

---

# Murrumbidgee Council

## Risk-Based Drinking Water Management System

September 2016

---

**Review Date:** September 2017 (or on system change)

**Document Owner:** Director of Technical Services

## DOCUMENT INFORMATION

Version	Author	Reviewed by	Date	Details
1.0	Tasleem Hasan	Tasleem Hasan	29/9/16	Merger of DWMS' for the former Jerilderie and Murrumbidgee shires

**Viridis Consultants Pty Ltd** undertook the merger of the DWMS documents, based on review and discussions with relevant council staff and from information present in the original DWMS' for the former councils.

The original DWMS for the former Jerilderie Shire Council was developed by City Water Technology Pty Ltd and Risk Edge Pty Ltd in March 2014. The original DWMS for the former Murrumbidgee Shire Council was developed by Water Futures Pty Ltd in June 2013.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Executive Summary

## DWMS Purpose

The NSW *Public Health Act 2010* was passed by Parliament at the end of 2010. The *Public Health Act 2010* (and its supporting regulation) includes the requirement for water suppliers to produce a Quality Assurance Program, which is based on the *Framework for Management of Drinking Water Quality* in the *Australian Drinking Water Guidelines* (NHMRC/NRMMC, 2011). For the purposes of implementation, this quality assurance program is termed a Risk-Based Drinking Water Management System (DWMS).

This document forms Murrumbidgee Council's overall DWMS and is based on the 12 Elements, 32 Components and 76 Actions of the Framework for Management of Drinking Water Quality.

## DWMS Overall

This document is the overall DWMS for Murrumbidgee Council and it contains or references the overarching elements common to the different drinking water schemes.

## Individual DWMS Plans

Individual DWMS Plans are available for each of the drinking water schemes, Jerilderie, Darlington Point and Coleambally (included as Appendices). The individual DWMS Plans contain system specific information to manage the risks to that particular scheme.

## Critical Control Points

Murrumbidgee Council has established critical control points (CCPs) which are referenced in this document and in the individual DWMS Plans.

## Incidents and Emergencies

Drinking water quality incidents and emergencies are managed through the Drinking Water Quality Incident and Emergency Response Plan.

## Improvement Plan

An improvement plan forms part of the DWMS, and is available as a separate excel spreadsheet.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Contents

<b>Executive Summary</b>	<b>3</b>
DWMS Purpose	3
DWMS Overall	3
Individual DWMS Plans	3
Critical Control Points	3
Incidents and Emergencies	3
Improvement Plan	3
<b>Introduction and Background</b>	<b>6</b>
Overview of the Framework	7
Scope	8
Document Control	8
DWMS Responsibilities and Authorities	8
<b>Element 1 Commitment to Drinking Water Quality Management</b>	<b>11</b>
1.1 Drinking Water Quality Policy	11
1.2 Regulatory and Formal Requirements	12
1.3 Engaging Stakeholders	13
<b>Element 2 Assessment of the Drinking Water Supply System</b>	<b>14</b>
2.1 Water Supply System Analysis	14
2.2 Assessment of Water Quality Data	15
2.3 Hazard Identification and Risk Assessment	15
<b>Element 3 Preventive Measures for Drinking Water Quality Management</b>	<b>18</b>
3.1 Preventive Measures and Multiple Barriers	18
3.2 Critical Control Points	18
<b>Element 4 Operational Procedures and Process Control</b>	<b>19</b>
4.1 Operational Procedures	19
4.2 Operational Monitoring	19
4.3 Corrective Action	19
4.4 Equipment capability and maintenance	19
4.5 Materials and chemicals	20
<b>Element 5 Verification of Drinking Water Quality</b>	<b>21</b>
5.1 Drinking Water Quality Monitoring	21
5.2 Consumer Satisfaction	21
5.3 Short-Term Evaluation of Results	22
5.4 Corrective Action	22
<b>Element 6 Management of Incidents and Emergencies</b>	<b>23</b>
6.1 Communication	23
6.2 Incident and Emergency Response Protocols	23
<b>Element 7 Employee Awareness and Training</b>	<b>24</b>
7.1 Employee Awareness and Involvement	24
7.2 Employee Training	24
<b>Element 8 Community Involvement and Awareness</b>	<b>25</b>
8.1 Community Consultation	25

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

8.2	Communication	25
<b>Element 9 Research and Development</b>		<b>26</b>
9.1	Investigative Studies and Research Monitoring	26
9.2	Validation of Processes	26
9.3	Design of Equipment	26
<b>Element 10 Documentation and Reporting</b>		<b>27</b>
10.1	Management of Documentations and Records	27
10.2	Reporting	27
<b>Element 11 Evaluation and Audit</b>		<b>28</b>
11.1	Long-Term Evaluation of Results	28
11.2	Audit of Drinking Water Quality Management	28
<b>Element 12 Review and Continual Improvement</b>		<b>29</b>
12.1	Review by Senior Executive	29
12.2	Drinking Water Quality Management Improvement Plan	29
<b>References</b>		<b>30</b>
<b>Appendix A Jerilderie DWMS Plan</b>		<b>A</b>
<b>Appendix B Coleambally DWMS Plan</b>		<b>B</b>
<b>Appendix C Darlington Point DWMS Plan</b>		<b>C</b>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Introduction and Background

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* ('the Framework') in the *Australian Drinking Water Guidelines (ADWG) 2011* (NHMRC/NRMMC 2011). The QAP will be referred to as a Drinking Water Management System ('DWMS') and water utilities in NSW are required to have a DWMS in place by 1 September 2014.

As stated in the ADWG:

*"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."*

The NSW Government has encompassed this philosophy within the recent legislation. The Act includes the following requirement:

### *Section 25 Quality assurance programs*

(1) *A supplier of drinking water must establish, and adhere to, a quality assurance program that complies with the requirements prescribed by the regulations.*

The Regulation states the following:

### **Part 5 Safety measures for drinking water**

#### *Clause 34 Quality assurance programs*

(1) *For the purposes of section 25 (1) of the Act, a quality assurance program must address the elements of the Framework for Management of Drinking Water Quality (as set out in the Australian Drinking Water Guidelines published by the National Health and Medical Research Council) that are relevant to the operations of the supplier of drinking water concerned.*

(2) *A supplier of drinking water must provide the Director-General with a copy of its most recent quality assurance program.*

(3) *The Director-General may arrange for the review of a quality assurance program of a supplier of drinking water at any time.*

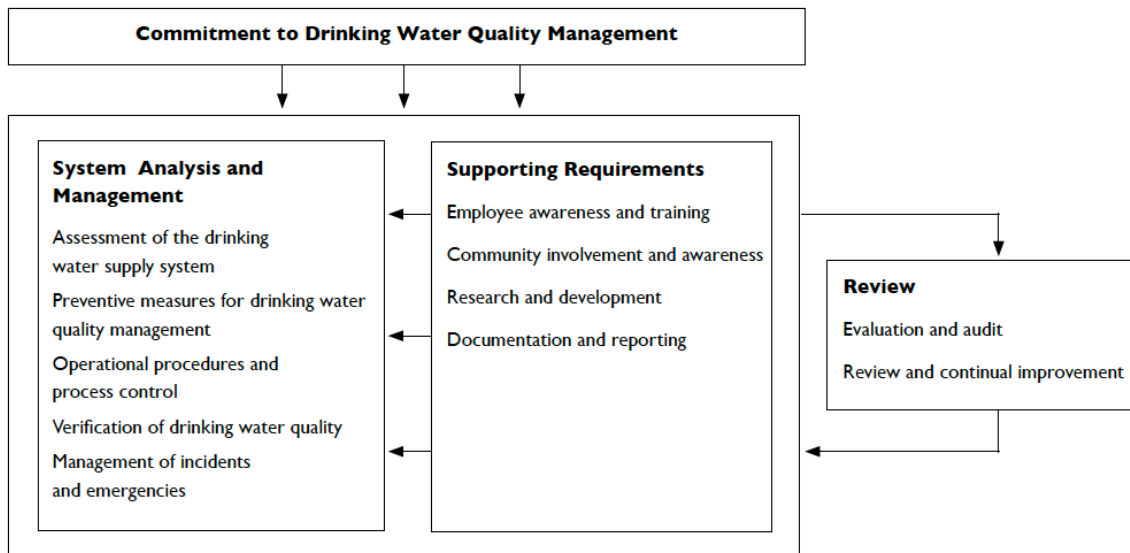
In developing a management system, water suppliers should undertake a risk assessment from catchment to consumer and develop critical control points to ensure that unsafe water is not released into the distribution system and that treated water is protected from contamination during distribution.

This DWMS forms Murrumbidgee Council's QAP. This DWMS is a risk-based system which has been developed based on the 12 Elements, 32 Components and 76 Actions of the Framework and the *NSW Guidelines for Drinking Water Management Systems 2013* (NSW Health/ DPI Water 2013). The DWMS is supported by a range of procedures, registers, drawings, etc., which are referenced at appropriate points in this document.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Overview of the Framework

The ADWG set out a holistic approach to drinking water management including understanding where sources of contamination may arise and how contamination may find its way to the consumer. The approach is termed the *Framework for Management of Drinking Water Quality* ('the Framework'; Figure 1).



**Figure 1: Framework for Management of Drinking Water Quality (NHMRC/NRMMC 2011)**

ADWG (2011) sets out six guiding principles for drinking water management as follows:

1. *The greatest risks to consumers of drinking water are pathogenic microorganisms. Protection of water sources and treatment are of paramount importance and must never be compromised.*
2. *The drinking water system must have, and continuously maintain, robust multiple barriers appropriate to the level of potential contamination facing the raw water supply.*
3. *Any sudden or extreme change in water quality, flow or environmental conditions (e.g. extreme rainfall or flooding) should arouse suspicion that drinking water might become contaminated.*
4. *System operators must be able to respond quickly and effectively to adverse monitoring signals.*
5. *System operators must maintain a personal sense of responsibility and dedication to providing consumers with safe water, and should never ignore a consumer complaint about water quality.*
6. *Ensuring drinking water safety and quality requires the application of a considered risk management approach.*

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Scope

This DWMS applies to the operation and maintenance of the following drinking water supply systems (described in Section 2.1):

- ▲ Jerilderie
- ▲ Coleambally
- ▲ Darlington Point

## Document Control

This DWMS document is owned by the Director of Technical Services. The Director of Technical Services is responsible for ensuring that the DWMS is reviewed annually when the DWMS Annual Report is compiled and on system change.

## DWMS Responsibilities and Authorities

MC employees are encouraged to participate in decisions that affect their jobs and areas of responsibility. This participation fosters a sense of ownership for decisions and their consequences. Specific drinking water management responsibilities and authorities are described in position descriptions, which are maintained by MC's Human Resources department. The main responsibilities and authorities related to the DWMS are listed below.

### All Managers and Employees

All managers and employees involved in the supply of drinking water are responsible for:

- ▲ Understanding, implementing, maintaining and continuously improving the DWMS
- ▲ Being aware of:
  - The Drinking Water Quality Policy
  - Characteristics of the water supply system and preventive strategies in place throughout the system
  - Regulatory and legislative requirements
  - Roles and responsibilities of employees and departments
  - How their actions can impact on water quality and public health.

### Councillors

Councillors are responsible for:

- ▲ Reviewing and approving the Drinking Water Quality Policy as required
- ▲ Reviewing and approving MC's budget annually
- ▲ Overall responsibility for management of drinking water quality, but this responsibility is delegated to the relevant directors and supervisory staff.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



## General Manager

The General Manager is responsible for approving new employees on directors' recommendations. In so doing, the General Manager is responsible for ensuring that only appropriately qualified and experienced personnel are employed by MC.

## Director of Technical Services

The Director of Technical Services is responsible for:

- ▲ Supporting and promoting the Drinking Water Quality Policy and the establishment and continual improvement of a DWMS
- ▲ Maintaining oversight of the effectiveness of the DWMS
- ▲ Evaluating the need for change
- ▲ Ensuring the following key elements of the DWMS are developed and implemented:
  - Processes for the assessment of the drinking water supply system and preventive measures for drinking water quality management, with a focus on critical control points
  - Operational procedures, process control and verification of drinking water quality
  - Management of incidents and emergencies
  - Processes to ensure that employees, including contractors, maintain the appropriate experience and qualifications
  - Processes and communication procedures to increase employees' awareness of and participation in drinking water quality management
  - Processes to identify, communicate and review compliance requirements
  - Processes for identifying all stakeholders who could affect, or be affected by, council decisions or activities on the water supply systems
  - Processes for the systematic evaluation of activities and processes to confirm that objectives are met through internal and external audits
  - Processes to identify and act on drinking water quality improvements, including communication and monitoring of effectiveness of improvements
- ▲ Management review of the DWMS and in particular:
  - Reviewing reports from audits, drinking water quality performance and previous management review and authorising implementation of improvements where relevant
  - Considering concerns of consumers, regulatory and other stakeholders
  - Evaluating the suitability of the Drinking Water Quality Policy, objectives and preventive strategies in relation to changing internal and external conditions

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

**Water Operators**

Water Operators are responsible for:

- ▲ Operation and maintenance of the water treatment facilities
- ▲ Operation and maintenance of water testing functions to meet operational and reporting needs
- ▲ Primary response to incidents
- ▲ Bringing water quality issues to management's attention when they become aware of those issues
- ▲ Awareness of their actions in protecting drinking water quality

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Element 1 Commitment to Drinking Water Quality Management

## 1.1 Drinking Water Quality Policy

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

MC's drinking water quality policy statement is provided below.

