



0001c Design Checklist - Water

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00 Design Principles

0.01 General

It is a requirement to undertake the [00 PLANNING AND DESIGN/ 0001R - DESIGN REFERENCE](#) and [GLOSSARY OF TERMS](#) information into all aspects of design, detailing and delivery when developing the content here within. Clear demonstration of adherence to these requirements is part of the services and will be called upon at key points in the project and during at the discretion of the Department of Education (DoE).

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0823 COLD AND HEATED WATER for Insulation materials, Fire Hazard Proprieties, acoustic treatment of piping & Mixing Valves

The Water services within a school facility include the water supply and associated services. The designers must also refer to the drainage, and gas section of the design guide.

Water design services and the selection of fittings must be based on a “Whole of Life” (WOL) principle.

Specifically, Water services must:

- Support sustainable design principles including reducing water consumption and waste production
- Be accessible and serviceable - easy to maintain with minimal impact on school use when maintenance is being performed
- Use products with a long-life span – many services are concealed so durability is essential

The design of the Water services should consider the following:

- Temperature: Boiling, hot, warm, cold or chilled water should be supplied to outlets as required by AS3500 and the requirements of the NSW Health with regard to the installation of temperature control devices.
- Heating, chilling and supply systems should consider economics and energy efficiency.

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- Chilled drinking water is required in schools affected by Public Sector Management Regulation 37 or west of 330 C isotherm.

Refer to [08 HYDRAULIC/ 0811 SANITARY FIXTURES](#) for more details.

- Pipework exposed on walls is to be avoided.

WATER CONSERVATION STRATEGIES must be implemented on school sites, including:

- Manual Flush Urinal Systems: New and replacement urinals must use manual in lieu of automatic flushing mechanisms. A microwave-activated urinal flushing system may be used as an alternative.
- Water Conserving Taps: Use metal flow control valves and /or push down taps with pre-set flow limits.
- Harvest Rainwater: Where practical, harvest roof water and connect to a pumped rainwater supply to authorities' requirements for landscaped areas and toilet flushing.

0.02 WELS Rating for Fixtures

GUIDE NOTE: Refer to [08 HYDRAULIC/ 0811 SANITARY FIXTURES](#) for the latest product selection & WELS rating.

All fixtures and fittings must be at least the average WELS star rating by product type. Where WELS rating is not available, use the alternative WaterMark rating scheme.

All new water-using appliances must be at least 0.5 stars above the average Water Efficiency Labelling and Standards (WELS) star rating by product type, except toilets and urinals, which must be purchased at the average WELS star rating.

Appliances and equipment purchased in the following categories with star ratings under the WELS scheme will be at least:

- showerheads – 4 stars (More than 4.5 but not more than 6.0 litres per minute)
- toilets – 4 stars
- urinals – 5 stars
- basins – 5 Star
- sink – 5 Star
- washing machines – 5 stars dishwashers – 5 stars

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- taps and flow controllers – 5 stars

0.03 Ground Water

Where ground water is available for use for irrigation purposes in drought affected locations, enquiries must be undertaken with the Department of Planning, Industry and Environment to determine the suitability of a ground water system.

0.04 Metering Supplies

GUIDE NOTE: Identify requirements for the provision of sub-meters in addition to the main water meter in conjunction with the BMS strategy and areas identified as “major water use on the site”.

In addition to the main water meter for the site provide sub meters for the following:

- Mixed irrigation systems
- Laboratory buildings
- Amenities blocks
- Canteens
- Any other major water use on the site

0.05 Backflow Protection

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0823 COLD AND HEATED WATER

Provide backflow protection to the water services in accordance with AS 3500.1 and regulatory authority requirements. Ensure devices are securely enclosed.

Ensure that there is enough pressure at all outlets by getting minimum pressures from the authority.

