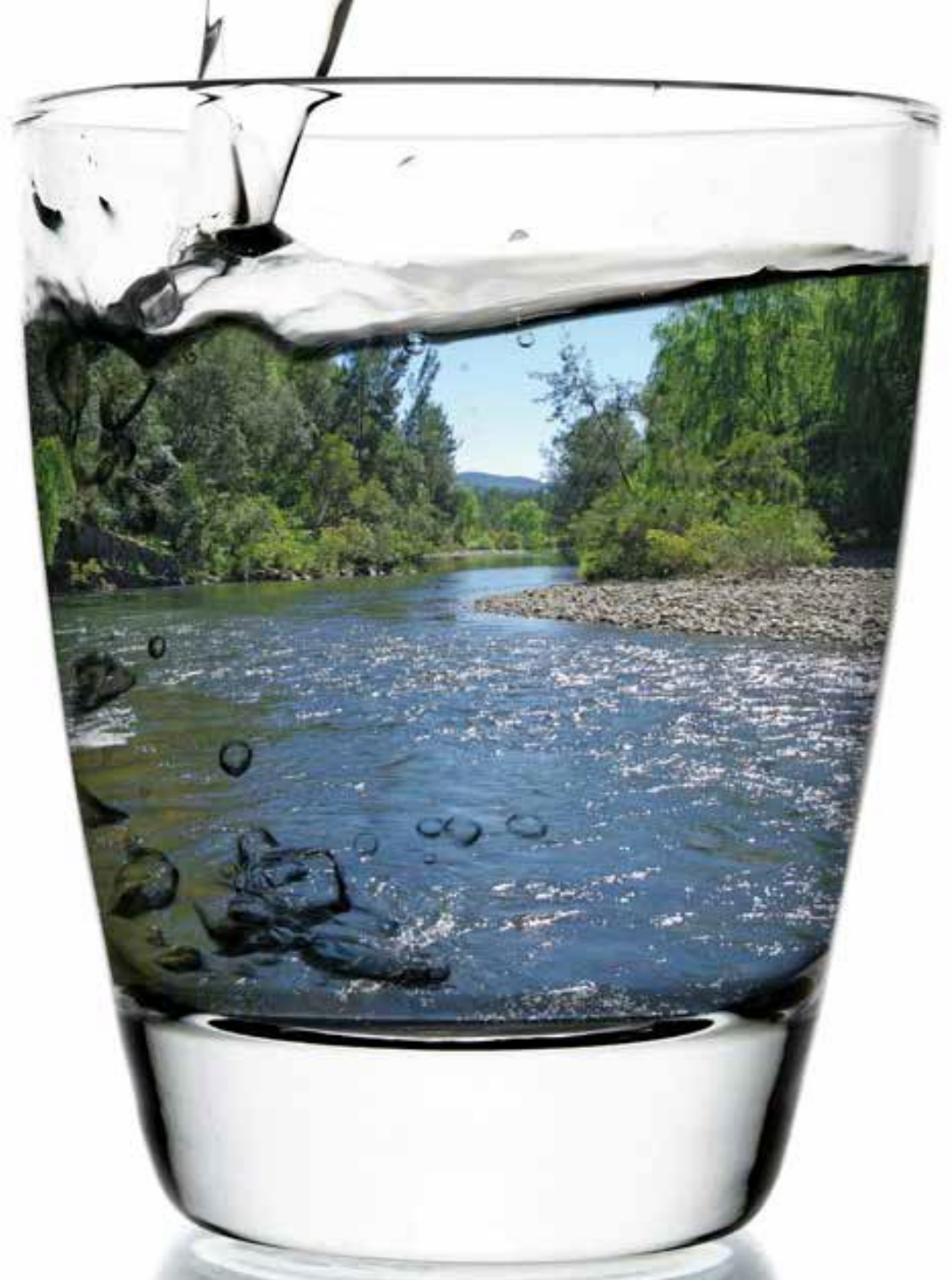




DRINKING WATER QUALITY MANAGEMENT SYSTEM SUMMARY

Updated 2023



DRINKING WATER QUALITY MANAGEMENT SYSTEM

1 Commitment to drinking water quality management

System Analysis

- 2 Risk assessment of drinking water supply system
- 3 Preventative measures to mitigate risks
- 4 Operational procedures and process control
- 5 Verification of drinking water quality
- 6 Management of incidents and emergencies

