Warren Shire Council

Drinking Water Management System

Warren and Nevertire Potable Water Supply Systems

Document Control

Version	Date	Details	Author	Reviewer	Approver
		Draft*	Glenn Fernandes (Public Works)[1]	Kamal Fernando (Public Works)	Kamal Fernando (Public Works)
	4/12/2012	Final Draft	Glenn Fernandes (Public Works) [1]	Kamal Fernando (Public Works)	Kamal Fernando (Public Works)
1.0	30/08/2013	Final	Yasas Siriwardene (Public Works) [1]	Kamal Fernando (Public Works)	Kamal Fernando (Public Works)
2.0	Nov 2014	Proofread and updated		Allan Murdoch	USM (Warren Shire Council)
3.0	Aug 2021	Significant review and update of DWMS, including site visit (March 2021) to review currency of document. Provided to Council, NSW Health and DPE for review.	Andrew Gonzalez / Natalie Crawford (Atom Consulting)[2]		
4.0	11 August 2022	Version 3 of DWMS reviewed with Council onsite (27 July 2022) and minor changes made. Updates made to PFD including during 10 August 2022 site visit.	Natalie Crawford (Atom Consulting)[2]	Raymond Burns. Town Services Manager (WSC), Asset Technical Officer (WSC) and Bruce Lamont (DPE Inspector) during site visit (27 July 2022)	
5.0	17/08/2022	Minor updates		Raymond Burns, Town Services Manager (WSC), 11/08/2021	

Note 1: DWMS developed for NSW Health and Warren Shire Council. The project team included NSW Public Works (Glenn Fernandes and Samantha deSouza) and Atom Consulting (Annalisa Contos). NSW Health provided funding to assist Warren Shire Council in the development of the project.

Note 2: NSW Health provided funding to assist Warren Shire Council in the review and update of the DWMS

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Introduction

Purpose

The *NSW Public Health Act 2010* (the 'Act') and the Public Health Regulation 2012 require drinking water suppliers to establish and maintain a risk-based quality assurance program (QAP) for the management of drinking water supplied to consumers.

This Drinking Water Management System (DWMS) documents how Warren Shire Council (Council, or WSC) meet their obligations under the Act, consistent Australian Drinking Water Guidelines (ADWG) (NHMRC/NRMMC, 2011) Framework for Management of Drinking Water Quality (the Framework).

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

The structure of this document reflects the structure of the Framework for the Management of Drinking Water Quality (Framework), as set out in the ADWG. The DWMS is divided into 12 sections, such that each section addresses each element of the Framework. The components that sit under each of the 12 elements are addressed as separate subsections. The specific action requirements are documented under each component. This DWMS is supported by a range documentation referenced at the appropriate points in this document.

Scope

This DWMS covers the following drinking water supply systems (described in detail in Element 2):

- Warren water supply system
- Nevertire water supply system

1 Element 1: Commitment to Drinking Water Quality Management

Component 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.

Warren Shire Council has a drinking water quality policy adopted by Council on December 2014. The controlled version of the policy is kept on the I: drive and is available for download on Council's website.

The responsibilities within this policy are communicated to staff through:

- Staff inductions
- Weekly team meetings
- Toolbox meetings
- Participation in water quality risk assessments

Councils' commitment to drinking water quality management as included in planning and policy documents is shown in Table 1.

Table 1. Relevant planning and policy documents

Document	How water quality objectives are incorporated
Community strategic plan 2035	Objective 3.2: Provide sustainable infrastructure for the community 3.2.1 Maintain community assets (…. water and sewer infrastructure) to acceptable community standards Objective 4.2: Proactively manage environmental-based assets for the community 4.2.3 Provide Warren and the villages of Nevertire and Collie with an adequate and safe water supply that is appropriately priced for all consumers
Operational plan (annually)	Maintenance and capital works budgets for water infrastructure Includes actions, responsibilities, performance measures and targets to implement strategic outcomes (4.3.2)
Asset Management Strategy and Asset Management Plan Water	Support implementation of strategic outcomes.
Long term financial plan	Water fund capital works program linked to Water & Sewerage Strategic Plan

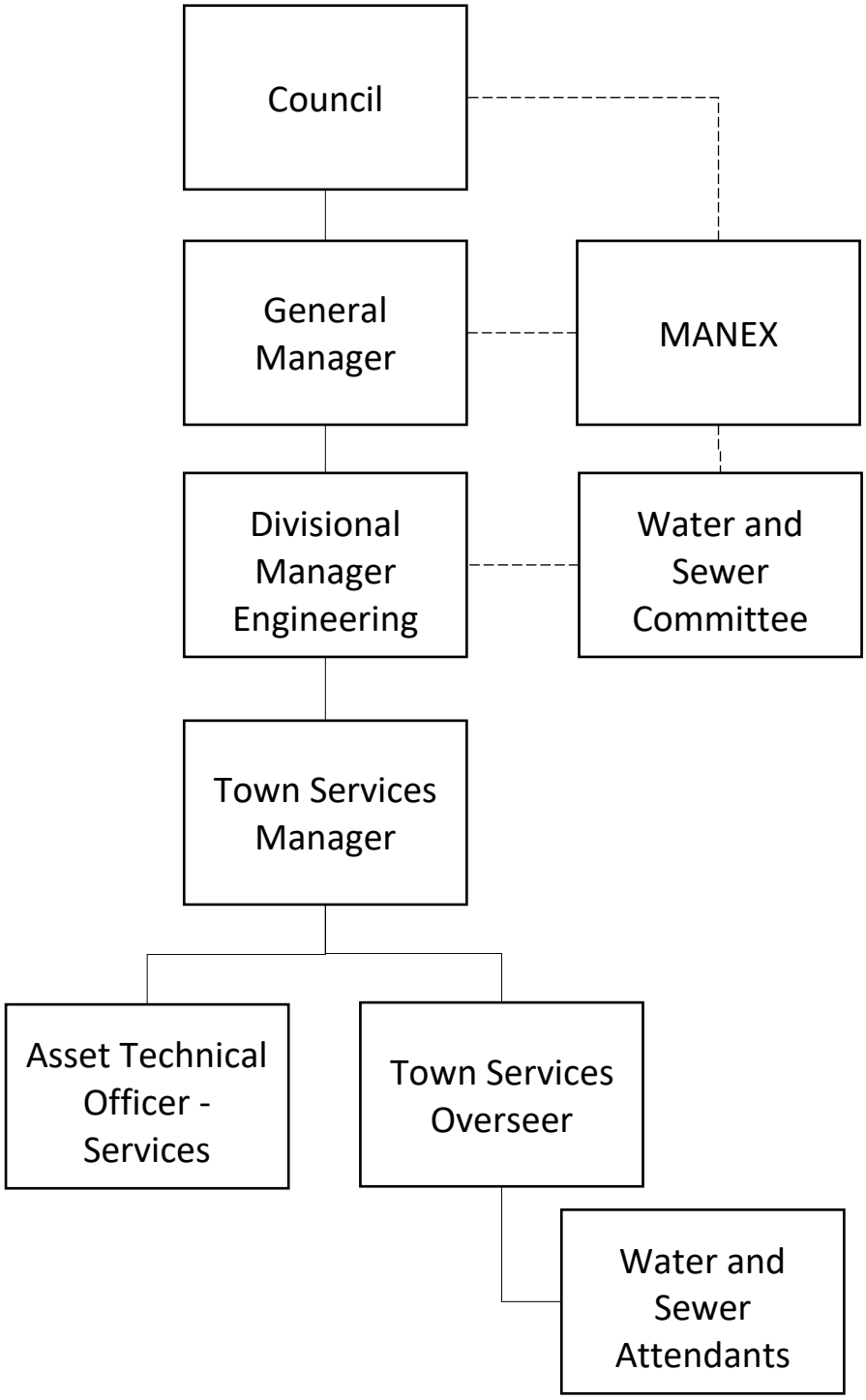
Action 86: Water quality policy to be laminated and displayed in the depot lunchroom.

