water Regulator - Annual Report *Total Complaints*					
Water Supply Scheme	**Suspected Health**	**Appearance**	**Taste & Odour**	**Other**	**TOTAL**
Logan North	12	246	35	9	302
Logan East	1	31	12	4	48
Logan South	2	17	11	1	31
TOTAL	**15**	**294**	**58**	**14**	**381**

Water Regulator - Annual Report *Complaints per 1000 Connections*						
Water Supply Scheme	**Suspected Health**	**Appearance**	**Taste & Odour**	**Other**	**TOTAL**	**No. Connections**
Logan North	0.18	3.60	0.51	0.13	4.42	68318
Logan East	0.06	1.82	0.71	0.24	2.82	17012
Logan South	0.29	2.46	1.59	0.14	4.48	6921
TOTAL	0.16	3.19	0.63	0.15	4.13	**92251**

5.1.1 Suspected Health

Complaints are occasionally received by Logan City Council from customers concerned that the drinking water may be causing illness. All alleged health complaints are thoroughly investigated by LCC's laboratory staff through an onsite inspection with subsequent sampling and analytical testing, including the mains supply and at times a neighbouring property. The Laboratory Coordinator is responsible for the administration of these test outcomes and the appropriate dissemination of findings to both key internal staff and the customer.

Depending on the incident nature and analytical findings, the Laboratory Coordinator will notify the Product Quality and Operations Department to undertake corrective actions and root cause assessments. This is a consultative process to verify if the complaint is a possible health risk and whether the incident is isolated or wide spread.

During the 2012-13 financial year Logan City Council received a total of 15 suspected health complaints of which there were no confirmed cases of illness arising from the water supply system. This equates to around 1 suspected health complaint for every 7000 connections across the entire city. All 15 complaints were actioned and closed out with the appropriate consultation with the customer. For alleged illness complaints that also presented discoloured or odorous water at the property, flushing of the system at a nearby hydrant point was conducted

to restore water quality to the resident's property. No operational changes have been implemented as a result of any of these 15 complaints.

5.1.2 Appearance

Complaints relating to the Appearance of water were the highest occurring incidence of complaint for the 2012/13 reporting period. Over the year, 294 complaints were received about the appearance of the water in which the majority were for discoloured or dirty water with the minority of complaints (29) being for water appearing to be milky or white.

As a total, this equates to just over 3 complaints in every 1000 connections across the entire city relating to water appearance.

Dirty Water

Dirty water is a sub-set of water appearance complaints and is typically associated with brown, reddish, black, or muddy water. In addition, it's also relevant for complaints regarding suspended particles or water which has caused discoloured washing. Dirty water accounted for 90 % of the total water appearance complaints received across the year, with the majority coming from the Logan North Zone. This zone, due to its size, also had the majority of reactive and planned works undertaken across it.

Records of planned and unplanned work schedules across the whole of the city show that disturbance due to maintenance activities is a possible explanation for around 15% of the total complaints for the year. A possible explanation for the remainder of dirty water complaints is long transmission paths and high water age profiles, as this has been identified as an issue in certain areas of Logan and is currently being reviewed. Logan North in particular is recognised as an area where water age is high due to transmission distance and storage profiles. It is suspected that water retained longer in the network has a greater chance of making matter become soluble or suspended within the water, thus reducing its quality. Findings from investigative research done by the Logan Water Alliance have indicated that high water age is a problem in parts of Logan North. This is being addressed through the Logan North Water Age Management Plan.

All complaints lodged for dirty water over the 2012/13 reporting period were investigated by Water Operations and flushing was conducted in close proximity to the resident's home to extract unsatisfactory water and restore clean water to the property. One complaint was resolved by flushing and providing washing powder whilst bottled water was supplied on two separate occasions to customers as courtesy whilst flushing was undertaken. Any dirty water complaints that require sampling and further examination are done so in conjunction with the Laboratory and Product Quality Departments.

No major operational changes have been implemented at this time to address dirty water complaints. Assessment of the Logan North water supply zone in conjunction with a Water Age Management Plan is ongoing.

Milky/White Water

Milky/White water is considered as a sub-set of water Appearance complaints. A total of 29 complaints of this nature were recorded across the entire Logan region for this reporting period with around half coming from the Logan North water supply zone.

As part of the customer complaint management process, complaints lodged by customers for white or milky water are first investigated to see if air entrainment is the cause by requesting the customer perform a settling test and observing if the water clears after a defined time period. It was noted from records that around 50 % of these complaints were resolved by this test and no further action was required since the customer confirmed they were satisfied with the settling test outcome. Since air was the cause in these instances, no other immediate operational actions were taken.

Complaints that could not be dismissed by a settling test were investigated further to determine the degree of the problem and the cause. Sampling and further testing was undertaken where required if deemed appropriate to assess the root cause of the milky/white water or if the

resolution of the issue is not immediately apparent. All of these instances were investigated and attended to by Water Operations for flushing in the immediate proximity of the property to clear the discoloured water and restore a clean supply. No operational changes were implemented as a result of any investigations into White/Milky water complaints over the 2012/13 financial year.

5.1.3 Taste and Odour

Taste and odour complaints are commonly described by customers as an earthy, sour, or chemical taste in the water. A total of 58 complaints were received across the whole of Logan City for the reporting period meaning that on average just over one complaint was received for every 2000 connections in Logan (0.63 complaints/1000 connections). Of the three zones that make up the city, the Logan North zone had the highest share of total complaints; however Logan South had the highest per 1000 connections (1.59 complaints / 1000 connections).

Taste and Odour complaints are treated in the same manner as health related complaint types in that they are investigated and tested and also typically flushed to restore water to the customer that meets their level of satisfaction. All 58 complaints lodged were attended to and flushed with one customer being supplied bottled water until flushing was complete.

Hydrocarbon

Two complaints were received for hydrocarbon taste in the water and were acted upon immediately. Both were associated with a spill local to the property which subsequently contaminated a water pipe present under the ground. Samples were collected on both occasions from both neighbouring properties and the main supply system to determine the extent of contamination and rule out contamination of the network. Analytical testing was conducted by ALS Laboratory as Total Petroleum Hydrocarbons testing is not available at Logan's own laboratory. Analytical results were supplied to both customers confirming that the water supply network was safe but that petroleum hydrocarbon substances were present in their water and localised to their property, caused by their actions.

Water Operations did assist with an approach to flushing at the property to alleviate the problem and advised the customer to remedy the situation.

Chlorine

Logan East, whilst reasonably small, had 12 complaints for taste and odour of which half could be associated with a chlorine taste in the water. This zone is unlike others owing to the fact that water coming into it undergoes a break-point chlorination process and becomes free chlorinated. This process has become effective as of December 2012 as part of a disinfection strategy review and pump station upgrade. All localised chlorine related complaints in Logan East have occurred after the commissioning of this facility, which has since led to investigations and constant review of the performance of the plant. Due to current system constraints and network connections, some customers receive higher levels of chlorine than is aesthetically desirable. However, an investigation into these complainants has shown that whilst levels may be higher than usual, none have been a health risk and all instances have been compliant with the ADWG 2011.

The varying sensitivity of customers to free chlorine levels has been acknowledged and the operation of this pump station has been tailored to curb this issue without compromising disinfection levels. Affected customers have been consulted and also advised that future operational changes are intended to occur within the next 12 months that will amend supply to those in close proximity to the facility and eliminate these issues.

5.1.4 Other

In the event that a complaint is received that can not be assigned to an existing pre-defined complaint type, it is designated into the "Other" category. In total there were 14 complaints across the entire city that were assigned to this category making it the least common complaint type. With this type of complaint, if the customer is not satisfied with the immediate response offered over the phone the complaint will be lodged and investigated, as with other complaint

types. Complaints received over the year varied from suspected scaling of hot water service components, a stained kettle, suspected phosphorous in a swimming pool and an enquiry on manganese levels from a customer with specialised water requirements. One complaint regarding the health of fish in a customer's aquarium was also received and dealt with by analytical testing.

In all cases, correspondence to the customer was undertaken to facilitate an outcome that addressed the enquiry. Sampling and analytical testing was done where required and flushing was conducted where necessary to appease the customer.

No complaints from this category have prompted any immediate operational changes. However, it is planned to develop fact sheets and improve LCC website information regarding water quality. This is being undertaken by the Water Business branch including the Customer Service and Product Quality team.

