



**BLIGH
TANNER**

Drinking Water Quality Management Plan Audit Report

Rockhampton Regional Council

Date. 4 AUGUST 2020

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BLIGH TANNER

+ DOCUMENT

Drinking Water Quality Management Plan Audit Report

+ JOB NUMBER

2020.0399

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Version	Author	Reviewer	Authorised	Date
Draft	M Lawrence	S Hinton		22/6/20
1.0	M Lawrence	J Plumb	M Lawrence	4/8/2020

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Drinking Water Quality Management Plan Audit

Rockhampton Regional Council has an approved drinking water quality management plan (DWQMP), and was required under the *Water Supply (Safety and Reliability) Act 2008* (the Act) to arrange for an audit of their DWQMP by 31 August 2020.

The audit was conducted on-site on 17th and 18th June 2020 by Michael Lawrence in accordance with relevant audit standards. As the Manager Water was unavailable at the time, the audit was not completed until after conducting an additional telephone interview on 16th July 2020. This audit report was subsequently finalised on 4th August 2020 after review comments and the Statutory Declaration from Council was provided to Bligh Tanner.

While there are non-compliances identified in the audit, the operation of the Glenmore Water Treatment plant was excellent, and the water quality is of very high standard.

Audit requirements:

Section 108 of the Act prescribes the requirements of the auditor. These are further described in the DWQMP Review and Audit Guideline. These legislated requirements define the scope of the audit and the content of the audit report. Under these requirements, the auditor is required to:

- + verify whether the monitoring and performance data given to the regulator under the plan is accurate,
- + assess the providers compliance with the plan and the conditions, and
- + assess the plan's relevance to the water service

Verification of monitoring and performance data

The accuracy of the verification monitoring data for the period 2016-20 was assessed against Council's published DWQMP Reports for the same period. The data provided in the DWQMP Reports did not completely reflect the extent of verification monitoring undertaken. Parameters listed in the Verification monitoring program such as cyanobacteria, *Cryptosporidium* and *Giardia* were undertaken, but not reported in the annual report. As the reports are provided directly to them, the Regulator is already aware that these parameters had not been reported. This is identified here as a technical non conformance. An improvement item is noted in E10.6 to ensure the accuracy of future reports.

Methodology for assessing compliance with the conditions

There were 2 standard conditions directly relevant to this requirement.

- + **Condition 1 Water Quality Criteria** - *the verification monitoring program in the approved DWQMP must be implemented; and any non-compliance with the water quality criteria must be reported*

This condition was audited against Element 5 of the Australian Drinking Water Guidelines (ADWG). The verification monitoring program was not implemented as stated in the DWQMP. For example, radiological quality is stated in Table 10.1 to be monitored annually. It was monitored in 2020, but not the preceding 2 years. This had not been identified in the previous audit. Similarly chlorate and chlorite are indicated as monthly parameters, but they are only monitored when chlorine dioxide is used. This was raised as a technical non-conformance - it is recommended that the DWQMP be worded to capture the actual frequency for these parameters, or provide a description as to when the parameters should be analysed.

- + **Condition 2 Additional Reporting Requirements** - *"events", and detections of parameters with no water quality criteria must be reported if there is a concern public health may be impacted*

There were no clear instances identified by the auditor in which reporting should have occurred under this condition.

Methodology for assessing compliance with the DWQMP

The assessment of the compliance with the DWQMP was undertaken by determining whether the ADWG requirements as stated in the DWQMP have been met. Where an ADWG recommendation is included in the plan, and confirmed by evidence as being met in practice, these criteria are assessed as "conforms". Where an item is stated in the plan, but was evidently not met in practice, these criteria were assessed as "non-conformance".

In instances where the ADWG best practice guidance was not met, but the ADWG component or element is not required under the Act, this was assessed as "Not Applicable". "Improvement Opportunities" were identified wherever possible and stated against the relevant ADWG element. Improvement opportunities are identified based on the auditor's knowledge of water quality management processes and reflects his opinion.

These may or may not be adopted by Council depending on the circumstances and available resources.

During the audit, the auditor visited the Glenmore and Mount Morgan water treatment plants, and various Reservoirs and redosing stations (identified in subsequent sections). The auditor inspected the drinking water supply infrastructure, evaluated a sample of water quality results and other relevant records, and interviewed the following staff:

- + Water Quality Officer
- + Manager EGM
- + Manager Networks
- + Dispatch Officer

Subsequent to the site audit, an additional interview was held over Zoom with:

- + Manager Fitzroy River Water
- + Water Quality Officer

Relevance of the plan to the water service

The auditor has identified several areas of improvement that he believes impact on the relevance of the DWQMP. The auditor believes that the risk assessment should be more detailed, and that in doing so, the risks to the service would be better described, and specific mitigating measures described.

Similarly, the ADWG recommends that key treatment barriers are identified as appropriate as Critical Control Points, with strong documentation to support these processes. While these are not necessarily required in a Qld DWQMP, the unidentified low dose from the UV unit is more likely to have been identified had the appropriate dose rate been effectively documented.

Documents inspected in addition to the photographic record provided

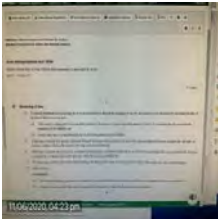
- + FRW DWQMP Versions 2, 3 and 4
- + Information Notices for the Decisions, 2014, 2016 and 2018
- + SPID493 DWQMP Annual Reports 2015-2016, 2016-17, 2017-18 and 2018-19
- + Notification of event or parameter initial report 20 May 2016
- + Notification of event or parameter investigation report 23 August 2016
- + A random selection of water quality results that were shown on screen at the auditors request.

Audit statement

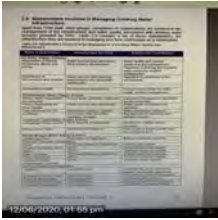
This audit report is a true and accurate reflection of the findings of the audit, and the opinions of the auditor; the audit outcomes are based on the review of sufficient information for the auditor to make an informed decision for each criteria.

However, as is the case for any audit, only a small proportion of all possible information was assessed. As such, components of the audit may have been assessed differently had different information been reviewed.

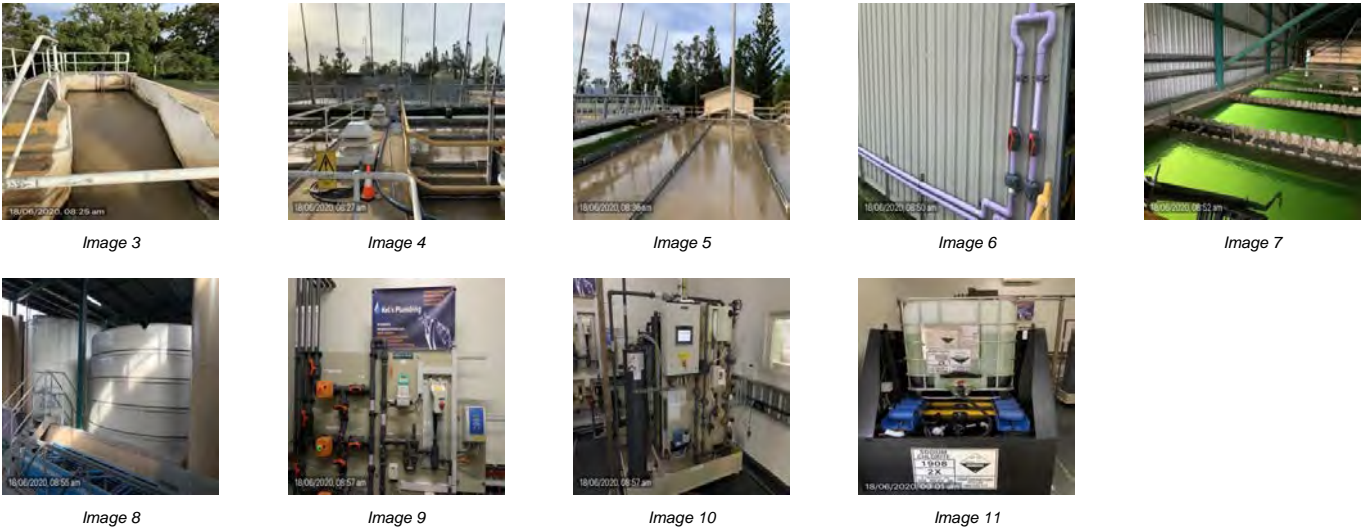
Regulatory Requirements

Requirements – Qld DWQMP		
Date of previous audit	20/April/2017	
Approval Notices since last audit	12/1/2017 and 21/11/2018	
DWQMPs to be audited and relevant timeframes for each DWQMP.	DWQMPs versions 2, 3 and 4.	
Additional conditions to be audited	Nil. Standard conditions in all 3 relevant approval notices	
Current approved DWQMP	Version 4 dated August 2018	
Additional documents included in current approved DWQMP (auditable).	Nil. Section 6.4 of the approval also specifically excludes all associated procedures and supporting documents.	
RR1 Were reviews conducted in accordance with the relevant information notices for the decision.	Improvement opportunity	The dates stated in the approval notices indicate when the regulator received amended DWQMPs. In each case, the full 30 business days, as counted under s38 of the Acts Interpretation Act were used. There was no evidence provided to prove the date when the review was completed. It is suggested that a record of the date of completion of the review be documented so that compliance with the stated dates can be demonstrated clearly in accordance with section 3.4 of the DWQMP Review and Audit Guidelines 2019.
 <p style="text-align: center;">Image 1</p>		

Element 1: Commitment to Drinking Water Quality

ADWG Component	Outcome	Evidence and reasoning
Drinking Water Quality Policy		
E1.1 Formulate a drinking water quality policy, endorsed by senior executive, to be implemented throughout the organisation.	Not applicable	
E1.2 Ensure that the policy is visible and is communicated, understood and implemented by employees.	Not applicable	
Regulatory and Formal Requirements		
E1.3 Identify and document all relevant regulatory and formal requirements.	Not applicable	
E1.4 Ensure responsibilities are understood and communicated to employees.	Not applicable	
E1.5 Review requirements periodically to reflect any changes.	Not applicable	
Engaging Stakeholders		
E1.6 Identify all stakeholders who could affect, or be affected by, decisions or activities of the drinking water supplier.	Conforms	Table 2.9 lists appropriate stakeholders. Table 8.2 also supports this through incident response.
 <p style="text-align: center;">Image 2</p>		
E1.7 Develop appropriate mechanisms and documentation for stakeholder commitment and involvement.	Conforms	Mechanisms for engaging with catchment management groups include: Sending Lab Reports directly to key customers monthly. Audited this list and relevant parties and major customers are included. Manager water attends meetings with catchment groups such as: Fitzroy Basin Association Incorporated Fitzroy Water Quality Advisory Group Fitzroy Partnership for River Health
E1.8 Regularly update the list of relevant agencies.	Conforms	Table 2.9 has been updated to reflect the changes in government agencies. No contact details are included, and this may be considered by FRW as a potential improvement.

Element 2: Assessment of the Drinking Water Supply System

ADWG Component	Outcome	Evidence and reasoning
Water supply system analysis - Glenmore		
E2.1 Assemble a team with appropriate knowledge and expertise.	Conforms	Page 45 lists the people involved in the risk assessment. This list has been updated since the previous approved version of the DWQMP.
E2.2 Construct a flow diagram of the water supply system from catchment to consumer.	Improvement opportunity	There is a minor improvement noted in that MgO is added to the raw water when alkalinity is low to facilitate appropriate coagulation. Consider placing fluoridation in brackets as it has not been used in many years, and while the infrastructure is present, is not in normal use.
 <p style="text-align: center;"> <i>Image 3</i> <i>Image 4</i> <i>Image 5</i> <i>Image 6</i> <i>Image 7</i> <i>Image 8</i> <i>Image 9</i> <i>Image 10</i> <i>Image 11</i> </p>		
E2.3 Assemble pertinent information and document key characteristics of the water supply system to be considered.	Conforms	The water quality data for Glenmore was updated to 2018. The catchment description is succinct, but generally identifies areas of concern.
E2.4 Periodically review the water supply system analysis.	Conforms	The water supply analysis has captured the addition of chlorine dioxide in the treatment train, but not MgO. This is captured in the flow diagram details.

Water supply system analysis - Mount Morgan

E2.5 Construct a flow diagram of the water supply system from catchment to consumer.

Improvement opportunity

The schematic is accurate except that the permanganate dosing is decommissioned. There is still fluoride infrastructure present, but it also has not been used for some time. Given there are manganese issues in reticulation, the inability for permanganate dosing to be implemented may impact the ability to manage manganese and/or change the risk profile.



Image 12



Image 13



Image 14

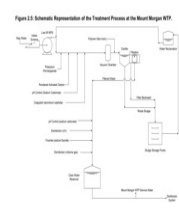


Image 15



Image 16



Image 17

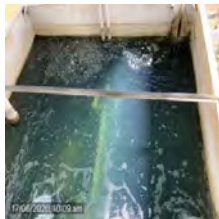


Image 18



Image 19



Image 20



Image 21



Image 22



Image 23



Image 24



Image 25



Image 26



Image 27



Image 28



Image 29



Image 30



Image 31



Image 32



Image 33



Image 34



Image 35



Image 36



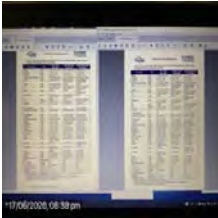
E2.6 Assemble pertinent information and document key characteristics of the water supply system to be considered.	Improvement opportunity	Water quality data is identical in the 2016 and 2018 DWQMPs and only goes to 2013. This should be updated when the DWQMP is reviewed to reflect current operation. For example, it was identified that filter media was replaced when the UV unit was installed, and the filtered water turbidity was stated to have improved. The average turbidity currently appears to be below 1 NTU, yet the plan states an average of ~1.4 NTU implying negative impacts on disinfection effectiveness.
 <p style="text-align: center;">Image 40</p>		
E2.7 Periodically review the water supply system analysis.	Improvement opportunity	The water quality data and scheme descriptions have been updated to include the new UV system, however, the operation of the UV system has not been described in sufficient detail. For example, the management plan should state the minimum dose rate that is applied. E.g. operators did not know to intervene even though the dose rate was not sufficient at 7 mJ/cm ² .
Assessment of water quality data		
E2.8 Assemble historical data from source waters, treatment plants and finished water supplied to consumers (over time and following specific events).	Improvement opportunity	Table 3.1 and 3.3 provide broad summary raw and potable water data for Glenmore and Mount Morgan respectively. The Mount Morgan data has not been recently updated.
E2.9 List and examine exceedances.	Conforms	There are limited recent exceedances. The most recent was in 2016.
E2.10 Assess data using tools such as control charts and trends analysis to identify trends and potential problems.	Improvement opportunity	<p>There are figures of raw water electrical conductivity (EC) and turbidity presented in the plan, but this could be expanded to both process and treated water to demonstrate plant and process performance e.g. effectiveness of critical treatment barriers. EC causes aesthetic issues, and is of interest to Councilor's, but has no direct health impact.</p> <p>While there is no reason to remove this graph, filtered water turbidity performance of individual filters would be a more relevant parameter to plot in terms of management of health risks</p>
Hazard identification and risk assessment		
E2.11 Define the approach and methodology to be used for hazard identification and risk assessment.	Conforms	The DWQMP states that the methodology is compliant with the superseded AS/NZS:4360 standard series. The risk assessment appears to also meet all regulatory requirements for a DWQMP given that the risk matrix and definitions appear to come from the regulators DWQMP guideline and has been approved by the regulator.



Image 41

<p>E2.12 Glenmore: Identify and document hazards, sources and hazardous events for each component of the water supply system.</p>	<p>Improvement opportunity</p>	<p>The risk assessment should be more detailed on a process by process basis. For example, the current DWQMP does not discuss the potential for failure of coagulation due to a loss of alkalinity in the raw water. However, it is necessary for the operators to dose MgO to mitigate against this risk.</p>
<p>E2.13 Mount Morgan: Identify and document hazards, sources and hazardous events for each component of the water supply system.</p>	<p>Improvement opportunity</p>	<p>The hazardous events are grouped broadly, without specifying failure modes. As such there is a lack of detail in the risk assessment that means that known issues at the treatment plant are not identified in the risk assessment. For example, the sludge bleed off is inefficient and has been modified from the original design. However, there is uneven draw off and if sludge builds up the clarification process is ineffective. The operator indicates a need to annually empty and fully desludge the clarifier which is not documented as required maintenance.</p> <p>Failure modes for filtration are similarly not examined - it was also noted that if the supernatant return is used that it is not possible to keep turbidity below 1 NTU. These types of issues should be risk assessed to determine if the risks are appropriately managed.</p>
<p>E2.14 Estimate the level of risk for each identified hazard or hazardous event.</p>	<p>Non conformance</p>	<p>The level of risk rated does not appear to match the risk observed in the audit. The risks for Mount Morgan that were rated as medium 8 in 2016 have been reduced in the 2018 DWQMP to Low 3.</p> <p>In the view of the auditor, the pathogen assessments are incorrect. The residual risk of pathogens as a result of failure of treatment barriers is currently stated as Low 3. This is contested for the following reason. Turbidity off the filters is regularly >0.5 NTU meaning that the filters are not effective as a barrier to <i>Cryptosporidium</i>, The UV intensity was observed to be 7 mJ/cm², which would only ensure 2 log reduction. Given there has been an incident of <i>Giardia</i> in reticulation in the past 5 years, the lack of an effective barrier for protozoan pathogens does not warrant a reduction of risk to low.</p> <p>Similarly, at the stated design dose rate of 22 mJ/cm² the UV is not a barrier for virus. The virus risk has been reduced since 2016 with UV stated as the additional barrier. Given there is no additional effective barrier, the reduction in risk from 2016 is considered to be in error.</p> <p>It was additionally noted that the operator does not record UV dose rate, and dose rate is not visible in SCADA. However, UV transmissivity is visible. A hand written note in the UV O and M manual indicates there is an alarm at <22 mJ/cm², however the operator was not aware of this, and it was not able to be identified in SCADA by either the Mount Morgan operator or the Glenmore plant operator.</p>

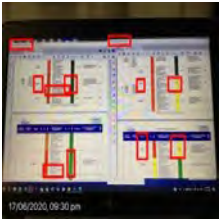


Image 42



Image 43



Image 44

E2.15 Evaluate the major sources of uncertainty associated with each hazard and hazardous event and consider actions to reduce uncertainty.

