

Micro Drainage Soakaway Calculations

For

**Swallowfield,
Eastergate Lane,
Eastergate,
PO20 3SJ**

**Date: May 2021
Project No: 59084 Rev01**

THIS DRAWING IS BASED ON DRAWING NO. 2019.257DR BY DOWNSVIEW ASSOCIATES

VERSAVOID
SOAKAWAY/INFILTRATION TANK
SCALE NTS

FLEXIBLE JOINT DETAIL For Sleeved Pipes

TYPICAL PIPE JOINTING DETAIL

SCALE NTS

MIN. 150mm GRADE
C20P CONCRETE BED
AND SURROUND WITH
FLEXIBLE JOINTS ●
MAX. 6.0m CRS.

MIN. 150mm UNDER SOCKET.

CONCRETE PIPE BEDDING

LOADING FACTOR - 2.2)

(BEDDING FACTOR - 2.2)

Drainage with more than 1.2m cover

PIPE BEDDING DETAIL

SCALE NTS

A	SOAKAWAY SIZE	06/05/21 JS
0	ORIGINAL ISSUE -	19/04/21 JS
REV	DESCRIPTION	DATE

DIXON HURST

CONSULTING CIVIL & STRUCTURAL ENGINEERS

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CONTRACT

**SWALLOWFIELD
EASTERGATE LANE
EASTERGATE**

DRAWING

SOAKAWAY LAYOUT AND DETAILS

DRAWING No. 59084 / 10	REV	A	CHECKED
	SCALE AS SHOWN	DATE APR 21	DRAWN JS
AutoCAD Ref: 59084-10.dwg			

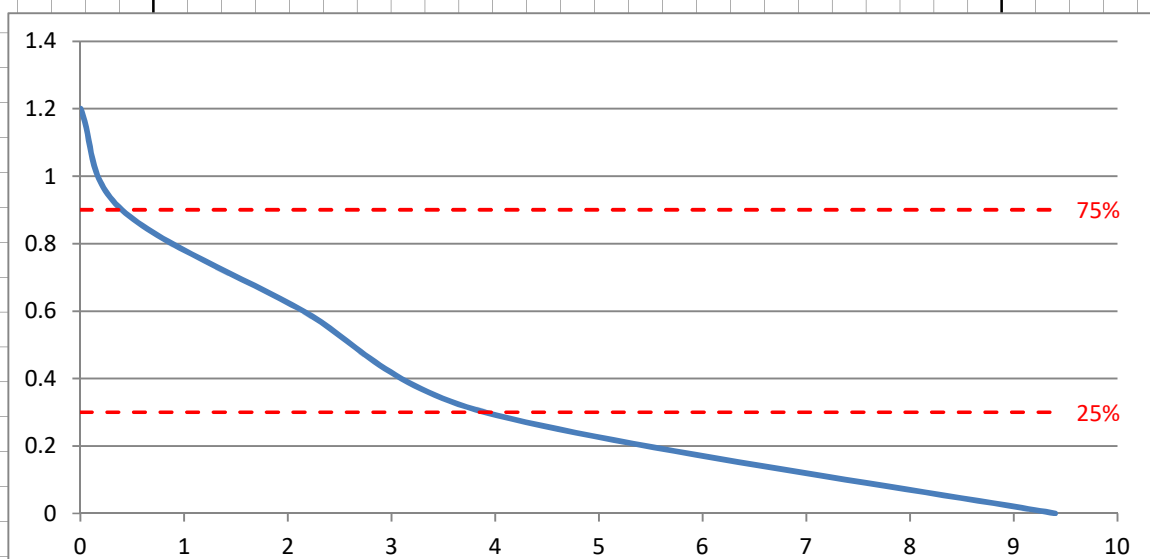
This drawing is rendered using Autodesk. Only written dimensions are to be used.