6 OUTCOME OF THE DWQMP REVIEW AND HOW THE FINDINGS HAVE BEEN IMPLEMENTED

6.1 Reviews Undertaken

Two key reviews were undertaken of the DWQMP which included a Gap Analysis of the DWQMP document and an Internal Audit Review to understand the extent of implementation of the DWQMP.

The purpose of the reviews was to ensure that the DWQMP remains relevant in regard to the operation of the drinking water service.

The objective of the Gap Analysis was to compare the DWQMP Rev 4 (and previously developed DWQMP Rev 2) with the ADWG and The Act to;

- Identify major gaps and shortcomings; and
- Provide a targeted Improvement Plan to help prioritise updates required to best meet ADWG and Legislative requirements. The review aimed to create a user friendly, DWQMP that could be easily understood and practically used by LCC staff.

The objective of the Internal Audit review was to provide further review of particular priority gap areas to assist re-submission and re-approval of the DWQMP by the Water Regulator. The Internal Audit was not extensive but represented targeted areas of concern to help prioritise actions.

The Internal Audit Review is summarised in Table 3.

Table 3 – Internal Audit Review Summary

Audit Item	Description
Purpose:	To conduct a water quality audit of LCCs water supply components
Criteria:	The 12 Elements of the Framework for Management of Drinking Water Quality (ADWG, 2011). The requirements of the Act.
Time Period:	The audit was conducted against all LCCs operations since July 2012. It focussed on the future from July 2013 beyond.
Venue:	Located primarily at LCCs offices with field visits as detailed as part of the audit schedule.
Date:	Over 3 days

The Gap Analysis included a desk top review during April with an on-site 2 day site visit on the 2nd & 3rd May 2013.

The DWQMP document internal audited was the DWQMP Rev 5 (draft version, 30th May) in association with Rev 2 and Rev 4. Associated documents and evidence were reviewed during the onsite Internal Audit Review from 3rd to 5th June 2013.

This also included a presentation of findings to senior staff, managers and the DCEO of Roads & Water Infrastructure business stream on the 5th June 2013.

The reviews were lead by Dr Therese Flapper (GHD) with details of the audit team in Table 4 below. Additional staff, who assisted during the audit, can be found in Appendix C (Audit Review Plan) which included laboratory, operational, customer service and management staff members.

Table 4 - Internal Audit Review Team

Representative	Org.	Role in Audit	Contact Details
Natasha Georgius	**LCC**	Senior Water Quality Scientist Internal Audit – co-auditor	07 3412 4830 natashageorgius@logan.qld.gov.au
Chris Pipe-Martin	**LCC**	Water Quality Manager - Regulatory compliance	07 3412 4868 chrispipe-martin@logan.qld.gov.au
Dr Therese Flapper	**GHD**	Audit lead	0400 488 186 therese.flapper@ghd.com
Danielle Baker	**GHD**	Peer Review	Danielle.baker@ghd.com

6.1.1 Review Findings Detailed Reports

Full details from the Gap Analysis and Internal Audit Review reports can be found in:

- DM#8364080 - LCC DWQMP Review Gap Analysis (May 2013)
- DM# 8436655 - LCC DWQMP Internal Audit Review (June 2013)

6.1.2 Summary of Review Findings

The findings focused on sufficiency, clarity, ease of reference, consistency and likelihood of compliance or not against The Act and components of the ADWG 12 Elements. Definitions on achieving compliance are summarised in

Table 5 below.

Table 5 – Compliance Definition with The Water Supply Act & ADWG 12 Elements

Compliant	Complies with the key components of the ADWG Element. Some may require minor improvements.
Minor Non-conformance	Complies with some but not all of the components of the ADWG Element. Improvements required.
Major Non-conformance	Does not comply with the key components of the ADWG Element. Major improvements required.
Best Practice Element	This element is not assessed by the Water Regulator, as it is not a legislative requirement against The Water Supply Act. It is considered best practice.

The internal audit reviews made the following findings in relation to compliance against The Act and 12 Elements of the ADWG, noting that this review was not extensive but focused on key areas, also summarised in Table 6.

- 4 were considered Compliant however required some minor improvements (green);
- 4 were considered Minor Non-conformance (yellow), requiring improvements;
- 4 were considered as Major Non-conformance (red), requiring substantial improvements;

With focused action on key priority areas prior to re-submission, the DWQMP compliance rating per element could improve. Taking into account the short time-frame prior to re-submission (i.e. 2 months), it would "estimate" the following outcomes if focused action occurred:

- 6 potentially Compliant (green);
- 3 potentially Minor Non-conformance (yellow), still requiring improvements; and
- 2 potentially Major Non-conformance (red), still requiring substantial improvements.

Table 6 - Summary of Internal Audit Review Compliance

ADWG Element	Current Status (June 2013)	Estimate at Re-submission
1. Commitment	Minor Non-conformance	Compliant
2. Supply System Assessment	Minor Non-conformance	Compliant
3. Preventative Measures	Minor Non-conformance	Minor Non-conformance
4. Operational Procedures / Training	Major Non-conformance	Major Non-conformance
5. Verification Monitoring	Opportunity for improvement	Compliant
6. Incident Management	Opportunity for improvement	Compliant
7. Employee Awareness & Training	Major Non-conformance	Major Non-conformance
8. Community Involvement	Minor Non-conformance	Compliant
9. R&D	Opportunity for improvement	Compliant
10. Documentation & Reporting	Major Non-conformance	Minor Non-conformance
11. Evaluation & Audit	Major Non-conformance	Minor Non-conformance
12. Review & Improvement	Opportunity for improvement	Compliant

6.1.3 Details of Findings

Details of the Internal Audit Review findings are discussed below, including actions to date at the time of the Internal Audit Review and updates included in DWQMP Rev 5.1, post audit, shown in ***bold italic.***

Element 1 – Commitment to Drinking Water Quality Management

- Draft DWQ Policy exists however not yet finalised nor endorsed and signed-off. This is a Best Practice component of the Act and not firmly prescribed.
- Regulatory and formal requirements possibly not current, and not reviewed annually. Currently being developed.
- Stakeholder register possibly not current, and not reviewed annually. Currently being developed.
- This is a Best Practice aspect of the Act.

Policy was finalised & endorsed by Senior Water Branch Managers & DCEO for 2013/2014 FY. Regulatory & formal requirements and stakeholder register updates included in DWQMP Rev 5.1.

Element 2 – Assessment of the Drinking Water Supply System

- Flow Diagram developed and to be reviewed and signed-off.
- Although the risk assessment has been rigorous, the currently held risk register does not seem up to date and reflective of LCC needs.
- There are actions and workshops in place to develop appropriate risk register, for example, chlorine dosing / stand pipes.
- It requires further update for new assets or corrective actions.
- It is noted in the recent letter from the Regulator that the risk assessment is not inclusive of some incidents, and has not been completed for ‘any unusual changes to the water supply’.

Flow diagram updates included in DWQMP Rev 5.1. Focused Risk Assessment of recent system changes (i.e. disinfection) undertaken May 2013 and updates included in DWQMP Rev 5.1. A whole of system Risk Assessment is planned for 2014, once Seqwater has completed their risk assessment so tthat any new residual risks can be incorporated.

Element 3 – Preventative Measures for Drinking Water Quality

- Preventive measures are only reflected in the Risk Assessment and a consolidated upper level listing of key measures would be informative.
- CCPs have been developed and critical alerts exist. Implementation is not to an appropriate level across LCC.
- It is not clear that the CCPs meet the definition of a CCP – particularly Q3 (can operation of the preventive measure be monitored and corrective actions applied in a timely fashion?).
- The identified CCPs are presently: 1 Reservoirs – chlorination which is not online monitored (weekly grab) and is not online dose controlled (manual drum used); and 2. Reticulation – whereby E. coli is noted (routine grab sample).
- There is no clear link between a deemed CCP to SCADA and online process control, and field activities.
- Further CCP Workshops are currently being held.

Additional CCP workshops have since been undertaken which identified CCP as per the CCP decision tree and limits established. Updates included in DWQMP Rev 5.1 and work continues into 2013/14 FY.

Element 4 – Operational Procedures & Process Control

- A range of O&M procedures and processes are described in Rev 2 and to a degree in Rev 4. Their application and suitability being linked to DWQ is not clear. Revision dates noted in Table 7.1 of Rev 4 are dated.
- Intent and on the ground may be adequate, but evidence is lacking. There seems to be a lack of procedures documented for a range of WQ related O&M – such as calibration, chlorine dosing, use of tools etc. Most are out of date or not known or used, and some are non-existent.
- Non-routine O&M practices do not appear to be documented.

