



THE UNIVERSITY OF
SYDNEY

CIS Private Water Supply Standard

The University of Sydney

Campus Infrastructure and Services



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1 Purpose

The CIS Private Water Supply Standard sets out the University of Sydney's minimum requirements for the design, construction and maintenance of systems that are subject to the Public Health Amendment (Quality Assurance Programs of Drinking Water Suppliers) Regulation. This Regulation applies to all drinking water supplies that are not taken from a water corporation (such as Sydney Water) or a local council. Private water supplies include local rainwater tanks, ground water bores, rivers, creeks or surface water storage (dams), as are most often found on farms or remote campuses. This Standard is a key part of the University's compliance with the Regulation.

This Private Water Supply Standard complements the CIS Hydraulic Services Standard. Requirements from the CIS Hydraulic Services Standard for the following sections also apply to the private water supply systems:

- Section 5.3 Cold Water Services
- Section 5.4 Hot Water Services

Applicable requirements documented in the Public Health legislation, Workplace Health and Safety legislation, Disability Discrimination legislation, State Environmental Planning legislation, Commonwealth and State legislation, National Construction Codes (NCC), the Building Code of Australia (BCA) and Australian and New Zealand Standards (AS/NZS) are the minimum and mandatory compliance requirements.

Where any ambiguity exists between this standard and the aforementioned mandatory requirements then:

- a) the highest performance requirements must apply
- b) applicable requirements must follow this order of precedence:
 - i. Public Health Legislation
 - ii. Workplace Health and Safety legislation
 - iii. Disability Discrimination legislation
 - iv. State Environmental Planning and Assessment legislation
 - v. All other Commonwealth and State legislation
 - vi. NCC, BCA and PCA
 - vii. AS/NZS
 - viii. This standard and other University of Sydney standards

2 Scope

These standards describe the minimum requirements for the design, construction and maintenance of all private water systems throughout all buildings owned, operated and managed by the University of Sydney. This includes those water supplies that are not planned for drinking as this Standard also sets signage requirements for systems that are non-potable.

Any drinking water supplied from an external licenced authority (Sydney Water, local council, etc) shall meet the requirements set by the CIS Hydraulic Services Standard rather than this Private Water Supply Standard.

The standards apply to all planners, project managers, consultants, contractors, sub-contractors, tenants, managing agents and University staff involved in the design, construction and maintenance of existing, new and proposed University buildings and facilities.

All private water supply systems products and services provided or specified by designers, consultants, staff and contractors must conform to this standard.

Where specific applications are not explicitly covered or ambiguity exists, the intent of the design standard must be satisfied. In such cases a return design brief must be provided for review and approval by the issuer of this standard or their appointed delegate who must have relevant technical competence in the subject matter. Additional more stringent requirements may apply on a project specific basis dependent upon risk management and insurance requirements.

The standard provides:

- a) A reference document to enable consistency with the design and engineering objectives
- b) Details of the minimum performance requirements for Planning, Architectural Design and maintenance.
- c) Support of the University Vision for the built environment and best practice.
- d) The Standard addresses key objectives:
 - i. Quality design which responds, enhances and complements the environment
 - ii. Appreciation of the heritage context and cultural history of the campuses
 - iii. Value for money in all aspects of the project
 - iv. The design of low maintenance buildings and environments
 - v. Longevity of construction approach to design
 - vi. Compliance with Health Authority requirements for Private Water Supplies
 - vii. Flexible design, to future proof building usage for expansion or adaption to new uses
 - viii. Safety in design

3 Definitions

drinking water	water that is intended, or likely, to be used for human consumption, or for purposes connected with human consumption, such as: <ol style="list-style-type: none"> a) the washing or cooling of food, or b) the making of ice for consumption, or for the preservation of unpackaged food, whether or not the water is used for other purposes
mains or town water	drinking water supplied by a water utility (such as Sydney Water), a local council or similar
carted water	water brought to site by a truck and stored in a tank
rain water	water collected from a roof or similar
ground water	water drawn from a bore hole
surface water	water drawn from a river, creek, farm dam, lake, pond or similar
bottled water	commercially supplied drinking water packaged in a bottle or other suitable container
private water supplier	a person who supplies drinking water in the course of a commercial undertaking (other than that of supplying bottled or packaged drinking water), being a person who has not received the water: <ol style="list-style-type: none"> (a) from any of these suppliers of drinking water: <ul style="list-style-type: none"> • Sydney Water Corporation or Hunter Water Corporation • a water supply authority within the meaning of the Water Management Act 2000



