



LOGAN CITY COUNCIL

**DRINKING WATER QUALITY MANAGEMENT PLAN
REPORT – 2013/14 FINANCIAL YEAR**

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NOTATIONS AND ABBREVIATIONS

ADWG	Australian Drinking Water Guidelines, 2011. Published by the National Health and Medical Research Council of Australia
CCP	Critical Control Point (as defined by HACCP)
DEWS	Department of Energy and Water Supply
DWQMP	Drinking Water Quality Management Plan
<i>E. Coli</i>	Escherichia coli, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
EPI	Eastern Pipeline Interconnector
ERP	Emergency Response Plan
FY	Financial Year
HACCP	Hazard Analysis Critical Control Point
KPI	Key Performance Indicator
LCC	Logan City Council
LOD	Limit of Detection
LOR	Limit of Reporting
LMS	Learning Management System
LWA	Logan Water Alliance
NATA	National Association of Testing Authorities, Australia
QWSR	Queensland Water Supply Regulator (Water Regulator)
RMIP	Risk Management Improvement Plan
SEQ	South East Queensland
SOP	Standard Operating Procedures
SRWP	Southern Regional Water Pipeline
The Act	Water Supply (<i>Safety and Reliability</i>) Act 2008
THM	Trihalomethane
UMD	Utility Management Data
WSAA	Water Services Association of Australia
WSZ	Water Supply Zone
WTP	Water Treatment Plant
WWETT	Water & Wastewater Event Tracking Tool

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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) Report documents the performance of LCC's drinking water quality and LCC's performance in implementing the actions detailed in the DWQMP Rev 5.1 for the 2013/14 Financial Year (FY), as required under The Act.

This report assists the Water Regulator, from the Queensland Water Supply Regulator (QWSR), 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 LCC to report publicly on performance in managing drinking water quality.

This report has been prepared in accordance with the *Water Industry Regulatory Reform – drinking water quality management plan report factsheet* published by the DEWS, accessible at www.dews.qld.gov.au.

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. Figure 1 shows the 12 Elements of the ADWG, which also consists of 32 Components and 76 Actions.

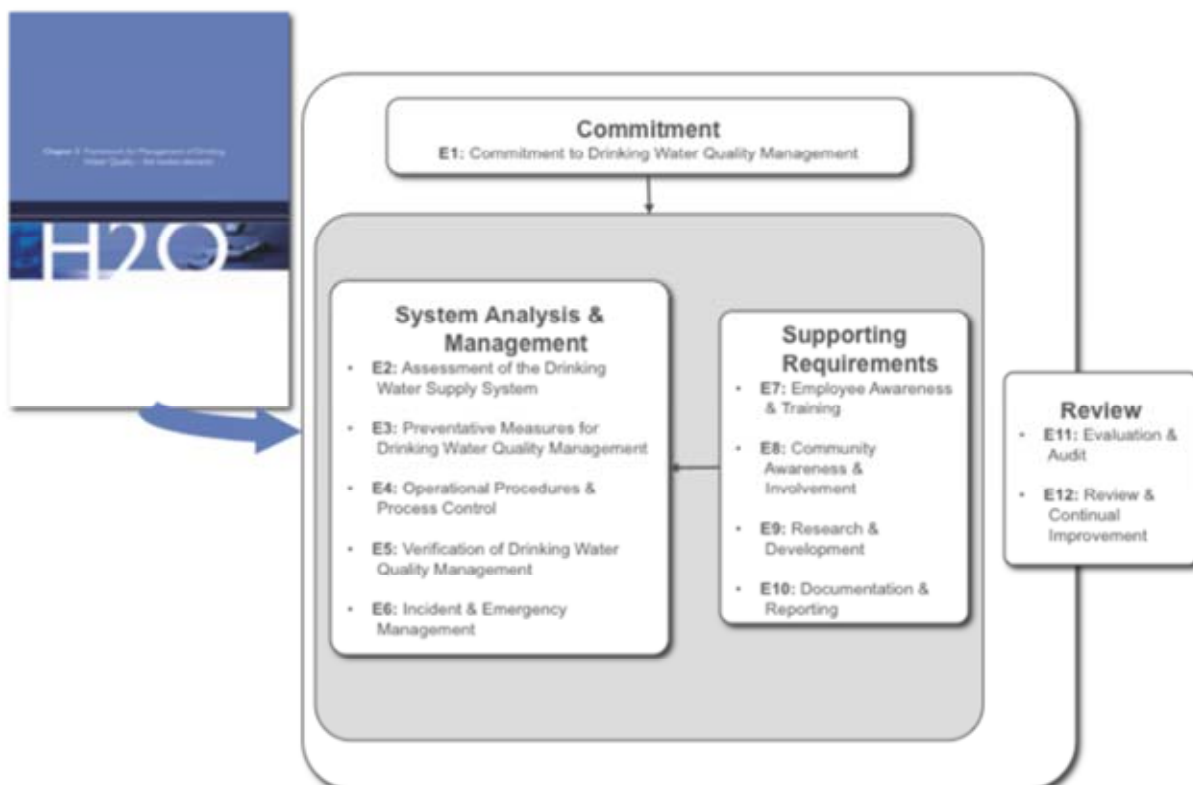


Figure 1 - ADWG Framework

2 OVERVIEW OF OPERATIONS

2.1 Logan City Council Network Description Overview

LCC covers an area of approximately 957 square kilometres and has a population greater than 300,000 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 its customers 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 water mains as part of its distribution network.

The Logan Water Alliance (LWA) is the collaborative initiative of Logan City Council, DownerTenix, Cardno and Parsons Brinkerhoff. LWA 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.

2.2 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, Lockyer Valley, Logan, Redlands, Moreton Bay, Noosa, 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 supply of bulk water 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 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.

LCC generally receives chloraminated disinfected water from Seqwater, although chlorinated water can be supplied from some sources when required. LCC also converts chloraminated water to chlorinated water via its breakpoint chlorination systems located at various sites within Logan. Conversion generally occurs during the hotter months, to ensure continued effective disinfection of the water supply or for network maintenance.

Taking into account the various water supply sources, mixed supply zones and two types of disinfection, there are seven discrete Water Supply Zones (WSZ) within Logan. The zones supplied from each water source, under general operating conditions, are shown in Table 1. This indicates the general water disinfection type as being either chlorinated or chloraminated. Blending of water characteristics from different sources can occur within some of the zones. The water quality analysis for this report is based on these seven supply 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 / Chloraminated ^C	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. (C) Converted to chloraminated water during June 2014 (Winter period) with the intention to convert to chlorinated water when incoming water chlorine residuals are not sufficient.

3 ACTIONS TAKEN TO IMPLEMENT THE DWQMP

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

In accordance with the requirement of Section 100 of The Act and form WSR506 DWQMP Amendment Application, the LCC DWQMP Rev 5.1 was submitted to the Water Regulator for review September 2013. The amendments undertaken were substantial including a total re-write of the DWQMP, of which details of the amendments have been previously described in the LCC DWQMP Annual Report 2012/13. The submitted LCC DWQMP Rev 5.1 was approved by DEWS in December 2013.

Since approval, implementation of the DWQMP and key water quality improvements have been undertaken via the Risk Management Improvement Plan (RMIP).

3.2 Implementation of the Risk Management Improvement Plan

3.2.1 Risk Management Improvement Plan Process

LCC's RMIP is the key document used to identify opportunities and actions to address water quality issues and risks identified. Key issues are identified by the following:

- **Risk Assessment Process** - where current Preventative Measures do not reduce the residual risk to an acceptable level (i.e. includes 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 of the DWQMP as per The Act requirements and also the implementation of the DWQMP;
- **Incidents** – long term improvements required, resulting from investigation of incidents, near misses and non-compliance incident investigations; and
- **Water Regulator feedback.**

To help prioritise Key Actions, each issue or 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 outcomes from internal reviews, audit non-conformance findings, risk assessments (high residual risks), incidents and outcomes from regular review meetings with key internal stakeholders.

3.2.2 Implementation of the RMIP

The current LCC RMIP is quite extensive due to the following:

- Major operational and business changes associated with demalgamation from Allconnex to Logan City Council resulting in a total re-write of the previous DWQMP;

- Gap analysis of the DWQMP Rev 4, internal review and audit review findings undertaken May 2013; and
- Additional Risk Assessments undertaken due to new operational changes.

Thus the RMIP includes “general” improvements to the DWQMP noted as (G) resulting from the Gap analysis and internal review audit. It also includes actions required to improve current preventative measures for “high level risks” identified in recent risk assessments undertaken, noted as (R). It also includes ongoing actions required from planning studies identifying areas requiring improvements to help maintain effective water quality. Residual risks from the 2012 DWQMP that were not completed in the DWQMP Annual Report 2012/13, have also been incorporated, noted as (2012RMIP).

To help with the implementation and execution of the RMIP within the three Water Branches, a training session was undertaken in February 2014 to understand the RMIP process. This included understanding roles and responsibilities and the review process required.

3.2.3 RMIP Progress Overview

The RMIP was quite extensive, with some of the original timeframe targets being too ambitious. Hence a number of due dates have been revised to more achievable targets. Finish dates are detailed in Appendix B.

The following sections summarise the progress of the key actions initiated, in association with the RMIP. The detailed RMIP is included in Appendix B.

Element 1 – Commitment to Drinking Water Quality Management

The DWQMP Policy was finalised & endorsed by the Senior Water Branch Managers & Deputy CEO in November 2013. Development of formalised policy awareness training is planned for the 2014/15 FY.

Regulatory & formal requirements and stakeholder register updates were included in the DWQMP Rev 5.1.

The 2013 Operating Protocol between Seqwater, Logan City Council, Gold Coast City Council and Queensland Urban Utilities were reviewed and finalised. The Seqwater Emergency Response Plan Operating Protocol was also reviewed and finalised with Logan City Council, Gold Coast City Council and Queensland Urban Utilities.

Element 2 – Assessment of the Drinking Water Supply System

Network flow diagram system schematic updates, from key system changes post Allconnex demalgamatin, are included in the DWQMP Rev 5.1. Annual review of the network system schematic has commenced and is to be updated and completed during 2014/15 FY.

Focused Risk Assessment of recent system changes (i.e. Logan River pump station disinfection system) were undertaken in May 2013 and updates are included in the DWQMP Rev 5.1. Risk assessments continue to be undertaken as part of the planning and commissioning of new disinfection systems or key system changes.

Commencement of consolidating a whole of system Risk Assessment is planned for the 2014/15 FY, incorporating Seqwater’s residual risks.

Element 3 – Preventative Measures for Drinking Water Quality

Hazard Analysis Critical Control Point (HACCP) workshops were held during 2013/14 FY, using the CCP decision tree. This helped to identify and establish operating limits, and associated operating procedures, for chlorine dosing systems, particularly breakpoint systems, with updates included in DWQMP Rev 5.1.

Risk assessments and HACCP workshops will continue into 2014/15 FY as new disinfection dosing systems are commissioned and become operational.

An extensive network disinfection maintenance program commenced at the end of the 2013/14 FY to reduce nitrification in the network for Logan North and help improve water quality for customers after a long drought period. This also included the commissioning of the Illaweena and Greenbank reservoir chlorine dosing facilities.

A Water Quality Network Maintenance Strategy (LWA 90-12-97) and Water Quality Operational Strategy (LWA 90-12-98) are being undertaken during the 2014/15 FY. This will help improve network maintenance and operational systems associated with enhancing drinking water quality for our customers (i.e. operating procedures, optimal set-points, cleaning and maintenance regimes, etc).

Planning investigations are also underway to identify key sites for chlorine booster stations. Installation of additional on-line water quality monitoring equipment is planned to be completed during the 2014/15 FY.

Element 4 – Operational Procedures & Process Control

A review of all Water Operation's standard operating procedures (SOPs) was undertaken, including development of key SOPs such as operation of chlorine dosing facilities, flushing of mains and protocol for reservoir level management to minimise water age.

LCC SOP for acceptance of new water mains was developed incorporating Water Services Association of Australia (WSAA) guidelines and new SEQ Building Code requirements, including water quality requirements.

Interface with Seqwater's systems was established to help with early detection of potential inadequate incoming water disinfection residuals.

Regulatory reporting of Non-Conformance events has been established using the Intalex tool to help track long term improvements. Development of a formal Corrective Action process, including non-reportable incidents to the regulatory authority DEWS, is included in the 2014/15 FY program, using Intalex as an appropriate tracking tool.

Ad hoc reservoir audits were undertaken in addition to routine inspections with formal training to be developed and implemented in the 2014/15 FY.

A Water Quality Operational Strategy (LWA 90-12-98) will be undertaken during the 2014/15 FY to help improve operational systems associated with enhancing drinking water quality for our customers.

Element 5 – Verification of Drinking Water Quality

A modified verification monitoring program was implemented in July 2013, to ensure legislative microbial sampling criteria were met for new water supply zones established as part of DWQMP Rev 5.1. Trihalomethan (THM) monitoring was also extended, due to commissioning and operation of chlorine dosing systems. Verification Monitoring implementation review continues for 2014/15 FY to identify any monitoring gaps, including outcomes from the Tap Audit to ensure safety of staff and that drinking water sample sites continue to be representative.

A new Water & Wastewater Event Tracking Tool (WWETT) was implemented in February 2014 to be compliant with software upgrades. This replaced the old Utility Management Data (UMD) system and helped enhance the customer complaint tracking system.

The Process Improvement team was initiated early 2014, reviewing medium and long term water quality and customer complaint trends. Key focus for 2014/15 FY will be the review of reservoir chlorine residual trends and associated improvements, until effective water quality trend databases are identified and established.

Element 6 – Management of Incidents & Emergencies

A consultant was engaged to review LCC's Emergency Response Plan (ERP) and identify gaps. The consultant assisted with implementation and training roll-out of LCC Emergency Response Plan.

Focus for 2014/15 FY will be to undertake annual ERP awareness training for staff, test the ERP and participate in annual Seqwater ERP exercises.

Element 7 – Employee Awareness & Training

A new LCC corporate "Learning Management System" (LMS) tool was established during 2013/14 FY to capture OH&S, Organisational Development and external training. Additionally, staff are required to undertake Job Safety Analysis (JSA) assessments for each job and hence must be familiar with associated SOPs and OH&S requirements for each job.

Investigation of expanding the LMS tool to capture "on-the-job" competency training and development of a job role water quality awareness and training matrix, will commence in the 2014/15 FY and will continue into the 2015/16 FY.

Element 8 – Community Involvement & Awareness

Results from the Logan Listen's 2013 Resident's Survey were incorporated into the Process Improvement team's kick-off presentation early 2014, which helped confirm areas to focus improvements.

A survey was also conducted early 2014 in the Marsden WSZ and found that about half the residents were pleased with the quality of their drinking water. Those that were not pleased with the quality of their drinking water would rarely act on this and complain to LCC. These residents were subsequently encouraged to formally lodge complaints in the future, so LCC is aware of water quality issues and can act to resolve the issue.

Action continues during the 2014/15 FY in relation to the development of water quality fact sheets, which will be incorporated into the LCC's website.

Element 9 – Research & Development

The following Water Quality improvement projects undertaken by the LWA, have been included in the DWQMP Rev 5.1:

- Water Age Modelling;
- Logan North Disinfection Strategy;
- Logan East Water Quality Strategy; and
- Logan South Disinfection Strategy.

Assessment of the effectiveness of the Logan North network disinfection maintenance program will be undertaken during the 2014/15 FY. This will also include strategies to improve water quality via network operations and maintenance.

Element 10 – Documentation & Record Keeping

A number of existing disjointed periodic Water Business reports were identified and consolidated to generate one monthly Water Business Report, reporting on Key Performance Indicators (KPIs).

During 2013/14 more than 20 Water Business Plans were also developed, as part of the Water Netserv Plan. For each Plan, key business KPIs were identified for the upcoming FY and incorporated into the overall annual Water Business Plan. Monthly updates are reported to Councillors and displayed on LCC's intranet WaterWiki site.

