A high-speed photograph of a water droplet falling into a pool of water. The droplet is captured mid-fall, just above the surface, and is perfectly spherical. Below it, the water surface is disturbed, creating a crown-like splash that is perfectly symmetrical and centered under the droplet. The background is a solid, light blue color, and the water surface shows concentric ripples spreading outwards from the point of impact.

North East Water
Engineering Guidelines for
Subdivisions and
Development Standards
PART 4 Water Reticulation
September 2009



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Part 4 - Water Reticulation

1. Introduction

This Part of The Corporation's "Engineering Guidelines for Subdivisions and Developments" is related to water reticulation. Reference to the Authority/Corporation will include reference to North East Water Corporation as the Water Corporation.

The design of water reticulation shall generally be in accordance with the latest version of the Water Services Association of Australia (WSAA) "Water Supply Code of Australia (WSA 03). **HOWEVER this part of The Corporation's "Engineering Guidelines" take precedence over WSA 03** (i.e. these are The Corporation's requirements which may be different to WSA 03).

The other parts of the "Engineering Guidelines for Subdivisions and Developments" are as follows:

- Part 1 - General Requirements
- Part 2 - Guidelines for Design of Roads (not used)
- Part 3 - Guidelines for Design of Drainage (not used)
- Part 4- Guidelines for Design of Water Reticulation**
- Part 5 - Guidelines for Design of Sewerage Reticulation
- Part 6 Guidelines for Landscaping, and Measures for Erosion, Sedimentation and Pollution Control (not used)
- Part 7 - Guidelines for Testing.

This part of the "Engineering Guidelines" is set out in the same order as WSA 03 for ease of cross-referencing.

2. General

2.1 Scope

2.1.1 Design Responsibilities of the Water Agency (*refer WSA 1.5.2*)

The Corporation (as the Water Agency) **will not** provide a “Concept Plan” for the localised water supply system. This is the responsibility of the “Designer” and particularly so if the proposed development is going to be staged (i.e. developed in stages). The Corporation will, however provide details of items (a) to (h) inclusive as specified in Clause 1.5.2 of WSA 03 where available.

If such a staged development is proposed the “Designer” shall provide an indicative overall concept plan of the development at the time of submitting the first stage to The Corporation for approval. This concept plan shall not be binding with respect to the proposed layout/staging; however, the final number of tenements cannot differ by more than 20% between the original concept plan and the ultimate constructed development.

3. System Planning

3.1 System Planning Process

3.1.1 Extending/upgrading an existing water supply system (refer WSA 2.1.1)

In lieu of (a) and (b) of this Clause of WSA 03, the “Planner/Designer” shall:

- (a) Take into account points (i), (ii) and (iii) which will be provided by The Corporation in designing the extension/upgrade of an existing water supply system to ensure that it adequately services any existing and any future customers on that system.
- (b) Provide details of the proposed extension/upgrade in the preliminary/early phases of the design in particular existing and future customers, to the Corporation to allow it to be “trialed / modelled ” in The Corporation’s network analysis and determine its impact on the existing water reticulation system.

The outcome of this trialling may lead to The Corporation placing additional requirements on the proposed extension/upgrade and/or the developer to augment the existing system to meet the demands of the proposed extension/upgrade.

3.2 Demands (refer WSA 2.2.1)

Demand rates shall be in accordance with Table 2.1 (Melbourne/Geelong) unless the demand of the proposed development is known and exceeds those values in Table 2.1 in which case the “known” demand shall be used. Use North East Water Demands where specified by the Corporation.

3.3 System Hydraulics

3.3.1 Minimum allowable service pressure (refer WSA 2.4.3.3 and Table 2.2)

The minimum allowable service pressure shall be 200 kPa (20 m head) throughout the reticulation system when meeting a peak instantaneous demand of 0.15 litres/second/tenement. These minimum pressures are to be achieved with the relevant supplying water storage reservoir two thirds full.

Where the pressure does not meet the Corporation requirement a Section 173 agreement may be registered on the title as determined by the Corporation.