DIXON HURST CONSULTING CIVIL & STRUCTURAL ENGINEERS	Project:	Swallowfield, Estergate Lane, Eastergate,	By:
	Calculation:	Soakaway Design	JS
	Infiltration Rate		Approved:
	Sheet Number:	1 Date:	Apr-21 JS

Infiltration Test (BRE 365)**Trial Pit Details**

Total Pit Depth	1.6	m
Total Pit Length	1.6	m
Total Pit Width	1.2	m

Test Results		
	Time (Mins)	Water Level (From Base)
1	0	1.20
2	0.4	0.90
3	2.15	0.60
4	3.9	0.30
5	9.4	0.00
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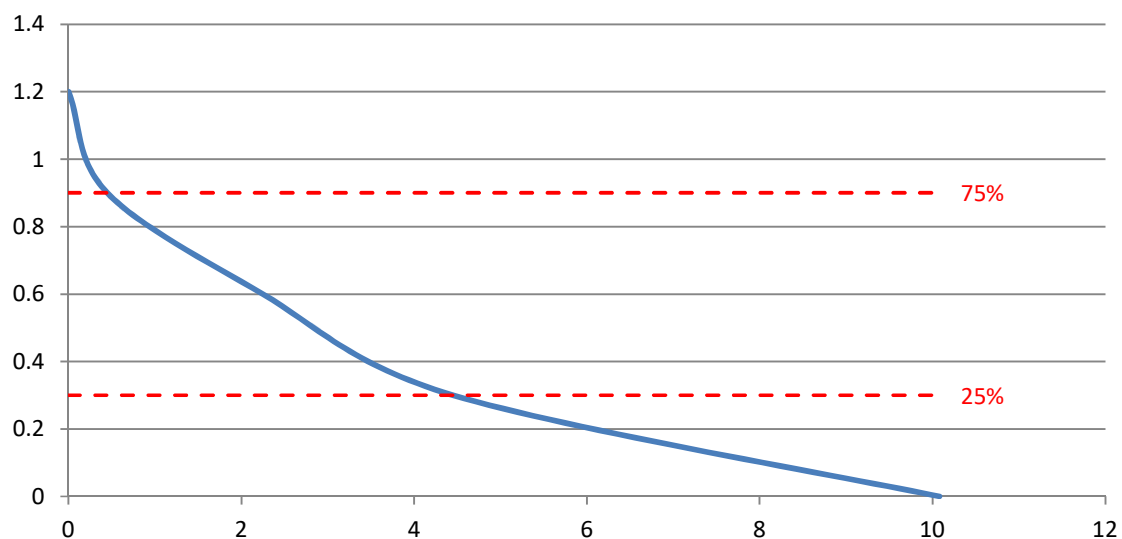
 CONSULTING CIVIL & STRUCTURAL ENGINEERS	Project: Swallowfield, Estergate Lane, Eastergate,		By:
	Calculation: Soakaway Design		JS
			Approved:
Sheet Number:	2	Date:	01/04/2021 JS
<u>Results</u> Time to reach 75% depth: 0.4 mins Time to reach 25% depth: 3.9 mins Soil Infiltration Rate: <u>0.001038961</u> m/s 3.74025974 m/hr			

DIXON HURST CONSULTING CIVIL & STRUCTURAL ENGINEERS	Project:	Swallowfield, Estergate Lane, Eastergate,	By:
	Calculation:	Soakaway Design	JS
	Infiltration Rate		Approved:
	Sheet Number:	1 Date:	Apr-21 JS