	<ul style="list-style-type: none"> • a local council or a county council exercising water supply functions under Division 2 of Part 3 of Chapter 6 of the Local Government Act 1993 • a licensed network operator or a licensed retail supplier within the meaning of the Water Industry Competition Act 2006 • any person who treats or supplies water on behalf of a person referred to in any of the preceding paragraphs <p>(b) in the form of bottled or packaged water</p>
QAP	drinking water Quality Assurance Plan, based on the NSW Health template and addressing the requirements of the Regulation
(the) Regulation	Public Health Amendment (Quality Assurance Programs of Drinking Water Suppliers) Regulation 2018, under the Public Health Act 2010
treatment	any process or technique used to improve the quality of water, including filters and disinfection
water carter	a person who receives water from a supplier of drinking water and who supplies drinking water from a water carting vehicle in the course of a commercial undertaking

4 Roles and Responsibilities

4.1 Director, CIS

- Approval and sign off for this standard

4.2 Engineering Team

- Maintaining this standard and keeping it up-to-date

5 Technical Requirements

To be safe for human consumption, drinking water must not contain:

- disease causing micro-organisms or
- chemicals at potentially harmful levels

The water should also have good physical quality including being clear, colourless and well aerated, without suspended material (such as clay or silt) or unpleasant taste or odour.

All of the University's private water supplies are considered to be unfit for drinking by default. A private drinking water system shall not be used for drinking water until it has been assessed as meeting this Standard and a Quality Assurance Plan (QAP) has been implemented.

This Standard groups drinking water sources into the categories of:



- mains ↑ *lowest risk*
- carted
- rain
- ground
- surface ↓ *highest risk*

These water source categories are ordered from lowest to highest risk, where *mains* water is safest and *surface* water the least safe. Water shall always be drawn from the safest possible source whenever there is a choice.

The 4 private water sources (carted, rain, ground, surface) have varying technical requirements which are discussed in their specific individual sections below. There are also requirements which apply to all of the sources, which are discussed in the following Sections 5.1 and 5.2.

5.1 Signage for taps

This section of the standard applies to all private water supplies, even when they are not intended for drinking.

Any consumer of privately supplied water must be aware of the drinking water quality. The warning can be in the form of a sign at each water outlet and/or other prominent locations or an in-room directory or notification card. These images are examples of signs that can be used to notify consumers.

If a private water supply is not treated by a reliable process (for example filtration and chlorine dosing or UV), suitably maintained, or regularly tested, all potential consumers should be warned.



Where the water supply is not intended to be used for drinking, then consumers should be warned with a sign displayed at each drinking water tap and in bathing areas. Information folders, notice boards and other locations may also be appropriate places to display signs.





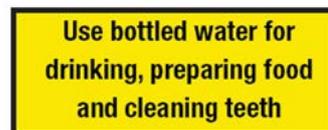
If testing is carried out and the results show the presence of microorganisms, then consumers should be warned not to drink the water.



If a blue green algae bloom occurs in the water supply, consumers should be warned that the water is unsuitable for drinking or bathing (even after boiling the water).



If water is contaminated by chemicals or blue green algae, further advice could be given to use an alternative water supply (e.g. commercially bottled water).



5.2 Requirements for drinking water from private sources

5.2.1 Quality Assurance Plan

A QAP must be in place for each private water source that is intended for drinking. The QAP must meet the minimum requirements for design, installation, maintenance and monitoring set by this standard.

The QAP document should be kept in a central place that is easily accessible to staff on the site, and also uploaded to the CIS SharePoint Document Register.

A current copy must be provided to the local Public Health Unit, along with any update or change to the QAP.

The QAP will describe a process to:

- assess and protect the quality of the source water
- make sure treatment processes are appropriate, maintained and working properly
- test to assess water quality
- make the water supply safe if contamination occurs



- ensure consumers are warned and/or provided with safe drinking water if the normal supply is found to be unsatisfactory or quality cannot be guaranteed
- record checks on the system

