



# **Drinking Water Quality Management Plan**

November 2022



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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 This was submitted to the regulator but was withdrawn on 1 July 2020.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the review and update using the amended DWQMP version submitted to the Regulator on 11 December 2019, (subsequently withdrawn 1 July 2020), as the starting point.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.
3.3	29 September 22	Marty Hancock and Tasleem Hasan, Viridis Elizabeth O'Chin, CASC	Review and update of the DWQMP in response to the Compliance Notice issued by the Regulator (26/7/22) and following the risk workshop on 5/9/22.
3.4	25 November 2022	Tasleem Hasan, Viridis Cherbourg ASC Team	Updated in response to clarifications from the Regulator.

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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
<b>Service Provider Identification Number (SPID)</b>	146
<b>Council Name and Contact Details</b>	<p><b>Cherbourg Aboriginal Shire Council</b>                      22 Barambah Avenue                      Cherbourg QLD 4605                      ABN: 17 862 722 505                      Phone: (07) 4168 1866</p> <p><b>DWQMP In-Charge</b>                      Water &amp; Sewerage Manager                      Phone: (07) 4168 1503                      E: <a href="mailto:wsm@Cherbourg.qld.gov.au">wsm@Cherbourg.qld.gov.au</a></p>
<b>Drinking Water Scheme operated</b>	Cherbourg Drinking Water Supply Scheme
<b>Communities serviced</b>	Cherbourg
<b>Current population</b>	1,194 (2021 census data)
<b>Current connections</b>	363
<b>Current demand</b>	510 kL/day
<b>Projected population (2032)*</b>	1,360
<b>Future connections (2032)*</b>	375
<b>Future demand (2032)*</b>	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 (CASC) is the registered Water Service Provider. The CASC service area covers 31.8 km<sup>2</sup>, 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 2.5 ML/day (based on flow from filters at 30L/s), 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/Industrial Estate (TBC)
- Gundoo Early Learning Centre
- Nurunderi Tafe
- Ny-ku Byun Aged Care Centre
- Youth Justice Service Centre (Jumbunna Centre)
- Mudjimba Women’s Safehouse, Uniting Care Community
- CASC Operation’s Dept. and Depot (Industrial area based at Fisher St Cherbourg)
- Cherbourg Retail Store – CFC
- Cherbourg Community Café and Training Centre – Skill Centred
- Cherbourg Sports Complex

- Ration Shed Museum Cherbourg Historical Precinct Group
- Beemar Yumba Aboriginal Children's hostel
- Cherbourg Regional Aboriginal & Islander Community Controlled Health Services (CRAICCHS)

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

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 it is a potential risk. This has been further assessed in the risk assessment.



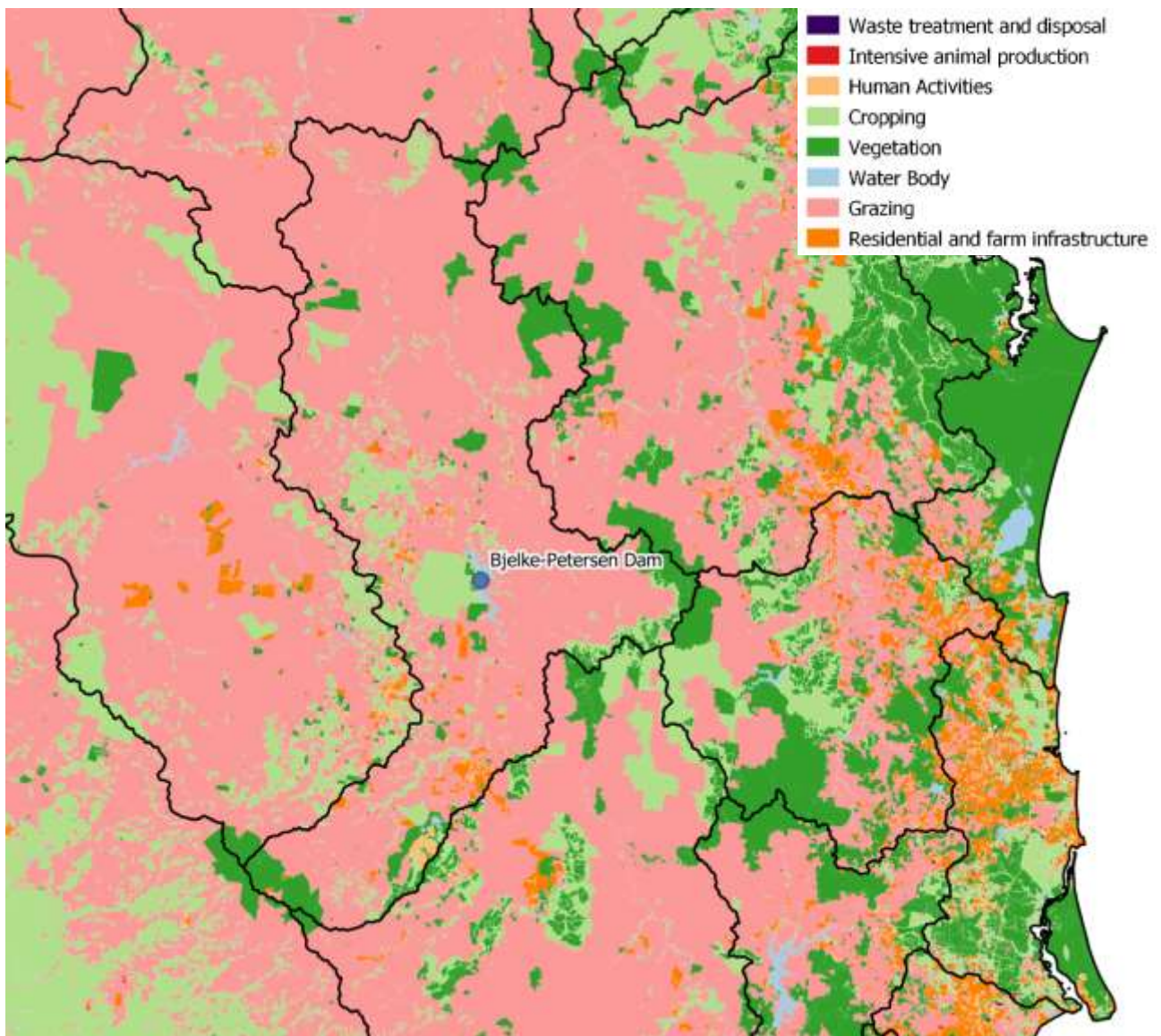


Figure 2 Barker-Barambah sub-basin land use.



