

NAPRANUM ABORIGINAL SHIRE COUNCIL



WATER AND WASTEWATER BUSINESS CONTINUITY PLAN 2020

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1. INTRODUCTION

1.1 Executive Summary

Napranum Aboriginal Shire Council undertakes a number of critical functions within the community which includes the storage and treatment of water for drinking and the collection and treatment of waste water. An event which interrupted the Council's ability to perform either of these critical functions must be planned for and mitigated against. Councils Operational and Works departments are predominantly responsible for these services; however, each department of Council has interdependency on each other as well as dependencies on external agencies such as materials and service providers. As such, each department of council has a role in the development, review and discharge of the Water and Wastewater Business Continuity Plan (PBC).

1.2 Objective

The purpose of this plan is to ensure that Council is able to continue delivering treated water to the local community following a significant business interruption event. The plan aims to safeguard personnel, support operations, minimise damage to water treatment assets, and to restore services as quickly as possible.

Additional points to support the objectives of this plan are to:

- Undertake or review the existing Drinking Water Quality Management Plan (DWQMP) to identify the key risks and mitigating strategies for the continuation of supply of safe drinking water.
- Undertake or review the risk assessment for the conveyance, treatment and disposal of wastewater.
- Define and prioritise the critical business functions for the water and wastewater.
- Detail immediate response to critical water and wastewater incidents.
- Detail strategies and actions to be taken to enable the business to continue to function.
- Review and update this plan on a regular basis.

1.3 Scope

The plan has been developed to be as flexible as possible and is to be specifically applied to the water and wastewater sectors of the business.

1.4 Review

The Business Continuity Team (BCT) will review the Business Continuity Plan annually.

1.5 Authority

The decision to invoke the Business Continuity Plan is the responsibility of the Chief Executive Officer (CEO) or a delegated officer.

The CEO shall appoint an Executive Sponsor (ES) for the purpose of overseeing, implementing, reviewing and testing the BCP. The CEO may also direct the ES to activate the water and wastewater BCP.

1.6 Roles and Responsibilities

Role	Responsibilities
CEO – Janelle Menzies	<ul style="list-style-type: none"> • Decision to activate the BCP. • Co-ordinate the overall management of water and wastewater business interruption event to bring together all necessary people and resources to cover all aspects/ implications of an event. To be coordinated in conjunction with the ES. • Provide a focal point to ensure the public and media receive correct and non-contradictory information. • Ensure all employees and stakeholders are made aware of their responsibilities in relation to the water and wastewater BCP.
Operations Manager – Stephen Turner	<ul style="list-style-type: none"> • Activate the BCP under the direction of the CEO. • Manage yearly review and implementation of the BCP. • Co-ordinate regular testing of plans and report the results to Managers. • Provide advice to the BCT in the event of plan invocation. • Co-ordinate ongoing review and BCP training.
Finance Manager – Paul Martin	<ul style="list-style-type: none"> • Provide financial services management assistance such as insurance claims, WHS coordination, payroll duties etc.

<p>Corporate and Community Services Manager – Stephen Frost</p>	<ul style="list-style-type: none"> • Provide community updates via the communities' radio station and social media platforms. • Provide employee assistance such as medical assistance, counselling, etc. • Liaise with victims' families. • Provide recruitment support.
<p>Business Continuity Team Members – Janelle Menzies, Stephen Frost, Paul Martin, Julie Guest, Stephen Turner</p>	<ul style="list-style-type: none"> • Direct, coordinate and monitor all restoration, relocation and recovery operations for their business units. • Minimise any further losses and salvage recoverable resources. • Act as an arbitrator in the resolution of issues that may arise in the development, implementation or activation of the BCP. • Contact key personnel required for the restoration of services. • Determine the restoration strategy for the particular interruption scenario faced. • Monitor the progress of their respective departments. Confirm tasks are completed on time and to an acceptable standard. • As part of an ongoing risk reduction strategy, ensure that the business interruption reduction methods outlined in this plan are implemented. • Ensure that compliance measures are met throughout the business interruption event. Where compliance measures are unable to be met, issue appropriate notifications.

1.7 Distribution

This plan will be distributed to and used by the CEO and the Business Continuity Team. The plan will be stored electronically in Council's Electronic Document Records Management System (eDRMS), on Council's website and at the following locations:

- Administration Office

- Napranum Aboriginal Shire Council Works Depot

1.8 Glossary

<i>Business Continuity Planning</i>	<i>a process that helps develop a plan document to manage the risks to a business, ensuring that it can operate to the extent required in the event of a crisis/disaster.</i>
<i>Business Continuity Plan</i>	<i>a document containing all of the information required to ensure that your business is able to resume critical business activities should a crisis/disaster occur.</i>
<i>Business Impact Analysis</i>	<i>the process of gathering information to determine basic recovery requirements for your key business activities in the event of a crisis/disaster.</i>
<i>Key Business Activities</i>	<i>those activities essential to deliver outputs and achievement of business objectives.</i>
<i>Recovery Time Objective (RTO)</i>	<i>the time from which you declare a crisis/disaster to the time that the critical business functions must be fully operational in order to avoid serious financial loss.</i>

2. CONTINUITY PLAN REQUIREMENTS

2.1 Business Continuity Team

The Business Continuity Team, upon advice from the Chief Executive Officer, will assess the interruption to business services including damage to the building, assets, infrastructure, services and records. The team will work to control and coordinate recovery and will make recommendations to the Chief Executive Officer. The team will consist of officers from the following functions:

- **ADMINISTRATION**
- **FINANCE**
- **HUMAN RESOURCES**
- **WORKS AND SERVICES**
- **WORKSHOP**
- **UTILITIES**

2.2 Water and Wastewater Infrastructure

Napranum Aboriginal Shire Council have the following key water and wastewater infrastructure:

Water

- Water Treatment Plant (WTP)
- 2 x groundwater bores
- 1.2 ML water storage capacity
- Chlorine dosing system
 - Chlorine Gas Dosing
 - Additional Hypo Dosing

Wastewater

- No STP
- Primary and Secondary lagoons for treatment
- Marine outfall line
- 3 x Sewage Pump Stations

2.3 Operation and Maintenance Procedures

Standard operation and maintenance procedures are listed below for Napranum Aboriginal Shire Council Water Infrastructure:

- Water Testing Refer to DWQMP
- Chlorination Refer to DWQMP

2.4 Alternative Operations Centres

Should the Napranum Aboriginal Shire Council Administration Office or Napranum Works Depot be destroyed or long-term access to these sites be denied, operations will be set up at one of the designated alternative sites, at the direction of the Chief Executive Officer. Alternative sites could be:

- Napranum Community Hall

2.5 Operations Team

Napranum Aboriginal Shire Council operate with an internal water and wastewater team with some reliance on external resources for scheduled and unplanned maintenance. The operations teams are shared across the water and wastewater and are outlined below:

- Essential Services Supervisor
- Works Coordinator
- Manager Operations Division

2.6 Required Resources

Required resources will be identified by the Business Continuity Team according to the circumstances of each event. The required resources summarises both internal and external resources required to continue operations of the water and wastewater systems. The following requirements will be considered:

- External resources required to deliver critical services including routine and

- unplanned maintenance and delivery of consumables
- Communication requirements of each business unit
- Availability of regular or alternate suppliers
- Counselling services (if applicable)
- Transport assistance for staff (if applicable)
- Staff needs (support for families etc.)

2.7 Risk Management Planning

The risk management planning has been separated into water and wastewater. The risk management planning identifies and analyses the things that may have an adverse effect on the continuation to supply safe drinking water to the community as well as convey, treat and dispose of wastewater.

- Refer to the DWQMP

3. BUSINESS CONTINUITY PLAN

This Business Continuity Plan covers four (4) categories of business interruption events:

LOSS OF KEY PERSONNEL

This covers business interruptions that result in the loss of key personnel and includes, but is not limited to:

- Pandemic Epidemic
- Extended sickness
- Multiple key personnel suddenly resigning
- Death

LOSS OF FACILITY/ASSET

This covers business interruptions that result in the destruction of the facility, department or asset and includes, but is not limited to:

- Fire
- Cyclone
- Flood
- Impact by aircraft Bomb/explosion
- Godzilla
- Sabotage

LOSS OF INFORMATION

This covers business interruptions that result in the destruction of information (both hard copy and electronic).

Possible causes include:

- Water damage
- Computer virus
- Major IT failure
- Fire
- Mould/mildew
- Sabotage

LOSS OF ACCESS (FACILITY/ASSET/INFORMATION)

This category of business interruption is different from those outlined above. Facilities, assets and information are **not lost**, but become **unavailable** for an extended period of time.

Causes may include:

- Prolonged electricity failure
- Air-conditioning/site contamination
- Prolonged industrial action

3.1 Loss of Key Personnel

3.1.1 Business Interruption Reduction Methods

- Each section to ensure that key personnel are backed up by another officer who knows the appropriate key processes
- Each section to maintain a list of preferred suppliers
- Each section to maintain documented procedures for key processes and positions
- Identify employment agencies or service providers capable of providing skilled temporary staff at short notice

3.1.2 Emergency Response (Stabalise Environment)

- Advise employees of situation Review critical task requirements
- Review skills available to assign officers accordingly Prioritise services to be available, and advise public Keep Council informed
- Recover assets (keys, etc) – refer to each Key Register If necessary, seek outside expert advice
- In case of food poisoning, advise State Health Department Link employees with counselling services if appropriate

3.1.3 Recovery Procedures

- Review operational functions of key department personnel Identify work/tasks already planned
- Reallocate work/tasks
- Identify critical skills needed and request personnel from other departments
- Recruit outside expertise
- At the completion of temporary assignments, arrange full debriefing hand over.

3.1.4 Recovery Timetable

Recovery is deemed to be at a point when Council can provide a reasonable level of service before full recovery. It is expected that in the event of loss of key personnel, all Council services would either remain operational or be restored within one (1) day.

3.2 Loss of Facility/Assest

3.2.1 Business Interruption Reduction Methods

- Undertake a full review of insurance coverage every year.

- Maintain risk register

If Cyclone Threat

- Review Business Continuity Plan with Business Continuity Team Review LDMG capabilities
- Secure important records/data
- Check that alternative site is available
- Ensure that valuable records/data are placed in strong room and silicone the door if necessary
- Conduct building inspection
- Secure all loose items in and around the building
- Review staffing requirements for during the Cyclone event

If Flood Threat

- Review Business Continuity Plan with Business Continuity Team Review LDMG capabilities
- Check that alternative site is available
- Ensure that valuable records/data are placed in strong room and silicone the door if necessary
- Remove all items in and around the building that may be affected by flood water
- Relocate necessary items, records and data to alternative site

3.2.2 Emergency Response (Stabalise Environment)

- Evacuate building under Chief Warden's instructions
- Contact Business Continuity Team and meet as soon as possible Gain approval to re-enter the building from the Chief Warden
- Assess damage – BCT members to assess their area of responsibility. Inform insurance company of damage
- Salvage equipment/records. Check off all equipment against each Asset Register.
- Determine whether to relocate to alternative site – liaise with CEO. Advise staff and public of situation. Request that CEO make suitable announcements.
- Determine staff availability
- Prioritise service recovery
 - Health
 - Water and sewerage services
 - Records
 - Customer Service
 - Payroll
 - Accounts Receivable and Payable
- Assess the timeframe of the business interruption event and, if necessary, investigate more permanent alternative sites.

3.2.3 Recovery Procedures

- Assess the time needed to recover the building. If appropriate, arrange temporary repairs.
- If necessary relocate to alternative site.
- Compile estimate for emergency funding, and submit to Council.
- Request computer needs from IT and develop workable recovery solution with

Managed Services provider.

- Request Admin to purchase office supplies and stationery Check other services (water/electricity)
- Request temporary signs as necessary Request phone services
- Clean up and secure area
- Prioritise rebuilding and commencement of services Determine staffing requirements
- Advise employees of proposed actions and their role Establish computer and communications system recovery.

3.3 Loss of Information

3.3.1 Business Interruption Reduction Methods

- Ensure that all vital records are identified and protected.
- Ensure all vital documents are scanned into eDRMS².
- Ensure regular backup and verification of data is carried out daily and data is stored offsite.
- Ensure all external forms are on the Internet and internal forms are on the Intranet.
- Ensure all software and hardware upgrades allow for backwards compatible storage of data.

3.3.2 Emergency Response (Stabalise Environment)

- Contact Business Continuity Team and meet as soon as possible. Gain approval to enter office from Executive Sponsor (Chris).
- Take steps to minimise damage from water and electricity.
- Assess damage. BCT members to assess their area of responsibility. Salvage data/records. Don't assume that records are unsalvageable. In accordance with advice from Queensland State Archives if a significant volume of records/data are damaged, consult with a commercial salvage provider such as **Moisture Control Services** (Telephone 1800 800 675). This should be done immediately.
- Damaged public records to be identified and documented in preparation for recovery.
- Identity staff availability
- Prioritise data rebuild
- Request data/records from other sources
- Advise public of services to be made available. Request that CEO make suitable announcements.

3.3.3 Recovery Procedures

- If necessary, relocate to temporary site.
- Complete a formal application for notification for lost records³, or early disposal of damaged records⁴ to be submitted to the State Archivist for approval. (See Appendix 1 & 2 for hard copies of these forms)
- Compile estimate for emergency funding, and submit to Council Assess resources needed to assist in rebuilding data/records system Implement hard copy processes if necessary. Access necessary forms from the Internet and Intranet.

- Seek expert assistance in recovering records
- Recover and restore essential records/data where possible. Administration Coordinator to arrange destruction of unrecoverable records after approval from the CEO and/or State Archives.

