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15 Princes Street Norwich Norfolk NR3 1AF		Attenuation Basin 1 in 100 yr + 40% CC Holland Park			
Date 27/06/2022		Designed by JPP			
File ATTENUATION BASIN 1 IN ...		Checked by GS			
Innovyze		Source Control 2018.1.1			
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	1.282	0.382	2.6	370.0	O K
30 min Summer	1.431	0.531	2.6	531.0	O K
60 min Summer	1.589	0.689	2.6	710.0	O K
120 min Summer	1.731	0.831	2.6	882.0	O K
180 min Summer	1.812	0.912	2.6	982.3	O K
240 min Summer	1.867	0.967	2.6	1053.6	O K
360 min Summer	1.942	1.042	2.6	1152.4	O K
480 min Summer	1.993	1.093	2.6	1220.0	O K
600 min Summer	2.031	1.131	2.6	1272.1	O K
720 min Summer	2.063	1.163	2.7	1316.2	O K
960 min Summer	2.112	1.212	2.7	1384.3	O K
1440 min Summer	2.174	1.274	2.8	1472.6	O K
2160 min Summer	2.222	1.322	2.8	1541.3	O K
2880 min Summer	2.240	1.340	2.8	1568.9	O K
4320 min Summer	2.235	1.335	2.8	1560.3	O K
5760 min Summer	2.201	1.301	2.8	1510.8	O K
7200 min Summer	2.164	1.264	2.8	1458.7	O K
8640 min Summer	2.130	1.230	2.7	1409.1	O K
10080 min Summer	2.096	1.196	2.7	1362.3	O K
15 min Winter	1.344	0.444	2.6	435.4	O K
30 min Winter	1.513	0.613	2.6	622.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	128.253	0.0	213.1	845	
30 min Summer	82.677	0.0	207.6	962	
60 min Summer	50.812	0.0	379.1	1104	
120 min Summer	30.273	0.0	377.6	1150	
180 min Summer	22.125	0.0	388.0	1178	
240 min Summer	17.638	0.0	394.2	1226	
360 min Summer	12.742	0.0	400.6	1302	
480 min Summer	10.074	0.0	402.7	1372	
600 min Summer	8.388	0.0	402.9	1442	
720 min Summer	7.228	0.0	402.1	1524	
960 min Summer	5.712	0.0	398.3	1678	
1440 min Summer	4.095	0.0	385.7	2012	
2160 min Summer	2.931	0.0	824.0	2568	
2880 min Summer	2.311	0.0	809.1	3156	
4320 min Summer	1.651	0.0	764.0	4408	
5760 min Summer	1.300	0.0	1573.9	5424	
7200 min Summer	1.079	0.0	1541.9	6184	
8640 min Summer	0.927	0.0	1495.9	6928	
10080 min Summer	0.815	0.0	1438.1	7688	
15 min Winter	128.253	0.0	212.6	895	
30 min Winter	82.677	0.0	199.1	1026	
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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	1.680	0.780	2.6	819.0	O K
120 min Winter	1.832	0.932	2.6	1008.2	O K
180 min Winter	1.918	1.018	2.6	1120.2	O K
240 min Winter	1.978	1.078	2.6	1199.9	O K
360 min Winter	2.059	1.159	2.7	1310.8	O K
480 min Winter	2.114	1.214	2.7	1386.7	O K
600 min Winter	2.155	1.255	2.8	1445.4	O K
720 min Winter	2.190	1.290	2.8	1495.3	O K
960 min Winter	2.243	1.343	2.8	1572.6	O K
1440 min Winter	2.311	1.411	2.9	1674.4	O K
2160 min Winter	2.366	1.466	3.0	1757.3	O K
2880 min Winter	2.391	1.491	3.0	1795.4	O K
4320 min Winter	2.395	1.495	3.0	1801.6	O K
5760 min Winter	2.367	1.467	3.0	1758.9	O K
7200 min Winter	2.325	1.425	2.9	1695.5	O K
8640 min Winter	2.284	1.384	2.9	1633.6	O K
10080 min Winter	2.245	1.345	2.8	1575.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	50.812	0.0	373.2	1116	
120 min Winter	30.273	0.0	395.1	1152	
180 min Winter	22.125	0.0	406.6	1192	
240 min Winter	17.638	0.0	413.4	1228	
360 min Winter	12.742	0.0	420.4	1302	
480 min Winter	10.074	0.0	422.9	1374	
600 min Winter	8.388	0.0	423.1	1456	
720 min Winter	7.228	0.0	422.4	1526	
960 min Winter	5.712	0.0	418.3	1694	
1440 min Winter	4.095	0.0	404.7	2028	
2160 min Winter	2.931	0.0	865.8	2576	
2880 min Winter	2.311	0.0	848.5	3156	
4320 min Winter	1.651	0.0	798.7	4392	
5760 min Winter	1.300	0.0	1664.8	5648	
7200 min Winter	1.079	0.0	1629.1	6712	
8640 min Winter	0.927	0.0	1580.8	7296	
10080 min Winter	0.815	0.0	1521.9	8168	
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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)	18.000	Shortest Storm (mins)	15
Ratio R	0.450	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Pipe Network

Volume in Pipe Network (m³) 1635 Dia of Outfall Pipe (m) 0.3
Slope of Outfall Pipe (1:X) 250 Roughness of Outfall Pipe (mm) 0.001

Time Area Diagram

Total Area (ha) 2.477

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
(ha)	(ha)	(ha)	(ha)	(ha)	(ha)
0	4	4	8	8	12
0.680		1.512		0.285	

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Model Details

Storage is Online Cover Level (m) 2.740

Tank or Pond Structure

Invert Level (m) 0.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	896.0	1.550	1570.7	1.850	1717.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0075-3000-1500-3000
Design Head (m)	1.500
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	0.900
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.0
Flush-Flo™	0.329	2.6
Kick-Flo®	0.671	2.1
Mean Flow over Head Range	-	2.4

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	2.1	1.200	2.7	3.000	4.1	7.000	6.1
0.200	2.5	1.400	2.9	3.500	4.4	7.500	6.3
0.300	2.6	1.600	3.1	4.000	4.7	8.000	6.5
0.400	2.6	1.800	3.3	4.500	5.0	8.500	6.7
0.500	2.5	2.000	3.4	5.000	5.2	9.000	6.9
0.600	2.3	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.2	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	5.9		