Case study– Bathurst Regional Council

Managing discoloured water

Customers expect to turn on their tap for drinking water that is safe and pleasant to drink. When this is not the case and the water is discoloured or smells strange, this will likely result in reputational, financial and operational impacts for councils. In the first instance, Councillors might receive complaints from customers in the street, via social media or media enquiries from the local newspaper or radio station.

This case study describes how Bathurst Regional Council successfully managed the ongoing issue of discoloured drinking water from naturally occurring manganese.

This case study is a resource for regional and county council decision-makers, including Councillors and operations staff of council-owned local water utilities.

About Bathurst Regional Council

- Bathurst Regional Council is responsible for Bathurst and surrounding towns and villages in the NSW Central West.
- The local government area is home to around 44,000 residents across 3,820 square kilometres.
- Council manages more than $2.2 billion in assets, including $585 million in water and sewerage assets.

Figure 1. Map showing the location of Bathurst local government area in the central west of NSW

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System context

Bathurst Regional Council (Council) has 1 water filtration plant which produces drinking water for the Bathurst water supply system. The plant sources water from a weir pool on the Macquarie River which is fed by water from Chifley Dam or the Fish River (Figure 2).

Another plant at Chifley Dam services the drinking water requirements for employees and visitors at the dam and sources water directly from Chifley Dam. Council owns and runs both plants and manages 2 raw water systems. In summary, Council has 3 main water products:

- reticulated drinking water - Chifley Dam site and wider Bathurst water supply area
- reticulated non-drinking water - within Bathurst and sourced separately for the Hillview system
- drinking water for water carting.