0.06 Cold Water

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0823 COLD AND HEATED WATER for Provision for Expansion, Finishes & Protection from Sunlight

- Install isolation valves on each building in cast iron path box when located underground.
- Provide a stop valve adjacent to the meter.
- Ensure entire installation is vandal resistant. Provide lockable enclosures for all external equipment and vandal proof fixtures.
- Type B copper must be used for all installations except within 2m of connections to galvanised, zincalume or Aquaplate lined water tanks or where corrosive soils or water are present. Pipework in the Hunter area is to be a cross-linked polyethylene material or polypropylene random PP-R80 (fusion welded).
- Cross Linked Polyethylene Piping (PE) Systems or polypropylene random PP-R80 (fusion welded), can be used for underground services with copper services above ground. All PE supply pipes are to have a copper trace wire to assist future locating.
- Any external plastic water pipes are to be UV protected and installed in vandal proof sheathing.
- Use key operated hose taps.
- Solid fixed pipework must be used in all situations. Flexible hose piping in hot and cold water connections is not permitted in concealed connections. Any connections using flexible hoses to fixtures must be accessible for maintenance.
- Prevent embedding or casting water service pipes into concrete structures.

0.07 Authorities Recycled Water

- Install isolation valves on each building in cast iron path box when located underground
- Provide a stop valve adjacent to the meter
- Ensure entire installation is vandal resistant
- Ensure backflow prevention is installed in accordance with AS3500 and the requirements of the local authority. Ensure that there is enough pressure at all outlets by getting minimum pressures from the authority

0.08 Hot Water and Tempered Water

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0823 COLD AND HEATED WATER for Warm Water Systems.

- Water piping to be as per cold water above. insulated to AS requirements
- Outside units to be within a chain wire enclosure with awning roof

Refer within [0001c DESIGN CHECKLIST - WATER/ WARM WATER MIXING VALVE](#)

0.09 Hot Water Heaters for Schools

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0813 WATER HEATERS for Electrical, Gas & Solar storage water heaters requirements

- Hot water and tempered water generation for schools must be carefully considered to ensure that a Whole of Life assessment is undertaken to minimise life cycle costs and carbon emissions.
- There are restrictions under current building regulations that limit the temperatures of water that can be delivered to a water outlet accessible to children. This water is referred to as tempered water.
- Plan water-heating plant to coordinate with other project elements.
- Water heaters are not to be mounted at high level.
- Storage hot water heaters, when provided, are to be mounted on a safe tray complete with a safe waste drain and at floor level.
- Avoid locating storage hot water heaters in habitable areas. Where there is no alternative, provide protection against scalding/burning.
- Environmentally friendly options such as solar heating (if vandal resistant), and heat pumps are preferred energy sources to minimise energy consumption.
- When using solar heating ensure that the outlet temperature will not be above the manufacturers recommended temperature for any services downstream of the heating plant such as thermostatic mixing valves.

- Ensure solar panels face north and are NOT located below high roofed areas or trees.

0.10 Water Heater Sizing Guide

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0813 WATER HEATERS for Installation.

Table 01: Water Heater Sizing Guide

No of Showers	Delivery 50oC in 10 min	Recovery L/Hr
2	100 L	75
3-4	180	180
5-7	280	300
8-10	400	500
11-13	550	670
14-20	750	1000
21-30	1000	1200

0.11 Tempered (Warm) Water Mixing Valves

GUIDE NOTE: Refer to NATSPEC 08 HYDRAULIC/ 0823 COLD AND HEATED WATER for Thermostatic mixing valves requirements.

- To minimise scalding risk all hand basins, showers and the kitchen sink in practical activities areas serving IO /IS classes, require “warm” rather than “hot” water provided at the specified temperature, by mixing hot and cold water through a Thermostatic Mixing Valve. (Note: Tempering Valves are not permitted in schools).
- Size mixing valves to service all fixtures simultaneously.

- Comply with microbe disinfection requirements - “Code of Practice for Thermostatic Mixing Valves NSW” as approved by the NSW Health Department.
- Water temperature at the outlet of all fixtures shall comply with the current version of AS3500.4

Thermostatic Mixing Valves:

- Are to be located a maximum of 6 m from the outlet,
- Must be designed so the water temperature cannot be altered, except by appropriately trained persons.
- Mounting height is to be between 1200mm and 1500mm for maintenance purposes. Install valves in lockable, hinged, stainless steel wall boxes recessed into the wall or built-into cupboards to facilitate servicing.
- Are to be serviced as required to ensure compliance with relevant codes and standard requirements for the defects liability period. Testing and maintenance will include as a minimum, monthly testing and a yearly service.

