



**Drinking Water Management System**  
Overall Manual

June 2019

# **Drinking Water Management System**

Overall Manual

**TRIM:** 19/2008

## Executive Summary

### Background

Implementation of a DWMS is crucial to fulfil Kempsey Shire Council's (KSC) obligations under the NSW Public Health Act 2010 and the Public Health Regulation 2012. The Public Health Act 2010 sets out the requirement for drinking water suppliers to develop and adhere to a quality assurance program also known as a drinking water management system, consistent with the Australian Drinking Water Guidelines 2011 (ADWG) (NHMRC, NRMCC, 2011).

### Overall DWMS Manual

This document is the Overall DWMS Manual for KSC and it contains or references the overarching ADWG Elements common to the different drinking water schemes.

The ADWG specifies 12 Elements that should be documented and implemented to form a comprehensive DWMS. This Manual is therefore divided into 12 sections corresponding to the 12 ADWG Elements, such that each section explains or references how KSC addresses the requirement of the ADWG Framework for Drinking Water Quality Management.

### Supply Specific DWMS Subplans

Supply specific DWMS Subplans are available for each of the drinking water supplies (as separate documents), and they form part of the overall DWMS. The individual DWMS Subplans contain supply specific information to manage the risks to that particular water scheme. The individual supply DWMS Subplans include:

- Bellbrook Scheme DWMS Subplan
- Crescent Head Scheme DWMS Subplan
- Hat Head Scheme DWMS Subplan
- Kempsey and Lower Macleay Scheme DWMS Subplan
- South West Rocks Scheme DWMS Subplan
- Stuarts Point Scheme DWMS Subplan
- Thungutti Scheme DWMS Subplan
- Willawarrin Scheme DWMS Subplan

### Critical Control Points

Critical control points (CCPs) have been established for each supply scheme and are referenced in this Manual and included in the supply specific DWMS Subplans.

### Drinking Water Quality Incidents

Drinking water quality incidents are managed through the Drinking Water Quality Incident Response and Reporting Plan (separate supporting document, discussed in Section 6).

### Improvement Plan

An improvement plan forms part of the DWMS and is available on the F:Drive as an Excel spreadsheet (separate supporting document).

### Document Review

This Manual is reviewed internally at least on an annual basis when the DWMS Annual Report is prepared, or earlier upon significant system change.

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## Introduction

### Overview

Kempsey Shire Council (KSC) has developed and is implementing a Drinking Water Management System (DWMS) to ensure consistent supply of safe, quality drinking water to its customers through a risk-based management approach.

This document is Council's DWMS Overall Manual which contains and/or references the relevant processes, procedures and systems used for the management of drinking water quality for all Council supplies to ensure safety quality of drinking water to its customers. It is structured on the 12 Element of the Australian Drinking Water Guidelines (ADWG 2011).

This Manual, and the supporting documents referenced, demonstrate Council's compliance with the requirement of the *Public Health Act 2010* to develop a Quality Assurance Plan in line with the Framework for Drinking Water Quality Management in the ADWG.

Supply specific DWMSs are available for each of the drinking water supplies, and they form part of the overall DWMS. The individual DWMSs contain system specific information to manage the risks to that particular water scheme.

### Objective

This document provides the overall approach which is used by KSC for the management of a safe drinking water product. The DWMS and its supporting documentation are living documents, which are reviewed and updated accordingly, when new processes or changes are introduced and at least annually when the DWMS Annual Report is prepared.

### DWMS Documents

The key documents that together form the DWMS are as follows:

- Water quality statement (3.3.8)
- DWMS Overall Manual
- DWMS Subplans (includes CCP procedures)
- Water quality risk assessment register (Excel document)
- Water quality monitoring and data recording spreadsheets (Excel documents)
- Various standard operating procedures (SOPs)
- Drinking water quality incident response and reporting plan
- Steuart McIntyre Dam emergency supply plan
- Improvement Plan (Excel document)

### DWMS Purpose

The *Public Health Act 2010* (NSW) ('the Act') requires drinking water suppliers to establish, and adhere to, a 'quality assurance program' (QAP) that complies with the Public Health Regulation 2012 (NSW) ('the Regulation'). The Regulation requires water suppliers to implement a QAP consistent with the *Framework for Management of Drinking Water Quality* in the *Australian Drinking Water Guidelines (ADWG) 2011*



(NHMRC/NRMMC, 2011). The QAP is referred to as a Drinking Water Management System ('DWMS') for water utilities in NSW.

As stated in the *Australian Drinking Water Guidelines* (NHMRC/NRMMC, 2011):

*"The most effective means of assuring drinking water quality and the protection of public health is through adoption of a preventive management approach that encompasses all steps in water production from catchment to consumer."*

This is the purpose of KSC's DWMS.

## **Scope**

KSC's DWMS applies to the operation and maintenance of the following drinking water schemes:

- Bellbrook Scheme
- Crescent Head Scheme
- Hat Head Scheme
- Kempsey and Lower Macleay Scheme
- South West Rocks Scheme
- Stuarts Point Scheme
- Thungutti Scheme
- Willawarrin Scheme

## **Document Navigation**

Within each section of this Manual corresponding to the ADWG Elements, the specific requirements of the relevant sub-component within an Element are documented. The purpose of this is to clearly communicate Council's obligations under the ADWG Framework.

Following the statement of requirements is text that describes what activities and processes Council currently has in place to address these requirements. Where Council's current activities do not fully address the requirements of the Framework, further actions to meet the requirements of the Framework are detailed in the Improvement Plan.

## **Document Review**

The DWMS is not static. It is a "living document" which is iteratively updated as required, and as new risks are identified, or other risks mitigated or eliminated.

The Risk Assessment register and the Improvement Plan should be reviewed and updated at least annually or when significant changes to the water supply system or treatment process are made (e.g. upgrade of control system, or new treatment process unit installed, etc.). This should be undertaken in conjunction with an annual review of CCP monitoring data in consultation with the local Public Health Unit (PHU) and Department of Industry (DoI) regional officer.

## DWMS Responsibilities and Authorities

KSC employees are encouraged to participate in decisions that affect their jobs and areas of responsibility. This fosters a sense of ownership for decisions and their consequences. The main responsibilities and authorities related to the DWMS are listed in Table 1 below.

