Drinking Water Quality Management Plan

June 2021

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Document History and Status

Revision	Date	Reviewed by	Details
1.0	25 Jun 13	Council	Approved by the regulator
2.0	Feb 18	Jason Baker	Reviewed and updated
3.0	9 Dec 19	Glen Luscombe, Stacey Edwards and Tasleem Hasan, Viridis Jason Baker, Council	Comprehensive review and reformat/restructure of the DWQMP. This was submitted to the regulator but was withdrawn on 1 July 2020. A minor amendment of the Feb 18 DWQMP version was undertaken and was approved by the regulator on 6/11/21. The amended plan included details of the WTP upgrade scope of works.
3.1	22 Apr 21	Tasleem Hasan, Viridis Darren Lonergan, CASC	Review and update of the DWQMP. The regulator's advice (email dated 6/11/21) was to undertake the review and update using the amended DWQMP version submitted to the Regulator on 11 December 2019, (subsequently withdrawn 1 July 2020), as the starting point. This version 3.1 includes changes made to the Dec 19 version of the DWQMP (3.0) following a site inspection on 12/4/21 and a comprehensive risk assessment workshop (on 13/4/21).
3.2	3 June 21	Tasleem Hasan, Viridis Darren Lonergan, CASC	Section 5.3.1 and Figures 5-7 updated to reflect the Regulator's current e-mail address in relation to incidents - based on feedback from the Regulator (Evan Post, Regulatory Officer) on 2 June 21.

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1. Registered Service Details

The registered service details are included in Table 1.

Table 1 Registered Service Details

Service description	Details
Service Provider Identification Number (SPID)	146
Council Name and Contact Details	**Cherbourg Aboriginal Shire Council** 22 Barambah Avenue Cherbourg QLD 4605 ABN: 17 862 722 505 Phone: (07) 4168 2554 Fax: (07) 4168 2552 **DWQMP In-Charge** Darren Lonergan Operations Manager Phone: (07) 4168 2554 Mobile: 0472 878 268 Email: ops@cherbourg.qld.gov.au
Drinking Water Scheme operated	Cherbourg Drinking Water Supply Scheme
Communities serviced	Cherbourg
Current population	1,315
Current connections	363
Current demand	510 kL/day
Projected population (2029)*	1,360
Future connections (2029)*	375
Future demand (2029)*	527 kL/day

** Based on Queensland Government population projections, 2018 edition; Australian Bureau of Statistics, Population by age and sex, regions of Australia, 2016 (Cat no. 3235.0).*

Cherbourg Aboriginal Shire Council (ASC) is the registered Water Service Provider. The Cherbourg ASC service area covers 31.8 km², with the majority of residents located in the Cherbourg community. Cherbourg is located in south east Queensland, approximately 170km north-west of Brisbane, near the town of Murgon.

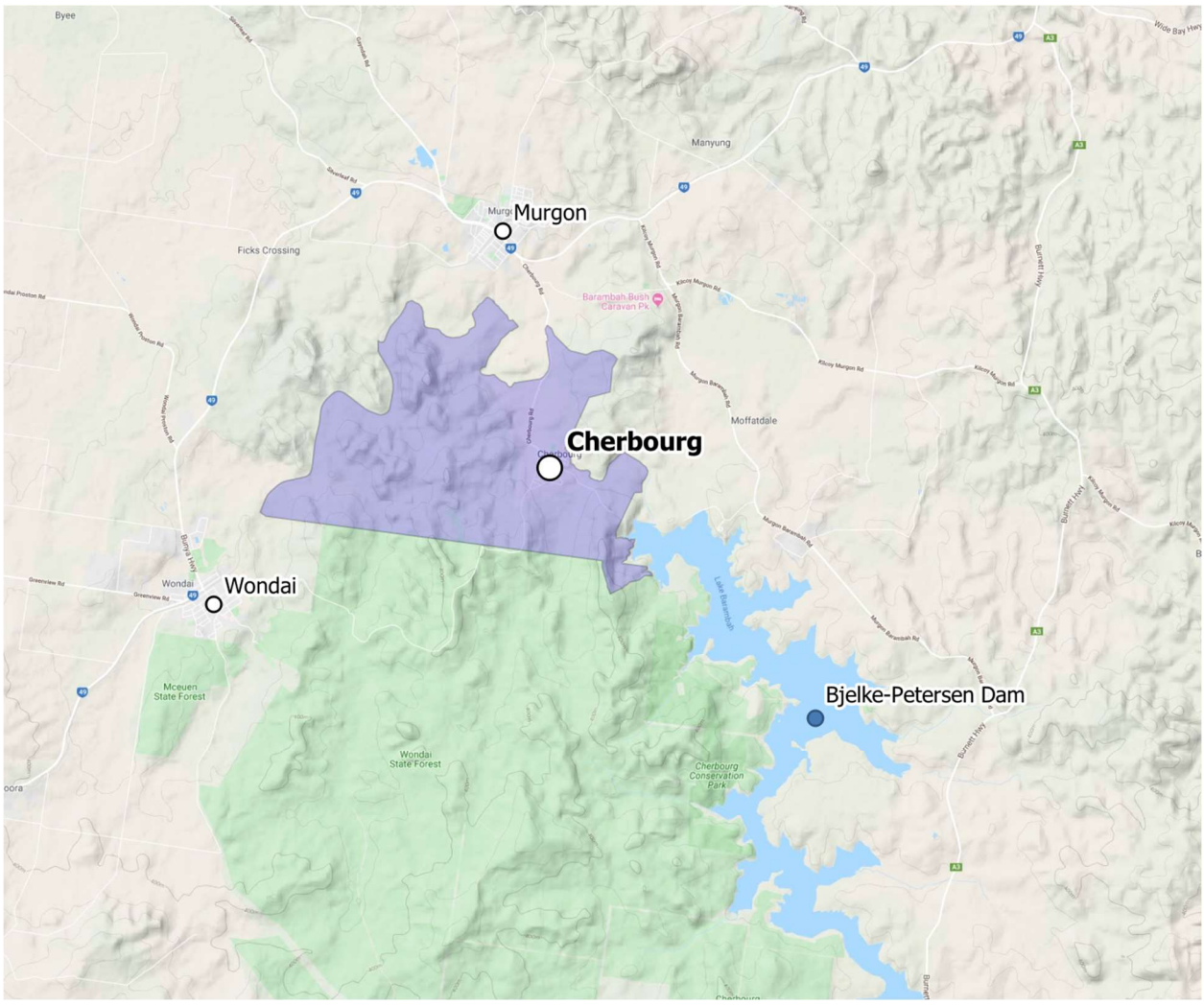


Figure 1 Cherbourg ASC service area

Cherbourg WTP has a design capacity of approximately 2.4 ML/day, and the projected increase in population is not going to impact on the ability to produce sufficient water to meet demand in the medium or long term.

The customer base is mainly residential services, other major customers include:

- Cherbourg Hospital
- Cherbourg State School
- Police Station / Fire Brigade
- Recycling plant
- Cherbourg Farm
- Gundoo Day Care Centre
- Nurunderi Tafe
- Ny-ku Byun Aged Care Centre
- Jumbana Juvenile Centre
- Mudjimba Women's Shelter
- Industrial area based at Fisher St Cherbourg

2. Details of Infrastructure for Providing the Service

Criteria

The Plan must describe the details of the infrastructure for each scheme including the following:

- a schematic layout
- source details
- treatment process details for each drinking water source
- a description of any variations to process operation (for example, bypassing a process step)
- a schematic(s) representing the treatment process(es)
- any sources that do not undergo a treatment process must be identified and an explanation as to why no treatment process exists
- disinfection process(es) for each drinking water source
- any sources that do not undergo a disinfection process must be identified and an explanation as to why no disinfection process exists
- details of the distribution and reticulation system
- key stakeholders, who have been actively involved in the management of drinking water quality, and their relevance.

2.1. Water Source

The raw water source at Cherbourg is sourced from "The Rocks" at Barambah Creek. The Bjelke-Petersen Dam, managed by Sunwater, can augment the Barambah Creek supply when there are releases. However, this is not a major source of augmentation (or tributary). The Barambah Creek is the main supply.

Land-use challenge for the Bjelke-Petersen Dam, as well as the wider Barker-Barambah Creeks Sub-basin is predominantly cattle grazing and low-density septic systems associated with rural properties (Figure 3, Figure 2). Raw water from Barambah Creek is sourced upstream of Cherbourg, and there are no urban settlements upstream of this location. With challenge from stock grazing and human sources, raw water is expected to have significant pathogen (including protozoan) challenge.

There is also a lime quarry not far upstream of the intake point. The quarry has been in operation for about 20 years and has not impacted the source, although is a potential risk. This has been further assessed in the risk assessment.

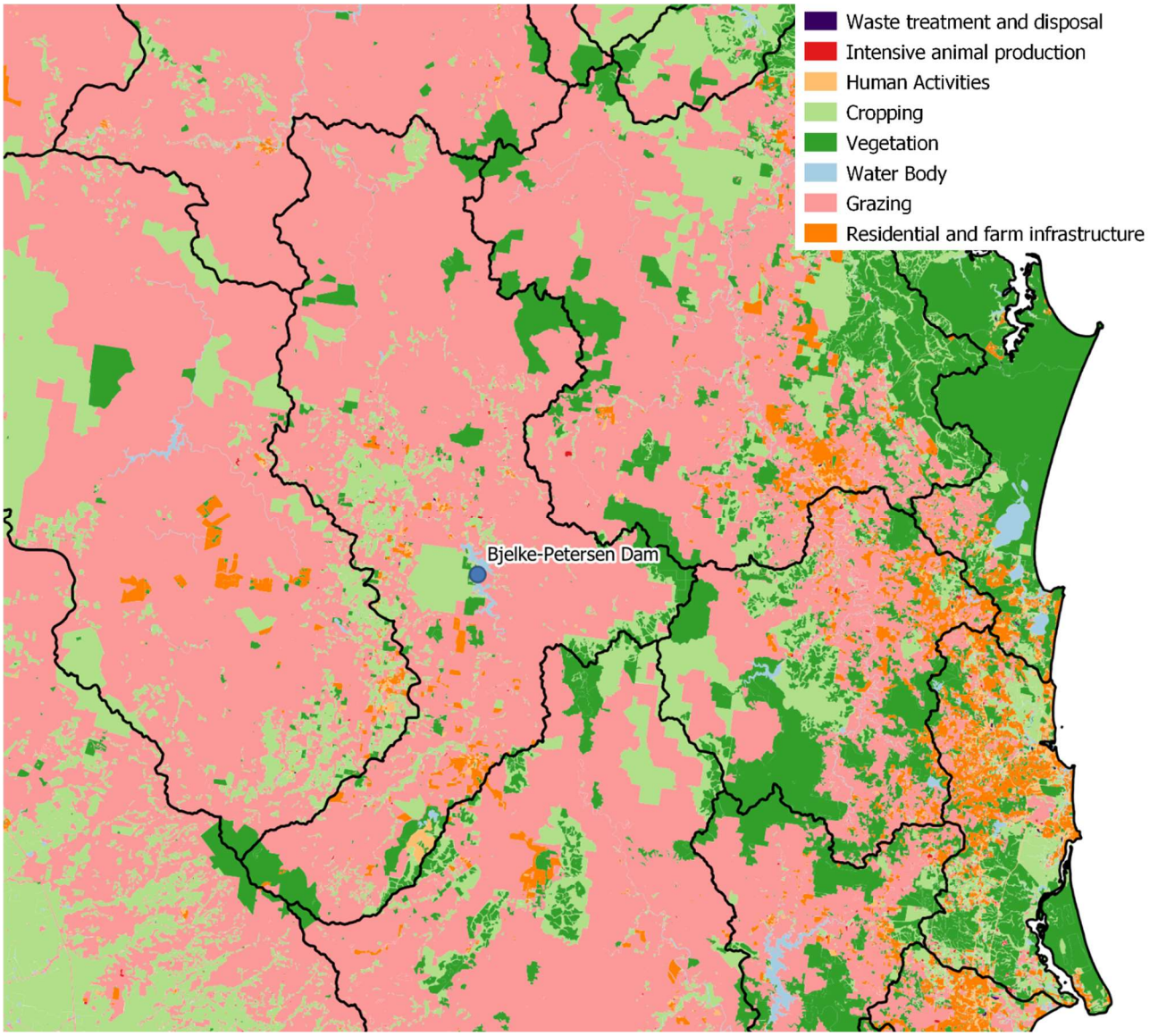


Figure 2 Barker-Barambah sub-basin land use.

