



CONSULTING CIVIL & STRUCTURAL ENGINEERS

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S. Haslam Esq
Basement Force
Unit 5
Rainbow Industrial Park
London
SW20 0JY

18 September 2014

Dear Mr. Haslam,
Garden Soakaway in London. Check on Area Required.

As requested I have carried out an approximate check on the area of permeable garden required to drain a garden roof over a basement, in London where good sands and gravel sub soils are present. This check has been made making certain reasonable assumptions as stated in the calculation. The check has been made for a 100 year return storm with 30% increase in global warming.

In real case scenarios it would be necessary to perform site specific soil permeability tests to check the ability of the soil to effectively drain impermeable areas.

Yours sincerely,

T. J. Vincent



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Project CHECK ON SOAKAWAY AREA IN GARDEN LONDON				Job Ref.	
Section				Sheet no./rev. 1	
Calc. by TV	Date 18/09/2014	Chk'd by	Date	App'd by	Date

ASSUMPTIONS

- 1.100m² GARDEN, 100 YEAR RETURN, 30% INCREASE FOR GLOBAL WARNING.
- 2.15% VOIDS IN GRAVELS.
3. KEMPTON PARK GRAVELS OR SIMILAR $f = 4.0 \times 10^5$ m/sec
- 3.3.5m DEEP BASEMENT

SOAKAWAY DESIGN

In accordance with CIRIA C697 SUDS

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area	London	Imp area drained to soakaway	$A = 100.0 \text{ m}^2$
Return period	Period = 100 yr	Ratio r	$r = 0.440$
5-yr rtn period rainfall 60 min	M5_60min = 20.0 mm	Increase for global warming	$p_{\text{climate}} = 30 \%$

Soakaway / infiltration trench details

Soakaway type	Rectangular	Width of pit	$w = 4600 \text{ mm}$
Length of pit	$l = 1000 \text{ mm}$	Percentage free volume	$V_{\text{free}} = 15 \%$
Soil infiltration rate	$f = 40.0 \times 10^{-6} \text{ m/s}$	Perimeter	$P = 11200 \text{ mm}$
Base area	$A_b = 4600000 \text{ mm}^2$		
Coefficient b	$b = 2.34 \text{ hr}^{-1}$		

Table equations

Rainfall intensity	$i = M100 / D$		
Coefficient a	$a = A_b / P - (A \times i / (P \times f))$	Minimum depth required	$H = a \times (e^{(-bD)} - 1)$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5	0.39	10.1	1.91	19.2	230.53	-13883	2457
10	0.54	14.0	1.97	27.5	165.20	-9832	3172
15	0.65	16.8	2.00	33.7	134.81	-7948	3517
30	0.82	21.2	2.03	43.0	86.00	-4921	3392
60	1.00	26.0	2.00	52.1	52.05	-2817	2545
120	1.19	31.0	1.96	60.9	30.43	-1476	1463
240	1.39	36.2	1.92	69.6	17.39	-668	668
360	1.53	39.8	1.89	75.3	12.54	-367	367
600	1.70	44.2	1.86	82.1	8.21	-98	98
1440	2.07	53.9	1.78	96.1	4.01	162	0

Minimum depth of soakaway $H_{\text{max}} = 3517 \text{ mm}$ Time to empty half soakaway $t_{s50} = 15 \text{ min } 14 \text{ s}$

PASS - Soakaway discharge time less than or equal to 24 hours

100 m², YOU NEED 4.6 X 1.0m in plan area, i.e 4.6 / 104.6 x 100 = 4.4% of garden area