**Table 1 Summary of DWMS Responsibilities and Authorities**

<b>Role</b>	<b>Responsibility</b>
Councillors	<ul style="list-style-type: none"> <li>Overall responsibility for management of drinking water quality, but this responsibility is delegated to the relevant directors and supervisory staff.</li> </ul>
General Manager and Director	<ul style="list-style-type: none"> <li>Reporting to councillors the monthly and yearly performance of the DWMS.</li> </ul>
Manager Water and Sewer	<ul style="list-style-type: none"> <li>Maintaining oversight of the DWMS</li> <li>Supporting and promoting continual improvement of the DWMS</li> <li>Evaluating the need for change</li> <li>Reviewing and authorising the DWMS document</li> </ul>
Team Leader and Process Engineer	<ul style="list-style-type: none"> <li>Coordinate implementation and continual improvement of the DWMS</li> <li>Evaluating the need for change</li> </ul>
Water Quality Officer	<ul style="list-style-type: none"> <li>Facilitate reviews, update and audits of the DWMS</li> <li>Preparation of the DWMS Monthly Water Quality Report for submission to Management</li> <li>Preparation of the DWMS Annual Report for submission to the NSW Health</li> </ul>
Operators	<ul style="list-style-type: none"> <li>Implement the DWMS as relevant in accordance with documented procedures.</li> </ul>
All Council employees	<p>All Council employees are responsible for:</p> <ul style="list-style-type: none"> <li>Understanding, implementing, maintaining and continuously improving the DWMS</li> <li>Being aware of:                             <ul style="list-style-type: none"> <li>the Drinking Water Quality Statement;</li> <li>characteristics of the water supply system and preventive strategies in place throughout the system;</li> <li>regulatory and legislative requirements;</li> <li>roles and responsibilities of employees and departments; and</li> <li>how their actions can impact on water quality and public health.</li> </ul> </li> </ul>

# 1. Element 1: Commitment to Drinking Water Quality Management

## 1.1. Commitment

- 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.

Council is committed to managing its drinking water supply systems to provide a safe, high quality drinking water that consistently meets the ADWG, consumer expectations and regulatory requirements.

Council has a Water Quality Statement that demonstrates its commitment to drinking water quality management and the provision of safe and quality drinking water that meets the ADWG. This statement has been signed by the Mayor and the General Manager (date adopted 13 December 2013).

The Statement has been reviewed to include reference to Thungutti scheme (part of Improvement Plan) and adopted by Council in August 2019.

The Statement is visible on Council website:

<http://www.kempsey.nsw.gov.au/corporate/policies/procedure-3-03-08-water-quality-statement.html>).

Staff are made aware of the policy through normal Council process to ensure that it is understood and implemented by relevant employees.

## 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.

Relevant key regulatory and formal requirements relating to drinking water quality have been identified and detailed in Table 2. Requirements are communicated to staff as required through meetings, informal or formal.

Council utilises the Austlii website ([www.austlii.edu.au](http://www.austlii.edu.au)), accessed through Council's intranet, to ensure all legislative enquiries and searches are referencing current legislation.

Table 2 is reviewed annually when the DWMS Annual Report is compiled and updated if required.

**Table 2 Regulatory and Formal Requirements**

Regulatory or Formal Requirement	Relevance to Drinking Water Quality	Agency
<i>Legislation</i>		
Environmental Planning and Assessment Act 1979	Requires that the environmental impacts of projects be studied at all stages on the basis of scale, location and performance. Under Part 3 of the Act, Local Environmental Plans (LEPs) are developed to establish what forms of development and land use are permissible and/or prohibited.	NSW Department of Planning and Infrastructure

<b>Regulatory or Formal Requirement</b>	<b>Relevance to Drinking Water Quality</b>	<b>Agency</b>
Fluoridation of Public Water Supplies Act 1957 Regulation and Code of Practice	Requirements for testing and reporting where water supplies are fluoridated.	NSW Health
Local Government Act 1993	Local councils have the responsibility for the provision of water supply to consumers, in accordance to the NSW Best-Practice Management of Water Supply and Sewerage Guidelines.	NSW Government Division of Local Government
Local Government Act 1993	Requires licences for the construction or extension of regulated water treatment infrastructure. The act also requires Council to comply with directions from NSW Department of Primary Industry relating to water treatment works or emergency responses relating to public health.	NSW Department of Industry (DoI)
NSW Groundwater Quality Protection Policy 1998	Manages groundwater resources for sustainable economic, social and environmental uses, with a specific principle to protect town water supplies against contamination. A key recommendation is to develop wellhead protection plans.	NSW Department of Industry (DoI)
Protection of the Environment (Operations) Act 1997	Requires licences for activities with potentially significant environmental impacts. Prosecution may be carried out under this act for any chemical leakage, spill, and disposal of wastes or similar.	NSW EPA
Public Health Act 2010 Public Health Regulation 2012	Requires all water authorities to develop Drinking Water Management Systems (DWMS). Bestows certain powers on NSW Health with respect to provision of safe drinking water, including ability to enter treatment facilities, order mandatory testing, obtain information about the drinking water and powers to close a water supply or require Council to issue public advice regarding the water supply.	NSW Health
Water Management Act 2000	Provides the basis for water planning, the allocation of water resources and water access entitlements.	NSW Department of Industry (DoI)
Work, Health & Safety (WHS) Act 2011	The WHS Act places the primary health and safety duty on a person conducting a business or undertaking (PCBU). The PCBU must ensure, so far as is reasonably practicable, the health and safety of workers at the workplace. Duties are also placed on officers of a PCBU, workers and other persons at a workplace, including for example, the safe use, handling, storage and transport of plant, structures and substances.	WorkCover Authority of NSW
<i>National and State Guidelines and Programs</i>		
Australian Drinking Water Guidelines (ADWG) 2011	Ensures the accountability of drinking water managers, operators, health authorities and auditors for the supply of safe, good quality drinking water to consumers.	NSW Health National Health and Medical Research Council (NHMRC)