To fulfil the requirements of the water quality policy and this drinking water management system, The responsibilities for the governance of the DWMS is shown in Figure 1. Individual responsibilities are included in position descriptions and identified in relevant sections.

The process for Council to endorse the DWMS includes (major changes):

- DWMS review and recommendation for approval by the Water and Sewer Committee. Recorded in meeting minutes
- Approval of DWMS by Manex
- Council endorsement

Figure 1. DMWS implementation hierarchy of responsibility



Component 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.

A summary of regulatory and formal requirements relevant to drinking water is shown in Table 2.

The responsibilities of staff to implement the requirements of this legislation is communicated to staff through water team meetings.

Regulatory and formal requirements are reviewed as part of DWMS updates (see Element 12: Review and continual improvement for review schedule). Updates may also occur as part of Strategic Business Plan and IWCM reviews.

Table 2. Key formal requirements relating to water quality

Instrument	Jurisdiction	Type	Relevance
Public Health Act 2010	NSW	Statute	Protection of public health follow any advice issued from the Chief of Health regarding drinking water safety to the public; sample drinking water in accordance with NSW Health recommendations. Prepare a drinking water management system
Public Health Regulation 2012	NSW	Regulation	Requirement to have a quality assurance program (QAP) in place that addresses the elements of the Framework as set out in the ADWG. A copy of the most recent QAP is to be provided to the Director-General who may arrange a review of the QAP at any time. Specifies the requirements of the QAP (see Table 3)
Competition and Consumer Act 2010	Commonwealth	Statute	Replaces the Trade Practices Act 1974 and incorporates Schedule 2 – The Australian Consumer Law. As a "seller" of water, the local council is subject to provisions of Consumer transactions and Consumer guarantees, which guarantees that the goods supplied are reasonably fit for purpose
AS/NZS 3500.1:2021 - Plumbing and Drainage Set	National	Standard	Largely for management of the distribution system including standards for plumbing and drainage issues
Plumbing Code of Australia (National Construction Code Volume 3)	National	Standard	Largely for management of the distribution system including standards for plumbing and drainage issues
Australian Drinking Water Guidelines 2011	National	Guideline	Sets frameworks and guidance for the provision of safe, quality drinking water

Instrument	Jurisdiction	Type	Relevance
Local Government Act 1993	NSW	Statute	Urban water services and management/review of on-site sewage management systems. Have only persons licensed or certified under the Home Building Act 1989 (or supervised by such a person) carry out any water supply work, sewerage work or stormwater drainage work. Preparation of Asset Management Plans
Protection of the Environment Operations Act 1997	NSW	Statute	Environment protection including licensed discharges
NSW Water and Sewerage Strategic Business Planning Guidelines	NSW	Guidelines	Prepare Strategic Business plans including a review of the operating environment and IWCM which should identify key water quality issues in the catchment.
NSW Health Drinking Water Monitoring Program	NSW	Guidelines	Free-of-charge testing for water supply system monitoring for indicator bacteria and health-related inorganic chemicals.
Environmental Planning and Assessment Act 1979 No 203	NSW	Statute	Proper management, development and conservation of resources including water for the welfare of the community and environment.

The Public Health Regulation (2012) sets out the matters to be included a suppliers QAP. A summary of requirements from the 2018 amendment and how they are met by this DWMS is shown in Table 3.

Table 3. Public Health Regulation 2012 – matters to be included in a QAP

Clause	Matters to be included in the quality assurance plan	DWMS Reference
34A(a)	Identification of potential health risks associated with the supply of drinking water.	Element 2 – Assessment of the Drinking Water Supply System
34A(b)	A process for controlling those risks in accordance with the Framework for Management of Drinking Water Quality (as set out in the Australia Drinking Water Guidelines published from time to time by the National Health and Medical Research Council).	Elements 1 to 12
34A(c)	Documentation of the identification and the process referred to under this clause.	This DWMS
34B(a)	Documentation that sets out the following:	
34B(a)i	A commitment by the supplier to drinking water quality management and a description of how that commitment is communicated to staff and included in planning and policy documents.	Component 1.1 Drinking water quality policy Table 1
34B(a)ii	Research and development carried out in relation to maintaining or improving the quality of the drinking water, including a list of any previous water quality studies and plans for future studies.	Component 9.1 Investigative studies and research monitoring Improvement plan
34B(a)iii	Systems or procedures for record-keeping.	Component 10.1 Management of

Clause	Matters to be included in the quality assurance plan	DWMS Reference
		documentation and records
34B(a)iv	Systems or procedures for reviewing the monitoring of the operation, and the verifying, of the drinking water supply system and for reporting the results of those reviews to management and external parties.	Operational and Verification Monitoring Plan Element 5: Verification of drinking water quality
34B(a)v	Preventive measures, critical control points and communication of those measures and points to staff.	Component 3.2 Critical control points Appendix A Critical and operational control points
34B(a)vi	Procedures for the validation of equipment used, and the treatment processes carried out, for the drinking water supply system.	Component 9.2 Validation of processes
34B(b)	In relation to the management of the drinking water supply system and the quality of the drinking water, the following:	
34B(b)i	An assessment of the risks to the drinking water supply system.	Element 2 - Assessment of the Drinking Water Supply System Appendix C Risk assessment
34B(b)ii	An assessment of the maximum and residual risks to the drinking water supply system.	
34B(b)iii	Identification of hazards to the drinking water supply system.	
34B(b)iv	Measures to prevent any hazards to the drinking water supply system (preventive measures).	Component 3.1 Preventive measures and multiple barriers
34B(b)v	Actions to improve the drinking water supply system.	Component 12.2 Drinking water quality management improvement plan Appendix B Improvement plan
34B(b)vi	Management, if possible, of any risks to the drinking water supply system assessed (control points)	Component 3.2 Critical control points Appendix A Critical and operational control points - Protocols
34B(b)vii	Communication to staff about control points that are critical to the drinking water supply system and drinking water quality (critical control points)	
34B(b)viii	Documentation of the matters referred to under this subclause	
34B(c)	Processes and procedures in relation to the drinking water supply system for the following:	
34B(c)i	Managing critical control points and recording non-compliance with critical control points.	Component 3.2 Critical control points Appendix A Critical and operational control points – Protocols Operational monitoring spreadsheet
34B(c)ii	Operational monitoring and correction of the drinking water supply system.	Component 4.2 Operational Component 4.3 Corrective
34B(c)iii	Procurement, delivery and testing of chemicals and equipment used in relation to the drinking water supply system.	Component 4.5 Materials and chemicals
34B(c)iv	Primary disinfection and recording of primary disinfection conditions (including a recording of the concentration and contact time of the disinfectant and the temperature and pH level of the water).	Component 4.2 Operational Operational monitoring spreadsheet **Action 84**: Collect flow data to confirm chlorine contact time