Conforms

Uncertainty is stated in the risk assessment. This was approved as appropriate by the Regulator.

E2.16 Determine significant risks and document priorities for risk management.

Non conformance

By underestimating risk e.g. MM27, improvements that are required are not noted in the risk assessment. For example, contamination of the South reservoir through the holes in the roof should link to the roof replacement capital upgrade item that is planned. Several of the Reservoir roofs were observed to have compromised integrity as detailed later.

Note the provider has identified and is in the process of implementing appropriate corrective actions. There is a capital works item to repair or replace this roof.

The nonconformance is that the DWQMP does not adequately represent risks to drinking water quality and does not document the priorities for risk management.



Image 45



Image 46






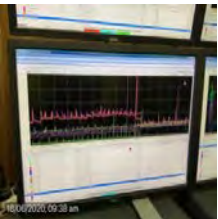

Image 47

E2.17 Periodically review and update the hazard identification and risk assessment to incorporate any changes.

Conforms

Changes have been made to the risk assessment as the system has changed.

Element 3: Preventive Measures for Drinking Water Quality Management

ADWG Component	Outcome	Evidence and reasoning
Preventive measures and multiple barriers		
E3.1 Identify existing preventive measures from catchment to consumer for each significant hazard or hazardous event and estimate the residual risk.	Improvement opportunity	All relevant preventive measures should be identified in a more comprehensive risk assessment. MgO is example that is not currently identified.
E3.2 Evaluate alternative or additional preventive measures where improvement is required.	Not applicable	The current risk assessment does not allow this item to be fully assessed. There are few items assessed as requiring further preventive measures. In those cases, improvements are identified. However, the auditor does not agree that the risk assessment is comprehensive enough to determine all unacceptable risks. Therefore, preventive measure for unidentified or underestimated risks have not been identified.
E3.3 Document the preventive measures and strategies into a plan addressing each significant risk.	Conforms	For the 3 risks identified as unacceptable there has been an improvement program developed.
Critical control points - Glenmore		
E3.4 Assess preventive measures from catchment to consumer to identify critical control points.	Not applicable	The DWQMP does not define critical control points.
E3.5 Establish mechanisms for operational control	Improvement opportunity	While the DWQMP does not provide strong guidance as to acceptable performance, targets are stated in some areas of the plan, but it is not clear in the plan what the actual limits for key parameters are. For example, the risk assessment preventive measures state that the plant goes into backwash at 0.2 NTU off individual filters. The SCADA system indicates an alarm at 0.3 NTU. The risk assessment also states that individual filters rarely go above 0.3 NTU, however this should never occur if the filters went into backwash as described. This was observed to be the case in SCADA trends.
<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Image 48</p> </div> <div style="text-align: center;">  <p>Image 49</p> </div> <div style="text-align: center;">  <p>Image 50</p> </div> <div style="text-align: center;">  <p>Image 51</p> </div> <div style="text-align: center;">  <p>Image 52</p> </div> </div>		

E3.6 Document the critical control points, critical limits and target criteria.	Improvement opportunity	There are no defined CCPs. Targets in the plan are stated, but there is operator discretion around the points of intervention that are loosely defined in the DWQMP. There are also no SOPs that define the point of intervention. The limits should be defined and documented so that operators are aware of where and when to intervene.
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Image 53



Image 54

Critical control points - Mount Morgan

E3.7 Assess preventive measures from catchment to consumer to identify critical control points.	Not applicable	As above. This is not necessarily required under the Queensland framework.
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E3.8 Establish mechanisms for operational control	Improvement opportunity	There are no CCPs, so there are no documented controls for how to operate each barrier effectively. There is no ability for the operator to control UV at this plant. The only online monitoring for UV is transmissivity, not dose rate. In the auditor's view, CCPs should be developed and implemented at both plants to provide a more robust operational basis for operators.
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E3.9 Document the critical control points, critical limits and target criteria.	Improvement opportunity	Limits are broadly stated in the DWQMP; however, no processes have been identified as CCPs. There are targets stated for turbidity and chlorine, but not for UV. There is no definitive statement in the DWQMP identifying when the operators should intervene to control a process.
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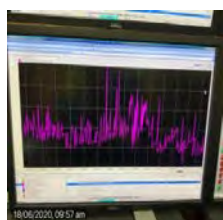


Image 55

Element 4: Operational Procedures and Process Control

ADWG Component	Outcome	Evidence and reasoning
E4.1 Identify procedures required for processes and activities from catchment to consumer.	Improvement opportunity	<p>There was no evidence that operators have or use standard operating procedures for unit processes as described in the DWQMP. In addition, the DWQMP indicates that the review of procedures is ongoing. This has been the case in all 3 DWQMPs. SOPs should have been finalised as the 2014 DWQMP stated that this was in progress.</p> <p>There is a recent calibration procedure that was seen at multiple chlorine redoing stations.</p>



Image 56

E4.2 Document all procedures and compile into an operations manual.	Improvement opportunity	<p>There are manufacturers O and M manuals as described in Table 7.1. For example, there is a chemical dosing manual for Mount Morgan that was provided as a part of that upgrade. However, the original plant manual does not reflect current operation as processes have changed, and the operator indicated these manuals are only periodically of use. Effective manuals and supporting standard operating procedures should be developed and implemented.</p>
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Image 57



Image 58

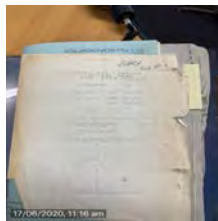


Image 59

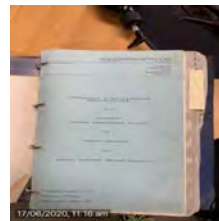


Image 60



Image 61

Operational monitoring

E4.3 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.	Improvement opportunity	<p>There is a spreadsheet that is routinely filled out by operators for standard parameters. This should have been updated at Mount Morgan when the UV was installed so the operator could keep track of dose rate (and UVT). The monitoring is not closely linked to operational limits and performance as would be expected if there were effective CCPs.</p>
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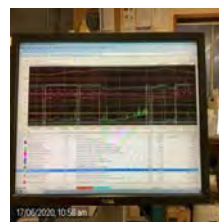


Image 62

Image 63

Image 64

Image 65

Image 66

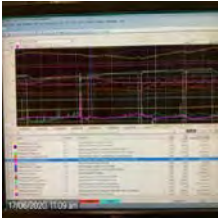


Image 67

E4.4 Document monitoring protocols into an operational monitoring plan.

Improvement opportunity

Operators appear to be using the plant diary effectively, and this does demonstrate links to other processes, e.g. Conquest requests. There was also changes noted e.g. increasing or decreasing dose rates in response to changing pH. This could be documented in a procedure such as an operational control point. The operational monitoring plan is implemented by operators filling out daily spreadsheets and entering that data into Excel.

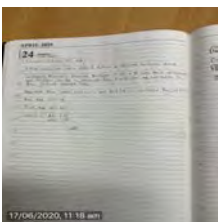


Image 68



Image 69



Image 70

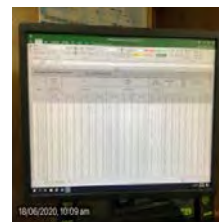


Image 71

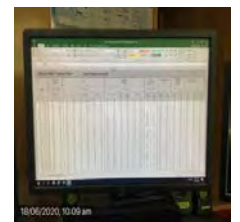


Image 72

E4.5 Redosing systems at Maudesley Hill, Yaamba Rd, Rogar Ave target 1mg/L. Thozet Rd 0.9 mg/L.

Conforms

Dosing systems are present and appear to be operated at the target stated. Note, there are no upper and lower limits stated in the plan.



Image 73



Image 74



Image 75



Image 76



Image 77



Image 78

E4.6 Mount Morgan. North St redosing target 1 mg/L.

Conforms

The dosing station was observed to be reading an appropriate chlorine level.



Corrective action

E4.7 Establish and document procedures for corrective action to control excursions in operational parameters.

Improvement opportunity

As above, in the absence of written procedures for process steps, the point of intervention is not documented. This relies on the operator responding to exceedances of set points that can be operator adjusted.

E4.8 Establish rapid communication systems to deal with unexpected events.

Conforms

Verbal communication is used.
On call managers are called if there is an issue. All operators verbally indicated there is an escalation process that broadly matches the stated descriptions.

Equipment capability and maintenance

E4.9 Ensure that equipment performs adequately and provides sufficient flexibility and process control.

Conforms

Meters are regularly calibrated both internally and externally. External calibrations were conducted for WTP meters shortly before the audit.

There are also processes for internal calibration of meters and this is also supported by operators comparing hand held and online meters daily. .

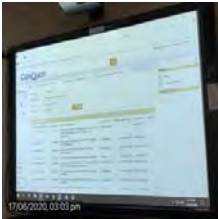


Image 82

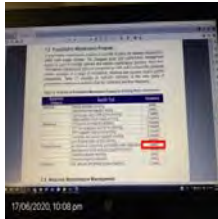


Image 83

E4.10 Establish a program for regular inspection and maintenance of all equipment, including monitoring equipment.

Improvement opportunity

There are regular inspections managed through Conquest. Table 7.2 should be checked to ensure that it matches the frequency in Conquest for assigning preventive maintenance tasks. For example, the table states weekly monitoring, but Conquest indicates the meter calibration is monthly.

Regular inspections occur, however, these may not always occur at the stated frequency (see photo below). There is a process to track open items that have not yet been closed.

As there was no evidence identified that meters are reading differently to the bench top instruments, there is no evidence indicating the actual frequency being undertaken is not appropriate. Therefore, this is considered to be an improvement to ensure that the DWQMP accurately represents the actual frequency that these tasks are required.

The reservoir inspection checklist has a column identifying if frogs are present. In the auditor's view, frogs in reservoirs indicate that the reservoir integrity is compromised and that there is a risk of pathogens being introduced.

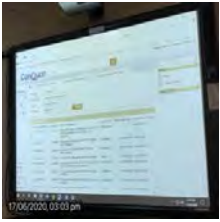


Image 84

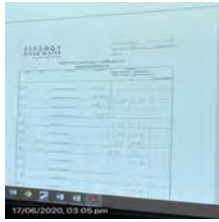


Image 85

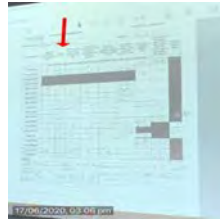


Image 86

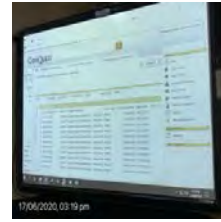


Image 87

E4.11 Maudsley Hill Reservoirs - Integrity and redosing

Improvement opportunity

The integrity of the reservoir could be improved to prevent ingress of vermin.



Image 88



Image 89



Image 90



Image 91



Image 92



Image 93



Image 94



Image 95



Image 96



Image 97

E4.12 Yaamba Rd Reservoir - Integrity and redosing

Improvement opportunity

There are minor points of ingress into this reservoir, but the structure is at end of life. It was indicated this roof is scheduled for replacement. There are small gaps around penetrations and hatches.



Image 98



Image 99



Image 100



Image 101



Image 102

E4.13 Thozet Rd Reservoir - Integrity and redosing

Improvement opportunity

While the integrity of this roof is generally good, the old ladder should be replaced as it is a tempting access point to the reservoir roof for vandalism. There are also gaps around penetrations meaning this roof will also allow water and contaminants in during rain.



Image 103



Image 104



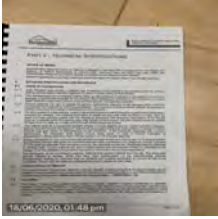

Image 105



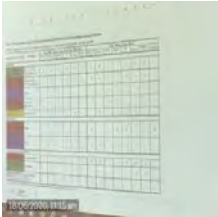
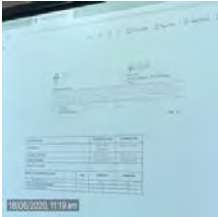
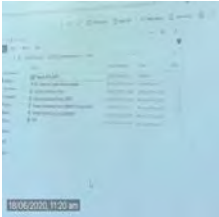
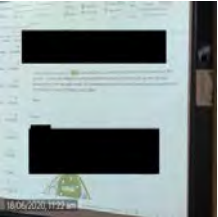

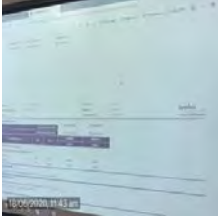
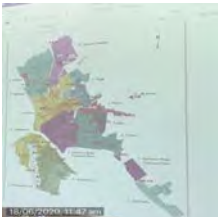
Image 106

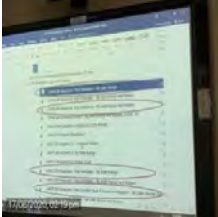
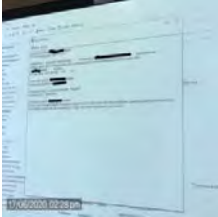
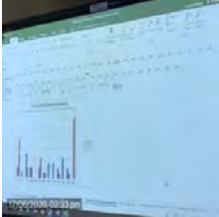



Image 107

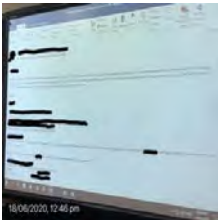
Materials and chemicals		
E4.14 Ensure that only approved materials and chemicals are used.	Conforms	There was evidence of appropriate consideration during procurement referencing applicable standards as stated in the risk assessment preventive measures.
E4.15 Establish documented procedures for evaluating chemicals, materials and suppliers.	Conforms	Contracts specify chemical quality. This is not stated in the DWQMP, but is an effective mitigation measure.
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Image 108</p> </div> <div style="text-align: center;">  <p>Image 109</p> </div> </div>		

Element 5: Verification of Drinking Water Quality

ADWG Component	Outcome	Evidence and reasoning
Drinking water quality monitoring		
E5.1 Determine the characteristics to be monitored in the distribution system and in water as supplied to the consumer.	Conforms	DWQMP identifies the parameters to be monitored.
E5.2 Establish and document a sampling plan for each characteristic, including the location and frequency of sampling.	Non conformance	<p>The DWQMP indicates monthly testing for chlorite and chlorate. The annual report only identifies 6 samples were taken, with the indication that these samples are only taken if the chlorine dioxide system is in use. While this may be reasonable, the distinction is not made in the DWQMP, hence the verification monitoring program was not fully implemented.</p> <p>Note: Annual reports for 2018, 2019 do not include cyanobacteria, <i>Cryptosporidium</i> and <i>Giardia</i> results which was undertaken.</p> <p>Radionuclides also not tested yearly, although have been done in 2020. The missing radionuclides monitoring was not identified in the previous audit.</p>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Image 110</p> </div> <div style="text-align: center;">  <p>Image 111</p> </div> <div style="text-align: center;">  <p>Image 112</p> </div> <div style="text-align: center;">  <p>Image 113</p> </div> <div style="text-align: center;">  <p>Image 114</p> </div> </div> <div style="margin-top: 10px;"> <div style="text-align: center;">  <p>Image 115</p> </div> </div>		
E5.3 Ensure monitoring data are representative and reliable	Conforms	The sample locations were identified on the attached map and appear to be well considered and appropriate for ensuring a mix of mid zone and end of line to be representative of water quality to all consumers.
<div style="text-align: center;">  <p>Image 116</p> </div>		

Consumer satisfaction		
E5.4 Establish a consumer complaint and response program, including appropriate training of employees.	Conforms	<p>Pathways system captures the customer complaints, and all are level 2 requiring response within 2 hours. Staff attend site and take a sample back to the laboratory. Respond back to customers</p> <p>Customer complaints data was checked Aug 2019, March 2019. Data is manually checked monthly to determine the number of complaints for reporting. This was accurate.</p>
<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Image 117</p> </div> <div style="text-align: center;">  <p>Image 118</p> </div> <div style="text-align: center;">  <p>Image 119</p> </div> <div style="text-align: center;">  <p>Image 120</p> </div> </div>		
Short-term evaluation of results		
E5.5 Establish procedures for the daily review of drinking water quality monitoring data and consumer satisfaction.	Conforms	Laboratory results are sent to multiple staff who can immediately review. These results are then circulated amongst both internal and external stakeholders.
E5.6 Develop reporting mechanisms internally, and externally, where required.	Conforms	As above. There is monthly, quarterly and annual reporting of water quality. Annual reports for 2018, 2019 do not include cyanobacteria, <i>Cryptosporidium</i> and <i>Giardia</i> results.
Corrective action		
E5.7 Establish and document procedures for corrective action in response to non-conformance or consumer feedback.	Conforms	Customers complaints related to water quality have a clear process. Where a parameter was to exceed a guideline value interviews revealed the key staff understand the link to the emergency response plan.
E5.8 Establish rapid communication systems to deal with unexpected events.	Conforms	As the water quality team is co located at the plant, many processes are by direct communication. This is rapid, but not easily documented when it is a verbal conversation. There have been no non-compliances identified recently.

