2014

Drinking Water Management System

URALLA SHIRE COUNCIL

VERSION 3.0

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Executive Summary

Plan Purpose

This document and its supporting systems demonstrate Uralla Shire Council's compliance with the requirement in the *Public Health Act 2010* to develop a Quality Assurance Plan in line with the Framework for Drinking Water Quality Management in the Australian Drinking Water Guidelines. This document acts as a roadmap of the activities that Council undertakes to ensure the provision of safe drinking water to its customers.

Critical Control Points

The day-to-day safety of the water is maintained to critical control points. The critical control points (CCPs) for the Uralla Water Supply system are shown in Executive Summary Table 1 and for the Bundarra Water Supply System in Executive Summary Table 2.

Executive Summary Table 1. Summary of critical control points - Uralla

System	CCP	Target	Adjustment	Critical
Fluoridation	Fluoride dosing	1.0 mg/L	< 0.95 mg/L or > 1.1 mg/L	1.5 mg/L
Chlorination	Chlorine dosing	Clear Water Tank: 1.8 mg/L First Customer: 1.2 mg/L	Clear Water Tank: 1.2 mg/L – 2.5 mg/L First Customer: 1 mg/L	Clear Water Tank: 1 mg/L for 10 minutes First Customer: 0.5 mg/L
Filtration	Filters	0.2 NTU	0.5 NTU	1.0 NTU
Clarifier	Clarifier	< 1 NTU pH 6 – 7	1 NTU pH 6 – 7	10 NTU after 1 day pH 6 – 7
Reservoirs	Distribution reservoirs	Secure and vermin proof	Evidence of breaches < 0.2 mg/L free chlorine	Breach not rectified, serious breach or evidence of vermin

Executive Summary Table 2. Summary of critical control points –Bundarra

System	CCP	Target	Adjustment	Critical
Fluoridation	Fluoride dosing	1.0 mg/L	< 0.95 mg/L or > 1.1 mg/L	1.5 mg/L
Chlorination	Chlorine dosing	1.3 mg/L	1.0 – 2.0 mg/L	0.5 mg/L for 30 minutes
Filtration	Filters	0.2 NTU	0.5 NTU	1.0 NTU
Reservoirs	Distribution reservoirs	Secure and vermin proof	Evidence of breaches < 0.2 mg/L free chlorine	Breach not rectified, serious breach or evidence of vermin

Action and Continuous Improvement Plan

A number of actions were identified through the risk assessment and plan development. These have been assigned to staff members and contractors/consultants to follow-up. The Action and Continuous Improvement Plan is reviewed regularly as actions are completed and as part of the annual planning cycle.

System Review

The drinking water management system should be reviewed internally on an annual basis and by an independent party every 3 years (subject to NSW Health advice).

This document is designed for double sided printing

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1 INTRODUCTION

The NSW *Public Health Act 2010* (the Act) was passed by Parliament at the end of 2010. The Act includes a requirement for water suppliers to produce a *Quality Assurance Program* (QAP). This document forms Uralla Shire Council's response to the requirement to develop a QAP for the Uralla Water Supply System and is based on the 12 Elements, 32 Components and 76 Actions of the Framework.

2 PURPOSE

This document acts as a roadmap of the activities that Council undertakes to ensure the provision of safe drinking water to its customers.

The document is supported by a range of procedures, registers, data management systems, flow diagrams and process and instrumentation diagrams which are all referenced at the appropriate points in this document.

This document and the supporting documentation are living documents that should be reviewed and updated in a timely manner and a copy provided to the Hunter New England Public Health Unit.

3 Elements Roadmap

3.1 Element 1: Commitment to Drinking Water Quality Management

3.1.1 Drinking water quality policy

- Formulate a drinking water quality policy, endorsed by senior executives, to be implemented throughout the organisation.
- Ensure that the policy is visible and is communicated, understood and implemented by employees.

While Council does not have a formal drinking water quality policy, Council's Community Strategic Plan 2013 – 2023 lists a service goal of "*Residents enjoy high quality, safe water".* This is linked to a strategy of ensuring a safe and high quality water supply system, with a performance measure of meeting regulations and community expectations. This DWMS fulfils the role of a drinking water quality policy.

The Project Reference Group (PRG) formed as part of the Integrated Water Cycle Management Evaluation (2010) considered *"implementing a risk-based Water Quality Management Plan"* as a high priority

Policies are communicated to staff via the Consultative Committee, the fortnightly Engineering Newsletter, and formal meetings.

3.1.2 Regulatory and formal requirements

- Identify and document all relevant regulatory and formal requirements.
- Ensure responsibilities are understood and communicated to employees.
- Review requirements periodically to reflect any changes.

The Water Managers Group within the Regional Organisation of Councils (ROC) has a charter to identify and document all relevant regulatory and formal requirements. Uralla Shire Council keeps up to date with these requirements through regular participation in the ROC.

Water Directorate updates are also used to ensure Council understands current regulatory requirements.

Responsibilities are communicated to operators and tool box talks ensure their understanding.

Action: The key formal requirements shown in Table 3-1 should be reviewed and considered when the Strategic Business Plan is updated.

Table 3-1. Key formal requirements relating to water quality

Instrument	Jurisdiction	Type	Relevance
AS/NZS 3500.0 to 4:2003 - Plumbing and Drainage Set	National	Standard	Largely for management of the distribution system including standards for plumbing and drainage issues
Plumbing Code of Australia (National Construction Code Series 2013)	National	Standard	Largely for management of the distribution system including standards for plumbing and drainage issues
Australian Drinking Water Guidelines 2011	National	Guideline	Sets frameworks and guidance for the provision of safe, quality drinking water

Instrument	Jurisdiction	Type	Relevance
Local Government Act 1993	NSW	Statute	Urban water services and management/review of on-site sewage management systems; Have only persons licensed or certified under the Home Building Act 1989 (or supervised by such a person) carry out any water supply work, sewerage work or stormwater drainage work Preparation of Asset Management Plans
Public Health Act 2010	NSW	Statute	Protection of public health, follow any advice issued from the Chief of Health regarding drinking water safety to the public; sample drinking water in accordance with NSW Health recommendations. Prepare a drinking water management system
Public Health Regulation 2012	NSW	Regulation	Requirement to have a quality assurance program (QAP) in place that addresses the elements of the Framework as set out in the ADWG. A copy of the most recent QAP is to be provided to the Director-General who may arrange a review of the QAP at any time.
Protection of the Environment Operations Act 1997	NSW	Statute	Environment protection including licensed discharges
NSW Water and Sewerage Strategic Business Planning Guidelines	NSW	Guidelines	Prepare Strategic Business plans including a review of the operating environment and Integrated Water System Management (IWCM) which should identify key water quality issues in the catchment.
NSW Health Drinking Water Monitoring Program	NSW	Guidelines	Free-of-charge testing for water supply system monitoring for indicator bacteria and health-related inorganic chemicals. Includes NSW Health Response Protocols for chemical and quality, treatment failure and *Cryptosporidium* and *Giardia.*
Fluoridation of Public Water Supplies Act 1957 No 58	NSW	Statute	Authorises and controls the addition of fluoride to public water supplies.
Fluoridation of Public Water Supplies Regulation 2007	NSW	Regulation	Made under the Fluoridation of Public Water Supplies Act 1957, relating to correct fluoride dosing equipment; collection, supply and analysis of water samples; provision of results monthly.
Environmental Planning and Assessment Act 1979 No 203	NSW	Statute	Proper management, development and conservation of resources including water for the welfare of the community and environment.

Action: Communicate regulatory and formal requirements to the staff and review requirements on an annual basis.

