ENTER DATA IN YELLOW CELLS ONLY

DEPTH OF WATER IN RECTANGULAR SOAKAWAY CALCULATION TO CIRIA REPORT 156

Step 1 Input Data		unit	reference
Catchment to be drained **(Ad)**	9300	(m^2)	
Porosity of fill **(n)**	0.95	ratio	
Infiltration Coefficient **(qtest)**	0.36	(m/h)	from tests
Soakaway length (L)	90	(m)	
M5 - 60	20	(mm)	(Wallingford Vol. 1, Fig. 6.1)
Ratio r	0.4		(Wallingford Vol. 1, Fig. 6.2)
Soakaway width (W)	5	(m)	
Factor of safety for infiltration	1.5		table 4.6 in Ciria report 156 is superceeded by SUDS manual table 4.8 which allows 2 for the F.O.S

Step 2 calculated coefficients used in calculations		unit	reference
effective infiltration coef **(q)**	0.24	(m/h)	equation 1
Base area **(Ab)**	450	(m^2)	required in equation 3
Perimeter **(P)**	190	(m)	required in equations 2 and 3
Parameter for 3d infiltration **(b)**	0.1067		equation 2

Step 3 results		unit	reference
Storm Duration **(D) 1 in 10**	0.5	(hours)	Use value appropriate to the return period you need. The numbers can be seen on graph 2 also and checked against fig 4.5
Storm Duration **(D) 1 in 30**	0.5	(hours)	
Storm Duration **(D) 1 in 100**	1	(hours)	
Storm Duration **(D) 1 in 100 +20%**	1	(hours)	
bD x axis for input into fig 4.5 **(bD) 1 in 10**	0.05		input into fig 4.5 to check calculated value of hmax
bD x axis for input into fig 4.5 **(bD) 1 in 30**	0.05		
bD x axis for input into fig 4.5 **(bD) 1 in 100**	0.11		
bD x axis for input into fig 4.5 **(bD) 1 in 100 +20%**	0.11		
Max water depth in system during storm **(hmax) 1 in 10**	0.287	(m)	Use value appropriate to the return period you need. The numbers can be seen on graph 2 also and checked against fig 4.5 **IT IS IMPORTANT TO CHECK THAT HMAX IS EQUAL TO OR LESS THEN THE DEPTH THAT THE SOAKAWAY EXTENDS INTO THE FILTERING LAYER, NOT JUST LESS THAN THE OVERALL DEPTH OF THE SOAKAWAY**
Max water depth in system during storm **(hmax) 1 in 30**	0.401	(m)	
Max water depth in system during storm **(hmax) 1 in 100**	0.596	(m)	
Max water depth in system during storm **(hmax) 1 in 100 + 20%**	0.739	(m)	

Table 4.6 Factor of safety, *F*, for use in hydraulic design

Size of area to be drained	Consequences of failure		
	No damage or inconvenience	Minor inconvenience, e.g., surface water on car parking	Damage to buildings or structures or major inconvenience, e.g., flooding of roads
< 100 m^2	1.5	2	10
100 m^2 to 1000 m^2	1.5	3	10
> 1000 m^2	1.5	5	10

