

drainage calculations



for

Proposed new dwelling

at

Elm Lodge
Tamarisk Way
Ferring BN12 5ER

client

Mr & Mrs Jenkins

Ref **06984-jmla-TY-00-CA-D-2500-S4-P01**

date **august 2020**

jmla (south east) limited
consultants@jmla.co.uk
www.jmla.co.uk tel 01882 531 626

consulting structural & civil engineers
party wall surveyors
principal designers & asbestos consultants

foundation house
coach & horses passage
tunbridge wells kent tn2 5np

registered in england and wales
no 3636485
vat reg no 792 8806 42

Percolation Test Recording Sheet

1. These tests should be carried out within and be representative of, the proposed infiltration area which should be at least 5m from the intended building and any boundary.
2. Excavate 2 percolation holes, not less than 5m apart, 300mm square to a depth of 300mm below the proposed invert level of the effluent distribution pipe. Where deep holes are necessary, the hole should conform to this shape at the bottom but may be enlarged above the 300mm level to enable safe excavation to be carried out.
3. Fill the 300mm square section of the holes to a depth of at least 300mm with water and allow it to seep away overnight. It is important to saturate the soil surrounding the test hole to simulate day to day conditions in an operational drainage field.
4. Next day, refill the test sections with water to a depth of at least 300mm and observe the time (T) in seconds, for the water to seep away from 75% to 25% full level.
5. Extreme weather conditions should be avoided when testing.
6. In evaluating your test results please note that where the Vp value does not fall between 15 secs/mm and 100secs/mm then infiltration trench or bed systems may not be possible.

Trial Hole	Depth below ground level	Depth of Water (minimum 300mm)	Time taken between 75% & 25% full(seconds) (T)
1	(Test 1) 1000mm	300mm	3840
	(Test 2) 1020mm	300mm	3960
	(Test 3) 1000mm	300mm	3600
2	(Test 1) 600mm	300mm	3420
	(Test 2) 600mm	300mm	3600
	(Test 3) 600mm	300mm	3720

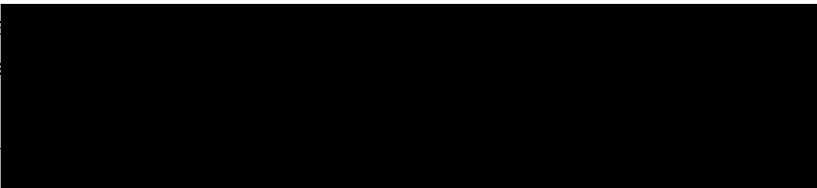
Average Vp
 $3690 \div 150 = 24.6 \text{ sec/mm}$

Site Location: EUM LODGE, BN12 5ER

Description of ground strata: SOIL

Warrant Ref. Number if known: _____ Date test carried out: 25/2/19

Name of person carrying out the test: M JENKINS

The water table  further confirm that there are no water in the infiltration area.

Signed: _____

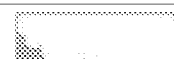
JMLA		Page 1
Foundation House	06984	
Coach & Horse Passage	Elm Lodge	
Tunbridge Wells	Infiltration Basin	
Date 11/08/2020	Designed by rmh	
File 06984_SC_P01_Pond.SRCX	Checked by	
Innovyze	Source Control 2018.1.1	

Summary of Results for 2 year Return Period

Half Drain Time : 85 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	4.417	0.017	0.1	1.0	O K
30 min Summer	4.421	0.021	0.2	1.3	O K
60 min Summer	4.425	0.025	0.2	1.5	O K
120 min Summer	4.427	0.027	0.2	1.6	O K
180 min Summer	4.428	0.028	0.2	1.6	O K
240 min Summer	4.428	0.028	0.2	1.6	O K
360 min Summer	4.427	0.027	0.2	1.6	O K
480 min Summer	4.426	0.026	0.2	1.5	O K
600 min Summer	4.425	0.025	0.2	1.5	O K
720 min Summer	4.424	0.024	0.2	1.4	O K
960 min Summer	4.422	0.022	0.2	1.3	O K
1440 min Summer	4.419	0.019	0.2	1.1	O K
2160 min Summer	4.416	0.016	0.1	0.9	O K
2880 min Summer	4.414	0.014	0.1	0.8	O K
4320 min Summer	4.411	0.011	0.1	0.7	O K
5760 min Summer	4.410	0.010	0.1	0.6	O K
7200 min Summer	4.408	0.008	0.1	0.5	O K
8640 min Summer	4.407	0.007	0.1	0.4	O K
10080 min Summer	4.407	0.007	0.1	0.4	O K
15 min Winter	4.419	0.019	0.1	1.1	O K
30 min Winter	4.424	0.024	0.2	1.4	O K
60 min Winter	4.428	0.028	0.2	1.6	O K
120 min Winter	4.430	0.030	0.2	1.8	O K
180 min Winter	4.430	0.030	0.2	1.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	36.365	0.0	24
30 min Summer	24.055	0.0	36
60 min Summer	15.352	0.0	60
120 min Summer	9.607	0.0	90
180 min Summer	7.267	0.0	124
240 min Summer	5.954	0.0	158
360 min Summer	4.480	0.0	226
480 min Summer	3.655	0.0	292
600 min Summer	3.121	0.0	358
720 min Summer	2.743	0.0	420
960 min Summer	2.237	0.0	544
1440 min Summer	1.678	0.0	792
2160 min Summer	1.259	0.0	1152
2880 min Summer	1.026	0.0	1532
4320 min Summer	0.770	0.0	2252
5760 min Summer	0.628	0.0	2976
7200 min Summer	0.536	0.0	3680
8640 min Summer	0.471	0.0	4416
10080 min Summer	0.422	0.0	5144
15 min Winter	36.365	0.0	24
30 min Winter	24.055	0.0	36
60 min Winter	15.352	0.0	60
120 min Winter	9.607	0.0	90
180 min Winter	7.267	0.0	134

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Foundation House	06984	
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Innovyze	Source Control 2018.1.1	

Summary of Results for 2 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	4.430	0.030	0.2	1.8	O K
360 min Winter	4.428	0.028	0.2	1.7	O K
480 min Winter	4.427	0.027	0.2	1.6	O K
600 min Winter	4.425	0.025	0.2	1.5	O K
720 min Winter	4.423	0.023	0.2	1.4	O K
960 min Winter	4.421	0.021	0.2	1.2	O K
1440 min Winter	4.417	0.017	0.1	1.0	O K
2160 min Winter	4.414	0.014	0.1	0.8	O K
2880 min Winter	4.412	0.012	0.1	0.7	O K
4320 min Winter	4.409	0.009	0.1	0.5	O K
5760 min Winter	4.407	0.007	0.1	0.4	O K
7200 min Winter	4.406	0.006	0.0	0.4	O K
8640 min Winter	4.406	0.006	0.0	0.3	O K
10080 min Winter	4.405	0.005	0.0	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	5.954	0.0	170
360 min Winter	4.480	0.0	240
480 min Winter	3.655	0.0	308
600 min Winter	3.121	0.0	374
720 min Winter	2.743	0.0	440
960 min Winter	2.237	0.0	568
1440 min Winter	1.678	0.0	814
2160 min Winter	1.259	0.0	1176
2880 min Winter	1.026	0.0	1560
4320 min Winter	0.770	0.0	2296
5760 min Winter	0.628	0.0	3008
7200 min Winter	0.536	0.0	3744
8640 min Winter	0.471	0.0	4352
10080 min Winter	0.422	0.0	5136

