



**BLIGH
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Rockhampton Regional Council Drinking Water Quality Management Plan

Audit Report – April 2016

+ DOCUMENT CONTROL SHEET

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Rockhampton Regional Council DWQMP Audit

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VERSION	AUTHOR	REVIEWED	APPROVED	DATE
Draft	Michael Lawrence	Jason Plumb		29 March 2016
Final	Michael Lawrence	Michael Lawrence	Jason Plumb	20 April 2016

+ EXECUTIVE SUMMARY

All drinking water service providers were required to implement approved Drinking Water Quality Management Plans under the *Water Supply (Safety and Reliability) Act 2008*. The Rockhampton Regional Council Drinking Water Quality Management Plan (RRC DWQMP) was approved by the Department of Energy and Water Supply on 18th December 2014, and the Notice for the Decision stated that a regular audit of the plan must be conducted by 31st August 2016.

On 23rd March 2016, the RRC DWQMP was audited to:

- (a) verify the accuracy of monitoring and performance data provided to the regulator
- (b) assess the service provider's compliance with the plan
- (c) assess the relevance of the plan in relation to the provider's drinking water service

Accuracy of monitoring and performance data: There was no data provided to the regulator under the plan in the time period for the audit.

Compliance with the plan: In the opinion of the auditor, based on evidence gathered during the course of the audit, Fitzroy River Water is generally operating in compliance with the approved DWQMP.

A number of improvement items, and one non-compliance have been identified.

Operational procedures. The DWQMP identifies that there are specific operational procedures that are used to manage particular risks. Some, such as the Glenmore O and M manual (QWD Template in preparation) have not been completed and have been identified as an improvement opportunity. However, the Reservoir Disinfection and Inspection Procedure (and Mains Break Repair procedure), identified in the same table, are absent. This has been assessed as a non-compliance with the DWQMP. It is noted that the AWWA book provides best practice examples of these procedures, and practically, this is what is referred to. Therefore, it is recommended that the DWQMP more accurately describe the situation, and how staff are made aware as to the appropriate procedure, and how it is ensured that these are implemented.

A number of improvements have been noted, either as improvements in their own right, or when the item was still compliant, in the comments for each component of the audit. The major improvement item that needs addressing is to continue to maintain focus on ensuring that reservoirs are vermin proofed. This is an ongoing challenge given the design of some reservoirs, and the prevalence of summer storms that can damage roofs and roofing materials, but is essential to ensure that treated water is protected from ingress of vermin to maintain safe water.

Relevance of the plan: The audit focussed on the Glenmore WTP, and the auditor did not inspect the Mount Morgan WTP. Despite Mount Morgan not being inspected, it was made clear that there are capital upgrades to the infrastructure and dosing systems at Mount Morgan that have resulted in some discrepancies with the DWQMP.

It will be important for RRC to ensure that the upgrades are captured in the upcoming review of the DWQMP.

In general, the RRC DWQMP is a high level management, not operational, document. The plan was determined to be accurate in the way that it described the Glenmore WTP, and the risk assessment has identified the key risks to the service. Verification monitoring is undertaken as required under a condition of the approved plan. To the extent that the operation of the drinking water service is described in the DWQMP, the plan is relevant to the service.

+ GLOSSARY

Term	Definition
ADWG	Australian Drinking Water Guideline 6 2011 v3.2 updated February 2016
BWA	Boil Water Alert
DWQMP	Drinking Water Quality Management Plan
ERP	Emergency Response Plan
FRW	Fitzroy River Water
LSC	Livingstone Shire Council
PHR	Public Health Regulation 2005
RRC	Rockhampton Regional Council
WS Act	<i>Water Supply (Safety and Reliability) Act 2010</i>
WPR	Department of Energy and Water Supply, Water Planning and Regulation.
WQ	Water Quality

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1 INTRODUCTION

Rockhampton Regional Council is a registered drinking water service provider under the *Water Supply (Safety and Reliability) Act 2008*. Rockhampton Regional Council developed a Drinking Water Quality Management Plan, and the most recent amendment to that plan was approved by the Regulator on 18th December 2014.

A drinking water provider has an obligation under the Act to comply with the approved plan, and any conditions of the plan. Compliance is assessed in relation to the DWQMP that was subject to the most recent regulatory approval.

The *Water Supply (Safety and Reliability) Act 2008* contains provisions related to auditing the DWQMP; the Notice for the decision required that RRC conduct the audit before 31st August 2016.

Act Requirements relating to audits

The *Water Supply (Safety and Reliability) Act 2008 (the Act)* requires that;

108 Ensuring audits of drinking water quality management plan

(1) A service provider must ensure someone other than the provider does the following, unless the provider has a reasonable excuse—

(a) audits its drinking water quality management plan at the intervals stated in a notice given to the provider under section 99;

(b) prepares a report (a **drinking water quality management plan audit report**) complying with this section about each of the audits;

(c) gives the regulator each report within 30 business days after the relevant audit is completed.

(2) The auditor—

(a) can not be an employee of the provider or employed in operating its infrastructure; and

(b) must—

(i) be certified under the Drinking Water-Quality Management System Auditor Certification Scheme to conduct an audit of the type to which the audit and report relates; or

(ii) have a qualification the regulator is satisfied is at least equivalent to the certification.

(3) The reports must—

(a) verify whether or not the monitoring and performance data given to the regulator under the plan is accurate; and

(b) assess—

(i) the provider's compliance with the plan and its conditions; and

(ii) the plan's relevance to the provider's drinking water service; and

(c) be prepared in accordance with any guidelines made by the regulator.

This report was therefore prepared in accordance with the Drinking Water Quality Management Plan Review and Audit Guidelines (State of Qld, 2013) (the guideline).

Auditor Qualifications and independence

Dr Michael Lawrence is an independent auditor who is certified under the Exemplar Global Drinking Water Quality Management Systems Auditor Certification Scheme as required under the Act (Certificate number 129230, Expiry 18th Sept 2016).

Note: Michael previously worked for the Queensland Water Supply Regulator, however, on advice from Exemplar Global, this is not of itself considered to represent a conflict of interest if revealed to the provider. Thus, the auditor is free from bias or conflict of interest with respect to the audit.

Monitoring and performance data given to the regulator under the plan.

Section 4.3 of the audit guideline states that data provided to the regulator *under the plan* is required to be verified. However, the note clarifies that any reports of non-compliance with water quality criteria are not captured under this provision (this is because reports of non-compliance with water quality criteria are an Act requirement under S102 of the Act).

Therefore, by the same reasoning, DWQMP reports that are provided to the Regulator under S142 *are not captured* under this requirement and do not need to be verified as part of the audit. This interpretation has previously been clarified with the relevant Director in DEWS.

Data provided under the plan: The Notice for the decision approving the RRC DWQMP identifies 4 standard conditions of approval. Condition 2 relates to the reporting of parameters with no water quality criteria. A report relating to the detection of cyanobacteria was made to the Regulator on 8 Dec 2014, but this was prior to the approval of the DWQMP and is out of scope for the audit.

There was no data provided to the Regulator under the plan since 18th December 2014.

Compliance with the plan and its conditions

The audit has assessed RRCs compliance with the plan, and the conditions of approval of the plan.

For example, each of the water treatment barriers at Glenmore Water Treatment Plant was inspected, and the SCADA trends examined to ensure compliance with the DWQMP. Where SCADA trends indicated that the relevant parameter may be out of the stated operational range, this was investigated. For example, by determining whether the plant was operating at the time, and auditing WTP daily plant monitoring sheets and inspecting the WTP diary to identify the cause of the issue, and the actions taken by operators. Photographs provide evidence.

The following sections of the audit report identify the level of compliance with the DWQMP.

The relevance of the plan to the drinking water service

The RRC DWQMP was approved by the regulator and must therefore meet the requirements of the *WS Act*. It is not the role of the auditor to determine the compliance of the plan with the Act requirements. Rather, the audit is required to determine the relevance of the plan to the drinking water service; this was assessed by considering the accuracy of the plan in relation to the service in the context of the Exemplar Global audit standard, which for a water quality management system is the Australian Drinking Water Guidelines (NHRMC 2011). However, in consultation with the provider it was agreed that the audit would not evaluate the ADWG criteria that are not required under the Act if they are not addressed in the current DWQMP. This is in accordance with the relevant regulatory guideline.

Audit methodology

The compliance of RRC with each applicable element and component of the ADWG was assessed against the evidence provided either in the DWQMP, in records of the provider, or as revealed during discussions with key staff members.

Each component was assessed as either compliant or non-compliant, and the decision justified by evidence. In some cases, improvement opportunities were identified, but in most cases these improvements were assessed in the context of improving compliance with the current approved DWQMP, as required under the WS Act.

Infrastructure inspected

Rockhampton Regional Council has two drinking water schemes located in Rockhampton and Mount Morgan.

In consultation with the provider, it was determined that the auditor could form an informed opinion relating to the level of compliance with the plan by inspecting the Rockhampton Scheme only, and **not inspecting** the Mount Morgan infrastructure.

The provider indicated that there are current capital upgrade projects underway at the Mount Morgan WTP, that when complete will include the installation of a new UV disinfection barrier, and upgrades to the chemical dosing systems, such that the current approved plan is becoming outdated. As a result, the DWQMP will require updating either in the forthcoming review (if the works are completed at that time), or shortly thereafter.

Nonetheless, some aspects of the Mount Morgan scheme were audited – for example, verification monitoring data from Mount Morgan was fully audited, and demonstrated that the Rockhampton Regional Council is implementing the verification monitoring program stated in the DWQMP.

1.1 Documents/ Records/ Items inspected

The following documents and items were inspected during the audit

- Notice for the Decision 18th December 2014
- RRC DWQMP October 2014
- SPID493 DWQMP Annual Report 1 July 2014 to 30 June 2015
- October 15-Feb 16 Toxicity Testing
- DWQ Weekly test results – (Jan 2014 to current)
- 2014 GWTP Inhouse Water Results
- 2014 MWTP Inhouse Water Results
- 2015 GWTP Inhouse Water Results
- 2015 MWTP Inhouse Water Results
- 2014-15 SP493 Verification Monitoring Results
- 2015-16 SP493 Verification Monitoring Results
- 2016 GWTP Inhouse Water Results
- 2016 MWTP Inhouse Water Results
- Excerpt from PLC program showing chlorine shutdown trigger
- Cryptosporidium and Giardia test results Jan 2015, Feb 2016.
- SP 493 Part A Notice of Non Compliance 12 Mar 2015
- SP 493 Part A Notice of Non Compliance 23 Jun 2015
- SP 493 Part A Notice of Non Compliance 27 Mar 2015
- SP 493 Part A Notice of Non Compliance 9 Dec 2014 (out of scope)
- SP493 Part A Notification of event or parameter – 2 Dec 2014 (out of scope)
- DWI-70493-00026 Investigation Report Sep 2015
- DWI-70493-00027 Investigation Report Nov 2015
- DWI-70493-00028 Investigation Report Nov 2015
- DWI-70493-00029 Investigation Report Sep 2015

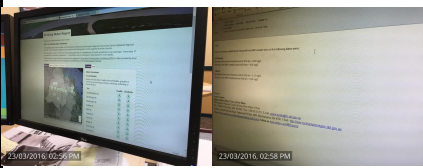
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- SCADA Trends – examples provided in photographs
 - GIS System as identified in photographs
 - WTP diary entries – examples provided in photographs
 - Online instrumentation servicing and calibration records
 - SCADA Alarm settings
 - Glenmore WTP Daily Process Log Sheets – several examples in photographs
 - Water treatment plant diary – multiple entries photographed
 - Conquest system – Annual instrument calibration/ servicing
 - Conquest system – reservoir inspection requests and completed jobs
 - Reservoir inspection maintenance log sheets
 - Laboratory test results when responding to from customer complaints

1.2 Staff involved in the audit





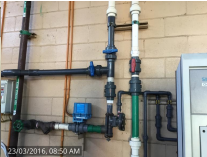







- A/Manager Treatment and Supply (JP)
- Water Treatment Operators (x3 SP KS MR)
- Water Quality Officer (AL)
- Administration Officer (AN)
- Conquest – (FR)

2 ELEMENT 1: COMMITMENT TO DRINKING WATER QUALITY

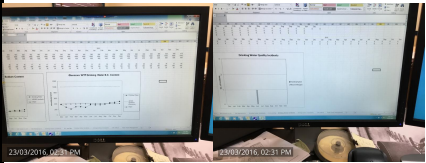
Question	Response	Details
<i>Drinking Water Quality Policy</i>		
Formulate a drinking water quality policy, endorsed by senior executive, to be implemented throughout the organisation.		Not required under the WS Act
Ensure that the policy is visible and is communicated, understood and implemented by employees.		
<i>Regulatory and Formal Requirements</i>		
Identify and document all relevant regulatory and formal requirements.		Not required under the WS Act
Review requirements periodically to reflect any changes.		
Ensure responsibilities are understood and communicated to employees.		
<i>Engaging Stakeholders</i>		
Identify all stakeholders who could affect, or be affected by, decisions or activities of the drinking water supplier.	Compliant	Dialysis patients are in Pathways system. Could include in stakeholder list. AL has list of customers requiring water quality data.
Develop appropriate mechanisms and documentation for stakeholder commitment and involvement.	Compliant	Fitzroy partnership links to drinking water report. Report card of water quality data. Links to catchment improvements. DWQMP includes the operating protocol between RRC and LSC. LSC gets weekly and monthly WQ reports.

