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11 Tungsten Building George Street Fishersgate BN41 1RA	Greenfield Run-off Wicks Farm Ford Lane	
Date 13/12/2018	Designed by AMF	
File Prelim Reservoir Calc.srcx	Checked by	
XP Solutions		Source Control 2017.1.2
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.400 Area (ha) 9.740 Urban 0.000 SAAR (mm) 700 Region Number Region 7 Results l/s QBAR Rural 33.1 QBAR Urban 33.1 Q100 years 105.7 Q1 year 28.2 Q30 years 75.1 Q100 years 105.7		
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11 Tungsten Building George Street Fishersgate BN41 1RA		Preliminary SuDS Storage Pond Wicks Farm Ford Lane			
Date 13/12/2018		Designed by AMF			
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XP Solutions		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	2.723	0.223	12.9	297.8	O K
30 min Summer	2.793	0.293	13.0	396.0	O K
60 min Summer	2.865	0.365	13.0	497.6	O K
120 min Summer	2.933	0.433	13.0	594.9	O K
180 min Summer	2.965	0.465	13.0	642.4	Flood Risk
240 min Summer	2.982	0.482	13.0	667.0	Flood Risk
360 min Summer	2.996	0.496	13.0	687.2	Flood Risk
480 min Summer	2.997	0.497	13.0	689.8	Flood Risk
600 min Summer	2.997	0.497	13.0	688.5	Flood Risk
720 min Summer	2.994	0.494	13.0	684.5	Flood Risk
960 min Summer	2.985	0.485	13.0	671.0	Flood Risk
1440 min Summer	2.956	0.456	13.0	629.2	Flood Risk
2160 min Summer	2.905	0.405	13.0	554.8	O K
2880 min Summer	2.856	0.356	13.0	484.1	O K
4320 min Summer	2.772	0.272	13.0	367.0	O K
5760 min Summer	2.714	0.214	12.9	286.7	O K
7200 min Summer	2.678	0.178	12.7	236.6	O K
8640 min Summer	2.660	0.160	11.7	212.4	O K
10080 min Summer	2.647	0.147	10.6	194.8	O K
15 min Winter	2.749	0.249	13.0	334.2	O K
30 min Winter	2.828	0.328	13.0	444.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	125.353	0.0	277.8	19	
30 min Summer	84.267	0.0	380.0	33	
60 min Summer	54.074	0.0	512.1	62	
120 min Summer	33.506	0.0	637.0	122	
180 min Summer	24.949	0.0	712.4	182	
240 min Summer	20.093	0.0	765.5	242	
360 min Summer	14.773	0.0	844.7	360	
480 min Summer	11.871	0.0	905.1	432	
600 min Summer	10.010	0.0	953.9	492	
720 min Summer	8.703	0.0	994.9	556	
960 min Summer	6.973	0.0	1061.8	684	
1440 min Summer	5.093	0.0	1159.6	954	
2160 min Summer	3.711	0.0	1292.5	1360	
2880 min Summer	2.961	0.0	1374.0	1732	
4320 min Summer	2.150	0.0	1489.7	2464	
5760 min Summer	1.711	0.0	1595.8	3120	
7200 min Summer	1.432	0.0	1668.3	3816	
8640 min Summer	1.240	0.0	1730.4	4496	
10080 min Summer	1.098	0.0	1780.8	5240	
15 min Winter	125.353	0.0	313.5	18	
30 min Winter	84.267	0.0	427.6	33	
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XP Solutions		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	2.909	0.409	13.0	560.4	O K
120 min Winter	2.986	0.486	13.0	672.3	Flood Risk
180 min Winter	3.022	0.522	13.0	726.8	Flood Risk
240 min Winter	3.042	0.542	13.0	755.4	Flood Risk
360 min Winter	3.059	0.559	13.0	781.8	Flood Risk
480 min Winter	3.063	0.563	13.0	787.8	Flood Risk
600 min Winter	3.060	0.560	13.0	782.3	Flood Risk
720 min Winter	3.054	0.554	13.0	773.8	Flood Risk
960 min Winter	3.041	0.541	13.0	754.3	Flood Risk
1440 min Winter	3.001	0.501	13.0	695.5	Flood Risk
2160 min Winter	2.922	0.422	13.0	580.0	O K
2880 min Winter	2.845	0.345	13.0	469.0	O K
4320 min Winter	2.727	0.227	12.9	303.6	O K
5760 min Winter	2.668	0.168	12.3	223.5	O K
7200 min Winter	2.646	0.146	10.5	194.0	O K
8640 min Winter	2.632	0.132	9.3	175.0	O K
10080 min Winter	2.622	0.122	8.3	161.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	54.074	0.0	574.8	62	
120 min Winter	33.506	0.0	714.6	120	
180 min Winter	24.949	0.0	799.0	178	
240 min Winter	20.093	0.0	858.4	236	
360 min Winter	14.773	0.0	947.1	348	
480 min Winter	11.871	0.0	1014.7	458	
600 min Winter	10.010	0.0	1069.2	558	
720 min Winter	8.703	0.0	1115.1	580	
960 min Winter	6.973	0.0	1189.8	732	
1440 min Winter	5.093	0.0	1298.0	1040	
2160 min Winter	3.711	0.0	1448.4	1468	
2880 min Winter	2.961	0.0	1540.2	1848	
4320 min Winter	2.150	0.0	1671.1	2512	
5760 min Winter	1.711	0.0	1788.0	3112	
7200 min Winter	1.432	0.0	1869.5	3816	
8640 min Winter	1.240	0.0	1939.6	4496	
10080 min Winter	1.098	0.0	1997.4	5240	
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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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.300