An entire review of all Water Operation SOPs was undertaken including updates and identifying any key missing SOPs. Updates included in DWQMP Rev 5.1, include date last reviewed and development of missing SOPs included in RMIP for 2013/14 FY. Formal Corrective Action process also included in 2013/14 FY, trialling Intelex as an appropriate tool.

Element 5 – Verification of Drinking Water Quality

- An appropriate verification sampling and analysis program is followed, with recent review.
- There is no particular evaluation of results, or appropriate relationships investigated to customer satisfaction / complaints or to corrective actions. Although it appears to occur in a reactive manner, there is little to no readily available evidence trail.

Modified Verification Monitoring program was developed and implemented July 2013, to ensure microbial sampling criteria was met with new water supply zones as part of DWQMP Rev 5.1. Implementation review is planned for 2013/14 FY to identify any gaps. Process Improvement team is also planned to kickoff during 2013/14 FY reviewing water quality and customer complaint trends. Both actions included in DWQMP Rev 5.1 RMIP for 2013/14 FY.

Element 6 – Management of Incidents & Emergencies

- The recently prepared ERP (Dec 2012) has been approved by the Regulator.
- Implementation is required.

Action for ERP implementation and training included in DWQMP Rev 5.1 RMIP. Consultant engaged to identify gaps and assist with implementation and training roll-out for 2013/14 FY.

Element 7 – Employee Awareness & Training

- The Rev 2 provides some outline for training and awareness, however it seems that it is not to an appropriate level and that implementation has not been undertaken.
- This is a Best Practice component of the Act and not firmly prescribed.

OH&S and External training well recorded but not so for "on-the-job" training, though people trained well via buddy system with experienced staff. Action to identify system to best capture and record training is included in DWQMP Rev 5.1 RMIP, which is being Championed by Senior Water Branch Managers. New tool, currently being trialled for 2013/14 FY.

Element 8 – Community Involvement & Awareness

- The Rev 2 provides some outline communication and consultation, however it seems that it is not to an appropriate level and that implementation has not been undertaken.
- Community involvement occurs with the schools program. There are also some web based materials and fact sheets being developed.

Action continues in relation to development of website and fact sheets and has been included in DWQMP Rev 5.1. Results from Logan Listen's 2013 Survey will be incorporated into the Process Improvement team kickoff presentation as part of 2013/14 FY.

Element 9 – Research & Development

- The Rev 2 provides some discussion of R&D and validation. Some activities are undertaken that could be considered R&D and validation, but are currently not formally recognised as such.
- There are R&D type activities being undertaken and this should be recognised in the Plan.
- This is a Best Practice component of the Act and not firmly prescribed.

R&D projects undertaken by the LWA, which includes a number of Water Quality improvement projects, has been included in the DWQMP Rev 5.1.

Element 10 – Documentation & Record Keeping

- Although Rev 2 (and at times Rev 4) prescribes an approach to documentation and reporting, there has been little implementation and documented evidence of this Element being undertaken. Rev 4 provides some information but it is not to an appropriate level and would likely not meet the Act.
- There are several types of reporting conducted associated with water quality from monthly to quarterly. Reports and documents associated with water quality are not consolidated and are uncontrolled.
- There seem to be no annual reports that have been conducted.

Various periodic Water Business reports which exist are being identified and consolidated. This also includes >20 Water Business Plans currently being developed as part of NetServPlan. This has been included in DWQMP Rev 5.1 and actions for 2013/14 FY.

Element 11 – Evaluation & Audit

- Although Rev 2 prescribes an approach to evaluation and audit, there has been no implementation and no documented evidence of this Element being undertaken. Rev 4 provides some information but it is not to an appropriate level and would likely not meet the Act.
- There is no long term evaluation conducted.
- There seem to be no audits that have been conducted.

This Internal Audit Review has been included in the DWQMP Rev 5.1 with associated actions included in the RMIP for 2013/14 FY.

Element 12 – Review & Continual Improvement

- Although a RMIP exists, there are a few different registers and approaches which require consolidation. There appears to be little routine review of the RMIP to ascertain status and progress.
- There appears to be little to no review by Senior Executive, except where it triggers a briefing sheet to the Logan Water Alliance.
- The RMIP is being developed as a component of the recent Gap Analysis and this Internal Audit.

A revised RMIP was developed as a result of this Gap Analysis, Internal Audit Review and Risk Assessment undertaken May 2013. This is included in the DWQMP Rev 5.1 and includes kickoff presentation of the RMIP process to ensure regular review of action progress in the 2013/14 FY.

6.1.4 Hazards and hazardous events that affected the quality of drinking water during the year and which were not previously addressed in the DWQMP

The hazardous events shown in

Table 7 were identified during the Risk Assessment undertaken during May 2013, discussed in Section 4.3. The Internal Audit highlighted a need for a more current risk assessment after key system changes, discussed above with Element 2.

A summary of actions undertaken and progress to date are also included in

Table 7, which includes the Item No. which is the Risk Assessment reference section (details can be found in the DWQMP Rev 5.1 Appendix K).

Table 7 - Hazardous Events and Actions Undertaken

Item No.	Hazard	Issue	Actions / Preventative Measures	Progress to Date (2013/14)
4.2 (R) DOS 1.0	Bacterial & Chemical Effective disinfection required for Logan East due to water source changes from Gold Coast to Mt Crosby WTP Dec 2012. High chlorine residual unpalatable to consumers (not health but aesthetic issue). Note: ADWG Health is for limit to be <5mg/L.	Free chlorine >0.6 mg/L can be noticeable to some consumers, which can be unpalatable. Also require to ensure effective disinfection for entire Logan East Zone. Target at new Logan River breakpoint facility being established.	Establish CCP operational and communication protocols including SCADA system set-up and field work via workshop with key stakeholders. Includes effective online monitoring alarm limits.	Draft SOP complete and currently being implemented with target of 1 mg/L (range: 0.7 to 1.3 mg/L). SOP improvements required, such as 2nd chlorine analyser for backup reliability, SCADA re-coding and re-instatement SOP to be developed for new membranes or when system has been off-line for extended period. Details in meeting monthly CCP minutes DM#8583487. Effective Preventative Measure would reduce risk from High to Medium (acceptable).
5.2 (R) DOS 2	Bacterial & Chemical	Commissioning of new breakpoints chlorination system, risk of over and under dosing.	Verify chlorine auto trim can maintain stable chlorine residual (Logan River PS Breakpoint chlorination system).	Auto trim commenced. Changes from PLC to RTU required to help simplify the hardware and give improved control of the system. Effective Preventative Measure would reduce risk from High to Medium (acceptable).
5.1 ® DOS 2	Bacterial & Chemical	Chemical supplies runs out for disinfection	Chemical Agreement exists however not formalised. Formalise agreement for	Planned for 2014. Effective Preventative Measure would

Item No.	Hazard	Issue	Actions / Preventative Measures	Progress to Date (2013/14)
		dosing and having consistent quality of supply.	appropriate supply schedule and quality.	reduce risk from Medium (unacceptable) to Low. (acceptable).
5.1 (R) DIS 1.0	Bacterial - Rainwater washing animal waste into reservoirs or animal/vermin entry due to not well sealed Reservoirs.	Reservoir inspections exist however refresher training required after internal audit review found leaves in gutters & air vents not well cleared.	Develop and implement Reservoir Inspection training to Operational staff.	Development of training material commenced and still to be finalised. Finalise and implement post Christmas period. Ad hoc audits currently undertaken to identify and fix any immediate concerns additional to periodic Reservoir Inspections. Effective Preventative Measure would reduce risk from High to Medium (acceptable) and Low if online chlorine analysers in place with alarms.
5.1 (R) WOS 2.0	Bacterial – cross contamination of tools used for sewage works not cleaned prior to use on water works.	Not clear what current SOPs exist for tool disinfection, identified during Internal Audit review.	Private Works - review develop disinfection of tools and equipment SOP. Need to confirm what Contractors do.	Separate tools used with Mech & Elec. Team internally however Private works still to be confirmed. Effective Preventative Measure would reduce risk from High to Low.
5.1 (R) WOS 2.0	Bacterial, Chemical	No SOP nor formal training exists in relation to potable water hygiene & sanitary work practises. Risk for “new” staff not understanding appropriate materials to use for Potable Water system (i.e. sealants). Identified during the Internal Audit review.	Review & potentially develop formal Potable Water Hygiene Practises SOP and incorporate into future inductions and sign off. Buddy system currently used with experienced staff. (Staff & Contractors).	Formal process not yet commenced and needs to align with recently indorsed Drinking Water Quality Policy Statement. Effective Preventative Measure would reduce risk from High to Low/Medium (acceptable)

6.1.5 Summary of Amendments Made to the Drinking Water Quality Management Plan (DWQMP)

A summary of the key changes made to the DWQMP have already been discussed and summarised in Section 4.1, which incorporates findings from the Internal Audit review and changes associated with the dissolution of Allconnex Water June 2012. This included substantial implementation actions and resulted in considerable amendments to the previous DWQMP Rev 4. It created the need to completely re-write the exisiting DWQMP to reflect the way in which LCC manages and operates the supply of safe drinking water.