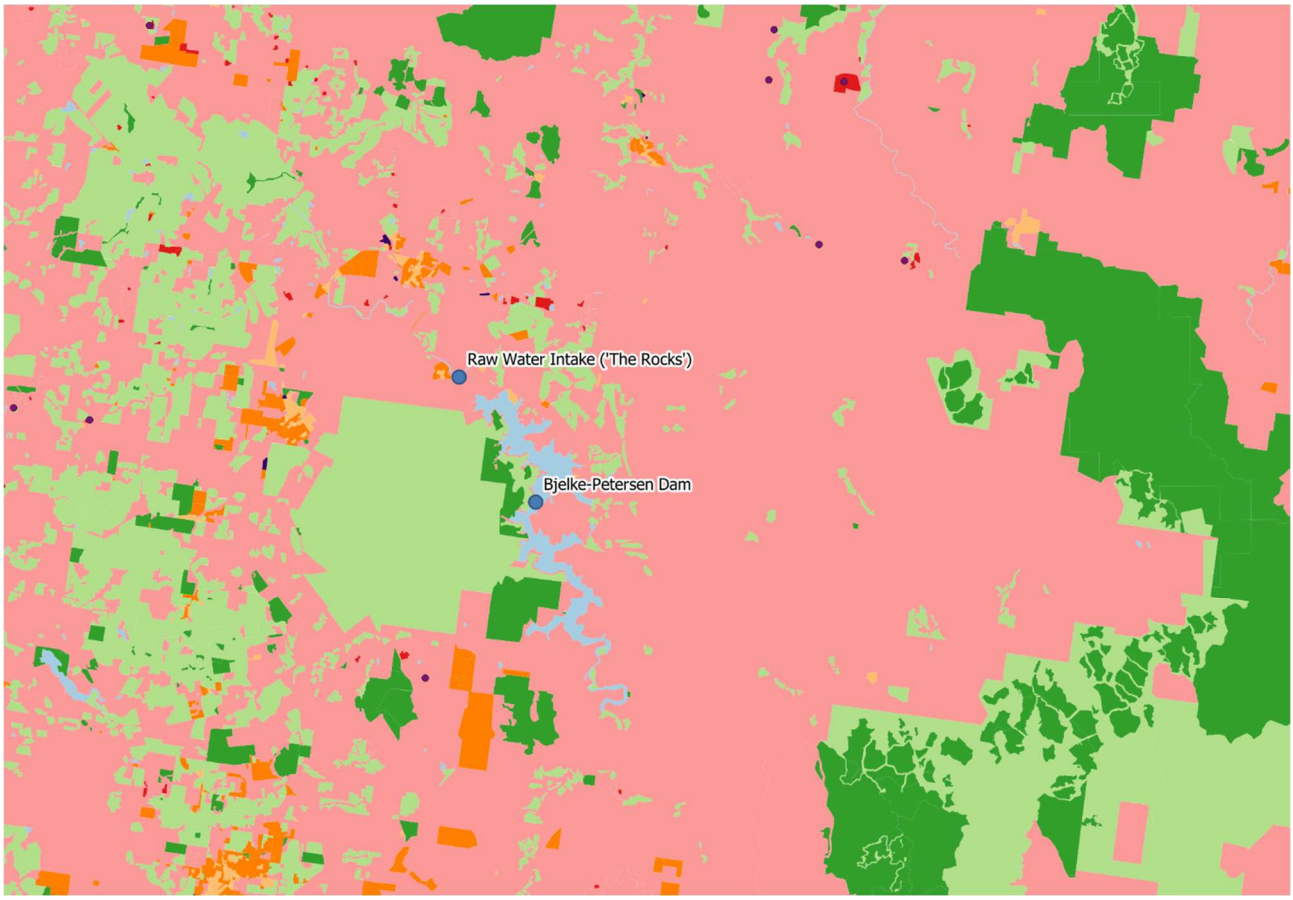


Figure 3 Bjelke-Petersen inner catchment land use

If required, CASC can contact Sunwater requesting a water release from the dam – there are no contracts in place for this arrangement. At the time of updating the DWQMP, storage at Bjelke-Petersen Dam was approximately 8.7%, and future water security relies on rainfall during the summer period.

Anecdotally, turbidity is noted as rapidly changing during storm conditions, although recent raw water turbidity data collected (refer to Water Quality Data Analysis Report, March 2021) indicates that raw water turbidity remains within modest ranges, although may rapidly increase from 5 NTU to 28 NTU.

Table 2 Water source details

Name	**Barambah Creek**
Type	Surface Water
% of supply	100%
Reliability	Bjelke Petersen Dam releases into Creek at times – no historical reliability issues noted for the Creek. The dam is currently drought affected.
Water quality issues	Storm season – turbidity and increased pathogen load.

2.2. Supply Schematic

A simple process flow diagram or schematic is presented in the below figure.

SCADA screen overview drawings are included in Appendix B for reference.

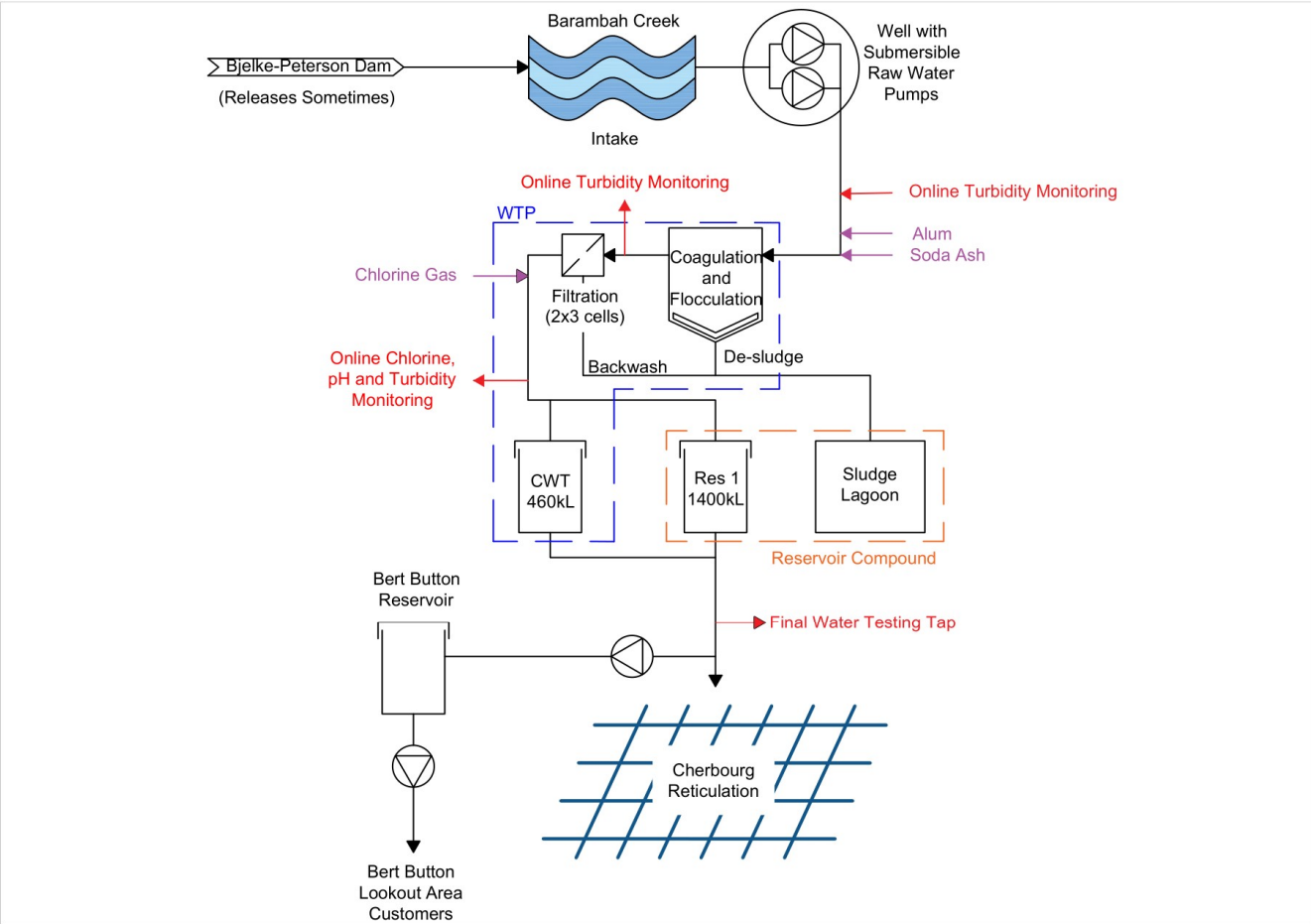


Figure 4 System schematic

2.3. Supply Infrastructure

2.3.1. Treatment Process Description

Water is pumped through an intake structure (screened). This is planned for an upgrade (captured in the risk assessment and Improvement Plan). There are two pumps in a duty/standby arrangement. The pumping capacity is 30 L/s. Water is pumped to the rising main of the WTP through ~600m of PVC pipe.

At the WTP, the raw water is dosed with liquid alum (duty/standby with a manual dose rate determined by jar test results).

Following flocculation and clarification, water is filtered through 2 banks of 3 sand filters (3 large and 3 small) with filters backwashed twice daily (every 12 hours). There is an online meter to measure the turbidity of clarified water. The filters are made with 3 layers of coarse gravel, fine gravel and sand. Individual filter turbidity is not monitored at the filter outlet; instead the combined turbidity is measured. This is measurement via an online turbidity meter. CASC have been experiencing issues in the control of the coagulation, flocculation, clarification and filtration processes that support the removal of microbial pathogens (notably protozoa) in treated water. This can be seen in treated water turbidity results. However, with the plant upgrades it is seen that these results have improved.