Clause	Matters to be included in the quality assurance plan	DWMS Reference
		calculations
34B(c)v	Calibration, operation and maintenance of critical treatment equipment.	Component 4.4 Equipment capability and maintenance
34B(d)	Processes for verifying the quality of the drinking water and documentation that sets out the following:	
34B(d)i	A comprehensive program for monitoring the drinking water supply distribution system.	Component 4.2 Operational Operational and Verification Monitoring Plan
34B(d)ii	Procedures to review and respond to results from monitoring the drinking water supply distribution system	Operational and Verification Monitoring Plan Component 4.3 Corrective
34B(e)	Processes for managing incidents and emergencies in relation to the quality of the drinking water and the following:	
34B(e)i	A process to notify the Secretary of incidents in relation to the drinking water quality.	Component 6.2 Incident and emergency response protocols Incident and Emergency Protocols Appendix A Critical and operational control points – Protocols
34B(e)ii	Identification of the types of incidents and emergencies that may occur and that would require management.	
34B(e)iii	Procedures, including communication procedures, to be followed in the case of an incident or emergency.	
34B(e)iv	Procedures for the control of document versions.	Component 10.1 Management of documentation and records
34B(e)v	Documentation of the contact details (including name, business name and telephone number) of individuals who should be contacted in the event of an incident or emergency in relation to the quality of the drinking water (emergency contact details).	**Action 100**: Develop a water incident and emergency contact list
34B(f)	In relation to employee training about the quality of the drinking water, the following:	
34B(f)i	Training for employees about, and awareness of issues relating to, the quality of the drinking water.	Element 7: Employee awareness and training
34B(f)ii	Processes for managing and reviewing the training for employees and maintaining and improving awareness of employees and contractors about drinking water quality issues.	
34B(g)	In relation to the local community, the following:	
34B(g)i	Processes for engaging and raising awareness in the local community about the quality of the drinking water and informing the community at the time of any drinking water supply system incidents.	Element 8: Community involvement and awareness
34B(g)ii	Consideration of local community and consumer objectives in the management of the drinking water supply system.	
34B(h)	In relation to evaluations and audits, the following:	
34B(h)i	Long term evaluation of the drinking water quality.	Component 11.1 Long term evaluation of results
34B(h)ii	Processes for updating or improving the quality assurance program where required.	Component 12.1 Review by senior executive
34B(h)iii	Scheduling of internal and external reviews of the quality assurance program and processes for such	Component 11.2 Audit of drinking water quality management

Clause	Matters to be included in the quality assurance plan	DWMS Reference
	reviews.	

Component 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.

A summary of drinking water internal and external stakeholders is shown in Table 4 and Table 5. The list is reviewed annually as part of the overall DWMS review process.

Table 4. Summary of internal stakeholders

Stakeholder	Role
Council	Overarching commitment to drinking water
Manex	The Manex team are briefed monthly by the Manager Town Services Reviews and approves major changes to the DWMS
Council General Manager	Strategic planning, shared leadership and advocacy.
Council staff	Implementation of the Drinking Water Management System

Table 5. Summary of external stakeholders

Stakeholder	Role	Communication and roles of Council
Householders and businesses	Customers	Customers are listed on Council water connections database. Customer complaint follow up
NSW Health	Provides water analysis through the NSW Health Drinking Water Monitoring Program. NSW Health response protocol to microbial and physical and chemical exceedances. Provision of advice to Council on drinking water management	Participation in drinking water quality risk assessments Annual reporting to NSW Health on DWMS performance Providing water samples for testing by NSW Health
NSW Department of Industries, Planning and the Environment	Provides expertise and advice and acts in utility activities regulation, water allocation and access issues. Polluting activities regulator, advice on spills in catchment, environmental flows advice.	Annual reporting Inspections of treatment plants and systems Licensing and liaison over resource issues.
NSW joint organisation	Intergovernmental collaborations	Warren Shire Council is a member Council of the Orana Water Utilities Alliance organisation (OWUA)
NSW Department of Fair Trading	Water fitness for purpose and related trading issues	Liaison over water product issues

2 Element 2 - Assessment of the Drinking Water Supply System

Component 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.

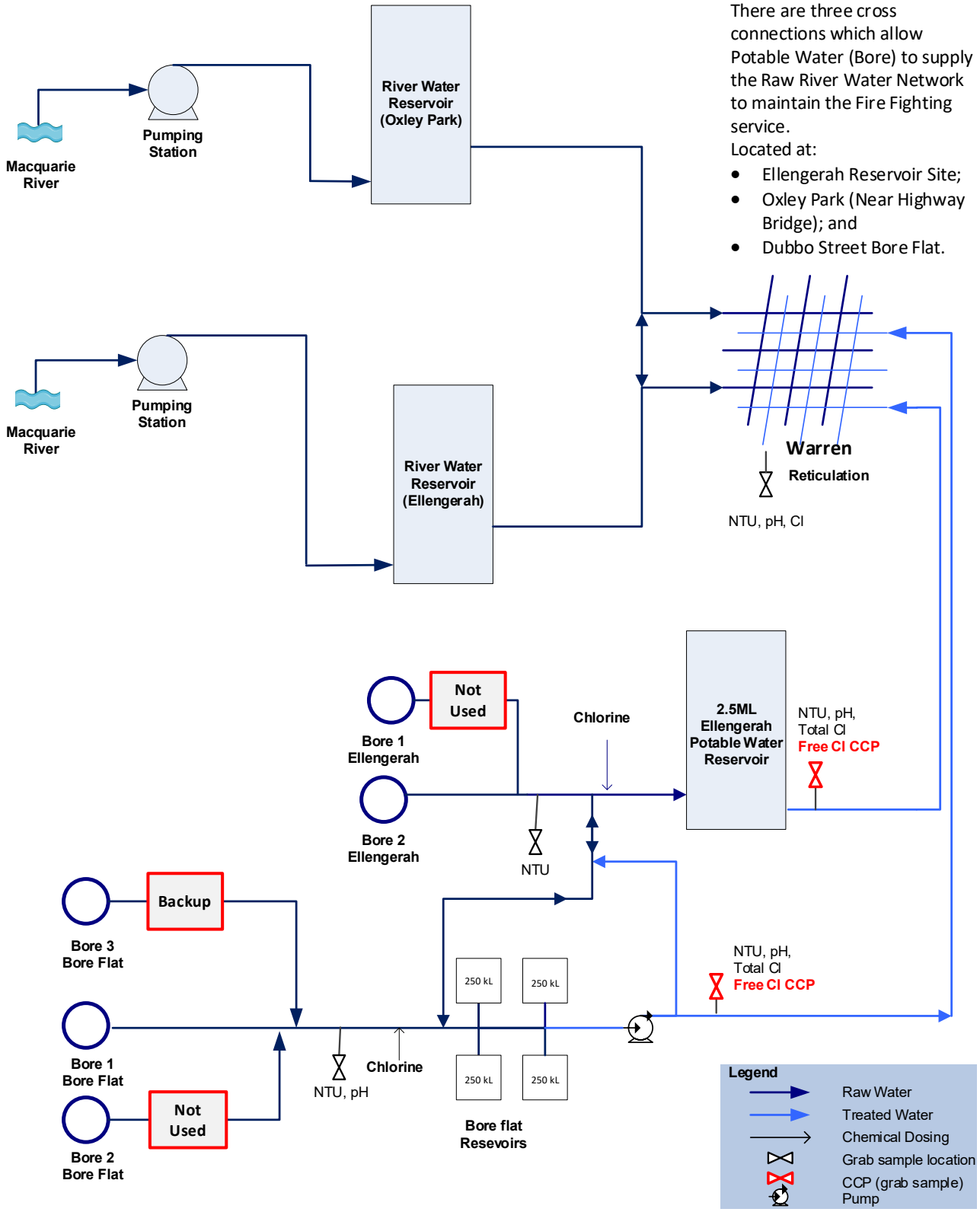
Warren Council manages two water supply schemes, Warren and Nevertire. The Collie water supply system has been declared non potable and is not covered by this Drinking Water Management System.