The policy is in the process of being adopted by council to demonstrate compliance with drinking water quality management.

**Murrumbidgee Council** is committed to managing its water supply effectively to provide a safe, quality product that consistently meets appropriate drinking water standards developed in accordance with the *Australian Drinking Water Guidelines* and other regulatory requirements.

To achieve this, **Murrumbidgee Council** will implement and maintain a *Drinking Water Management System* to effectively manage the risks to drinking water quality.

In partnership with relevant stakeholders, **Murrumbidgee Council** will:

- ▲ manage water quality at all points, from catchment (where possible) through to treatment, storage and distribution;
- ▲ use a risk-based approach in which potential threats to water quality are identified and balanced;
- ▲ develop incident response processes to deal with any water quality issues identified;
- ▲ ensure that employees and any contractors involved in the supply of drinking water understand their responsibility and are appropriately trained to implement the *Drinking Water Management System*;
- ▲ routinely monitor the quality of drinking water; use effective reporting mechanisms to provide relevant and timely information; and promote confidence in the water supply and its management;
- ▲ comply with the regulatory requirements of the Public Health Act 2010 (NSW) and associated Public Health Regulation 2012; and
- ▲ continually improve our practices by assessing performance against criteria stated in the *Drinking Water Management System*.

All managers and employees involved in the supply of drinking water are responsible for understanding, implementing, maintaining and continuously improving the *Drinking Water Management System*.

Dated:

Signed by Responsible Officer:

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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.

Regulatory and formal requirements are communicated to staff as required through meetings, via regular management meetings and toolbox talks, which are minuted as appropriate. Table 1-1 is reviewed annually when the DWMS Annual report is compiled.

**Table 1-1: Regulatory and formal requirements**

INSTRUMENT	JURISDICTION	TYPE	RELEVANCE
<i>Plumbing and Drainage Act 2011</i>	NSW	Statute	Largely for management of the distribution system including legislative requirements for plumbing and drainage works
<i>Plumbing and Drainage Regulation 2012</i>	NSW	Regulation	Largely for management of the distribution system including legislative requirements for plumbing and drainage works
<i>AS/NZS 3500 Plumbing and Drainage Set</i>	National	Standard	Largely for management of the distribution system including standards for plumbing and drainage issues
<i>Plumbing Code of Australia 2013</i>	National	Standard	Largely for management of the distribution system including standards for plumbing and drainage issues
<i>Australian Drinking Water Guidelines 2011</i>	National	Guideline	Sets frameworks and guidance for the provision of safe, quality drinking water
<i>Local Government Act 1993</i>	NSW	Statute	Urban water services and management/review of on-site sewage management systems; Have only persons licensed or certified under the <i>Home Building Act 1989</i> (or supervised by such a person) carry out any water supply work, sewerage work or stormwater drainage work. Preparation of Asset Management Plans
<i>Public Health Act 2010</i>	NSW	Statute	Protection of public health, follow any advice issued from the Chief of Health regarding drinking water safety to the public; sample drinking water in accordance with NSW Health recommendations. Prepare a drinking water management system.
<i>Public Health Regulation 2012</i>	NSW	Regulation	Requirement to prepare a drinking water management system in accordance with the ADWG Framework for Management of Drinking Water Quality. Requirement to keep records of all water carters supplied.
<i>Protection of the Environment Operations Act 1997</i>	NSW	Statute	Environmental protection including licensed discharges.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

INSTRUMENT	JURISDICTION	TYPE	RELEVANCE
<i>NSW Water and Sewerage Strategic Business Planning Guidelines</i>	NSW	Guidelines	Prepare Strategic Business plans including a review of the operating environment and IWCM which should identify key water quality issues in the catchment.
<i>NSW Health Drinking Water Monitoring Program</i>	NSW	Guidelines	Free-of-charge testing for water supply system monitoring of indicator bacteria and health-related inorganic chemicals. Includes NSW Health Response Protocols for chemical and microbial quality, treatment failure and <i>Cryptosporidium</i> and <i>Giardia</i> .

### 1.3 Engaging Stakeholders

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

Key stakeholders relevant to drinking water quality management include:

- ▲ NSW Health
- ▲ DPI Water

Other stakeholders are involved when and as required, for example, vulnerable customers, water testing laboratory, emergency contacts.

The contact details for all stakeholders, including when they are involved/contacted is maintained in an Incidents Contacts and Stakeholders register (excel spreadsheet), which is reviewed annually when the DWMS Annual report is compiled.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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 Water Quality Team

The Risk Assessment Team is shown in Table 2-1, other stakeholders are invited as required. When a risk assessment is undertaken, the workshop participants are recorded in the respective Risk Workshop report.

**Table 2-1: Risk Assessment Team**

ORGANISATION	ROLE
Murrumbidgee Council	Director of Technical Services
	Environmental Services
	Operation Managers – North and South
	Water Operators
NSW Health	Local Public Health Unit Representative
DPI Water	Officer
DWMS Expert Consultant	Workshop Facilitator

The core Water Quality Team for ongoing implementation and maintenance of the DWMS consists of:

- ▲ Director of Technical Services
- ▲ Operation Managers
- ▲ Water Operators

The core Water Quality Team is supported by the local NSW Health Environmental Health Officer and local DPI Water Officer.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

### 2.1.2 Water Supply Systems

Details of the water supply systems and process flow diagrams are included in individual DWMS' for the 3 schemes, refer to Appendices A-C.

## 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 water quality data relevant for each scheme are analysed prior to the risk assessment workshop, the results of which are captured in the respective Risk Workshop Report. A summary of the issues identified for each water supply system is included in their individual DWMS Plan (refer to Appendices A-C).

## 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 methodology adopted was as follows:

Events and hazards were identified for each process step. Risks posed by each of the events were assessed. Participants were asked to identify the:

**Hazardous event** A hazardous event is one that introduces contaminants (hazards) to the water.

For this risk assessment the hazardous event was for the level of contamination to be unacceptable for treatment through the downstream processes. Examples of a hazardous event might be:

- Cyanobacterial bloom resulting in toxins that cannot be removed by downstream processes
- Distribution reservoir contamination by vermin resulting in pathogens in the distribution system

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

<b>Hazard</b>	<p>A hazard is a physical, chemical or biological agent in the water with the potential to cause an adverse effect.</p> <p>Examples of hazards might be:</p> <ul style="list-style-type: none"> <li>• Human-infectious pathogens and nutrients from failing septic tanks</li> <li>• Particles and nutrients from land clearing practices</li> </ul>
<b>Controls in place</b>	<p>Controls are practices and equipment that reduce the hazard or the hazardous event.</p> <p>Examples of controls include:</p> <ul style="list-style-type: none"> <li>• Catchment management programs to reduce nutrients in the river, thereby reducing cyanobacterial blooms</li> <li>• A water treatment plant</li> <li>• A backflow prevention program</li> </ul>
<b>Controlled Risk</b>	<p>Controlled or 'residual' risk was assessed by identifying the likelihood and consequence of the hazardous event occurring with the control in place. The risks were assessed as Likelihood (Table 2-2) x Consequence (Table 2-3).</p> <p>A risk assessment matrix (ADWG, 2011) was used to assess risks to the identified end uses (Table 2-4).</p>
<b>Maximum Risk</b>	<p>Likelihood and consequence of the hazardous event occurring if the controls were to fail or considered inadequate.</p>

The results were captured during the workshop via a Microsoft Excel® spreadsheet. The risk assessment will be reviewed comprehensively every 4 years (with the next review due in 2018), unless there is a significant change to the supply scheme (e.g. treatment processes).

**Table 2-2: Likelihood Table (ADWG, 2011)**

Level	Descriptor	Example Description
A	Almost certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances
C	Possible	Might occur or should occur at some time
D	Unlikely	Could occur at some time
E	Rare	May occur only in exceptional circumstances

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



**Table 2-3: Consequence Table (ADWG, 2011)**

Level	Descriptor	Example Description
1	Insignificant	Insignificant impact, little disruption to normal operation, low increase in normal operation costs
2	Minor	Minor impact for small population, some manageable operation disruption, some increase in operating costs
3	Moderate	Minor impact for large population, significant modification to normal operation but manageable, operation costs increase, increased monitoring
4	Major	Major impact for small population, systems significantly compromised and abnormal operation if at all, high level of monitoring required
5	Catastrophic	Major impact for large population, complete failure of systems

**Table 2-4: Risk Matrix (ADWG, 2011)**

Likelihood	Consequences				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
A (almost certain)	Moderate	High	Very high	Very high	Very high
B (likely)	Moderate	High	High	Very high	Very high
C (possible)	Low	Moderate	High	Very high	Very high
D (unlikely)	Low	Low	Moderate	High	Very high
E (rare)	Low	Low	Moderate	High	High

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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.
- ▲ Document the preventive measures and strategies into a plan addressing each significant risk.

MC's preventive measures were identified and assessed during the Risk Workshops, and have been documented alongside the significant risks that they address in the Risk Registers. Gaps identified in the workshop were noted as actions in the Risk Registers 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.

Key risks were reviewed during the Risk Workshops and critical control points (CCPs) identified. For a point to satisfy the requirements of a CCP it must:

- ▲ Control hazards that represent a significant risk and require elimination or reduction to assure supply of safe drinking water
- ▲ Have a parameter (surrogate) that can be measured in a timely manner for the hazardous event
- ▲ Be able to have a correction applied in a timely manner in response to a deviation in the process

The CCPs were reviewed in September 2016. They are included in the individual DWMS Plans (refer to Appendices A-C).

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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 operations manual.

The available operational procedures to control risks are included in the individual DWMS Plans (refer to Appendices A-C). Some procedures need to be reviewed and/or developed (formalised), and these are part of the Improvement Plan.

### 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.

The operational monitoring conducted at each supply scheme is included in the respective DWMS Plan (refer to Appendices A-C).

### 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.

MC has a number of corrective actions associated with CCPs, which are summarised in the respective DWMS Plans.

MC communicates operational issues internally via operational meetings. Communication systems for water quality issues also include:

- ▲ Informal liaison with local NSW Health Environmental Health Officer
- ▲ Informal liaison with local DPI Water Officer

### 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.

Reliability of MC's monitoring equipment is informally verified against monitoring equipment used by the local DPI Water Officer.

Other details relevant to this section are included in the individual DWMS Plans (refer to Appendices A-C).

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

---

## 4.5 Materials and chemicals

---

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

MC orders water treatment chemicals and materials from reputable suppliers.

The chemicals used at the different schemes is included in the individual DWMS Plans (refer to Appendices A-C).

Process monitoring at CCPs provides additional assurance for many possible failure modes. For example, incorrectly formulated or dosed chemicals typically do not perform adequately leading to process malfunction and critical limit nonconformities.

Chemical deliveries are attended by trained water treatment plant operators, reducing the risk of delivery error.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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 are representative and reliable.

MC participates in the NSW Health Drinking Water Monitoring Program. As part of this, MC collects samples for microbiological analysis weekly at various sites in each drinking water reticulation system. MC also collects samples for chemical analysis twice-yearly from various points in each reticulation system.

The sample points are listed in the individual DWMS Plans (refer to Appendices A-C).

Parameters monitored as part of the 'microbiology' analysis suite include:

- *E. coli*
- Free Chlorine
- pH
- Total Chlorine
- Total Coliforms
- Turbidity

Parameters monitored as part of the 'chemistry' analysis suite include:

- Aluminium
- Antimony
- Arsenic
- Barium
- Boron
- Cadmium
- Calcium
- Chloride
- Chromium
- Copper
- Cyanide
- Fluoride
- Fluoride Ratio
- Iodide
- Iodine
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- Nickel
- Nitrate
- Nitrite
- pH
- Selenium
- Silver
- Sodium
- Sulphate
- Total Dissolved Solids (TDS)
- Total Hardness as CaCO<sub>3</sub>
- True Colour
- Turbidity
- Zinc

All samples are sent to Sydney to NSW Health's NATA accredited laboratory and both NSW Health and MC are provided with results from the analyses. Under the NSW Health Drinking Water Monitoring Program, local water utilities are notified of results that exceed a guideline value.