**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. Council will investigate if a formal arrangement around releases and communications could be established (part of the Improvement Plan). At the time of updating the DWQMP, storage at Bjelke-Petersen Dam was approximately 101%. 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, September 2022) indicates that raw water turbidity remains within modest ranges, although may rapidly increase from an average of 11 NTU to a max of around 36 NTU, even with recent rain events experienced.

**Table 2 Water source details**

<b>Name</b>	<b>Barambah Creek</b>
<b>Type</b>	Surface Water
<b>% of supply</b>	100%
<b>Reliability</b>	Bjelke Petersen Dam releases into Creek at times – no historical reliability issues noted for the Creek. The dam is currently at full capacity.
<b>Water quality issues</b>	Storm season – turbidity and increased pathogen load. Open surface water catchment hence exposed to hazard sources / contaminants.

## 2.2. Supply Schematic

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

The SCADA screen overview drawings are to be updated following the most recent changes and upgrades to the system (e.g. new coagulant and new reservoirs) – included in the Improvement Plan.

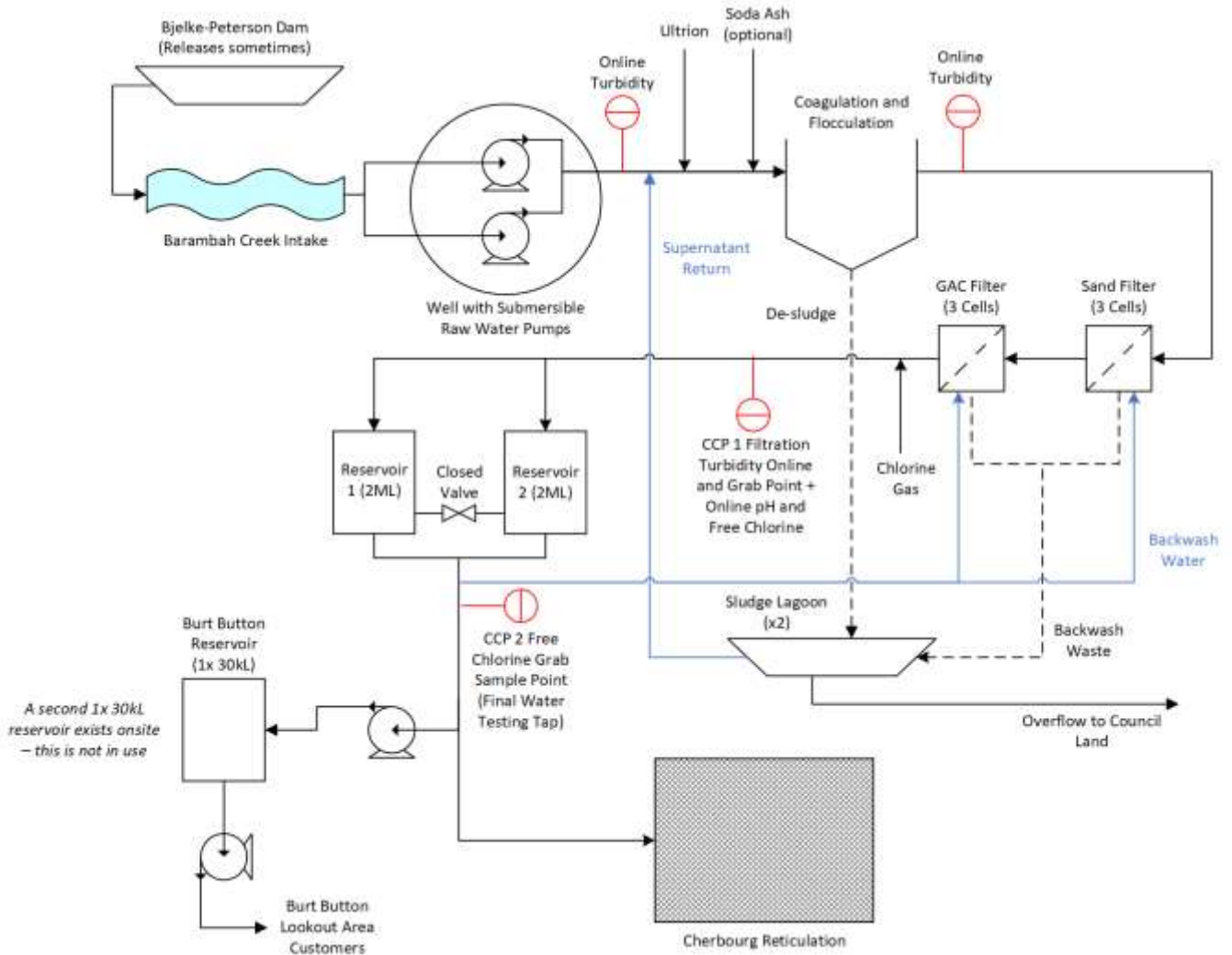


Figure 4 System schematic

## **2.3. Supply Infrastructure**

### **2.3.1. Treatment Process Description**

Water is pumped through an intake structure (screened), which has been upgraded in 2021-22. 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 ACH-Ultrion 44697 (duty/standby with a manual dose rate determined by jar test results).

Following flocculation and clarification, water is filtered through 2 filter blocks – firstly sand (3 filter cells in the block) and then carbon (3 filter cells in the block), with filter backwash triggered on filtered water turbidity (>1 NTU), headloss and time-based (every 12 hours). The backwash water is currently sourced from the treated water reservoirs. The old clear water tank, which is offline is being repaired with new roof and will serve as the backwash water tank in the future.