An overview of the potable water supply systems is provided in Table 6. A flow diagram of the water supply system from catchment to the consumer is shown in Figure 2 and Figure 3.

Table 6. Overview of Warren Shire Council potable water supply systems

System component	Warren	Nevertire
Population	2,732 (2016 census)	189 (2016 census)
Raw water source	Bore 2 (Ellengerah) Bore 1 Bore Flat Bore 3 Bore Flat (back up)	Bores 1 and 2
Water treatment process	Chlorine gas disinfection	Chlorine gas disinfection
Storage after treatment	Bores as it is pumped into the potable water storage reservoirs. 2.5 ML Ellengerah potable water reservoir; and Four 250KL potable water tanks at Bore Flat	0.6 ML potable water reservoir.
Distribution	Gravity to reticulation from potable water reservoirs.	Gravity to reticulation from potable water reservoirs.
Cross connections	Dual raw supply for irrigation (surface water) in town Three cross connections between the two networks to enable emergency supply (firefighting) from the Potable water network into the raw river water supply.	-

Figure 2. Process flow diagram of Warren Water Supply System



Ver.	Date	Description	Author	Reviewer
1.1	15/01/2020	Update based on site visit 12/12/19 with Council	NC	LP
2.0	10/03/2020	Updated following 4/3/20 site visit with Council	NC	AC
3.0	1/7/2021	Updated based on site visit 4/3/21 with Council. Added monitoring	NC	
4.0	17/8/2022	Updated 27/7/22 site visit. Bore names and Bore Flat chlorine and reservoir arrangements updated	NC	

WARREN shire council

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Warren Shire Council

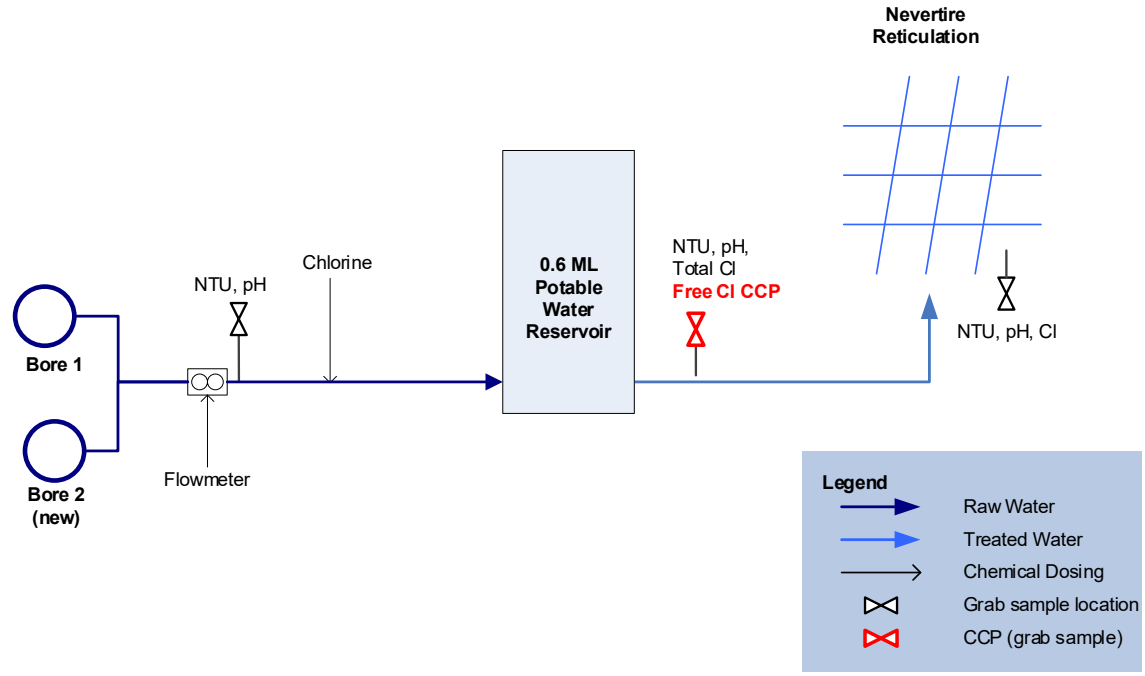
Warren water supply

Document No. 01

Status For issue

Version 4.0

Figure 3. Process flow diagram of Nevertire Water Supply System



Ver.	Date	Description	Author	Reviewer			
1.1	15/01/2020	Update based on site visit 12/12/19	NC	LP	WARREN shire council	Warren Shire Council	Document No. 02
2.0	31/08/2020	Added monitoring	NC			Nevertire water supply	Status: For issue; Version: 3.0
3.0	4/8/2022	Updated following 27/7/22 site visit. Bore details updated	NC		Project No. HEA1910JWSC		

Drinking water quality risk assessment workshops are scheduled to be held every 5 years (or on major system change) and include a review of all drinking water supply systems, from catchment to consumer, and identified hazards and risks to drinking water quality.

A summary of water supply system analyses that have been undertaken is shown in Table 7, including a summary of the team and pertinent information assembled as part of the assessment. Teams of both external and internal parties with appropriate knowledge and expertise on technical, strategic and legislative aspects have been involved in the risk assessment workshops.

Table 7. Assessment of Warren Council water supply systems

Activity	Includes	Reference
19 September 2012 Drinking water quality risk Assessment workshop (Warren and Nevertire)	Details of workshop team with appropriate knowledge and expertise, including: • Council • NSW Department of Health • Office of Water (Now DPE) • Public Works • Atom Consulting (Facilitator) Systems description and key system water quality characteristics	Warren and Nevertire Water Supply Systems, Water Quality Risk Assessment (FINAL) Workshop Output Paper (NSW Public Works, 2013) Review of Risk Assessment, Critical, Control Points, and Procedures Workshop, Briefing Paper (NSW Public Works, 2012)

Activity	Includes	Reference
31 May 2017 Risk review workshop (Warren and Nevertire)	Details of workshop team with appropriate knowledge and expertise, including: • Council • NSW Health PHU • DPIE Water Inspector (Operators and Manager) (now DPE) • Atom Consulting (Facilitator) Includes systems description and key system characteristics	Warren and Nevertire, Drinking Water Quality Risk Review Output Paper (Atom Consulting 2017) Risk register

Component 2.2 Assessment of water quality data

- Assemble historical data from source waters 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.

Drinking water supply system historical analyses that have been undertaken for the water supply systems are summarised in Table 8.

Table 8: Assessment of water quality data

Activity	Includes	Reference
19 September 2012 Drinking water quality risk Assessment workshop (Warren and Nevertire supply)	Water quality analysis of data from the NSW Health verification monitoring program. Analysis includes trending and identification of exceedances.	Warren and Nevertire Water Supply Systems, Water Quality Risk Assessment (FINAL) Workshop Output Paper (NSW Public Works, 2013) Review of Risk Assessment, Critical, Control Points, and Procedures Workshop, Briefing Paper (NSW Public Works, 2012)
31 May 2017 Risk review workshop (Warren and Nevertire)	Water quality analysis of operational monitoring data and NSW Health verification (database accessed during the review for key parameters e.g. fluoride levels). Analysis includes trending of CCP data. Limited data available for review	Warren and Nevertire, Drinking Water Quality Risk Review Output Paper (Atom Consulting 2017)
DWMS Annual Report	Water quality data analysis, undertaken as part of annual report process: • Critical control point exceedances • Non-compliant water quality data (NSW Health verification data) • Water quality data control charts • Water quality issue summary • Consumer complaints • Water quality incidents	DWMS annual review reports

Component 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 significant 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.