### 5.2 Consumer Satisfaction

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

Where appropriate, MC Water and Sewer staff respond complaints with urgency by collecting samples for further analysis and/or flushing mains in the vicinity of the complaint.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

The process for recording complaints and resolutions will be consolidated between the schemes.

### 5.3 Short-Term Evaluation of Results

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

The recording and review of daily operational monitoring results is included in the respective DWMS Plan (refer to Appendices A-C).

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

Where non-compliant water quality is identified through short-term evaluation of results, response protocols include those actions listed under Component 5.4 below.

### 5.4 Corrective Action

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

Water quality incidents are managed according to section 6 of this document.

Reactive flushing is undertaken following customer complaint.

MC also relies on guidance documents from external parties for appropriate corrective actions, including the following, which are publically available via the NSW Health website:

- ▲ NSW Health Drinking Water Monitoring Program Handbook:
  - <http://www.health.nsw.gov.au/environment/water/Pages/Drinking-Water-Quality-and-Incidents.aspx>
- ▲ NSW Health Response Protocols (which form part of the Drinking Water Quality Incident and Emergency Response Plan, section 6.o):
  - <http://www.health.nsw.gov.au/environment/water/pages/drinking-water.aspx>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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.

MC maintains an Incident Contacts and Stakeholders list (excel spreadsheet) in case of water quality incidents/emergencies. The emergency contact list is reviewed annually when the DWMS annual report is compiled.

### 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.

Incident and emergency response protocols are regarded as a priority. MC uses their Drinking Water Quality Incident and Emergency Response Plan (DWQ IERP) for water quality incident management. These are based on the NSW Health Response Protocols.

Water quality incidents and emergencies are reported to the local NSW Health PHU and DPI Water, as required. The need to issue (and withdraw) a boil water alert is assessed in consultation with the local PHU (explained in the DWQ IERP).

Management of significant incidents and emergencies is covered by council's Disaster Plan.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Element 7 Employee Awareness and Training

## 7.1 Employee Awareness and Involvement

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

MC communicates water quality issues with employees via three monthly operational meetings. Employees are also encouraged to discuss water quality via:

- ▲ Informal liaison with local NSW Health Environmental Health Officer
- ▲ Informal liaison with local DPI Water Officer

## 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.

All MC water and sewer operators have undergone training in water operations and are upgrading their certifications, where required. Operators are also encouraged to attend various conferences and workshops.

For contractors working on the drinking water systems, MC relies on the company reputation and the recommendations of local water authorities to ensure suitable qualifications and experience.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



# Element 8 Community Involvement and Awareness

## 8.1 Community Consultation

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

Community consultation is undertaken on a needs basis for water supply improvements, for example, addition of new chemicals or process, which may be of interest to the community.

Methods of community consultation that MC may use include:

- ▲ Community meetings
- ▲ Surveys
- ▲ Radio and newspaper interviews and reports
- ▲ Discussions with local social groups and advocacy groups
- ▲ Information in quarterly ratepayer notices
- ▲ Public forums
- ▲ Social media

## 8.2 Communication

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

MC receives community feedback about water quality via complaints, as detailed in Section 5.2.

MC also uses the following mechanisms to inform the community about water quality issues:

- ▲ Community consultation methods as detailed in Section 8.1
- ▲ Community consultation as described in the DWQ IERP

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 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.

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 the risk workshop is undertaken and delivered through the implementation of the Improvement Plan respective action. The results from the investigation are used during the risk assessment review.

Other investigative programs include:

- ▲ DPI Water Officer reports and implementation of the corrective actions arising from those reports
- ▲ One-off samples taken in response to customer requests when considered necessary
- ▲ Council commissioned investigations for example, the recent (Aug 2015) Jerilderie WTP Upgrade Investigative Report prepared by Public Works

### 9.2 Validation of Processes

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

Validation of MC's processes and procedures was undertaken as part of the risk assessment for this DWMS.

The *C.t* values with disinfection parameters for each WTP, where calculated, are included in the respective DWMS Plans (refer to Appendices A-C).

MC will be revalidating processes through CCP implementation and data analysis, which was initiated through this DWMS. The assessment of CCP performance during the compilation of the DWMS Annual report will assist with this.

### 9.3 Design of Equipment

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

MC relies on consultants and contractors to validate the selection and design of new equipment required for upgrades and process improvements. All new infrastructure must also be approved by DPI Water, in accordance with Section 60 of the *Local Government Act 1993* (NSW), prior to construction.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Element 10 Documentation and Reporting

## 10.1 Management of Documentations 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.

This DWMS, including the individual DWMS Plans, DWQ IERP and CCP procedures, documents key information relevant to drinking water quality management.

The Director of Technical Services maintains access to the current versions of all documents, and provides it to operators/others as required.

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

The documents developed as part of the DWMS have the review dates stated in them. The Director of Technical Services or delegate ensures that the documents are reviewed when required.

## 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.

The DWQ IERP includes reporting and communication lines between plant operators and their supervisor. The supervisor also communicates upwardly as required.

Information is reported through the various DPI Water requirements under the NSW Water Supply and Sewerage Strategic Business Planning Guidelines.

Other internal and external reporting includes:

- ▲ To Councillors (via Council meetings)
- ▲ MSC Management Plan
- ▲ MSC Annual Report
- ▲ State of the Environment reporting

MC also prepares the DWMS Annual Report annually summarising the implementation of the DWMS and water quality performance. This report is submitted to the local PHU.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# 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.

Long term trending of data was carried out for the risk assessment workshops, and is captured within the Risk Workshop Reports.

MC uses the NSW Drinking Water Database for long-term (12 months) evaluation of distribution water quality results, and includes it in the DWMS Annual report. The performance of CCPs are also evaluated and included in the DWMS Annual report.

## 11.2 Audit of Drinking Water Quality Management

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

Informal inspections of the system are carried out by operators.

External inspections of the system are also carried out by the local DPI Water Officer during visits. The Officer's findings are used to help direct works.

MC uses the preparation of the DWMS Annual Report as a means to simulate the internal audit. Refer to section 12.1 for details.

The external audit frequency is not yet established by NSW Health, MC will adhere to it when informed. For external audits, MC will engage an independent auditor approved in consultation with the PHU.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# 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 Director of Technical Services (or designate) 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. operation Managers, water operators).

The following are reviewed annually and 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
- supply system details, including schematics (in respective DWMS Plans, Appendices A-C). Update schematic, if required
- drinking water quality performance (section 11.1)
- CCP performance (implementation of CCPs and documented response to any exceedances)
- outcomes of drinking water quality incidents and emergencies
- any changes to the risk register
- concerns of consumers (customer complaints)
- audit outcomes (section 11.2)
- improvement plan progress
- any concerns from NSW Health and DPI Water

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

## 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) is used by MC for continuous improvements and to address identified needs for full implementation of the DWMS.

It is the responsibility of the Director of Technical Services (or designate) to ensure that the Improvement Plan is implemented, up-to-date and communicated to relevant water staff.

Progress against the Improvement Plan is reviewed by the Director (or designate) as required, and at least annually (refer to section 12.1).

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## References

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

NSW Health, NSW DPI Water (2013). NSW Guidelines for Drinking Water Management Systems 2013. NSW Health, NSW Department of Primary Industries – Office of Water, New South Wales, North Sydney.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Appendix A Jerilderie DWMS Plan

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

---

# Murrumbidgee Council

## Jerilderie DWMS Plan

September 2016

---

**Review Date:** September 2017 (or on system change)

**Document Owner:** Director of Technical Services



**DOCUMENT INFORMATION**

Version	Author	Reviewed by	Date	Details
1.0	Tasleem Hasan	Tasleem Hasan	29/9/16	Resulting from merger of DWMS' for the former Jerilderie and Murrumbidgee shires

**Viridis Consultants Pty Ltd** undertook the merger of the DWMS documents, based on review and discussions with relevant council staff and from information present in the original DWMS' for the former councils.

The original DWMS for the former Jerilderie Shire Council was developed by City Water Technology Pty Ltd and Risk Edge Pty Ltd in March 2014. The original DWMS for the former Murrumbidgee Shire Council was developed by Water Futures Pty Ltd in June 2013.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Executive Summary

### DWMS Purpose

The NSW *Public Health Act 2010* was passed by Parliament at the end of 2010. The *Public Health Act 2010* (and its supporting regulation) includes the requirement for water suppliers to produce a Quality Assurance Program, which is based on the *Framework for Management of Drinking Water Quality* in the *Australian Drinking Water Guidelines* (NHMRC/NRMMC, 2011). For the purposes of implementation, this quality assurance program is termed a Risk-Based Drinking Water Management System (DWMS).

Murrumbidgee Council's overall DWMS is based on the 12 Elements, 32 Components and 76 Actions of the Framework for Management of Drinking Water Quality.

### DWMS Overall

The overall DWMS for Murrumbidgee Council contains or references the overarching elements common to the different drinking water schemes.

### Jerilderie DWMS Plan

This document is the Jerilderie DWMS Plan. It contains system specific information to manage the risks to this particular scheme.

### Critical Control Points

Jerilderie's critical control points (CCPs) and procedures are included in this document.

### Incidents and Emergencies

Drinking water quality incidents and emergencies are managed through the Drinking Water Quality Incident and Emergency Response Plan, which is a separate complementary document.

### Improvement Plan

An improvement plan forms part of the overall DWMS, and is available as a separate excel spreadsheet.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Contents

<b>Executive Summary</b>	<b>3</b>
DWMS Purpose	3
DWMS Overall	3
Jerilderie DWMS Plan	3
Critical Control Points	3
Incidents and Emergencies	3
Improvement Plan	3
<b>Introduction and Background</b>	<b>6</b>
Scope	6
Document Control	6
DWMS Responsibilities and Authorities	6
<b>1. Assessment of the Drinking Water Supply System</b>	<b>8</b>
1.1 Process Flow Diagram	8
1.2 System Summary	8
1.3 Detailed System Description	10
1.4 Assessment of Water Quality Data	11
1.5 Hazard Identification and Risk Assessment	11
<b>2. Preventive Measures for Drinking Water Quality Management</b>	<b>12</b>
2.1 Preventive Measures and Multiple Barriers	12
2.2 Critical Control Points	12
<b>3. Operational Procedures and Process Control</b>	<b>15</b>
3.1 Operational Procedures	15
3.2 Operational Monitoring	15
3.3 Corrective Action	15
3.4 Equipment capability and maintenance	15
3.5 Materials and chemicals	16
<b>4. Verification of Drinking Water Quality</b>	<b>17</b>
4.1 Drinking Water Quality Monitoring	17
4.2 Short-Term Evaluation of Results	18
4.3 Corrective Action	18
<b>5. Management of Incidents and Emergencies</b>	<b>19</b>
5.1 Communication	19
5.2 Incident and Emergency Response Protocols	19
<b>6. Operator Awareness and Training</b>	<b>19</b>
<b>7. Research and Development</b>	<b>19</b>
<b>8. Documentation and Reporting</b>	<b>20</b>
8.1 Management of Documentations and Records	20
8.2 Reporting	20

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

---

9.	Evaluation and Audit	20
10.	Review and Continual Improvement	20
	References	21

---

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Introduction and Background

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* ('the Framework') in the *Australian Drinking Water Guidelines (ADWG) 2011* (NHMRC/NRMMC 2011). The QAP will be referred to as a Drinking Water Management System ('DWMS') and water utilities in NSW are required to have a DWMS in place by 1 September 2014.

As stated in the ADWG:

*"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."*

The NSW Government has encompassed this philosophy within the recent legislation.

---

### Scope

This DWMS Plan applies to the operation and maintenance of the Jerilderie drinking water scheme.

---

### Document Control

This DWMS document is owned by the Director of Technical Services. The Director of Technical Services is responsible for ensuring that the DWMS is reviewed annually and on system change.

---

### DWMS Responsibilities and Authorities

MC employees are encouraged to participate in decisions that affect their jobs and areas of responsibility. This participation fosters a sense of ownership for decisions and their consequences. Specific drinking water management responsibilities and authorities are described in position descriptions. The main responsibilities and authorities related to this DWMS Plan are listed below.

#### All Managers and Employees

All managers and employees involved in the supply of drinking water are responsible for:

- ▲ Understanding, implementing, maintaining and continuously improving the DWMS
- ▲ Being aware of:
  - The Drinking Water Quality Policy
  - Characteristics of the water supply system and preventive strategies in place throughout the system
  - Regulatory and legislative requirements
  - Roles and responsibilities of employees and departments
  - How their actions can impact on water quality and public health.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

**Water Operators**

Water Operators are responsible for:

- ▲ Operation and maintenance of the water treatment facilities
- ▲ Operation and maintenance of water testing functions to meet operational and reporting needs
- ▲ Primary response to incidents
- ▲ Bringing water quality issues to management's attention when they become aware of those issues
- ▲ Awareness of their actions in protecting drinking water quality

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# 1. Assessment of the Drinking Water Supply System

## 1.1 Process Flow Diagram

A process flow diagram (PFD) of the Jerilderie water supply system is shown in Figure 1-1.