Element 6: Management of Incidents and Emergencies

ADWG Component	Outcome	Evidence and reasoning
Communication		
E6.1 Define communication protocols with the involvement of relevant agencies and prepare a contact list of key people, agencies and businesses.	Conforms	This is defined in the DWQMP.
E6.2 Develop a public and media communications strategy.	Improvement opportunity	<i>Ad hoc</i> responses occur if there are repeated issues. E.g. see email below. BWA templates could be prepared as could other community notifications.
 <p style="text-align: center;">Image 121</p>		
Incident and emergency response protocols		
E6.3 Define potential incidents and emergencies and document procedures and response plans with the involvement of relevant agencies.	Conforms	The types of incident are stated in the DWQMP. While there are no specific responses identified for different types of incident, the low frequency of incidents means that this is not currently a major concern. See previous item e.g. templates for Boil Water Alerts are recommended.
E6.4 Train employees and regularly test emergency response plans.	Improvement opportunity	The plan indicates there are routine exercises regarding testing the emergency response plan. These have not occurred.
E6.5 Investigate any incidents or emergencies and revise protocols as necessary.	Not applicable	The <i>Giardia</i> incident at Mount Morgan was investigated as indicated by reports sent to the regulator, and a UV unit is now in place.

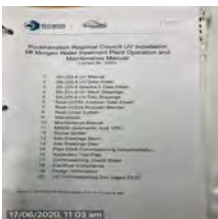

Element 7: Employee Awareness and Training

ADWG Component	Outcome	Evidence and reasoning
Employee awareness and involvement		
E7.1 Develop mechanisms and communication procedures to increase employees' awareness of and participation in drinking water quality management.	Improvement opportunity	<p>Toolbox meetings are undertaken monthly (pre-Covid). This provides an awareness of water quality issues that arise at the time.</p> <p>The general awareness of the DWQMP is that operators understand that there is a plan. As it is not written as an operational document, operators do not need to refer to it frequently to effectively work in their roles.</p>
Employee training		
E7.2 Ensure that employees, including contractors, maintain the appropriate experience and qualifications.	Not applicable	Not assessed.
E7.3 Identify training needs and ensure resources are available to support training programs.	Not applicable	Not assessed.
E7.4 Document training and maintain records of all employee training.	Not applicable	Not assessed.


Element 8: Community Involvement and Awareness

ADWG Component	Outcome	Evidence and reasoning
Community consultation		
E8.1 Assess requirements for effective community involvement.	Not applicable	Not assessed.
E8.2 Develop a comprehensive strategy for community consultation.	Not applicable	Not assessed.
Communication		
E8.3 Develop an active two-way communication program to inform consumers and promote awareness of drinking water quality issues.	Not applicable	Not assessed.

Element 9: Research and Development

ADWG Component	Outcome	Evidence and reasoning
Investigative studies and research monitoring		
E9.1 Establish programs to increase understanding of the water supply system.	Not applicable	Not assessed.
E9.2 Use information to improve management of the water supply system.	Conforms	FRW works with CSIRO and DES e.g. paddock to reef and data is made available on request.
Validation of processes		
E9.3 Validate processes and procedures to ensure that they are effective in controlling hazards.	Not applicable	Not assessed.
E9.4 Revalidate processes periodically or when variations in conditions occur.	Not applicable	Not assessed.
Design of equipment		
E9.5 Validate the selection and design of new equipment and infrastructure to ensure continuing reliability.	Conforms	<p>Design specifications are stated. In this case, the design is for 3 log Protozoa, but the documented (written) data indicates the system was originally set up to achieve 4 log.</p> <p>At the time of the audit however, this system only delivered 2 log and did not send a low dose alarm.</p> <p>The roof design for the North Res at Mt Morgan appears to be reasonable, however, consideration could be given to eliminating the center box gutter design that for many providers proves problematic with significant ingress during heavy rain, especially if there is any buildup of leaves etc. in the gutter that can block the drain.</p>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Image 122</p> </div> <div style="text-align: center;">  <p>Image 123</p> </div> </div>		

Element 10: Documentation and Reporting

ADWG Component	Outcome	Evidence and reasoning
Management of documentation and records		
E10.1 Document information pertinent to all aspects of drinking water quality management.	Conforms	<p>There is a council wide policy for record keeping which is available on the council website.</p> <p>Latest version is April 2019. All records requested were able to be located and shown during the audit.</p>
<div style="text-align: center;">  <p>Image 124</p> </div>		
E10.2 Develop a document control system to ensure current versions are in use.	Not applicable	No document control system is implemented or stated.
E10.3 Establish a records management system and ensure that employees are trained to fill out records.	Improvement opportunity	<p>ECM is used as the record keeping system, but not all documents and communication is recorded in this system.</p> <p>Water quality data and documents related to water quality are all saved on the server for easy access, and the relevant people were able to rapidly locate relevant information.</p> <p>Relating to operational data: Daily process log sheet is normally filled out and confirmed for all of 2019 and 2020 for Glenmore. Several days not recorded in Excel but checked in hard copy (e.g. data entry to Excel did not happen).</p> <p>Christmas Day 2019 also not recorded in Excel and the hard copy indicates the operator did not undertake testing. This was a one-off example in the dataset, so not considered systemic.</p> <p>Mount Morgan, the past 2 months checked with no missing data.</p> <p>Some verification monitoring results were not yet saved in correct folders, but evidence of testing observed in email records of the Water Quality Officer.</p>

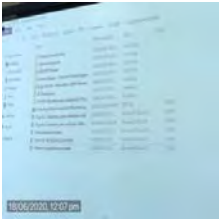


Image 125



Image 126

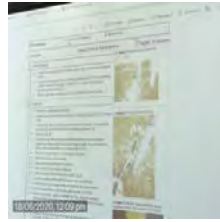


Image 127

E10.4 Periodically review documentation and revise as necessary.

Improvement opportunity

Procedures have been under review for the past 3 versions of the DWQMP with little evidence of progress towards developing current accurate SOPs.

This should be rectified; the auditor was informed that there is a plan to incorporate updated SOPs linked to the SCADA system when the Glenmore plant is upgraded. This will be a good improvement, but development of SOPs should not be delayed until the SCADA system is upgraded (where the treatment process will remain the same).

Reporting

E10.5 Establish procedures for effective internal and external reporting.

Conforms

Monthly quarterly and annual reporting to management and council. This appears to be effective.



Image 128

E10.6 Produce an annual report to be made available to consumers, regulatory authorities and stakeholders.

Improvement opportunity

Annual reports were provided and are available. Care should be taken to ensure that all monitoring data is included in the annual report as compared to the verification monitoring stated in Table 10.1. For example, *Cryptosporidium*, *Giardia*, cyanobacteria, cyanobacterial toxins, chlorite and chlorate.

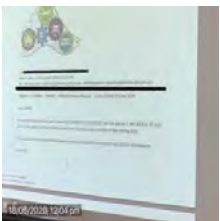
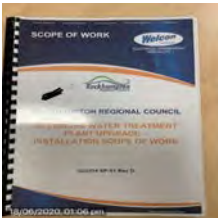
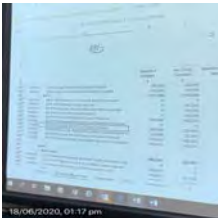
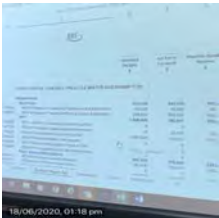


Image 129

Element 11: Evaluation and Audit

ADWG Component	Outcome	Evidence and reasoning
Long-term evaluation of results		
E11.1 Collect and evaluate long-term data to assess performance and identify problems.	Improvement opportunity	There was no formal process identified where specific barriers are assessed to ensure that they are performing acceptably. This should be undertaken.
E11.2 Document and report results.	Conforms	Verification monitoring data is assessed and reported monthly and annually. Performance of particular barriers could be included in these reports as that links directly to the management of health risks.
Audit of drinking water quality management		
E11.3 Establish processes for internal and external audits.	Conforms	This is met by ensuring the external audit is undertaken within the timeframes stated in the approval notice.
E11.4 Document and communicate audit results.	Conforms	Annual report following previous audit identifies audit outcomes.

Element 12: Review and Continual Improvement

ADWG Component	Outcome	Evidence and reasoning
Review by senior executive		
E12.1 Senior executive review of the effectiveness of the management system.	Conforms	Monthly reports go to water and waste committees, and issues escalated to Executive Leadership Team (ELT).
E12.2 Evaluate the need for change.	Improvement opportunity	There was not a clear process identified whereby the ELT would influence the content of effectiveness of the DWQMP.
Drinking water quality management improvement plan		
E12.3 Develop a drinking water quality management improvement plan.	Improvement opportunity	<p>There are a number of programs and processes being undertaken by FRW that demonstrate that improving water quality is a priority. For example, the upgrade of the Glenmore WTP, and the replacement of deficient reservoir roofs. However, these major items that demonstrate commitment are not identified in the DWQMP.</p> <p>From the perspective of what is stated in the DWQMP. There were previously 8 items in the RMIP, and most have been addressed. Specifically identified improvements are being implemented.</p> <p>There is also another more general table in the DWQMP that identifies other areas of focus for improvement. These are not clear auditable commitments, and some, such as the stated Element 4 are limited in that there was little evidence identified during the audit that operational staff use the DWQMP as part of their routine duties.</p>
<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Image 130</p> </div> <div style="text-align: center;">  <p>Image 131</p> </div> <div style="text-align: center;">  <p>Image 132</p> </div> </div>		
E12.4 Ensure that the plan is communicated and implemented, and that improvements are monitored for effectiveness.	Improvement opportunity	There is a clear awareness within FRW of specific issues within the drinking water system that are not articulated in the DWQMP. For example, poor roof integrity of reservoirs that leads to the risk of vermin ingress. These issues should be identified through the risk assessment and assessed as unacceptable risks - doing so would then ensure that the rectification measures were part of the improvement program. As such, there is a lost opportunity to communicate these issues and ensure effective resolution.

Media

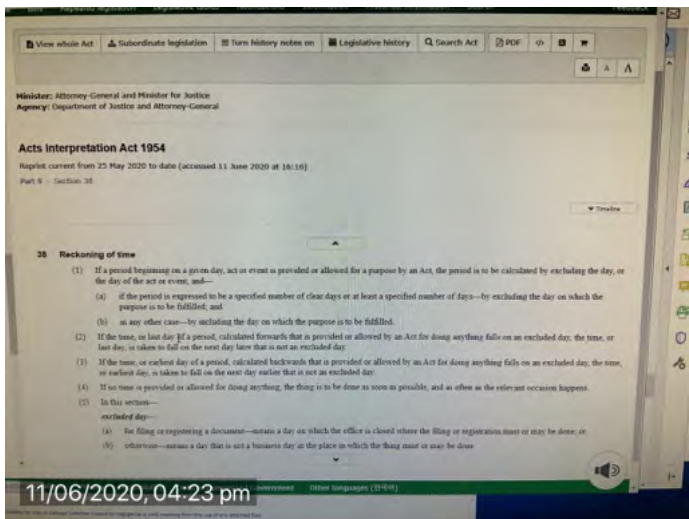


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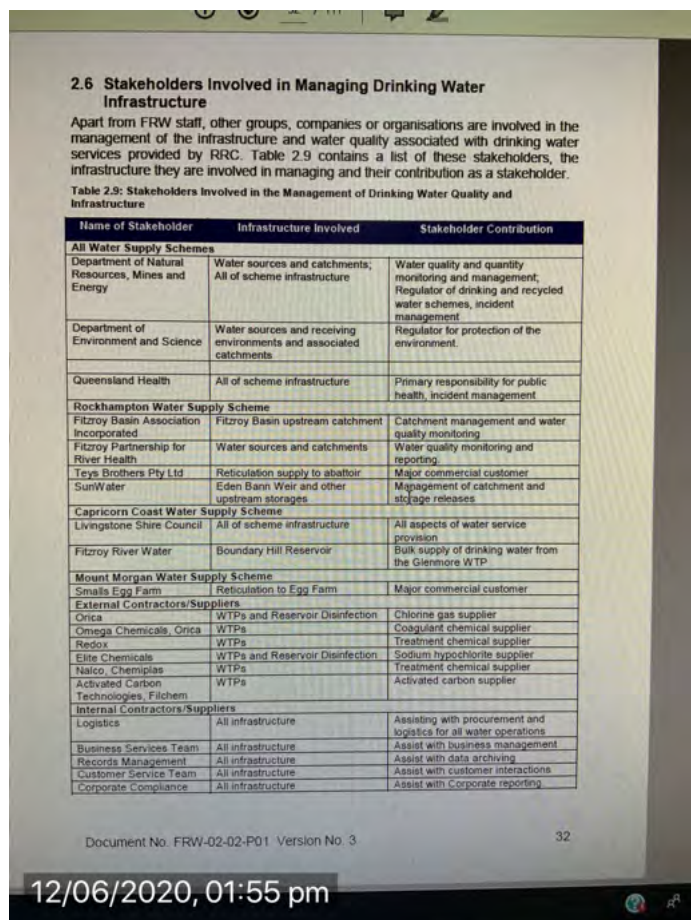


Image 2



Image 3

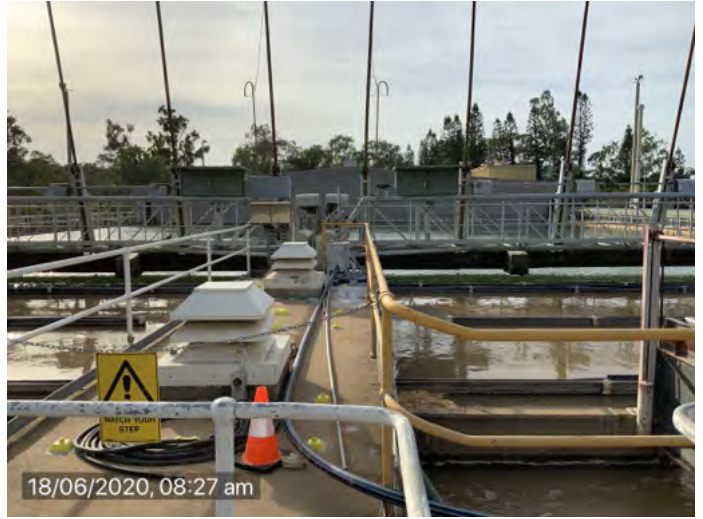


Image 4



Image 5

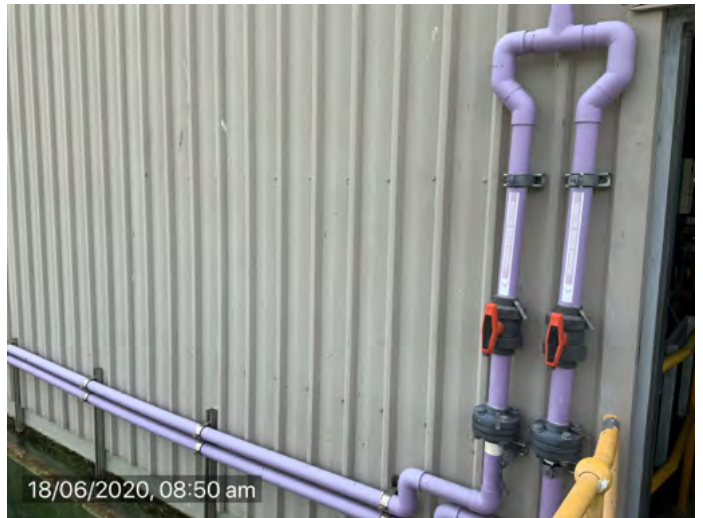


Image 6



Image 7



Image 8

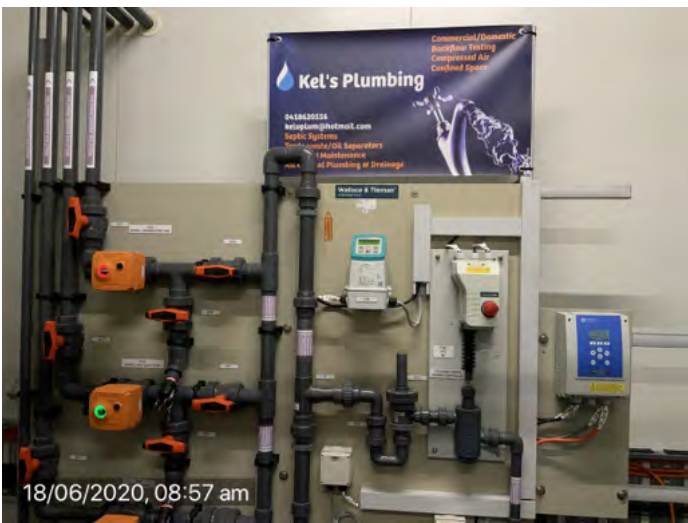


Image 9



Image 10



Image 11



Image 12



Image 13



Image 14

Figure 2.5: Schematic Representation of the Treatment Process at the Mount Morgan WTP.

