THE UNIVERSITY OF SYDNEY

Private Water Supply Standard

Design, Engineering, Planning & Sustainability

University Infrastructure

Document Edit Control

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Author(s)	Chris Hipsley

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Contents

1 Purpose

The 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 Hydraulic Services Standard. Requirements from the Hydraulic Services Standard for the following sections also apply to the private water supply systems:

- Cold Water Services
- 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:
    1. Workplace Health and Safety legislation.
    2. Safety in Design Legislation.
    3. Disability Discrimination legislation.
    4. State Environmental Planning and Assessment legislation.
    5. All other Commonwealth and State legislation.
    6. NCC, BCA and PCA.
    7. AS/NZS.
    8. This standard and other University of Sydney standards.

Where there is reference to one state regulation or standard (e.g. NSW), the equivalent level of standard must be utilised when constructing in other states. Any reference to NSW guidelines and regulations should utilise this equivalent state guidelines.

2 Scope

This standard describes 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 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.

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.

The standard addresses key objectives:
a. Quality design which responds, enhances and complements the environment.
b. Appreciation of the heritage context and cultural history of the campuses.
c. Value for money in all aspects of the project.
d. The design of low maintenance buildings and environments.
e. Longevity of construction approach to design.
f. Standardization of key infrastructure and details.
g. Flexible design, to future proof building usage for expansion or adaption to new uses
h. Safety in design.

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.

3 Glossary of Terms

AS	Australian Standard
AUMS	Advanced Utilities Monitoring System
BCA	Building Code of Australia
BFPD	Backflow Prevention Device
BMCS	Building Management & Control System
CCTV	Closed circuit television
COS	Central Operations Services
DPI	Department of Primary Industries
EPA	NSW Environmental Protection Authority
EP&AR	Environmental Planning & Assessment Regulation
NCC	National Construction Code
PCA	Plumbing Code of Australia
PC	Practical Completion
PUG	Project User Group or Project Working Group
RPZD	Reduced Pressure Zone Device
USYD	University of Sydney
UI	University Infrastructure
WELS	Water Efficiency Labelling and Standards
WHS	Work Health & Safety

4 Definitions

drinking water	water that is intended, or likely, to be used for human consumption, or for purposes connected with human consumption, such as: 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 that collects below the surface of the earth. Generally extracted via a bore, well or spring
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: (a) from any of these suppliers of drinking water: • Sydney Water Corporation or Hunter Water Corporation • a water supply authority within the meaning of the Water Management Act 2000 • 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 (b) in the form of bottled or packaged water
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

5 Roles and Responsibilities

This standard is issued by UI. It is approved and signed off by the Chief University Infrastructure Officer. UI is responsible for maintaining the standard and keeping it up-to-date.

6 Construction Requirements

Due to the complex nature of the University's Infrastructure, the requirements for construction of new buildings, and the refurbishment of existing buildings differ and must be assessed on a case by case basis. Careful consideration must be taken in relation to connection and disconnection of existing services, and the reuse of existing equipment. This section outlines the construction requirements for both new and existing buildings.

This standard generally applies to existing buildings in rural areas where there is not a dedicated drinking water supply available. The design for projects within existing buildings must be assessed on a case by case basis and developed in conjunction with this standard. The project scope will drive the design requirements.

New projects within existing buildings must assess what the expectation of the refurbishment will be. This will enable the right outcome for the given project. These specific requirements must be included in the scope of works specification.

6.1 New Buildings

The Private Water Supply services in University buildings must be designed and installed in accordance with the minimum legislative requirements incorporating all Statutory Regulations, Australian Standards, Local Council, Fire & Rescue NSW, Work Health & Safety (WHS) and WorkCover requirements.

The consultant/contractor will consult with UI, COS and Project User Groups, to discuss any additional requirements that must be included in the design, in order to suit the proposed occupancy and associated hazards.