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Foundation House	06984	
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.016

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.005	4 8	0.005	8 12	0.006

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Foundation House	06984	
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Innovyze	Source Control 2018.1.1	

Model Details

Storage is Online Cover Level (m) 5.000

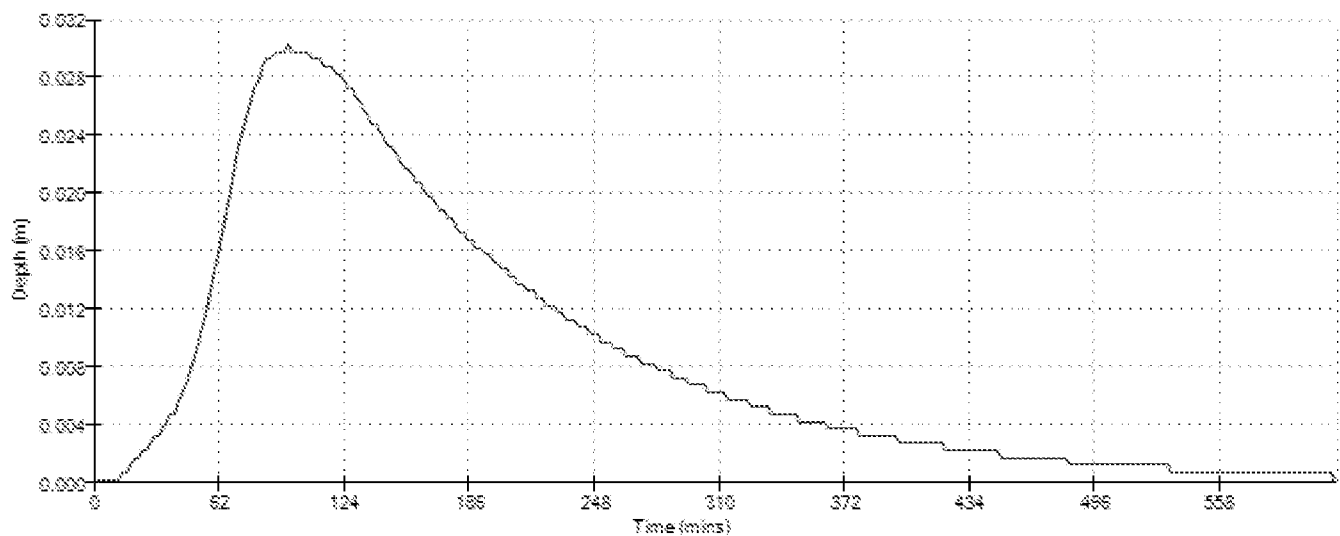
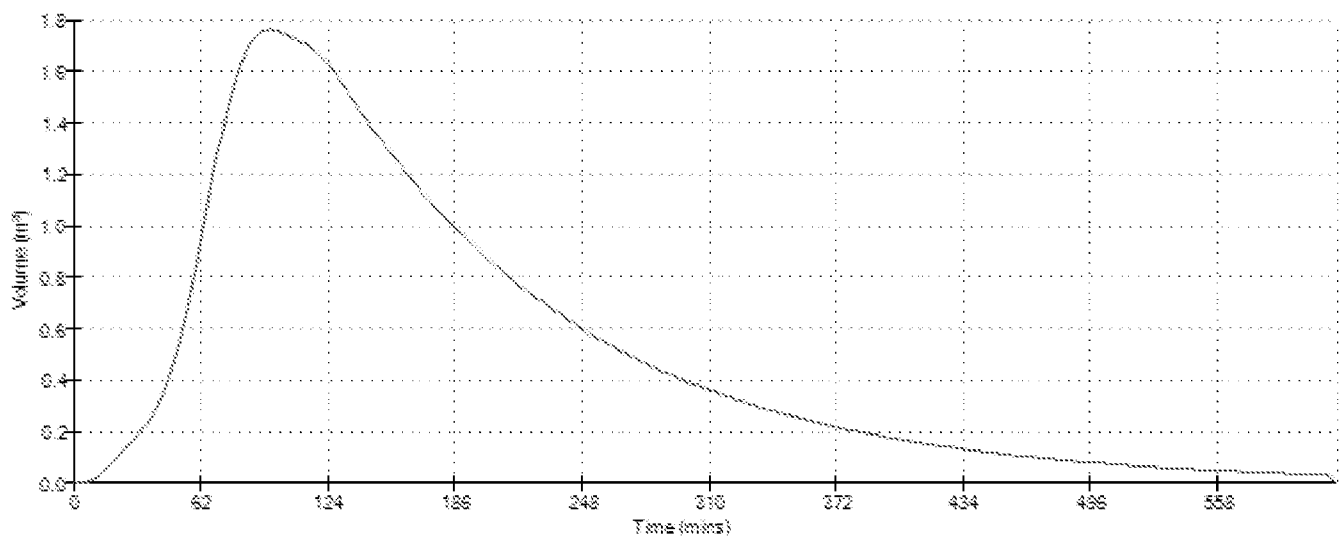
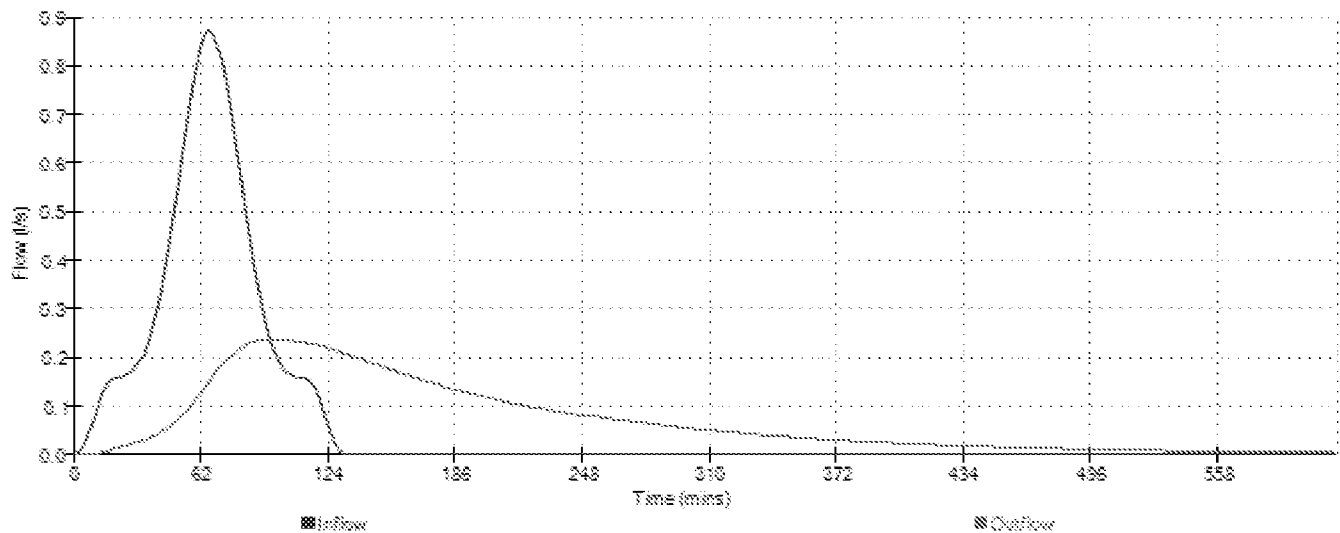
Infiltration Basin Structure

