

## A collaborative approach to source water quality risk management for water utilities in NSW Australia

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### Highlights:

- New partnership program between Local and State-Government to improve drinking water safety for regional communities, in New South Wales, Australia.
- Leveraging state-level expertise and resources in catchment and source water management to prioritise risks and implement improvement actions.
- Three-phase program, adopts a preventative and multibarrier approach for managing water quality, combining the Australian Drinking Water Guidelines and international standards.
- Program tools have been developed for efficient and replicable application of optimal water supply management practices across the water utilities.

Keywords:source water quality; capacity building; risk management.

## INTRODUCTION

In regional areas of New South Wales (most populated state in Australia) 92 independent local water utilities (LWUs) are responsible for delivering safe drinking water to their communities. Challenges they face are many, including funding constraints, skilled labour shortages and managing high risk water sources. These conditions have contributed towards a disparity in drinking water incidents between regional communities and metropolitan areas.

WaterNSW is a State-government owned corporation supplying ~70% of the water used across NSW, over an area the size of Ecuador and Paraguay combined. WaterNSW is legislated protect and enhance the quality and quantity of source water in the Greater Sydney drinking water catchment, using catchment programs, scientific research and advanced monitoring and modelling tools to optimise the quality of water supplied to Water Treatment Plants (WTP).

A key principle of drinking water management is the multi-barrier approach, where multiple management barriers appropriate to the level of contamination within the raw water supply must be maintained. Quantification of region-specific risks, and implementation of effective barriers, has posed a challenge for small water utilities.

Under the NSW Government's new Town Water Risk Reduction Program, an approach of local and state government partnership has been adopted to improve outcomes for regional communities. This program has implemented a range of actions to reduce water supply risks and developed new tools applicable to the management of highly variable drinking water sources.

## METHODOLOGY

Fourteen Local Water Utilities (LWUs) across NSW were included in the initial program, with a total of 40 distinct water sources (including surface and mixed surface/groundwater sources). Many of these LWUs manage multiple water treatment plants with differing treatment capabilities. The program was developed in consultation with LWUs and is divided into three phases: 1) Discovery; 2) Risk Reduction Controls and 3) Resiliency and Development. An overview is provided in Figure 1.

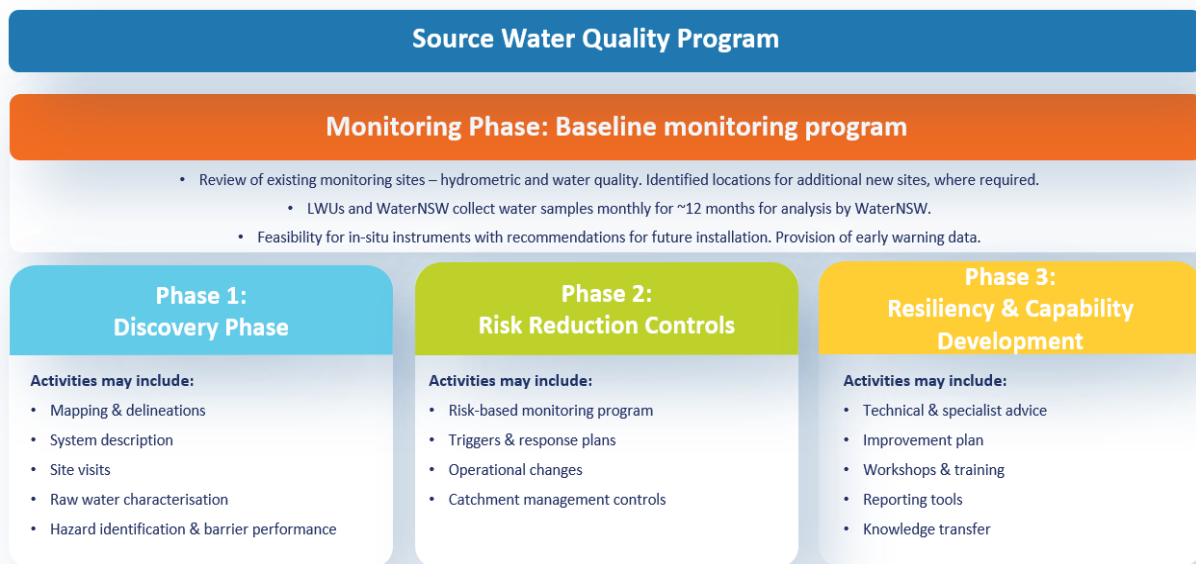


Figure 1. Overview of the Town Water Risk Reduction phases.