CASC has undertaken a major upgrade to monitoring and dosing equipment to assist improve performance of the filtration barrier under the Indigenous Councils Critical Infrastructure Program (ICCIP).

Following filtration, the water is chlorinated via chlorine gas (duty/standby pumps, set to achieve chlorine residuals required) with free chlorine set at 1.2 – 2.5 mg/L target range for the sample location post the clear water tank (CWT). There is an online chlorine and pH meter pre the clear water tank which corrects the chlorine dose. Outside of this range post the clear water tank, the dose rate is adjusted by the plant operators via SCADA settings.

The water post treatment passes into the CWT and 1 service reservoir simultaneously (there were two reservoirs, but these are being decommissioned and new ones built). Any of the currently 2 tanks can be shut off and the other filled individually if required. Reservoirs are scoured periodically (a maintenance schedule is need as discussed at the risk workshop April 21). Water from the CWT and the reservoir is then reticulated by gravity feed through 3 mains into the Cherbourg reticulation.

The water treatment plant has a design capacity for 2.4 ML/day but is typically used for 4-6 hours per day to produce sufficient water to fill the tank/reservoir (with daily demand typically around 500 kL day). As such, it is considered that the WTP is appropriately sized to meet current and future demand, and no infrastructure elements are undersized such that they pose a risk to the quality of water under this current (or projected future) loading.

C.*t*. is a measure of free chlorine residual concentration (C) and contact time (t). A primary disinfection contact time greater than 15 min.mg/L is required to be consistent with ADWG requirements of 30 mins contact time at 0.5 mg/L. If the water treatment plant were to run at capacity and the CWT and smaller (1400kL) reservoir were to be used at a chlorine concentration of 0.5mg/L (critical low limit), a C.*t* of 29.11 min.mg/L would be achieved. This indicates an adequate contact time is being achieved within the CCP limits.

Jar testing is conducted in-house (currently daily and then will reduce to as required). Operator training is being conducted under the 'Safe and Healthy Drinking Water in Indigenous Local Government Areas Program'. CASC has procured a Jar Tester and operators are being trained by a contractor.

2.3.2. Infrastructure Details

Table 3 Infrastructure Details

Component		Cherbourg WTP
Sourcing Infrastructure	Type (pumped/gravity/equipped bore/etc)	2 pumps 1 duty. 30 L/s pump @ 84 m lift.
	Description	Single pump used at a time.
Treatment	Process	Conventional flocculation, coagulation and clarification, pH correction, filtration, disinfection
	Design Capacity (20 hr operation)	2.4 ML/day
	Typical Daily and maximum flow range	510 kl/day
	Chemicals added	Liquid aluminium sulphate (alum), soda ash, chlorine gas.
	Standby chemical dosing facilities (Y/N)	All dosing points have a redundant pump that is turned on when required.
	Water sourced from and %	Barambah Creek 100%
	% of average day demand provided	100%
	% of scheme supply Distribution area supplied	100% Cherbourg community
	Bypasses / Variations	No bypasses
Disinfection	Location	Post filtration
	Type	Chlorine gas
	Dose rate	Target dose 1.0 – 2.5 mg/L free chlorine
	Target residual levels	1.5 mg/L at WTP
	Duty/standby	Auto changeover.
	Dosing arrangements	SCADA auto adjustment guided by online chlorine meter
	Alarms	Yes
	Auto shut-off arrangements	Yes

Component		Cherbourg WTP
Distribution and Reticulation System	Pipe material	PVC, cast iron
	Age range	<1-80 years old.
	Approximate total length	11.4 km
	Areas where potential long detention periods could be expected	Dairy Farm, Collins Road, Cemetery Road, Wondai Road, Barber Street, Broadway Street, Murray Road, Myrtle Bond Bridge, Oak Avenue, Bert Button Lookout. (Monthly Flushing Locations – Hospital is also flushed)
	Areas where low water pressure (e.g. < 12 m) could be expected during peak or other demand periods)	STP pressure can be low (anecdotal)
Reservoirs	**Reservoir 1**	
	Capacity (ML)	1400kL
	Roofed (Y/N)	Y
	Vermin-proof (Y/N)	Y
	Runoff directed off roof (Y/N)	Y
	Bert Button	
	Capacity (ML)	Exact unknown (small tank)
	Roofed (Y/N)	Y
	Vermin-proof (Y/N)	Y
	Runoff directed off roof (Y/N)	Y
	CWT	
	Capacity (KL)	460
	Roofed (Y/N)	Y
	Vermin-proof (Y/N)	N (captured in the risk assessment)
	Runoff directed off roof (Y/N)	Y

2.4. Key Stakeholders

Table 4 Stakeholders

Organisation	Contact Name and Details	Relevance to management of drinking water quality	How the stakeholder is engaged in the DWQMP
IXOM P/L	Ryan Dowling 0427 921 359	Chemical Supplier (Chlorine gas)	Chemical Supplier
QLD Water Supply Regulation	1300 596 709	Regulator	Approves Plan, incident reporting
Day Care Centre	Jackie Tapau (07) 4168 2832	Vulnerable users	Customer
Aged Care Centre	Lulu Speedy (07) 4168 2699	Vulnerable users	Customer
Hospital	Lyn Schuh (07) 4169 8800	Vulnerable users	Customer
Qld Health	Amanda Hutchings 0418276433	Health Advice	Public health advice as needed
Murgon Electrical	Jimmy Dennis (07) 4168 1800	Electrical Contractor	Works as required
Hit the Switch Electrical	Ashley Burns 0423 548 630	Electrical Contractor	Works as required
Radio Station 94.1	Michael Monk 4168 2080	Emergency response community announcements	Broadcasts advice when required
SunWater	Trevor Cavanagh 0407566688	Raw water releases from Dam	No formal arrangements.
Aquapac	Sales Section 0296731192	Chemical Supplier (Soda ash, Liquid Alum)	Chemical Supplier
Cherbourg State School	41699333	Vulnerable users	Customer
Selwood Construction	0407 777 553	Plumbing and Mechanical contractors, as needed	Works as required
Queensland Forensic and Scientific Services (QFSS)	1800 000 377	External Laboratory	Verification Monitoring

3. Identify Hazards and Hazardous Events

3.1. Water quality information

Criteria

- The Plan must include a summary of the analysis and interpretation of available and relevant water quality information.
- Where multiple providers are involved in providing the water supply, the above summary must (to the best of their knowledge) include relevant water quality information on the immediate upstream (for example, bulk supplier) and/or immediate downstream (for example, distributor) system(s).

Detailed analysis of available water quality data was undertaken. The interpretation and summary of the results are included in the Water Quality Analysis Report March 21 (DWQMP supporting document). This report was discussed at the risk workshop (April 21) and results used to guide risk assessment as relevant.

The data analysis is not included in this section to avoid duplication and for ease of future review and update of the DWQMP.

3.2. Water Quality Complaints

Council generally does not receive water quality complaints. Council has not held records of these complaints previously, but reactively flushes the line.

3.3. Catchment Characteristics

Criteria

The catchment characteristics for each system's water source must be documented in the Plan. This includes a description of:

- catchment area or groundwater recharge area
- topography
- main geological features
- climatic features
- land use.

Cherbourg is located on Barambah Creek, and is below the Bjelke Petersen Dam Catchment. The dam catchment rises in the Bunya Mountains. The catchment includes mountains and rolling hills, and extensive flatter farmlands including irrigated crops, and cattle (beef and dairy) production. Predominant land uses include state forest and farmland including Lucerne cropping, grazing and a winery, there is a lime quarry at the base of the dam. The geology of the catchment includes a number of volcanic and sedimentary units, but none that house extensive mineral deposits, such that other than the quarry, there is no extractive industry. The sewage treatment plant effluent from the Nanango STP flows into the catchment but has not direct impact.

Also refer to section 2.1.

Average annual rainfall for Kingaroy (the closest BOM site) is 630 mm rain, with average maximum temperatures in the range of 20- 30ºC annually. Rainfall is predominantly in summer, but overall rainfall has been low last couple of years. Relevant information can be seen @:

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=040922

4. Assessment of Risks

Criteria

Details of the risk assessment results for each system's identified hazards and hazardous events must be documented in the Plan, including:

- key stakeholders who have been actively involved in the risk assessment process, their role and the rationale for inclusion
- where multiple providers are involved, the Plan must (to the best of their knowledge) explain how the relevant maximum and residual risk assessment results from other provider's service(s) have been considered.

Hazard identification and the risk assessment for the scheme was reviewed in a workshop over two days at Cherbourg, combined with an inspection of each major piece of infrastructure as an overview. This was undertaken on 12-13 April 2021.

4.1. Hazard Identification and Risk Assessment Team

Criteria

The hazards and hazardous events (together with the sources of the hazards and hazardous events) that could adversely affect water quality must be documented in the Plan, including those affecting the:

- catchment
- sourcing infrastructure
- treatment plants
- disinfection process(es)
- distribution system.

When multiple providers are involved, the Plan must (to the best of their knowledge) include the hazards and hazardous events together with the sources of these hazards and hazardous events associated with the operations and water quality management processes of the other entities' systems which the provider considers could impact on the service.

The whole of service hazards and hazardous events and the sources of the hazards and hazardous events must be documented in the Plan.

The Plan must detail the personnel (i.e. position) responsible for the hazard identification and risk assessment process, their roles and responsibilities and how knowledge of the actual day-to-day operation of the system(s) has been included in this process.

The risk assessment is detailed in the risk register spreadsheet (Excel, supporting document), separate to this main document. The team detailed are the people who were involved in developing the risk assessment up to this stage, future review of the risk assessment would be undertaken by the Operations Manager and appropriate subject matter experts as required.

The risk assessment team is included within a tab in the risk register spreadsheet.

4.1.1. Methodology

The methodology used for the risk assessment has been adopted from the DNRME publication *Preparing a Drinking Water Quality Management Plan Supporting Information (Sept 2010)*. The definitions of likelihood, consequence and uncertainty are presented below.

Table 5 Risk Assessment Likelihood Description

Level	Likelihood	ADWG Description
A	**Almost certain**	Occurs more often than once per week (52/yr)
B	**Likely**	Occurs more often than once per month (12/yr) and up to once per week (52/yr)
C	**Possible**	Occurs more often than once per year and up to once a month (12/yr)
D	**Unlikely**	Occurs more often than once every 5 years and up to once per year
E	**Rare**	Occurs less than or equal to once every 5 years

Table 6 Risk Assessment Consequence Description

Level	Consequence	ADWG Description
5	**Catastrophic**	Potential acute health impact, declared outbreak expected
4	**Major**	Potential acute health impact, no declared outbreak expected
3	**Moderate**	Potential widespread aesthetic impact or repeated breach of chronic health parameter
2	**Minor**	Potential local aesthetic, isolated exceedance of chronic health parameter
1	**Insignificant**	Isolated exceedance of aesthetic parameter with little or no disruption to normal operation

Table 7 Risk Assessment Matrix

Likelihood	Consequence				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	Medium (6)	High (10)	High (15)	Extreme (20)	Extreme (25)
Likely	Medium (5)	Medium (8)	High (12)	High (16)	Extreme (20)
Possible	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)
Unlikely	Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)
Rare	Low (1)	Low (2)	Low (3)	Medium (5)	Medium (6)

Table 8 Risk Assessment Uncertainty Description

Uncertainty	Description
Certain	There is 5 years of continuous monitoring data, which has been trended and assessed, with at least daily monitoring; or The processes involved are thoroughly understood.
Confident	There is 5 years of continuous monitoring data, which has been collated and assessed, with at least weekly monitoring or for the duration of seasonal events; or There is a good understanding of the processes involved.
Reliable	There is at least a year of continuous monitoring data available, which has been assessed; or There is a reasonable understanding of the processes involved.
Estimate	There is limited monitoring data available; or There is a limited understanding of the processes involved.
Uncertain	There is limited or no monitoring data available; or The processes are not well understood.