A summary of the hazard identification and risk assessments and risk reviews that have been undertaken for the Warren water supply systems are shown in Table 9.

The most current risk register is included in Appendix C of this DWMS.

Action 13: Consider telemetry monitored on-line monitoring for all chlorination systems.

Table 9: Summary of risk assessments

Activity	Includes	Reference
19 September 2012 Drinking water quality risk Assessment workshop (Warren and Nevertire supply)	Hazard analysis and risk assessment workshop that included: • Description of risk assessment methodology • List of hazards, sources and hazardous events • Assessment of maximum and residual risk • Identification of risk assessment improvement actions	Warren and Nevertire Water Supply Systems, Water Quality Risk Assessment (FINAL) Workshop Output Paper (NSW Public Works, 2013) Drinking Water Management Systems, Review of risk assessment, critical control points and procedures workshop, Briefing Paper (NSW Public Works, 2012)
31 May 2017 Risk review workshop (Warren and Nevertire)	Hazard analysis and risk assessment review: • Description of risk review methodology • List of hazards, sources and hazardous events • Assessment of maximum and residual risk • Identification of risk assessment improvement actions • Consideration of barrier effectiveness • Consideration of uncertainty through the assessment of barrier effectiveness	Warren and Nevertire, Drinking Water Quality Risk Review Output Paper (Atom Consulting 2017) NSW Health DWMS implementation, High level risk assessment review briefing note (Atom Consulting, 2017)

3 Element 3: Preventive Measures for Drinking Water Quality Management

Component 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.

Documents listing preventative measures and multiple barriers are summarised in Table 10.

Table 10: Assessment of water supply system barriers

Document	Includes	Reference
Risk assessments	Documentation of existing preventative measures in place for identified hazards and hazardous events. Recommendations for additional preventative measures or changes where necessary.	See Table 9
Critical Control Points	List of critical and operational control points. Protocols for exceedances.	Appendix A

A summary of preventative measures identified from the most recent risk assessment review for the Warren and Nevertire water supply systems are summarised in Table 11. Gaps identified for significant risks (e.g., online monitoring) have been included in the Improvement Plan (Appendix B).

Table 11. Summary of key Warren & Nevertire preventative measures

Hazard and hazardous event	Upstream barriers	Downstream barriers
Contamination of bore source water	• Deep bore • Wellhead protection • Bores access separate aquifers • Council ensures old bores are properly decommissioned • Daily inspections • Surface water runoff opposite direction to bore location	• Chlorination
Ineffective inactivation of pathogens by chlorination system	• Bore pumps shut down on power failure • Chlorine gas cylinders shut off on power failure • Daily chlorination checks • Daily operator inspections • Duty and standby • Multiple chlorination system sites	• Proactive Boiled Water Notice • Reactive Boiled Water Notice
Aesthetically displeasing water at customers tap	• Chlorine gas • Flushing procedure	• Flushing procedure

Hazard and hazardous event	Upstream barriers	Downstream barriers
	• Low head reservoirs • Settling in reservoir	
Pathogens & chemicals in distribution system	• Wellhead protection • Chlorination • Circular 18 Annual reservoir inspections & visual inspections • Critical control procedures • Reservoirs designed with top inlet and bottom outlet • Reservoirs clear of vegetation • Single check valves on household meters for some houses	• Proactive Boiled Water Notice • Reactive Boiled Water Notice

Component 3.2 Critical control points

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

The CCPs, their critical limits and monitoring locations to meet the NSW Health guidance and the NSW Public Health Regulation (2012) are shown in Table 12. The CCPs and their notification protocols are included in Appendix A. A summary of CCP amendment details is included in the CCP protocols document.

Table 12: Critical Control Point summary (version 4, 2021)

No.	Water supply	CCP	Parameter (unit)	How measured	Operating target	Adjustment limit	Critical limit
CCP1	Warren	Chlorination	Free chlorine (mg/L)	Grab a sample from the Ellengerah reservoir outlets	2.5 mg/L	< 1.5 mg/L, or > 3.0 mg/L	< 0.5 mg/L, or > 5.0 mg/L
CCP2	Nevertire	Chlorination	Free chlorine (mg/L)	Grab a sample from the Nevertire Reservoir outlet	1.5 mg/L	< 0.8 mg/L, or > 2.0 mg/L	< 0.5 mg/L, or > 5.0 mg/L
CCP3	Warren and Nevertire	Reservoir Integrity	Reservoir integrity	Inspection	Secure and vermin proof	Evidence of lack of integrity	Breach not rectified, serious breach, or evidence of potential contamination

4 Element 4: Operational Procedures and Process Control

Component 4.1 Operational procedures

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

A summary of developed standard operating procedures (SOP) for the Warren Council water supply systems is shown in in Table 13.

Table 13. Standard operating procedures

Name	Description
SOP Reservoir inspections	Procedure for undertaking reservoir integrity inspection.
SOP Equipment validation	Selection and design of new water equipment and infrastructure

Action 15: Develop SWMS for key activities.

Action 17: Compile SWMS & procedures into an operations manual.

Action 87: Develop a daily plant inspection SOP

Action 88: Develop chlorine dosing SOPs, including start up and shut down

Action 89: Develop water quality sampling, testing and calibration SOP, including for operational parameters (chlorine, pH and turbidity) and microbiological and chemical samples

Action 90: Develop water quality data and review, analyse and report water quality data SOP

Action 91: Develop chemical procurement, delivery, storage and handling SOP

Action 92: Develop pipe repair procedures to reduce contamination risk

Component 4.2 Operational monitoring

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

Operational performance is measured through the sampling of specific operational parameters throughout the Nevertire and Warren water supply schemes.

Operating monitoring protocols are documented in the following areas:

- Critical control point protocols
- Operational and Verification Monitoring Plan - which documents frequency, parameter, location, basis and corrective action for operational and verification monitoring

The process for undertaking operational monitoring and the routine analysis of results includes:

- Monitoring in accordance with the schedules in the Operational and Verification Monitoring Plan
- Sampling undertaken using data logger handheld unit

- Results are documented on the sampling sheet by the Water Attendees.
- Exceedances are reported to the Town Service Manger immediately (in accordance with the Critical Control Point protocols)
- Sheets are provided to the office and data is entered into the operational spreadsheet by the Asset Technical Officer on a weekly basis, who reviews exceedances and trends
- Water quality issues are discussed at the next fortnightly meeting

Component 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.

Corrective actions for CCP exceedances including communication protocols are described in the CCP procedures in Appendix A.

Council has developed Incident and Emergency Communication protocols for use in the event of an incident or an emergency.

Component 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.

Warren Council's asset management consists of inspections and reactive maintenance. Preventative maintenance activities are included in the Warren and Nevertire Water Supply Preventative Maintenance Plan.

Council is in the process of developing an asset database and an asset management system.

Monitoring equipment is sent away annually for maintenance and calibration.

A list of monitoring equipment utilised for water by the Council is listed in Table 14.

Table 14. Water quality testing equipment list

Instrument	Brand
Colour meter	Hach
Photometer system MD 610	Labtech Lovibond

Action 93: Utilise the Warren and Nevertire Water Supply Preventative Maintenance Plan as part of asset management system development

Component 4.5 Materials and chemicals

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

Warren Shire Council has a Procurement and Disposal policy adopted by Council in October 2017.

The Operators order chemicals as required (within the delivery schedule window). Operators follow Council's purchasing procedures. A minimum level of stock is held across the Council.

Relevant codes, legislation and guidance are used to ensure appropriate chemicals and materials are used within the water supply system:

- Plumbing Code of Australia (National Construction Code Volume 3)
- ADWG Chapter 8 Drinking Water Treatment Chemicals
- AS/NZS 4020 Testing of products for use in contact with drinking water.

The following is undertaken for chemical deliveries:

- Chemical deliveries are attended by operators
- Certificate of analysis is provided by the supplier
- Chlorine gas cylinders are delivered to Ellengerah and Stafford Street reservoirs. Small quantities are then transported to Nevertire.

Safety Data Sheets (SDS) are kept at the dosing sites.

Warren Council procures water treatment chemical through the suppliers shown in Table 15.

Table 15. Water treatment chemical suppliers

Chemical	Supplier
Chorine Gas	Ixom

Council maintains a chemical register for the water supply system that identifies all chemical products used at council sites.

Action 91: Develop chemical delivery, storage and handling SOP (as part of chlorination upgrade improvement project)

Action 94: Complete and implement use of developed chemical register

5 Element 5: Verification of drinking water quality

Component 5.1 Drinking water monitoring

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

Details of Councils drinking water verification monitoring program are described in the Drinking Water Operational and Verification Monitoring Plan (Warren, 2020b).

Council participates in NSW Health Drinking Water Monitoring Program, with results recorded in the NSW Health Drinking Water Database. The NSW Health Drinking Water Monitoring Program aims to verify water quality from samples collected throughout the distribution system. Verification sampling is collected by operators and sent to accredited laboratories of the NSW Division of Analytical Laboratories for analysis.

The water quality characteristics that are monitored as part of this program are specified by NSW Health and are listed in Table 16.

Table 16. NSW Health drinking water monitoring program parameters

Zone	Parameters tested
Microbial	*E. coli*, Total coliforms
Chemical	Aluminium, Antimony, Arsenic, Barium, Boron, Cadmium, Calcium, Chloride, Chromium, Copper, Fluoride, Iodine, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Nitrate, Nitrite, pH, Selenium, Silver, Sodium, Sulphate, Total Dissolved Solids, Total Hardness, True Colour, Zinc
Field testing	Chlorine concentration (free and total), pH and turbidity recorded on the NSW Health sample label

Emails are sent to the Council email address (council@warren.nsw.gov.au), the Records Manager registers the data and forwards the results to the Town Services Manager and Asset Technical Officer.

Action 95: Liaise with NSW Health to get council (council@warren.nsw.gov) email added to NSW Health FASS monitoring results distribution list.

Component 5.2 Consumer satisfaction

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

The Complaints Management Policy (adopted by in September 2018 by Council) provides guidance on the management and resolutions of complaints.

Pathways for customers to contact Council are detailed on their website and include:

- Request for service form (water is listed as a category on the form)

- Phone number, directed to the appropriate person out of hours

The method for receiving and allocating customer complaints is as follows:

- Use of a computerised 'Complaint/Action request' form
- Complaints assigned to water are sent to the Water group email address (Divisional Manager Engineering Services, Town Services Manager, Services Overseer and Water & Sewer Team Leader)
- The appropriate person actions the complaint
- Actions are closed out, a form is completed, scanned, emailed to customer services, who ensure that the customer records management database is updated
- A list is generated of weekly of actions that have not been dealt with
- Unactioned complaints are reviewed in weekly meetings, by Manex and Council.

A register of complaints is submitted annually to DPE Water for inclusion in the *NSW Water Supply and Sewerage – NSW Benchmarking Reports*.

Water quality complaints are reviewed and reported as part of the DWMS annual report.

Component 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, externally, where required.

Daily reviewing of drinking water quality monitoring data is undertaken by Water and Sewer Attendants, with exceedances reported internally and externally as discussed under Element 4. Monitoring sheets are provided to the Asset Technical Officer for data entry and review.

Consumer satisfaction is reviewed by the Customer Service.

The Manager Town Services is notified of non-conforming results and ensures appropriate response actions are undertaken in line with the NSW Health response protocols for the management of physical, chemical and microbiological quality of drinking water.

The local PHU will also be contacted by the Manager Town Services in the event of an ADWG exceedance. The target for assessing the acceptability of verification monitoring data is the relevant ADWG guideline value.

The Asset Technical Officer enters NSW Health monitoring data into the monitoring spreadsheet and reviews data trends. Issues are communicated to the Town Services Manager.

Action 96: Request login to NSW Health access for the Town Services Manager to access the verification monitoring database

Action 97: Develop mechanisms for short term reports to management of water quality data e.g. monthly review meetings

Component 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.

A summary of the corrective actions and rapid communications systems for unexpected events is shown in Table 17.

Table 17. Summary of corrective actions procedure

Item	Corrective action	Reference	Records
Customer complaints	• Resolve on an urgent basis • Complaints that cannot be readily resolved are reviewed weekly and escalated to Management as appropriate.	Complaints Management Policy	Customer records management system
Critical control points	• Operators take immediate action according to CCP procedure	Critical Control Point Protocols	Operational monitoring spreadsheets Emails records of phone notifications Exceedances and response registered on compliance log
Drinking water quality monitoring exceedances	• Any exceedances are recorded and acted upon immediately with the appropriate regulatory authorities notified.	Drinking Water Operational and Verification Monitoring Plan (Warren, 2020b). Warren Shire Council Drinking Water Supply System: Incident and emergency communication protocols NSW Health Response Protocol: for the management of microbiological quality of drinking water NSW Health Response Protocol: for the management of physical and chemical quality NSW Health Response Protocol: Treatment Failure	Operational monitoring spreadsheets Emails records of phone notifications

Other actions that the Council may undertake include:

- Increasing chlorine concentration for disinfection

- Limited flushing available to be undertaken (hydrants availability)
- Inspection of bore integrity
- Inspection of reservoir integrity
- Change bore source
- Resampling (utilise coliform testing available at nearby Council e.g. Narromine Shire Council and Dubbo Regional Council have coliform testing equipment)
- Reticulation extremity testing

6 Element 6: Management of incidents and emergencies

Component 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.

Council follow the NSW Health response protocol for drinking water. These protocols relate to:

- Management of pathogenic risks (https://www.health.nsw.gov.au/environment/water/Pages/nswhrp-microbiological.aspxv)
- Physical and chemical quality (https://www.health.nsw.gov.au/environment/water/Pages/nswhrp-chemical.aspx)
- Treatment failure – critical limit failure, raw water quality problem, evidence of vermin in a reservoir (https://www.health.nsw.gov.au/environment/water/Pages/nswhrp-microbiological.aspx)

Council specific Incident and Emergency Communication Protocols were developed with input from NSW Health and NSW DPE (as part of an NSW Health DWMS Implementation project).

In an incident Warren Shire Council can communicate to the public through the following mechanisms:

- Facebook
- Website
- Door knock
- Signage on main road / information centers

Action 99: Formalise the public and media communications strategy for water related incidents and emergencies, including delegations for contacting the media.

Action 100: Develop a water incident and emergency contact list and determine review frequency

Component 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.

In the event of a water quality incident, Council will respond according to the incident and emergency protocols and procedures shown in Table 18.

Staff are trained in incident protocols following document development, incident scenarios, document updates (through toolbox talks) and new staff inductions.