Element 11 – Evaluation & Audit

The findings from the DWQMP Gap Analysis and Internal Audit Review undertaken May 2013 were incorporated in the DWQMP Rev 5.1, with outstanding general improvements (G) incorporated into the RMIP.

The next internal review of the DWQMP Rev 5.1 will be undertaken during the 2014/15 FY. The LCC internal audit program will also be developed and commence during the 2014/15 FY.

Element 12 – Review & Continual Improvement

An extensive RMIP was developed as a result of the Gap Analysis, Internal Audit Review and Risk Assessment undertaken during 2013, which was included in the DWQMP Rev 5.1.

To help with the RMIP implementation, a training session was undertaken in February 2014 to help stakeholders understand the RMIP process. This included understanding roles and responsibilities to help with the RMIP execution and the review process.

The 2014/15 FY will see the RMIP process continue and be refined with senior management review.

3.2.4 Operational Monitoring Program Revisions to Maintain Water Quality Compliance

No additional revisions were made to the Operational Monitoring Program to those already included in the improvements described in the RMIP for the 2013/14 FY.

3.2.5 DWQMP Amendments

The next internal review of the DWQMP will be undertaken by June 2015, which will include DWQMP amendments.

4 COMPLIANCE WITH WATER QUALITY CRITERIA FOR DRINKING WATER QUALITY

4.1 Compliance Summary

Results from the verification monitoring program have been assessed against the the water quality criteria specified by the Water Regulator and Reporting Guideline for a Drinking Water Service. The relevant water quality criteria are the health guideline values in the current ADWG, as well as the criteria specified in the Public Health Regulation 2005 and any other water quality criteria specified by the Water Regulator.

During the 2013/14 FY, there were no non-conformances of any health related parameters detected by the drinking water verification monitoring program in Logan City. All samples met health related compliance targets including *E. Coli* and Fluoride.

Verification monitoring samples are collected and tested (except THMs) by trained staff from LCC's own National Association of Testing Authorities, Australia (NATA) accredited laboratory.

A summary of the water quality results can be found in Appendix A.

4.2 Monitoring Program Overview

Monitoring of drinking water quality in Logan is undertaken on a regular basis to assess whether water quality is meeting regulatory requirements. This practice serves as verification of the control barriers against system contamination. It also verifies the safety of the water, the effectiveness of the network operation and integrity of the system. Monitoring also allows for the review of results and an opportunity to assess overall performance and identify emerging problems in a proactive manner.

Verification monitoring during the 2013/14 FY was carried out in accordance with the LCC DWQMP 5.1 Section 6.1.1 Sampling Plan.

LCC's current verification program remains appropriate for the following reasons;

- The minimum frequency for monitoring of *E. Coli* is compliant with Schedule 3A of the Public Health Regulation (2005) and Table 9.4 of the ADWG (2011).
- The monitoring of *E. Coli* under Schedule 3A is based upon projected populations of 2016 planning horizons, thus is conservative.
- The frequency of monitoring for non-microbial health and aesthetic parameters is as per the recommendations of Table 9.5 ADWG (2011).
- Monitoring is undertaken at both reservoirs and points within the reticulation and spread across a range of locations to ensure a true understanding exists of the network and the water supplied to consumers.
- Sampling frequency in some water supply zones is well beyond the minimum frequency required. Water Supply Zones identified as having particular traits that present challenges to water quality management are sampled in excess of regulatory requirements, in some case by over 100%, to ensure good coverage.
- Verification monitoring of drinking water undertaken by LCC includes consumer satisfaction, the results of which are included in Section 6 Customer Complaints related to Drinking Water Quality. This is in accordance with Element 5 of the ADWG (2011).

4.3 Data Analysis Methodology

Statistical principles applied whilst undertaking analysis of water quality data are important to note, as management of the data must be appropriate, accurate and practical. The following techniques were applied during the analysis.

- **Outliers** – Data that appears to be extreme when contrasted against typical results can be classified as an outlier. Outliers are not excluded from data analysis unless it can be proven that they're a result of transcription error or malfunction of measuring equipment. Though outliers have the possibility to skew statistical results, it is not acceptable to censor them out of data, as doing so could potentially affect public health. No Outliers were observed in the data set for the 2013/14 FY.
- **'Less-than' values (<)** – 'Less than' values occur in a data set if a test is conducted and the measured result is less than the Limit of Reporting (LOR). There is no one correct or prescriptive method for the censoring and substitution of 'less-than' values however varying methods do exist. It is important to note the methodology selected and the reason. The method adopted by LCC to rationalize 'less-than' values is to censor the result by substituting a value that is equivalent to half the Limit of Reporting (LOR). This approach, whilst not free of flaws, is more conservative than substituting for zero as trace levels could be present.
- Due to censorship of data (use of half of LOR) minimum and mean values for some analytes may compute to less than the LOR. In this case, the values are displayed as less than the limit of reporting (< LOR).
- The reported water quality data do not include results derived from repeat samples, or from emergency or investigative samples undertaken in response to an elevated result.

The summary of the water quality data is presented in seven separate tables representing each of the seven WSZs found in Appendix A.

Also included, is a summary of compliance results for *E.Coli* undertaken during the drinking water verification monitoring. Whilst monitoring for *E.Coli* is undertaken in each of the seven individual water supply zones, results are displayed in this report as one table for the whole of the Logan City water supply scheme.

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

During the 2013/14 FY, there was one instance where the Water Regulator was notified under sections 102 or 102A of The Act. This was not part of the regular verification monitoring program.

Notifications include 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.

5.1 Non Compliances with the Water Quality Criteria

The incident reported to the Regulator was the detection of lead exceeding the ADWG health guideline limits.

5.1.1 Detection of Lead

Incident Description

As part of a customer complaint investigation, lead was detected (0.02mg/L) in a water sample taken from the end of a main via an old crimped copper pipe, which exceeded the ADWG health limits requiring it to be <0.01 mg/L. This was reported to the Regulator on the 22nd October 2013.

Corrective and Preventative Actions

The sample results from the customer's house and nearby water meter box indicated no lead in the water supply samples. Thus the suspect old style copper pipe and associated fittings were completely removed and flushing undertaken of the mains in the immediate vicinity to ensure any possible backflow from the suspect pipe was removed. Re-testing from the nearest meter boxes confirmed no lead present in the water supply.

6 CUSTOMER COMPLAINTS RELATED TO DRINKING WATER QUALITY

6.1 Community Engagement

Consumer satisfaction is considered a critical aspect in the verification of drinking water quality. Due to this, the monitoring and analysis of customer complaints is considered a key part of LCC's drinking water quality verification program. At all times LCC encourages customers to lodge complaints about their water quality, if they feel their drinking water is unsatisfactory. Encouraging customers to lodge complaints establishes a link between the service provider and the customer and provides a real time indicator of water quality.

A survey conducted early 2014, by LCC staff, in the Marsden water supply zone found that half the residents were pleased with the quality of their drinking water. Those that were not pleased with the quality of their drinking water, would rarely act on this and complain to LCC. These residents were subsequently encouraged to formally lodge complaints in the future so LCC is aware of water quality issues and can act to resolve the issue. This information also serves to drive improvement programs and the results of this survey in particular were found to be useful in the planning phase of the Logan North network disinfection maintenance program.

An extensive network disinfection maintenance program commenced the end of the 2013/14 FY to reduce nitrification in the network for Logan North and help improve water quality for customers after a long drought period. The community was informed about this program via local newspaper media and LCC's website, which included regular updates.

6.2 Customer Complaints

Customer complaints are closely linked to the performance of the water supply system and thus are an important link in forming preventative strategies and process improvement activities. In all cases, the primary aim is to respond to the complaint to investigate and rectify the condition ensuring public health is not compromised. With this, data is collected which assists with future improvement activities.

Over the 2013/14 FY, LCC recorded customer complaints according to the following categories;

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

A total of 419 complaints were received for the 2013/14 FY, equating to 4.54 complaints per 1000 connections for all types of complaints across the whole of the city.

Of the 419 complaints, the majority related to Appearance (67%), followed by Taste and Odour (25%), and Suspected Health (8%). The number of customer complaints received by LCC per category for each WSZ is shown in Table 2.

Table 2 - Customer Complaints by Water Supply Zone

TOTAL COMPLAINTS 2013/14 FY				
WATER SUPPLY ZONE	Water Quality - Suspected Health	Water Quality - Appearance	Water Quality - Taste/Odour	TOTAL
LOGAN EAST	9	36	16	61
LOGAN SOUTH	2	9	6	17
GREENBANK	11	108	52	171
MARSDEN	5	56	8	69
SPRINGWOOD LOW	4	25	11	40
SPRINGWOOD HIGH	1	17	4	22
KIMBERLEY PARK	1	30	8	39
TOTAL	33	281	105	419
% OF TOTAL	8 %	67 %	25 %	

Customer complaints per 1000 connections is shown below in Table 3. Whilst the total number of complaints is relevant, analysing complaints per 1000 connections helps understand the intensity distribution of complaints as each WSZ has a different number of connections and thus people within it.

Table 3 - Customer Complaints per 1000 Connections

CUSTOMER COMPLAINTS / 1000 CONNECTIONS 2013/14 FY					
WATER SUPPLY ZONE	Water Quality - Suspected Health	Water Quality - Appearance	Water Quality - Taste/Odour	TOTAL	No. Connections
LOGAN EAST	0.53	2.12	0.94	3.59	17,012
LOGAN SOUTH	0.29	1.30	0.87	2.46	6,921
GREENBANK	0.80	7.86	3.78	12.45	13,740
MARSDEN	0.32	3.62	0.52	4.46	15,472
SPRINGWOOD LOW	0.21	1.34	0.59	2.14	18,705
SPRINGWOOD HIGH	0.11	1.83	0.43	2.36	9,305
KIMBERLEY PARK	0.09	2.70	0.72	3.51	11,096
ALL ZONES TOTAL	0.36	3.05	1.14	4.54	92,251

6.2.1 Suspected Health

Complaints are occasionally received from customers concerned that their drinking water may be causing illness and these are thus categorised as Suspected Health complaints. At all times LCC encourages customers to lodge a complaint if they believe they are experiencing illness due to their drinking water.

All Suspected Health complaints are thoroughly investigated by LCC to ascertain if water quality complies with health related guidelines. This involves an investigation which includes water quality sampling and testing undertaken at both LCC's reticulation system (i.e. water source to the customer's house) and the customer's house, with the final results documented in a report. Part of the investigation involves discussing the results with the customer and educating them in relation to drinking water quality and ensuring they understand what is considered normal for water quality in their area and ADWG health limits. If the results suggest the water quality may be responsible for illness then immediate actions are undertaken along with emergency response preparation activities. This is done in conjunction with the relevant health authorities through immediate consultation and full disclosure of relevant facts.

During the 2013/14 FY, LCC received a total of 33 suspected health complaints of which there were no confirmed cases of the water supply system being non-compliant with ADWG health related guidelines or regulated values. All 33 complaints were actioned and closed out following appropriate consultation with the customer.

Records indicate that around 20% of these complaints occurred during the Logan North network disinfection maintenance program. During this program, some customers responded to chlorine in their drinking water by calling Council with suspected health concerns. These customers have historically only received chloraminated water thus the change to chlorinated water for this short period was unfamiliar to some. Chlorine levels during the program were monitored continually and at all times remained well within the health guidelines.

No operational changes have been implemented as a result of any of these 33 complaints across the 2013/14 FY. Post review of the effectiveness of the network disinfection maintenance program along with consumer satisfaction is ongoing.

6.2.2 Appearance

Appearance of water was the highest complaint type for the 2013/14 FY reporting period. Of the 419 total complaints, 281 were related to the appearance of the water and thus represented 67% of all water complaints received.

The zone with the most complaints for the appearance of water was Greenbank (108) followed by Marsden (56). All water appearance complaints received during the 2013/14 FY were investigated with the most common remedial action being flushing of water mains. In all cases the aim is to respond to the complaint to restore clean water to the property and ensure public health is maintained.

Dirty Water

Dirty Water is a sub-set of water appearance complaints and is typically associated with brown or murky water. In total, there were 268 of these complaints received which shows that 95% of all water appearance complaints across the city relate to dirty water.

Of all seven zones in the city, Greenbank WSZ had the highest incidence of dirty water complaints at 105. This indicates that this zone alone is responsible for around 40% of all dirty water complaints received. Marsden water supply zone had the second highest number at 53, thus accounts for 20% of all dirty water complaints. This data serves to show that both Marsden and Greenbank together account for 60% of the cities' dirty water complaints, whilst only representing 32% of total connections.

Analysis of complaints within the Greenbank WSZ shows that just under half of the dirty water complaints occurred whilst work was being undertaken for the Logan North network disinfection maintenance program. Due to this, it is believed that maintenance activities contributed to some of the complaints.

Investigation into complaints within the Marsden WSZ shows that the distribution of complaints over the year was steady with little variation between months with the exception of reactive maintenance work undertaken in May 2014, which caused higher complaint numbers than usual.

Currently, LCC employs a scheduled flushing program which occurs at nominated sites within the Marsden WSZ to reduce water age and reduce sediment loading. The effectiveness of this activity is currently being investigated by the LWA to determine if the activity may be contributing to disturbance in the network and possibly causing dirty water complaints.

Both the Greenbank and Marsden WSZs have areas within them that have been identified as having high water age. In response to this, operational changes have been made during the 2013/14 FY to better manage the storage volume and improve water quality. This has involved the reconfiguration and isolation of trunk mains to increase velocities resulting in better disinfection levels at the ends of the network with fresher water delivered to customers.

In addition, the recent network disinfection maintenance program, which occurred in both Marsden WSZ and Greenbank WSZ is anticipated to result in a reduction in long term dirty water complaints due to biofilm reduction. Targeted flushing as part of this project also resulted in a significant amount of dirty water being removed from the network. Chlorine levels post project have been higher in the Marsden WSZ, indicating the activity has had a positive effect.

The LWA has been engaged to develop a Network Water Quality Maintenance Strategy (LWA 90-12-97) aimed at network optimisation. It is anticipated that this will provide a valuable aid in minimising the occurrence of dirty water complaints.

LCC is committed to reducing dirty water complaints and will continue to investigate improvement methods in particular for both the Marsden and Greenbank WSZs.

Milky and or White Water

Milky and or White Water is considered a sub-set of water appearance complaints. A total of 11 complaints of this nature were recorded and investigated across the entire Logan city for this reporting period. Of all complaints, around 40% were suspected to be associated with air in the line.

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. In cases where air is suspected and cannot be rectified, LCC will investigate to ensure integrity is being maintained within the network and sample if suspicious conditions exist. Complaints were evenly distributed across all WSZs and no emerging patterns were detected in relation to white or milky water.

All complaints that were not rectified by a settling test or mains flushing were investigated further along with sampling and additional testing to assess the root cause. None of these investigations resulted in detection of system faults.

No operational changes were implemented as a result of investigations into these complaints over the 2013/14 FY.

6.2.3 Taste and Odour

Taste and Odour complaints are characterised by an objectionable odour or taste noticed by customers. Typical descriptions from customers include earthy, metallic, or a chemical taste in the water. A total of 105 of these complaints were received across the whole of Logan City this financial year.

Occasionally, a taste and odour complaint may accompany a claim of illness, thus these complaints are often treated in the same manner as suspected health related complaint types. All 105 complaints were attended to and flushed with customers on occasion being supplied bottled water whilst investigation and remedial activities were undertaken.

Hydrocarbon

Four complaints were received for suspected hydrocarbon taste in the water and all were acted upon immediately. In all cases an investigation was conducted and samples were collected from the property at point of use and also directly from the reticulation main servicing the property. Where it's deemed appropriate, samples are also taken from neighbouring properties to assess if the problem is isolated or has possibly spread. This serves to understand the mobility and fate of petrol or oil spills that can migrate and contaminate nearby properties and other connections.

Of the four complaints, two were positive for contamination, which had occurred because residents had spilt oil on their property and contaminated their own service line. LCC advised the owners to remediate the issue (i.e. contaminated soil and pipework to be replaced). As both incidents occurred on private property, being the owner's responsibility and not Council's, both owner's undertook remediation. One owner paid for re-testing post remediation, which confirmed the water quality had returned to normal.