4.1.2. Acceptable Risk

Risks scored as low or medium were classified as acceptable risks. Risks with a rating of high and above in the risk assessment (unacceptable risks) have an associated item entered in the Improvement Plan. Where appropriate, risk scores of low and medium also have an assigned improvement action, such as where the uncertainty level was high (estimate or uncertain) and it was decided to implement an improvement (or best practice). These risks will be re-evaluated during future reviews of the DWQMP to ascertain that the risk level remains low or medium (with an improved uncertainty level).

4.1.3. Hazard identification and risk assessment

The hazards, hazardous events, risk evaluation and improvement actions are included in the *Risk Register and Improvement Plan* spreadsheet, which is a supporting DWQMP document.

5. Managing Risks

Criteria

The Plan must contain an overall list of all the existing and proposed preventive actions or measures managed by the provider to achieve acceptable residual risks in the short and longer-term.

Where the provider relies on an external organisation to manage a risk to their service, the Plan must document what the preventive actions or measures are, and what arrangements are in place with the external organisation to ensure the measures remain effective.

In order to ensure that hazards and hazardous events are managed effectively, measures need to be in place to eliminate or reduce the associated risk. This DWQMP addresses this through the implementation of the following:

- preventive measures that reduce the likelihood of contaminants being at a concentration which may cause harm to the consumer (detailed in risk register)
- multiple barriers – a series of barriers that ensure contaminants are at an acceptable level
- critical control points – these are points in the system that can be monitored and action can be taken to prevent the process going out of control leading to a non-compliant product
- risk treatments (or proposed additional preventive measures) to reduce any unacceptable residual risk to an acceptable level.

It is important that all of the identified significant maximum risks are managed appropriately and that there are barriers in place to manage them.

The existing and proposed preventive measures (improvements) are included in the *Risk Register and Improvement Plan* spreadsheet, DWQMP supporting document.

5.1. Operation and maintenance procedures

Criteria

The Plan must contain, for each existing preventive measure identified in the risk assessment as a measure for achieving the documented residual risk, a list of the documented operation and maintenance (or other) procedures that are required to ensure the integrity of the measures, including:

- title
- date last revised
- the process used for maintaining the documented procedures
- the process for implementing the procedures.

The WTP has undergone major upgrade works. Proper handover by the Contractor has not been completed yet, but when this is undertaken then the Contractor will supply an appropriate Operations and Maintenance Manual (with procedures) and diagrams (P&IDs).

In addition, other procedures (SOPs) which are required have been identified at the risk workshop (April 21) and included in the Improvement Plan.

The key procedures for the DWQMP are the critical control point (CCP) procedures, refer to section 5.2 and Appendix A.

The procedures are reviewed/revised in line with the review of the DWQMP.

The Operations Manager is responsible to ensure the currency of the procedures (including the DWQMP and supporting documents) and for maintaining them. The process includes review of the document, assess need for change, update document if required and ensure staff use current version. The implementation of the procedures will be checked by the Operations Manager (or appropriate delegate) as part of overall supervision and management.

5.2. Critical Control Points

Within a process a number of points may be identified as critical, where increased control is required to ensure a quality product. A CCP is defined as an activity, procedure or process at which control can be applied and which is essential to prevent a hazard or reduce it to an acceptable level. Not all activities are amenable to selection as critical control points. A CCP has several operational requirements, including:

- operational parameters that can be measured and for which critical limits can be set to define the operational effectiveness of the activity (e.g. chlorine residuals for disinfection)
- operational parameters that can be monitored frequently enough to reveal any failures in a timely manner (online and continuous monitoring is preferable)
- procedures for corrective action that can be implemented in response to deviation from critical limits to bring the process back into control.

All preventive measures were assessed to determine if they were a CCP. There could be more than one CCP for a particular hazard.

For each identified CCP, critical and alert limits were set and defined as follows:

- *Critical limit:* a set point that once exceeded the treatment process is taken to be out of control, which may result in a non-compliant product and action must be taken to remedy the situation
- *Alert limit:* a warning allowing an opportunity to take appropriate action to avert the breach of the critical limit
- *Target level:* representing day to day operational limits and procedures. This is what is to be achieved

Table 9 Critical Control Points

Parameter	Frequency	Target Limit	Alert Level	Critical Limit
CCP Filtration*				
Turbidity – Filtered Water (combined)	Continuous online	<0.5 NTU	0.5 – 1.0 NTU	>1.0 NTU
CCP Disinfection				
Free chlorine – Final Water	Continuous online	1.0-2.0 mg/L	<1.0 mg/L >2.5 mg/L	<0.5 mg/L (free) >5.0 mg/L (total)

*Note: the filtration turbidity measured is currently combined filtered water. Risk assessment has more discussions on individual filter turbidity meters. These limits will need to be tightened in the near future (e.g. critical limit >0.5 NTU) to manage the protozoa risk present in the raw water when individual filter turbidity meters are installed.

5.3. Management of Incidents and Emergencies

Criteria

The process for managing drinking water incidents and emergencies must be described in the Plan, including:

- incidents and emergencies
- the level of emergency (for example, green, amber, red or level 1, 2)
- summary of action(s) taken for each level including emergency contacts
- internal and external communication processes and protocols including those with other key stakeholders that are actively involved
- responsible positions.

When multiple providers are involved in providing drinking water, the Plan must explain how incidents and emergencies are managed between the entities.

The process for managing drinking water incidents and emergencies is described in the Table below. Table 10 provides the overview (alert level, description, key responsible, positions responsible, actions and procedures).

Staff have received on the job training in incident and emergency response protocols, with overall supervision and management provided by the Operations Manager.

Also refer to Sections 5.3.1 and 5.3.2.

Table 10 Management of Incidents and Emergencies

Alert Level	Description	Key management response(s)	Brief summary of actions	Position(s) responsible
Level 3: Emergency	Outbreak of waterborne disease. Major event (something that has happened or is likely to happen, in relation to a drinking water service that may have an adverse effect on public health and is unable to be controlled using normal procedures (e.g. Terrorism, deliberate contamination of treated water). Declared disaster or emergency situation in the local area or by state/national government. Cybersecurity event that causes inability to control or manage supply operations. *Is likely to require external resourcing and support from Stakeholders and or agencies, such as DRDMW, Department of Health, local disaster management groups, emergency responders QFRS, Police*	Activate response actions as per the DWQMP. Request advice from external experts as appropriate to regain control.	Notify Regulator as soon as practicable on 1300 596 709 (24/7), as per reporting requirements. Operations Manager to ensure personnel and resources are available. Coordinate notification, investigation and response. Consider what community notification / messaging is needed (e.g. do not drink alert, boil water alert or bottled/emergency water distribution). Coordinate community messaging as required. For emergencies triggered by cybersecurity events, shut down supply, ensure all automated systems are isolated until verified as safe. Increase manual grab sample testing. Engage external expertise to resolve issue.	CEO
Level 2: Incident	Non-compliance (typically against the ADWG values) Minor event. Examples include natural disaster (flood, drought), bushfire, and inability to operate system within acceptable operational limits but where rectification is likely prior to unsafe water delivered. Cybersecurity event that may impact water quality parameters. *Incident is managed within the team responsible for drinking water operations and management in line with the n DWQMP. In some cases, it may require coordination across the Council departments and external resources and support, such as from DRDMW, Queensland Health.*	Activate response actions as per the DWQMP. Ensure all control measures identified in the DWQMP are functioning effectively. Request advice from external experts as appropriate to regain control.	Notify Regulator as soon as practicable on 1300 596 709 (24/7), as per reporting requirements. Operations Manager to ensure personnel and resources are available. Ensure all control measures identified in the DWQMP are functioning effectively. Commence investigation to determine cause if not traceable through the DWQMP. Arrange for re-samples to be taken where required. Instigate immediate remediation actions, including isolation of affected area where possible. Review associated laboratory reports and operational records. For incidents triggered by cybersecurity events, temporarily shut down supply, ensure all automated systems are isolated until verified as safe. Increase manual grab sample testing of water quality. Assess need to elevate to Emergency.	Environmental Health Worker, Operations Manager

Alert Level	Description	Key management response(s)	Brief summary of actions	Position(s) responsible
Level 1: Operational exceedance	Exceedance of operational limits (as per the operational monitoring section of the Plan). *Incident is managed within the water operations team. An incident is not declared, and the issue can be managed in line with the DWQMP.*	Ensure all operational steps identified in the DWQMP are functioning effectively. Check and act upon operations records.	Ensure Operations Manager is notified as soon as practicable. Review operations and maintenance records for anomalies. Commence investigation to determine cause, if not identifiable through operational records. Instigate immediate remediation actions. Ensure all control measures identified in the DWQM Plan are functioning effectively. Determine need to increase operational monitoring frequency where required. In case of customer complaints, coordinate investigation and resolution, including obtaining water samples where required.	WTP Operators

5.3.1. Process for Incident Reporting

The incident response and reporting protocols have been adopted from the Queensland Water Supply Regulator Drinking Water Service Provider Monitoring and Reporting Requirements guidelines.

Queensland Water Supply Regulator reporting forms are submitted as required.:

- *Notification of a drinking water event or detection of a parameter with no water quality criteria: Form WSR507* and
- *Notice of noncompliance with water quality criteria: Drinking water: Form WSR017*

Incident reporting forms used are located online at:

https://www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/industry-regulation/drinking-water/forms-guidelines

Reporting requirements are summarised in Table 11 as below, and also represented as flow charts in Figures 5 and 6.

Table 11 Incident reporting requirements

Incident	Reporting Requirements (to Regulator)
Detection of *E. coli*, detection of a pathogen, failure to meet ADWG health guideline values	See Figure 5 and 6
Radiological (exceed ADWG levels)	As per Figure 6
Parameters with no ADWG guideline value	Written confirmation within 24 hours
An event likely to affect water quality	By telephone as soon as practicable. Also refer to Figure 7 which includes some guidance.

Reporting number is 1300 596 709

Email: DrinkingWater.Reporting@rdmw.qld.gov.au

5.3.2. Emergency Contacts and Notification of Alerts

Where an alert about the quality of the water is required to be distributed to the community, the following methods may be appropriate and should be considered:

- door knocking
- posters
- word of mouth

Vulnerable consumers may be notified by phone and are listed in Section 2.4.