Regulatory or Formal Requirement	Relevance to Drinking Water Quality	Agency
NSW Best-Practice Management of Water Supply and Sewerage Guidelines 2007	Provides for appropriate, affordable and cost-effective services to meet community needs while protecting public health and the environment and making best use of regional resources. Council has a “Delivery Program” “Operational Plan” and a with a Financial Plan and associated asset management plans. KSC participates in NSW Office of Water Annual Performance reporting program. Council has an Integrated Water Cycle Management (IWCM) strategy.	NSW Department of Industry (DoI)
NSW Health Drinking Water Monitoring Program 2005	NSW Health provides analysis of drinking water samples for water utilities, providing an independent analysis of water at point of supply.	NSW Health
National Partnership Agreement on Water for the Future	The COAG Strategy on Water and Wastewater Services in Remote Communities in New South Wales aims to provide water infrastructure and build the capacity of the Council to improve the management and overall security of water in remote communities.	Australian Government NSW Department of Industry (DoI)
Plumbing Code of Australia	Specifications for plumbing in drinking water systems, to be complied with by administrators, plumbing Licensees, developers and property owners/occupiers.	Office of Fair Trading
<i>Other Formal Requirements</i>		
Circular LWU 18	Provides minimum requirements to ensure potable water supply is safe from contamination. Includes requirements for disinfection, chlorine residual and reservoir integrity.	NSW Department of Industry (DoI)
Thungutti LALC Agreement	Council currently manages the Thungutti Local Aboriginal Land Council (LALC) water and sewerage services through an agreement with DoI. Council meets 4-monthly with the Thungutti LALC, local PHU and DoI, to discuss all issues associated with the management of these services.	NSW Department of Industry (DoI)

### 1.3. Engaging stakeholders

- |   |
|---|
| <ul style="list-style-type: none"> <li>• Identify all stakeholders who could affect, or be affected by, decisions or activities of the drinking water supplier.</li> <li>• Develop appropriate mechanisms and documentation for stakeholder commitment and involvement.</li> <li>• Regularly update the list of relevant agencies.</li> </ul> |
|---|

Key stakeholders involved in the provision of a safe reliable drinking water supply include, but not limited, to:

- NSW Health (local PHU and the Water Unit)
- Department of Industry (DoI)
- Local Aboriginal Land Councils

Other stakeholders include catchment management groups in the Macleay River catchment and consumers/customers. These are contacted as relevant.

NSW Health Water Unit, local Public Health Unit (PHU) and the Department of Industry (DoI) participated in the development of the original DWMS and are invited to participate at risk review workshops, as relevant.

Contact details for key stakeholders involved in the provision of a safe reliable drinking water supply have been identified and are listed in

Table 3.

Table 3 is reviewed annually when the DWMS Annual Report is compiled and updated if required.

**Table 3 Key Stakeholders in Drinking Water Quality Management**

Name	Organisation / Position	Responsibilities	Communication mechanism	Contact Details
Water Unit	NSW Health	Overall regulatory oversight and advice	- Telephone - Emails	P: 02 9391 9993 E: HSSG-WaterQual@health.nsw.gov.au
Kerryn Lawrence	North Coast Public Health Unit, Senior Environmental Health Officer	Provides ongoing advice, support and response to water quality matters. Local regulatory oversight, NSW Drinking Water Monitoring Program	- Telephone - Emails - Meetings - Invited to workshops	P: 02 6589 2108 D: 02 6589 2143 M: 0418 112 248 E: <a href="mailto:Kerryn.Lawrence@health.nsw.gov.au">Kerryn.Lawrence@health.nsw.gov.au</a> AH: 0428 882 805
David Basso	North Coast Public Health Unit, Environmental Health Officer			P: 02 6589 2108 M: 0417 695 113 E: <a href="mailto:David.Basso@health.nsw.gov.au">David.Basso@health.nsw.gov.au</a> AH: 0428 882 805
Glenn George	DoI, Regional Manager Urban Water	Technical and strategic advice, assistance on project development, W&S funding programs, regulatory oversight	- Telephone - Emails	P: 02 6653 0127 M: 0411 449 745 E: glenn.george@dpi.nsw.gov.au
Graham Campbell	DoI, Regional Inspector	Inspection of water supply systems, water quality and treatment advice, regulatory oversight	- Telephone - Emails - Meetings - Invited to workshops	P: 02 4904 2517 M: 0419620990 E: graham.campbell@dpi.nsw.gov.au
Geoff Snell	DoI Senior Project Officer	Technical and strategic advice, assistance on project development, water quality and treatment advice, regulatory oversight	- Telephone - Emails - Meetings - Invited to workshops	P: 02 6650 3127 M: 0417 470 250 E: geoff.snell@industry.nsw.gov.au
Greg Douglas	Kempsey Local Aboriginal Land Council, CEO	Be the 1 <sup>st</sup> point of contact for general community issues and report any WQ issues to Councils Customer Services	- Telephone - Emails - Meetings	P: 02 6562 8971 P: 02 6562 8688 E: <a href="mailto:klalc_ceo@bigpond.com">klalc_ceo@bigpond.com</a>
	NSW Aboriginal Land Council, Northern Zone office	Advocate for the rights of Aboriginal people; build the capacity of Aboriginal communities and provide support for Aboriginal people.	- Telephone - Emails	P: 02 6659 1200M:
Richard Campbell	Thungutti Local Aboriginal Land Council, CEO	Be the 1 <sup>st</sup> point of contact for general community issues and report any WQ issues to Councils Customer Services.	- Telephone - Emails - Quarterly meetings (with Council, PHU and DoI).	P: 02 6567 2050 M: 0428 672 050

## 2. Element 2: Assessment of the Drinking Water Supply System

### 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.

#### 2.1.1. Risk Team

Council's core water quality Risk Assessment Team consists of:

- Manager Water and Sewer
- Process Engineer Water and Sewer
- Team Leader Water Treatment
- Technical Officer Process
- Water Quality Officer
- Water Operators

The core team is supported by North Coast PHU and DoI, as well as independent consultants, as required.

Council has hosted a number of drinking water quality risk assessment workshops to review its water supply systems, including the development of the original DWMS.

At these workshops the team reviews the process flow diagrams, water supply characteristics and risks.

The risk workshop participants and risk summary for previous workshops were included in respective Reports - *Drinking Water Quality Risk Assessment (AECOM 2014)* and *KLM DWSD (Aqualift 2013)*.