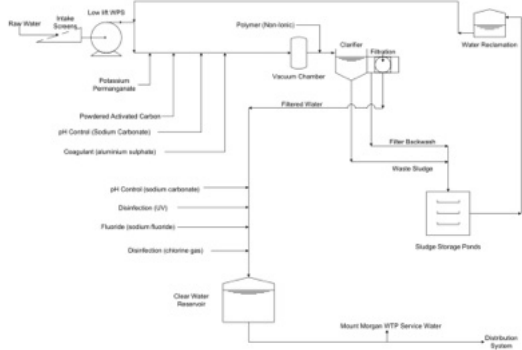


Image 15



Image 16



Image 17

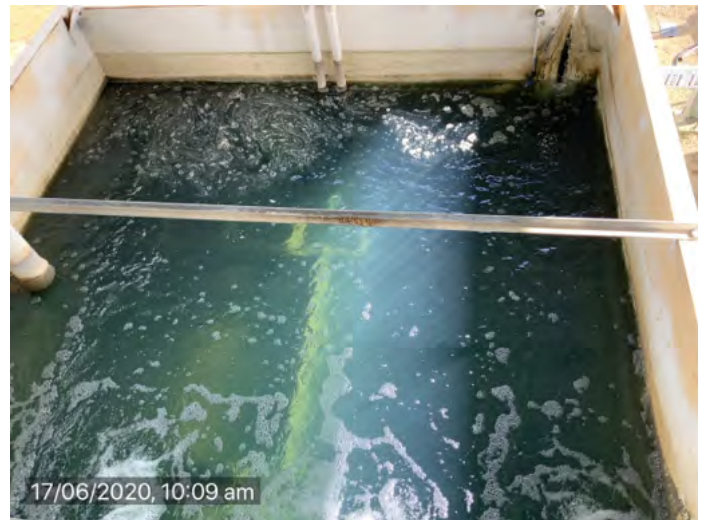


Image 18



Image 19



Image 20



Image 21



Image 22



Image 23



Image 24



Image 25



Image 26



Image 27



Image 28



Image 29



Image 30



Image 31



Image 32



Image 33



Image 34



Image 35

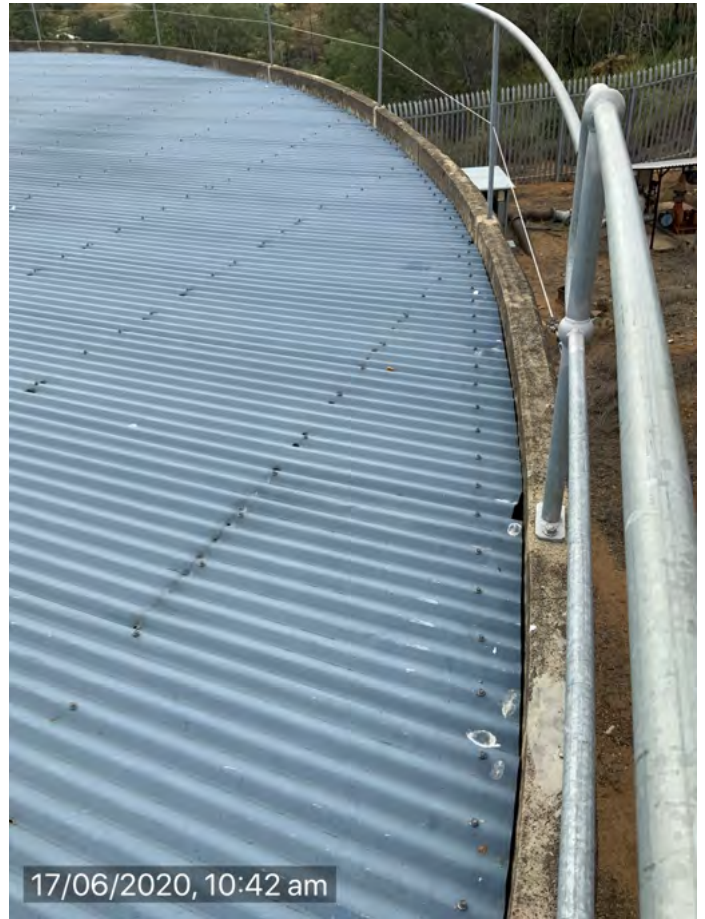


Image 36



Image 37



Image 38



Image 39

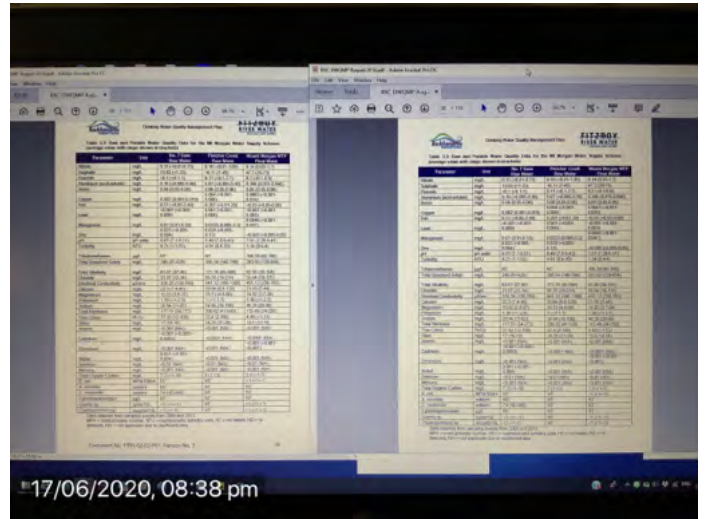


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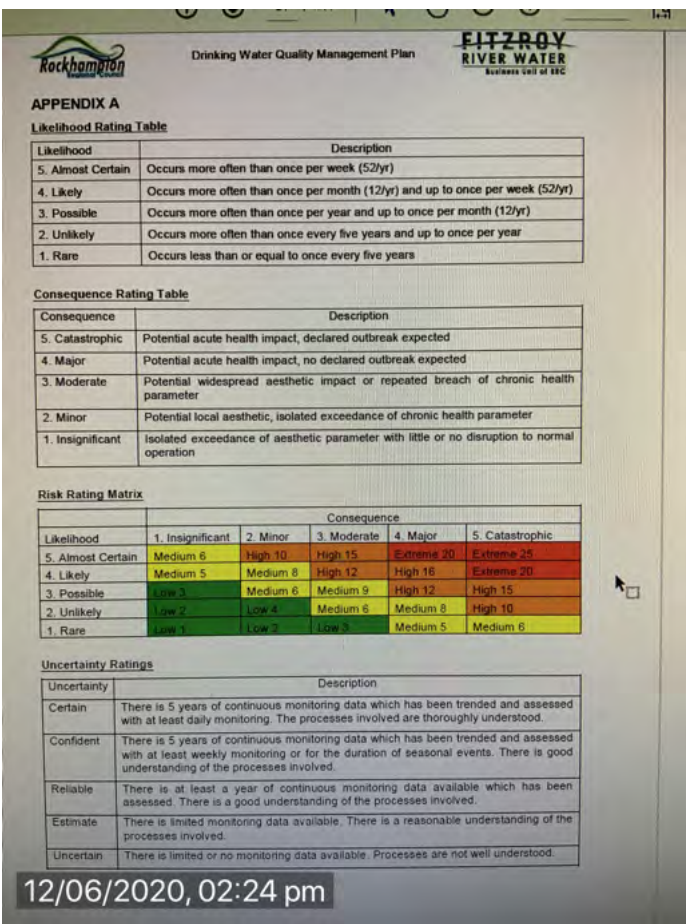


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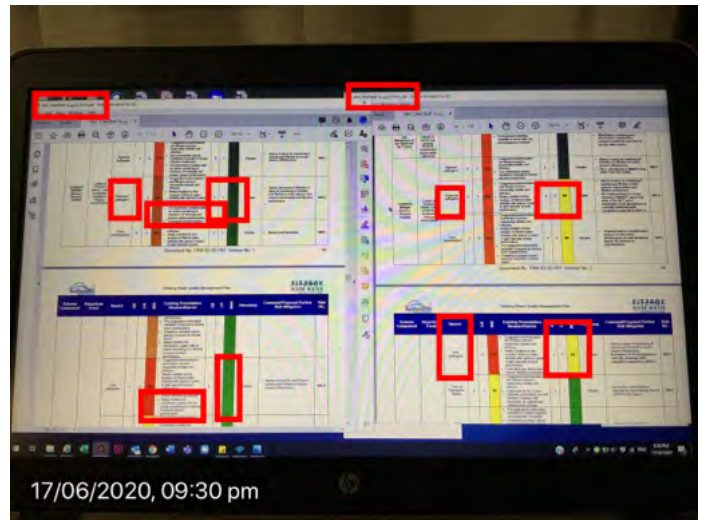


Image 42



Image 43

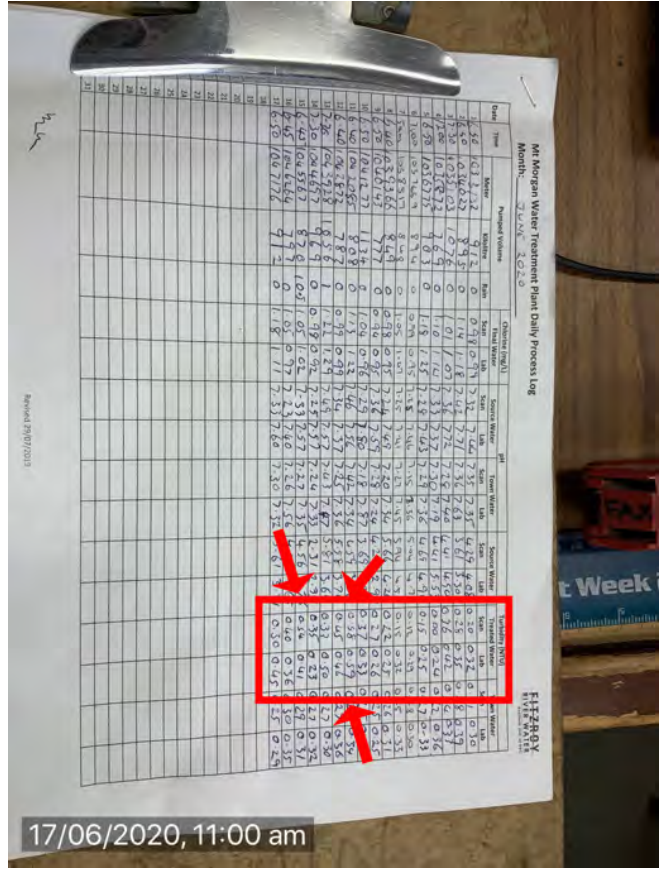


Image 44



Image 45

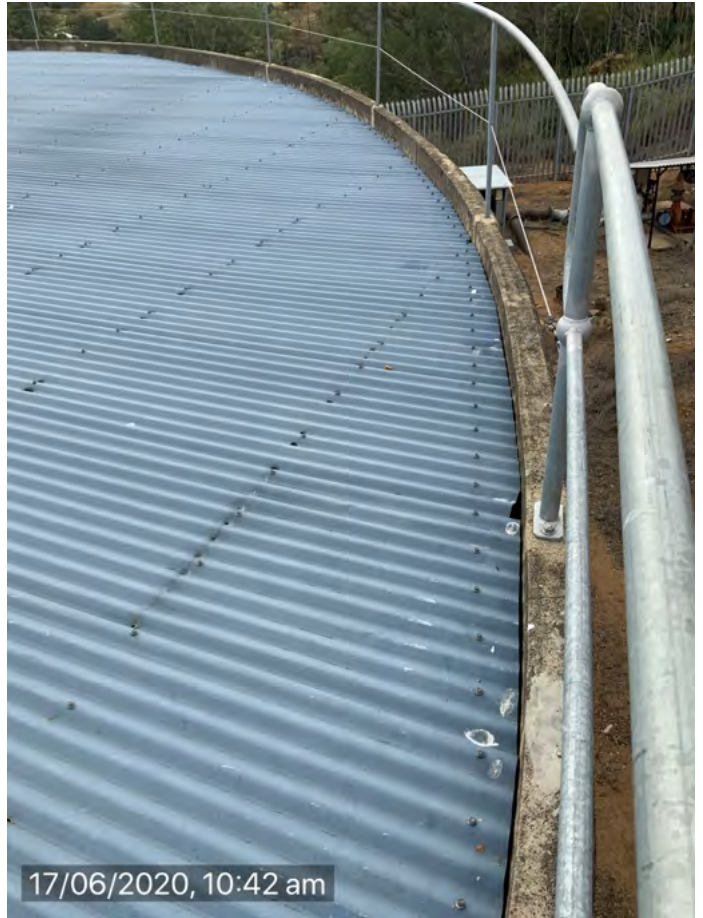


Image 46



Image 47



Image 48

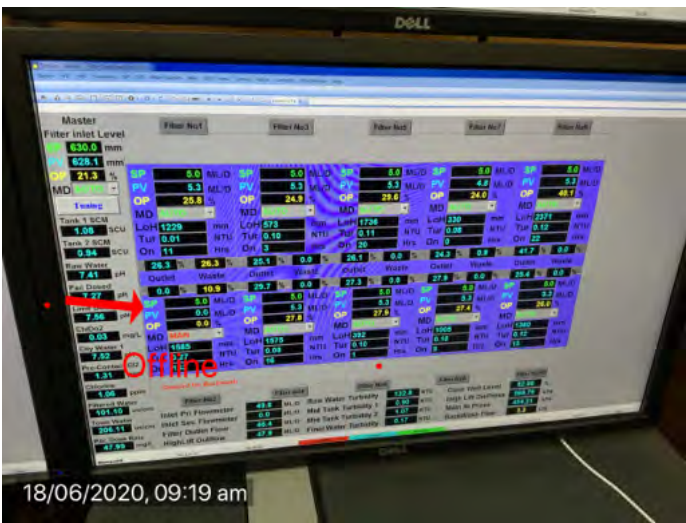


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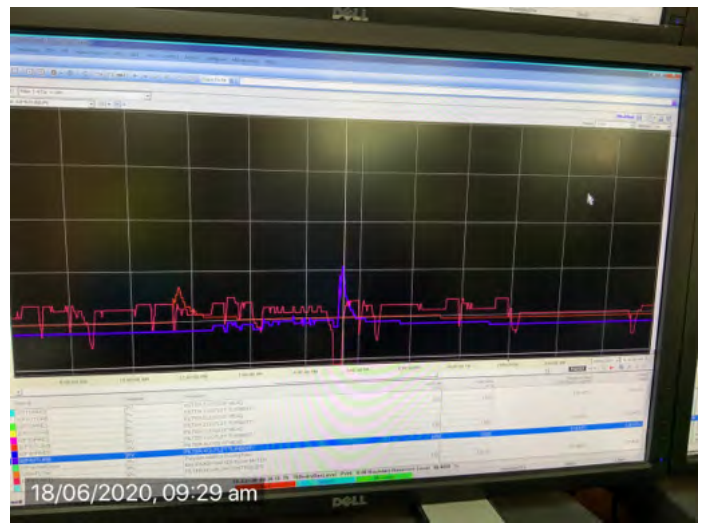


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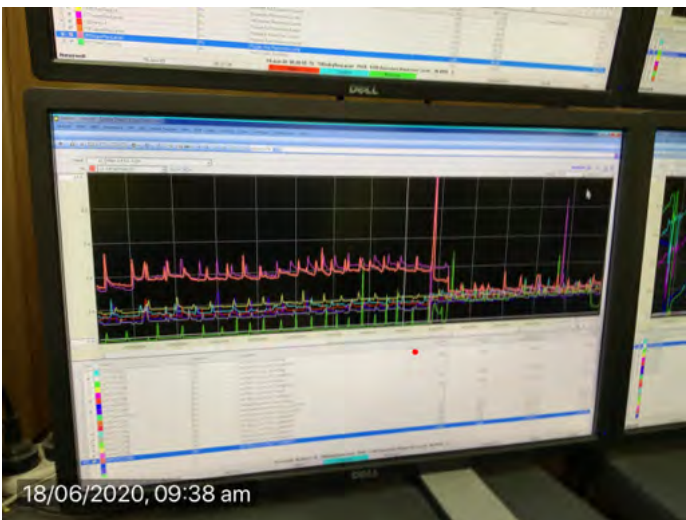