Time (mins)	Area
From:	To: (ha)
0	4 1.300

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Model Details

Storage is Online Cover Level (m) 3.250

Tank or Pond Structure

Invert Level (m) 2.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1300.0	0.750	1568.2

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0169-1300-0600-1300
Design Head (m)	0.600
Design Flow (l/s)	13.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	169
Invert Level (m)	2.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	13.0
Flush-Flo™	0.256	13.0
Kick-Flo®	0.467	11.5
Mean Flow over Head Range	-	10.4

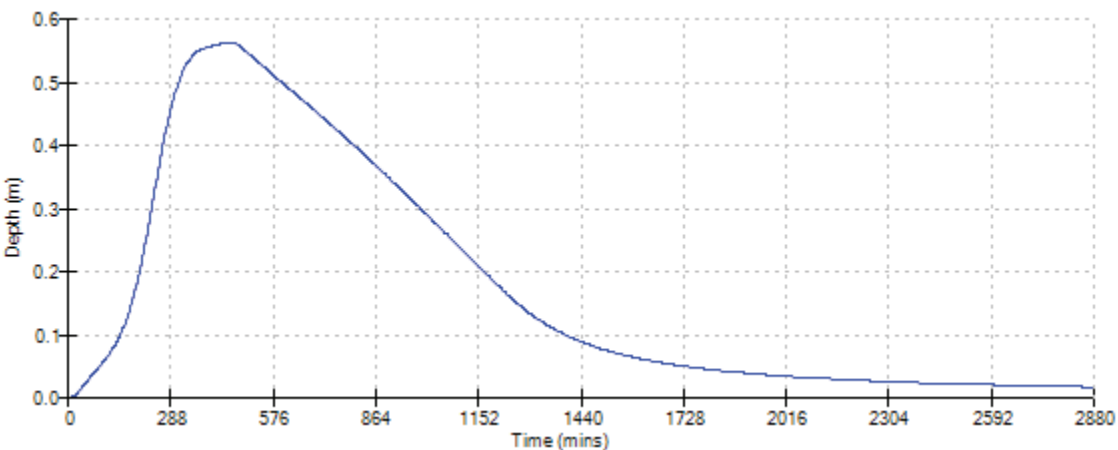
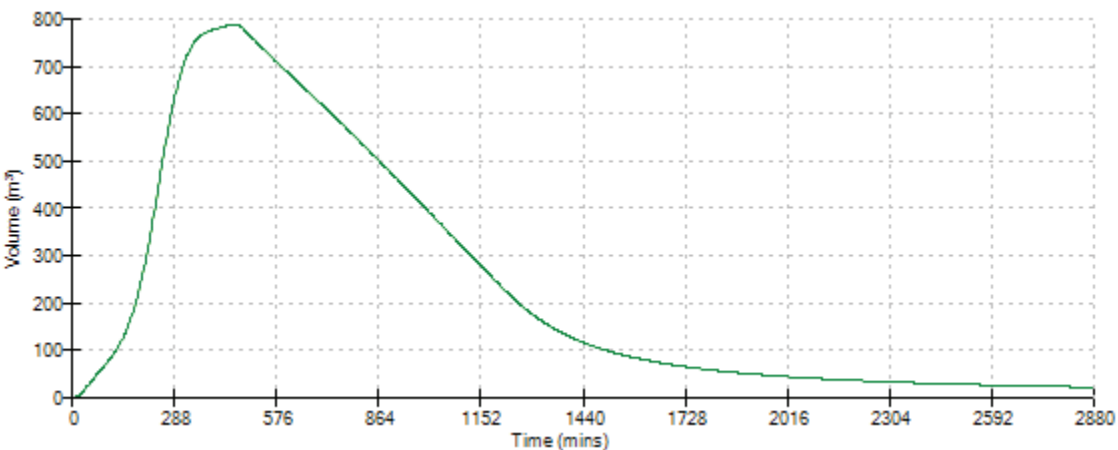
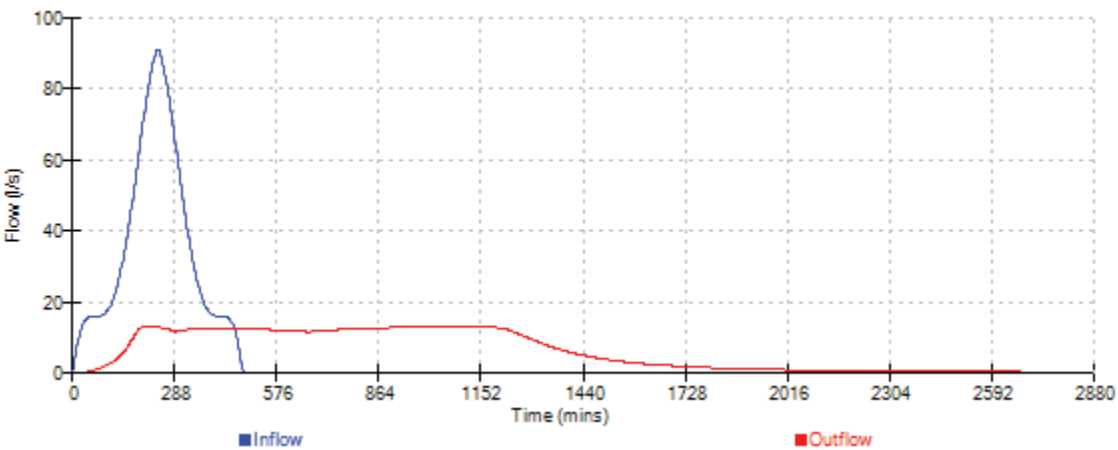
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	1.200	18.1	3.000	28.0	7.000	42.0
0.200	12.8	1.400	19.4	3.500	30.2	7.500	43.5
0.300	12.9	1.600	20.7	4.000	32.2	8.000	44.9
0.400	12.4	1.800	21.9	4.500	34.0	8.500	46.3
0.500	11.9	2.000	23.0	5.000	35.8	9.000	47.7
0.600	13.0	2.200	24.1	5.500	37.5	9.500	49.0
0.800	14.9	2.400	25.1	6.000	39.1		
1.000	16.6	2.600	26.1	6.500	40.5		