In Special Circumstances the Corporation may give consideration to an absolute minimum service pressure of 100 kPa (10 m head). The absolute minimum flow shall be 10 L/minute. Consideration will only be given on a case by case basis having regard to specific site circumstances in these instances the relevant property will be required to install a storage tank (1500 litres minimum capacity) and an on-property system capable of providing a minimum pressure of 200 kPa (20 m head).



3.3.2 Pressure variation analysis (refer WSA 2.4.4)

Where distribution and reticulation systems are designed to control diurnal pressure variations, the diurnal demand factors to be used for each customer category. Consult with the Corporation prior to undertaking analysis.

3.3.3 Determining supply zones (refer WSA 2.4.5)

The creation of **different pressure zones is not preferred** and “Planners/Designers” should discuss this issue with the Corporation in the early stages of the design phase in an attempt to eliminate such zones. Pressure zones shall be consistent with The Corporation’s existing system.

3.4 Pumping Stations (refer WSA 2.6(c))

A standby pump of the same capacity as the duty pump is required. Provision shall be made in the design and ultimate operation for the standby and duty pumps to be alternated.

The design of any water pump station **must be** undertaken in consultation with the Corporation’s Mechanical and Electrical Group.

3.5 Service Reservoirs (refer WSA 2.7)

The minimum capacity for any service reservoir shall be on one (1) day supply at peak demand.

The reservoir should be located at an elevation such that the water level when the reservoir is 2/3 full provides not less than the minimum allowable service pressures at the customer’s services under peak demand conditions (Table 2.2 of WSA –03 modified as per 2.4 above). Reservoirs are to be designed as part of an overall system and are to be located at elevations consistent with other reservoirs within the same pressure zone.

4. Hydraulic Design

4.1 Sizing of mains

4.1.1 Minimum pipe sizes *(refer WSA 3.2.2)*

The minimum acceptable pipe size is 100 mm diameter for “residential” areas and 150 mm diameter for commercial and industrial areas.

The minimum pipe size for the bowls of courts, cul-de-sacs shall be 50 mm (63 mm nominal diameter if polyethylene (PE) pipe is being used), however fire hydrants **must** have a minimum main diameter of 100 mm on the supply side.

4.1.2 Fire flows *(refer WSA 3.2.4)*

The following applies in addition to Clause 3.2.4 of WSA 03:

Comply with the Fire Authority requirements.

In addition to the above requirements a minimum supply head of 28 metres is to be achieved at any fire hydrant within the reticulation system when drawing 11 litres/second from the individual hydrant **and** meeting a peak instantaneous demand of 0.10 litres/second/tenement throughout the system. A tenement is deemed to be the demand relating to a typical residential lot. Where the demand differs from that of a standard tenement the anticipated water supply demand for each development shall be used in undertaking the above calculations.

4.2 Design Pressures

4.2.1 Maximum design pressure (denoted on design drawings) *(refer WSA 3.4.2)*

The maximum design pressures are not required to be recorded on the ‘design drawings’ as per Clause 3.4.2 of WSA 03. However they should be shown on an overall concept plan at strategic locations that shall be included with the design computations provided to Corporation when the design is submitted for approval.

4.2.2 Empirical Sizing of Reticulation Mains (notes) *(refer WSA 3.2.3)*

Minimum class 12.

4.3 Pipe and Fittings Pressure Class

4.3.1 Minimum pressure class *(refer WSA 3.7.2)*

The minimum pipe and fitting pressure class for reticulation mains shall be Class 12.



4.4 Pipeline materials (refer WSA 3.8)

The following pipeline materials are currently approved for use however other materials may be considered but will require Corporation approval on a case-by-case basis.

Property Service Connections

Copper tube Type A and Polyethylene (PE) pipe with trace wire is approved for use in property service connections. Copper tube is not approved for water reticulation use. However if the property service has to cross a road, copper tube and Polyethylene (PE) pipe with trace wire is to be inserted into a sleeve pipe of minimum Class 12. Sleeved pipes shall be installed so that water hammer and pressure fluctuations do not cause pipe movement within the conduit.