5.2.2 Water Quality Testing

- The microbiological quality of drinking water will be monitored where it is supplied to consumers (for example at a kitchen tap or other regularly used drinking water tap) at least monthly by testing for the organism *Escherichia coli* (*E. coli*). Detection of *E. coli* indicates faecal contamination and the possible presence of infectious microorganisms. If the system has a filter and disinfection in place, and the microbiological safety of the drinking water system can be established through 6 months of testing, the frequency of testing can be extended so that it occurs 6 monthly.
- The chemical and physical quality of drinking water will be monitored where it is supplied to consumers at least annually. A comprehensive analysis should be undertaken initially to identify any unusual contaminants in the water supply. The range of characteristics to be analysed in ongoing monitoring should be decided according to risk.
- Test drinking water after any significant change to the system or an event which may have a negative impact on water quality.
- Test the water if there is any suspicion of blue green algae (cyanobacteria), any other contamination or possible illness suspected to be related to drinking water.
- Testing must be conducted at a laboratory accredited by the National Association of Testing Authorities (NATA).
- The results of testing must meet values set in *the NHMRC Australian Drinking Water Guidelines* (ADWG). (Indicative values are provided in the tables below.) Any anomalous test results must be assessed and treated according to the recommendations of the ADWG.
- If test results are outside of the reasonable values, people must be prevented from drinking the water until the water has been retested to be within the reasonable values.
- Monitoring for additional characteristics may be required depending on the presence of particular materials or industrial activities in the catchment (for example pesticides, organochlorides or fertilisers).

These tables are included for indicative levels of water quality testing, but the values provided by the latest revision of the NHMRC Australian Drinking Water Guidelines should be used in preference.

Microbiology test parameter	Australian Drinking Water Guideline value
<i>E. coli</i>	should not be detected in a 100 mL sample
Cyanobacteria	testing is complex and can not be summarised within this table

Chemical Test Parameter	Australian Drinking Water Guideline value (mg/L)
Antimony	0.003
Arsenic	0.01
Cadmium	0.002
Chromium	0.05
Copper	2



Chemical Test Parameter	Australian Drinking Water Guideline value (mg/L)
Fluoride	1.5
Lead	0.01
Nitrate	50
Nitrite	3
Manganese	0.1
Sulfate	250

Chemical Test Parameter	Australian Drinking Water Guideline value (mg/L)
pH	6.5 – 8.5
Total dissolved solids (TDS)	600
Total hardness	200
Turbidity	5 NTU Less than 1 NTU is the target for effective disinfection. Less than 0.2 NTU is the target for effective filtration of Cryptosporidium and Giardia.

5.2.3 Filtering and disinfection

- Private drinking water supplies will have filtering installed inline with the drinking water plumbing. Filters shall be suitable to treat Cryptosporidium and Giardia and shall be capable of removing particles that are less than or equal to one micron.
- Private drinking water supplies may have disinfection manually dosed or installed inline with the drinking water plumbing. A justification should be documented within the QAP whenever disinfection is not installed. Disinfection may be by Chlorine, Ultraviolet light or reverse osmosis filters.
- Where filters and disinfection are installed, they must be maintained and replaced in accordance with the manufacturer's instructions.
- Where Chlorine is used for disinfection, there should be at least 0.5 mg/L free Chlorine residual in water coming from all taps used for drinking and food preparation to maintain effective disinfection throughout the supply system. This test can be conducted onsite using a simple test kit.

5.2.4 Tanks for drinking water storage

- Tanks must have covers to prevent leaves, dust, animals and solids and liquids (other than rain water) entering the tank.
- In ground tanks must be protected against surface water ingress from surrounding soil or water ponded on the lid. Lids and inspection openings must be sealed. In ground tanks must be inspected to ensure that they cannot become contaminated.
- Tanks and plumbing should be light-proofed to minimise algal growth.
- Tanks must be inspected for build-up of sediments every 2 to 3 years or if sediments are seen in the water flow. Any build-up of sediment should be removed, either by siphoning or completely emptying the tank.
- Entering a tank is hazardous and should be carried out by a specialist with confined spaces training and qualifications. (Tanks should be additionally be labelled as confined spaces.)

5.2.5 Multiple barriers

It is good practice to have multiple barriers against the contamination of drinking water. Should one barrier fail, the others will help to protect the quality of water. The barriers can include:

- A clean catchment for the supply (such as a roof without leaves, groundwater from a safe area)
- Maintaining the hardware of the system
- Multiple consumer warnings of the drinking water source and quality
- Filtration and disinfection
- Ongoing checks on the visual, microbial and chemical water quality

5.3 Carted Water

5.3.1 General

- Water Carters shall be able to demonstrate compliance with the *NSW Health Guidelines for Water Carters* and be registered with the local council.
- The original water source for the carted water should be from a town water supply or equivalent. A justification should be documented within the QAP whenever carted water is not sourced from a town supply.

