Urban WaterManagement Strategy

ballina shire council




Ballina Shire Council

Drinking Water Management System

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Drinking Water Management System

Ballina Shire Council

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Introduction

This Drinking Water Quality Management System (DWMS) for the Ballina Shire Council drinking water supply scheme has been developed in accordance with the twelve elements of the *Australian Drinking Water Guidelines* (ADWG) and with reference to the NSW *Guidelines for Drinking Water Management Systems* (Draft – 2012).

This DWMS contains or references all policies, procedures and registers, as supporting documents and appendices that are required to meet the *Public Health Act 2010* requirement for drinking water suppliers to develop and implement a quality assurance program to maintain drinking water quality.

Ballina Shire Council

Ballina Shire is located in the northern rivers region of the far north coast of New South Wales, covers an area of 687 km^2 with a shire population of 42,708 (2010) and makes up approximately 10% of the Richmond River catchment area of 6864 km^2. Some of the main localities within the council area include Lennox Head in the north, Wollongbar and Alstonville in the west, Ballina in the east and Wardell in the south. Figure 1 provides an overview of the Ballina Shire Local Government Area.

Figure 1 Ballina Shire Council Local Government Area

Detailed descriptions and diagrams of the schemes, treatment plants and distributions systems are presented in the *Risk Assessment Workshop Report* (Appendix A).

Table 1 provides a brief overview of the Ballina Shire Council service. Figure 2 provides a projection of the expected population growth for Ballina Shire.

Table 1 Water Service Summary

Service Description	Details
Local Water Utility Name and Contact Details	Ballina Shire Council Cnr Cherry and Tamar Streets Ballina NSW 2478 (02) 6686 4444
Schemes that the plan refers to	Wardell including Cabbage Tree Island – treatment and supply Alstonville & Wollongbar – Supply only from Lismore pipeline Ballina and Lennox Heads – Supply only from Knockrow Reservoir
Communities served	Ballina Alstonville
Current Population (2010)	42, 708

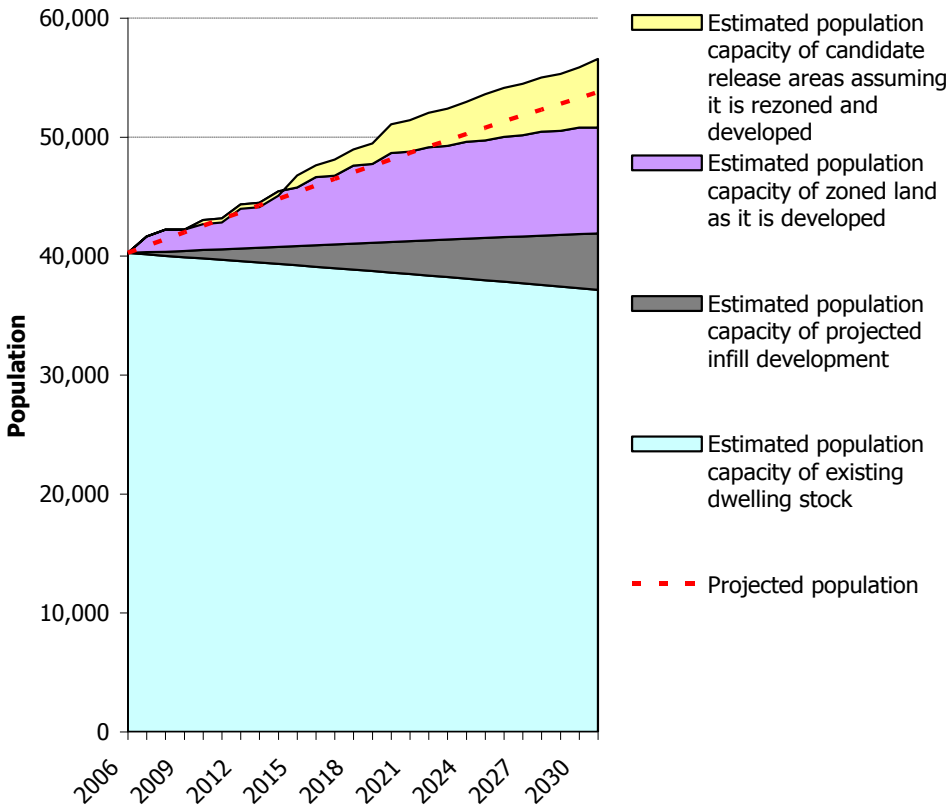

Figure 2 Population Projections

Scope

This DWMS covers the Ballina Shire Council water supply scheme; the collection, treatment and distribution of water to the Wardell System including Cabbage Tree Island and the distribution of bulk water supplied by Rous Water to Ballina, Lennox Heads, Alstonville and Wollongbar.

Coverage of this DWMS starts at the receiving point of Wardell catchment and bulk water transfer points and finishes at the point of supply of drinking water to customers.

1. Commitment to Drinking Water Quality Management

1.1. Drinking Water Quality Policy

Ballina Shire Council has developed a Drinking Water Quality Policy that was adopted in June 2012. The policy outlines Ballina Shire Council's commitment to managing its water supply effectively to provide a safe, high-quality drinking water that protects public health and consistently meets the NHMRC/NRMMC *Australian Drinking Water Guidelines*, and consumer and other regulatory requirements. A copy of policy is attached (Appendix B).

Table 2 identifies Ballina Shire Council's planning documents that are relevant to the DWMS and contain supporting information. These documents are available on the Ballina Shire Council website.

Table 2 Ballina Shire Council Planning Documents

Guideline	Planning Document	Details
NSW Water and Sewerage Strategic Business Planning Guidelines Planning and Reporting Guidelines for Local Government in NSW	• Delivery Program 2012-2013 • Operational Plan 2012 - 2013 • Community Strategic Plan 2010- 2025	Documentation available on Ballina Shire Council's website (www. www.ballina.nsw.gov.au)
Urban Water Management Strategy	• Urban Water Management Strategy • Urban Water Policy Statement • Ballina- Lennox Head Recycled Water Master Plan	Dated July 2003 Documentation available on Ballina Shire Council's website

1.2. Regulatory and Formal Requirements

Ballina Shire Council are required to comply with a range of regulatory instruments and guidelines. Ballina Shire Council identifies legislative requirements for each specific policy with in the relevant policy document. The *Legal and Other Requirements Register* (Appendix C) summarises the key regulatory requirements for Ballina Shire Council and how Council complies with those requirements.

