

Canham Consulting Ltd

The Old School
Thorpe St Andrew
Norwich NR7 0EP

Date 13/06/2018 16:43
File 211200_ATTENUATION_TANK...

XP Solutions

211200 Onslow Mills
Attenuation Tank Design

Designed by iangeorge
Checked by

Source Control 2016.1

Page 1



Summary of Results for 100 year Return Period (+40%)							
Half Drain Time : 51 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	9.460	0.260	0.0	5.0	5.0	18.5	O K
30 min Summer	9.524	0.324	0.0	5.0	5.0	23.1	O K
60 min Summer	9.545	0.345	0.0	5.0	5.0	24.6	O K
120 min Summer	9.519	0.319	0.0	5.0	5.0	22.7	O K
180 min Summer	9.483	0.283	0.0	5.0	5.0	20.2	O K
240 min Summer	9.445	0.245	0.0	5.0	5.0	17.5	O K
360 min Summer	9.376	0.176	0.0	5.0	5.0	12.5	O K
480 min Summer	9.317	0.117	0.0	5.0	5.0	8.4	O K
600 min Summer	9.272	0.072	0.0	5.0	5.0	5.1	O K
720 min Summer	9.239	0.039	0.0	5.0	5.0	2.8	O K
960 min Summer	9.203	0.003	0.0	5.0	5.0	0.2	O K
1440 min Summer	9.200	0.000	0.0	3.8	3.8	0.0	O K
2160 min Summer	9.200	0.000	0.0	2.7	2.7	0.0	O K
2880 min Summer	9.200	0.000	0.0	2.2	2.2	0.0	O K
4320 min Summer	9.200	0.000	0.0	1.6	1.6	0.0	O K
5760 min Summer	9.200	0.000	0.0	1.2	1.2	0.0	O K
7200 min Summer	9.200	0.000	0.0	1.0	1.0	0.0	O K
8640 min Summer	9.200	0.000	0.0	0.9	0.9	0.0	O K
10080 min Summer	9.200	0.000	0.0	0.8	0.8	0.0	O K
15 min Winter	9.502	0.302	0.0	5.0	5.0	21.5	O K
Storm Event	Rain (mm/hr)		Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
15 min Summer	138.153		0.0	24.8	22		
30 min Summer	90.705		0.0	32.7	35		
60 min Summer	56.713		0.0	40.6	60		
120 min Summer	34.246		0.0	49.3	92		
180 min Summer	25.149		0.0	54.3	124		
240 min Summer	20.078		0.0	57.9	158		
360 min Summer	14.585		0.0	63.1	220		
480 min Summer	11.622		0.0	66.8	280		
600 min Summer	9.738		0.0	70.0	338		
720 min Summer	8.424		0.0	72.7	392		
960 min Summer	6.697		0.0	77.2	496		
1440 min Summer	4.839		0.0	83.6	0		
2160 min Summer	3.490		0.0	90.5	0		
2880 min Summer	2.766		0.0	95.6	0		
4320 min Summer	1.989		0.0	103.1	0		
5760 min Summer	1.573		0.0	108.7	0		
7200 min Summer	1.311		0.0	113.2	0		
8640 min Summer	1.129		0.0	117.0	0		
10080 min Summer	0.994		0.0	120.3	0		
15 min Winter	138.153		0.0	27.8	23		

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Canham Consulting Ltd		Page 3
The Old School Thorpe St Andrew Norwich NR7 0EP	211200 Onslow Mills Attenuation Tank Design	
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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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.096

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.032	4	8	0.032
				8	12
					0.032

Canham Consulting Ltd		Page 4
The Old School Thorpe St Andrew Norwich NR7 0EP	211200 Onslow Mills Attenuation Tank Design	
Date 13/06/2018 16:43 File 211200_ATTENUATION_TANK...	Designed by iangeorge Checked by	
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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 9.200 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	75.0	75.0	0.500	0.1	89.8
0.400	75.0	89.8			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0109-5000-0800-5000
Design Head (m) 0.800
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 109
Invert Level (m) 9.000
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.241	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

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	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

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