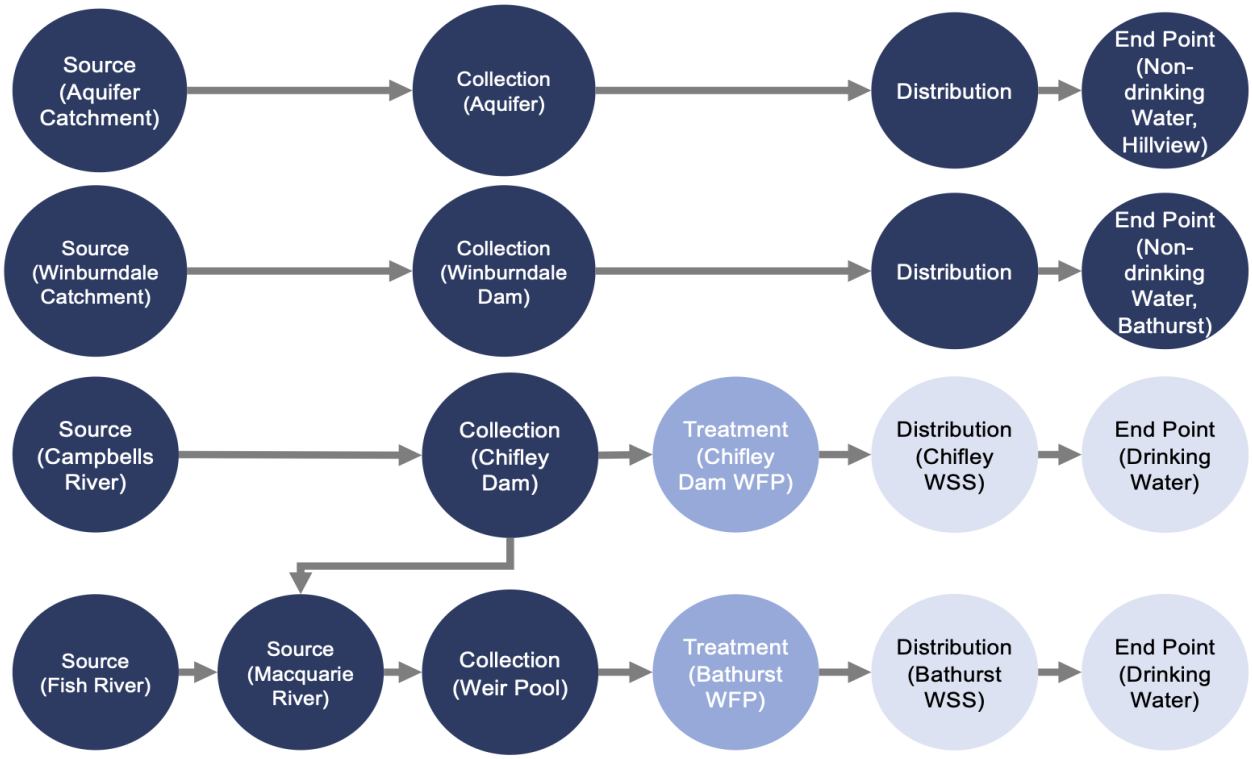

Figure 2. Bathurst water supply system showing how raw water is collected, treated and distributed to customers

Manganese and iron are naturally occurring elements from soil in Bathurst's raw water catchments. If not carefully managed, these elements can result in discoloured water at the customers tap.

Council historically used potassium permanganate to pre-dose the raw water to remove manganese. However due to site and technology constraints this process was not fully effective and resulted in soluble iron and manganese remaining in the filtered water.

The event

Council managed the manganese impacts on drinking water to improve levels of service to the community by taking a risk-based approach to identifying a manganese removal solution that would ensure Council met both public health and *Local Government Act 1993* (NSW) obligations.

Commencing in 2011, a staged approach was undertaken with regulators and other stakeholders, leading to the design and commissioning of a $5 million manganese removal plant in 2015. Because of the build-up in pipes over time, testing and ongoing flushing of the town's network has been necessary to remove the manganese.

Before 2015, discolouration of water from the Bathurst water supply system resulted in between 500 to 600 complaints each year. Customer complaints were largely from older parts of the town where a build-up of manganese in pipes had occurred due to the 120+ years of system use.

Although manganese is largely an aesthetic concern, it can have subsequent health and water system impacts such as:

- stripping disinfectant from the system
- reducing the effectiveness of disinfection
- creating false positives for chlorine analysis.

Facts about manganese

Manganese is an element found naturally in soils in Bathurst's raw water catchments.

At concentrations of >0.1 mg/L, manganese can make water taste unpleasant and can stain plumbing and laundry fixtures.

Even at concentrations of 0.02 mg/L, manganese can coat water pipes and when dislodged, come out of the household tap looking like tar.

Following Council's implementation of the manganese removal plant, customer complaints were significantly reduced.

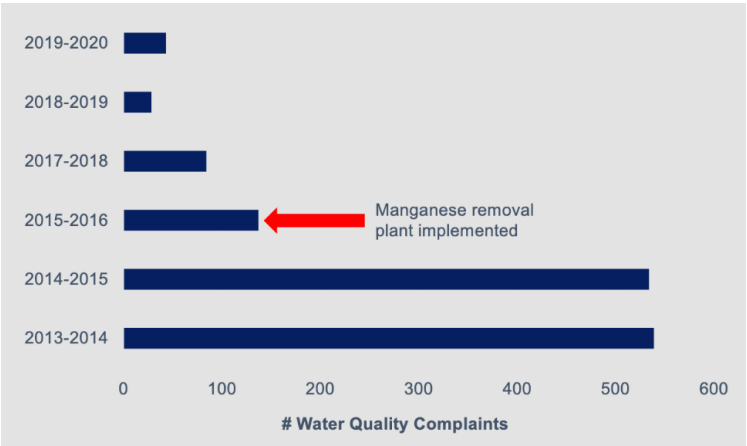

Figure 3. Reduced customer complaints received between 2013 - 2020 following removal of manganese

Council governance

Bathurst Regional Council is a council under the *Local Government Act 1993* (NSW) and has a range of obligations under that Act. Council also has several water business obligations, including to provide drinking water and management of Chifley and Winburndale Dams which form significant components of Bathurst's water raw and drinking supply systems.

As part of its drinking water obligations, under the *Public Health Act 2010* (NSW) and the Public Health Regulation 2012 (NSW), Council must:

- meet requirements of the Public Health Act and levels of service agreed with the community
- carry out and uphold a quality assurance program often known as a Drinking Water Management System or DWMS
- have a DWMS that is consistent with the Framework for Management of Drinking Water Quality in the Australian Drinking Water Guidelines (ADWG).

The Australian Drinking Water Guidelines set out a holistic approach to managing drinking water, including:

- understanding where sources of contamination may arise and how contamination may find its way to the customer
- understanding and managing risks to drinking water quality – including health and aesthetic objectives like taste, odour, look.

Bathurst Regional Council was one of the first councils to have a Drinking Water Management System in place that satisfied NSW Health who routinely undertake risk reviews of Council's water supply system to ensure the system stays compliant.

Overview of risks

The impact of manganese discolouration on Bathurst's drinking water was not just an aesthetic issue as it posed several risks for Council, which are summarised in Table 1.

Risk	Consequence to Council	Impacts
Limited resourcing available for the reticulation team to respond to the problem and manage other ongoing priorities	• Increased maintenance costs due to the unplanned nature of the work • Potential failure to meet other system obligations and levels of service • Staff fatigue from increased call-outs with up to 80% of the 5-person team required to flush during significant periods of manganese discolouration	• Financial • Public health • Work health and safety • Compliance • Reputation

Risk	Consequence to Council	Impacts
Operational issues with effective maintenance of chlorine residual in the distribution system	• Reduced capacity to deliver health and wellbeing obligations for the community • Reduced ability to meet *Public Health Act 2010* obligations • Reduced ability to meet Department of Planning and Environment Water Circular LWU18 requirements	• Compliance • Public health • Reputation
Perception of substandard water supply and water security management	• Mistrust in Council's capacity to manage resources well for the community • Community perception that water flushing was wasting water	• Reputation • Political • Wellbeing • Public health
Limited capacity for the customer service team to manage the 500-600 complaints received each year.	• Lack of confidence in Council's responsiveness to resolve the issue • Pressure on Council's quality of customer service • Difficulty in prioritising other service issues	• Reputation • Work health and safety • Public health • Compliance
Potential for manganese to create false chlorine positives	• Potential for council to supply unsafe water to customers	• Public health • Financial • Wellbeing • Compliance

Table 1. Overview of risks Council were exposed to from manganese discolouration of drinking water

Insights gained

Some of the key insights learned from this discoloured water event include:

Capital works and operational change

- To create Council and operational staff confidence in the approach, a staged approach including initial testing and a pilot project was implemented before operational changes were applied to all filters. This approach also enabled opportunities to source funding and strengthened organisational support for the capital works improvement project.

Financial

- Although implementing the manganese removal plant required an investment from Council, it significantly reduced the costs required for contractors and less resourcing was required to treat water wastage due to reservoir cleaning caused by manganese build-up.

Reputation

- By addressing community concerns, the Council has increased community confidence in council's ability to manage water sustainably and has strengthened Bathurst's capacity to attract new residents and industry to the region.

Customer service

- Community trust in Council was helped by Council improving its procedures for managing, collating and responding to customer enquiries.

Considerations

- Do you understand what water supply products and services your council is responsible for?
- Are you confident that Council is meeting the requirements of the *Public Health Act 2010* (NSW) to have a Drinking Water Management System in place?
- Do you know what potential community concerns exist regarding drinking water quality?
- Are you confident in Council's complaint management system?

References

https://www.yourcouncil.nsw.gov.au/council-data/bathurst-regional/2019/

https://www.bathurst.nsw.gov.au/images/stories/water/BRC_MRP_FA_220715.pdf

Water quality complaint data from https://www.industry.nsw.gov.au/water/water-utilities/lwu-performance-monitoring-data