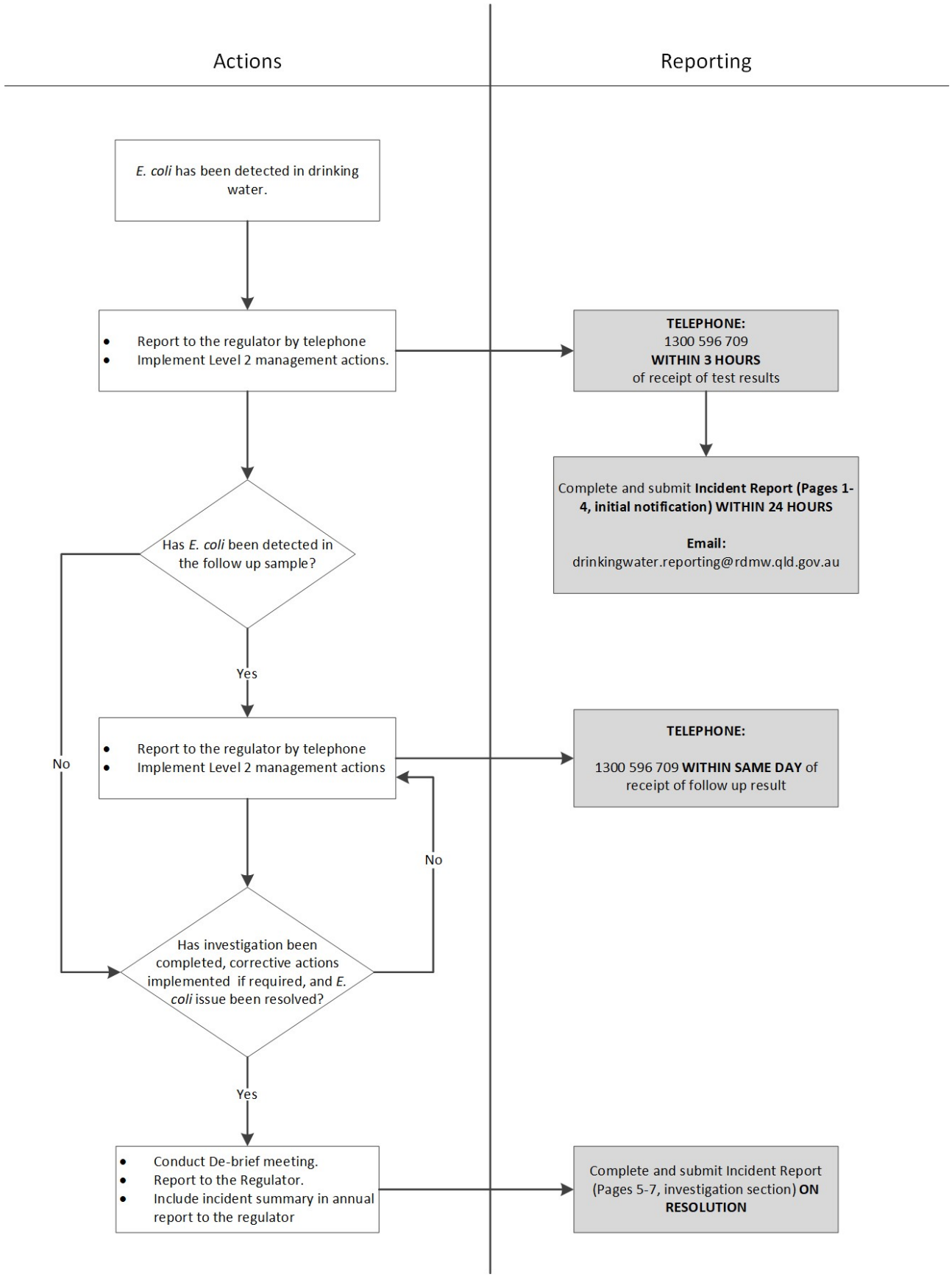


Figure 5 Action and Reporting for Detection of *E. coli*

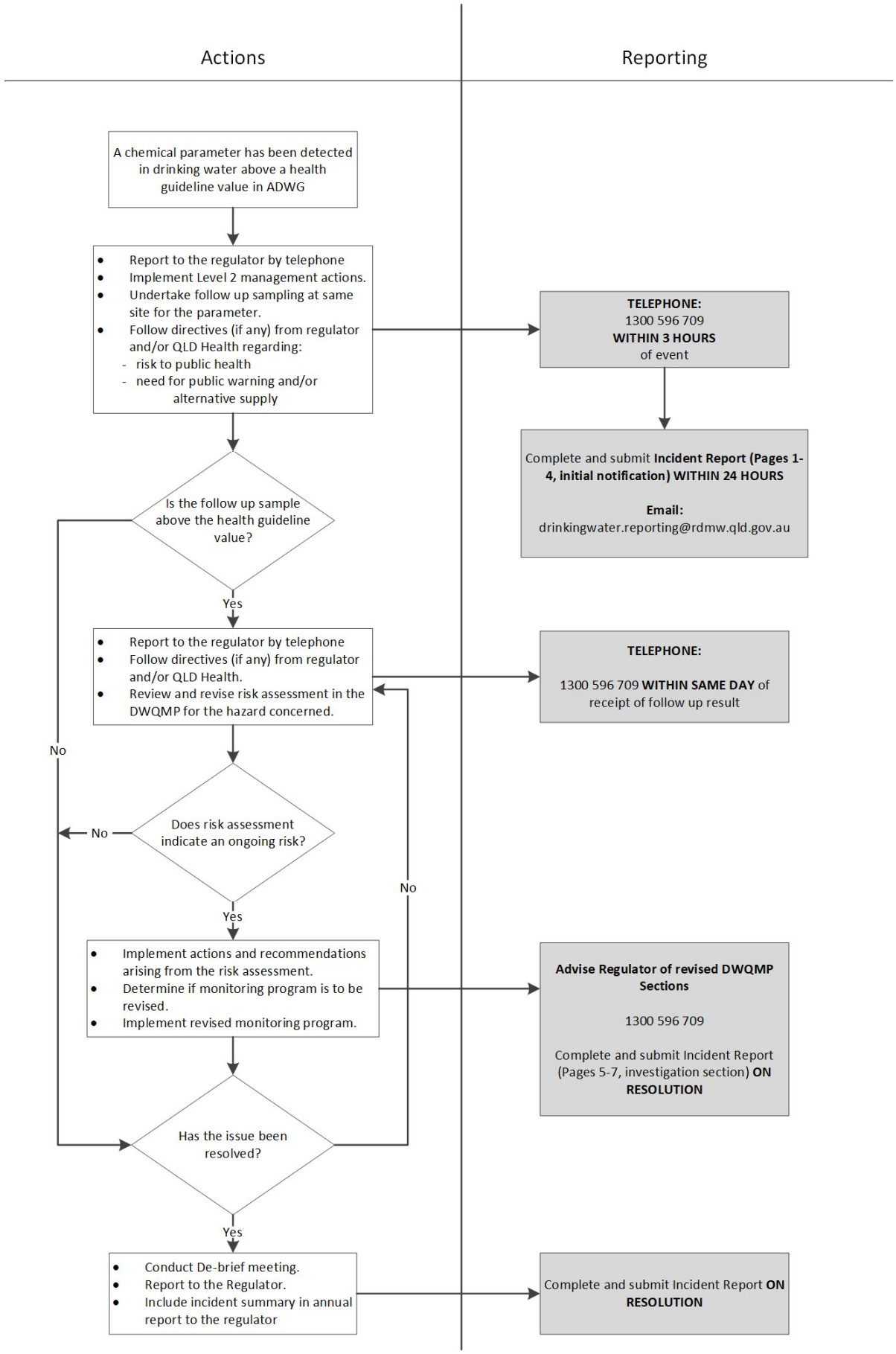


Figure 6 Actions and Reporting for Detection of Chemical Parameters above ADWG Health Values

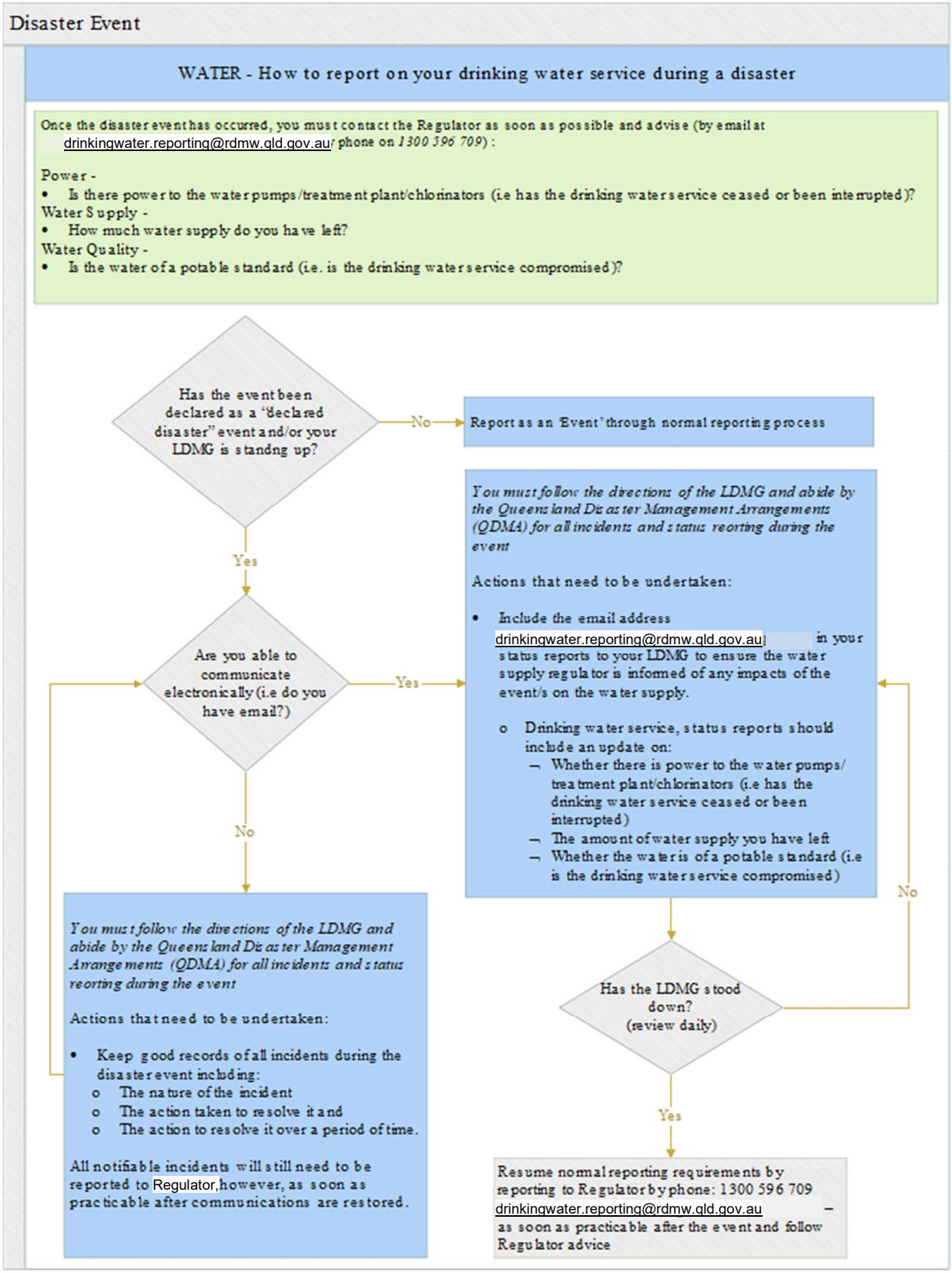


Figure 7 Actions and Reporting during a Disaster

5.4. Risk Management Improvement Program

Criteria

The Plan, through the program, must describe the management measures proposed for each unacceptable residual risk. The process for providing the relevant information to the regulator must also be described. The description must include:

- measures, actions, strategies or processes
- priority for implementation
- timeframe
- other factors, for example, responsibilities between the provider and third parties and/or other stakeholders.