There is an online meter to measure the turbidity of clarified water. The sand filters are made with 3 layers of coarse gravel, fine gravel and sand. The carbon filter is granular activated carbon (GAC). Individual filter turbidity is not monitored at the filter outlet; instead the combined turbidity is measured. This is measured via an online turbidity meter. CASC has improved 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, further improvements to optimise the processes and monitoring is ongoing.

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), over 2020-22.

Following filtration, the water is chlorinated via chlorine gas (duty/standby pumps, set to achieve chlorine residuals required) with free chlorine set at 1.0 – 2.0 mg/L target range for the sample location post the reservoirs. There is an online chlorine and pH meter pre reservoirs which corrects the chlorine dose. Outside of this range post the reservoirs, the dose rate is adjusted by the plant operators via SCADA settings.

The water post treatment passes into 2 service reservoirs simultaneously (newly commissioned in 2022). Any of the 2 reservoirs can be isolated and the other filled individually if required. There is a balance line between the reservoirs, but the valve is closed. Reservoirs are scoured periodically. Water from the reservoirs is then reticulated by gravity feed through mains into the Cherbourg reticulation. Treated water from the reservoirs is also pumped via manual mode to the Burt Button operational reservoir to supply 5 houses. The manual pumping is managed by the operators and this task is included in the operator daily checklist.

The clarifier sludge and backwash water go to 2 sludge lagoons in series. This enables settling. Supernatant is then pumped to the head of the plant prior to chemical dosing. The return rate is auto managed via SCADA to ensure it is <10% of plant flow rate. Due to algal issues with the lagoons in 2022, the supernatant return has been offline while investigations are being undertaken. Any overflow from the sludge lagoons, although not expected, will be on to land (Council-owned).

The water treatment plant has a design capacity for 2.5 ML/day but is typically used for 4-6 hours per day to produce sufficient water to fill the reservoirs (with daily demand typically around 510 kL). 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.

There is a backup power generator, which auto turns on when there is power loss. This is checked monthly to ensure that it is operational. In the case of a power failure, the plant will still run and be SCADA-controlled due to the generator coming online. SCADA room in Council office will not run on power failure so alarms

will not be sent but the WTP will still be SCADA monitored onsite and critical failure will still shut down the plant.

SCADA will send alarms to operators on failures (e.g. dosing pumps) and limit breach on the clarified water, filtered water and chlorine dosed water. There is an SOP on SCADA alarms and actions and the WTP and Telemetry O&M Manual.

*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. Considering a peak demand of 700kL/day (estimated from average daily demand), 50% reservoir operating level, baffle factor of 0.3 and a chlorine concentration of 0.5mg/L (critical low limit) post the reservoirs, a *C.t* of 617 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 (as required based on raw water quality in line with the Jar Testing SOP). CASC has procured a Jar Tester and operators have been trained. Additional operator training related to water quality management is being conducted under the 'Safe and Healthy Drinking Water in Indigenous Local Government Areas Program'.

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)	2.5 ML/day
	Typical Daily and maximum flow range	510 kL/day
	Chemicals added	Ultrion - Liquid Aluminium chlorohydrate (ACH), soda ash (optional), 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	100% Cherbourg community
	Distribution area supplied	
Bypasses / Variations	No bypasses	
Disinfection	Location	Post filtration
	Type	Chlorine gas
	Dose rate	Target dose 1.5 – 2.5 mg/L free chlorine
	Target residual levels	1.0-2.0 mg/L post the reservoirs
	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	<b>Reservoirs 1 and 2</b>	
	Capacity (ML)	2 ML each
	Roofed (Y/N)	Y
	Vermin-proof (Y/N)	Y
	Runoff directed off roof (Y/N)	Y
	<b>Bert Button</b>	
	Capacity (ML)	1 x 30kL each (There is another 30kL reservoir at the site but this is not in use).
	Roofed (Y/N)	Y
	Vermin-proof (Y/N)	Y
	Runoff directed off roof (Y/N)	Y

## 2.4. Key Stakeholders

**Table 4 Stakeholders**

<b>Organisation</b>	<b>Contact Name and Details</b>	<b>Relevance to management of drinking water quality</b>	<b>How the stakeholder is engaged in the DWQMP</b>
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 Kellie Robertson 0455171084	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)	Chemical Supplier
Cherbourg State School	41699333	Vulnerable users	Customer
Queensland Forensic and Scientific Services (QFSS)	1800 000 377	External Laboratory	Verification Monitoring



<b>Organisation</b>	<b>Contact Name and Details</b>	<b>Relevance to management of drinking water quality</b>	<b>How the stakeholder is engaged in the DWQMP</b>
Nalco Water	Zaheer Khokar 07 3710 3200	Chemical Supplier (Liquid ACH – Ultrion 44697)	Chemical Supplier
Thompson Plumbing & Gas	Daniel Thompson 0447 157 938	Plumbing contractor	Contractor as required

### 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 Reports: REC-22-171\_1.0 September 22 and REC-21-057\_1.0 March 21 (DWQMP supporting documents). Water quality information from these reports were used to complete the 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. A process to record complaints has been set up. No complaints were recorded for the 2022 review.

#### 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 774 mm, with average maximum monthly temperatures in the range of 18- 30°C. Rainfall is predominantly in summer. Bureau of Meteorology Climate statistics:

[Climate statistics for Australian locations \(bom.gov.au\)](https://www.bom.gov.au)

## 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 undertaken on 5 September 2022.

### 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 and Improvement Plan spreadsheet (Excel, supporting document), separate to this main document..

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
<b>Certain</b>	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.
<b>Confident</b>	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.
<b>Reliable</b>	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.
<b>Estimate</b>	There is limited monitoring data available; or There is a limited understanding of the processes involved.
<b>Uncertain</b>	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, over 2020-22. The Contractor has supplied Operations and Maintenance Manual and diagrams (P&IDs).

In addition, other procedures (SOPs) have been developed with support from the DD PHU. Additional SOPs have been identified at the risk workshop (September 22) 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.