3.1.3 ENGAGING STAKEHOLDERS

- Identify all stakeholders who could affect, or be affected by, decisions or activities of the drinking water supplier.
- Develop appropriate mechanisms and documentation for stakeholder commitment and involvement.
- Regularly update the list of relevant agencies.

Council does not currently have an up to date stakeholder register or an up to date Strategic Business Plan. Stakeholder engagement occurs as required, for example through the PRG for the IWCM evaluation and through the multi-stakeholder nature of the water quality risk assessment. Table 3-2 forms a preliminary stakeholder register.

TABLE 3-2. KEY STAKEHOLDER REGISTER

Organisation	Name	Role	Contact
Uralla Shire Council	Robert Bell	Director Engineering Services	0427 215 970
	Paul Byrne	Water/Sewer Ganger	0427 784 304
NSW Office of Water	Trent Betts	Inspector	0417 458 247
	Chris Hennessy	Acting Regional Manager North	0429 863 123
	District Office	-	(02) 6701 9600
NSW Health Hunter New England Health Service	Glenn Pearce	Environmental Health Officer	0429 100 391
Catchment Management Authority	Border Rivers Gwydir	-	(02) 6728 8020
NSW Department of Planning and Infrastructure	Craig Diss	Northern Region Office	0428 296 619
Environmental Protection Agency	District Office	-	(02) 6773 7000
Customers with special needs	Peta Cooper	McMaugh Gardens Aged Care Centre	(02) 6778 6383 or (02) 6778 6380
	Michelle Beard	Grace Monroe Aged Care	(02) 6723 7008
	Control Centre	State Emergency Service	(02) 6723 7304 or (02) 6723 7123

Action: Assign responsibility for maintaining the Stakeholder Register including the review cycle.

3.2 ELEMENT 2 - ASSESSMENT OF THE DRINKING WATER SUPPLY SYSTEM

3.2.1 WATER SUPPLY SYSTEM ANALYSIS

- Assemble a team with appropriate knowledge and expertise.
- Construct a flow diagram of the water supply system from catchment to consumer.
- Assemble pertinent information and document key characteristics of the water supply system to be considered.

This was undertaken as part of the Risk Assessment Workshop on 27th and 29th November 2013. A summary of the Uralla drinking water supply system is shown in Table 3-3, and Bundarra in Table 3-4. See Appendix C for the workshop outcomes paper.

TABLE 3-3. URALLA SYSTEM SUMMARY

Characteristic	Data
Surface source	Kentucky Creek Dam, Gwydir River
Catchment	Gwydir River Catchment
Extraction point	Kentucky Creek
Treatment process	Filtration, coagulation, flocculation, fluoridation, chlorination.
Treatment plant capacity	5 ML/day
Customers	2,500 connections

TABLE 3-4. BUNDARRA SYSTEM SUMMARY

Characteristic	Data
Surface source	Gwydir River
Catchment	Gwydir River Catchment
Extraction point	Taylors Pond
Treatment process	Filtration, flocculation, fluoridation, GAC, chlorination.
Treatment plant capacity	0.8 ML/day
Customers	400 connections

The process flow diagram used for the risk assessment for Uralla is shown in Figure 3-1 and for Bundarra in Figure 3-2.

FIGURE 3-1. URALLA PROCESS FLOW DIAGRAM USED IN THE RISK ASSESSMENT

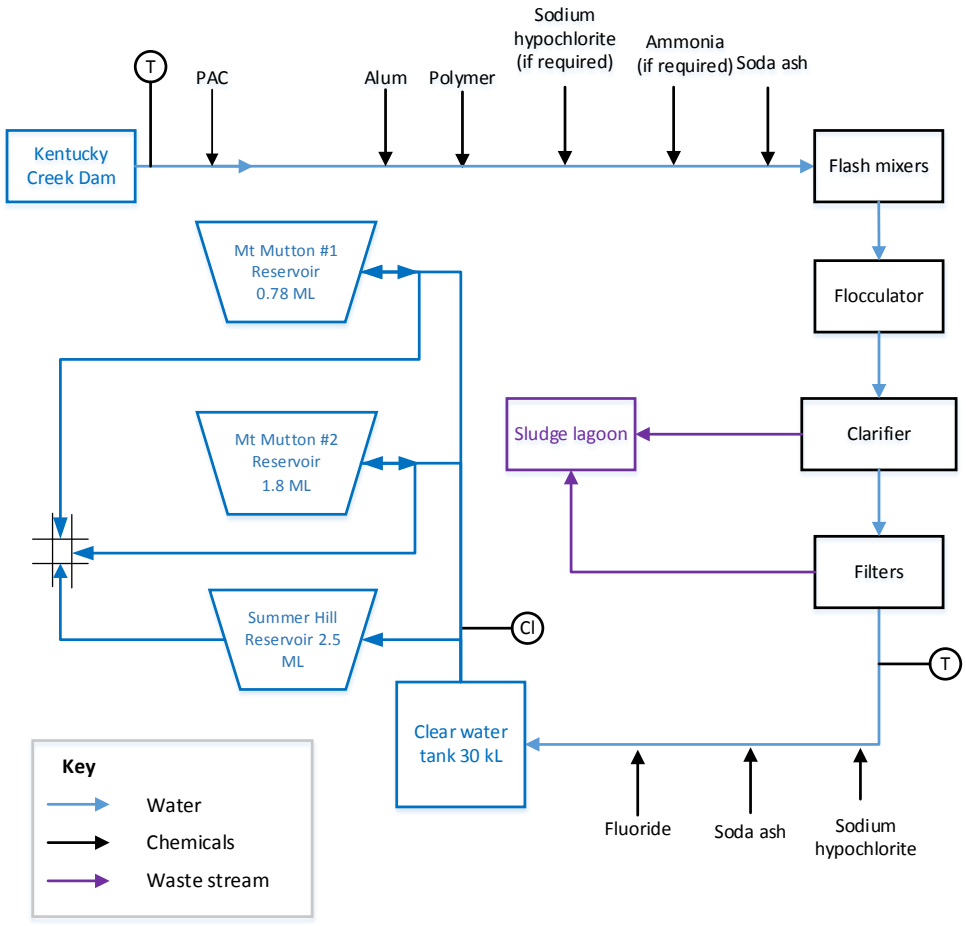
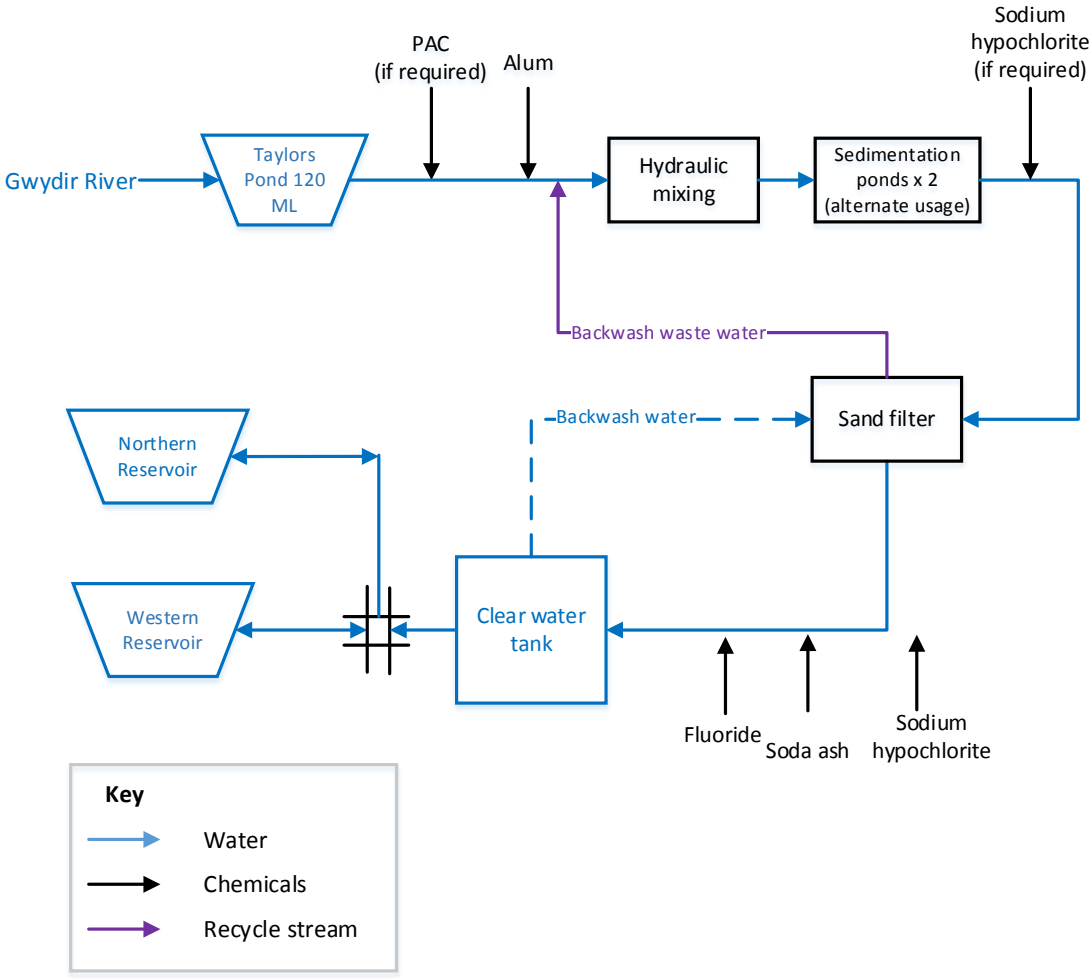