Invert Level (m) 4.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04878 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	58.7	0.600	59.7

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Event: 120 min Winter



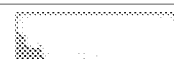
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Summary of Results for 30 year Return Period

Half Drain Time : 95 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	4.432	0.032	0.3	1.9	O K
30 min Summer	4.441	0.041	0.3	2.4	O K
60 min Summer	4.447	0.047	0.4	2.8	O K
120 min Summer	4.451	0.051	0.4	3.0	O K
180 min Summer	4.452	0.052	0.4	3.0	O K
240 min Summer	4.451	0.051	0.4	3.0	O K
360 min Summer	4.449	0.049	0.4	2.9	O K
480 min Summer	4.447	0.047	0.4	2.7	O K
600 min Summer	4.444	0.044	0.4	2.6	O K
720 min Summer	4.442	0.042	0.3	2.5	O K
960 min Summer	4.438	0.038	0.3	2.3	O K
1440 min Summer	4.433	0.033	0.3	1.9	O K
2160 min Summer	4.427	0.027	0.2	1.6	O K
2880 min Summer	4.423	0.023	0.2	1.4	O K
4320 min Summer	4.418	0.018	0.1	1.1	O K
5760 min Summer	4.415	0.015	0.1	0.9	O K
7200 min Summer	4.413	0.013	0.1	0.8	O K
8640 min Summer	4.412	0.012	0.1	0.7	O K
10080 min Summer	4.410	0.010	0.1	0.6	O K
15 min Winter	4.436	0.036	0.3	2.1	O K
30 min Winter	4.446	0.046	0.4	2.7	O K
60 min Winter	4.453	0.053	0.4	3.1	O K
120 min Winter	4.457	0.057	0.4	3.4	O K
180 min Winter	4.457	0.057	0.4	3.4	O K

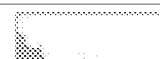
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	68.836	0.0	24
30 min Summer	45.828	0.0	36
60 min Summer	29.238	0.0	60
120 min Summer	18.112	0.0	92
180 min Summer	13.534	0.0	126
240 min Summer	10.952	0.0	160
360 min Summer	8.106	0.0	226
480 min Summer	6.544	0.0	292
600 min Summer	5.539	0.0	356
720 min Summer	4.832	0.0	420
960 min Summer	3.892	0.0	546
1440 min Summer	2.866	0.0	792
2160 min Summer	2.108	0.0	1156
2880 min Summer	1.693	0.0	1524
4320 min Summer	1.242	0.0	2248
5760 min Summer	0.996	0.0	2952
7200 min Summer	0.839	0.0	3680
8640 min Summer	0.730	0.0	4416
10080 min Summer	0.648	0.0	5144
15 min Winter	68.836	0.0	24
30 min Winter	45.828	0.0	36
60 min Winter	29.238	0.0	60
120 min Winter	18.112	0.0	92
180 min Winter	13.534	0.0	136

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Innovyze	Source Control 2018.1.1	

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	4.456	0.056	0.4	3.3	O K
360 min Winter	4.451	0.051	0.4	3.0	O K
480 min Winter	4.447	0.047	0.4	2.8	O K
600 min Winter	4.444	0.044	0.4	2.6	O K
720 min Winter	4.441	0.041	0.3	2.4	O K
960 min Winter	4.436	0.036	0.3	2.1	O K
1440 min Winter	4.429	0.029	0.2	1.7	O K
2160 min Winter	4.423	0.023	0.2	1.3	O K
2880 min Winter	4.419	0.019	0.1	1.1	O K
4320 min Winter	4.414	0.014	0.1	0.8	O K
5760 min Winter	4.412	0.012	0.1	0.7	O K
7200 min Winter	4.410	0.010	0.1	0.6	O K
8640 min Winter	4.409	0.009	0.1	0.5	O K
10080 min Winter	4.408	0.008	0.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	10.952	0.0	172
360 min Winter	8.106	0.0	242
480 min Winter	6.544	0.0	308
600 min Winter	5.539	0.0	374
720 min Winter	4.832	0.0	440
960 min Winter	3.892	0.0	566
1440 min Winter	2.866	0.0	816
2160 min Winter	2.108	0.0	1192
2880 min Winter	1.693	0.0	1560
4320 min Winter	1.242	0.0	2288
5760 min Winter	0.996	0.0	2984
7200 min Winter	0.839	0.0	3752
8640 min Winter	0.730	0.0	4392
10080 min Winter	0.648	0.0	5048

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.016

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.005	4	8	0.005
				8	12
					0.006

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Model Details

Storage is Online Cover Level (m) 5.000

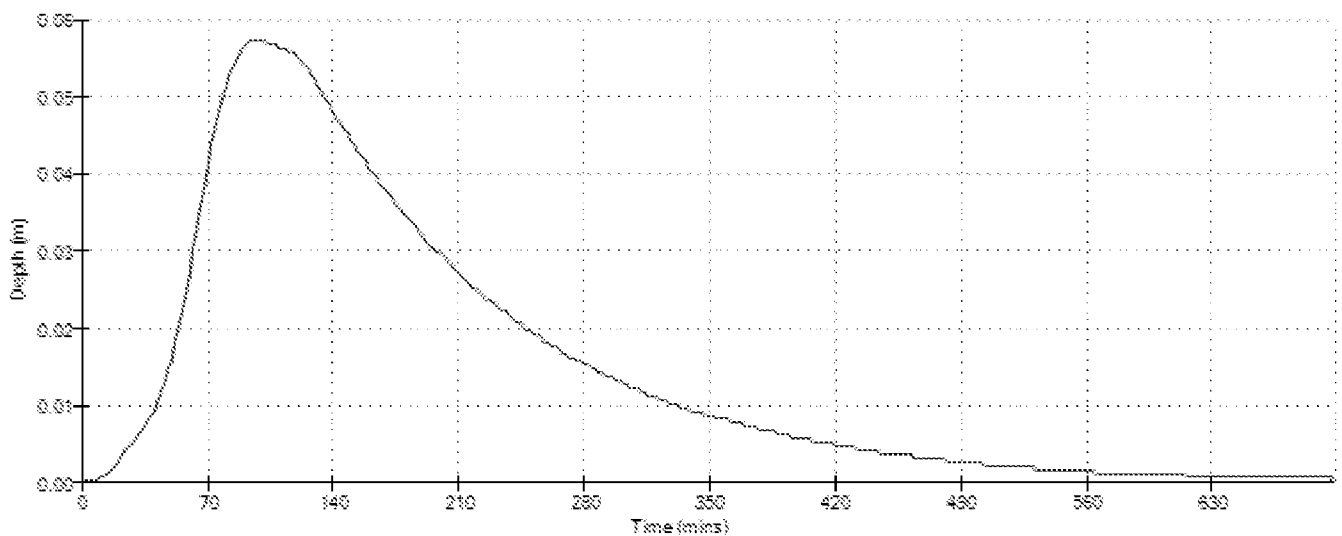
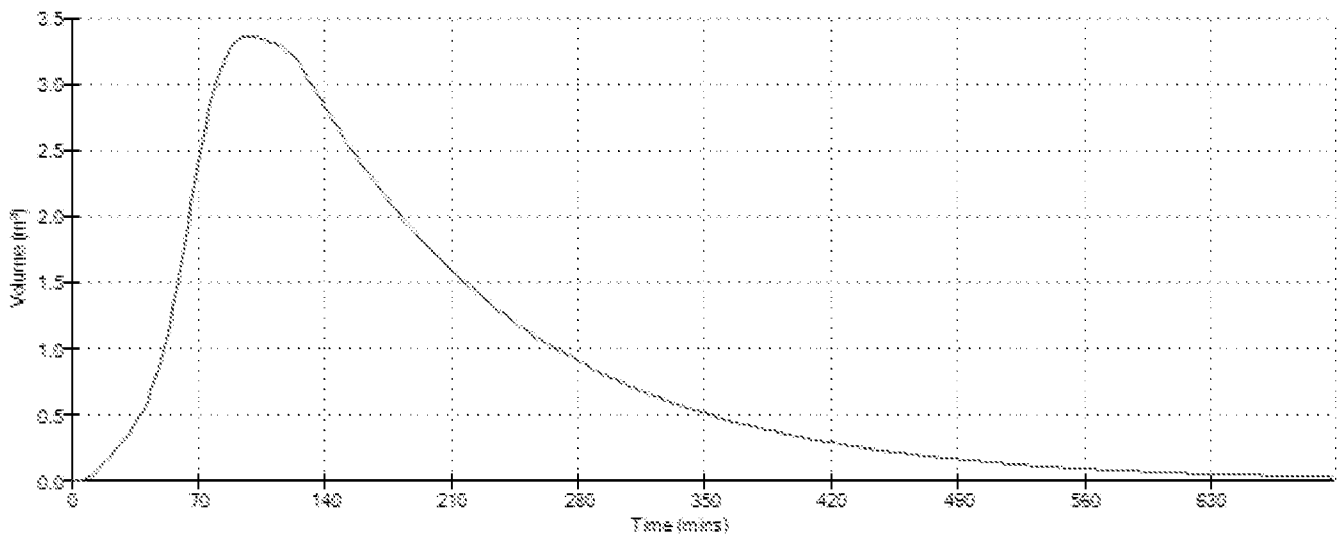
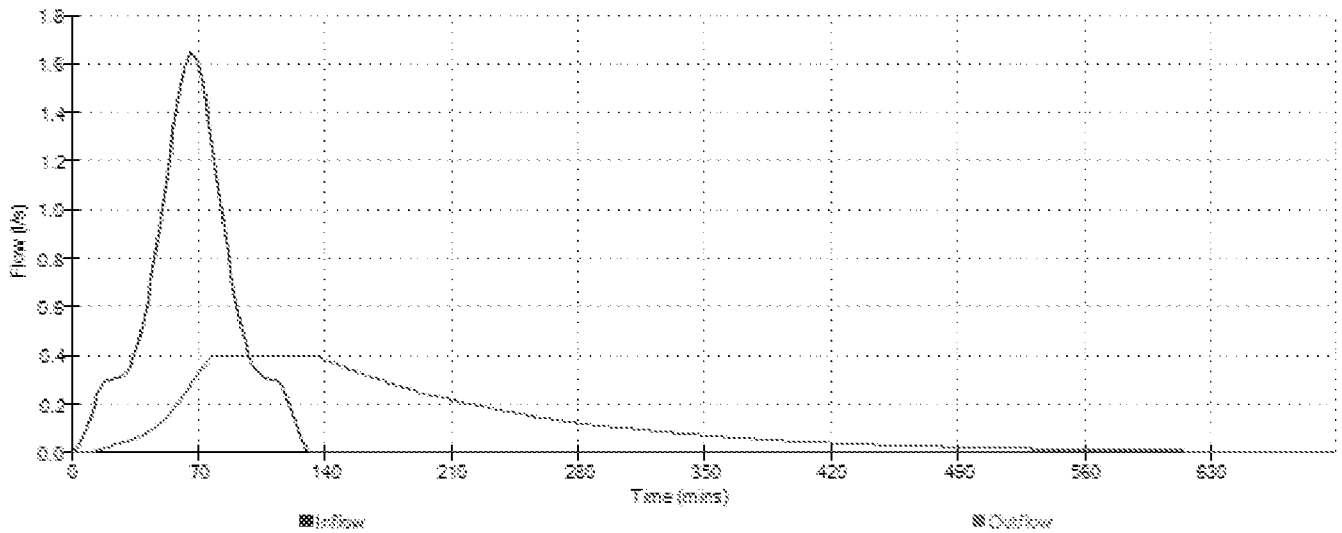
Infiltration Basin Structure

Invert Level (m) 4.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04878 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	58.7	0.600	59.7

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Event: 120 min Winter



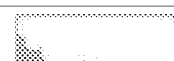
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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 154 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	4.458	0.058	0.4	3.4	O K
30 min Summer	4.476	0.076	0.4	4.5	O K
60 min Summer	4.493	0.093	0.4	5.5	O K
120 min Summer	4.504	0.104	0.4	6.1	O K
180 min Summer	4.506	0.106	0.4	6.2	O K
240 min Summer	4.506	0.106	0.4	6.2	O K
360 min Summer	4.503	0.103	0.4	6.0	O K
480 min Summer	4.498	0.098	0.4	5.8	O K
600 min Summer	4.493	0.093	0.4	5.5	O K
720 min Summer	4.488	0.088	0.4	5.2	O K
960 min Summer	4.478	0.078	0.4	4.6	O K
1440 min Summer	4.461	0.061	0.4	3.6	O K
2160 min Summer	4.447	0.047	0.4	2.8	O K
2880 min Summer	4.440	0.040	0.3	2.4	O K
4320 min Summer	4.431	0.031	0.2	1.8	O K
5760 min Summer	4.426	0.026	0.2	1.5	O K
7200 min Summer	4.422	0.022	0.2	1.3	O K
8640 min Summer	4.419	0.019	0.2	1.1	O K
10080 min Summer	4.417	0.017	0.1	1.0	O K
15 min Winter	4.466	0.066	0.4	3.9	O K
30 min Winter	4.486	0.086	0.4	5.1	O K
60 min Winter	4.506	0.106	0.4	6.2	O K
120 min Winter	4.519	0.119	0.4	7.0	O K
180 min Winter	4.521	0.121	0.4	7.1	O K