**Table 9 Procedures**

Process	Significant SOPs - Status	Date
Catchment	SOP Available	09/22
BGA Response	SOP Available	09/22
Daily duties	MS001 - Daily Operator Log	09/22
Flow meters	SOP015 Flow meters – reading and operation	09/21
Operational and verification monitoring	Monitoring Plan Available SOP001 Chlorine and turbidity reference points SOP002 Chlorine and turbidity table kit cards SOP003 Total and free chlorine reference sheet SOP004 Measuring chlorine and pH SOP005 Measuring turbidity	Within this DWQMP 09/21 09/21 09/21 09/21 09/21
Jar Test	SOP008 Clarification - Jar Testing	05/22
Coagulation, Flocculation, Clarification	O&M Manual	02/21
Filtration	O&M Manual CCP 1 – Appendix A Filter maintenance tasks - to be developed, identified at 2022 workshop	02/21 Within this DWQMP NA
Disinfection	CCP 2 – Appendix A SOP009 Chlorine gas bottle changeover	Within this DWQMP 05/22

Process	Significant SOPs - Status	Date
	Chlorine handling and safety - to be developed, identified at 2022 workshop	NA
<b>Alum dosing and Soda Ash</b>	O&M Manual	02/21
	When to use soda ash - to be developed, identified at 2022 workshop	NA
<b>Manual chlorine dosing</b>	Manual dosing - to be developed, identified at 2022 workshop	NA
<b>Reservoirs integrity inspections</b>	SOP Available	09/22
<b>Calibration</b>	SOP012 Cleaning and Calibration of turbidity analysers	09/21
	Calibration manuals from manufacturer	NA
	Dosing pumps calibration – to be developed, identified at 2022 workshop	NA
<b>Actions on SCADA alerts</b>	SOP013 SCADA system	06/22
	SCADA Operations Manual	08/21
	Setpoint changes in SCADA management - to be developed, identified at 2022 workshop	NA
<b>Mains/pipes repair and hygiene</b>	SOP Available	09/22
<b>Flushing program</b>	Flushing program - to be developed, identified at 2022 workshop	NA
<b>Maintenance schedule</b>	Schedule Available, Excel spreadsheet	09/22
<b>Sampling and testing</b>	SOP006 Collecting and submitting water samples	06/22
	SOP007 Transporting water samples	09/21
<b>Water quality complaints, response and records</b>	Included in the Water Spreadsheet	09/22

The procedures, except the CCPs and Monitoring Programs (operational and verification), are reviewed/revised every 3 years, or earlier if a significant change is required due to changes in operational practices. The CCPs and Monitoring Programs are reviewed in line with the review of the DWQMP.

The Water and Sewerage 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 Water and Sewerage 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 10 Critical Control Points**

Parameter	Frequency	Location	Target Limit	Alert Level	Critical Limit
<b>CCP Filtration*</b>					
Turbidity – Filtered Water (combined)	Continuous online and grab sample	After filtration**	<0.5 NTU	0.5 – 1.0 NTU	>1.0 NTU
<b>CCP Disinfection</b>					
Free chlorine – Final Water	Grab sample	Post the reservoirs (CHER 5)	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.

\*\*currently there is no sample tap just post the filters so the grab sample can only be tested at the online meter instrument point (sample line) post filtration. An improvement action to investigate installation of a tap has been included in the Improvement Plan.

### 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 11 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 Water and Sewerage Manager. The DD PHU provides support also, as required.

Also refer to Sections 5.3.1 and 5.3.2.

**Table 11 Management of Incidents and Emergencies**

Alert Level	Description	Key management response(s)	Brief summary of actions	Position(s) responsible
<b>Level 3: Emergency</b>	<p>Outbreak of waterborne disease.</p> <p>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, total failure or loss of water supply).</p> <p>Declared disaster or emergency situation in the local area or by state/national government.</p> <p>Cybersecurity event that causes inability to control or manage supply operations.</p> <p><i>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</i></p>	<p>Activate response actions as per the DWQMP.</p> <p>Request advice from external experts as appropriate to regain control.</p>	<p>Notify Regulator as soon as practicable on 1300 596 709 (24/7), as per reporting requirements.</p> <p>Water and Sewerage Manager to ensure personnel and resources are available.</p> <p>Coordinate notification, investigation and response.</p> <p>Consider what community notification / messaging is needed (e.g. do not drink alert, boil water alert or bottled/emergency water distribution).</p> <p>Coordinate community messaging as required.</p> <p>For emergencies triggered by cybersecurity events, shut down supply, ensure all automated systems are isolated until verified as safe.</p> <p>Increase manual grab sample testing. Engage external expertise to resolve issue.</p>	<p>CEO and Operations Manager</p>
<b>Level 2: Incident</b>	<p>Non-compliance (typically against the ADWG values)</p> <p>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.</p> <p>Cybersecurity event that may impact water quality parameters.</p> <p><i>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.</i></p>	<p>Activate response actions as per the DWQMP.</p> <p>Ensure all control measures identified in the DWQMP are functioning effectively.</p> <p>Request advice from external experts as appropriate to regain control.</p>	<p>Notify Regulator as soon as practicable on 1300 596 709 (24/7), as per reporting requirements.</p> <p>Water and Sewerage Manager to ensure personnel and resources are available.</p> <p>Ensure all control measures identified in the DWQMP are functioning effectively.</p> <p>Commence investigation to determine cause if not traceable through the DWQMP.</p> <p>Arrange for re-samples to be taken where required.</p> <p>Instigate immediate remediation actions, including isolation of affected area where possible.</p> <p>Review associated laboratory reports and operational records.</p> <p>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.</p>	<p>Water and Sewerage Manager</p>

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

### 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 12 as below, and also represented as flow charts in Figures 5 and 6.

**Table 12 Incident reporting requirements**

Incident	Reporting Requirements (to Regulator)
Detection of <i>E. coli</i> , 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. Refer also to Figure 8.
An event likely to affect water quality	By telephone as soon as practicable. Also refer to Figure 7 and Figure 8 which includes some guidance.