FIGURE 3-2. BUNDARRA PROCESS FLOW DIAGRAM USED IN THE RISK ASSESSMENT



3.2.2 ASSESSMENT OF WATER QUALITY DATA

- Assemble historical data from source waters, treatment plants and finished water supplied to consumers (over time and following specific events).
- List and examine exceedences.
- Assess data using tools such as control charts and trends analysis to identify trends and potential problems.

This was assessed as part of the Risk Assessment Workshop on 27th and 29th November 2013 (See Appendix C). Water quality data was extracted from the NSW Health verification monitoring database for testing carried out over the period 2001 – 2013. An analysis of the results against the Australian Drinking Water Guidelines (2011) are provided below, including statistics for common parameters. Uralla Water Treatment Plant (WTP) is shown in Table 3-5, Bundarra WTP in Table 3-6. The following notes apply to both tables:

1. pH results are combined chemistry and microbiology sample results.
2. ADWG (2011) recommend 200 mg/L total hardness as $CaCO_3$ as an upper limit to minimise the build-up of scale. A lower limit of 60 mg/L is desirable for avoiding corrosion by soft water.
3. Turbidity results are combined chemistry and microbiology sample results. Exceedences are based on the guideline value of 1 NTU for effective disinfection.
4. n.d. means not detected.

TABLE 3-5. SUMMARY OF KEY WATER QUALITY PARAMETERS (NSW HEALTH) FOR URALLA

Characteristic	Guideline Value	Min	5th %-tile	Median	95th %-tile	Max	# of samples	# of Exceed-ences
Aluminium (mg/L)	0.2	0.005	0.01	0.1	0.7	4	26	7
Fluoride (mg/L)	0.9-1.5	0.6	0.8	1.0	1.2	1.9	139	19
Fluoride water utility (mg/L)	0.9-1.5	0.1	0.93	1.0	1.1	1.3	4554	51
pH [1]	6.5 - 8.5	6.8	7.3	7.8	8.2	8.9	290	3
TDS (mg/L)	600	122	152	211	278	294	28	0
Total hardness as $CaCO_3$ (mg/L) [2]	60-200	36	52	74	125	137	26	5
True colour (HU)	15	2	2	4	9	16	25	1
Turbidity (NTU) [3]	1.00	0.100	0.165	0.400	1.59	5.73	226	26
E. coli (cfu/100 mL)	0	0	0	0	0	9	515	13
Free chlorine (mg/L)	0.2 - 5.0	0.05	0.26	1.1	1.6	7.2	265	2
Thermotolerant coliforms (cfu/100ml)	0	0	0	0	0	1	32	1
Total coliforms (cfu/100ml)	0	0	0	0	8	202	515	46

Source: *NSW Health Water Quality Monitoring Program*
See previous page for notes

TABLE 3-6. SUMMARY OF KEY WATER QUALITY PARAMETERS (NSW HEALTH) FOR BUNDARRA

Characteristic	Guideline Value	Min	5th %-tile	Median	95th %-tile	Max	# of samples	# of Exceed-ences
Aluminium (mg/L)	0.2	n.d.	n.d.	0.05	0.7	0.8	24	4
Fluoride (mg/L)	0.9-1.5	0.05	0.6	1	1.2	1.4	140	31
Fluoride water utility (mg/L)	0.9-1.5	0.29	0.93	1.1	1.2	1.6	1840	48
Iron mg/L	0.3	0.005	0.01	0.1	0.7	1	24	6
Lead (mg/L)	0.01	n.d.	n.d.	n.d.	0.02	0.03	30	4
pH [1]	6.5 - 8.5	6.9	7.2	7.6	8	8.4	89	0
TDS (mg/L)	600	118	124	189	291	368	26	0
Total hardness as $CaCO_3$ (mg/L) [2]	60-200	42	42	89	123	137	24	5
Turbidity (NTU) [3]	1.00	n.d.	0.100	0.600	2.50	7.80	81	18
E. coli (cfu/100 mL)	0	0	0	0	0	200	303	11
Free chlorine (mg/L)	0.2 - 5	0	0	0.13	0.70	7.6	65	46
Thermotolerant coliforms (cfu/100ml)	0	0	0	0	1	3	33	3
Total coliforms (cfu/100ml)	0	0	0	0	45	202	303	55

Source: *NSW Health Water Quality Monitoring Program*
See previous page for notes

3.2.3 HAZARD IDENTIFICATION AND RISK ASSESSMENT

- Define the approach and methodology to be used for hazard identification and risk assessment.
- Identify and document hazards, sources and hazardous events for each component of the water supply system.
- Estimate the level of risk for each identified hazard or hazardous event.
- Evaluate the major sources of uncertainty associated with each hazard and hazardous event and consider actions to reduce uncertainty.
- Determine significant risks and document priorities for risk management.
- Periodically review and update the hazard identification and risk assessment to incorporate any changes.

This was assessed as part of the Risk Assessment Workshop on 27th and 29th November 2013 using bow tie analysis (See Appendix C for more information).

For Uralla the workshop identified 42 causes and 13 consequences of these hazardous events. Similarly there were 42 causes and 13 consequences of these hazardous events for Bundarra.

The consequences were assessed as having both maximum risk- those without identified controls in place, and controlled risk- those with identified controls in place. Participants ranked risks from a health, operational and aesthetic perspective using a risk assessment matrix (ADWG 2011).

For the two water treatment systems of Uralla and Bundarra, there were in total 14 health risks, six operational risks and four aesthetic risks. Of the health risks two had residual risks that were still very high, and six had residual risks that were high.

