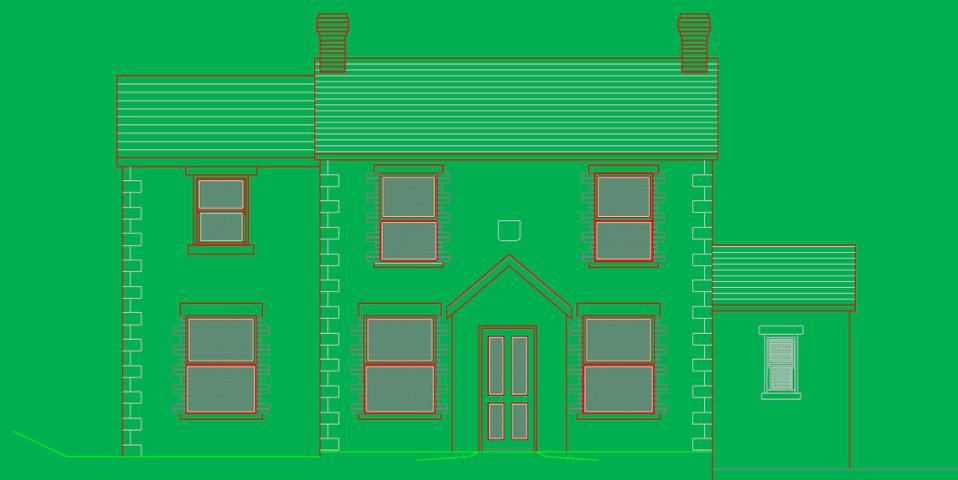


Planning stage guidance on  
**Drainage requirements for  
domestic extensions  
and  
single dwellings**



**Building Regulations 2010 (including 2015 Amendments)  
For use in England**

**April 2016 (Revision 4)**

**Adopted by Planning Committee 12<sup>th</sup> April 2016**

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Acknowledgements

FoDDC Building Control Services

Guidance notes copyright

# Part 1: Introduction & general information

## 1.1 Introduction

This document has been produced to provide guidance on the drainage requirements for new domestic extensions and new single dwellings at the planning stage and is for home owners/occupiers, students, builders, designers and other property professionals who have a basic knowledge of building construction and require easy to understand guidance on the building regulations for domestic building projects in England. A separate system of building control applies in Scotland, Northern Ireland and Wales.

This document intends to provide education and guidance on how some of the more common technical design and drainage requirements of the building regulations can be achieved and met for the submission of planning applications.

Typical details, tables, and illustrations have been provided in the guidance documents for the more common construction methods used in dwellings and have been adapted from the technical details contained within the Approved Documents of the Building Regulations. The diagrams and details produced in this guidance document are for guidance only and are only an interpretation of how the requirements of the building regulations can be met, the actual diagrams and details must be agreed and approved by building control at an early stage and before works commence. You must comply with the requirements of the Building Regulations and you are advised to fully refer to the Approved Documents and contact a suitably qualified and experienced property professional for details and specifications for the most suitable form and method of construction for your project.

## 1.2 Disclaimer

Forest of Dean District Council (the Council) has made every effort to ensure that the information contained in this Guidance Document is accurate at the time of publication. However, the Guidance is advisory and has been developed by Council officers to assist home owners/occupiers, students, builders, and designers in England. This Guidance is not a substitute for the advice of a suitably qualified professional.

The Council does not guarantee and accepts no legal liability of whatever nature arising from or connected to, the accuracy, reliability, currency or completeness of the content of this Guidance. Users of the Guidance must be aware that alterations after the date of publication may not be incorporated into the content of the Guidance.

References to organisations or websites in this Guidance does not constitute an endorsement thereof on the part of the Council.

## 1.3 Drainage requirements for new development at the planning stage

### **Foreword by Clive Reynolds: Development Manager**

This document is designed to assist applicants in determining what level of information may be needed to address issues of drainage when submitting planning applications for small domestic extensions to dwellings and the applications for single new dwelling houses. It does not apply in areas of flood risk (flood zone

areas 2 and 3) or in areas where the ground conditions including high water table levels make the use of soakaways impossible. In accordance with national policy the Council's Core Strategy Policy CSP.2 promotes the use of the Sustainable Urban Drainage System (SUDs) and as such the default position for any drainage solution is that it should demonstrate that the design and layout will reduce the impacts of climate change by improving water efficiency, effectively managing surface water and address any potential flood risk issues. If an applicant is willing to adhere to the advice contained in this guidance document and expressly refers to it within their submission it may not be necessary to submit detailed hydraulic drainage calculations with a planning application.

#### **1.4 The Building Act 1984 and the Building Regulations 2010**

The power to make building regulations are contained within Section 1 of the Building Act 1984 and deals with the powers of the Secretary of State to make building regulations for the following purposes:

- Securing the health, safety, welfare, and convenience of people in or about buildings
- Conservation of fuel and power
- Preventing waste, undue consumption, misuse or contamination of water  
(The Building Act 1984 can be viewed at: [www.legislation.gov.uk](http://www.legislation.gov.uk))

The current building regulations are the Building Regulations 2010 and the Building (Approved Inspectors etc.) Regulations 2010, which came into force on October 1<sup>st</sup> 2010, and apply to England. A separate system of building control applies in Scotland, Northern Ireland and Wales. The 2010 Regulations in both cases consolidate the Building Regulations 2000 and the Building (Approved Inspectors etc.) Regulations 2000. Incorporating amendments since 2000. The Building Regulations are very short, contain no technical details and are expressed as functional requirements and are difficult to interpret or understand. For this reason, the department for Communities and Local Government publishes guidance on meeting the requirements in a series of documents known as 'Approved Documents'.

#### **1.5 Approved Documents**

The Approved Documents are intended to provide guidance on how to achieve the requirements of the building regulations and make reference to other guidance and standards. In themselves the Approved Documents are not mandatory and there is no obligation to adopt any particular solution contained within them if it can be achieved in some other way. In all cases it is the responsibility of the designer, applicant/owner and contractor to ensure the works are carried out in compliance with the building regulations. The current Approved Documents relevant to drainage and flood risk are listed below and are available to view on the Department for Communities and Local Government web site: [www.communities.gov.uk](http://www.communities.gov.uk), or to purchase from The Stationary Office (TSO) on line at [www.tsoshop.co.uk](http://www.tsoshop.co.uk) or telephone: 0870 600 5522.

##### **Relevant Approved Documents and sections they cover:**

**C: Site preparation and resistance to contaminants and moisture (2004 edition with 2010 and 2013 amendments);**

**H: Drainage and waste disposal (2015 edition);**

## **Regulation 7: Materials and workmanship (2013 edition).**

Reproduced/modified details: The details in this guidance have been reproduced/modified from the details contained in the Approved Documents providing an interpretation of them and also incorporating additional information not contained within the Approved Documents. None of the values contained within the Approved Documents have been changed. For each table and diagram used or modified in this guidance, only the more common values and information have been reproduced and the reader should fully refer to the Approved Documents.

Abbreviations: References made in this guidance to Approved Documents are abbreviated as AD, for example, reference to Approved Document A: Structure (2004 edition with 2010 amendments) will be abbreviated to ADA.

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[www.direct.gov.uk/en/SiteInformation/DG\\_020460](http://www.direct.gov.uk/en/SiteInformation/DG_020460)

### **1.6 Other ways of satisfying the building regulation requirements**

The building regulation requirements may be satisfied in other ways or non-standard ways by calculations or test details from a manufacturer or an approved third party method of certification such as a British Board of Agreement (BBA or other third party accredited) Certification.

## **Part 2: Flood risk**

Please refer fully to ADC: Site preparation and resistance to moisture (2004 edition with 2010 and 2013 amendments)

### **2.1 Flood risk (See Paragraph 0.8 of ADC)**

Policies set out in the National Planning Policy Framework (March 2012) aim to avoid inappropriate development in areas at risk of flooding, requiring new development to be flood resilient and resistant as and where appropriate.

Flood resistance is not currently a requirement in Schedule 1 of the Building Regulations 2010 (and amendments). However, when local considerations necessitate buildings in flood prone areas the building can be constructed to mitigate some effects of flooding such as:

- a.** Elevated groundwater levels or flow of subsoil water across the site - this can be alleviated by the provision of adequate sub-soil drainage in accordance with Section 3 of ADC.
- b.** Sewer flooding due to backflow or surcharging of sewers or drains - this can be addressed through the use of non-return valves and anti-flooding devices (See Paragraph 3.6; Section 3 of ADC).
- c.** Intrusion of ground water through floors - this can be addressed through the use of water resistant construction (See Paragraphs 4.7 to 4.12; Section 4 of ADC).
- d.** Entry of water into floor voids - provision to inspect and clear out sub-floor voids can be considered (See Paragraph 4.20; Section 4 of ADC).

Further information on flood resistant and resilient construction can be found in the publication 'Improving the flood performance of new buildings - Flood resilient construction' obtainable from: Communities and Local Government, Defra and the Environment Agency (May 2007).

## Part 3: Drainage requirements for domestic extensions and single dwellings

Please refer fully to ADH: Drainage and waste disposal (2015 edition)

### H1: Foul water drainage

#### Foul water drainage systems

An adequate system of foul water drainage shall be provided to carry foul water from appliances within the building to one of the following, listed in order of priority:

- (i) **public sewer**, or where that is not reasonably practicable,
- (ii) **private sewer**, or where that is not reasonably practicable,
- (iii) **sewage treatment system**, or where that is not reasonably practicable,
- (iv) **septic tank**, or where that is not reasonably practicable,
- (v) **cesspool** - all as detailed in this guidance.