The diagram is reviewed annually when the DWMS annual report is compiled.

## 1.2 System Summary

The system description is summarised in Table 1-1.

**Table 1-1: Jerilderie Supply System Summary**

SYSTEM COMPONENT	DESCRIPTION
Population Served	1070 (Census 2011)
Water Source	Open rural residential, grazing and horticultural catchment Billabong Creek
Raw Water Filters and Storage	Pumped from Billabong Creek at Pump Station approx. 650m upstream of weir. There are two self-cleaning filters of about 100 µm. Pre-screened water is pumped to Steel Raw Water Storage Tower (2.50 ML Capacity) and Gravity fed back to Concrete Storage Tower (0.580 ML Capacity ) as required by Water Filtration Plant.
Water Treatment	Gravity main to Treatment Plant Water Treatment Plant: <ul style="list-style-type: none"> <li>• Soda ash dosing for pH correction</li> <li>• Alum dosing to begin coagulation and flocculation</li> <li>• Powered activated carbon dosing (when required) for taste, odour and toxin removal</li> <li>• Permanganate dosing (when required) for manganese removal</li> <li>• Sedimentation tank for clarification</li> <li>• Gravity single media sand filter for filtration</li> <li>• Chlorine (gas) for disinfection</li> </ul> NON-POTABLE Raw water is distributed to Jerilderie via dual reticulation for non-potable uses, not intended for drinking.
Storage After Treatment	Closed / Steel Tower (0.5 ML Capacity) adjacent to Raw Water Tower in Nowranie Street, Jerilderie.
Distribution of Product	Reticulation pipes of various diameters and materials and extend through town for approximately 19.80 km in length
Any Special Controls Required	Backflow prevention and elimination of cross-connections from the dual raw water reticulation system (Existing Meters)

Uncontrolled when printed. Please refer to intranet for controlled document.	Date:	Sept 2016
	Version No.	1.0

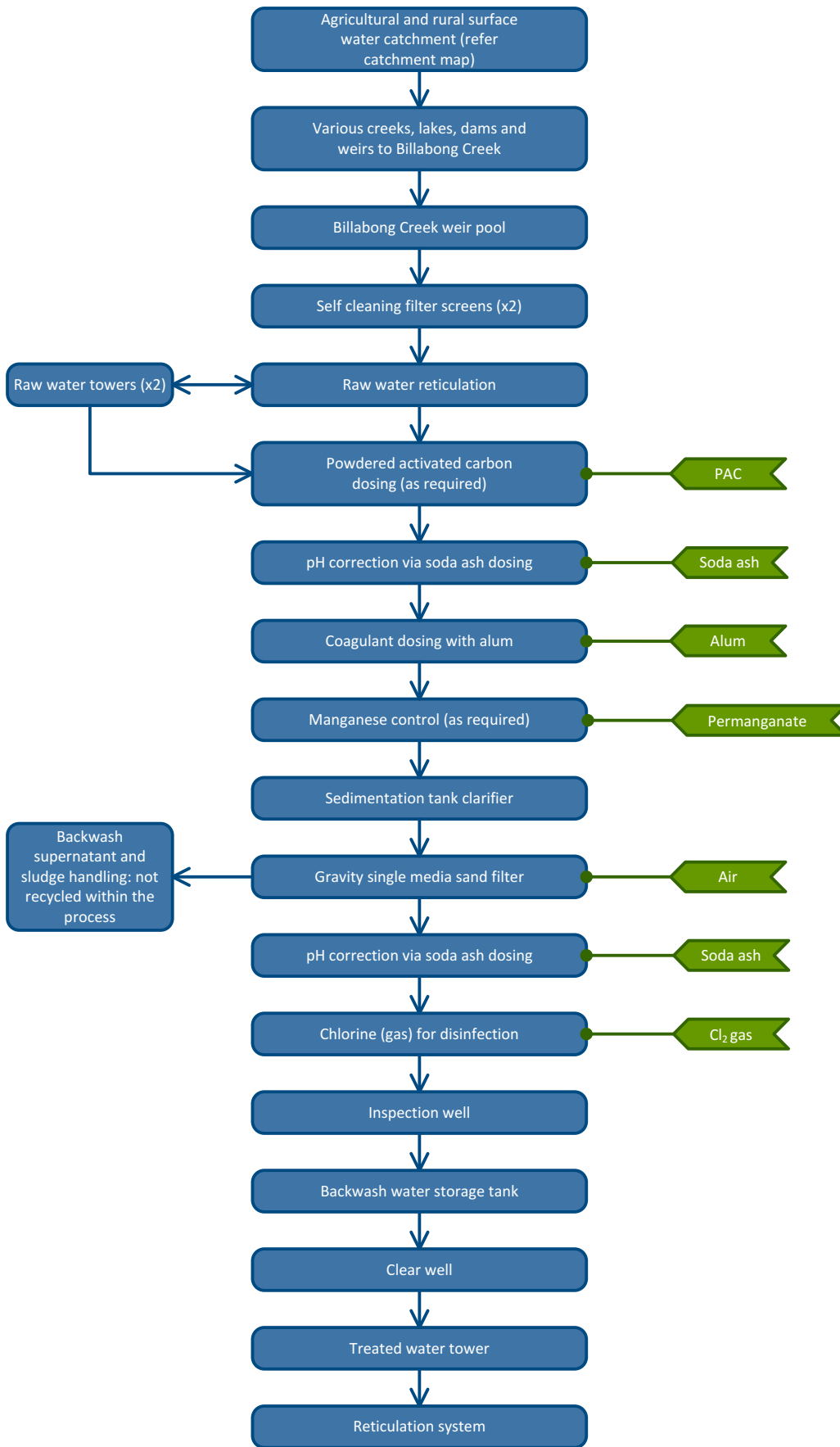


Figure 1–1: Jerilderie Process Flow Diagram

Uncontrolled when printed. Please refer to intranet for controlled document.	Date: Version No.	Sept 2016 1.0
--	----------------------	------------------



### 1.3 Detailed System Description

The Water Filtration Scheme was commissioned in 1983. The scheme is supplied from the Billabong Creek, with the raw water pump station located adjacent to the Billabong Creek approximately 400 m north of the Water Filtration Plant. Raw water is screened through two self-cleaning filters and then pumped through a 200 mm Pipe to a 2.50 ML Steel Water Tower (next to railway station at southern end of the town) and gravity fed back to a 0.58 ML Concrete Water Tower on demand by the Filtration Plant.

Billabong Creek flows through the Township of Jerilderie.

The catchment includes:

- Recreational Activities
- Stock grazing
- Horticulture activities (Wheat, Canola, Rice, Tomatoes, Onions, Olives, Various Cereal Crops, Small Factory and Poultry Farming)
- Jerilderie Township
- Jerilderie Residences including scattered Rural Housing with septic tanks

There are no Upstream Dams on Billabong Creek within the Jerilderie area, however, water is pumped from the Billabong Creek into storage dams located on properties that border the Billabong creek.

Water is pumped upstream of a small weir on the Billabong Creek, through raw water pipelines (200 mm diameter) to a Steel Raw Water Tower of 2.50 ML capacity.

Raw Water is delivered to the Water Treatment Plant by a gravity main through the town's raw water reticulation mains (approx. distance travelled depending on pressure could be 2 km in length) into the 0.58 ML Concrete Water Tower (Storage for the Water Filtration Plant.)

The Water Filtration Plant has an estimated 9.2 L/Sec total peak production capacity at 20 hours per day of 0.662 ML. The treatment plant was constructed and officially opened in 1983. Average daily demand is 0.29 ML/d and peak daily demand is between 0.4 and 0.42 ML/day. The plant does not run continuously; it runs for anywhere between 10 and 13 hours a day. The powdered activated carbon (PAC) dosing system was installed in 2010 to improve taste and odour. There is no fluoridation at the plant.

The treatment steps are listed in the table above in Table 1-1. Raw water is dosed with soda ash and an aluminium chlorohydrate solution. The dosed water is then directed to the sedimentation tank. Sludge collection cones collect settled aluminium chlorohydrate sludge and sludge is drawn off to sludge drying ponds. Following clarification, the water enters a sand filter for final polishing. The backwashing of the filter occurs each day and is manually triggered by the operators when the filter shell loss across the bed is approx. 1 m. The backwash is air scour assisted. It is a manual process and uses approximately 3 KL of water with the waste also discharged to the Settling Ponds (dam). Chlorine is added to filtered water prior to its discharge to the treated water (backwash) and then into the Clear Well Storage before pumped to the Filtered Water Reservoir (0.50 ML). There are duty and standby chlorine cylinders and pumps on hand as standby if required.

Currently, there is no online telemetered monitoring of raw water turbidity, filtered water turbidity or chlorine. There is an inline turbidity meter for measuring filtered water turbidity.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

The treated water is transferred from the clear water (backwash tank) to the filtered water tower (0.5 ML), adjacent to the raw water tower at Nowranie St via the treated water reticulation system. The town can be supplied directly from the clear water storage while the pump is operating or via gravity from the tower.

The Tower is roofed and bird-proofed. The tower has telemetered continuously monitored low level alarm.

The existing reticulation system primarily comprises a mixture of 50 mm, 80 mm, 100 mm, 150 mm, and 200 mm diameter pipes primarily of PVC. The total length of the reticulation mains is 19.80 km.

Residual chlorine levels are tested daily and remain greater than 0.1 mg/L, even at the extremities of Town due to the relatively small distribution system.

---

## 1.4 Assessment of Water Quality Data

---

Long term historical water quality data relevant for each scheme are analysed prior to the risk assessment workshop, the results of which are captured in the respective Risk Workshop Report. A summary of the issues identified for Jerilderie is provided below:

Turbidity is sometimes higher than the ADWG target for chlorine disinfection of <1 NTU (based on daily data collected at the treatment plant). *E. coli* detection is rare.

---

## 1.5 Hazard Identification and Risk Assessment

---

The risk assessment details are present in the Risk Workshop Report.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 2. Preventive Measures for Drinking Water Quality Management

### 2.1 Preventive Measures and Multiple Barriers

The preventive measures were identified and assessed during the Risk Workshop and have been documented, alongside the significant risks that they address, in the Risk Register.

### 2.2 Critical Control Points

Key risks were reviewed during the Risk Workshop and critical control points (CCPs) identified. For a point to satisfy the requirements of a CCP it must:

- ▲ Control hazards that represent a significant risk and require elimination or reduction to assure supply of safe drinking water
- ▲ Have a parameter (surrogate) that can be measured in a timely manner for the hazardous event
- ▲ Be able to have a correction applied in a timely manner in response to a deviation in the process

The CCPs were reviewed in September 2016.

#### Jerilderie Scheme

	Parameter	Operational Target	Adjustment Limit	Critical Limit
Filtration	Turbidity	<0.5 NTU	>0.8 NTU	>1.0 NTU
Primary Disinfection Chlorine	Free chlorine	1.5-2.0 mg/L	<1.0, >2.5 mg/L	<0.5, >5.0 mg/L
	pH	7.0-7.6	>8.0	>8.5

#### Operational Target

This is where you should be operating.  
Aim to keep the system operating at this value.

#### Adjustment Limit

If you reach this limit, refer to CCP procedure and try to get back to the operational target.

Increase monitoring until returned to normal.

#### Critical Limit

If you reach this limit, you have lost control of your system.

Refer to CCP procedure and try to return to operational target as a matter of urgency.