		
Fitzroy Partnership for River Health	Weekly email of operational water quality monitoring	
Regularly update the list of relevant agencies.	Improve	<p>Refers to Office of the Water Supply Regulator – has been through multiple name changes since that time.</p> <p>Minor improvement to check all agencies are referenced correctly and update in next review.</p>

3 ELEMENT 2: ASSESSMENT OF THE DRINKING WATER SUPPLY SYSTEM

Question	Response	Details
<i>Water supply system analysis</i>		
Construct a flow diagram of the water supply system from catchment to consumer.	Compliant	
  		 
River intake	High level river intake	River intake
		Chlorinators
		Chlorinator showing piping configuration to predose chlorine as required
		Bottled water on site
     		
Coagulant dosing at flume	PAC dosing into flocculator bay	Flocculator
		Tube settlers (roofed)
		Turbidity meter at tube settlers
		Lime dosing

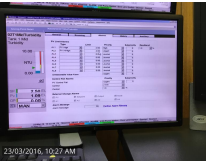
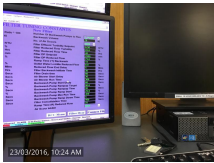
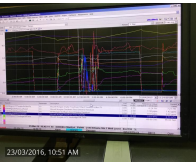
<p>PAC loading PAC Dosing Poly Dosing Chemical Storage Chlorine cylinders Clear water tanks</p>		
<p>Filters Filtration pipework showing filter to waste valves Online instrumentation Online instrumentation Online instrumentation Maintenance logs for online instruments.</p>		
<p>Is Glenmore water treatment plant schematic accurate?</p>	<p>Compliant</p>	<p>Walkthrough of infrastructure demonstrates that figure 2.4 in DWQMP is accurate. There is dual pipework from filters that reconverges prior to chemical dosing that could be added, but this is not a bypass, and the schematic reflects the process.</p>
<p>Is Rockhampton catchment to tap schematic consistent with SCADA?</p>	<p>Compliant</p>	<p>SCADA overview matches DWQMP Figures 2.1 and 2.4.</p>
<p>Are the Mt Morgan schematics consistent with SCADA?</p>	<p>Improve</p>	<p>Mt Morgan WTP was not inspected. Informed that upgrades to dosing systems required to be incorporated into DWQMP at review, or after completion.</p> <p>Mt Morgan SCADA visibility limited at moment, but is part of the capital upgrade.</p>
<p>Mount Morgan SCADA Mt Morgan trends Mt Morgan trends</p>		

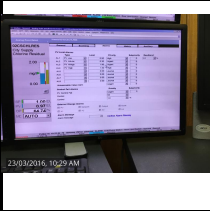
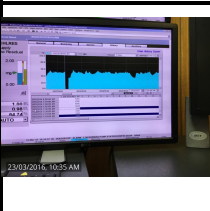
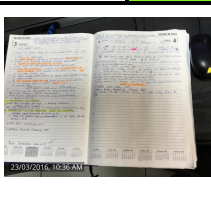
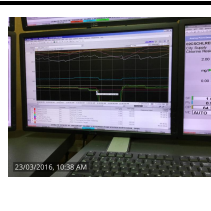
<i>Assessment of water quality data</i>		
Assemble historical data from source waters, treatment plants and finished water supplied to consumers (over time and following specific events).	Compliant	Water quality data included in DWQMP – annual report publishes financial year water quality data, Excel tables for each financial year for water quality. Issues such as Ensham mine release in 2008 discussed.
List and examine exceedances.	Compliant	Annual report included exceedance so, historical data in DWQMP similar.
Assess data using tools such as control charts and trends analysis to identify trends and potential problems.	Compliant	Trends for operational parameters are included in water quality analysis. Map of chlorine residual over scheme also demonstrates how this element is met..
 <p>Water quality trends Water quality incidents over time</p>		
<i>Hazard identification and risk assessment</i>		
Define the approach and methodology to be used for hazard identification and risk assessment.	Compliant	Defined in DWQMP
Estimate the level of risk for each identified hazard or hazardous event.	Compliant	Maximum risk identified, and residual risk calculated. Alignment of DWQMP risk to corporate risk would be better achieved by modifying consequence definitions.
Identify and document hazards, sources and hazardous events for each component of the water supply system.	Compliant	DWQMP was approved by Regulator. Manganese and THMs risks could be reviewed to ensure that most recent issue following the Cyclone is appropriately assessed, but both are present.

Evaluate the major sources of uncertainty associated with each hazard and hazardous event and consider actions to reduce uncertainty.	Compliant	Uncertainty is evaluated in risk assessment.
Determine significant risks and document priorities for risk management.	Compliant	Risk improvement plan details actions for significant risks.
Periodically review and update the hazard identification and risk assessment to incorporate any changes.	Compliant	Reviewed and updated with DWQMP. Draft document being prepared that identify need for change.

4 ELEMENT 3: PREVENTIVE MEASURES FOR DRINKING WATER QUALITY MANAGEMENT

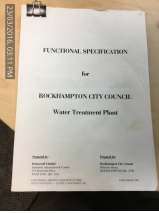
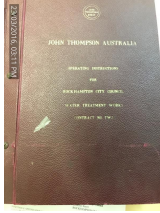

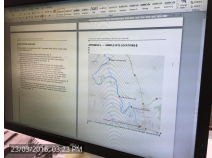
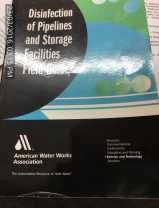
Question	Response	Details
<i>Preventive measures and multiple barriers</i>		
Identify existing preventive measures from catchment to consumer for each significant hazard or hazardous event and estimate the residual risk.	Compliant	
Document the preventive measures and strategies into a plan addressing each significant risk.	Compliant	Within DWQMP
Evaluate alternative or additional preventive measures where improvement is required.	Compliant	Risk assessment links to improvement plan.
Is emergency generator now available at Glenmore as per W02 risk item?	Compliant	Being commissioned on day of audit.
<i>Critical control points</i>		
Assess preventive measures from catchment to consumer to identify critical control points.	Not Required in Act	

<p>Establish mechanisms for operational control</p>	<p>Compliant</p>	
<p>Are there appropriate limits and actions set in SCADA for coagulation?</p>	<p>Compliant</p>	<p>Typically less than 1.5 NTU, high-high alarms set for >4 NTU. Not stated in DWQMP but appropriate.</p>
<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Clarifier turbidity</p> </div> </div>		
<p>Are there appropriate limits set in SCADA for filtration? (e.g. Backwash at 0.3 NTU at Glenmore WTP)</p> <p>Is Mt Morgan operating within similar ranges?</p>	<p>Compliant</p>	<p>Trends indicate well below 0.3. Backwash at 0.3 NTU, plus also loss of head and time triggers</p> <p>Mt Morgan turbidity spike 3.6 NTU, but plant determined to not be producing water, reservoir dropping at time. Diary indicates working on plant. No concern.</p>
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>SCADA Filter settings</p> </div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Filter performance</p> </div> </div> </div>		
<p>Is chlorination set with range 0.5 - 1.5 mg/L with shutdown at 1.7 mg/L as per s2.3.1 p 18?</p>	<p>Compliant</p>	<p>DWQMP states that there is a chlorine target, with high, hi high, low and lo low alarms. The lo low and hi high alarms are not defined in the DWQMP. The target range is as stated. Hi high alarm is 1.8mg/L in SCADA.</p> <p>DWQMP states specifically that the shutdown is hard coded in the PLC. Email from JP included extract of PLC program showing hard coded 1.7mg/L shutdown. So whilst Hi High alarm and PLC shutdown are not the same limit, the operational actions are completely consistent with the DWQMP description.</p> <p>Checked chlorine trends for a number of months including Nov 15, Dec 14. No evidence that chlorine alarms triggered.</p>

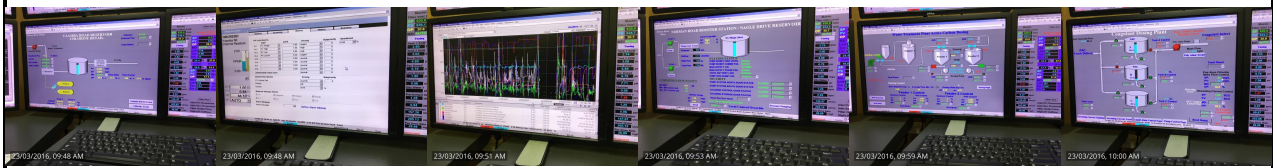
	<p>Chlorine SCADA limits/alarms</p>				
<p>Is there evidence of action if <0.5 mg/L chlorine?</p>	<p style="background-color: #90EE90; text-align: center;">Compliant</p> <p>3/March. Shutdown at time, see diary and SCADA trend.</p>				
	<p>Low chlorine</p>		<p>Plant diary describes shutdown</p>		<p>SCADA trend</p>
<p>Document the critical control points, critical limits and target criteria.</p>	<p style="text-align: center;">Not required</p>	<p>CCPs not required under WS Act.</p>			

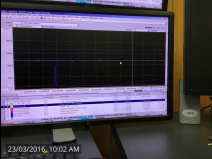


5 ELEMENT 4: OPERATIONAL PROCEDURES AND PROCESS CONTROL

Question	Response	Details
<i>Operational procedures</i>		
<p>Identify procedures required for processes and activities from catchment to consumer.</p>	<p style="text-align: center;">Improve</p>	<p>Not specifically identified as yet.</p>
<p>Document all procedures and compile into an operations manual.</p>	<p style="text-align: center;">Improve</p>	<p>Functional specs and old operations manual exist, but requires updating. DWQMP implies that there are more documented procedures than are actually in place.</p> <p>DWQMP should more accurately describe the current state of procedures, for example, where SCADA/ PLC control exists, generally describe how the barrier is controlled, and why it is believed that specific procedures may not be necessary.</p>

	<p>Functional specifications document</p>		<p>Original WTP manual</p>
<p>Has the Glenmore WTP OM manual been developed?</p>	<p>Improve</p>	<p>Other than the original manual, the other OM manual described in the plan has not been finalised.</p>	
<p>Is cyanobacteria monitoring and management procedure 2014 version and available?</p>	<p>Yes</p>	<p>Manual updated 2014. Much of this document is reproduced from the ADWG</p>	
	<p>Cyanobacteria monitoring protocol</p>		<p>Cyanobacteria sampling locations</p>
<p>Is there a formal Reservoir Disinfection and Inspection Procedure?</p>	<p>Non compliant</p>	<p>FRW uses AWWA reference as the basis, advises field staff of appropriate method. Not a specific procedure as implied in DWQMP. Should describe how these processes work, rather than indicating that there is a specific FRW procedure.</p>	
	<p>AWWA manual – the proxy procedure.</p>		
<p><i>Operational monitoring</i></p>			
<p>Develop monitoring protocols for operational performance of the water supply system, including the selection of operational parameters and criteria, and the routine analysis of results.</p>	<p>Compliant</p>	<p>Operationally, the coagulant dose rate is compared to SCADA history (usually 12 months prior to capture seasonal changes) to identify probable dose rate based on historical raw turbidity/coagulant dose. Jar tests conducted regularly.</p>	

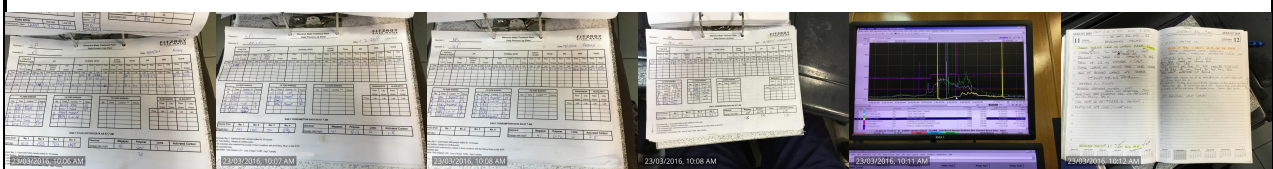
		Spikes in data were investigated, spikes were on backwash, and not in production.
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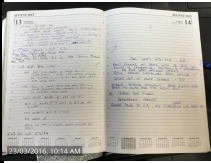
Yaamba Rd reservoir SCADA screen	Yaamba road chlorine set points	Yaamba Rd SCADA trends	Nagle Dr Res SCADA	PAC Dosing SCADA Screen	Coagulant Dosing SCADA
					

Are there appropriate levels of documentation of daily parameters (e.g. WTP diaries/ log sheets).	Compliant	Diary complements log sheets, SCADA in agreement. Looked in detail around Aug 12 2015. Jar test book sometimes used, sometimes diary. Could improve the record keeping to ensure that jar tests are captured in same location each time.
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Check 12/8/2015 - final turbidity recorded as 0.51 NTU, tube settlers also recorded as 0.51 NTU.	Compliant	<p>Written log sheet indicates same as Excel.</p> <p>Diary checked – algal bloom noted in diary, and stated that jar test conducted.</p> <p>No record of the jar testing results found, but SCADA records demonstrating a change in coagulant dose rate.</p>
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Daily process log sheets	Daily process log sheets	Daily process log sheets	Daily process log sheets	SCADA trends of turbidity and coagulant dose	Diary entries for 11 and 12/8/2015
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Plant Diary 13 and 14/8/2015