3.4 Loss of Access (Facility/Asset/Information)

3.4.1 Business Interruption Reduction Methods

- Maintain and monitor building access to prevent unauthorised persons from gaining access to buildings.
- Maintain a policy of not allowing application of pesticides or other hazardous treatments during working hours.
- Review security access levels progressively throughout the year in line with this and other relevant plans⁵
- Review operational status of standby generators.
- Obtain temporary ventilation and lighting (electricity blackout).

3.4.2 Emergency Response (Stabalise Environment)

Loss or Interruption of Access to Facility:

- Contact Business Continuity Team and meet as soon as possible. Establish duration of lost access to facility
- Advise public of situation. (Request that CEO makes suitable announcements.)
- Ensure that communication is maintained throughout Council. Prioritise essential services.
- Determine staff availability.
- Arrange alternative site from which to operate. Secure building.

Loss or Interruption of Access to Department:

- Contact Business Continuity Team and meet ASAP. Establish duration of lost access to department.
- Determine staff availability.
- Arrange temporary office accommodation.

Loss or Interruption of Access to Information:

- Council's website is also available through Cloud technology. Establish duration of lost access to information.
- Contact Business Continuity Team and meet ASAP. Determine staff availability
- Arrange for data to be processed off location if possible. Revert to hard copy processes if necessary.
- Contact alternative sources of information/documents from which Council may be able to obtain copies.

3.4.3 Recovery Procedures

Loss or Interruption of Access to Facility

- Establish alternative site from which to operate
- Review security arrangements
- Determine staff availability

- If necessary revert to hard copy processes
- Advise public and other departments of ongoing changes
- Request that CEO make suitable announcements.

Loss or Interruption of Access to Department

- Establish temporary location within Shire Offices.

Loss or Interruption of Access to Information

- Staff critical functions as necessary. Revert to hard copy processes
- Request IT Manager to use back-up tapes to establish operations with alternative server.

4. ALTERNATIVE SITES FOR SHORT TERM RECOVERY

- Napranum Works Depot

5. RECOVERY TIMETABLE BY BUSINESS UNITS

Recovery is deemed to be at a point when we can provide a reasonable level of service before full recovery.

Business Unit	Operation	Minimum Staff Requirements	Maximum Acceptable Outage
Water & Sewerage	Water supply Sewerage services	2	12 hours
Information Technology	Provision and Support of Infrastructure	4	12 hours
	Provision and Support of Business Applications	2	12 hours
Customer Service	Admin & Depot Front Counter	1	12 hours
		1	12 hours
Finance	Single-user Operation Multi-user Operation	1	1-10 days
Human Resources/Payroll	Single-user Operation Multi-user Operation	1	1-10 days
Operations (Road & Drainage/ Parks & Gardens)	Assessment of road closures, Assessment of drainage issues, Assessments of trees down/wind damage/ damage to parks and equipment.	1	1 day
Health Services	Inspect licensed premises	1	7 days
Waste Management	Waste collection and removal	1	7 days
Animal Control	Animal management	1	28 days

6. TESTING

Testing of this plan is to be conducted annually at the direction of the ES. Testing may be conducted in any of the following ways:

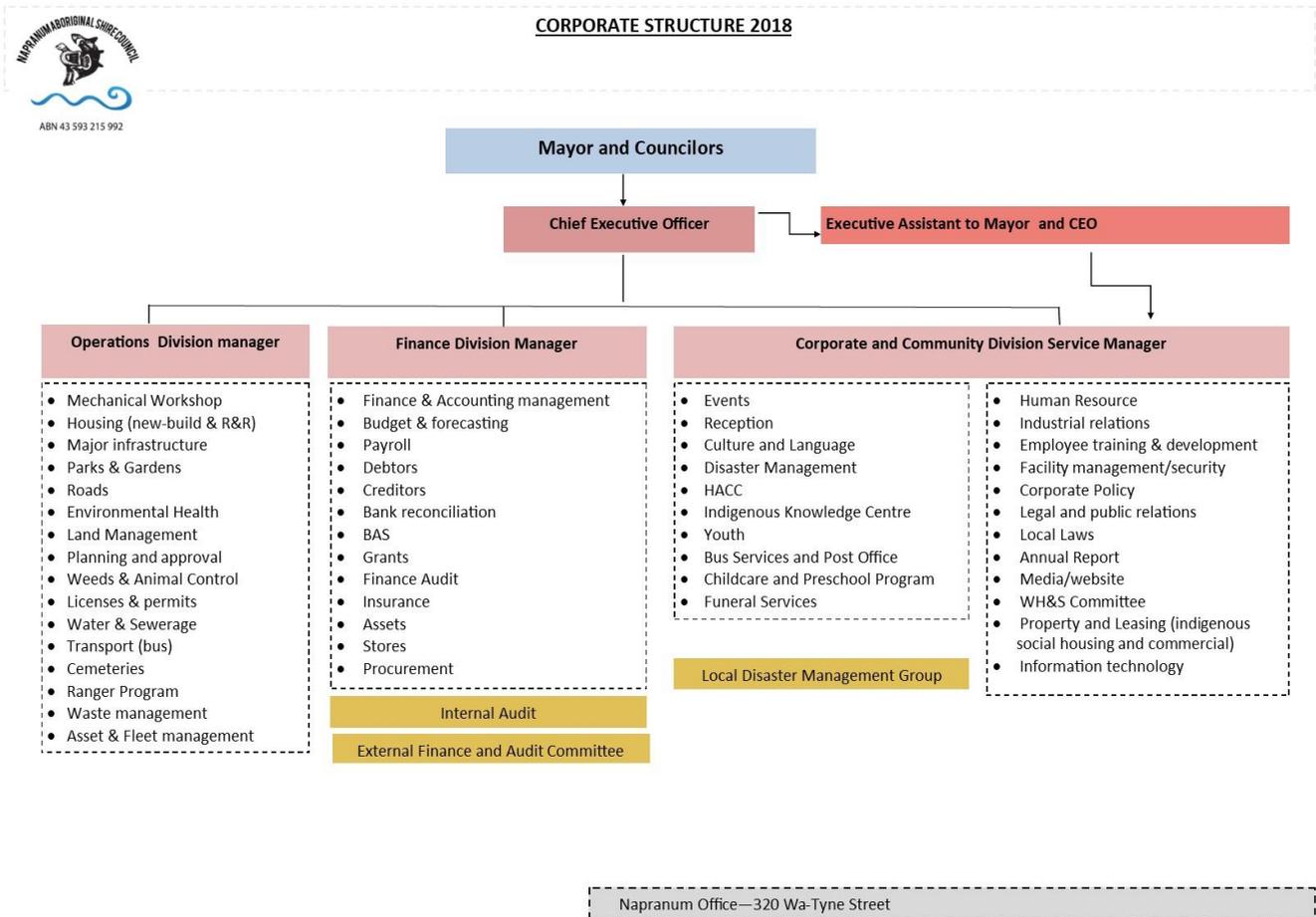
- Desk top testing (with members of the BCT)
- Component testing (involving members of some departments)
- Live simulation testing (involving all of Council).

7. APPENDICES

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APPENDIX 1

Napranum Aboriginal Shire Council Organisational Structure



APPENDIX 2

Risk Management Planning Water and Wastewater

Hazard	Hazardous Event	Maximum Consequence	Maximum Likelihood	Maximum Risk	Preventive Measures and control barriers	Monitoring	Residual Consequence	Residual Likelihood	Hazardous Event Risk	Level of Uncertainty	Risk Treatments or Improvements	Comments
Catchment and source infrastructure - Bores												
Bacteria / Virus (harmful)	Sewer leaking into aquifer	Major	Possible	High (12)	Breaks are fixed as soon as identified, disinfection Deep bore (19m) and protected bore head, no issues with flooding around the bores	E.coli monitoring at reticulation turbidity testing at bores	Major	Rare	Medium (5)	Confident	Develop program to replace aged sewer mains. Bore turbidity not monitored, however monthly testing will be undertaken.	No issues historically
Protozoa (Crypto and Giardia)	Sewer leaking into aquifer	Major	Possible	High (12)	Fix breaks as soon as identified Deep bore (19m) and protected bore head, no issues with flooding around the bores	E.coli monitoring at reticulation turbidity testing at bores	Major	Unlikely	Medium (8)	Reliable	Develop program to replace aged sewer mains. Bore turbidity monitored with monthly testing.	Disinfection is not a suitable barrier for protozoa
Chemical contaminants - Heavy Metals	Source Water Characteristic / Ingress into bores and aquifer	Moderate	Unlikely	Medium (6)	Deep bore (19m) and protected bore head, no issues with flooding around the bores	Annual standard chemical water analysis at verification	Moderate	Unlikely	Medium (6)	Estimate	Standard Water Analysis will be undertaken as part of review process.	Undertaken annually
Chemical contaminants - Herbicides/Pesticides	Ingress into bores and aquifer	Moderate	Unlikely	Medium (6)	Deep bore (19m) and protected bore head, no issues with flooding around the bores	-	Moderate	Unlikely	Medium (6)	Estimate		No agricultural activities in the area
Chemical contaminants - Emerging Contaminants	Ingress into bores and aquifer	Moderate	Unlikely	Medium (6)	Deep bore (19m) and protected bore head, no issues with flooding around the bores	-	Moderate	Unlikely	Medium (6)	Estimate		PFAS/PFOS undertaken last year, but no issues with Napranum supply
Physical - Turbidity (Aesthetic)	Source Water Characteristic / Ingress into bores and aquifer	Minor	Possible	Medium (6)	Deep bore (19m) and protected bore head, no issues with flooding around the bores	Monthly turbidity testing at bores	Minor	Possible	Medium (6)	Reliable	Turbidity unertaken monthly and increased to weekly during the wet season	
Physical - Turbidity (Disinfection)	Source Water Characteristic / Ingress into bores and aquifer	Major	Possible	High (12)	Deep bore (19m) and protected bore head Good chlorine contact time is maintained through implementation of disinfection CCP	Monthly turbidity testing at bores	Major	Unlikely	Medium (8)	Reliable	Council are currently in the process of procuring a turbidity monitor. Council will likely do weekly monitoring during wet season.	
Physical - Natural Geology low pH	Source Water Characteristic	Moderate	Likely	High (12)	Lime addition and aeration	pH monitored at Ground Reservoir	Moderate	Unlikely	Medium (6)	Estimate	Council to investigate the condition of the ground level tank. Council to commence weekly pH tests and turbidity at outlet of reservoir	
Infrastructure	Bore integrity	Major	Unlikely	Medium (8)	Deep bore (19m) and protected bore head, no issues with flooding around the bores	Visual checks by operators	Major	Rare	Medium (5)	Reliable	Council to investigate elevating the collar, a reseal and a CCTV camera for monitoring the casings.	Collars sealed. Waiting on CCTV inspection
Treatment Process - Aeration												
pH	Aeration not operational (resulting in low pH - corrosive to assets)	Moderate	Possible	Medium (9)	Aerator is cleaned every 3 months, and equipment is maintained in good condition	Visual inspection at plant pH monitored at Ground Reservoir	Moderate	Unlikely	Medium (6)	Reliable		
Treatment Process - pH correction												
pH	Underdosing of lime (corrosive to assets)	Moderate	Possible	Medium (9)	Three pallets of lime is ordered at a time, lasting three months. Equipment maintenance is undertaken on a three monthly basis.	pH monitored at Ground Reservoir	Moderate	Unlikely	Medium (6)	Reliable	Council to investigate developing pH monitoring targets for ground water reservoir (Viridis to assist) SOPs should be developed for raw water mixing (12-18 months)	Lime bed is replenished on an as needs basis
	overdosing of lime (impact on disinfection)	Major	Unlikely	Medium (8)	Three monthly equipment maintenance, and back up parts are kept on hand	pH monitored at Ground Reservoir	Major	Rare	Medium (5)	Estimate		Historically no incidences
Treatment Process - Chlorination												
Chlorine	Overdose	Moderate	Possible	Medium (9)	SCADA alarms, visual inspections and three monthly equipment maintenance	Mon to Friday testing at WTP. Target 0.5 mg/L at end of reticulation. Free chlorine tested 7 days a week, at 5 reticulation sites.	Moderate	Rare	Low (3)	Confident	Ask SCADA contractor to program minimum chlorine 0.7 mg/L for Alarm	Maintenance contract with SCADA contractor from Cairns, 5 years contract
	Underdose (bacteria, virus)	Major	Possible	High (12)	Two bottles of chlorine gas, automatic switch, on scales	Mon to Friday testing at WTP. Target 0.5 mg/L at end of reticulation. Free chlorine tested 7 days a week, at 5 reticulation sites.	Major	Unlikely	Medium (8)	Reliable		Historically no issues
	Chemical quality (storage)	Moderate	Likely	High (12)	Sodium hypochlorite stored out of the sun, undercover.	Visual checks by operators	Moderate	Possible	Medium (9)	Reliable		Storage issue rectified after audit.

