

Design Checklist for Water and Sewer for Extensions and Subdivisions

The proponent's hydraulic engineer/designer is required to complete this checklist and submit to Services Development, when submitting the water and sewer project drawings for small subdivisions/extensions. For large subdivisions/extensions the items in this checklist are to be included in the project design report. Refer appendix for design report table of contents. *Note –The applicant should attach design calculations, reports, approvals, and any information additional to this checklist that will assist in the assessment of their application by Power and Water.

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Land Details / Location of Works

Lot No. : _____ Street Address: _____

Suburb: _____ Project: _____

Stage: _____

Description of works, water sewer (i.e. no. of lots): _____

Drawing No./s: _____

Comments: _____

Consulting Engineer/ Designer

Name: _____ Company: _____

Postal Address: _____

Phone: _____ E-mail: _____

Signed (Checked): _____ Date: / /

General

- Designs must conform to all requirements of the Power and Water Connection Code and associated documents.
- For detail design and drawings, refer to NT WSAA Supplements of the Water Services Association of Australia (WSAA) Water Supply and Sewerage Codes, and Introduction of Planning Guidelines for Water Supply and Sewerage, available from the Power and Water website: http://www.powerwater.com.au/business/for_business_and_developers/water_services_connection_code/technical_requirements
- Conducted a site inspection and surveyed the alignment.
- Obtain Aboriginal Areas Protection Authority (AAPA) clearances (if applicable).
- Obtain geotechnical investigation report with recommended bedding type, lateral and vertical bearing capacities at various depths, excavation condition and assessment of subsoil condition and subsoil drainage etc.

- Provide a design report of the subdivision (design calculations).
- Prepare project specific specification and schedule by using Power and Water Master Water Supply and Sewerage Specification and other associated documents.
- Prepare project drawings and get approval from Power and Water and other authorities.
- Prepare master services plan and master plan for the proposed development.
- As constructed drawings are required before connection to Power and Water system and handover.
- Large or deep water and sewerage infrastructure proposed within a road reserve may require a suitably designed service allocation to ensure access to the infrastructure does not disturb other services. An easement may also be required into an adjacent lot.
- Thrust boring or sleeving under road and railway may be required by Power and Water, road authority or council.
- Steel or concrete sleeves details should include OD, pipe thickness, joint type, type 4 bedding for steel sleeves, or type 2 bedding for concrete sleeves, select backfill under road, etc. Use Tyton-Lok joint for DICL, collar for MSCL and electrofusion weld joint for PE pipes through sleeves.
- In conjunction with Services Development determine the fees/costs applicable (i.e. contribution, connection, etc.), and inform the developer.
- Where possible locate water and sewer mains on opposite sides of the road. Where this is not possible maximise the separation distances of water and sewer.
- Ensure approval is granted from Power and water's Services Development, Power Networks, and Office of the General Counsel departments for any proposal concerning existing or proposed easements.
- Ensure design is approved by Power and Water prior to construction.

Water

- Obtain approval from Services Development for services extensions/subdivisions concept plan and proposed connection points.
- Determine the current, future and ultimate demand (L/s) from the development, both domestic and fire fighting. Provide as an attachment.
- Determine the worst case headloss in the development.
- Ensure there is sufficient flow and pressure in the local water supply system to service the ultimate demand, including fire flows and worst case head loss. Consult with Services Development for system modelling results.
- Minimum pipe size shall be DN150 in residential areas, and DN225 in commercial and industrial areas.
- Minimum Series 1 PVC-M class 12 can be used for pipes \leq DN150 with working pressure below 350 kPa.
- Use minimum class 16 PVC pipes for all high pressure zones (working pressure above 350 kPa).
- Minimum series 2 PVC-M class 16 pipe can be used for mains DN200 \leq DN300.
- DICL or MSCL pipes shall be used for pipes \geq DN375 unless approved otherwise by Power and Water.
- PVC-O class 16 pipe should be used for all rising mains and mains subject to repeated cyclic loading.
- DICL can be used for sizes \geq DN100. Buried DICL pipework and fittings must be wrapped in a protective polyethylene sleeving and noted on the drawing.
- DICL pipe shall not be cut to suit. All dimensions of DICL short pipes should be provided in the detail drawings.
- Water service connections \geq DN100 and water mains under roadways located in major centre CBD areas (Darwin, Alice Springs, Katherine Tennant Creek, Yulara) and high pressure zones (specific areas in Palmerston and other centres) are required to be constructed in restrained jointed DICL (Tyton-Lok or flanged jointed).

- Water services under roadways shall be either DICL flanged or Tyton-Lok jointed or MSCL collar jointed. Alternatively PE class 16 pipes electrofusion weld jointed with RCP or MSCL sleeves can also be used for pipes DN225 and below under road. No polyethylene is to be used for any other piping or connections (unless specific approval granted for locations with corrosive water).
- Any section of pipe may be isolated by no more than 4 sluice valves.
- No more than 25 property service connections may be isolated at any time by valve operation. (Include the number of units on allotments in this calculation, i.e. ten units on one allotment are counted as ten service connections).
- All water service connections to multi dwellings with greater than 20 apartments, commercial/industrial properties greater than 2,000m² in area, or commercial/industrial properties that include water critical businesses (see list), will require a stop valve either side of the service connection tapping to the existing water main.