Supporting documents

- 7 Employee awareness and training
- 8 Community involvement and awareness
- 9 Research and development
- 10 Documentation and reporting

11 Evaluation and Audit of the Management System

12 Review and continual improvement

As a local council responsible for the delivery of drinking water services, MidCoast Council is required to develop and adhere to a Drinking Water Quality Management System (Quality System) by the *Public Health Act 2010* and *Public Health Regulation 2022*. It is also agreed as part of our Memorandum of Understanding with NSW Health to ensure the quality system is adhered to.

MidCoast Council's Quality System for drinking water has undergone a review and a new version was adopted in February 2023. The significant changes incorporated in the latest version of the quality system are capital works and process upgrades to the water supply schemes, as well as the incorporation of audit findings of the quality system. Improved controls that ensure the delivery of safe drinking water and the progress of improvement actions from the audit have also been incorporated into the new version of the Quality System.

The Quality System describes our quality assurance program and documents the processes used to deliver safe drinking water to our customers. It is based on the Framework for Management of Drinking Water Quality under the Australian Drinking Water Guidelines (The Guidelines). The old practice of ensuring drinking water quality by relying on testing water quality at the end of the system at customers' taps is outdated and insufficient. The Guideline follows a risk-based approach which includes anticipating potential problems and implementing preventive measures throughout the drinking water supply scheme (including catchment, different stages of treatment, reservoirs, and the reticulation system).

The important aspect that underpins the Quality System is the commitment to drinking water quality management from all levels of the organisation. System analysis and supporting documents are used to develop the Quality System and ensure its implementation while evaluation audit and continual improvement sections show councils' commitment to continuing improvement.

The figure shown gives an overview of the 12 elements of the framework.

A glass of water is shown with a river scene inside it, symbolizing water quality. The river is surrounded by lush green trees and a clear blue sky. The water in the glass is clear and sparkling.

THE QUALITY SYSTEM IS AN OVERVIEW DOCUMENT THAT:

- Documents our water supply systems
- Provides analysis of water quality monitoring requirements and assessment of drinking water quality
- Identifies management approaches to delivering good quality, reliable drinking water to customers
- Demonstrates MidCoast Council's operational and monitoring practices that enable its adherence to community and regulatory standards
- Demonstrates the council's commitment to continuous improvement.

WATER SUPPLY SYSTEM ANALYSIS

MidCoast Council is responsible for the operation of five drinking water supply schemes; Manning, Bulahdelah, Stroud, Tea Gardens, and Gloucester. Bulk water is purchased from Hunter Water to supply a small reticulation scheme at North Karuah.

Each of the drinking water supply schemes are described in detail, including;

- General description and history
- Catchment management
- Water treatment plant process description
- Reservoirs, distribution system, and pumping stations
- Hazard identification and risk assessment
- Preventive measures and multiple barriers to mitigate risks
- Critical control points where the performance of barriers is controlled and measured
- Operational plans and procedures
- Water quality monitoring programs and evaluation of results
- Equipment capabilities and maintenance
- Materials and chemicals used for drinking water treatment
- Employee awareness and training
- Customer communication strategies
- Research and development
- Documentation and reporting
- Review and continual improvement



Manning Water Supply Scheme

The largest of MidCoast Council's drinking water supplies is the Manning Water Supply Scheme, which supplies drinking water to 80% of our customers in the towns and villages of the lower Manning River catchment.

This includes towns from Crowdy Head to Tarbuk Bay such as Taree, Wingham, Forster, and Pacific Palms.

Manning Water Supply has two water sources and treatment plants; water from the Manning River is treated at the Bootawa Water Treatment Plant, and water from the Nahiack Inland Dune Aquifer is treated at the Nahiack Water Treatment Plant.



Bootawa Water Treatment Plant

The first protective measures of water supply schemes are implemented in the catchment. Rivers and creeks feeding into the Manning catchment include the Nowendoc, Barnard, Little Manning and Gloucester rivers, and Dingo Creek. Councils' Integrated Water Cycle Management Strategy (Water Strategy) identifies incorporating catchment management initiatives into water management. The Manning River Estuary and Catchment Management Program 2021-2031 sets out the council's ten-year action plan to improve catchment health. Catchment management actions include: erosion control (fencing along rivers to exclude cattle, bank stabilisation, and planting native and Indigenous vegetation), environmental flow investigations and other monitoring programs.

Water is pumped from the Manning River upstream from Wingham to the off-river storage at Bootawa Dam. Water is then treated at the Bootawa Water Treatment Plant. To protect the water quality in Bootawa Dam, water is only pumped from the river to the dam under favourable conditions. After heavy rainfall, river water quality declines and is not extracted under normal operations. However, if required, water can be pumped from the river directly to the water treatment plant without going through Bootawa Dam.

The treatment process at Bootawa Water Treatment Plant includes membrane filtration, ozone treatment, biologically activated carbon filters, chlorination for disinfection, and fluoridation for dental hygiene. This advanced technology can treat water to a very high standard. Water is tested at each stage of the treatment process by online analysers or by collecting samples and testing water quality at the operator's lab on site to ensure the treatment plant is operating effectively.

As water leaves the treatment plant it travels through a long reticulation system including several reservoirs and pumping stations to customers' taps. Chlorine levels are measured and boosted along the way to ensure quality remains high as it travels long distances. As a final check to confirm water quality, testing is conducted on samples collected at reservoirs, public areas, and customers' taps in each town or village.

All water quality test results are also confirmed at MidCoast Council's National Association of Testing Authorities certified laboratory at Bootawa.



Nabiac Water Treatment Plant

Nabiac Water Treatment Plant was commissioned in 2019 to secure long-term supply for an increasing population and to diversify the supply source. Water is extracted from a bore field at the Nabiac Inland Dune Aquifer, treated at the Nabiac Water Treatment Plant, and supplied to the southern part of the existing Manning Distribution System. Upgrades are underway to increase the capacity of the Water Treatment Plant which will build the resilience of the Manning Water Supply Scheme, during a drought.

Groundwater from 23 bores is pumped via a header main to the Nabiac Water Treatment Plant. This plant includes an aeration tower, membrane filtration, and chlorination for disinfection. Fluoride is also added for dental hygiene. The Nabiac Water Treatment Plant is also capable of treating water to a high standard. Water is tested at various stages of the treatment process by online analysers or by collecting a sample and testing water quality at the operator's lab on site.

As water leaves the plant it is pumped to the Darawank Balance Tank and into the southern part of the existing Manning Distribution System. Chlorine levels are measured at reservoirs and boosted along the way to ensure quality remains high as it travels long distances. As a final check to confirm water quality, testing is conducted on samples collected at reservoirs, public areas, and customers' taps.

All water quality test results are confirmed at MidCoast Council's National Association of Testing Authorities certified laboratory at Bootawa.

Bulahdelah Water Supply Scheme



The Bulahdelah Water Supply Scheme supplies drinking water to residents of Bulahdelah. Water is sourced from the Crawford River and treated at a conventional/traditional water treatment plant.

The main watercourse in this catchment is the Crawford River and the majority of the upper catchment is forested land managed by the National Parks and Wildlife Service and State Forests. Agriculture dominates the lower catchment. A scoping study was completed in June 2022 for MidCoast Council's southern catchments as the first step in developing a catchment management program for these catchments. Funding has also been secured for the above program and the implementation of this program will aim to address key risks to water quality in the lower Crawford River.

Water is extracted from the Crawford River weir pool and pumped directly to a conventional/traditional water treatment plant. Weeds management, fencing, and off-stream stock watering systems focusing on the weir pool are some of the catchment management activities currently conducted.

Bulahdelah Water Treatment Plant includes clarifier, sand filters, and chlorine disinfection to treat water to comply with The Guidelines. Fluoride is added for dental hygiene. There have been several upgrades to the water treatment plant and process optimisations to improve water quality since the plant was initially commissioned in 1988.

Online monitoring, collecting, and testing samples throughout the treatment process (including the Crawford River) ensures the plant is operating effectively. As water leaves the treatment plant it is pumped to three reservoirs before being distributed to the reticulation system and customers' taps. Chlorine levels are measured at reservoirs and boosted if necessary. As a final check to confirm water quality, testing is conducted on samples collected at public areas, and customers' taps.

All water quality test results are confirmed at MidCoast Council's National Association of Testing Authorities certified laboratory at Bootawa.



Stroud Water Supply Scheme



Stroud Water Supply Scheme provides drinking water to residents of Stroud and Stroud Road. Water is sourced from the Karuah River and treated at a conventional/traditional water treatment plant at Stroud.

MidCoast Council produced the Karuah River Catchment Management Plan to maintain and improve the health of the catchment. A collaborative approach was taken to develop the plan with input from relevant agencies and stakeholders. Water quality monitoring in the catchment is undertaken and reported as part of the MidCoast Council Catchment Report Card.

The conventional/traditional water treatment plant at Stroud includes a flocculation tank, settling lagoons, sand filters, and chlorination for disinfection. Fluoride is added for dental hygiene. There is also an off-river storage at the treatment plant which provides some water security during periods of low flow in the Karuah River. The treatment plant has undergone various improvements to operational procedures and capital works upgrades since commissioning to produce drinking water which complies with The Guidelines.

Water is tested at various stages of treatment (including river and off-river storage) using online analysers or by collecting and testing samples at the operator's lab at the water treatment plant. This is to ensure the treatment plant is running effectively.

As water leaves the treatment plant it is pumped into reservoirs and reticulation systems at Stroud and Stroud Road. Chlorine levels are measured at reservoirs and boosted if necessary.

As a final check to confirm water quality, testing is conducted on samples collected at public areas and customers' taps.

All test results are confirmed at MidCoast Council's National Association of Testing Authorities certified laboratory at Bootawa.



Tea Gardens Water Supply Scheme

Tea Gardens Water Supply Scheme provides drinking water to residents of Tea Gardens and Hawks Nest. Water is sourced from the Viney Creek Aquifer and treated at the Tea Gardens Water Treatment Plant.

Groundwater typically has high microbiological quality and Viney Creek aquifer is no exception. There are, however, dissolved metals present in raw water including iron and aluminium. While not a health concern, the presence of these metals in drinking water can lead to staining of appliances and laundry. In 2013 a membrane filtration water treatment plant with aeration was commissioned, which replaced a very basic treatment plant. This advanced technology can remove dissolved metals and produce water of very high quality.

Water is extracted from ten groundwater bores that tap the aquifer between 17 and 20 metres below the surface. Groundwater is pumped via a header main to the water treatment plant which consists of aeration towers, membrane filtration, and chlorination for disinfection. Fluoride is added for dental hygiene. Water is tested at various stages of the treatment process (including the header main which pumps raw water to the treatment plant) with online analysers or collecting a sample and testing water quality at the operator's lab on site.

As water leaves the treatment plant it is pumped to three reservoirs and into reticulation systems to customers at Tea Gardens and Hawks Nest. Chlorine levels are measured at reservoirs and boosted if necessary. As a final check to confirm water quality, testing is conducted on samples collected at public areas and customers' taps.

