

Soakaway design report

For the development at
**Abbotsmead Place, Caversham,
Reading, RG4 8BB**

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Scope

Note: this report can only be assessed under the scope it is intended for as set out below:

Town and Country Planning Act 1990

The scope of this report includes the provision of supplementary information in relation to a planning application set under the provision of this Act and is intended to meet the requirements for “particulars” under Section 62; (3) & (4 A) of same.

The Town and Country Planning (Development Management Procedure) (England) Order 2015

The scope of this report includes the provision of supplementary information in relation to any related planning Condition set under the provision of this Order and is intended to meet the requirements for “particulars” under Section 27(b) of same.

Building Act 1984

Building Regulations 2010 and Statute control

This report **is not** provided in support of any application made under the Building Act 1984 or related Regulations.

Statement of conformity

While this report cannot therefore be lawfully assessed by any persons, in any capacity, for compliance with the above Building Regulations all drainage on this private site, both foul and SW will be subject to full compliance with Part H of the Building Regulations 2010 (as amended 2013).

Hence all construction details, SW runs, pipe diameters etc. as detailed in this report are designed to comply in full with the “Adequate provision” Requirement of Part H and are to be checked, inspected, tested and approved by the Building Control Body of the clients choice at the time of detailed design and construction.

SuDS design additional standards

All SuDS (Sustainable drainage system) on site will also be designed and installed in accordance with CIRIA 753 & CIRIA 768, para 165 of the NPPF, its supporting technical guidance and the DEFRA Non-Statutory Technical standards for sustainable drainage systems (2015).

1 Introduction

1.1 Site location

The development is on land currently known as Abbotsmead Place, Caversham, Reading, RG4 8BB.

1.2 Proposed development description

The proposal is for a pair of flats within one building, see proposal plans at Appendix A. The development is Minor development.

1.3 Site geology

Ground investigation data to be submitted under separate cover.

1.3.1 Infiltration rates

Infiltration rates for the site are calculated as $2.0 \times 10^{-5} \text{ ms}^{-1}$ and $2.1 \times 10^{-5} \text{ ms}^{-1}$ (circa 72mm.hr^{-1}) following on-site testing to BRE 365 in two locations on site (A & B), as results at Appendix B.

1.3.2 Water table

Not found on site during site testing or seen in geotechnical data from the site.

1.4 Existing surface water disposal strategy

The site is greenfield and hence drains via natural process.

2 SuDS Principles

In line with the SuDS management train, the following hierarchy has been considered in applying the use of SuDS into the proposed development scheme.

2.1 SuDS design philosophy

The CIRIA SuDS^[1] manual provides the design philosophy:

“SuDS design should, as much as possible, be based around the following:

- using surface water run-off as a resource
- managing rainwater close to where it falls
- managing run-off at the surface
- allowing rainwater to soak into the ground
- promoting evapotranspiration
- slowing and storing run-off to mimic natural run-off characteristics
- reducing contamination of run-off through pollution prevention and controlling the run-off at source
- treating run-off to reduce the risk of urban contaminants causing environmental pollution.”

2.2 Source control

- Sedum roofing.
- Infiltration devices. Typically soakaways.
- Rainwater harvesting.
- Bio-retention planting, rain gardens.
- Permeable paving, porous asphalt. These provide both infiltration and short term storage volumes thus reducing overall un-mitigated run-off volumes.

2.3 “End of pipe” solutions

To be considered only after implementation of the above options.

- Retention tanks with outfall controlled by hydraulic means to limiting discharge rates and volumes to discharge to existing SW flow pathways.

3 Proposed surface water disposal strategy

The following sections consider the strategy for water arising from the roof areas, driveways and hard standing and areas of landscaping.

3.1 Roofs

All surface water arising from the area of new roofing is controlled by direct infiltration through a soakaway. Notes:

- For this report the drained area to the soakaway(s) arises from the area of a soakaway. plus a 1 allowance for urban creep.
- The soakaway is designed for all events up to and including the M100 6hr event.
- An allowance of x1.4 is made for climate change in line with current best practice.