Analytical testing was conducted by ALS Laboratory as Total Petroleum Hydrocarbons testing is not available at Council's own laboratory. The remaining two complaints were for suspected contamination however water quality test results did not indicate the presence of hydrocarbons and the water quality met the ADWG (2011).

Whilst not common, residents do occasionally spill petrol or oil on their property and call LCC with water quality concerns. In all cases, LCC liaises with the concerned resident and ensures appropriate corrective and preventative actions are understood. It is not unusual for residents in these situations to be required to excavate and replace the contaminated soil and replace affected piping. The cost to undertake this work can be expensive thus prevention of this type of contamination is always preferred. In light of this, work is currently being undertaken to develop and publish fact sheets outlining how people can avoid mistakes around the home which can lead to contamination of their property's water service lines.

No operational changes were implemented by LCC as a result of these investigations however facts sheets will be developed in the 2014/15 FY and displayed on LCC's website.

Chlorine

Whilst most areas of Logan receives chloramine as the residual disinfectant, some WSZs within Logan can at times have chlorine residual in the water as the disinfectant. People typically taste chlorine more easily than chloramine. Thus complaints received are usually in areas where chlorine is used.

The ADWG advises that customers may notice the taste of chlorine at levels around 0.6 mg/L however this will vary between people. The ADWG health limit is 5mg/L however LCC aims to operate well below this limit to balance effective disinfection and aesthetic quality.

At all times it is important to maintain a sufficient amount of disinfectant within the drinking water to ensure the water remains safe. It is important to note that this raises the challenge of ensuring customers receive water that's safe but also pleasant to taste.

During the 2013/14 FY, 32 complaints were received associated with chlorine odour or taste. Of these complaints 85% occurred in the Greenbank WSZ whilst the network disinfection maintenance program was being undertaken. At this time, the Greenbank WSZ, normally chloraminated, was converted to chlorine disinfection and some customers responded to this with complaints.

Chlorine levels during the program were monitored continually and at all times kept well within the ADWG health guideline limits. All complaints were investigated and sampled with the customer informed on the water quality results and educated on the system changes. On

occasions, flushing of the service was undertaken and bottled water was supplied in the interim period. No operational changes have been implemented by LCC as a result of these complaints. Review of the effectiveness of the network disinfection maintenance program, along with consumer satisfaction, is ongoing.

7 FINDINGS AND RECOMMENDATIONS OF THE DWQMP AUDITOR

7.1 Reviews Undertaken

No audits were undertaken during the 2013/14 FY and the next external audit of the DWQMP is due before the 30th June 2017.

External audits are required within 4 years of an approved DWQMP and the LCC DWQMP Rev 5.1 was approved in December 2013, after major amendments to DWQMP Rev 4 (previously approved July 2012).

Updates from the actions planned from the internal audit undertaken in May 2013 have been incorporated into the RMIP.

8 OUTCOME OF THE REVIEW OF THE DWQMP AND HOW ISSUES RAISED HAVE BEEN ADDRESSED

The next internal review of the DWQMP is due before the 20th June 2015.

APPENDIX A - SUMMARY OF COMPLIANCE WITH WATER QUALITY CRITERIA

The results from the verification monitoring program have been compared with the water quality criteria specified by the Water Regulator in the water quality and Reporting Guideline for a Drinking Water Service. Each water supply zone assessed is tabulated below.

Please refer to Section 4 for Data Analysis Methodology and further descriptions on the sampling program regime and statistical analysis principles used.

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.

Where less-than (<) values are seen, the value will be in reference to the LOR as per bullet point 3 of Data Analysis Methodology Section 4.3.

Verification Monitoring

Table 4 - Water Quality Data Logan East

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
LOGAN EAST	Chlorine, Free	mg/L	WEEKLY	234	89	0	<0.05	1.16	0.12	0.05	LCC
LOGAN EAST	Chlorine, Total	mg/L	WEEKLY	234	219	0	<0.05	2.05	0.27	0.05	LCC
LOGAN EAST	E.coli by Colilert	MPN/100mL	WEEKLY	234	0	0	<1	<1	<1	1	LCC
LOGAN EAST	Temperature	°C	WEEKLY	234	234	0	17.5	30.2	24.44	1	LCC
LOGAN EAST	Total Coliforms	MPN/100mL	WEEKLY	234	25	0	<1	165	4.51	1	LCC
LOGAN EAST	Aluminium, Total	mg/L	EVERY 4 WEEKS	58	56	0	<0.01	0.06	0.03	0.01	LCC
LOGAN EAST	Ammonia-N	mg/L	EVERY 4 WEEKS	92	6	0	<0.1	0.1	<0.1	0.1	LCC
LOGAN EAST	Arsenic, Total	mg/L	EVERY 4 WEEKS	58	0	0	<0.02	<0.02	<0.02	0.02	LCC
LOGAN EAST	Cadmium, Total	mg/L	EVERY 4 WEEKS	58	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN EAST	Calcium Hardness	mg/L	EVERY 4 WEEKS	58	58	0	52.4	102.4	68.26	0.1	LCC
LOGAN EAST	Calcium, Total	mg/L	EVERY 4 WEEKS	58	58	0	21	41	27.34	0.1	LCC
LOGAN EAST	Chloride	mg/L	EVERY 4 WEEKS	59	59	0	22	150	72.07	1	LCC
LOGAN EAST	Chromium, Total	mg/L	EVERY 4 WEEKS	58	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN EAST	Cobalt, Total	mg/L	EVERY 4 WEEKS	58	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN EAST	Colour, Apparent	Hazen	EVERY 4 WEEKS	62	62	0	1	10	3.37	1	LCC
LOGAN EAST	Colour, True	Hazen	EVERY 4 WEEKS	62	20	0	<1	2	<1	1	LCC
LOGAN EAST	Conductivity	µS/cm	EVERY 4 WEEKS	92	92	0	220	850	491.96	1	LCC
LOGAN EAST	Copper, Total	mg/L	EVERY 4 WEEKS	58	21	0	<0.01	0.21	<0.01	0.01	LCC
LOGAN EAST	Fluoride	mg/L	EVERY 4 WEEKS	62	59	0	<0.1	0.8	0.68	0.1	LCC

LOGAN EAST	HPC	cfu/mL	EVERY 4 WEEKS	88	18	0	<1	40	2.08	1	LCC
LOGAN EAST	Iron, Total	mg/L	EVERY 4 WEEKS	58	42	0	<0.01	0.06	0.02	0.01	LCC
LOGAN EAST	Lead, Total	mg/L	EVERY 4 WEEKS	58	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN EAST	Magnesium, Total	mg/L	EVERY 4 WEEKS	58	58	0	2.8	25	13.27	0.01	LCC
LOGAN EAST	Manganese, Total	mg/L	EVERY 4 WEEKS	58	6	0	<0.01	0.02	<0.01	0.01	LCC
LOGAN EAST	Nickel, Total	mg/L	EVERY 4 WEEKS	58	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN EAST	Nitrate-N	mg/L	EVERY 4 WEEKS	62	61	0	<0.1	1.2	0.29	0.1	LCC
LOGAN EAST	Nitrite-N	mg/L	EVERY 4 WEEKS	62	0	0	<0.1	<0.1	<0.1	0.1	LCC
LOGAN EAST	pH	pH Units	EVERY 4 WEEKS	92	92	0	7.2	8	7.63	0.1	LCC
LOGAN EAST	Phosphorous, Total	mg/L	EVERY 4 WEEKS	53	0	0	<0.1	<0.1	<0.1	0.1	LCC
LOGAN EAST	Potassium, Total	mg/L	EVERY 4 WEEKS	58	57	0	0.5	4.5	2.63	0.01	LCC
LOGAN EAST	Sodium, Total	mg/L	EVERY 4 WEEKS	58	58	0	17	73	39.90	0.1	LCC
LOGAN EAST	Sulphate	mg/L	EVERY 4 WEEKS	62	62	0	16	47	29.73	0.1	LCC
LOGAN EAST	Total Hardness	mg/L	EVERY 4 WEEKS	62	62	0	64	224	127.97	1	LCC
LOGAN EAST	Turbidity	NTU	EVERY 4 WEEKS	88	88	0	0.2	1.9	0.39	0.1	LCC
LOGAN EAST	Zinc, Total	mg/L	EVERY 4 WEEKS	58	14	0	<0.01	0.04	0.01	0.01	LCC
LOGAN EAST	TDS, Calculated	mg/L	EVERY 4 WEEKS	65	64	0	<1	515.95	282.71	1	LCC
LOGAN EAST	Alkalinity as CaCO3	mg/L	EVERY 4 WEEKS	11	11	0	74	110	84.00	1	LCC
LOGAN EAST	THM	mg/L	EVERY 4 WEEKS	27	27	0	0.011	0.19	0.10	0.001	ALS/GC

Table 5 - Water Quality Data Logan South

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
LOGAN SOUTH	Chlorine, Free	mg/L	WEEKLY	297	58	0	<0.05	0.75	<0.05	0.05	LCC
LOGAN SOUTH	Chlorine, Total	mg/L	WEEKLY	297	252	0	<0.05	2.2	0.266	0.05	LCC
LOGAN SOUTH	E.coli by Colilert	MPN/100mL	WEEKLY	297	0	0	<1	<1	<1	1	LCC
LOGAN SOUTH	Temperature	°C	WEEKLY	297	297	0	16.8	32.3	24.347	1	LCC
LOGAN SOUTH	Total Coliforms	MPN/100mL	WEEKLY	297	79	0	<1	165	4.896	1	LCC
LOGAN SOUTH	Aluminium, Total	mg/L	EVERY 4 WEEKS	73	73	0	0.01	0.13	0.041	0.01	LCC
LOGAN SOUTH	Ammonia-N	mg/L	EVERY 4 WEEKS	113	24	0	<0.1	0.4	<0.1	0.1	LCC
LOGAN SOUTH	Arsenic, Total	mg/L	EVERY 4 WEEKS	73	0	0	<0.02	<0.02	<0.02	0.02	LCC
LOGAN SOUTH	Cadmium, Total	mg/L	EVERY 4 WEEKS	73	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN SOUTH	Calcium Hardness	mg/L	EVERY 4 WEEKS	73	73	0	27.5	92.4	59.337	0.1	LCC
LOGAN SOUTH	Calcium, Total	mg/L	EVERY 4 WEEKS	73	73	0	11	37	23.767	0.1	LCC
LOGAN SOUTH	Chloride	mg/L	EVERY 4 WEEKS	73	73	0	15	140	53.082	1	LCC
LOGAN SOUTH	Chromium, Total	mg/L	EVERY 4 WEEKS	73	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN SOUTH	Cobalt, Total	mg/L	EVERY 4 WEEKS	73	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN SOUTH	Colour, Apparent	Hazen	EVERY 4 WEEKS	78	77	0	<1	64	5.386	1	LCC
LOGAN SOUTH	Colour, True	Hazen	EVERY 4 WEEKS	78	32	0	<1	3	<1	1	LCC
LOGAN SOUTH	Conductivity	µS/cm	EVERY 4 WEEKS	113	113	0	190	790	411.681	1	LCC
LOGAN SOUTH	Copper, Total	mg/L	EVERY 4 WEEKS	73	28	0	<0.01	0.18	0.011	0.01	LCC
LOGAN SOUTH	Fluoride	mg/L	EVERY 4 WEEKS	78	74	0	<0.1	0.8	0.640	0.1	LCC
LOGAN	HPC	cfu/mL	EVERY 4	108	53	0	<1	75	10.338	1	LCC

SOUTH			WEEKS								
LOGAN SOUTH	Iron, Total	mg/L	EVERY 4 WEEKS	73	33	0	<0.01	0.2	0.023	0.01	LCC
LOGAN SOUTH	Lead, Total	mg/L	EVERY 4 WEEKS	73	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN SOUTH	Magnesium, Total	mg/L	EVERY 4 WEEKS	73	73	0	1.8	24	10.345	0.01	LCC
LOGAN SOUTH	Manganese, Total	mg/L	EVERY 4 WEEKS	73	8	0	<0.01	0.09	<0.01	0.01	LCC
LOGAN SOUTH	Nickel, Total	mg/L	EVERY 4 WEEKS	73	0	0	<0.01	<0.01	<0.01	0.01	LCC
LOGAN SOUTH	Nitrate-N	mg/L	EVERY 4 WEEKS	78	73	0	<0.1	1.2	0.399	0.1	LCC
LOGAN SOUTH	Nitrite-N	mg/L	EVERY 4 WEEKS	78	28	0	<0.1	0.3	<0.1	0.1	LCC
LOGAN SOUTH	pH	pH Units	EVERY 4 WEEKS	113	113	0	7.5	8.6	7.865	0.1	LCC
LOGAN SOUTH	Phosphorous, Total	mg/L	EVERY 4 WEEKS	68	0	0	<0.1	<0.1	<0.1	0.1	LCC
LOGAN SOUTH	Potassium, Total	mg/L	EVERY 4 WEEKS	73	73	0	1.4	4.2	2.437	0.01	LCC
LOGAN SOUTH	Sodium, Total	mg/L	EVERY 4 WEEKS	73	73	0	16	67	32.329	0.1	LCC
LOGAN SOUTH	Sulphate	mg/L	EVERY 4 WEEKS	78	78	0	13	46	25.897	0.1	LCC
LOGAN SOUTH	Total Hardness	mg/L	EVERY 4 WEEKS	78	78	0	36.1	200	107.641	1	LCC
LOGAN SOUTH	Turbidity	NTU	EVERY 4 WEEKS	109	109	0	0.1	5.3	0.454	0.1	LCC
LOGAN SOUTH	Zinc, Total	mg/L	EVERY 4 WEEKS	73	5	0	<0.01	0.02	<0.01	0.01	LCC
LOGAN SOUTH	TDS, Calculated	mg/L	EVERY 4 WEEKS	79	78	0	<1	479.53	243.507	1	LCC
LOGAN SOUTH	Alkalinity as CaCO ₃	mg/L	EVERY 4 WEEKS	14	14	0	50	90	73.071	1	LCC
LOGAN SOUTH	THM	mg/L	EVERY 4 WEEKS	27	27	0	<0.001	0.11	0.060	0.001	ALS/GC

Table 6 - Water Quality Data Marsden

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
MARSDEN	Chlorine, Free	mg/L	WEEKLY	206	95	0	<0.05	1.01	0.10	0.05	LCC
MARSDEN	Chlorine, Total	mg/L	WEEKLY	206	199	0	<0.05	2.16	0.76	0.05	LCC
MARSDEN	E.coli by Colilert	MPN/100mL	WEEKLY	209	0	0	<1	<1	<1	1	LCC
MARSDEN	Temperature	°C	WEEKLY	206	206	0	18.5	30.8	25.11	1	LCC
MARSDEN	Total Coliforms	MPN/100mL	WEEKLY	209	32	0	<1	160	2.43	1	LCC
MARSDEN	Aluminium, Total	mg/L	EVERY 4 WEEKS	51	51	0	0.02	0.11	0.04	0.01	LCC
MARSDEN	Ammonia-N	mg/L	EVERY 4 WEEKS	92	60	0	<0.1	0.5	0.16	0.1	LCC
MARSDEN	Arsenic, Total	mg/L	EVERY 4 WEEKS	50	0	0	<0.02	<0.02	<0.02	0.02	LCC
MARSDEN	Cadmium, Total	mg/L	EVERY 4 WEEKS	50	0	0	<0.01	<0.01	<0.01	0.01	LCC
MARSDEN	Calcium Hardness	mg/L	EVERY 4 WEEKS	50	50	0	54.9	92.4	67.60	0.1	LCC
MARSDEN	Calcium, Total	mg/L	EVERY 4 WEEKS	51	51	0	22	37	27.20	0.1	LCC
MARSDEN	Chloride	mg/L	EVERY 4 WEEKS	54	54	0	45	150	72.28	1	LCC
MARSDEN	Chromium, Total	mg/L	EVERY 4 WEEKS	50	0	0	<0.01	<0.01	<0.01	0.01	LCC
MARSDEN	Cobalt, Total	mg/L	EVERY 4 WEEKS	50	0	0	<0.01	<0.01	<0.01	0.01	LCC
MARSDEN	Colour, Apparent	Hazen	EVERY 4 WEEKS	54	54	0	1	19	4.66	1	LCC
MARSDEN	Colour, True	Hazen	EVERY 4 WEEKS	54	29	0	<1	5	1.16	1	LCC
MARSDEN	Conductivity	µS/cm	EVERY 4 WEEKS	92	92	0	370	820	491.09	1	LCC
MARSDEN	Copper, Total	mg/L	EVERY 4 WEEKS	50	11	0	<0.01	0.11	<0.01	0.01	LCC
MARSDEN	Fluoride	mg/L	EVERY 4 WEEKS	54	54	0	0.3	0.9	0.72	0.1	LCC
MARSDEN	HPC	cfu/mL	EVERY 4 WEEKS	89	24	0	<1	209	10.69	1	LCC