The very high residual health risk was that of Turbidity above 1 NTU resulting in disinfection shielding. The six residual health risks that were high include:

- Ineffective pathogen inactivation and insufficient chlorine residual leading to illness from chlorine sensitive pathogens
- Water at customers' taps does not meet ADWG values resulting in health issues for the community
- Water at customers' taps does not meet ADWG values resulting in chronic illness.
- Turbidity, pathogens, colour, iron, manganese, aluminium and other contaminants resulting in chronic illness from chemicals above ADWG values – rank is considered ALARP
- Turbidity, pathogens, colour, iron, manganese, aluminium and other contaminants resulting in health issues for the community

There were three operational risks with high residual risks for the three systems. Of the four aesthetic risks, two had high residual risks.

3.3 ELEMENT 3: PREVENTIVE MEASURES FOR DRINKING WATER QUALITY MANAGEMENT

3.3.1 PREVENTIVE MEASURES AND MULTIPLE BARRIERS

- Identify existing preventive measures from catchment to consumer for each significant hazard or hazardous event and estimate the residual risk.
- Evaluate alternative or additional preventive measures where improvement is required.

This was assessed as part of the Risk Assessment Workshop on 27th and 29th November 2013 (See Appendix C). The control measures are listed in the worksheet. Additional actions are listed as part of Element 12.

3.3.2 Critical Control Points

- Assess preventive measures from catchment to consumer to identify critical control points.
- Establish mechanisms for operational control.
- Document the critical control points, critical limits and target criteria.

This was assessed as part of the Risk Assessment Workshop on 27th and 29th November 2013. A summary of CCPs for both Uralla and Bundarra are provided in Appendix B in a form to be displayed at both plants. A summary of the CCPs for Uralla is shown in Table 3-7 and Bundarra in Table 3-8.

Table 3-7. Summary of critical control points for Uralla

System	CCP	Target	Adjustment	Critical
Fluoridation	Fluoride dosing	1.0 mg/L	< 0.95 mg/L or > 1.1 mg/L	1.5 mg/L
Chlorination	Chlorine dosing	1.2 mg/L	0.4 – 1.5 mg/L	Clear Water Tank: 1 mg/L for 10 minutes First Customer: 0.5 mg/L
Filtration	Filters	0.2 NTU	0.5 NTU	1.0 NTU
Clarifier	Clarifier	< 1 NTU pH 6 – 7	1 NTU pH 6 – 7	10 NTU after 1 day pH 6 – 7
Reservoirs	Distribution reservoirs	Secure and vermin proof	Evidence of breaches < 0.2 mg/L free chlorine	Breach not rectified or serious breach

Table 3-8. Summary of critical control points for Bundarra

System	CCP	Target	Adjustment	Critical
Fluoridation	Fluoride dosing	1.0 mg/L	< 0.95 mg/L or > 1.1 mg/L	1.5 mg/L
Chlorination	Chlorine dosing	1.3 mg/L	1.0 – 2.0 mg/L	0.5 mg/L for 30 minutes
Filtration	Filters	0.2 NTU	0.5 NTU	1.0 NTU
Reservoirs	Distribution reservoirs	Secure and vermin proof	Evidence of breaches < 0.2 mg/L free chlorine	Breach not rectified or serious breach

Action: Display the CCP details at each WTP

3.4 Element 4: Operational Procedures and Process Control

3.4.1 Identify procedures required for processes and activities from catchment to consumer

- Document all procedures and compile into an operations manual.

Hard copies of operational procedures are held at Uralla WTP. A daily procedure for Bundarra WTP was developed during the risk assessment workshop and is provided in Appendix A.

Action: Review, update and formalise operational procedures
Action: Compile procedures into an operations manual

3.4.2 Operational Monitoring

- Develop monitoring protocols for operational performance of the water supply system, including the selection of operational parameters and criteria, and the routine analysis of results.
- Document monitoring protocols into an operational monitoring plan.

A monthly sampling plan has been developed and analysis procedures are held at Uralla WTP (Table 3-9 and Table 3-10). Operators record daily sampling electronically into the monitoring program spreadsheets. These results are reviewed weekly by the Director Engineering Services.

Table 3-9. Uralla operational sampling plan

Characteristic	Raw	Coagulated	Settled	Filtered	Clear	Reticulated
pH	Daily	Daily		Daily	Daily	Monthly
Turbidity (NTU)	Daily/ weekly		Daily/ weekly	Daily/ weekly	Daily/ weekly	Monthly
Total hardness as $CaCO_3$ (mg/L)	Weekly			Weekly		Weekly
True colour (HU)	Daily/ weekly	Daily/ weekly		Daily/ weekly	Daily/ weekly	Monthly
Aluminium (mg/L)				Weekly	Weekly	Weekly/ monthly
Iron (mg/L)				Weekly	Weekly	Weekly/ monthly
Manganese (mg/L)				Weekly	Weekly	Weekly/ monthly
Free chlorine (mg/L)					Daily	Weekly/ monthly

Table 3-10. Bundarra operational sampling plan

Characteristic	Raw	Filtered	Clear
pH	Daily	Daily	Daily
Turbidity (NTU)	Daily	Daily	Daily
True colour (HU)	Daily	Daily	Daily
Free chlorine (mg/L)			Daily

Action: Develop a process to review operational monitoring data on a monthly and six monthly basis

3.4.3 Corrective Action

- Establish and document procedures for corrective action to control excursions in operational parameters.
- Establish rapid communication systems to deal with unexpected events.

The key risks from the risk assessment were reviewed as part of the risk assessment workshop. CCPs were identified, critical limits assigned (Table 3-7 and Table 3-8) and corrective actions developed (Appendix B).

The disinfection C.t for Uralla has been calculated as 19 mg.min/L using chlorine as the primary disinfectant. This is based upon a residual of 0.5 mg/L at the first customer, 2km from the plant and a pipe diameter of 300mm and flowrate of 60 L/s. The contact tank (30kL) was not included in the calculation; it provides only 8 minutes contact time.

The disinfection C.t for Bundarra has been calculated as 28 mg.min/L using chlorine as the primary disinfectant. This is based upon a residual of 0.5 mg/L leaving the contact tank (125 m^3) and a pump rate of 11 L/s

3.4.4 EQUIPMENT CAPABILITY AND MAINTENANCE

- Ensure that equipment performs adequately and provides sufficient flexibility and process control.
- Establish a program for regular inspection and maintenance of all equipment, including monitoring equipment.

The operational monitoring procedure, and the equipment inspection and maintenance procedure are held at the Uralla WTP. The plants operate stably under a variety of operating conditions and plant and equipment have been modified and updated where necessary to maintain process control.

Action: Develop a program to record modification and update of equipment
Action: Develop a procedure for regular inspection and maintenance of all equipment, including monitoring equipment.

3.4.5 MATERIALS AND CHEMICALS

- Ensure that only approved materials and chemicals are used.
- Establish documented procedures for evaluating chemicals, materials and suppliers.

Bulk purchasing arrangements established by the Region of Councils (ROC) provide assurance of quality. Quotes are sought form reputable suppliers:

- Omega
- Elite
- Orica
- Ionics

Action: Formalise procedures for periodic testing of materials and chemicals upon delivery
Action: Develop procedures for testing materials and chemicals to troubleshoot plant operations

3.5 ELEMENT 5: VERIFICATION OF DRINKING WATER QUALITY

3.5.1 DRINKING WATER QUALITY MONITORING

- Determine the characteristics to be monitored in the distribution system and in water as supplied to the consumer.
- Establish and document a sampling plan for each characteristic, including the location and frequency of sampling.
- Ensure monitoring data is representative and reliable.

The following parameters are monitored in the reticulated system at Uralla on a monthly basis:

- pH
- Turbidity
- Total hardness as $CaCO_3$
- True colour
- Aluminium
- Iron
- Manganese

Free chlorine Sampling sites used by Council are shown in Table 3-9.