Infiltration Test (BRE 365)**Trial Pit Details**

Total Pit Depth	1.6	m
Total Pit Length	1.6	m
Total Pit Width	1.2	m

Test Results		
	Time (Mins)	Water Level (From Base)
1	0	1.20
2	0.45	0.90
3	2.25	0.60
4	4.45	0.30
5	10.08	0.00
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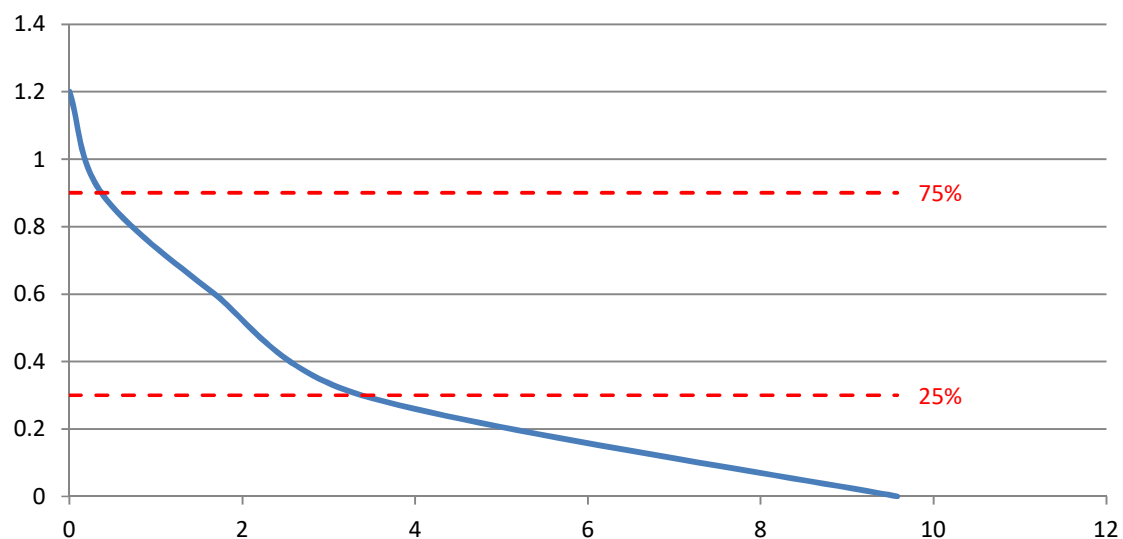
 CONSULTING CIVIL & STRUCTURAL ENGINEERS	Project: Swallowfield, Estergate Lane, Eastergate,		By:
	Calculation: Soakaway Design		JS
			Approved:
Sheet Number:	2	Date:	01/04/2021 JS
<u>Results</u> Time to reach 75% depth: 0.5 mins Time to reach 25% depth: 4.5 mins Soil Infiltration Rate: <u>0.000909091</u> m/s 3.272727273 m/hr			

DIXON HURST CONSULTING CIVIL & STRUCTURAL ENGINEERS	Project:	Swallowfield, Estergate Lane, Eastergate,	By:
	Calculation:	Soakaway Design	JS
	Infiltration Rate		Approved:
	Sheet Number:	1 Date:	Apr-21 JS

Infiltration Test (BRE 365)**Trial Pit Details**

Total Pit Depth	1.6	m
Total Pit Length	1.6	m
Total Pit Width	1.2	m

Test Results		
	Time (Mins)	Water Level (From Base)
1	0	1.20
2	0.37	0.90
3	1.68	0.60
4	3.38	0.30
5	9.58	0.00
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 CONSULTING CIVIL & STRUCTURAL ENGINEERS	Project: Swallowfield, Estergate Lane, Eastergate,		By:
	Calculation: Soakaway Design		JS
			Approved:
Sheet Number:	2	Date:	01/04/2021 JS
<u>Results</u> Time to reach 75% depth: 0.4 mins Time to reach 25% depth: 3.4 mins Soil Infiltration Rate: <u>0.001208094</u> m/s 4.349139233 m/hr			