Small developments should connect to a public sewer if they are within 30m of a public sewer wherever it's reasonably practical in accordance with paragraphs 2.3-2.7 of ADH (ADH1).

#### Important notes:

1. New surface/rainwater system must (unless agreed by the planning department) be separate from the foul water or combined sewer system. Written consent will also be required from the relevant Water Authority.
2. Foul water drainage system and disposal should be indicated on plans submitted to the planning department for approval.

#### Surcharging of drains

Prevention of the surcharging of drains to be carried out in accordance with paragraphs 2.8-2.12 of ADH1.

#### Layouts

Drainage layouts to be carried out in accordance with paragraphs 2.13-2.21 of ADH1. All connections should be made using proprietary prefabricated components and connected obliquely or in the direction of flow. Drainage systems (including those fitted with intercepting traps on sealed systems - or systems subject to surcharging), are to be vented near to or at the head of the main drain using a 100mm diameter pipe (or discharge stacks) fitted with a proprietary vented guard and terminated at least 900mm above any openings into the building (not an air admittance valve).

Pipes to be laid at even gradients and any change of gradient or direction to be fitted with an access point (for example an inspection chamber). Pipes to be laid in straight lines or slight curves, bends (as large as possible) to be located in or close to inspection chambers, man holes and base of discharge stacks.

### **Rodent control**

Where necessary, rodent control to be carried out in accordance with paragraph 2.22 of ADH1.

### **Protection from settlement**

Drainage/services to incorporate adequate precautions to prevent excessive movement due to possible ground movement in shrinkable clay sub soils in accordance with paragraphs 2.23-2.26 and Diagrams 7 and 8 of ADH1, or design details from a suitably qualified specialist.

### **Depth of pipe cover**

UPVC pipes should be surrounded in a single size aggregate (size 5-10mm) at a minimum/maximum depth of 0.6/7.0m in fields, 0.9/7.0m in drives and roads in compliance with the guidance diagram 1 below. If minimum depths cannot be achieved, pipes can be protected with a 100mm reinforced concrete slab with compressible material under and 300mm minimum bearing on original ground in compliance with the guidance diagram 1 below.

### **Pumping stations**

Pumping stations and installation of pumping stations to be carried out in accordance with paragraphs 2.36-2.39 of ADH1, or design details from a suitably qualified specialist.

### **Materials for pipes and jointing**

Foul water drainage systems to comply with British standards, BBA certification (or other approved accreditation), installed in accordance with manufacturer's details.

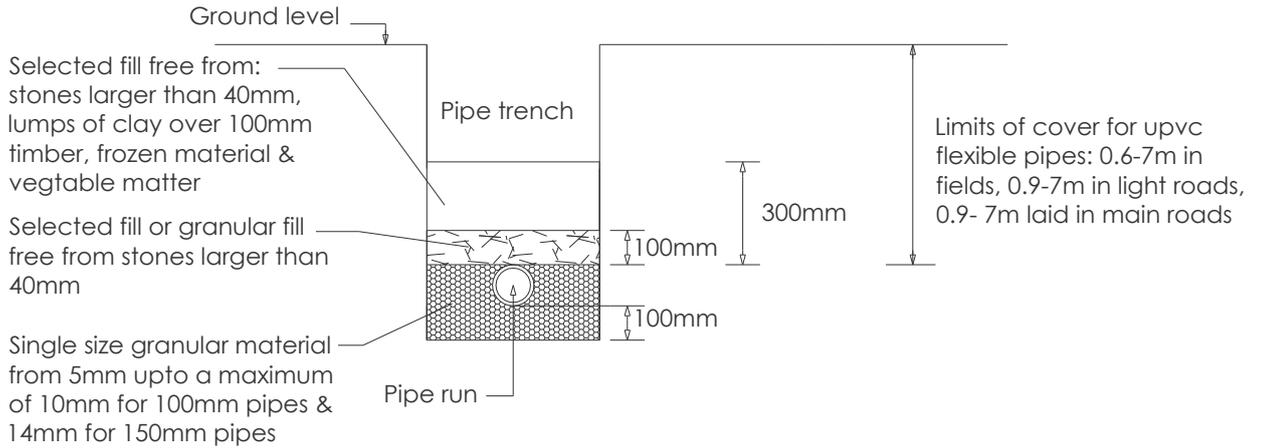
### **Pipe gradients and sizes**

100mm minimum diameter pipes to be laid at a minimum gradient of 1:40 (or 1:80 where serves one or more wc). 150mm diameter pipes to be laid at a minimum gradient of 1:150.

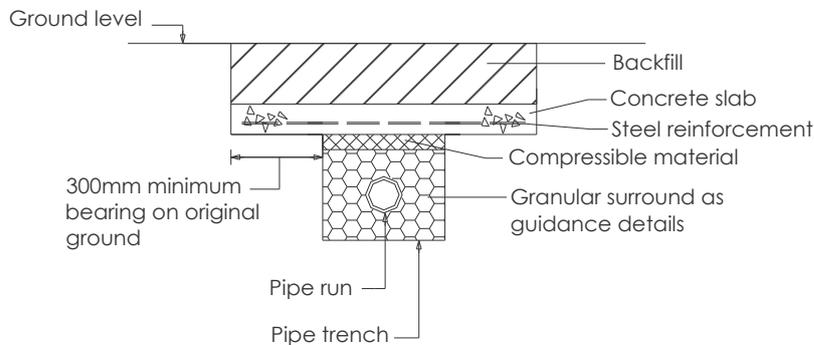
### **Bedding and backfilling requirements for rigid and flexible pipes**

Rigid UPVC pipes should be bedded and surrounded in a single size aggregate (size 5-10mm). Vitrified clay, concrete and iron pipes to be laid in accordance with manufacturer's details. See Diagram 10 of ADH1 for full details.

**Guidance Diagram 1: Typical bedding detail for flexible pipes (not to scale)**



**Guidance Diagram 2: Typical protection detail for pipes laid at shallow depths (not to scale). See Diagram 11 of ADH1 for full details.**



**Pipes penetrating through walls**

Pipes penetrating through walls should have joints formed within 150mm of either wall face, with 600mm maximum length adjacent rocker pipes fitted both sides with flexible joints, or alternatively lintels provided above openings through walls to give 50mm clear space around pipes and openings in-filled with inert sheet material and sealed to prevent ingress of fill, vermin and radon gas.

**Drain trenches near buildings**

Trench excavations for pipe runs located within 1.0m of buildings which extend below the level of the existing foundations should have trenches backfilled with concrete up to the underside of the existing foundations. Trench excavations for pipe runs located more than 1.0m from buildings which extend below the level of the existing foundations should have trenches backfilled with concrete up to the underside of the existing foundations less 150mm.

**Inspection chambers and gullies**

Proprietary UPVC 450mm diameter inspection chambers to be provided at all changes of level and or direction and at 45m maximum spacing in straight runs up to 1.2m in depth. Other access fittings and rodding eyes to be in accordance with the guidance table below. All gullies to be trapped and have rodding access where serving branches. Inspection chamber covers to be single sealed to prevent odours, mechanically fixed and suitable for loadings in accordance with BS EN 124: (Ductile iron: Class A15 for light duty - suitable for pedestrians and pedal cyclists;

Class B125 for medium duty - suitable for driveways and pedestrian areas; Class C250 for heavy duty - suitable for car parks; Class D400 for heavy duty - suitable for use in main roads and carriageways). Covers and frames in buildings to be double sealed with air tight bolt down covers and frames in accordance with manufacturer's details.

### Guidance Table 1: Minimum dimensions for access fittings and inspection chambers

(See Table 11 of ADH1 for full details)

Type of fitting	Depth to invert from cover level (m)	Internal sizes		Cover sizes	
		Length x Width (mm)	Circular (mm)	Length x Width (mm)	Circular (mm)
<b>Rodding access</b>	n/a	As drain but min 100	n/a	n/a	Same size as Pipework <sup>1</sup>
<b>Access fitting</b>					
Small : 150 diam 150 x 100	0.6 or less except where situated in a chamber	150 x 100	150	150 x 100 <sup>1</sup>	Same size as access fitting
Large: 225 x 100	0.6 or less except where situated in a chamber	225 x 100	225	225 x 100 <sup>1</sup>	Same size as access fitting
<b>Inspection chamber</b>					
Shallow	0.6 or less 1.2 or less	225 x 100 450 x 450	190 <sup>2</sup> 450	Min 430 x 430	190 <sup>1</sup> 450
Deep	Greater than 1.2	450 x 450	450	Max 300 x 300 <sup>3</sup>	Access restricted to max 350 <sup>3</sup>
<b>Notes:</b>					
<sup>1</sup> The clear opening may be reduced by 20mm in order to provide proper support for the cover and frame					
<sup>2</sup> Drains up to 150mm diameter					
<sup>3</sup> A larger clear opening cover may be used in conjunction with a restricted access. The size is restricted for health and safety reasons to deter entry					

### Guidance Table 2: Minimum dimensions for manholes

(See Table 12 of ADH1 for full details)