Below DN100 water mains

Where written approval has been given, water mains (below DN100) and property service connections may be constructed in:

- ▶ Polyethylene (AS/NZS 4130) minimum PN12.5, blue striped for potable systems, lilac striped for reuse or raw water systems. All jointing to be electro-fusion or butt-welded. Place tracing wire.

Between DN100 and DN250 water mains shall be constructed in:

- ▶ PVC-M (AS/NZS 4765), Series 1 or 2 minimum PN 12 rubber ring joint. PVC must be lilac coloured where used in reuse or raw water systems;
- ▶ PVC-O (AS/NZS 4441), Series 1 or 2, minimum PN 12.5 and minimum SDR 37 rubber ring joint. PVC must be lilac coloured where used in reuse or raw water systems;
- ▶ DICL (AS/NZS 2280), PN35 rubber ring joint, polyethylene wrapped AS 3680; If DICL flanged pipe is to be used the class shall be flange class pipe;
- ▶ Polyethylene (AS/NZS 4130) minimum PN12.5, blue striped for potable systems, lilac striped for reuse or raw water systems. All jointing to be electro-fusion or butt-welded. Place tracing wire.

DN300 and over water mains shall be constructed in:

- ▶ DICL AS/NZS 2280, PN35, rubber ring joint, polyethylene wrapped AS 3680;
- ▶ Series 2 PVC Rubber Ring Joint minimum PN 12.

Fittings

- ▶ Pipeline fittings for joining DICL and/or uPVC pipes shall be cast or ductile iron, cement lined and conforming to AS 2544 and AS 2280 respectively. If gibault joints are used they shall be the elongated type or vari gib type.



5. General Design

5.1 General requirements

5.1.1 Design tolerances *(refer WSA 4.1.1)*

The following shall apply in lieu of Clause 4.1.1(a) and (b) (ii):

“The alignments shall be calculated to the nearest 5 mm and expressed/shown on the drawings to two (2) decimal places with the rounding application being 0.4 mm rounded down to the 2nd decimal place and rounded up to the 2nd decimal place of a metre.”

The horizontal alignment shall be referenced to GMA.

5.1.2 Levels *(refer WSA 4.1.2)*

In addition to the requirements of Clause 4.1.2: where a longitudinal elevation forms part of the design drawings levels shall be specified at:

- Every 15 metre interval;
- Horizontal changes if alignment where a bend(s) is used; and
- Vertical changes if alignment where a bend(s) is used.

5.2 Location of Watermains

5.2.1 General *(refer WSA 4.3.1a)*

Watermains are to be located on the nature strip unless otherwise approved by the corporation.

These watermains shall be located in co-ordination with other service authorities with the objective of creating consistent outcomes.

5.2.2 Watermains near trees *(refer WSA 4.3.5)*

In lieu of Clause 4.3.5 of WSA 03 the ‘specialist advice’ shall be sought from Council’s Parks and Recreation Section. Further, the Parks and Recreation Section may require portions of the main to be underbored – this shall be specified on the Design Drawings. Particular attention is required in relation to the impact on the tree route system from the cumulative impact of the construction of all services and works.

5.2.3 Railway reserves *(refer WSA 4.3.9)*

In addition to watermains being laid within railway reserves (either along or across them) being authorised by the Railway owner and complying with AS 4799, the design and ultimate construction shall comply with the requirements of the Railway owner.

5.2.4 Crossing Creeks or Drainage Reserves *(refer WSA 4.3.10)*

Concrete encase main or directional bore.



5.2.5 Overhead Power Lines And Transmission Towers *(refer WSA 4.3.11)*

In addition to this Clause in WSA 03 the Designer shall liaise and consult with the appropriate electricity Corporation responsible within the boundaries of The Corporation area.

5.2.6 Shared Trenching *(refer WSA 4.4)*

Avoid sharing with electricity.

5.3 Connection of new mains to existing mains *(refer WSA 4.7)*

Where it is necessary to connect to the Corporation water supply main, The Corporation Staff should carry out this work at the developer's expense.

Contractors that are recognised by the Corporation and have approval may undertake tapping under pressure.

The developer will provide all pipes and fittings required to complete the connection or tapping at the developer's expense.

