

## Drainage DR 07 | Bedding site stormwater drains

### Audience

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

- |  |  |
|--|--|
| <input type="checkbox"/> Architects/ Designers                     | <input 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"/> Homeowners / Residential Tenants          |  |

### Purpose

This Practice Note provides guidance to the industry on the correct deemed to satisfy requirements for below ground site stormwater drains including gradient, depth of cover, bedding, embedment and backfill material.

The content below provides guidance on:

- General Requirements
- Embedment and trench fill terminology
- Bedding and embedment material
- Drains laid in stable ground
- Drains laid in other than stable ground
- Trench fill (backfill) material
- Minimum grade
- Minimum pipe cover

### 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.

- **Act** – Building Act 1993
- **NCC** – National Construction Code 2022

### Plumbing Regulations 2018

In Victoria, the design and installation of below ground stormwater drainage systems is regulated under the Plumbing Regulations 2018 (Regulations). The Regulations require the installation of below ground stormwater 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 3500.3 – Stormwater Drainage.



## Division 1 – Drainage work:

**Drainage work** is the construction, installation, replacement, repair, alteration, maintenance, relining, testing, or commissioning of any part of—

A below ground stormwater drainage system from the above-ground stormwater pipes to the point of discharge (nominated point of connection or Legal point of discharge).

The National Construction Code Volume 3 is adopted by and forms part of the Victorian Plumbing Regulations 2018.

Vic Part E4 of the NCC volume 3 specifies the Scope, objectives and performance requirements related to the design, construction, installation, replacement, repair, alteration, and maintenance of surface and subsurface **drainage** systems to the point of connection. AS/NZS 3500.3: Plumbing and drainage Part 3: Stormwater drainage is a “Deemed-to-Satisfy” document listed in Part E4D2 of the NCC Vol 3 and contains a section on site stormwater drains.

## General requirements

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

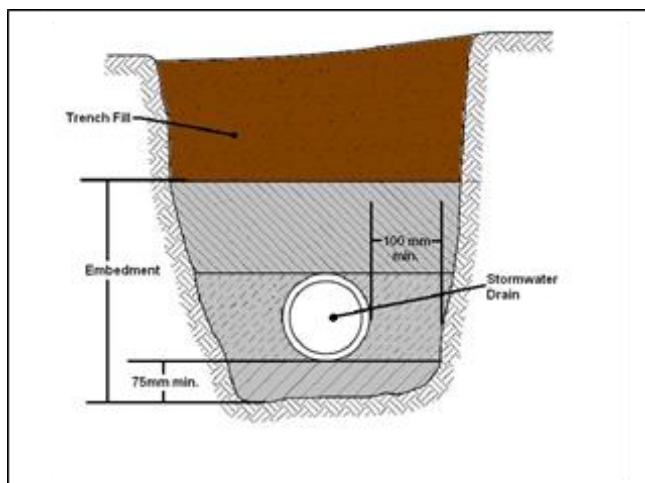
- Site classification (soil conditions report).
- Legal point of discharge (nominated by local authority).
- Site plans
- Work site; and
- WH&S requirements

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 6 mm 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 Figure 1: Drain bedding). Bedding material that is applied must be consistent with the relevant plumbing laws and standards.

## Embedment and Trench fill terminology

Embedment or drain bedding and trench fill are two separate requirements. (Figure 1)

- Embedment is to support, envelop or enclose the stormwater drain.
- Trench fill is the backfill used above the drain embedment to the ground surface.



**Figure 1 – Trench terminology bedding and embedment materials**

VBA Illustration

### Bedding and embedment material

For pipes in clay soils and rock, a graded continuous cushion of embedment material of minimum thickness 75 mm shall be provided at the trench floor. The material for bedding, haunch support, side support and overlay are determined by the characteristics of the ground in which the stormwater drain is located.

Where cement mortar is used as bedding, it shall be packed into the space between the trench floor and the pipe laid in the trench to attain the line, grade, and specified minimum cover over the pipe. Cement mortar-based material shall not be installed as a haunch.

Where the pipeline is to be laid on the trench floor, the trench shall be free from hard objects such as stones, sharp projecting rocks and tree roots, and the trench floor shall be trimmed to provide continuous support for the pipes.

Bedding material can be crushed rock, gravel screenings of nominal sizes between 6 mm to 10mm or cement mortar containing one part cement and four parts of sand by volume thoroughly mixed with clean water to a workable consistency.