Ballina Shire Council distributes water supplied by Rous Water under the *Water Supply Agreement*, referred to as the Service Level Agreement (SLA). The SLA was developed in March 2008 and is an agreement between Rous Water and four constituent councils - Byron Shire Council, Ballina Shire Council, Ballina Shire Council and Richmond Valley Council.

1.3. Engagement

1.3.1. Employee Responsibilities

Those employees within the Ballina Shire Organisational Structure depicted in Figure 3, with responsibilities directly related to water quality management have those requirements relevant to their position reflected in their Position Description.

The Drinking Water Policy states that all managers and employees involved in the supply of drinking water are responsible for understanding, implementing, maintaining and continuously improving the DWMS.

Figure 3 Organisational Structure

1.3.2. Communication with Employees

Ballina Shire Council's drinking water policy contains a commitment to ensuring that all managers and employees involved in the supply of drinking water are responsible for understanding, implementing, maintaining and continuously improving the drinking water quality management system. Ballina Shire Council communicate with staff about drinking water management and their obligations and responsibilities during annual performance reviews and regular meetings.

1.3.3. Identifying and Communicating Regulatory Changes

It is the responsibility of Ballina Shire Council to ensure regulatory compliance. Ballina Shire Council reviews legislative requirements as part of the strategic business planning process and communicates the requirements through the strategic business planning reporting process.

Any changes to this DWMS due to regulatory and formal requirements are to be communicated to relevant managers, employees and contractors.

1.3.4. Engaging Stakeholders

Many aspects of drinking water quality management require involvement with other agencies and stakeholders. Similarly, consultation with relevant health and other regulatory authorities is necessary for establishing many elements of the DWMS, such as monitoring and reporting requirements, emergency response plans and communication strategies. This means establishing two-way communication paths with state government departments, Ballina Shire Council customers, contractors and other local water utilities.

Ballina Shire Council have prepared a *Community Consultation Policy* (Policy Reference C14) that sets out Council's commitment to engage and consult with the community using agreed protocols

Ballina Shire Council have prepared a draft *ADWG Stakeholder Engagement Register* that identifies the relevant stakeholders for the drinking water service and the communication between Council and each stakeholder. Table 3 summarises the key stakeholders for the DWMS and how Ballina Shire Council communicates with them.

Table 3 Stakeholder Summary

Stakeholder	Engagement	Comments
Rous Water	Water Supply Agreement Communication relating to water supply, quality, disruptions etc.	The Water Supply Agreement contains protocols for communication between Rous Water and the constituent councils
Community/ consumers	Communication relating to water supply, quality, disruptions etc. Integrated Planning and Reporting process	Council Community Consultation Policy (Policy Reference C14)
NSW Health	NSW Health Drinking Water Monitoring Program Notifications of water quality issues as per protocols	NSW Health attended Ballina Shire Council's DWMS Risk Assessment Workshop NSW Health provide advice on public health and regulatory issues
NSW Office of Water (NOW)	Annual performance reporting	NOW attended Ballina Shire Council's DWMS Risk Assessment Workshop NOW provide advice and undertake inspections of treatment plants and water supply systems

2. Assessment of the Drinking Water Supply System

The assessment of the drinking water supply system is an essential prerequisite for subsequent steps in which effective strategies for prevention and control of hazards are planned and implemented. This includes understanding the characteristics of the drinking water system, what hazards may arise, how these hazards create risks, and the processes and practices that affect drinking water quality. The drinking water supply system is defined as everything from the point of collection of water to the consumer and can include:

- catchments, including groundwater systems
- source waters;
- storage reservoirs and intakes
- treatment systems
- service reservoirs and distribution systems
- consumers

Water quality can be affected at each of these points, and because they are all interrelated, integrated management is essential.

2.1. System Analysis

The Ballina Shire Council supply system is described the *Risk Assessment Workshop Report* and the *Risk Assessment Briefing Paper* (Appendix A). The scheme description, layout plans and process flow diagrams were reviewed and verified at the risk assessment workshop.

2.2. Assessment of Water Quality Data

A review of historical water quality data can assist in understanding source water characteristics and system performance both over time and following specific events such as heavy rainfall. This can aid the identification of hazards and aspects of the drinking water system that require improvement. Water quality should be reviewed at last annually and used to inform the risk assessment.

Water quality data from routine conditions as well as complaints, exceedences and climatic information have been collected and reviewed. The Risk Assessment Briefing Paper contains graphical representations and summary tables of the data for the scheme, which was utilised in the risk assessment process. This was used to help identify, hazards, hazardous events, and long-term trends in water quality.

The water quality analysis was completed prior to the risk assessment workshop and the results are presented in the *Risk Assessment Workshop Report*.

2.3. Hazard Identification and Risk Assessment

Hazards and hazardous events are based on:

- information gathered in Section 2.1 – System Analysis
- information gathered in Section 2.2.– Assessment of Water Quality Data
- hazards added through water treatment or reticulation such as treatment chemicals
- operational experience, gathered during the risk workshop

2.3.1. Assessment of Risks

The process undertaken for the risk assessment was as follows:

- assembly of the risk assessment team, which was:
  - multi-disciplinary, including staff from all areas of operations
  - included at least one member with formal risk assessment training or equivalent experience or skills, the remaining members of the team received an introduction to the risk assessment process, prior to commencing the risk assessment
  - representatives of the constituent councils
- in a workshop with the risk assessment team the following steps were undertaken:
  - analysis of the process flow diagram, describing processes
  - review of background information and related work, which included the characterisation of raw water from all sources
  - identification of microbial, physical, chemical and radiological hazards and their sources and assessment of the inherent risk
  - identification of hazardous events, and limiting hazards, that could occur at each step in the water supply system,
  - assessment of maximum risk using the risk methodology
  - identification of preventive measures and the assessment of residual risk using the risk methodology
  - evaluation of significant risks and identification of required further risk treatments
  - identification of critical control points (CCPs) by assessing each of preventive measures used to reduce risk using a CCP Decision Tree.

Details of the risk assessment and the risk assessment team are described in the *Risk Assessment Workshop Report.* Hazardous events that could have an effect on water quality are listed in order of scheme component in the risk register (*Risk Assessment Workshop Report*).