6.2 Refurbishments

All existing Private Water Supply systems in a building must be extended as necessary into the given project. The design for projects within existing buildings must be assessed on a case by case basis and developed in conjunction with this standard. The project scope will drive the design requirements and the extent of upgrade of the existing services.

Any items not included in the scope must not be priced into the overall project to achieve the following aim; To reduce the need to value engineer any services.

Depending on the delivery method (COS/ UI), it is the responsibility of the consultant/ contractor to obtain the gate paper or the project inquiry form from the Project Manager, to understand the scope of works in relation to the space and fit out requirements. New projects within existing buildings must assess what the expectation of the refurbishment will be. This will enable the right outcome for the given project to meet the approved budget.

Where identified, all redundant pipework, equipment and wiring, including inaccessible ceiling spaces, must be removed as part of the project works. Make good exposed surfaces before commencing the installation of new services. This includes the removal of redundant underground services unless otherwise approved by the project superintendent.

6.3 Reuse of Equipment

Reuse existing services where identified in the Gate Paper or scope of works and the approved Return Brief.

Equipment must be suitable for the intended new purpose and life expectancy of the works, comply with current codes and achieve energy targets.

Equipment must be cleaned, have consumables replaced, tested, relabeled and re-commissioned.

Remove redundant pipework, equipment and wiring, including inaccessible ceiling spaces, and make good exposed surfaces before commencing the installation of new services.

Remove redundant underground services unless otherwise approved by the project superintendent.

7 Technical Requirements

7.1 Introduction

To be safe for human consumption, drinking water must not contain:
a. disease causing micro-organisms or
b. 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.

7.2 Design and Documentation

7.2.1 Design Approach

The University requires consultants and designers to provide designs that meet all of the requirements of this standard. Consultants, designers and installers are to reflect the following priorities in their design documents:

a. Provide Private Drinking Water Supply systems that meet or exceed the requirements listed in this standard.
b. Take a long term and balanced view of capital costs, maintenance costs and longevity.
c. As educational and research both progress at rapid rates, usage of buildings and areas within buildings are subject to multiple changes within the life of the building, systems must be designed to be adaptable for such changes.
d. Ensure that assets and equipment are designed with access and visual impact taken into consideration.

It is the designers and the installing contractor's obligation to document and install systems, equipment and materials that are "fit for purpose" from both a WH&S and operational perspective. Any disputes in regard to the interpretation of this clause shall be referred to NSW Fair Trading and/or the UI Project Manager for a final determination.

7.2.2 Design Input and Process

The University expects consultants and designers to proactively inform, advise and contribute to the design process. In particular, the following aspects:

a. Building Physics - provide advice to the project team, including other design team members that would improve the inherent building performance, which may lead to reductions in both capital and energy costs. This may initially take the form of simple advice relating to existing infrastructure capacity and location, which may affect the siting of the building, and subsequently backed up by modelling or similar methods. The process may take a number of iterative steps. The consultant or designer is expected to advice, contribute and if necessary lead such processes.
b. Planning and Architecture – provide advice on the appropriate location of plant rooms and reticulation strategy to assist in both the planning of the building and the facilitation of better maintenance in the future. Such advice must be provided in the early stages of the design and planning process so that this is taken into consideration for the architect's design and to be incorporated into his planning. Late advice will lead to poor location of plant and lack of maintenance access, thus a building of poor quality that will suffer from either poor or lack of maintenance and high owning costs to the University.
c. The University of Sydney – provide advice on the availability of options, assist in assessing the advantages and disadvantages, provide analysis of life cycle costs and life expectancies, offer recommendations and assist in making decisions.

7.2.3 Engineering Process

The University expects consultants and contractors to be fully qualified, experienced and capable of carrying out all engineering design, calculations, equipment selection and construction quality checks.

As part of the design development, the University expects consultants and designers to select proven and reliable Private water supply systems.

7.2.4 Equipment Selection and Sizing

In selecting equipment, the University expects consultants and contractors to select products of proven and reliable quality, with reputable support and after sales service.