The most recent DWMS review workshop was undertaken in August 2018, facilitated by Viridis Consultants P/L. The workshop participants and risk summary are included in the Water Quality Risk Assessment Register 2018 (Excel document).

#### 2.1.2. Summary of Drinking Water Schemes

Kempsey Shire Council is located on the north coast of NSW, covering an area of 3,380 square kilometres, between the Pacific Ocean to the east, Five Day Creek in the west, Grassy Head to the north and Kundabung to the south. The Shire encompasses the catchment of the Macleay River which extends from the towns of Armidale, Guyra and Walcha from the west to South West Rocks in the east.

The Council district consists of a number of town centres along the coastal stretch and west along the Macleay River, with its major population centre in Kempsey. The Kempsey Local Government area population, as determined from the 2016 Census, is 28,885 (Census 2016).

Council manages a total of eight (8) water supply systems, providing drinking water to Kempsey and the Lower Macleay (includes the towns of Frederickton, Smithtown and Gladstone), Crescent Head, Hat Head, South West Rocks, Stuarts Point, Willawarrin, Bellbrook and the Thungutti Aboriginal Community. Figure 1 provides a map of each of the supply schemes for Council, with the Thungutti Aboriginal community located 4 km from Bellbrook village.

The Kempsey and Lower Macleay (KLM) drinking water is extracted from the Sherwood borefield, which is recharged from the Macleay River and local rainfall. There are two main water sources for the

KLM supply. Drinking water is supplied from the Sherwood borefield, treated and supplied directly to the residents, Stuart McIntyre Dam (SMD) is used as an emergency water supply. Raw water can be pumped from the Sherwood borefield to the SMD for storage, treatment and supply to residents.

Drinking water for South West Rocks, Hat Head and Crescent Head is sourced from groundwater extracted from the Macleay Coastal Sands Aquifer in the Hat Head National Park which is recharged by rainfall. Drinking water for Stuarts Point is supplied by a separate coastal aquifer located in the Fishermans Bend Nature Reserve, also recharged by rainfall.

The drinking water for Bellbrook and Willawarrin is sourced from the Macleay River, and Thungutti drinking water is sourced from the Nulla Nulla Creek, a tributary of the Macleay River. Water is extracted for these supplies through shallow bores within or at the river/creek edge.

Table 4 provides a summary of each of the water supply systems. Detailed description of each supply, including the process flow diagrams, is present in the respective DWMS Subplan (separate supporting document).

The process flow diagrams are reviewed annually when the DWMS Annual Report is compiled and updated if required.

**Table 4 Summary of Council's Drinking Water Schemes**

Supply Scheme	Source Water	Treatment
Kempsey	Groundwater Sherwood (Bypass of Dam)	Gas chlorine for disinfection and lime dosing for pH correction
	Steuart McIntyre Dam (Emergency supply)	Chlorine (Sodium hypochlorite) dosing.
Crescent Head	Groundwater, Maguires Crossing, Hat Head National Park	Aeration for iron removal, lime and CO <sub>2</sub> dosing for increasing alkalinity and pH correction. Gas chlorination for disinfection.
Hat Head	Groundwater, Hat Head National Park	Media based aerator for iron removal, soda ash for pH correction and chlorine gas for disinfection.
South West Rocks	Groundwater, Hat Head National Park	Aeration for iron removal, membrane filtration, lime for pH correction, chlorine (sodium hypochlorite) and fluoridation.
Stuarts Point	Groundwater, Fishermans Bend Nature Reserve	Ferric dosing for coagulation and iron removal, sand filtration and chlorine gas for disinfection.
Willawarrin	Surface water from Macleay River (bore on edge of river for gravel bed extraction)	Chlorine (sodium hypochlorite) dosing.
Bellbrook	Surface water from Macleay River (bore within river for gravel bed extraction)	Multi-media filtration including arsenic removal, soda ash for pH correction and chlorine (sodium hypochlorite) dosing.
Thungutti	Surface water from creek (bore on edge of river for gravel bed extraction)	Chlorine (sodium hypochlorite) dosing.





## 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 exceedances.
- Assess data using tools such as control charts and trends analysis to identify trends and potential problems.

Long term historical data was analysed prior to the original risk assessment workshop when the DWMS was first developed. This was captured in Reports - *Drinking Water Quality Risk Assessment (AECOM 2014)* and *KLM DWSD (Aqualift 2013)*.

Before a comprehensive review of a risk register, long-term data analysis is undertaken. The most recent evaluation was done as part of the 2018 DWMS review. This was captured in a Report - *Kempsey Shire Council DWMS Risk Assessment Review - Water Quality Data Analysis (Viridis Consultants, Aug 2018)*, and was used during the review of the Water Quality Risk Assessment Register.

Council undertakes ongoing assessment of water quality (operational and verification) as part of internal and external reporting (e.g. the preparation of the DWMS Monthly Water Quality Report and the DWMS Annual Report, refer to Section 10.2).

## 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.

The risk assessment approach and methodology are included in the Risk Register (separate supporting document, Excel spreadsheet). DWMS support documentation are listed in the DWMS Document Register, that is stored in Councils' records management system and network folder (F:Drive).

Council uses the ADWG 2011 (NHMRC, NRMCC, 2011) Risk Assessment Matrix. Both maximum and residual risks were assessed within the system.

**Maximum risk:** risks that is present without preventive measures and controls

**Residual risks:** risks that are present after implementing the system's preventive measures and controls

The risk assessment results (hazards, hazardous events, risk evaluation and uncertainty) are captured in the Risk Assessment Register, for all schemes.

Council previously had two different risk registers – one for KLM scheme and one for all other schemes. As part of the 2018 DWMS, the risk registers were consolidated, and a comprehensive review of the risk register was undertaken.

The risk assessment results are captured in the Risk Register (Excel spreadsheet, supporting document recorded in the DWMS Document Register).

The Risk Register is reviewed in detail periodically (every 4 years). A general review is undertaken annually when the DWMS Annual Report is prepared (e.g. unacceptable residual risks and/or key selected process steps), or as advised by the local PHU (e.g. resulting from a water quality incident).