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Event: 480 min Winter



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XP Solutions		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.321	0.321	20.0	1313.8	O K
30 min Summer	0.427	0.427	20.0	1758.9	O K
60 min Summer	0.540	0.540	20.0	2240.8	O K
120 min Summer	0.655	0.655	20.0	2741.8	O K
180 min Summer	0.720	0.720	20.0	3028.3	O K
240 min Summer	0.763	0.763	20.0	3216.7	O K
360 min Summer	0.819	0.819	20.0	3467.4	O K
480 min Summer	0.856	0.856	20.0	3633.1	O K
600 min Summer	0.881	0.881	20.0	3746.4	O K
720 min Summer	0.899	0.899	20.0	3825.4	O K
960 min Summer	0.919	0.919	20.0	3916.3	O K
1440 min Summer	0.925	0.925	20.0	3945.6	O K
2160 min Summer	0.910	0.910	20.0	3877.9	O K
2880 min Summer	0.890	0.890	20.0	3785.3	O K
4320 min Summer	0.841	0.841	20.0	3564.5	O K
5760 min Summer	0.787	0.787	20.0	3322.7	O K
7200 min Summer	0.730	0.730	20.0	3069.8	O K
8640 min Summer	0.668	0.668	20.0	2797.9	O K
10080 min Summer	0.612	0.612	20.0	2553.6	O K
15 min Winter	0.359	0.359	20.0	1472.2	O K
30 min Winter	0.477	0.477	20.0	1971.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	124.633	0.0	1049.6	17	
30 min Summer	83.789	0.0	1396.8	32	
60 min Summer	53.779	0.0	2100.5	62	
120 min Summer	33.337	0.0	2581.7	122	
180 min Summer	24.832	0.0	2840.0	182	
240 min Summer	20.006	0.0	2990.4	242	
360 min Summer	14.706	0.0	3125.1	362	
480 min Summer	11.818	0.0	3114.7	482	
600 min Summer	9.966	0.0	3071.2	602	
720 min Summer	8.665	0.0	3028.3	720	
960 min Summer	6.943	0.0	2949.1	960	
1440 min Summer	5.071	0.0	2809.0	1428	
2160 min Summer	3.696	0.0	5375.7	1772	
2880 min Summer	2.949	0.0	5564.4	2136	
4320 min Summer	2.142	0.0	5193.9	2944	
5760 min Summer	1.705	0.0	6886.9	3800	
7200 min Summer	1.427	0.0	7196.7	4616	
8640 min Summer	1.235	0.0	7460.8	5368	
10080 min Summer	1.093	0.0	7663.8	6152	
15 min Winter	124.633	0.0	1178.3	17	
30 min Winter	83.789	0.0	1530.2	32	
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XP Solutions		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.603	0.603	20.0	2513.2	O K
120 min Winter	0.732	0.732	20.0	3080.0	O K
180 min Winter	0.805	0.805	20.0	3404.2	O K
240 min Winter	0.852	0.852	20.0	3616.1	O K
360 min Winter	0.916	0.916	20.0	3902.4	O K
480 min Winter	0.958	0.958	20.0	4095.2	O K
600 min Winter	0.988	0.988	20.0	4230.3	O K
720 min Winter	1.009	1.009	20.1	4327.1	O K
960 min Winter	1.035	1.035	20.3	4446.9	O K
1440 min Winter	1.051	1.051	20.5	4520.1	O K
2160 min Winter	1.033	1.033	20.3	4437.2	O K
2880 min Winter	1.005	1.005	20.0	4309.4	O K
4320 min Winter	0.939	0.939	20.0	4007.4	O K
5760 min Winter	0.862	0.862	20.0	3660.8	O K
7200 min Winter	0.781	0.781	20.0	3297.1	O K
8640 min Winter	0.689	0.689	20.0	2891.1	O K
10080 min Winter	0.599	0.599	20.0	2499.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	53.779	0.0	2347.9	62	
120 min Winter	33.337	0.0	2850.4	120	
180 min Winter	24.832	0.0	3081.0	180	
240 min Winter	20.006	0.0	3172.8	240	
360 min Winter	14.706	0.0	3162.0	356	
480 min Winter	11.818	0.0	3122.8	474	
600 min Winter	9.966	0.0	3088.3	590	
720 min Winter	8.665	0.0	3058.1	706	
960 min Winter	6.943	0.0	3005.8	934	
1440 min Winter	5.071	0.0	2921.7	1382	
2160 min Winter	3.696	0.0	5902.3	1992	
2880 min Winter	2.949	0.0	5897.5	2252	
4320 min Winter	2.142	0.0	5413.6	3196	
5760 min Winter	1.705	0.0	7713.1	4096	
7200 min Winter	1.427	0.0	8057.2	5040	
8640 min Winter	1.235	0.0	8352.1	5872	
10080 min Winter	1.093	0.0	8594.0	6560	
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XP Solutions		Source Control 2017.1.2