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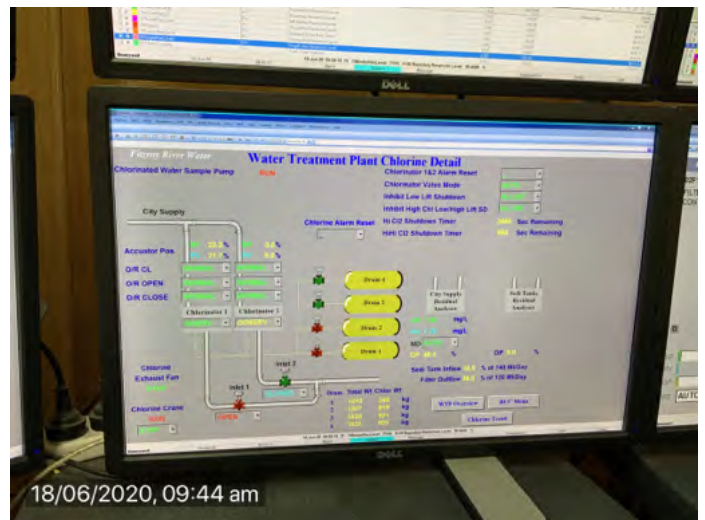


Image 52



Image 53

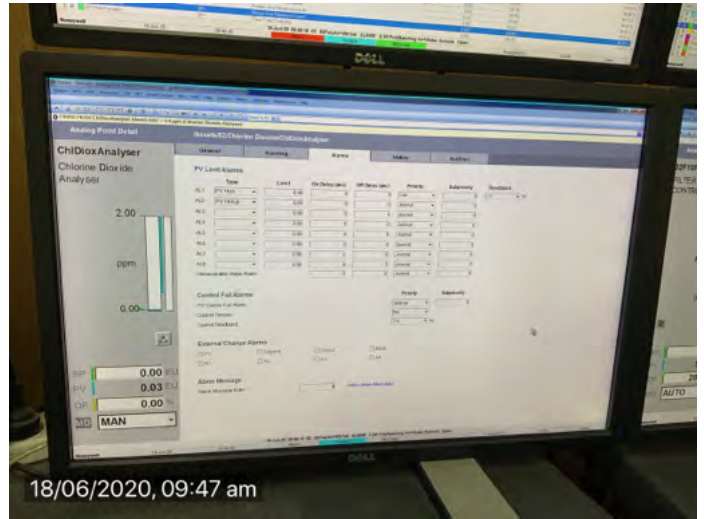


Image 54

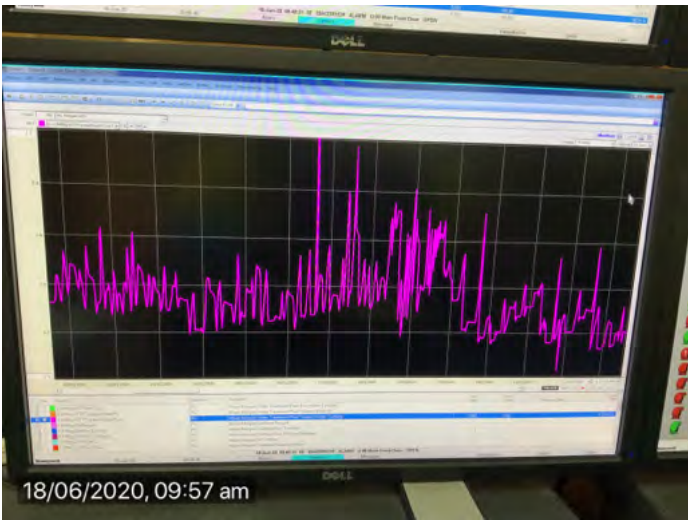


Image 55



Image 56



Image 57

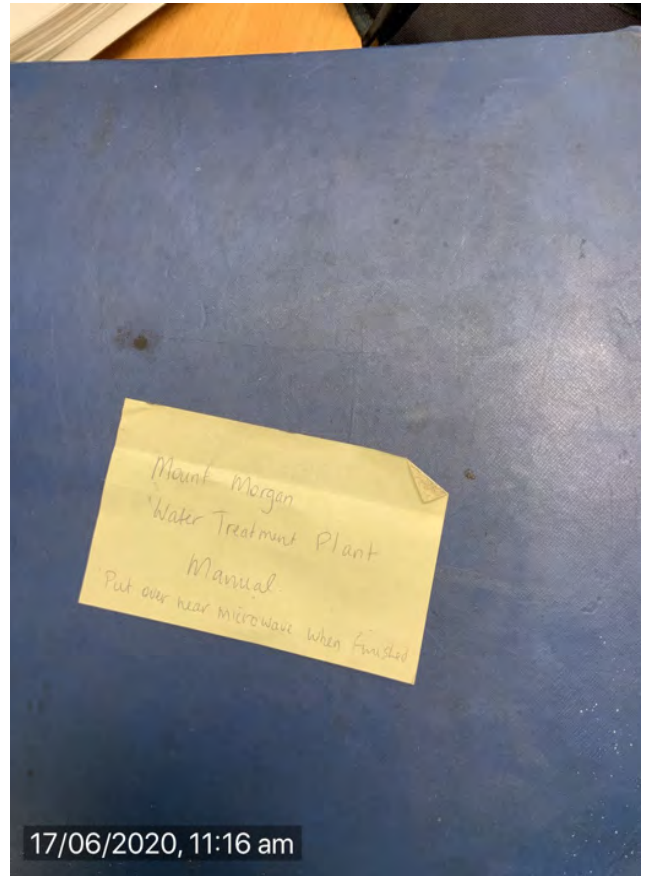


Image 58

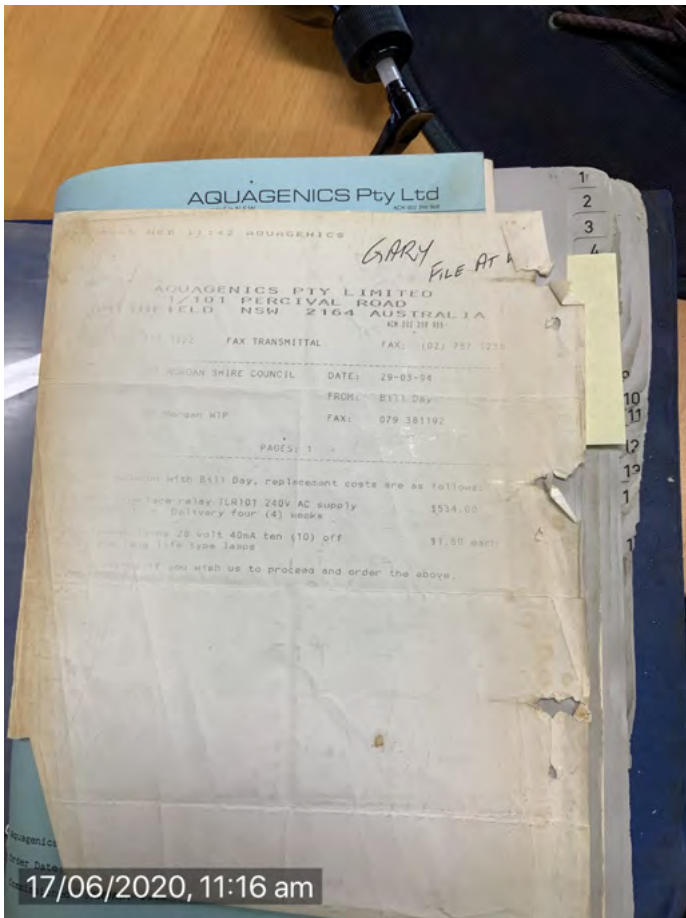


Image 59

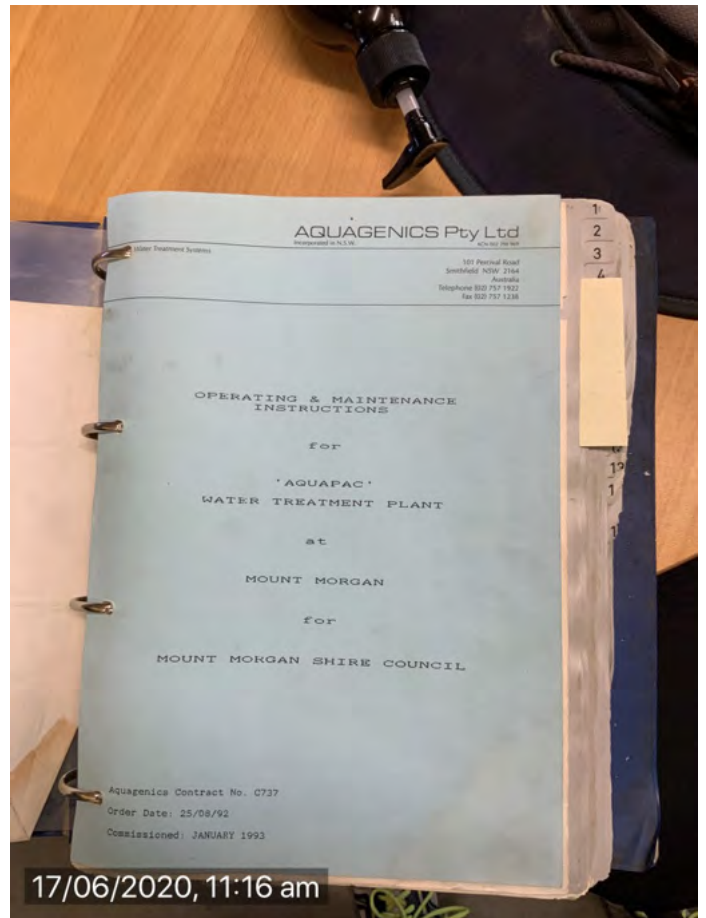


Image 60



Image 61

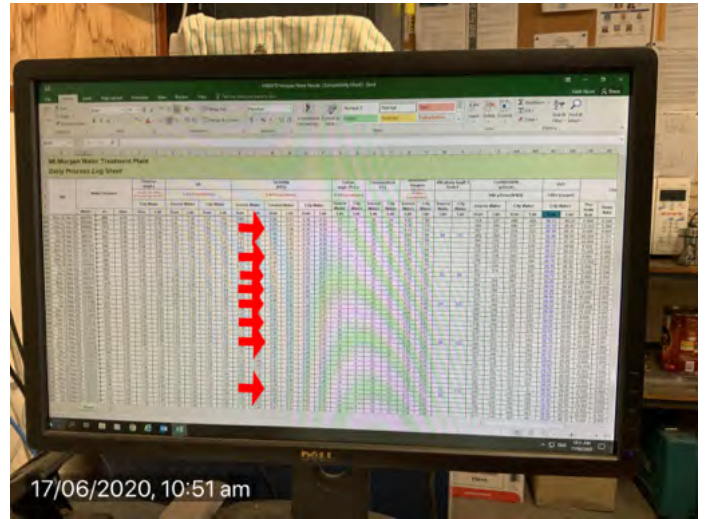


Image 62

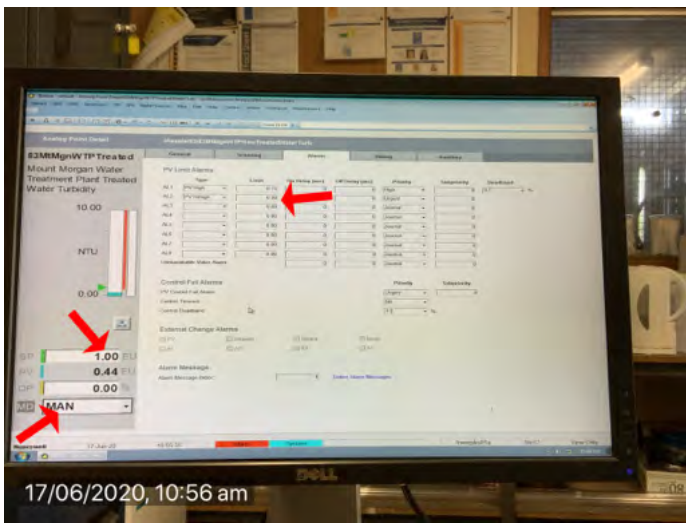


Image 63

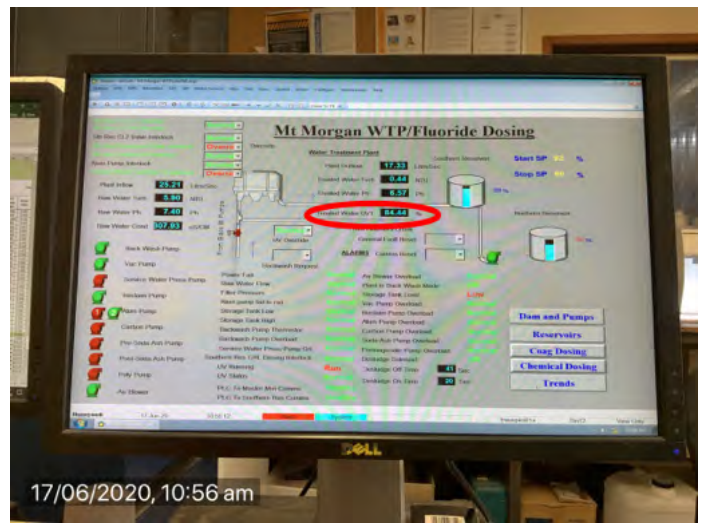


Image 64

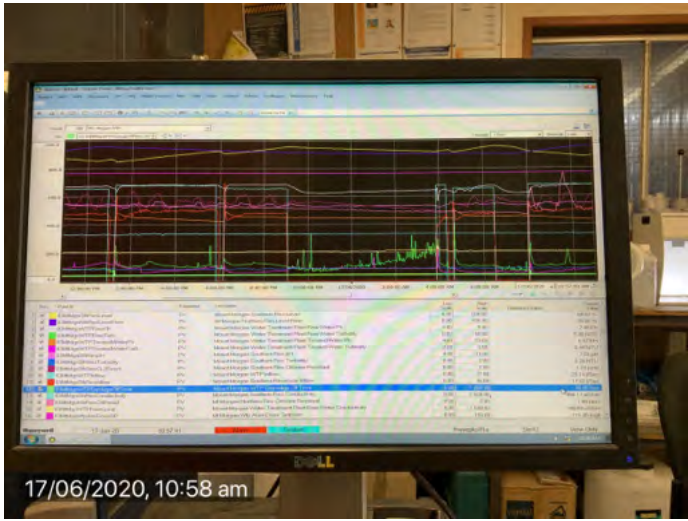


Image 65

MT Morgan Water Treatment Plant Daily Process Log
 Month: 7/2020

Date	Time	Pumped Volume		Conductivity (µS/cm)		pH		Sulphate (mg/L)		Total Hardness (mg/L)					
		Raw	Filtered	Raw	Filtered	Raw	Filtered	Raw	Filtered	Raw	Filtered				
17/06/2020	10:58	91.8	91.8	0.71	0.91	7.32	7.44	7.56	7.35	4.52	4.08	0.20	0.72	0.21	0.10
17/06/2020	11:00	91.8	91.8	0.71	0.91	7.32	7.44	7.56	7.35	4.52	4.08	0.20	0.72	0.21	0.10
17/06/2020	11:09	91.8	91.8	0.71	0.91	7.32	7.44	7.56	7.35	4.52	4.08	0.20	0.72	0.21	0.10
17/06/2020	11:18	91.8	91.8	0.71	0.91	7.32	7.44	7.56	7.35	4.52	4.08	0.20	0.72	0.21	0.10

17/06/2020, 11:00 am

Image 66

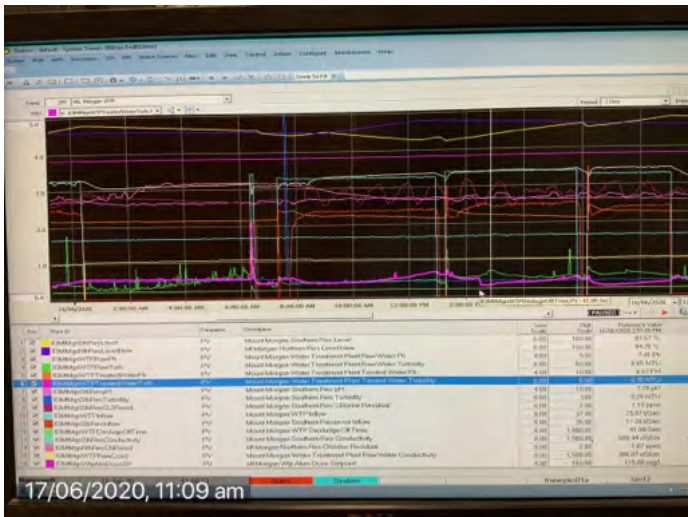


Image 67

APRIL 2020
 24 FRIDAY
 11/2/2018 Week 17

General duties all ok

Filtered chemical vats, cleaned filters + flushed carbon pump.

Southern Reservoir chlorine Analyser 0.65 + D lab test 0.72mg/L
 got Michael to do a compare for Electrician to calibrate it.
 Also flushed sample line.