TABLE 3-11. LIST OF COUNCIL SAMPLING SITES

Uralla	Bundarra
Uralla Shire Council Depot, John Street	Uralla Shire Council Depot, Oliver Street
Rowan Avenue (southern edge of town)	Grace Munro Centre

NSW Health sampling of the distribution system provides ongoing independent verification of the treatment process. Sampling and testing of the following parameters is scheduled weekly at both Uralla and Bundarra:

- pH
- Turbidity
- Free chlorine
- *E. coli*
- Total coliforms

Sampling sites are selected at different parts of each town and are listed in Table 3-10.

TABLE 3-12. LIST OF NSW HEALTH SAMPLING SITES

Site #	Uralla	Site #	Bundarra
5	Uralla Water Treatment Plant	1	8 Oliver Street, Bundarra
6	John Street, Uralla	222	8 Oliver Street, Bundarra
7	Uralla Sewage Treatment Plant	3	Bundarra Hall
111	Uralla Water Treatment Plant		
123	Gostwyck Church, Gostwyck Road, Uralla		
456	Uralla Sewage Treatment Plant		

3.5.2 CONSUMER SATISFACTION

- Establish a consumer complaint and response program, including appropriate training of employees

The Customer Request Management system runs through the front office. All customer enquiries including those regarding broken pipes are logged through this system.

Customer service staff have a formal procedure relating to how customer enquiries are handled. The relevant water treatment plant personnel are notified of the enquiry and the nature of the report.

Action: Develop a formal procedure to log the enquiries that go directly to the operators when called on their emergency contact numbers

3.5.3 SHORT TERM EVALUATION OF RESULTS

- Establish procedures for the daily review of drinking water quality monitoring data and consumer satisfaction.
- Develop reporting mechanisms internally, and externally, where required.

Results of the operators' daily water sample testing is logged in the spreadsheet and any values outside ADWG values are flagged. The CCP tables provide guidance on appropriate actions when values exceed adjustment and critical limits.

Action: Formalise process to identify and report water quality exceedences including near misses to CCPs

3.5.4 CORRECTIVE ACTION

- Establish and document procedures for corrective action in response to non-conformance or consumer feedback.
- Establish rapid communication systems to deal with unexpected events.

Key operational and communication procedures are documented in Appendix A. The NSW Health Drinking Water Monitoring program provides response protocols for microbiological quality, physical and chemical quality, and treatment failure. The protocols can be found at http://www.health.nsw.gov.au/environment/water/Pages/Drinking-Water-Quality-and-Incidents.aspx

Council performs all connections to the water distribution system and testing of all devices. All new meters (currently around 90 per cent of meters in both Uralla and Bundarra) have a dual check valve.

The results of backflow testing are recorded in the book provided by the NSW Officer of Water (previously Department of Land and Water Conservation)

Action: Review and implement Action Plan component flowing out of Annual Report
Action: Develop and implement a policy for the installation and monitoring of backflow prevention devices including the use of the Backflow Prevention and Cross Connection Control Guidelines published by the Water Directorate

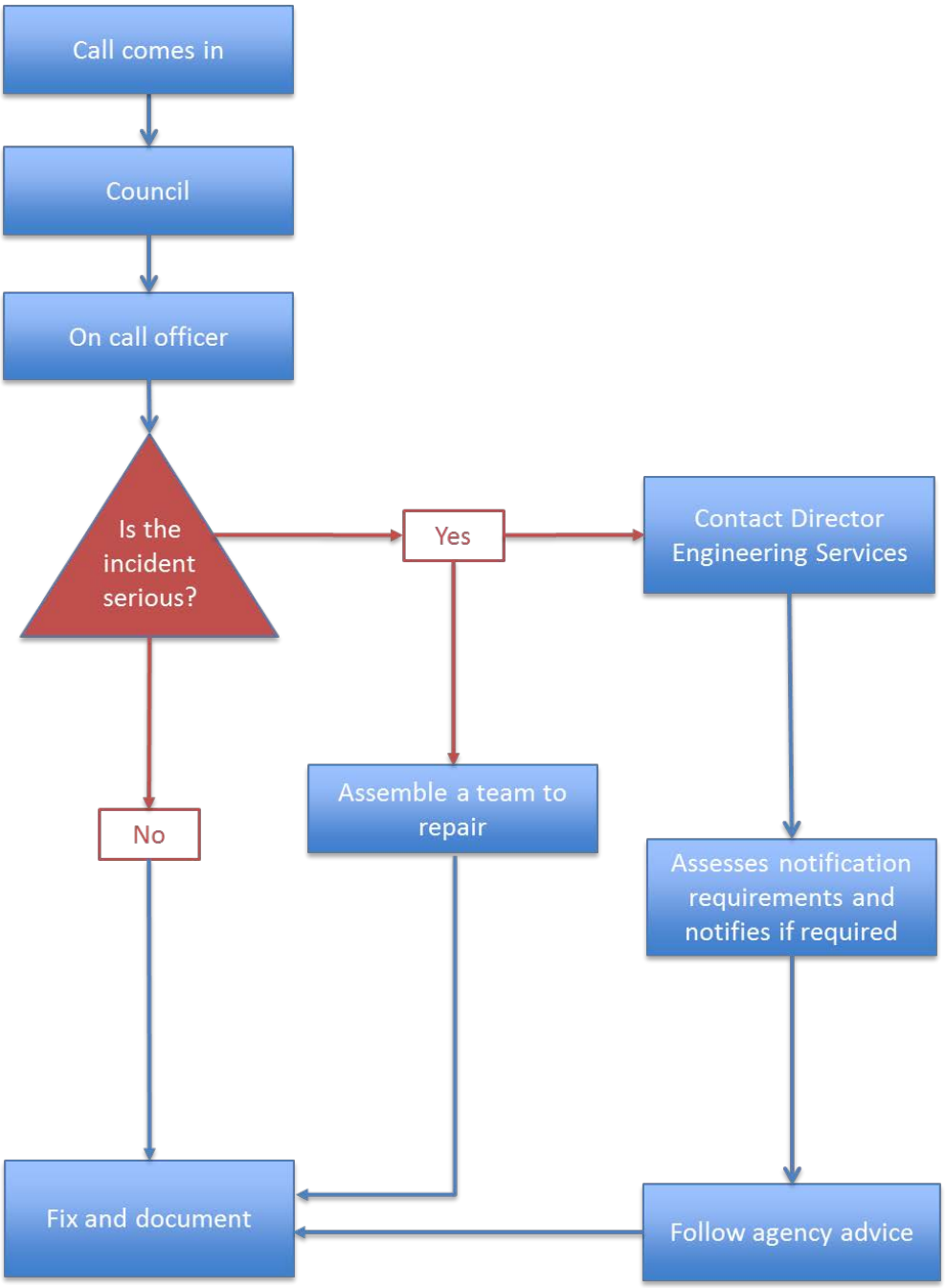
3.6 ELEMENT 6: MANAGEMENT OF INCIDENTS AND EMERGENCIES

3.6.1 COMMUNICATION

- Define communication protocols with the involvement of relevant agencies and prepare a contact list of key people, agencies and businesses.
- Develop a public and media communications strategy

A water related incident and emergency response flowchart was developed in the risk assessment workshop (Figure 3-3).