MARSDEN	Iron, Total	mg/L	EVERY 4 WEEKS	51	28	0	<0.01	0.16	0.02	0.01	LCC
MARSDEN	Lead, Total	mg/L	EVERY 4 WEEKS	51	0	0	<0.01	<0.01	<0.01	0.01	LCC
MARSDEN	Magnesium, Total	mg/L	EVERY 4 WEEKS	51	51	0	11	26	14.84	0.01	LCC
MARSDEN	Manganese, Total	mg/L	EVERY 4 WEEKS	51	12	0	<0.01	0.08	<0.01	0.01	LCC
MARSDEN	Nickel, Total	mg/L	EVERY 4 WEEKS	50	1	0	<0.01	0.01	<0.01	0.01	LCC
MARSDEN	Nitrate-N	mg/L	EVERY 4 WEEKS	54	45	0	<0.1	1.2	0.34	0.1	LCC
MARSDEN	Nitrite-N	mg/L	EVERY 4 WEEKS	54	3	0	<0.1	0.2	<0.1	0.1	LCC
MARSDEN	pH	pH Units	EVERY 4 WEEKS	92	92	0	7.3	7.9	7.62	0.1	LCC
MARSDEN	Phosphorous, Total	mg/L	EVERY 4 WEEKS	46	0	0	<0.1	<0.1	<0.1	0.1	LCC
MARSDEN	Potassium, Total	mg/L	EVERY 4 WEEKS	50	50	0	2.1	4.3	2.77	0.01	LCC
MARSDEN	Sodium, Total	mg/L	EVERY 4 WEEKS	50	50	0	25	66	37.92	0.1	LCC
MARSDEN	Sulphate	mg/L	EVERY 4 WEEKS	53	53	0	20	46	30.32	0.1	LCC
MARSDEN	Total Hardness	mg/L	EVERY 4 WEEKS	54	54	0	102.7	197	131.94	1	LCC
MARSDEN	Turbidity	NTU	EVERY 4 WEEKS	85	85	0	0.2	1.6	0.38	0.1	LCC
MARSDEN	Zinc, Total	mg/L	EVERY 4 WEEKS	50	3	0	<0.01	0.03	<0.01	0.01	LCC
MARSDEN	TDS, Calculated	mg/L	EVERY 4 WEEKS	56	56	0	225	492	285.29	1	LCC
MARSDEN	Alkalinity as CaCO ₃	mg/L	EVERY 4 WEEKS	14	14	0	76	110	87.21	1	LCC
MARSDEN	THM	mg/L	EVERY 4 WEEKS	12	12	0	0.038	0.13	0.08	0.001	ALS/GC

Table 7 - Water Quality Data Kimberley Park

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
KIMBERLEY PARK	Chlorine, Free	mg/L	WEEKLY	131	30	0	<0.05	0.53	<0.05	0.05	LCC
KIMBERLEY PARK	Chlorine, Total	mg/L	WEEKLY	131	115	0	<0.05	1.54	0.295	0.05	LCC
KIMBERLEY PARK	E.coli by Colilert	MPN/100mL	WEEKLY	132	0	0	<1	<1	<1	1	LCC
KIMBERLEY PARK	Temperature	°C	WEEKLY	131	131	0	18	30.6	24.645	1	LCC
KIMBERLEY PARK	Total Coliforms	MPN/100mL	WEEKLY	132	15	0	<1	728	6.602	1	LCC
KIMBERLEY PARK	Aluminium, Total	mg/L	EVERY 4 WEEKS	35	35	0	0.02	0.06	0.038	0.01	LCC
KIMBERLEY PARK	Ammonia-N	mg/L	EVERY 4 WEEKS	104	32	0	<0.1	0.5	<0.1	0.1	LCC
KIMBERLEY PARK	Arsenic, Total	mg/L	EVERY 4 WEEKS	34	0	0	<0.02	<0.02	<0.02	0.02	LCC
KIMBERLEY PARK	Cadmium, Total	mg/L	EVERY 4 WEEKS	34	0	0	<0.01	<0.01	<0.01	0.01	LCC
KIMBERLEY PARK	Calcium Hardness	mg/L	EVERY 4 WEEKS	34	34	0	47.4	97.4	63.944	0.1	LCC
KIMBERLEY PARK	Calcium, Total	mg/L	EVERY 4 WEEKS	35	35	0	19	39	25.886	0.1	LCC
KIMBERLEY PARK	Chloride	mg/L	EVERY 4 WEEKS	35	35	0	28	140	61.629	1	LCC
KIMBERLEY PARK	Chromium, Total	mg/L	EVERY 4 WEEKS	34	0	0	<0.01	<0.01	<0.01	0.01	LCC
KIMBERLEY PARK	Cobalt, Total	mg/L	EVERY 4 WEEKS	34	0	0	<0.01	<0.01	<0.01	0.01	LCC
KIMBERLEY PARK	Colour, Apparent	Hazen	EVERY 4 WEEKS	35	35	0	1.5	18	5.026	1	LCC
KIMBERLEY PARK	Colour, True	Hazen	EVERY 4 WEEKS	35	17	0	<1	3	1.114	1	LCC
KIMBERLEY PARK	Conductivity	µS/cm	EVERY 4 WEEKS	104	104	0	240	880	425.385	1	LCC
KIMBERLEY PARK	Copper, Total	mg/L	EVERY 4 WEEKS	34	7	0	<0.01	0.15	<0.01	0.01	LCC
KIMBERLEY PARK	Fluoride	mg/L	EVERY 4 WEEKS	35	35	0	0.4	0.9	0.72	0.1	LCC

KIMBERLEY PARK	HPC	cfu/mL	EVERY 4 WEEKS	104	48	0	<1	490	18.587	1	LCC
KIMBERLEY PARK	Iron, Total	mg/L	EVERY 4 WEEKS	35	32	0	<0.01	0.06	0.020	0.01	LCC
KIMBERLEY PARK	Lead, Total	mg/L	EVERY 4 WEEKS	35	0	0	<0.01	<0.01	<0.01	0.01	LCC
KIMBERLEY PARK	Magnesium, Total	mg/L	EVERY 4 WEEKS	35	35	0	3.1	26	11.849	0.01	LCC
KIMBERLEY PARK	Manganese, Total	mg/L	EVERY 4 WEEKS	35	6	0	<0.01	0.02	<0.01	0.01	LCC
KIMBERLEY PARK	Nickel, Total	mg/L	EVERY 4 WEEKS	34	0	0	<0.01	<0.01	<0.01	0.01	LCC
KIMBERLEY PARK	Nitrate-N	mg/L	EVERY 4 WEEKS	35	35	0	0.1	1	0.411	0.1	LCC
KIMBERLEY PARK	Nitrite-N	mg/L	EVERY 4 WEEKS	35	24	0	<0.1	0.2	0.121	0.1	LCC
KIMBERLEY PARK	pH	pH Units	EVERY 4 WEEKS	104	104	0	7.4	8	7.624	0.1	LCC
KIMBERLEY PARK	Phosphorous, Total	mg/L	EVERY 4 WEEKS	31	1	0	<0.1	0.1	<0.1	0.1	LCC
KIMBERLEY PARK	Potassium, Total	mg/L	EVERY 4 WEEKS	34	34	0	0.6	4.5	2.229	0.01	LCC
KIMBERLEY PARK	Sodium, Total	mg/L	EVERY 4 WEEKS	34	34	0	17	67	34.176	0.1	LCC
KIMBERLEY PARK	Sulphate	mg/L	EVERY 4 WEEKS	35	35	0	6	47	24.151	0.1	LCC
KIMBERLEY PARK	Total Hardness	mg/L	EVERY 4 WEEKS	35	35	0	64.3	200.3	111.686	1	LCC
KIMBERLEY PARK	Turbidity	NTU	EVERY 4 WEEKS	102	102	0	0.2	0.9	0.395	0.1	LCC
KIMBERLEY PARK	Zinc, Total	mg/L	EVERY 4 WEEKS	34	7	0	<0.01	0.02	<0.01	0.01	LCC
KIMBERLEY PARK	TDS, Calculated	mg/L	EVERY 4 WEEKS	94	94	0	146	467	249.957	1	LCC
KIMBERLEY PARK	Alkalinity as CaCO3	mg/L	EVERY 4 WEEKS	26	26	0	50	110	73.885	1	LCC
KIMBERLEY PARK	THM	mg/L	EVERY 4 WEEKS	12	12	0	0.008	0.11	0.051	0.001	ALS/GC

Table 8 - Water Quality Data Greenbank

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
GREENBANK	Chlorine, Free	mg/L	WEEKLY	175	95	0	<0.05	1.19	0.122	0.05	LCC
GREENBANK	Chlorine, Total	mg/L	WEEKLY	175	171	0	<0.05	1.88	0.643	0.05	LCC
GREENBANK	E.coli by Colilert	MPN/100mL	WEEKLY	177	0	0	<1	<1	<1	1	LCC
GREENBANK	Temperature	°C	WEEKLY	175	175	0	16.6	30.4	24.645	1	LCC
GREENBANK	Total Coliforms	MPN/100mL	WEEKLY	177	18	0	<1	400	3.314	1	LCC
GREENBANK	Aluminium, Total	mg/L	EVERY 4 WEEKS	46	46	0	0.018	0.8	0.060	0.01	LCC
GREENBANK	Ammonia-N	mg/L	EVERY 4 WEEKS	123	94	0	<0.1	0.5	0.178	0.1	LCC
GREENBANK	Arsenic, Total	mg/L	EVERY 4 WEEKS	44	0	0	<0.02	<0.02	<0.02	0.02	LCC
GREENBANK	Cadmium, Total	mg/L	EVERY 4 WEEKS	44	0	0	<0.01	<0.01	<0.01	0.01	LCC
GREENBANK	Calcium Hardness	mg/L	EVERY 4 WEEKS	44	44	0	30	92.4	65.359	0.1	LCC
GREENBANK	Calcium, Total	mg/L	EVERY 4 WEEKS	46	46	0	12	37	26.522	0.1	LCC
GREENBANK	Chloride	mg/L	EVERY 4 WEEKS	48	48	0	17	140	70.938	1	LCC
GREENBANK	Chromium, Total	mg/L	EVERY 4 WEEKS	44	0	0	<0.01	<0.01	<0.01	0.01	LCC
GREENBANK	Cobalt, Total	mg/L	EVERY 4 WEEKS	44	0	0	<0.01	<0.01	<0.01	0.01	LCC
GREENBANK	Colour, Apparent	Hazen	EVERY 4 WEEKS	48	48	0	1	45	5.913	1	LCC
GREENBANK	Colour, True	Hazen	EVERY 4 WEEKS	48	26	0	<1	9	1.227	1	LCC
GREENBANK	Conductivity	µS/cm	EVERY 4 WEEKS	123	123	0	190	820	476.179	1	LCC
GREENBANK	Copper, Total	mg/L	EVERY 4 WEEKS	44	21	0	<0.01	0.05	0.011	0.01	LCC
GREENBANK	Fluoride	mg/L	EVERY 4 WEEKS	48	48	0	0.4	0.9	0.715	0.1	LCC
GREENBANK	HPC	cfu/mL	EVERY 4 WEEKS	121	41	0	<1	100	6.612	1	LCC

GREENBANK	Iron, Total	mg/L	EVERY 4 WEEKS	46	35	0	<0.01	0.46	0.027	0.01	LCC
GREENBANK	Lead, Total	mg/L	EVERY 4 WEEKS	46	0	0	<0.01	<0.01	<0.01	0.01	LCC
GREENBANK	Magnesium, Total	mg/L	EVERY 4 WEEKS	46	46	0	2.3	25	14.217	0.01	LCC
GREENBANK	Manganese, Total	mg/L	EVERY 4 WEEKS	46	11	0	<0.01	0.09	<0.01	0.01	LCC
GREENBANK	Nickel, Total	mg/L	EVERY 4 WEEKS	44	0	0	<0.01	<0.01	<0.01	0.01	LCC
GREENBANK	Nitrate-N	mg/L	EVERY 4 WEEKS	48	48	0	0.1	1	0.329	0.1	LCC
GREENBANK	Nitrite-N	mg/L	EVERY 4 WEEKS	48	9	0	<0.1	0.4	<0.1	0.1	LCC
GREENBANK	pH	pH Units	EVERY 4 WEEKS	123	123	0	7.3	8.7	7.674	0.1	LCC
GREENBANK	Phosphorous, Total	mg/L	EVERY 4 WEEKS	40	0	0	<0.1	<0.1	<0.1	0.1	LCC
GREENBANK	Potassium, Total	mg/L	EVERY 4 WEEKS	44	44	0	1.3	4.2	2.693	0.01	LCC
GREENBANK	Sodium, Total	mg/L	EVERY 4 WEEKS	44	44	0	19	65	37.136	0.1	LCC
GREENBANK	Sulphate	mg/L	EVERY 4 WEEKS	49	49	0	14	45	30.286	0.1	LCC
GREENBANK	Total Hardness	mg/L	EVERY 4 WEEKS	48	48	0	43.6	204	127.825	1	LCC
GREENBANK	Turbidity	NTU	EVERY 4 WEEKS	120	120	0	0.2	5.6	0.406	0.1	LCC
GREENBANK	Zinc, Total	mg/L	EVERY 4 WEEKS	44	7	0	<0.01	0.1	0.010	0.01	LCC
GREENBANK	TDS, Calculated	mg/L	EVERY 4 WEEKS	100	100	0	115	486	280.650	1	LCC
GREENBANK	Alkalinity as CaCO3	mg/L	EVERY 4 WEEKS	28	28	0	49	110	82.75	1	LCC
GREENBANK	THM	mg/L	EVERY 4 WEEKS	12	12	0	0.04	0.12	0.083	0.001	ALS/GC