Adjusted Post Soda ash as I got 8.13 pH in Southern Res. 40 → 25

Raw App cal: 48

Final App cal: 10

Clarifier pH: 6.81
 MV: 1.50

17/06/2020, 11:18 am

Image 68

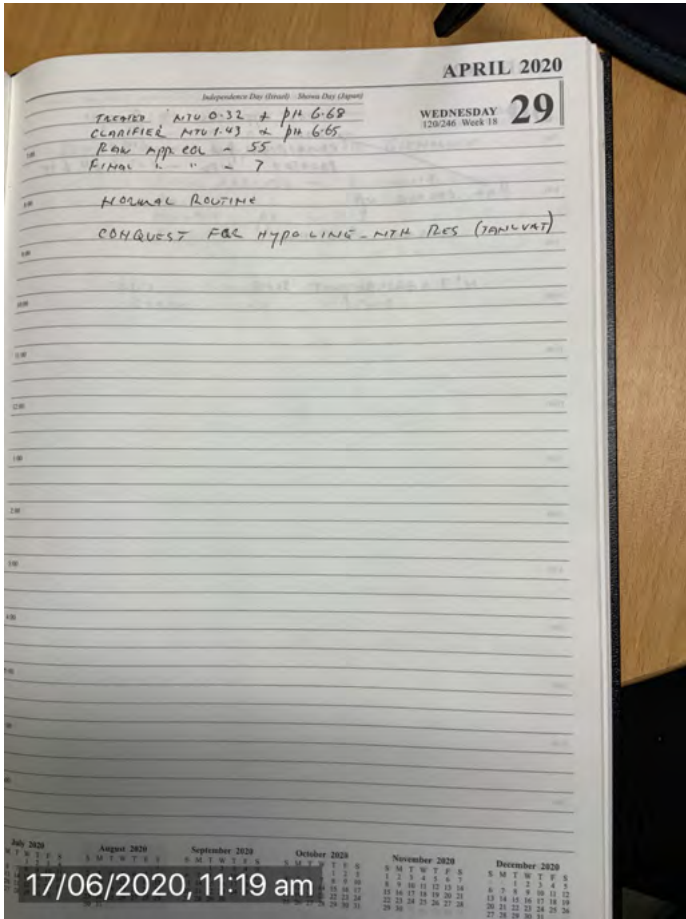


Image 69

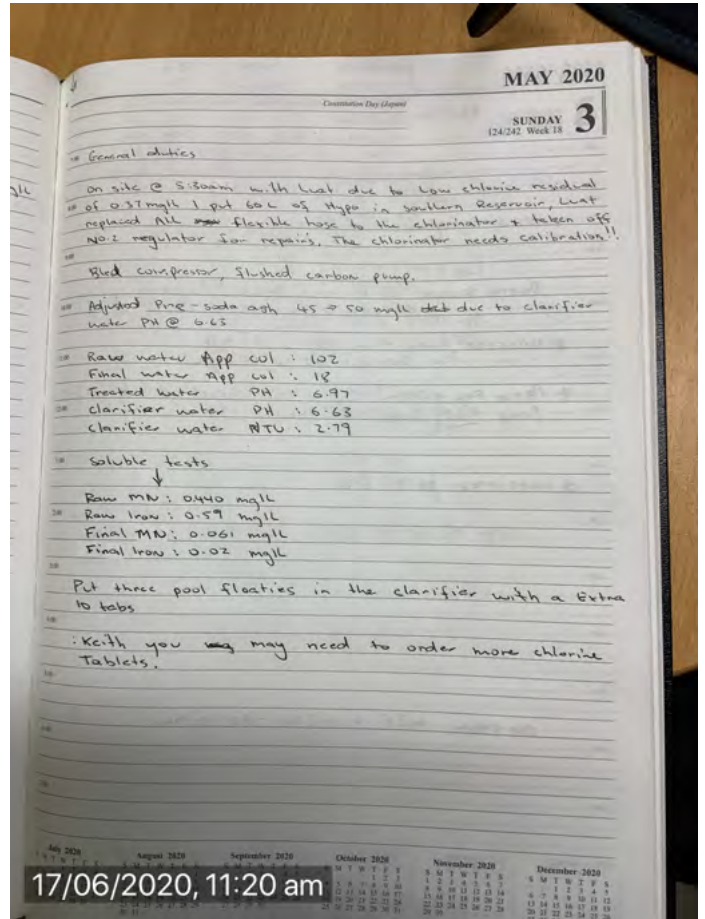


Image 70

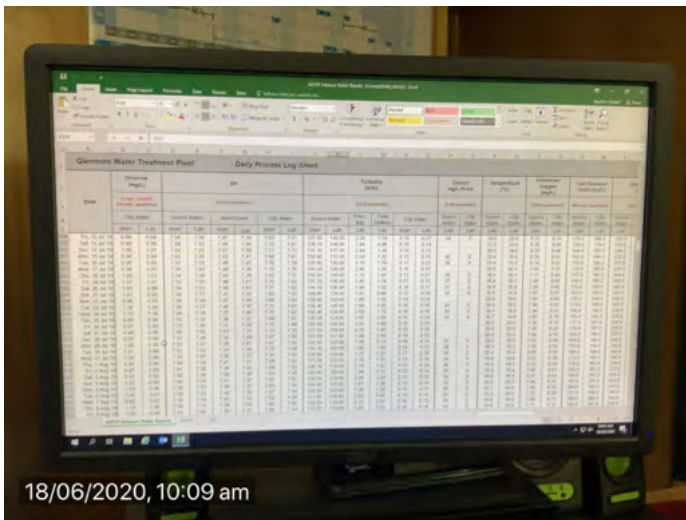


Image 71

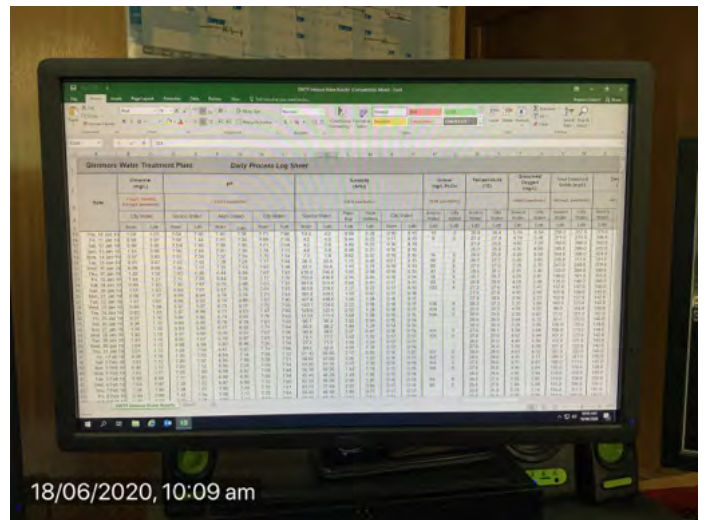


Image 72



Image 73



Image 74



Image 75



Image 76



Image 77



Image 78



Image 79

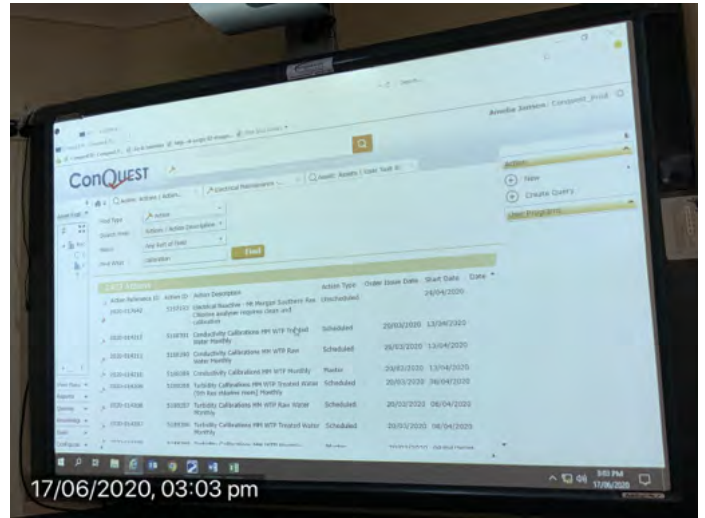


Image 80



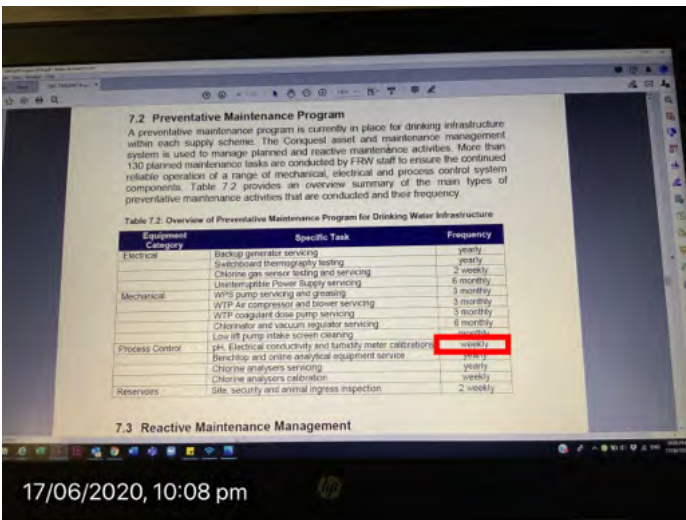
17/06/2020, 11:51 am

Image 81



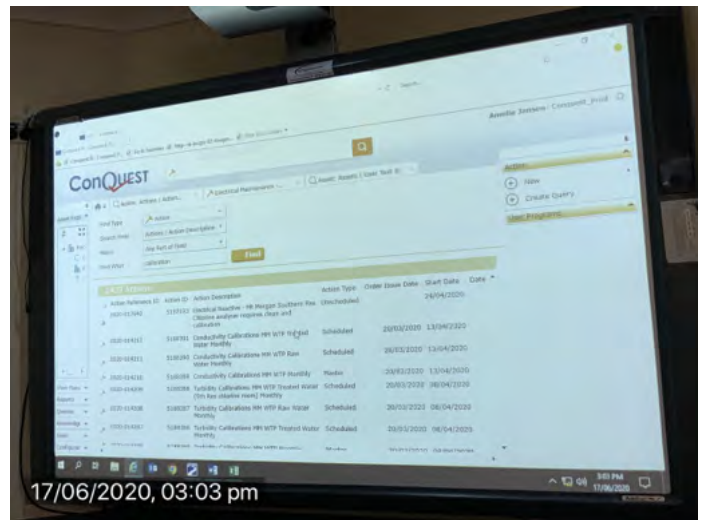
17/06/2020, 03:03 pm

Image 82



17/06/2020, 10:08 pm

Image 83



17/06/2020, 03:03 pm

Image 84

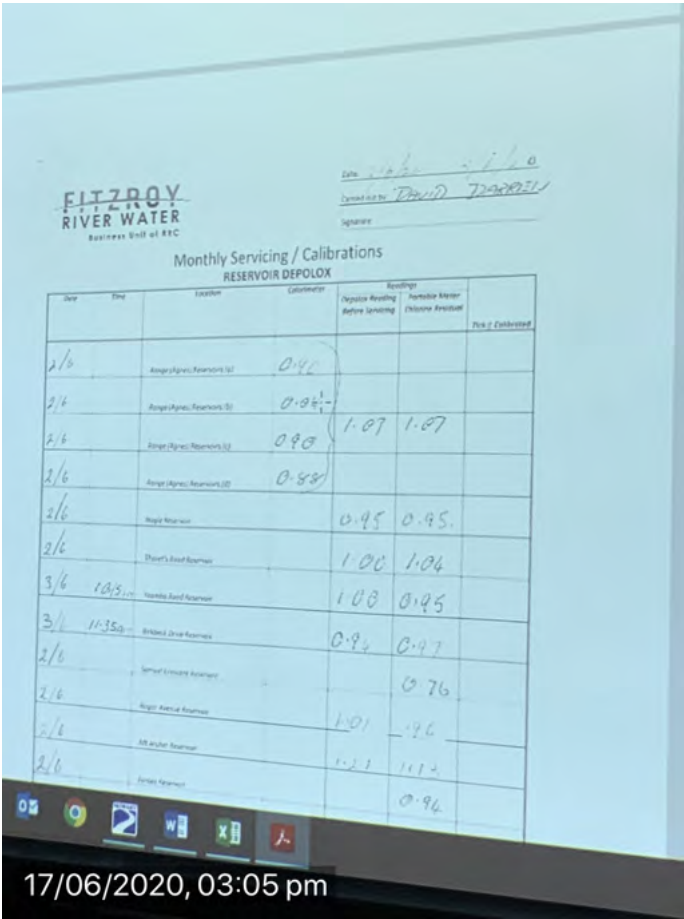


Image 85

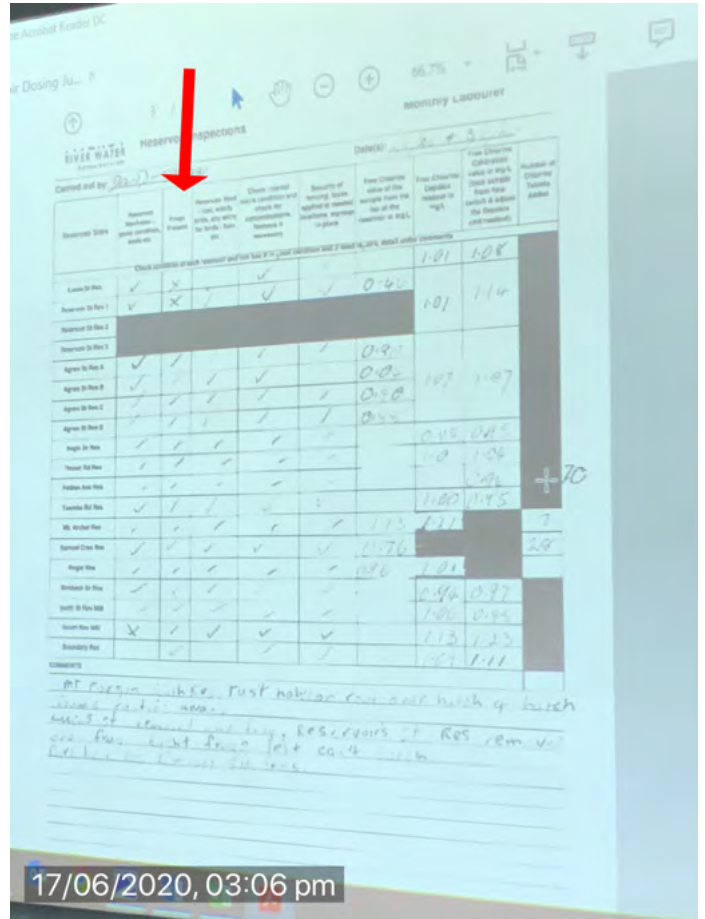


Image 86

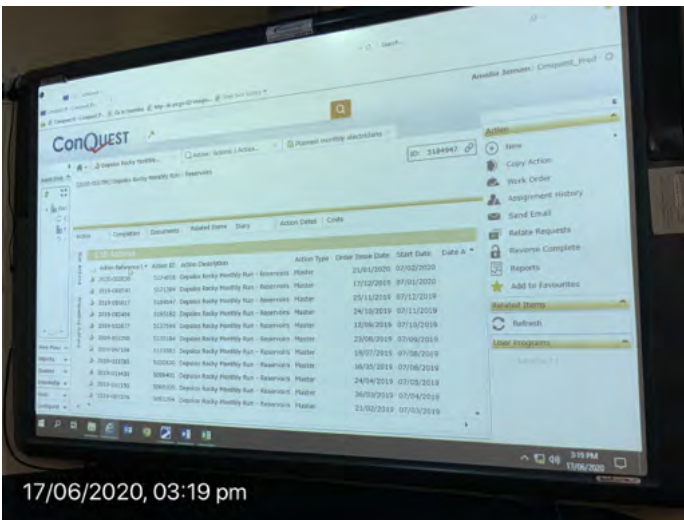


Image 87



Image 88



Image 89



Image 90



Image 91

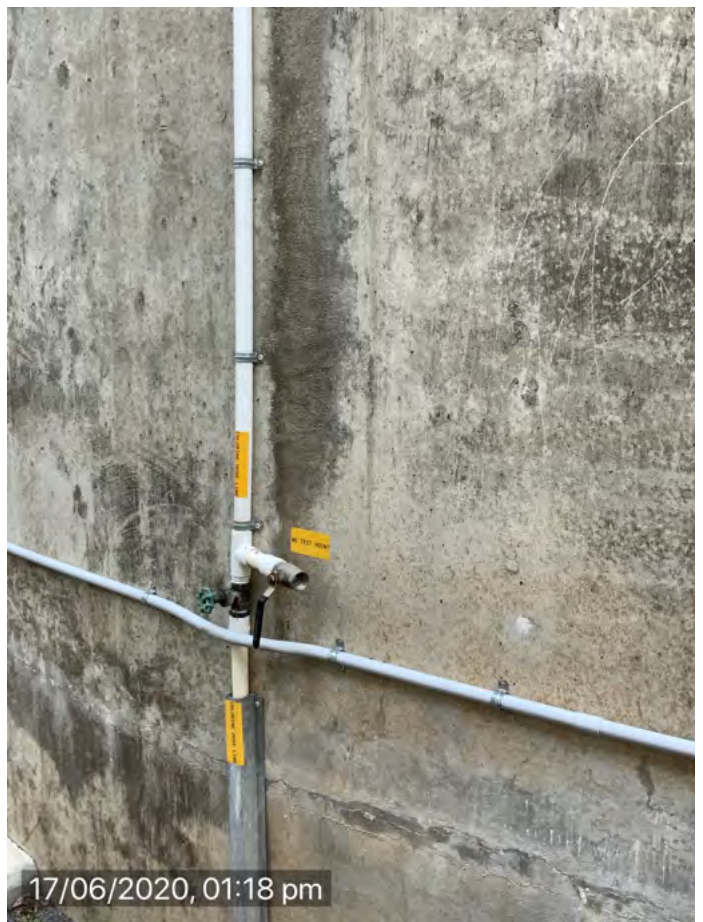


Image 92



Image 93



Image 94



Image 95



Image 96



Image 97



Image 98



Image 99



Image 100



Image 101



Image 102



Image 103



Image 104

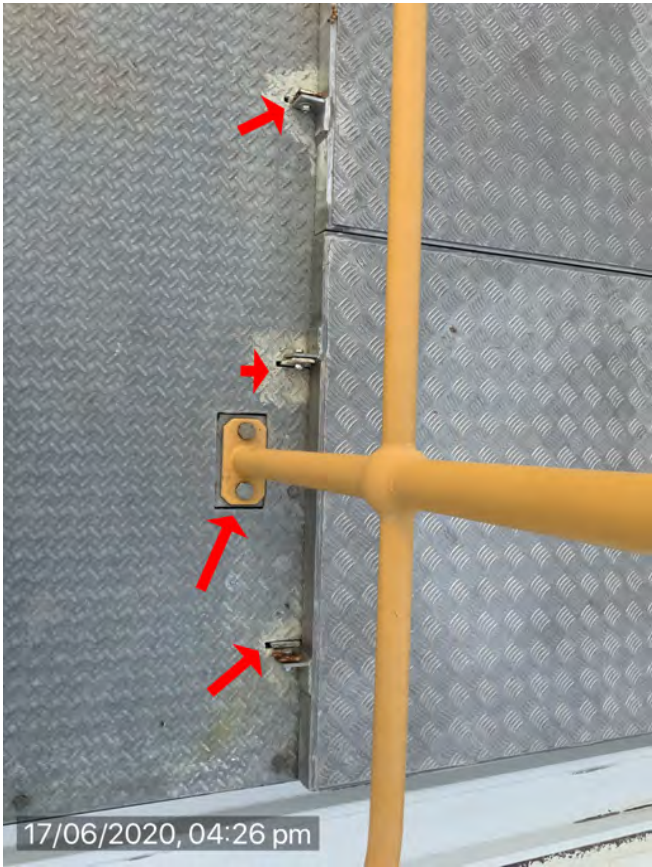


Image 105



Image 106



Image 107

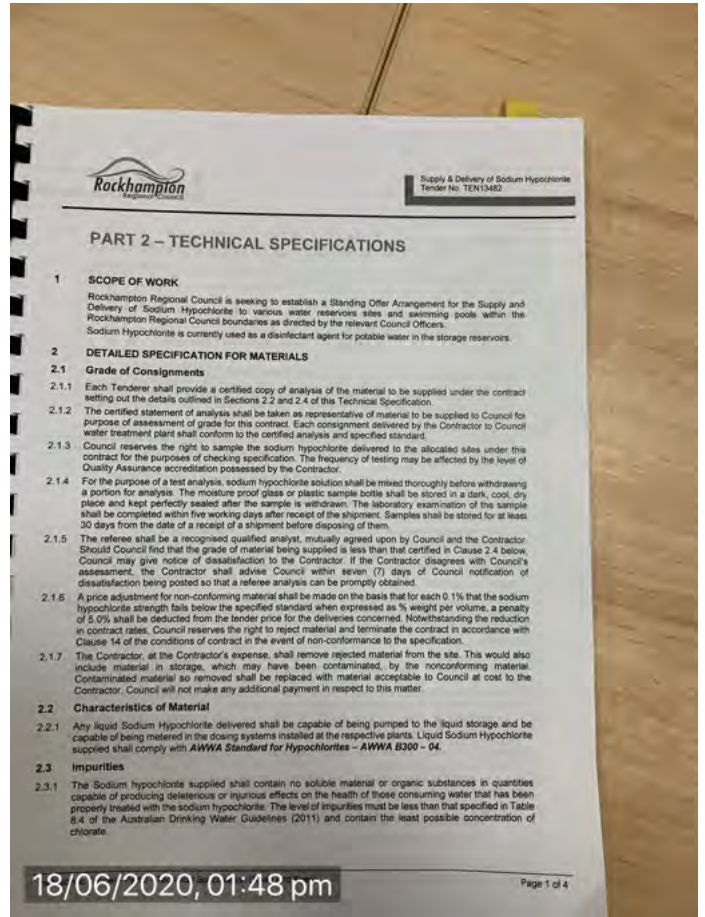


Image 108

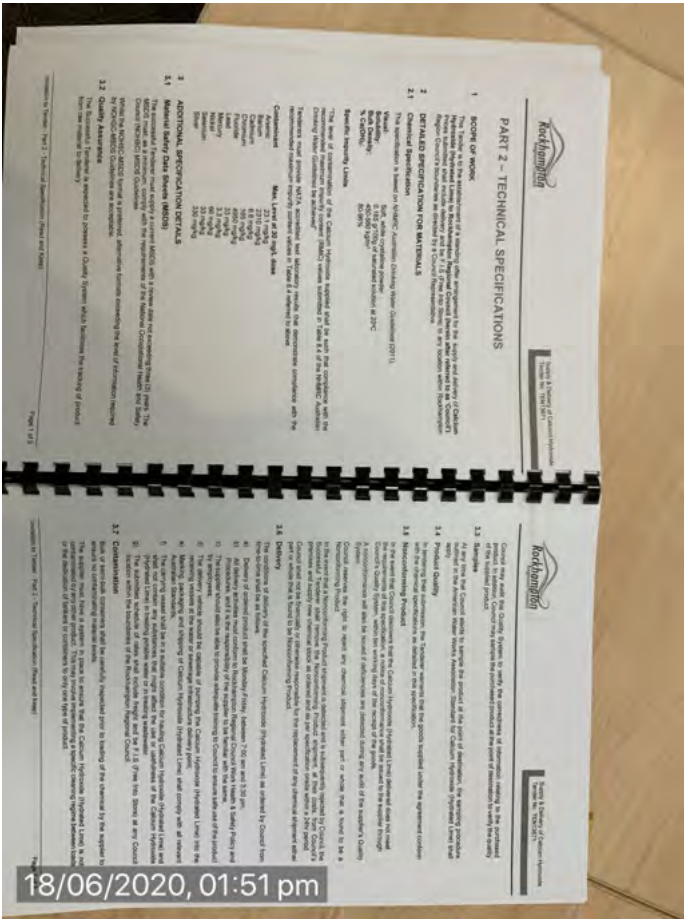


Image 109

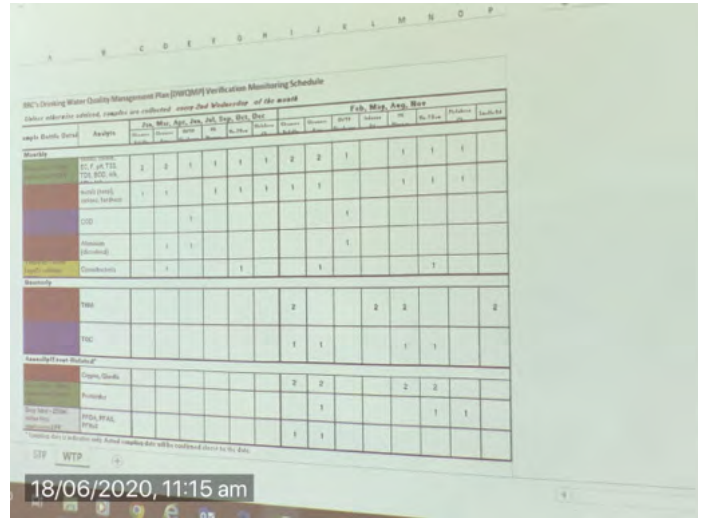


Image 110

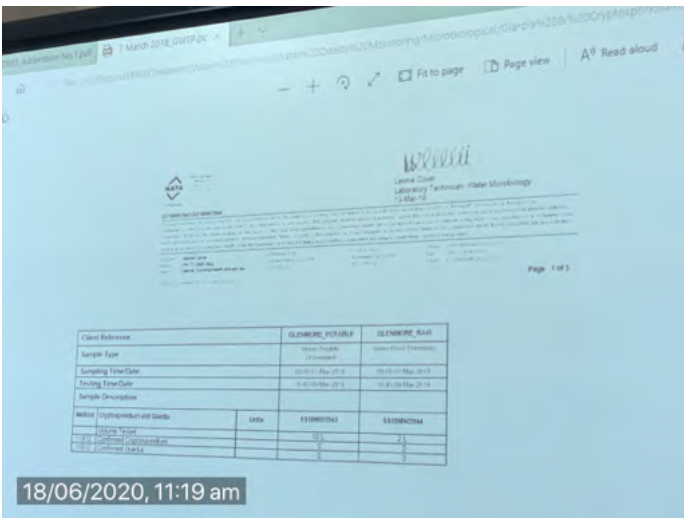


Image 111

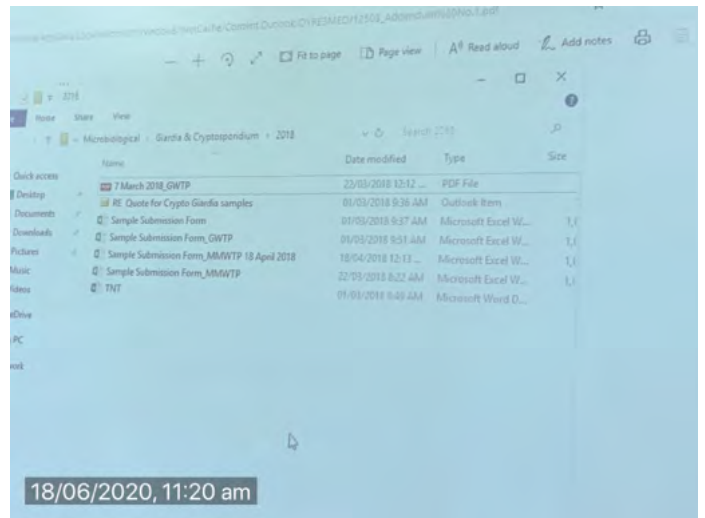


Image 112

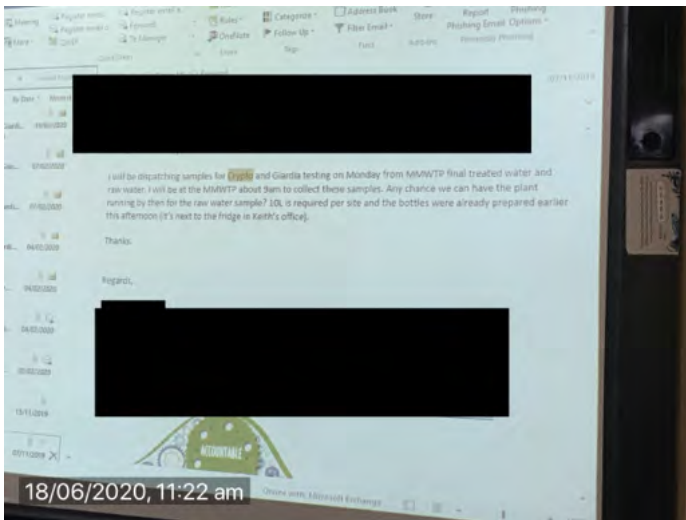