Details of these changes are included in Table 8.

The most recently amended version is known as LCC DWQMP Rev 5.1. This was submitted to the Water Regulator 26th September 2013 and is currently under review awaiting approval. This is a requirement under Section 100 and 107 (7) of The Act.

Table 8 - Amendments to DWQMP Rev 4 - Form WSR506

Amendment made (Y/N)	Proposed Amendment	List of Proposed Amendments to the DWQMP, supporting documentation and examples
Y	Registered service details	DWQMP Section 1.3 *Service provider ID Number *Service provider name and contact details *Change to Water Supply Zones
Y	Details of infrastructure for providing the service	*Network System Changes (Section 3.1.2.3) *LCC Network Distribution System - Zones (Section 3.1.2.4) *Water Sources (Section 3.1.2.5 to 3.1.2.8)
Y	Identify hazards and hazardous events	DWQMP Section 3.3 *Approach and Methodology -Background (Section 3.3.1.1)
Y	Information gathering - water quality and catchment characteristics	DWQMP Section 3.1.3 *Catchment Characteristics - Gold Coast City- (Hinze Dam expansion and capacity increase) (Section 3.1.3.2)
Y	Assessment of risks	DWQMP Section 3.3 *Approach and Methodology -Background (Section 3.3.1.1) *Updated Risk Assessments (Appendix D)
Y	Risk management measures	DWQMP Section 4.2 & 7.1-7.2 *CCPs (Section 4.2.1 - 4.2.3) *Emergency Response Plan (Section 7.1 - 7.2) *Employee Training (Section 7.2.1.1)
Y	Operation and maintenance procedures	DWQMP Section 5.1 *Operational Procedures (Section 5.1.1-Table 26) *Maintenance Planning (Section 5.4.1) *Operational Monitoring (Section 5.2.2)
Y	Management of incidents and emergencies	DWQMP Section 7.1 - 7.2 *Emergency Response Plans (Section 7.1)

		*Incident and Emergency Response Protocol (Section 7.2)
Y	Risk management improvement program	DWQMP Section 13.2 *RMIP Format (Section 13.2.1) *RMIP Priorities (Section 13.2.2) *RMIP Review (Section 13.2.3) *RMIP Document (Appendix K)
Y	Service wide support--information management	DWQMP Section (11.1-11.2) *Reporting (Section 11.1) *Business Plans and Reports (Section 11.2.3) *NetServPlan (Section 11.2.3.2)
Y	Operational monitoring	DWQMP Section 4.2 & 5.2 *Operational Monitoring (Section 5.2.2) *CCPs (Section 4.2.1 - 4.2.3)
Y	Verification monitoring	DWQMP Section 6.1 *Drinking Water Quality Monitoring *Sampling Plan (Section 6.1.1) *Characteristics Monitored (Frequency) (Section 6.1.2)
Y	Other (please detail)	*Drinking Water Policy (Appendix A) *Document Rewrite and change from Revision 4 to Revision 5 (As per Document Revision and Modification Control Table) *Accompanying Letter

7 FINDINGS AND RECOMMENDATIONS OF THE DWQMP AUDITOR

No external audit of the DWQMP Rev 4 has been undertaken this financial year. Under The Act, an external audit is required within 4 years of an approved DWQMP. The DWQMP Rev 4 was approved July 2012.

APPENDIX A - SUMMARY OF COMPLIANCE WITH WATER QUALITY CRITERIA

The results from the verification monitoring program have been compared against the levels of the water quality criteria specified by the Regulator in the water quality and Reporting Guideline for a Drinking Water Service.

The reported statistics do not include results derived from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result.

The Limit of Reporting (LOR) is quoted within the tables below as is the Laboratory name. LCC Laboratory was responsible for conducting all verification monitoring analytical testing except for Trihalomethanes, (THM's) which was conducted by either ALS or the Gold Coast Water Laboratory, depending on availability.

Verification Monitoring was carried out as per the program stated in the Allconnex DWQMP Rev 4, with the exception of parameters labelled Monthly*. DWQMP Rev 4 indicated these parameters were undertaken quarterly however were undertaken monthly, thus a correction to Rev 4 has since been made and is reflected in the updated DWQMP Rev 5.1. Parameters monitored and the frequency, are in alignment with the requirements of the ADWG section 10. E.coli sampling is in alignment as per Schedule 3A of the Public Health Regulations 2005.

The water quality data is presented in three separate tables representing the three water supply schemes, being Table 9 - Logan East, Table 10 - Logan South and Water Supply Zones, followed by the three Water Supply Zone tables for Reticulation ***E.Coli*** Verification Monitoring.

Future 2013/2014 Verification Monitoring Plan

The DWQMP Rev 4 verification monitoring plan has since been revised and was implemented July 2013. The amended plan, now represents seven water supply schemes/zones. LCC made a decision that seven separate water supply zones best represented the water supply in Logan due to the differing water quality from the various water supplies provided by Seqwater to Logan (i.e. Mt Crosby WTP , EPI - Capalaba WTP, Molendinar WTP & Tugun Desalination Plant). These seven water supply zones were considered individually when determining sampling frequency as per Schedule 3A of the Public Health Regulations 2005, and are reflected in the verification monitoring program for 2013/14 financial year onwards.

Sampling frequency as per Schedule 3A of the Public Health Regulations 2005 is a regulatory requirement for E.Coli. To demonstrate best practice, the monitoring frequency of other non-regulated parameters has also been brought into alignment with this E.Coli monitoring to ensure LCC is proactive in delivering a safe supply of drinking water with changed water supply sources.