2.3.2. Methodology

In this risk assessment three different risks were identified:

- **Inherent risk** – this is the level of risk in Ballina Shire Council's Wardell raw water source, Marom Creek and the Lindendale Road and Ellis Road Bores.
- **Maximum risk** – risk without existing barriers/preventive measures in place. Therefore, maximum risk is the inherent risk plus any additional sources of hazards/ hazardous events due to Ballina Shire Council's treatment and /or distribution network.
- **Residual risk** – the risk after current barriers and preventive measures are taken into consideration.

For this risk assessment a risk that was Medium (8) or greater was deemed to be significant (or unacceptable). Significant maximum risks require adequate risk mitigation to be in place and robust operational procedures. Significant residual risks identify a gap in risk mitigation and require further risk treatments to bring the level of risk down to an acceptable level.

Risk scores were assessed using a likelihood and consequence risk matrix, Table 4. The risk score is the intercept of likelihood and consequence.

Table 4 Risk Matrix

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

In identifying risk the first step is to determine the consequence of the hazardous event. The consequence categories used are defined in Table 5.

Table 5 Consequence Descriptors

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

Following the identification of the consequence the likelihood of that consequence materialising was determined using the likelihood categories defined in Table 6. To assist in the categorisation of hazardous events a unit was considered to be a day e.g. a seasonal event that lasted a week was considered to happen seven times per year would have been defined as possible.

The advantage of using "likelihood of the consequence" approach is that it does not overstate risk. If you were to calculate the likelihood of the hazard occurring it would not be a realistic representation.

Table 6 Likelihood Descriptors

Likelihood	Descriptor	Definition
1	Rare	May occur only in exceptional circumstances. E.g. occurs less than or equal to once every 5 years
2	Unlikely	Could occur at some time. E.g. occurs more often than once every 5 years and up to once per year
3	Possible	Might occur or should occur at some time. E.g. occurs more often than once per year and up to once a month (12/yr)
4	Likely	Will probably occur in most circumstances. E.g. occurs more often than once per month (12/yr) and up to once per week (52/yr)
5	Almost Certain	Is expected to occur in most circumstances. E.g. occurs more often than once per week (52/yr)

For each risk assessment the level of uncertainty in the assessment was identified using the definitions in Table 7 as a guide.

Table 7 Uncertainty Descriptors

Level of Uncertainty	Descriptor	Definition
1	Certain	there is 5 years of continuous monitoring data, which has been trended and assessed, with at least daily monitoring; or the processes involved are thoroughly understood
2	Confident	there is 5 years of continuous monitoring data, which has been collated and assessed, with at least weekly monitoring or for the duration of seasonal events; or there is a considerable understanding of the processes involved
3	Reliable	there is at least a year of continuous monitoring data available, which has been assessed; or there is a good understanding of the processes involved
4	Estimate	there is limited monitoring data available; or there is a reasonable understanding of the processes involved
5	Uncertain	there is limited or no monitoring data available; or the processes are not well understood

The results of the risk assessment were recorded in the risk register and is included in the *Risk Assessment Workshop Report* (Appendix A*).* Currency of the risk assessment will be maintained by Ballina Shire Council, the following will trigger a review:

- 12 months follow the last complete review of the risk assessment
- a non-compliance or water quality incident
- ongoing exceedence of a CCP critical limit.

2.3.3. Inherent Risk

The risks that are present in the system are reflective of the catchment and nature of the treatment processes. Significant residual risks that were identified during the Rous Water risk assessment workshop were also included as inherent risks for the Ballina water supply

system. These are the risks inherently in the water that need to be managed by Ballina Shire Council's infrastructure, where possible.

2.3.4. Maximum Risk

Maximum risk is the additional inherent risk plus the risks due to hazards introduced by the treatment process and any problems with the system's integrity. Working out the maximum risk allows operators to identify important preventative measures and barriers.

Full details of the maximum risk assessments are presented in the *Risk Assessment Workshop Report*. It is the maximum risk that must be managed by Ballina Shire Council. Maximum risk was assessed for each hazardous event.

2.3.5. Residual Risk

Details of the residual risk assessment are presented in the *Risk Assessment Workshop Report*.

Residual risk is determined once **existing** preventive measures and barriers have been applied. Residual risk is the level of risk a particular hazard is assessed as posing to the drinking water once the existing preventative measure/s have been applied. Barriers and preventative measures were identified during the risk assessment workshop for identified hazards.

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 DWMS addresses this through the implementation of the following:

- identification of significant hazards
- assessment of hazardous events that result in significant hazards
- formalise preventative measures that manage significant hazards
- critical control points - these are points in the system that can be monitored and action taken, to prevent the process going out of control leading to a non-compliant product, in good time
- improvement actions for unacceptable residual risks

Section 3 discusses preventive measures and barriers in further detail

2.3.6. Uncertainty

Assessing uncertainty provides an indication of the need to undertake further work or gather more data to ensure that the risk assessment is accurate and reliable. This work can be undertaken prior to the finalisation of the DWMS or at a point in the future, in which case these activities should be reflected in the *Improvement Plan* (Appendix F).

3. Preventive Measures for Drinking Water Quality Management

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 DWMS addresses this through the implementation of the following:

- preventive measures that reduce the likelihood of contaminants being at concentration which may cause harm to the consumer
- 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

3.1. Preventive Measures and Multiple Barriers

An important aspect of a drinking water quality management system is a multiple barrier approach to prevent contaminants entering the potable water supply. This DWMS covers the sourcing, treatment, disinfection and distribution of potable water. The barriers that are in place in this component of the water supply system are identified in the *Risk Assessment Workshop Report.*

3.2. Critical Control Points

In HACCP style quality assurance systems monitoring plays a key role in risk management, but the focus is shifted from reliance on end product compliance testing and verification to targeted operational monitoring and processes.

A critical control point (CCP) is defined as an activity, procedure or process at which control can be applied and which is essential to prevent a hazard or reduce it to an acceptable level. Not all activities are amenable to selection as critical control points. A critical control point 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

All preventative measures identified in the risk assessment were assessed using the decision tree identified in Figure 4 to determine if they are CCPs. The CCPs for the Ballina Shire Council supply system are identified in Table 8, with the critical and alert limits and the monitoring requirements. Procedures for the monitoring of CCPs and the corrective action and reporting required in response to an exceedence of a critical or alert limit and are presented in Appendix D.