Table 9 - Water Quality Data Springwood Low Level Zone

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
SPRINGWOOD LOW	Chlorine, Free	mg/L	WEEKLY	200	152	0	<0.05	1.37	0.146	0.05	LCC
SPRINGWOOD LOW	Chlorine, Total	mg/L	WEEKLY	200	197	0	<0.05	2.2	1.302	0.05	LCC
SPRINGWOOD LOW	E.coli by Colilert	MPN/100mL	WEEKLY	202	0	0	<1	<1	<1	1	LCC
SPRINGWOOD LOW	Temperature	°C	WEEKLY	200	200	0	18.2	32.9	24.859	1	LCC
SPRINGWOOD LOW	Total Coliforms	MPN/100mL	WEEKLY	202	2	0	<1	2	<1	1	LCC
SPRINGWOOD LOW	Aluminium, Total	mg/L	EVERY 4 WEEKS	50	50	0	0.02	0.07	0.041	0.01	LCC
SPRINGWOOD LOW	Ammonia-N	mg/L	EVERY 4 WEEKS	90	77	0	<0.1	0.5	0.188	0.1	LCC
SPRINGWOOD LOW	Arsenic, Total	mg/L	EVERY 4 WEEKS	49	0	0	<0.02	<0.02	<0.02	0.02	LCC
SPRINGWOOD LOW	Cadmium, Total	mg/L	EVERY 4 WEEKS	49	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD LOW	Calcium Hardness	mg/L	EVERY 4 WEEKS	49	49	0	44.9	97.4	66.788	0.1	LCC
SPRINGWOOD LOW	Calcium, Total	mg/L	EVERY 4 WEEKS	50	50	0	18	39	26.88	0.1	LCC
SPRINGWOOD LOW	Chloride	mg/L	EVERY 4 WEEKS	53	53	0	31	150	73.038	1	LCC
SPRINGWOOD LOW	Chromium, Total	mg/L	EVERY 4 WEEKS	49	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD LOW	Cobalt, Total	mg/L	EVERY 4 WEEKS	49	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD LOW	Colour, Apparent	Hazen	EVERY 4 WEEKS	53	50	0	<1	14.1	3.953	1	LCC
SPRINGWOOD LOW	Colour, True	Hazen	EVERY 4 WEEKS	53	31	0	<1	7.8	1.191	1	LCC
SPRINGWOOD LOW	Conductivity	µS/cm	EVERY 4 WEEKS	90	90	0	250	850	490	1	LCC
SPRINGWOOD LOW	Copper, Total	mg/L	EVERY 4 WEEKS	49	15	0	<0.01	0.1	0.019	0.01	LCC
SPRINGWOOD LOW	Fluoride	mg/L	EVERY 4 WEEKS	53	53	0	0.6	0.9	0.743	0.1	LCC
SPRINGWOOD	HPC	cfu/mL	EVERY 4	87	17	0	<1	23	1.115	1	LCC

LOW			WEEKS								
SPRINGWOOD LOW	Iron, Total	mg/L	EVERY 4 WEEKS	50	28	0	<0.01	0.52	0.025	0.01	LCC
SPRINGWOOD LOW	Lead, Total	mg/L	EVERY 4 WEEKS	50	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD LOW	Magnesium, Total	mg/L	EVERY 4 WEEKS	50	50	0	4	27	14.996	0.01	LCC
SPRINGWOOD LOW	Manganese, Total	mg/L	EVERY 4 WEEKS	50	10	0	<0.01	0.04	<0.01	0.01	LCC
SPRINGWOOD LOW	Nickel, Total	mg/L	EVERY 4 WEEKS	49	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD LOW	Nitrate-N	mg/L	EVERY 4 WEEKS	53	37	0	<0.1	1	0.226	0.1	LCC
SPRINGWOOD LOW	Nitrite-N	mg/L	EVERY 4 WEEKS	53	8	0	<0.1	0.2	<0.1	0.1	LCC
SPRINGWOOD LOW	pH	pH Units	EVERY 4 WEEKS	90	90	0	7.4	7.8	7.628	0.1	LCC
SPRINGWOOD LOW	Phosphorous, Total	mg/L	EVERY 4 WEEKS	45	0	0	<0.1	<0.1	<0.1	0.1	LCC
SPRINGWOOD LOW	Potassium, Total	mg/L	EVERY 4 WEEKS	49	49	0	1	22.7	3.165	0.01	LCC
SPRINGWOOD LOW	Sodium, Total	mg/L	EVERY 4 WEEKS	49	49	0	20	652	50.898	0.1	LCC
SPRINGWOOD LOW	Sulphate	mg/L	EVERY 4 WEEKS	53	53	0	8.1	52	30.832	0.1	LCC
SPRINGWOOD LOW	Total Hardness	mg/L	EVERY 4 WEEKS	53	53	0	61.4	208.6	132.160	1	LCC
SPRINGWOOD LOW	Turbidity	NTU	EVERY 4 WEEKS	83	83	0	0.2	2.4	0.377	0.1	LCC
SPRINGWOOD LOW	Zinc, Total	mg/L	EVERY 4 WEEKS	49	14	0	<0.01	0.03	<0.01	0.01	LCC
SPRINGWOOD LOW	TDS, Calculated	mg/L	EVERY 4 WEEKS	56	56	0	152	486	280.196	1	LCC
SPRINGWOOD LOW	Alkalinity as CaCO3	mg/L	EVERY 4 WEEKS	14	14	0	75	110	86.143	1	LCC
SPRINGWOOD LOW	THM	mg/L	EVERY 4 WEEKS	8	8	0	0.042	0.09	0.063	0.001	ALS/GC

Table 10 - Water Quality Data Springwood High Level Zone

ZONE	PARAMETER	UNITS	FREQUENCY	TOTAL NO. OF SAMPLES COLLECTED	NO. OF SAMPLES IN WHICH PARAMETER WAS DETECTED	NO. OF SAMPLES EXCEEDING WATER QUALITY CRITERIA	MIN	MAX	MEAN	LOR	LABORATORY NAME
SPRINGWOOD HIGH	Chlorine, Free	mg/L	WEEKLY	113	54	0	<0.05	0.7	0.072	0.05	LCC
SPRINGWOOD HIGH	Chlorine, Total	mg/L	WEEKLY	113	106	0	<0.05	1.87	0.620	0.05	LCC
SPRINGWOOD HIGH	E.coli by Colilert	MPN/100mL	WEEKLY	114	0	0	<1	<1	<1	1	LCC
SPRINGWOOD HIGH	Temperature	°C	WEEKLY	113	113	0	17.7	29.9	24.745	1	LCC
SPRINGWOOD HIGH	Total Coliforms	MPN/100mL	WEEKLY	114	3	0	<1	4	<1	1	LCC
SPRINGWOOD HIGH	Aluminium, Total	mg/L	EVERY 4 WEEKS	29	29	0	0.01	0.06	0.036	0.01	LCC
SPRINGWOOD HIGH	Ammonia-N	mg/L	EVERY 4 WEEKS	68	48	0	<0.1	0.5	0.147	0.1	LCC
SPRINGWOOD HIGH	Arsenic, Total	mg/L	EVERY 4 WEEKS	28	0	0	<0.02	<0.02	<0.02	0.02	LCC
SPRINGWOOD HIGH	Cadmium, Total	mg/L	EVERY 4 WEEKS	28	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD HIGH	Calcium Hardness	mg/L	EVERY 4 WEEKS	28	28	0	54.9	97.4	68.65	0.1	LCC
SPRINGWOOD HIGH	Calcium, Total	mg/L	EVERY 4 WEEKS	29	29	0	22	39	27.690	0.1	LCC
SPRINGWOOD HIGH	Chloride	mg/L	EVERY 4 WEEKS	30	30	0	46	140	72.067	1	LCC
SPRINGWOOD HIGH	Chromium, Total	mg/L	EVERY 4 WEEKS	28	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD HIGH	Cobalt, Total	mg/L	EVERY 4 WEEKS	28	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD HIGH	Colour, Apparent	Hazen	EVERY 4 WEEKS	30	29	0	<1	7	3.69	1	LCC
SPRINGWOOD HIGH	Colour, True	Hazen	EVERY 4 WEEKS	30	17	0	<1	3	1.03	1	LCC
SPRINGWOOD HIGH	Conductivity	µS/cm	EVERY 4 WEEKS	68	68	0	370	880	492.353	1	LCC
SPRINGWOOD HIGH	Copper, Total	mg/L	EVERY 4 WEEKS	28	16	0	<0.01	0.2	0.016	0.01	LCC

SPRINGWOOD HIGH	Fluoride	mg/L	EVERY 4 WEEKS	30	30	0	0.5	0.9	0.727	0.1	LCC
SPRINGWOOD HIGH	HPC	cfu/mL	EVERY 4 WEEKS	67	8	0	<1	67	1.769	1	LCC
SPRINGWOOD HIGH	Iron, Total	mg/L	EVERY 4 WEEKS	29	9	0	<0.01	0.03	<0.01	0.01	LCC
SPRINGWOOD HIGH	Lead, Total	mg/L	EVERY 4 WEEKS	29	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD HIGH	Magnesium, Total	mg/L	EVERY 4 WEEKS	29	29	0	11	26	15.172	0.01	LCC
SPRINGWOOD HIGH	Manganese, Total	mg/L	EVERY 4 WEEKS	29	3	0	<0.01	0.01	<0.01	0.01	LCC
SPRINGWOOD HIGH	Nickel, Total	mg/L	EVERY 4 WEEKS	28	0	0	<0.01	<0.01	<0.01	0.01	LCC
SPRINGWOOD HIGH	Nitrate-N	mg/L	EVERY 4 WEEKS	30	29	0	<0.1	1.2	0.345	0.1	LCC
SPRINGWOOD HIGH	Nitrite-N	mg/L	EVERY 4 WEEKS	30	10	0	<0.1	0.2	<0.1	0.1	LCC
SPRINGWOOD HIGH	pH	pH Units	EVERY 4 WEEKS	68	68	0	7.2	7.7	7.55	0.1	LCC
SPRINGWOOD HIGH	Phosphorous, Total	mg/L	EVERY 4 WEEKS	26	0	0	<0.1	<0.1	<0.1	0.1	LCC
SPRINGWOOD HIGH	Potassium, Total	mg/L	EVERY 4 WEEKS	28	28	0	2.2	4.1	2.764	0.01	LCC
SPRINGWOOD HIGH	Sodium, Total	mg/L	EVERY 4 WEEKS	28	28	0	30	63	39	0.1	LCC
SPRINGWOOD HIGH	Sulphate	mg/L	EVERY 4 WEEKS	30	30	0	21	46	31.133	0.1	LCC
SPRINGWOOD HIGH	Total Hardness	mg/L	EVERY 4 WEEKS	30	30	0	100.2	199.5	133.413	1	LCC
SPRINGWOOD HIGH	Turbidity	NTU	EVERY 4 WEEKS	66	66	0	0.2	0.7	0.339	0.1	LCC
SPRINGWOOD HIGH	Zinc, Total	mg/L	EVERY 4 WEEKS	28	3	0	<0.01	0.03	<0.01	0.01	LCC
SPRINGWOOD HIGH	TDS, Calculated	mg/L	EVERY 4 WEEKS	51	51	0	225	473	288.451	1	LCC
SPRINGWOOD HIGH	Alkalinity as CaCO3	mg/L	EVERY 4 WEEKS	14	14	0	70	110	84.429	1	LCC
SPRINGWOOD HIGH	THM	mg/L	EVERY 4 WEEKS	6	6	0	0.043	0.1	0.073	0.001	ALS/GC

***E.coli* Verification Monitoring**

Table 11 - *E.Coli* Verification Monitoring

WHOLE OF LOGAN CITY - ALL ZONES		2013/14 FY											
Month Sampled	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	
No. of samples collected	122	106	115	126	115	89	104	110	123	130	112	113	
No. of samples collected in which <i>E. coli</i> 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	1187	1217	1261	1272	1296	1279	1283	1298	1326	1346	1354	1365	
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%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
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 5.1.

Item	Priority (1, 2 or 3)	DWQMP Section G-General Improvement (Audit) R-Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
			N/A							
0.01	1	1.3 (G)		Old Service Provide details exist (i.e. Allconnex) & needs updating to new one (i.e. LCC).	Update DWQMP Rev5 with LCC details including SPID, Name & Contact Details.	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	Jul-13	May-13	100%
0.02	1	3.1 (G)		Previously 3xschemes (i.e. North, South & East water supply Zones) & now 7xZones, including water source changes.	Update DWQMP to include new water sources supply schemes (i.e. 7xZones).	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	Jul-13	May-13	100%
0.03	1	3.1 (G)		Population, No. connections and water demands are old and require review to reflect new schemes/zones.	Update DWQMP as per changed population predictions, no. connects and water demand and associated details for next 10yrs.	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	Jul-13	Jul-13	100%
0.04	2	3.1 (G)		Population, No. connections and water demands require review to reflect new IDM.	Annual review required or when system changes occur.	Await new IDM to finalise, then number of connections and water demand can be reassessed. Next review update required for 2015/16 Verification Monitoring requirements hence completion date revised.	Water Infrastructure Program Leader (Sandy V)	Jun-15	Feb-15	10% (NEW)
Element 1: Commitment to Drinking Water Quality Management										
1.1 Drinking Water Quality Policy										
1.00	1	2.1 (G)		Draft policy developed but not yet endorsed by senior management. Wording is straight extract from ADWG, requires refinement.	1. Re-draft Policy to include Water branches "Purposeful Team" statement. 2. Senior management review and update. 3. Marketing display formatting for internal and public display. 4. Endorsement by all Water Branch Managers and DCEO Water and Roads Infrastructure.	1&2. Policy updated to include Water branch's "Purposeful Team" statement & reviewed by Senior Mgt. 3. Marketing formatting completed. 4. Submitted & endorsed by Senior mgt & Deputy CEO.	Senior Water Quality Scientist (Natasha G)	Sep-13	Nov-13	100%
1.01	1	2.1 (G)			Display Policy: announce via BUZZ, intranet-Water Knowledge database (i.e. WikkiWater) and LCC website.	WaterWiki announcement & on Water Intranet and LCC Website.	Business & Customer Mgt Program Leader (Michael K)	Nov-13	Apr-14	100%
1.02	2	2.1 (G)		Once Policy endorsed, will require implementation to staff across all LCC Water branches. Policy to be displayed (internal & public) and training/toolbox sessions to be undertaken.	Develop material to include in DWQMP Policy Awareness Training & future Water Inductions.	ADWG & Water Act awareness training material developed & delivered to Senior Mgt Jun'13, post audit with re-training scheduled early 2014. Policy awareness training material still to be developed for staff inductions.	Senior Water Quality Scientist (Natasha G)	Dec-13	Jun-15	40%
1.03	2	2.1 (G)			Commence training/toolbox sessions to all Water Branch staff and include in future Inductions.	Commence once Item 1.02 completed.	Senior Water Quality Scientist (Natasha G)	Feb-14	Feb-16	0%
1.2 Regulatory & Formal Requirements										
1.04	1	2.2 (G)		List of relevant regulatory & formal requirements is out of date. A number of disjointed databases exist.	Updated regulatory requirements and list in DWQMP Rev 5.	Complete. DWQMP Rev 5.1 updated. Regulated requirements also documented in NetServ Management Plans.	Senior Water Quality Scientist (Natasha G)	Jul-13	Jul-13	100%
1.05	2	2.2 (G)			Update regulatory requirements listed in DWQMP Rev 5 - annual review .	Refer to Item 1.07.	Business & Customer Mgt Program Leader (Michael K)			
1.06	1	2.2 (G)		Ensure staff know who is responsible for what regarding regulations.	Arrange toolbox sessions to communicate responsibilities (via NetServPlan process): 1. Nominate key point persons to manage the regulations associated with their Plan (i.e. NetServPlan). 2. Investigate one database location for all regulatory requirements. 3. Ensure changes are updated are registered & communicated.	NetServPlan workshops undertaken during 2013/14. 1. NetServPlan has an assigned Lead and associated working group. 2 & 3. Regulated requirements documented in individual NetServPlans (located in Business database), which has an update review process. NetServPlans (Part B) to be published Nov'14.	Business & Customer Mgt Program Leader (Michael K)	Nov-13	Jul-14	100%
1.07	2	2.2 (G)		Annual review and/or update if changes occur prior.	Annual review and/or update if changes occur prior.	Next review update required by Jun'15 hence completion date revised.	Business & Customer Mgt Program Leader (Michael K)	Jun-14	Jun-15	0%
1.3 Engaging Stakeholders										
1.08	1	2.3 (G)		Key stakeholders list requires review and updating to include all upstream and downstream stakeholders.	Review and update stakeholder register including roles of responsibilities. Identify key industrial customers (i.e. Teys, Snapfresh), Logan hospital, immune compromised (i.e. home dialysis patients).	Complete & DWQMP Rev 5.1 updated.	Senior Water Quality Scientist (Natasha G)	Jun-13	Jul-13	100%
1.09	2	2.3 (G)			Annual review and/or update if changes occur prior.	Next review update required by Jun'15 hence completion date revised.	Business & Customer Mgt Program Leader (Michael K)	Jun-14	Jun-15	0%
1.10	1	2.3 (G)		Formal communication tool/form required to inform key stakeholders of changes to water quality which may effect them.	Develop tool/form to communicate potential water quality changes that may effect key stakeholders (i.e. high conductivity - effect cooling tower blowdown & potential increase in RO systems maintenance/set-ups).	Dialysis Patients DM#8452560. Commercial High Volume Users DM#9278580. "Notification" form drafted.	Business & Customer Mgt Program Leader (Michael K)	Oct-13	Jun-15	90%
1.11	2	2.3 (G)		Changes since July 2012 with Water Grid, SEQWater & Linkwater all amalgamating to Seqwater. Operating protocol arrangements changed hence requiring updating.	Seqwater Operating Protocol currently being reviewed. Monthly Regional Operational Manager's (ROM) meetings is formal forum to communicate between Seqwater and SEQ water service providers.	Complete. Protocol updated & endorsed. Annual review required as per protocol requirements to ensure processes are relevant and effective.	Operations Support & Admin Coord. (Rolly W)	Jun-14	Nov-13	100%