Type	Size of largest pipe (DN) (mm)	Min internal dimensions <sup>1</sup>		Min clear opening size <sup>1</sup>	
		Rectangular length and width (mm)	Circular diameter (mm)	Rectangular length and width (mm)	Circular diameter (mm)
<b>Manhole</b>					
Less than 1.5m deep to soffit	Equal to or less than 150 225 300 Greater than 300	750 x 675 <sup>1</sup> 1200 x 675 1200 x 750 1800 x (DN+450)	1000 <sup>1</sup> 1200 1200 The larger of 1800 or (DN+450)	750 x 675 <sup>2</sup> 1200 x 675 <sup>2</sup>	n/a <sup>3</sup>
Greater than 1.5m deep to soffit	Equal to or less than 225 300 375-400 Greater than 450	1200 x 1000 1200 x 1075 1350 x 1225 1800 x (DN+775)	1200 1200 1200 The larger of 1800 or (DN+775)	600 x 600	600
<b>Manhole shaft<sup>4</sup></b>					
Greater than 3.0m deep to soffit pipe	Steps <sup>5</sup>	1050 x 800	1050	600 x 600	600
	Ladder <sup>5</sup>	1200 x 800	1200	-	-
	Winch <sup>6</sup>	900 x 800	900	600 x 600	600
<b>Notes</b>					
1. Larger sizes may be required for manholes on bends or where there are junctions					
2. May be reduced to 600 x 600 where required by highway loading considerations, subject to a safe system of work being specified.					
3. Not applicable due to working space needed					
4. Minimum height of chamber in shafted manhole 2m from benching to underside of reducing slab					
5. Min clear space between ladder or steps and the opposite face of the shaft should be approximately 900mm					
6. Winch only- no steps or ladders, permanent or removable					

7. The minimum size of any manhole serving a sewer (i.e. any drain serving more than one property) should be 1200mm x 675mm rectangular or 1200mm diameter

**Guidance Table 3: Maximum spacing of access points in metres**  
(See Table 13 of ADH1 for full details)

From	To access fitting				
	Small	Large	Junction	Inspection chamber	Manhole
Start of external drain <sup>1</sup>	12	12	-	22	45
Rodding eye	22	22	22	45	45
Access fitting: Small 150 diam and 150 x100	-	-	12	22	22
Large 225 x100	-	-	45	22	45
Inspection chamber shallow	22	45	22	45	45
Manhole and inspection chamber deep	-	-	-	45	90 <sup>2</sup>
<b>Notes:</b>					
1. Stack or ground floor appliance					
2. May be up to 200 for man-entry size drains and sewers					

### Foul water disposal

Foul water should be discharged into new or existing foul water drainage facilities using existing or new inspection chamber connection as shown on plans/ specification, or as agreed with building control on site.

Foul drainage systems to low lying buildings or basements which carry storm water or other vulnerable drainage systems should be provided with anti flood protection such as one way valves, etc, to prevent flooding and sewage entering the building.

### Waste pipes

All wcs to have trapped outlet connected to 100mm diameter pipes. Sanitary appliances such as wash hand basins, baths, showers, sinks etc, to be provided with waste pipes laid to falls and fitted with traps sizes as stated in the guidance table below. Where waste pipe runs exceed 4m British Board of Agreement (BBA or other third party accredited) air admittance valves are to be fitted above appliance spill over level. Waste pipes to either discharge below trapped gully grating or into soil and vent pipes via proprietary waste manifolds or bossed junctions. Internally all waste and drainage pipes to have rodding access/eyes at changes of direction and be adequately clipped/supported and provided with 30 minutes fire protection where passing through floors.

**Guidance Table 4: Waste pipe and trap design limits**

See Tables 1 and 2 of ADH1 for full details

Appliance	Minimum diameter of pipe and trap (mm)	Depth of trap Seal (mm)	Slope of pipe (mm/m)	Maximum length of Pipe to stack (m)
Sink	40	75	18 to 90	3 (increased to 4 for 50mm diam pipe <sup>1</sup> )
Bath	40	50	18 to 90	3 (increased to 4 for 50mm diam pipe)
WC	100	50	18	6-8 for single wc
Washbasin	32	75 <sup>2</sup>	120/0.5 80/0.75 50/1.0 35/1.25	1.7 (increased to 3 for 40mm diam pipe <sup>1</sup> )

			25/1.5 20/1.75	
Notes:				
1. Trap sizes should not be increased - only the pipe sizes - commencing 50mm beyond tail of trap				
2. Depth of seal may be reduced to 50mm only with flush grated wastes without plugs on spray tap basins				

**Soil and vent pipes (discharge stack)**

To consist of UPVC proprietary above ground drainage system, sized in accordance with the table below. Discharge stack is normally installed internally through the building in sound insulated boxing as guidance details and fitted with proprietary flashing system through the roof or vent tile, or alternatively soil and vent pipe fixed externally in accordance with manufacturer's details. A ventilated stack should terminate 900mm minimum above any opening into the building that is within 3.0m of the stack and fitted with a proprietary grilled vent cap. An open soil and vent pipe should always be fitted wherever possible at the head of the drainage system, particularly where a septic tank or sewage treatment system is installed.

**Guidance Table 5: Minimum diameters for discharge stacks**

See Table 3 of ADH1 for full details

Stack size (mm)	Maximum capacity (liters/sec)
50*	1.2
65*	2.1
76**	3.4
90	5.3
100	7.2
<b>Key:</b>	
*No wcs	
**Not more than 1 wc with outlet size < 80mm	

**Waste pipe connections to soil and vent pipes (discharge stack) - to prevent cross flow**

- (i) **Waste pipes up-to 65mm diameter** - opposed pipe connections (without swept entries) should be offset at least 110mm on a 100mm diameter stack and 250mm on a 150mm diameter stack, at a radius of 25mm or angle of 45 degrees - or alternatively a proprietary manifold fitted in accordance with manufacturer's details.
- (ii) **Waste pipes over 65mm diameter** - opposed pipe connections (with swept entries) should be offset at least 200mm irrespective of stack diameter (no connections are allowed within this 200mm zone), at a radius of 50mm or angle of 45 degrees. Unopposed connections may be at any position.
- (iii) **Lowest waste pipe connection to soil and vent pipe** - 450mm minimum distance is required between centre line of waste pipe connection to soil and vent pipe and invert level of below ground drain, ensuring a 200mm minimum radius bend connects the soil and vent pipe to the drain.

**Stub stacks**

To consist of 100mm diameter UPVC proprietary above ground drainage system, with wash basins/sinks connected to the sub stack within 2.0m of the invert level of the drain and the wc floor level is to be within 1.3m of the invert level of the drain.

### **Air admittance valves**

Proprietary air admittance valves fitted to sub stacks or soil and vent pipes should comply with BS EN 12380 and be installed in accordance with manufacturer's details, and valve is to be located above the spillover level of the highest appliance i.e. wash basin or sink. Valves installed internally should be located in sound insulated boxing, accessible for maintenance and clearance of blockages etc. and fitted with 225 x 75mm louvered vent. Valves should not be installed in dusty environments. An open vent should always be fitted wherever possible at the head of the drainage system, particularly where a septic tank or sewage treatment system is installed.

### **Pumping installations**

Where gravity drainage is impractical, or protection is required against flooding due to surcharging in downstream sewers, pumped drainage solutions may be required - subject to building control approval.

Proprietary packaged pumping systems to consist of a watertight GRP/polyethylene chamber, lockable pedestrian/vehicle covers, pumps, high level alarm, preset automatic level control, float switch, non-return valve, discharge pipe and connections etc. Domestic sewage pump sets located within buildings should conform to BS EN 12050, designed in accordance with BS EN 12056-4 and installed in accordance with manufacturer's details. Domestic sewage pump sets located outside buildings should be designed in accordance with BS EN 752-6 and installed in accordance with manufacturer's details. Pumped installations must contain 24 hours inflow storage. The minimum daily discharge of foul drainage should be taken as 150 litres per person per day for domestic use. Auto-changeover duty/standby duplex (twin pumps) pump stations may be accepted as an alternative to 24 hours storage subject to approval by building control.

### **Air tightness and testing**

Pipes, fittings and joints should be capable of withstanding an air test of positive pressure of at least 38mm water gauge for at least 3 minutes. Every trap should maintain a water seal of at least 25mm. Smoke testing should be used to identify defects where water test has failed. Note: smoke testing is not recommended for UPVC pipes.

## **H2: Septic tanks, sewage treatment systems and cesspools**

### **Existing septic tank and effluent drainage**

Where additional drainage effluent is to be connected to the existing septic tank/treatment system, it should be checked by specialist and sizes/condition of tank/system to be confirmed as suitable for treatment of additional effluent.

### **Non mains foul drainage waste water treatment systems**

Non mains drainage systems are to be used only where connection to the mains drainage system is not possible. Either a septic tank or sewage treatment system is to be installed as to suit specific ground conditions as agreed with Building Control. No septic tank/sewage treatment system and associated tertiary (secondary) treatment is permitted by the Environment Agency in prescribed Zone 1 ground water source protection zones. Where no other option is feasible, the installation of a cesspool is to be agreed with Building Control and the Environment Agency.

### **Septic tanks**

Septic tanks to consist of a watertight chamber (watertight from both sides to prevent the ingress of water and contain the effluent). The sewage is liquefied by anaerobic bacteria action in the absence of oxygen assisted by the natural formation of a surface scum or crust. Sludge settlement at the base of the tank must be removed annually (or more frequently if required). Discharge from tanks is to be taken to drainage fields, drainage mounds or wetlands/reed beds for secondary treatment as detailed in the guidance below.