## 3. Element 3: Preventive Measures for Drinking Water Quality Management

### 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.

Council's preventive measures are included in the Risk Register and have been documented alongside the significant risks that they address. Improvements or gaps identified in the workshops are noted and are included in the Improvement Plan.

### 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.

Critical Control Points (CCPs) are activities, procedures or processes where the operator can apply control, and are essential processes in reducing risks to an acceptable level.

In order to define acceptable from unacceptable performance at each point, target levels, a levels and critical limits have been identified for Council's drinking water supply systems.

Three different limits have been set for each CCP within Council's drinking water supply systems:

- **Target Level:** representing day to day operational limits and procedures. This is what is aimed to be achieved
- **Alert Level:** deviation to this level indicates a trend towards loss of control and corrective actions should be immediately taken to resolve the problem and restore control to the drinking water supply system
- **Critical Limit:** deviation from the critical limit indicates loss of control and the potential of unacceptable health risks. If the critical limit is exceeded, corrective actions should be immediately activated, and the local PHU notified immediately.

CCPs were reviewed in August 2018 (facilitated by Viridis Consultants) with input from North Coast PHU and are documented in the respective DWMS Subplans for each scheme.

When CCPs are revised, these are communicated to operators through updated DWMS Subplans. The Subplans include current CCP procedures.

Documents are listed in the DWMS Document Register and stored within Councils' records management system and are electronically available on the network folder (F:Drive).

## 4. Element 4: Operational Procedures and Process Control

### 4.1. Operational Procedures

- Identify procedures required for processes and activities from catchment to consumer
- Document all procedures and compile into an operation manual.

Council is documenting a range of operational procedures for the effective and efficient operation of drinking water supply systems (part of the Improvement Plan). Some procedures exist and are currently being reviewed.

The list of procedures and their status is available in the *DWMS SOP Matrix* (Excel supporting document recorded in the DWMS Document Register). In addition, SOPs for CCPs are documented and available in the Subplans for each supply scheme.

### 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.

Operational monitoring of water quality is undertaken both manually and via online instruments, where available, in the water supply systems. Operational monitoring data is stored in supply system specific Excel spreadsheets or in Access database stored in the network folder (F:Drive).

Future operational monitoring data storage will be through the WaterOutlook software application.

The operational monitoring conducted at each supply scheme is discussed in the respective Subplans (supporting documents recorded in the DWMS Document Register).

### 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 corrective actions required to control excursions for operational parameters are part of operational monitoring and are discussed in the DWMS Subplans for each scheme.

The CCP SOPs also include corrective actions. A number of operational procedures are currently under development/review (discussed in Section 4.1), which will include corrective actions relevant to those procedures.

Communication protocols for incidents and events are explained in in Section 6.2.

Council observes the guidance provided in the NSW Health Response Protocols on microbial quality and physical and chemical quality. Response protocols are available in the Drinking Water Quality Incident Response and Reporting Plan (supporting document recorded in the DWMS Document Register).

#### 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.

Water operators undertake regular visual inspections to ensure equipment is working appropriately.

Council utilises an Asset Management System that consists of a comprehensive inventory of equipment including details such as maintenance history to ensure equipment is functioning optimally and within the bounds it was designed for. It also details the age of infrastructure, last service date, maintenance frequency, who is responsible for maintaining each piece of equipment and any recorded failures. Asset information is currently stored in Excel spreadsheets. Council is in the process of investigating in an alternative Asset Management System package.

Asset Management documents are listed in the DWMS Document Register that is stored within Councils records management system. Comparison checks are undertaken monthly by Water Operators in house for benchtop monitoring equipment. Online monitoring equipment is serviced and calibrated by KSC instrument technicians. Benchtop monitoring equipment is serviced and calibrated annually by external contractors. There is an action to ensure that all online and portable instrumentation is included in the maintenance program (part of Improvement Plan) that will be captured in WaterOutlook.

#### 4.5. Materials and chemicals

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

Council requires conformance with the following plumbing codes, regulations and standards, which guide product selection and installation:

- AS/NZS 3500.1:2003 Plumbing and drainage – Water services
- AUS-SPEC 0071 Water Supply – Reticulation and pump stations (Design)
- AUS-SPEC 1341 Water – reticulation and pump stations (Construction)

Council has preferred suppliers for the purchasing of products. Councils' supplier contracts include chemical quality compliance requirements. In addition, Council participates in a tender undertaken by Regional Procurement, involving a number of Councils in the area, for tendering and procuring chemicals.

There are long standing contracts in place with chemical suppliers for water treatment chemicals and chemicals are delivered with a statement of chemical quality. However, where small amounts of chemicals are used, procurement is handled through the store, rather than through the procurement contract, for example, for purchase of small bottles of liquid sodium hypochlorite, ammonia and PACL.

Chemical deliveries are attended by operators to reduce risk of delivery error and a certificate of analysis is obtained.

An SOP on chemical quality control will be developed, including procurement control through stores (part of the Improvement Plan).

The summary of chemicals used at each supply site is included in the respective DWMS Subplans.

## 5. Element 5: Verification of Drinking Water Quality

### 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 verification of drinking water quality supplied to the consumer assesses the overall performance of the system. Verification provides an important link back to the operation of the water supply system and additional assurance that the preventive measures and treatment barriers have worked and are supplying safe quality water.

Sampling of the distribution system is undertaken through the NSW Health Drinking Water Monitoring Program, which provides ongoing independent verification of the treatment process. The parameters monitored include a suite of chemical, physical and microbiological parameters as per the NSW Health Monitoring Program. Samples collected for the NSW Health Drinking Water Monitoring Program are analysed at the NSW Forensic and Analytical Science Service (FASS) laboratory.

The 25 verification monitoring locations are representative of the system and are reviewed annually as part of the DWMS review.

Further details on the verification monitoring program, including frequency and locations are discussed in the respective DWMS Subplans.

The verification monitoring results are recorded in the NSW Health Database, which can be accessed at [www.drinkingwaterdb.nsw.gov.au](http://www.drinkingwaterdb.nsw.gov.au).

When needed, new username/password can be requested by contacting the NSW Health Water Unit.