Products which are of closed systems and proprietary in nature, thus locking the University into exclusive dependence of one manufacturer must be avoided and only used if there are no other options.

In the sizing of equipment, the University expects consultants, designers and installers to follow good industry practice. Sizing of all components are to equal or preferably exceed the relevant Australian Standards. This is especially important for the sizing of downpipes and stormwater infrastructure.

The provision of spare capacities for roof platforms and access to cater for future services and equipment upgrades, must be considered for all projects. In making such considerations, careful analysis of spare capacity against all applications must be considered. The practicality of proposed future equipment sizing, and selection must be submitted by the consultant and contractor to UI for approval.

7.3 Design and Construction

7.3.1 General

This section outlines the extent of the services to be provided by the contractor under a Design and Construct contract.

The contractor shall be fully responsible for the complete design of the Private water supply installation, including the selection, sizes and quantity of materials and equipment, and shall provide calculations and drawings and other documentation as necessary to demonstrate conformance with the design parameters, industry practice, UI requirements, codes, regulations and standards. This includes all calculations required to confirm that existing infrastructure is sufficient to supply the proposed systems installed under the project.

The contractor shall allow to fully co-ordinate the documentation with the Architect, Engineer and all other services consultants / contractors. Where there are buildings with heritage significance these must be reviewed by the University's heritage architect.

7.3.2 Drawings and Documentation

The contractor shall provide design, construction and as-built drawings, which may be either design drawings produced by the contractor or shop drawings produced by equipment manufacturers.

For each service, present on the schematic layout for that service, a "Basis of Design" summary. The summary shall identify how the system works, basis of design, any departures from Australian or UI standards and all substantial information are required to review the adequacy of the design intent.

It shall be maintained up to date using Revision Numbering throughout the checking and review process.

The contractor is responsible for producing all design and as-built documentation, including, but not limited to:

a. Concept Design documentation (as required).
b. Detailed Design documentation, including:
    i. Layout drawings.
    ii. Details.
    iii. Schematics, including a Basis of Design Statement for each service.
    iv. Design certification.
    v. Equipment details.

vi. Testing / commissioning procedures.
vii. Workshop drawings, including:
    - Drawings for the purpose of system manufacture.
viii. As Built drawings, including:
    - Detailed drawings demonstrating the as installed system.
ix. Operations and Maintenance manuals (refer to O&M Manual standard)
x. Training manuals.

7.3.3 Technical Submittals

Technical submittals shall be provided with the full technical and spatial requirements of each proposed plant item. The technical submissions shall include, where applicable, but not be limited to:

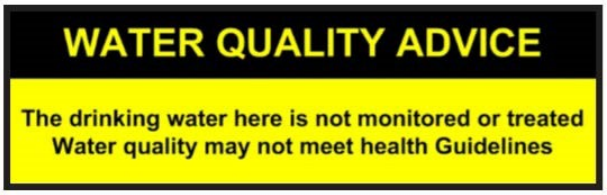
a. Certified shop drawings of each item complete with sectional weights and point loads.
b. Maintenance zones and requirements including weights of any replaceable components.
c. Manufacturer's recommendations for installation including repairs and penetrations.
d. Confirmation of product lifespan assuming maintained to manufacturers recommendations.
e. Where equipment model numbers / references are stated these are indicative only and the Contractor MUST ensure the selected plant fully complies with the standard.

7.4 Signage for taps

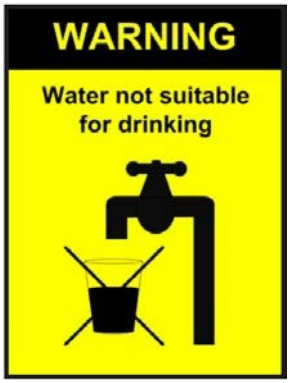
This section of the standard applies to all private water supplies, even when they are not intended for drinking.

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 must 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).	

7.5 Requirements for drinking water from private sources

7.5.1 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 COS SharePoint Document Register. A template for the QAP is provided with this Standard.