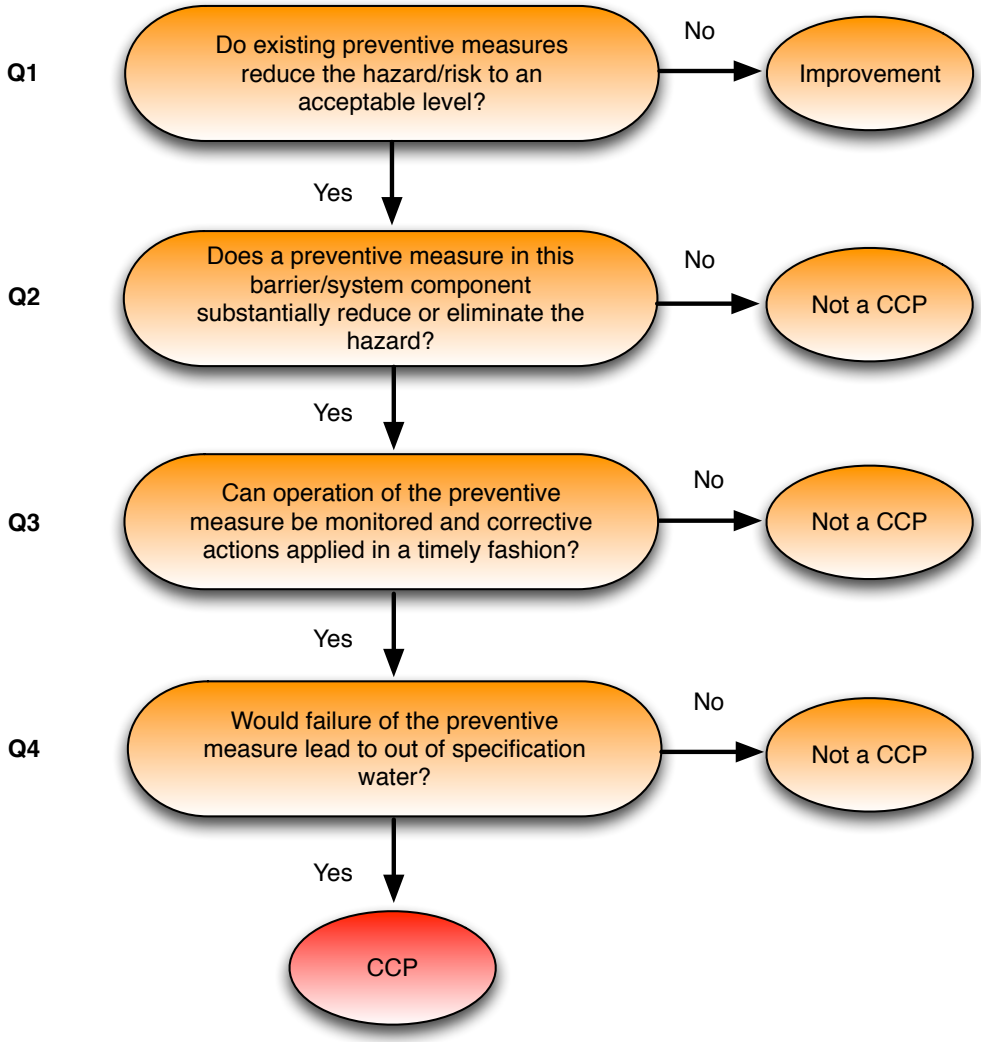

Figure 4 Critical Control Point Decision Tree

Table 8 Critical Control Point Monitoring

Preventive measure	Parameter	Monitoring method	Location	Frequency	Responsibility	Target value for optimal performance	Alert level	Critical limit	Corrective action procedure
Selective abstraction at Weir	Turbidity	Visual inspection Grab sampling	Raw water (Dam)	Daily	Operator	< 5 NTU	5 NTU	10 NTU	Appendix D Cease raw water pumping Adjust alum dose
Coagulation (Alum dosing and pH Correction)	pH	Grab sample	Flocculation pond Dose water	Daily (visual) Daily (grab)	Operator	6.6 - 6.8	<6.6 and >6.8	<6 - >7.5	Appendix D
Filtration	Turbidity	Current - grab Proposed - online	Current - clear water Proposed - filtered water	Current - daily Proposed - continuous	Operator	0.3 NTU	0.5 NTU	1 NTU	Appendix D Limit determined for effective chlorination
Chlorination	Chlorine residual	Grab sample	Clear water tank	Daily	Operator	1.2 - 1.4 mg/L	<1.2 - >1.4 mg/L	Low - <0.5 mg/L High > 5 mg/L	Appendix D AL - Check dosing CL - Shut down

4. Operational Procedures and Process Control

Operational procedures, monitoring and process control are key components of ensuring that consistent and reliable performance is achieved and maintained. These components create a systematic mechanism for process and product checking that fulfils the quality assurance aspect of this DWMS.

4.1. Operational Procedures

Operational procedures formalise the activities that are essential to ensure the provision of consistently good quality water. Detailed procedures are required for the operation of all processes and activities (both ongoing and periodic), including preventive measures, operational monitoring and verification procedures, and maintenance requirements. Table 9 lists the existing procedures and the reference numbers that relate to this DWMS. Formalised procedures for all operations relating to the Ballina Shire Council's water supply system are yet to be developed. Procedures to be developed are identified and prioritised in the *Improvement Plan* (Appendix F).