Designed to BRE365, and to accommodate all surface water arising from a drained area of 75m² requires 1 , open void (i.e. 95%), soakaway(s) of 2m wide x 2.7m long with a 0.8m effective depth. See Table 1.

Permeability	2.00E-05	ms ⁻¹
Urban Creep	1	
Drained area	75	m ²
Designed drained area	75	m ²
Return Period	100	yr
% voids	95	%
Climate change	1.4	

Design Width, m	2
Design Depth _{eff} , m	0.8
Design Qty	1

Duration, mins	5	10	15	30	60	120	240	360	600	1440
Rainfall, mm	16.0	23.8	28.9	38.0	47.8	58.3	69.5	76.2	84.8	101.6
Volume in, m ³	1.2	1.8	2.2	2.9	3.6	4.4	5.2	5.7	6.4	7.6
Length req'd, m	0.8	1.2	1.4	1.8	2.2	2.5	2.7	2.7	2.5	1.7

Crit Length, m	2.7
Crit Duration, mins	240
Empty to 50%, hrs	7.59

Table 1: BRE 365 Calculation results

3.1.1 Sedimentation risk

Generally, roofing carries a very low sediment loading. Worst case 216 kg.ha⁻¹yr⁻¹ - so for this site that equates to circa 1.6kg.yr⁻¹ in the worst case. Generally this would reduce the attenuation capacity by circa 2% over 50yrs (all data from the SuDS maunual).

The design allows for this amount with extra capacity provided to a 100yr design life. The BRE 365 method acknowledges this sedimentation and hence the base area is not considered in the sizing calculations.

3.1.2 Minimising sedimentation risk

The developer will fit accessible sumped rainwater gulleys at the base of all RWP's so as to reduce the amount of any sediment entering the soakaway.

The developer will also fit downpipe leaf guards to all outfalls from the roof (or "hedgehog" gutter guards).

3.2 Paths and hard standing

All surface water arising from the area of new driveways and paths is controlled by direct infiltration through a soakaway. Notes:

- For this report the drained area to the soakaway(s) arises from the area of a soakaway. plus a 1 allowance for urban creep.
- The soakaway is designed for all events up to and including the M100 6hr event.
- An allowance of x1.4 is made for climate change in line with current best practice.

Designed to BRE365, and to accommodate all surface water arising from a drained area of 45m² requires 1 , open void (i.e. 95%), soakaway(s) of 2m wide x 1.5m long with a 0.8m effective depth. See Table 2.

Permeability	2.10E-05	ms ⁻¹
Urban Creep	1	
Drained area	45	m ²
Designed drained area	45	m ²
Return Period	100	yr
% voids	95	%
Climate change	1.4	

Design Width, m	2
Design Depth _{eff} , m	0.8
Design Qty	1

Duration, mins	5	10	15	30	60	120	240	360	600	1440
Rainfall, mm	16.0	23.8	28.9	38.0	47.8	58.3	69.5	76.2	84.8	101.6
Volume in, m ³	0.7	1.1	1.3	1.7	2.2	2.6	3.1	3.4	3.8	4.6
Length req'd, m	0.5	0.7	0.8	1.1	1.3	1.4	1.5	1.4	1.2	0.6

Crit Length, m	1.5
Crit Duration, mins	240
Empty to 50%, hrs	5.35

Table 2: BRE 365 Calculation results

3.3 Landscaped areas

Typical domestic planting.

3.4 Indicative drainage layout

Please refer to the drainage layout showing SuDS features at Appendix A.

Flow will be conveyed to the soakaway via 100mm diameter drainage runs laid at no less than 1:80 falls giving a maximum design capacity of 6.6ls^{-1} (Part H design chart, Figure 1).