### Drains laid in stable ground

Where stormwater drains are laid in stable ground such as sandy loam or free running sand deemed as Class A non-reactive soils, the stormwater drain where not laid on an approved bedding material must be laid on the undisturbed base of the trench. (see Figure 2 (a))

### Drains in other than stable ground

Where excessive soil movement due to filled, unstable or water-charged ground may affect the performance of any site stormwater drain, the drain shall be installed in accordance with plans and specifications, based on geotechnical reports and calculations, prepared by a suitably qualified competent person.

For more information on drains in unstable ground please refer to Practice Note DR 04 Drainage in reactive soil.



**Trench fill (backfill) material**

Trench fill shall either—

- (a) be material excavated from the trench or imported, provided that the material placed within the top of stormwater pipes is free from builders' waste, bricks, pieces of concrete, rocks or similar material that would be retained on a 75 mm sieve; or
- (b) be embedment material

**Minimum Gradient**

The minimum gradient of a site stormwater drain shall be as given in the table below.

Nominal Size	Minimum gradient
DN	Grade
<b>90</b>	<b>1:100</b>
<b>100</b>	<b>1:100</b>
<b>150</b>	<b>1:100</b>
<b>225</b>	<b>1:200</b>
<b>300</b>	<b>1:250</b>
<b>375</b>	<b>1:300</b>

**Table 1 - Gradient for stormwater pipes**

*VBA Illustrations*



**Minimum Pipe Cover**

<b>MINIMUM PIPE COVER (from finished surface to top of pipe)</b>		
Location	Cast iron, ductile iron, galvanized steel	Other authorized* products
Minimum cover millimetres		
1 Not subject to vehicular loading:		
(a) without pavement—		
(i) for single dwellings	Nil	100
(ii) for other than Item (i)	Nil	300
(b) with pavement of brick or unreinforced concrete	Nil†	50†
2 Subject to vehicular loading:		
(a) other than roads—		
(i) without pavement	300	450
(ii) with pavement of—		
(A) reinforced concrete for heavy vehicular loading	Nil†‡	100†‡
(B) brick or unreinforced concrete for light vehicular loading	Nil†‡	75†‡
(b) roads—		
(i) sealed	300	500‡
(ii) unsealed	300	500‡
3 Subject to construction equipment loading or in embankment conditions	300	500‡

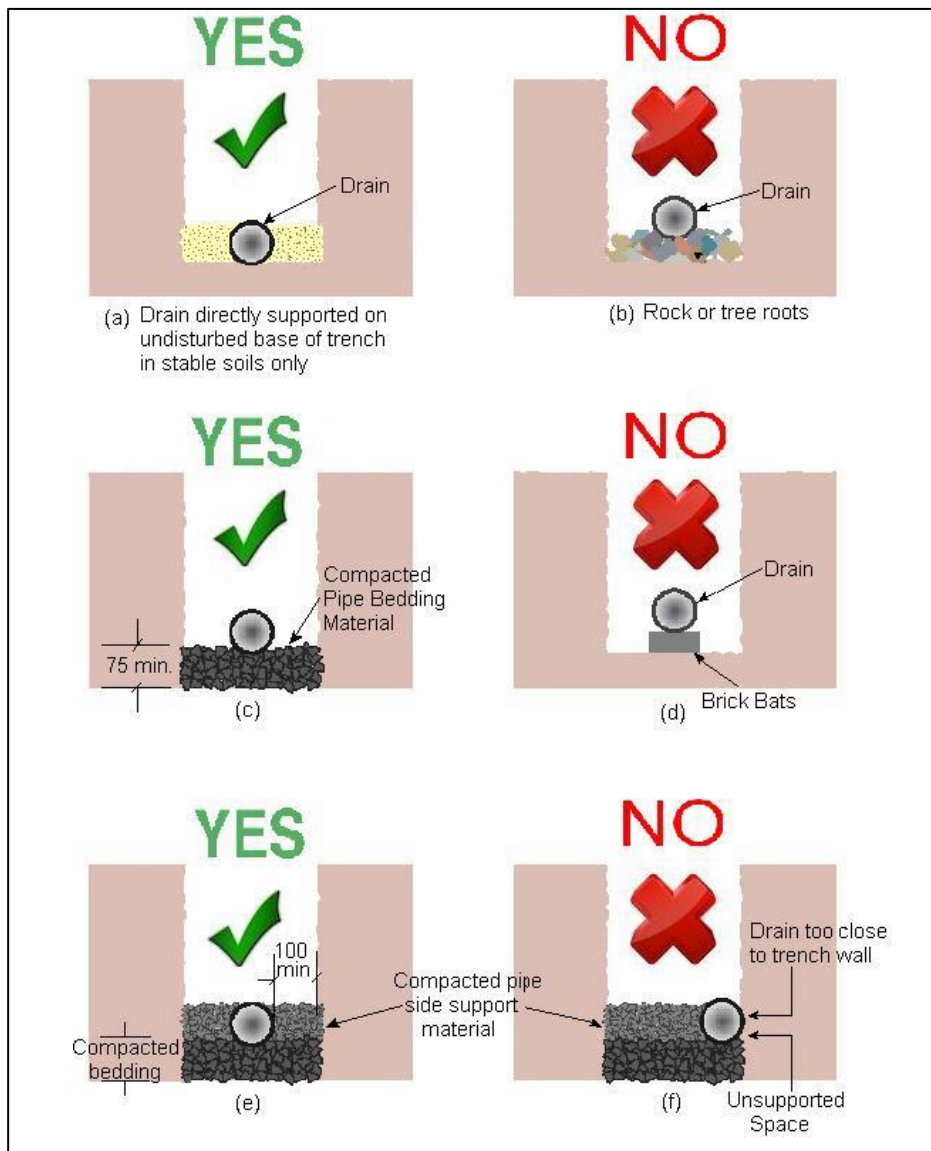
\* Includes overlay above the top of the pipe of not less than 50 mm thick.  
 † Below the underside of the pavement.  
 ‡ Subject to compliance with AS 1762, AS 2033, AS/NZS 2566.1, AS 3725 or AS 4060.