Proprietary factory made septic tanks to be designed and constructed to BS EN 12566 and installed in accordance with manufacturer's details, or

Non proprietary septic tanks constructed in situ to be designed and constructed to a drainage specialist's design and approved by Building Control before the works commence on site. Typically, the tank consists of two chambers (the first being twice as large as the second) constructed using 150mm minimum thick reinforced concrete base C25P mix to BS 5328, 220mm thick engineering quality brickwork walls (or concrete), mortar mix 1:3 cement/sand ratio with water proof rendering or suitable proprietary tanking system applied to both sides and designed heavy concrete roof structure. 100mm diameter inlet and outlet 'dip pipes' is required and designed to prevent disturbance of the surface scum, inlet pipe laid at a flatter gradient for at least 12 metres before it enters the tank.

Septic tanks to be fitted with durable lockable lids or covers for emptying and cleaning, and inspection chamber fitted on the discharge side of tank for sampling of the effluent.

Septic tanks to be sited at least 7m from any habitable part of any building, preferably down slopes, within 30m of a suitable vehicle access for emptying and cleaning sludge which must not be taken through a dwelling or place of work and must not be a hazard to the building occupants. If the tank invert is more than 3.0m the 30m distance should be reduced.

Septic tank should have a minimum capacity of 2,700 litres for up to 4 users and increased by 180 litres for each additional user. (Recommended minimum size of septic tank to be 3,800 litres to accommodate discharges from washing machines/dishwashers etc). A notice plate must be fixed within the building and include the following information: address of the property; location of the treatment system; description of the septic tank and effluent drainage installed; necessary maintenance to be carried out (including monthly checks of the apparatus and emptying of the tank every 12 months by a licensed contractor) and a statement that the owner is legally responsible to ensure that the system does not cause pollution, health hazard or nuisance.

Consultations are to be carried out with Building Control and The Environment Agency before any works commence on site. It is the Occupier's responsibility to register the effluent discharge as an exempt facility with the Environment Agency for discharges of 2m<sup>3</sup> or less per day to the ground from a septic tank, or obtain an Environmental Permit from the Environment Agency. Septic tanks must not discharge to a water course. For more information contact the Environment Agency at: [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

### **Sewage treatment systems**

Proprietary sewage treatment systems treat sewage by an accelerated (aerobic) process to higher standards than that of septic tanks, and are to be factory made, designed and constructed to BS EN 12566, be installed and maintained in accordance with the manufacturer's details and fitted with a uninterruptible power supply (or 6 hours power back up). Note: only treatment systems suitable for intermittent use should be used for holiday lets or similar uses where the system is unused for periods of time.

Sewage treatment system to be sited at least 7m from any habitable part of any building, preferably down slopes, within 30m of a suitable vehicle access for emptying and cleaning sludge which must not be taken through a dwelling or place of work and must not be a hazard to the building occupants. If the tank invert is more than 3.0m the 30m distance should be reduced.

Sewage treatment system should be designed to British Water design criteria based on the maximum occupancy of the property, and the final effluent quality requirements of the Environment Agency.

Discharges from sewage treatment systems can be taken to a water course or alternatively a designed drainage field, drainage mound, wetlands or reed beds as detailed below.

A notice plate must be fixed within the building and include the following information: address of the property; location of the treatment system; description of the sewage treatment system and effluent drainage installed; necessary maintenance to be carried out in accordance with the manufacturer's details and a statement that the owner is legally responsible to ensure that the system does not cause pollution, health hazard or nuisance.

Consultations should be carried out with Building Control and The Environment Agency before any works commence on site. It is the Occupier's responsibility to register the effluent discharge as an exempt facility with the Environment Agency for discharges of 5m<sup>3</sup> or less per day to a surface water course or 2m<sup>3</sup> or less per day to the ground from a sewage treatment system, or to obtain an Environmental Permit from the Environment Agency. For more information contact the Environment Agency at: [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

### **Disposal of sewage from septic tanks and sewage treatment systems**

#### **Drainage fields**

Drainage fields consist of irrigation pipes laid below ground allowing partially treated effluent to percolate into the ground and further biological treatment to take place in the aerated soil layers. Construction of drainage fields to be carried out as tank/system manufacturer's details and BS6297:2007 + A1:2008. See typical guidance section detail and drainage field layout below. The drainage field area is calculated from the percolation test results which should have a suggested minimum area of 30m x 0.6m wide subject to percolation test results and number of users and approved by Building Control before works commence on site. See below for percolation test procedure.

Drainage fields to be located 10m from any water course, 50m from any point of water abstraction, 15m from any building, 2m from any boundary and sufficiently far from any other drainage areas so the overall soakage capacity of the ground is not exceeded. Water supply pipes, access roads, drives or paved areas etc must not be located within the drainage areas. See diagram 1 of ADH2 for typical drainage field construction details.

### **Drainage mounds**

Drainage mounds consist of drainage fields constructed above the ground allowing further biological treatment of the partially treated effluent in the aerated soil layers. Drainage mounds to be used where there is a high water table level, impervious or semi water logged ground. Drainage mounds and drainage mound areas should be designed by a drainage specialist for particular ground problems and approved by Building Control before works commence on site. See diagram 2 of ADH2 for typical drainage mound construction details.

Drainage fields and drainage mounds to be located 10m from any water course, 50m from any point of water abstraction, 15m from any building, 2m from any boundary and sufficiently far from any other drainage areas so the overall soakage capacity of the ground is not exceeded. Water supply pipes, access roads, drives or paved areas etc must not be located within the drainage areas. See diagram 1 of ADH2 for typical drainage field construction details.

### **Wetlands/reed beds**

In situations where additional treatment is required, wetland treatment systems consisting of manmade reed beds can be constructed as either vertical or horizontal flow reed bed systems (see Diagrams 3 and 4 of ADH2 for full details) for the purification of the partially treated effluent by filtration, biological oxidization, sedimentation and chemical precipitation as the partially treated effluent passes through gravel beds and root systems of wetland plants. Wetlands should not be constructed in shaded, windblown or severe winter areas. Vertical or horizontal flow wetland treatment systems should be designed by a drainage specialist for particular ground problems and approved by Building Control before works commence on site.

A notice plate must be fixed within the building and include the following information: address of the property; location of the treatment system; description of the sewage treatment system and effluent drainage installed; necessary maintenance to be carried out in accordance with the drainage specialist's details and a statement that the owner is legally responsible to ensure that the system does not cause pollution, health hazard or nuisance.

### **Percolation tests for septic tanks**

A percolation test is required to calculate the area of a drainage field for a septic tank or sewage treatment system. A preliminary assessment of the site should be carried out including consultation with the Environment Agency and building control to determine the suitability of the site.

### **Ground conditions**

Ground conditions should be assessed to determine the suitability of sub soils. Examples of suitable sub soils with good percolation include sand, gravel, chalk,

sandy loam and clay loam. Examples of poor sub soils are sandy clay, silty clay and clay. It is important that percolation characteristics are suitable in both summer and winter conditions and that the sub soil is well drained and not saturated with water. A trial hole should be excavated 1.5m below the invert of the proposed effluent drainage pipe work to determine the position of the standing ground water table. The ground water level in summer and winter should be at least 1.0m below the invert of the effluent drainage pipe work.

### **Percolation test method**

Percolation tests should not be carried out in abnormal weather conditions such as heavy rain, severe frost or drought.

**Step 1:** Excavate a test hole 300mm square x 300mm deep below proposed invert level of the drainage field trench bottom.

**Step 2:** Fill the test hole with water and allow to drain away overnight.

**Step 3:** Refill to a depth of 300mm and note time taken in seconds to drain away from 75% full to 25% full (i.e. 150mm drop in level from 225mm to 75mm).

**Step 4:** Carry out the procedure a second and third time (can be in the same day if the hole empties completely and quickly enough).

**Step 5:** Repeat the procedure in two more test holes and calculate the average of the three results as follows:  $\frac{\text{test 1} + \text{test 2} + \text{test 3}}{3}$  = **average time taken for each test hole.**

**Step 6:** Find the average of these results as follows:  $\frac{\text{Hole 1} + \text{Hole 2} + \text{Hole 3}}{3}$  = **average time taken for all test holes.**

**Step 7:** Calculate the Vp (average time in seconds for the water to drop 1mm) as follows:

For example: If average time above took 2100 seconds

(i) Divide 2100 seconds by 150mm depth of water

(ii)  $\frac{2100}{150} = 14$  Vp\* (see note below\*)

(iii) Area of trench = number of persons to use property x Vp x 0.25 (0.25 figure is used for septic tanks and can be reduced to 0.20 for treatment systems).

Therefore: 5 persons x 14 x 0.25 = 17.5m<sup>2</sup> of effluent drainage field is required.

