



0001c Design Checklist - Hydraulic

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Table of contents

0001c Design Checklist - Hydraulic	0
Table of contents	1
List of tables	1
List of figures.....	1
00 Design Principles	2
0.01 Main considerations	2
Introduction.....	2
0.02 Co-ordination.....	3
Mechanical Services	3
Civil Engineering Services	3
Electrical Services	3
Drain electrical pits	3
Structural Services	3
Landscaping	4
0.03 Investigations	4
0.04 Planning Considerations.....	4
0.05 Documentation Requirements	5
0.06 Approval by Authorities.....	6
0.07 Protecting Sydney's Water Supply (Drinking Water Catchment Areas)	7
Affected Areas.....	7
0.08 Equipment Life-Cycle Calculation.....	8
0.09 Microbial Control	8

List of tables

Table 01: Areas requiring Water Cycle Management Study	7
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List of figures

No table of figures entries found.

00 Design Principles

0.01 Main considerations

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).

Introduction

Hydraulics services within a school facility include all the gas, water supply, drainage and associated services.

Designers must refer to [00 PLANNING AND DESIGN/ 0001c DESIGN CHECKLIST – WATER](#), [08 HYDRAULICS/ 0822 WASTEWATER](#) and [08 HYDRAULICS/ 0824 FUEL GAS](#).

Hydraulic services should be designed based on a “Whole of Life” perspective.

Specifically, hydraulic services must:

- Support sustainable design principles including reducing water consumption and waste production.
- Appropriately treat any trade waste to ensure minimal environmental impact
- 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 hydraulic services are concealed so durability is essential.

Ascertain the regulatory authority, Australian Standards requirements, and design all services to fully comply with all requirements including National Construction Code (NCC), Plumbing Code of Australia and AS3500.

Regulatory authorities include:

- Hydraulic services: Local Water Authority and/or the Local Council.
- Fire services: Fire and Rescue NSW, Rural Fire Service and the Local Council.
- Gas services: The Natural Gas supply authority or Local Council or local supply authority.

0.02 Co-ordination

A hydraulic engineer is to be involved in the design of the services and is to fully co-ordinate with all other disciplines.

In particular:

Mechanical Services

- Ensure tundishes are located where needed to drain condensate water from equipment. Tundishes are to drain into the riser of a constantly charged sewer waste pipe trap or to garden beds.
- Adequately size all water services for all mechanical services requirements including evaporative coolers.
- Provide Floor Wastes where needed to drain plant rooms.
- Gas Space Heaters are to be sized and positioned by the Mechanical Services Engineer; however gas service connection to heaters is required using adequately sized pipework designed by the hydraulic engineer.
- Connect all gas points.

Civil Engineering Services

Refer to [08 HYDRAULICS/ 0821 STORMWATER – BUILDINGS](#) and [02 SITE, URBAN AND OPEN SPACES/ 0224 STORMWATER SITE](#)

- Ensure existing infrastructure is adequately sized.

Electrical Services

Refer to [00 PLANNING AND DESIGN/ 0001c DESIGN CHECKLIST - ELECTRICAL](#)

Drain electrical pits

- Ensure all electrical services are included in the electrical documents eg rainwater harvesting pumps, fire hose reel and hydrant pumps, hot water heaters etc.

Structural Services

- Ensure the structural engineer approves all hydraulic penetrations of the structure.

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- Ensure all subsoil drainage behind retaining walls etc are included in the documents.

Landscaping

- Co-ordinate location of water and gas meters, fire hydrants and booster valves, fire hydrant booster pumps, drinking fountains, stand pipes, watering systems, service lines, tanks, pits and trade waste arrestors, irrigation connections, relative to soft and hard landscaping,
- Ensure all subsoil drainage for planting beds etc. are included in the design.

Refer [02 SITE, URBAN AND OPEN SPACES/ 0233 SERVICE TRENCHING](#)

0.03 Investigations

Before design and documentation of services carry out an investigation to:

- Investigate the existence of authorities mains and establish details of location depths, size, slope, capacity and material. (test existing line pressure and flow capacity)
- Determine the suitability of existing mains for the proposed development.
- Determine the necessity for mains extensions or amplification, particularly any pressure boosting in relation to Fire, Water and Gas services.
- Written evidence of available pressures obtained from the local authority for hydraulic services where available.
- Evaluate the site and existing services for practical installation and design of proposed services, especially soil characteristics and/or water quality (i.e. corrosion by extremes of pH, electrolysis, chemicals etc.).
- Liaise with local authorities to establish any particular local requirements including stormwater detention, retention (stormwater reuse) and \ or treatment.
- Liaise with Mines Subsidence Board, NSW Government to establish requirements, if applicable.

0.04 Planning Considerations

- Incorporate into the design, special requirements identified in Investigations.
- When locating buildings ensure there are sufficient grades for sanitary and stormwater drainage systems for connection to authorities mains or existing services.

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- When connecting to existing internal services establish whether they are of a sufficient size, capacity, depth and condition (age) to allow for new connections. Upgrade existing as necessary if they are not.
 - Site buildings and locate fixtures to avoid excessive pipe runs and pipe sizes.
 - Keep pipe lines and any necessary pits as shallow as possible, with the minimum cover required by the relevant codes.
 - Co-ordinate inverts of all service lines under buildings with the structural design so pipes do not pass through footings.
 - Do not run pipes under buildings except to service fixtures in that building.
 - Avoid siting buildings over authorities' mains or main site services.
 - If unavoidable, fully design, detail and specify all necessary diversions and/or precautions for building over, in accordance with Local Authorities and obtain written approvals.