The CCP procedures are provided below, which the operators use.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

**Jerilderie CCP 1 – Filtration – Post Filter Turbidity**

What is the control point?	<b>Filtration</b>
What are the hazards?	<b>Pathogens, turbidity</b>
What is being measured / when?	<b>Filtered water turbidity (when plant is running) / daily</b>
How are the hazards controlled?	<b>Optimise flocculation, coagulation, settling and filtration processes, investigate system</b>

<b>Operational Target</b> <b>&lt;0.5 NTU</b>	<b>Adjustment Limit</b> <b>&gt;0.8 NTU</b>	<b>Critical Limit</b> <b>&gt;1.0 NTU, for 2 immediate consecutive samples</b>
<ul style="list-style-type: none"> <li>• Routine water sampling and testing</li> <li>• Daily checks and visual inspection</li> <li>• Equipment checks</li> <li>• Dosing rate checks</li> <li>• Instrument calibration</li> </ul>	<ul style="list-style-type: none"> <li>• Contact Supervisor</li> <li>• Verify result with grab sample</li> <li>• Inspect filter, backwash if necessary</li> <li>• Inspect clarifier and floc size, carry out jar test if necessary</li> <li>• Inspect dosing systems</li> <li>• Test filtered water turbidity hourly, and other parameters as needed</li> <li>• <b>Fill in the water quality incident report and inform Supervisor.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Contact Supervisor</li> <li>• Full plant analytical investigation</li> <li>• Extended manual backwash</li> <li>• Consider shutting down plant, draining clarifier and then recommencing plant operation</li> <li>• Contact local DPI Water Officer, for advice if required</li> <li>• Consider boil water notice if issue is not resolving</li> <li>• <b>Fill in the water quality incident report and inform the Supervisor immediately.</b> The Supervisor to inform NSW Health PHU as soon as possible (and within 24 hours).</li> </ul>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Jerilderie CCP 2 – Primary Disinfection – Final Free Chlorine

What is the control point?	<b>Final Water</b>
What are the hazards?	<b>Chlorine sensitive pathogens; excess chlorine; high pH causing ineffective disinfection</b>
What is being measured / when?	<b>Free chlorine and pH for final water / daily</b>
How are the hazards controlled?	<b>Adjust the chlorine and soda dose</b>

<b>Operational Target</b> Free chlorine 1.5-2.0 mg/L pH 7.0-7.6	<b>Adjustment Limit</b> Free chlorine <1.0, >2.5 mg/L pH >8.0	<b>Critical Limit</b> Free chlorine <0.5, >5.0 mg/L pH >8.5, for 2 immediate consecutive samples
<ul style="list-style-type: none"> <li>• Routine water sampling and testing</li> <li>• Daily checks and visual inspection</li> <li>• Equipment checks</li> <li>• Dosing rate checks</li> <li>• Instrument calibration</li> </ul>	<ul style="list-style-type: none"> <li>• Verify result by resampling and retesting</li> <li>• If &gt;2.5 mg/L, adjust chlorine dose</li> <li>• Sample and test free chlorine hourly</li> <li>• If &lt;1.0 mg/L, do following:               <ul style="list-style-type: none"> <li>○ Contact Supervisor</li> <li>○ Adjust dose if necessary</li> <li>○ Inspect dosing system</li> <li>○ Sample and test free chlorine hourly, and other parameters as needed</li> </ul> </li> <li>• <b>Fill in the water quality incident report and inform Supervisor.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Contact Supervisor</li> <li>• Adjust chlorine dose</li> <li>• Full plant analytical investigation</li> <li>• Sample and test reticulation free chlorine</li> <li>• If &lt;0.5 mg/L, consider manual hypo dosing to reservoir</li> <li>• If &gt;5.0 mg/L, consider holding water in reservoir until excess chlorine has dissipated (if possible)</li> <li>• Consider plant shutdown</li> <li>• Contact local DPI Water Officer, for advice if required</li> <li>• Consider boil water notice if issue is not resolving</li> <li>• <b>Fill in the water quality incident report and inform the Supervisor immediately.</b> The Supervisor to inform NSW Health PHU as soon as possible (and within 24 hours).</li> </ul>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 3. Operational Procedures and Process Control

### 3.1 Operational Procedures

The CCP procedures are included above in section 2 of this document. Other supporting operational procedures are available for use by operators through the Director of Technical Services or the respective area Operation Manager.

### 3.2 Operational Monitoring

Operational monitoring is conducted as detailed in Table 3-1. These results are recorded in appropriate recording sheets.

**Table 3-1: Jerilderie Operational Monitoring**

PROCESS LOCATION	PARAMETER	FREQUENCY
Raw water	Turbidity	Daily
	pH	Daily
	Colour	Daily
Clarified water	pH	Daily
	Turbidity	Daily
Final water	Chlorine – free and total	Daily (refer to CCP2)
	pH	Daily (refer to CCP2)
	Turbidity	Daily (refer to CCP1)
	Colour	Daily
Reservoirs	Reservoir integrity	Every 6 months (reservoir inspection SOP)
Reticulation	Various locations - chlorine residual	Weekly

### 3.3 Corrective Action

The corrective actions associated with the CCPs are outlined in the CCP procedure in section 2.

Other corrective actions are undertaken as described in the Drinking Water Quality Incident and Emergency Response Plan, which is a separate and complementary document to this DWMS Plan.

### 3.4 Equipment capability and maintenance

The 2100 P turbidity meter, Cyberscan 500 pH meter and colorimeter are used to for testing water quality parameters. The inline turbidity meter is calibrated annually by a specialist contractor.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

Reliability of monitoring equipment is informally verified against monitoring equipment used by the local DPI Water Officer.

---

### 3.5 Materials and chemicals

---

Chemicals and materials used include:

- ▲ chlorine gas
- ▲ permanganate (if needed)
- ▲ soda ash
- ▲ polyaluminium chlorohydrate
- ▲ powdered activated carbon (if needed)

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 4. Verification of Drinking Water Quality

### 4.1 Drinking Water Quality Monitoring

MC participates in the NSW Health Drinking Water Monitoring Program. As part of this, MC collects samples for microbiological analysis weekly at various sites in each drinking water reticulation system. MC also collects samples for chemical analysis twice-yearly from various points in each reticulation system.

The Jerilderie sample points are listed in Table 4-1.

**Table 4-1: NSW Health Program Monitoring Sites**

SCHEME	SAMPLE SITE LOCATION	NSW HEALTH SITE CODE
Jerilderie Supply System	McGillvrays Shed	001
	Winklers	002
	BP Service Station/Budget Motel	003
	Last House Showgrounds Road	004
	Shire Offices 35 Jerilderie Street	005
	Oaklands Lot 9	006
	Wunnamurra Estate Argoon	007
	Depot East Fence	008
	Last House in McDougall Street	009
	Airfield Rifle Range Road	010
	Wunnamurra Estate Bunyola	011

Parameters monitored as part of the 'microbiology' analysis suite include:

- *E. coli*
- Free Chlorine
- pH
- Total Chlorine
- Total Coliforms
- Turbidity

Parameters monitored as part of the 'chemistry' analysis suite include:

- Aluminium
- Antimony
- Arsenic
- Barium
- Boron
- Cadmium
- Calcium
- Chloride
- Chromium
- Copper
- Cyanide
- Fluoride
- Fluoride Ratio
- Iodide
- Iodine
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- Nickel
- Nitrate
- Nitrite
- pH
- Selenium
- Silver
- Sodium
- Sulphate
- Total Dissolved Solids (TDS)
- Total Hardness as CaCO<sub>3</sub>
- True Colour
- Turbidity
- Zinc

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



All samples are sent to Sydney to NSW Health's NATA accredited laboratory and both NSW Health and MSC are provided with results from the analyses. Under the NSW Health Drinking Water Monitoring Program, local water utilities are notified of results that exceed a guideline value.

---

## 4.2 Short-Term Evaluation of Results

---

The operational monitoring results are recorded in a log book. Operators review results daily as part of their operations and undertake corrective actions where required.

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

---

## 4.3 Corrective Action

---

Water quality incidents are managed according to the Drinking Water Quality Incident and Emergency Response Plan.

Responses to water quality non-conformance can include:

- ▲ Resampling
- ▲ Increased operational monitoring
- ▲ Reactive flushing following customer complaint

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 5. Management of Incidents and Emergencies

### 5.1 Communication

The communication and reporting lines are described in the DWQ IERP.

### 5.2 Incident and Emergency Response Protocols

Incident and emergency response protocols are regarded as a priority. MC uses their Drinking Water Quality Incident and Emergency Response Plan (DWQ IERP) for water quality incident management. These are based on the NSW Health Response Protocols.

Water quality incidents and emergencies are reported to the local NSW Health PHU and DPI Water, as required. The need to issue (and withdraw) a boil water alert is assessed in consultation with the local PHU (explained in the DWQ IERP).

Management of significant incidents and emergencies is covered by council's Disaster Plan.

## 6. Operator Awareness and Training

MC communicates water quality issues with employees via three monthly operational meetings. Operators are also encouraged to discuss water quality via:

- ▲ Informal liaison with local NSW Health Environmental Health Officer
- ▲ Informal liaison with local DPI Water Officer

Operators are encouraged to discuss any additional or further training needs with their supervisors.

## 7. Research and Development

The Jerilderie clear water tank at the WTP provides sufficient contact time to meet the *C.t* value for disinfection.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 8. Documentation and Reporting

### 8.1 Management of Documentations and Records

This DWMS Plan, including the DWQ IERP and CCP procedures, document key information relevant to drinking water quality management for the Jerilderie scheme.

The Director of Technical Services maintains access to the current versions of all documents, and provides it to operators/others as required.

Operators ensure that the correct forms are filled and records are made.

### 8.2 Reporting

The DWQ IERP includes reporting and communication lines between plant operators and their supervisor. The supervisor also communicates upwardly as required.

MC also prepares the DWMS Annual Report annually summarising the implementation of the DWMS and water quality performance. This report is submitted to the local PHU.

## 9. Evaluation and Audit

Informal inspections of the system are carried out by operators.

External inspections of the system are also carried out by the local DPI Water Officer during visits. The Officer's findings are used to help direct works.

MC uses the preparation of the DWMS Annual Report as a means to simulate the internal audit. Refer to section 12.1 of the Overall DWMS for details.

The external audit frequency is not yet established by NSW Health, MC will adhere to it when informed. For external audits, MC will engage an independent auditor approved in consultation with the PHU.

Operators maintain appropriate practices and records as described in this DWMS Plan to assist with audit purposes when required.

## 10. Review and Continual Improvement

The effectiveness of the DWMS will be reviewed by the Director of Technical Services, and need for any change or improvements will be identified, and rectified. For mid to long term improvement actions, these will be included in the Improvement Plan for implementation and monitoring.

The key improvements to the Jerilderie scheme include upgrade of the clarification and filtration process and online monitoring of CCP parameters (telemetered and linked to SCADA).

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## References

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

NSW Health Drinking Water Database. Viewed on 10 August 2012.  
<<http://www.drinkingwaterdb.nsw.gov.au/>>.

NSW Health, NSW DPI Water (2013). NSW Guidelines for Drinking Water Management Systems 2013. NSW Health, NSW Department of Primary Industries – Office of Water, New South Wales, North Sydney.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

This page intentionally left blank.

## Appendix B Coleambally DWMS Plan

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

---

# Murrumbidgee Council

## Coleambally DWMS Plan

September 2016

---

**Review Date:** September 2017 (or on system change)

**Document Owner:** Director of Technical Services

**DOCUMENT INFORMATION**

Version	Author	Reviewed by	Date	Details
1.0	Tasleem Hasan	Tasleem Hasan	29/9/16	Resulting from merger of DWMS' for the former Jerilderie and Murrumbidgee shires

**Viridis Consultants Pty Ltd** undertook the merger of the DWMS documents, based on review and discussions with relevant council staff and from information present in the original DWMS' for the former councils.

The original DWMS for the former Jerilderie Shire Council was developed by City Water Technology Pty Ltd and Risk Edge Pty Ltd in March 2014. The original DWMS for the former Murrumbidgee Shire Council was developed by Water Futures Pty Ltd in June 2013.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



# Executive Summary

## DWMS Purpose

The NSW *Public Health Act 2010* was passed by Parliament at the end of 2010. The *Public Health Act 2010* (and its supporting regulation) includes the requirement for water suppliers to produce a Quality Assurance Program, which is based on the *Framework for Management of Drinking Water Quality* in the *Australian Drinking Water Guidelines* (NHMRC/NRMMC, 2011). For the purposes of implementation, this quality assurance program is termed a Risk-Based Drinking Water Management System (DWMS).

Murrumbidgee Council's overall DWMS is based on the 12 Elements, 32 Components and 76 Actions of the Framework for Management of Drinking Water Quality.

## DWMS Overall

The overall DWMS for Murrumbidgee Council contains or references the overarching elements common to the different drinking water schemes.

## Coleambally DWMS Plan

This document is the Coleambally DWMS Plan. It contains system specific information to manage the risks to this particular scheme.

## Critical Control Points

Coleambally's critical control points (CCPs) and procedures are included in this document.

## Incidents and Emergencies

Drinking water quality incidents and emergencies are managed through the Drinking Water Quality Incident and Emergency Response Plan, which is a separate complementary document.

## Improvement Plan

An improvement plan forms part of the overall DWMS, and is available as a separate excel spreadsheet.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Contents

<b>Executive Summary</b>	<b>3</b>
DWMS Purpose	3
DWMS Overall	3
Coleambally DWMS Plan	3
Critical Control Points	3
Incidents and Emergencies	3
Improvement Plan	3
<b>Introduction and Background</b>	<b>5</b>
Scope	5
Document Control	5
DWMS Responsibilities and Authorities	5
<b>1. Assessment of the Drinking Water Supply System</b>	<b>7</b>
1.1 Process Flow Diagram	7
1.2 System Summary	8
1.3 Assessment of Water Quality Data	8
1.4 Hazard Identification and Risk Assessment	8
<b>2. Preventive Measures for Drinking Water Quality Management</b>	<b>9</b>
2.1 Preventive Measures and Multiple Barriers	9
2.2 Critical Control Points	9
<b>3. Operational Procedures and Process Control</b>	<b>11</b>
3.1 Operational Procedures	11
3.2 Operational Monitoring	11
3.3 Corrective Action	11
3.4 Equipment capability and maintenance	11
3.5 Materials and chemicals	12
<b>4. Verification of Drinking Water Quality</b>	<b>13</b>
4.1 Drinking Water Quality Monitoring	13
4.2 Short-Term Evaluation of Results	14
4.3 Corrective Action	14
<b>5. Management of Incidents and Emergencies</b>	<b>15</b>
5.1 Communication	15
5.2 Incident and Emergency Response Protocols	15
<b>6. Operator Awareness and Training</b>	<b>15</b>
<b>7. Research and Development</b>	<b>16</b>
<b>8. Documentation and Reporting</b>	<b>17</b>
8.1 Management of Documentations and Records	17
8.2 Reporting	17
<b>9. Evaluation and Audit</b>	<b>17</b>
<b>10. Review and Continual Improvement</b>	<b>17</b>
<b>References</b>	<b>18</b>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Introduction and Background

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* ('the Framework') in the *Australian Drinking Water Guidelines (ADWG) 2011* (NHMRC/NRMMC 2011). The QAP will be referred to as a Drinking Water Management System ('DWMS') and water utilities in NSW are required to have a DWMS in place by 1 September 2014.

As stated in the ADWG:

*"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."*

The NSW Government has encompassed this philosophy within the recent legislation.

---

### Scope

This DWMS Plan applies to the operation and maintenance of the Coleambally drinking water scheme.

---

### Document Control

This DWMS document is owned by the Director of Technical Services. The Director of Technical Services is responsible for ensuring that the DWMS is reviewed annually and on system change.

---

### DWMS Responsibilities and Authorities

MC employees are encouraged to participate in decisions that affect their jobs and areas of responsibility. This participation fosters a sense of ownership for decisions and their consequences. Specific drinking water management responsibilities and authorities are described in position descriptions. The main responsibilities and authorities related to this DWMS Plan are listed below.

#### All Managers and Employees

All managers and employees involved in the supply of drinking water are responsible for:

- ▲ Understanding, implementing, maintaining and continuously improving the DWMS
- ▲ Being aware of:
  - The Drinking Water Quality Policy
  - Characteristics of the water supply system and preventive strategies in place throughout the system
  - Regulatory and legislative requirements
  - Roles and responsibilities of employees and departments
  - How their actions can impact on water quality and public health.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Water Operators

Water Operators are responsible for:

- ▲ Operation and maintenance of the water treatment facilities
- ▲ Operation and maintenance of water testing functions to meet operational and reporting needs
- ▲ Primary response to incidents
- ▲ Bringing water quality issues to management's attention when they become aware of those issues
- ▲ Awareness of their actions in protecting drinking water quality

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# 1. Assessment of the Drinking Water Supply System

## 1.1 Process Flow Diagram

A process flow diagram (PFD) of the Coleambally water supply system is shown in Figure 1-1.

The diagram is reviewed annually when the DWMS annual report is compiled.

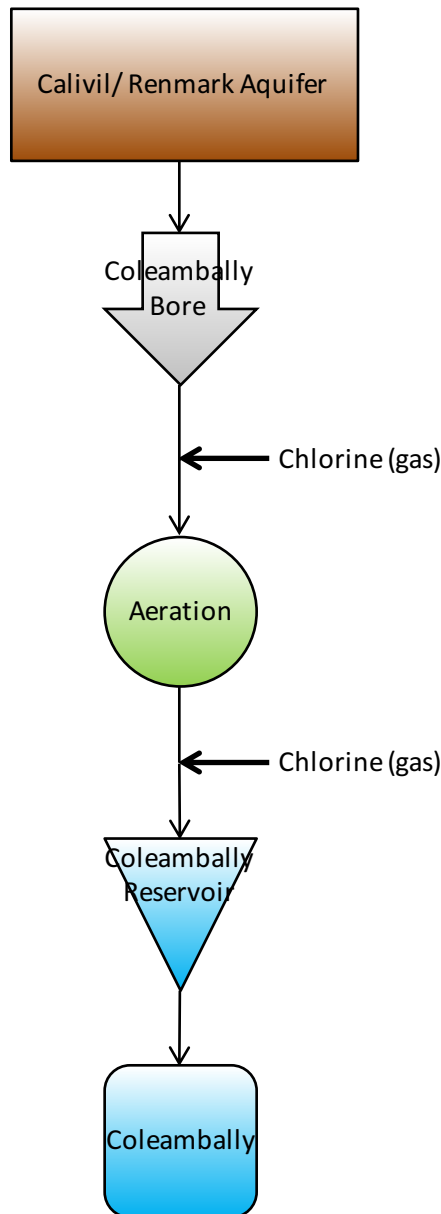


Figure 1–1: Coleambally Process Flow Diagram

Uncontrolled when printed. Please refer to intranet for controlled document.	Date: Version No.	Sept 2016 1.0
--	----------------------	------------------

## 1.2 System Summary

The system description is summarised in Table 1-1.

**Table 1-1: Coleambally Supply System Summary**

SYSTEM COMPONENT	DESCRIPTION
Population Supplied	<ul style="list-style-type: none"> <li>Coleambally: 700</li> </ul>
Source Water Description	Sources: <ul style="list-style-type: none"> <li>Coleambally Bore</li> </ul> Location: <ul style="list-style-type: none"> <li>Calivil/ Renmark aquifers in Lower Murrumbidgee Groundwater Management Area</li> </ul> Water quality: <ul style="list-style-type: none"> <li>Electrical conductivity typically &lt;1000 µS/cm</li> </ul>
Water Treatment	Raw water from the Coleambally bore is treated as follows: <ul style="list-style-type: none"> <li>Chlorination (chlorine gas) for oxidation of dissolved metals and hydrogen sulphide</li> <li>Aeration for further oxidation of dissolved metals and hydrogen sulphide</li> <li>Chlorination (chlorine gas) for disinfection</li> </ul>
Storage After Treatment	Treated water is pumped to the Coleambally reservoir, from where it flows by gravity to the reticulation.
Distribution of Product	Flow by gravity from reservoirs to the reticulation via pressurised trunk and reticulation mains.
Reservoirs	Coleambally Reservoir: 1 ML
Groundwater Allocation	2,119 ML/annum

## 1.3 Assessment of Water Quality Data

Long term historical water quality data relevant for each scheme are analysed prior to the risk assessment workshop, the results of which are captured in the respective Risk Workshop Report. A summary of the issues identified for Coleambally is provided below:

Treated water turbidity exceeded the ADWG target for chlorine disinfection of <1 NTU in 33% of samples. Total coliforms were also detected on a number of occasions. Free and total chlorine results were consistently above the ADWG aesthetic limit of 0.6 mg/L, but it was noted that adequate disinfection is considered higher priority than aesthetic acceptability. Occasional exceedances were also recorded for *E. coli* and iron.

## 1.4 Hazard Identification and Risk Assessment

The risk assessment details are present in the Risk Workshop Report.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 2. Preventive Measures for Drinking Water Quality Management

### 2.1 Preventive Measures and Multiple Barriers

The preventive measures were identified and assessed during the Risk Workshop and have been documented, alongside the significant risks that they address, in the Risk Register.

### 2.2 Critical Control Points

Key risks were reviewed during the Risk Workshop and critical control points (CCPs) identified. For a point to satisfy the requirements of a CCP it must:

- ▲ Control hazards that represent a significant risk and require elimination or reduction to assure supply of safe drinking water
- ▲ Have a parameter (surrogate) that can be measured in a timely manner for the hazardous event
- ▲ Be able to have a correction applied in a timely manner in response to a deviation in the process

The CCPs were reviewed in September 2016.

#### Coleambally Scheme

	Parameter	Operational Target	Adjustment Limit	Critical Limit
Primary Disinfection Chlorine	Free chlorine	0.7-1.0 mg/L	<0.6, >1.0 mg/L	<0.5, >5.0 mg/L

#### Operational Target

This is where you should be operating.  
Aim to keep the system operating at this value.

#### Adjustment Limit

If you reach this limit, refer to CCP procedure and try to get back to the operational target.

Increase monitoring until returned to normal.

#### Critical Limit

If you reach this limit, you have lost control of your system.  
Refer to CCP procedure and try to return to operational target as a matter of urgency.

The CCP procedure is provided below, which the operators use.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Coleambally CCP 1 – Primary Disinfection – Reservoir

What is the control point?	<b>Final Water</b>
What are the hazards?	<b>Chlorine sensitive pathogens; excess chlorine</b>
What is being measured / when?	<b>Free chlorine at Coleambally reservoir outlet / daily</b>
How are the hazards controlled?	<b>Adjust the chlorine dose</b>

<b>Operational Target</b> Free chlorine 0.7-1.0 mg/L	<b>Adjustment Limit</b> Free chlorine <0.6, >1.0 mg/L	<b>Critical Limit</b> Free chlorine <0.5, >5.0 mg/L, for 2 immediate consecutive samples
<ul style="list-style-type: none"> <li>• Routine water sampling and testing</li> <li>• Daily checks and visual inspection</li> <li>• Equipment checks</li> <li>• Dosing rate checks</li> <li>• Instrument calibration</li> </ul>	<ul style="list-style-type: none"> <li>• Verify result by resampling and retesting</li> <li>• If &gt;1.0 mg/L, adjust chlorine dose</li> <li>• Sample and test free chlorine hourly</li> <li>• If &lt;0.6 mg/L, do following:               <ul style="list-style-type: none"> <li>○ Contact Supervisor</li> <li>○ Adjust dose if necessary</li> <li>○ Inspect dosing system</li> <li>○ Sample and test free chlorine hourly, and other parameters as needed</li> </ul> </li> <li>• <b>Fill in the water quality incident report and inform Supervisor.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Contact Supervisor</li> <li>• Adjust chlorine dose</li> <li>• Full analytical investigation</li> <li>• Sample and test reticulation free chlorine</li> <li>• If &lt;0.5 mg/L, consider manual hypo dosing to reservoir</li> <li>• If &gt;5.0 mg/L, consider holding water in reservoir until excess chlorine has dissipated (if possible)</li> <li>• Consider bore shutdown</li> <li>• Contact local DPI Water Officer, for advice if required</li> <li>• Consider boil water notice if issue is not resolving</li> <li>• <b>Fill in the water quality incident report and inform the Supervisor immediately.</b> The Supervisor to inform NSW Health PHU as soon as possible (and within 24 hours).</li> </ul>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



## 3. Operational Procedures and Process Control

### 3.1 Operational Procedures

The CCP procedure is included above in section 2 of this document. Other supporting operational procedures are available for use by operators through the Director of Technical Services or the respective area Operation Manager.

### 3.2 Operational Monitoring

Operational monitoring is conducted as detailed in Table 3-1. These results are recorded in an electronic log sheet.

**Table 3-1: Coleambally Operational Monitoring**

PROCESS LOCATION	PARAMETER	FREQUENCY
Bore	Duty bore number	Daily
	Run/stop status	Daily
Aerator	Pre-dose chlorinator setting	Daily
	Aeration tank chlorine residual	Daily
Distribution Reservoir	Post-dose chlorinator setting	Daily
	Post reservoir - chlorine – free	Daily (refer to CCP1)
	Reservoir integrity	Every 6 months (reservoir inspection SOP)
Reticulation	Town Hall chlorine residual	Weekly
	Police Station chlorine residual	Weekly
	33 Sandpiper Street chlorine residual	Weekly
	25 Bluebonnet Crescent chlorine residual	Weekly
	43 Bencubbin Avenue chlorine residual	Weekly

### 3.3 Corrective Action

The corrective actions associated with the CCP is outlined in the CCP procedure in section 2.

Other corrective actions are undertaken as described in the Drinking Water Quality Incident and Emergency Response Plan, which is a separate and complementary document to this DWMS Plan.

### 3.4 Equipment capability and maintenance

The Lovibond MD100 4-in-1 photometer used to measure chlorine in the Coleambally reticulation is calibrated annually by a specialist contractor.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

Reliability of monitoring equipment is informally verified against monitoring equipment used by the local DPI Water Officer.

Bores and pumps are serviced annually by specialist contractors. Chlorinators are serviced annually by Orica.

---

### 3.5 Materials and chemicals

---

Chemicals and materials used include:

- ▲ Chlorine gas supplied by Orica
- ▲ Sodium hypochlorite supplied by Axi-Kem Griffith (as needed)
- ▲ Laboratory reagents supplied by Lovibond

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 4. Verification of Drinking Water Quality

### 4.1 Drinking Water Quality Monitoring

MC participates in the NSW Health Drinking Water Monitoring Program. As part of this, MC collects samples for microbiological analysis weekly at various sites in each drinking water reticulation system. MC also collects samples for chemical analysis twice-yearly from various points in each reticulation system.

The Coleambally sample points are listed in Table 4-1.

**Table 4-1: NSW Health Program Monitoring Sites**

SCHEME	SAMPLE SITE LOCATION	NSW HEALTH SITE CODE
Coleambally Supply System	Community Hall, Coleambally	31
	Falcon Rd, Coleambally	32
	Fire Station Rd, Coleambally	33
	Bencubbin East, Coleambally	34
	Calrose Ave, Coleambally	35
	Brolga Pl, Coleambally	41
	Curlew Cres, Coleambally	42
	Kookaburra Ave, Coleambally	43
	Kingfisher Ave, Coleambally	51
	Currawong Cres, Coleambally	52
	Bluebonnet Cres, Coleambally	54
	12 Bellbird St, Coleambally	55
	Robin Cres, Coleambally	56

Parameters monitored as part of the 'microbiology' analysis suite include:

- *E. coli*
- Free Chlorine
- pH
- Total Chlorine
- Total Coliforms
- Turbidity

Parameters monitored as part of the 'chemistry' analysis suite include:

- Aluminium
- Antimony
- Arsenic
- Barium
- Boron
- Cadmium
- Calcium
- Chloride
- Chromium
- Copper
- Cyanide
- Fluoride Ratio
- Iodide
- Iodine
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- Nickel
- Nitrate
- pH
- Selenium
- Silver
- Sodium
- Sulphate
- Total Dissolved Solids (TDS)
- Total Hardness as CaCO<sub>3</sub>
- True Colour
- Turbidity

Uncontrolled when printed. Please refer to intranet for controlled document.	Date:	Sept 2016
	Version No.	1.0

- Fluoride
- Nitrite
- Zinc

All samples are sent to Sydney to NSW Health's NATA accredited laboratory and both NSW Health and MSC are provided with results from the analyses. Under the NSW Health Drinking Water Monitoring Program, local water utilities are notified of results that exceed a guideline value.

---

## 4.2 Short-Term Evaluation of Results

---

The operational monitoring results are recorded in electronic log sheets. Operators review results daily as part of their operations and undertake corrective actions where required.

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

---

## 4.3 Corrective Action

---

Water quality incidents are managed according to the Drinking Water Quality Incident and Emergency Response Plan.

Responses to water quality non-conformance can include:

- ▲ Manual dosing of sodium hypochlorite into reservoirs
- ▲ Reactive flushing following customer complaint

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 5. Management of Incidents and Emergencies

### 5.1 Communication

The communication and reporting lines are described in the DWQ IERP.

### 5.2 Incident and Emergency Response Protocols

Incident and emergency response protocols are regarded as a priority. MC uses their Drinking Water Quality Incident and Emergency Response Plan (DWQ IERP) for water quality incident management. These are based on the NSW Health Response Protocols.

Water quality incidents and emergencies are reported to the local NSW Health PHU and DPI Water, as required. The need to issue (and withdraw) a boil water alert is assessed in consultation with the local PHU (explained in the DWQ IERP).

Management of significant incidents and emergencies is covered by council's Disaster Plan.

## 6. Operator Awareness and Training

MC communicates water quality issues with employees via three monthly operational meetings. Operators are also encouraged to discuss water quality via:

- ▲ Informal liaison with local NSW Health Environmental Health Officer
- ▲ Informal liaison with local DPI Water Officer

Operators are encouraged to discuss any additional or further training needs with their supervisors.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 7. Research and Development

Worst, Typical and Best Case effective C.t values of disinfection were calculated as part of the development of this DWMS, following the methodology detailed below. All effective C.t values with disinfection parameters for the WTP are listed in Table 7-1.

It shows that there is adequate disinfection C.t being achieved.

**Table 7-1 Summary of Coleambally Effective C.t and Disinfection Parameters**

PARAMETER	UNITS	VALUE			DATA SOURCE
		WORST CASE	TYPICAL CASE	BEST CASE	
Effective C.t (pH-corrected)	mg.min/L	28	57	98	Calculated
Effective C.t (no pH-correction)	mg.min/L	94	124	154	Calculated
pH	-	8	7.7	7.47	Coleambally log sheets, Jan-Mar 2013
Free Cl <sub>2</sub> residual	mg/L	0.95	1.25	1.56	Coleambally log sheets, Jan-Mar 2013
WTP Production	ML/day	4	4	4	Estimated (WTP capacity)
WTP run time	h/day	22	22	22	Estimated (typical design)
Baffling factor (T <sub>10</sub> /T)	-	0.3	0.3	0.3	Estimated (typical design)
Contact tank capacity	m <sup>3</sup>	1000	1000	1000	Advised by MSC
Effective Contact Time	mins	99	99	99	Calculated

## 8. Documentation and Reporting

### 8.1 Management of Documentations and Records

This DWMS Plan, including the DWQ IERP and CCP procedures, document key information relevant to drinking water quality management for the Coleambally scheme.

The Director of Technical Services maintains access to the current versions of all documents, and provides it to operators/others as required.

Operators ensure that the correct forms are filled and records are made.

### 8.2 Reporting

The DWQ IERP includes reporting and communication lines between plant operators and their supervisor. The supervisor also communicates upwardly as required.

MC also prepares the DWMS Annual Report annually summarising the implementation of the DWMS and water quality performance. This report is submitted to the local PHU.

## 9. Evaluation and Audit

Informal inspections of the system are carried out by operators.

External inspections of the system are also carried out by the local DPI Water Officer during visits. The Officer's findings are used to help direct works.

MC uses the preparation of the DWMS Annual Report as a means to simulate the internal audit. Refer to section 12.1 of the Overall DWMS for details.

The external audit frequency is not yet established by NSW Health, MC will adhere to it when informed. For external audits, MC will engage an independent auditor approved in consultation with the PHU.

Operators maintain appropriate practices and records as described in this DWMS Plan to assist with audit purposes when required.

## 10. Review and Continual Improvement

The effectiveness of the DWMS will be reviewed by the Director of Technical Services, and need for any change or improvements will be identified, and rectified. For mid to long term improvement actions, these will be included in the Improvement Plan for implementation and monitoring.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## References

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

NSW Health Drinking Water Database. Viewed on 10 August 2012.  
<<http://www.drinkingwaterdb.nsw.gov.au/>>.

NSW Health, NSW DPI Water (2013). NSW Guidelines for Drinking Water Management Systems 2013. NSW Health, NSW Department of Primary Industries – Office of Water, New South Wales, North Sydney.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



This page intentionally left blank.

## Appendix C Darlington Point DWMS Plan

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

---

# Murrumbidgee Council

## Darlington Point DWMS Plan

September 2016

---

**Review Date:** September 2017 (or on system change)

**Document Owner:** Director of Technical Services

**DOCUMENT INFORMATION**

Version	Author	Reviewed by	Date	Details
1.0	Tasleem Hasan	Tasleem Hasan	29/9/16	Resulting from merger of DWMS' for the former Jerilderie and Murrumbidgee shires

**Viridis Consultants Pty Ltd** undertook the merger of the DWMS documents, based on review and discussions with relevant council staff and from information present in the original DWMS' for the former councils.

The original DWMS for the former Jerilderie Shire Council was developed by City Water Technology Pty Ltd and Risk Edge Pty Ltd in March 2014. The original DWMS for the former Murrumbidgee Shire Council was developed by Water Futures Pty Ltd in June 2013.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Executive Summary

### DWMS Purpose

The NSW *Public Health Act 2010* was passed by Parliament at the end of 2010. The *Public Health Act 2010* (and its supporting regulation) includes the requirement for water suppliers to produce a Quality Assurance Program, which is based on the *Framework for Management of Drinking Water Quality* in the *Australian Drinking Water Guidelines* (NHMRC/NRMMC, 2011). For the purposes of implementation, this quality assurance program is termed a Risk-Based Drinking Water Management System (DWMS).

Murrumbidgee Council's overall DWMS is based on the 12 Elements, 32 Components and 76 Actions of the Framework for Management of Drinking Water Quality.

### DWMS Overall

The overall DWMS for Murrumbidgee Council contains or references the overarching elements common to the different drinking water schemes.

### Darlington Point DWMS Plan

This document is the Darlington Point DWMS Plan. It contains system specific information to manage the risks to this particular scheme.

### Critical Control Points

Critical control points (CCPs) are discussed in this document.

### Incidents and Emergencies

Drinking water quality incidents and emergencies are managed through the Drinking Water Quality Incident and Emergency Response Plan, which is a separate complementary document.

### Improvement Plan

An improvement plan forms part of the overall DWMS, and is available as a separate excel spreadsheet.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

# Contents

<b>Executive Summary</b>	<b>3</b>
DWMS Purpose	3
DWMS Overall	3
Darlington Point DWMS Plan	3
Critical Control Points	3
Incidents and Emergencies	3
Improvement Plan	3
<b>Introduction and Background</b>	<b>5</b>
Scope	5
Document Control	5
DWMS Responsibilities and Authorities	5
<b>1. Assessment of the Drinking Water Supply System</b>	<b>7</b>
1.1 Process Flow Diagram	7
1.2 System Summary	8
1.3 Assessment of Water Quality Data	8
1.4 Hazard Identification and Risk Assessment	8
<b>2. Preventive Measures for Drinking Water Quality Management</b>	<b>9</b>
2.1 Preventive Measures and Multiple Barriers	9
2.2 Critical Control Points	9
<b>3. Operational Procedures and Process Control</b>	<b>10</b>
3.1 Operational Procedures	10
3.2 Operational Monitoring	10
3.3 Corrective Action	10
3.4 Equipment capability and maintenance	10
3.5 Materials and chemicals	10
<b>4. Verification of Drinking Water Quality</b>	<b>11</b>
4.1 Drinking Water Quality Monitoring	11
4.2 Short-Term Evaluation of Results	12
4.3 Corrective Action	12
<b>5. Management of Incidents and Emergencies</b>	<b>13</b>
5.1 Communication	13
5.2 Incident and Emergency Response Protocols	13
<b>6. Operator Awareness and Training</b>	<b>13</b>
<b>7. Research and Development</b>	<b>13</b>
<b>8. Documentation and Reporting</b>	<b>14</b>
8.1 Management of Documentations and Records	14
8.2 Reporting	14
<b>9. Evaluation and Audit</b>	<b>14</b>
<b>10. Review and Continual Improvement</b>	<b>14</b>
<b>References</b>	<b>15</b>

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Introduction and Background

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* ('the Framework') in the *Australian Drinking Water Guidelines (ADWG) 2011* (NHMRC/NRMMC 2011). The QAP will be referred to as a Drinking Water Management System ('DWMS') and water utilities in NSW are required to have a DWMS in place by 1 September 2014.

As stated in the ADWG:

*"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."*

The NSW Government has encompassed this philosophy within the recent legislation.

---

### Scope

This DWMS Plan applies to the operation and maintenance of the Darlington Point drinking water scheme.

---

### Document Control

This DWMS document is owned by the Director of Technical Services. The Director of Technical Services is responsible for ensuring that the DWMS is reviewed annually and on system change.

---

### DWMS Responsibilities and Authorities

MC employees are encouraged to participate in decisions that affect their jobs and areas of responsibility. This participation fosters a sense of ownership for decisions and their consequences. Specific drinking water management responsibilities and authorities are described in position descriptions. The main responsibilities and authorities related to this DWMS Plan are listed below.

#### All Managers and Employees

All managers and employees involved in the supply of drinking water are responsible for:

- ▲ Understanding, implementing, maintaining and continuously improving the DWMS
- ▲ Being aware of:
  - The Drinking Water Quality Policy
  - Characteristics of the water supply system and preventive strategies in place throughout the system
  - Regulatory and legislative requirements
  - Roles and responsibilities of employees and departments
  - How their actions can impact on water quality and public health.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## Water Operators

Water Operators are responsible for:

- ▲ Operation and maintenance of the water treatment facilities
- ▲ Operation and maintenance of water testing functions to meet operational and reporting needs
- ▲ Primary response to incidents
- ▲ Bringing water quality issues to management's attention when they become aware of those issues
- ▲ Awareness of their actions in protecting drinking water quality

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



# 1. Assessment of the Drinking Water Supply System

## 1.1 Process Flow Diagram

A process flow diagram (PFD) of the Darlington Point water supply system is shown in Figure 1-1.

The diagram is reviewed annually when the DWMS annual report is compiled.