0.12 Water Pressure / Discharges

Table 02: Pressure / Discharge capacity

Type	Litres per minute
WC Cistern	3 to 4.5 (Dual flush cistern used)
Wash Basin	6
Shower	7 to 9
Bath	18
Sinks	12
Wash tub	9
Urinal cistern	Use manual type
Cleaners sink	12
Hose cock	18

- Minimum pressure at outlets at above flow rates to be not less than 150 kPa.
- Fit pressure reduction valves where pressures over 500 kPa are encountered.

- Automatic closing tapware shall be used wherever practical to ensure water conservation, including water bubblers.

Refer to [08 HYDRAULIC/ 0812 TAPWARE](#) for selection & installation.

0.13 Height of Fittings

GUIDE NOTE: Refer to [08 HYDRAULIC/ 0811 SANITARY FIXTURES](#) for Installation

Table 03: Height of Fittings

Item	Pre School	Primary	Secondary & Staff	Comment
Hand Basin\Trough	550	650	700	
Cistern Pull		1300	1600	
Water Closet	355	400	400	
Shower Control		1000	1000	
Drink Fountain (not accessible)	600	700	900	
Hose Tap External	450	450	450	
Cleaners Sink	500	500	500	
Bucket Sink			700	
Fire Extinguisher		1200	1200	
Fire Blankets		1500	1500	

Item	Pre School	Primary	Secondary & Staff	Comment
Coat Hook top row		1200	1700	Staggered Hooks
Coat Hook bottom row		900	1200	
Soap dispenser		1000	1000	From bottom of dispenser
Soap holder		1200	1200	
Toilet paper holder		700	800	From bottom of holder
Towel rail		900	1000	Nominal
Paper towel dispenser		1200	1200	From bottom of dispenser
Fittings and fixtures in accessible and ambulant toilets	Comply with AS1428.1			

0.14 Water Tanks

GUIDE NOTE: Refer to [08 HYDRAULIC/ 0816 TANKS](#) for general requirements.

As per DoE policy roof water harvesting and tank storage must be included in new schools and to encourage it where practical in existing schools, to reduce the demand on drinking water supplies.

The rainwater tank water must be connected to irrigation systems for adjacent landscape/gardens with the major preference being for gravity fed supply to minimise ongoing maintenance.

The rainwater tanks must be connected to toilets for toilet flushing. If this is not feasible, approval must be granted by SINSW

To manage the risk of contamination, tanks for drinking and non-drinking water use are to be designed and installed in accordance with HB 230 Rainwater Tank Design and Installation Handbook, Managing Urban Stormwater Harvesting and Reuse AS3500.

0.15 Tanks Generally

GUIDE NOTE: Refer to [08 HYDRAULIC/ 0816 TANKS](#) for general requirements.

- Suitable tanks for drinking water and non- drinking water use are zincalume tanks (above ground) or polyethylene (above preferred or below ground).
- If installing zincalume tanks ensure they are “aquaplated” and/or have a food grade polyethylene liner in tanks used to collect drinking water.
- Provide all tanks with mosquito proofing, particularly inlets and overflows which require fine mesh.
- Cover all tanks with tight fitting lids to keep out birds and animals, which can introduce contaminants, and to exclude sunlight, which can degrade the liner and encourage the growth of algae.
- Locate tanks ideally in shady positions away from trees from which leaves and debris could clog the strainer or contaminate the water.
- Locate tanks to allow easy connection to the roof drainage system but avoid blocking windows, inhibiting pedestrian circulation and student supervision, and avoid assisting unauthorised roof access.
- On ground tanks to be installed on concrete slabs to suit the design load but of minimum 200mm thickness.
- Engineer tank stands to safely support the tank when full of water, which has a mass of 1 kg
- /litre and to be constructed from galvanised mild steel.
- Eliminate Cross connections between mains supply and water tanks.
- Pumps and filters may be needed in the supply line.
- Copper pipes must not be connected to tanks lined with Aquaplate. If copper outlet pipes are involved there must be at least 2 metres of plastic pipe between the tank and copper piping.
- Install ‘First-flush’ diverters so during a storm, dirt that accumulates on a roof flows into a system that diverts the first flowing water away from the water tank.
- Gutter Guards – Leaf debris diversion and exclusion systems – Should be fire proof (zero ignitability index), non-rusting and approved for drinking water.