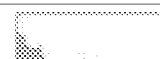
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	124.633	0.0	24
30 min Summer	83.789	0.0	38
60 min Summer	53.779	0.0	64
120 min Summer	33.337	0.0	116
180 min Summer	24.832	0.0	148
240 min Summer	20.006	0.0	180
360 min Summer	14.706	0.0	248
480 min Summer	11.818	0.0	316
600 min Summer	9.966	0.0	382
720 min Summer	8.665	0.0	448
960 min Summer	6.943	0.0	576
1440 min Summer	5.071	0.0	814
2160 min Summer	3.696	0.0	1156
2880 min Summer	2.949	0.0	1528
4320 min Summer	2.142	0.0	2252
5760 min Summer	1.705	0.0	2952
7200 min Summer	1.427	0.0	3680
8640 min Summer	1.235	0.0	4416
10080 min Summer	1.093	0.0	5144
15 min Winter	124.633	0.0	24
30 min Winter	83.789	0.0	38
60 min Winter	53.779	0.0	66
120 min Winter	33.337	0.0	120
180 min Winter	24.832	0.0	168

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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
240 min Winter	4.520	0.120	0.4	7.0	O K
360 min Winter	4.514	0.114	0.4	6.7	O K
480 min Winter	4.507	0.107	0.4	6.3	O K
600 min Winter	4.499	0.099	0.4	5.8	O K
720 min Winter	4.491	0.091	0.4	5.3	O K
960 min Winter	4.475	0.075	0.4	4.4	O K
1440 min Winter	4.452	0.052	0.4	3.1	O K
2160 min Winter	4.440	0.040	0.3	2.4	O K
2880 min Winter	4.433	0.033	0.3	1.9	O K
4320 min Winter	4.425	0.025	0.2	1.4	O K
5760 min Winter	4.420	0.020	0.2	1.2	O K
7200 min Winter	4.417	0.017	0.1	1.0	O K
8640 min Winter	4.415	0.015	0.1	0.9	O K
10080 min Winter	4.413	0.013	0.1	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.006	0.0	192
360 min Winter	14.706	0.0	270
480 min Winter	11.818	0.0	344
600 min Winter	9.966	0.0	414
720 min Winter	8.665	0.0	482
960 min Winter	6.943	0.0	610
1440 min Winter	5.071	0.0	828
2160 min Winter	3.696	0.0	1180
2880 min Winter	2.949	0.0	1544
4320 min Winter	2.142	0.0	2256
5760 min Winter	1.705	0.0	3000
7200 min Winter	1.427	0.0	3680
8640 min Winter	1.235	0.0	4376
10080 min Winter	1.093	0.0	5240

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Foundation House	06984	
Coach & Horse Passage	Elm Lodge	
Tunbridge Wells	Infiltration Basin	
Date 11/08/2020	Designed by rmh	
File 06984_SC_P01_Pond.SRCX	Checked by	
Innovyze	Source Control 2018.1.1	

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)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.016

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.005	4 8	0.005	8 12	0.006

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Innovyze	Source Control 2018.1.1	

Model Details

Storage is Online Cover Level (m) 5.000

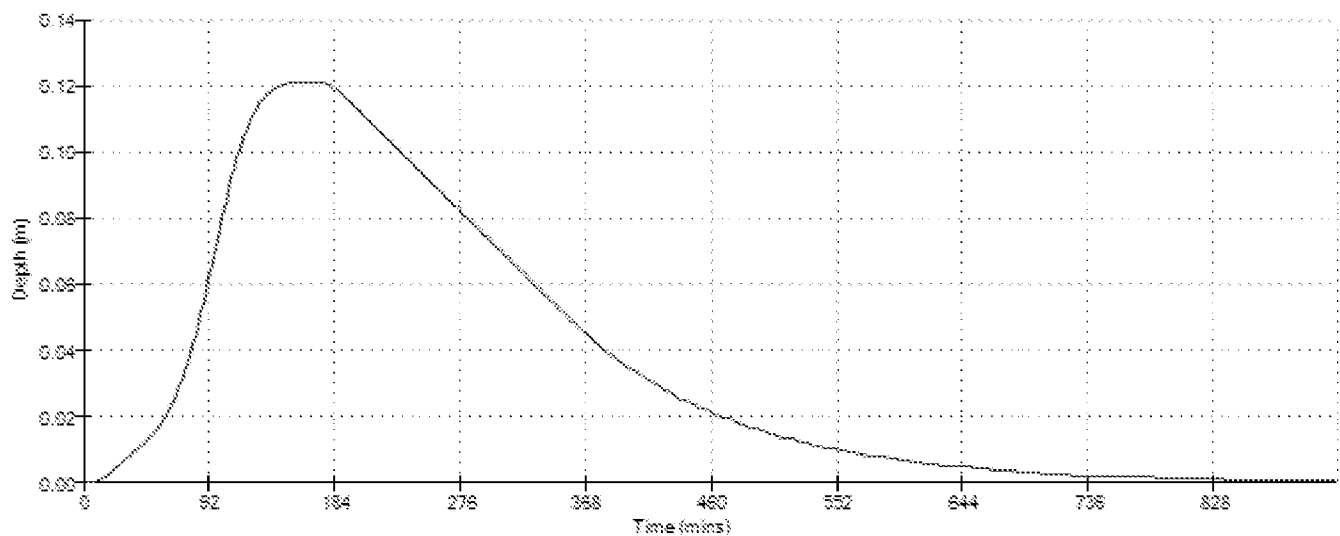
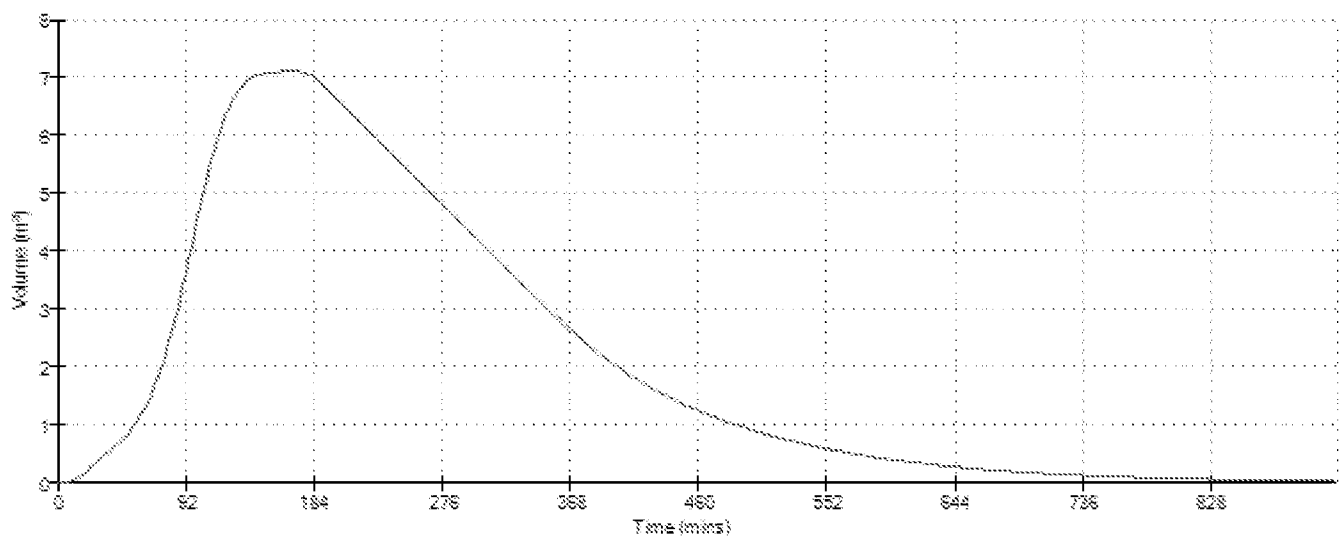
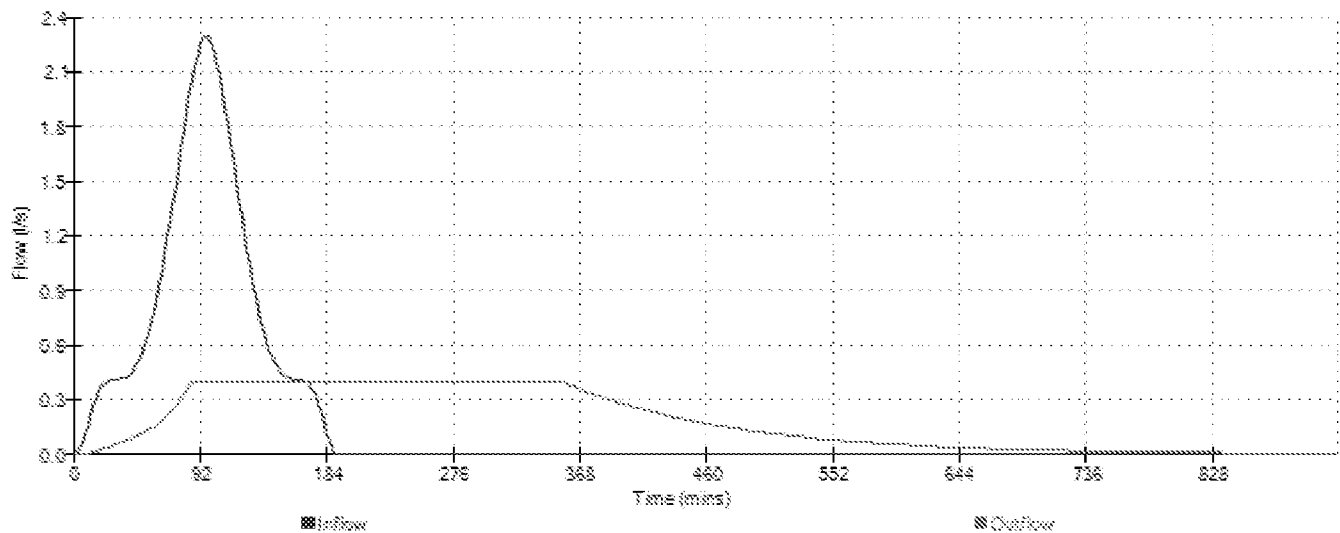
Infiltration Basin Structure