1 in 100yr max mean intensity storm = 128mmhr^{-1}

Drained area to one pipe = 98m^2

Required pipe capacity = $98 \times 0.1278 / 3.6 = 3.5\text{ls}^{-1}$

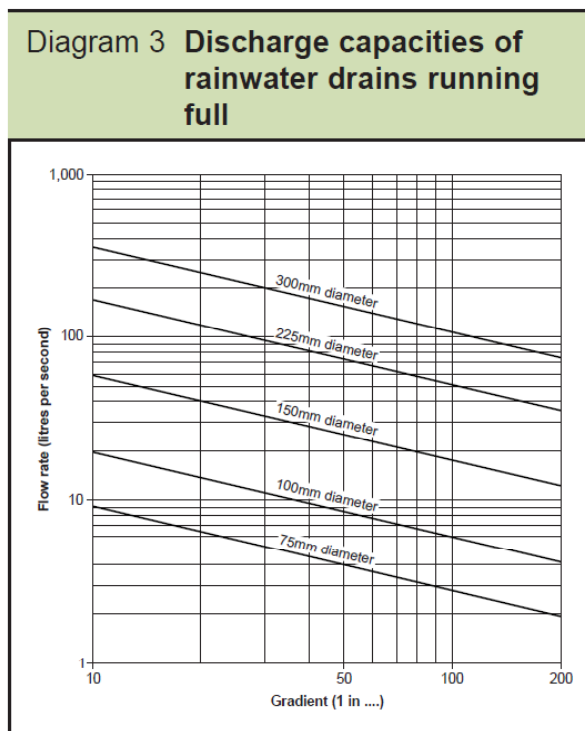


Figure 1: Part H drainage design chart

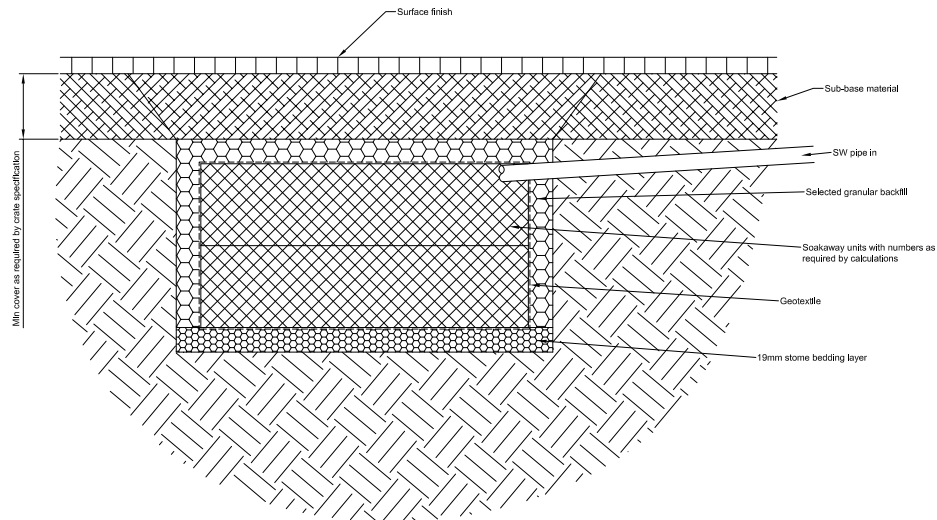


Figure 2: Soakaway under driveway

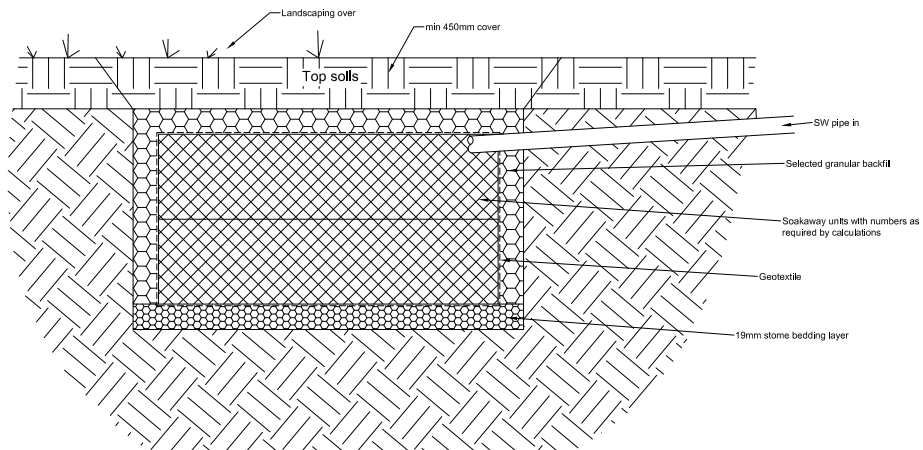


Figure 3: Soakaway under grass

3.5 Exceedance flow routes

To the front of the properties, a surface mounted channel will be used to intercept exceedance surface flows from the driveway. The outfall from this will be directed to the soakaway unit.

3.6 Exceedance flows

Soakaways - Designed to 100yr + 40% climate change hence no design exceedance.

There are no design overland exceedance flow paths other than as noted above.

3.7 Timetable for implementation

3.7.1 Construction phase

During the construction phase, rainwater will be managed in line with the requirements under the CDM regulations using existing SW gullies with measures in place to prevent contaminants entering the network. Sand bag bunding will be provided around surface gullies where construction run-off may contain sediments etc.

Soakaways/attenuation cells will be installed early in the project under the remit of the ground-works operations.

Areas of landscaping and boundary planting will be undertaken as the project nears completion.

3.7.2 Post construction phase

Water butts will be installed prior to final completion as part of the final landscaping.

Soakaway cells inspected and cleaned out if required.

4 Maintenance of SuDS

Ultimate responsibility for the long term maintenance with SuDS in this environment lay with the land owner/management company.

All SuDS on site will be installed with full consideration to long term maintenance. The following guidance applies:

4.1 Soakaways (and pre treatment sediment sumps)

Figure 4^[1] provides details maintenance operations required for a soakaway system.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Figure 4: Maintenance operations for soakaway

4.2 Summary

All surface water arising can be managed on site using SuDS. There is no design exceedance outfall away from the site. Exceedance flows and flows arising from system failure can be accommodated on site within the soakaway cells.

The use of SuDS techniques on site, as detailed above and when installed in line with best practice (I.e. CIRIA 753 & CIRIA 768), will mitigate and treat the run-off volumes in line with the core policies.

Signed: 