List of Critical Businesses as defined by AS/NZS 3500:2003

- Dentists, medical clinics, hospitals, nursing homes
- Shopping centres, hairdressers, photographic laboratories/processors, dry cleaners/commercial laundries
- Education facilities, child care centres
- Chemical plants or storage facilities, abattoirs
- Marinas/docks, caravan parks

- Provide a minimum of type 2 embedment for PVC pipe or type 4 embedment for steel pipe unless geotechnical investigations have been completed and the resultant report supports the use of lower quality embedment.
- Where the cover is insufficient but still greater than 300mm (with Power and Water approval only) use DICL pipes and flanged fittings. A concrete slab may be required as added protection.
- In general fire hydrant spacing shall be 80m in urban areas and 300m in rural areas. However actual location and spacing should be determined by fire coverage required to cover the subdivision and extension work. Fire hydrants shall be below ground type BS750.
- 100% of lots shall be covered by proposed fire hydrants or alternatively internal hydrants with DN80 or larger service connection will be required for larger lots not covered by external hydrants. Show areas covered by external fire hydrants.
- Cul-de-sacs must always have ring mains/through mains as shown on standard drawings.
- Dead ends will not be allowed unless approved. When allowed, valve and flushing hydrant arrangement for all dead end branches will be required.
- Ensure service size meets ultimate demand for zoning of lot. Zones MR, GI, DV, CV and other zones as determined by Services Development are to be provided with a min. DN100 service as agreed by Power and Water.
- Ensure water services do not conflict with other services (i.e. electricity, sewer and driveway). Indicate non-standard alignments. Provide a copy of the master plan and master services plan.
- Inline booster pumping >1 L/s will not be permitted without written approval from Power and Water.
- Provide water supply easements for property water services sized ≥ 100 mm. Size of easement to be determined by Power and Water.
- Thrust block design required for water and pressure mains \geq DN300, Show calculation and lateral bearing capacity used for design.
- Pipe sizes shall not be less than DN150 for residential zones and DN225 for industrial and commercial zones. A maximum permissible loss is 6.0m/km for all reticulation mains sizes DN300 and below.
- Provide trench stops at a maximum interval of 20m for water mains with grades $\geq 5\%$.

Sewer

- Gain approval from Services Development for services extensions/subdivisions concept plan and proposed connection points.
- Determine the ultimate peak wet weather flow for the development (L/s) at each discharge point to Power and Water's sewer system.
- Ensure there is sufficient existing capacity in the local sewer network. Provide sewer flow schedule as an attachment. Consult with Services Development for system modelling results.
- Sewers are to be located in road reserves. With approval they may be located in public land.
- U-PVC class SN8 is to be used for pipes \leq DN300.
- For diameters $>$ DN300, VC or an alternative approved pipe material must be used. Rigid pipes are preferred for areas with high water table or subsoil drainage. Design must be based on the recommendation of a Geotechnical Investigation Report.
- Sewer pipes shall be designed to achieve self cleansing grades with pipe capacity exceeding peak wet weather flow. Under no circumstances pipe grades can not be less than minimum grades.
- Use heavy-duty rectangular lids (class D, shape R) in road reserves/parks/drains and light duty lids (class B) within yards.
- Ensure minimum drops and bends are achieved through/into maintenance holes.
- Maintenance hole spacing shall be in accordance to WSA Supplement WSA03.
- Maintenance shafts are permitted on DN150 sewers with depths $<$ 3.0m. One maintenance shaft only between maintenance holes. Sewer branch lines are not to join at maintenance shafts.
- Maintenance shafts are permitted for a change in direction in standard manufactured angles up to 30° .
- For straight sewer section or sewer with maximum 30° bends with no branch connections and depth below or equal to 3.0m, Maintenance shafts are preferred over maintenance holes at alternate maintenance hole locations.
- Terminal maintenance shafts should not be used when future extension of sewer main is required (based on master plan).
- Ensure that sewer flow in maintenance hole is deflected by an angle no less than 90° , unless the appropriate drop is available.
- Ensure gas trap maintenance hole (in-line permitted only when space is constrained) is provided prior to connection to trunk sewers (i.e. sewers \geq DN300). Boundary traps are to be used for house connections when the receiving sewer is \geq DN375.
- Ensure property connection meets ultimate demand and current standards for servicing the lots. Minimum 150mm for residential and commercial lots and a minimum 225mm for industrial and large flows. Loads \geq 80EP shall discharge to a maintenance hole.
- Provide a copy of the lot control calculations. If accepted by Power and Water, show the limitations of lot control on sewerage reticulation plan.
- Provide pipe capacity and self cleansing check calculations for each gravity section between maintenance holes.
- Polyurethane or approved lining required for all maintenance holes with \geq DN300 gravity main. Standard 1200 dia. maintenance holes can only be used for gravity sewers \leq DN300. Structural design required for all larger maintenance holes suitable for gravity mains $>$ DN300.
- Provide a minimum 4 trench stops between maintenance holes on sewer sections with grades \geq 5%.
- Provide a dedicated MH with a short gravity section to receive flows from sewer rising main to the gravity system.

Appendix

Example of Hydraulic Design Report Table of Contents

1. Introduction

2. Background

- General
- Scope of Hydraulic Works
- Stakeholder Consultation
- Relevant Statutory Approvals
- Project Timeline
- Project Key Deliverables
- Geotechnical Report

3. Sewerage

- General
- Connections to existing Sewer
- Sewer Loading and Sewer Grading
- Issues Confirmed with Power and Water
- Upgrades

4. Water Supply

- General
- Connections to existing Water
- Thrust Blocks

5. Approved Specification and Drawings

- Specification including Preliminaries, and Technical Clauses
- Design Drawings

Appendices

- Appedix A Development Permit
- Appedix B Subdivision Plan and Site Plan
- Appedix C Master Plan
- Appedix D Works Plan
- Appedix E Design layouts
- Appedix F Sewerage Catchment Plan
- Appedix G Sewerage Loading and Grade Calculations
- Appedix H Water Demand Calculations and Modelling
- Appedix I Geotechnical Assessment Report
- Appedix J Meeting Minutes