Invert Level (m) 4.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04878 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m) Area (m²)		Depth (m) Area (m²)	
0.000	58.7	0.600	59.7

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Foundation House	06984	
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Innovyze	Source Control 2018.1.1	

Event: 180 min Winter



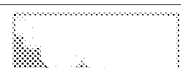
JMLA		Page 1
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Date 11/08/2020	Designed by rmh	
File 06984_SC_P01_Paving.SRCX	Checked by	
Innovyze	Source Control 2018.1.1	

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

Half Drain Time : 88 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	5.484	0.114	0.2	0.9	O K
30 min Summer	5.523	0.153	0.2	1.2	O K
60 min Summer	5.554	0.184	0.2	1.4	O K
120 min Summer	5.568	0.198	0.2	1.6	O K
180 min Summer	5.566	0.196	0.2	1.5	O K
240 min Summer	5.559	0.189	0.2	1.5	O K
360 min Summer	5.540	0.170	0.2	1.3	O K
480 min Summer	5.520	0.150	0.2	1.2	O K
600 min Summer	5.502	0.132	0.2	1.0	O K
720 min Summer	5.485	0.115	0.2	0.9	O K
960 min Summer	5.457	0.087	0.2	0.7	O K
1440 min Summer	5.423	0.053	0.2	0.4	O K
2160 min Summer	5.410	0.040	0.1	0.3	O K
2880 min Summer	5.403	0.033	0.1	0.3	O K
4320 min Summer	5.394	0.024	0.1	0.2	O K
5760 min Summer	5.389	0.019	0.1	0.2	O K
7200 min Summer	5.386	0.016	0.1	0.1	O K
8640 min Summer	5.384	0.014	0.1	0.1	O K
10080 min Summer	5.382	0.012	0.0	0.1	O K
15 min Winter	5.501	0.131	0.2	1.0	O K
30 min Winter	5.546	0.176	0.2	1.4	O K
60 min Winter	5.582	0.212	0.2	1.7	O K
120 min Winter	5.597	0.227	0.2	1.8	O K
180 min Winter	5.593	0.223	0.2	1.8	O K

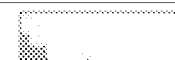
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	124.633	0.0	24
30 min Summer	83.789	0.0	36
60 min Summer	53.779	0.0	62
120 min Summer	33.337	0.0	98
180 min Summer	24.832	0.0	132
240 min Summer	20.006	0.0	166
360 min Summer	14.706	0.0	234
480 min Summer	11.818	0.0	300
600 min Summer	9.966	0.0	364
720 min Summer	8.665	0.0	424
960 min Summer	6.943	0.0	540
1440 min Summer	5.071	0.0	758
2160 min Summer	3.696	0.0	1112
2880 min Summer	2.949	0.0	1472
4320 min Summer	2.142	0.0	2204
5760 min Summer	1.705	0.0	2936
7200 min Summer	1.427	0.0	3624
8640 min Summer	1.235	0.0	4400
10080 min Summer	1.093	0.0	5136
15 min Winter	124.633	0.0	24
30 min Winter	83.789	0.0	37
60 min Winter	53.779	0.0	64
120 min Winter	33.337	0.0	106
180 min Winter	24.832	0.0	142

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Innovyze	Source Control 2018.1.1	

