

Town Water Risk Reduction Program

Managing source water quality to improve drinking water safety: Practical tools for LWUs

WaterNSW's Source Water Quality Program



About WaterNSW

We're the people taking care of the state's water at the source – capturing, storing, delivering.



Our story

We're vital



We use our expertise to carefully capture and store our most vital natural resource. We then supply that water ready for distribution, for the environment, agriculture, industry and the community.

- ✓ We manage 41 major dams and hundreds of waterways across the state, delivering two thirds of all water used in NSW
- ✓ We're at the source of the state's water, we're not at the taps
- ✓ WaterNSW is a State-Owned Corporation and one of the main government agencies tasked with managing water in NSW
- ✓ We follow the rules, we don't make the rules
- ✓ We're also the source of vital information, like river and dam storage levels

What we do

We're expert operators



We operate the state's dams like Warragamba and Burrendong using our knowledge of nature, science and engineering.

Our why

We're proud custodians



We are driven to use our knowledge, passion and expertise to manage water responsibly and support the resilience of NSW.

How we work

We're local partners



We live and work side-by-side with our customers and communities across NSW, and our work with First Nations people is important to us.

Project Background

In regional NSW, Local Water Utilities (LWUs) face many challenges in supplying safe drinking water to their communities

The **Town Water Risk Reduction Program (TWRRP)** was established by the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), a local and state government partnership approach to overcome some of these challenges.

WaterNSW was appointed to deliver:

- **Source water quality:** Leverage WaterNSW experience and expertise, collaborating with Local Water Utilities (LWU) to identify risk and develop mitigation strategies aim at catchment & source water quality management to improve drinking water outcomes for our regional communities
- **Dam safety:** Deliver 5-yearly dam safety risk reviews with the aim of increasing the number of regional councils in compliance with Dam Safety Regulation.

Our source water quality program of works

Monitoring: Baseline and risk-based sampling

Phase 1: Discovery Phase

Activities may include:

- Mapping & delineations
- System description
- Site visits
- Raw water characterization
- Practice assessment
- Hazard identification & barrier performance

Phase 2: Risk Reduction Controls

Activities may include:

- Risk-based monitoring program
- Triggers & response plans
- Operational changes
- Catchment management controls

Phase 3: Resiliency & Capability Development

Activities may include:

- Technical & specialist advice
- Improvement plan
- Workshops & training
- Reporting tools
- Knowledge transfer

LWUs we're collaborating with

Western NSW

Brewarrina
Bourke

Southern NSW

Murrumbidgee
Snowy Monaro
Snowy Valleys

Northern NSW

Clarence Valley
Gwydir
Richmond Valley

Central NSW

Central Tablelands Water (CTW)
Dubbo
Mid-Western
Singleton
Upper Hunter



Why we developed tools?

- ✓ To be able help our 13 LWUs – covering over 40 water sources
- ✓ For us to quickly assess their systems, compare against ADWG, identify gaps, and make recommendations
- ✓ Consistency across the LWUs
- ✓ Easily transferrable – potential for LWUs to adopt and use in their continued source water quality management



What we created

Top 3 tools

-  #1 Source Water Management Assessment Tool
-  #2 Hazard Identification & Prioritisation Template
-  #3 Source water risk-based water monitoring tool

Tool #1 : Source water management assessment tool (SWMAT)

Source water protection can help prevent hazards or reduce their impact on drinking water quality

- WaterNSW developed this tool (SWMAT) to list a range of practical good practice controls for source water quality management.
- They are based on the twelve elements of the Australian Drinking Water Guidelines (ADWG), international & national water supply frameworks, and WaterNSW standard practice.
- Used as a pre-program assessment to determine the extent to which these measures were already effectively implemented by the LWU and to identify opportunities for improvement.

