



AUS-SPEC

Infrastructure Specifications

0224 Stormwater – site

0224 STORMWATER – SITE

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the Cessnock City Council area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) Cessnock City Council customisations (also known as ‘office master’ text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown **in brown text like this**.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and Cessnock City Council specific clauses, Council’s specific clauses shall prevail.

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide stormwater drainage **for building site works**, as documented.

1.2 DESIGN

General

Designer: **A professional engineer in accordance with 0010 Quality requirements for design worksection.**

Requirements

General: To DESIGN in **0171 General requirements**.

Responsibility: **Not Used**

Performance requirements: **As per DA consent conditions.**

Authority requirements: **As per DA consent conditions.**

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- **0010 Quality requirements for design.**
- **0136 General requirements (Construction).**
- ~~0171 General requirements.~~

Limitations

Exclusion: This worksection is not intended to apply to works within the scope of the following:

- **1351 Stormwater drainage (Construction).** That worksection applies to stormwater within community reserve land such as parks and sporting fields, existing and future public road reserves, for example as part of subdivision works.

1.4 STANDARDS

Stormwater drainage

Standard: To AS/NZS 3500.3 (2021).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Pipe surround: Includes pipe overlay, pipe side support, side zone and haunch zone.

1.6 SUBMISSIONS

Certification

Requirement: Submit certificate stating that network is leak free upon completion.

Samples

General: **Prior to commencement**, submit samples of the following:

- Each type of imported pipe bedding material.
- Each type of filter material.

Note: If samples are to be tested, the size is determined by the type of test. See the AS 1141 series on aggregate tests.

Tests

Results: Submit results from pre-completion leak testing.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- **Hold Point:** Excavated surfaces prior to placing bedding material.
- **Hold Point:** Underground services, or services to be concealed, before being covered.
- **Hold Point:** Pipe joints before covering.
- **Hold Point:** Placing of concrete.
- **Hold Point:** Completion of stormwater drainage.

2 PRODUCTS

2.1 MATERIALS

Concrete and mortar

Concrete: To AS/NZS 3500.3 (2021) clause 2.9 and the following:

- Grade: **As documented. If not documented and for concrete only in pedestrian areas with non-aggressive soils, minimum N15.**
- Cement: To AS 3972 (2010).
 - . Type: GP, GL or GB.

Steel reinforcement:

- Bars and machine welded mesh: To AS/NZS 4671 (2019).

Joints

Solvent cement and priming fluid: To AS 3879 (2011).

Rubber ring joints/elastomeric seals: To AS 1646 (2007).

Pipes and fittings

Fibre reinforced cement (FRC): To AS 4139 (2003) and the following:

- ≤ 450 mm diameter: Rubber ring joints to AS 4139 (2003).
- > 450 mm diameter: With a purpose machined internal spigot and socket system within the pipe wall.

Glass-reinforced plastic (GRP): To AS 3571.1 (2009).

Access covers and grates: To AS 3996 (2019).

Polyvinyl chloride (PVC): To AS/NZS 1254 (2010), AS/NZS 1260 (2017) or AS 1273 (1991), as appropriate.

Best environmental practice (BEP) PVC: Conform to AS/NZS 1260 (2017) Appendix C, including all marking requirements.

Polyethylene (PE): To AS/NZS 4129 (2020), AS/NZS 4130 (2018), ISO 8770 (2003) or AS/NZS 2033 (2008), as appropriate.

Precast concrete: To AS 3850.3 (2021) and AS/NZS 4058 (2007).

Plastic pipe for subsoil drainage: To AS 2439.1 (2007).

Vitrified clay or ceramic: To AS 1741 (1991).

Bedding material

Bed and haunch zones: Provide granular material graded to the AS 1141 series.

Bedding material grading table

Sieve size (mm)	Weight passing %	
	Bed and haunch	Side zones
75.0	-	100
19.0	100	-
9.5	-	50 - 100
2.36	50 - 100	30 - 100
0.60	20 - 90	15 - 50
0.30	10 - 60	-
0.15	0 - 25	-
0.075	0 - 10	0 - 25

Filter material

Requirement: Materials consisting of natural clean washed sands and gravels and screened crushed rock, to AS/NZS 3500.3 (2021) clause 2.13.1.

2.2 GEOTEXTILES

General

Material: UV stabilised, permeable, polymeric, woven or non-woven textile material used in contact with soil/rock material.

Identification and marking: To AS 3705 (2012).

Product: As documented.

Properties: As documented.

Subsoil drainage

Filter: Conform to AS/NZS 3500.3 (2021) clause 2.13.2.

2.3 PREFABRICATED PITS

General

Requirement: Precast or prefabricated pits conforming to AS/NZS 3500.3 (2021) clauses 2.12.8 and 7.5, and AS 3850.3 (2021).