FIGURE 3-3. WATER RELATED INCIDENT AND EMERGENCY RESPONSE FLOW DIAGRAM



Communication protocols for water related incidents and emergencies follow the flowchart shown in Figure 3-3. The following are detailed in the Pollution Incident Response Management Plan (PRIMP):

- Contact details for council personnel
- Notification details for external parties
- Contact details for media releases

Communication protocols for disasters are contained within the combined Armidale area DISPLAN:

- Annexure A with contact details of those at risk in an emergency
- Mobilisation of resources at different stages of an emergency

NSW Health protocols are available from the NSW Health web site <http://www.health.nsw.gov.au/environment/water/Pages/drinking-water.aspx>. Council will follow these protocols where applicable for:

- Physical and chemical quality
- Treatment failure, Cryptosporidium and Giardia
- Microbiological quality

Action: Develop a process to trigger regular review of non-policy documents including the PRIMP so they remain current

3.6.2 INCIDENT AND EMERGENCY RESPONSE PROTOCOLS

- Define potential incidents and emergencies and document procedures and response plans with the involvement of relevant agencies
- Train employees and regularly test emergency response plans
- Investigate any incidents or emergencies and revise protocols as necessary

The PRIMP defines potential incidents and emergencies and documents procedures and response plans with the involvement of relevant agencies. This includes a list of emergency equipment. The Uralla Shire Council has a CB radio system with a unique channel for Council to use during incidents and emergencies to assist in communication.

Radio and television stations are used to communicate boiled water alerts to the community and pamphlets are distributed to communicate planned works being undertaken.

New incident protocols are reviewed with staff before training is provided to ensure the guidelines are followed. Minor incidents have been used in the past to check protocols. Investigations of incidents relate to the scale and type of incident or emergency. The Director Engineering Services is responsible for the investigation and revision of protocols if necessary for minor incidents. Investigation and revision of protocols following major incidents would be done in conjunction with relevant external agencies. There is an Incident Log Form in the PRIMP.

Action: Review current PRIMP to include implementation of the incident response flow diagram developed during the risk assessment workshop
Action: Review the telephone contact list in the PRIMP to ensure that details of all parties needed are included

3.7 ELEMENT 7: EMPLOYEE AWARENESS AND TRAINING

3.7.1 EMPLOYEE AWARENESS AND INVOLVEMENT

- Develop mechanisms and communication procedures to increase employees' awareness of and participation in drinking water quality management

Council receives and makes available to staff water industry newsletters from the Water Directorate and NSW Health.

Council maintains contacts within the water industry including peers from other councils. A Council representative attends local government meetings. Toolbox talks are held with employees to inform them of any relevant changes, for example to provide consultation through the development of the PRIMP.

3.7.2 EMPLOYEE TRAINING

- Ensure that employees, including contractors, maintain the appropriate experience and qualifications
- Identify training needs and ensure resources are available to support training programs
- Document training and maintain records of all employee training

Council is committed to maintaining a workforce structure that meets service requirements in the community and to creating an organisation that supports staff to develop their own skills. Position descriptions for all roles are maintained and reviewed annually. The grade of each position is reviewed and training needs are identified and prioritised with requirements versus advancements. Records are kept of all training attended and requiring renewal, with the Water/Sewer Ganger organising identified training for employees.

An annual review of water and sewer operations, including equipment and training is performed.

3.8 ELEMENT 8: COMMUNITY INVOLVEMENT AND AWARENESS

3.8.1 COMMUNITY CONSULTATION

- Assess requirements for effective community involvement.
- Develop a comprehensive strategy for community consultation.

Council has in place a Community Strategic Planning Process. Every four years as part of their Community Strategic Plan a series of public meetings are held. The community is asked what levels of service they expect in terms of the provision of water and sewerage. The Community Engagement Policy is reviewed annually with the input from the four yearly public meetings included as collected.

Council also engages with the community through a monthly newsletter publication posted to every residence within the Shire.

When the issue of joining the two monetary funds for Bundarra and Uralla was raised, Council held community debate to facilitate community consultation.

3.8.2 COMMUNICATION

- Develop an active two-way communication program to inform consumers and promote awareness of drinking water quality issues.

Council has a documented communication strategy including their Community Engagement Policy, newspapers, monthly newsletter, letters of notification, road trips staged with a booth for community engagement, radio and television communication and delivery of pamphlets having all been used successfully in the past and able to be implemented when required.

3.9 ELEMENT 9: RESEARCH AND DEVELOPMENT

3.9.1 INVESTIGATIVE STUDIES AND RESEARCH MONITORING

- Establish programs to increase understanding of the water supply system.
- Use information to improve management of the water supply system.

Health Stream is a quarterly public health bulletin established by the Cooperative Research Centre for Water Quality and Treatment and now produced by Water Research Australia. Council pass this newsletter on to operators as relevant.

The Water Managers Group within the ROC has a charter to identify and document all relevant regulatory and formal requirements. Uralla Shire Council keeps up to date with this by regular participation within this group and receives regular updates from the Water Directorate.

3.9.2 VALIDATION OF PROCESSES

- Validate processes and procedures to ensure that they are effective at controlling hazards.
- Revalidate processes periodically or when variations in conditions occur.

Process	Location	Parameter	Validation
Clarifier	Uralla	Turbidity	The limits have been established based on operational history to achieve effective clarification and filtration.
Filtration	Uralla and Bundarra post filtered water	Turbidity	0.2 NTU selected as target as plants are regularly achieving this value. 1 NTU selected for the critical limit based on ADWG guidance for effective disinfection
Chlorine disinfection	Uralla and Bundarra	Free chlorine residual	Free chlorine target for Uralla and Bundarra has been set to achieve a 4 log inactivation of coxsackievirus B5[1]. The C.t and parameters used for its calculation are in Section 3.4.3. For Uralla the calculation is based upon contact time in the pipe to the first customer. For Bundarra the calculation is based upon the chlorine contact tank. The targets also ensure sufficient residual throughout the reticulation system.
Fluoridation	Uralla and Bundarra finished water	Fluoride	Target criteria is set from the NSW Fluoridation Code of Practice. Adjustment limits have been set for 10% of the target criterion. Critical limit has been set based on 95th percentile upper limit requirements under the NSW Fluoridation Code of Practice.
Distribution	Reticulation systems	Free chlorine residual	The routine testing of chlorine residual in the reticulation provides evidence that reservoirs have not been compromised.

NSW Health sampling of the distribution system provides ongoing validation of the treatment process. These samples are taken at Uralla Water Treatment Plant, Uralla Sewage Treatment Plant, Gostwyck Church, John Street and Bundarra Hall.

Council also undertakes simultaneous in-house sampling for pH, turbidity and free chlorine. The disinfection C.t has been calculated as chlorine is used as the primary disinfectant, and is given in Element 4, Section 3.4.3.

Action: Implement daily chlorine monitoring prior to first customer to ensure C.t is achieved
Action: Implement weekly monitoring in the reticulation
Action: Review weekly reticulation monitoring data every six months to confirm chlorine dosing levels

[1] Black, S. Thurston, J. and Gerba, C. 2009, *Determination of Ct values for chlorine of resistant enteroviruses*, Journal of Environmental Science and Health, Part A: Toxic/Hazardous Substances and Environmental Engineering 44:4, 336-339

3.9.3 DESIGN OF EQUIPMENT

- Validate the selection and design of new equipment and infrastructure to ensure continuing reliability.

Council engages external consultants and experienced contractors for any upgrade works to ensure new or modified treatment works are suitable. A Section 60 approval for upgrade works also ensures validation of equipment and infrastructure.

3.10 ELEMENT 10: DOCUMENTATION AND RECORD KEEPING

3.10.1 MANAGEMENT OF DOCUMENTATION AND RECORDS

- Document information pertinent to all aspects of drinking water quality management.
- Develop a document control system to ensure current versions are in use.
- Establish a records management system and ensure that employees are trained to fill out records.
- Periodically review documentation and revise as necessary.

Council uses TRIM for document control in areas relating to council correspondence. Technical services stores electronic information on the shared services drive.