Below: Example of the SWMAT

	Controls	Status (Initial assessment)
Element 1 Commitment to Drinking Water Quality Management	1. A policy is in place that demonstrates organisational commitment to an effective water quality management system	Partially Present (see Section 2.1)
	2. Local government planning practices and controls in place to protect drinking water sources from the impact of development	Partially Present (see Section 4.2.8)
Element 2 System Assessment	3. A characterisation of the source water quality has been completed	Partially Present (see Section 3.1)
	4. Trends in source water quality have been analysed	Partially Present (see Section 4.3.1)
	5. Travel time of raw water from the source(s) to the WTP/s is known	Not Present (see Section 4.2.5)
Element 3 & 4 Preventative Measures & Controls	11. Where alternative offtakes/sources are provided, the most suitable offtake for quality is selected	Partially Present (see Section 4.2.3)
	12. Operational Control Points are clearly outlined, with triggers and responses outlined within the DWMS	Partially Present (see Section 4.2.3)
	13. Protection of raw water extraction points and their immediate surroundings	Partially Present (see Section 4.2.3)

Tool #2 : Hazard identification & prioritisation

Identifying hazards, barrier gaps and actions to reduce water quality risks

- A tool that allows us to identify the LWU's key source water hazardous events, to assess effectiveness of existing controls and barriers.
- Includes reviewing their risk registers, catchment assessments, discussions with LWU officers and WaterNSW officers.
- Outcomes, along with the SWMAT helped to identify water quality improvement actions throughout the program, and for inclusion in the LWU's ongoing improvement plans.

Hazardous event	Existing controls, barriers and supporting actions	Gaps in barriers and controls
1. Pesticides or agricultural chemicals from the catchment enter the source water	Council conduct free chemical clean outs in the LGA. Council also encourages land users in the catchment to take part in drumMUSTER and ChemClear initiatives. WTPs have PAC dosing	Presence of pesticides or agricultural chemicals in the source water is not known (see Section 4.1.2) Notification protocol for the application of pesticides not present. Lack of educational initiatives for pesticide and agricultural chemical users in the catchment area (See section 4.3.2).

Above:

Example output of hazard identification and prioritisation

Below:

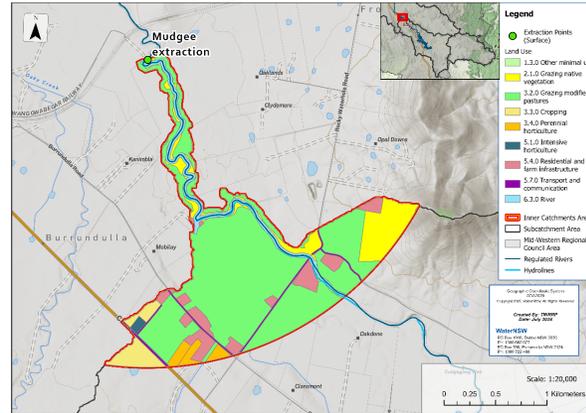
Process for hazard identification and prioritisation



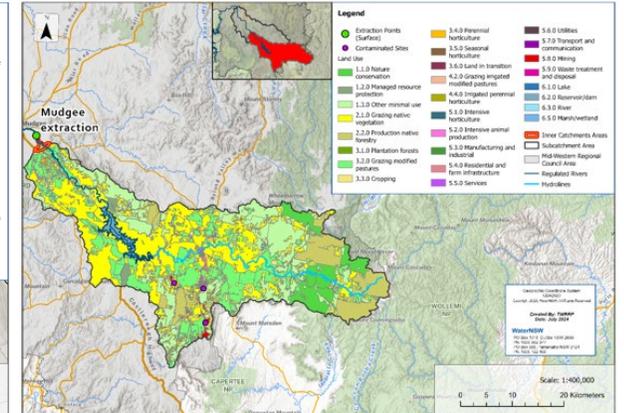
Tool #3 : Risk-based water monitoring

Land-use vs hazards – prioritised risk-based monitoring

- Provides LWUs with a guide to quickly identify hazards that may be present in their catchments.
- Enables risk-based prioritisation of monitoring (based on Australian Land Use and Management Classification - ALUM) to build an understanding of risks associated with specific land uses.
- In addition, TWRRP conducted a water quality monitoring program to test for key analytes (15 - consisting of metals, nutrients, bacteria and algae) over a 12-month period. To help characterise the quality for each source water.
- We also conducted risk-based monitoring following events, such as lake weather inflow and pesticide spraying season.