Item	Priority (1, 2 or 3)	DWQMP Section for Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
1.12	2	2.3 (G)		Annual review.	Liase with key Internal Stakeholders for updates. Annual review or when key new changes occur. Update DWQMP.	Next review update required by Jun'15 hence completion date revised.	Business & Customer Mgt Program Leader (Michael K)	Jun-14	Jun-15	0%

Item	Priority (1, 2 or 3)	DWQMP Section Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
Element 2: Review System Description & Update										
2.1 Water supply system analysis.										
2.00	1	3.1 (G)		People involved with original and previous risk workshop's listed however requires update of new team currently involved with workshops since Allconnex dissolution.	1. Update Rev5 to include current team involved with LCC DWQMP; Water scheme long term plans; schematic updates, risk/HACCP workshops, customer management, etc. 2. Roles & responsibilities to be defined (includes LW Alliance team members).	Current team listed in DWQMP Rev5.1 who have been involved in recent risk assessments.	Senior Water Quality Scientist (Natasha G)	Aug-13	Aug-13	100%
2.01	1	3.1 (G)		Flow diagram of the current water supply system is out of date. Changes since June2012 include: Allconnex dissolution & new LCC organisational structure; Sth McClean WTP moth-balled, new breakpoint chlorination @ Logan River PS, changed water source suppli	Review and update the water supply system diagram to show: - Water supply zones (changed water supply sources) - Changes since REV4 (Logan River PS, Sth McClean WTP) - Other key changes (i.e. reservoirs & pump stations online/offline and near future plans	1. Flow diagram schematic updated to include key major system changes since July 2012 & included in DWQMP Rev5.1.	Senior Water Quality Scientist (Natasha G) & Senior Water Infrastructure Engineer (Sandy V)	Oct-13	Aug-13	100%
2.02	2	3.1 (G)		Annual review required or when key system changes occur.	Review and update flow diagram schematic during next whole of system risk assessment review (or major system change), incorporating any upstream changes post Seqwater's risk assessment.	Next whole of system risk assessment scheduled 2014/15 and review process has already commenced. Next review update required by Jun'15 or when key systems change hence completion date revised.	Water Infrastructure Program Leader (Sandy V)	Jun-14	Jun-15	70%
2.03	1	3.1 (G)		Key system changes effecting water supply need to be considered and reviewed (i.e. breakpoint chlorination system, Sth McClean WTP moth balled and source supply changes and related effect on water source blending - chloraminated and chlorinated water sour	Updated DWQMP Rev 5 with key changes.	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	Jun-13	Jun-13	100%
2.04	2	3.1 (G)			Annual review required or when system changes occur.	Next review update required by Jun'15 or when key systems change hence completion date revised.	Water Infrastructure Program Leader (Sandy V)	Jun-14	Jun-15	0%
2.2 Assessment of water quality data										
2.05	1	3.2 (G)		DWQMP Rev4. Historical data reviewed with historical exceedances listed but not examined (i.e. no root cause analysis undertaken). Minor data trending reporting but limited data analysis undertaken. Seqwater WQNotification process exists regarding curre	Previous DWQMP Rev4 report used for historic data trends.	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	Jun-13	Aug-13	100%
2.06	1	3.2 (G)		Water Regulator Non-conformance process followed.	1. Investigate available reporting systems with other service providers. 2. Commence establishment of system to report exceedances which are not necessarily reportable to Water Regulator (i.e. aesthetic, alert limits, customer complaints).	Intelix system developed as a Corrective Action tool to allow for communication trail for WQ Non Conformances only. Not yet trialed due to no Non Conformances as yet. DEWS form WSR017 used.	Water Quality Officer (Jamie B)	Commence by Oct13	Sep-13	100%
2.07	1	3.2 (G)		There is no ongoing control charts and statistical trend analysis conducted. Current database system not user friendly for trend analysis.	Commence development of effective water quality database (link with LIMS) to be able to assess WQ trends. LIMS currently being implemented in LAB. Use with developing customer complaint trend database and available SCADA.	Water Quality Officer engaged to assist with database development & WQ analysis. Short term water quality trends assessed using SCADA, weekly WQ reports & WWETT system and monthly busienss reports generated. LIMS implemented Jul'14 with Datapipe / KIWI to follow to allow effective long term data trending Refer Item 11.01 Medium/Long term trends.	Water Quality Officer (Jamie B)	Commence by Oct13	Jun-14	100%
2.08	1	3.2 (G)			Implement "Process Improvement" team to undertake regular review of data trends (include staff from operations and product quality team).	Process Improvement Kickoff presentation held Feb14 hence system implemented. Refer Item 11.01 Medium/Long term trends.	Senior Water Quality Scientist (Natasha G)	Oct-13	Feb-14	100%
2.3 Hazard identification and risk assessment										
2.09	1	3.3 (G)		Risk assessment methodology not clearly defined. Consistency required including clearly understanding what upstream supplier (i.e. Seqwater) used. Ensure certainty is described. Continue to use current risk base method and register to cover all operations.	Confirm methodology used in previous DWQMP is consistant as what's used with Seqwater and hence use same for consistency for future risk assessments	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	May-13	Jun-13	100%
2.10	1	3.3 (G)		HAZOP undertaken for Logan River PS breakpoint chlorination system but no HACCP risk assessment.	Undertake risk assessment workshop with focus on network disinfection (i.e. chlorine dosing systems).	Complete & DWQMP Rev5.1 updated. Risk assessments undertaken as required, as new dosing systems planned & commissioned. Refer Item 2.14.	Product Quality Program Leader (Chris PM)	May-13	Jun-13	100%
2.11	1	3.3 (G)		Estimate level of risk for each hazard or hazardous event.	Refer to Item 2.10.	Complete & DWQMP Rev5.1 updated.	Product Quality Program Leader (Chris PM)	May-13	Jun-13	100%
2.12	1	3.3 (G)		Consider actions to reduce major sources of uncertainty.	Refer to Item 2.10.	Complete & DWQMP Rev5.1 updated.	Product Quality Program Leader (Chris PM)	May-13	Jun-13	100%
2.13	1	3.3 (R) DOS 1.0 DIS 1.0 SEQ 1.0		Backup online chlorine monitoring system required if Seqwater disinfection systems failed (i.e. dosing and monitoring).	Undertake "Online Water Quality Monitoring Strategy" - online instrumentation with SCADA alarms as backup to Seqwater system.	Online Water Quality Monitoring prioritisation - Preliminary Planning & Design completed. Installation required. Logistics of sites chosen was extensive hence Finish date revised.	Product Quality Program Leader (Chris PM)	Jun-14	Apr-15	50%

Item	Priority (1, 2 or 3)	DWQMP Section Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
2.14	2	3.3 (G)		Regular reviews not undertaken, taking into account system changes. Need to review consolidate previous Rev 4 Risk Assessment, taking into account any system changes from Seqwater which may impact LCC.	Undertake annual review of Risk Assessment (RA) - or when system change: Consolidate current and previous RA (Rev 4 & 5). Undertake entire system RA, taking into account water source changes, standpipes and any new Seqwater residual risks entering LCC network,	Individual risk assessments were undertaken for newly installed chlorine dosing systems (Greenbank, Illaweena & Travis Rd reservoirs). Seqwater RA scheduled. Consolidation of all Risk assessments scheduled for 2014/15 hence Finish date revised.	Senior Water Quality Scientist (Natasha G)	Jun-14	Jun-15	0%
Element 3: Preventive Measures for Drinking Water Quality										
3.00	1	4.1 (G)	3.1 Preventative Measures & Multiple Barriers	Existing preventive measures from catchment to consumer are not clearly recognised.	Follow-on from Chlorine dosing risk assessment, review CCP in system, particularly reservoirs and chlorine dosing systems, noting for CCP, can corrective action be done in a timely manner.	Post risk assessment workshops, HACCP workshop were undertaken to determine CCP for LCC with Logan River PS chlorine dosing system identified as CCP and limits generated.	Product Quality Program Leader (Chris PM)	May-14	Jul-13	100%
3.01a	1	4.1 (G) 2012RMIP (G3)		Water age is high in the Spring Mt & 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).	The decommissioning of Pub Lane was scheduled for the 2013/14 summer, once Round Mountain reservoir was commissioned (May'14) however there are delays with the resolution of New Beith Water allowance from Seqwater.	Product Quality Program Leader (Chris PM)	Mar-14	Jun-15	80%
3.01b	1	4.1 (G)		-	Summarise risk assessment outcomes for "additional preventative measures" and assess implementation.	Individual risk assessment were undertaken for new chlorine dosing systems as they were implemented: Illaweena & Greenbank reservoirs commissioned Jun'14; Travis rd reservoir commissioning scheduled Aug'14; & Logan East Booster Stations - suitable sites currently being assessed. Two Strategy Projects will help assess implementation effectiveness with results to be reviewed 2015. LWA 90-12-97 Network Water Quality Maintenance Strategy (2014-2015). LWA 90-12-98 Network Water Quality Operating Strategy (2014-2015).	Product Quality Program Leader (Chris PM)	Oct-13	Jun-15	80%
3.02	1	4.2 (G)		3.2 Critical Control Points	DWQMP Rev4 had no clear established CCPs with Rev3 CCPs not meeting the CCP decision tree criteria, specifically timeliness response to alert limits. CCPs need to be re-assessed.	Re-assess and establish CCPs via workshop post 2013 risk assessment. *Determine CCP using Decision Tree and establish Targets, Alert limits + Critical limits. *Use latest Logan River PS SCADA trends since commissioning.	Post risk assessment workshops, HACCP workshop were undertaken to determine CCP for LCC with Logan River PS chlorine dosing system identified as CCP and limits generated.	Senior Water Quality Scientist (Natasha G)	Jul-13	Jul-13
3.03	1	4.2 (R) DOS 1.0	-		Establish operational and communication protocols including SCADA system set-up and field work via workshop with key stakeholders for LCC dosing systems.	WOP DM#8462220 (Logan River) & WOP DM#8462187 (Other) completed & implemented. Annual review required to ensure processes are relevant and effective.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Feb-14	100%
3.04	1	4.2 (R) DOS 1.0	-		Establish CCP operational and communication protocols including SCADA system set-up and field work via workshop with key stakeholders (Logan River Breakpoint Dosing System).	WOP DM#8462220 completed & implemented. Annual review required to ensure processes are relevant and effective.	Mech & Elec Operations Program Leader (Darshan U)	Feb-14	Feb-14	100%
3.05	1	4.2 (R) DOS 1.0	-		Implement CCP operational protocols with key stakeholders.	WOP DM#8462220 completed & implemented. Annual review required to ensure processes are relevant and effective.	Mech & Elec Operations Program Leader (Darshan U)	Feb-14	Feb-14	100%
3.06	2	4.2 (G) 2012RMIP (G5)	-		Document CCP in latest DWQMP. Undertake annual review or risk assessment change or significant process change.	WOP DM#8462220 completed & implemented. Annual review required to ensure processes are relevant and effective.	Senior Water Quality Scientist (Natasha G)	Jun-14	Feb-14	100%
Element 4: Operational procedures and process control										
4.01	1	5.1 (G)	4.1 Operational Procedures	Current operations manual missing some procedures that would be expected from a water utility (e.g. disinfection, flushing of mains etc)	Consolidate current known SOPs under specific sub-headings (operations, customer management, lab services, etc) in DWQMP Rev 5.1. See below for more details.	Complete & DWQMP Rev5.1 updated.	Senior Water Quality Scientist (Natasha G)	Aug-13	Aug-13	100%

Item	Priority (1, 2 or 3)	DWQMP Section Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
4.02a	1	5.1 (G)	4.1 Operational Procedures	Operational procedures not clearly defined in a single document - uncertainty amongst staff members as to which procedures are in use, some SOPs outdated.	Commence review, identify and update any outdated or missing SOPs, including non-routine SOP as per new/changed systems & Internal Audit Report findings (eg chemical acceptance at receipt; chemical handling and operation; operation of Logan River PS Breaches)	DM# 8034230 (WOP status report). Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Commence by Jul-13	Feb-14	100%
4.02b	1	5.1 (G)		Need to ensure newly commissioned chlorine dosing systems have relevant SOP developed.	Greenbank & Illaweena reservoir dosing systems recently commissioned Jun'14 with Travis Rd reservoir dosing system planned to be commissioned 2014/15 FY.	DM# 8034230 (WOP status report) SOPs being developed for recently commissioned Greenbank, Illaweena & Travis Reservoir chlorine dosing systems (Jun-Aug'14).	Mech & Elec Operations Program Leader (Darshan U)	Commence by Jul-14	May-15	20% (NEW)
4.03	1	5.1 (G)		SOP - Notification of Live Connections (i.e. Mains) - responsibilities not clear.	SOP - Acceptance of new water mains - water quality compliance responsibilities to be finalised. WSA document used as guide (WSA 03-2011-3.1). WOP604 (interim SOP). PRIVATE WORKS	Acceptance of new water mains - water quality compliance responsibilities finalised using WSA document used as guide (WSA 03-2011-3.1). DM#8472016	Water Development Services Policy Coord. (Tim Donovan)	Nov-13	Nov-13	100%
4.04a	1	5.1 (R) DIS 1.0		Internal Audit (2013) - large gaps and dirt close to vent holes found.	Review current Reservoir inspection list and update as required (WOP 202 DM#3332365). Review condition of other reservoirs in relation to gaps, vermin proofing, etc.	Ad hoc reservoir audits, additional to planned periodic inspections, to identify and fix any immediate concerns.	Senior Water Quality Scientist (Natasha G)	Mar-14	Mar-14	100%
4.04b	1	5.1 (R) DIS 1.0		Internal Audit (2013) - large gaps and dirt close to vent holes found.	2. LONG TERM: Develop and implement Reservoir Inspection training to Operational staff.	Development of training material commenced and still to be finalised. Implement 2015. Incorporate reservoir inspections in internal audit plan for 2015 implementation.	Senior Water Quality Scientist (Natasha G)	Mar-14	Mar-15	20%
4.05	1	5.1 (R) WOS 2.0		Risk Assessment: Private Works - Same staff work on wastewater and water systems and potentially same tools and equipment used. Need to confirm and develop disinfection of tools & equipment SOP.	Private Works - review develop disinfection of tools and equipment SOP. Need to confirm what Contractors do.	Separate tools used with Mech & Elec and disinfection occurs hence SOP to be documented. Draft SOP commenced. Need to confirm what Contractors do.	Network Operations & Maint. Program Leader (Angus H.)	Mar-14	May-15	50%
4.06	1	5.1 (R) WOS 2.0		Risk Assessment: No formal potable water hygiene practises SOP exists.	Review & potentially develop formal Potable Water Hygiene Practises SOP and incorporate into future inductions and sign off (Staff & Contractors).	Formal process not yet commenced and needs to align with recently endorsed Drinking Water Quality Policy Statement. Incorporate once Item 1.02 commences.	Senior Water Quality Scientist (Natasha G)	Jun-14	Jun-15	0%
4.07a	1	5.1 (R) DIS 4.0 WOS 2.0 2012RMIP (G7)		Risk Assessment: Need to confirm what flushing system is used when mains has been not used for some time.	Review SOP - Flushing & Disinfection of Mains post repairs and testing assets that have been out of service for a period (> 4 weeks).	WOP 408 DM#8455281 Flushing & Scouring of Water Mains documented Jul'13. Minor amendments required. WOP 404 DM#2994513 Water Mains Breaks - Reticulation developed.	Network Operations & Maint. Program Leader (Angus H.)	Feb-14	May-15	60%
4.07b	3	2012RMIP (G6)		2012RMIP (G6) To reduce the risk of contamination from properties without backflow prevention devices.	2012RMIP (G6) Undertake project to identify the unmetered properties & install a meter with backflow prevention (ongoing project).	New properties require backflow prevention. Residual project from Allconnex period where existing properties were mainly located in Gold Coast areas. Investigate if project still required.	Network Operations & Maint. Program Leader (Angus H.)	Feb-14	TBC	
4.08a	1	5.1 (R) DIS 1.0		Risk Assessment: Reservoir levels managed to minimise detention time and maintain chlorine residual	Formalise Reservoir level management SOP/Protocol using LWA reservoir modelling results.	Reservoir management protocols for Winter/Summer operations have been implemented & incorporated into Seqwater Operating Protocol.	Mech & Elec Operations Program Leader (Darshan U)	Feb-14	Nov-13	100%
4.08b	1	5.1 (R) DIS 1.0		Risk Assessment: Reservoir levels managed to minimise detention time and maintain chlorine residual	Formalise Reservoir level management SOP/Protocol using LWA reservoir modelling results.	Await adoption of LWA Task # 90-12-12 Logan North Water Supply - Reservoir Reliability Assessment report recommendations - partial implementation (1 & 3 implemented with 2 still required).	Mech & Elec Operations Program Leader (Darshan U)	Feb-14	May-15	60%
4.09	1	5.1 (R) DOS 1.0 SEQ 1.0		Risk Assessment: The need for disinfection would only apply if recieval water was not adequately disinfected. Online monitoring exists at entry points with alarms. Kimberly Park (Seqwater) LCC requires read access to online monitoring.	1. Arrange online read access to Seqwater online water quality SCADA monitoring via Seqwater Protocol (Kimberley Park, Kuraby & Chambers Flat). 2. Determine when Seqwater's Kuraby Reservoir chlorination dosing system will be installed.	Interfaces between Seqwater 's PLCs and LCC RTUs have been completed with mimics to be finalised.	Mech & Elec Operations Program Leader (Darshan U)	Feb-14	Feb-15	95%