Hazard	Hazardous Event	Maximum Consequence	Maximum Likelihood	Maximum Risk	Preventive Measures and control barriers	Monitoring	Residual Consequence	Residual Likelihood	Hazardous Event Risk	Level of Uncertainty	Risk Treatments or Improvements	Comments
Reservoir - Ground water reservoir												
Bacteria or Viruses	Vermin entry	Major	Unlikely	Medium (8)	Daily walkby inspection 3 monthly internal inspection Compound is surrounded by a security fence Roofed, raised hatch and locked, vermin proofing Stair case up reservoir also locked	Daily walkby inspection 3 monthly internal inspection	Major	Rare	Medium (5)	Reliable		
Opportunistic pathogens	Stagnation	Major	Possible	High (12)	Top fill and bottom out reservoir. Due to high usage, water not stagnant in reservoir.	Free chlorine tested 7 days a week, at 5 reticulation sites.	Major	Rare	Medium (5)	Reliable		
Reticulation												
Opportunistic pathogens	Dead end storages, long detention	Major	Possible	High (12)	Reticulation chlorine maintained at a good level (no issues)	Free chlorine tested 7 days a week, at 5 reticulation sites.	Major	Unlikely	Medium (8)	Reliable		Aged Care Centre and hospital amongst customers in community Council will record free chlorine daily on spreadsheet along with other testing (pH, turbidity), which will then be saved on the share drive.
Bacteria (harmful)	Pipe breaks / mains breaks (age, pressure)	Major	Possible	High (12)	Repair as soon as identified. Informal procedure followed.	Free chlorine tested 7 days a week, at 5 reticulation sites.	Major	Unlikely	Medium (8)	Reliable	Develop pipe repair SOP which includes chlorine testing	Pipe breaks are fixed by local plumbers, when a break is identified, public is alerted, then raised and fixed. Pressure reduction program completed in 2019 has reduced breakages. Chlorine testing after repair is undertaken, no records kept.
	Low or negative pressure / backflows	Major	Possible	High (12)	System is always pressurised, backflow device fitted at hospital.	-	Major	Rare	Medium (5)	Reliable	Backflow prevention valve should be considered for community farm	Hospital has backflow prevention. No rural properties and no industry. No residential backflow prevention. Community farm (not currently running) could be a source.
	Dead end storages, long detention	Major	Possible	High (12)	2 dead ends, lower end is a testing location. Disinfection and Monthly flushing undertaken.	Free chlorine tested 7 days a week, at 5 reticulation sites.	Major	Rare	Medium (5)	Confident		Two dead ends identified. Monthly flushing undertaken. Ring main proposed in current upgrade.
Disinfection by products	Organic matter in incoming water, disinfection dose	Moderate	Unlikely	Medium (6)	Deep bore (19m) and protected bore head, no issues with flooding around the bores	-	Moderate	Rare	Low (3)	Estimate		Groundwater source, shouldn't be an issue
Whole of Service												
ADWG parameters	Staff Turnover / Insufficient Training leading to unsafe water	Major	Possible	High (12)	DWQMP Processes in place but not documented Staff knowledge	-	Major	Unlikely	Medium (8)	Confident	Council staff currently training new ESO and plumbers getting Certificate III in water operations Key SOPs need to be recorded formally	Advertising for plumber to undertake some of the WTP and sewerage operations as a fatigue management initiative.
	Water quality data storage and summary lost	Major	Possible	High (12)	Data is now recorded in a spreadsheet and saved in a shared drive. Data received from laboratory is also saved in this drive.	-	Major	Unlikely	Medium (8)	Confident	Data store in shared drive and external drive	Data is important evidence to demonstrate compliance with DWQMP Data has recently been lost (early 2018), however electronic spreadsheets are now used
	Vandalism	Major	Rare	Medium (5)	Fenced and secure bores Visual checks by operators regularly	Visual checks by operators	Major	Rare	Medium (5)	Confident	The depot has 24 hour surveillance and various buildings are alarmed.	
No water	Electrical failure	Major	Likely	High (16)	Portable generators used to run entire system. Any failures likely to be short term.	Visual WTP checks by operators	Major	Rare	Medium (5)	Reliable	Blackouts are an issue, onsite generators. Hospital, office, supermarket, water treatment plant and sewerage pump stations are all auto start systems.	
	Pump failure	Major	Possible	High (12)	Regular equipment maintenance	Visual WTP checks by operators	Major	Unlikely	Medium (8)	Confident	Council has spare pumps for each installation	
	Intake line failure	Major	Unlikely	Medium (8)	Reactive maintenance	Visual WTP checks by operators	Major	Unlikely	Medium (8)	Reliable		
	Pipe breaks / mains breaks (age, pressure)	Moderate	Possible	Medium (9)	Reactive maintenance	-	Minor	Unlikely	Low (4)	Reliable	Pressure reduction program in 2019 has reduced breakages.	Sop will be developed
	No water in reservoirs	Major	Rare	Medium (5)	Maintenance schedule Reservoir level checks (in SCADA attached to reservoir) Low population	Visual checks by operators	Major	Rare	Medium (5)	Confident	Pressure reduction has reduced this issue	
	Aquifer Depletion	Major	Unlikely	Medium (8)	Bores 1 and 2 can provide enough water alone. Past incident without water was due to staffing and maintenance issues, not actually bore related.	Visual checks by operators	Major	Rare	Medium (5)	Reliable	Aquifer levels monitored regularly	Historically no issues
Cybersecurity	Cyber attack	Major	Rare	Medium (5)	SCADA is not connected to Councils other network or the internet. Security around the premises includes security cameras.	Plant room is alarmed and the pump room is alarmed. SCADA room alarmed and monitored 24/7 with security cameras around the whole of the depot.	Minor	Rare	Low (2)	Estimate	SCADA is not connected to Councils intranet or the internet.	This is a new hazardous event the regulator requires all service providers to review. If required develop a cybersecurity plan. Council has no documented cybersecurity plans as yet.

APPENDIX 3

Risk Assessment Methodology

RISK ASSESSMENT METHODOLOGY

Level	Consequence	ADWG Description
A	Almost certain	Occurs more often than weekly (52/yr)
B	Likely	Occurs more often than monthly (12/yr) and up to weekly (52/yr)
C	Possible	Occurs more often than annually and up to monthly (12/yr)
D	Unlikely	Occurs more often than once per 5 years and up to annually
E	Rare	Occurs less than or equal to once/5 years

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 exceedence of chronic health parameter
1	Insignificant	Isolated exceedence of aesthetic parameter with little or no disruption to normal operation

	Likelihood	Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
	Almost certain	Medium (5)	High (10)	High (15)	Extreme (20)	Extreme (25)
	Likely	Medium (4)	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 (4)	Medium (5)

	Uncertainty	Description
	Certain	There is 5 years of continuous monitoring data, that 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, that has been collated and assessed, with at least weekly monitoring for the duration of seasonal events; or there is a good understanding of the
	Reliable	There is a minimum of one year of continuous monitoring data available, that 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.
	Uncertainty	There is limited or no monitoring data available; or the processes are not well understood

APPENDIX 4

Napranum Aboriginal Shire Council Emergency Contact List

Name	Position	Organisation	Telephone (Business Hours)	Facsimile (Business Hours)	Telephone (After Hours)	Facsimile (After Hours)	Mobile	Sat Phone	Email
Janelle Menzies	CEO	Napranum Aboriginal Shire Council	4090 5603	4069 9490			0427 390 110		ceo@napranum.qld.gov.au
Stephen Turner	Operations Manager	Napranum Aboriginal Shire Council	4090 5601	4069 9490			0427 666 801		Stephen.turner@napranum.qld.gov.au
Paul Martin	Finance Manager	Napranum Aboriginal Shire Council	4090 5600	4069 9490			0428 198 654		Paul.martin@napranum.qld.gov.au
Stephen Frost	Corporate and Community Services Manager	Napranum Aboriginal Shire Council	4090 5605	4069 9490			0428 965 458		Stephen.frost@napranum.qld.gov.au
		Hospital	4082 3900						
		Police	4090 6000						lesic.antoni@police.qld.gov.au
		QFES					0409 3891 360		Murray.Hayton@qfes.qld.gov.au
		QLD Health Napranum Clinic	4082 3500						TRACY.SEKAC@health.qld.gov.au
		Contractor D							

APPENDIX 5

Drinking Water Quality Management Plan

Napranum Aboriginal Shire Council

Drinking Water Quality Management Plan

March 2020



Napranum Aboriginal Shire Council

412 Moun-Ding Street
Napranum QLD 4874

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Document History and Status

Revision	Date	Approved by	Initials	Details
1	-	-	-	For review
2	-	-	-	For review incorporating reviewers comments
3	-	-	-	Incorporating preliminary comments from OWSR
4	-	-	-	Board approval for submission to OWSR
5	06/09/18	Stephen Turner	S.T	DWQMP updated as a fresh re-write following review undertaken in July 2018, facilitated by Viridis Consultants.
6	2/03/20	Stephen Turner	S.T.	Review facilitated by Viridis Consultants. Draft for NASC approval.

Document Owner	Manager Operations Division
Name of document	Drinking Water Quality Management Plan
Document version	6

1. Registered Service Details

Criteria

The Plan must contain information on the registered service, including the:

- service provider identification number (SPID)
- service provider name and contact details – if the service provider is not the operator, then the operator’s name and contact details must also be provided
- name of each scheme to which the Plan applies
- name of the communities that are supplied including the current and future (next 10 years) populations, connections and demands.

The registered service details are included in Table 1.

Table 1 Registered Service Details

Service description	Details
Service Provider Identification Number (SPID)	144
Council Name and Contact Details	<p>Napranum Aboriginal Shire Council PO Box 538 Weipa QLD 4784</p> <p>ABN: 15 093 924 706</p> <p>Phone: 07 4069 7855 Fax: 07 4069 7445 E-Mail: essentialservices@napranum.qld.gov.au</p> <p>Website: www.napranum.qld.gov.au/</p>
Drinking Water Scheme operated	Napranum
Communities serviced	Napranum
Current population*	957
Current connections	255
Current demand ML/day	2.6
Projected population (2026)**	1062
Future connections (2028)***	300
Future demand (2028) ML/day	3.6
Projected population (2031)**	1087

* Population estimates based off the 2016 Census results

** Projected population (medium series), by local government area, Queensland Government, 2016 to 2041

***Based on 2016 Census population growth projections of an average annual growth rate of 14.3%, published by The Australian Bureau of Statistics, *Estimated Resident Population, Local Government Areas, Queensland*, 28 July 2017, Canberra.

2. Introduction

This Drinking Water Quality Management Plan (DWQMP) documents Napranum Aboriginal Shire Council’s (NASC) risk assessment and risk management process and provides a basis on which to maintain (and improve) the safety of the Napranum water supply scheme. The plan describes the current practice and is a ‘living’ document.

The DWQMP has been developed to meet the requirements of the *Water Supply (Safety and Reliability) Act 2008* (the Act). The structure and content of this plan was based

on the *Guidance Notes and Template for Drinking Water Service Providers Draft* (DERM 2011) and the 2010 version of the *Queensland Drinking Water Quality Management Plan Guideline* (the Guideline). This version of the plan has been updated following the November 2018 version of the Guideline.

This plan contains or references the relevant documentation which underpins the drinking water quality management for the Napranum water supply scheme. The following documents make up the DWQMP:

- Main DWQMP Document (this document)
- Risk Register and Risk Management Improvement Plan (RMIP) (Excel Spreadsheet)
- Standard Operating Procedures (SOPs) (separate documents)

2.1. Napranum Aboriginal Council

The NASC area is approximately 1,995 km², located north-east and north-west of Weipa, on the Cape York Peninsula. The Napranum township is approximately 15km south-east of Weipa and 760 km north-west of Cairns, see Figure 1.

2.2. Scope

This DWQMP applies to the drinking water service provided by NASC which includes all aspects of their potable water service from catchment to tap. It does not include the sewerage treatment system; nor does it include any non-potable water supply schemes that may be present in Napranum Shire.

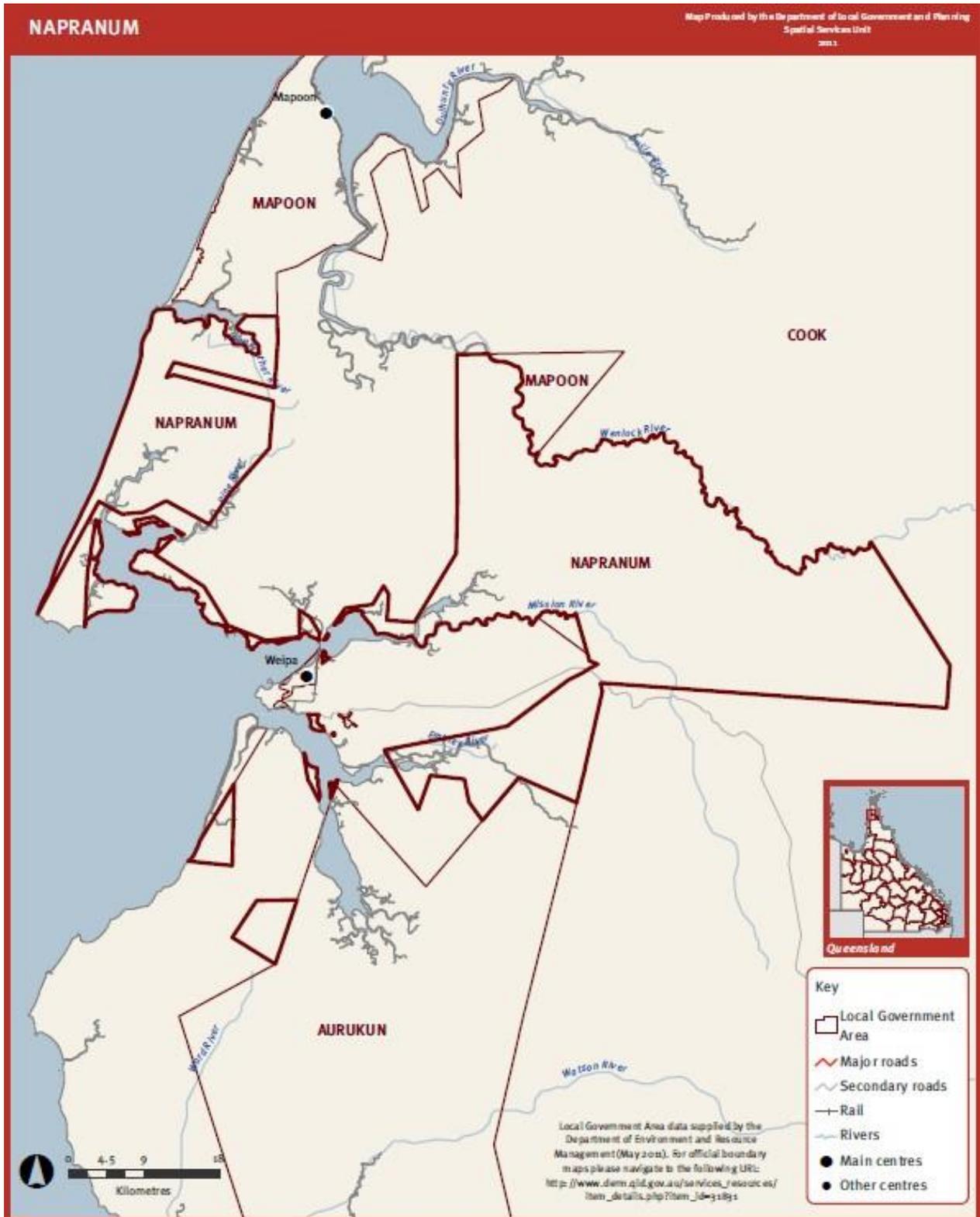


Figure 1 NASC Boundary

3. 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 for each scheme must be included in the plan and must-
 - be a representative of the scheme as at the date of the submission of the plan
 - include all components of the scheme from catchment to consumer (even when a bulk supplier exists upstream of the distributor)
 - show the linkages between the major infrastructure elements including sources, treatment plants, reservoirs, pump stations and re-chlorination facilities
 - include the locations of changes in infrastructure ownership and operational responsibility.
- Source details for each scheme must be provided in the plan. These details must contain information on the:
 - Water source(s) including
 - name
 - characteristics
 - performance
 - Source infrastructure
- Treatment process details for each drinking water source must be provided in the plan. These details must contain information on:
 - the process steps
 - the relationship between each step design capacity
 - operation
 - current loading
 - availability of stand-by equipment
 - proportion of flow from each source
 - proportion of scheme supply distribution area
 - a list of chemicals (if added).
- A description of any variations to process operation (for example, bypassing a process step) must be included in the plan.
- A schematic(s) representing the treatment process(es) must be included in the plan.
- Any sources that do not undergo a treatment process must be identified and an explanation as to why no treatment process exists must be included in the plan.
- Disinfection process(es) for each drinking water source must be provided in the plan. These details must include:
 - location
 - type
 - operation.

Any sources that do not undergo a disinfection process must be identified and an explanation as to why no disinfection process exists must be included in the plan.

- Details of the distribution and reticulation system must be included in the plan. These must include the:
 - Extent
 - Characteristics
 - Operation
- Key stakeholders, who have been actively involved in the management of drinking water quality, and their relevance, must be identified for each scheme and detailed plan.

3.1. 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.

The NASC Local Government area is situated in a coastal area of the western Cape York in far north Queensland approximately 5 km south of Weipa.

Water is sourced from a shallow aquifer in the Embley River catchment that drains through bauxite. The aquifer details are not well known. However, it is accepted that the aquifer has rapid connectivity to the surface, and there is a potential for surface contamination. Bore water levels have been observed to increase within 2 days of heavy rainfall. However, water quality has not been observed to change (though no water quality data exists to back up this observation). The bores currently extract water from 18 m depth, and water levels range from 5 m under the surface (wet season) down to 13 m (2013 prior to the commence of the wet – a very dry season). The bores consistently produce water at the flow rates identified and are considered to be very reliable. See Figure 1 for NASC location details.

Table 2 Catchment Characteristics

Characteristics	Details
Area	Unknown (aquifer)
Topography	Mostly flat and swampy surrounding Napranum - hills rise to the east of the catchment
Soil type	Bauxite
Annual rainfall	2000 mm predominantly in Nov – March (wet season)
Incidence of flooding and bushfires	Does not affect water quality in the bores
Land use	Residential and mining.
Agriculture, industry, mining	Bauxite mining
Potential sources of microbial and chemical contamination in the catchment	Sewerage infiltration possible following a major rainfall event after dry.

3.2. Source

The bulk water supply for Napranum is primarily drawn from two bores (M1 and M2) installed in the late 1960s and located within the water yard. A third bore (M3), located between the rangers shed and the tennis courts, was drilled in 1998 to supplement the community’s water supply. This bore is now unused and disconnected. Table 3 contains the details of the current bores.

Table 3 Current bore details

	Bore 1 (M1)	Bore 2 (M2)
Location	Water Yard NRW bore no. M1	Water Yard NRW bore no. M2
Operation	Bore pumps used to deliver water to treatment area. Two bores are operated on an alternate basis, usually with one supplying and the other on duty standby. If one bore cannot keep up with demand, the other bore will come online.	
Aquifer type	Unconfined	Unconfined
Yield	1.5 ML/day	0.95 ML/day
% of supply	50%	50%
Reliability	Excellent, no issues in the past	Excellent, no issues in the past
Pump type	Grundfos 60.4	
Capacity	17 L/s	11 L/s
Bore depth (m)	19 m	19 m
Bore head details	Elevated, no ingress, capped	Elevated, no ingress, capped
Diameter, casing and material	PVC	PVC
Water quality issues	Low pH (4.8 to 6)	Low pH (4.8 to 6)

3.3. Supply Infrastructure

The Napranum water supply scheme currently consists of two bores, a water treatment plant, one reservoir and the reticulation, along with appropriate dosing, pumps and monitoring. Council is currently undertaking upgrades of the reticulation. See Figure 2 for a supply system overview process flow diagram.

3.3.1. Treatment and Reservoirs

Low pH water from both bores (either separately or together) is pumped through a single pipe to an aerator / lime pH adjustment plant. Water enters the top, and flows down through 9 plates that allow aeration, before passing through a lime bed. The resulting pH is too high and needs to be blended with raw water to achieve a pH of 6.4 to 7.2. The mixing ratio is set manually daily. This currently causes issues as each bore has a separate pH, and the required ratio changes each time the source selection changes (automatic, based on usage).

Following pH adjustment, water is dosed with chlorine gas for disinfection. Sodium hypochlorite solution is also available as a backup disinfection supply, in instances where the chlorine gas dosing is not operational. pH adjustment is detailed in Table 4 below.

Table 4 pH Adjustment details

Location	Immediately after the supply bores, prior to entering the ground level reservoir. Feed from both bores combine before treatment.
pH adjustment plant	Aeration and lime dosing are undertaken to raise pH. Water enters the top, and flows down through 9 plates that allow aeration, before passing through a lime bed. The resulting pH is too high and requires blending with raw water to achieve a pH of 6.4 to 7.2. The mixing ratio is set manually on a daily basis to achieve the desired result. By-pass for aeration possible, but not used.
pH adjustment chemicals	Lime
pH adjustment design capacity	Pumps 60 L/s
Chemicals added, storage and turnover	Three pallets of lime (3 month supply)
Inspection schedule	Routine visual check, three monthly maintenance
Bypass / variation	Yes can by-pass. Not used.

Disinfection pumps (one linked to each bore) are operated automatically when the associated bore is switched on. Disinfected water flows into the ground level tank. C.t calculations for Napranum were undertaken, which indicate that at a free chlorine of at least 0.7 mg/L at the reservoir will provide sufficient chlorine contact time, to ensure primary kill is achieved.

Treatment details are in Table 5.

Table 5 Treatment details

Location	At water treatment plant (chlorine shed) prior to reservoirs
Disinfection Type	The disinfection system was upgraded to chlorine gas in 2014. Injection on outlet side of pH correction, prior to ground level tank
Chlorine dose rate	Fixed – pumps start and stop when bore pumps operate
Free chlorine target residual level	At least 0.7 mg/L leaving the reservoir. Aim is for a residual of 0.5 mg/L free chlorine at the end of the reticulation network at 5 monitoring sites around town.
Duty / standby	Two pumps, one per bore, currently no redundancy (part of improvement plan)
Dosing arrangement	Fixed – pumps start and stop when bores operate
Alarms	SCADA system is alarmed and sends notifications
Chemicals added, storage and turnover	Chlorine gas is stored in cylinders, stored on scales and connected to SCADA. Spare cylinders are currently kept in store which is covered, however a dedicated storage facility will be constructed in the water yard.
Inspection schedule	Daily visual operational monitoring, visual inspection of equipment and SCADA alarms

Both bores combine to supply water to the reservoir simultaneously. The ground level reservoir feeds into a common main which feeds the reticulation, via the 5 variable speed pumps.

Table 6 details the ground level reservoir.

There is an elevated reservoir which was used in the past, however this is disconnected and unused.

Table 6 Reservoir details

Capacity	1 ML
Location	At the Water Compound/Depot Shed, Construction date unknown
Type	19.1 m diameter, abetong concrete ground level. Epoxy coated inside.
Roofed	Yes
Vermin-proof	Yes
Runoff from roof	Directed away, opening on top has raised lip which is securely covered.
Cleaning schedule	Yearly
Filling	Bore pumps are triggered by a float valve. Usually kept close to full. E.g. when reservoir is 4/5 capacity, bores commence pumping.

Figure 2 below details the NASC supply scheme

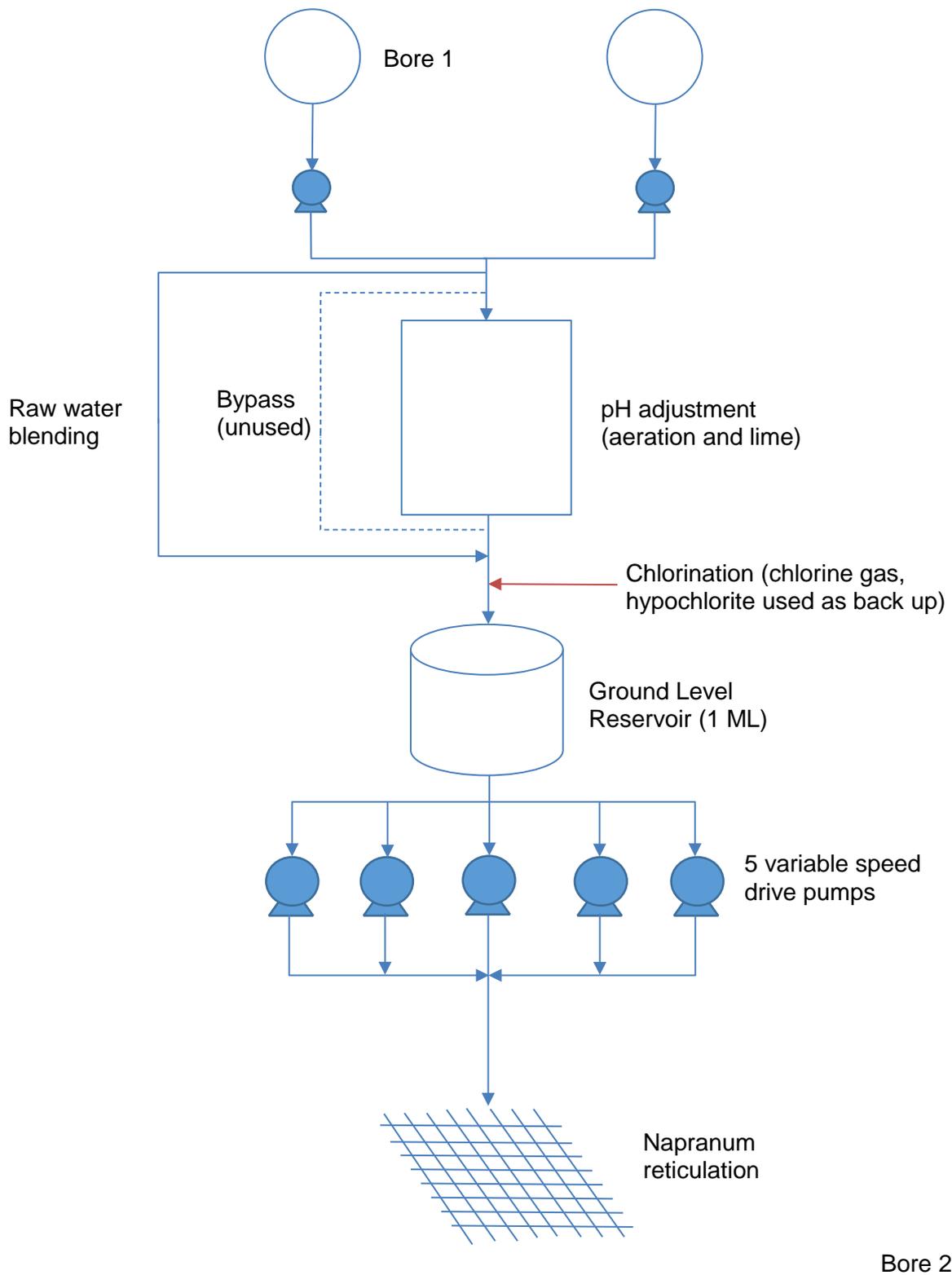


Figure 2 NASC Water Supply Overview



Figure 3 NASC Water Supply Layout

3.4. Distribution of reticulation

Five pumps supply the Napranum community reticulation network from the ground level reservoir. Details are in Table 7. A network pressure reduction program was completed in 2019 to reduce system losses.

Table 7 Reticulation network details

Pipe material(s)	Reticulation is thought to have been mostly replaced with uPVC, however, the replacement has been ad hoc, so there may be old sections remaining (cast iron mains).
Age range	Uncertain – 1960s onwards
Length of mains	8.5 km
Issues with long detection and dead ends	2 dead ends – Tavern (low point), Twal St (high point)
High pressure issues	Network pressure reduction program has reduced leakages. Operated at 240 kPa (pressure reducing valves in several locations)
Low pressure issues	No
Number of pump stations	Five pumps (variable speed drive)
Flushing	Monthly (or based on chlorine residual at Tavern / incident response)

3.5. Key stakeholders

Table 8 details the key stakeholders of the Napranum supply scheme.