Table 9 Operational Procedures

Procedure Name	Doc Number	Date revised
CCP Procedures	Appendix D	October 2012
Operational and Verification Monitoring Plan	Appendix E	October 2012
Marom Creek Water Treatment Plant Operation and Maintenance Manual	N/A	2002
Backflow Prevention	BO4	March 2012
Water - 20-25mm Water Meter Replacement Procedure	WC05	01/06/2011
Water - After Hours Procedure	WC12	01/06/2011
Water - Bartletts Lane Reservoir Motorised Valves Procedure	WC37	01/06/2011
Water - Basalt Court Reservoir Motorised Valves Procedure	WC36	01/06/2011
Water - Concrete Bitumen Restoration Works Procedure	WC29	01/06/2011
Water - Concrete Cutting, Pipes etc Procedure	WC27	01/06/2011
Water - Confined Space Entry Procedure	WC34	01/06/2011
Water - Control Red Valves Procedure	WC22	01/06/2011
Water - Dirty Water Complaint Procedure	WC13	01/06/2011
Water - Environmental Procedure	WC21	01/06/2011
Water - Excavation Work Procedure	WC16	01/06/2011
Water - Foreign Matter Entering Water Supply Procedure	WC25	01/06/2011
Water - Hydrant Maintenance Procedure	WC08	01/06/2011
Water - Hydrant Repair Procedure	WC07	01/06/2011
Water - Hydrostatic Test Pump Operating Instructions Procedure	WC42	01/06/2011
Water - Isolation and Lock Out Procedure	WC32	01/06/2011
Water - Leak Detection Procedure	WC11	01/06/2011
Water - Lennox Head Reservoir Motorised Valves Procedure	WC39	01/06/2011
Water - Locating Water and Waste Water Services	WC28	01/06/2011
Water - Mains Cleaning Procedure	WC31	01/06/2011

Procedure Name	Doc Number	Date revised
Water - Meter Maintenance larger than 25mm	WC15	01/06/2011
Water - North Ballina Water Wheels Motorised Valves Procedure	WC41	01/06/2011
Water - North Creek Road Motorised Valves Procedure	WC38	01/06/2011
Water - Poor Pressure Complaint Procedure	WC14	01/06/2011
Water - Relocating Water Meter From Property	WC06	01/06/2011
Water - Restoration Requirements Procedure	WC19	01/06/2011
Water - Roadway Restorations Procedure	WC26	01/06/2011
Water - Ross Lane Meters & Valves Procedure	WC40	01/06/2011
Water - Service Repair Procedure	WC03	01/06/2011
Water - Service Replacement Procedure	WC04	01/06/2011
Water - Service TPNFR Disconnection Procedure	WC24	01/06/2011
Water - Tapping Water Mains 25-50mm Procedure	WC17	01/06/2011
Water - Undertaking Construction Works Procedure	WC30	01/06/2011
Water - Vacuum Excavation Procedure	WC35	01/06/2011
Water - Valve Maintenance Procedure	WC09	01/06/2011
Water - Valve Repair Procedure	WC10	01/06/2011
Water - Water Main Repair larger than 25mm Procedure	WC23	01/06/2011
Water - Water Main Repair Procedure	WC02	01/06/2011
Water - Water Main Shutdown Procedure	WC01	01/06/2011
Water - Work Safety Procedure	WC20	01/06/2011

4.2. Operational Monitoring

Operational monitoring includes the planned sequence of measurements and observations to assess and confirm the performance of preventive measures. Measurements are of operational parameters that will indicate whether processes are functioning effectively.

The procedure for operational monitoring is documented in the *Operational and Verification Monitoring Plan* (Appendix E). Ballina Shire Council currently undertake the operational monitoring of their system using the Water Quality Log Sheets, that are used to record and review all of the results of the operational monitoring undertaken on a day to day basis

The procedure for operational monitoring is documented in the *Operational and Verification Monitoring Plan* (Appendix E). Ballina Shire Council record the results of operational monitoring in the Water Quality Log Sheets, that are used to record and review all of the results of the operational monitoring undertaken on a day to day basis.

4.3. Corrective Action

Procedures are essential for immediate corrective action required to re-establish process control following failure to meet target criteria or critical limits. The procedures should include instructions on required adjustments, process control changes and additional monitoring. Responsibilities and authorities, including communication and notification requirements, should be clearly identified. Corrective action and reporting requirements for the exceedence of CCP critical or alert limits are identified in the CCP procedures in Appendix D.

4.4. Equipment Capability and Maintenance

The capability of equipment is an important consideration in maintaining process control. Equipment and infrastructure in a drinking water supply system need to be adequately designed and of sufficient capacity (size, volume, detention times) to handle all flow rates (peak and otherwise) without limiting performance.

Ballina Shire Council undertake maintenance of equipment in accordance with the *Marom Creek Water Treatment Plant Operation and Maintenance Manua*l. Laboratory equipment used for in-house monitoring is calibrated, in accordance with manufacturers specifications.

The calibration of water treatment equipment is currently undertaken informally, a formalised procedure will be developed as part of the *Improvement Plan* (Appendix F).

4.5. Materials and Chemicals

The selection of materials and chemicals used in water systems is an important consideration as they have the potential to adversely affect drinking water quality. Ballina Shire Council do not have formal procedures for the purchase and use of water treatment chemicals. All chemicals are purchased from regular suppliers that Ballina Shire Council have determined to be reliable, identified in Table 10.

A formalised procedure for the purchase and receipt of chemicals will be developed as part of the *Improvement Plan* (Appendix F).

Table 10 Chemical suppliers

Chemical	Supplier	Contact
Alum	Omega Chemicals	0400 599 379
Liquid Caustic	Omega Chemicals	0400 599 379
Chlorine	Omega Hospitality	66 867 155

5. Verification of Drinking Water Quality

Verification of drinking water quality provides an assessment of the overall performance of the system and the ultimate quality of drinking water being supplied to consumers. This incorporates monitoring drinking water quality as well as assessment of consumer satisfaction.

5.1. Drinking Water Quality Monitoring

Drinking water quality monitoring is a wide-ranging assessment of the quality of water in the distribution system and importantly, as supplied to the consumer. It includes regular sampling and testing to assess whether water quality is complying with guideline values, any regulatory requirements or agreed levels of service.

Ballina Shire Council participate in the *NSW Health Drinking Water Monitoring Program*, the monitoring locations are identified in Table 11. The results from the NSW Health monitoring program are recorded on the NSW Health Drinking Water Database, which Ballina Shire Council can access and review. Review of the NSW Database results are undertaken by the operations engineer and the water treatment plant operator:

- after the result of each microbiological sample is reported
- monthly for trends and water quality implications

Ballina Shire Council participate in the NSW Health Drinking Water Monitoring Program, the monitoring locations are identified in Table 11. The results from the NSW Health monitoring program are recorded on the NSW Health Drinking Water Database and emailed directly to relevant officers within Ballina Shire Council. Review of the NSW Database results are undertaken by the operations engineer and the water treatment plant operator after the result of each microbiological sample is reported.