Dixon Hurst Kemp			Page 1																																																																																																																																																																																																																																																																							
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 10 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 Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>98.903</td><td>0.603</td><td>1.9</td><td>1.7</td><td>O K</td></tr><tr><td>30 min Summer</td><td>99.002</td><td>0.702</td><td>2.2</td><td>2.0</td><td>O K</td></tr><tr><td>60 min Summer</td><td>99.012</td><td>0.712</td><td>2.3</td><td>2.0</td><td>O K</td></tr><tr><td>120 min Summer</td><td>98.935</td><td>0.635</td><td>2.0</td><td>1.8</td><td>O K</td></tr><tr><td>180 min Summer</td><td>98.851</td><td>0.551</td><td>1.8</td><td>1.6</td><td>O K</td></tr><tr><td>240 min Summer</td><td>98.786</td><td>0.486</td><td>1.5</td><td>1.4</td><td>O K</td></tr><tr><td>360 min Summer</td><td>98.697</td><td>0.397</td><td>1.3</td><td>1.1</td><td>O K</td></tr><tr><td>480 min Summer</td><td>98.637</td><td>0.337</td><td>1.1</td><td>1.0</td><td>O K</td></tr><tr><td>600 min Summer</td><td>98.595</td><td>0.295</td><td>0.9</td><td>0.8</td><td>O K</td></tr><tr><td>720 min Summer</td><td>98.562</td><td>0.262</td><td>0.8</td><td>0.7</td><td>O K</td></tr><tr><td>960 min Summer</td><td>98.517</td><td>0.217</td><td>0.7</td><td>0.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>98.464</td><td>0.164</td><td>0.5</td><td>0.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>98.422</td><td>0.122</td><td>0.4</td><td>0.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>98.398</td><td>0.098</td><td>0.3</td><td>0.3</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>98.372</td><td>0.072</td><td>0.2</td><td>0.2</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>98.357</td><td>0.057</td><td>0.2</td><td>0.2</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>98.348</td><td>0.048</td><td>0.2</td><td>0.1</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>98.342</td><td>0.042</td><td>0.1</td><td>0.1</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>98.337</td><td>0.037</td><td>0.1</td><td>0.1</td><td>O K</td></tr><tr><td>15 min Winter</td><td>98.968</td><td>0.668</td><td>2.1</td><td>1.9</td><td>O K</td></tr><tr><td>30 min Winter</td><td>99.067</td><td>0.767</td><td>2.4</td><td>2.2</td><td>O K</td></tr><tr><td>60 min Winter</td><td>99.043</td><td>0.743</td><td>2.4</td><td>2.1</td><td>O K</td></tr><tr><td>120 min Winter</td><td>98.906</td><td>0.606</td><td>1.9</td><td>1.7</td><td>O K</td></tr><tr><td>180 min Winter</td><td>98.799</td><td>0.499</td><td>1.6</td><td>1.4</td><td>O K</td></tr><tr><td>240 min Winter</td><td>98.723</td><td>0.423</td><td>1.3</td><td>1.2</td><td>O K</td></tr><tr><td>360 min Winter</td><td>98.628</td><td>0.328</td><td>1.0</td><td>0.9</td><td>O K</td></tr><tr><td>480 min Winter</td><td>98.570</td><td>0.270</td><td>0.9</td><td>0.8</td><td>O K</td></tr><tr><td>600 min Winter</td><td>98.531</td><td>0.231</td><td>0.7</td><td>0.7</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>127.611</td><td>20</td></tr><tr><td>30 min Summer</td><td>86.644</td><td>28</td></tr><tr><td>60 min Summer</td><td>56.129</td><td>42</td></tr><tr><td>120 min Summer</td><td>35.027</td><td>74</td></tr><tr><td>180 min Summer</td><td>26.131</td><td>104</td></tr><tr><td>240 min Summer</td><td>21.089</td><td>136</td></tr><tr><td>360 min Summer</td><td>15.605</td><td>196</td></tr><tr><td>480 min Summer</td><td>12.580</td><td>256</td></tr><tr><td>600 min Summer</td><td>10.633</td><td>316</td></tr><tr><td>720 min Summer</td><td>9.263</td><td>376</td></tr><tr><td>960 min Summer</td><td>7.443</td><td>498</td></tr><tr><td>1440 min Summer</td><td>5.457</td><td>738</td></tr><tr><td>2160 min Summer</td><td>3.991</td><td>1104</td></tr><tr><td>2880 min Summer</td><td>3.192</td><td>1468</td></tr><tr><td>4320 min Summer</td><td>2.325</td><td>2184</td></tr><tr><td>5760 min Summer</td><td>1.857</td><td>2880</td></tr><tr><td>7200 min Summer</td><td>1.561</td><td>3616</td></tr><tr><td>8640 min Summer</td><td>1.354</td><td>4400</td></tr><tr><td>10080 min Summer</td><td>1.202</td><td>5096</td></tr><tr><td>15 min Winter</td><td>127.611</td><td>20</td></tr><tr><td>30 min Winter</td><td>86.644</td><td>28</td></tr><tr><td>60 min Winter</td><td>56.129</td><td>44</td></tr><tr><td>120 min Winter</td><td>35.027</td><td>76</td></tr><tr><td>180 min Winter</td><td>26.131</td><td>108</td></tr><tr><td>240 min Winter</td><td>21.089</td><td>138</td></tr><tr><td>360 min Winter</td><td>15.605</td><td>198</td></tr><tr><td>480 min Winter</td><td>12.580</td><td>258</td></tr><tr><td>600 min Winter</td><td>10.633</td><td>318</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	98.903	0.603	1.9	1.7	O K	30 min Summer	99.002	0.702	2.2	2.0	O K	60 min Summer	99.012	0.712	2.3	2.0	O K	120 min Summer	98.935	0.635	2.0	1.8	O K	180 min Summer	98.851	0.551	1.8	1.6	O K	240 min Summer	98.786	0.486	1.5	1.4	O K	360 min Summer	98.697	0.397	1.3	1.1	O K	480 min Summer	98.637	0.337	1.1	1.0	