All test results are confirmed at MidCoast Council's National Association of Testing Authorities certified laboratory at Bootawa.



Gloucester Water Supply Scheme



Residents of Gloucester and Barrington are supplied with drinking water from the Gloucester Water Supply Scheme. Water is sourced from the Barrington River, upstream of its confluence with the Gloucester River, and treated at a conventional/traditional treatment plant at Gloucester. The Barrington River is included in Councils' Manning River and Estuary and Catchment Management Program 2021-2031. Catchment management actions in an adaptive management approach for the Barrington River include: erosion control (fencing along rivers to exclude cattle, bank stabilisation, and planting native and Indigenous vegetation), environmental flow investigations, and other monitoring and research programs.

The Gloucester Water Supply Scheme has undergone various process improvements and capital works upgrades since its inception. A three-stage capital works upgrade was recently completed to improve water security and water quality. These include the construction of two new reservoirs, a booster pump station to improve pressure, a booster chlorine gas dosing system, a new rising main from the water treatment plant (approximately 6 km), and additional reticulation works within the township.

Water is pumped from the river directly to the Gloucester Water Treatment Plant. The conventional/traditional treatment plant includes a flocculation tank, clarifier, sand filters, chlorination for disinfection, and fluoridation for dental hygiene. Operators monitor the water quality at various stages of the treatment (including Barrington River) by collecting samples and testing them at the laboratory on site.

As water leaves the treatment plant it's pumped into reservoirs in Gloucester. Water is then reticulated to the townships of Gloucester and Barrington from the reservoirs in Gloucester. Chlorine levels are measured at reservoirs and boosted if necessary. As a final check to confirm water quality, testing is conducted on samples collected at public areas and customers' taps.

All test results are confirmed at MidCoast Council's National Association of Testing Authorities certified laboratory at Bootawa.





North Karuah Reticulation System

MidCoast Council purchases bulk water from Hunter Water to supply residents of North Karuah with reticulated drinking water.

Drinking water for this scheme is sourced from the Tomago bore fields, treated at the Lemon Tree Passage Water Treatment Plant and supplied to the Karuah zone reticulated system. Water extraction treatment and operational monitoring at the Water Treatment Plant and Karuah zone is the responsibility of Hunter Water. MidCoast Council is responsible for the water quality monitoring in the North Karuah reticulation system, including the water main on the bridge over the Karuah River (Tarean Road) and the reticulation system north of the bridge.

Water quality testing of the reticulation system is conducted at MidCoast Council's laboratory on samples collected at customers' taps.

A notification protocol between MidCoast Council and Hunter Water enables good communication between the two organisations to ensure the continued supply of high-quality drinking water to residents of North Karuah.

MidCoast Council and Hunter Water exchange water quality data on Karuah and North Karuah which helps to plan, prioritise and improve system performance.

HAZARD ANALYSIS AND RISK ASSESSMENT



The common approach for developing and reviewing the Quality System is described in The Guidelines. The above Guidelines prescribe a proactive rather than reactive approach. This involves anticipating potential problems to water quality before they occur, and ensuring effective preventative measures and barriers are in place throughout all steps of the water supply scheme, to mitigate these problems or hazards.

The potential problems or hazards to water quality are identified by undertaking a risk assessment for the Water Supply Schemes.

Risk assessment workshops for each water supply scheme are conducted every five years to review and update the Quality System. The most recent risk assessments were conducted in July 2020 with participants from MidCoast Council and NSW Health. The council participants included a representative of the executive, engineers, scientists, water treatment plant operators, maintenance and response crew, and environmental officers. The participants had various water quality management expertise and roles in water supply operations, planning, and regulatory compliance.