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
240 min Winter	5.581	0.211	0.2	1.7	O K
360 min Winter	5.551	0.181	0.2	1.4	O K
480 min Winter	5.521	0.151	0.2	1.2	O K
600 min Winter	5.493	0.123	0.2	1.0	O K
720 min Winter	5.468	0.098	0.2	0.8	O K
960 min Winter	5.430	0.060	0.2	0.5	O K
1440 min Winter	5.411	0.041	0.1	0.3	O K
2160 min Winter	5.400	0.030	0.1	0.2	O K
2880 min Winter	5.394	0.024	0.1	0.2	O K
4320 min Winter	5.388	0.018	0.1	0.1	O K
5760 min Winter	5.384	0.014	0.0	0.1	O K
7200 min Winter	5.382	0.012	0.0	0.1	O K
8640 min Winter	5.380	0.010	0.0	0.1	O K
10080 min Winter	5.379	0.009	0.0	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.006	0.0	180
360 min Winter	14.706	0.0	254
480 min Winter	11.818	0.0	322
600 min Winter	9.966	0.0	384
720 min Winter	8.665	0.0	444
960 min Winter	6.943	0.0	544
1440 min Winter	5.071	0.0	758
2160 min Winter	3.696	0.0	1108
2880 min Winter	2.949	0.0	1468
4320 min Winter	2.142	0.0	2188
5760 min Winter	1.705	0.0	2952
7200 min Winter	1.427	0.0	3632
8640 min Winter	1.235	0.0	4368
10080 min Winter	1.093	0.0	5152

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File 06984_SC_P01_Paving.SRCX	Checked by	
Innovyze	Source Control 2018.1.1	

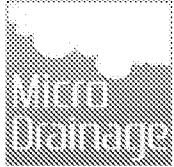
Rainfall Details

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)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.001		0.002		0.002

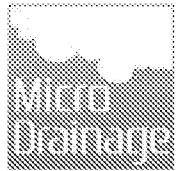
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Model Details

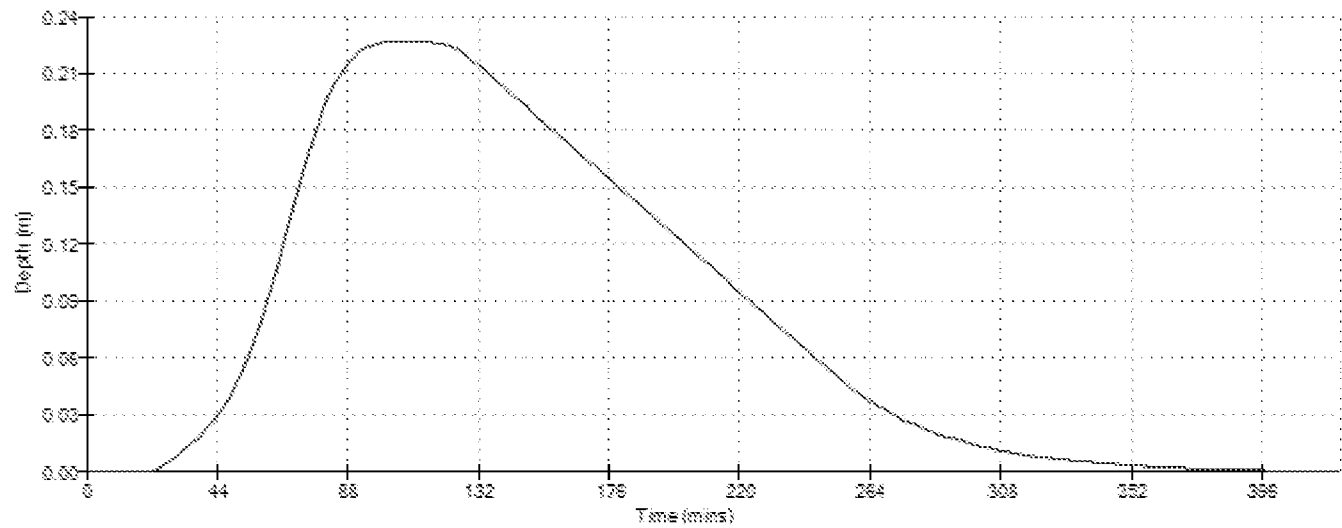
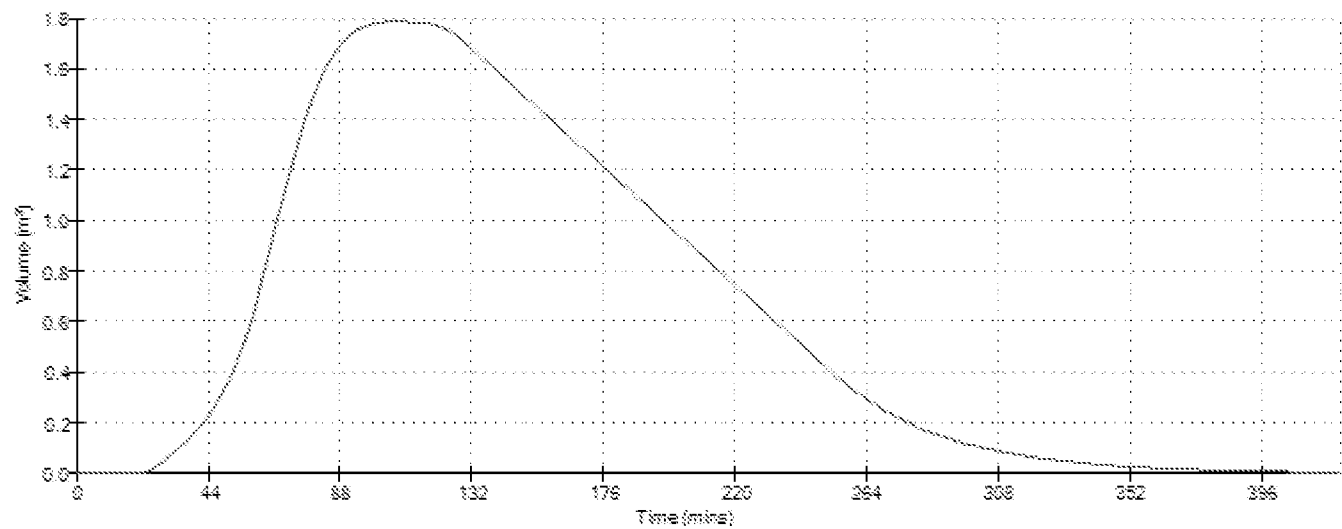
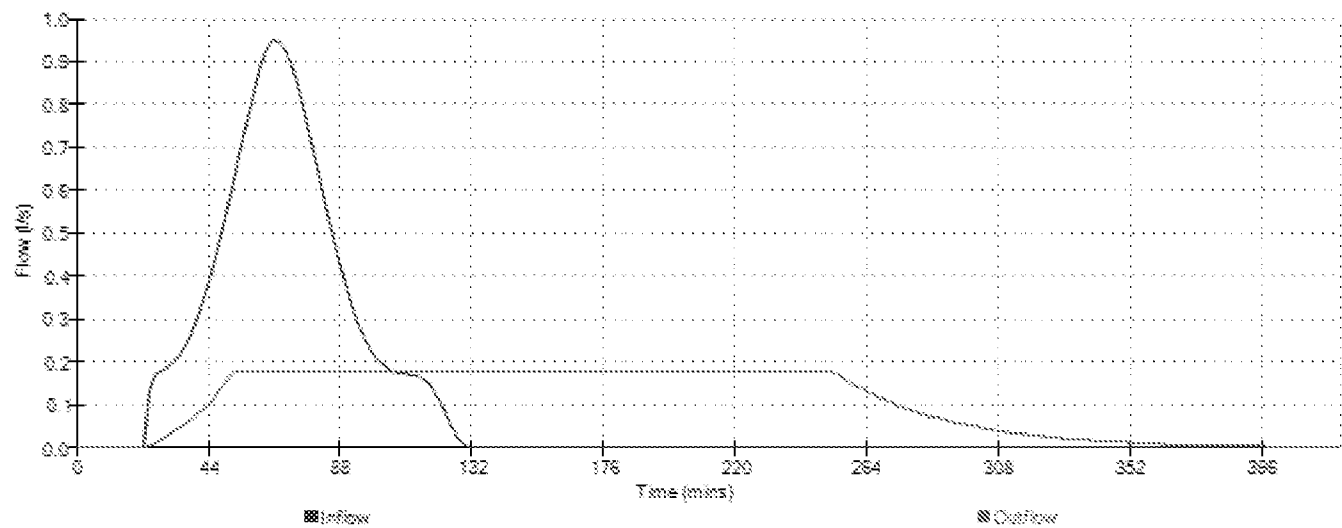
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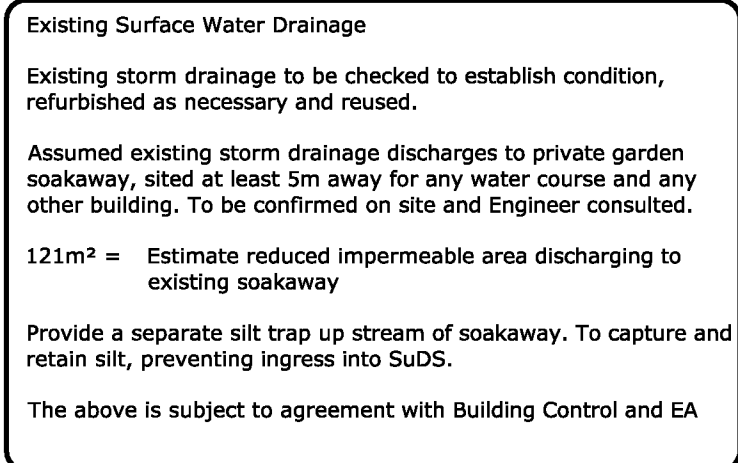
Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04878	Width (m)	9.7
Membrane Percolation (mm/hr)	1000	Length (m)	2.7
Max Percolation (l/s)	7.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.370	Cap Volume Depth (m)	0.350