5.4 Rain Water

5.4.1 General

For new buildings or buildings undergoing significant refurbishment which do not have access to mains water, a rainwater harvesting system must be considered for installation to suit the requirements of the University of Sydney Sustainability Framework document.

5.4.2 Design and Installation Criteria

- Rainwater re-use systems must collect rainwater from building roofs only and store the water in a dedicated rainwater tank. Stormwater collected from trafficable balconies, hard surfaces external to the building and water collected from sub-soil drainage must not be piped to the rainwater tank.
- A first flush must be installed on all rainwater pipework prior to entry to the tank to prevent contamination of the tank. Access for maintenance must be provided to all first flush systems.
- Tank inlets and overflows must have screens to prevent the entry of leaves and small animals or as a breeding site for mosquitoes.
- Other risks to be considered from the roof is the ash and chemicals from chimneys, pesticides or fertilisers from aerial spraying, or animal faeces.
- Consider removing overhanging tree branches (to prevent leaves falling into gutters and birds perching) and mount TV antenna's off the roof (also to prevent birds perching).

5.4.3 Equipment and Materials

- Roofing must not have lead flashings, lead paint, flaky paint, asbestos, pesticide-treated timber or bitumen coating used on the roof surface. If there is uncertainty about paint on the roof, it must be assumed to contain lead.

5.4.4 Maintenance

The NSW Private Water Supply Guidelines recommends the following maintenance:

- At quarterly intervals:
 - Rooves and gutters are cleaned of leaves and sediment
 - Leaf / animal / mosquito screens are inspected and cleaned
 - Check for mosquito larvae in tank
- At annual intervals:
 - Check condition of roof, downpipes, overhanging branches

5.5 Ground Water

5.5.1 General

Ground water generally becomes safer as it is drawn from deeper aquifers. Surficial (sometimes known as 'unconfined' aquifers) are a higher risk of contamination as they are hydraulically connected to surface waters and generally have less natural filtering than deeper aquifers.

5.5.2 Design and Installation Criteria

- A groundwater bore shall not be downhill and within 250 metres of a wastewater disposal system such as a septic tank and trenches.
- The groundwater must not be in contact with surface waters (such as through bores that are not sealed at the surface) or where water flows freely from the surface down into the groundwater (such as surficial aquifers or in limestone areas)
- The area around a groundwater supply must not have subsurface contaminants, which could come from septic tank overflows, spills of chemicals, pesticide or fertiliser spraying and intensive agriculture sites such as livestock dips.
- Bore heads shall be raised above ground level to avoid floodwaters and surface runoff contaminating aquifers. This includes bores which are not used for drinking water, such as irrigation bores.
- New bores shall be tested for water quality before they are used as drinking water.

5.5.3 Maintenance

The *NSW Private Water Supply Guidelines* recommends the system, including the bore casing, pump and piping are checked annually.

5.6 Surface Water

5.6.1 General

Surface waters are high risk sources and will not be used for drinking water.

Surface waters may be drawn from rivers, creeks or dams which are exposed to the following hazards:

- Faecal contamination from livestock and wild fauna, particularly when surface waters are not fenced.
- Septic tank overflows and spills of domestic, agricultural or industrial chemicals.
- Pesticide or fertiliser spraying which may be washed into the surface water.
- Activities higher up in a river/stream's catchment.

As these hazards are difficult to control, surface water shall not be used as a source for drinking water systems.

6 Document Amendment History

Version (Revision)	Amendment	Commencing
01	Document creation	March 2019

7 Record Keeping Requirements

Record keeping requirements will be described in the QAP for each drinking water source.

8 Further Information

8.1 Links, Attachments & Supporting Documents

The documents below were consulted in developing this standard:

- CIS Hydraulic Services Standard, 2015
- NSW Private Water Supply Guidelines, 2016, published by NSW Health
- NT Guidelines for Private Water Supply 2012, published by the NT Department of Health (based on the NSW Private Water Supply Guidelines)
- Rainwater Tanks brochure, published by NSW Health



- Safe water on rural properties, 2015, published by Queensland Health
- Water Supply Quality Assurance Program template, published by NSW Health
- Guidance on use of rainwater tanks, 2004, published by the enHealth Council
- Australian Drinking Water Guidelines, 2011, published by the National Health and Medical Research Council
- CIS Documented Information Protocol