

Drainage DR 02 | Bedding materials for below ground sanitary drains

Audience

The audience/s for this Practice Note include/s:

- | | |
|--|--|
| <input type="checkbox"/> Architects/ Designers | <input checked="" type="checkbox"/> Owner Builders |
| <input checked="" type="checkbox"/> Builders | <input checked="" type="checkbox"/> Plumbers |
| <input checked="" type="checkbox"/> Building Surveyors/ Inspectors | <input type="checkbox"/> Real estate management agents |
| <input checked="" type="checkbox"/> Engineers | <input checked="" type="checkbox"/> Trades and Maintenance (inc. Electricians) |
| <input type="checkbox"/> Home Owners / Residential Tenants | |

Purpose

This Practice Note provides guidance on the regulatory requirements for installation of bedding materials for below ground sanitary drains.

The content below provides guidance on:

- Regulatory requirements
- General requirements
- Sand bedding materials and drainage inspections
- Suitability of bedding materials and tables

Abbreviations & Definitions

The abbreviations and definitions set out below are for guidance only. They are not intended to vary those set out in the Building Act 1993, the Building Regulations 2018 or the National Construction Code.

- **AS** – Australian Standard
- **AS/NZS** – Australian/ New Zealand Standard
- **NCC** – National Construction Code 2019, Volume Three
- **Regulations** – Plumbing Regulations 2018
- **WH&S** – Work Health & Safety
- **NATA** – National Association of Testing Authorities



For guidance on the plumbing regulatory framework, refer to Plumbing Practice Note RF-01 – Regulatory framework



Regulatory requirements

In Victoria, the design and installation of sanitary plumbing and drainage systems is regulated under the Plumbing Regulations 2018 (Regulations). The Regulations require the installation of sanitary plumbing and drainage systems must meet the Performance Requirements of the National Construction Code 2022, Volume Three (NCC). The performance requirements are satisfied if the work is performed in accordance with AS/NZS 3500.2 - Sanitary Plumbing and Drainage.

Clause 5.4.2(d) of AS/NZS 3500.2, allows the free running sand, excavated from the trench, capable of passing through a 2mm mesh sieve, which does not contain clay, organic or any other deleterious materials, where used in permeable soil conditions and where ground water or surface water entering the trench does not disturb the sand.

General requirements

The following checks must be completed before considering the bedding material for sanitary drainage systems:

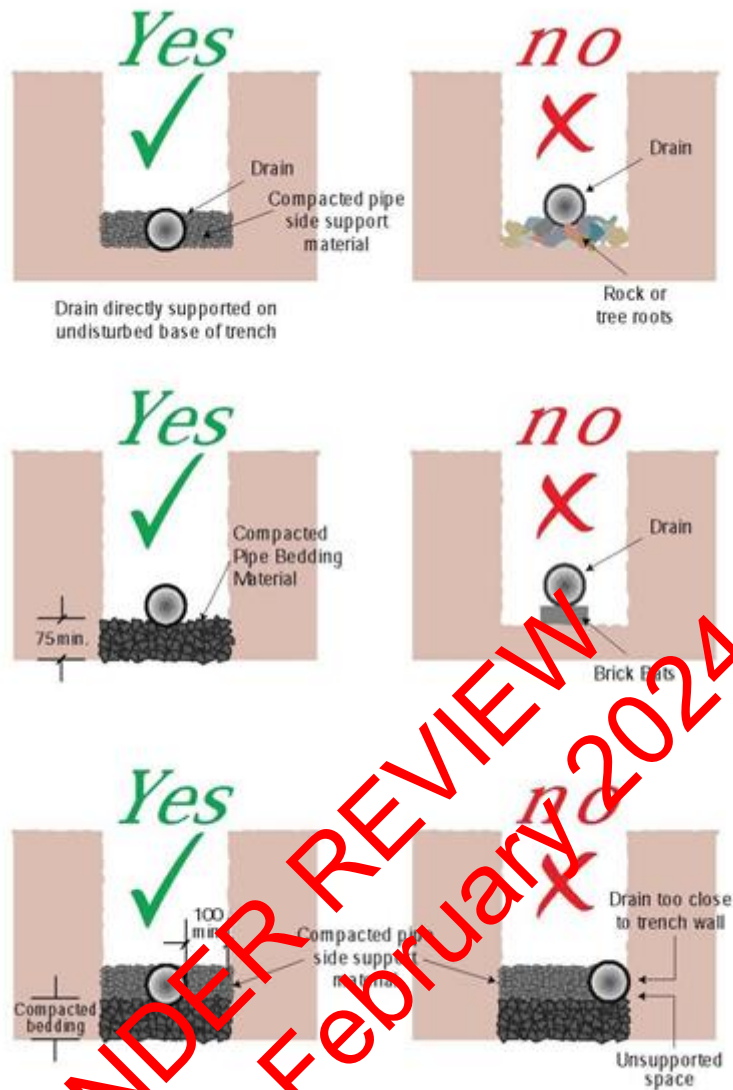
- site classification (soil conditions report);
- property services drainage plan;
- site plans;
- work site; and
- WH&S requirements.