O K	600 min Summer	98.595	0.295	0.9	0.8	O K	720 min Summer	98.562	0.262	0.8	0.7	O K	960 min Summer	98.517	0.217	0.7	0.6	O K	1440 min Summer	98.464	0.164	0.5	0.5	O K	2160 min Summer	98.422	0.122	0.4	0.3	O K	2880 min Summer	98.398	0.098	0.3	0.3	O K	4320 min Summer	98.372	0.072	0.2	0.2	O K	5760 min Summer	98.357	0.057	0.2	0.2	O K	7200 min Summer	98.348	0.048	0.2	0.1	O K	8640 min Summer	98.342	0.042	0.1	0.1	O K	10080 min Summer	98.337	0.037	0.1	0.1	O K	15 min Winter	98.968	0.668	2.1	1.9	O K	30 min Winter	99.067	0.767	2.4	2.2	O K	60 min Winter	99.043	0.743	2.4	2.1	O K	120 min Winter	98.906	0.606	1.9	1.7	O K	180 min Winter	98.799	0.499	1.6	1.4	O K	240 min Winter	98.723	0.423	1.3	1.2	O K	360 min Winter	98.628	0.328	1.0	0.9	O K	480 min Winter	98.570	0.270	0.9	0.8	O K	600 min Winter	98.531	0.231	0.7	0.7	O K	Storm Event	Rain (mm/hr)	Time-Peak (mins)	15 min Summer	127.611	20	30 min Summer	86.644	28	60 min Summer	56.129	42	120 min Summer	35.027	74	180 min Summer	26.131	104	240 min Summer	21.089	136	360 min Summer	15.605	196	480 min Summer	12.580	256	600 min Summer	10.633	316	720 min Summer	9.263	376	960 min Summer	7.443	498	1440 min Summer	5.457	738	2160 min Summer	3.991	1104	2880 min Summer	3.192	1468	4320 min Summer	2.325	2184	5760 min Summer	1.857	2880	7200 min Summer	1.561	3616	8640 min Summer	1.354	4400	10080 min Summer	1.202	5096	15 min Winter	127.611	20	30 min Winter	86.644	28	60 min Winter	56.129	44	120 min Winter	35.027	76	180 min Winter	26.131	108	240 min Winter	21.089	138	360 min Winter	15.605	198	480 min Winter	12.580	258	600 min Winter	10.633	318
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30 min Winter	86.644	28																																																																																																																																																																																																																																																																								
60 min Winter	56.129	44																																																																																																																																																																																																																																																																								
120 min Winter	35.027	76																																																																																																																																																																																																																																																																								
180 min Winter	26.131	108																																																																																																																																																																																																																																																																								
240 min Winter	21.089	138																																																																																																																																																																																																																																																																								
360 min Winter	15.605	198																																																																																																																																																																																																																																																																								
480 min Winter	12.580	258																																																																																																																																																																																																																																																																								
600 min Winter	10.633	318																																																																																																																																																																																																																																																																								
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Date May 21 File SOAKAWAY 1 ...		Designed by JS Checked by			
Elstree Computin...		Source Control w.12.6			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max volume (m³)	Status
720 min winter	98.502	0.202	0.6	0.6	O K
960 min winter	98.464	0.164	0.5	0.5	O K
1440 min winter	98.421	0.121	0.4	0.3	O K
2160 min winter	98.389	0.089	0.3	0.3	O K
2880 min winter	98.371	0.071	0.2	0.2	O K
4320 min winter	98.352	0.052	0.2	0.1	O K
5760 min winter	98.342	0.042	0.1	0.1	O K
7200 min winter	98.335	0.035	0.1	0.1	O K
8640 min winter	98.330	0.030	0.1	0.1	O K
10080 min winter	98.327	0.027	0.1	0.1	O K
Storm Event		Rain (mm/hr)	Time-Peak (mins)		
720 min winter		9.263	378		
960 min winter		7.443	500		
1440 min winter		5.457	740		
2160 min winter		3.991	1104		
2880 min winter		3.192	1456		
4320 min winter		2.325	2204		
5760 min winter		1.857	2912		
7200 min winter		1.561	3672		
8640 min winter		1.354	4320		
10080 min winter		1.202	5136		
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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)	19.800	Shortest Storm (mins)	15
Ratio R	0.329	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.012