Model Details

Storage is Online Cover Level (m) 2.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	4000.0	2.000	5199.5

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0199-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	199
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	20.0
Flush-Flo™	0.340	20.0
Kick-Flo®	0.721	17.1
Mean Flow over Head Range	-	16.8

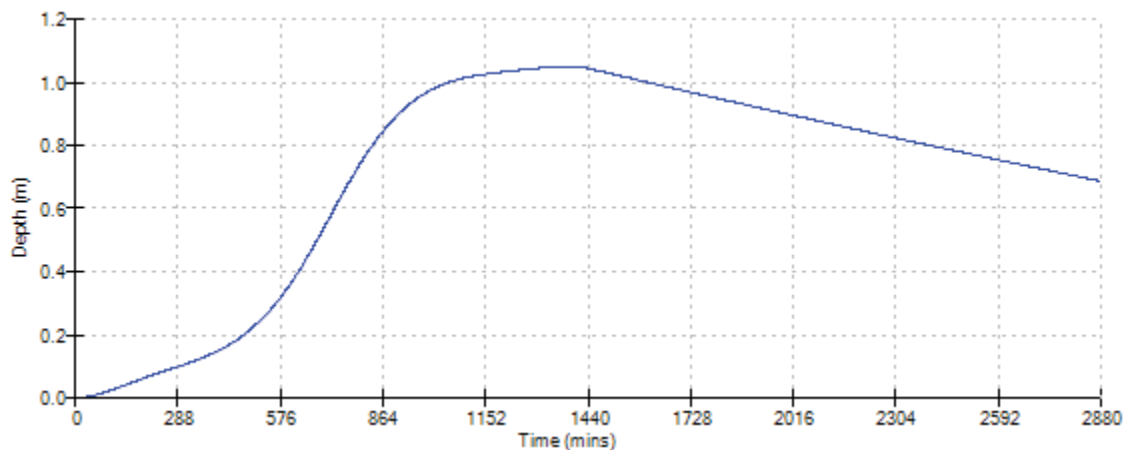
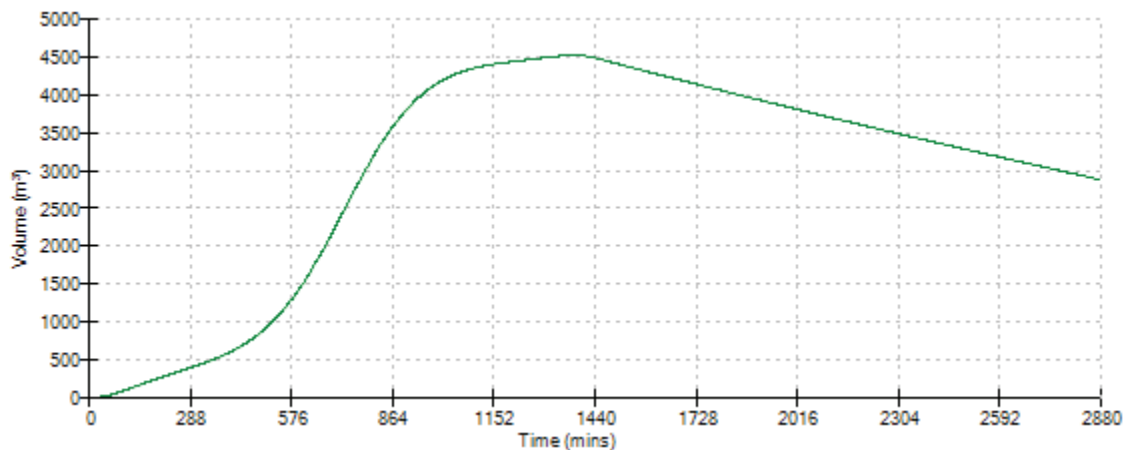
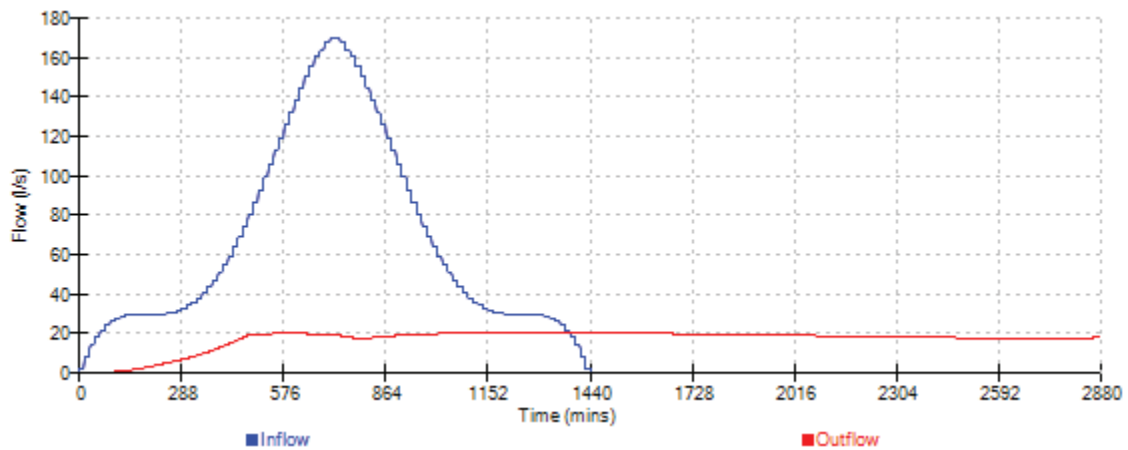
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.9	1.200	21.8	3.000	33.8	7.000	51.0
0.200	18.7	1.400	23.5	3.500	36.4	7.500	52.7
0.300	19.9	1.600	25.0	4.000	38.9	8.000	54.4
0.400	19.9	1.800	26.5	4.500	41.1	8.500	56.0
0.500	19.5	2.000	27.8	5.000	43.3	9.000	57.6
0.600	19.0	2.200	29.1	5.500	45.3	9.500	59.1
0.800	18.0	2.400	30.4	6.000	47.3		
1.000	20.0	2.600	31.6	6.500	49.2		