Are reservoir inspections monthly?	Compliant	Conquest inspections sighted. Detailed info on issues.
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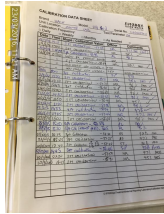
Are Athelstane Reservoirs vermin proof?	Improve	<p>The Athelstane Reservoir complex contains 4 reservoirs – all reservoirs had potential points of ingress. For example, the two in ground reservoirs would allow access of small vermin under the corrugated roofing. Some locations where roofing screws missing. Possible that the roof is angled backwards to allow rainwater to flow under the central whirlybird (which is well meshed).</p> <p>Oldest reservoir has terracotta bricks with big enough holes to be a point of ingress. Some of these have been broken to allow dosing pipes to enter/exit. Some evidence of debris/ possible bird faeces inside the reservoir. The asbestos roof is not fully sealed, and there are some large gaps at the ridge line.</p> <p>20 ML reservoir door has been replaced with wooden sheeting – some evidence of roofing lifting and potentially allowing frog/ small vermin access.</p> <p>Overall this is listed as an improvement as there are points of ingress that should be remedied. However, most of the observed access points are small, and the evidence suggests that prevention of ingress is a priority that is being addressed.</p>
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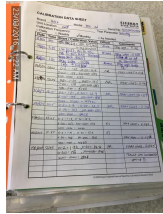
Security gate to Athelstane Reservoirs	Inground reservoirs.	Hatch fits closely	Internal view of ground level reservoir have	Terracotta air vents slightly too large holes.	Some lifting of roof, hole plugged with foam.
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<p>Angle may allow rainwater into reservoir</p> <p>View to 20 ML reservoir</p> <p>Broken terracotta, potentially allowing ingress</p> <p>Internal view of asbestos roof</p> <p>Internal view of reservoir</p> <p>Debris and possible bird faeces inside reservoir.</p>		
<p>Is Rogar reservoir vermin proof?</p>	<p>Compliant</p>	<p>Rogar Reservoir was in good condition, with no evidence of vermin access points.</p>
		
<p>Mesh cage around whirly birds</p> <p>Hatch has rubber seal to prevent vermin</p> <p>View into reservoir</p> <p>Record of manual chlorine dosing</p> <p>Floating chlorine tablets in reservoir</p> <p>Concrete roof has no points of ingress between wall and roof</p>		
<p><i>Corrective action</i></p>		
<p>Establish and document procedures for corrective action to control excursions in operational parameters.</p>	<p>Compliant</p>	<p>DWQMP states management actions. SCADA is programmed with alarms, and some alarms associated with comments that link directly to ERP. E.g. on alarm, the screen prompt identifies the P1 and P2 ERP levels which define the timeframes for reporting and action.</p>
<p>Is SCADA programmed for backwash at 0.3 NTU as per s2.3.1 p18?</p>	<p>Compliant</p>	<p>Backwash is programmed as described. SCADA trends confirm this occurs</p>
<p>Document monitoring protocols into an operational monitoring plan.</p>	<p>Compliant</p>	<p>Op monitoring is listed in DWQMP. Daily plant log sheets and diary confirm that this is followed</p>
<p><i>Equipment capability and maintenance</i></p>		
<p>Ensure that equipment performs adequately and provides sufficient flexibility and process control.</p>	<p>Compliant</p>	<p>Annual calibration of instruments. Related records. Monthly reservoir chlorinator calibration record also sighted.</p>

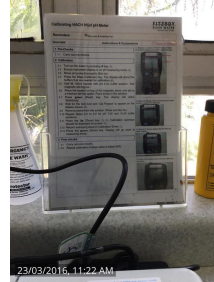
<p>Is there evidence of laboratory instrument calibration</p>	<p>Compliant</p>	<p>Calibration records for lab instruments below.</p>
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pH meter calibration record

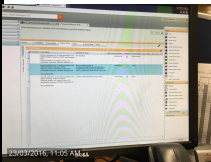


Turbidity meter calibration record

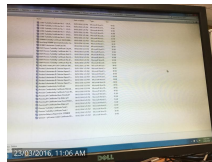


Calibration manual

<p>Establish a program for regular inspection and maintenance of all equipment, including monitoring equipment.</p>	<p>Compliant</p>	<p>Annual maintenance of instruments. Related records in conquest.</p>
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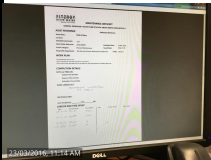


Conquest job for calibration of instruments

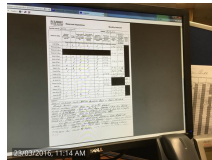


Record for 2016 instrument calibrations

<p>Is Conquest system resulting in maintenance occurring as stated in DWQMP?</p>	<p>Compliant</p>	<p>Set up for water quality to enforce new job on time. Reservoir inspection below.</p>
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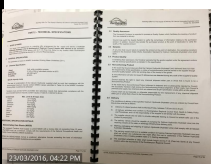
Reservoir inspection job



Reservoir inspection comments

Materials and chemicals

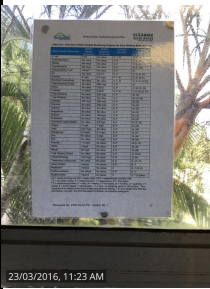
<p>Ensure that only approved materials and chemicals are used.</p>	<p>Compliant</p>	<p>Bulk chemical tendering includes water quality requirement. AS 4020 could be included as matter of course. Some test certificates from suppliers some testing undertaken.</p>
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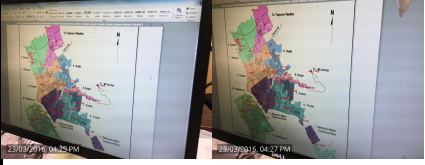
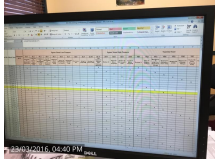
Chemical specification

Is there a mechanism to ensure quality of chemicals?	Yes	On delivery, checks of certificate of analysis. Not formal.
Establish documented procedures for evaluating chemicals, materials and suppliers.	Not Required in Act	

6 ELEMENT 5: VERIFICATION OF DRINKING WATER QUALITY

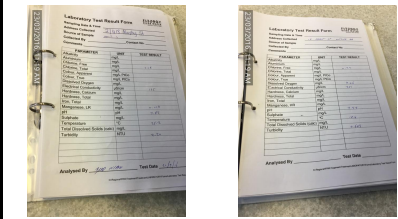
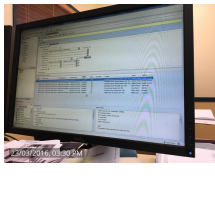
Question	Response	Details
<i>Drinking water quality monitoring</i>		
Determine the characteristics to be monitored in the distribution system and in water as supplied to the consumer.	Compliant	Table 10.1 in DWQMP
Establish and document a sampling plan for each characteristic, including the location and frequency of sampling.	Compliant	Weekly sampling plan developed, and annually updated. See photograph of 2016 microbiological sampling schedule.
Was verification monitoring program implemented as stated in the DWQMP?	Compliant	Water quality data from 18 December 2014-current was audited for both the Rockhampton and Mount Morgan schemes. The verification monitoring stated in the verification monitoring plan was undertaken, and all identified exceedences reported to the regulator.
<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Verification monitoring program is laminated in GWTP lab.</p> </div> </div>		
Ensure monitoring data are representative and reliable	Compliant	Sampling locations approved by the regulator. Sites are well spread. Low chlorine can initiate Conquest requests for remedial action if abnormal.

		Monitoring of parameters that may change in reticulation (Mn, THMs etc) could be monitored more extensively in reticulation, but current monitoring is compliant with the approved plan.
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	Chlorine penetration map		Microbiological sampling program 2016
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Consumer satisfaction

Establish a consumer complaint and response program, including appropriate training of employees.	Compliant	Customer service RRC dispatch. Normally Pathways request. After hours -service provider- water requests emailed to operators. After hours call log of customer contacts sent to FRW on weekdays.
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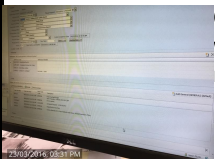
	Lab sheets for customer complaint investigations		Record of customer contacts/ complaints
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Short-term evaluation of results

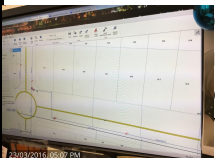
Establish procedures for the daily review of drinking water quality monitoring data and consumer satisfaction.	Compliant	Weekly review of verification data, SCADA report automatically emailed to Manager daily, backup to alarms.
Develop reporting mechanisms internally, and externally, where required.	Compliant	Email from SCADA, alarms actioned. Plant diary indicates issues. Close proximity of key staff allows good verbal information transfer.

Corrective action

Establish and document procedures for corrective action in response to non-conformance or consumer feedback.	Compliant	Customer complaint - Conquest request linked into Pathways.
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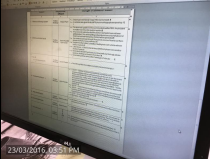
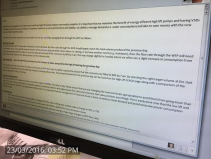
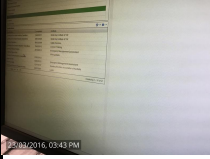
 <p>Customer complaint with Conquest request identified</p>		
Establish rapid communication systems to deal with unexpected events.	Compliant	Email to responsible officer if pathways request not actioned in 24 hours.

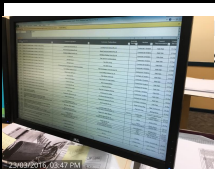
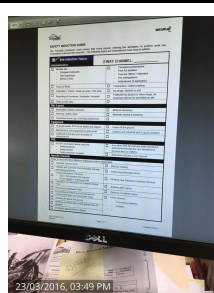
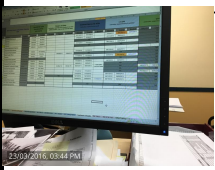
7 ELEMENT 6: MANAGEMENT OF INCIDENTS AND EMERGENCIES

Question	Response	Details
<i>Communication</i>		
Define communication protocols with the involvement of relevant agencies and prepare a contact list of key people, agencies and businesses.	Compliant	Dialysis patients, other key customers are included in GIS system. Physical tags on valves. Maintenance crews identify valve locations in GIS prior to shutdowns, so should identify prior to commencing job, and back up from physical tags on valves.
 <p>GIS screenshot near location of dialysis patient. Valves labelled</p>		
Develop a public and media communications strategy.	Improve	ADWG referenced. Have prior BWA on file. Dam Safety list has many of the same agencies needing to be contacted – improvement item is to include these contacts in single location (e.g. in ERP)
<i>Incident and emergency response protocols</i>		
Define potential incidents and emergencies and document procedures and response plans with the involvement of relevant agencies.	Compliant	SCADA notification for emergency issues.

Train employees and regularly test emergency response plans.	Improve	Council wide emergency training. Big events such as Cyclones Marcia and Oswald have tested processes. Guardian is used now for coordination, and should be incorporated. Can describe new process.
Investigate any incidents or emergencies and revise protocols as necessary.	Compliant	Floods and cyclones have ensured that protocols are fairly robust.

8 ELEMENT 7: EMPLOYEE AWARENESS AND TRAINING

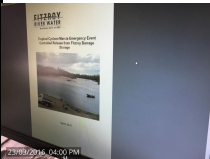
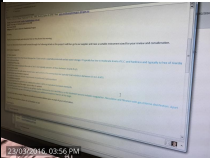
Question	Response	Details
<i>Employee awareness and involvement</i>		
Develop mechanisms and communication procedures to increase employees' awareness of and participation in drinking water quality management.	Compliant	Work instructions, directions by email, or monthly toolbox for less urgent issues. Treatment plant and water quality are standing agenda items. Notes in log book, or direct discussion with operators.
 Toolbox meeting agenda		 Email directions to staff
<i>Employee training</i>		
Document training and maintain records of all employee training. (Identified in risk assessment)	Compliant	Staff trained to Certificate 3 level..
 Staff training record		
Ensure that employees, including contractors, maintain the appropriate experience and qualifications. (Link to risk assessment)	Compliant	Either through pre approved panel /local buy. Pre start checks.