In addition to monitoring undertaken as part of NSW Health's Drinking Water Monitoring Program, Council independently monitors both chemical and physical water quality parameters as part of daily operations (pre and post-treatment at the water supply systems). A standard list of water quality parameters is monitored across all water supply schemes (including chlorine residuals, pH, temperature, and electrical conductivity), any additional parameters are supply scheme specific (e.g. iron, manganese and arsenic).

Anomalies found outside of the ADWG and other recommended water quality indicators in relation to the daily operations monitoring are acted upon, reported into Council's Initial Incident database and communicated internally from the Operators directly to the Team Leader Water Process. External communication to the local PHU of daily results is limited to a gross and/or consistent exceedance.

All drinking water quality data is reviewed on at least a monthly basis and reported in the Monthly Water Quality Report and through the annual DWMS review process. Reports are stored in Council's records management system and in the local network folder (F:Drive).

### 5.2. Consumer satisfaction

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

Customer complaints (or compliments) are received through Council's Customer Service Centre either in person, writing (email) or by telephone. Complaints are recorded and saved on Council's corporate business system, which automatically notifies the Team Leader who delegates responsibilities as appropriate.

Generally operational staff will go out to investigate, take water quality samples and clean mains where appropriate and/or check water treatment operation.

Customer complaints are reported externally through the NSW Water Supply and Sewerage – NSW Benchmarking Report (DoI) and the DWMS Annual Report to NSW Health.

Improvements to the customer complaints records system is underway, including for ease of categorisation, extraction and review of complaints data (part of the Improvement Plan).

### **5.3. Short term evaluation of results**

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| <ul style="list-style-type: none"><li>• Establish procedures for the daily review of drinking water quality monitoring data and consumer satisfaction.</li><li>• Develop reporting mechanisms internally, and externally, where required.</li></ul> |
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Operators review results daily against the water quality targets as part of their operations and undertake corrective actions where required (e.g. using relevant SOPs, as required).

The Water Quality Officer also reviews the water quality data on at least a monthly basis which is collated and reported into the Monthly Water Quality Report.

Review of the results for the NSW Health Drinking Water Monitoring program is undertaken by the testing laboratory and any exceedance is notified by the laboratory to relevance KSC staff and the local PHU.

Council is in the process of establishing a centralised water quality database (WaterOutlook) for the recording of operational and compliance monitoring results (part of the Improvement Plan).

A summary of the water quality performance for the discrete Aboriginal communities within the KLM, Crescent Head, South West Rocks and Thungutti systems is provided for discussion at the regular the DoI, KSC, PHU and LALC 4 monthly meetings. The discussions also include complaints/feedback from the community.

Water quality incidents are managed as per Section 6. The communication and reporting lines are described in the drinking water quality incident response and reporting plan (Section 6.2).

### **5.4. Corrective action**

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| <ul style="list-style-type: none"><li>• Establish and document procedures for corrective action in response to non-conformance or consumer feedback.</li><li>• Establish rapid communication systems to deal with unexpected events.</li></ul> |
|--|

Corrective actions for water quality incidents are managed as per Section 6.2.



## 6. Element 6: Management of Incidents and Emergencies

### 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

Effective communication is vital in managing drinking water quality incidents (and emergencies). In the event of a drinking water quality incident, Council follows the communication protocols described in the Drinking Water Quality Incident Response and Reporting plan (supporting document recorded in the DWMS Document Register).

Council currently communicates water quality issues or changes to treatment processes to the public and media on their website and also through their Facebook page. Customers can also contact Council's Customer Service Centre via email or telephone for more information on water quality issues. Council implements a project specific communication plan when major works or major issues occur.

There are formal communication procedures within Council's Corporate and Commercial services specific to issues such as water restrictions, drought management and service levels.

Key immediate emergency contacts for drinking water incidents is detailed in Section 1.3.

Council will develop an emergency contacts list, which will include details for emergency services, government stakeholders, media and vulnerable customers for e.g. schools, aged care, hospitals (part of the Improvement Plan).

In addition, Council in conjunction with Kempsey District Hospital records dialysis patients' localities and contact details (including lot ID, assessment number, customer name, contact address and phone number).

Patient Dialysis list is recorded in the DWMS Document Register that is stored within Councils records management system and in the local network folder (F:Drive). Council also ensures that valves in the distribution system, that could isolate a dialysis patient from water supply, are colour capped, to ensure that inadvertent isolation of these customers does not occur.

### 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 requirements for this component are addressed in the Drinking Water Quality Incident Response and Reporting Plan (supporting document recorded in the DWMS Document Register), including incident de-briefs.

Water quality incidents and emergencies are reported to the local PHU and DoI, as described in the Plan. The need to issue (and withdraw) a boil water alert or other notices is assessed in consultation with the local PHU.

Management of emergencies is covered by Council's Local Business Continuity Plan (BCP).

## 7. Element 7: Employee Awareness and Training

### 7.1. Employee awareness and involvement

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

Council aims to provide an environment of equal opportunity in its workplace and is committed to the development of skilled, knowledgeable and dedicated staff.

Employee participation in drinking water quality management is encouraged by Council. The water team meet regularly to discuss any issues e.g. toolbox meetings.

Employee awareness of DWMS is increased through regular contact by the local PHU and visits by the DoI inspector, as well as through internal/external reviews of the DWMS.

The most recent external review was facilitated by Viridis Consultants Pty Ltd in August 2018, where staff involvement in DWMS awareness and implementation was undertaken.

### 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

Staff training is an important and essential element of corporate development. All employees receive on-the-job training to ensure that they understand operating procedures, document management and reporting requirements in accordance with this DWMS.

Contractors are selected based on their skills and knowledge in working on water supplies to ensure that the work undertaken does not adversely impact operations and water quality. There is an action to incorporate water quality awareness and issues into WHS induction for all contractors that work on water supply sites (part of Improvement Plan).

Training needs for each staff member are identified in annual appraisal reviews and training requirements, including resources, are actioned throughout the year.

Council's Human Resources team maintains records of all staff training including: licenses, ticket numbers and expiry dates. Examples of training undertaken by operators include:

- Training courses (i.e. WTP Processes – DoI Part 1 and 2, NWP Certificates 2 and 3)
- Work Cover Construction Induction
- Health and Safety Induction
- Fluoride training courses
- Chlorine safe handling and awareness
- Dam surveillance

In addition, Council undertakes various internal training courses for its staff, Council is also involved in Trainee and School based training scheme.