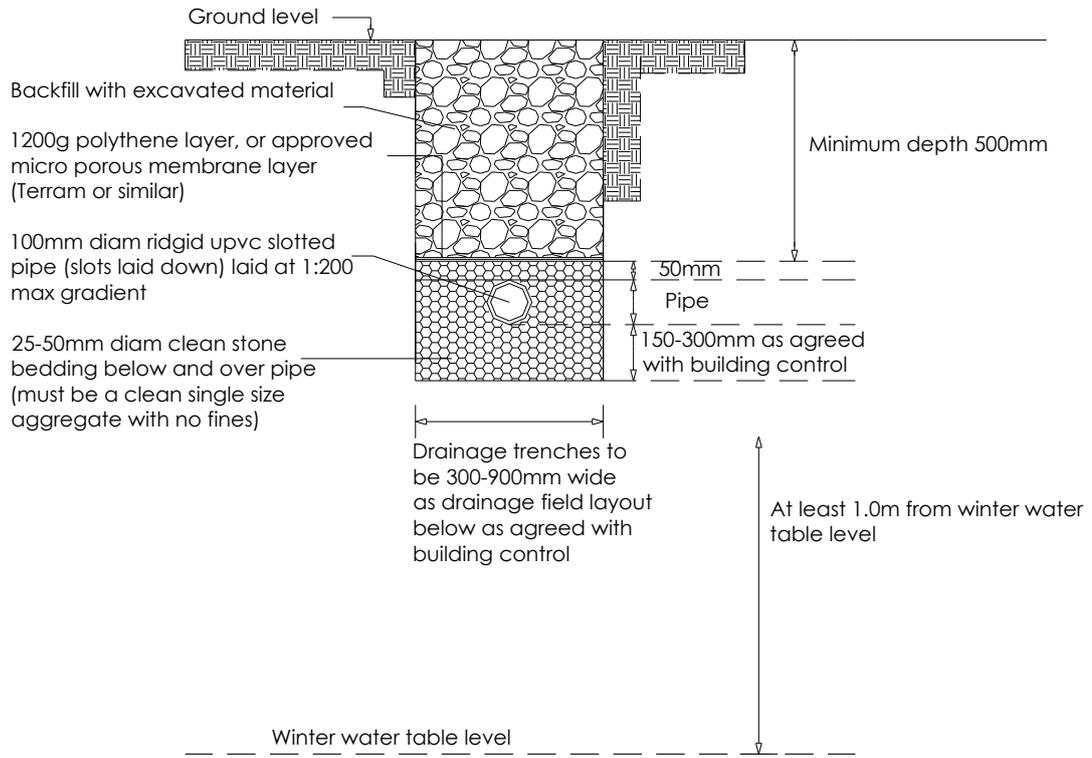
(iv) To calculate actual length of drainage trench required divide 17.5m<sup>2</sup> by width of the trench

Required, therefore:  $\frac{17.5\text{m}^2}{0.6\text{m wide}} = \mathbf{29.16}$  (**Suggested minimum area 30m long x**

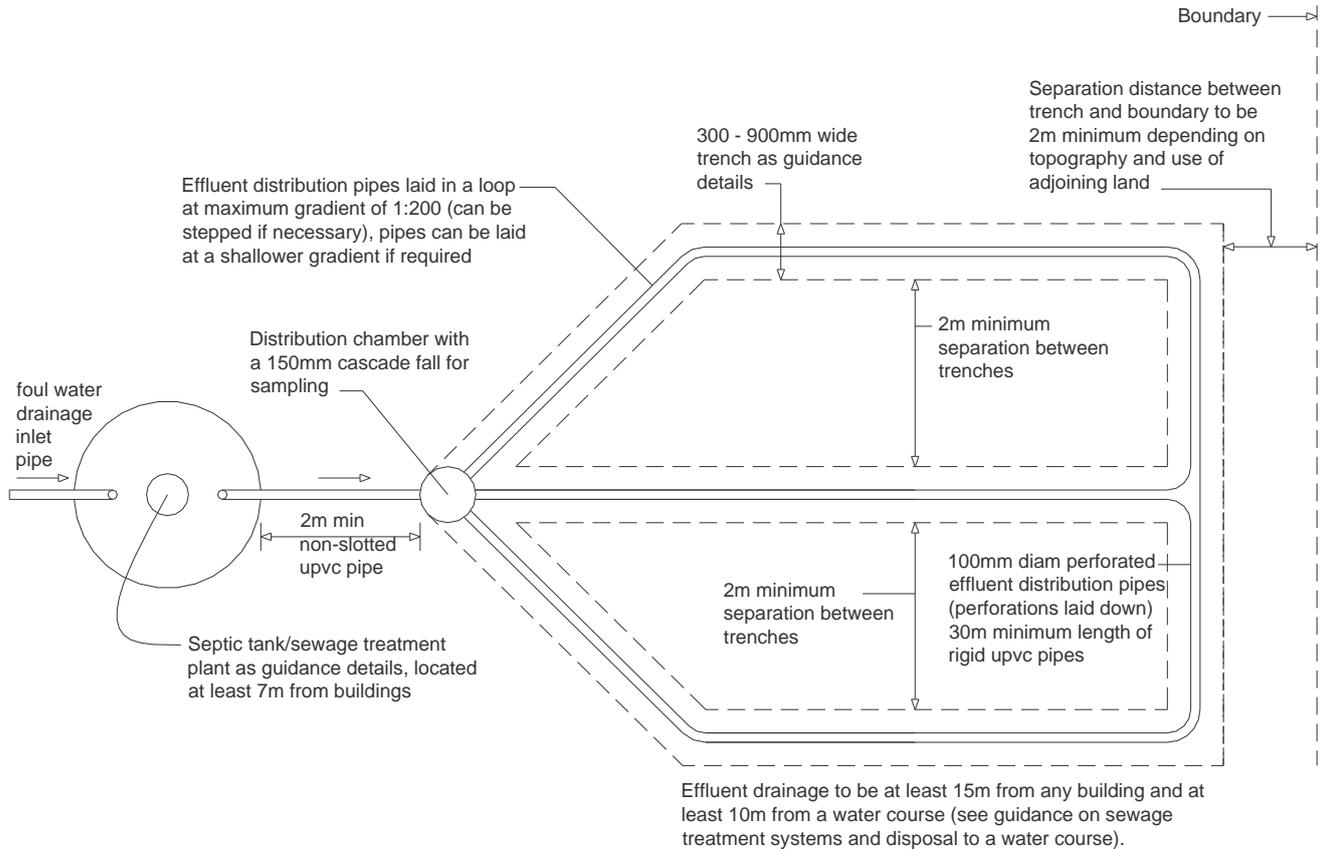
**0.6m wide**)

\* Vp should range between 12 and 100 to be successful; otherwise the system should be designed by a drainage specialist.

**Guidance Diagram 3: Typical section through a septic tank/sewage treatment system drainage field (not to scale).** See Diagram 1 of ADH2 for full details.



**Guidance Diagram 4: Typical drainage field plan layout (not to scale).**  
See Diagram 1 of ADH2 for full details.



### Cesspools

Cesspools are sealed watertight tanks used for the containment of domestic sewage and must be emptied regularly by a licensed contractor. Cesspools are

used in locations without main drainage in locations acceptable to the Environment Agency, where the discharge of treated effluent is not permissible due to unsuitable ground conditions, or where infrequent use or seasonal use would prevent the functioning of a septic tank or sewage treatment system.

Proprietary factory made cesspools to be designed and constructed to BS EN 12566-1 and installed in compliance with manufacturer's details, or

Non proprietary cesspool can be constructed in situ to a drainage specialist's design and approved by Building Control before the works commence on site. Cesspools to be watertight to prevent leakage of the contents and ingress of sub soil water. Typically the tank consists of one chamber constructed using 150mm minimum thick reinforced concrete base designed by a suitably qualified specialist suitable for storing aggressive effluents, 215mm thick engineering quality brickwork walls (or dense concrete bricks), bond to be agreed with building control, mortar mix 1:3 cement/sand ratio with water proof render or suitable proprietary tanking system applied to both sides and designed heavy concrete roof structure.

Cesspools to be ventilated and fitted with durable lockable lids or covers for emptying and cleaning, and the inlet side of tank should be fitted with a lockable access for inspection. No other openings are permitted. A high level alarm should be fitted for monitoring the cesspool for optimum usage.

Cesspools to be sited:

- At least 7m from any habitable part of any building, preferably down slopes and lower than any existing building and
- Within 30m of a vehicle access suitable for emptying and cleaning the effluent, and the contents should not be taken through a dwelling or place of work and must not be a hazard to the building occupants.

Cesspools should have a minimum capacity of 18,000 litres (18.0m<sup>3</sup>) for up to 2 users and increased by 6800 litres (6.8m<sup>3</sup>) for each additional user.

A notice plate must be fixed within the building describing the necessary maintenance and the following is an example of such wording:

- 'The foul drainage system from this property is served by a cesspool'
- 'The system should be emptied approximately every (insert frequency) by a licensed contractor and inspected fortnightly for overflow'
- 'The owner is legally responsible to ensure that the system does not cause pollution, a health hazard or a nuisance'

Consultations are to be carried out with Building Control and The Environment Agency before any works commence on site. Cesspools normally do not need registration with the Environment Agency as they are sealed systems with no discharge to the environment. For more information contact the Environment Agency at: [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

### **H3: Rainwater drainage and rainwater harvesting Rain and storm water drainage systems (single dwellings)**

An adequate system of rainwater drainage shall be provided to carry rainwater from roofs of the building and paved areas around the building to one of the following, listed in order of priority:

- (i) **adequate soak away** as detailed in this guidance (or similar approved filtration system) or where that is not practicable,
- (ii) **water course** or where that is not practicable,
- (iii) **a sewer** (note: discharge to a water course or sewer is subject to the relevant Water Authority's written approval).