Table 8 NASC Key Stakeholders

Organisation	Contact details	Relevance to the management of drinking water quality	How the stakeholder is engaged in the DWQMP
Napranum community	-	Consumers or customers	Informed of water quality issues
Coogee chemicals	T: 07 3907 0400	Chemical supplier and service agent	Arrangement with Pumps & Irrigation (Mareeba)
Ergon	T: 1800 7076 633	Pumping water from bore fields	Maintaining continuity of power
Elite Chemicals (Cairns)	Glen Taylor 07 3893 7500	Hypochlorite supplier	Arranging stock and supplier of chemicals required, quality of chemicals directly affects quality of drinking water supply

Ixom (Melbourne)	Stephanie Quattrocelli 03 9906 3274	Chlorine gas supplier	Arranging stock and supplier of chemicals required, quality of chemicals directly affects quality of drinking water supply
Aquapure Construction Pty Ltd (Brisbane)	Cyril Roots 07 3375 5307	Calcite supplier (pH correction)	Arranging stock and supplier of chemicals required, quality of chemicals directly affects quality of drinking water supply
Organisation	Contact details	Relevance to the management of drinking water quality	How the stakeholder is engaged in the DWQMP
Queensland Water Supply Regulator	T: 1300 596 709	Regulator	Consulted during development of DWQMP, water quality incidents reported to QWSR
Council	T: 07 4090 5600	Overall management, budget and finances	Informed of water quality issues
Hospital	Clinic T: 4069 7055	Consumer, high risk	Informed of water quality issues
Aged Care	T: 4069 7055	Consumer, high risk	Informed of water quality issues
School and Preschool	T: 4069 7336	Consumer, high risk	Informed of water quality issues
Ibis Supermarket	T: 4069 7805	Makes water drinks	Informed of water quality issues

4. Identify Hazards and Hazardous Events

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).

4.1. Water Quality Information

Council previously had issues with water quality storage and an incident occurred where historical data was lost. This was rectified and as of July 2018 all water quality data has been entered into electronic spreadsheets, which are saved into the shared Council drive.

4.1.1. Operational monitoring

A summary of operational monitoring from July 2018 until December 2019, is presented in Table 9. This includes turbidity results which were included in the operational monitoring spreadsheet from the start of 2019. In 2019 there was only one CCP breach with a value of 0.2 mg/L free chlorine on the 29th of July.

Table 9 Operational monitoring data for July 2018 - December 2019

Sites	Units	N	Ave	SD	min	max	Target
Free chlorine							
208 Twal Street	mg/L	526.0	1.4	0.4	0.2	2.6	>0.5
Preschool	mg/L	531.0	1.6	0.4	0.7	3.3	>0.5
303 Tavern	mg/L	525.0	1.4	0.4	0.5	2.9	>0.5
Water Treatment Plant	mg/L	532.0	1.4	0.4	0.4	2.9	>0.7
Hospital	mg/L	376.0	1.5	0.4	0.7	2.5	>0.5
pH							
Water Treatment Plant	pH Units	543.0	6.9	0.8	1.2	9.3	6.8 – 7.5
Turbidity							
Water Treatment Plant	NTU	23.0	0.4	0.4	0.1	2.0	<2

4.1.2. Verification monitoring

Annual DWQMP reports have reported past water quality performance from 2014 to 2019, with no *E. coli* detections within these time frames. Samples from the reticulation networks have been sent to a laboratory in Cairns for analysis as a quality check for in house testing. A summary of these results from 2017 to 2019 is shown below. In 2018 and early 2019, there were a number of logistical issues which resulted in only one sample being sent to the laboratory. In 2020 the sampling program has been amended and samples will be sent for laboratory analysis on a monthly basis.

Table 10 Summary of Verification Laboratory Results

Source	Parameter	N	Min	Max	Mean	Comments
Hospital	<i>E. coli</i> (CFU/100 mL)	8	ND	ND	ND	Compliant with water quality criteria, <i>Public Health Regulation (2018)</i> .
	Heterotrophic Plate Count (CFU/mL)	8	ND	10	3.4	Not of health significance and used as an indicator of system integrity and disinfection performance.
	Total Coliforms (CFU/100 mL)	8	ND	ND	ND	Not of health significance and used as an indicator of system integrity and disinfection performance.
Overhead Reservoir	<i>E. coli</i> (CFU/100 mL)	8	ND	ND	ND	Compliant with water quality criteria, <i>Public Health Regulation (2018)</i> .
	Heterotrophic Plate Count (CFU/mL)	8	ND	10	2.7	Not of health significance and used as an indicator of system integrity and disinfection performance.
	Total Coliforms (CFU/100 mL)	8	ND	ND	ND	Not of health significance and are used as an indicator of system integrity and disinfection performance.
School	<i>E. coli</i> (CFU/100 mL)	8	ND	ND	ND	Compliant with water quality criteria, <i>Public Health Regulation (2018)</i> .
	Heterotrophic Plate Count (CFU/mL)	8	ND	25	4.2	Not of health significance and used as an indicator of system integrity and disinfection performance.
	Total Coliforms (CFU/100 mL)	8	ND	ND	ND	Not of health significance and used as an indicator of system integrity and disinfection performance.

Detailed water analysis testing of the source water is undertaken annually, which will further build on Council’s knowledge of the water quality of the bores. The source water is known to have naturally low pH, which is monitored operationally, and managed through water treatment.

Free Perfluoroalkyl Compounds (PFAS) snapshot monitoring was undertaken for Bores M1 and M2 as well as treated water in November 2017. Testing showed that there are no issues with PFAS in the source water, with no reportable levels detected.

Past water quality incidents include loss of supply and *E. coli* detections. The loss of supply was a result of one bore being repaired, and a failure of the bore pump on the service bore. The three-day loss of supply could have been prevented had staff at the time had more system understanding, as the fault in the pump could have been repaired.

E. coli has been detected at the Napranum school (5 cfu/100mL), the Overhead tank (3 cfu/100 mL) and Napranum Hospital (1 cfu/100mL) on the 19/02/2013. Council consulted with the Department of Health and issued a boil water alert and increased chlorination as a result.

Further, detections at the hospital of 1 cfu/100 mL were made on the 10/12/2012, and at the Napranum school (1 cfu/100 mL) on the 11/09/2012. A common factor identified across all detections was very low chlorine levels.

A suite of ADWG parameters is analysed by a laboratory at least once a year. These results and the results from the snapshot monitoring are shown in Table 11 below. Results indicated low pH is an issue, however overall, no ADWG health-based guidelines were exceeded.

4.2. Customer Complaints

No water quality complaints have been received from the community in the last two years. There is currently no formal mechanism for recording customer complaints, however community members raise issues through the Council offices.

Table 11 Source water monitoring

Parameter	September 2011 result	August 2018 result (Bore 2)	August 2018 result (Bore 1)	October 2019 result (Bore 1)	October 2019 result (Bore 2)	ADWG Guideline Value	Compliant
Aluminum (mg/L)	0.005	< 0.015	< 0.015	<0.015	<0.015	0.2 (A)	Yes
Antimony (mg/L)	< 0.0001	-	-	-	-	0.003 (H)	Yes
Arsenic (mg/L)	< 0.0003	-	-	<0.0002	<0.0002	0.01 (H)	Yes
Barium (mg/L)	0.001	-	-	-	-	2 (H)	Yes
Beryllium (mg/L)	< 0.0001	-	-	-	-	0.06 (H)	Yes
Boron (mg/L)	0.009	< 0.05	< 0.05	-	-	4 (H)	Yes
Cadmium (mg/L)	< 0.0001	< 0.0001	< 0.0001	<0.0001	<0.0001	0.002 (H)	Yes
Chromium (mg/L)	< 0.0001	< 0.0002	< 0.0002	-	-	0.05 (H)	Yes
Cobalt (mg/L)	< 0.0001	-	-	-	-	n/a	n/a
Copper (mg/L)	0.005	0.007	0.004	0.005	0.009	2 (H) 1 (A)	Yes
Iron (mg/L)	< 0.005	<0.008	< 0.008	<0.008	<0.008	0.3 (A)	Yes
Lead (mg/L)	0.0004	0.0096	0.0009	0.0009	0.0042	0.01 (H)	Yes
Manganese (mg/L)	< 0.0001	-	-	<0.0002	<0.0002	0.5 (H) 0.1 (A)	Yes
Molybdenum (mg/L)	< 0.0001	-	-	-	-	0.05 (H)	Yes
Nickel (mg/L)	< 0.0001	< 0.0005	< 0.0005	-	-	0.02 (H)	Yes

Parameter	September 2011 result	August 2018 result (Bore 2)	August 2018 result (Bore 1)	October 2019 result (Bore 1)	October 2019 result (Bore 2)	ADWG Guideline Value	Compliant
Selenium (mg/L)	< 0.001	-	-	-	-	0.01 (H)	Yes
Silver (mg/L)	< 0.001	-	-	-	-	0.1 (H)	Yes
Uranium (mg/L)	< 0.0001	-	-	-	-	0.017 (H)	Yes
Vanadium (mg/L)	< 0.0001	-	-	-	-	n/a	n/a
Conductivity (uS/cm)	19	19	20	18	19	n/a	n/a
pH	6.04	5.6	5.2	5.4	5.3	6.5 – 8.5 (A)	No
Temperature (°C)	22	-	-	-	-	n/a	n/a
Total Hardness as CaCO ₃ (mg/L)	1	1.2	1.2	1.2	1.2	n/a	n/a
Alkalinity CaCO ₃ (mg/L)	6	47	1.5	<1.5	<1.5	n/a	n/a
Silica (mg/L)	6	6	6.3	6.4	6.2	80 (A)	Yes
Total Dissolved Solids (mg/L)	17	18	-	23	17	600 (A)	Yes
True Colour (Hazen)	1	< 1	< 1	-	-	15 (A)	Yes
Turbidity (NTU)	<1	0.2	< 0.1	<0.1	<0.1	5 (A)	Yes
Bicarbonate (mg/L)	8	-	-	-	-	n/a	n/a
Carbonate (mg/L)	0	-	-	-	-	n/a	n/a

Parameter	September 2011 result	August 2018 result (Bore 2)	August 2018 result (Bore 1)	October 2019 result (Bore 1)	October 2019 result (Bore 2)	ADWG Guideline Value	Compliant
Hydroxide (mg/L)	0	-	-	-	-	n/a	n/a
Chloride (mg/L)	3.4	-	-	3.8	3.8	250 (A)	Yes
Fluoride (mg/L)	< 0.1	< 0.02	< 0.02	<0.02	<0.02	1.5 (H)	Yes
Nitrate (mg/L)	1	0.21	0.2	-	-	50 (H)	Yes
Nitrite	-	< 0.01	< 0.01	-	-	3 (H)	Yes
Sulphate (mg/L)	< 1	< 1	< 1	<1	<1	500 (A)	Yes
Zinc (mg/L)	< 0.01	< 0.008	< 0.008	-	-	3 (A)	Yes
Sodium (mg/L)	2	-	-	2.5	2.4	180 (H)	Yes
Potassium (mg/L)	0.2	-	-	<0.015	<0.015	n/a	n/a
Calcium (mg/L)	0.1	< 0.1	< 0.1	< 0.1	< 0.1	n/a	n/a
Magnesium	0.2	0.23	0.22	0.23	0.22	n/a	n/a
Gross alpha (Bq/L)	-	<0.05	<0.05	-	-	0.5 (screening)	Yes
Gross beta activity (Bq/L)	-	<0.1	<0.1	-	-	0.5 (screening)	Yes

* (A) – Aesthetic based ADWG value, (H) – Health based ADWG value

5. Assessment of Risks

Criteria

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

- hazard
- source of hazard and hazardous event
- maximum risk level or equivalent process¹⁶ (i.e. without existing barriers in place for example, treatment and/or disinfection)
- existing preventive measures including multiple barriers (i.e. treatment process steps)
- residual risk level (i.e. with existing barriers in place for example, treatment and/or disinfection)
- any uncertainties.

Key stakeholders who have been actively involved in the risk assessment process, their role and rationale for inclusion must be documented in the Plan.

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.

The hazard identification and risk assessment were conducted when the DWQMP was developed in 2018 and revised as part of the DWQMP review in 2020.

5.1. 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.

Whole of service hazards and hazardous events (including cyber security threats and breaches with regard to water quality) 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.

Key stakeholders who have been actively involved in the hazard identification process, their role and rationale for inclusion must be documented in the plan.

The risk assessment is detailed in the risk register spreadsheet, which is maintained separately to the main DWQMP document. The risk register was created in August 2019, see Risk

Register and Improvement Plan spreadsheet for risk assessment team details. The risk assessment team going forward is detailed in Table 12.

Table 12 Ongoing review risk assessment team

Name	Position	Expertise and system knowledge
Stephen Turner	Operations Division Manager	Registered Professional Engineer QLD, B Eng(Hons), M.Eng. 1 years in Napranum as Works Manager.
Brendan Cherry	Essential Services Supervisor	Licensed plumber. Previously Essential Services Officer at Aurukun Shire Council for 12 months. Currently enrolled in Certificate III General Water Operations.

5.2. Methodology

Criteria

The Plan must detail the risk assessment methodology used for each scheme including:

- reference to a published version such as ADWG, HACCP, AS/NZS ISO 31000-2009
- if a published version has not been used, a description of the methodology which has been used must be provided
- the definition of likelihood, consequence and risk level used
- an explanation of the acceptable risk level and the rationale for this selection.

The methodology used for the risk assessment has been adopted from the Australian Drinking Water Guidelines and the Department of Natural Resources, Mines and Energy, Water Supply Regulator publication *Preparing a Drinking Water Quality Management Plan Supporting Information* (Sept 2010). The definitions of likelihood, consequence and uncertainty are presented in the methodology section of the *NASC Risk Register and Improvement Plan* spreadsheet.

5.3. Acceptable Risk

Residual risks scored as low and medium, were classified as acceptable risks. Risks with a rating of high or extreme in the risk assessment (unacceptable risks) have an associated action entered in the Improvement Plan. These risks will be re-evaluated during regular reviews of the DWQMP to ascertain that the risk level remains low (with an improved uncertainty level).

6. 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 organization 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 organization to ensure the measure 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.

6.1. 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 hazard identification and risk assessment matrices have been reproduced to formulate a risk management improvement program. The tables are available in the *Improvement Plan and Risk Register* spreadsheet, which is a supporting DWQMP document.

6.2. Operational Control

6.2.1. Existing preventative measures

Barriers and preventative measures were identified during the risk assessment review for the identified hazards, and this can be seen in the risk register and improvement plan supporting document.

Operational control is essential for the management of the drinking water supply system. In order to manage a process, it must be able to be monitored and corrective action applied to ensure processes function within the defined operational envelope.

Preventive measures that manage a significant risk are to have a documented procedure in place or an improvement action to document and formalise the procedure (see section 6.3).

Within a process a number of points may be identified as critical, where increased control is required to ensure a quality product. These are identified as critical control points (CCPs). 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 CCPs. 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 in the NASC drinking water supply system 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.

6.2.2. Critical control points

For NASC, one CCP was identified for disinfection, which is detailed in Appendix A.

6.2.3. Proposed preventative measures

Proposed preventative measures are included in the *Risk register and improvement plan*, alongside timeframes and responsibilities for implementation.

6.3. 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 following work checklists, records and procedures are used in the operation of the drinking water scheme, see Table 13.

The Manager Operations Division is responsible for developing and maintaining these documents and these are stored electronically in Council’s shared drive. These documents are updated as needed. An improvement item has been included to develop additional written procedures.

The Manager Operations Division is responsible for delegating the tasks and ensures that staff have appropriate understanding of procedures and uses verbal checks to ensure understanding.

Table 13 List of operating procedures

Procedure	Version date	Comments/Status
pH correction plant operating instruction	July 2012	Given to Council after plant handover
Water testing guide	No version control	n/a

Palintest operating instruction	Original	n/a
pH adjustment procedure	Current DWQMP	See Appendix B
Disinfection CCP	Current DWQMP	See Appendix A
Mains break repair, flushing	n/a	To be developed
Implementing and lifting Boil Water Alerts	n/a	See Appendix C

6.4. 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 (*including cyber security incidents/emergencies associated with drinking water quality*)
- 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 processes for managing drinking water incidents and emergencies are described in the tables below. Table 14 provides the overview (alert level, description, key responsible and positions responsible). The Table 15 gives the summary of actions and procedures. This has also been included as a flow chart in Figure 4.

All level 2 and 3 alerts are notified to the Manager Operations Division, who remains on call by mobile phone on **0427 666 801**. Water staff have received on the job training in incident and emergency response protocols with overall supervision and management provided by the Manager Operations Division.

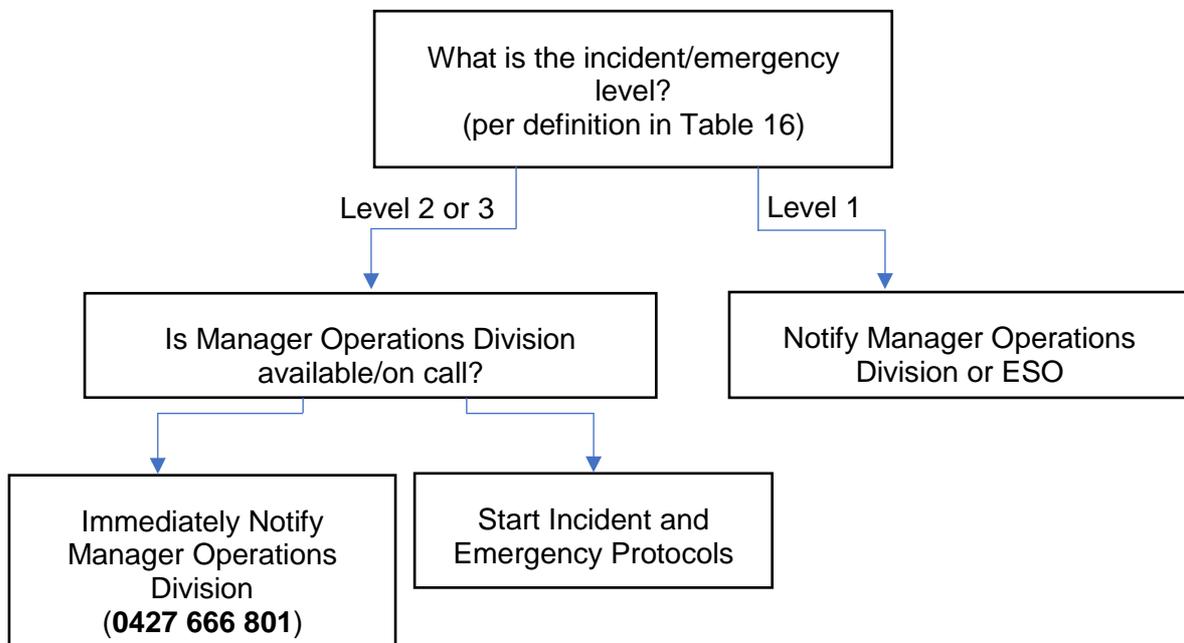


Figure 4 Preliminary Incident/Emergency Flow Chart

Table 14 Alert levels of incidents and emergencies

Alert Level	Description	Key management response(s)	Position(s) responsible
Level 3 or High: Emergency	<ul style="list-style-type: none"> • 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, source water where treatment is ineffective) • declared disaster or emergency situation by the Council or state/national government <p><i>Requires coordination across the provider (Council) departments and is likely to require external resourcing and support from agencies, such as Queensland Water Supply Regulator, Queensland Health, local disaster management groups, emergency responders QFRS, Police</i></p>	Activate disaster management plan if appropriate Activate incident response and reporting protocols. Request advice from external experts as appropriate to regain control. <i>Refer to summary of actions and procedures</i>	CEO (if appropriate – e.g. disaster management plan) Manager Operations Division
Level 2 or Medium: Incident	<ul style="list-style-type: none"> • non-compliance (typically against the ADWG values) • minor event. Examples include natural disaster (flood, drought), bushfire, inability to operate system within acceptable operational limits but where rectification is likely prior to unsafe water delivered. <p><i>Incident likely to be managed within the team responsible for drinking water operations and management in line with their DWQMP. In some cases, it may require coordination across the Council departments and external resources and support, such as from Queensland Water Supply Regulator, Queensland Health. Possible customer complaints.</i></p>	Activate drinking water incident response and reporting protocols. Ensure all control measures identified in the DWQMP are functioning effectively. <i>Refer to summary of actions and procedures.</i>	Manager Operations Division Essential Services Officer
Level 1 or Low: Operational Exceedance	<ul style="list-style-type: none"> • Exceedances of operational limits (e.g. low or elevated chlorine in reticulation, pH). <p><i>Incident can be managed within the water operations team. An incident is not declared and the issue can be managed by local team in line with their DWQMP.</i></p>	Ensure all operational steps identified in the DWQMP are functioning effectively. Check and act upon operations and maintenance records and procedures. Incident response and reporting protocols on standby. <i>Refer to summary of actions and procedures</i>	Essential Services Officer

Table 15 Summary of IERP Actions

Alert Level	Key management response(s)	Brief summary of actions	Documented Plans & Procedures
Level 3 Emergency	Activate incident response and reporting protocols. Request advice from external experts as appropriate to regain control. Activate disaster management plan if appropriate	<ul style="list-style-type: none"> • CEO to notify Council and assemble team • Coordinate notification, investigation and response of water related aspects • Consider what community notification / messaging is needed (e.g. do not drink alert, boil water alert or bottle/emergency water distribution) • Coordinate community messaging, for e.g. boil water alert, do not drink alert as required • Notify Queensland Water Supply Regulator as soon as practicable on 1300 596 709 (24 hours line), as per reporting requirements. 	Disaster management plan, including communications protocols.
Level 2 or Medium: Incident	Activate incident response and reporting protocols. Ensure all control measures identified in the DWQMP are functioning effectively.	<ul style="list-style-type: none"> • Essential Services Officer to inform the Manager Operations Division • Notify Queensland Water Supply Regulator on 1300 596 709 (24/7), as per reporting requirements • Ensure all control measures identified in 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. • In case of customer complaints, coordinate investigation and resolution, including obtaining water samples where required 	See Table 16 for reporting protocols Napranum DWQMP
Level 1 or Low: Operational Exceedance	Ensure all operational steps identified in the DWQMP are functioning effectively. Check and act upon operations and maintenance Incident response and reporting protocols on standby.	<ul style="list-style-type: none"> • Operations staff to notify Essential Services Officer • 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 DWQMP are functioning effectively • Increase operational monitoring frequency where required • Ensure incident response and reporting protocols are on standby if the need arises 	Operations and maintenance procedure Napranum DWQMP.

6.4.1. 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 *Notification of a drinking water event or detection of a parameter with no water quality criteria: Form WSR50* and *Notice of noncompliance*

with water quality criteria: Drinking water: Form WSR017 are submitted as required.

These are summarised in Table 16 as below, and also represented as flow charts in Figure 5 Figure 6.

Table 16 Incident reporting requirements

Incident	Reporting Requirements (to Water Supply Regulator)
Detection of <i>E. coli</i> , detection of a pathogen, failure to meet ADWG health guideline values	Figure 5 and Figure 6 outline the reporting requirements.
Radiological (exceed levels described in the notice)	By telephone within 3 hours of receipt of test results
Parameters with no ADWG guideline value	Written confirmation within 24 hours
An event likely to affect water quality	By telephone as soon as practicable

