Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 165 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	98.351	0.691	0.0	10.5	10.5	111.6	O K
30 min Summer	98.538	0.878	0.0	10.5	10.5	141.8	O K
60 min Summer	98.678	1.018	0.0	10.5	10.5	164.4	O K
120 min Summer	98.731	1.071	0.0	10.5	10.5	172.9	O K
180 min Summer	98.705	1.045	0.0	10.5	10.5	168.7	O K
240 min Summer	98.668	1.008	0.0	10.5	10.5	162.8	O K
360 min Summer	98.594	0.934	0.0	10.5	10.5	150.8	O K
480 min Summer	98.521	0.861	0.0	10.5	10.5	139.0	O K
600 min Summer	98.445	0.785	0.0	10.5	10.5	126.8	O K
720 min Summer	98.362	0.702	0.0	10.5	10.5	113.4	O K
960 min Summer	98.225	0.565	0.0	10.5	10.5	91.3	O K
1440 min Summer	98.025	0.365	0.0	10.5	10.5	59.0	O K
2160 min Summer	97.870	0.210	0.0	10.0	10.0	33.9	O K
2880 min Summer	97.814	0.154	0.0	9.0	9.0	24.9	O K
4320 min Summer	97.778	0.118	0.0	6.7	6.7	19.0	O K
5760 min Summer	97.760	0.100	0.0	5.3	5.3	16.2	O K
7200 min Summer	97.750	0.090	0.0	4.4	4.4	14.5	O K
8640 min Summer	97.742	0.082	0.0	3.8	3.8	13.2	O K
10080 min Summer	97.736	0.076	0.0	3.3	3.3	12.2	O K
15 min Winter	98.443	0.783	0.0	10.5	10.5	126.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.329	0.0	121.7	25
30 min Summer	89.302	0.0	157.2	38
60 min Summer	54.817	0.0	193.4	66
120 min Summer	32.499	0.0	229.4	122
180 min Summer	23.630	0.0	250.2	156
240 min Summer	18.745	0.0	264.6	186
360 min Summer	13.505	0.0	286.0	254
480 min Summer	10.699	0.0	302.1	324
600 min Summer	8.924	0.0	315.0	394
720 min Summer	7.692	0.0	325.8	454
960 min Summer	6.081	0.0	343.4	578
1440 min Summer	4.360	0.0	369.2	810
2160 min Summer	3.122	0.0	396.8	1144
2880 min Summer	2.461	0.0	417.1	1476
4320 min Summer	1.758	0.0	446.7	2204
5760 min Summer	1.384	0.0	469.1	2936
7200 min Summer	1.149	0.0	486.8	3672
8640 min Summer	0.986	0.0	501.5	4376
10080 min Summer	0.867	0.0	514.0	5136
15 min Winter	138.329	0.0	136.3	25

Summary of Results for 100 year Return Period (+30%)

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	98.652	0.992	0.0	10.5	10.5	160.2	O K
60 min Winter	98.815	1.155	0.0	10.5	10.5	186.6	O K
120 min Winter	98.895	1.235	0.0	10.7	10.7	198.5	O K
180 min Winter	98.863	1.203	0.0	10.5	10.5	194.3	O K
240 min Winter	98.815	1.155	0.0	10.5	10.5	186.5	O K
360 min Winter	98.717	1.057	0.0	10.5	10.5	170.7	O K
480 min Winter	98.615	0.955	0.0	10.5	10.5	154.2	O K
600 min Winter	98.509	0.849	0.0	10.5	10.5	137.1	O K
720 min Winter	98.384	0.724	0.0	10.5	10.5	116.9	O K
960 min Winter	98.174	0.514	0.0	10.5	10.5	82.9	O K
1440 min Winter	97.917	0.257	0.0	10.3	10.3	41.5	O K
2160 min Winter	97.805	0.145	0.0	8.5	8.5	23.5	O K
2880 min Winter	97.779	0.119	0.0	6.8	6.8	19.2	O K
4320 min Winter	97.755	0.095	0.0	4.9	4.9	15.4	O K
5760 min Winter	97.742	0.082	0.0	3.8	3.8	13.3	O K
7200 min Winter	97.734	0.074	0.0	3.2	3.2	11.9	O K
8640 min Winter	97.728	0.068	0.0	2.7	2.7	10.9	O K
10080 min Winter	97.723	0.063	0.0	2.4	2.4	10.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	89.302	0.0	176.1	38
60 min Winter	54.817	0.0	216.6	66
120 min Winter	32.499	0.0	256.9	120
180 min Winter	23.630	0.0	280.2	172
240 min Winter	18.745	0.0	296.4	196
360 min Winter	13.505	0.0	320.3	274
480 min Winter	10.699	0.0	338.4	350
600 min Winter	8.924	0.0	352.8	426
720 min Winter	7.692	0.0	364.9	494
960 min Winter	6.081	0.0	384.6	610
1440 min Winter	4.360	0.0	413.6	822
2160 min Winter	3.122	0.0	444.5	1124
2880 min Winter	2.461	0.0	467.1	1472
4320 min Winter	1.758	0.0	500.4	2204
5760 min Winter	1.384	0.0	525.4	2936
7200 min Winter	1.149	0.0	545.2	3672
8640 min Winter	0.986	0.0	561.7	4424
10080 min Winter	0.867	0.0	575.8	5056

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)	20.800	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.471

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.157	4	8	0.157	8	12	0.157

Model Details

Storage is Online Cover Level (m) 99.610

Cellular Storage Structure

Invert Level (m) 97.660 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	170.0	170.0	2.600	0.0	237.8
0.200	170.0	180.4	2.800	0.0	237.8
0.400	170.0	190.9	3.000	0.0	237.8
0.600	170.0	201.3	3.200	0.0	237.8
0.800	170.0	211.7	3.400	0.0	237.8
1.000	170.0	222.2	3.600	0.0	237.8
1.200	170.0	232.6	3.800	0.0	237.8
1.400	0.0	237.8	4.000	0.0	237.8
1.600	0.0	237.8	4.200	0.0	237.8
1.800	0.0	237.8	4.400	0.0	237.8
2.000	0.0	237.8	4.600	0.0	237.8
2.200	0.0	237.8	4.800	0.0	237.8
2.400	0.0	237.8	5.000	0.0	237.8

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0146-1060-1200-1060
Design Head (m)	1.200
Design Flow (l/s)	10.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	146
Invert Level (m)	97.660
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	10.5
Flush-Flo™	0.357	10.5
Kick-Flo®	0.780	8.6
Mean Flow over Head Range	-	9.1

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	0.300	10.4	0.500	10.3	0.800	8.7
0.200	9.9	0.400	10.5	0.600	10.0	1.000	9.6

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)
1.200	10.5	2.400	14.6	5.000	20.7	8.000	26.0
1.400	11.3	2.600	15.2	5.500	21.7	8.500	26.7
1.600	12.0	3.000	16.2	6.000	22.6	9.000	27.5
1.800	12.7	3.500	17.5	6.500	23.5	9.500	28.2
2.000	13.4	4.000	18.6	7.000	24.3		
2.200	14.0	4.500	19.7	7.500	25.2		