Daily water quality records are stored electronically. Council submits its fluoride records to NSW Health electronically.

Action: Ensure current versions of non-policy documents are in use and have a regular review cycle

3.10.2 REPORTING

- Establish procedures for effective internal and external reporting.
- Produce an annual report to be made available to consumers, regulatory authorities and stakeholders.

Council reports annually to NSW Office of Water. Daily water quality results are entered into a spreadsheet. Outcomes from analysis are reported to Council and are available through the business paper.

Financial position is reported monthly to Council.

Water quality reports for the samples tested by NSW Health can be retrieved from the NSW Health Drinking Water Database.

3.11 ELEMENT 11: EVALUATION AND AUDIT

3.11.1 LONG TERM EVALUATION OF RESULTS

- Collect and evaluate long-term data to assess performance and identify problems.
- Document and report results.

Council reviews and submits data as part of the NSW Office of Water annual performance reporting. Reports on water quality can be generated through the NSW Drinking Water Database. Council has records of historical data analysis and reports all data collected as part of the NSW Health Monitoring Program. Actions to improve compliance with this element are captured in the Action and Continuous Improvement Plan (Appendix D).

Action: Develop procedures for the long term review of raw, treated and reticulated water quality data and documentation reporting the review outcomes.

3.11.2 AUDIT OF DRINKING WATER QUALITY MANAGEMENT

- Establish processes for internal and external audits.
- Document and communicate audit results.

A gap analysis audit of Uralla Shire Council's water supply system was undertaken 21st October 2013. The results of the gap analysis were used to facilitate development of this document. The NSW Health Drinking Water Database is used to document water quality results and was interrogated as part of the preparation for the risk assessment workshop on 27th and 29th November 2013.

Procedure based inspections of the system are carried out by operators. External inspections of the system are carried out by NSW Office of Water (NOW) inspectors. Council reviews its water quality results prior to a visit from the NOW inspector. These results are discussed as part of the inspection. Reports of findings are provided by the inspectors and are used to help direct works.

A preliminary internal audit schedule has been developed (Table 3-11).

TABLE 3-13. INTERNAL AUDIT SCHEDULE

Item verified	Method	Frequency	Responsibility	Objectives	Reference
Critical control points	Internal audit of operational activities identified in the CCP information	Quarterly	Director Engineering Services	Conformity between the CCP information and operational practices	Internal audit findings summary
Critical limit monitoring instruments	Cross-check of critical limit monitoring instruments	Quarterly [1]	Director Engineering Services	Check calibration by local operator and cross-checking operator	Calibration sheets
DWMS	Internal audit of DWMS for sample of processes and systems	Annually	Director Engineering Services	Conformity between the DWMS and practices	Internal audit findings summary

Note 1: *Frequency to be reviewed after one year and altered based on findings.*

Action: Develop a Strategic Business Plan
Action: Independent audit undertaken before March 2017

3.12 ELEMENT 12: REVIEW AND CONTINUAL IMPROVEMENT

3.12.1 REVIEW BY SENIOR EXECUTIVE

- Senior executive review of the effectiveness of the management system.
- Evaluate the need for change.

The General Manager engages directly with the community regarding local issues including water. The community has his direct line to his office. In addition, the General Manager maintains informal oversight through personal use of the water.

There is a good relationship with two way communication between the General Manager, the Water/Sewer Ganger and the Director of Engineering Services

Weekly executive meetings (MANEX) and held and minuted. These minutes are confidential but are provided to the Council and findings reported.

The General Manager reports to the Mayor and Council through s briefing twice per month.

The NSW Office of Water report goes to Council via the General Manager. The outcome report from NOW is sent to the General Manager and tabled in the Council meeting.

The General Manager visits any sites where significant incidents occur.

The Council budget is structured to allow full payment of employees. Sufficient funds for the materials required at the water treatment plants are calculated and then this goes to the Directors who manage the money.

This Drinking Water Management System and its implementation will be reviewed regularly (at least annually) to ensure that it maintains currency with the water supply operation and management.

Action: Include the DWMS as a policy document to ensure annual review and evaluation. Where possible, include the PHU and NOW regional officer in the review process.

3.12.2 DRINKING WATER QUALITY MANAGEMENT IMPROVEMENT PLAN

- Develop a drinking water quality management improvement plan.
- Ensure that the plan is communicated and implemented, and that improvements are monitored for effectiveness.

The Action and Improvement Plan is captured in Appendix D. The Director Engineering Services is responsible for the implementation and oversight of the plan. Individual actions are assigned to the appropriate organisation.

The Action and Improvement Plan is used by the Director Engineering Services to monitor the implementation of the DWMS. The plan is subject to 12 monthly reviews with the General Manager.

Appendix A – Operational Information

This appendix contains the following operational information:

- Bundarra routine procedures
- Critical control points

BUNDARRA ROUTINE PROCEDURES

DAILY PROCEDURE

1. Security check:
    - Lock on gate
    - No visible sign of entry / vandalism

2. Walk through of building and plant:
    - Check for leaks in dosing equipment (chlorine & alum)
    - Checking the chemical levels and consider need to order
    - Unusual sounds

3. Enter the building:
    - Visual of control board to check for lock-outs:

        1. If not OK investigate and record in plant diary.
        2. If OK undertake sampling and testing:

	pH	Turbidity	Colour	Fluoride	Free & total chlorine
Raw water					
Clear water					

- Complete daily log sheet.
- Complete fluoride calculations in plant diary and complete NSW Health fluoride Form 4
- Inspect fluoride room. Top up saturator if necessary.
- Inspect soda ash room. Top up if necessary.
- Walk around the settling lagoon and check the condition of the ponds (looking for clarity, sludge accumulation and any animal access).

FORTNIGHTLY PROCEDURE

Undertake NSW Health Sampling at the hospital and depot

MONTHLY PROCEDURE

Take NSW Health Fluoride sample from Bundarra depot and fax daily entries to Uralla depot

BACKWASH PROCEDURE

Backwash should be undertaken when:

- Turbidity > 1.0 NTU
- Plant has shut down on head loss (level switch)
- Once a fortnight (minimum)
- 1 ML since last backwash (recorded in log sheet)

Procedure:

1. At the control board in the control room switch the plant to BACKWASH mode:
2. Go to filter and open valve (NUMBER VALVES AND ADD NUMBER TO PROCEDURE)
3. Wait for filter to drain and hose walls if required (e.g. slime)
4. Climb up ladder to top of filter
5. Open backwash valve 3-4 turns initially
6. Start the backwash pump (switch is at top of filter)
7. Open backwash valve fully
8. Monitor backwash until the media become clear (4-6 minutes)
9. Shut down backwash pump
10. Close backwash valve
11. Climb back down and close the filter valve
12. Go to the control board in the control room and switch the plant to NORMAL mode.

Contact Numbers

Electrician	
ABB Kent	
Chemical Suppliers	
Orion Pacific	
Mechanic	
Welder	
W&S Uralla	0427 784 304
Howards Electrical	6778 4062
Mick	6723 7413 / 0428 406 517

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Appendix B – Critical Control Points

Appendix C – Risk Assessment Paper

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Appendix D – Action and Continuous Improvement Plan

Actions arising from the Gap Analysis and Risk Assessment are shown in the table below. The first two numbers of each action refer to the Element and the Component numbers for ease of cross-referencing back to the Framework.

