



Baynham Meikle Partnership		Page 1
8 Meadow Road Edgbaston, Birmingham B 17 8BU	HATFIELD LAND WEST OF HATFIELD SWALE 3 & POND	
Date 10/09/2018 14:03 File 2018.09.10_SWALE 3 + PO...	Designed by EB Checked by NSB	
Micro Drainage		Source Control 2018.1

Summary of Results for 10 year Return Period

Half Drain Time : 286 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	75.872	0.872	0.0	149.8	149.8	2887.6	O K
30 min Summer	75.987	0.987	0.0	157.8	157.8	3613.3	O K
60 min Summer	76.084	1.084	0.0	164.2	164.2	4237.5	O K
120 min Summer	76.156	1.156	0.0	168.8	168.8	4656.2	O K
180 min Summer	76.168	1.168	0.0	169.6	169.6	4726.5	O K
240 min Summer	76.158	1.158	0.0	168.9	168.9	4667.7	O K
360 min Summer	76.129	1.129	0.0	167.1	167.1	4503.6	O K
480 min Summer	76.101	1.101	0.0	165.3	165.3	4336.3	O K
600 min Summer	76.073	1.073	0.0	163.5	163.5	4172.8	O K
720 min Summer	76.048	1.048	0.0	161.9	161.9	4012.6	O K
960 min Summer	76.001	1.001	0.0	158.7	158.7	3705.3	O K
1440 min Summer	75.912	0.912	0.0	152.6	152.6	3133.8	O K
2160 min Summer	75.784	0.784	0.0	148.1	148.1	2373.6	O K
2880 min Summer	75.650	0.650	0.0	148.1	148.1	1663.5	O K
4320 min Summer	75.420	0.420	0.0	147.7	147.7	753.1	O K
5760 min Summer	75.278	0.278	0.0	142.5	142.5	380.8	O K
7200 min Summer	75.227	0.227	0.0	124.2	124.2	278.4	O K
8640 min Summer	75.193	0.193	0.0	108.3	108.3	218.4	O K
10080 min Summer	75.167	0.167	0.0	96.2	96.2	177.8	O K
15 min Winter	75.931	0.931	0.0	153.9	153.9	3250.3	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	61.324	0.0	3047.0	22
30 min Summer	39.180	0.0	3893.1	36
60 min Summer	24.003	0.0	4769.1	66
120 min Summer	14.335	0.0	5698.7	122
180 min Summer	10.522	0.0	6272.9	180
240 min Summer	8.426	0.0	6698.0	224
360 min Summer	6.146	0.0	7329.6	284
480 min Summer	4.911	0.0	7807.8	348
600 min Summer	4.125	0.0	8199.5	416
720 min Summer	3.576	0.0	8529.3	486
960 min Summer	2.853	0.0	9073.2	622
1440 min Summer	2.074	0.0	9893.1	894
2160 min Summer	1.507	0.0	10783.8	1284
2880 min Summer	1.201	0.0	11458.0	1644
4320 min Summer	0.872	0.0	12475.8	2296
5760 min Summer	0.694	0.0	13248.8	2944
7200 min Summer	0.582	0.0	13879.0	3672
8640 min Summer	0.504	0.0	14414.9	4400
10080 min Summer	0.446	0.0	14883.0	5136
15 min Winter	61.324	0.0	3411.6	22

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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	76.058	1.058	0.0	162.5	162.5	4078.8	O K
60 min Winter	76.183	1.183	0.0	170.5	170.5	4809.2	O K
120 min Winter	76.288	1.288	0.0	176.9	176.9	5338.2	O K
180 min Winter	76.317	1.317	0.0	178.6	178.6	5473.8	O K
240 min Winter	76.313	1.313	0.0	178.4	178.4	5453.6	O K
360 min Winter	76.267	1.267	0.0	175.7	175.7	5242.0	O K
480 min Winter	76.226	1.226	0.0	173.1	173.1	5036.4	O K
600 min Winter	76.183	1.183	0.0	170.5	170.5	4811.0	O K
720 min Winter	76.142	1.142	0.0	167.9	167.9	4579.5	O K
960 min Winter	76.064	1.064	0.0	162.9	162.9	4120.3	O K
1440 min Winter	75.932	0.932	0.0	154.0	154.0	3256.4	O K
2160 min Winter	75.732	0.732	0.0	148.1	148.1	2090.7	O K
2880 min Winter	75.513	0.513	0.0	148.1	148.1	1070.8	O K
4320 min Winter	75.252	0.252	0.0	134.5	134.5	325.4	O K
5760 min Winter	75.192	0.192	0.0	108.1	108.1	217.9	O K
7200 min Winter	75.156	0.156	0.0	91.0	91.0	161.2	O K
8640 min Winter	75.130	0.130	0.0	78.8	78.8	125.6	O K
10080 min Winter	75.110	0.110	0.0	69.6	69.6	101.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	39.180	0.0	4359.8	36
60 min Winter	24.003	0.0	5340.1	64
120 min Winter	14.335	0.0	6382.7	120
180 min Winter	10.522	0.0	7026.0	178
240 min Winter	8.426	0.0	7503.0	232
360 min Winter	6.146	0.0	8210.2	296
480 min Winter	4.911	0.0	8746.4	372
600 min Winter	4.125	0.0	9181.8	448
720 min Winter	3.576	0.0	9552.5	526
960 min Winter	2.853	0.0	10162.6	676
1440 min Winter	2.074	0.0	11082.6	964
2160 min Winter	1.507	0.0	12077.0	1368
2880 min Winter	1.201	0.0	12832.9	1676
4320 min Winter	0.872	0.0	13973.0	2244
5760 min Winter	0.694	0.0	14838.7	2936
7200 min Winter	0.582	0.0	15544.4	3672
8640 min Winter	0.504	0.0	16144.8	4376
10080 min Winter	0.446	0.0	16669.9	5136

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Micro Drainage	Source Control 2018.1
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.429	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 26.500

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 13.250	4	8 13.250

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Model Details

Storage is Online Cover Level (m) 78.000

Complex Structure

Swale

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	680.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	1000.0
Porosity	1.00	Cap Volume Depth (m)	1.000
Invert Level (m)	75.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	4.0		

Tank or Pond

Invert Level (m) 75.000


Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	660.0	0.500	935.0	1.000	1225.0
0.250	795.0	0.750	1080.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0466-1483-1000-1483
Design Head (m)	1.000
Design Flow (l/s)	148.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	466
Invert Level (m)	74.850
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	148.2
Flush-Flo™	0.624	148.1
Kick-Flo®	0.889	140.0
Mean Flow over Head Range	-	108.0

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

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Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	12.1	1.200	162.0	3.000	253.5	7.000	384.4
0.200	44.1	1.400	174.6	3.500	273.4	7.500	397.7
0.300	88.3	1.600	186.4	4.000	292.0	8.000	410.6
0.400	133.8	1.800	197.4	4.500	309.4	8.500	423.0
0.500	146.0	2.000	207.9	5.000	325.8	9.000	435.1
0.600	148.0	2.200	217.8	5.500	341.4	9.500	446.8
0.800	144.6	2.400	227.3	6.000	356.4		
1.000	148.2	2.600	236.4	6.500	370.7		