Reporting number is 1300 596 709

Email: [DrinkingWater.Reporting@rdmw.qld.gov.au](mailto: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
- radio

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

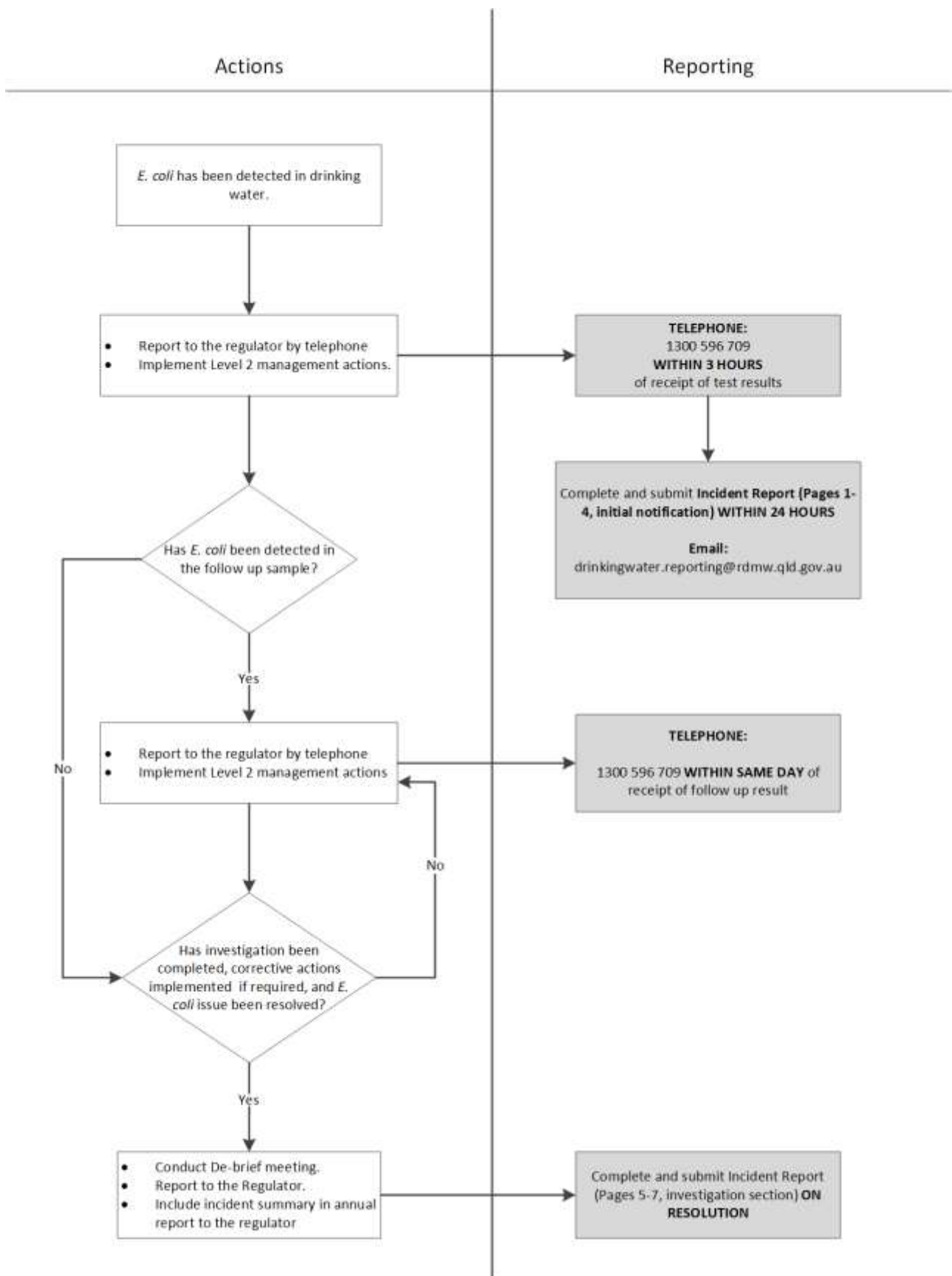


Figure 5 Action and Reporting for Detection of *E. coli*

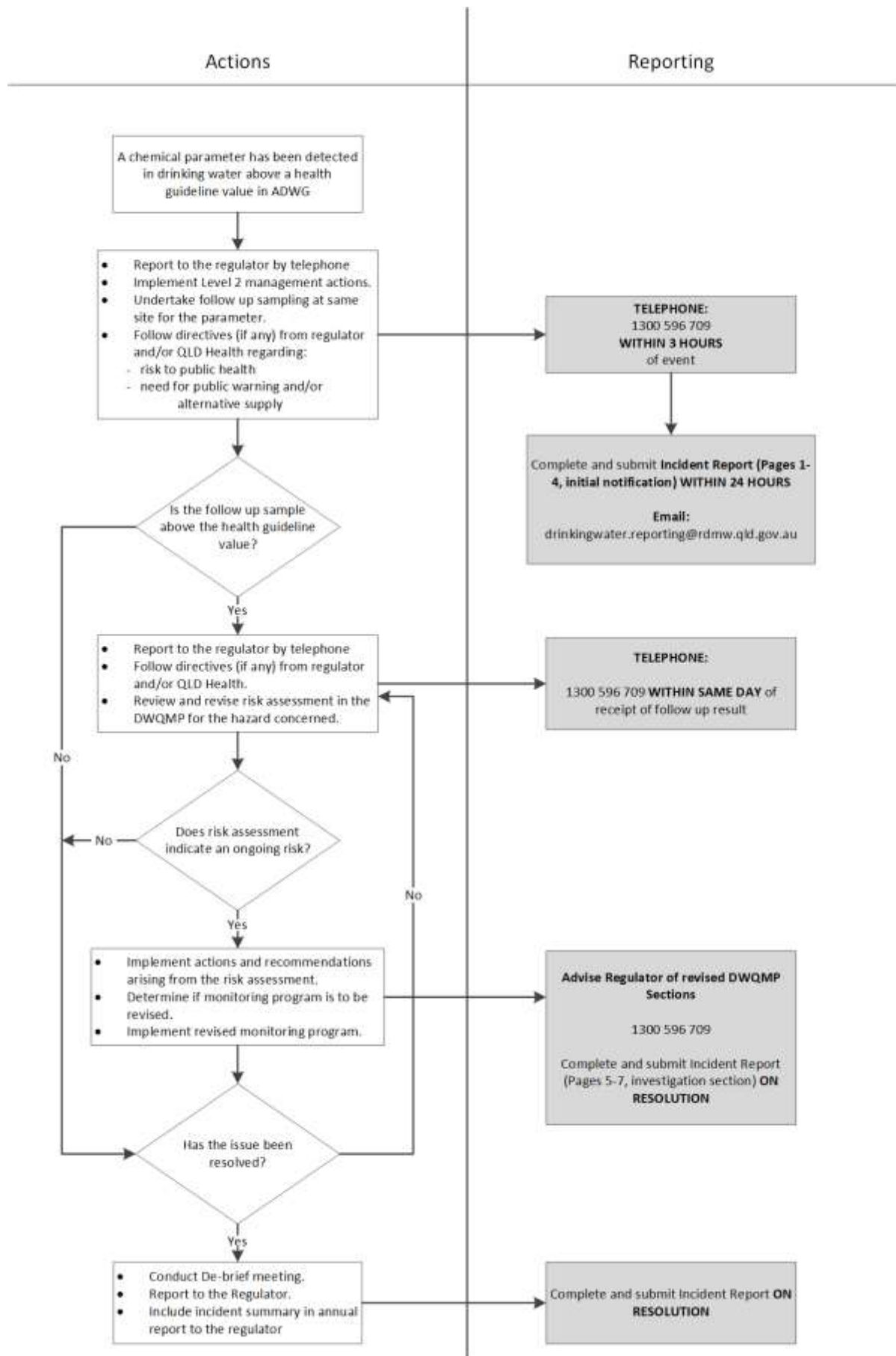


Figure 6 Actions and Reporting for Detection of Chemical Parameters above ADWG Health Values

**Disaster Event**

**WATER – How to report on your drinking water service during a disaster**

Once the disaster event has