Above left: LWU's inner-catchment land use ALUM codes



Above right: LWU's full sub-catchment land use ALUM codes

Below: Matrix – library of potential source water quality risks per ALUM code highlighting the possible contaminant type, usage, and analytes to test for (including threshold).

CODE	CLASS	SOURCE WATER QUALITY RISK	HAZARD CLASS	ANALYTES	CONTAMINANT TYPE	USAGE	LIMIT (mg/L unless otherwise stated)
4.5.2	Irrigated seasonal flowers and bulbs	Agrichemicals	Chemical	Thiram	Fungicide	fruit legumes sorghum ornamentals	0.007
				Pendimethalin	herbicide	vine wheat canola	0.4
				Maldison (malathion)	insecticide	barley food crops ornamentals	0.07
				Diquat	herbicide	weed control/aquatic weed control (sewers) orchards vineyards	0.007
				Dimethoate	Insecticide	fruit trees ornamentals	0.007
				2,2 DPA 2,2-dichloropropionic acid	Herbicide	farm and domestic control annual and perennial grasses, and	0.5
				Fertilizer/manure application	Microbial	Total Coliforms, E. Coli	Bacteria
	Chemical	Nitrogen, Nitrate	NA	NA	50		
		Phosphorus	NA	NA	NA		

Program outcomes

Benefits of these tools for the program

Source water management assessment tool (SWMAT)

LWUs can continue to use the SWMAT to keep track of the existing controls they have in-place and identify those that are still outstanding and prioritise their implementation.

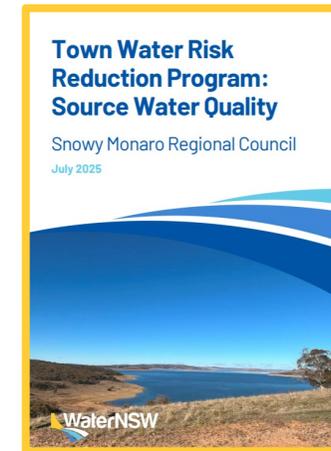
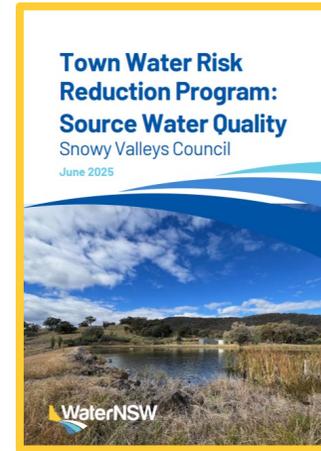
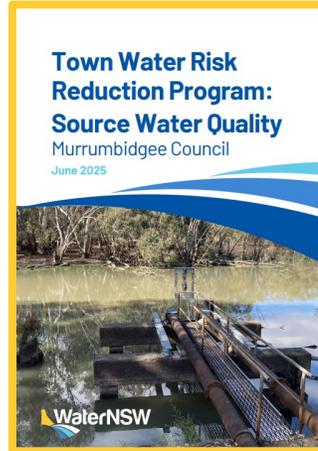
Hazard identification & prioritisation tool

LWUs will be equipped with a tool to help identify their source water hazardous events, assess the effectiveness of their barriers and control, and to prioritise mitigation actions.

Risk-based water monitoring tool

LWUs will be able to better understand, based on land use, key hazards that should be monitored to protect drinking water safety. Also provided is a quick reference for how to test & monitor for them.

Other program deliverables



Insight videos

- 1. Safety - Town Water Risk Reduction Program**
WaterNSW - 11 views - 3 days ago
- 2. CoC SIDs - Town Water Risk Reduction Program**
WaterNSW - 9 views - 3 days ago
- 3. Bottle Information - Town Water Risk Reduction Program**
WaterNSW - 7 views - 5 days ago
- 4. Sampling Spots - Town Water Risk Reduction Program**
WaterNSW - 8 views - 5 days ago
- 5. Sampling method - Town Water Risk Reduction Program**
WaterNSW - 6 views - 5 days ago
- 6. Sampling Filters - Town Water Risk Reduction Program**
WaterNSW - 5 views - 5 days ago
- 7. QA/QC - Town Water Risk Reduction Program**
WaterNSW - 5 views - 5 days ago

Q&A Sessions



Paperwork a) Bottle labelling

You will need to collect 7 bottles at each site. Each bottle is specific to the parameters being tested for and will require different handling and filling methods. You will need to refer to the label with the correct Sample ID. Each bottle will also require the specific label. You will need to refer to the label with the correct Sample ID.