**Important note: Rain water drainage detail and disposal (including soakaway positions and exceedance pathways) should be indicated on plans submitted to the planning department for approval.**

### Construction

Rain and storm drainage to consist of proprietary underground drainage system with BBA certification (or other approved accreditation), with 100mm minimum diameter pipes laid at a minimum gradient of 1:100. UPVC pipes should be surrounded in a single size aggregate (size 5-10mm) at a minimum/maximum depth of 0.6/7.0m in fields, 0.9/7.0m in drives and roads in compliance with the guidance diagram below. If minimum depths cannot be achieved, pipes can be protected with a 100mm reinforced concrete slab with compressible material under and 300mm minimum bearing on original ground in compliance with the guidance diagram below. Drainage/services to incorporate adequate precautions to prevent excessive movement due to possible ground movement in shrinkable clay sub soils in accordance with design details from a suitably qualified specialist.

### Bedding and backfilling requirements for rigid and flexible pipes

See Diagram 10 of ADH1 for full details.

### Rainwater gutters and down pipes

Rainwater gutters and down pipe sizes and number to be suitable for roof area to be drained in compliance with the guidance table below, and fixed in compliance with manufacturer's details. See H3 of ADH for further information.

### Guidance Table 6: Gutter sizes and pipe outlet sizes for drainage of roof areas

See Table 2 of ADH3 for full details

Maximum effective roof area m <sup>2</sup>	Gutter sizes (mm diam)	Outlet sizes (mm diam)
18.0	75	50
37.0	100	63
53.0	115	63
65.0	125	75
103.0	150	89

Note: The sizes above refer to half round gutters and round rain water pipes

### Rainwater harvesting system

Used for collecting and storing rainwater at source rather than allowing runoff. This can include runoff from within the boundaries of a property, roofs and surrounding surfaces.

### Rain water harvesting tanks

Rain water harvesting tanks and systems to be designed, installed, and commissioned by a specialist to supply rainwater to sanitary appliances. Below

drainage pipe work is to be carried out in accordance with the foul water pipe guidance details above. Overflow from the rain water storage tank is to discharge to a designed soakaway system constructed at least 5m from any building.

### **Rainwater butts**

Rainwater butts used to store rain water are to connect to the downpipe from the roof gutter. Modular designs of decorative water butts range in size from 100-200 litres and can be connected together to make a series and increase the water storage. Rainwater is diverted from the down pipe via a proprietary pre-filter and rainwater diverter kit which prevent the water butt from overflowing once the butt is full.

### **Grey water harvesting**

(Consisting of recycled bath, shower and basin waste water) systems designed for use within the building to be designed, manufactured, installed and commissioned by a suitably qualified and experienced specialist. Grey water to be treated prior to use in toilets etc by an approved method and overflow to discharge to the foul water drainage system.

Grey water and rainwater tanks and systems should:

- Prevent leakage of the contents, ingress of subsoil water and should be ventilated.
- Have an anti backflow device on any overflow connected to a drain or sewer.
- Have a corrosion proof locked access cover for emptying and cleaning.
- Supply pipes from the grey water or rain water collector tanks to the dwelling must be clearly marked as either 'GREY WATER' or 'RAIN WATER'.
- Guidance should be followed in particular 1.69-1.72 of App Doc H2, App Doc G of the Building Regulations and the Water Regulations Advisory Scheme Leaflet No: 09-02-04, and BS 8515:2009.

### **Surface water drainage around the building**

**Paths and paved areas:** around the building to have a non slip finish and provided with a surface cross fall of 1:40 – 1:60 to dispose of rain/surface water and a reverse gradient of at least 500mm away from walls of building (unless the paved/path area is a proprietary system designed to be porous and installed in accordance with manufacturer's details). Surface water to be disposed of by an adequately sized and roddable drainage system via soakaways, or other approved means. Alternatively paths and paved areas to be constructed of self-draining permeable materials (gravel etc) or a proprietary self-draining system with a BBA or other approved third party accreditation and installed in accordance with manufacturer's details.

**Driveways and hard standings:** to be constructed of self-draining permeable materials (gravel etc) or a proprietary self-draining system with a BBA or other approved third party accreditation and installed in accordance with manufacturer's details.

### **Rain/surface water disposal**

Rain/surface water to be piped away from buildings as detailed in guidance above and discharged in to new or existing surface water soakaway, storm water or combined storm/foul water drainage facilities using existing or new inspection

chamber connection as shown on plans/specification, or as agreed with building control on site. New connections to existing storm or combined storm/foul water systems may require consent from the relevant Water Authority before works commence on site. The new surface/rainwater system must (unless agreed by the planning department) be separate from the existing foul water or combined sewer system. Written consent will also be required from the relevant Water Authority.

Rain/surface water disposed of in a separate surface water sewer or combined sewer should be connected via trapped gullies, with inspection chamber positions as detailed in guidance for foul water drainage. Drainage systems to low lying buildings or basements which carry storm water or other vulnerable drainage systems should be provided with anti flood protection such as one way valves, etc, to prevent flooding and sewerage entering the building.

### **Existing soakaways**

Where additional rain/surface water systems are to be connected to the existing soakaway system, it should be checked by a specialist and sizes of the soakaway should be confirmed and agreed with building control as adequate for percolation into the ground.

### **New soakaways**

#### **1. For roof/paved areas less than 100m<sup>2</sup> and individual soakaways serving a single rainwater pipe and roof area less than 25m<sup>2</sup> the following is applicable:**

New surface water soakaway(s) to be designed, sited and constructed to provide adequate short term storage for rain/surface water and adequate percolation into the ground.

**Important note:** for soakaways serving a roof area exceeding 25m<sup>2</sup> up to a maximum area of 100m<sup>2</sup> and soakaways in clay sub soils or serving roof/paved areas exceeding 100m<sup>2</sup> see items 2 and 3 below.

#### **Siting of Soakaways:**

Soakaways should be sited:

- At least 5m from any buildings and 2m from boundaries and sloping away from the foundations of any building.
- On land lower than existing/new buildings.
- With an exceedance pathway to prevent flooding of existing/new buildings/land including any adjoining buildings/land. Note: Exceedance pathways should be provided from soakaways, or by linking soakaways together with an overflow to an acceptable exceedance area, for example, a driveway/road or other approved by the planning department.

#### **Types of soakaway**

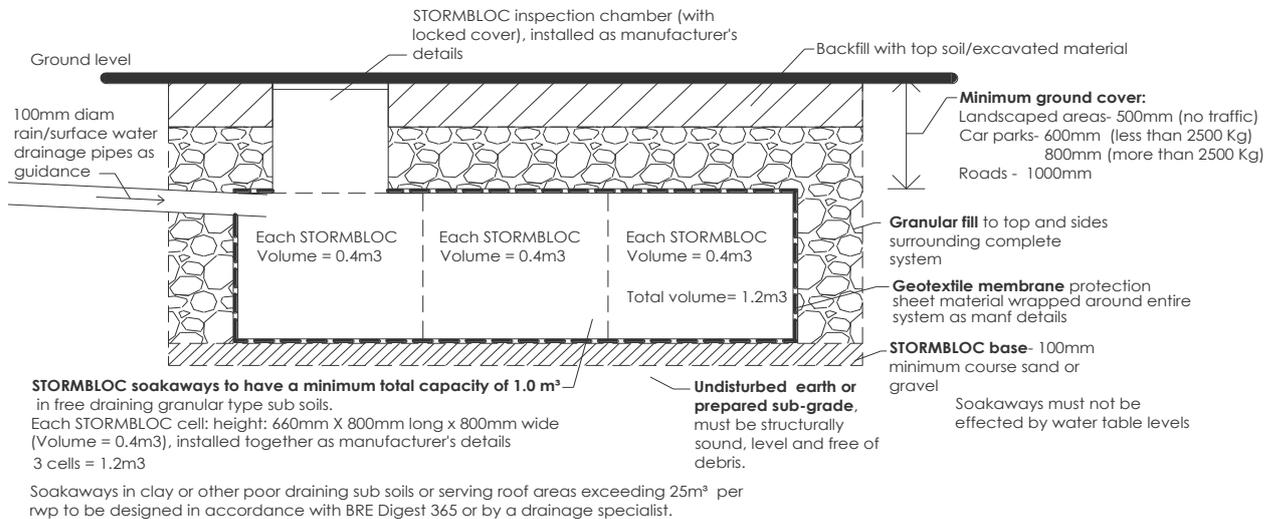
Three common options:

#### **Option 1: Geocellular (open cell plastic boxes) soakaway**

Individual geocellular soakaway to have a minimum void capacity of 1.0m<sup>3</sup> (constructed in free draining granular type sub soils), per rain water pipe serving a roof area up to 25m<sup>2</sup> - constructed using a proprietary underground modular block type geocellular structured system for infiltration, soakaway and storage of rain/storm/surface water, with a BBA/European certification (or other approved

third party accreditation), installed in accordance with the manufacturer's details, typically as detailed in the diagram below.