Table 18. List of Council water quality incident response protocols

Response Protocol	Details	Records
CCP response protocols	CCP 1– Warren Chlorination CCP 2– Nevertire Chlorination CCP 3 – Reservoir Integrity	Operational monitoring spreadsheet Emails documenting notifications
Drinking water supply system, incident and emergency communication protocols	Communication protocols and notification responsibilities	Incident debrief form
Surface water cross connection communication protocol	Details communication and monitoring in the event that the cross connection between the raw and potable water supply in the Warren water supply system are utilised.	Surface Water Cross Connection Use - Form
NSW Health Response Protocols	Response protocol for the management of physical and chemical quality https://www.health.nsw.gov.au/environment/water/Pages/nswhrp-chemical.aspx Response protocol for the management of microbiological quality of drinking water https://www.health.nsw.gov.au/environment/water/Pages/nswhrp-microbiological.aspxv Response protocol for water utilities and public health units (CCPs, raw water quality, reservoir contamination) https://www.health.nsw.gov.au/environment/water/Pages/nswhrp-microbiological.aspx	Operational monitoring spreadsheet Emails documenting notifications
Warren Emergency Plan (EMPLAN)	The EMPLAN covers the water supply system. Three monthly meeting are undertaken that include the review of water related incidents	Meeting minutes

7 Element 7: Employee awareness and training

Component 7.1 Employee awareness and involvement

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

Employee DWMS awareness for water operations staff is communicated through the following mechanisms:

- Inductions
- On the job training
- Weekly meetings – water quality reviews and work prioritisation
- Attendance as risk assessment workshops
- Participation in NSW Health funded DWMS implementation projects

Contractors are made aware of the DWMS through their respective service contracts.

An improvement item has been included to develop and implement a program for DWMS awareness training program, for all staff involved in water, including customer service staff (**Action 102**).

Component 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.

Councils Workforce Plan and Strategy 2020 documents the following:

- Work force planning
- Recruitment
- Career development opportunities
- Training

The Staff Education and Training Policy (adopted by in 2018 by Council) outlines the requirement for an annual training plan. Staff Performance Reviews are held annually by appropriate managers. Skills and competency lists and employee training plans are reviewed as part of this assessment.

Employees are required to hold appropriate qualifications. Water Attendees and Supervisors are encouraged to holder Certificate III (or other equivalent training package) in water and sewer and be appropriately competent to carry out their job. Progression of through grades for Overseers and Attendees requires Certificate III (or 3 years of industry experience); this is managed through the performance evaluation process.

All staff qualifications are maintained by the Works Clerk.

Training records include Toolbox talk minutes, formal training records. Records are held by staff and/or Human Resources.

There is a Contractor WHS Management Policy and Contractor Management Procedure that includes that contract specification include competency certificates and appropriate licences and permits.

Action 37: Staff review procedures should be documented in a framework roadmap for full compliance (employee training)

8 Element 8: Community involvement and awareness

Component 8.1 Community consultation

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

Councils' community consultation and engagement strategy is documented in the Warren Shire Council Community Strategic Plan 2027.

Council informs the community about water issues via a range of avenues:

- Community Survey: Last undertaken in 2017
- Council meetings: Two Council meetings are held per year in different communities on a rotational basis
- Posts to Council Facebook page
- Advertisement in the Warren Weekly newspaper.
- Community noticeboard
- Mail outs
- Website

If appropriate, consumers are also informed of water quality incidents by issuing 'Boiled Water Notices' or notifying them of supply cessation.

Component 8.2 Communication

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

Council engages with its community through:

- Council meeting minutes published on the Council website
- Attendance at Council meetings (two per year in different communities on a rotational basis)
- Council's water quality performance is published annually as part of the NSW DPE performance monitoring programs.

Customer complaints and enquiries are received by the customer services team, redirected as required and actioned by the appropriate team (see Component 5.2 Consumer satisfaction). Records of the enquires and complaints and the actions take are recorded in the customer management system (CRM) under a number of categories relating to water, including water quality, no water, water leaks and low pressure.

9 Element 9: Research and development

Component 9.1 Investigative studies and research monitoring

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

Council is a member of the Orana Water Utilities Alliance (OWUA). OWUA provides a forum for collaborative research, sharing of knowledge, expertise and resources. Projects undertaken through OWUA include:

- Condition assessment of existing groundwaters bores (review of casing integrity)
- Development of a register of water and sewer capital works projects and priorities

Council conducts on-the-ground programs to improve water quality. These are identified as actions in the Water Quality Improvement Plan (Appendix B).

Project specific water quality monitoring is carried out as required, for example when raw water monitoring testing for new bore sites.

The risk assessment process has also identified investigative actions to improve knowledge and performance of the system and decrease the level of uncertainty during risk assessment.

Component 9.2 Validation of processes

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

Monitoring is in place to validate processes and guide corrective actions. Investigative actions included in the improvement plan (Appendix B) are also used to validate processes. A summary of the validation for the CCPs controlling key hazards is shown in Table 19.

Table 19. Validation of targets and limits for critical control points and supporting procedures

Process	Location	Parameter	Validation
Chlorine disinfection	Reservoir outlets	Free Chlorine	C.T. calculations are documented in the Technical Note, Review of C.T. for Warren and Nevertire water supply systems (Atom Consulting, 2020) From the data available, a minimum C.T. value of 15 mg/L/min is achieved with a chlorine residual of 0.5 mg/L at both the Warren and Nevertire sites. An action has been noted that additional flow data is required to finalise validation of the chlorine residual limits and review C.T for bore flat tanks.
Reservoir integrity	Reservoirs	Integrity of the reservoir	In line with NSW Health recommendation for setting critical control points.

Action 84: Collect peak flow data at reservoir outlet and confirm level at which pump operates at each of the reservoirs. Review against data used in chlorine contact time (C.T) calculations

Component 9.3 Design of equipment

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

In NSW, a proposal to construct or modify a water treatment works requires the NSW DPE Section 60 approval under the *Local Government Act 1993*. NSW DPE may also direct corrective actions to be undertaken under Section 61 of the *Local Government Act 1993*.

Checklist for equipment validation is included in the Equipment Validation SOP. Processes will be revalidated periodically or when variations in conditions occur.

10 Element 10: Documentation and record keeping

Component 10.1 Management of documentation and records

- Document information pertaining 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.

Warren Shire Council have a Records Management Policy (adopted by Council in 2018) that sets out the records management program framework as per the requirement of the NSW *State Records Act 1998*. The policy includes obligations for Councils staff, supervisor, managers and councillors as required. The corporate information officer (Finance and Corporate Services Division) is responsible for corporate record management activities.

Documents received by email (council@warren.nsw.gov.au) are registered and forwarded to the appropriate person.

The water group email (water@warren.nsw.gov.au) is utilised to send water related records to the following positions:

- Divisional Manager Engineering Services
- Divisional Manager Engineering Services, Administrative Officer
- Town Services Manager
- Overseer Town Services
- Asset Technical Officer

Electronic records are stored on the Council server. Council manages its records through the systems as identified in Table 20.

The DWMS includes or references documents and records that are required for the management of drinking water quality. Document review requirements are either included in the relevant document or requirements are included as part of this DWMS.