Reference: AS/NZS 3500.3 (2021) clause 7.5 specifies general requirements for stormwater pits, inlet pits and arrestors. Preferably show the location, type and details of pits on the drawings. Alternatively, the pit types and sizes may be scheduled in SELECTIONS. Refer to AS/NZS 3500.3 (2021) Table 7.5.2.1 for the required dimensions for precast concrete pits.

Access covers and grates

Cover finish and load classification: Provide access cover and grate with the documented finish, slip resistance and load class.

3 EXECUTION

3.1 PIPING

Installation

Laying: Lay lengths separately with the barrel bearing evenly on the prepared bedding.

Sockets: Lay with socket ends pointing upstream.

Cleaning: Clean pipe interior of dirt, debris, mortar and other foreign matter.

Protection: Provide temporary caps over the ends of incomplete sections to prevent the entry of foreign matter.

3.2 TOLERANCES

Pipeline tolerances table

	Permissible angular deviation from the documented alignment	Permissible displacement from the documented positions
Horizontal	1:300	15 mm
Vertical	1:500	5 mm

Note: These tolerances are conditional on falls to outlets being maintained and no part of a pipeline having less than the documented gradient.

3.3 STORMWATER DRAINS

Location

General: Provide stormwater drains to connect surface drains, subsoil drains and drainage pits to the outlet point or point of connection. Make sure location of piping will not interfere with other services and building elements not yet installed or built. Subject to the preceding and documented layouts, follow the most direct route with the least number of changes in direction.

Laying

Installation: Lay in straight lines between changes in direction or grade. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

Identification

Requirement: Lay a detectable strip or plastic tape in the trench after pipe laying, testing and initial backfilling.

Pipe underlay

General: Bed piping on a continuous underlay of bedding material, minimum 75 mm and maximum 150 mm thick after compaction. Grade the underlay evenly to the gradient of the pipeline.

Chases: If required, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers, maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Trench backfill

General: Backfill the remainder of the trench to the underside of the subgrade with fill material placed in layers, maximum 200 mm loose thickness and compacted to minimum 90%, or 95% under pavements, of the standard maximum dry density.

Lifting holes

Sealing: Seal lifting holes in all pipes with plastic preformed plugs or 3:1 (sand:cement) mortar, before the commencement of backfilling.

Anchor blocks

Restraint: If required to restrain lateral and axial movement of the stormwater pipes, provide reinforced concrete anchor blocks at junctions and changes of grade or direction conforming to AS/NZS 3500.3 (2021) clause 7.9.

Encasement

Location: Where documented, encase the pipeline in concrete at least 150 mm above and below the pipe, and 150 mm each side or the width of the trench, whichever is the greater.

3.4 SUBSOIL DRAINS

General

Requirement: Provide subsoil drains to intercept groundwater seepage and prevent water build-up behind walls and under pavements. Connect subsoil drains to surface drains or to the stormwater drainage system as applicable.

Piping: As documented.

Trench width: Minimum 450 mm.

Trench floor: Grade the trench floor evenly to the gradient of the pipeline. If the trench floor is rock, correct any irregularities with compacted bedding material.

Pipe depth: **Unless otherwise documented**, provide the following minimum clear depths, measured to the crown of the pipe, where the pipe passes below the following elements:

- Formation level of the pavement, kerb or channel: 100 mm.
- Average gradient of the bottom of footings: 100 mm.
- Finished surface of unpaved ground: 450 mm.

Jointing

General: At junctions of subsoil pipes, provide tees, couplings or adaptors to AS 2439.1 (2007).

Pipe underlay

Bedding: Bed piping on a continuous underlay of bedding material, minimum 75 mm and maximum 150 mm thick after compaction. Grade the underlay evenly to the gradient of the pipeline.

Chases: If required, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers, maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Depth of overlay:

- To the underside of the bases of overlying structures such as pavements, slabs and channels.
- To within 150 mm of the finished surface of unpaved or landscaped areas.

Geotextiles

Marking: To AS 3705 (2012).

Laying: Place geotextile, as documented.

Protection: Provide heavy duty protective covering. Store clear of the ground and out of direct sunlight. During installation, do not expose the filter fabric to sunlight for more than 14 days.

Filter socks

General: Provide permeable polyester socks, capable of retaining particles 0.25 mm and greater. Securely fit or join the sock at each joint.

3.5 PITS

Installation

General: Prepare foundation, install pit and connect pipes, to manufacturer's recommendations.

Location: At junctions, changes of gradient and changes of direction of stormwater drains, as documented.

Finish to in situ exposed surfaces

General: Provide a smooth, seamless finish, using steel trowelled render or concrete cast in steel forms.

Corners: Cove or splay internal corners.