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:

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

e. 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
f. record checks on the system

7.5.2 Water Quality Testing

a. 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.
b. 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.
c. Test drinking water after any significant change to the system or an event which may have a negative impact on water quality.
d. 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.
e. Testing must be conducted at a laboratory accredited by the National Association of Testing Authorities (NATA).
f. 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.
g. 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.
h. 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**
E. coli	should not be detected in a 100 mL sample
Cyanobacteria	testing is complex and cannot 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
Fluoride	1.5
Lead	0.01
Nitrate	50
Nitrite	3
Manganese	0.1
Sulfate	250
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.

7.5.3 Filtering and disinfection

a. 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.
b. 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.
c. Where filters and disinfection are installed, they must be maintained and replaced in accordance with the manufacturer's instructions.
d. 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.

7.5.4 Tanks for drinking water storage

a. Tanks must have covers to prevent leaves, dust, animals and solids and liquids (other than rain water) entering the tank.
b. 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.
c. Tanks and plumbing should be light-proofed to minimise algal growth.

d. 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.
e. Entering a tank is hazardous and should be carried out by a specialist with confined spaces training and qualifications. (Tanks should be labelled as confined spaces.)

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

7.6 Carted Water

7.6.1 General

a. Water Carters shall be able to demonstrate compliance with the NSW Health Guidelines for Water Carters and be registered with the local council.
b. 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.

7.7 Rain Water

7.7.1 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 Policy and the Hydraulic Services Standard.

7.7.2 Design and Installation Criteria

a. 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.
b. 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.
c. Tank inlets and overflows must have screens to prevent the entry of leaves and small animals or as a breeding site for mosquitoes.
d. Other risks to be considered from the roof is the ash and chemicals from chimneys, pesticides or fertilisers from aerial spraying, or animal faeces.
e. 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).

7.7.3 Equipment and Materials

a. Where equipment is capturing rainwater, 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.

7.7.4 Maintenance

The NSW Private Water Supply Guidelines recommends the following maintenance:

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

7.8 Ground Water

7.8.1 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.

7.8.2 Design and Installation Criteria

a. A groundwater bore shall not be downhill and within 250 metres of a wastewater disposal system such as a septic tank and trenches.
b. 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)
c. 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.
d. 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.
e. New bores shall be tested for water quality before they are used as drinking water.

7.8.3 Maintenance

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

7.9 Surface Water

7.9.1 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:

a. Faecal contamination from livestock and wild fauna, particularly when surface waters are not fenced.
b. Septic tank overflows and spills of domestic, agricultural or industrial chemicals.

c. Pesticide or fertiliser spraying which may be washed into the surface water.
d. 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.

7.10 Redundant Equipment

All redundant services (power, water, drainage, etc.) must be removed as part of the project. Building surfaces and finishes must be "made good".

7.11 Material and Equipment selection

Only new materials, equipment and components will be installed, and these must be of good quality, fit for purpose and selected to minimise life-cycle costs and maximise efficiency. All products must be supported locally and internationally by factory trained service networks. All spare parts must be available ex-stock factory for a period of 10 years from purchase date. Equipment and materials that are obsolete, discontinued, about to be discontinued or superseded, must not be installed.

Uniformity of the type of materials must be consistent throughout all individual installations and must match, or be fully compatible, with the existing equipment.

Details of all major items of hydraulic services equipment proposed to be installed during new or refurbishment projects must be submitted to UI for approval prior to installation. This will include, but is not limited to pipe material selection, pumps, water storage tanks, pits, hot water plant, syphonic drainage systems, rainwater re-use filtration systems and sanitary fixtures and tapware.

Identification of a proprietary item of equipment will not necessarily imply exclusive preference for the item identified but indicates a deemed-to-comply item.