occurred, you must contact the Regulator as soon as possible and advise (by email at [DrinkingWater.Reporting@rdmw.qld.gov.au](mailto:DrinkingWater.Reporting@rdmw.qld.gov.au) or by phone on 1300 396 709) :

**Power -**

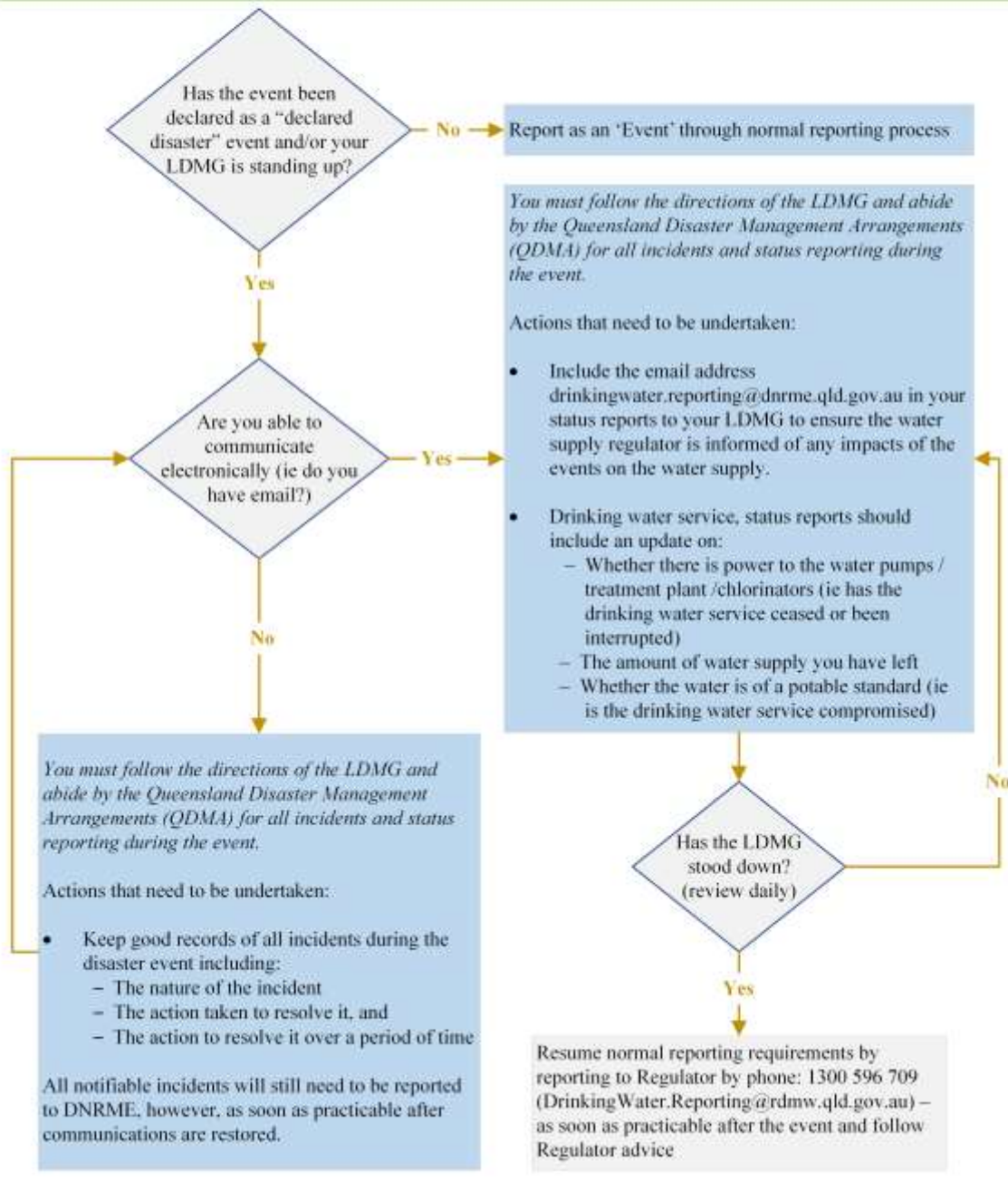
- Is there power to the water pumps / treatment plant / chlorinators (ie has the drinking water service ceased or been interrupted)?

**Water Supply –**

- How much water supply do you have left?

**Water Quality -**

- Is the water of a potable standard (ie. Is the drinking water service compromised)?