Item	Priority (1, 2 or 3)	DWQMP Section Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
4.10	1	5.1 (G)		During Audit (June 2013), procedures were not known or followed and documented.	1. Ensure Corrective Action (i.e. control excursions of operational parameters) incorporated into SOPs. 2. Develop process for implementation of operational SOPs.	DM# 8034230 (WOP status report) WOP DM#8462220 completed & implemented & refer to Item 4.02b. Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Feb-14	100%
4.11	1	5.2 (G)	4.2 Operational Monitoring	No clear operational monitoring program currently in place. Develop and show how link to corrective actions by operations. Also relate to SCADA. Some Operational monitoring occurs as part of the Lab's Verification Monitoring program (i.e. HPC, etc)	Commence: 1. Identify operational monitoring parameters. 2. Determine if related SOPs exist or need to be developed; incorporate related SCADA (trends/events/alarms) and management of excursions, including reporting responsibilities. 3. Review operational	Informal processes exist including review of weekly lab reports, flushing program and SCADA trend reviews. Formalisation will commence post LWA project findings and recommendations. LWA 90-12-97 Network Water Quality Maintenance Strategy (2014-2015). LWA 90-12-98 Network Water Quality Operating Strategy (2014-2015).	Senior Water Quality Scientist (Natasha G)	Mar-14	2015/16	40%
4.12	1	5.2 (R) DOS 2.0		Risk Assessment: Breakpoint chlorination is particularly sensitive to small changes in %conc of hypo chlorite.	Verify chlorine auto trim can maintain stable chlorine residual (Logan River PS Breakpoint chlorination system).	Auto trim commenced. Changes from PLC to RTU completed to help simplify hardware and give improved control of system. Auto trim dose procedure included in SOP. Adjustments to changed hypo conc now available. Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Feb-14	Feb-14	100%
4.13	1	5.2 (G)	4.2 Operational Monitoring	No clear operational monitoring plan currently in place.	1. Ensure Corrective Action (i.e. control excursions of operational parameters) incorporated into SOPs. 2. Develop process for implementation of operational SOPs.	DM# 8034230 (WOP status report) WOP DM#8462220 completed & implemented & refer to Item 4.02b. Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Feb-14	100%
4.14	1	5.2 (G)	4.3 Corrective Action	No clear documented SOPs for corrective action to control excursions in operational parameters. (Low Risk Levels 1 & 2)	1. Ensure Corrective Action (i.e. control excursions of operational parameters) incorporated into SOPs. 2. Develop process for implementation of operational SOPs.	DM# 8034230 (WOP status report) WOP DM#8462220 completed & implemented & refer to Item 4.02b. Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Feb-14	100%
4.15	1	5.2 (G)		1. Develop and establish centralised corrective action process across LCC Water Branches. Must be documented and allow for trail (i.e. tracking & prioritisation). Responsibilities need to be developed and understood. 2. Develop appropriate SOP.	Intellex system being developed as a Corrective Action tool to allow for communication trail. WQ Non Conformances implemented. Need to expand to include audit findings and near misses too. Long Term: Implementation process required across all 3 Water Branches required.	Senior Water Quality Scientist (Natasha G)	Mar-14	Jun-15	30%	
4.16	1	5.3 (G)		-	Refer to ERP.	Refer to Item 6.00.	Senior Water Quality Scientist (Natasha G) & Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Jun-14	100%
4.17	2	5.4 (G)	4.4 Equipment capability and maintenance	Maintenance system captures this well (MEX & UMD).	Annual review.	Current MEX system captures this well. SHORT TERM: WWETT system established for work orders and customer complaints (Feb'14) LONG TERM: SAMMS system being developed to encompass business wide system (see 5.2). Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Jun-14	Feb-14	100%
4.18	2	5.4 (G)		Reservoir inspections and cleans were found to be overdue (i.e. 3 mthly reservoir inspections are often 1-2 mths overdue and 2 yearly clean up to one year overdue).	RESERVOIRS 1. Ensure schedules are followed and not significantly over-due (eg reservoir inspections & cleans). 2. Annual review to ensure schedules are appropriate via internal audit process.	Audit system would identify non-conformances. Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Jun-14	Jun-14	100%
4.19	2	5.4 (G)			OTHER EQUIPMENT 1. Ensure schedules are followed and not significantly over-due and follow vendor maintenance requirements. 2. Annual review to ensure schedules are appropriate via internal audit process.	Audit system would identify non-conformances. Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Jun-14	Jun-14	100%

Item	Priority (1, 2 or 3)	DWQMP Section Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
4.2a	2	5.5 (R) DOS 2.0 WOS 2.0	4.5 Materials and chemicals	No formal approved materials & chemicals register exists.	Develop Chemical Supply and Materials procurement register, incorporating AS4020 requirements.	LCC Procurement Terms & Conditions exist for supplier requirements for product supplied to "meet all AS" & "fit for purpose." Council's obligation to meet SEQ Design and Construction Code Section I4.1 "requires that all materials used in constructing drinking water systems comply with AS/NZS 4020."	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Jun-15	100%
4.2b	2	5.5 (R) DOS 2.0 WOS 2.0		No formal approved materials & chemicals register exists.	Develop Chemical Supply and Materials procurement register, incorporating AS4020 requirements.	Formal register to be developed.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Jun-15	10%
4.2c	2	5.5 (R) DOS 2.0 WOS 2.0		No formal approved materials & chemicals register exists.	Formalise chemical supply agreement (i.e. quality & delivery schedule).	Due to small volumes of hypo delivered, informal agreement currently exists with reference to WOP DM#8462220. Review of terms commenced and to be finalised & implemented.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Jun-15	50%
4.2i	2	5.5 (R) DOS 2.0		No formal chemical SOP exists, reviewing quality.	Develop Chemical acceptance SOP, that evaluates quality at receipt (specifically hypochlorite).	WOP DM#8462220 (incl chemical acceptance, handling, dosing & operation). Annual review required to ensure processes continue and are effective.	Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Feb-14	100%
Element 5: Verification of Drinking Water Quality										
5.1 Drinking water quality monitoring										
5.00	1	6.1 (G)	5.1 Drinking water quality monitoring	2012/2013 monitoring program is currently being reviewed to meet Legislative requirements (i.e. no. sites per population requirements) and outcomes from Water Age Modelling (LWA project).	Review Verification Monitoring program to meet associated risk to verify minimisation of potential risks (eg. THM for chlorinated system) & Water Age study.	THM testing now undertaken as part of routine verification monitoring program. Annual review required.	Senior Water Quality Scientist (Natasha G)	Oct-13	Feb-14	100%
5.01	1	6.1 (G)		Regular review & ensure new 2013/2014 Monitoring program is adequate.	1. Review and revise water monitoring program to incorporate revised water supply zones, key reservoirs, appropriate No. per population and good sampling spread, incorporating LWA Water Age Modelling recommendations. Aim to implement changes in new FY.	Complete.	Senior Water Quality Scientist (Natasha G)	Aug-13	Aug-13	100%
5.02	1	6.1 (G)		-	Review new 2013/2014 Monitoring program and identify any issues in relation to sampling No.(i.e. Marsden), locations & frequency. Tap audit - includes tap conditions/labelling, OH&S, GIS updates.	Tap audit developed & commenced. Tap Audit not only incorporates legislation requirements but also OH&S, recent implemented LIMS and future SAMMS requirements.	Water Quality Officer (Jamie B)	Oct-13	Feb-15	50%
5.03	1	6.1 (G)		-	Update monitoring program 2013-2014 handbook with new site photos.	Commenced & ongoing. Will need to capture any new information from Tap Audit outcomes. Annual review required to ensure processes continue and are effective.	Water Quality Officer (Johanna J)	Mar-14	Jun-14	100%
5.04	2	6.1 (G)		Regular review & ensure new 2013/2014 Monitoring program is adequate.	Review new 2013/2014 Monitoring program and identify any issues in relation to data being representative. Update as required.	Inform Water Regulator of any major changes to Verification Monitoring program. Annual review required to ensure processes continue and are effective.	Water Quality Officer (Jamie B)	Jun-14	Jun-14	100%
5.05	1	6.2 (G)		5.2 Consumer Satisfaction	Various "disjointed" customer complaint systems exist (i.e. pathways, UMD, Lab database, CM database (emails/letters), etc) and need to review and establish responsibilities & reporting requirements since Allconnex dissolution.	Identify number of current systems capturing Customer Complaints (via phone calls and letters/emails).	Complete. This was required to generate monthly reports and regulatory Annual Report. Note WWETT system replaced UMD system Feb'14, which captured phone call complaints. Written complaints captured via DM system.	Senior Water Quality Scientist (Natasha G)	Feb'14	Feb'14
5.06	1	6.2 (G)	-		Development interim database to capture Customer Complaints from all current systems, for reporting requirements and process improvement opportunities.	Complete. This was required to generate monthly reports and regulatory Annual Report. Note WWETT system replaced UMD system Feb'14, which captured phone call complaints. Written complaints captured via DM system.	Water Quality Officer (Jamie B)	Oct-13	Feb'14	100%
5.07	2	6.2 (G)	-		Review current consumer complaints & response SOPs (i.e. Lab, operations, product quality, customer service centre) and identify opportunities for improvements specifically responsibilities and reporting requirements and system improvements (eg improved Pathway set-up to easily capture Consumer Complaint categories & UMD number, training Customer Service staff in Water Quality, etc).	Refer to Item 5.08	Senior Water Quality Scientist (Natasha G)			
5.08a	3	6.2 (G)	Develop and implement one Customer Complaints and satisfaction system across the business. Ensure appropriate targets are set and reported on.		Review current consumer complaints & response SOPs (i.e. Lab, operations, product quality, customer service centre) and identify opportunities for improvements specifically responsibilities and reporting requirements and system improvements (eg improved Pathway set-up to easily capture Consumer Complaint categories & UMD number, training Customer Service staff in Water Quality, etc). Long term investigation is taking place to look at "one" Customer RM system, integrated with other systems (i.e. asset mgt, etc). Consultant engaged to scope works.	INTERIM: Replacement of UMD system with WWETT completed by Consultant. WWETT system replaced UMD & Lab spreadsheet. Written complaints via DM system. Water & Wastewater Event Tracking Tool (WWETT) Training Manual developed.	Business & Customer Mgt Program Leader (Michael K)	Jun-15	Feb'14	100%

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5.08b	3	6.2 (G)	5.2 Consumer Satisfaction	Develop and implement one Customer Complaints and satisfaction system across the business. Ensure appropriate targets are set and reported on.	Review current consumer complaints & response SOPs (i.e. Lab, operations, product quality, customer service centre) and identify opportunities for improvements specifically responsibilities and reporting requirements and system improvements (eg improved Pathway set-up to easily capture Consumer Complaint categories & UMD number, training Customer Service staff in Water Quality, etc). Long term investigation is taking place to look at "one" Customer RM system, integrated with other systems (i.e. asset mgt, etc). Consultant engaged to scope works.	LONG TERM: Customer Service audit undertaken by external provider. Software Asset Maintenance Mgt System (SAMMS) investigation commenced by external provider. Anticipate a CRM system will follow once SAMMS implemented. Limited by Corporate initiatives.	Business & Customer Mgt Program Leader (Michael K)	Jun-15	TBC	40%
5.09	2	6.3 (G)	5.3 Short term evaluation of results	Informal review of weekly/monthly lab and SCADA data currently undertaken.	Formalise water quality monitoring data review SOPs, including customer satisfaction.	Continue informal weekly review of WQ until LIMS Datapipe/Kiwi system is implemented, including associated WQ database established in the interim. WWETT system replaced UMD to manage current customer complaints via phone calls if which WWETT SOPs exist & FN# written complaints & enquiries. Water & Wastewater Event Tracking Tool (WWETT) Training Manual developed.	Senior Water Quality Scientist (Natasha G)	Jun-14	Aug-15	50%
5.10	2	6.3 (G)		Weekly & monthly verification monitoring data is reported and water quality business KPIs are reported monthly.	Annual review of water quality business KPIs.	Already occurs. Ongoing.	Senior Water Quality Scientist (Natasha G)	Jun-14	Jun-14	100%
5.11	1	6.4 (G)	5.4 Corrective Action	No formal corrective action system currently exists.	Establish Corrective Action system.	Intellex system developed as a Corrective Action tool to allow for communication trail for Non-Conformance however SOP to be developed.	Senior Water Quality Scientist (Natasha G)	Mar-14	Jun-15	60%
5.12	1	6.4 (G)					Senior Water Quality Scientist (Natasha G) & Mech & Elec Operations Program Leader (Darshan U)	Mar-14	Jun-14	100%
Element 6: Management of Incidents and Emergencies										
6.00	1	7.1 (G)	6.1 Communication	LCC ERP exists however currently under review since Allconnex dissolution July 2012. Formal staff ERP awareness and training not currently undertaken to understand their reporting responsibilities. High Risk level (Level 3 to 5).	LCC's ERP currently under review to align with Seqwater's ERP, which is also currently under review. Develop ERP SOPs (include Nonconformances) and implement across LCC Water business ensuring appropriate awareness and training, understanding roles and responsibilities.	External provider engaged to desktop review ERP, which was updated with annual review in place including staff awareness training.	Business & Customer Mgt Program Leader (Michael K)	Mar-14	Jun-14	100%
6.01	1	7.1 (G)		Refer to Element 6.1.1	Marketing & Media Branch.	Marketing & Media Branch form part of the ER team and provide advice and release of media information to the public relating to water quality changes & projects.	Business & Customer Mgt Program Leader (Michael K)	Mar-14	Mar-14	100%
6.02	1	7.2 (G)	6.2 Incident and emergency response protocols	Refer to Element 6.1.1	Refer to Item 6.00.	Incorporated into current ERP.	Business & Customer Mgt Program Leader (Michael K)	Mar-14	Jun-14	100%
6.03a	1	7.2 (G)		Not undertaken internally, only via Seqwater Grid.	Arrange at least one internal ERP test per year.	ERP familiarisation exercise undertaken by external provider with key staff. Record keeping, documentation & notification improvements required. ERP familiarisation is a Business Plan action (2014/15).	Business & Customer Mgt Program Leader (Michael K)	Apr-14	Apr-14	100%
6.03b	1	7.2 (G)		Not undertaken internally, only via Seqwater Grid.	External exercise involving Seqwater Grid.	Exercise Hydra planned Oct'14 (Seqwater Grid) DM#9187691.	Business & Customer Mgt Program Leader (Michael K)	Oct-14		NEW
6.04	2	7.2 (G)		Review whether to revise ERP protocol post incident not formally undertaken.	Investigate effectiveness of ERP SOPs post ERP incident.	Review of ERP effectiveness undertaken post Seqwater Grid Hydra exercises, undertaken annually.	Business & Customer Mgt Program Leader (Michael K)	Jun-14	Oct-13	100%
Element 7: Employee Awareness and Training										