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Event: 1440 min Winter



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XP Solutions		Source Control 2017.1.2				
Summary of Results for 100 year Return Period (+40%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	
15 min Summer	0.393	0.393	32.9	1615.1	O K	
30 min Summer	0.521	0.521	32.9	2159.8	O K	
60 min Summer	0.656	0.656	32.9	2745.1	O K	
120 min Summer	0.791	0.791	32.9	3344.1	O K	
180 min Summer	0.866	0.866	32.9	3678.6	O K	
240 min Summer	0.913	0.913	32.9	3892.7	O K	
360 min Summer	0.973	0.973	32.9	4162.9	O K	
480 min Summer	1.009	1.009	32.9	4327.4	O K	
600 min Summer	1.031	1.031	32.9	4426.9	O K	
720 min Summer	1.043	1.043	32.9	4484.3	O K	
960 min Summer	1.050	1.050	32.9	4518.8	O K	
1440 min Summer	1.038	1.038	32.9	4462.6	O K	
2160 min Summer	1.008	1.008	32.9	4321.6	O K	
2880 min Summer	0.969	0.969	32.9	4147.2	O K	
4320 min Summer	0.881	0.881	32.9	3747.6	O K	
5760 min Summer	0.782	0.782	32.9	3301.7	O K	
7200 min Summer	0.691	0.691	32.9	2900.8	O K	
8640 min Summer	0.611	0.611	32.9	2549.8	O K	
10080 min Summer	0.539	0.539	32.9	2238.1	O K	
15 min Winter	0.439	0.439	32.9	1810.5	O K	
30 min Winter	0.582	0.582	32.9	2422.5	O K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
15 min Summer	124.633	0.0	1392.6	19		
30 min Summer	83.789	0.0	1886.8	34		
60 min Summer	53.779	0.0	2675.6	64		
120 min Summer	33.337	0.0	3319.3	124		
180 min Summer	24.832	0.0	3698.9	184		
240 min Summer	20.006	0.0	3958.7	242		
360 min Summer	14.706	0.0	4326.3	362		
480 min Summer	11.818	0.0	4582.4	482		
600 min Summer	9.966	0.0	4759.1	602		
720 min Summer	8.665	0.0	4870.3	720		
960 min Summer	6.943	0.0	4906.6	960		
1440 min Summer	5.071	0.0	4651.7	1212		
2160 min Summer	3.696	0.0	6842.2	1580		
2880 min Summer	2.949	0.0	7248.9	1992		
4320 min Summer	2.142	0.0	7761.8	2848		
5760 min Summer	1.705	0.0	8541.0	3624		
7200 min Summer	1.427	0.0	8929.3	4392		
8640 min Summer	1.235	0.0	9255.2	5104		
10080 min Summer	1.093	0.0	9513.0	5848		
15 min Winter	124.633	0.0	1568.9	19		
30 min Winter	83.789	0.0	2104.8	33		
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XP Solutions		Source Control 2017.1.2				
Summary of Results for 100 year Return Period (+40%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	
60 min Winter	0.732	0.732	32.9	3080.8	O K	
120 min Winter	0.885	0.885	32.9	3762.9	O K	
180 min Winter	0.968	0.968	32.9	4142.6	O K	
240 min Winter	1.021	1.021	32.9	4383.8	O K	