$$q = \frac{0.45}{3} = 0.15 \text{ m/h}$$ Equation 1

$$b = (P \times q) / (Ab \times qtest)$$ Equation 2

$$a = \frac{A_b}{P} - \frac{A_D\, i}{Pq}$$ Equation 3

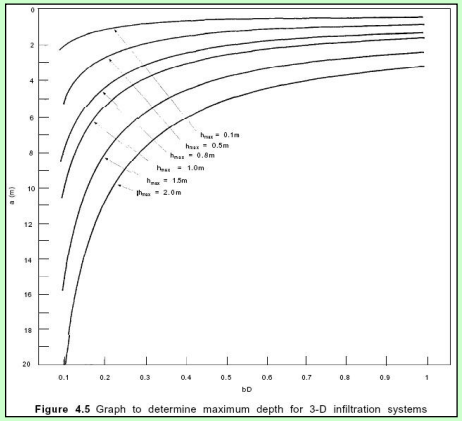
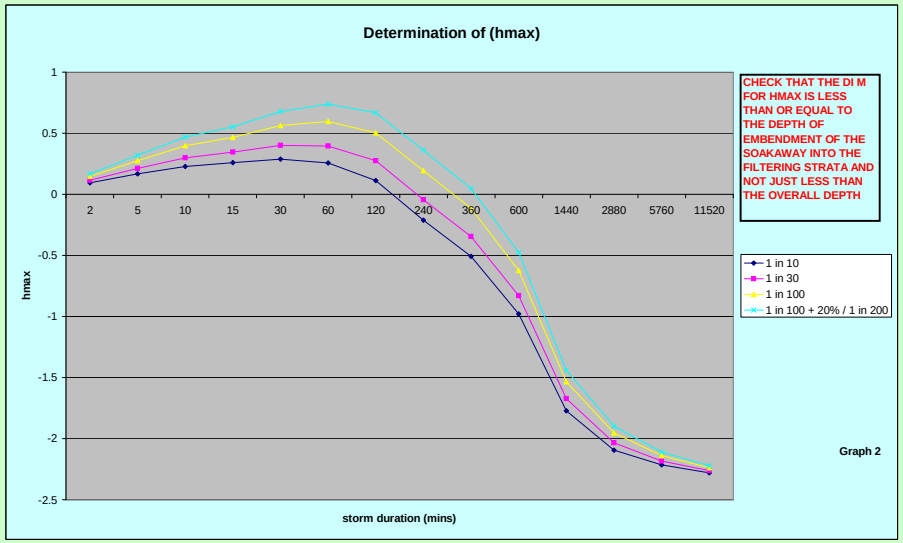
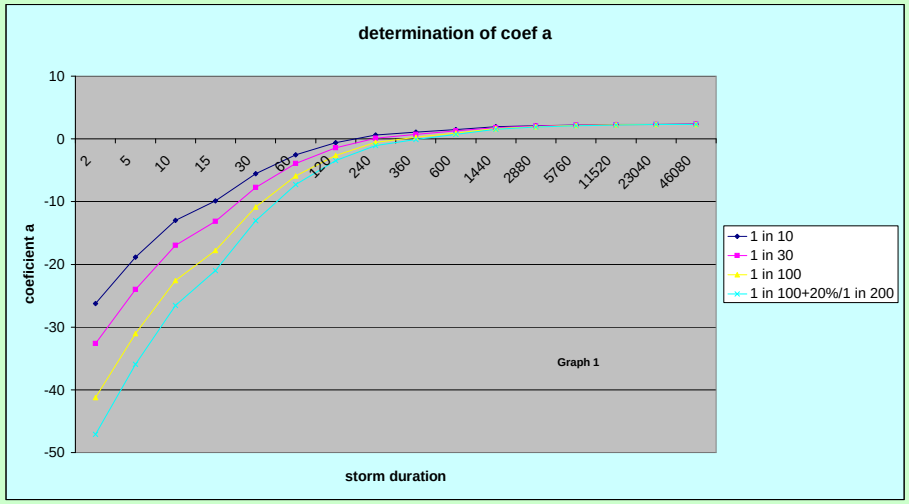


Figure 4.5 Graph to determine maximum depth for 3-D infiltration systems



Graph 2



Graph 1

TIME TO DISCHARGE CALCULATION

Step 4 results		unit	reference
Ab/p ratio required for eq **(Ab/P)**	2.368421		required in equation 4
Required for Calc **(Abn)/(Pq)**	9.38		
Time Taken to Half Empty **(T) 1 in 10**	0.52	(hours)	Equation 4. This time to drain has to be less than 24 hours
Time Taken to Half Empty **(T) 1 in 30**	0.71	(hours)	
Time Taken to Half Empty **(T) 1 in 100**	0.99	(hours)	
Time Taken to Half Empty **(T) 1 in 100 + 20%**	1.19	(hours)	

$$\frac{A_b n}{pq} \log_e \left[\frac{h_{max} + \frac{A_b}{p}}{\frac{h_{max}}{2} + \frac{A_b}{p}} \right]$$

Equation 4