### Guidance Diagram 5: Typical 'Stormbloc' geocellular soakaway system (section detail not to scale)

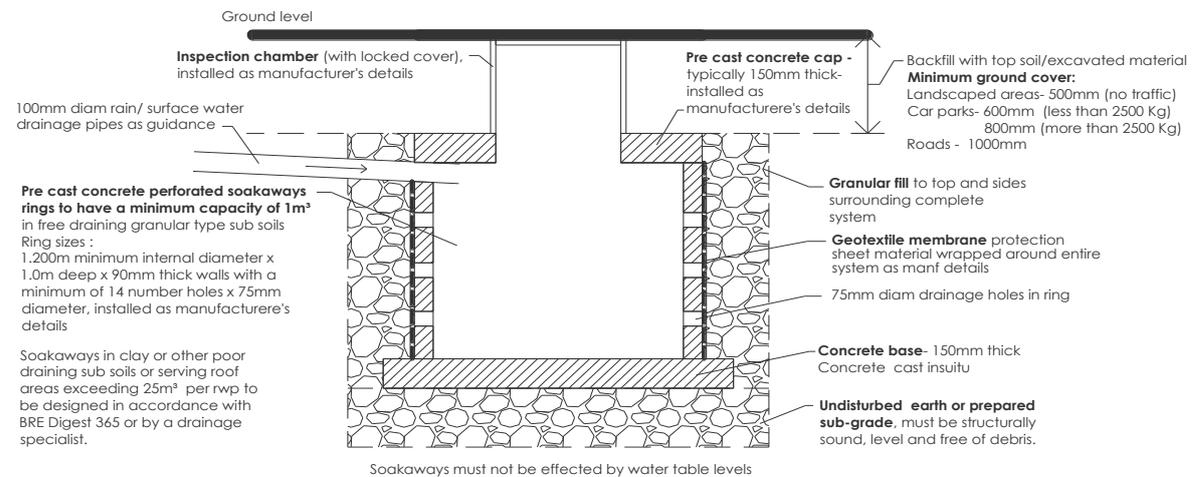


Stormbloc obtained from: Hydro International: [www.hydro-int.com](http://www.hydro-int.com) Tel: 01275 878371 [enquiries@hydro-int.com](mailto:enquiries@hydro-int.com)

### Option 2: Perforated precast concrete ring soakaway

Individual soakaway to have a minimum void capacity of 1.0m<sup>3</sup> (constructed in free draining granular type sub soils), per rain water pipe serving a roof area up to 25m<sup>2</sup> - constructed using a proprietary perforated precast concrete underground ring system for infiltration, soakaway and storage of rain/storm/surface water, with a BBA/European certification (or other approved third party accreditation), installed in accordance with the manufacturer's details, typically as detailed in the diagram below.

### Guidance Diagram 6: Typical 'Perforated precast concrete ring' soakaway system (section detail not to scale)

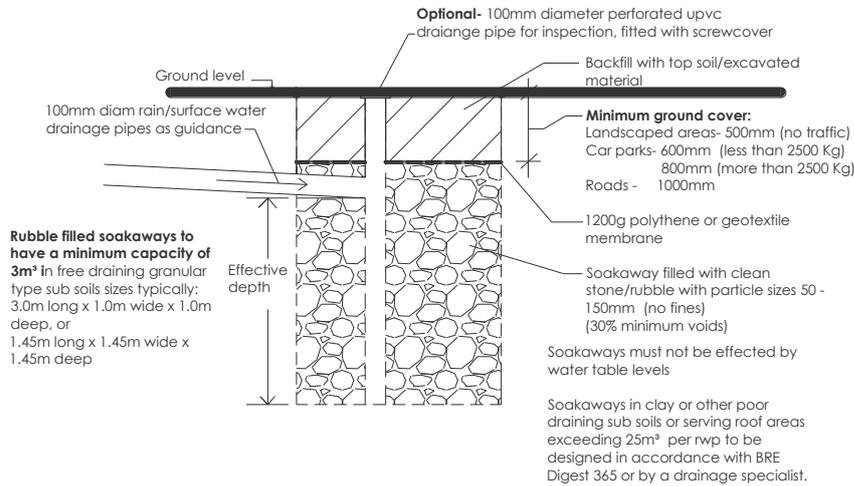


### Option 3: Rubble filled soakaway

1. Individual soakaway to have a minimum void capacity of 3.0m<sup>3</sup> (constructed in free draining granular type sub soils), per rain water pipe serving a roof area up

to 25m<sup>2</sup> - constructed of clean stone/rubble with particle sizes ranging in size from 50 to 150mm (30% minimum voids) and covered with polythene/geotechnical membrane with a BBA/European certification (or other approved third party accreditation), installed in accordance with the manufacturer's details, and top soil/excavated material - typically as detailed in the diagram below.

**Guidance Diagram 7: Typical 'Rubble filled' soakaway system (section detail not to scale)**



2. **Soakaways serving a roof area 25m<sup>2</sup> up to a maximum area of 100m<sup>2</sup>**  
To be designed in accordance with the soakaway design details below (following example 1 for actual roof area to be served - soakaway sizes must not be less than those stated above) or by a drainage specialist.
3. **Soakaways in clay sub soils or serving roof/paved areas exceeding 100m<sup>2</sup>**  
To be designed in accordance with BRE Digest 365 or by a drainage specialist.

**Rainwater/paved area soakaway design**

**Example 1: Roof area of 25m<sup>2</sup> extension to be drained to a 1.0m<sup>3</sup> soakaway\* filled with rubble with at least 30% voids. (\*Please note minimum soakaway size is to be 3.0m<sup>3</sup>)**

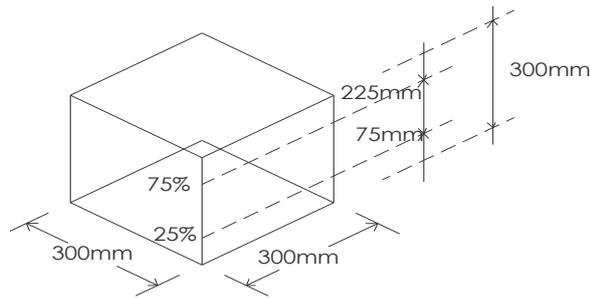
**Ground conditions**

Ground conditions should be assessed to determine the suitability of sub soils. Examples of suitable sub soils with good percolation include sand, gravel, chalk, sandy loam and clay loam. Examples of poor sub soils are sandy clay, silty clay and clay. It is important that percolation characteristics are suitable in both summer and winter conditions and that the sub soil is well drained and not saturated with water. A trial hole should be excavated 1.5m below the invert of the proposed effluent drainage pipe work to determine the position of the standing ground water table. The ground water level in summer and winter should be at least 1.0m below the invert of the effluent drainage pipe work.

**Percolation test**

Percolation tests should not be carried out in abnormal weather conditions such as heavy rain, severe frost or drought.

**Step 1: Excavate a test hole: 300mm square x 300mm deep below proposed invert level of the drainage field trench bottom.**



**Step 2: Calculate percolation of soil using formula:  $f = \frac{V_p}{a \times t}$**

Where:

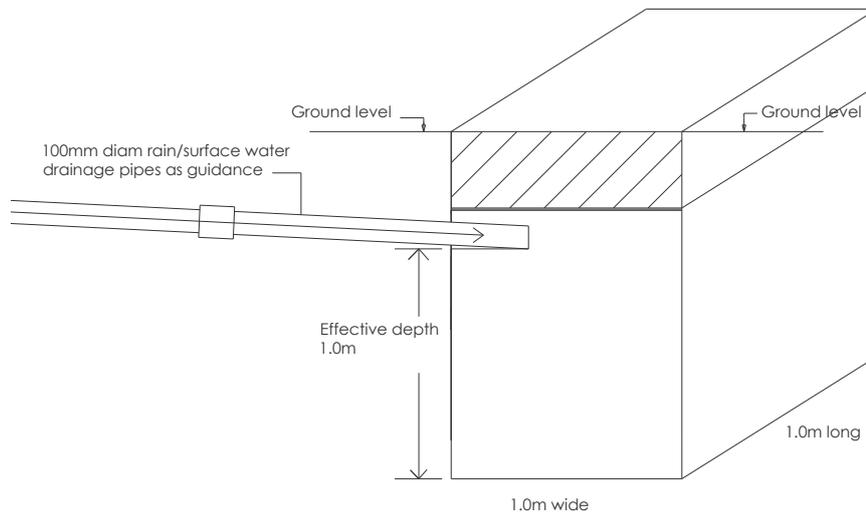
<b>f =</b>	<b>soil infiltration rate (meters/second)</b>
<b>V<sub>p</sub> =</b>	<b>volume of water measured between 75% to 25% of test hole (m<sup>3</sup>)</b> Calculated as follows: $0.3 \times 0.3 \times (0.225 - 0.075) = 0.0135 \text{ m}^3$
<b>a =</b>	<b>internal surface area of test hole (m<sup>2</sup>) (50% effective depth of sides + base)</b> Calculated as follows: $4 \text{ sides} \times 0.3 \times (50\% \text{ of } 0.3 = 0.15) + (0.3 \times 0.3) = 0.27 \text{ m}^2$
<b>t =</b>	<b>time taken for water to fall from 75% full to 25% full (in seconds)*</b> Calculated as follows: (i) Fill the test hole with water and allow to drain away overnight. (ii) Refill to a depth of 300mm and note time taken in seconds to drain away from 75% full to 25% full (i.e. 150mm drop in level from 225mm to 75mm). (iii) Carry out the procedure a second and third time (can be in the same day if the hole empties completely and quickly enough). (iv) Repeat the procedure in two more test holes and calculate the average of the three results as follows: $\frac{\text{test 1} + \text{test 2} + \text{test 3}}{3} = \text{average time taken for each test hole.}$ (v) Find the average of these results as follows: $\frac{\text{Hole 1} + \text{Hole 2} + \text{Hole 3}}{3} = \text{average time taken for all test holes.}$ (vi) For example: average time for (v) took 35 minutes $\times 60 = 2100 \text{ seconds.}$  * <b>Note:</b> Time taken should Between XXX and XXX to be successful; otherwise the system should be designed by a drainage specialist.
<p><b>Calculate the soil percolation using formula: <math>f = \frac{V_p}{a \times t}</math></b></p> <p style="text-align: center;"><math>f = \frac{0.0135}{0.27 \times 2100}</math></p> <p style="text-align: center;"><b><math>f = 0.0000238 \text{ m/s}</math></b></p>	