The Discovery Phase aims to enhance understanding of hazards and prioritise mitigation strategies. Land use mapping, development of system diagrams (Figure 2), catchment surveys, and water quality data reviews were used to identify key hazards and confirm source water vulnerability against pathogen risks. A best practice guide for source water and catchment management was developed to assess efficacy of existing controls, following the principles of the Australian Drinking Water Guidelines (NHMRC 2011), and taking practices from a range of international and national standards.

The Risk Reduction & Controls Phase includes the implementation of operational triggers and response plans, early warning system improvements and updates in operational responses. The Resiliency & Development Phase focuses on knowledge transfer upskilling of LWU capabilities through provision of training, specialist advice, leveraging of WaterNSW organisational expertise.

These phases are underpinned by a risk-based baseline water monitoring program for robust source water quality characterisations, including grab sampling and the installation of in-situ water quality instruments at strategic locations. To ensure ongoing and resilient water supplies, the program relied on close collaboration with managers and operators from each LWU, throughout the program of works.

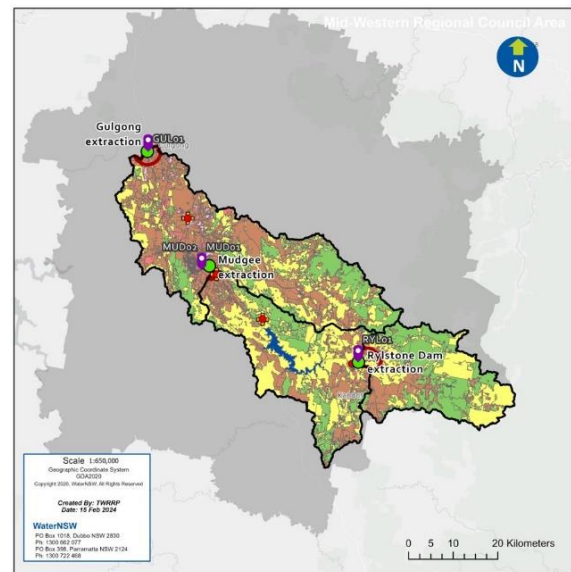
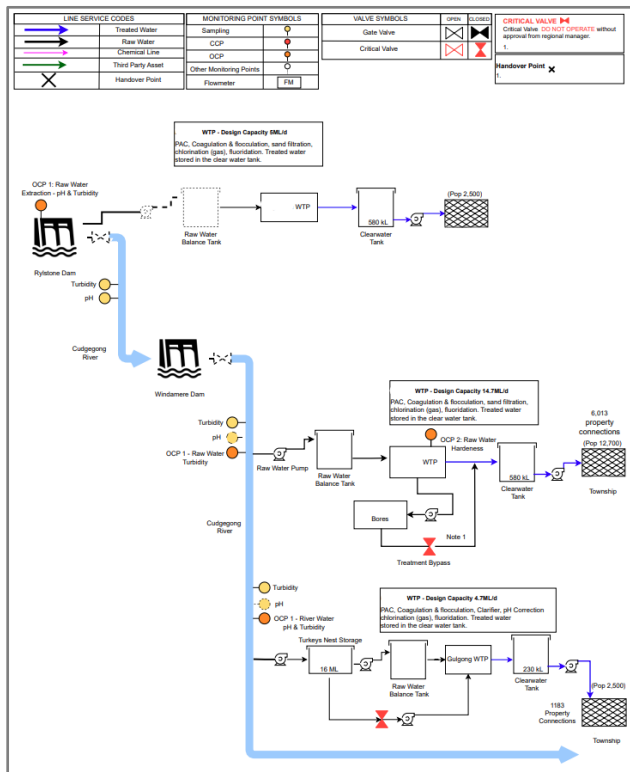


Figure 2. Examples of system diagram and catchment delineation with land use mapping

## RESULTS AND CONCLUSIONS

Early-stage outputs of the program have resulted in twenty-nine individual improvements to water quality risks of a single LWU within a 3-month period, and outlined recommendations for ongoing improvements. These actions have included updating monitoring and operational control points, quantification of hydrological systems under differing flows, pesticide assessments, communication and incident response protocols improvements and statistically quantified insights into risk trends.

WaterNSW practices were adapted and implemented to strengthen the LWU's Water Quality Management Systems, including the source water good practice guide and a hazard characterisation and barrier assessment. With improved understanding of source water management, ability of LWUs to proactively mitigate water quality risks prior to supply to WTPs was enhanced. The program highlighted LWU-specific priority gaps, enabling the development of a targeted water quality improvement plan.

The program has provided a new pathway for government support of regional communities. WaterNSW has strengthened relationships with new and existing customers and fostered a better understanding of LWU needs. Furthermore, outcomes of this program will inform policy changes, to advocate for an integrated water quality management approach across NSW. Providing safe and reliable drinking water is fundamental to the wellbeing, health, and prosperity of local communities across regional NSW.



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## REFERENCES

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