



Clarke Nicholls Marcel		Page 0
Glen House 22-24 Glenthorne Road Hammersmith W6 ONG	150 Holborn Main Roof	
Date 06/09/2016 16:18 File 1 IN 1 YEAR - MAIN ROOF...	Designed by Alan Yan Checked by Mark Stanton	
Micro Drainage	Source Control 2015.1	

Summary of Results for 1 year Return Period

Half Drain Time : 598 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.010	0.010	0.0	0.1	0.1	7.5	O K
30 min Summer	0.013	0.013	0.0	0.1	0.1	9.6	O K
60 min Summer	0.016	0.016	0.0	0.2	0.2	11.8	O K
120 min Summer	0.019	0.019	0.0	0.2	0.2	14.0	O K
180 min Summer	0.020	0.020	0.0	0.3	0.3	15.2	O K
240 min Summer	0.021	0.021	0.0	0.3	0.3	15.9	O K
360 min Summer	0.022	0.022	0.0	0.3	0.3	16.6	O K
480 min Summer	0.022	0.022	0.0	0.3	0.3	16.9	O K
600 min Summer	0.023	0.023	0.0	0.4	0.4	17.2	O K
720 min Summer	0.023	0.023	0.0	0.4	0.4	17.4	O K
960 min Summer	0.023	0.023	0.0	0.4	0.4	17.7	O K
1440 min Summer	0.024	0.024	0.0	0.4	0.4	17.8	O K
2160 min Summer	0.023	0.023	0.0	0.4	0.4	17.5	O K
2880 min Summer	0.023	0.023	0.0	0.4	0.4	17.1	O K
4320 min Summer	0.021	0.021	0.0	0.3	0.3	16.2	O K
5760 min Summer	0.020	0.020	0.0	0.3	0.3	15.3	O K
7200 min Summer	0.019	0.019	0.0	0.3	0.3	14.6	O K
8640 min Summer	0.019	0.019	0.0	0.2	0.2	14.0	O K
10080 min Summer	0.018	0.018	0.0	0.2	0.2	13.5	O K
15 min Winter	0.011	0.011	0.0	0.1	0.1	8.4	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	32.747	0.0	3.3	27
30 min Summer	21.114	0.0	4.9	41
60 min Summer	13.161	0.0	8.7	70
120 min Summer	8.028	0.0	11.1	128
180 min Summer	5.980	0.0	12.7	186
240 min Summer	4.846	0.0	14.0	242
360 min Summer	3.584	0.0	15.7	344
480 min Summer	2.884	0.0	17.0	390
600 min Summer	2.437	0.0	18.1	446
720 min Summer	2.123	0.0	18.9	508
960 min Summer	1.708	0.0	20.3	644
1440 min Summer	1.257	0.0	22.2	912
2160 min Summer	0.926	0.0	27.9	1308
2880 min Summer	0.745	0.0	29.8	1704
4320 min Summer	0.548	0.0	32.1	2468
5760 min Summer	0.441	0.0	37.3	3224
7200 min Summer	0.373	0.0	39.2	3968
8640 min Summer	0.325	0.0	40.6	4672
10080 min Summer	0.289	0.0	41.5	5448
15 min Winter	32.747	0.0	4.0	27

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Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	0.014	0.014	0.0	0.1	0.1	10.8	O K
60 min Winter	0.018	0.018	0.0	0.2	0.2	13.2	O K
120 min Winter	0.021	0.021	0.0	0.3	0.3	15.7	O K
180 min Winter	0.022	0.022	0.0	0.3	0.3	17.0	O K
240 min Winter	0.024	0.024	0.0	0.4	0.4	17.8	O K
360 min Winter	0.024	0.024	0.0	0.4	0.4	18.4	O K
480 min Winter	0.025	0.025	0.0	0.4	0.4	18.7	O K
600 min Winter	0.025	0.025	0.0	0.4	0.4	19.0	O K
720 min Winter	0.025	0.025	0.0	0.4	0.4	19.1	O K
960 min Winter	0.025	0.025	0.0	0.4	0.4	19.2	O K
1440 min Winter	0.025	0.025	0.0	0.4	0.4	18.9	O K
2160 min Winter	0.024	0.024	0.0	0.4	0.4	18.1	O K
2880 min Winter	0.023	0.023	0.0	0.4	0.4	17.3	O K
4320 min Winter	0.021	0.021	0.0	0.3	0.3	15.9	O K
5760 min Winter	0.020	0.020	0.0	0.3	0.3	14.8	O K
7200 min Winter	0.018	0.018	0.0	0.2	0.2	13.9	O K
8640 min Winter	0.017	0.017	0.0	0.2	0.2	13.1	O K
10080 min Winter	0.017	0.017	0.0	0.2	0.2	12.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	21.114	0.0	5.8	41
60 min Winter	13.161	0.0	10.0	68
120 min Winter	8.028	0.0	12.8	126
180 min Winter	5.980	0.0	14.6	182
240 min Winter	4.846	0.0	16.0	236
360 min Winter	3.584	0.0	18.0	342
480 min Winter	2.884	0.0	19.5	386
600 min Winter	2.437	0.0	20.7	458
720 min Winter	2.123	0.0	21.7	534
960 min Winter	1.708	0.0	23.2	684
1440 min Winter	1.257	0.0	25.4	972
2160 min Winter	0.926	0.0	31.5	1388
2880 min Winter	0.745	0.0	33.7	1792
4320 min Winter	0.548	0.0	36.3	2552
5760 min Winter	0.441	0.0	42.0	3288
7200 min Winter	0.373	0.0	44.1	4104
8640 min Winter	0.325	0.0	45.7	4848
10080 min Winter	0.289	0.0	46.8	5464

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.500	Shortest Storm (mins)	15
Ratio R	0.437	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.123

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.041		0.041		0.041

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Model Details

Storage is Online Cover Level (m) 0.085

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	795.0	0.0	0.085	795.0	0.0

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0146-9000-0400-9000
 Design Head (m) 0.400
 Design Flow (l/s) 9.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Diameter (mm) 146
 Invert Level (m) 0.000
 Minimum Outlet Pipe Diameter (mm) 225
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	9.0
Flush-Flo™	0.209	8.9
Kick-Flo®	0.333	8.2
Mean Flow over Head Range	-	6.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	1.200	15.1	3.000	23.3	7.000	35.3
0.200	8.9	1.400	16.2	3.500	25.1	7.500	36.5
0.300	8.6	1.600	17.3	4.000	26.8	8.000	37.7
0.400	9.0	1.800	18.3	4.500	28.2	8.500	38.9
0.500	9.9	2.000	19.2	5.000	29.8	9.000	40.1
0.600	10.8	2.200	20.1	5.500	31.2	9.500	41.2
0.800	12.4	2.400	21.0	6.000	32.6		
1.000	13.8	2.600	21.8	6.500	34.0		