We will provide you with all your SIDs

Sample ID	Parameter	Volume	Material	Color	Cap
1001	Lead	200ml	HDPE	White	White
1002	Copper	200ml	HDPE	White	White
1003	Iron	200ml	HDPE	White	White
1004	Manganese	200ml	HDPE	White	White
1005	Nitrate	200ml	HDPE	White	White
1006	Nitrite	200ml	HDPE	White	White
1007	Ammonia	200ml	HDPE	White	White
1008	Chloride	200ml	HDPE	White	White
1009	Sulfate	200ml	HDPE	White	White
1010	Calcium	200ml	HDPE	White	White
1011	Magnesium	200ml	HDPE	White	White
1012	Total Hardness	200ml	HDPE	White	White
1013	Total Dissolved Solids	200ml	HDPE	White	White
1014	Total Suspended Solids	200ml	HDPE	White	White
1015	Phosphate	200ml	HDPE	White	White
1016	Fluoride	200ml	HDPE	White	White
1017	Boron	200ml	HDPE	White	White
1018	Selenium	200ml	HDPE	White	White
1019	Vanadium	200ml	HDPE	White	White
1020	Chromium	200ml	HDPE	White	White
1021	Cadmium	200ml	HDPE	White	White
1022	Mercury	200ml	HDPE	White	White
1023	Barium	200ml	HDPE	White	White
1024	Strontium	200ml	HDPE	White	White
1025	Zinc	200ml	HDPE	White	White
1026	Cobalt	200ml	HDPE	White	White
1027	Nickel	200ml	HDPE	White	White
1028	Manganese	200ml	HDPE	White	White
1029	Iron	200ml	HDPE	White	White
1030	Copper	200ml	HDPE	White	White
1031	Lead	200ml	HDPE	White	White
1032	Chloride	200ml	HDPE	White	White
1033	Sulfate	200ml	HDPE	White	White
1034	Calcium	200ml	HDPE	White	White
1035	Magnesium	200ml	HDPE	White	White
1036	Total Hardness	200ml	HDPE	White	White
1037	Total Dissolved Solids	200ml	HDPE	White	White
1038	Total Suspended Solids	200ml	HDPE	White	White
1039	Phosphate	200ml	HDPE	White	White
1040	Fluoride	200ml	HDPE	White	White
1041	Boron	200ml	HDPE	White	White
1042	Selenium	200ml	HDPE	White	White
1043	Vanadium	200ml	HDPE	White	White
1044	Chromium	200ml	HDPE	White	White
1045	Cadmium	200ml	HDPE	White	White
1046	Mercury	200ml	HDPE	White	White
1047	Barium	200ml	HDPE	White	White
1048	Strontium	200ml	HDPE	White	White
1049	Zinc	200ml	HDPE	White	White
1050	Cobalt	200ml	HDPE	White	White
1051	Nickel	200ml	HDPE	White	White
1052	Manganese	200ml	HDPE	White	White
1053	Iron	200ml	HDPE	White	White
1054	Copper	200ml	HDPE	White	White
1055	Lead	200ml	HDPE	White	White
1056	Chloride	200ml	HDPE	White	White
1057	Sulfate	200ml	HDPE	White	White
1058	Calcium	200ml	HDPE	White	White
1059	Magnesium	200ml	HDPE	White	White
1060	Total Hardness	200ml	HDPE	White	White
1061	Total Dissolved Solids	200ml	HDPE	White	White
1062	Total Suspended Solids	200ml	HDPE	White	White
1063	Phosphate	200ml	HDPE	White	White
1064	Fluoride	200ml	HDPE	White	White
1065	Boron	200ml	HDPE	White	White
1066	Selenium	200ml	HDPE	White	White
1067	Vanadium	200ml	HDPE	White	White
1068	Chromium	200ml	HDPE	White	White
1069	Cadmium	200ml	HDPE	White	White
1070	Mercury	200ml	HDPE	White	White
1071	Barium	200ml	HDPE	White	White
1072	Strontium	200ml	HDPE	White	White
1073	Zinc	200ml	HDPE	White	White
1074	Cobalt	200ml	HDPE	White	White
1075	Nickel	200ml	HDPE	White	White
1076	Manganese	200ml	HDPE	White	White
1077	Iron	200ml	HDPE	White	White
1078	Copper	200ml	HDPE	White	White
1079	Lead	200ml	HDPE	White	White
1080	Chloride	200ml	HDPE	White	White
1081	Sulfate	200ml	HDPE	White	White
1082	Calcium	200ml	HDPE	White	White
1083	Magnesium	200ml	HDPE	White	White
1084	Total Hardness	200ml	HDPE	White	White
1085	Total Dissolved Solids	200ml	HDPE	White	White
1086	Total Suspended Solids	200ml	HDPE	White	White
1087	Phosphate	200ml	HDPE	White	White
1088	Fluoride	200ml	HDPE	White	White
1089	Boron	200ml	HDPE	White	White
1090	Selenium	200ml	HDPE	White	White
1091	Vanadium	200ml	HDPE	White	White
1092	Chromium	200ml	HDPE	White	White
1093	Cadmium	200ml	HDPE	White	White
1094	Mercury	200ml	HDPE	White	White
1095	Barium	200ml	HDPE	White	White
1096	Strontium	200ml	HDPE	White	White
1097	Zinc	200ml	HDPE	White	White
1098	Cobalt	200ml	HDPE	White	White
1099	Nickel	200ml	HDPE	White	White
1100	Manganese	200ml	HDPE	White	White