Reporting number is 1300 596 709

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

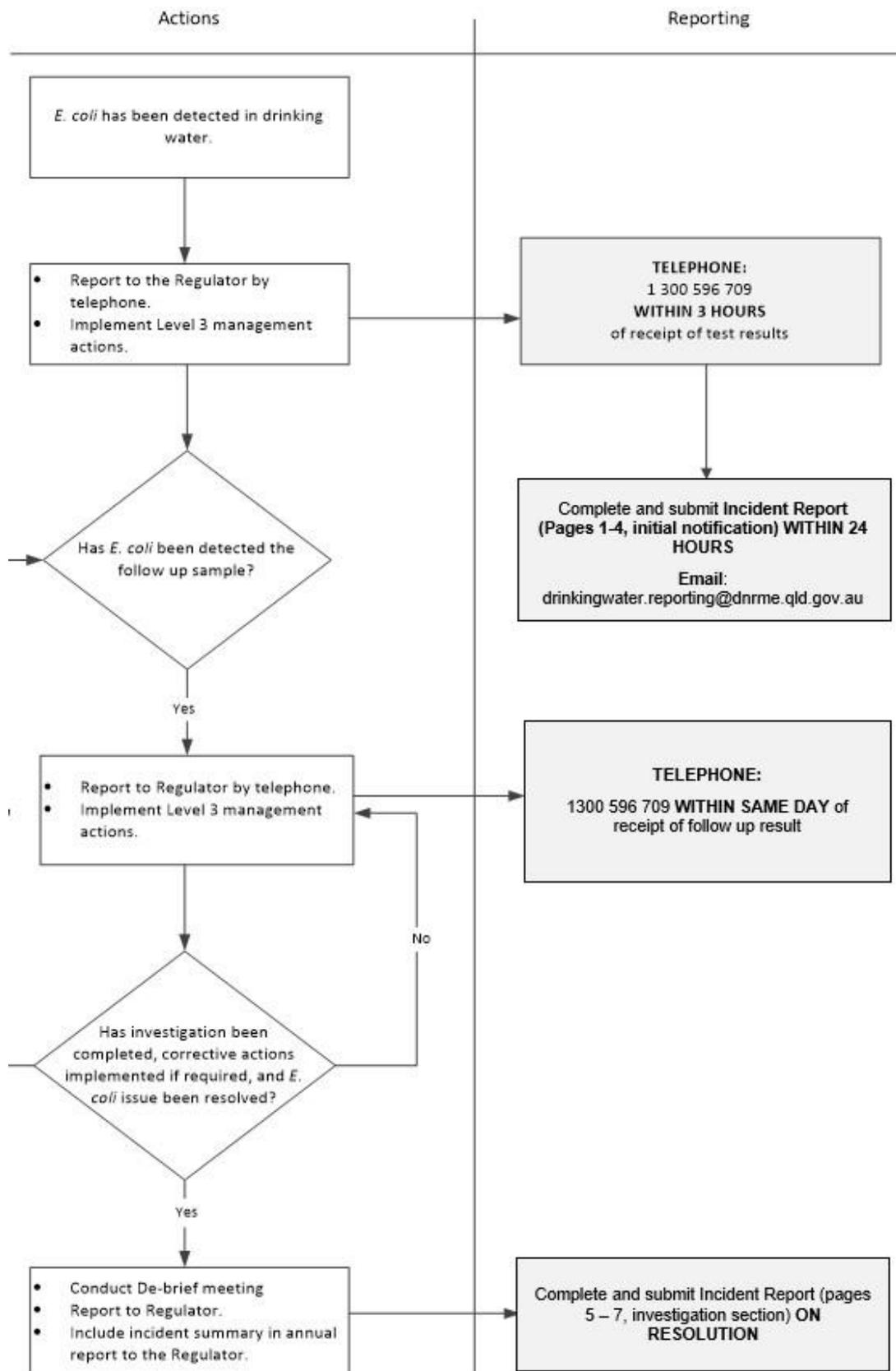


Figure 5 Actions and Reporting for Detection of *E. coli*

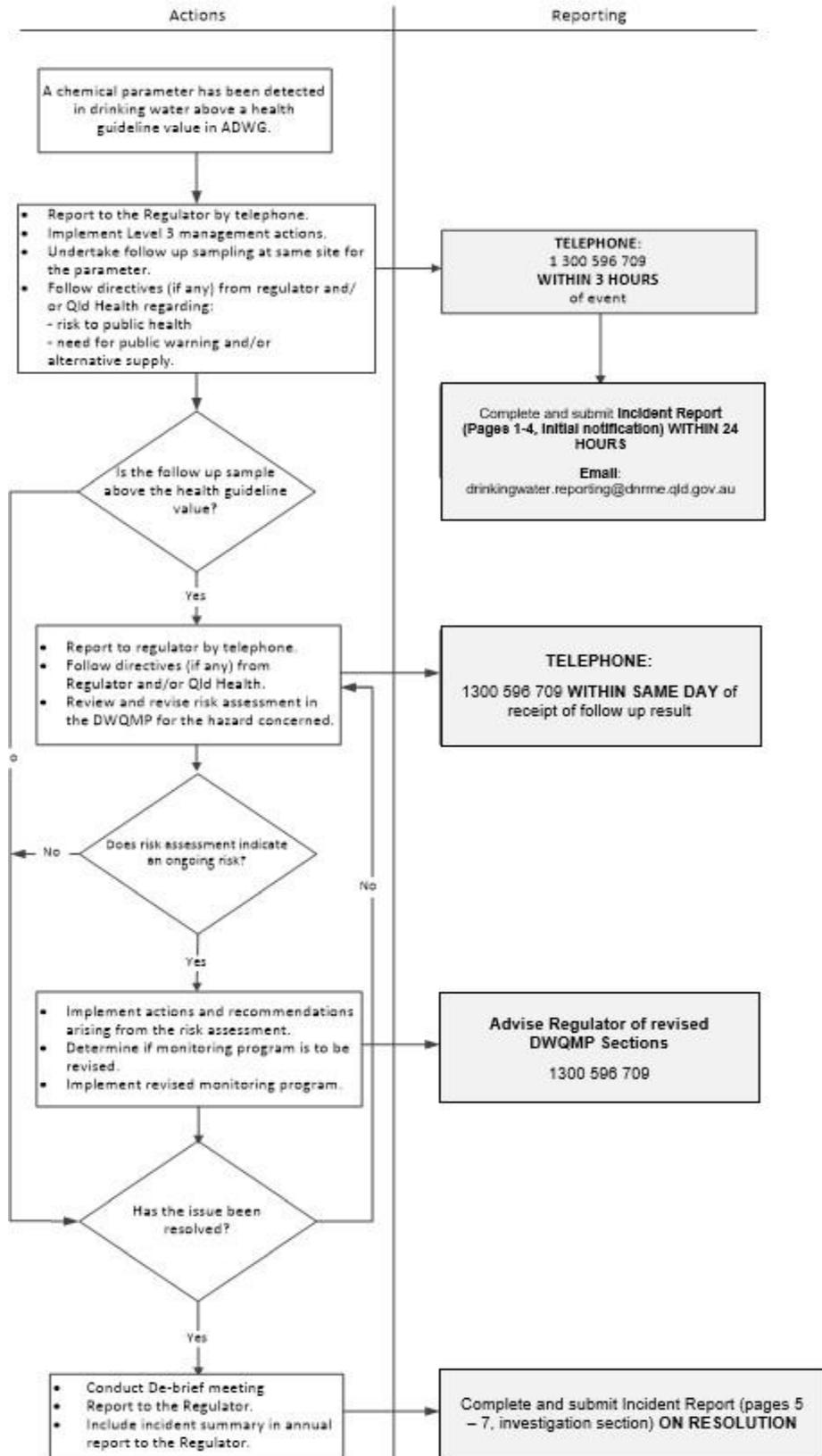


Figure 6 Actions and Reporting for Detection of Chemical Parameters above ADWG Health Guideline Values

6.4.2. Notification of Alerts about water quality

Any water quality alerts are currently communicated via an electronic bulletin board outside the Council office, the Council social media page, email bulletins and flyers.

Customers with vulnerable health may need to be notified by phone such as:

- Hospitals
- Schools
- Retirement home

Vulnerable customers within the Napranum scheme are listed in Table 17.

Table 17 Vulnerable customer details

Vulnerable Customers	Contact Person	Phone numbers
Hospital	n/a	T: 4069 7055 (respite centre) T: 4082 3500 (general number)
Aged Care	Marianne Smith (Aged and Disabilities Service Manger)	M: 0409 718 819 T: 4069 7055
Pre-school and day care	Rachelle Munro (Children services Manager)	M: 0428 858 953 T: 4069 7336

6.5. 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.

The following table summarises the recording keeping activities undertaken at NASC pertaining to the DWQMP. Table below summarises the activities.

Table 18 Information Management Activities/Document Summary

Information	Storage Location/Retention	Currency	Responsible Person(s)
Daily Water Quality Testing Records (Excel spreadsheet)	Shared Council drive Hard copy and USB	Results recorded on spreadsheet and saved onto shared council drive and USB	Staff undertaking the sampling, reviewed by ESO
External Laboratory Water Quality Results (Cairns Laboratory)	Shared Council drive Hard copy and USB	As received from external laboratory	ESO and Manager Operations Division
DWQMP and supporting documents	Shared Council drive Hard copy and USB	Reviewed as needed, current version saved in shared drive and USB	Manager Operations Division
pH correction plant operating instruction	At Water Yard	July 2012	Manager Operations Division
Water testing guide	At Water Yard	No version control	Manager Operations Division
Palintest operating instruction	At Water Yard	Original Copy in shared drive and USB	Manager Operations Division
Water Supply Regulator Water Quality Incident Notification Form (WSR507, WSR017)	Queensland Water Supply Regulator Website	Current as from website	n/a
Boiled Water Alert form	Shared Council drive Hard copy and USB	No version control	Manager Operations Division

Five-year-old data are archived through Council's system, by Council officers.

7. Operational and Verification Monitoring

7.1. 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 current operational monitoring program is presented in this section, with site details in Table 19 and testing and parameter details in Table 20. Table 20 also includes corrective actions when target and critical limits are breached. The ESO collects the operational monitoring samples around town and has been trained by the Manager Operations Division. The Manager Operations Division is responsible for assessing the operational and verification monitoring water quality results weekly and investigating any trends. This includes plotting a graph of source water pH and turbidity values and reviewing for trends (e.g. decreasing pH over time).

Visual inspections and checks are conducted as part of the operational monitoring to ensure preventative measures function as required, in conjunction with water quality testing. Note that daily means seven days – these checks are currently conducted on the weekends.

The operational monitoring program is appropriate to confirm and maintain the effective operation of the preventive measures due to the broad spectrum of sampling sites throughout the community. These parameters will ensure that the most significant hazard of harmful bacteria should are not present.

Table 19 Operational monitoring sites, sampling parameters and frequencies

Site	Sampling	
	Parameters Tested	Frequency
Bore M1	Turbidity, pH	Weekly
Bore M2	Turbidity, pH	Weekly
Ground level reservoir	Residual free chlorine, turbidity	Daily
Water Yard (point of dosing)	Residual free chlorine, pH	Daily
School (vulnerable customers)	Residual free chlorine	Daily
Hospital (vulnerable customers)	Residual free chlorine	Daily
208 Twal St. (dead end)	Residual free chlorine	Daily
303 Tavern (dead end)	Residual free chlorine	Daily

Table 20 Operational monitoring undertaken at NASC, including targets

Process step / location in system	Parameter	Associated hazard	Sampling			Target limit	Action if target limit is not met	Critical limit	Action if critical limit is exceeded
			Frequency	Method	Analysis				
Bores Sites	Turbidity	Harmful Pathogens	Weekly	Grab Sample	In-house	<1 NTU	Ensure residual chlorine level is maintained in the reticulation/reservoirs. Increase dose rate as required. Consider shutting down plant Increase monitoring until system conforms	n/a	n/a
	pH	Water Supply	Weekly	Grab Sample	In-house	-	n/a	n/a	n/a
	Bore operation	Water Supply	Daily	Visual inspection	n/a	Bores operating normally	Notify Manager Operations Division, investigate issue, repair asset	n/a	n/a
	Fence integrity around bores	Bore integrity	Daily	Visual inspection	n/a	Good fence integrity	Notify Manager Operations Division, repair asset, ensure residual chlorine level is maintained in the reticulation / reservoirs	n/a	n/a
	Aquifer Level	Water Supply	Daily	Manual	n/a	n/a	n/a	n/a	n/a
Water yard (WTP)	pH	Bacteria and Viruses	Daily	Grab Sample	In-house	6.8 to 7.5	Follow pH control procedure	n/a	n/a
	Chlorinators working properly	Bacteria and Viruses	Daily	Visual inspection	n/a	Chlorinators in good working condition	Notify Manager Operations Division, repair asset	n/a	n/a
	General site maintenance and fence integrity check	Water Supply	Weekly	Visual inspection	n/a	Good asset condition	Repair asset, if possible, take immediate action to rectify the breach. Notify the Manager Operations Division If contamination is suspected, undertake testing of chlorine residual and <i>E. coli</i> . If <i>E. coli</i> is detected, begin	n/a	n/a

Process step / location in system	Parameter	Associated hazard	Sampling			Target limit	Action if target limit is not met	Critical limit	Action if critical limit is exceeded
			Frequency	Method	Analysis				
							Emergency response protocol.		
	Inspection and testing of switchboards (by electrician)	Water Supply	Bi-monthly	Visual inspection/ appropriate tests	n/a	Switchboards operating normally	Notify Manager Operations Division, repair asset	n/a	n/a
Ground Level Reservoir	Turbidity	Bacteria and Viruses	Daily	Grab sample	In-house	<1 NTU	Ensure residual chlorine level is maintained in the reticulation/reservoir. Increase dose rate as required. Consider shutting down plant Increase monitoring until system conforms	n/a	n/a
	Free chlorine	Bacteria and Viruses	Daily	Grab sample	In-house	>0.7 mg/L	Ensure residual chlorine level is maintained in the reticulation/reservoir. Increase dose rate as required.	<0.5 mg/L, > 5 mg/L	If free chlorine is < 0.7 mg/L in the reservoir, ensure residual chlorine levels are maintained in the reticulation, increase dose rate as required. If free chlorine > 5mg/L, isolate the reservoir if possible, confirm free chlorine levels are acceptable in the reticulation. Consider shutting down the plant. Begin the Emergency Response Protocol for breach of an ADWG health based target.
	Reservoir level	Water Supply	Daily	Visual inspection	n/a	> 50%	Reservoir is generally maintained at > 50% capacity. Investigate any water supply/asset issues if levels are	n/a	n/a

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Process step / location in system	Parameter	Associated hazard	Sampling			Target limit	Action if target limit is not met	Critical limit	Action if critical limit is exceeded
			Frequency	Method	Analysis				
							Consistently below this.		
	Integrity check, looking for leaks, overflow or vandalism	Water Supply	Daily	Visual inspection	n/a	Good reservoir integrity	Repair asset, if possible, take immediate action to rectify the breach. Notify the Manager Operations Division If contamination is suspected, undertake testing of chlorine residual and <i>E. coli</i> . If <i>E. coli</i> is detected, begin Emergency response protocol.	n/a	n/a
Reticulation sites	Free Chlorine	Bacteria and Viruses	Daily	Grab sample	In-house	>0.5 mg/L <5 mg/L	Follow disinfection procedure	n/a	n/a
	Turbidity	Harmful Pathogens	Daily	Grab Sample	In-house	<1 NTU	Check residual chlorine level is maintained. Increase dose rate as required. Consider shutting down plant Increase monitoring until system conforms	n/a	n/a

7.2. 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).

Verification monitoring for NASC is used to confirm that safe water is delivered to customers in compliance with the ADWG and *Public Health Act (2005)*.

Verification monitoring is conducted at operational monitoring locations weekly is *E. coli* monitoring (samples collected by ESO, and in-house analysis via Colilert testing). *E. coli* samples are sent to Cairns Regional Council's NATA accredited laboratory on a monthly basis to confirm in-house testing results. The verification monitoring program design is based on the risks identified in the risk assessment, and the *E. coli* frequency is required for this community size (i.e. weekly, based on a population of more than 1000 served). Monitoring locations are representative and appropriate as they address vulnerable customers, and dead ends in the reticulation. Verification monitoring sites are included in Table 21.

If *E. coli* is detected in the reticulation, this is considered a level 2 incident and actions are taken as per the emergency response plan.

Council also conducts an annual standard water analysis and metals scan at the bores to better characterise changes in the catchment, and to confirm the risk assessment is accurate. Disinfection by-products (Trihalomethanes) will also be analysed yearly from samples at the school and hospital as part of the annual analysis. A list of parameters for the standard water analysis is listed in Table 21 below.