5.4 Property Services *(refer WSA 4.9)*

A common property service, which is then further divided to service additional properties, IS NOT PERMITTED except on owner corporation subdivisions.

Property services shall be located at a point where the meter assembly is preferably located in the middle of the property or is within 300 mm of the property side boundary where location in the middle of the property boundary is not practical. Coordinate service design with other services.

5.5 Obstructions and Clearances

5.5.1 Clearance Requirements *(refer WSA 4.10.5.2)*

Avoid sharing with electricity.

5.5.2 Deviation of mains around structures *(refer WSA 4.10.7)*

The maximum individual joint deflection for DICL in either the horizontal or vertical plane or a multiple joint (i.e. where there is deflection in both planes) shall be not more than 75% of the manufacturer's recommendation.

Pipe deflection for DICL, mPVC and oPVC shall be to Manufacturers Specifications (i.e. No deflection in joints, deflection bends at mid point of pipe).

6. Structural Design

6.1 Pipe Anchorage

6.1.1 Anchor Blocks *(refer WSA 5.9.3)*

Rapid set concrete anchor blocks are not allowed.

6.1.2 Restrained Elastomeric Seal Joint Water Mains (DICL) *(refer WSA 5.9.4)*

Not accepted.



7. Appurtenances

7.1 Stop Valves

All stop valves shall be anticlockwise closing.

7.1.1 Gate Valves *(refer WSA 6.2.1.2)*

7.1.2 Stop valves for transfer/distribution mains *(refer WSA 6.2.2)*

7.2 Air valves

7.2.1 Installation design criteria *(refer WSA 6.4.1)*

Air Valve Types to be only those approved by the Water Corporation.

7.2.2 Air valve types *(refer WSA 6.4.2)*

Air Valve Types to be only those approved by the Water Corporation.

7.3 Swabbing Joints *(refer WSA 6.7)*

Not required.

7.4 Hydrants

7.4.1 Hydrant types *(refer WSA 6.8.3)*

Spring type hydrants accepted. Other types of hydrants as directed by the Corporation.

7.4.2 Hydrant Spacing *(refer WSA 6.8.7)*

Fire hydrants to the Fire Authority requirements. Flushing hydrants are to be installed at all dead ends, including temporary dead ends for the purpose of flushing the main in addition to fire fighting.

Table 1 Average Day Demands for New Domestic Properties

Class of Building	Fire Fighting Flow (L/s)
1. Properties that are zoned for commercial (3) or industrial (4) purposes in the relevant LEP.	20
2. Any property not included in Category 1.	10

7.4.3 Hydrant Locations *(refer WSA 6.8.8)*

Always in Road Reserve in accordance with CFA requirements.

7.5 Fire Fighting Flows *(not referenced in WSA)*

In accordance with the Fire Authority requirements.

7.6 Unaccounted Water

An allowance equivalent to 15% of the average demand is to be made for unaccounted water resulting from leakage in the water distribution system and meter inaccuracies. Peaking factors are not to be applied to unaccounted water.

8. Design Review And Drawings

8.1 Design Review *(refer WSA 7.1)*

Submit Water supply check list when requested by the Corporation.

8.2 Design Drawings *(refer WSA 7.2)*

Provide longitudinal sections for trunk mains in accordance with WSA.

9. Standard Drawings

The following North East Water standard drawings take precedence over WSAA.

Table 2 Corporation Standard Drawings **North East Water**

Drawing No.	Description	North East Water Current Practice
WAT-1104	Typical main Construction 63mm PE Cul De Sec Arrangement	63mm joints back into 100 PVC with an additional SV after the FP
WAT-1107	Split Services - Split Service Main to Meter	Not accepted generally Accepted in owners corporation subdivision.
WAT-1108	Property Services Connection to Main	Class A copper or PE pipe with trace wire minimum PN 12.5
WAT-1109	Property Services Above Ground Meter Assembly Arrangement	Lay over arrangement not accepted
WAT-1208	Restrained Joint System DN100 to DN 375 DI Mains	Not accepted
WAT-1300	Valve and Hydrant Identification	NEW Standard drawing - Marker Posts



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