Ballina Shire will develop a procedure for the monthly monitoring of trends and water quality implications as part of the water quality database identified in the *Improvement Plan* (Appendix F).

Table 11 NSW Health monitoring locations

Water Supply	Location	Details
Wardell	Richmond Street, Wardell	Tap at opposite end of Richmond Street to the pub in a grass reserve
Wardell	Corner Wardell and Marom Creek Roads, Meerschaum Vale	Meerschaum Vale Hall
Wardell	Cabbage Tree Island	Left hand side of bridge leading to the Island
Bulk water distribution (Lismore pipeline)	Mellis Circuit, Alstonville	Public Reserve next to No. 35 Mellis Circuit
Bulk water distribution (Lismore pipeline)	Alstonville	Not Defined

Water Supply	Location	Details
Bulk water distribution (Lismore pipeline)	Simpson Avenue, Wollongbar	Located at Hill Park Oval Toilets
Bulk water distribution (Knockrow reservoir)	Ross Lane, Lennox Head	Lake Ainsworth Caravan Park, opposite the entrance to the beach carpark
Bulk water distribution (Knockrow reservoir)	Riverina Street, Ballina	Tap is located in the garden are to the right of the entrance of the Ballina Central Caravan Park
Bulk water distribution (Knockrow reservoir)	Shelley Beach Road, Ballina	Tap attached to pump station opposite Shelley Beach
Bulk water distribution (Knockrow reservoir)	Riverside Drive, West Ballina	Tap attached to pump station in Falks Reserve
Bulk water distribution (Knockrow reservoir)	Bentick St, Ballina (Ballina Island)	Ballina Public High School Oval

5.2. Consumer Satisfaction

Ballina Shire Council record and respond to consumer water quality complaints and enquires in accordance wit the *Complaints Management Policy* (Policy Reference CO9) which includes the procedure for handling, resolving and reviewing complaints.

Ballina Shire Council maintain a register of complaints within the Records Electronic Document Management System, which are reviewed regularly. Ballina Shire Council is further developing a complaints register in the corporate database. The register will be used to inform future reviews of the DWMS and monitoring plans.

5.3. Short-term Evaluation of Results

Short-term performance evaluation entails the review of drinking water quality monitoring data and consumer satisfaction, to verify that the quality of water supplied to consumers conforms to guideline values. If the quality does not conform, then immediate corrective actions and/or incident and emergency responses are undertaken.

5.4. Corrective Action

If the short-term evaluation of drinking water quality monitoring data indicates non-conformance with guideline values or other requirements, an investigation is undertaken and, if necessary, a corrective action implemented as quickly as possible, in accordance with NSW Health Protocols. Failure to take immediate or effective action may lead to the development of a more serious situation, which could require incident and emergency response protocols to be instituted. Implementation of corrective action could also be required due to operational monitoring to optimise the process.

6. Management of Incidents and Emergencies

Considered and controlled responses to incidents or emergencies that can compromise the safety of water quality are essential for protecting public health, as well as maintaining consumer confidence and the organisation's reputation. Although preventive strategies are intended to prevent incidents and emergency situations from occurring, some events cannot be anticipated or controlled, or have such a low probability of occurring that providing preventive measures would be too costly. For such incidents, there must be an adaptive capability to respond constructively and efficiently.

6.1. Communication

Effective communication is vital in managing incidents and emergencies. Clearly defined protocols for external communications have been established through the NSW Health guidelines, internal communications are informal and will be developed as part of the *Improvement Plan* (Appendix F).

6.2. Incident and Emergency Response Protocols

Incident and emergency response protocols are regarded as a priority and are managed in accordance NSW Health Protocols, with formal internal procedures to be developed as identified in the *Improvement Plan* (Appendix F). Water quality incidents must be managed in accordance with the following protocols:

- NSW Health Response Protocol – Management of Microbiological Quality
- NSW Health Response Protocol - Treatment Failure, Cryptosporidium and Giardia
- NSW Health Response Protocol - Management of Physical and Chemical Quality
- NSW Water Directorate - Blue Green Algae Management Protocols
- NSW Code of Practice for Fluoridation of Public Water Supplies

Table 12 identifies the external emergency contacts relevant to water quality incidents.

Table 12 External Emergency Contacts

External Contact	Details
Northern Rivers Public Health Unit	Environmental Health Officer Mobile 0414 569 516 On call pager 132 222 pager number 314857 Geoff.sullivan@ncahs.health.gov.au
NSW Office of Water	Regional Inspector Alstonville Telephone 6627 0110 Mobile 0412 283 768 terry.camm@water.nsw.gov.au

The emergency services based the Ballina Shire Council Local Government Area are identified in Table 13.

Table 13 Emergency Services

Community	Service	Phone Number
All emergencies	Police, Fire, Ambulance	000
Ballina	Fire Police	02 6686 2038 02 6681 8699
Alstonville	Fire Police	02 6628 0480 02 6628 024
Wardell	Police	02 6683 4144

7. Employee Awareness and Training

To ensure drinking water quality is effectively managed all employees need to have an understanding and awareness of the DWMS. Employees need to have appropriate skills and training in all aspects of their job description in order to operate the water supply system.

Ballina Shire Council ensure the requirements for employee awareness and training are met through the *Staff Training Plan* (August 2012).

7.1. Employee Awareness and Involvement

An understanding of drinking water quality management is essential for empowering and motivating employees to make effective decisions. All employees involved in drinking water supply must be aware of:

- Ballina Shire Council's drinking water quality policy
- characteristics of the water supply system and preventive strategies in place throughout the system
- emergency and incident response procedures
- regulatory and legislative requirements
- roles and responsibilities of employees and departments
- how their actions can impact on water quality and public health

Ballina Shire Council achieves this through communication and training, which is part of the annual performance appraisal process. A drinking water awareness training presentation is provided in Appendix G. This presentation will be rolled out to existing staff via toolbox meetings and to new staff during the induction process.

7.2. Employee Training

Employees and contractors must be appropriately skilled and trained in the management and operation of water supply systems, as their actions can have a major impact on drinking water quality and public health.

All relevant staff receive ongoing on-the-job training in order to fulfil their role and additional training needs are identified and addressed during the annual performance appraisal. The annual appraisal includes:

- review of position description
- assessment of competencies
- review and revise training plan for the following year.

