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48 West End Westbury Wiltshire BA13 3JG	MBP-7764 62 Avenue Road Attenuation Storage	
Date July 2019 File Attenuation+Hydrobrake.SRCX	Designed by Peter White Checked by	
Micro Drainage	Source Control 2016.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 32 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	45.472	0.922	0.0	5.0	5.0	13.1	O K
30 min Summer	45.584	1.034	0.0	5.0	5.0	14.7	O K
60 min Summer	45.570	1.020	0.0	5.0	5.0	14.5	O K
120 min Summer	45.433	0.883	0.0	5.0	5.0	12.6	O K
180 min Summer	45.253	0.703	0.0	5.0	5.0	10.0	O K
240 min Summer	45.080	0.530	0.0	5.0	5.0	7.6	O K
360 min Summer	44.859	0.309	0.0	5.0	5.0	4.4	O K
480 min Summer	44.747	0.197	0.0	4.7	4.7	2.8	O K
600 min Summer	44.690	0.140	0.0	4.4	4.4	2.0	O K
720 min Summer	44.666	0.116	0.0	3.9	3.9	1.7	O K
960 min Summer	44.643	0.093	0.0	3.2	3.2	1.3	O K
1440 min Summer	44.623	0.073	0.0	2.3	2.3	1.0	O K
2160 min Summer	44.609	0.059	0.0	1.6	1.6	0.8	O K
2880 min Summer	44.602	0.052	0.0	1.3	1.3	0.7	O K
4320 min Summer	44.593	0.043	0.0	0.9	0.9	0.6	O K
5760 min Summer	44.588	0.038	0.0	0.7	0.7	0.5	O K
7200 min Summer	44.584	0.034	0.0	0.6	0.6	0.5	O K
8640 min Summer	44.581	0.031	0.0	0.5	0.5	0.4	O K
10080 min Summer	44.579	0.029	0.0	0.5	0.5	0.4	O K
15 min Winter	45.601	1.051	0.0	5.0	5.0	15.0	O K
30 min Winter	45.745	1.195	0.0	5.0	5.0	17.0	O K
60 min Winter	45.720	1.170	0.0	5.0	5.0	16.7	O K
120 min Winter	45.511	0.961	0.0	5.0	5.0	13.7	O K
180 min Winter	45.231	0.681	0.0	5.0	5.0	9.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	148.070	0.0	16.7	16
30 min Summer	95.640	0.0	21.5	28
60 min Summer	58.745	0.0	26.4	44
120 min Summer	34.854	0.0	31.4	80
180 min Summer	25.354	0.0	34.2	112
240 min Summer	20.120	0.0	36.2	142
360 min Summer	14.497	0.0	39.1	198
480 min Summer	11.487	0.0	41.3	254
600 min Summer	9.583	0.0	43.1	310
720 min Summer	8.261	0.0	44.6	368
960 min Summer	6.531	0.0	47.0	490
1440 min Summer	4.684	0.0	50.6	734
2160 min Summer	3.354	0.0	54.3	1100
2880 min Summer	2.645	0.0	57.1	1444
4320 min Summer	1.890	0.0	61.2	2148
5760 min Summer	1.488	0.0	64.3	2888
7200 min Summer	1.235	0.0	66.7	3648
8640 min Summer	1.061	0.0	68.7	4400
10080 min Summer	0.932	0.0	70.5	5064
15 min Winter	148.070	0.0	18.6	16
30 min Winter	95.640	0.0	24.1	30
60 min Winter	58.745	0.0	29.6	48
120 min Winter	34.854	0.0	35.1	86
180 min Winter	25.354	0.0	38.3	120

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Micro Drainage

Source Control 2016.1

Summary of Results for 100 year Return Period (+40%)

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
240 min Winter	44.983	0.433	0.0	5.0	5.0	6.2	O K
360 min Winter	44.739	0.189	0.0	4.7	4.7	2.7	O K
480 min Winter	44.668	0.118	0.0	4.0	4.0	1.7	O K
600 min Winter	44.649	0.099	0.0	3.4	3.4	1.4	O K
720 min Winter	44.637	0.087	0.0	2.9	2.9	1.2	O K
960 min Winter	44.623	0.073	0.0	2.3	2.3	1.0	O K
1440 min Winter	44.610	0.060	0.0	1.7	1.7	0.8	O K
2160 min Winter	44.599	0.049	0.0	1.2	1.2	0.7	O K
2880 min Winter	44.593	0.043	0.0	0.9	0.9	0.6	O K
4320 min Winter	44.586	0.036	0.0	0.7	0.7	0.5	O K
5760 min Winter	44.582	0.032	0.0	0.5	0.5	0.5	O K
7200 min Winter	44.579	0.029	0.0	0.4	0.4	0.4	O K
8640 min Winter	44.576	0.026	0.0	0.4	0.4	0.4	O K
10080 min Winter	44.575	0.025	0.0	0.3	0.3	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
240 min Winter	20.120	0.0	40.6	148
360 min Winter	14.497	0.0	43.8	198
480 min Winter	11.487	0.0	46.3	248
600 min Winter	9.583	0.0	48.3	308
720 min Winter	8.261	0.0	50.0	368
960 min Winter	6.531	0.0	52.7	490
1440 min Winter	4.684	0.0	56.6	720
2160 min Winter	3.354	0.0	60.9	1100
2880 min Winter	2.645	0.0	64.0	1456
4320 min Winter	1.890	0.0	68.6	2152
5760 min Winter	1.488	0.0	72.0	2848
7200 min Winter	1.235	0.0	74.7	3592
8640 min Winter	1.061	0.0	77.0	4408
10080 min Winter	0.932	0.0	78.9	5120

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.700	Shortest Storm (mins)	15
Ratio R	0.438	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.060

Time (mins)		Area
From:	To:	(ha)
0	4	0.060

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Model Details

Storage is Online Cover Level (m) 46.500

Cellular Storage Structure

Invert Level (m) 44.550 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	15.0	0.0	1.200	15.0	0.0	1.201	1.2	0.0

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0103-5000-1200-5000
 Design Head (m) 1.200
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 103
 Invert Level (m) 44.550
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0	Kick-Flo®	0.745	4.0
Flush-Flo™	0.354	5.0	Mean Flow over Head Range	-	4.4

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)	Depth (m)	Flow (l/s)
0.100	3.4	0.800	4.1	2.000	6.3	4.000	8.8	7.000	11.5
0.200	4.7	1.000	4.6	2.200	6.6	4.500	9.3	7.500	11.8
0.300	5.0	1.200	5.0	2.400	6.9	5.000	9.8	8.000	12.2
0.400	5.0	1.400	5.4	2.600	7.2	5.500	10.2	8.500	12.6
0.500	4.9	1.600	5.7	3.000	7.7	6.000	10.7	9.000	12.9
0.600	4.7	1.800	6.0	3.500	8.3	6.500	11.1	9.500	13.3

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Event: 30 min Winter