Reticulation Verification Monitoring

Table 9 - Logan East

ZONE NAME	COMPONENT	PARAMETER	UNITS	SAMPLING FREQUENCY	TOTAL SAMPLES COLLECTED	SAMPLES PARAMETER WAS DETECED	SAMPLES EXCEEDING WATER QUALITY CRITERIA (Health)	MIN	MAX	MEAN	LOR	LABORATORY NAME
LOGAN EAST WSZ	Reticulation	Free Cl2	mg/L	Weekly	218	205	0	0.05	1.9	0.22	0.05	LOGAN
	Reticulation	Total Cl2	mg/L	Weekly	218	218	0	0.05	2.2	0.37	0.05	LOGAN
	Reticulation	TC	cfu/100mL	Weekly	218	218	0	1	50	1.15	1	LOGAN
	Reticulation	Ecoli	cfu/100mL	Weekly	218	218	0	<1	<1	<1	1	LOGAN
	Reticulation	HPC 35	cfu/1mL	Monthly	46	46	0	1	35	2.57	1	LOGAN
	Reticulation	NO2-N	mg/L	Monthly	63	63	0	0.1	0.1	0.05	0.1	LOGAN
	Reticulation	NO3-N	mg/L	Monthly	63	63	0	0.1	0.7	0.22	0.1	LOGAN
	Reticulation	F (Fluoride)	mg/L	Monthly	63	63	0	0.4	1	0.82	0.1	LOGAN
	Reticulation	EC	µS/Cm	Monthly	63	63	0	140	740	351.41	1	LOGAN
	Reticulation	Temperature	ºC	Weekly	53	53	0	15	31	22.97	0.1	LOGAN
	Reticulation	T COLOUR	Hazen Units	Monthly	62	62	0	1	2	0.69	1	LOGAN
	Reticulation	A COLOUR	Hazen Units	Monthly	63	63	0	1	16	2.84	1	LOGAN
	Reticulation	TURBIDITY	NTU	Monthly	63	63	0	0.1	1.7	0.37	0.1	LOGAN
	Reticulation	pH	N/A	Monthly	63	63	0	6.8	8.3	7.64	0.1	LOGAN
	Reticulation	HARDNESS	mg/L	Monthly	63	63	0	39	225	94.10	1	LOGAN
	Reticulation	NH3	mg/L	Monthly	60	60	0	0.05	0.2	0.05	0.1	LOGAN
	Reticulation	THMs	µg/L	6 Monthly	7	7	0	1	0.12	0.09	1	ALS / GC
	Reticulation	Al	mg/L	Monthly*	64	64	0	0.01	0.07	0.02	0.01	LOGAN
	Reticulation	As	mg/L	Monthly*	64	64	0	<0.02	<0.02	<0.02	0.02	LOGAN
	Reticulation	Ca	mg/L	Monthly*	64	64	0	12	49	23.88	0.1	LOGAN
	Reticulation	Cd	mg/L	Monthly*	64	64	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Reticulation	Co	mg/L	Monthly*	64	64	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Reticulation	Cr	mg/L	Monthly*	64	64	0	0.01	0.010	0.005	0.01	LOGAN
	Reticulation	Cu	mg/L	Monthly*	64	64	0	0.01	0.19	0.02	0.01	LOGAN
	Reticulation	Fe	mg/L	Monthly*	64	64	0	0.01	0.07	0.02	0.01	LOGAN
	Reticulation	K	mg/L	Monthly*	64	64	0	1.4	3.3	2.20	0.01	LOGAN
	Reticulation	Mg	mg/L	Monthly*	64	64	0	1.5	29	8.75	0.1	LOGAN
	Reticulation	Mn	mg/L	Monthly*	64	64	0	0.01	0.02	0.01	0.01	LOGAN
	Reticulation	Na	mg/L	Monthly*	51	51	0	13	65	31.02	0.1	LOGAN
	Reticulation	Ni	mg/L	Monthly*	64	64	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Reticulation	Pb	mg/L	Monthly*	64	64	0	0.02	0.01	0.01	0.02	LOGAN
	Reticulation	P	mg/L	Monthly*	54	54	0	<0.1	<0.1	<0.1	0.1	LOGAN
	Reticulation	Zn	mg/L	Monthly*	64	64	0	0.01	0.2	0.02	0.01	LOGAN
	Reticulation	Cl	mg/L	Monthly	-	-	-	-	-	-	1	LOGAN
	Reticulation	B	mg/L	Monthly*	64	64	0	0.1	0.1	0.06	0.1	LOGAN
	Reticulation	SO4	mg/L	Monthly	64	64	0	0.1	59	25.30	0.1	LOGAN
	Reticulation	Ba	mg/L	Monthly*	64	64	0	<0.1	<0.1	<0.1	0.01	LOGAN

Table 10 - Logan South

ZONE NAME	COMPONENT	PARAMETER	UNITS	SAMPLING FREQUENCY	TOTAL SAMPLES COLLECTED	SAMPLES PARAMETER WAS DETECED	SAMPLES EXCEEDING WATER QUALITY CRITERIA (Health)	MIN	MAX	MEAN	LOR	LABORATORY NAME
LOGAN SOUTH WSZ	Retic	Free Cl2	mg/L	Weekly	256	240	0	0.05	2.16	0.41	0.05	LOGAN
	Retic	Total Cl2	mg/L	Weekly	256	256	0	0.05	2.2	0.74	0.05	LOGAN
	Retic	TC	cfu/100mL	Weekly	256	256	0	1	2	0.51	1	LOGAN
	Retic	Ecoli	cfu/100mL	Weekly	256	256	0	<1	<1	<1	1	LOGAN
	Retic	HPC 35	cfu/1mL	Monthly	65	65	0	1	540	29.28	1	LOGAN
	Retic	NO2-N	mg/L	Monthly	60	60	0	0.1	0.4	0.09	0.1	LOGAN
	Retic	NO3-N	mg/L	Monthly	60	60	0	0.1	0.8	0.43	0.1	LOGAN
	Retic	F (Fluoride)	mg/L	Monthly	60	60	0	0.1	1	0.67	0.1	LOGAN
	Retic	EC	µS/Cm	Monthly	60	60	0	170	859	376.00	1	LOGAN
	Retic	Temperature	ºC	Weekly	239	239	0	16	33.6	22.92	0.1	LOGAN
	Retic	T COLOUR	Hazen Units	Monthly	60	60	0	1	2.1	0.65	1	LOGAN
	Retic	A COLOUR	Hazen Units	Monthly	59	59	0	1	39	3.28	1	LOGAN
	Retic	TURBIDITY	NTU	Monthly	60	60	0	0.1	4.4	0.44	0.1	LOGAN
	Retic	pH	N/A	Monthly	60	60	0	7	9	7.93	0.1	LOGAN
	Retic	HARDNESS	mg/L	Monthly	60	60	0	42	234	98.03	1	LOGAN
	Retic	NH3	mg/L	Monthly	60	60	0	0.1	0.3	0.10	0.1	LOGAN
	Retic	THMs	µg/L	6 Monthly	5	5	0	1	0.14	0.08	1	ALS / GC
	Retic	Al	mg/L	Monthly*	59	59	0	0.01	0.35	0.03	0.01	LOGAN
	Retic	As	mg/L	Monthly*	59	59	0	<0.02	<0.02	<0.02	0.02	LOGAN
	Retic	Ca	mg/L	Monthly*	59	59	0	14	46	23.32	0.1	LOGAN
	Retic	Cd	mg/L	Monthly*	59	59	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Retic	Co	mg/L	Monthly*	59	59	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Retic	Cr	mg/L	Monthly*	59	59	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Retic	Cu	mg/L	Monthly*	59	59	0	0.01	0.11	0.01	0.01	LOGAN
	Retic	Fe	mg/L	Monthly*	59	59	0	0.01	0.23	0.02	0.01	LOGAN
	Retic	K	mg/L	Monthly*	59	59	0	1.5	3.1	2.05	0.01	LOGAN
	Retic	Mg	mg/L	Monthly*	59	59	0	1.7	29	9.57	0.1	LOGAN
	Retic	Mn	mg/L	Monthly*	59	59	0	0.01	0.01	0.01	0.01	LOGAN
	Retic	Na	mg/L	Monthly*	57	57	0	17	78	33.47	0.1	LOGAN
	Retic	Ni	mg/L	Monthly*	59	59	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Retic	Pb	mg/L	Monthly*	59	59	0	<0.01	<0.01	<0.01	0.02	LOGAN
	Retic	P	mg/L	Monthly*	59	59	0	<0.1	<0.1	<0.1	0.1	LOGAN
	Retic	Zn	mg/L	Monthly*	59	59	0	0.01	1.61	0.06	0.01	LOGAN
	Retic	Cl	mg/L	Monthly	-	-	-	-	-	-	1	LOGAN
	Retic	B	mg/L	Monthly*	59	59	0	0.1	0.2	0.07	0.1	LOGAN
	Retic	SO4	mg/L	Monthly	60	60	0	5.6	50	20.27	0.1	LOGAN
	Retic	Ba	mg/L	Monthly*	59	59	0	0.02	0.1	0.05	0.01	LOGAN

