

Shaun Tonge Engineering							Page 1																																																																																																																																																																																																																																																																																		
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 282 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>98.601</td><td>0.601</td><td>0.0</td><td>3.5</td><td>3.5</td><td>57.1</td><td>O K</td></tr><tr><td>30 min Summer</td><td>98.792</td><td>0.792</td><td>0.0</td><td>3.5</td><td>3.5</td><td>75.3</td><td>O K</td></tr><tr><td>60 min Summer</td><td>98.974</td><td>0.974</td><td>0.0</td><td>3.5</td><td>3.5</td><td>92.5</td><td>O K</td></tr><tr><td>120 min Summer</td><td>99.117</td><td>1.117</td><td>0.0</td><td>3.5</td><td>3.5</td><td>106.1</td><td>O K</td></tr><tr><td>180 min Summer</td><td>99.160</td><td>1.160</td><td>0.0</td><td>3.5</td><td>3.5</td><td>110.2</td><td>O K</td></tr><tr><td>240 min Summer</td><td>99.162</td><td>1.162</td><td>0.0</td><td>3.5</td><td>3.5</td><td>110.3</td><td>O K</td></tr><tr><td>360 min Summer</td><td>99.136</td><td>1.136</td><td>0.0</td><td>3.5</td><td>3.5</td><td>107.9</td><td>O K</td></tr><tr><td>480 min Summer</td><td>99.106</td><td>1.106</td><td>0.0</td><td>3.5</td><td>3.5</td><td>105.1</td><td>O K</td></tr><tr><td>600 min Summer</td><td>99.074</td><td>1.074</td><td>0.0</td><td>3.5</td><td>3.5</td><td>102.0</td><td>O K</td></tr><tr><td>720 min Summer</td><td>99.041</td><td>1.041</td><td>0.0</td><td>3.5</td><td>3.5</td><td>98.9</td><td>O K</td></tr><tr><td>960 min Summer</td><td>98.974</td><td>0.974</td><td>0.0</td><td>3.5</td><td>3.5</td><td>92.5</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>98.841</td><td>0.841</td><td>0.0</td><td>3.5</td><td>3.5</td><td>79.9</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>98.612</td><td>0.612</td><td>0.0</td><td>3.5</td><td>3.5</td><td>58.2</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>98.441</td><td>0.441</td><td>0.0</td><td>3.5</td><td>3.5</td><td>41.9</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>98.242</td><td>0.242</td><td>0.0</td><td>3.4</td><td>3.4</td><td>23.0</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>98.152</td><td>0.152</td><td>0.0</td><td>3.1</td><td>3.1</td><td>14.4</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>98.110</td><td>0.110</td><td>0.0</td><td>2.8</td><td>2.8</td><td>10.5</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>98.094</td><td>0.094</td><td>0.0</td><td>2.5</td><td>2.5</td><td>9.0</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>98.084</td><td>0.084</td><td>0.0</td><td>2.2</td><td>2.2</td><td>7.9</td><td>O K</td></tr><tr><td>15 min Winter</td><td>98.601</td><td>0.601</td><td>0.0</td><td>3.5</td><td>3.5</td><td>57.1</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>125.869</td><td>0.0</td><td>59.6</td><td>18</td></tr><tr><td>30 min Summer</td><td>84.215</td><td>0.0</td><td>79.7</td><td>33</td></tr><tr><td>60 min Summer</td><td>53.779</td><td>0.0</td><td>102.1</td><td>62</td></tr><tr><td>120 min Summer</td><td>33.180</td><td>0.0</td><td>126.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>24.659</td><td>0.0</td><td>140.4</td><td>180</td></tr><tr><td>240 min Summer</td><td>19.841</td><td>0.0</td><td>150.7</td><td>238</td></tr><tr><td>360 min Summer</td><td>14.545</td><td>0.0</td><td>165.7</td><td>294</td></tr><tr><td>480 min Summer</td><td>11.669</td><td>0.0</td><td>177.2</td><td>358</td></tr><tr><td>600 min Summer</td><td>9.828</td><td>0.0</td><td>186.6</td><td>424</td></tr><tr><td>720 min Summer</td><td>8.537</td><td>0.0</td><td>194.5</td><td>494</td></tr><tr><td>960 min Summer</td><td>6.830</td><td>0.0</td><td>207.4</td><td>636</td></tr><tr><td>1440 min Summer</td><td>4.978</td><td>0.0</td><td>226.8</td><td>910</td></tr><tr><td>2160 min Summer</td><td>3.621</td><td>0.0</td><td>247.6</td><td>1280</td></tr><tr><td>2880 min Summer</td><td>2.885</td><td>0.0</td><td>263.1</td><td>1620</td></tr><tr><td>4320 min Summer</td><td>2.092</td><td>0.0</td><td>285.9</td><td>2292</td></tr><tr><td>5760 min Summer</td><td>1.663</td><td>0.0</td><td>303.2</td><td>2992</td></tr><tr><td>7200 min Summer</td><td>1.391</td><td>0.0</td><td>317.0</td><td>3672</td></tr><tr><td>8640 min Summer</td><td>1.201</td><td>0.0</td><td>328.6</td><td>4400</td></tr><tr><td>10080 min Summer</td><td>1.063</td><td>0.0</td><td>339.0</td><td>5136</td></tr><tr><td>15 min Winter</td><td>125.869</td><td>0.0</td><td>59.6</td><td>18</td></tr></table>									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	98.601	0.601	0.0	3.5	3.5	57.1	O K	30 min Summer	98.792	0.792	0.0	3.5	3.5	75.3	O K	60 min Summer	98.974	0.974	0.0	3.5	3.5	92.5	O K	120 min Summer	99.117	1.117	0.0	3.5	3.5	106.1	O K	180 min Summer	99.160	1.160	0.0	3.5	3.5	110.2	O K	240 min Summer	99.162	1.162	0.0	3.5	3.5	110.3	O K	360 min Summer	99.136	1.136	0.0	3.5	3.5	107.9	O K	480 min Summer	99.106	1.106	0.0	3.5	3.5	105.1	O K	600 min Summer	99.074	1.074	0.0	3.5	3.5	102.0	O K	720 min Summer	99.041	1.041	0.0	3.5	3.5	98.9	O K	960 min Summer	98.974	0.974	0.0	3.5	3.5	92.5	O K	1440 min Summer	98.841	0.841	0.0	3.5	3.5	79.9	O K	2160 min Summer	98.612	0.612	0.0	3.5	3.5	58.2	O K	2880 min Summer	98.441	0.441	0.0	3.5	3.5	41.9	O K	4320 min Summer	98.242	0.242	0.0	3.4	3.4	23.0	O K	5760 min Summer	98.152	0.152	0.0	3.1	3.1	14.4	O K	7200 min Summer	98.110	0.110	0.0	2.8	2.8	10.5	O K	8640 min Summer	98.094	0.094	0.0	2.5	2.5	9.0	O K	10080 min Summer	98.084	0.084	0.0	2.2	2.2	7.9	O K	15 min Winter	98.601	0.601	0.0	3.5	3.5	57.1	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	125.869	0.0	59.6	18	30 min Summer	84.215	0.0	79.7	33	60 min Summer	53.779	0.0	102.1	62	120 min Summer	33.180	0.0	126.0	122	180 min Summer	24.659	0.0	140.4	180	240 min Summer	19.841	0.0	150.7	238	360 min Summer	14.545	0.0	165.7	294	480 min Summer	11.669	0.0	177.2	358	600 min Summer	9.828	0.0	186.6	424	720 min Summer	8.537	0.0	194.5	494	960 min Summer	6.830	0.0	207.4	636	1440 min Summer	4.978	0.0	226.8	910	2160 min Summer	3.621	0.0	247.6	1280	2880 min Summer	2.885	0.0	263.1	1620	4320 min Summer	2.092	0.0	285.9	2292	5760 min Summer	1.663	0.0	303.2	2992	7200 min Summer	1.391	0.0	317.0	3672	8640 min Summer	1.201	0.0	328.6	4400	10080 min Summer	1.063	0.0	339.0	5136	15 min Winter	125.869	0.0	59.6	18
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Date 03/04/2024 15:46
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Designed by shaun
Checked by