**Figure 7 Actions and Reporting during a Disaster**



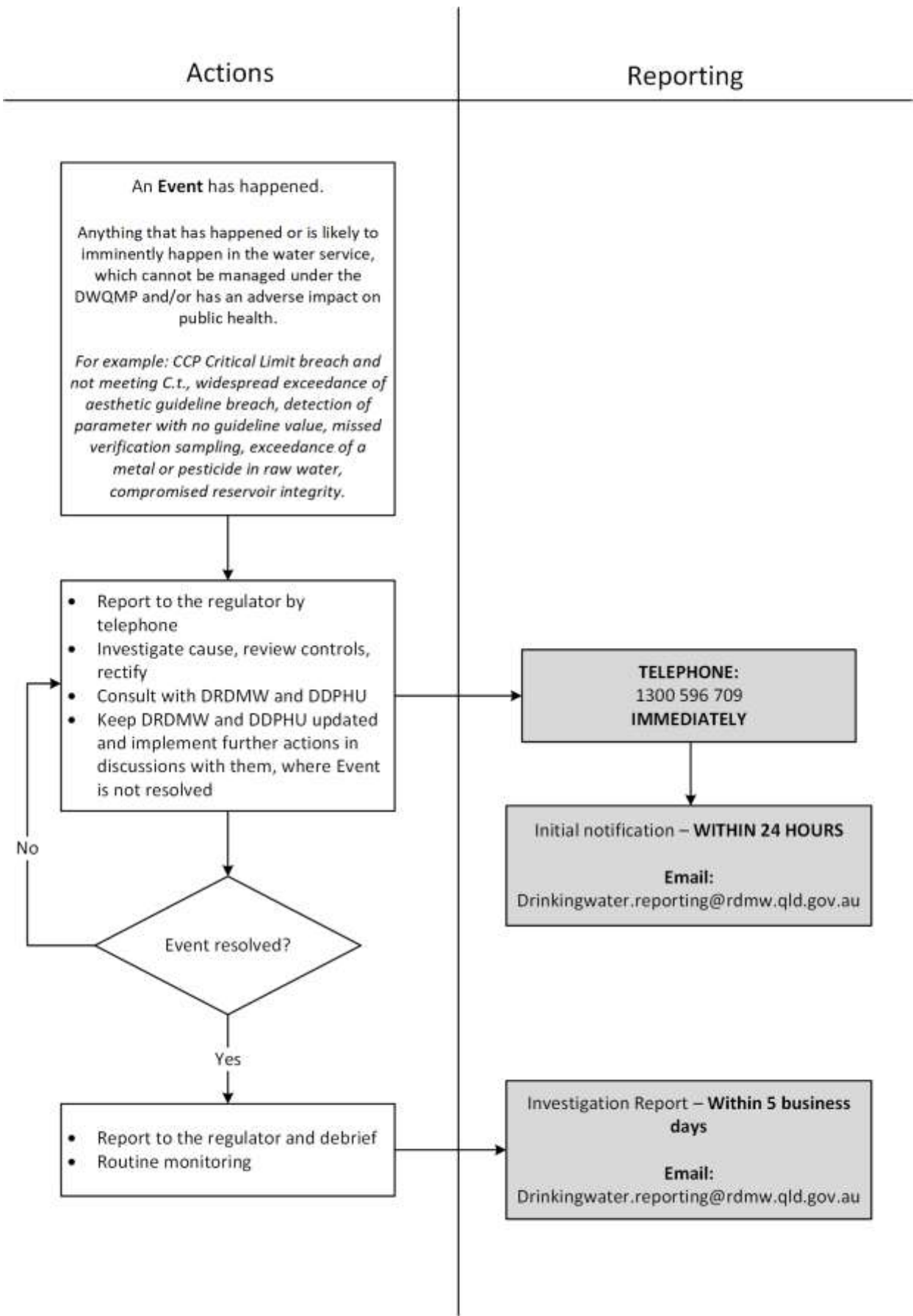


Figure 8 Actions and Reporting for an Event

## 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 13 Summary of Water Quality Management Information**

<b>Information/ Document</b>	<b>Format (hardcopy / electronic)</b>	<b>Where stored (at WTP / on electronic system / other)</b>	<b>Position Responsible / Business Unit</b>	<b>Comments</b>
Daily Operator Log	Electronic version Hardcopy used	Council Network Drive  WTP	WTP Operator	Electronic version is controlled. Hardcopy are replaced if version is changed.
Operational and Verification Monitoring Water Spreadsheet	Electronic spreadsheet PDF lab reports	Council Network Drive	WTP Operators and Water and Sewerage Manager	Entered by admin assistant into spreadsheet, supported by Water and Sewerage Manager as needed.  Reviewed by Water and Sewerage Manager, Operations Manager, as relevant.
DWQMP and related information (e.g. SOPs)	Electronic Hardcopy, if needed	Council Network Drive	Water and Sewerage Manager	Electronic version is controlled. Hardcopies are replaced if version is changed.
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.

The operational monitoring undertaken is outlined in the Table 14.

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), the integrity of reservoirs is maintained, and raw water is tested to adjust dosing or processes.

Operational monitoring limits are defined in Table 14. Where operational monitoring indicates that there is an issue, corrective actions are undertaken as per the CCP procedure and Table 14.

For raw water testing - turbidity is monitored and recorded daily at the WTP 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. The SWA parameters generally include: conductivity, pH, hardness, alkalinity, silica, TDS, colour, turbidity, fluoride, nitrate, sulfate, iron, manganese, zinc, aluminium, boron and copper.

Online monitoring is also undertaken at some locations, included in Table 14.

**Table 14 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.
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 (Event reporting). Refer to BGA SOP

Location	Parameter	Frequency	Action Trigger	Corrective Action
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 Water and Sewerage Manager.
Filtered Water	Turbidity	As per CCP	As per CCP	As per CCP 1
Final Water (CHER 5 outlet)	Chlorine	As per CCP	As per CCP	As per CCP 2
Filtered Water	pH	Daily – grab Continuous - online	<6.5 or >8.5	Retest, check soda ash and free chlorine level and adjust as required.
Filtered water	Chlorine	Continuous online	<1 mg/L	Increase chlorine dose, ensure CCP 2 is working well, rectify any issues
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 Water and Sewerage Manager. Manager to arrange repair of asset. Consider if increased <i>E. coli</i> monitoring is required. Refer to Event flowchart also (Figure 8).