Table 11 - Logan North

ZONE NAME	COMPONENT	PARAMETER	UNITS	SAMPLING FREQUENCY	TOTAL SAMPLES COLLECTED	SAMPLES PARAMETER WAS DETECED	SAMPLES EXCEEDING WATER QUALITY CRITERIA (Health)	MIN	MAX	MEAN	LOR	LABORATORY NAME
Logan North WSZ	Reticulation	Free Cl2	mg/L	Weekly	457	434	0	0.05	1.85	0.12	0.05	LOGAN
	Reticulation	Total Cl2	mg/L	Weekly	457	457	0	0.05	2.19	0.71	0.05	LOGAN
	Reticulation	TC	cfu/100mL	Weekly	457	457	0	1	200.00	1.47	1	LOGAN
	Reticulation	Ecoli	cfu/100mL	Weekly	457	457	0	<1	<1	<1	1	LOGAN
	Reticulation	HPC 35	cfu/1mL	Monthly	109	109	0	1	216.00	8.02	1	LOGAN
	Reticulation	NO2-N	mg/L	Monthly	90	90	0	0.1	0.40	0.09	0.1	LOGAN
	Reticulation	NO3-N	mg/L	Monthly	90	90	0	0.1	0.90	0.46	0.1	LOGAN
	Reticulation	F (Fluoride)	mg/L	Monthly	90	90	0	0.40	1.10	0.81	0.1	LOGAN
	Reticulation	EC	µS/Cm	Monthly	90	90	0	203.00	730.00	470.81	1	LOGAN
	Reticulation	Temperature	ºC	Weekly	391	391	0	9.60	32.50	23.40	0.1	LOGAN
	Reticulation	T COLOUR	Hazen Units	Monthly	90	90	0	1	8.00	1.03	1	LOGAN
	Reticulation	A COLOUR	Hazen Units	Monthly	90	90	0	1	45.00	3.81	1	LOGAN
	Reticulation	TURBIDITY	NTU	Monthly	90	90	0	0.20	2.30	0.38	0.1	LOGAN
	Reticulation	pH	N/A	Monthly	90	90	0	6.80	8.20	7.71	0.1	LOGAN
	Reticulation	HARDNESS	mg/L	Monthly	90	90	0	52.00	180.00	125.41	1	LOGAN
	Reticulation	NH3	mg/L	Monthly	90	90	0	0.1	0.20	0.09	0.1	LOGAN
	Reticulation	THMs	µg/L	6 Monthly	9	9	0	1	0.18	0.09	1	ALS / GC
	Reticulation	Al	mg/L	Monthly*	107	107	0	0.01	0.14	0.03	0.01	LOGAN
	Reticulation	As	mg/L	Monthly*	107	107	0	<0.02	<0.02	<0.02	0.02	LOGAN
	Reticulation	Ca	mg/L	Monthly*	107	107	0	16.00	41.00	28.88	0.1	LOGAN
	Reticulation	Cd	mg/L	Monthly*	107	107	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Reticulation	Co	mg/L	Monthly*	107	107	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Reticulation	Cr	mg/L	Monthly*	107	107	0	0.01	0.02	0.01	0.01	LOGAN
	Reticulation	Cu	mg/L	Monthly*	107	107	0	0.01	0.85	0.02	0.01	LOGAN
	Reticulation	Fe	mg/L	Monthly*	107	107	0	0.01	0.29	0.02	0.01	LOGAN
	Reticulation	K	mg/L	Monthly*	107	107	0	0.60	3.60	2.60	0.01	LOGAN
	Reticulation	Mg	mg/L	Monthly*	107	107	0	2.60	29.00	15.54	0.1	LOGAN
	Reticulation	Mn	mg/L	Monthly*	107	107	0	0.01	0.24	0.01	0.01	LOGAN
	Reticulation	Na	mg/L	Monthly*	107	107	0	18.00	79.00	44.36	0.1	LOGAN
	Reticulation	Ni	mg/L	Monthly*	107	107	0	<0.01	<0.01	<0.01	0.01	LOGAN
	Reticulation	Pb	mg/L	Monthly*	107	107	0	0.02	0.01	0.01	0.02	LOGAN
	Reticulation	P	mg/L	Monthly*	107	107	0	<0.1	<0.1	<0.1	0.1	LOGAN
	Reticulation	Zn	mg/L	Monthly*	107	107	0	0.01	0.06	0.01	0.01	LOGAN
	Reticulation	Cl	mg/L	Monthly	108	108	0	28.00	150.00	75.66	1	LOGAN
	Reticulation	B	mg/L	Monthly*	107	107	0	0.1	0.10	0.05	0.1	LOGAN
	Reticulation	SO4	mg/L	Monthly	108	108	0	6.10	60.00	35.88	0.1	LOGAN
	Reticulation	Ba	mg/L	Monthly*	107	107	0	0.01	0.05	0.05	0.01	LOGAN

Reticulation *E.Coli* Verification Monitoring

Drinking water scheme: Logan East

Year	***2012/13***											
Month	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***June***
No. of samples collected	14	15	16	20	16	30	19	16	16	17	19	16
No. of samples collected in which *E. coli* is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	161	160	164	169	172	190	193	197	201	203	210	214
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Drinking water scheme: Logan South

Year	*2012/13*											
Month	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*June*
No. of samples collected	20	25	19	25	20	15	21	20	20	20	25	26
No. of samples collected in which *E. coli* is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	262	262	260	259	259	254	250	250	250	245	250	256
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Drinking water scheme: Logan North

Year							*2012/13*					
Month	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*June*
No. of samples collected	45	36	36	45	34	37	36	36	36	45	36	36
No. of samples collected in which *E. coli* is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	513	499	495	500	484	481	487	474	470	475	461	458
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

APPENDIX B - IMPLEMENTATION OF THE DWQMP RISK MANAGEMENT IMPROVEMENT PROGRAM

The following table summarises the progress of the proposed actions undertaken as part of the approved DWQMP Rev 4, when the water supplier operated as Allconnex Water. Most of the actions proposed have been the responsibility of the Logan Water Alliance (LWA) and mainly CAPEX projects and hence long term in nature. Any actions that are still ongoing, have been rolled over and incorporated into the revised DWQMP Rev 5.1 which includes a comprehensive RMIP. As previously stated, the revised DWQMP Rev 5.1 was submitted to the Water Regulator for review in September 2013.

NO.	MANAGEMENT MEASURE/REQUIREMENT	PROPOSED ACTION/S	PRIORITY	RESPONSIBILITY	DUE DATE	CURRENT STATUS COMPLETED? (Y/N)	REVISED DUE DATE	ADDITIONAL COMMENTS (i.e. details of completed project Name/Number, outcome resulted in additional projects or why there is a delay)
RMIP - G1	Sampling points are not included in all DMA's in Logan North, some of which have high water age. All DMAs should be included in the water sampling program.	All sampling points and frequency to be reviewed as part of the Logan North Review of Network Flushing and Sampling Program Project.	**1**	Logan Water Alliance (Grant G)	31/12/2012	Y	NA	Completed as part of the review of the sampling monitoring program undertaken in Mat/June 2013
RMIP - G2	The residual Chlorine in the Logan East Catchment is constantly low.	A review of the disinfection effectiveness of the Logan East Catchment needs to be undertaken to determine what actions are required to improve the residual chlorine in the Catchment.	**2**	Logan Water Alliance (Grant G)	30/06/2013	Y	NA	Final report "Logan East Water Quality Strategy – Project Scoping" submitted in May 2013. It recommended additional online instrumentation and the installation of two re-dosing facilities.

RMIP - G3	The water age is high in the Spring Mountain and Pub Lane areas	• It is proposed to reduce the detention times in the system by decommissioning the Pub Lane Reservoir (the reservoir is not needed hydraulically).	**2**	Logan Water Alliance (Grant G)	31/12/2014	N	March 2014	The decommissioning of Pub Lane is scheduled for the 2013/14 summer, once Round Mountain reservoir is commissioned.
RMIP-G4	The Travis Road disinfection facility is off-line.	• Investigate the need for the Travis Road disinfection facility and make recommendations on proposed actions.	**2**	Logan Water Alliance (Grant G)	31/12/2012	Y	July 2014	Detailed design of the upgrade of the Travis Rd reservoir disinfection facility is currently underway and is expected to be constructed in the 2013/14 financial year
RMIP - G5	Some of the procedures in Rev 3 of the DWQMP are not included in the Logan Document Management System.	• Critical Control Procedures identified in Rev 3 of the DWQMP and included in Table 7.1 (DWQMP Rev4) need to be included in the Logan Document Management System	**2**	Logan QA (Natasha G)	31/12/2012	N	Feb14	No CCP SOPs existed. Development of CCP SOPs included in revised DWQMP Rev 5.1 RMIP. Draft SOP DM#8462220

RMIP - G6	To reduce the risk of contamination from properties without backflow prevention devices.	Undertake a project to identify the unmetered properties and install a meter with backflow prevention. (on-going project)	**2**	Logan Operations (Rezaul H)	30/06/2013	N	TBA	Project still in development phases. Project to be revised and rolled-over into DWQMP Rev 5.1 RMIP.
RMIP - G7	Reduce the risk of contamination as a result of main maintenance or repair	• Review current procedures and consider developing a procedure to pre-chlorinate a new section of pipe before putting it in the ground.	**2**	Logan Operations (Rezaul H)	30/06/2013	N	Feb14	Appropriate SOP being developed and included in revised DWQMP Rev 5.1 RMIP.
RMIP - G8	Maintain water quality in the Reservoirs	Install Mixers in the Greenbank, Illaweena, Springwood HL & Springwood LL Reservoirs. Investigate the operational levels & need for mixers in all reservoirs,	**1**	Logan Water Alliance (Grant G)	31/03/2012	Y	NA	Reservoir mixers installed in early 2012, reservoir operating levels have been reviewed in conjunction with operations.
RMIP - G9	Increase turnover of water in "dead" spots	Investigate the possibility to relocate the overhead fill points for water tankers to increase turn over in dead spots.	**2**	Logan Water Alliance (Grant G)	30/06/2013	N	Feb 2014	Preliminary investigations on the relocation of the overhead fill points are currently underway.