Water staff are encouraged to participate at relevant water conferences and workshops to maintain awareness and knowledge on industry practices and advancements with water quality management.

## 8. Element 8: Community Involvement and Awareness

### 8.1. Community consultation

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

Council has a comprehensive *Community Strategic Plan (July 2017)*. In addition, Council has developed Local Community Plans. The Community Plans identify how Council works with communities to identify, promote and enhance the distinctive character of the local areas, including water as relevant.

Council also has a five-year Delivery Program and annual Operations Plan, that is provided to the community for comments on an annual basis. These plans include information about upcoming projects for water supply as well as the expected financial costs of these projects.

Moreover, Council engages proactively with the local community to around water issues and management through:

- Waterwise Schools Program
- Kempsey Shire Council Facebook Page ([www.facebook.com/KempseyShireCouncil](http://www.facebook.com/KempseyShireCouncil))
- Kempsey Shire Council Website ([www.kempsey.nsw.gov.au](http://www.kempsey.nsw.gov.au))
- Monthly council meetings

With regards to the Aboriginal communities that are connected to the Kempsey, Thungutti, South West Rocks and Crescent Head supplies, Council communicates with these communities, as per all other residents of Council.

Council also meets 4-monthly with the Thungutti LALC CEO, local PHU and DoI, to discuss all issues associated with the management of the water and sewerage services, and also meets separately with the Kempsey LALC, local PHU and DoI to discuss water and sewerage management issues. The LALC CEOs are the first point of contact for Council's communication to the community regarding specific water & sewer issues. Upon receipt of a water or sewer issue, the CEO notifies Council who then records and responds to the issues within its area of responsibility.

### 8.2. Communication

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

Council communicates water quality issues and awareness through the following engagement tools:

- Public notification through print media and local radio
- Letter box drop
- Council website
- Individual notification for special requirements (e.g. dialysis patients, hospitals)
- Social media (e.g. Facebook)
- Moveable road signs
- Signage on Council vehicles
- Signage around towns and villages
- Community notice boards

The above means are also used for communication for water quality incidents, if needed.

In addition, when response teams go out to investigate customer complaints, the consumer is informed and made aware of water quality issues and outcomes, as relevant.

Council does not operate any non-potable schemes. However, some customers for some sections of the KLM scheme (e.g. Greenhills and Potters Hill) are supplied water off first mains to reservoir (i.e. combined rising and distribution main). There is an action to check the supply arrangement details for these customers (part of Improvement Plan).

## 9. Element 9: Research and Development

### 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.

Council accesses investigative or research monitoring programs through in-house budget, as well as through the *NSW Health Drinking Water Monitoring Program* in consultation/discussion with the local PHU.

The risk assessment process is used as one of the means to initiate or undertake investigative activities or research, as necessary. These are identified when a risk workshop is undertaken and delivered through the implementation of the Improvement Plan. The results from the investigation are used during the risk assessment review or to guide improvement activities.

Some investigative studies that Council has undertaken or participated in include:

- Bellbrook antimony and arsenic – current treatment system addresses concerns
- Stuarts Point raw water pesticides – no issues identified
- KLM system – Sherwood borefield pesticides – no issues identified
- Crescent Head disinfection by-product (DBP) – THM's above guideline level
- Crescent Head Nitrification - discussions of issues resulted in shutdown of chloramination
- Crescent Head Bore metals - Bore shut down on results above ADWG levels
- DBP and TOC at Hat Head, Stuarts Point, Willawarrin and KLM – Hat Head CAA's above guideline level
- Microbial raw water quality from the Crescent Head settling pond 2013
- Microbial raw and disinfected water quality from the Thungutti infiltration well 2010-11
- NSW Health total organic carbon survey 2008
- Macleay sands aquifer capacity and water quality study 2015

Recent / current investigative projects are included and tracked at the Annual Review.

### 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.

Validation of new or upgraded processes and equipment is undertaken in-house or through external consultants, as required. DoI provides advice on this as required.

Council validates key processes through CCP implementation, data analysis and CCP reviews, as part of the DWMS implementation.

The assessment of CCP performance assists with revalidation and ensures that CCP limits remain appropriate.

Reporting on CCP performance is part of the DWMS Annual Report.

In addition, chlorination *C.t* has been calculated for the schemes. The calculations are shown in the *C.t* calculation spreadsheet (Excel document, separate document) and discussed in the respective DWMS Subplans. The *C.t* document is recorded in the DWMS Document Register and saved in the local network folder (F:Drive).

### **9.3. Design of equipment**

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| <ul style="list-style-type: none"><li>• Validate the selection and design of new equipment and infrastructure to ensure continuing reliability.</li></ul> |
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Council uses in-house expertise and/or engages external consultants and experienced contractors for any upgrade works to ensure new or modified treatment works are suitable.

A DoI section 60 approval for upgrade works also ensures validation of new equipment and infrastructure.

Council's asset management system establishes maintenance and assessment of existing infrastructure to ensure continued reliability.

## 10. Element 10: Documentation and Record Keeping

### 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.

The DWMS documents (e.g. DWMS Manual, Subplans, CCPs, SOPs, Excel spreadsheets) contain information pertinent to all aspects of drinking water quality management for Council's drinking water schemes. The DWMS is a living document and is maintained in-line with actual operations and management. Any changes to the drinking water supply system is updated and documented within the relevant DWMS document.

Council uses a DWMS document register (Excel spreadsheet), which includes all key documents related to the management of the water service. This register outlines the document name, location, review frequency, version and document responsibility to ensure these documents are current and relevant. The document register is maintained by the Water Quality Officer.

Council maintains a central records management system (TRIM). IT Vision is used to manage work orders and Customer complaints. Council is currently in the process of updating the corporate business system with changes to take effect in mid-2019.

The DWMS document is stored in Councils' records management system and also the shared network folder (F:Drive). F:Drive is accessible by all, including operators.