**Step 3: Calculate the Inflow using formula:  $I = A \times R$**

Where:

<b>I =</b>	<b>Inflow (m<sup>3</sup>)</b>
<b>A =</b>	<b>Actual area of impermeable roof/paved area to be drained (m<sup>2</sup>)</b> For example: actual roof area of new extension = <b>25m<sup>2</sup></b>
<b>R =</b>	<b>Total rainfall in design storm (m)</b> In accordance with Approved Document H3: 2015 edition - for soakaway up to 25m <sup>2</sup> a design rainfall of 10mm in 5 minutes is to be assumed Calculated as follows: $\frac{10\text{mm}}{1000} = 0.01\text{m}$
<p><b>Calculate the inflow using formula: <math>I = A \times R</math></b></p> <p style="text-align: center;"><math>I = 25 \times 0.01</math></p> <p style="text-align: center;"><b><math>I = 0.25 \text{ m}^3</math></b></p>	

**Step 4: Assume a soak away size: 1.5m below ground level with an effective depth of 1.0m (below inlet) x 1.0m wide x 1.0m long**



**Step 5: Calculate the Out flow using formula:  $O = a \times f \times d$**

Where:

<b>O =</b>	<b>Out flow (m<sup>3</sup>)</b>
<b>a =</b>	<b>internal surface area of proposed soakaway(m<sup>2</sup>) (50% effective depth of sides + base)</b> Calculated as follows: 4 sides x 1.0m x (50% of 1.0m = 0.5m) + (1.0x1.0m) = <b>3.0m<sup>2</sup></b>
<b>f =</b>	<b>Percolation (soil infiltration rate) (m/s)</b> See step 2: <b>f = 0.0000238 m/s</b>
<b>d =</b>	<b>Storm duration (seconds):</b> Calculated as follows: 5 minutes x 60 = <b>300 seconds</b>
<b>Calculate the Out flow using formula: <math>O = a \times f \times d</math></b> $O = 3 \times 0.0000238 \times 300$ <b><math>O = 0.02142 \text{ m}^3</math></b>	

**Step 6: Calculate the required stored volume using formula:  $S = I - O$**

Where:

<b>S =</b>	<b>Soakaway storage volume required (m<sup>3</sup>)</b>
<b>I =</b>	<b>Inflow (m<sup>3</sup>)</b> See step 3: <b>I = 0.25m<sup>3</sup></b>
<b>O =</b>	<b>Out flow (m<sup>3</sup>)</b> See Step 5: <b>O = 0.02142 m<sup>3</sup></b>
<b>Calculate the required stored volume using formula: <math>S = I - O</math></b> $S = 0.25 - 0.02142$ <b><math>S = 0.2285 \text{ m}^3</math></b>	

**Step 7: Check proposed soakaway with 30% voids will have sufficient capacity**

Required soakaway storage volume required in Step 6 = **0.2285 m<sup>3</sup>**  
Proposed soakaway sizes with 30% voids: 1.0m x 1.0m x 1.0m x 0.3 (30% voids) = **0.3m<sup>3</sup>**

**Therefore proposed soakaway is suitable - Note: minimum size of a rubble filled soakaway is 3.0m<sup>3</sup>**

**Oil/fuel separators**

Under the requirements of the Water Industries Act, it is an offence to discharge fuels into water courses, coastal water or underground water. Oil separators are required where fuel is stored or in other high risk areas or car parks and the Environment Agency has issued guidance on the provision of oil separators. For paved areas around buildings or car parks a bypass separator is required with a

nominal size of 0.0018 times the contributing area and silt storage area (in litres) equal to 100 times the nominal size.

In fuel storage areas and other high risk areas full retention separators are required with a nominal size equal to 0.018 times the contributing area and silt storage area (in litres) equal to 100 times the nominal size. Separators discharging to infiltration devices or surface water sewers should be class 1 (and capable of accommodating the whole content volume of one compartment of a delivery tanker).

Proprietary oil separators should be factory made, water proof, designed and constructed to the requirements of the Environment Agency, licensing authorities requirements (where the Petroleum Act applies), prEN858 and BBA certification or other approved accreditation). Separators must be installed and maintained in compliance with the manufacturer's details and inlet arrangements should not be direct to the water surface, adequate ventilation must be provided. The separator must be cleaned out and emptied regularly by a licensed contractor. See Appendix H3-A of ADH3 for further information

#### **Air tightness and testing**

To be carried out as for foul water drainage above.

### **H4: Building over or close to and connections to public sewers**

#### **Building over or close to a Public Sewer**

The Water Authority (WA) being the sewerage undertaker is responsible for maintaining public sewers and the owner/developer of a building being constructed, extended or underpinned within 3m of a public sewer (as indicated on the relevant WA sewer maps) is required to consult with the WA to ensure:

- (i) No damage occurs to the sewer. The extra weight of building being constructed, extended or underpinned above a sewer could cause the sewer to collapse, resulting in structural damage to the new building, interrupted drainage from other properties and wastewater flooding. In these instances the sewer will need to be repaired quickly and this may involve taking down the building.
- (ii) Suitable access is available to carry out any maintenance, repair or replacement works to the public sewer.
- (iii) Consent is obtained and an agreement is entered into to build close to or over the public sewer before works commence on site.

#### **Locating a public sewer**

Copies of the sewer record maps are held by the WA and Local Authority for the location of public sewers, and checks should be carried out at an early stage to ensure that the proposed works do not affect a public sewer.

#### **Options**

If you find that your plans could affect a public sewer, you should consult the relevant WA and discuss with them the following options:

- Avoiding the sewer through modifications of plans so that the building is at least 3 metres away from the sewer. This is often the easiest and cheapest option.

- Diverting the sewer. If the plans cannot be modified, the WA will usually require the sewer to be diverted. In most cases the diversion works are carried out at the property owner's expense, normally by contractors approved by the WA.

**The WA will not normally allow construction directly over a manhole or pressurized pumping main.**

### **The Build Over Process**

If the only option is to apply to build over a public sewer, the building owner should make an application to the WA who may allow them to build over a sewer, subject to the sewer being in satisfactory condition and their written Agreement before works commence.

### **Typical procedure:**

- A Closed Circuit Television (CCTV) survey is carried out by WA before works commence to ascertain whether any repair work is required.
- Another survey is required when the building is completed, to check that the sewer has not been damaged.
- In certain circumstances, if the building owner does not obtain the WA agreement, the WA has the right to discontinue the works, and take down the building erected over the public sewer.
- Consultations should be carried out early on in the design process to avoid any abortive costs, delays or other problems.
- The WA make a charge for applications.

### **Private Sewer Transfer Regulations**

Since the implementation of the Private Sewer Transfer Regulations on 1st October 2011, all lateral drains and sewers, i.e. those serving two or more properties that connect to the public sewer network, will be adopted by the relevant Water Authority/sewerage provider and the above requirements for building over/close to and/or making new connections to public sewers will apply. As these lateral drains and sewers may not yet show up on the sewer maps it is important that consultations with the WA are carried out at an early stage.

### **Protection**

Protection of the sewer pipes and systems are to be carried out in compliance with the WA requirements.

### **Further information**

Is available from the relevant Water Authority or [www.defra.gov.uk/environment/quality/water/sewage/sewers](http://www.defra.gov.uk/environment/quality/water/sewage/sewers) or [www.water.org.uk/home/policy/private-sewer-transfer](http://www.water.org.uk/home/policy/private-sewer-transfer)

### **Connections to public sewers**

Owners/developers of a building with new drainage connections or indirect drainage connections being made to a public sewer as indicated on the relevant Water Authorities sewer maps are required to consult with the WA and where necessary obtain consent before works commence on site.

### **H5: Separate systems of drainage**

The building owner/agent must carry out all necessary consultations with the

relevant Water Authority before works commence on site. Rain/surface water systems cannot be connected to foul water drains without the written permission of the relevant Water Authority. See H5 of ADH for further information.

## Part 4: Materials and workmanship

Please refer fully to AD: Regulation 7: Materials and workmanship (2013 edition)

### Materials and workmanship

All materials used for a specific purpose should be assessed for suitability using the following aids: (See AD: Regulation 7: Materials and Workmanship for full details)

- British Standards or European Standards (or other acceptable national and international technical specifications and technical approvals)
- Product Certification Schemes (Kite marks)
- Quality Assurance Schemes
- British Board of Agreement Certificates (BBA)
- CE marking under the Construction Products Regulations
- CE marking under other EU Directives and Regulations
- Local Authority National Type Approvals (System Approval Certification)
- In certain circumstances, materials (and workmanship) can be assessed by past experience, for example a building already in use - providing it is capable of performing a function for which it was intended - subject to building control approval.

All materials must be fixed in strict accordance with manufacturer's printed details. Workmanship should be in strict accordance with Regulation 7 and BS 8000: Workmanship on Building Sites: should be in compliance with Parts: 1 to 16. Where materials, products and workmanship are not fully specified or described, they are to be 'fit for purpose' stated or inferred and in accordance with recognized best practice. Testing to be carried out if required by building control to ensure workmanship is appropriate.

## Acknowledgements

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