The risk management improvement actions from the risk assessment are outlined in the *Risk Register and Improvement Plan Register* spreadsheet, which is a supporting DWQMP document.

5.5. Service Wide Support – Information Management

Criteria

The Plan must describe the information management, record keeping and reporting processes relevant to drinking water quality management, including how they address:

- accessibility
- currency.
- record retention requirements.

Table 12 Summary of Water Quality Management Information

Information/ Document	Format (hardcopy / electronic)	Where stored (at WTP / on electronic system / other)	Position Responsible / Business Unit	Comments
Water Treatment Plant Daily Logbook	Hardcopy only	WTP	WTP Operator	NA
Operational and Verification Monitoring Water Testing Folder	Hardcopy and email records Electronic spreadsheet	WTP and Council offices Council Network Drive	WTP Operator and EHW	Entered by admin assistant into spreadsheet. Reviewed by Operations Manager.
DWQMP and related information	Electronic and hardcopy	Council Network Drive	Operations Manager	NA
Online testing	Electronic	SCADA	Auto via SCADA	Operators attend to alarms and notifications.

DWQMP related digital information can be accessed by the water team from Council's network drive. Hardcopy records are accessible by the water team at the WTP and Council office, as relevant.

Internal and external reporting is undertaken in accordance with the DWQMP (e.g. CCP procedures in Appendix A and incident response section 5.3).

External reporting will be also undertaken in the form of the DWQMP Annual Report annually.

All records are maintained for 7 years in accordance with Queensland record retention requirements.

6. Operational and Verification Monitoring Programs

6.1.1. Operational Monitoring

Criteria

The Plan must contain details of the operational monitoring program, including:

- a link to the process step or operational function
- the parameter being tested
- location of monitoring
- frequency
- summary of how excursions are managed and/or corrective action is taken.

The Plan must describe why the operational monitoring program is appropriate to confirm and maintain the effective operation of the existing preventive measures.

At present the only process operational monitoring is for Chlorine, Turbidity and pH at the WTP as per the CCPs and operational monitoring outlined in the Table 13.

This is considered appropriate to manage the treatment plant and online meters have been installed also. Monitoring locations ensure that the solids removal process is working well (turbidity for settled water and filtered water), water is being disinfected (chlorine and pH) and the integrity of reservoirs are maintained.

Operational monitoring limits are defined in Table 13. Where operational monitoring indicates that there is an issue, corrective actions are undertaken as per the CCP procedure and Table 13.

In addition, raw water is also tested. Turbidity is monitored and recorded daily at the WTP new raw water sample tap, there is also an online raw water turbidity meter. Monthly samples are to be taken from the raw water sample tap and tested for Standard Water Analysis (SWA), heavy metals, Blue Green Algae and Pesticides (Improvement Plan action). The SWA parameters generally include: conductivity, pH, hardness, alkalinity, silica, TDS, colour, turbidity, fluoride, nitrate, sulfate, iron, manganese, zinc, aluminium, boron and copper.

A monthly sample is also to be taken at STP Yard and tested for SWA, heavy metals, Blue Green Algae, pesticides and THMs (Improvement Plan).

The final water (post clear water tank) is tested daily for chlorine residual (Free & Total), turbidity and pH.

Online monitoring is also undertaken at some location, included in Table 13.

Table 13 Operational Monitoring

Location	Parameter	Frequency	Action Trigger	Corrective Action
Raw water	Turbidity	Daily – grab Continuous - online	30 NTU	To note raw water characteristics. To alert operators on change to raw water quality and to guide need for jar testing. Refer to CCP Filtration also.

Location	Parameter	Frequency	Action Trigger	Corrective Action
Raw water tap	SWA, heavy metals, BGA and pesticides	Monthly	Standard water – NA Heavy metals – as per ADWG BGA – bloom (visual and high cell counts) Pesticides – as per ADWG	To note raw water characteristics. Contact the regulator and PHU for further advice as needed if any out-of-spec result is noted.
After Clarifier	Turbidity	Daily – grab Continuous - online	>5 NTU	Retest, undertake jar test, check clarifier and calibration of instrument, check dosing pumps, further action dependent on findings, tell Operations Manager.
Filtered Water	Turbidity	As per CCP	As per CCP	As per CCP
Final Water	Chlorine	As per CCP	As per CCP	As per CCP
Final Water	pH	Daily – grab Continuous - online	<6.5 or >8.5	Retest, check soda ash and free chlorine level and adjust as required.
Reticulation (verification monitoring sites)	Free Chlorine	Weekly	<0.2mg/L	Retest, check dosing pumps or calibration of instrument, increase chlorine at WTP as needed, further action dependent on findings, tell Operations Manager.
STP Yard (verification monitoring)	SWA, heavy metals, BGA and pesticides	Monthly	Standard water – NA Heavy metals – as per ADWG BGA – bloom (visual and high cell counts) Pesticides – as per ADWG	Refer to Incident Response section of the DWQMP. Contact the regulator and PHU for further advice.
CWT / Reservoirs	Integrity	6-monthly	Evidence of vandalism. Hatches not closed. Reservoir roof, vermin screens and flashing not intact. Evidence of vermin ingress into reservoir.	Notify Operations Manager. Manager to arrange repair of asset. Consider if increased *E. coli* monitoring is required. Consider activating incident protocol and notifying DRDMW.

6.1.2. Verification Monitoring

Criteria

The Plan must contain details of the verification monitoring program including:

- the parameter being tested
- location of monitoring
- frequency
- summary of how excursions are managed and/or corrective action is taken.

The Plan must also describe why the verification monitoring program is appropriate to confirm that the drinking water complies with the water quality criteria for drinking water (including the rationale for the choice of the parameters).

E. coli and chlorine testing is undertaken weekly at the following 4 sample locations: Bert Button Lookout, WTP After Treatment (Combined CWT, Res 1 & Res 2), "Gundoo" Day Care Centre (Kitchen tap) and STP (Yard tap).

THMs sample are taken monthly from the STP Yard Tap. SWA, BGA, heavy metals and pesticides will also be tested here (Improvement Plan).

All water samples are collected by the Environmental Health Worker (EHW) or when not available, the WTP operators. Samples are currently sent to QHFSS for analysis, and this laboratory holds NATA accreditation.

The locations and parameters are considered to be representative of the water quality in Cherbourg and the requirements of the Public Health Regulation (2018), whilst also sampling at locations at the end of dead end lines, and representing vulnerable users (school and hospital) and are considered sufficient to inform operational decisions.

Where verification results exceed ADWG health guideline values, this is considered an incident, and the EHW will be informed and appropriate actions in accordance with Table 13 undertaken to rectify the situation.

Appendix A – CCP Procedures

Cherbourg Supply System CCP – Disinfection

What is being measured?	Chlorine residual (mg/L)
Where/how is it measured?	Chlorine: Final water – Continuous online and Grab sample (daily)
What is the control point?	Disinfection
What are the hazards?	Pathogens (chlorine sensitive)

Target **Free chlorine: 1.0 – 2.0 mg/L**	**Adjustment Limit** **Free chlorine: < 1.0 mg/L or > 2.5 mg/L for >30 mins**	**Critical Limit** **Free chlorine: < 0.5 mg/L or > 5.0 mg/L (total) for >30mins**
• Daily plant checks and duties • Daily treated water monitoring	• Re-test to verify result • Thoroughly inspect system to ensure no issues (injection pipe break, dosing meter fault, dosing meter or line clog, sufficient chemical available, check raw water turbidity etc). • Rectify the issue as relevant. • Increase chlorine dose, if chlorine is the issue • Check other dosing chemicals (e.g. alum) • Inform Operations Manager as soon as possible • Increase monitoring until system conforms • Maintain records as relevant.	• Inform Operations Manager as soon as possible • Repeat corrective actions from alert level • Consider shutting down plant • Check chlorine residual in the reservoirs and reticulation • Increase monitoring until system conforms • Maintain records • Consider if the event should be notified to the Regulator (DRDMW). • Consider need to issue a boil water alert in consultation with the PHU/DRDMW.

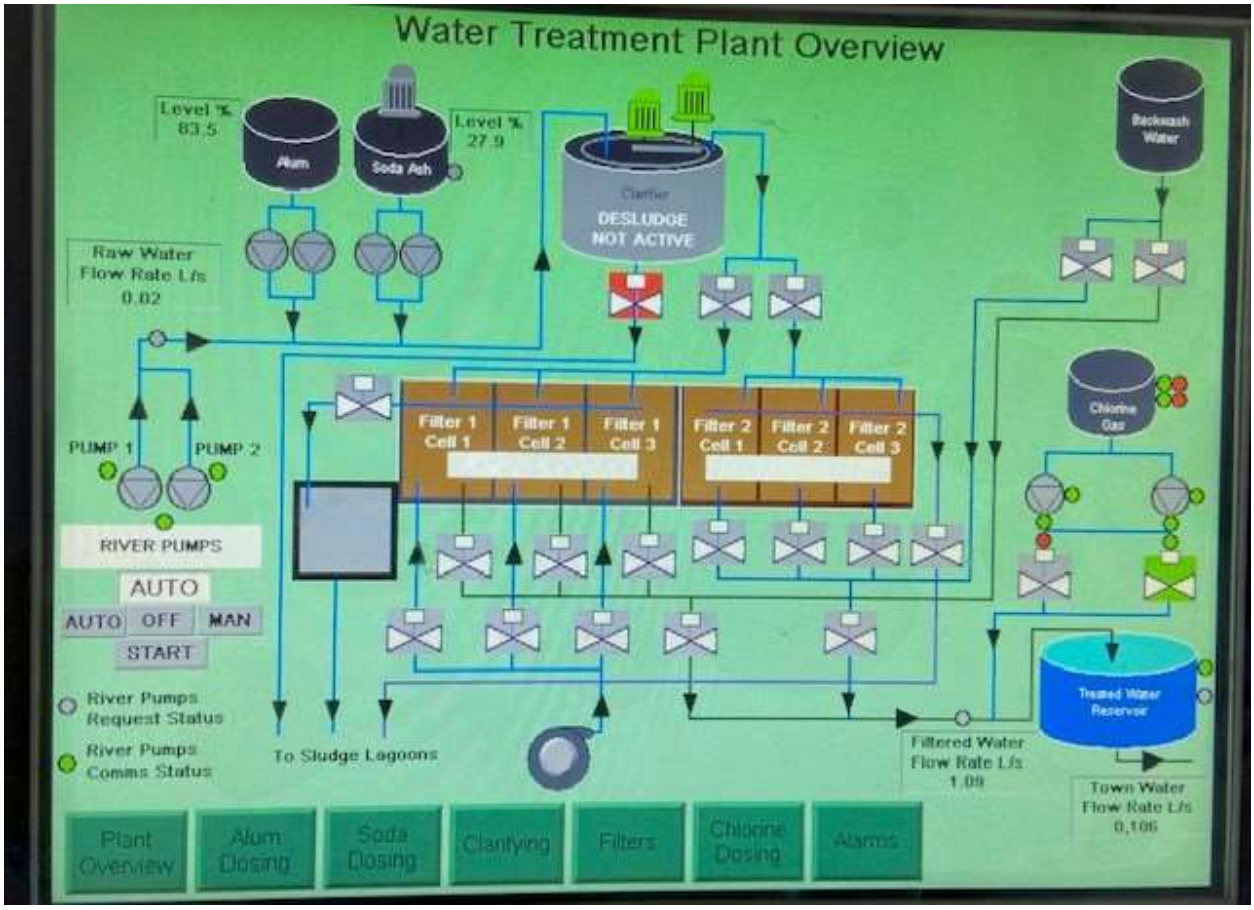
Cherbourg Supply System CCP – Filtration