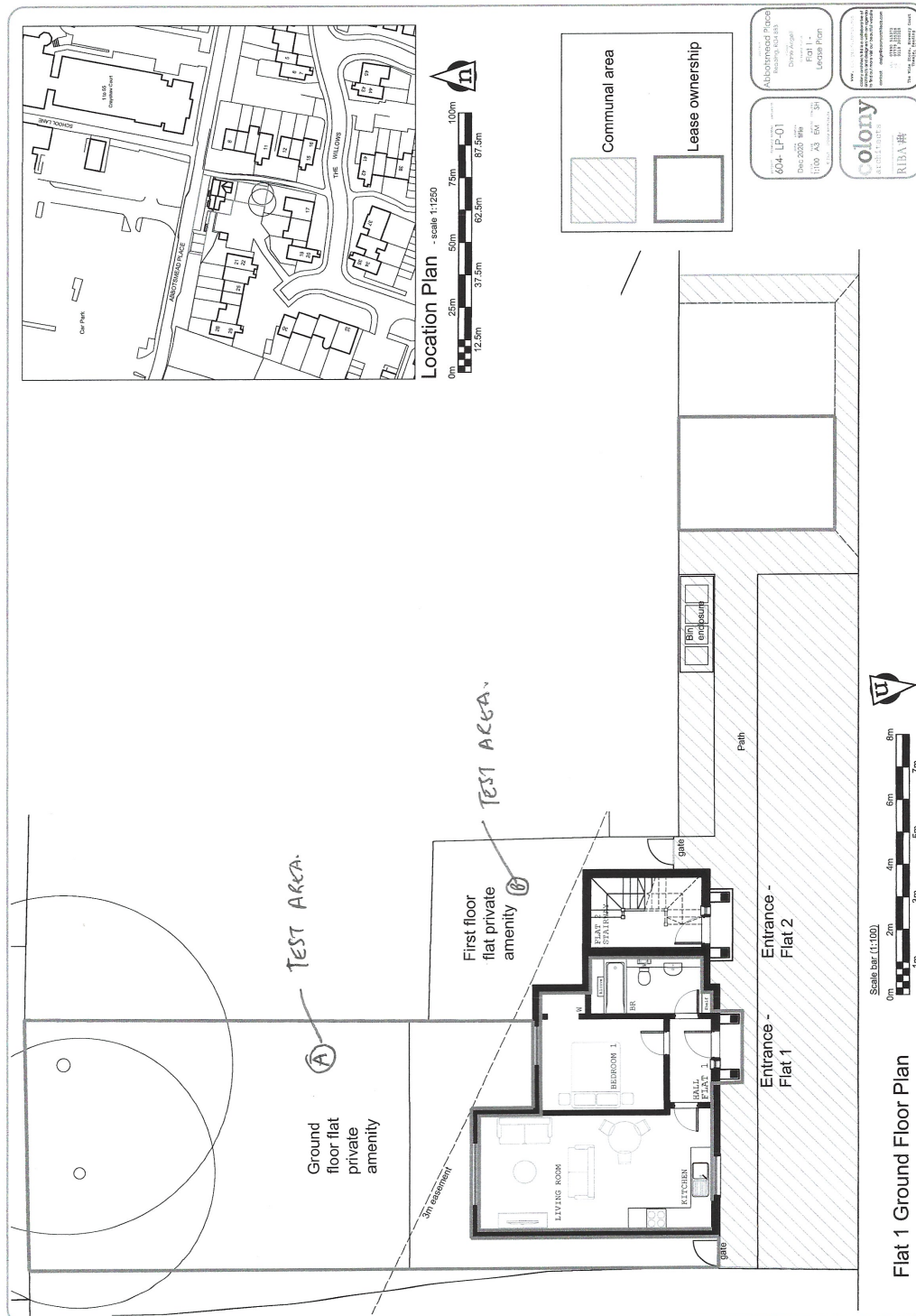
Dr Robin Saunders CEng, C. Build E, MCABE, BEng(Hons), PhD

Date: 18th January, 2021

References

- [1] CIRIA. The SUDS manual. Technical report, CIRIA, 2015.

B Infiltration testing



14/11/21 (Ground was wet from rain overnight, cloudy, some brief light showers during test).

Site details: **Permeability Test Data**
 Abbotsmead Place, Caversham, Reading, RG4 8BB.
 Trial Hole location or reference: A+B (See attached site plan).

Trial Hole (actual test hole that is filled)			
Width	mm	min	300mm
Length	mm	min	800mm
Depth b.g.l.	mm	min	1200mm
Depth of water	mm	min	400mm

400-360.

	Test 1		Test 2		Test 3		Example!!	
	Time	Depth of water	Time	Depth of water	Time	Depth of water	Time	depth
Start	A B	A B	A B	A B	A B	A B	10.00AM	400
Reading 1	8.15 8.40	400 300	10.00 10.40	300 13.00	13.00 13.40	300 10.05	350	
Reading 2	8.15 8.15	350 265	10.20 10.20	230 13.20	13.20 13.20	220 10.15	325	
Reading 3	8.30 8.30	305 200	10.40 10.40	160 13.40	13.40 13.40	150 10.28	290	
Reading 4	9 9	220 110	11 11	230 80	14.00 14.00	135 50	11.07	198
Reading 5	9.30 9.30	160 40	11.30 11.30	0 0	14.30 14.30	0 0	12.22	130
Reading 6	9.45 9.45	50 0	12 12	0	15.00 15.00	0 0	13.14	115
Finish	9.55 9.55	0 0					14.45	85

Notes: Use one sheet per test hole. Conduct three tests per hole. Email copy of completed sheet(s) to rob@innervision-design.co.uk
 The last reading MUST be below 25% of start depth (e.g. less than 100mm in a 400mm test hole)

Site Notes:

