



Clarke Nicholls Marcel		Page 0
Glen House 22-24 Glenthorne Road Hammersmith W6 ONG	150 Holborn Residential Roof	
Date 07/09/2016 12:21 File 1 in 30 year - resi ro...	Designed by Alan Yan Checked by Mark Stanton	
Micro Drainage	Source Control 2015.1	

Summary of Results for 30 year Return Period

Half Drain Time : 98 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	0.023	0.023	0.0	0.2	0.2	1.8	O K
30 min Summer	0.028	0.028	0.0	0.3	0.3	2.3	O K
60 min Summer	0.031	0.031	0.0	0.3	0.3	2.5	O K
120 min Summer	0.033	0.033	0.0	0.4	0.4	2.6	O K
180 min Summer	0.033	0.033	0.0	0.4	0.4	2.7	O K
240 min Summer	0.033	0.033	0.0	0.4	0.4	2.6	O K
360 min Summer	0.032	0.032	0.0	0.3	0.3	2.6	O K
480 min Summer	0.030	0.030	0.0	0.3	0.3	2.5	O K
600 min Summer	0.029	0.029	0.0	0.3	0.3	2.4	O K
720 min Summer	0.028	0.028	0.0	0.3	0.3	2.3	O K
960 min Summer	0.026	0.026	0.0	0.2	0.2	2.1	O K
1440 min Summer	0.024	0.024	0.0	0.2	0.2	1.9	O K
2160 min Summer	0.021	0.021	0.0	0.2	0.2	1.7	O K
2880 min Summer	0.019	0.019	0.0	0.1	0.1	1.5	O K
4320 min Summer	0.016	0.016	0.0	0.1	0.1	1.3	O K
5760 min Summer	0.015	0.015	0.0	0.1	0.1	1.2	O K
7200 min Summer	0.013	0.013	0.0	0.1	0.1	1.1	O K
8640 min Summer	0.012	0.012	0.0	0.1	0.1	1.0	O K
10080 min Summer	0.012	0.012	0.0	0.1	0.1	0.9	O K
15 min Winter	0.025	0.025	0.0	0.2	0.2	2.1	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	80.412	0.0	1.8	24
30 min Summer	51.576	0.0	2.3	36
60 min Summer	31.593	0.0	3.0	60
120 min Summer	18.784	0.0	3.6	90
180 min Summer	13.717	0.0	3.9	122
240 min Summer	10.932	0.0	4.2	156
360 min Summer	7.920	0.0	4.5	222
480 min Summer	6.299	0.0	4.8	288
600 min Summer	5.271	0.0	5.0	352
720 min Summer	4.555	0.0	5.2	414
960 min Summer	3.617	0.0	5.5	538
1440 min Summer	2.610	0.0	6.0	784
2160 min Summer	1.882	0.0	6.5	1152
2880 min Summer	1.491	0.0	6.9	1512
4320 min Summer	1.073	0.0	7.4	2248
5760 min Summer	0.850	0.0	7.9	2992
7200 min Summer	0.709	0.0	8.2	3688
8640 min Summer	0.611	0.0	8.5	4424
10080 min Summer	0.539	0.0	8.7	5144
15 min Winter	80.412	0.0	2.0	24

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Summary of Results for 30 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	0.031	0.031	0.0	0.3	0.3	2.5	O K
60 min Winter	0.035	0.035	0.0	0.4	0.4	2.8	O K
120 min Winter	0.036	0.036	0.0	0.4	0.4	2.9	O K
180 min Winter	0.036	0.036	0.0	0.4	0.4	2.9	O K
240 min Winter	0.035	0.035	0.0	0.4	0.4	2.8	O K
360 min Winter	0.033	0.033	0.0	0.4	0.4	2.6	O K
480 min Winter	0.031	0.031	0.0	0.3	0.3	2.5	O K
600 min Winter	0.029	0.029	0.0	0.3	0.3	2.3	O K
720 min Winter	0.028	0.028	0.0	0.3	0.3	2.2	O K
960 min Winter	0.025	0.025	0.0	0.2	0.2	2.0	O K
1440 min Winter	0.022	0.022	0.0	0.2	0.2	1.8	O K
2160 min Winter	0.019	0.019	0.0	0.1	0.1	1.5	O K
2880 min Winter	0.017	0.017	0.0	0.1	0.1	1.4	O K
4320 min Winter	0.014	0.014	0.0	0.1	0.1	1.1	O K
5760 min Winter	0.013	0.013	0.0	0.1	0.1	1.0	O K
7200 min Winter	0.012	0.012	0.0	0.1	0.1	0.9	O K
8640 min Winter	0.011	0.011	0.0	0.0	0.0	0.9	O K
10080 min Winter	0.010	0.010	0.0	0.0	0.0	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	51.576	0.0	2.6	35
60 min Winter	31.593	0.0	3.4	58
120 min Winter	18.784	0.0	4.0	94
180 min Winter	13.717	0.0	4.4	130
240 min Winter	10.932	0.0	4.7	166
360 min Winter	7.920	0.0	5.1	234
480 min Winter	6.299	0.0	5.4	300
600 min Winter	5.271	0.0	5.6	368
720 min Winter	4.555	0.0	5.9	428
960 min Winter	3.617	0.0	6.2	556
1440 min Winter	2.610	0.0	6.7	812
2160 min Winter	1.882	0.0	7.3	1176
2880 min Winter	1.491	0.0	7.7	1556
4320 min Winter	1.073	0.0	8.3	2292
5760 min Winter	0.850	0.0	8.9	2992
7200 min Winter	0.709	0.0	9.2	3680
8640 min Winter	0.611	0.0	9.5	4424
10080 min Winter	0.539	0.0	9.8	5064

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	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) 0.013

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.004		0.004		0.004

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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	85.0	0.0	0.085	85.0	0.0

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0055-1000-0400-1000
 Design Head (m) 0.400
 Design Flow (l/s) 1.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Diameter (mm) 55
 Invert Level (m) 0.000
 Minimum Outlet Pipe Diameter (mm) 75
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	1.0
Flush-Flo™	0.116	1.0
Kick-Flo®	0.271	0.8
Mean Flow over Head Range	-	0.8

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	1.0	1.200	1.6	3.000	2.5	7.000	3.7
0.200	0.9	1.400	1.7	3.500	2.6	7.500	3.8
0.300	0.9	1.600	1.8	4.000	2.8	8.000	4.0
0.400	1.0	1.800	1.9	4.500	3.0	8.500	4.1
0.500	1.1	2.000	2.0	5.000	3.1	9.000	4.2
0.600	1.2	2.200	2.1	5.500	3.3	9.500	4.3
0.800	1.3	2.400	2.2	6.000	3.4		
1.000	1.5	2.600	2.3	6.500	3.6		