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- Direct tank overflow into a stormwater drainage system using the same size as the inlet pipe.

0.16 Tanks for Drinking Water

GUIDE NOTE: Refer to [08 HYDRAULIC/ 0816 TANKS](#) for authorized products & accessibility for inspection and cleaning

In addition to the above, tanks for drinking water will require the following:

- Comply with AS /NZS 4020 – Products for use in contact with drinking water.
- Ensure rainwater is not collected from areas containing lead materials. In existing buildings, replace lead roof flashings with zincalume or malleable zinc and old lead soldered water pipes are replaced with a suitable alternative.
- Separate supply pipes will be required where drinking water and other uses such as flushing of toilets or outdoor use are supplied from the same tank.
- Obtain manufacturer's certificate for all tanks, certifying to AS/NZS 4020 that all coating materials used inside the reservoir are suitable for drinking water and obtain a guarantee against liner leakage for a period of 20 years.

0.17 Filter Systems - Tanks

For Non- Drinking Water

- Inlet Filter- Zincalume steel with aluminium mesh or moulded polythene sieves. Filters should be positioned above water level to avoid continuous immersion and to discourage mosquito breeding.

For Drinking Water

Water tanks for drinking water purposes to be only used where a mains water supply is not available. Where water storage tanks for drinking purposes are provided:

- Provide a washable 20-micron sediment filter to stop waterborne contaminants clogging the system, followed by a 1.5 micron sediment filter. Filters should be positioned above water level to avoid continuous immersion and to discourage mosquito breeding.

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- Provide a carbon filter system guaranteed to remove undesirable taste, odour, chlorine and toxic heavy metals.
 - Install an ultra violet tube treatment system to reduce micro-organisms in the water to an absolute minimum.
 - The filters and UV Disinfection Unit shall be located within a roofed & fenced or similar protected enclosure.

0.18 Fittings - Tanks

- Overflows- Polythene, ABS or polypropylene items, fixed with corrosion resistant fasteners. Carefully direct overflow from water tanks to avoid creating site erosion or damp problems for buildings.
- Outlets- Polypropylene, Polythene or ABS are recommended. Metals such as zinc/aluminium alloys and aluminium are suitable under most conditions depending on the corrosiveness of the ground water. Copper or its alloys such as brass or bronze must not be used.
- Fasteners- Stainless steel is recommended but may need supplementary neutral cure silicone rubber sealant coating.

0.19 General Development Requirements - Tanks

Refer to the local council for tank size at which a Development Application or Consent is required and any other water supply requirements.

Some of the requirements may include:

- Be designed to collect roof water only, but can be topped up from a water supply service pipe.
- Be prefabricated, enclosed and have any inlet screened.
- Be structurally sound and installed in accordance with the manufacturer's instructions.
- Do not exceed a height of 2.4m from ground level.
- Is not installed over or immediately adjacent to a water or sewer main unless the requirements of the public authority have been met.
- Is located behind the front building alignment.
- Is located at least 450mm from any property boundary.
- Has overflow directed into an existing stormwater system.

0.20 Sizing of Tanks

- Sizing of tanks is to be determined based on the local weather conditions, expected water usage and potential water collection area.
- Generally, the larger the tank/s, the more effective it is in conserving water and reducing stormwater run-off, providing the roof harvest area is large enough and the local rainfall is sufficient to replenish it.