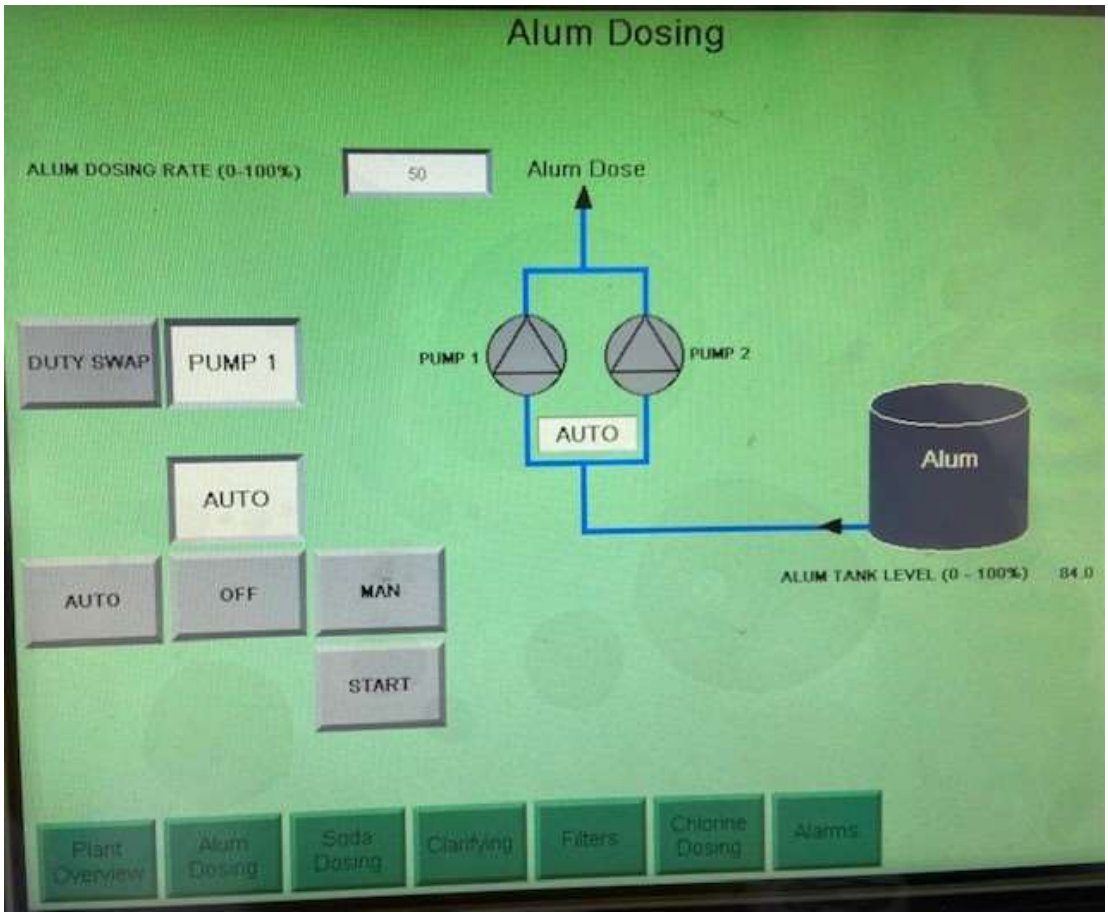
What is being measured?	Turbidity (NTU)
Where/how is it measured?	Turbidity: Filtered water – Continuous online and Grab sample (daily)
What is the control point?	Filtration
What are the hazards?	Pathogens, turbidity

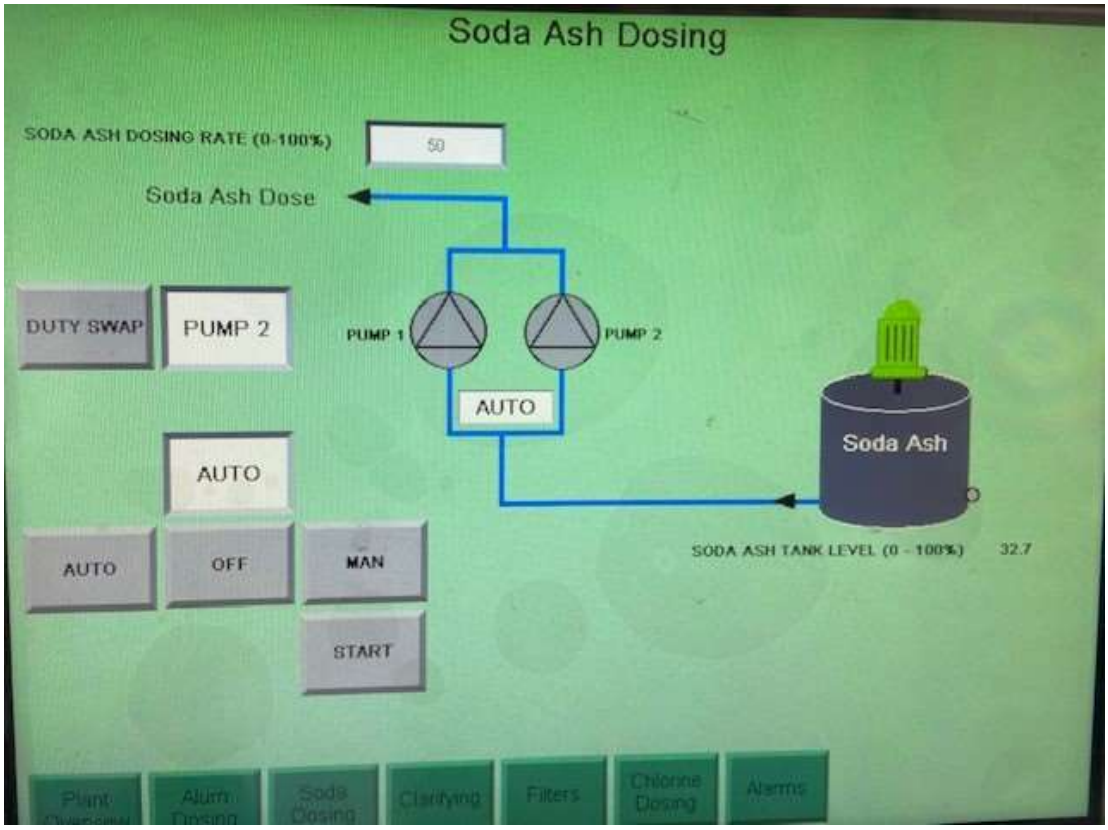
Target **< 0.5 NTU**	**Adjustment Limit** **0.5 - 1.0 NTU for >15 mins**	**Critical Limit** **> 1.0 NTU for > 15mins**
• Daily plant checks and duties • Daily water monitoring	• Re-test to verify result • Check status of backwash, backwash if required • Check status of coagulation and flocculation processes, adjust using jar testing as required • Inform Operations Manager as soon as possible • Operations Manager to consider need to inform DRDMW/PHU • Increase monitoring until system conforms • Maintain records as relevant.	• Inform Manager as soon as possible • Repeat corrective actions from alert level • Consider shutting down plant • Check turbidity and chlorine residual in the reservoirs and reticulation • Increase monitoring until system conforms • Maintain records. • Consider if the event should be notified to the Regulator. • Consider need to issue a boil water alert in consultation with DRDMW/PHU.

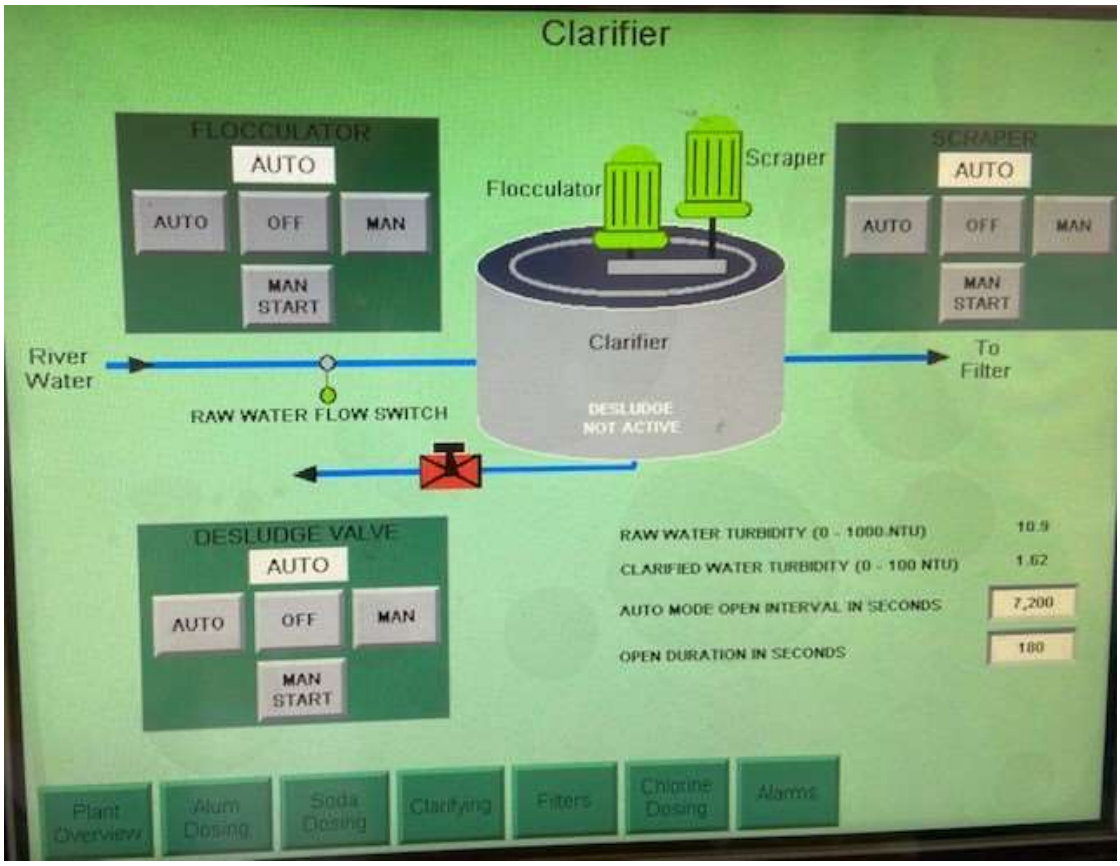
* These limits will need to be tightened when individual filter turbidity meters are installed (e.g. critical limit >0.5 NTU) to manage the protozoa risk present in the raw water.