7.12 Service Access Requirements

The following servicing and access requirements must be provided:
Position all equipment and arrange access provisions at equipment, to optimise future maintenance and repairs.

a. Service access doors and panels must be hinged and lockable with a University plantroom bi-lock key. Lift off panels with screw fixings are not acceptable.
b. The University will not accept major plant within ceiling spaces and plant in tight spaces.
c. Plant that is located in ceiling space must have free and easy access. This includes ability to service system without reaching around or over columns, beams, cable trays, pipe work, lights and duct work.
d. All motors are to be provided with isolators within 3 meters distance from motor.
e. Isolators must be labelled with details of the source of electrical supply (DB/CB).
f. A plus 20% additional dimension access allowance is to be provided for above the
g. manufacturers access requirements.
h. Major plant located above 3m height will have permanent stair/ladder access provisions with permanent workable platform.
i. Trip hazards to be identified and painted in yellow.
j. Electrical hazards must be identified and labelled appropriately.
k. Confined spaces to be noted and appropriate signage applied.
l. Access to plant and equipment must comply with all WHS regulations.

8 Record Keeping Requirements

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

9 Further Information

9.1 Links, Attachments & Supporting Documents

The documents below were consulted in developing this standard:

- University of Sydney Hydraulic Services Standard V4, 2023
- NSW Private Water Supply Guidelines, 2016, published by NSW Health
- NT Guidelines for Private Water Supply 2019, published by the NT Department of Health (based on the NSW Private Water Supply Guidelines)
- Rainwater Tanks brochure, published by NSW Health, 2007
- Safe water on rural properties, 2015, published by Queensland Health
- Water Supply Quality Assurance Program template, 2019 published by NSW Health
- Guidance on use of rainwater tanks, 2010, published by the enHealth Council
- Australian Drinking Water Guidelines, 2011 (updated 2022), published by the National Health and Medical Research Council
- University of Sydney Documented Information Protocol

10 Commissioning

Comprehensive pre-commissioning, commissioning and quality monitoring must be specified by the consultant/designer.

A project specific commissioning plan is to be developed and provided to the University for review and approval.

Detailed testing and commissioning records must be provided for each system and each component as appropriate. All such records must be witnessed and verified by the project consultant/head contractor prior to witness commissioning by UI Engineers and COS representatives.

Project handover plan must be developed by the consultant/designer to allow the system to be handed over to The University. A 12-month building tuning process will commence at Project handover with systems monitored monthly, reported and assessed quarterly, and include assessment of feedback from the occupants.

All system components must be subjected to testing before Practical Completion is awarded. Photo evidence and a site visit from the UI Engineer must be organised during the testing. Detailed testing and commissioning records must be provided for each system and each component as appropriate. All such records must be witnessed and verified by the project consultant/designer.

11 Safety in Design

The contractor must consider risk during the design. A design safety report must be submitted to the relevant UI Project Manager for every design project. Contractors must confirm, so far as it is reasonably practicable, that the structure is without risks to health and safety.

Design risks must be considered for the asset lifecycle covering construction, operational and maintenance, refurbishments and decommissioning.

The design safety report must include the following:
a. Description of design element.
b. Description of potential risks and hazards associated with the design element.
c. A low/medium/high risk assessment considering likelihood and consequence.
d. Proposed measures to eliminate risks where practicable.
e. Control measures to mitigate and manage design risks.
f. Nominating responsibilities for managing the design risks.

This may be provided as a design risk register where appropriate and must include results of any calculations, testing and analysis etc.

12 Documentation and Records

12.1 Design Documentation

Prior to commencing construction of new or refurbishment projects, the consultant/contractor must fully investigate and document the requirements for each Private water supply system required to be installed, altered or modified as part of the project works.

This must include:
a. Return Brief defining the systems proposed and any deviations from this standard.
b. Provision of a BCA/ NCC Compliance Report.
c. Calculations to be provided on the sizing of the pipe work. Any future allowances are to be included in these calculations\sizing.
d. Calculations & selections on the water supply system.
e. Budget calculations.
f. Provision of Design Certification of each drinking water system.
g. Requests for all variations to this Standard submitted using the USYD Request for Dispensation Form (USYD-ENG-F001).

