

Goodson Associates

53 Melville Street
Edinburgh
EH3 7HL

Date 06/03/2024 10:00
File P15710 SW ATTENUATION.SRCX

XP Solutions

Designed by PhilH
Checked by

Source Control 2020.1.3

Page 1

Micro Drainage

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

Half Drain Time : 67 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	0.203	0.203	0.0	5.0	5.0	21.2	O K
30 min Summer	0.267	0.267	0.0	5.0	5.0	27.9	O K
60 min Summer	0.319	0.319	0.0	5.0	5.0	33.3	O K
120 min Summer	0.339	0.339	0.0	5.0	5.0	35.4	O K
180 min Summer	0.332	0.332	0.0	5.0	5.0	34.7	O K
240 min Summer	0.317	0.317	0.0	5.0	5.0	33.1	O K
360 min Summer	0.279	0.279	0.0	5.0	5.0	29.2	O K
480 min Summer	0.242	0.242	0.0	5.0	5.0	25.3	O K
600 min Summer	0.209	0.209	0.0	5.0	5.0	21.9	O K
720 min Summer	0.182	0.182	0.0	5.0	5.0	19.0	O K
960 min Summer	0.142	0.142	0.0	5.0	5.0	14.8	O K
1440 min Summer	0.108	0.108	0.0	4.3	4.3	11.3	O K
2160 min Summer	0.088	0.088	0.0	3.3	3.3	9.2	O K
2880 min Summer	0.077	0.077	0.0	2.7	2.7	8.0	O K
4320 min Summer	0.064	0.064	0.0	2.0	2.0	6.7	O K
5760 min Summer	0.056	0.056	0.0	1.6	1.6	5.9	O K
7200 min Summer	0.051	0.051	0.0	1.4	1.4	5.3	O K
8640 min Summer	0.047	0.047	0.0	1.2	1.2	4.9	O K
10080 min Summer	0.044	0.044	0.0	1.1	1.1	4.6	O K
15 min Winter	0.230	0.230	0.0	5.0	5.0	24.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	127.920	0.0	25.0	22
30 min Summer	87.204	0.0	34.1	34
60 min Summer	56.713	0.0	44.6	60
120 min Summer	35.498	0.0	55.8	94
180 min Summer	26.506	0.0	62.5	128
240 min Summer	21.432	0.0	67.4	162
360 min Summer	15.889	0.0	75.0	228
480 min Summer	12.826	0.0	80.7	290
600 min Summer	10.852	0.0	85.3	350
720 min Summer	9.461	0.0	89.3	408
960 min Summer	7.611	0.0	95.7	520
1440 min Summer	5.589	0.0	105.4	750
2160 min Summer	4.093	0.0	116.0	1108
2880 min Summer	3.277	0.0	123.8	1472
4320 min Summer	2.390	0.0	135.3	2204
5760 min Summer	1.913	0.0	144.6	2936
7200 min Summer	1.610	0.0	152.1	3672
8640 min Summer	1.399	0.0	158.5	4400
10080 min Summer	1.242	0.0	164.1	5136
15 min Winter	127.920	0.0	28.0	23

©1982-2020 Innovyze

Goodson Associates

53 Melville Street
Edinburgh
EH3 7HL

Date 06/03/2024 10:00
File P15710 SW ATTENUATION.SRCX

XP Solutions

Designed by PhilH
Checked by

Source Control 2020.1.3

Page 2



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 (m³)	Status
30 min Winter	0.304	0.304	0.0	5.0	5.0	31.8	O K
60 min Winter	0.363	0.363	0.0	5.0	5.0	37.9	O K
120 min Winter	0.381	0.381	0.0	5.0	5.0	39.8	O K
180 min Winter	0.368	0.368	0.0	5.0	5.0	38.4	O K
240 min Winter	0.344	0.344	0.0	5.0	5.0	35.9	O K
360 min Winter	0.283	0.283	0.0	5.0	5.0	29.6	O K
480 min Winter	0.225	0.225	0.0	5.0	5.0	23.5	O K
600 min Winter	0.177	0.177	0.0	5.0	5.0	18.5	O K
720 min Winter	0.143	0.143	0.0	5.0	5.0	14.9	O K
960 min Winter	0.112	0.112	0.0	4.5	4.5	11.7	O K
1440 min Winter	0.089	0.089	0.0	3.4	3.4	9.3	O K
2160 min Winter	0.073	0.073	0.0	2.5	2.5	7.6	O K
2880 min Winter	0.064	0.064	0.0	2.0	2.0	6.6	O K
4320 min Winter	0.053	0.053	0.0	1.5	1.5	5.5	O K
5760 min Winter	0.047	0.047	0.0	1.2	1.2	4.9	O K
7200 min Winter	0.043	0.043	0.0	1.0	1.0	4.4	O K
8640 min Winter	0.040	0.040	0.0	0.9	0.9	4.1	O K
10080 min Winter	0.037	0.037	0.0	0.8	0.8	3.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	87.204	0.0	38.2	35
60 min Winter	56.713	0.0	49.9	60
120 min Winter	35.498	0.0	62.5	98
180 min Winter	26.506	0.0	70.0	138
240 min Winter	21.432	0.0	75.5	176
360 min Winter	15.889	0.0	84.0	246
480 min Winter	12.826	0.0	90.4	306
600 min Winter	10.852	0.0	95.6	362
720 min Winter	9.461	0.0	100.0	414
960 min Winter	7.611	0.0	107.3	518
1440 min Winter	5.589	0.0	118.1	752
2160 min Winter	4.093	0.0	129.9	1108
2880 min Winter	3.277	0.0	138.6	1472
4320 min Winter	2.390	0.0	151.6	2164
5760 min Winter	1.913	0.0	161.9	2936
7200 min Winter	1.610	0.0	170.3	3672
8640 min Winter	1.399	0.0	177.5	4320
10080 min Winter	1.242	0.0	183.9	5000

©1982-2020 Innovyze

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.321	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.105

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.035	4	8	0.035	8	12	0.035

Goodson Associates		Page 4
53 Melville Street Edinburgh EH3 7HL		
Date 06/03/2024 10:00	Designed by PhilH	
File P15710 SW ATTENUATION.SRCX	Checked by	
XP Solutions		Source Control 2020.1.3

Model Details

Storage is Online Cover Level (m) 1.600

Cellular Storage Structure

Invert Level (m) 0.000 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)
0.000	110.0	0.0	0.401	0.0	0.0
0.400	110.0	0.0	1.600	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0114-5000-0400-5000
Design Head (m) 0.400
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 114
Invert Level (m) 0.000
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	5.0
Flush-Flo™	0.169	5.0
Kick-Flo®	0.312	4.5
Mean Flow over Head Range	-	4.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	1.200	8.3	3.000	12.9	7.000	19.5
0.200	5.0	1.400	9.0	3.500	13.9	7.500	20.2
0.300	4.6	1.600	9.6	4.000	14.8	8.000	20.9
0.400	5.0	1.800	10.1	4.500	15.6	8.500	21.5
0.500	5.5	2.000	10.6	5.000	16.4	9.000	22.1
0.600	6.0	2.200	11.1	5.500	17.3	9.500	22.7
0.800	6.9	2.400	11.6	6.000	18.0		
1.000	7.7	2.600	12.0	6.500	18.8		

©1982-2020 Innovyze