Source Control 2020.1.3

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.360	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Total Area (ha) 0.190

Time (mins)	Area
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Shaun Tonge Engineering		Page 4
11 Broomhead Road Wombell Barnsley S73 0SA		
Date 03/04/2024 15:46	Designed by shaun	
File storage calc.SRCX	Checked by	
CADS		Source Control 2020.1.3

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 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	100.0	100.0	1.300	0.0	160.0
1.200	100.0	160.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0086-3500-1200-3500
Design Head (m) 1.200
Design Flow (l/s) 3.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 86
Invert Level (m) 98.000
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.5
Flush-Flo™	0.367	3.5
Kick-Flo®	0.746	2.8
Mean Flow over Head Range	-	3.1

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	2.6	1.200	3.5	3.000	5.4	7.000	8.0
0.200	3.3	1.400	3.8	3.500	5.8	7.500	8.3
0.300	3.5	1.600	4.0	4.000	6.1	8.000	8.5
0.400	3.5	1.800	4.2	4.500	6.5	8.500	8.8
0.500	3.4	2.000	4.4	5.000	6.8	9.000	9.0
0.600	3.3	2.200	4.6	5.500	7.1	9.500	9.2
0.800	2.9	2.400	4.8	6.000	7.4		
1.000	3.2	2.600	5.0	6.500	7.7		

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