### 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 total coliforms testing are undertaken weekly at the following 5 sample locations: CHER T (WTP after treatment on way to the community post reservoirs), CHER 1 (Wakka Wakka Park, sample point is across the road from STP), CHER 2 (Tap outside Operations Department Depot), CHER 3 (Gundoo Early Learning Centre – Tap outside yard, rear) and CHER 4 (Bert Button Lookout Reservoir).

Chlorine, turbidity and pH are also monitored daily in the final water and reticulation to initiate corrective actions, as mentioned in Table 15.

All water samples are collected by the WTP operators or when not available, the Water and Sewerage Manager. 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, the Manager Water and Sewerage will inform the Water Regulator and appropriate actions in accordance with Table 15 undertaken to rectify the situation.

**Table 15 Verification Monitoring**

Location	Parameter	Frequency	Action Trigger	Corrective Action
<b>Reticulation sites</b>	<i>E. coli</i>  Total coliforms	Weekly	Detected or >1 MPN/100mL  >200 MPN/100mL or widespread	<i>E. coli</i> – refer to Figure 5.  Total coliforms – check chlorine levels and increase as needed, determine need to flush the system, check for any ingress, rectify any issues found. Refer to Event flowchart also (Figure 8).
<b>Reticulation (CHER T, 1-4)</b>	Free Chlorine  Total chlorine  pH  Turbidity	Daily	<0.2mg/L  >5 mg/L  <6.5 and >8.5  >5 NTU	Retest, check dosing pumps or calibration of instrument, increase chlorine at WTP as needed, further action dependent on findings, tell Operations Manager.  If total chlorine is >5 mg/L, then report to Regulator as an incident and undertake corrective actions.  If pH and turbidity are out-of-spec, then investigate upstream processes, check for

Location	Parameter	Frequency	Action Trigger	Corrective Action
				ingress like pipe breaks and rectify. Refer to Event flowchart also (Figure 8).
<b>CHER 1</b>	THMs, SWA, heavy metals, BGA toxins (when required to be tested) and pesticides	Monthly	Standard water – as per ADWG Heavy metals – as per ADWG BGA toxins – as per the BGA SOP Pesticides – as per ADWG	Refer to Incident Response section of the DWQMP. Refer to Figure 6 also. Refer to the BGA SOP.

## Appendix A – CCP Procedures

### Cherbourg Supply System CCP – Disinfection

<b>What is being measured?</b>	Chlorine residual (mg/L)
<b>Where/how is it measured?</b>	Chlorine: Final water CHER 5 (combined reservoirs 1 and 2) / Grab sample (daily)
<b>What is the control point?</b>	Disinfection
<b>What are the hazards?</b>	Pathogens (chlorine sensitive)

<b>Target</b> <b>Free chlorine: 1.0 – 2.0 mg/L</b>	<b>Adjustment Limit</b> <b>Free chlorine: &lt; 1.0 mg/L or &gt; 2.5 mg/L</b>	<b>Critical Limit</b> <b>Free chlorine: &lt; 0.5 mg/L or &gt; 5.0 mg/L (total)</b>
<ul style="list-style-type: none"> <li>• Daily plant checks and duties</li> <li>• Daily treated water monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Re-test to verify result</li> <li>• 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).</li> <li>• Rectify the issue as relevant.</li> <li>• Increase chlorine dose, if chlorine is the issue</li> <li>• Check other dosing chemicals (e.g. ACH Ultrion 44697)</li> <li>• Inform Water and Sewerage Manager as soon as possible</li> <li>• Increase monitoring until system conforms</li> <li>• Maintain records as relevant.</li> </ul>	<ul style="list-style-type: none"> <li>• Inform Water and Sewerage Manager as soon as possible</li> <li>• Repeat corrective actions from alert level</li> <li>• Consider shutting down plant</li> <li>• Check chlorine residual in the reticulation</li> <li>• Increase monitoring until system conforms</li> <li>• Maintain records</li> <li>• Consider if the event should be notified to the Regulator (DRDMW). Refer to Figure 8 in the DWQMP.</li> <li>• Consider need to issue a boil water alert in consultation with the PHU/DRDMW.</li> </ul>



## Cherbourg Supply System CCP – Filtration

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

<b>Target</b> <b>&lt; 0.5 NTU</b>	<b>Adjustment Limit</b> <b>0.5 - 1.0 NTU for &gt;15 mins</b>	<b>Critical Limit</b> <b>&gt; 1.0 NTU for &gt; 15mins</b>
<ul style="list-style-type: none"> <li>• Daily plant checks and duties</li> <li>• Daily water monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Grab sample re-test to verify result</li> <li>• Check status of backwash, backwash if required</li> <li>• Check status of coagulation and flocculation processes, adjust using jar testing as required</li> <li>• Inform Water and Sewerage Manager as soon as possible</li> <li>• Water and Sewerage Manager to consider need to inform DRDMW/PHU</li> <li>• Increase monitoring until system conforms</li> <li>• Maintain records as relevant.</li> </ul>	<ul style="list-style-type: none"> <li>• Inform Water and Sewerage Manager as soon as possible</li> <li>• Repeat corrective actions from alert level</li> <li>• Consider shutting down plant, if not already shut down by SCADA</li> <li>• Check turbidity and chlorine residual in the reservoirs and reticulation</li> <li>• Increase monitoring until system conforms</li> <li>• Maintain records.</li> <li>• Consider if the event should be notified to the Regulator. Refer to Figure 8 in the DWQMP.</li> <li>• Consider need to issue a boil water alert in consultation with DRDMW/PHU.</li> </ul>

\* 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.

\*\*currently there is no sample tap just post the filters so the grab sample can only be tested at the online meter instrument point (sample line) post filtration. An improvement action to investigate installation of a tap has been included in the Improvement Plan.



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