Table 21 Verification monitoring sites

Site	Sampling	
	Parameters Tested	Frequency
Water Yard (point of dosing)	<i>E. coli</i>	Weekly
School (vulnerable customers)	<i>E. coli</i>	Weekly
Hospital (vulnerable customers)	<i>E. coli</i>	Weekly
208 Twal St. (dead end)	<i>E. coli</i>	Weekly
303 Tavern Rd (dead end)	<i>E. coli</i>	Weekly

Parameters to be included in the complete water analysis are as follows:

- Aluminium
- Arsenic
- Boron
- Cadmium
- Calcium
- Chlorate
- Chloride
- Colour
- Copper
- Electrical conductivity
- Fluoride
- Iron
- Lead
- Magnesium
- Manganese
- Nitrate
- Nickel
- pH
- Potassium
- Silicon
- Sodium
- Sulphate
- Total alkalinity
- Total dissolved solids
- Total hardness
- Turbidity
- Zinc
- Trihalomethanes

Table 22 Verification Monitoring undertaken by NASC

Parameter	ADWG or regulation value	Associated Hazard	Frequency, method		Analysing Authority	Response to exceedance
			Bores	Town		
<i>E. coli</i>	Not detected in 100mL	Pathogens	n/a	Monthly Weekly	Cairns Water Lab (NATA accredited) In-house	<i>E. coli</i> - Refer to tables describing incident and emergency management. Notify the Queensland Water Supply Regulator for town samples and complete incident reporting forms. Check that residual chlorine level is maintained. Increase dose rate as required. Check bore head structural integrity and reservoir security, review sampling method used, retest, and investigate
Complete water analysis	Refer to ADWG	Metals, physical and aesthetic parameters including disinfection byproducts	Annual	n/a	Cairns Water Lab (NATA accredited)	Assess any new hazards.

Glossary

Word	Description
CCP	Critical Control Point
C.t	Chlorine contact time
DWQMP	Drinking Water Quality Management Plan
ESO	Essential Services Officer
NASC	Napranum Aboriginal Shire Council

References

National Health and Medical Research Council (NHMRC) and Natural Resource Ministerial Management Council (NRMMC), 2016, Australian Drinking Water Guidelines 6, <
https://www.nhmrc.gov.au/_files_nhmrc/file/publications/nhmrc_adwg_6_version_3.3_2.pdf>

Department of Natural Resources, Mines and Energy, Preparing a Drinking Water Quality Management Plan Supporting Information, September 2010,
https://www.dews.qld.gov.au/__data/assets/pdf_file/0011/45587/dwqmp-supportinginfo.pdf

Appendix A

Disinfection CCP procedure

Flushing and Cleaning the Drinking Water Distribution System

1. PURPOSE

To describe and control the overall process for the management flushing and cleaning of the water supply network system for both reactive event (such as a water quality incident) and proactive maintenance (flushing dead ends).

2. SCOPE

This high level procedure covers flushing and cleaning of the water supply systems to manage and prevent dirty water incidents and to control possible nitrifying and iron metabolising bacteria colonies.

3. REFERENCES

- Any other Operation of Water Distribution System procedures – see also WSSA docs on flushing.

4. RESPONSIBILITIES AND AUTHORITIES

- Budget proposals and program development for process improvement and for necessary corrective action.
- Review of water quality data to determine the effectiveness of mains cleaning activities.

Network Supervisor

- Carry out detailed planning of flushing and water main cleaning activities.
- Supervisor Water Operations - Delegate staff to perform duties as required.

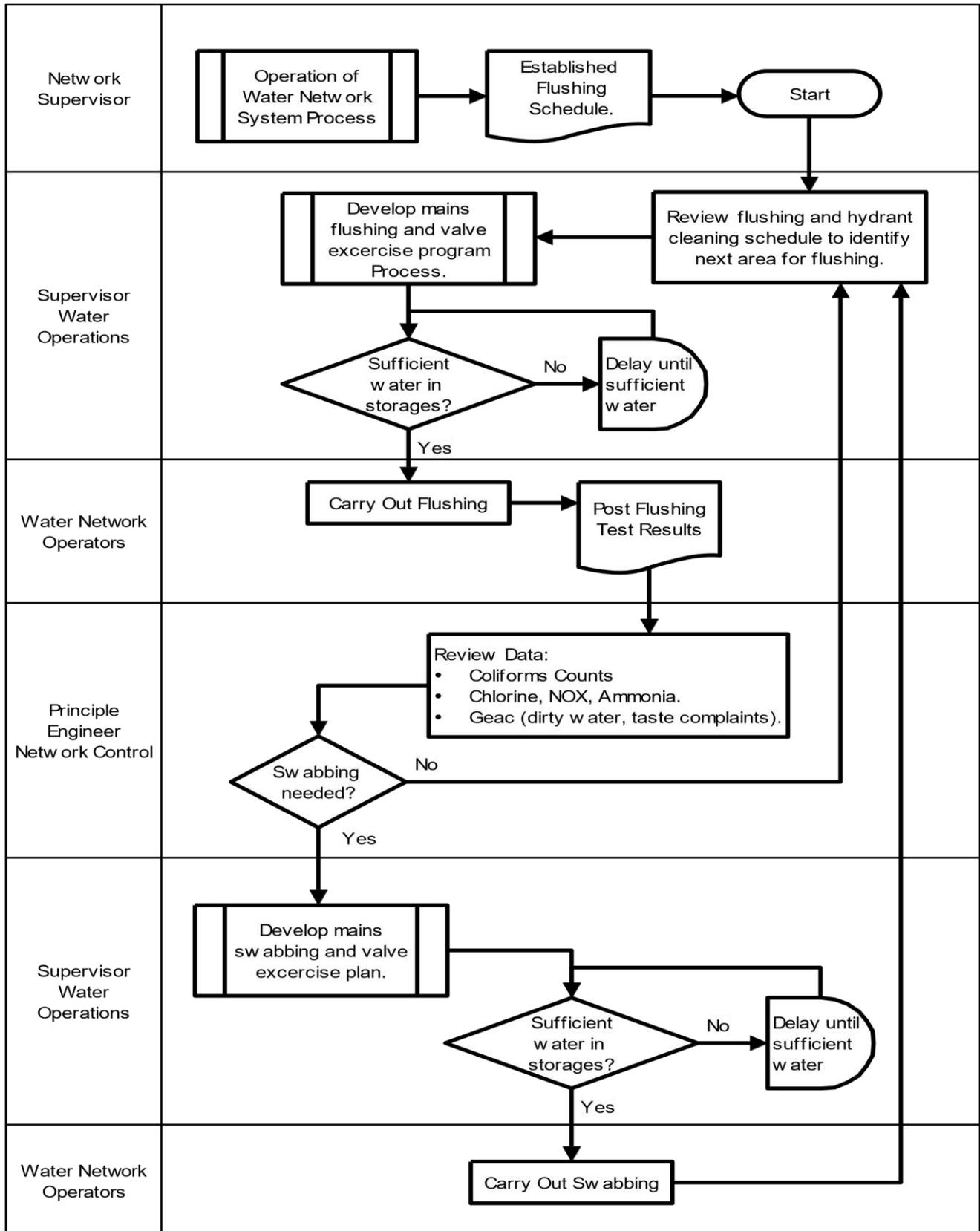
Water Network Operators

- Respond to dirty water complaints by contacting the affected customer and by flushing affected water mains in the network system.
- Carry out proactive water reticulation flushing activities to scour reticulation mains and so remove accumulated solids from the water distribution networks.
- Carry out or supervise the carrying out of swabbing activities when the need for swabbing is identified.

5. PROCEDURE (REACTIVE FLUSHING)

This process is defined by the following flowchart.

Flushing and Cleaning the Drinking Water Distribution System



Flushing and Cleaning the Drinking Water Distribution System

6. PROCEDURE (PROACTIVE MAINTENANCE)

PURPOSE

To describe the process of planning of water main Flushing for an identified area.

SCOPE

Proactive cleaning of the drinking water distribution network.

REFERENCES

WSAA doc Flushing and Cleaning in the Distribution System

7. RESPONSIBILITIES AND AUTHORITIES

Essential Service Supervisor

Coordinate and carry out the planning and initiation of Water Mains Flushing Programs.

8. PROCEDURE

Areas that are needed to be flushed are defined in *figure xxx*.

- Plans are preferably from GIS but must show – showing water mains, valves and hydrants.
- The flushing runs are marked on the plans with generally the water being flushed from the source outwards into the system.
- Samples to be taken before, during and after by staff to determine the effectiveness of the flushing (frequency of sampling depending upon the reason for flushing the area).

Aim

To maximise velocity in the main to remove any sediment or bacterial growth from the sides of the main.

Method

- All hydrants are to be marked off on the plan (*figure xx*) by field staff upon flushing the hydrant
- (if required) The leap frog method of flushing is to be used
- The hydrant is placed in the first hydrant identified on the plan as the starting point
- The hydrant is turned on fully to maximise the discharge velocity within the main
- The hydrant is left running whilst the next hydrant is placed in the main and turned on fully
- A further hydrant is placed in the next hydrant and turned on fully
- The first hydrant is then removed if the water is running clean and is placed in the next hydrant and turned of fully and so on (no hydrant is to be removed unless the water is clean)
- Where mains are of 100mm or less only one or two hydrants are to be used
- Where there is a possibility of water being drawn from a dirty service into the cleaned area, valves may have to be shut. This will be indicated on the field plans.
- Valves may be turned off if they help with the cleaning process by increasing velocity in the main

Plans are to be marked up with areas and dates completed, and operation costs with effectiveness reviewed and noted. Copies of plans are should be kept on plan hangers located in the office.

Defects found in the system are to be noted and notified to Essential Services supervisor.

Results forwarded to Operations Division Manager.

Flushing and Cleaning the Drinking Water Distribution System

Proposed main flushing program located in P: drive under Water Distribution/Flushing.

Field Tasks

1. Undertake Risk Assessment,
2. Notify Operations Division Manager prior to commencing work,
3. Check condition of scour (or hydrant) to be used for scouring main,
4. Inspect and confirm area downstream of location is safe to commence scouring,
5. Scour main for agreed timeframe,
6. Identify and report any further corrective maintenance works,
7. Notify Operations Division Manager on completion of work,
8. Complete work order.

Process Control		Disinfection CCP	Water Yard
Element		Chlorination	
Process Control		Set point manual adjustment – operation automatic with bore pump	
Purpose		Disinfection	
Major Potential Hazards		Bacteria and Virus	
Hazardous Events		Sewerage infiltration, ingress into storage, ingress in reticulation	
Existing Preventative Measures		Daily Monitoring (sampling) – disinfection is dosed	
Monitor Limits	Limits	 Critical Limit > 5 mg/L Action Limit 0.7 to 1 mg/L (increase dose) 3 to 5 mg/L (decrease dose) Target Limit 1 to 3	
	Frequency	Seven days a week	
	Primary Responsibility	Essential Services Officer	
Operational Monitoring	Parameter	<u>Free Chlorine after the Water Treatment Plant (Water Yard)</u>	
	Limits	> 0.5 mg/L < 0.7 mg/L flush reticulation (dead ends) and/ or increase dose at water yard Critical Limit > 5 mg/L	
	Frequency	Seven days a week	
	Primary Responsibility	Essential Services Officer	
Corrective Actions	Action	<ul style="list-style-type: none"> • Resample to confirm. If outside target. • Adjust chlorine dose at water yard to bring back into target • Flush reticulation to pull through disinfected water • If disinfection cannot be re-established, contact Operations Manager • Consider implementing Boil Water Alert 	
	Reporting	Report to QWSR if > 5 mg/L Boil Water implemented if < 0.5 mg/L	
	Primary Responsibility	Essential Services Manager and Manager Operations Division	
Records		Analysis report held by Essential services officer	
Notifications		ESO ESO and ESM ESM and Manager Operations Division, if Boil Water Alert contact CEO	

Appendix B

pH control procedure

Process Control		pH control	Water Yard
Element		pH control	
Process Control		Set point manual adjustment daily	
Purpose		Appropriate pH for effective disinfection	
Major Potential Hazards		Bacteria and Virus	
Hazardous Events		Bacterial and viral contamination	
Procedure		pH adjustment plant procedure	
Monitor Limits	Limits	<p>>  8.5</p> <p>Action Limit < 6.8 or 7.5 to 8.5</p> <p>Target Limit 6.8 to 7.5</p>	
	Frequency	Seven days a week	
	Primary Responsibility	Essential Services Officer	
Operational Monitoring	Parameter	<u>pH after adjustment at water yard</u>	
	Limits	<p>> 8.5</p> <p>< 6.8 or > 7.5</p> <p>6.8 to 7.5</p>	
	Frequency	Seven days a week	
	Primary Responsibility	Essential Services Officer	
Corrective Actions	Action	<ul style="list-style-type: none"> • Resample to confirm. If outside target, adjust mixing ratio to bring back into target • Check pH in reticulation if also > 8.5 adjust pH and consider flushing to ensure effective disinfection 	
	Reporting	Report to QWSR if process has completely failed.	
	Primary Responsibility	Essential Services Manager and Manager Operations Division	
Records		Analysis report held by Manager Operations Division	
Notifications		<p>ESO</p> <p>ESO and ESM</p> <p>ESM and Manager Operations Division</p>	

Appendix C

Boil Water Alert

Boil Water Alert

Napranum Aboriginal Shire Council



xx/xx/20XX

All residents and guests in Napranum should boil drinking water until further notice.

This advice has been issued following the detection of *E. coli*, which indicates that drinking water may be contaminated.

Customers should bring water to the boil and then allow it to cool before using it. Boiled water can be stored in a clean, closed container for later use. Customers should boil ALL water used for:

- Drinking
- Brushing teeth
- Washing and preparing food or drinks
- Preparing baby formula
- Making ice

Unboiled water can be used for:

- Flushing toilets
- Showers and baths – (but babies and toddlers should be sponge bathed.)
- Washing dishes (if allowed to dry completely before using again)
- Washing clothes

Drinking unboiled water could lead to illness. Contact the Hospital if you become sick at this time.

Council is working hard to identify and fix the problem as soon as possible, and is sorry for the inconvenience.

Please share this advice with neighbours and friends.



Boil water alert no longer needed as of

xx/xx/20XX

Napranum Aboriginal Shire Council advises that the town water is again safe to drink and it is no longer necessary to boil water before use.

As a final check, please run your internal taps for 2-3 minutes to ensure that any contaminated water is removed from the plumbing.

Please share this advice with neighbours and friends.



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