

Project Darlands Court, Chester					Job Ref. GN0585	
Part of structure Surface Water Drainage					Sheet No./Rev. 1	
Calc. By DRB	Date Feb '14	Checked by JDH	Date Feb '14		Approved	Date
Ref.	Calculations				Output	

Soakaway Testing

Hardstanding Areas

Houses (Plots 1-7)	=	691 m2			
Access Road and Drives	=	1535 m2	Total	=	2226 m2

Overflow discharge into Lavister Brook, maximum 5l/s

Storm Duration	=	6	Hours		
1:5 Year Storm (+5%)	=	3 l/s	plus 5%	=	3.15 <5l/s
1:30 Year Storm (+10%)	=	5 l/s	plus 10%	=	5.50 >5l/s
1:100 Year Storm (+30%)	=	7 l/s	plus 30%	=	9.10 >5l/s

Check 1:100 Year Storm (Worse Case)

Maximum allowable discharge rate not allowing for +30% climate change (<5l/s)	=	3.8 l/s
Maximum hardstanding area to keep discharge below 5l/s	=	1100 m2

House (Plots 1-7)

No. of Soakaways	Area (m2)	Soakaway Size
6	115	2.2m x 2.2m Excavation with 1.8m dia. Rings

(As Previous Calculations)

Access Road and Drives	=	1535 m2	(Maintain House Plots, as previous, ignore these areas)
Diacharge in to Brook	=	1100 m2	
Hardstanding Remaining	=	435 m2	

Access Road and Drives

No. of Soakaways	Area (m2)	Soakaway Size
4	109	2.5m x 2.5m Excavation with 2.0m dia. Rings

 Haltec Mollington Grange Parkgate Road Chester	Project Darlands Court, Chester					Job Ref. GN0585	
	Part of structure Surface Water Drainage					Sheet No./Rev. 2	
	Calc. By DRB	Date Feb '14	Checked by JDH	Date Feb '14		Approved	Date
Ref.	Calculations					Output	

Check 1:100 Year Storm (Worse Case)

DESIGN RAINFALL (BRE DIGEST 365)

TEDDS calculation version 1.0.02

Calculate design rainfall intensity

Location of catchment area	Leeds	
Storm duration	t = 6 hr	
Return period	Period = 100 yr	
Ratio of 60 min to 2 day rainfall of 5 yr return period		r = 0.330

From BRE Digest 365 Table 1

Factor Z1	Z1 = 1.73
Rainfall for 6 hr storm with 5 yr return period	M5_6hr = Z1 × 20 mm = 34.6 mm

From BRE Digest 365 Table 2

Factor Z2	Z2 = 1.93
Rainfall for 6 hr storm with 100 yr return period	M100_6hr = Z2 × M5_6hr = 66.9 mm
Design rainfall intensity	I_{max} = M100_6hr / t = 11.1 mm/hr

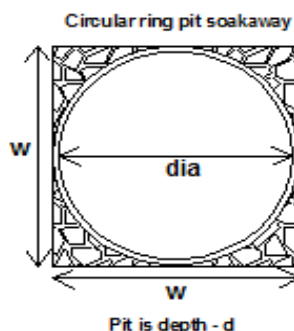
Calculate maximum surface water runoff

Catchment area	Area = 1100 m²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q_{max} = Area × p × I_{max} = 3 l/s

Access Road and Drives

SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



Perforated Concrete Ring Design

Excavation width	w = 2500 mm	Pit depth below invert	d = 1000 mm
Ring internal diameter	dia = 2000 mm	Ring thickness	T _{ring} = 100 mm
Free volume	V _{free} = 30.0 %		
Location of soakaway	England and Wales	Return period	100 years
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)			r = 0.35
Impermeable area drained	A = 109.0 m ²	Soil infiltration rate	f = 0.0000494 m/s
Internal surface area of pit to 50% storage depth	A _{s50} = 4 × w × d / 2 = 5.000 m ²		
Outflow factor	AF = A _{s50} × f = 247. × 10 ⁻⁶ m ³ /s		

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration	M5 rainfalls	Growth factor Z2	100 year rainfall	Inflow	Outflow	Storage required
5 mins	7.1 mm	1.84	13.1 mm	1.4 m ³	0.1 m ³	1.4 m ³
10 mins	10.1 mm	1.91	19.4 mm	2.1 m ³	0.1 m ³	2.0 m ³
15 mins	12.3 mm	1.95	24.0 mm	2.6 m ³	0.2 m ³	2.4 m ³
30 mins	15.7 mm	2.00	31.4 mm	3.4 m ³	0.4 m ³	3.0 m ³
1 hour	20.0 mm	2.03	40.6 mm	4.4 m ³	0.9 m ³	3.5 m ³
2 hours	24.5 mm	2.01	49.2 mm	5.4 m ³	1.8 m ³	3.6 m ³
4 hours	29.9 mm	1.97	59.0 mm	6.4 m ³	3.6 m ³	2.9 m ³
6 hours	33.8 mm	1.94	65.6 mm	7.1 m ³	5.3 m ³	1.8 m ³
10 hours	38.9 mm	1.90	73.9 mm	8.1 m ³	8.9 m ³	-0.8 m ³
24 hours	49.6 mm	1.81	89.9 mm	9.8 m ³	21.3 m ³	-11.5 m ³

Required storage volume	S _{reqd} = 3.6 m ³
Volume within ring units	V _r = π × (dia ² / 4) × d = 3.1 m ³
Free volume in pit	V _p = (d × w ² - (π × ((dia + 2 × T _{ring}) ² / 4) × d)) × V _{free} = 0.7 m ³
Soakaway storage volume	S _{act} = V _r + V _p = 3.9 m ³

Soakaway storage volume- OK