	<p>Pre approved suppliers</p>		<p>Induction guide</p>
<p>Identify training needs and ensure resources are available to support training programs.</p>	<p>Compliant</p>	<p>Training matrix in place for staff</p>	
	<p>Training matrix</p>		

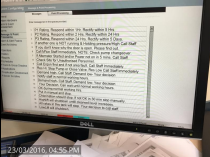

9 ELEMENT 8: COMMUNITY INVOLVEMENT AND AWARENESS

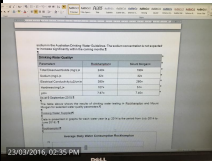
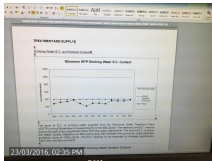
Question	Response	Details
<i>Community consultation</i>		
<p>Develop a comprehensive strategy for community consultation.</p>	<p>Compliant</p>	<p>Website used to provide information to customers – includes water quality data (aesthetic parameters only), blue green algae levels, interruptions etc. Consistent with DWQMP.</p>
<p>Assess requirements for effective community involvement.</p>	<p>Not required under Act.</p>	<p>Not required under Act.</p>
<i>Communication</i>		
<p>Develop an active two-way communication program to inform consumers and promote awareness of drinking water quality issues.</p>	<p>Compliant</p>	<p>Website, Fitzroy river partnership (Fitzroy River report cards).</p>

10 ELEMENT 9: RESEARCH AND DEVELOPMENT

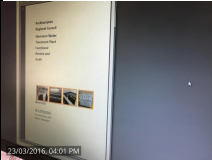
Question	Response	Details
<i>Investigative studies and research monitoring</i>		
Establish programs to increase understanding of the water supply system. (online analysis at Mt Morgan and risk improvement items?)	Not Required in Act	
Use information to improve management of the water supply system.	Compliant	Investigating ClO ₂ for Glenmore for Mn removal. Mn was organically complexed and not easily removed. Cyclone Marcia response to release water within ROP.
	Cyclone Marcia water release report – management under ROP.	
<i>Validation of processes</i>		
Validate processes and procedures to ensure that they are effective in controlling hazards. (Any assessment of barriers for HBT?)	Compliant	UV for Mt Morgan is being procured around expectation of HBTs
	Email setting requirements for UV unit.	
Revalidate processes periodically or when variations in conditions occur.	Not Required in Act	
<i>Design of equipment</i>		
Validate the selection and design of new equipment and infrastructure to ensure continuing reliability.	Not Required in Act	

11 ELEMENT 10: DOCUMENTATION AND REPORTING

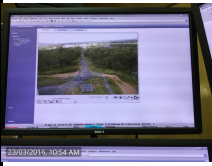
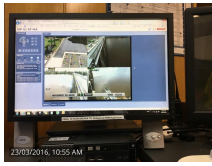
Question	Response	Details
<i>Management of documentation and records</i>		
Document information pertinent to all aspects of drinking water quality management.	Improve	Procedures not formalized. Relies on SCADA to alert issues, then operator knowledge to rectify. Some alarm response messages, but limited in scope.
<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>SCADA prompts on alarms</p> </div> </div>		
Develop a document control system to ensure current versions are in use.	Improve	DWQMP is a registered document for FRW. Registering is a manual system. ECM used, but more archiving system than document control system. Proper document control is desirable.
Establish a records management system and ensure that employees are trained to fill out records.	Compliant	Records in lab filled out, diary is very comprehensive compared to other providers.
<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Another daily log sheet</p> </div> </div>		
Periodically review documentation and revise as necessary.	Compliant	Act requirement – amendment of DWQMP was as a result of the Review.
<i>Reporting</i>		
Establish procedures for effective internal and external reporting.	Compliant	Monthly reports to Council. Lab results from Ecoscope to Water quality officer and Manager. Operators to arrange Conquest requests for rectification. Rare to exceed.

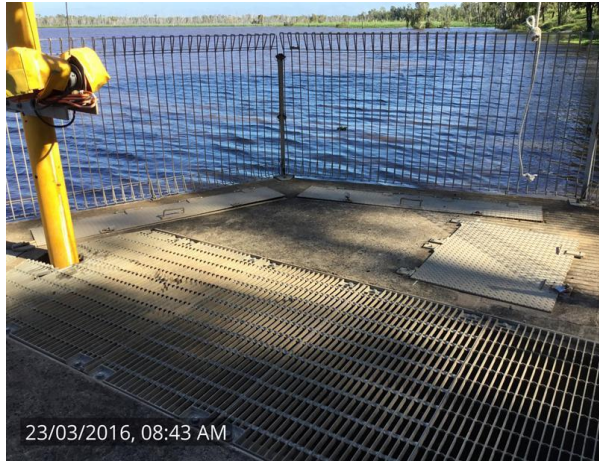
		Athelstane chlorine exceedance is one example where result exceeded. Action was appropriate. Reporting to regulator and internally as required.
	Reporting to Council	
Produce an annual report to be made available to consumers, regulatory authorities and stakeholders.	Compliant	Annual report was prepared as required

12 ELEMENT 11: EVALUATION AND AUDIT

Question	Response	Details
<i>Long-term evaluation of results</i>		
Collect and evaluate long-term data to assess performance and identify problems.	Compliant	Annual verification reports. Some data trending has been done to understand changes in water quality. Verification data provided in annual report.
Document and report results.	Compliant	Reports to council or otherwise to GM
<i>Audit of drinking water quality management</i>		
Establish processes for internal and external audits.	Compliant	Functional review and audit after Mn issue following Marcia.
	Functional review after Cyclone Marcia	
Document and communicate audit results.	Compliant	This report will meet this requirement.

13 ELEMENT 12: REVIEW AND CONTINUAL IMPROVEMENT

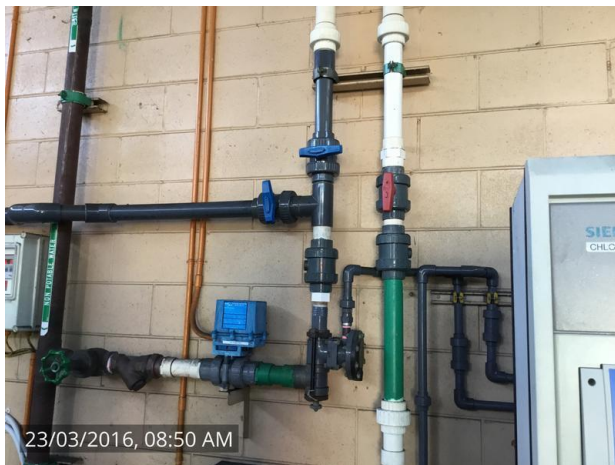
Question	Response	Details
<i>Review by senior executive</i>		
Senior executive review of the effectiveness of the management system.	Compliant	Manager water intimately involved in DWQMP - monthly reporting of issues. Councilors often involved.
Evaluate the need for change.	Compliant	Council provides two-way feedback. Mostly about billing, not water quality.
<i>Drinking water quality management improvement plan</i>		
Develop a drinking water quality management improvement plan.	Compliant	Improvements identified, and being implemented. Marcia has changed priorities from the DWQMP..
CCTV at reservoirs? (MM and Rockhampton)	Compliant	Birkbeck Reservoir has CCTV installed. Also CCTV at Barrage.
	<p>Birbeck Reservoir CCTV</p>	 <p>Barrage CCTV</p>
Ensure that the plan is communicated and implemented, and that improvements are monitored for effectiveness.	Compliant	Cyanobacteria operational monitoring and verification monitoring confirms effectiveness of process.



7-sided intake structure



Chlorinators



Prechlorination pipework



Bottled water if required



Flume and coagulant dosing



PAC dosing into flocculation tanks



Flocculator



Tube settlers



Turbidity meter – tube settlers



Lime Dosing



PAC loading



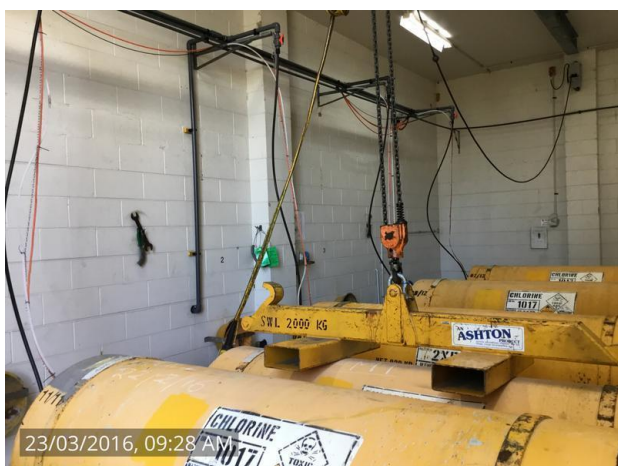
PAC dosing



Poly dosing



Chemical storage tanks



Chlorine cylinders



Clear water tanks



Filters



Filter pipework – valves for filter to waste



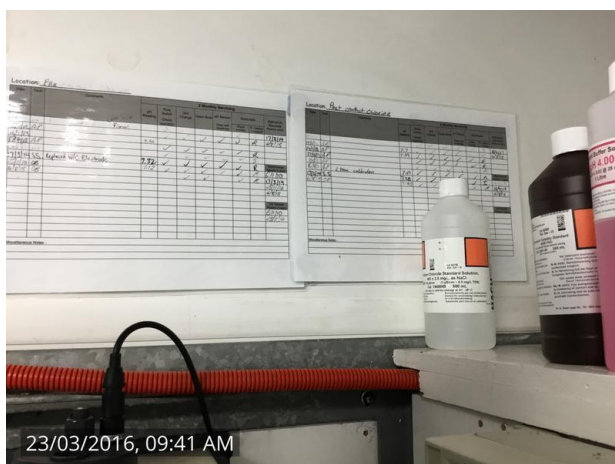
Online instruments



Online instruments



Online instruments



Online instrument servicing



Rogar Reservoir



Rogar reservoir hatch – note seal in excellent condition



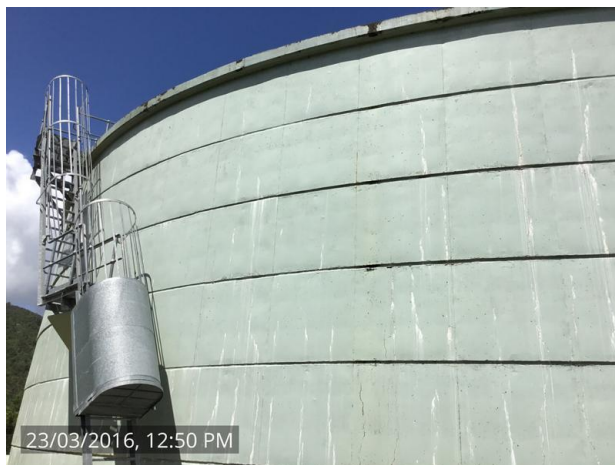
Rogar reservoir – chlorine tablets connected to ropes on ladder



Manual dosing log sheet



Floating chlorine tablets



External view – Rogar Reservoir



Athelstone Reservoirs



Ground level reservoirs (A and B). Gaps under corrugations



Athelstane B Hatch – close fitting, no other seal necessary



Internal view, ground level reservoirs



Original Athelstane reservoir – note the terracotta air vents



Some lifting of sheeting and hole stuffed with foam



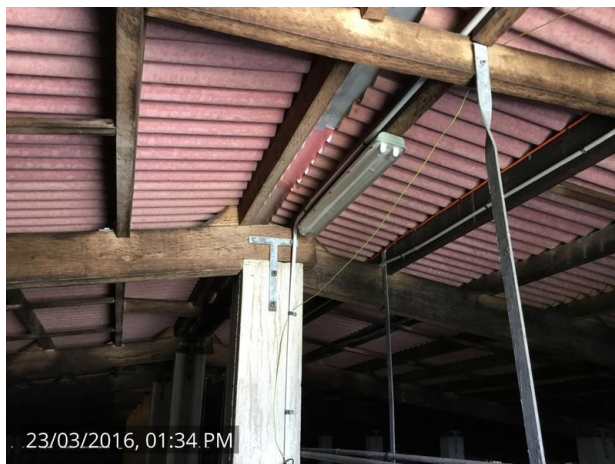
Angle of roof may allow rainwater to run under the whirlybird



View of 20 ML reservoir



Hole through terracotta is large enough for vermin access



Gaps under the asbestos roof



Internal view of original reservoir



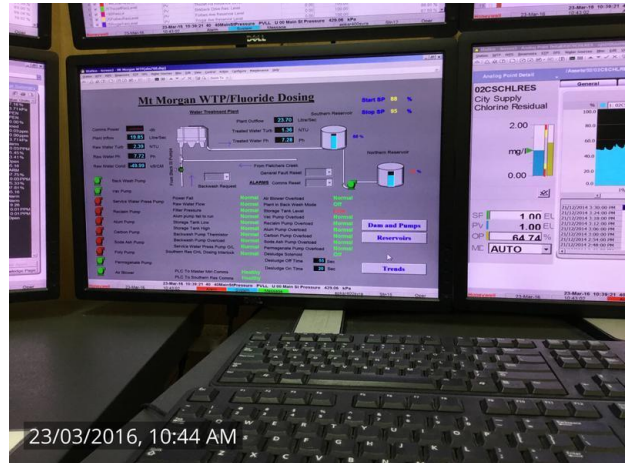
Debris and possible bird faeces inside reservoir



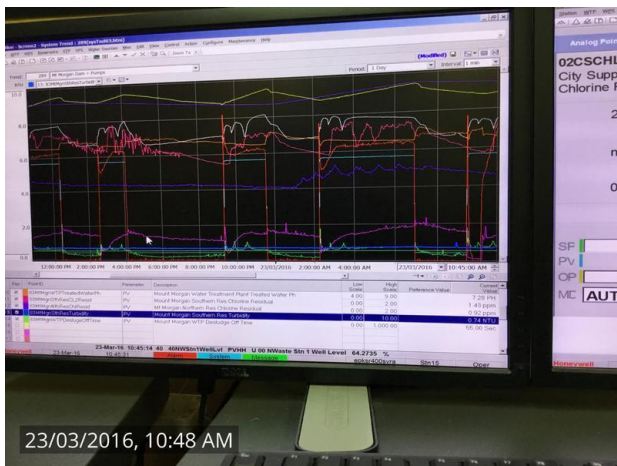
Lifting roofing, may be point of ingress on 20 ML reservoir



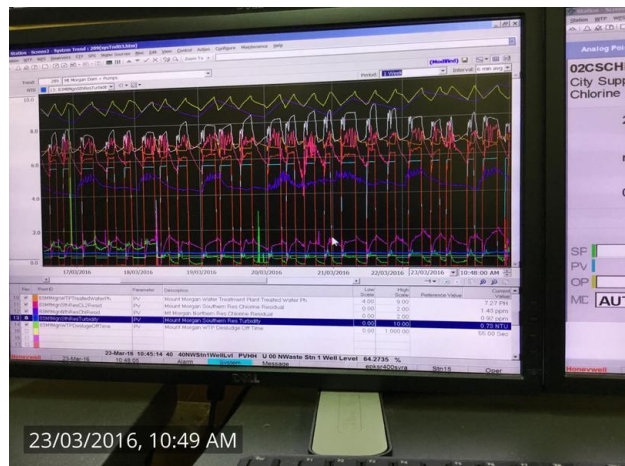
Deplox analyser at Athelstane rechlorination



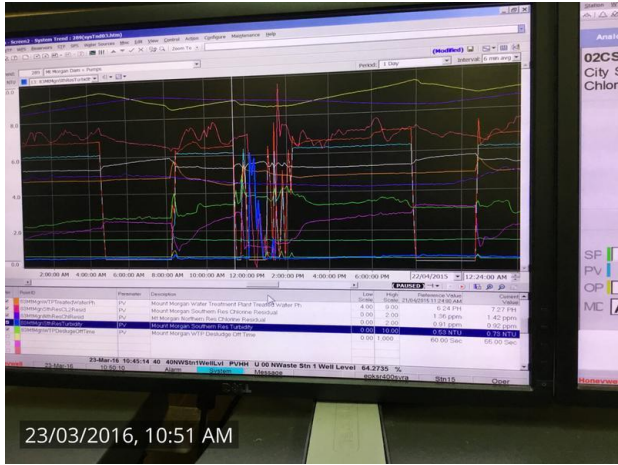
Mt Morgan SCADA



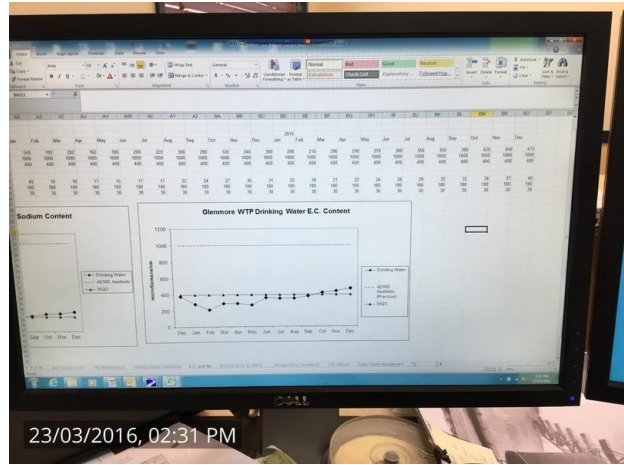
Mt Morgan SCADA



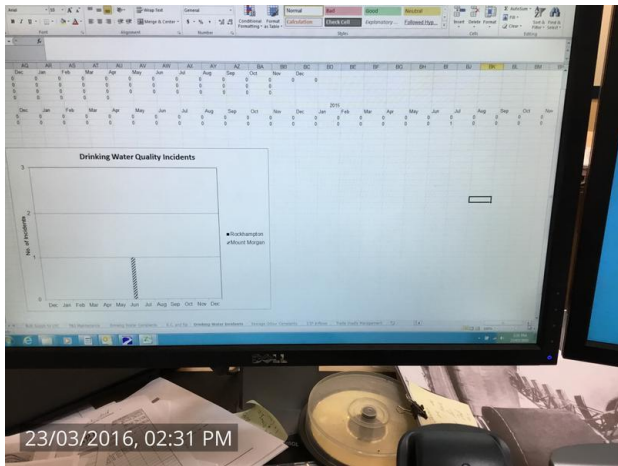
Mt Morgan SCADA



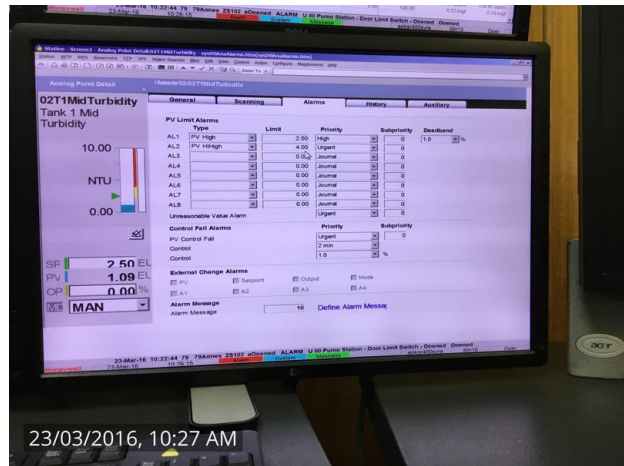
Mt Morgan SCADA



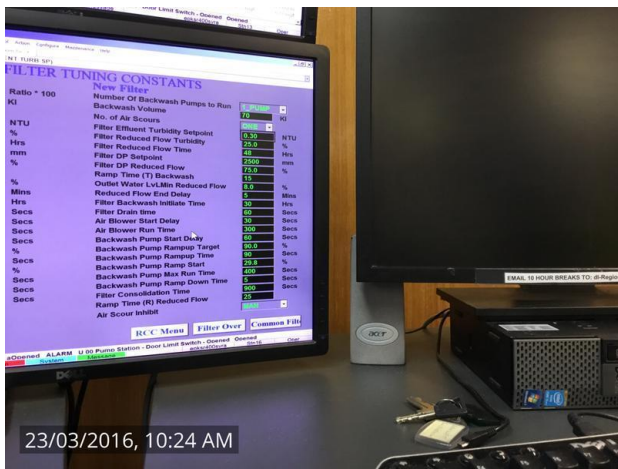
Water quality trending



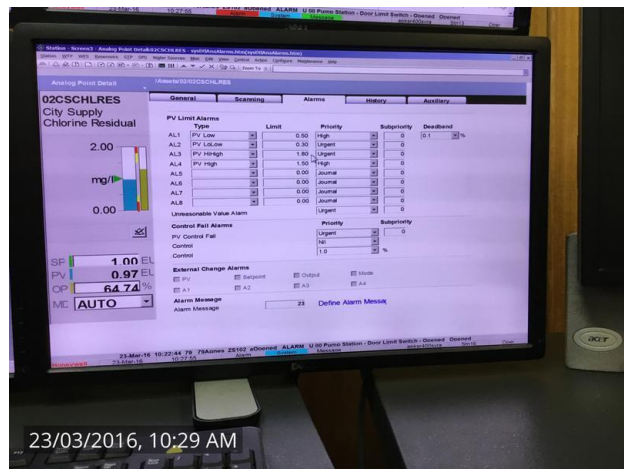
Incident trending/ tracking



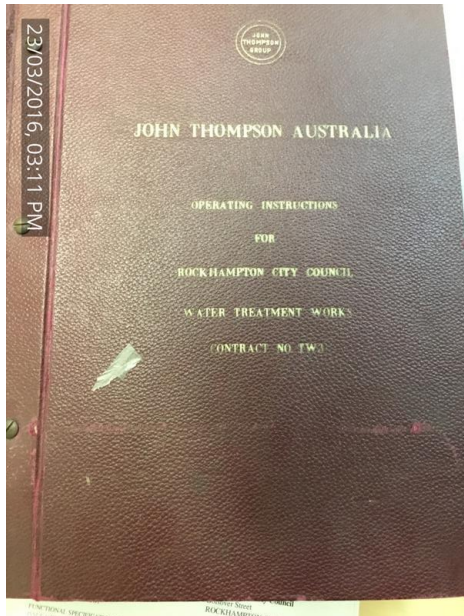
SCADA Turbidity limits



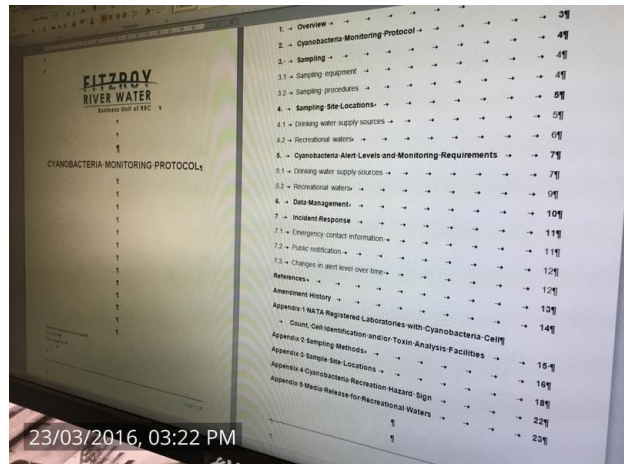
SCADA Filter control limits



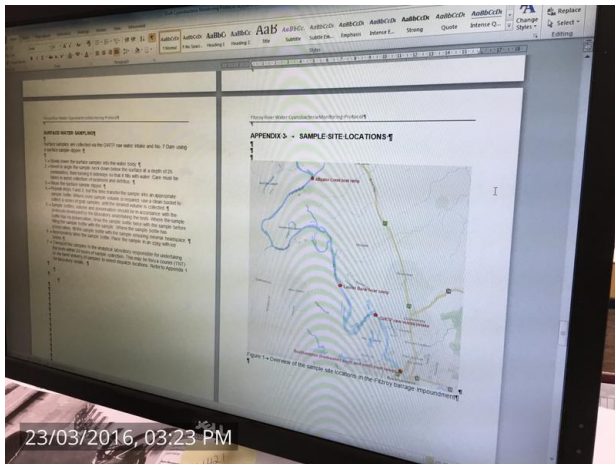
Primary chlorination SCADA limits and control



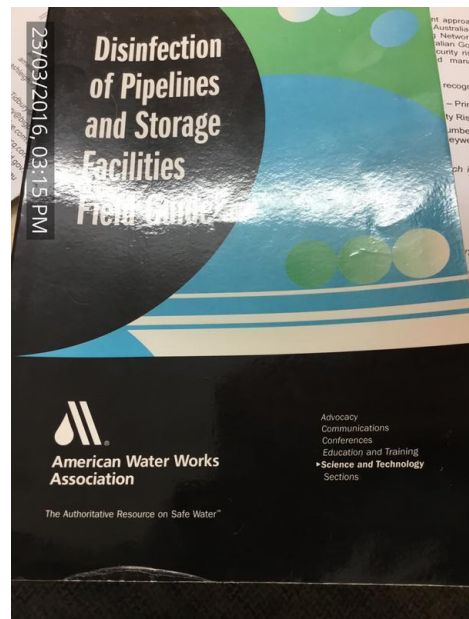
Original O and M manual



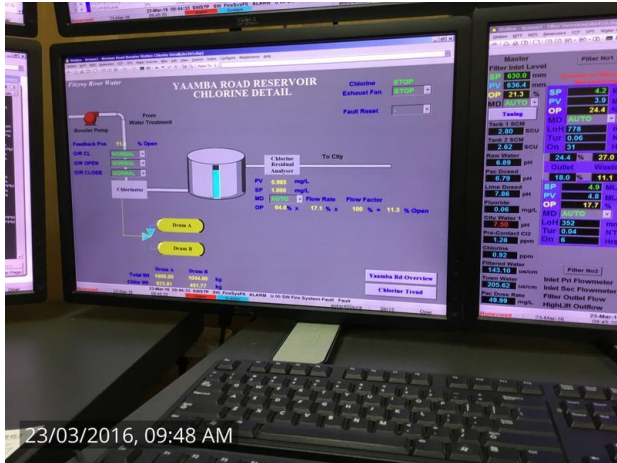
Cyanobacterial monitoring procedure from Table 7.1



Cyanobacterial monitoring locations

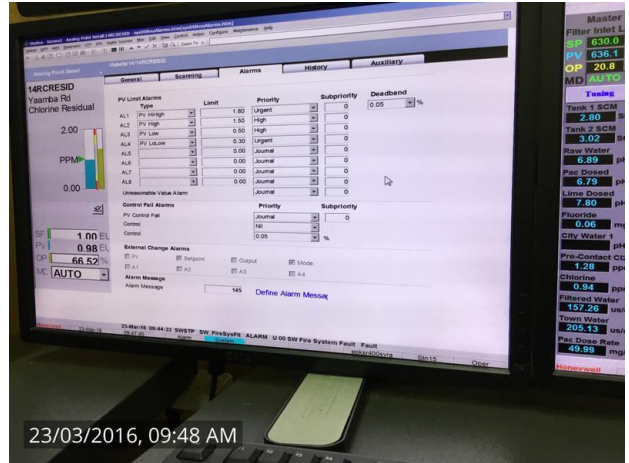


AWWA procedures for mains break and reservoir inspection



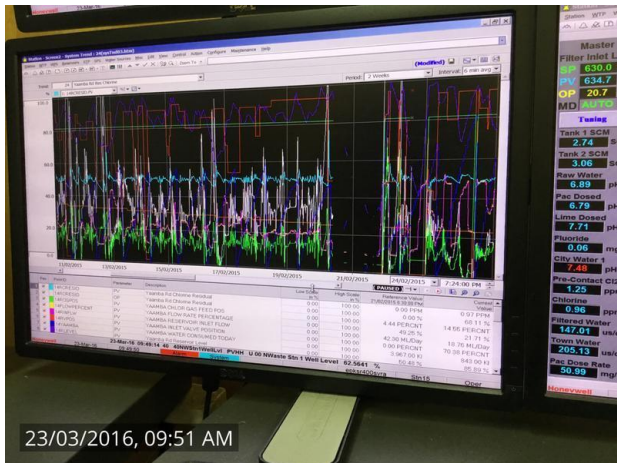
23/03/2016, 09:48 AM

Yaamba Road SCADA screen



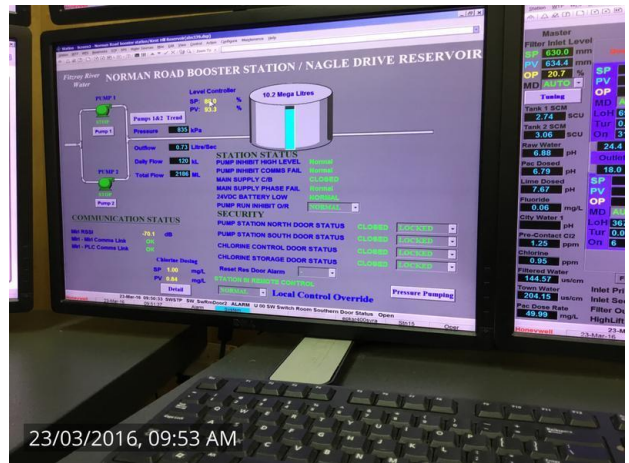
23/03/2016, 09:48 AM

Yaamba Road Chlorine limits



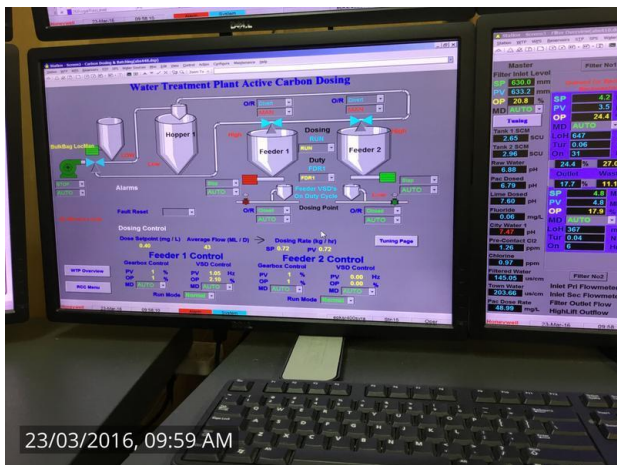
23/03/2016, 09:51 AM

Yaamba Road SCADA trends



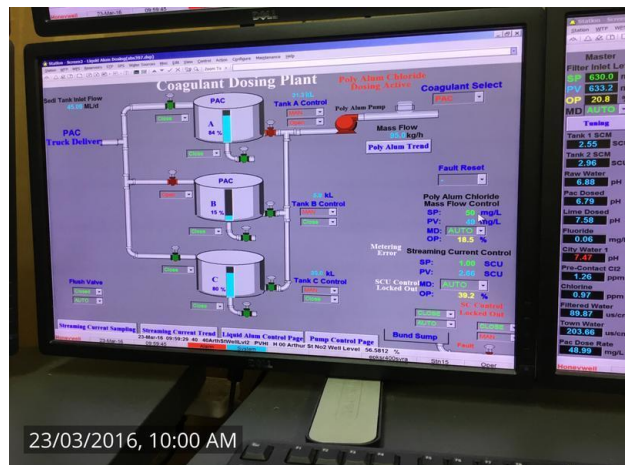
23/03/2016, 09:53 AM

Nagel Drive Reservoir SCADA



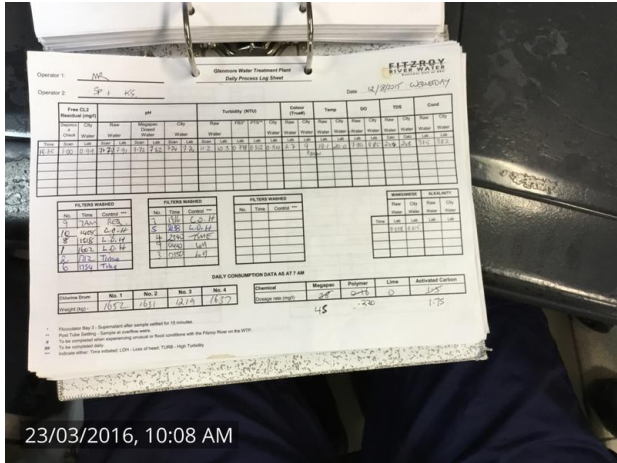
23/03/2016, 09:59 AM

PAC dosing



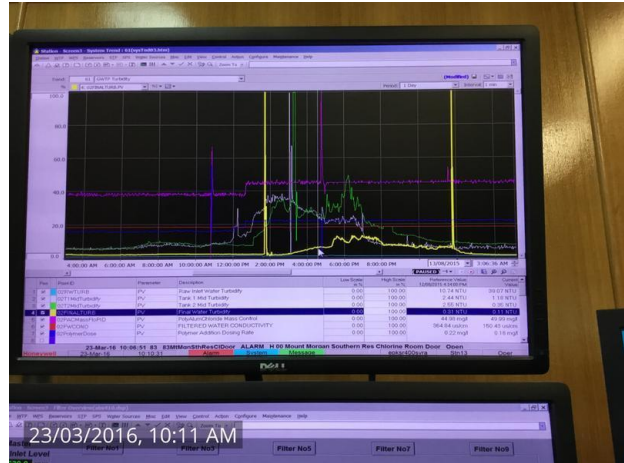
23/03/2016, 10:00 AM

Coagulant dosing



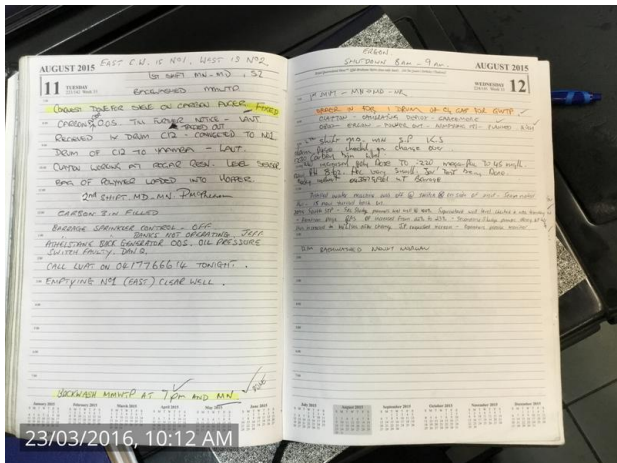
23/03/2016, 10:08 AM

Daily log sheets



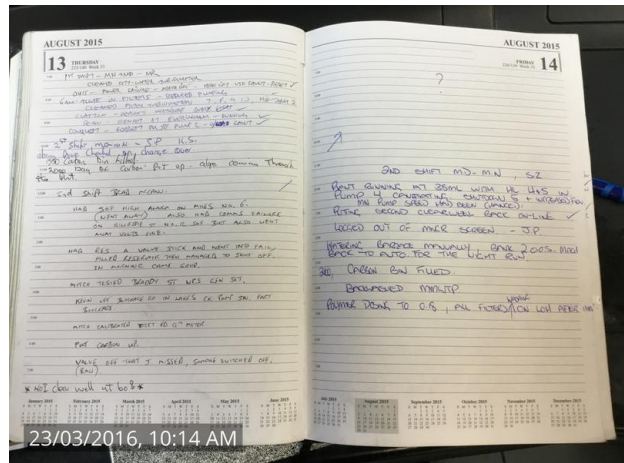
23/03/2016, 10:11 AM

12/8/2015 – change in coagulant dose, unusual turbidity readings



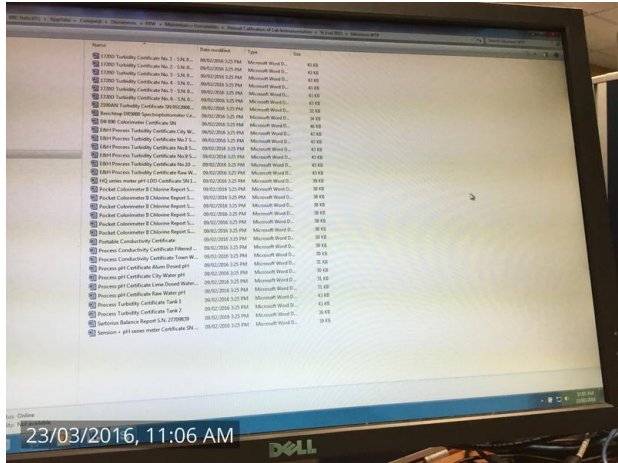
23/03/2016, 10:12 AM

Turbidity increased due to Algal bloom – change in coagulant



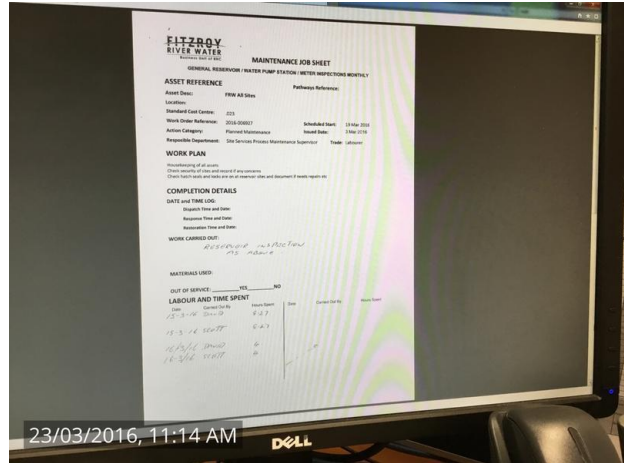
23/03/2016, 10:14 AM

Plant diary



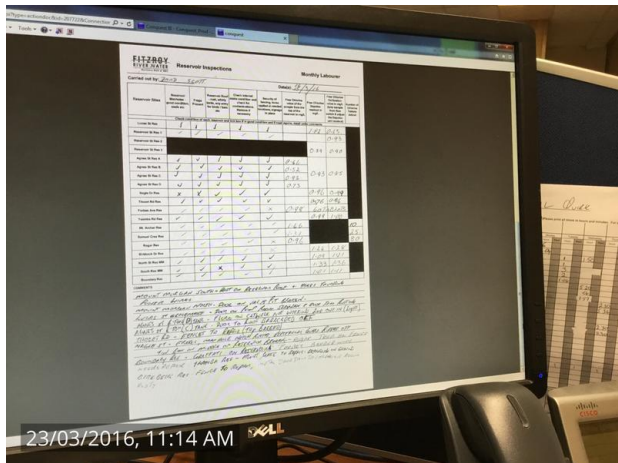
23/03/2016, 11:06 AM

Conquest annual record for instrument calibration certificates



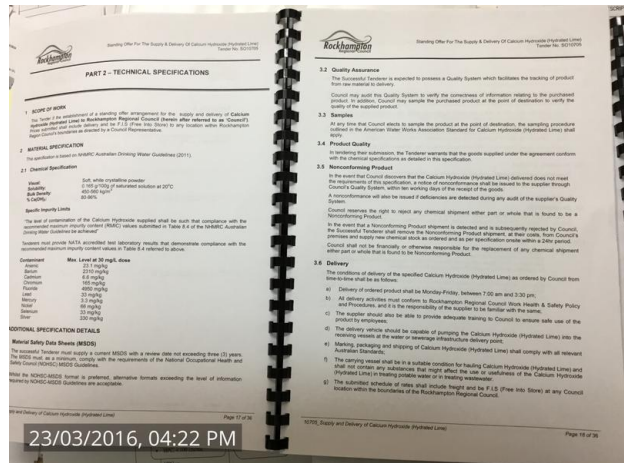
23/03/2016, 11:14 AM

Reservoir inspection job sheet



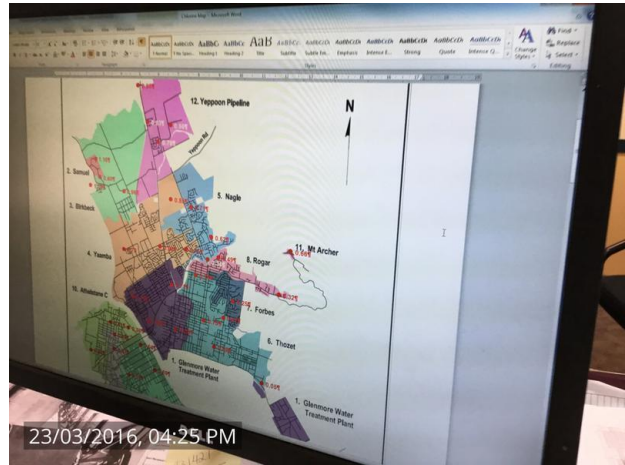
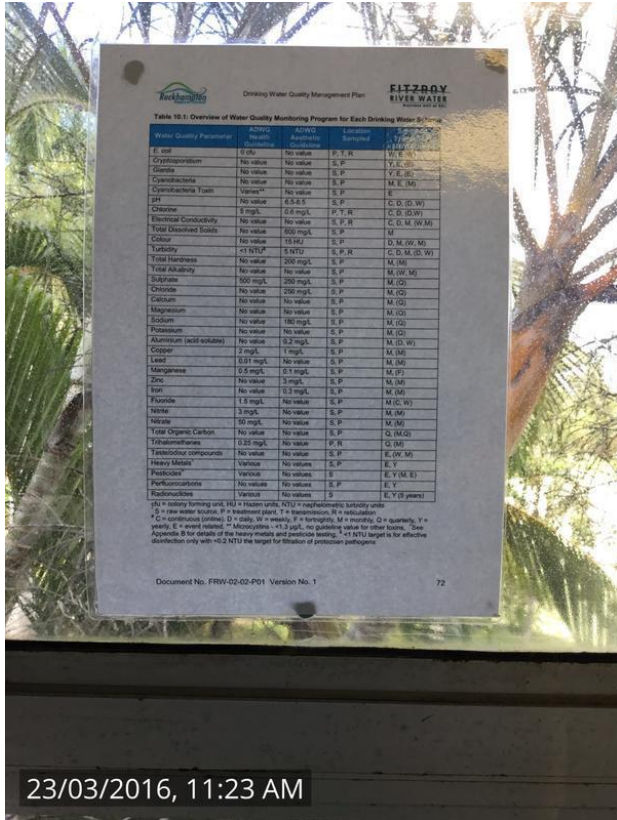
23/03/2016, 11:14 AM

Reservoir inspection job sheet



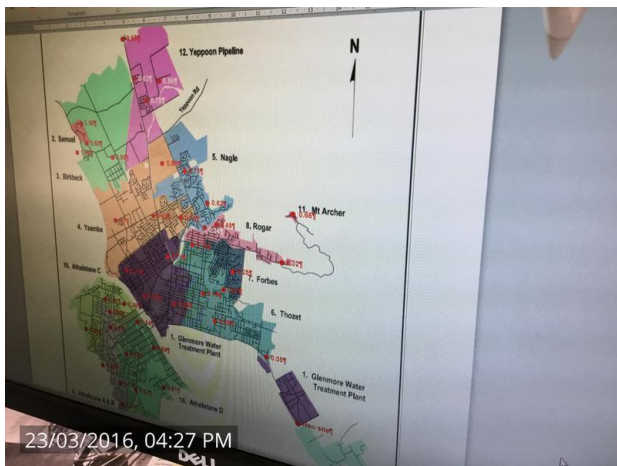
23/03/2016, 04:22 PM

Technical chemical specification

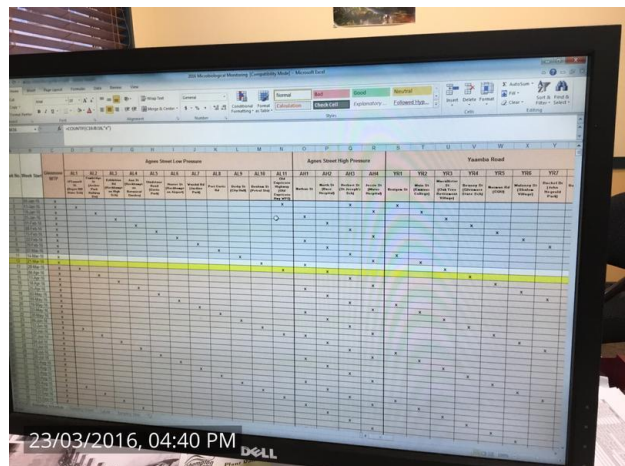


Verification monitoring program

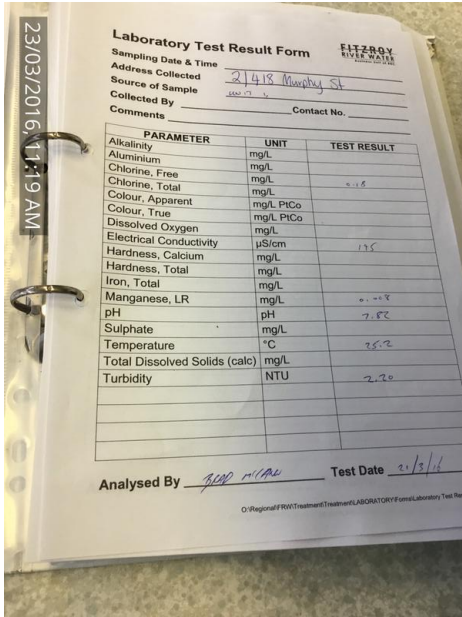
Chlorine penetration map



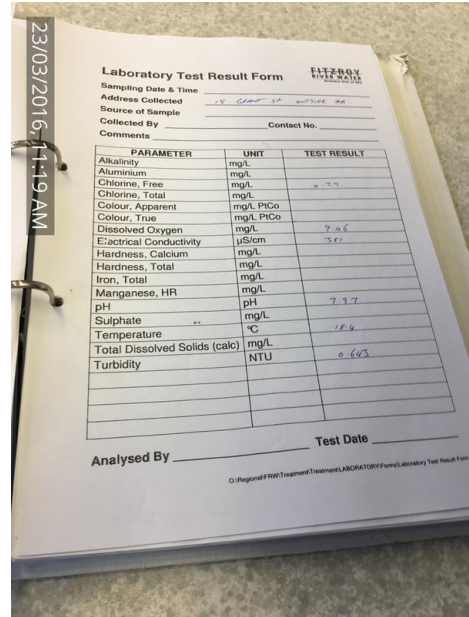
Chlorine penetration map



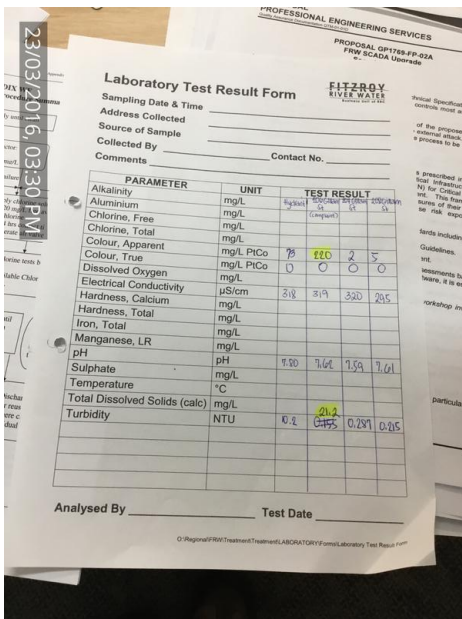
E coli monitoring program



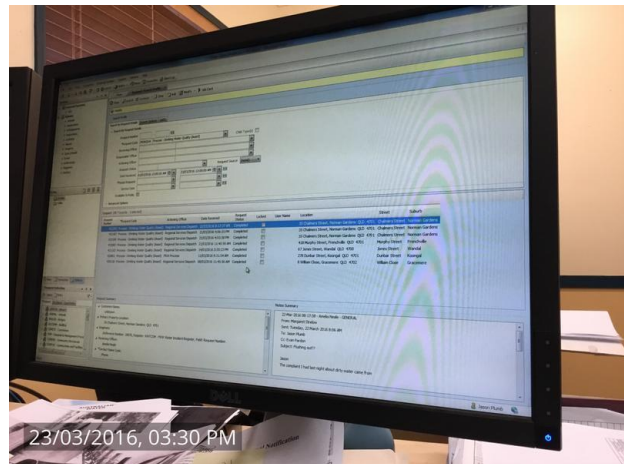
Lab testing following customer complaint



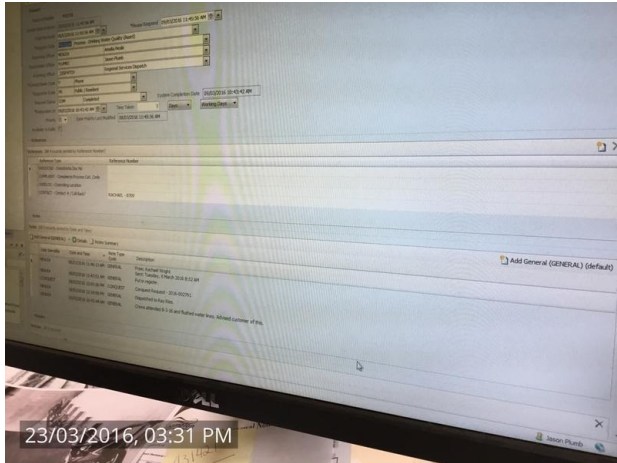
Lab testing following customer complaint



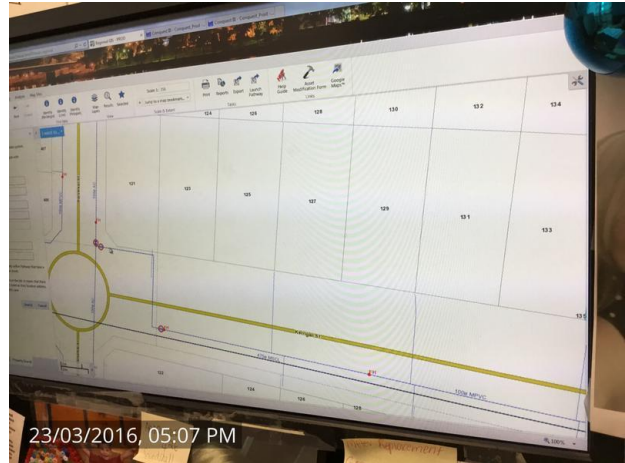
Lab testing following customer complaint



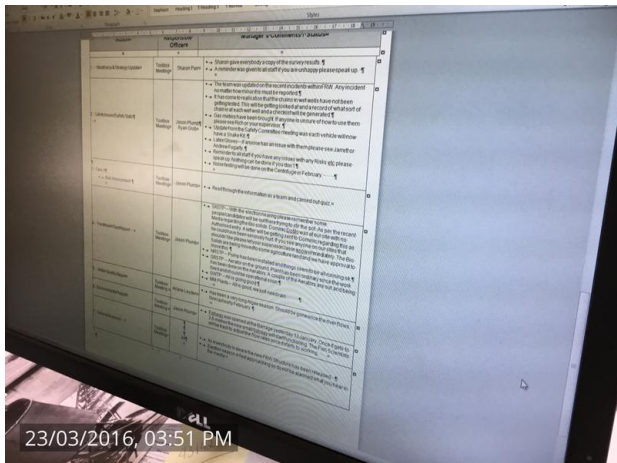
Pathways customer complaints- link to Conquest job



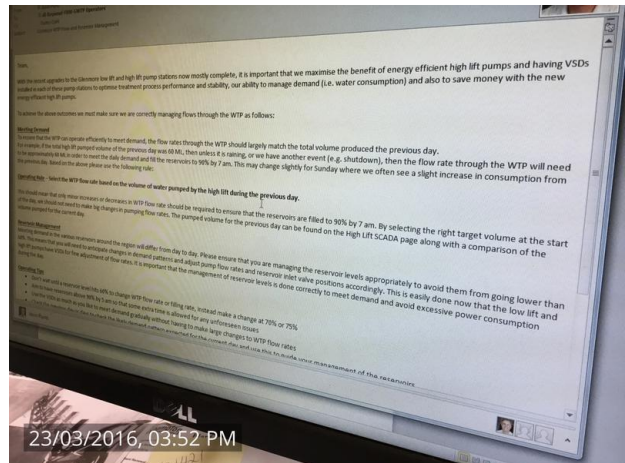
Pathways customer complaints



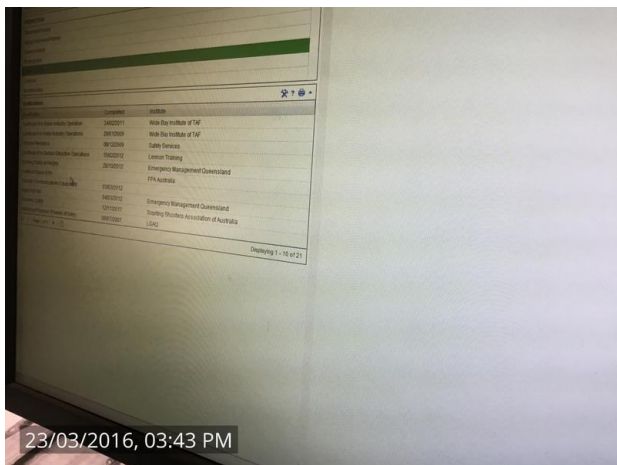
GIS system – valves marked when close to dialysis patients



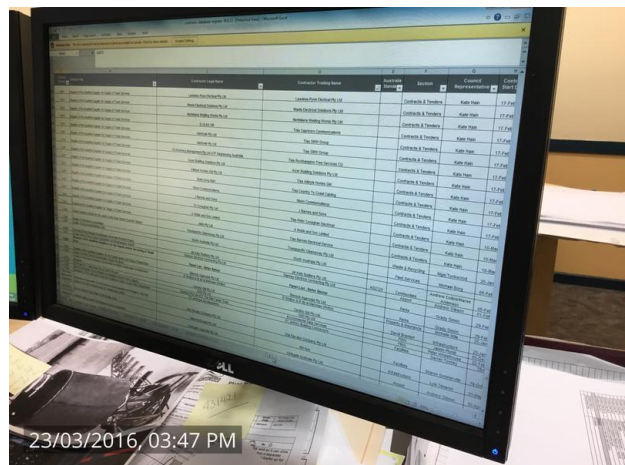
Toolbox meeting agenda



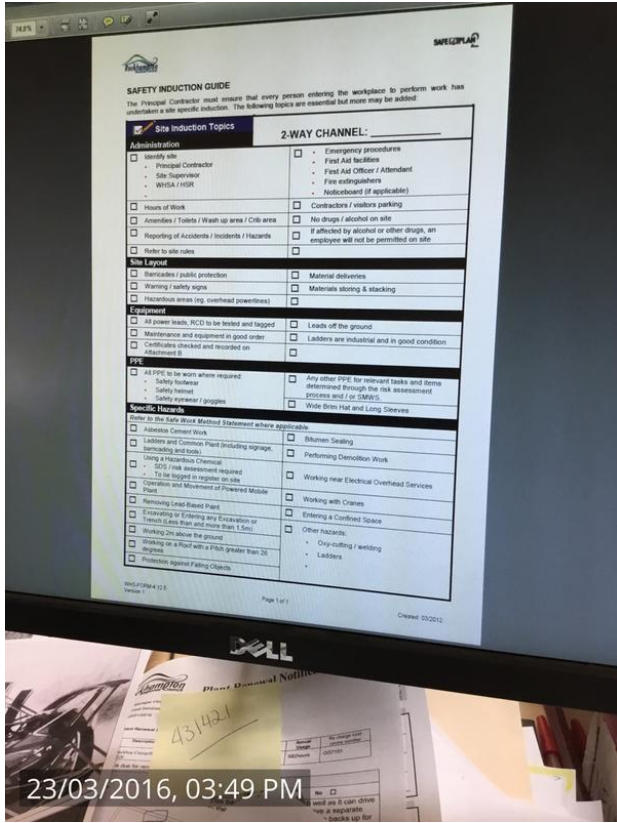
Directions to staff



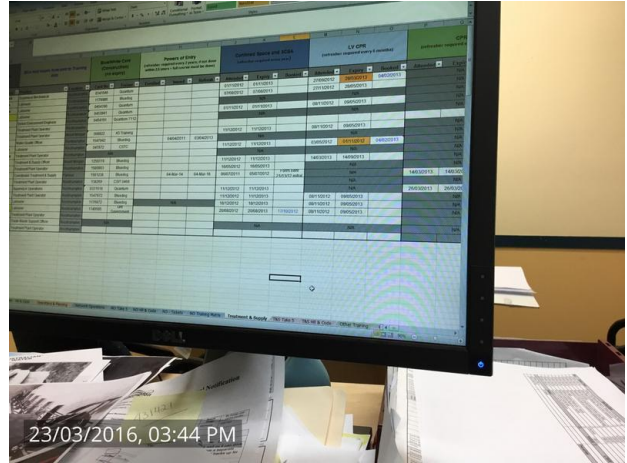
Training records



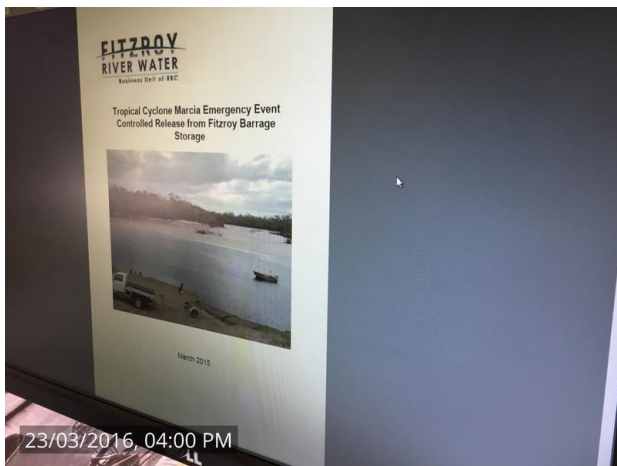
Prequalified supplier register



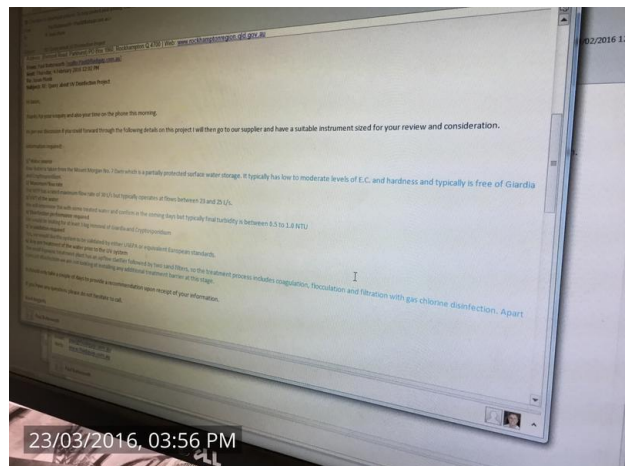
Contractor induction



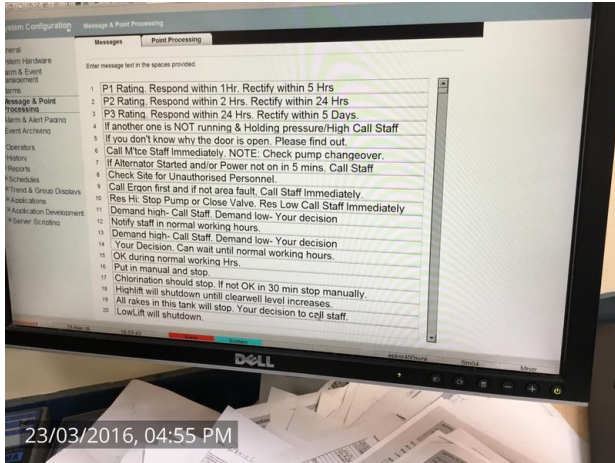
Training Matrix



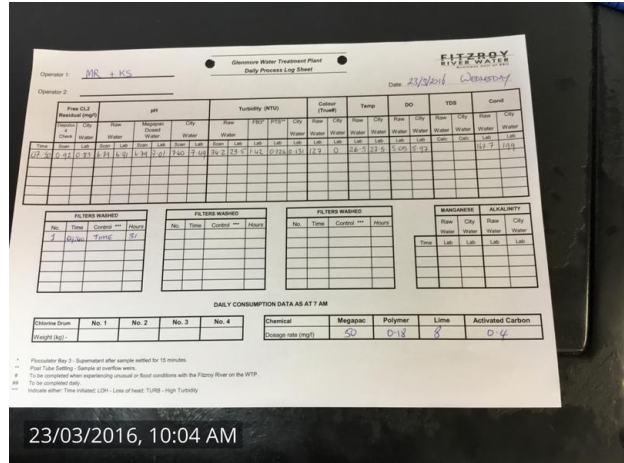
Investigative reports – ROP release of water following Cyclone Marcia



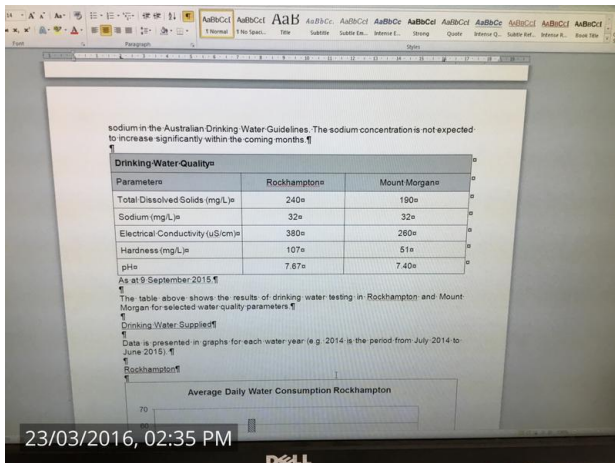
Email discussion of required specifications for Mount Morgan UV



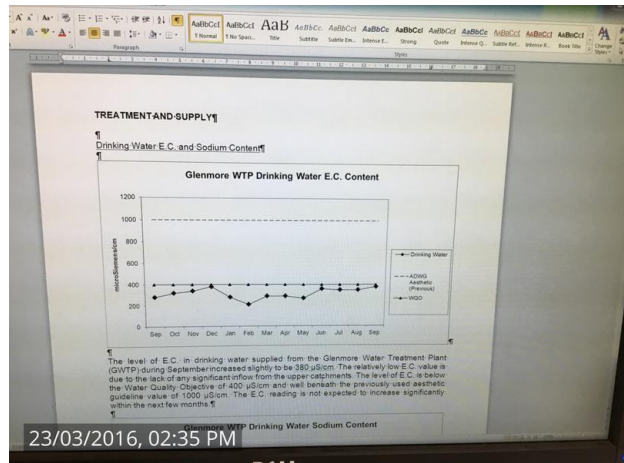
SCADA messages on specific alarms. P1 and P2 links to ERP



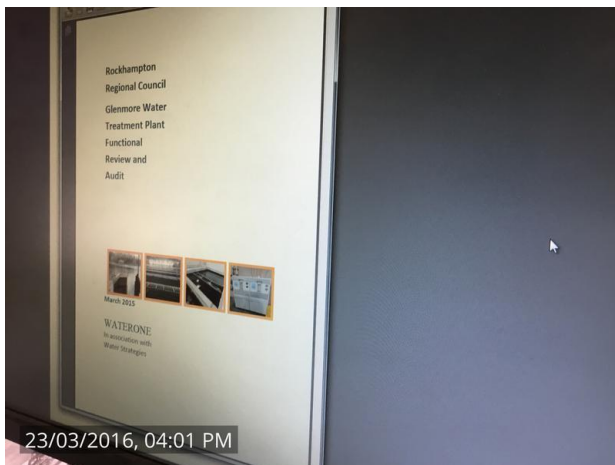
Daily log sheet



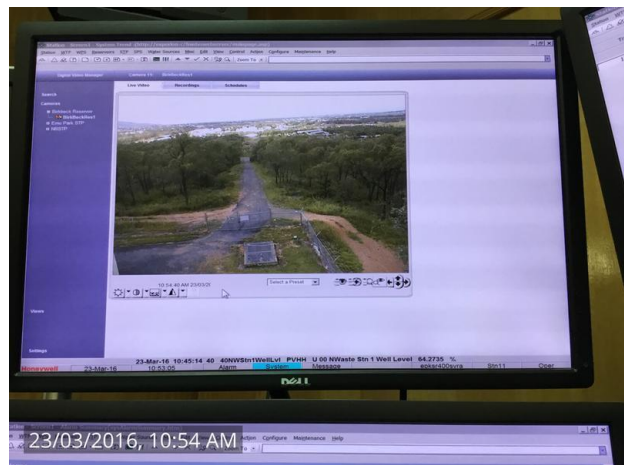
Reporting of water quality internally



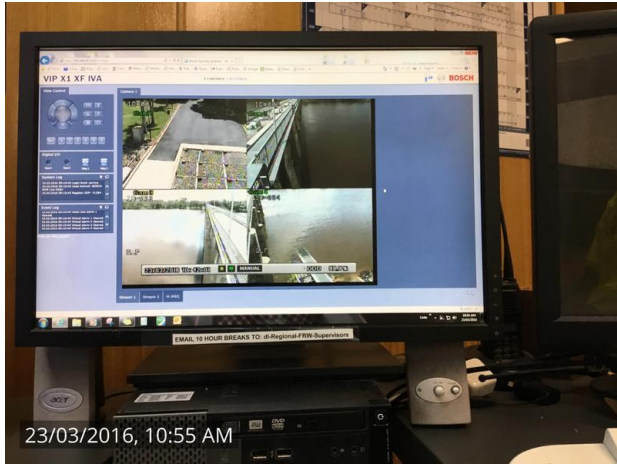
Reporting of water quality internally



Functional review of Glenmore WTP



Birbeck Reservoir CCTV



Barrage CCTV

15 STATUTORY DECLARATION

Oaths Act 1867

Statutory Declaration

QUEENSLAND
TO WIT

I, Michael Lawrence

of Bligh Tanner Pty Ltd, L9 288 Wickham St Fortitude Valley in the State of Queensland

do solemnly and sincerely declare that

I am certified under the Exemplar Global drinking water quality management system auditor certification scheme (certificate number 129230, expiry Sept 18, 2016).

To the best of my knowledge, information and belief, I have not knowingly included any false, misleading or incomplete information in the Rockhampton Regional Council Drinking Water Quality Management Plan Audit Report, nor knowingly failed to reveal any relevant information or document to the Regulator.

I certify that the audit report addresses the relevant matters for evaluation, is factually correct, and the opinions expressed in the report are honestly and reasonably held.

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the Oaths Act 1867.

Signature of declarant/deponent

Taken and declared before me at Fortitude Valley

this 12th day of April

A Justice of the Peace/Commissioner for Declarations. — Legal Practitioner.