This documentation must be provided by the consultant/contractor in both electronic and hard copy formats and approved by the University.

12.2 Completion Documentation

At the completion of all projects, the following documentation must be provided for each private water supply system installed or altered as part of the project works:
a. O&M manual (refer to O&M Manual standard)
b. As-built drawings (including schematics).
c. Commissioning test results and certificates of compliance
d. Product manufacturer's specific information
e. Warranties
f. System schematics
g. Certification documentation

h. Warranty schedules for all major items of equipment.
i. Maintenance requirements.
j. Certification of compliance to the design standard by completing and submitting the **UI Project Design Certification Form (UI-PROJ-F001).**

This documentation must be provided by the contractor in both electronic and hard copy formats and approved by the University prior to Practical Completion being granted.

13 Assets and Warranties

Assets are to be tagged in accordance with the COS Asset Identification and Labelling Standard for the purpose of maintenance and operation of University Assets. For refurbishment projects the project manage is to provide the existing asset list to the contractor to ensure modified and redundant equipment are captured in the contractors submitted asset list.

Each asset required to be collected can be found in the Form COS-ASSET-F001, each asset required to be coded will be identified by a unique equipment code.

The equipment code will be one the three following types:
a. Virtual asset (This is a concatenation *Building Code - Floor - Room number*)
b. Item count asset (This is a concatenation *Building Code - Floor - Room number*)
c. Unique bar code asset (Unique bar code in the million series number affixed to the asset)

Asset lists are to be submitted prior to practical completion of the project for review and approval by COS.

Equipment Warranties are to be provided for a minimum of 12 months from the date of practical completion. Warranties are to be provided as certificates as part of the O&M from the supplier of the equipment. It is the responsibility of the installation contractor to ensure all maintenance/ servicing required to the equipment is provided to ensure warranties are valid at the end of the project DLP period.

14 Operations

Access to all roofs within the University is controlled by a University of Sydney roof access permit. This permit must be submitted at least 3 business days before the start of works.

This permit provides the University with vital information about the applicant. Permits are to be submitted to the University delegate. The University delegate will review risk assessments and SWMS before access is granted.

Access to roofs must be through a plant room, stairwell or roof space. Access must not be situated in an area freely accessible to the public. Roof spaces used to access roofs are to be fitted out with walkways and lighting.

If you require University Security patrol to give you access to a roof area, you must submit a Service Request in Campus Assist Online (ask your UI/ COS representative if you don't have access to Campus Assist Online) on the preceding business day and at least 24 hours before the requested time. You must attach the authorised Permit to Work to the Service Request.

15 Defects and Liability Period

Consultants/designers must include in the project specification detailed requirements for the defects and liability period following completion of the water supply system installation.

15.1 Maintenance and Testing

For private water supply systems installed as part of a refurbishment project of an existing building, regular statutory maintenance and testing must be carried out by the University services maintenance contractor during the Defects Liability Period (DLP). Any defects raised during this maintenance must be rectified by the installation contractor.

Any details which will affect the future performance of the new or upgraded equipment must be supplied by the installation contractor at Practical Completion.

Prior to completion of the DLP, a final inspection of the installed systems will be carried out by the installation contractor, appropriate UI and COS staff, and University services maintenance contractor, in order to reconcile the performance of the equipment during DLP to produce a final list of project defects. All project defects identified must be rectified by the installation contractor prior to finalisation of the DLP.

16 Operations & Maintenance Manuals

Consultants/designers must include in the project specification detailed requirements for operation and maintenance manuals, including system description, operation procedures, testing and commissioning records, maintenance instructions, product support information and recovery protocols for any computer related systems. Contractors must provide these to the satisfaction of the consultant/designer. Providing a collection of manufacturers' brochures and catalogues is not acceptable to the University.