All water operators have a minimum qualification of Cert III in Water Operations. Ballina Shire Council identify the additional training needs for each team member during the annual performance appraisal. Additional training that should be considered during the annual appraisal include

- Regional Organisation of Councils and Alliance Workshops and Training
- NSW Health Workshops
- fluoridation courses
- NOW Training and Update Seminars
- conferences and other seminars

8. Community Involvement and Awareness

Community consultation, involvement and awareness can have a major impact on public confidence in the water supply and the organisation's reputation. A communication program is a long-term commitment, including both consultation and education, and should be designed to provide an active, two-way exchange of information. This will help to ensure that the needs and expectations of consumers are understood and are being satisfied.

Ballina Shire Council has prepared a Community Strategic Plan under the Strategic Business Planning process and the Urban Water Management Strategy that include processes for engaging with the community.

8.1. Community Consultation

Decisions on drinking water quality made by a drinking water supplier and the relevant regulatory authorities must be aligned with the needs and expectations of consumers. Therefore, the community and appropriate industry sectors should be consulted and involved during decision-making processes. Ballina Shire Council encourages community consultation through a range of mediums, including:

- newsletters
- community surveys
- public meetings
- targeted consultation with community groups
- media coverage
- councillor workshops

Council newsletters and planning reports are made publicly available through the website.

8.2. Community Education

Effective communication to increase community awareness and knowledge of drinking water quality issues and the various areas of responsibility is essential. Communication helps consumers to understand and contribute to decisions about the service provided by a drinking water supplier. A thorough understanding of the diversity of views held by individuals in the community is necessary to satisfy community expectations.

Ballina Shire Council communicates potential water quality issues due to the public in a variety of ways depending on the severity and scope of the issue. Methods for communicating with customers include:

- local radio announcement
- Ballina Shire Council website
- letter box drop

8.3. Consumer Feedback and Water Quality Complaints

Ballina Shire Council have developed a *Complaints Management Policy* (Policy Reference CO9) provides clear guidelines for the management of complaints to ensure all complaints are dealt with on a prompt and equitable basis. The *Complaints Management Policy* contains the procedure for managing complaints and conducting internal and external review of complaints.

Water quality complaints and consumer feedback will be tracked within the proposed database to meet requirements of the NOW Performance Reporting form (Improvement Plan – Appendix F).

9. Research and Development

A corporate commitment to conduct and participate in research and development activities on drinking water quality issues is important. Such a commitment helps to ensure continual improvement and the ongoing capability to meet drinking water quality requirements.

9.1. Investigative Studies and Research Monitoring

Investigative studies and research monitoring include strategic programs designed to increase understanding of a water supply system, to identify and characterise potential hazards, and to fill gaps in knowledge. Improved understanding of the factors affecting water quality characteristics allows suppliers to anticipate periods of poor water quality and respond to them in an effective way.

Ballina Shire Council undertake a broad range of research and investigation in relation to water quality issues. Recent investigations include the Ballina Shire Council, Marom Creek Pesticide Residue, Survey Report 2008

The risk assessment process may identify actions to investigate water quality or improve knowledge to the system, which will be captured in the *Improvement Plan* (Appendix F).

9.2. Validation of Processes

Validation involves evaluating scientific and technical information available on processes and then undertaking investigations, where necessary, to validate system-specific operational procedures, critical limits and target criteria. The aim of process validation is to ensure effective operation and control.

Ballina Shire Council continuously monitors the water supply system to validate the on-going performance. Table 14 summarises the ways in which Ballina Shire Council validate their system. The calculation and review of C.t. for the Wardell System will be addressed as part of the *Improvement Plan* (Appendix F).

Table 14 Validation summary

Scheme Component	Validation
Effectiveness of preventative measures	Operational monitoring Regular review of results
Critical limits and corrective actions	Operational monitoring Regular review of results CCP reporting Verification monitoring
Reticulation system controls	Verification monitoring
Whole of system	Risk assessment process DWMS development Regular review Audit processes

9.3. Design of Equipment

The selection and design of new equipment and infrastructure must be validated. Validation is also required to confirm design changes necessary to improve plant performance and control systems. To fulfil this requirement all new equipment installed is thoroughly

validated. Validation details are identified during the design and commissioning process, as appropriate.

10. Documentation and Reporting

Appropriate documentation provides the foundation for the establishment and maintenance of effective drinking water quality management systems. Documentation should:

- demonstrate that a systematic approach is established and is implemented effectively
- develop and protect the organisation's knowledge base
- provide an accountability mechanism and tool
- facilitate review and audits by providing written evidence of the system
- establish due diligence and credibility

10.1. Management of Documentation and Records

This DWMS identifies all documents and records that are required for the management of drinking water quality. Ballina Shire Council's *Records Management Policy and Procedure June 2008* and *Records Management Plan 2006 - 2008/2009 June 2008* identifies the policy for record keeping, including relevant legislation, standards and contacts. The purpose of the Record Management Plan is to ensure that full and accurate records of all activities and decisions of the Council are created, managed and retained or disposed of appropriately, and in accordance with relevant legislation.

10.2. Monitoring and reporting

Ballina Shire Council monitor water quality performance in accordance with NSW Health Protocols.

Reporting includes the internal and external reporting of activities pertinent to the implementation and performance of drinking water quality management.

External reporting is undertaken when required by legislation and includes:

- NSW Health compliance reporting
- annual reporting under the *Local Government Act 1993* (NSW)
- NOW Water supply and sewerage performance and benchmarking reporting
- State of the Environment reporting

11. Evaluation and Audit

Long-term evaluation of drinking water quality results and audit of drinking water quality management are required to determine whether preventive strategies are effective and whether they are being implemented appropriately. These reviews enable performance to be measured against objectives and help to identify opportunities for improvement.

11.1. Long-term Evaluation of Results

Water quality has been assessed as part of the risk assessment process and will continue to be reviewed on an annual basis and prior to the annual review of the Improvement Plan, budgeting process and strategic planning process. The long-term evaluation of results will include;

- critical control point performance
- water quality data results
- levels of service, including customer complaints

Reviews should take into consideration the requirements of the ADWG, levels of service, NSW Water Supply and Sewerage Performance Monitoring Reports.