Metal access covers and grates

Cover levels: Top of cover or grate, including frame:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.
- Gratings taking surface water runoff: Locate to receive runoff without ponding.

3.6 TESTING

Site tests

General: Before backfilling or concealing, carry out an air or water pressure test to AS/NZS 3500.3 (2021) Section 9.

Leaks: If leaks are found, rectify and re-test.

Best environmental practice (BEP) PVC: Conform to AS/NZS 1260 (2017) Appendix C, including all marking requirements.

3.7 COMPLETION

Cleaning

General: Clean and flush the whole installation.

4 SELECTIONS

The use of these schedules in addition to project Drawings on Council or private development works is optional, at the Superintendent's discretion.

4.1 STORMWATER

Stormwater pipeline schedule

	A	B	C
Pipe material and nominal size (mm)			
Class			
Jointing			
Pipe support			
Concrete encasement			

Notes to schedule:

A, B, C: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags. Edit codes in the **Schedule** to match those on drawings.

Pipe bedding schedule

	A	B	C
Bedding application			
Bedding zone			
Bedding type			
Material and grading			
Required density			

Notes to schedule:

A, B, C: These designate each instance or type or location of the item scheduled. Edit codes in the **Schedule** to match those on drawings.

Bedding application: Use a mark number, e.g. 1, 2, 3 or describe the pipe and trench condition.

Bedding zone: e.g. Underlay, Haunch, Side, Overlay. See AS/NZS 3500.3 Figure 6.2.2 and clause 6.3.5.

Bedding type: For concrete pipes, select U, H1, H2, H3, HS1, HS2, HS3, in accordance with AS/NZS 3725. Alternatively, specify the bedding type on the drawings. Delete if concrete pipes are not specified.

Material and grading: Specify locally available materials.

Required density: Specify the required dry density ratio or density index.

Subsoil pipeline schedule

	A	B	C
Trench depth (mm)			
Pipe size (nominal)			
Pipe type			
Pipe class			

Notes to schedule:

A, B, C: These designate each instance or type or location of the item scheduled. Edit codes in the **Schedule** to match those on drawings.

Pit schedule

	A	B	C
Type			
Size (mm)			
Cover type			
Cover finish			
Slip resistance to AS 4586 (2013)			
Load class to AS 3996 (2019)			

Notes to schedule:

A, B, C: These designate each instance or type or location of the item scheduled. Edit codes in the **Schedule** to match those on drawings.

5 ANNEXURE A - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1141		Methods for sampling and testing aggregates
AS/NZS 1254	2010	PVC (UPVC) pipes and fittings for storm and surface water
AS/NZS 1260	2017	PVC-U pipes and fittings for drain, waste and vent application
AS 1273	1991	Unplasticised PVC (UPVC) downpipe and fittings for rainwater
AS 1646	2007	Elastomeric seals for waterworks purposes
AS 1741	1991	Vitrified clay pipes and fittings with flexible joints - Sewer quality
AS/NZS 2033	2008	Installation of polyethylene pipe systems
AS 2439		Perforated plastics drainage and effluent pipe and fittings
AS 2439.1	2007	Perforated drainage pipe and associated fittings
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.3	2021	Stormwater drainage
AS 3571		Plastics piping systems - Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin
AS 3571.1	2009	Pressure and non-pressure drainage and sewerage (ISO)
AS 3705	2012	Geotextiles - Identification, marking, and general data
AS 3879	2011	Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3972	2010	General purpose and blended cements
AS 3996	2019	Access covers and grates
AS/NZS 4058	2007	Precast concrete pipes (pressure and non-pressure)
AS/NZS 4129	2020	Fittings for polyethylene (PE) pipes for pressure applications
AS/NZS 4130	2018	Polyethylene (PE) pipes for pressure applications
AS 4139	2003	Fibre-reinforced concrete pipes and fittings
AS/NZS 4671	2019	Steel for the reinforcement of concrete
EN 15804	2012	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO 8770	2003	Plastic piping systems for soil and waste discharge (low and high temperature) systems inside buildings – Polyethylene
ISO 14025	2006	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 21930	2017	Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services
Cessnock City Council		Development Engineering Handbook

6 ANNEXURE M – CESSNOCK CITY COUNCIL SPECIFIC CLAUSES

M1.	Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's <i>Development Engineering Handbook</i> . Acceptance is to be obtained in writing from: <ul style="list-style-type: none"> a) an authorised representative of Council's Director of Infrastructure and Engineering Services. 	Variation procedure
M2.	This specification applies in addition to any development consent (DA) conditions. If there is any inconsistency, the conditions of consent shall prevail.	DA Conditions
M3.	Refer to the Cessnock City Council Development Engineering Handbook for final inspection, works-as-executed and handover requirements.	Completion

7 AMENDMENT HISTORY

0	15/01/2024	First Published
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