Table 20. Council records systems

Source	Information Held
DWMS and supporting documents	The DWMS and supporting documents are stored on I: drive in the DWMS folders
Consumer Request Management (CRM) System	Consumer complaints and feedback
Operational water quality data	Hardcopy log sheets (with the operators until provided to the Council office) Monitoring spreadsheet (stored on I: drive)
Calibration records	Hardcopies held at Council office Electronic documentation stored on I: drive
Drinking water verification data	NSW Drinking Water Database

Source	Information Held
Standard operating procedures / SWMS	Council server
Reports, policies, plans	Electronic documentation stored on Council's server Council's website
NSW Performance Monitoring data	NSW DPE database

Component 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 following is reviewed annually and documented in an DWMS annual review report:

- Critical control points
- Drinking water quality performance
- Details of any drinking water quality incidents and emergencies
- Changes in reporting and communication protocols
- Improvement plan progress
- Audit outcomes

Water quality reporting is carried out according to the following schedule:

- Quarterly water and sewer committee
- Drinking water management system annual report provided to Director, Manex and Council

Internal reporting procedures are identified for:

- CCP exceedances (Section 3)
- Operational monitoring data exceedances and water quality reviews (Section 4)
- Verification monitoring data exceedances and water quality reviews (Section 5)
- Incident and emergency response (Section 6).

Council reports externally through:

- Council annual reports (available on Council websites)
- DWMS annual reports to NSW Health
- NSW Water Supply and Sewerage Performance Monitoring Reports to NSW DPE (data available on NSW DPE website)

11 Element 11: Evaluation and audit

Component 11.1 Long term evaluation of results

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

Water quality data is collected and compiled electronically into an operational monitoring spreadsheet. Data is automatically trended and CCP exceedances highlighted.

Water quality data is reviewed and documented on an annual basis in the DWMS annual review performance report:

- Operational monitoring data – including performance of CCPs data and other operational data
- Verification monitoring – review of NSW Health reticulation monitoring against ADWG Health and Aesthetic guidelines values
- Customer complaints – against service level targets

Evaluation of long-term water quality is assessed as part of the risk assessment and risk review process. A summary of water supply system analysis that have been undertaken for the Warren and Nevertire water supply systems are summarised in Table 8.

Component 11.2 Audit of drinking water quality management

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

A gap analysis of Councils' water quality management system against the requirements of the ADWG was completed by an external consultant as part of the DWMS review and update process. Recommendations from the review were added to the improvement plan.

The internal review schedule of DWMS documentation is detailed in Table 21. Recommendations identified as part of the process are added to the improvement plan.

Table 21. Summary of internal reviews

Aspect	Frequency	Audit	Responsibility	Records
DWMS	Annually as part of the Annual Report	Review of DWMS implementation as part of DWMS annual report provided to NSW Health. Implementation is reviewed in line with NSW Health guidance.	Town Services Manager	Annual report Improvement plan actions
Improvement plan	Annually as part of report	Check of progress of implementation of improvement action items as part of annual report.	Asset Technical Officer /Town Services Manager	Improvement plan versions

Aspect	Frequency	Audit	Responsibility	Records
CCP protocols	Annually as part of incident scenario	Checks that CCP exceptions reporting forms have been completed Implementation of CCP procedures	Town Services Manager	Document control and amendment summary in CCP protocols
Operational monitoring data	Annually as part of the Annual Report	Checks that monitoring is undertaken as per the monitoring plan, documented as part of annual DWMS report.	Town Services Manager	Annual report
NSW Health verification monitoring	Annually as part of the Annual Report	Checks that monitoring is undertaken as per the monitoring plan, documented as part of annual DWMS report.	Town Services Manager	Annual report
Incidents and emergencies	Annually as part of incident scenario or following an incident	Review incidents that occurred and corrective actions taken (against incident procedures) as part of annual report or any incident debrief.	Town Services Manager	Incident debrief forms Annual report

External audit frequency requirements will be determined in consultation with the NSW Health PHU. For external audits, Council to engage an independent auditor approved by NSW Health. It is also noted that NSW Health can, in the meantime, audit the DWMS at any time. DPE Water inspectors and local PHU Environmental Health Officers will also undertake external audits or informal inspection on various areas of the DWMS and will record the results. Records will be in the form of an audit report.

12 Element 12: Review and continual improvement

Component 12.1 Review by senior executive

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

The Town Services Manager is responsible for reviewing the effectiveness of the management system, its implementation and for keeping the DWMS current.

Senior executive review of the effectivities of the management system is carried out through the following mechanisms:

- Annual DWMS reports are provided to Town Services Manager, Divisional Manager Engineering Services, Manex and Council.
- Water Supply and Sewerage NSW Performance and Benchmarking Reports.
- Water and Sewer Committee meetings

The DWMS is endorsed by Council and a copy of the DWMS provided to NSW Health.

The DWMS is updated in the following circumstances:

- A comprehensive review is undertaken every 5 years
- Following significant changes to water supply systems
- To address audit and review findings (both internal and external)

Documents responsibilities and review frequencies are shown in Table 22.

Table 22. Key DWMS review frequency

Aspect	Responsibility	Review frequency
Drinking Water Management System	Town Services Manager	Annual review (as part of DWMS annual review report) Major review and update (including risk assessment) - 4 yearly or on significant change DWMS to be endorsed by Council and provided to NSW Health
Water Quality Policy	Town Services Manager	As required
Critical control points	Town Services Manager	Annually or on significant process change
DWMS improvement plan	Asset Technical Officer	Monthly
	Town Services Manager	Annual review (as part of DWMS annual review report)
Incident and Emergency communication protocols	Town Services Manager	Annually or following an incident
Emergency contact list – external users	Asset Technical Officer	Annually or as required
Emergency contact list – internal	Asset Technical	6 monthly or as required

Aspect	Responsibility	Review frequency
	Officer	
Surface water cross connection communication protocol	Town Services Manager	Annually or following use of the protocol
Operational monitoring spreadsheets	Asset Technical Officer	Weekly
Verification monitoring data	Asset Technical Officer	Monthly (data entry and review of trends)
Operational and verification monitoring plan	Town Services Manager	Annually
Standard Operating Procedures	Manager Town Services / Overseer	Two yearly
Chemical register	Overseer	Annually

Component 12.2 Drinking water quality management improvement plan

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

The Drinking Water Improvement Plan is attached as Appendix B. Each action item is assigned a priority, action owner and due date. The Town Services Manager is responsible for the Improvement Plan being implemented.

Action items are identified through the following mechanisms:

- Risk assessment recommendations
- Internal and external audit and reviews
- Incident debriefs
- Identified areas for increased system understanding
- Other relevant document or system reviews
- Corrective actions issued by DPE Water inspectors and local PHU Environmental Health Officers that relate to drinking water quality.

The Improvement Plan is reviewed and communicated through the following mechanisms:

- Reviews by the Asset Technical Officer and the Town Services Manager as detailed in Table 22
- Reviewed annually as part of the DWMS annual report, which is submitted to Manex, Council and NSW Health.

13 References

ADWG see NHMRC and NRMMC 2011

Atom Consulting, 2017, Warren and Nevertire, Drinking Water Quality Risk Review Output Paper. Prepared for Warren Shire Council and NSW Health. November 2017.

Atom Consulting, 2020, Technical Note, Review of C.t for Warren and Nevertire water supply systems. For Warren Shire Council and NSW Health

NSW Public Works and Atom Consulting, 2013, Warren and Nevertire Water Supply Systems, Water Quality Risk Assessment (FINAL) Workshop Output Paper. Prepared for NSW Health and Warren Shire Council. August 2013.

NSW Public Works and Atom Consulting, 2012, Drinking Water Management System, Review of Risk Assessment, Critical, Control Points, and Procedures Workshop, Briefing Paper. Prepared for NSW Health and Warren Shire Council. September 2012.

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

Appendix A Critical and operational control points

Appendix B Improvement plan

Appendix C Risk assessment