All potential hazards were documented throughout each stage of the water supply scheme, including catchments, treatment plants, reservoirs, and reticulation systems through to customers' taps. Preventative measures were assessed, and risk was calculated for each hazard. A review of the existing controls was undertaken to ensure the delivery of good-quality drinking water.

The Guidelines also stipulate that the performance of these preventative measures and barriers is monitored for each water supply scheme.

MULTIPLE BARRIERS AND CRITICAL CONTROL POINTS



Catchment



Treatment process



Customer's taps

As required by The Guidelines, potential risks to drinking water quality were identified during the risk assessments. Adequate preventative measures and barriers were then put in place to mitigate these risks throughout all steps of the water supply system. These include catchment management programs, water treatment processes, and reservoir and reticulation system integrity programs. The effectiveness of the existing barriers was also assessed.

The hazard analysis also identified critical control points for each water supply scheme. These are points, steps, or procedures where controls are applied to mitigate risk and the effectiveness of the barriers or preventative measures can be measured and controlled.

Critical control points were reviewed, updated, and approved by NSW Health in 2021. Most critical control points are measured continuously using online equipment to ensure water quality standards are adhered to. Good performance of the water supply system is then confirmed by testing water at sites throughout the reticulation system including customers' taps.

There are also operational plans and procedures for each water treatment plant and associated equipment to ensure the performance of water treatment and quality monitoring processes are effective.

SUPPORTING DOCUMENTATION OF THE QUALITY SYSTEM

Employee awareness and training

All staff employed in the Water Management and Treatment and Water Operations teams are trained to current water industry standards and regulatory requirements to ensure they can perform their duties to an acceptable level.

Awareness of drinking water quality management is also provided to staff as part of the water industry qualifications.

Community involvement and awareness

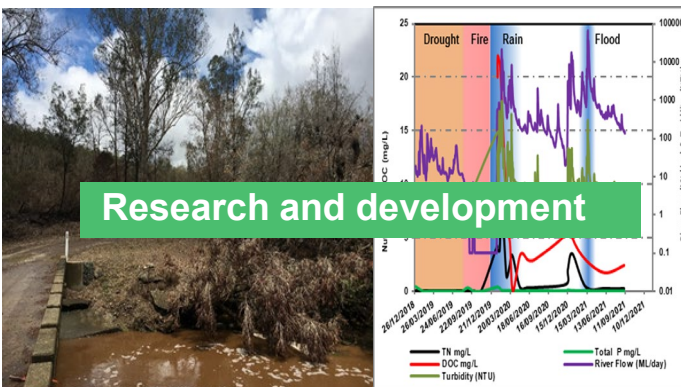
Community consultation is achieved through various methods including consultations for the Water Strategic Business Plan, Our Water Our Future which is the Council's long-term Water Strategy, Waterwatch Program, Manning Estuary, and Catchment Management Plan, etc.

Water quality data, Quality System, and the annual report on the implementation of the Quality System are published on the Council's web page.

Research and development

MidCoast Council undertakes a variety of research projects aiming to increase and improve knowledge of its drinking water supply schemes, e.g. water quality studies such as pesticide monitoring projects and catchment monitoring to investigate the influence and impact of bushfires on the source water quality for the water treatment plants.

Proof of performance studies are also performed for water treatment plants when these are commissioned. This is to ensure that the water treatment process and equipment can demonstrate that the scheme can be operated reliably to produce safe drinking water as specified in the design and planning documents.





REVIEW, AUDIT AND CONTINUAL IMPROVEMENT

The water industry is dynamic and continuously evolving. New technologies are being developed and regulatory requirements change. Due to this and the nature of the Quality System, it is reviewed regularly and updated as required to ensure it remains current. This review process is performed by council employees, NSW Health, and suitably qualified independent auditors.

Improvement actions recommended during the review and the audit process are also recorded and implemented.

Annual reports on the implementation of the quality system are submitted to NSW Health and a summary of this annual report is presented to the council and is available on the council web page.