0.05 Documentation Requirements

Provide the following design documentation for all projects:

- Sketch Plans
- Technical Specification including schedules of materials, fixtures, fittings and equipment
- Construction Drawings
- Certification of all designed hydraulic services

Provide the following minimum information on the drawings:

- Site plan and reticulation (Scale not smaller than 1:1000)
- Major pipe runs indicating control valves, meters and access pits and connections to existing services
- Reticulation indicating materials, pipe sizes, control valves, fixtures and taps
- Construction details of pits, inspection openings, valves etc.
- Schedule of fixtures and fittings with brand names, models etc.
- Pipe inverts and associated ground levels, at junctions, pipe crossovers and at termination of runs.
- Pipe gradients.
- Pits, trade waste arrestors and capacities.
- Fittings, fixtures and appliances.

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- Connection to and locations of all authorities mains and existing internal services, including sizes, invert levels and associated ground levels.
 - Symbolised fixtures, appliances and stacks at each building, including loadings on site plan
 - Location of all pits, tanks, etc.
 - Contour levels at minimum 1m levels
 - All downpipe locations and sizes
 - Dimensioned service locations (site plan)
 - Boundaries and roads
 - North Arrow
 - Hexagons to show services and sizes for risers.
 - Outline of structural elements in proximity of hydraulic services for coordination
 - Sections and elevations of complex areas of installation where on site coordination between trades is required.
 - Where flow rates are required indicate as below:
 - Sewer drainage : fixture units.
 - Stormwater drainage : litres/sec.
 - Cold water service : litres/sec.
 - Hot water service : litres/sec.
 - Gas service : Mega Joules/HR.
 - Show all pipework precisely routed in its actual position, do not leave to the installer's discretion
 - Show under slabs in ceilings, in walls, showing risers and drops, at each junction and for each fitting
 - Pay particular attention to co-ordination of the hydraulic services with architectural, structural, civil, landscape, electrical and mechanical drawings

0.06 Approval by Authorities

Final document submissions must include all relevant authorities' written approvals for:

- Connection of all services to Mains.
- All trade waste discharges including pits, arrestors, etc. with copy of trade waste forms completed (to be signed by client).
- All septic tanks, including locations and absorption areas.
- All L.P.G. and/or natural gas etc. installations.
- Fire hydrant services installations (where applicable).

- All stormwater discharges including stormwater detention, stormwater retention, stormwater harvesting etc.
- Any other approval that the relevant authorities may require before construction can commence.
- Water storage and recycling systems such as water tanks.

0.07 Protecting Sydney's Water Supply (Drinking Water Catchment Areas)

State Environmental and Assessment Act 1979– Drinking Water Catchments Regional Environmental Plan No 1, came into force on 1 January 09, to ensure development within the catchment does not have a detrimental effect on water quality.

A Water Cycle Management Study is to be included with the Development Application for Education Facility developments involving:

- Agriculture facilities
- Biosolids and effluent re-use schemes
- Sewerage systems or works (including package sewerage treatment plants)
- Stormwater or works involving the disposal of untreated runoff

Affected Areas

These requirements apply to all or part of the following local government areas:

Table 01: Areas requiring Water Cycle Management Study

Locations Affected			
Blue Mountains	Goulburn	Mulwaree	Tallganda
Campbelltown	Gunning	Oberon	Wingecarribee
Crookwell	Kiama	Shoalhaven	Wollondilly
Eurobodalla	Lithgow	Sutherland	Wollongong

A series of maps are kept in the Head Office of the Department of Urban Affairs and Planning and in the offices of the relevant councils. These should be consulted to ascertain whether a proposed development lies within the drinking water catchment

0.08 Equipment Life-Cycle Calculation

For new schools and when replacing or updating major hydraulic components, a simple life-cycle cost should be calculated. This should be based on initial capital cost, operational (usage) costs and ongoing maintenance/ servicing costs over a period of time, e.g. 20 years and/ or the life of the asset.

Assets requiring life cycle costing would include pumps, rainwater harvesting systems, hot water heating systems

When assessing the relative costs the calculation must consider the following:

- Capital cost of the asset
- Multi-service integration and interface - provision (and costs) of any supporting services (eg power, gas tanks etc).
- Reticulation of piping and of cables, if applicable
- Provision for expansion of plant and equipment (if a likely possibility)
- Resource (water/ power etc) consumption costs. Based on; 1 year, 5 years, 10 years and / or 20 years.
- Maintenance required and cost of this maintenance;
- Frequency, nature and costs of capital upgrades needed over the life of the asset to maintain fitness for purpose
- Cost of disposing of the asset or its components.

Comments also need to be made on:

- Future improvements and updates. Flexibility and change
- Value for Money from any chosen material, equipment or product
- Life span of the asset

0.09 Microbial Control

Under the Public Health Act 1991, heated water to hand basins, showers etc. shall be stored at temperature above 65 C Thermostatic Mixing Valves are to be used for tempered water generation at each point of use.

Thermostatic mixing valves are to be located to enable adequate servicing as required by regulations and standards.

Refer to [00 PLANNING AND DESIGN/ 0001c DESIGN CHECKLIST – MECHANICAL](#)
and [08 HYDRAULICS/ 0823 COLD AND HEATED WATER](#)