We refer to Appendix A for bottle handling

Attach label to specific bottle

Sampling "how to guide"

Townwater Risk Reduction Program (TWRPP) - WaterNSW Program

Guide: How WaterNSW collects our water quality samples Methods and procedures

Thank you for being part of the Townwater Risk Reduction Program. The following is a guide to highlight how WaterNSW collects our samples, from preparation of bottles to collection, storage requirements and paperwork. We understand there may be different ways to sample, but we ask that you follow our procedures, to ensure consistency, safety and QA/QC across the program.

- Prior to commencing any sampling for this program, we ask that you read this guide and to note the following:**
- This guide is accompanied by 7 videos and have been produced for the purpose of the Town Water Risk Reduction Program and is only valid from now until June 30th (the end of the program). It is intended to highlight key messaging only. It is not a training substitution and needs to be used in conjunction with formal water quality sampling training.
 - We ask that anyone collecting water samples for this program to read this guide and to watch the accompanying video prior to commencing, to ensure any qualifications you have through our contact email: info.twrpp@water.nsw.gov.au
 - The topics covered in this guide include: Safety, Chain of Custody (CoC), Bottle Information, Sampling Tips, and QA/QC.

Safety
Safety is our number one priority. WaterNSW is committed to minimising risks to workers in all activities. Coercive working or with WaterNSW is required to follow safety procedures and to call out when others aren't. Please watch our video on safety (link: 5. Safety) and take note of the below points while sampling for this program. We have also included Appendix B our internal safety guide for working in and near water procedures.

- Please take note of the following (this is not an exhaustive list):
- Always be aware of your safety and that of others.
 - Observe all safety procedures and always follow safety procedures.
 - Complete the site or equipment to return them to your department before leaving.
 - Upon arrival, perform safety checks of the area prior to commencing work.
 - When sampling, carry a first aid kit, along with a mobile phone and eye wash equipment.



Collaboration is key



This program is a whole-of-government response that brings the strengths of the major entities in the water sector to local councils, who can choose to engage with the skills and knowledge that will best assist them.



QUESTIONS