11.2. Audit of Drinking Water Quality Management System

Auditing is the systematic evaluation of activities and processes to confirm that objectives are being met. It includes assessment of the implementation and capability of management systems. Auditing provides valuable information on those aspects of the system that are effective, as well as identifying opportunities for improvement.

Internal and external auditing will be undertaken in accordance with the requirements to be developed by NSW Health. The requirements for undertaking audits of the DWMS will be captured in a formalised procedure as identified in the *Improvement Plan* (Appendix F).

Internal audits should address:

- implementation of CCPs and responses to exceedences
- progress against the Improvement Plan
- record keeping
- data collection and management, including NOW performance reporting requirements
- compliance with the *Fluoridation Act*, Regulation and Codes of Practice.

External audits must be undertaken by independent auditors that are approved by NSW Health. Components of the DWMS will also be audited by NOW inspectors and NSW Health officers.

12. Review and Continual Improvement

This DWMS will be reviewed annually to ensure management systems are effective and reflective of the drinking water supply system.

All management systems should be reviewed in accordance with the requirements of the Strategic Business Planning process.

12.1. Review by Senior Executive

Senior executive support, commitment and ongoing involvement are essential to the continual improvement of the organisation's activities relating to drinking water quality. Senior executive should regularly review its approach to drinking water quality management, develop action plans and commit the resources necessary to improve operational processes and overall drinking water quality performance.

In order to ensure continual improvement the management review team will review the following, at least annually:

- audit reports, where available
- drinking water quality performance
- previous management reviews
- customer complaints
- regulator and Stakeholder feedback
- drinking water policy
- changes to legislation, expectations and requirements;
- changes in the activities of the organisation
- advances in science and technology
- outcomes of drinking water quality incidents and emergencies
- reporting and communication

Records of the review will be documented. A formal procedure for the review of the DWMS, including review by senior executives will be prepared as identified the Improvement Plan (Appendix F).

12.2. Drinking Water Management System Improvement Plan

An *Improvement Plan* has been developed to ensure continual improvement and is attached in Appendix F. The *Improvement Plan* will be updated based on internal and external audit results, non-conformances and incident and emergency feedback. Progress against the *Improvement Plan* will be monitored by the Strategic Engineer Water and Wastewater every six months.

13. References

National Health & Medical Research Council and Natural Resource Management Ministerial Council. 2004. *National Water Quality Management Strategy: Australian Drinking Water Guidelines*. 6th Ed. Australia: NHMRC & NRMMC.

New South Wales Government 2004, *Integrated Water Cycle Management Guidelines for NSW Local Water Utilities*, Department of Energy, Utilities and Sustainability, Sydney, NSW.

New South Wales Government 2010, *Planning and Reporting Guidelines for Local Government in NSW*, Division of Local Government, Department of Premier and Cabinet, Sydney, NSW.

New South Wales Government 2011, *NSW Water Sewerage Business Planning Guidelines,* NSW Office of Water, Sydney, NSW.

New South Wales Government 2012, *NSW Guidelines for Drinking Water Management Systems*, New South Wales Health, New South Wales Department of Primary Industries – Office of Water, NSW.

Public Health Act 2010 (NSW), s. 15 (Austl.)

Public Health Regulation 2012 (NSW), p. 5 (Austl.)

Glossary

Word	Description
ADWG	Australian Drinking Water Guidelines, published by the National Health and Medical Research Council (NHMRC).
Catchment	Area of land that collects rainfall and contributes to surface water (streams, rivers, wetlands) or to groundwater.
Critical control point	A point, step or procedure at which control can be applied and which is essential to prevent or eliminate a hazard or reduce it to an acceptable level.
Critical limit	A prescribed tolerance that must be met to ensure that a critical control point effectively controls a potential health hazard; a criterion that separates acceptability from unacceptability (adapted from Codex Alimentarius).
C.t.	The product of residual disinfectant concentration (C) in milligrams per litre determined before or at taps providing water for human consumption, and the corresponding disinfectant contact time (t) in minutes.
Disinfection	The process designed to kill most microorganisms in water, including essentially all pathogenic (disease-causing) bacteria. There are several ways to disinfect, with chlorine being most frequently used in water treatment.
Distribution system	A network of pipes leading from a treatment plant to customers' plumbing systems.
Drinking water supply system	All aspects from the point of collection of water to the consumer (can include catchments, groundwater systems, source waters, storage reservoirs and intakes, treatment systems, service reservoirs and distribution systems, and consumers).
DWMS	Drinking Water Management System
Hazard	A biological, chemical, physical or radiological agent that has the potential to cause harm.
Hazardous event	An incident or situation that can lead to the presence of a hazard (what can happen and how).
Inherent risk	The risk in the source water without treatment barriers in place.
Maximum risk	Risk without existing barriers in place for example, treatment and/or disinfection. This is the maximum level of risk and in most instances it is the same as the inherent risk. However, there are a number of parameters whereby the treatment process adds to the risk, these include hazards such as trihalomethanes and chlorine. Therefore maximum risk is the total of the inherent risk and the additional risks added during treatment.
Multiple barriers	A series of barriers that ensure contaminants are at an acceptable level
Preventive measure	Any planned action, activity or process that is used to prevent hazards from occurring or reduce them to acceptable levels.
Quality assurance	All the planned and systematic activities implemented within a quality system, and demonstrated as needed, to provide adequate confidence that an entity will fulfil requirements for quality (e.g. AS/NZS ISO 8402:1994).
Residual risk	The risk remaining after consideration of existing preventive measures.

Risk	The likelihood of a hazard causing harm in exposed populations in a specified time frame, including the magnitude of that harm.
Source water	Water in its natural state, before any treatment to make it suitable for drinking.
Validation	The substantiation by scientific evidence (investigative or experimental studies) of existing or new processes and the operational criteria to ensure capability to effectively control hazards.
Verification	Assessment of the overall performance of the water supply system and the ultimate quality of drinking water being supplied to consumers; incorporates both drinking water quality monitoring and monitoring of consumer satisfaction.

Appendix A

Risk Assessment Workshop Report

Appendix B

Ballina Shire Council Drinking Water Quality Policy

Appendix C

Legal and Other Requirements Register

Appendix D

CCP Procedures

Appendix E

Operational and Verification Monitoring Plan

Appendix F

Improvement Plan

Appendix G

Awareness Training