Complaints are collected monthly and transcribed into a yearly tracking spreadsheet that is used to create and analyse data for the monthly and annual reports. The file path is:

F:\UTILITIES\DRAFT New Water Services\DWMS\E10 - Documentation & Reporting\10.2 Reporting\Monthly Water Quality Reports

Water quality incidents/events (e.g. CCP and ADWG exceptions) are recorded and stored in an Access Database on the F:Drive, in the future this will be captured in WaterOutlook.

Documentation for investigations regarding water quality emergencies and incidents are stored as year folders, file path is:

F:\UTILITIES\DRAFT New Water Services\DWMS\E6 - Incident Management\6.2 Incident Response

Reservoir inspection records are Excel forms, Water Operators save into F:Drive, in the future this will be captured in WaterOutlook.

Operators enter monitoring results from the hard copy records (diary/worksheets) into the respective water quality operational recording Excel spreadsheets, at least weekly that are stored on the F:Drive, in the future this will be captured in WaterOutlook.

The NSW Health Drinking Water Database is used as a records management system for Council's water quality results that are collected as a part of that program.

Employees are trained in records management as part of their general duties.

## **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 has informal and formal communication lines between treatment plant operators and team leaders. Any water quality exceedances and/or issues with the plant is communicated directly to the Team Leader and externally, in line with CCP procedures.

The plant operator also communicates upwardly to the Team Leader on a daily basis (and/or as needed). The Team Leader communicates upwardly to the Process Engineer Water and Sewer and the Process Engineer to the Manager Water and Sewer, as required and provides water quality related information at regular team meetings.

Council undertakes reporting as required. Some relevant reports which are produced include:

- Council Monthly Report
- Council Annual Report: available electronically on Council's website
- NSW Water Supply and Sewerage Performance Monitoring Report: Council's water supply service performance is detailed in this report annually. The report is available for public access from DoI website.
- DWMS Monthly Water Quality – summarising of water quality performance on a monthly basis. Reports are used to produce the DWMS Annual Report and are stored in Council's document management system.
- DWMS Annual Report - summarising the implementation of the DWMS and water quality performance for the past 12 months. This is submitted to the local PHU and adopted at an annual review meeting between Council, PHU and DoI. The report is stored in Councils' document management system.

Council also maintains and submits records and reports on fluoridation data to NSW Health Water Unit as required by the Fluoridation Code of Practice.



## 11. Element 11: Evaluation and Audit

### 11.1. Long term evaluation of results

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

As part of the DWMS Annual Report performance of water quality data (last 12 months), including verification data and CCPs are evaluated and included in the Report. Future Annual Reports may incorporate five yearly data reviews as appropriate.

The DWMS Annual Report provides the opportunity to assess the performance of the DWMS and identify any issues or improvements required.

The DWMS Annual Report is submitted to the local PHU (see Section 10.2).

### 11.2. Audit of drinking water quality management

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

External audits of the DWMS will be undertaken upon advice from the local PHU. The external audit will be carried out by an independent auditor approved by NSW Health.

In addition, internal audits of the DWMS implementation are highly recommended for continuous improvement. There is an action to investigate and establish an internal DWMS implementation audit process (part of Improvement Plan).

The audit findings will be communicated with senior executives through the Auditor's report and the audit findings will also be included in the DWMS Annual Report when relevant. Long-term improvements identified through the audit, if any, will be included in the Improvement Plan, and implemented.

## 12. Element 12: Review and Continual Improvement

### 12.1. Review by senior executive

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

Review by the senior executive is fundamental to continually improving water quality and consistently delivering a safe quality water supply.

The Manager Water and Sewer (or delegate) is responsible for reviewing the effectiveness of the management system, its implementation and for keeping the DWMS current, in discussions and consultation with relevant staff (e.g. water operators, foremen, coordinators).

The following are reviewed annually and, where relevant, included in the DWMS Annual report:

- any changes to the regulatory and formal requirements table (Section 1.2)
- any changes to the stakeholders/emergency contact list (within the DWQ IRRP)
- supply system details, including schematics (in each scheme's Subplan). The schematic will be updated, if required
- drinking water quality performance (Section 2)
- CCP performance (implementation of CCPs and documented response to any exceedances)
- outcomes of drinking water quality incidents and emergencies
- any changes to the risk assessment
- concerns of consumers (customer complaints)
- audit outcomes (Section 11)
- improvement plan progress (Section 12)
- any concerns from NSW Health and DoI

If the DWMS is changed as a result of this review, then the updated DWMS is submitted to the local PHU.

A complete review of the risk register is undertaken periodically (every 4 years), also refer to Section 2.3.

### 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.

An improvement plan (Excel register, separate document recorded in the DWMS Document Register) is used by Council to monitor continuous improvements.

It is the responsibility of the Manager Water and Sewer (or delegate) to ensure that the Improvement Plan is implemented, up-to-date and communicated to relevant water staff.

Progress against the Improvement Plan is reviewed/updated by the Water Quality Officer as required (every couple of months), and at least annually when the DWMS Annual Report is compiled (refer to Section 11.1). This ensures that actions are implemented and closed out, and new actions are added to it as necessary, from outcomes of audits, reviews, incident management and advice from local PHU/DoI. The effectiveness of the improvement action is assessed when the risk assessment is comprehensively reviewed.

## Glossary

NOTATION	DESCRIPTION
ADWG	Australian Drinking Water Guidelines
CCP	Critical Control Point
KSC	Kempsey Shire Council
<i>C.t.</i>	Used to indicate disinfection efficiency (concentration x time)
DoI	NSW Department of Industry
DWMS	Drinking Water Management System
EPA	Environmental Protection Agency
FASS	Forensic and Analytical Science Service
PHU	Public Health Unit
QAP	Quality Assurance Program
SOP	Standard Operating Procedure
WTP	Water Treatment Plant

## References

NHMRC, NRMCC (2011). National Water Quality Management Strategy Australian Drinking Water Guidelines 6, National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

NSW Health and DoI (2013). NSW Guidelines for Drinking Water Management Systems. NSW Health, NSW DoI, New South Wales.

NSW. (2010). Public Health Act. No. 127. <https://www.legislation.nsw.gov.au/#/view/act/2010/127>

NSW. (2012). Public Health Regulation. No. 311.  
<https://www.legislation.nsw.gov.au/#/view/regulation/2012/311/full>



[www.viridis.net.au](http://www.viridis.net.au)