Action #	Follow-up actions	Person Responsible	Timeframe	Action comment	Date complete	12 month review	Review sign off
1.2.1	The key formal requirements should be reviewed and considered when the Strategic Business Plan is updated						
1.2.3	Communicate regulatory and formal requirements to the staff and review requirements on an annual basis						
1.3.1	Assign responsibility for maintaining the Stakeholder Register including the review cycle						
2.1.1	Review record keeping for water testing						
2.1.2	Update plant manual and procedures						
3.1-S1	Ensure ongoing professional development program for operators						
3.1-S2	Review need for help with data analysis, trending and QA to address resourcing issues						
3.1-S3	Need for development of a process manual for the plant to address potential operator error						
3.1-S4	Review protozoan risk once NSW Health study results are released to address turbidity above 0.2 NTU						
3.1-S5	Consider refresher courses in fluoridation training for operators who are not undertaking this routinely						
3.1-S6	Discuss a pesticide monitoring project with NSW Health to address biocides in catchment						
3.1-S7	Add a formal response to a chemical spill within the catchment to the Pollution Incident Management Response Plan						
3.1-S8	Establish a communication protocol with NSW Health that NSW Health informs Council of a known issue compromising water source quality						
3.1-S9	Formalise capturing of customer complaints						
3.1-S10	Reconsider destratification for dam to help control algae						

Action #	Follow-up actions	Person Responsible	Timeframe	Action comment	Date complete	12 month review	Review sign off
3.1-U1	Consider if pH adjustment (acid) or buffering is needed to help with algal blooms in dam						
3.1-U2	Consider whether an online raw water pH meter would be useful to address rapid change in water pH						
3.1-U3	Consider whether mid-point chlorination would be useful						
3.1-U4	Look at assessing disinfection by-products as a NSW Health research sampling project						
3.1-U5	NSW Health Water Unit to follow up with NSW Health Forensic Analytical Science Services regarding unusual water chemistry affecting fluoridation						
3.1-U6	Add manganese testing to the raw water tests to address laundry effects						
3.1-U7	Recruit and train another person with appropriate aptitude and culture at Bundarra to be a relief operator						
3.1-B1	Operators to find out volume of supernatant returned to address potential for pathogen accumulation						
3.1-B2	Consider putting a concrete apron in place to address vegetation in the settling pond						
3.1-B3	Review whether backwash return needs to be rethought to address potential for pathogen accumulation						
3.1-B4	Review properties with medium to high risk of backflow for the need to install backflow prevention						
3.1-B5	Review triggers for PAC dosing						
3.1-B6	Need for online chlorine meter with automatic shutdown to address: pH above 8.2, high chlorine demand in water, underdosing or failure of dosing equipment						
3.1-B7	Ensure ongoing professional development program for operators						

Action #	Follow-up actions	Person Responsible	Timeframe	Action comment	Date complete	12 month review	Review sign off
3.2.1	Display the CCP details at each WTP						
4.1.1	Review, update and formalise operational procedures						
4.1.2	Compile procedures into an operations manual						
4.2.1	Develop a process to review operational monitoring data on a monthly and six monthly basis						
4.3.1	Develop a program to record modification and update of equipment						
4.3.2	Develop a procedure for regular inspection and maintenance of all equipment, including monitoring equipment						
4.5.1	Formalise procedures for periodic testing of materials and chemicals upon delivery						
4.5.2	Develop procedures for testing materials and chemicals to troubleshoot plant operations						
5.2.1	Develop a formal procedure to log the enquiries that go directly to the operators when called on their emergency contact numbers						
5.3.1	Formalise process to identify and report water quality exceedences including near misses to CCPs						
5.4.1	Review and implement Action Plan component flowing out of Annual Report						
5.4.2	Develop and implement a policy for the installation and monitoring of backflow prevention devices including the use of Backflow Prevention and Cross Connection Control Guidelines published by the Water Directorate						
6.1.1	Develop a process to trigger regular review of non-policy documents so they remain current						
6.2.1	Review current PRIMP to include implementation of the incident response flow diagram developed during the risk assessment workshop						

Action #	Follow-up actions	Person Responsible	Timeframe	Action comment	Date complete	12 month review	Review sign off
6.2.2	Review the telephone contact list in the PRIMP to ensure that details of all parties needed are included						
9.2.1	Implement daily chlorine monitoring prior to first customer to ensure C.t is achieved						
9.2.2	Implement weekly monitoring in the reticulation						
9.2.3	Review weekly reticulation monitoring data every six months to confirm chlorine dosing levels						
10.1.1	Ensure current versions are in use and have a regular review cycle						
11.1.1	Develop procedures for the long term review of raw, treated and reticulated water quality data and documentation reporting the review outcomes						
11.2.1	Develop a Strategic Business Plan						
11.2.2	Independent audit undertaken before March 2015						
12.1.1	Include the DWMS as a policy document to ensure annual review and evaluation						

Appendix E – Other Formal Requirements Relating to Water Quality

Instrument	Jurisdiction	Type	Relevance
Environment Protection and Biodiversity Conservation Act 1999	Commonwealth	Statute	Catchment management in particular for areas of national environmental significance
Competition and Consumer Act 2010	Commonwealth	Statute	Fitness for purpose of drinking water, evaluate capacity for third party access within Council's operations
Water Act 2007	Commonwealth	Statute	Under Part 7 of the *Water Act 2007*, the Bureau of Meteorology is required to collect, hold, manage, interpret and disseminate Australia's water information. Section 126 of the Act places an obligation on persons specified in the Regulations to give certain water information to the Bureau.
Water Regulations 2008	Commonwealth	Regulation	The Regulations define who must give specified water information to the Bureau and the time and format in which it must be supplied.
AS ISO 22000-2005 Food safety management systems-Requirements for any organisation in the food chain	National	Standard	Analogous to the ADWG Framework but would allow certification to that standard if sought
ISO31000:2009 Risk Management	National	Standard	Includes guidance on the use of risk assessment and management
Water Services Association of Australia Water Supply Codes	National	Best practice	Includes methodologies for undertaking a range of water supply works including distribution system management
Catchment Management Authorities Act 2003	NSW	Statute	Catchment management
Environmental Planning and Assessment Act 1979 No 203	NSW	Statute	Planning activities which require assessment
Fair Trading Act 1987	NSW	Statute	Includes provisions for goods (and services) to be fit for purpose
Fisheries Management Act 1994	NSW	Statute	Protection of fish habitats (including threatened and protected species management) and aquaculture management
Food Act 2003	NSW	Statute	Need to maintain water quality
Forestry Act 2012 No 96	NSW	Statute	Management of state forests
Mining Act 1992	NSW	Statute	Possible extraction of resources within catchment areas
Native Vegetation Act 2003	NSW	Statute	Native vegetation management (in the context of catchment management)
Natural Resources Commission Act 2003	NSW	Statute	Catchment management
Plantations and Reafforestation Act 1999	NSW	Statute	Regional forest agreements

Instrument	Jurisdiction	Type	Relevance
Local Government (General) Regulation 2005	NSW	Regulation	Audit and management of onsite sewage management systems (protects water quality from leaking sewage)
Protection of the Environment Operations Regulation 1998	NSW	Regulation	Submit annual National Pollutant Inventory (NPI) returns if any of the specified reporting thresholds are exceeded (water contamination issues)
Rivers and Foreshores Improvement Act 1948	NSW	Statute	Protection of rivers and lakes
Roads Act 1993	NSW	Statute	Planning of roads (and how they might impact on source waters)
Soil Conservation Act 1938	NSW	Statute	Soil management (in the context of catchment management)
Threatened Species Conservation Act 1995	NSW	Statute	Catchment management
Water Industry Competition Act 2006	NSW	Statute	Could allow a private company to access Council's reticulation systems
Water Industry Competition (General) Regulation 2008	NSW	Regulation	Sets out the requirements to be addressed in a WICA licence
Water Management Act 2000	NSW	Statute	Water management, drainage, water licences, water/river management committees, strategic business planning;
Wilderness Act 1987	NSW	Statute	Catchment management