Image 113

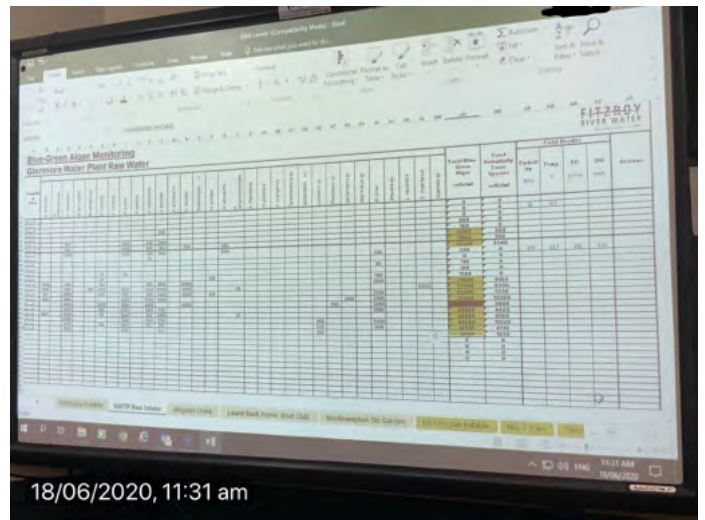


Image 114

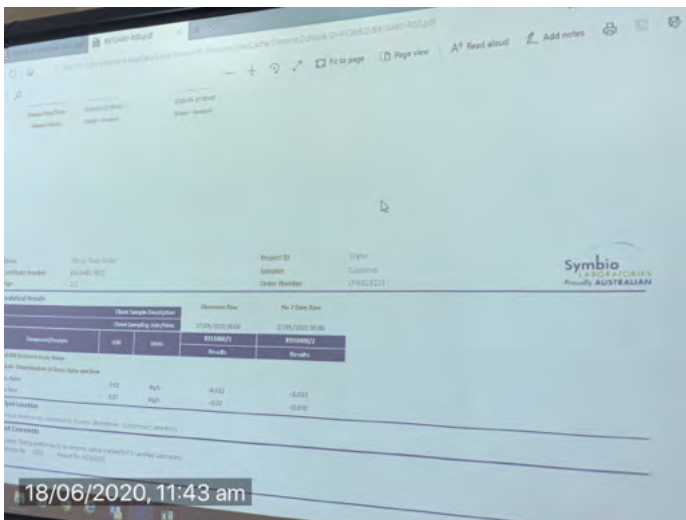


Image 115

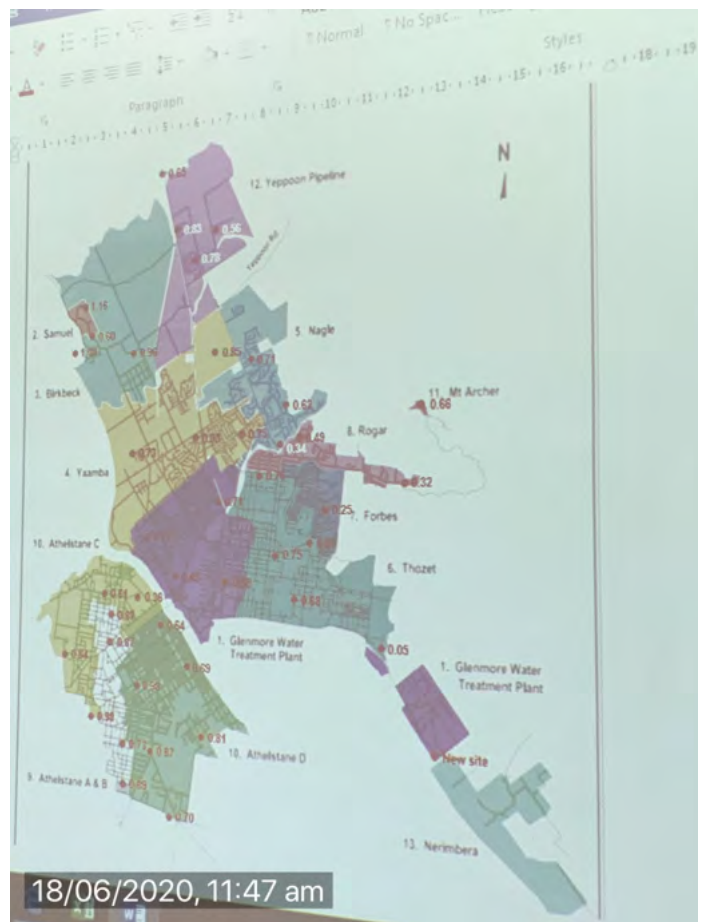


Image 116

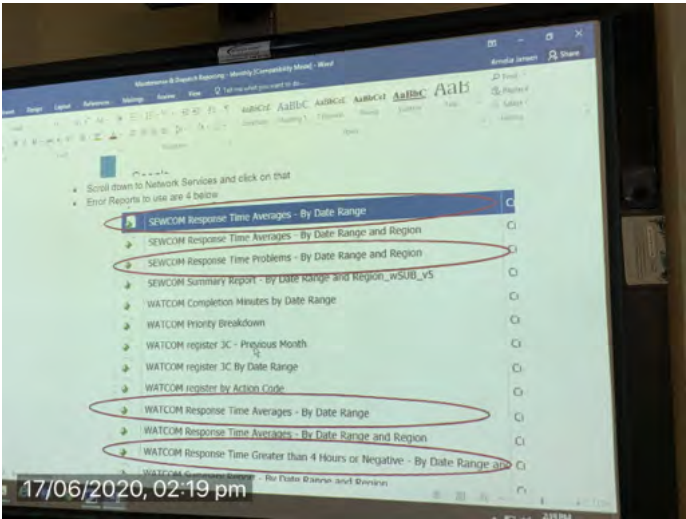


Image 117

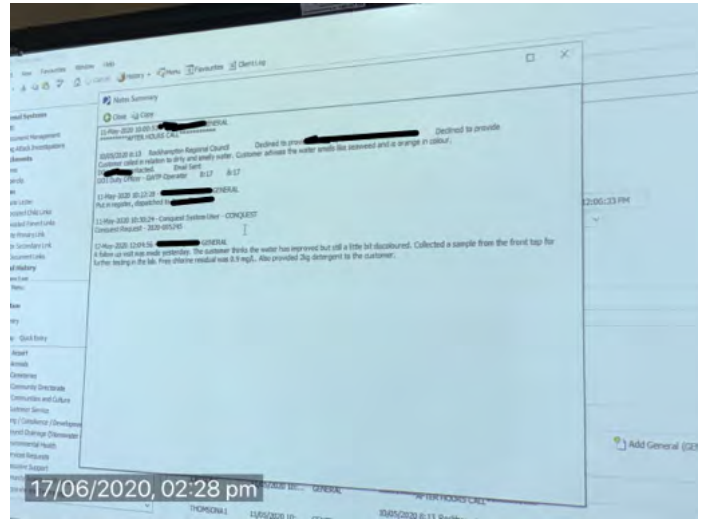


Image 118

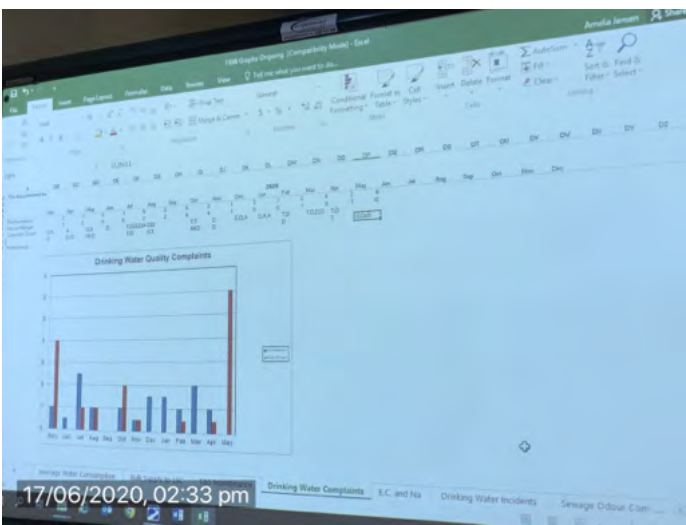


Image 119

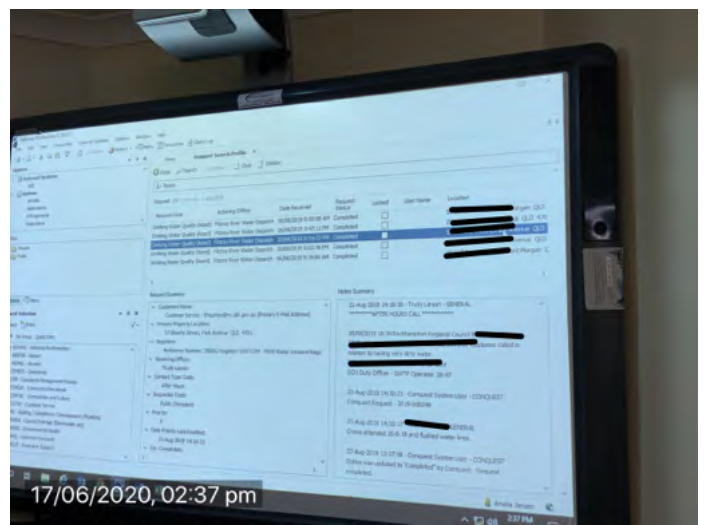


Image 120

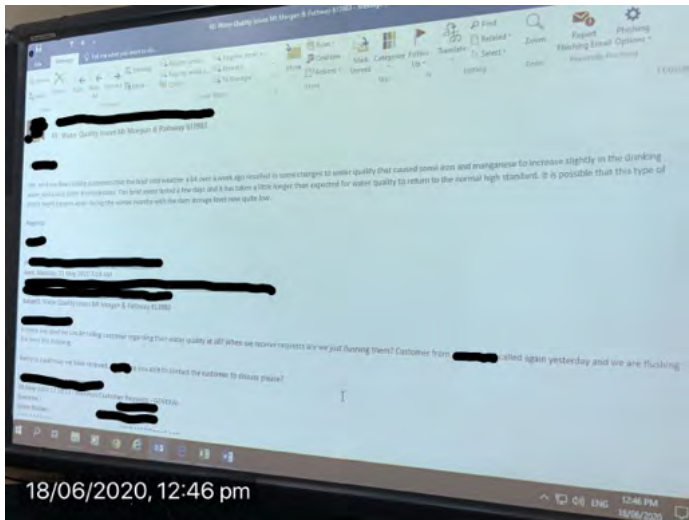


Image 121

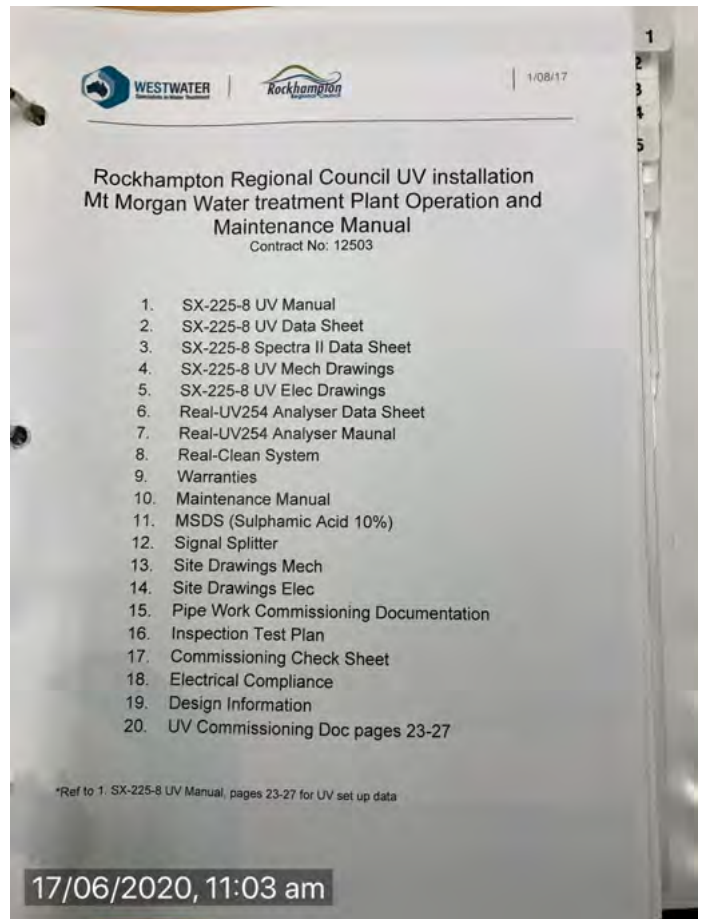


Image 122

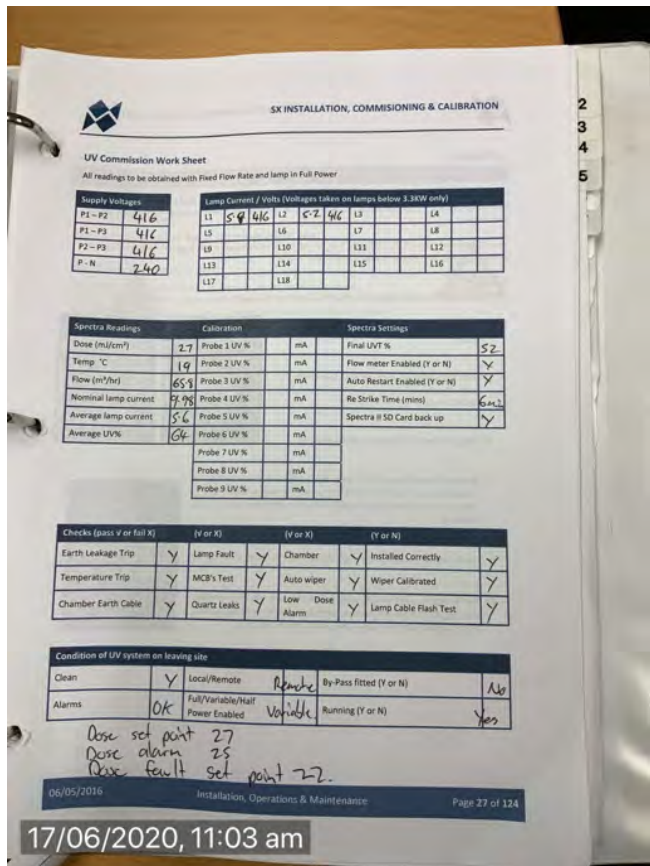


Image 123



Image 124

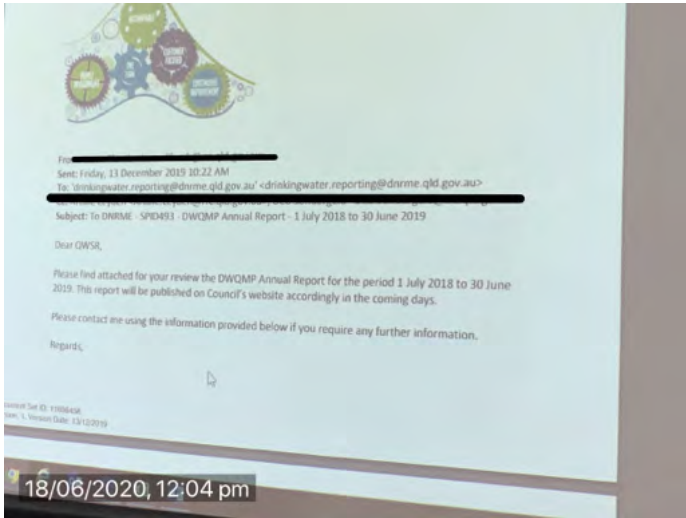


Image 129

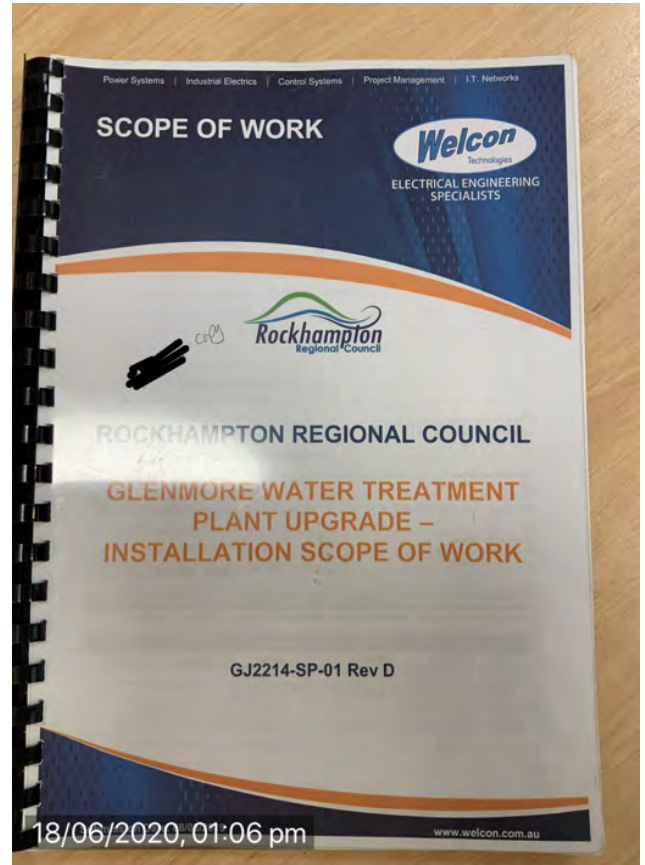


Image 130

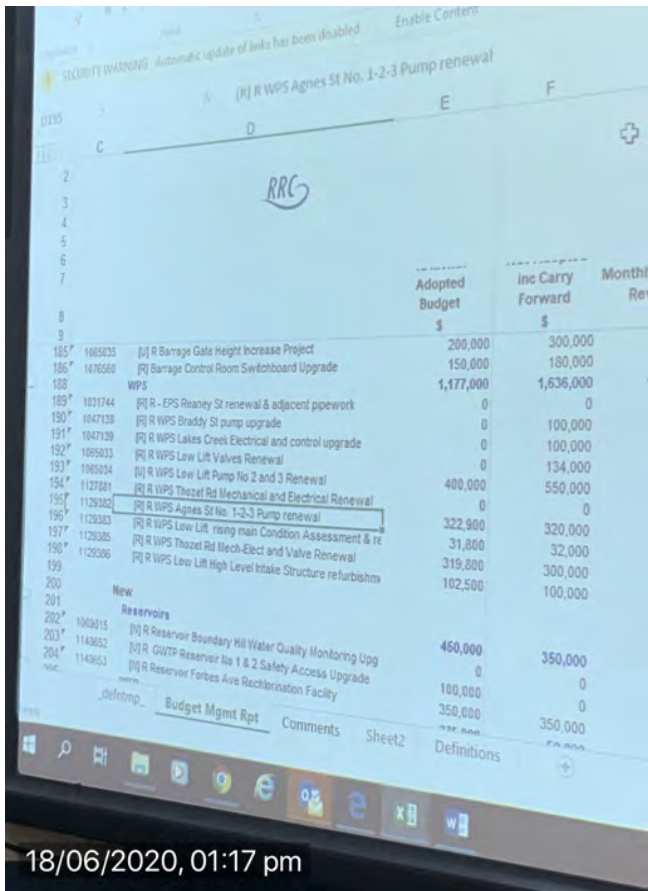


Image 131

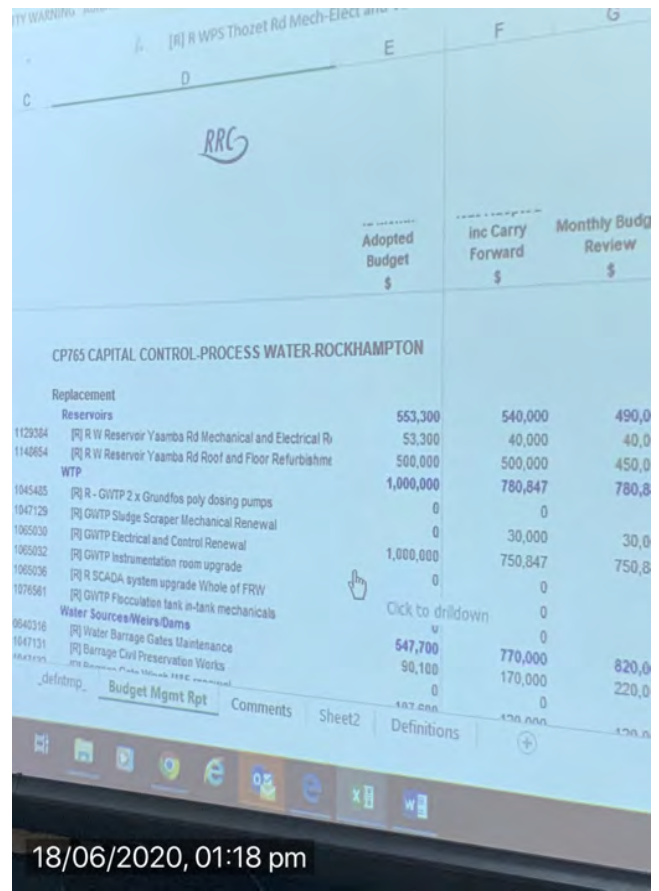


Image 132

Statutory Declaration - Auditor

The below Statutory Declaration was witnessed by the Post Master of the Grange Australia Post Office under the Regulation stated. That is, under that arrangement, Australia Post employees are able to witness Queensland Statutory Declarations.

Queensland

To Wit

I Michael Lawrence, of Bligh Tanner, Level 9 269 Wickham St Fortitude Valley 4006 in the state of Queensland do solemnly and sincerely declare:

I am certified under the Exemplar Global Drinking Water-Quality Management System Auditor Certification Scheme.

To the best of my knowledge, information and belief, I have not knowingly included any false, misleading or incomplete information in the report, not knowingly failed to reveal any relevant information or document to the regulator.

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

The declaration was made, signed and witnessed in accordance with the *Justice Legislation (COVID-19 Emergency Response—Documents and Oaths) Regulation 2020*.

The contents of the declaration are true.

I understand that a person who provides a false matter in a declaration is committing an offence.

Signed



Michael Lawrence 3/8/2020



Witnessed

Statutory Declaration - Provider

Oaths Act 1867

Statutory Declaration

QUEENSLAND
TO WIT

I,

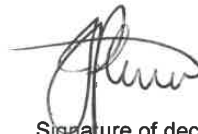
of in the State of Queensland

do solemnly and sincerely declare that

I am the Manager of Fitzroy River Water a commercial business unit of Rockhampton Regional Council ABN 59 923 523 766.

Through the course of the regulator audit of the drinking water quality management plan (DWQMP) by Bligh Tanner for the audit period ending August 2020; which has resulted in this regular audit report dated August 2020; that officers and employees of Fitzroy River Water have not knowingly given any false or misleading information. And have given all relevant information to the auditor who conducted the regular audit of the DWQMP mentioned above.

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

this day of

AMANDA WINTER

A Justice of the
Peace/Commissioner for
Declarations.



Level 9, 269 Wickham St
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QLD 4006, Australia

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