It is important in all soil conditions that a drain is directly and continuously supported either on the undisturbed base of a trench (stable class A) and the trench is free from rocks or tree roots or alternatively the drain shall be installed on imported bedding material such as crushed rock gravel screenings of nominal sizes between 7mm to 10mm or cement mortar.

Drains should be clear of any hard or sharp-edged objects, and at least 100mm clear of any trench wall (refer to Illustration 1: Drain bedding).

Bedding material that is applied, must be consistent with the relevant plumbing laws and standards.

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Illustration 1: Drain bedding

Sand bedding materials and drainage inspections

Sand bedding will only be acceptable as bedding material if the installation is excavated in natural sandy ground from the building site. The sand must be free running, capable of passing through a 2mm mesh sieve and not contain clay, organic or other deleterious material.

Drains can only be bedded on a site backfilled with sand which has been subject to 90% compaction and must have the appropriate certification by a qualified engineer.

When the excavation is carried out in clay soil, and sand is the only bedding material available, cement mortar bedding consisting of one part cement to four parts sand must be used.

Under the Building Act 1993 plumbers who perform below ground sanitary drainage work are required to offer the drain to the authority for inspection.



For booking of a drainage inspection refer to <https://www.vba.vic.gov.au/plumbing/renewals-other-requirements/drain-inspection-bookings>

Suitability of bedding materials and tables

Historically, plumbers have bedded drains in materials (quarter minus) with a nominal size of a quarter of an inch, or approximately 6mm. As these products have stood the test of time, the VBA will continue to accept the use of such materials, provided they appear consistent in size upon visual inspection, as shown in the Illustration 2 below.



Illustration 2: Quarter minus bedding material

Through routine audits and inspections, the VBA have identified an emerging trend toward the use of bedding materials that are inconsistently sized or that contain large volumes of dust/fines and smaller particles.

The suitability of a material depends on its compaction ability. Granular materials (gravel or sand) containing little or no fines, or specifically graded materials, require less compaction effort, and are preferred as bedding material.

Plumbing practitioners should refer to the primary referenced standard, AS/NZS 3500:2, specifically to:

- Section 5 - Excavation, bedding, support, and backfilling of drains,
- Appendix A - Acceptable pipes and fittings, and
- Clause 3.8.2 for drains near footings or foundations.

The AS/NZS 3500:2 is a primary reference standard for installation of sanitary and drainage systems. This standard references several other nominative standards, including AS/NZS 2032.

The AS/NZS 2032 is a specific standard for installation of polyvinyl chloride (PVC) pipe systems. It covers methods for handling, storage, installation, testing, and commissioning of PVC pipelines, above or below ground, for pressure and non-pressure applications conveying liquids.

For design and installation of buried flexible pipelines, reference should be made to AS/NZS 2566 Part 1 and Part 2. Pipe manufacturers also reference this standard in their specifications. This provides additional assurance that installation of the PVC piping systems is fit for its intended purpose.

Maximum particle sizes and other acceptable embedment materials

Maximum particle size for nominal pipe diameter, detailing material grading limits for various accepted bedding materials (sand, processed aggregates, crusher dust or crushed rock) are provided in Appendix G, Table 5.4 of AS/NZS 2566 (refer to Table 1 below).