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.004	4-8	0.004	8-12	0.004

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Model Details

Storage is Online Cover Level (m) 99.800

cellular Storage Structure

Invert Level (m) 98.300
Infiltration Coefficient Base (m/hr) 0.00000
Infiltration Coefficient Side (m/hr) 3.27000
Safety Factor 2.0
Porosity 0.95

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	3.0	3.0	1.100	0.0	10.0
1.000	3.0	10.0			

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Elstree Computin... Source Control w.12.6						
<u>Summary of Results for 100 year Return Period (+40%)</u>						
Half Drain Time : 10 minutes.						
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer		98.903	0.603	1.9	1.7	O K
30 min Summer		99.002	0.702	2.2	2.0	O K
60 min Summer		99.012	0.712	2.3	2.0	O K
120 min Summer		98.935	0.635	2.0	1.8	O K
180 min Summer		98.851	0.551	1.8	1.6	O K
240 min Summer		98.786	0.486	1.5	1.4	O K
360 min Summer		98.697	0.397	1.3	1.1	O K
480 min Summer		98.637	0.337	1.1	1.0	O K
600 min Summer		98.595	0.295	0.9	0.8	O K
720 min Summer		98.562	0.262	0.8	0.7	O K
960 min Summer		98.517	0.217	0.7	0.6	O K
1440 min Summer		98.464	0.164	0.5	0.5	O K
2160 min Summer		98.422	0.122	0.4	0.3	O K
2880 min Summer		98.398	0.098	0.3	0.3	O K
4320 min Summer		98.372	0.072	0.2	0.2	O K
5760 min Summer		98.357	0.057	0.2	0.2	O K
7200 min Summer		98.348	0.048	0.2	0.1	O K
8640 min Summer		98.342	0.042	0.1	0.1	O K
10080 min Summer		98.337	0.037	0.1	0.1	O K
15 min Winter		98.968	0.668	2.1	1.9	O K
30 min Winter		99.067	0.767	2.4	2.2	O K
60 min Winter		99.043	0.743	2.4	2.1	O K
120 min Winter		98.906	0.606	1.9	1.7	O K
180 min Winter		98.799	0.499	1.6	1.4	O K
240 min Winter		98.723	0.423	1.3	1.2	O K
360 min Winter		98.628	0.328	1.0	0.9	O K
480 min Winter		98.570	0.270	0.9	0.8	O K
600 min Winter		98.531	0.231	0.7	0.7	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)		
15 min Summer			127.611	20		
30 min Summer			86.644	28		
60 min Summer			56.129	42		
120 min Summer			35.027	74		
180 min Summer			26.131	104		
240 min Summer			21.089	136		
360 min Summer			15.605	196		
480 min Summer			12.580	256		
600 min Summer			10.633	316		
720 min Summer			9.263	376		
960 min Summer			7.443	498		
1440 min Summer			5.457	738		
2160 min Summer			3.991	1104		
2880 min Summer			3.192	1468		
4320 min Summer			2.325	2184		
5760 min Summer			1.857	2880		
7200 min Summer			1.561	3616		
8640 min Summer			1.354	4400		
10080 min Summer			1.202	5096		
15 min Winter			127.611	20		
30 min Winter			86.644	28		
60 min Winter			56.129	44		
120 min Winter			35.027	76		
180 min Winter			26.131	108		
240 min Winter			21.089	138		
360 min Winter			15.605	198		
480 min Winter			12.580	258		
600 min Winter			10.633	318		
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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
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4320 min winter	98.352	0.052	0.2	0.1	O K
5760 min winter	98.342	0.042	0.1	0.1	O K
7200 min winter	98.335	0.035	0.1	0.1	O K
8640 min winter	98.330	0.030	0.1	0.1	O K
10080 min winter	98.327	0.027	0.1	0.1	O K
Storm Event			Rain (mm/hr)	Time-Peak (mins)	
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1440 min winter			5.457	740	
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2880 min winter			3.192	1456	
4320 min winter			2.325	2204	
5760 min winter			1.857	2912	
7200 min winter			1.561	3672	
8640 min winter			1.354	4320	
10080 min winter			1.202	5136	

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Time / Area Diagram

Total Area (ha) 0.012

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.004	4-8	0.004	8-12	0.004

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Model Details

Storage is Online Cover Level (m) 99.800

cellular Storage Structure

Invert Level (m) 98.300
Infiltration Coefficient Base (m/hr) 0.00000
Infiltration Coefficient Side (m/hr) 3.27000
Safety Factor 2.0
Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	3.0	3.0	1.100	0.0	10.0
1.000	3.0	10.0			