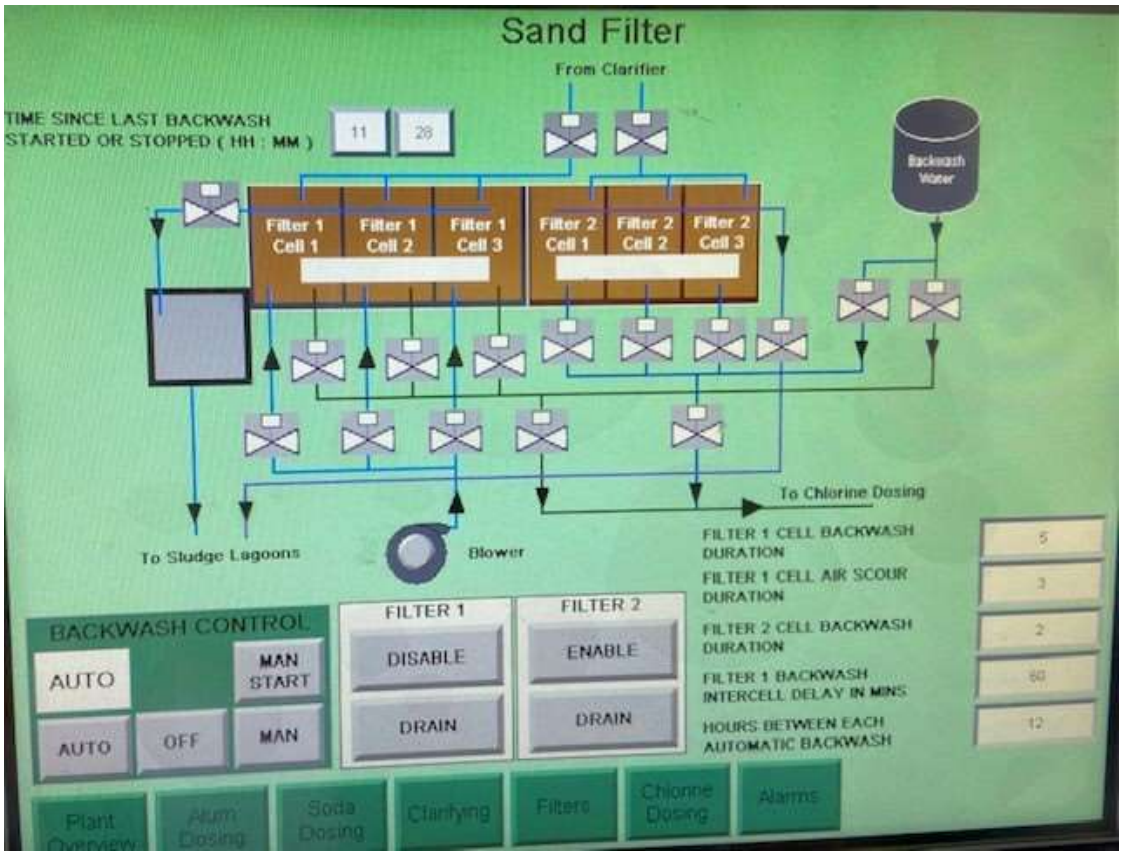
Appendix B – SCADA Overview Drawings

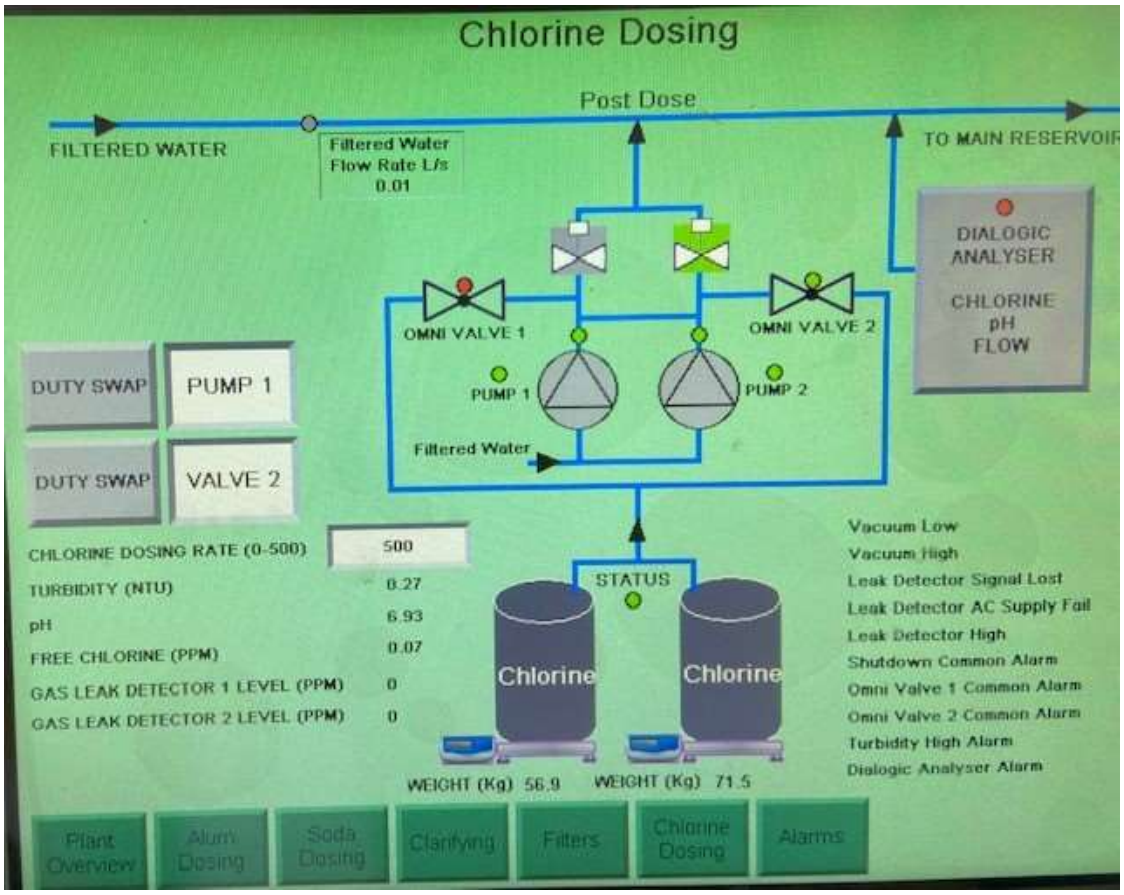



Alum Dosing
ALUM DOSING RATE (0-100%)
50
Alum Dose
DUTY SWAP
PUMP 1
PUMP 1
PUMP 2
AUTO
Alum
AUTO
AUTO
OFF
MAN
ALUM TANK LEVEL (0 - 100%)
84.0
START
Plant Overview
Alum Dosing
Soda Dosing
Clarifying
Filters
Chlorine Dosing
Alarms


Soda Ash Dosing
SODA ASH DOSING RATE (0-100%)
50
Soda Ash Dose
DUTY SWAP
PUMP 2
PUMP 1
PUMP 2
AUTO
Soda Ash
AUTO
AUTO
OFF
MAN
SODA ASH TANK LEVEL (0 - 100%)
32.7
START
Clarifying
Filters
Chlorine Dosing
Alarms


Clarifier
FLOCCULATOR
AUTO
AUTO
OFF
MAN
MAN START
Flocculator
Scraper
SCRAPER
AUTO
AUTO
OFF
MAN
MAN START
Clarifier
River Water
To Filter
RAW WATER FLOW SWITCH
DESLUDGE NOT ACTIVE
DESLUDGE VALVE
AUTO
AUTO
OFF
MAN
MAN START
RAW WATER TURBIDITY (0 - 1000 NTU)
10.9
CLARIFIED WATER TURBIDITY (0 - 100 NTU)
1.62
AUTO MODE OPEN INTERVAL IN SECONDS
7,200
OPEN DURATION IN SECONDS
180
Plant Overview
Alum Dosing
Soda Dosing
Clarifying
Filters
Chlorine Dosing
Alarms


Sand Filter
From Clarifier
TIME SINCE LAST BACKWASH STARTED OR STOPPED (HH : MM)
11
28
Backwash Water
Filter 1 Cell 1
Filter 1 Cell 2
Filter 1 Cell 3
Filter 2 Cell 1
Filter 2 Cell 2
Filter 2 Cell 3
To Chlorine Dosing
To Sludge Lagoons
Blower
FILTER 1 CELL BACKWASH DURATION
5
FILTER 1 CELL AIR SCOUR DURATION
3
FILTER 2 CELL BACKWASH DURATION
2
FILTER 1 BACKWASH INTERCELL DELAY IN MINS
60
HOURS BETWEEN EACH AUTOMATIC BACKWASH
12
BACKWASH CONTROL
AUTO
MAN START
AUTO
OFF
MAN
FILTER 1
DISABLE
DRAIN
FILTER 2
ENABLE
DRAIN
Plant Overview
Alum Dosing
Soda Dosing
Clarifying
Filters
Chlorine Dosing
Alarms


Chlorine Dosing
Post Dose
FILTERED WATER
Filtered Water
Flow Rate L/s
0.01
TO MAIN RESERVOIR
DIALOGIC
ANALYSER
CHLORINE
pH
FLOW
OMNI VALVE 1
OMNI VALVE 2
PUMP 1
PUMP 2
Filtered Water
DUTY SWAP
PUMP 1
DUTY SWAP
VALVE 2
CHLORINE DOSING RATE (0-500)
500
TURBIDITY (NTU)
0.27
pH
6.93
FREE CHLORINE (PPM)
0.07
GAS LEAK DETECTOR 1 LEVEL (PPM)
0
GAS LEAK DETECTOR 2 LEVEL (PPM)
0
STATUS
Chlorine
Chlorine
WEIGHT (Kg) 56.9
WEIGHT (Kg) 71.5
Vacuum Low
Vacuum High
Leak Detector Signal Lost
Leak Detector AC Supply Fail
Leak Detector High
Shutdown Common Alarm
Omni Valve 1 Common Alarm
Omni Valve 2 Common Alarm
Turbidity High Alarm
Dialogic Analyser Alarm
Plant Overview
Alum Dosing
Soda Dosing
Clarifying
Filters
Chlorine Dosing
Alarms

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