TABLE 5.4
MAXIMUM PARTICLE SIZE

Nominal pipe diameter <i>DN</i>	Maximum particle size mm
< 100	10
≥ 100 ≤ 150	14
> 150	20

Table 1: Maximum particle size Appendix G table 5.4 of AS/NZS 2566

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Tables 2 (G2) and 3 (G3) below, are extracts from AS/NZS 2566, detailing processed aggregates and other materials, which are acceptable to be used as embedment materials.

TABLE G2
PROCESSED AGGREGATES—ACCEPTABLE FOR EMBEDMENT MATERIALS*

Sieve size mm	Mass of sample passing, percent							
	Nominal size of graded aggregate† mm	Nominal size of single size aggregates mm						
		20	14	20	14	10	7	5
75.0	—	—	—	—	—	—	—	—
53.0	—	—	—	—	—	—	—	—
37.5	—	—	—	—	—	—	—	—
26.5	100	—	100	—	—	—	—	—
19.0	85–100	100	85–100	100	—	—	—	—
13.2	—	85–100	—	85–100	100	—	—	—
9.50	25–55	—	0–20	—	85–100	100	—	—
6.70	—	25–55	—	0–20	—	85–100	100	—
4.75	0–10	—	0–5	—	0–20	—	85–100	—
2.36	0–5	0–10	—	0–5	0–5	0–20	0–40	—
0.075‡	0	0–2	0–2	0–2	0–2	0–2	0–2	0–2

* Table taken in part from Table 1 of AS 758.1—1998.

† Single-size aggregate should always be specified where strict control of grading is considered essential. Graded aggregates are considered more susceptible to segregation in transport and handling.

‡ See Clause 8.2 of AS 758.1—1998. In addition, where coarse aggregates contain more than 1% of material passing the 0.075 mm sieve, particular care should be taken to remix or wash this material to minimize the effect of segregation.

Table 2: Processed aggregates – acceptable for embedment materials Table G2 of AS/NZS 2566.

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**TABLE G3
OTHER MATERIALS—ACCEPTABLE FOR EMBEDMENT MATERIALS**

Sieve size mm	Mass of sample passing, percent			
	Crushed rock dust	Well graded crushed rock		Sand
		20 mm	10 mm	
26.5	—	100	—	—
19.0	—	85–100	—	—
13.2	—	—	100	—
9.5	100	60–80	90–100	—
6.7	85–100	55–72	—	—
4.75	—	42–62	60–80	100
2.36	0–20	30–48	40–65	100–90
1.18	—	22–36	25–50	85–100
0.60	—	16–28	16–38	70–100
0.30	—	10–20	9–30	50–100
0.15	—	6–15	5–24	0–40
0.075	0–2	4–12	2–20	0–5
Liquid limit		25	25	
Plasticity index		4	6	

NOTE: Tolerances on aggregates are generally $\pm 10\%$ for sieve sizes above 2.36 mm (see AS 2758.1—1998 for details).

Table 3: Other materials -acceptable for embedment materials Table G3 of AS/NZS 2566. Reproduced with permission of Standards Australia Limited. Copyright in AS/NZS 2566 vests in Standards Australia Limited and Standards New Zealand.

Note: Tolerances on aggregate grading are generally $\pm 10\%$ for sieve sizes above 2.36 mm.



For bedding materials if required, it is recommended to have the (NATA) National Association of Testing Authorities certification with you at the time of the drainage audit. This can be obtained from local Sand, Soil & Gravel suppliers.

Related Documentation

- Building Act 1993
- Plumbing Regulations 2019
- National Construction Code 2022, Volume Three
- AS/NZS 3500.2:2021 - Plumbing and drainage - Part 2: Sanitary plumbing and drainage
- AS/NZS 2032:2006 - Installation of PVC pipe systems, Amdt 1: 2008
- AS/NZS 2566.1:1998 - Buried flexible pipelines - Part 1: Design
- AS/NZS 2566.2:2002 - Buried flexible pipelines - Part 2: Installation
- <https://www.wsaa.asn.au/>
- <https://nata.com.au/>

List of Amendments

- Amendment referencing standards AS/NZS2032, AS/NZS2566.Part 1 and Part 2, WSAA code, NATA.
- NCC amendment updates
- Updated format and content review
- Minor amendments to improve readability



Document history

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Topic	Bedding materials for below ground sanitary drains
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Contact Us

If you have a technical enquiry, please email plumbingtechnicaladvice@vba.vic.gov.au or call 1300 815 127.

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