The O&M manuals must be submitted in the format outlined in **Operation and Maintenance Manuals Standard**. The **O&M Manuals Folder Template** must be used to submit the final O&M manuals. O&M manuals must be provided electronically in the zip folder via a USB and a large file downloadable link or platform. **O&M Manuals Review Checklist** must be submitted with O&M manuals package. For more information refer to the **Operation and Maintenance Manuals Standard.**

Contractors must submit the university designed **Asset Management Master Asset Data Capture Spreadsheet (COS-ASSET-F001)** designed for recording operational and maintenance activities including materials used, test results, comments for future maintenance actions and notes covering asset condition. Completed logbook pages recording the operational and maintenance activities undertaken for Practical Completion and during the Defects Liability Period must also be provided. For more information refer to the **COS Asset Identification and Labelling Standard**.

Facilities Maintenance must establish, document and implement procedures for operation and maintenance of Private water supply systems, plant and equipment to ensure Private water supply systems are fit-for-purpose, provide secure, efficient, safe and reliable electrical power, and comply with requirements of this standard.

17 Authorisation of Variations

Project managers, consultants, contractors, commissioning agents and facilities maintenance personnel must ensure compliance with these requirements is achieved.

Variations to this standard must only be considered where:
a. The University Standard's requirement cannot physically or technically be achieved.
b. The Performance solution delivers demonstrated and proven superior performance for the same capital and life cycle cost or better.

Consultants and contractors must identify and justify requirements of the standard that do not apply to the project or which need to be varied and these which must be approved by the issuer of this standard. Formal requests for all variations to this Standard must be submitted using the UI Request for Dispensation Form (UI-ENG-F001). The issuer of this standard or their delegated authority must review and consider requirements of stakeholders from clients, projects and facilities management before deciding whether to approve variations. Their formal sign-off is required for acceptance of any non-compliances and departures from this standard's requirements.

18 Quality Control

18.1 Design Standard Compliance

Compliance with requirements of this standard must be checked throughout the design, construction and commissioning phases of projects by UI' services consultant. Any issues or deviations from this standard must be reviewed and approved in writing by the issuer of this standard.

Competent UI consultants and representatives must check compliance with this standard during design reviews and formal site inspections. Any non-conformances with requirements of this standard must be documented and provided to the UI Project Manager for issue to contractors and their consultants.

Project Managers must maintain a formal register of non-conformances and manage close out of outstanding non-conformances. Contractors and their consultants issued with non-conformances must take appropriate corrective actions. The UI Project Manager must ensure:
a. Proposed corrective actions are implemented.
b. Close out of non-conformances in relation to this standard is formally approved and signed off by the author of the standard or their delegate.

18.2 Design Standard Certification

Contractors and Consultants must certify compliance to the design standard by submitting a company Design Certification Form to the UI Project Manager at each of the following project phases:

a. Design and Documentation.
b. Tender.
c. Construction.

Notwithstanding UI's internal quality control processes, contractors and their consultants must implement their own robust quality assurance and control procedures to ensure compliance with requirements of this standard.

18.3 Construction Compliance

Consultants and contractors are expected to include check sheets for each system component detailing each item that needs to be checked, tested and verified during the installation process. Such check sheets must be completed and verified by the project consultant/contractors, including the identification of any defects and the closing out of such defects.

18.4 Acceptance

The University will only accept projects as complete when all of the above have been carried out, submitted and verified.

The above standards are not an exhaustive list of the relevant requirements. The consultant/contractor must incorporate all relevant standards and Authorities requirements into project specific design, documentation and installation.

Consideration must be given by the consultant/contractor to the original standard of performance relevant to the construction date of the individual Private water supply infrastructure.

19 Document Amendment History

Provision	Amendment	Commencing
001	First Issue	Nov 2019
2.0	a. General update to current USYD formatting, naming convention and references b. Updated for new public health regulation requirements c. Aligned document with other USYD standards d. Aligned with updated NSW Health Regulations e. Asset Standard Owner is now COS. f. Updated O&M manual requirements g. Finalised document	December 2023