360 min Winter	1.089	1.089	32.9	4695.1	O K	
480 min Winter	1.131	1.131	32.9	4891.1	O K	
600 min Winter	1.158	1.158	32.9	5016.1	O K	
720 min Winter	1.174	1.174	32.9	5094.8	O K	
960 min Winter	1.189	1.189	32.9	5164.1	O K	
1440 min Winter	1.178	1.178	32.9	5111.6	O K	
2160 min Winter	1.135	1.135	32.9	4910.6	O K	
2880 min Winter	1.084	1.084	32.9	4671.4	O K	
4320 min Winter	0.961	0.961	32.9	4107.9	O K	
5760 min Winter	0.814	0.814	32.9	3443.5	O K	
7200 min Winter	0.671	0.671	32.9	2812.4	O K	
8640 min Winter	0.549	0.549	32.9	2283.3	O K	
10080 min Winter	0.447	0.447	32.9	1845.1	O K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
60 min Winter	53.779	0.0	3000.5	62		
120 min Winter	33.337	0.0	3709.9	122		
180 min Winter	24.832	0.0	4121.8	180		
240 min Winter	20.006	0.0	4399.1	240		
360 min Winter	14.706	0.0	4772.1	356		
480 min Winter	11.818	0.0	4996.4	472		
600 min Winter	9.966	0.0	5097.8	588		
720 min Winter	8.665	0.0	5092.9	700		
960 min Winter	6.943	0.0	4990.2	924		
1440 min Winter	5.071	0.0	4764.6	1344		
2160 min Winter	3.696	0.0	7653.0	1684		
2880 min Winter	2.949	0.0	8094.6	2136		
4320 min Winter	2.142	0.0	8532.5	3068		
5760 min Winter	1.705	0.0	9568.9	3920		
7200 min Winter	1.427	0.0	10007.5	4680		
8640 min Winter	1.235	0.0	10377.0	5360		
10080 min Winter	1.093	0.0	10675.2	6048		
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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)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 7.000

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	2	3.500	2	4	3.500

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 2.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	4000.0	2.000	5199.5

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0244-3300-1200-3300
Design Head (m)	1.200
Design Flow (l/s)	33.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	244
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	32.9
Flush-Flo™	0.419	32.9
Kick-Flo®	0.870	28.2
Mean Flow over Head Range	-	27.7

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	8.0	1.200	32.9	3.000	51.2	7.000	77.2
0.200	24.9	1.400	35.5	3.500	55.2	7.500	79.9
0.300	32.3	1.600	37.8	4.000	58.9	8.000	82.4
0.400	32.9	1.800	40.0	4.500	62.3	8.500	84.9
0.500	32.8	2.000	42.1	5.000	65.6	9.000	87.3
0.600	32.3	2.200	44.1	5.500	68.7	9.500	89.6
0.800	30.1	2.400	46.0	6.000	71.7		
1.000	30.2	2.600	47.8	6.500	74.5		

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Event: 960 min Winter