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7.00	2	8.1 (G)	7.1 Employee awareness and involvement	External & OH&S training well documented however internal "on-the-job" training not.	1. Develop and implement appropriate Training Needs and register/document training delivered. Incorporate into Water Branch inductions. 2. Potentially expand old EMS style register to include "on-the-job" training for all Water Branches.	1. Identify: Identify roles & WQ awareness & competency training requirements. May include development of new training material (i.e. Item #1.02) &/or sourcing external provider. 2. Tool: Learning Management System LCC corporate tool has been established for OH&S, Organisational Development & External training. Investigate if this tool can be expanded for "on-the-job" training. 3. Establishment & Operation: If tool above is appropriate, appropriate resources required for initial set-up & establishment with ongoing operation of the training system for each Water Branch.	Water Branch Managers (Daryl R) (Palith S) (Tony G)	Mar-14	Jun-16	10%
7.01	2	8.2 (G)	7.2 Employee training	External & OH&S training well documented however internal "on-the-job" training not.	Refer to ADWG 7.1.1 action above (incorporate into Register discussed above).	Refer to Item 7.00.	Water Branch Managers (Daryl R) (Palith S) (Tony G)	Mar-14	Jun-16	10%
Element 8: Community Involvement & Awareness										
8.00	2	9.1 (G)	8.1 Community consultation	2012 Logan Listen's Residence Survey indicates 8.5% customers are dissatisfied with drinking water quality.	Review results from annual Logan Listen's Residence Survey.	Process Improvement kickoff presentation Mar'14 reviewed direct link of Logan Listen results with customer complaints data with key focus being dirty water complaints. Survey undertaken with Meadowbrook residents resulted in encouraging customers to phone Council if they experience water quality concerns & Disinfection Maintenance Program undertaken Jun-Aug'14. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Feb-14	Mar-14	100%
8.01	3	9.1 (G)		-	-	-	-	-	-	-
8.02	2	9.2 (G) 2012RMIP (G11 & G12)	8.2 Communication	No water quality reports currently exist on LCC website, like other water service providers do.	Place a public equivalent LCC Annual Water Quality Report on LCC website and other helpful information about water quality and management. - use & maintenance of trickle feed systems.	External provider engaged to finalise water quality fact sheets (i.e. hardness, fluoride, how to protect your water supply, trickle-feed management, etc) be displayed on LCC website. Also refer to Item 10.07.	Business & Customer Mgt Program Leader (Michael K)	Feb-14	May-15	50%
Element 9: Research & Development										
9.00	1	10.1 (G)	9.1 Investigative studies and research monitoring		Maintain register of projects and programs that address R&D. Particularly those conducted by the Alliance.	Extensive list of improvement projects maintained by Infrastructure Planning team. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Jul-13	Jun-14	100%
9.01	2	10.1 (G)			Update RMIP to incorporate process improvements.	Ongoing as part of a number of improvement studies undertaken by the current LWA. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Mar-14	Mar-14	100%
9.02	2	10.2 (G) 2012RMIP (G13)	9.2 Validation of processes	Review Logan River Breakpoint chlorination dosing system required, commissioned Dec12. 2012RMIP Consider emergency supply from Springwood Low (chloraminated).	Review effectiveness of Logan River Breakpoint chlorination dosing system at maintaining chlorine residual. Logan East conversion to chloraminated water during Winter also considered dependant on chlorine residual.	A review of the Operation of the Logan River Pumping Station & Chemical Dosing System was undertaken, providing recommendations for improvements. Implementations for review and adoption 2014/15. LWA - 90-12-35 & DM#9068673.	Senior Water Quality Scientist (Natasha G)	Nov-13	Aug-14	100%
9.03	2			Review of Logan North Disinfection Maintenance Program required, which was undertaken 2012 (i.e. Kimberly Park).	Review Logan North Kimberly Park Chlorine "Disinfection Maintenance" effectiveness.	Results presented and used to assist with the planning and implementation of the Logan North (Marsden/Greenbank WSZ) Disinfection Maintenance Program. LWA 90-12-36 & DM#9138554.	Product Quality Program Leader (Chris PM)	Nov-13	Mar-14	100%
9.04a	1			Poor residual disinfection in Marsden and Greenbank water supply zones during Summer periods.	Breakpoint chlorination systems to be instigated (Illaweena & Greenbank Reservoirs) - The Logan North (Marsden/Greenbank Water Supply Zone (WSZ)) Disinfection Maintenance Program.	Breakpoint chlorination system commissioned & implemented as part of the Logan North (Marsden/Greenbank WSZ) Disinfection Maintenance Program Jun-Aug'14. LWA 90-12-37 & DM#9138554.	Product Quality Program Leader (Chris PM)	Jun-14	Aug'14	100%
9.04b	1			Poor residual disinfection in Marsden and Greenbank water supply zones during Summer periods.	Breakpoint chlorination systems to be instigated (Illaweena & Greenbank Reservoirs) - The Logan North (Marsden/Greenbank Water Supply Zone (WSZ)) Disinfection Maintenance Program.	Next steps will be to review effectiveness of Disinfection Maintenance Project: LWA 90-12-97 Network Water Quality Maintenance Strategy.	Product Quality Program Leader (Chris PM)	Jun-15		30% (NEW)
9.04c	1	2012RMIP (G9)		2012RMIP Increase turn-over in "dead" spots.	Investigate the possibility to relocate the overhead fill points for water tankers to increase turnover in dead spots.	Additional fill points project being undertaken with hydrant fill points replacing overhead fill points.	Business & Customer Mgt Program Leader (Michael K)	Feb-14		100%
9.05	3	10.2 (G)								

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9.06	2	10.2 (G)	9.3 Design of equipment	Document the design approaches used to ensure appropriate equipment deployed.	Document the design approaches used to ensure appropriate equipment deployed.	Exists with current LWA however needs to be reviewed in set-up of new Alliance.	Product Quality Program Leader (Chris PM)	Jun-15	-	NEW
Element 10: Documentation & Reporting										
10.00	2	11.1 (G)	10.1 Management of documentation and records	Various doc mgt systems exist across the various Water Branches since Allconnex dissolution. DWQMP Rev 5.1 has documented SOPs known to date.	Commence development of WB doc mgt system template.	System Frame Establishment: Investigate current management tool to meet requirement needs. Water Ops & Lab has established system.	Product Quality Program Leader (Chris PM)	Nov-13	Jun-15	30%
10.01	2	11.1 (G)		-	Refer to Item 10.00.	Refer to Item 10.00	Product Quality Program Leader (Chris PM)	Feb-14	Dec-15	0%
10.02	2	11.1 (G)		-	Refer to Item 10.00.	Refer to Item 10.00	Product Quality Program Leader (Chris PM)	Feb-14	Jun-16	0%
10.03	2	11.1 (G)		Some SOPs have not been reviewed from some time.	Refer to Item 10.00.	Refer to Item 10.00	Product Quality Program Leader (Chris PM)	Jun-14	Jun-16	0%

Item	Priority (1, 2 or 3)	DWQMP Section Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
10.04	2	11.2 (G)	10.2 Reporting	Various internal/external WQ reports are generated with no formal procedures.	Ensure register of reports is maintained and associated procedures developed.	Report register commenced & located in DWQMP Rev5.1. Formal SOP to be developed. Annual review required to ensure processes continue and are effective.	Water Quality Officer (Jamie B)	Mar-14	Mar-15	80%
10.05	1	11.2 (G)		Require development of a standard internal monthly report that works for all areas of Water Branch.	1. Display Monthly Water Business Reports on Water Knowledge database (i.e. Water Wiki).	Monthly Water Business report process established & displayed on Intranet (Waterwiki)	Business & Customer Mgt Program Leader (Michael K)	Dec-13	Dec-13	100%
10.06	1	11.2 (G)		Annual WQ report required once DWQMP has been approved by Water Regulator. No Annual Report guidelines currently exist from WR.	Generate Annual water quality report using WR guidelines.	DEWS template established and followed. 2012/13 DWQMP Annual report developed and approved by DEWS.	Senior Water Quality Scientist (Natasha G)	Dec-13	Dec-13	100%
10.07	2	11.2 (G)			Place LCC Annual Water Quality Report on LCC website.	External provider engaged to finalise & help provide Annual Water Quality Reports on LCC website. Website display of annual report will be a DEWS requirement for 2014/15FY.	Business & Customer Mgt Program Leader (Michael K)	Feb-14	May-15	50%
Element 11: Evaluation of Audit										
11.00	1	12.1 (G)	11.1 Long term evaluation of results	Long term data is not evaluated or documented.	Undertake "long-term" trend analysis, evaluate performance and identify opportunities for improvements. Commence development of effective water quality database (link with LIMS) to be able to assess WQ trends.	Water Quality Officer engaged to assist with database development & WQ analysis. Medium/Long term trends of reservoir chlorine residual currently being evaluated via Process Improvement team. LONG TERM: LIMS implemented Jul'14 with Datapipe / KIWI to follow to allow effective long term data trending of more parameters, hence revised Finish date. Refer Item 11.01.	Water Quality Officer (Jamie B)	Oct-13	Jun-15	60%
11.01a	1				Reference from Item 2.08 Implement "Process Improvement" team to undertake regular review of data trends (include staff from operations and product quality team).	Process Improvement training commenced with cross functional team and trend analysis undertaken Feb'14. Next meet Oct'14 with quarterly meetings scheduled with initial focus on reservoir chlorine residuals. (meeting minutes DM#9240075). Implementation of Datapipe / KIWI Jul'15 will assist team with effective data analysis tool. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Oct-13	Feb-14	100%
11.01b	1	2012RMIP (G14)		2012RMIP There have been a number of pH incidents in Logan South, however Seqwater has not identified any pH incidents in their quarterly summary.	2012RMIP Investigate why there is a discrepancy in results & determine if there are any possible local issues such as concrete pipes, causing high pH.	Recent review of water quality has not shown this trend to continue however will continue to monitor as part of Process Improvement Team in long term trends. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Dec-13	Feb-14	100%
11.02	1	12.1 (G)			Long term data is not evaluated or documented.	Develop and document findings in Process Improvement - Water Quality Report. Initiate Process Improvement presentation of findings - at least twice per year & at a Seqwater Technical forum. Document information in the annual report for Water Regulator.	Process Improvement training commenced with cross functional team and trend analysis undertaken Feb'14. Next meet Oct'14 with quarterly meetings scheduled with initial focus on reservoir chlorine residuals. (meeting minutes DM#9240075). Tap Audit findings presented at SEQ WQ Technical forum. Implementation of Datapipe / KIWI Jul'15 will assist team with effective data analysis tool. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Mar-14	Jun-14
11.03	2	12.2 (G)	11.2 Audit of drinking water quality management	Internal audit undertaken & presented 6June13, however processes for annual audit not yet established.	Establish Internal Annual audit review process. Investigate use of Intellex system and WSA-AQuality audit tool (i.e. get feedback from other service providers effectiveness of tools).	Tender request has been executed for annual non-regulatory audit by external provider. Internal audit plan to be developed and commence implementation by LCC staff by 2014/15.	Senior Water Quality Scientist (Natasha G)	Jun-14	May-15	20%

Item	Priority (1, 2 or 3)	DWQMP Section ral Improvement (Audit) Risk Assessment	ADWG Element & Component	Issues / Risks	Key Actions	CURRENT STATUS COMMENTS (As of end June 2014)	LEAD			% Complete
11.04	3	12.2 (G)		Lack of appropriate internal auditor skills.	Develop internal auditor skills and aim to gain RABQ auditor qualifications.	Lead auditor training undertaken Jun'14 and ISO22000 HACCP training Aug'14. Need to apply the skills by undertaking internal audits.	Senior Water Quality Scientist (Natasha G)	Jun-15		50%
11.05	3	12.2 (G)		External audit processes not yet established	Undertake external audit (then every 4 years). Investigate use of Intellex system.	Regulatory external audit not required until June 2017 .	Senior Water Quality Scientist (Natasha G)	Jun-17		
11.06	1	12.2 (G)		Does not yet occur and is not planned and documented.	1. Present Internal Audit review (June 13) to Water Branch staff. 2. Summarise the Internal Audit review results for communication in the annual report (Dec 2013).	1. Complete. 2. Complete Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Dec-13	Dec-13	100%
		12.2 (G)	Element 12: Review & Continual Improvement							
			12.1 Review by senior executive							
12.00	2	12.2 (G)		Ongoing review required which is not currently undertaken except recently the following presented to senior managers & DCEO: 1. DWQMP Rev 4 gap analysis undertaken May 2013 (assisted by external provider). 2. Internal Audit review findings - June 2013 (assisted by external provider).	Undertake & present annual audit review findings highlighting RMIP effectiveness in achieving Target Goals, reflecting audit findings.	Senior Executive involved in following review teams: 1. RMIP - kicked off Feb 2014, with regular reviews required. 2. Process Improvement team kicked off Mar 2014, now meeting quarterly with distribution of minutes. 3. Audit findings presentations, including senior management training refreshers. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Oct-14	Nov-14	100%
12.01	2	12.2 (G)		Annual review of audit findings and identification of "none actions" trends which could impact business.	Annual review of audit findings, identifying trends.	1. Key audit finding actions incorporated into RMIP, which is reviewed at least annually - complete. 2. Development of internal Audit required & ensure findings captured & communicated to senior mgt - Feb 2015. 3. Engagement of external provider to undertake annual non-regulatory audit & present findings - Mar 2015. Tender request has been executed (see 11.2.1). Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Oct-14	Jun-15	50%
12.02	1	12.2 (G)		12.2 Drinking water quality management improvement plan (RMIP)	RMIP from Rev4 exists however has not been communicated nor reviewed since generated, which mainly includes LWA projects. Does not include risks associated with system changes since July 2012 nor recent audit findings.	Develop RMIP from recent internal gap analysis, internal audit review and risk assessment undertaken. Incorporate into DWQMP Rev 5.1 Appendix.	Extensive RMIP developed and incorporated into DWQMP Rev5.1.	Senior Water Quality Scientist (Natasha G)	Aug-13	Sep-13
12.03	1	12.2 (G)		-	Incorporate DWQMP Rev 4 RMIP updates into new revised RMIP Rev 5.	Completed.	Senior Water Quality Scientist (Natasha G)	Nov-13	Nov-14	100%
12.04	1	12.2 (G)		-	Commence facilitating RMIP review meetings with key internal stakeholders at least twice a year.	RMIP process kicked off Feb 2014. Refinement in process required. Annual review required to ensure processes continue and are effective.	Senior Water Quality Scientist (Natasha G)	Nov-13	Feb-14	100%