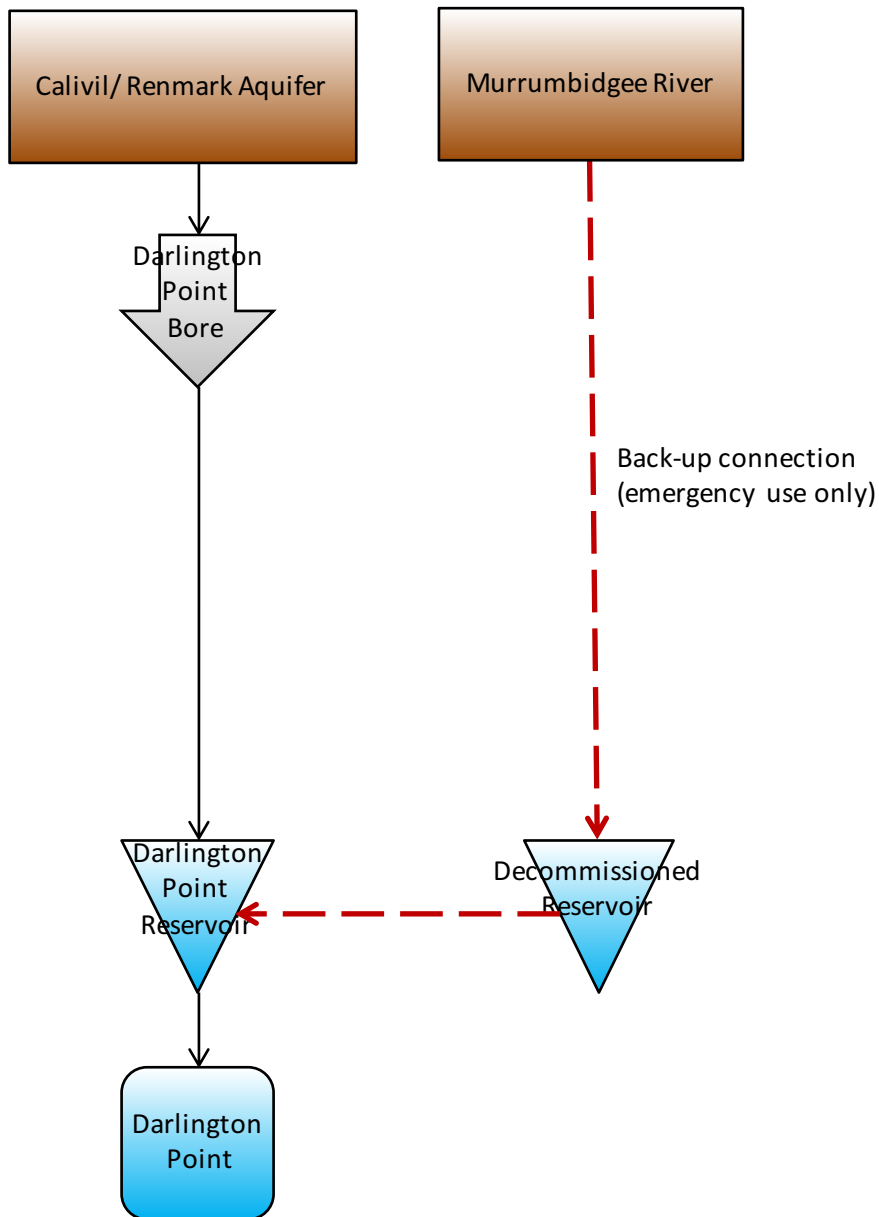


Figure 1–1: Darlington Point Process Flow Diagram

Uncontrolled when printed. Please refer to intranet for controlled document.	Date:	Sept 2016
	Version No.	1.0

## 1.2 System Summary

The system description is summarised in Table 1-1.

**Table 1-1: Darlington Point Supply System Summary**

SYSTEM COMPONENT	DESCRIPTION
Population Supplied	<ul style="list-style-type: none"> <li>Darlington Point: 997</li> </ul>
Source Water Description	Sources: <ul style="list-style-type: none"> <li>Darlington Point Bore</li> </ul> Location: <ul style="list-style-type: none"> <li>Calivil/ Renmark aquifers in Lower Murrumbidgee Groundwater Management Area</li> </ul> Water quality: <ul style="list-style-type: none"> <li>Electrical conductivity typically &lt;1000 µS/cm</li> </ul>
Water Treatment	Raw water from the Darlington Point bore is not treated before distribution.
Storage After Treatment	Untreated water is pumped to the Darlington Point reservoir, from where it flows by gravity to the reticulation.
Distribution of Product	Flow by gravity from reservoirs to the reticulation via pressurised trunk and reticulation mains.
Reservoirs	Darlington Point Reservoir: 1 ML
Groundwater Allocation	2,119 ML/annum

## 1.3 Assessment of Water Quality Data

Long term historical water quality data relevant for each scheme are analysed prior to the risk assessment workshop, the results of which are captured in the respective Risk Workshop Report. A summary of the issues identified for Darlington Point is provided below:

Treated water turbidity exceeded the ADWG target for chlorine disinfection of <1 NTU in 46% of samples; although Darlington Point supply is not currently disinfected, the turbidity should be noted for future dosing installations. Total coliforms were also detected on a number of occasions. Occasional exceedances were recorded for *E. coli*, and rare exceedances for true colour iron.

## 1.4 Hazard Identification and Risk Assessment

The risk assessment details are present in the Risk Workshop Report.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 2. Preventive Measures for Drinking Water Quality Management

### 2.1 Preventive Measures and Multiple Barriers

The preventive measures were identified and assessed during the Risk Workshop and have been documented, alongside the significant risks that they address, in the Risk Register.

### 2.2 Critical Control Points

Key risks were reviewed during the Risk Workshop and critical control points (CCPs) identified. For a point to satisfy the requirements of a CCP it must:

- ▲ Control hazards that represent a significant risk and require elimination or reduction to assure supply of safe drinking water
- ▲ Have a parameter (surrogate) that can be measured in a timely manner for the hazardous event
- ▲ Be able to have a correction applied in a timely manner in response to a deviation in the process

The CCPs were reviewed in September 2016.

For Darlington Point there were no CCPs established as the supply is currently untreated. However, there are other important operational parameters which need to be monitored, for example, reservoir inspections and integrity.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 3. Operational Procedures and Process Control

### 3.1 Operational Procedures

Supporting operational procedures are available for use by operators through the Director of Technical Services or the respective area Operation Manager.

### 3.2 Operational Monitoring

Operational monitoring is conducted as detailed in Table 3-1. These results are recorded in an electronic log sheet.

**Table 3-1: Darlington Point Daily Monitoring**

PROCESS LOCATION	PARAMETER	REFQUENCY
Bore	Duty bore number	Daily
	Run/stop status	Daily
Reservoir	Reservoir integrity	Every 6 months (reservoir inspection SOP)

### 3.3 Corrective Action

Corrective actions are undertaken as described in the Drinking Water Quality Incident and Emergency Response Plan, which is a separate and complementary document to this DWMS Plan.

### 3.4 Equipment capability and maintenance

Bores and pumps are serviced annually by specialist contractors.

### 3.5 Materials and chemicals

No chemicals are currently being used.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 4. Verification of Drinking Water Quality

### 4.1 Drinking Water Quality Monitoring

MC participates in the NSW Health Drinking Water Monitoring Program. As part of this, MC collects samples for microbiological analysis weekly at various sites in each drinking water reticulation system. MC also collects samples for chemical analysis twice-yearly from various points in each reticulation system.

The Darlington Point sample points are listed in Table 4-1.

**Table 4-1: NSW Health Program Monitoring Sites**

SCHEME	SAMPLE SITE LOCATION	NSW HEALTH SITE CODE
Darlington Point Supply System	Cemetery Lane, Darlington Point	10
	14 Boyd St, Darlington Point	11
	20 McAllister St, Darlington Point	12
	11 DeMamiel St, Darlington Point	13
	5 Chant St, Darlington Point	14
	11 Barwidgee Blvd, Darlington Point	15
	18 Young St, Darlington Point	16
	20 Brooks Cres, Darlington Point	18
	Stock St, Darlington Point	21
	Bridge St, Darlington Point	22
	21 Carrington St, Darlington Point	23
	42 Darlington St, Darlington Point	24
	2 Ryan St, Darlington Point	25
	Narrand St, Darlington Point	27
	28 Uri St, Darlington Point	28

Parameters monitored as part of the 'microbiology' analysis suite include:

- *E. coli*
- Free Chlorine
- pH
- Total Chlorine
- Total Coliforms
- Turbidity

Parameters monitored as part of the 'chemistry' analysis suite include:

- Aluminium
- Antimony
- Arsenic
- Barium
- Boron
- Cadmium
- Calcium
- Chloride
- Chromium
- Fluoride Ratio
- Iodide
- Iodine
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- pH
- Selenium
- Silver
- Sodium
- Sulphate
- Total Dissolved Solids (TDS)
- Total Hardness as CaCO<sub>3</sub>

Uncontrolled when printed. Please refer to intranet for controlled document.	Date:	Sept 2016
	Version No.	1.0

- Copper
- Cyanide
- Fluoride
- Nickel
- Nitrate
- Nitrite
- True Colour
- Turbidity
- Zinc

All samples are sent to Sydney to NSW Health's NATA accredited laboratory and both NSW Health and MSC are provided with results from the analyses. Under the NSW Health Drinking Water Monitoring Program, local water utilities are notified of results that exceed a guideline value.

---

## 4.2 Short-Term Evaluation of Results

---

There is no operational water quality testing being done at the moment.

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

---

## 4.3 Corrective Action

---

Water quality incidents are managed according to the Drinking Water Quality Incident and Emergency Response Plan.

Responses to water quality non-conformance can include:

- ▲ Manual dosing of sodium hypochlorite into reservoirs
- ▲ Reactive flushing following customer complaint

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 5. Management of Incidents and Emergencies

### 5.1 Communication

The communication and reporting lines are described in the DWQ IERP.

### 5.2 Incident and Emergency Response Protocols

Incident and emergency response protocols are regarded as a priority. MC uses their Drinking Water Quality Incident and Emergency Response Plan (DWQ IERP) for water quality incident management. These are based on the NSW Health Response Protocols.

Water quality incidents and emergencies are reported to the local NSW Health PHU and DPI Water, as required. The need to issue (and withdraw) a boil water alert is assessed in consultation with the local PHU (explained in the DWQ IERP).

Management of significant incidents and emergencies is covered by council's Disaster Plan.

## 6. Operator Awareness and Training

MC communicates water quality issues with employees via three monthly operational meetings. Operators are also encouraged to discuss water quality via:

- ▲ Informal liaison with local NSW Health Environmental Health Officer
- ▲ Informal liaison with local DPI Water Officer

Operators are encouraged to discuss any additional or further training needs with their supervisors.

## 7. Research and Development

As there is no treatment being undertaken at the moment,  $C.t$  calculation is not applicable as yet.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

## 8. Documentation and Reporting

### 8.1 Management of Documentations and Records

This DWMS Plan, including the DWQ IERP and operating procedures, document key information relevant to drinking water quality management for the Darlington Point scheme.

The Director of Technical Services maintains access to the current versions of all documents, and provides it to operators/others as required.

Operators ensure that the correct forms are filled and records are made.

### 8.2 Reporting

The DWQ IERP includes reporting and communication lines between plant operators and their supervisor. The supervisor also communicates upwardly as required.

MC also prepares the DWMS Annual Report annually summarising the implementation of the DWMS and water quality performance. This report is submitted to the local PHU.

## 9. Evaluation and Audit

Informal inspections of the system are carried out by operators. External inspections of the system are also carried out by the local DPI Water Officer during visits. The Officer's findings are used to help direct works.

MC uses the preparation of the DWMS Annual Report as a means to simulate the internal audit. Refer to section 12.1 of the Overall DWMS for details.

The external audit frequency is not yet established by NSW Health, MC will adhere to it when informed. For external audits, MC will engage an independent auditor approved in consultation with the PHU.

Operators maintain appropriate practices and records as described in this DWMS Plan to assist with audit purposes when required.

## 10. Review and Continual Improvement

The effectiveness of the DWMS will be reviewed by the Director of Technical Services, and need for any change or improvements will be identified, and rectified. For mid to long term improvement actions, these will be included in the Improvement Plan for implementation and monitoring.

The main and priority improvement for the Darlington Point scheme for now is to introduce treatment/disinfection for the water supply scheme.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0



## References

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

NSW Health Drinking Water Database. Viewed on 10 August 2012.  
<<http://www.drinkingwaterdb.nsw.gov.au/>>.

NSW Health, NSW DPI Water (2013). NSW Guidelines for Drinking Water Management Systems 2013. NSW Health, NSW Department of Primary Industries – Office of Water, New South Wales, North Sydney.

	Date:	Sept 2016
Uncontrolled when printed. Please refer to intranet for controlled document.	Version No.	1.0

This page intentionally left blank.