RMIP-G10	Investigate the low disinfection issues in Logan South	• Complete a Logan South disinfection study which is to include an investigation of the issues associated with blending of chloraminated and chlorinated water.	**1**	Logan Water Alliance (Grant G)	31/10/2012	Y	NA	A water quality risk assessment workshop was completed with all relevant stakeholders in Feb 2013. It found that current practices will be maintained until further growth is experienced in the network and that additional water quality monitoring instruments should be installed to monitor the disinfection residuals. Six new water quality instruments are currently in detailed design and are expected to be installed in the 2013/14 financial year.
RMIP-G11	Reduce the risk of constant flow systems as a result of poor knowledge of owners	• Highlight the risk of constant flow systems to Logan City Council Plumbing.	**2**	Logan Operations (Rezaul H)	31/12/2012	N	TBA	Project still in development phases. Project to be revised and rolled-over into DWQMP Rev 5.1 RMIP.

RMIP-G12	Residents may not be aware as to how to manage their constant flow water supply systems	Undertake a public awareness/education campaign regarding the use and maintenance of constant flow water supply systems (this could include fact sheets on a website)	**2**	Logan Community Management (Tammy S)	31/12/2013	N	Mar14	Draft Trickle Feed Fact Sheet developed. Currently under review. Action to be incorporated into revised DWQMP Rev 5.1 RMIP.
RMIP-G13	In an emergency situation Beenleigh (Chlorinated) will need to be supplied from Springwood Low Level (Chloraminated).	• Investigate issues associated with sampling water from Springwood Low Level zone in an emergency situation and make recommendation as appropriate (RMIP-UR2)	**2**	Logan Water Alliance (Grant G)	31/12/2013	N	TBA	No current LWA task assigned to this project. Requirement is currently being investigated. To be incorporated into revised DWQMP Rev 5.1 RMIP.
RMIP-G14	There have been a number of pH incidents in Logan South, however Seqwater has not identified any pH incidents in their quarterly summary.	Investigate why there is a discrepancy in results and determine if there are any possible local issues such as concrete pipes, causing the high pH.	**2**	Logan Water Alliance (Grant G)	31/12/2013	N	TBA	No current LWA task assigned to this project. Requirement is currently being investigated. To be incorporated into revised DWQMP Rev 5.1 RMIP.

NO.	MANAGEMENT MEASURE/REQUIREMENT	PROPOSED ACTION/S	PRIORITY	RESPONSIBILITY	DUE DATE	COMPLETED (Y/N)	REVISED DUE DATE	CURENT STATUS AND ADDITIONAL COMMENTS
RMIP - UR1	Sampling indicates that every summer there is a significant drop in Total Chlorine as a result of Nitrification. It is unknown if the drop is due to local or source water issues.	This issue is being investigated as part of the Logan North Disinfection Study.	**1**	Logan Water Alliance (Grant G)	31/12/2012	Y	NA	Completed and a program of operational and capital improvement options were implemented in 2012/13. Ongoing monitoring of the outcomes of the intervention is underway.
RMIP - UR2	Continual low residual chlorine in the Beenleigh Zone	• Need to investigate the need for a rechlorination facility at the inlet to the Logan East (Beenleigh) Water Supply Zone	**1**	Logan Water Alliance (Grant G)	31/03/2012	Y	NA	Final report "Logan East Water Quality Strategy – Project Scoping" submitted in May 2013. It recommended break-point chlorination as the preferred disinfection method for the zone.

APPENDIX C - INTERNAL AUDIT REVIEW PLAN

AUDIT SCHEDULE

Day One – Monday 3 June 2013: 2 to 5pm

Item	Component	Audit Actions	Doc	Auditee	Start	Finish	Time	Location
Orientation	Start-up Meeting (including Orientation, Induction, OH&S Instructions etc).	Confirm intent of audit and criteria to be followed.		NG/CPM (PQ)	2:00	2:15	0:15	Manila St
Review of audit agenda.	Update and shuffle agenda to reflect availability of staff and practicalities.	Finalise agenda.		NG (PQ)	2:15	2:30	0:15	Manila St
E 1: Commitment to Drinking Water Quality Management	C 1.1: Drinking water quality policy	Check that policy is in place and is intended to be signed off by management. Review how company communicates the policy to all employees and how it is implemented in practice.	Current signed Policy	NG (PQ)	2:30	2:40	0:10	Manila St
E 5: Verification of drinking water quality	C 5.2: Consumer satisfaction	Review how customer complaints are handled internally and how they are followed up (including on a daily basis if needed). Check to see if those who handle the customer complaints are trained in appropriate recording and handling of information. Check how all data including complaints and exceedances are reported internally and externally.	Customer complaints procedure. Eg. Of 1-2 complaints followed through.	PdA (PQ) - health	2:40	3:00	0:30	Manila St

				TammyS / CarmenR (CM)	2:40	2:50	0:10	Manila St
E 5: Verification of drinking water quality	C 5.2: Consumer satisfaction	Review how customer complaints are handled internally and how they are followed up (including on a daily basis if needed). Check to see if those who handle the customer complaints are trained in appropriate recording and handling of information. Check how all data including complaints and exceedances are reported internally and externally.	Customer complaints procedure. Eg. Of 1-2 complaints followed through.	DonnaH / Sandra (CM) letters/emails	2:50	3:00	0:10	Manila St
E 1: Commitment to Drinking Water Quality Management	C 1.3: Engaging stakeholders	Check that a stakeholder register is in place. Review how company updates the list of stakeholders.	Stakeholder register (Commercial)	TammyS / JamieB (CM)	2:50	3:00	0:10	Manila St
E 1: Commitment to Drinking Water Quality Management	C 1.3: Engaging stakeholders	Check that a stakeholder register is in place. Review how company updates the list of stakeholders.	Stakeholder register (Seqwater + other Water Entities)	RollyW (Ops)	4:15	4:30	0:10	Manila St

E 10: Documentation and record keeping	C 10.1: Management of documentation and records	Review how information pertinent to water quality management is documented including procedures and records. Check if document control systems are in use. Check to see how documents are reviewed and whether a systematic process is in place to enable this to occur. check to see if staff members are aware of document control processes both in head office and in the field. How do you ensure that documents used in the field are kept up to date?	Report Register. Examples of latest reports done.	RollyW (Ops) NG (PQ)	4:30	5:00	1:00	Manila St
Day Close-out					**4.5**	**5**	**0:10**	

Day Two – Tuesday 4 June 2013: 8am to 5pm – Field Visits say 11am to 4pm

Item	Component	Audit Actions	Doc.	Auditee	Start	Finish	Time (h:m)	Location
E 2: Assessment of the Drinking Water Supply System	C 2.3: Hazard identification and risk assessment	Check the corporate risk assessment process and how water quality risks could be captured within that system. Conduct light review of the risk assessment summary paper and risk register.	Latest Risk Register.	NG CPM	8	8.3	0:30	Head Office

E 5: Verification of drinking water quality	C 5.2: Consumer satisfaction	Review how customer complaints are handled internally and how they are followed up (including on a daily basis if needed). Check to see if those who handle the customer complaints are trained in appropriate recording and handling of information. Check how all data including complaints and exceedances are reported internally and externally.	Customer complaints procedure. Eg. Of 1-2 complaints followed through.	RayleneH (Ops)	8:30	9:00	0:30	Smith Rd Depot
E 4: Operational Procedures and Process Control	C 4.5: Materials and chemicals	Check procurement procedures for materials and chemicals including where specific contracts might exist for specific suppliers and how chemicals are certified and verified internally for composition. Check to see if appropriate standards and guidelines are referred to such as WSAA codes and AS.		LesterB / Bill H (Ops)	9:00	9:30	0:30	Smith St Depot