**Table 2 – Minimum pipe cover**

*Reproduced with permission of Standards Australia,*



For site stormwater drains under buildings—  
 The thickness of overlay between the top of the pipe and the underside of a reinforced concrete slab shall be not less than 25 mm and there shall be protection from mechanical damage.



**Figure 2 - Example of stormwater drain bedding**

VBA Illustration



The VBA will accept the use of quarter minus or scoria of a nominal size of 6 mm - 10.0mm as bedding and embedment material. (See Figure 2 – (c)&(e))



This practice note does not cover the requirements for Subsoil drainage systems

**Related Documentation**

- Building Act 1993
- Plumbing Regulations 2018
- National Construction Code 2022 (Volume 3)
- AS/NZS 3500.3:2022 Plumbing and drainage Part 3: Stormwater drainage



## List of Amendments

- VBA acceptance for bedding material

## Document history

<b>Sector</b>	Plumbing
<b>Category</b>	Drainage
<b>Topic</b>	Bedding site stormwater drains
<b>Document number</b>	07
<b>Version</b>	1.0
<b>Superseded</b>	<ul style="list-style-type: none"><li>• Technical Solution Sheet 4.06 - 4: Drainage (below ground storm water) Bedding Site Stormwater Drains last published June 2014</li></ul>
<b>Published</b>	13 March 2024

## Contact Us

If you have a technical enquiry, please email [plumbingtechnicaladvice@vba.vic.gov.au](mailto:plumbingtechnicaladvice@vba.vic.gov.au) or call 1300 815 127.

### Victorian Building Authority

Goods Shed North  
733 Bourke Street  
Docklands VIC 3008

[www.vba.vic.gov.au](http://www.vba.vic.gov.au)

## Copyright and disclaimer

### Copyright

© 2021 Victorian Building Authority (VBA). This publication must not be copied, reproduced, published, adapted, or communicated by any person without the VBA's prior written consent or as permitted by the Copyright Act 1968 (Cth)

### Disclaimer

The information set out in the VBA's resources is for general information purposes and guidance only. It is a reader's responsibility to obtain independent advice in respect of the application of legislation, a technical instruction or industry standard relevant to their circumstances. A person's use of the VBA's resources is not a substitute for obtaining independent advice. While we have made every attempt to ensure our resources contain correct information at the date of publication, the VBA makes no warranty or representation that its resources are error free. To the extent permitted by applicable laws, the VBA, its employees, agents, and consultants exclude any and all liability whatsoever for any direct, indirect, incidental, special, or consequential loss or damage a person may suffer arising out of or in connection with the access and use of the VBA's resources' (including any third-party material included in these resources).'