E 4: Operational Procedures and Process Control	C 4.4: Equipment capability and maintenance	Check that an equipment capability and maintenance manual is in place including for monitoring equipment e.g. for calibration etc. Check records to see how procedures are followed and actions are followed up. Review calibration records. Check that equipment is of an appropriate standard to protect drinking water. Are assets in an appropriate condition and fit for purpose.	Calibration schedule. Eg. Calibration checklist.	AJ (Ops)	10:00	10:30	0:30	
E 2: Assessment of the Drinking Water Supply System	C 2.1: Water supply system analysis	Check that a team details register exists. Check that a system flow diagram exists and is supported by other more in depth diagrams such as P&IDs. Check that the flow diagram has been signed off as an accurate record. Review how data are collected and stored (e.g. SCADA).	Latest flow diagram & system description. SCADA review on site.	GrantG (Alliance)	8.3	8.45	0:15	Head Office

E 2: Assessment of the Drinking Water Supply System	C 2.2: Assessment of water quality data	Review records of system assessment, risk assessment records and any minutes from risk assessment team meetings (noting 'newness' of system). Examine exceedance reports. Examine how data are collected, stored and examined.	Latest water quality data overview.	NG	8.45	9.15	0:30	Head Office
E 3: Preventive Measures for Drinking Water Quality Management	C 3.1: Preventive measures and multiple barriers	Cross-check with Element 2 and review risk treatments including where actions are required to reduce risk to acceptable levels.	List of preventative measures. Check onsite these are understood & implemented .	NG	9.15	9.3	0:15	Head Office
E 3: Preventive Measures for Drinking Water Quality Management	C 3.2: Critical Control Points	Review CCPs and cross-check them against the risk assessment process. Review control loops of CCPs. Check how they are implemented at Head Office.	CCP register.	NG CPM	9.3	10	0:30	Head Office
SITE VISIT				**10.3**		**11**		
E 3: Preventive Measures for Drinking Water Quality Management	C 3.2: Critical Control Points	Review CCPs and cross-check them against the risk assessment process. Review control loops of CCPs. Can control be applied in a timely manner.	SCADA review of control.	LesterB / Bill H (Ops)	11:00	11:30		Site Visit:

		Check how they are implemented at site and on SCADA.	Onsite review of CCP knowledge & control/limits.					Reservoir
		Do Operators know what they are and their significance.						
E 4: Operational Procedures and Process Control	C 4.2: Operational Monitoring	Check that operation protocols contain appropriate control loops to allow efficacy of operations to be checked.	Operation procedure for chlorination.	LesterB / Bill H (Ops)				Rechlorination
	C 4.3: Corrective Action	How do they monitor what and what action do they take?						
		How do they record corrective actions.	Procedure for water main break & repair.					Depot
			Procedure for reservoir inspection.					
			Example inspection reports.					
E 4: Operational Procedures and Process Control	C 4.1: Operational Procedures	Review procedures in place within 'Operations and Maintenance' manual.	Operation procedure for chlorination.	NG				
		Check that significant risks have an associated control measure (cross reference with Element 2).						
			Procedure for water main break & repair.					

			Procedure for reservoir inspection.					
			Example inspection reports.					
E 6: Management of incidents and emergencies	C 6.1: Communication	Check that an Incident management plan/strategy is in place and that incident levels are clearly defined.	Review ERP.	NG				
	C 6.2: Incident and emergency response protocols	Check for appropriate supporting documentation such as a media and communications strategy and supply of alternative sources and on-call duty rosters.						
		Check training records to see if emergency scenario training has been conducted.	Follow 1-2 incidents in the doc.					
		Check if operators know what to do.						
		Review incident records to see how incidents were dealt with and if needed, how actions were followed up and implemented after the event.	Eg. Training records to support DWQ.					
E 10: Documentation and record keeping	C 10.2: Reporting	Review how reporting is conducted on water quality outcomes internally: incident reporting		NG				

E 4: Operational Procedures and Process Control	C 4.5: Materials and chemicals	Check procurement procedures for materials and chemicals including where specific contracts might exist for specific suppliers and how chemicals are certified and verified internally for composition. Check to see if appropriate standards and guidelines are referred to such as WSAA codes and AS. Check how materials and chemicals are stored to maintain efficacy and in a hygienic/appropriate state for use. Check how stored and handled.	Eg contract for supply of pipe & chlorine.	NG				
Return to Head Office				**3.3**				
Write-up and break					4	4.3		

E 10: Documentation and record keeping	C 10.2: Reporting	Review how reporting is conducted on water quality outcomes both internally and externally (e.g. statutory reports, board reports, incident reporting). Is there a reporting matrix in place? Who is responsible for keeping the matrix up to date? Review Annual Report - check that it contains relevant information on water quality outcomes and incidents.		NG	4.3	4.5	0:20	Head Office
Day Close-out					**4.5**	**5**	**0:10**	

Day Three – Wednesday 5 June 2013: 8am to 2pm

Item	Component	Audit Actions	Doc.	Auditee	Start	Finish	Time (h:m)	Location
E 1: Commitment to Drinking Water Quality Management	C 1.2: Regulatory and formal requirements	Check that a register is in place of all reg and formal requirements. Review how reg and formal requirements are implemented in practice.	Regulatory & formal requirements register	MichaelK/ BenS / JoshB (CM)	?	?	0:10	Manila St

E 5: Verification of drinking water quality	C 5.1: Drinking water quality monitoring	Review the Drinking water quality monitoring plan ('verification schedule'). Check that the plan includes frequency, location and sampling method for each parameter and the representativeness and reliability of data.	Latest monitoring plan.	NG	8	9	0:30	Head Office
	C 5.3: Short term evaluation of results	Check to see if appropriate guidance has been used such as ADWG and Australian Guidelines for Water Quality Monitoring and Reporting 2000.						
	C 5.4: Corrective action							

E 9: Research and development	C 9.1: Investigative studies and research monitoring	Review CCPs in relation to validation statements.	Review contract matters.	NG	9	9.3	0:30	Head Office
		Review if research is entered into in terms of partnership studies and research programs.						
		Review how results of research have led to improvements in the water supply system.	Review list of R&D type projects the Alliance does.					

		If new equipment has been introduced, review records of commissioning to prove efficacy of equipment.						
		If system has been changed, review records to check if system has been re-validated (cross-check with the risk register).						

		Check contract requirements for new equipment to ensure fitness for purpose.						
E 11: Evaluation and audit	C 11.1: Long term evaluation of results	Cross-check with Element 2. Review how outcomes are reported internally and externally (cross-check with Element 10).	Check stats & charts done to review results.	NG	9.3	9.45	0:15	Head Office
E 11: Evaluation and audit	C 11.2: Audit of drinking water quality management	Review how Internal and external audits are undertaken - review audit schedules. Review how audit records and actions from results are communicated with the relevant parties. Check procedures against an audit trail of an incident and how it was responded to.	Audit plan. Any previous audit reports.	NG	9.45	10	0:45	Head Office
E 12: Review and continual improvement	C 12.1: Review by senior executive	Check how periodic reviews of water quality are undertaken by the senior executive. Review how any issues have been captured by evidence of changes in capital expenditure/ operational expenditure plans.	Eg. Of CAPEX link to DWQ issues.	NG	10	10.15	0:15	Head Office
Break					10.15	10.3		

E 7: Employee awareness and training	C 7.1: Employee awareness and involvement	Review training records including continuing education components (including training of board members as well as operators in water quality awareness).	Training records pertinent to WQ.	NG	10.3	10.45	0:15	Head Office
	C 7.2: Employee training	Check that records include components dealing with water quality specifically.						
		Where contractors are involved, check that contractors also have water quality awareness training as part of their contracts.	Site & employee induction eg.					
		Review toolbox talks and records.						
		Review induction programs for new staff and contractors - ensure that a water quality awareness component exists.	Contractor & Alliance matters as eg. Of awareness of DWQ.					
		Review position descriptions of those staff specifically involved in activities which may impact on water quality - ensure that those position descriptions include a requirement to understand water quality and undertake hygienic practices when dealing with drinking water.						
E 12: Review and continual improvement	C 12.2: Drinking water quality management improvement plan	DEVELOP THE IMPROVEMENT PLAN TOGETHER FROM MAJOR FINDINGS	Current Improvement Plan.	NG	10.45	12	0:30	Head Office

Lunch	Break	Write up audit results. Discuss major gaps.		TF NG	12	1.15	1:15	Head Office
Close	Audit Finish	Close out meeting. Presentation of preliminary results.		NG CPM CPM Boss	1.15	2:15	1:00	Head Office
TRAINING SESSION FOR SENIOR MANAGERS	Training	Training – what is the ADWG, the DWQMP and your role in it? What are you responsible for?		NG CPM 3 Water Branch Managers DCEO	2.3	3.3	1:00	Head Office