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Innovyze	Source Control 2018.1.1	

Event: 120 min Winter





Existing Reconfigured Infiltration Basin

Estimated Basin Area:-		
	Daghi	Area
Base	0.01m	\$8.7m^2\$
Top	0.61m	\$9.7m^2\$

Example pond levels :-
4.40 = Base
4.43 = 30mm Max W/L 2yr return period
4.48 = 60mm Max W/L 5yr return period
4.53 = 120mm Max W/L 100yr + 40% CC return period
5.00 = Bank Top

The design has been checked for 100 year + 40% climate change storm return period, and can achieve a half empty trench with 24mm (154mm), and safely accommodates storm flows without flooding on or off site.

160mm² = Estimate of proposed impermeable area discharging to infiltration basin.

A 'good' filtration rate of 0.04878m/hr was used in the design, taken as the average from permeability testing on site. Only the base infiltration has been considered.

The above is subject to agreement with Building Control

Drainage Legend

	Existing foul drainage run
	New foul water drainage run constructed to adoptable standards
	New private foul drainage run
	Soil & vent pipe, open to outside air
	Soil pipe with air admittance valve
	Stub stack @ low level (e.g. under sink)
	Back inlet gully
	Trapped floor gully
	Existing surface water drainage run
	New surface water drainage run constructed to adoptable standards
	New private surface water drainage run
	Rodding eye
	Rodding access @ low level (e.g. above floor)
	Rainwater down pipe
	External gully
	Road gully
	Channel drain
	Soakaway : Cellular storage units
	Attenuation Tank : Cellular storage units
	Headwall
	Infiltration Basin
	Porous surface structure: System 'A'
	Total infiltration
	Existing combined drainage run
	New combined drainage run constructed to adoptable standards
	New private combined drainage run
	Abandoned / redundant drainage To be confirmed on site
	Manhole Types '1' & '2'
	Inspection Chamber '3'
	Inspection Chamber '4'
	Backdrop manhole or inspection chamber
	Sump filter chamber. To capture and retain silt, preventing ingress into SuBS.
	Flow control chamber with sump and filter. To limit flows to suit storm attenuation and infiltration systems.

Drainage Notes

This drawing complies with "Sewers For Adoption 7th Edition".

All dimensions shown are in millimetres unless otherwise stated.

These notes shall be read directly in conjunction with JMLA's other relevant drawings, details and specification, together with any subsequent revisions and amendments.

The Contractor shall be responsible for all temporary and permanent support works necessary.

In general, no fall shall be less than:-
1 in 40 for full under a structure or 1 in 80 elsewhere.
1 in 100 for surface water.

Pipe work and fittings to all sewers shall be adequately durable and projected against damage.

Drain materials and components shall be in accordance with the following standards :-

Vitrified Clay	- BS 65 or BS EN 295
Precast Concrete	- BS 5911
Plastic	- BS 4662, BS 4660 or BS EN 1401-1

Adoptable sewers and laterals are to be vitrified clay.

All other drainage shall comply with Local Building Authority and relevant Structural Warranty provider standards.

Special protection may be required where pipes are near the ground surface or where they could be damaged by the weight of backfill or traffic load form above.

For flexible pipes, and where greater safety is needed, the bedding class and grading of backfill should comply with BS EN 13242.

All drain runs from RWP & SVP stacks to be 102/110mm diameter unless noted otherwise.

All pipes within close proximity to and deeper than new or existing foundations shall be encased in concrete and backfilled in concrete up to the level of those foundations.

Adequate sleeves or bridges shall be provided wherever drains pass through walls or foundations.

Manhole & access chamber cover to suit BS EN 124 loading:-
Grade A15 - Gardens
Grade B125 - Driveways & footways.
Grade D400 - Roads & carriageways.

Internal manhole & access chambers to be fitted with lockable triple-sealed aluminium recessed covers and frames.

Two sets of lifting keys to be provided to client for each type of cover at handover.

Cover levels given are conservative values and may require adjustment to suit Approved Documents Part M access and final ground levels.

All pipes to be bedding class (S"/Y" or Z") depending on position with granular surround as shown on detail drawing if crown of pipe is within 450mm of finished ground level then to be encased in concrete class Y" or Z".

Sewers to be abandoned should be removed from ground not grouted up.

Storm Surface Design

Storage has been designed for a 100 year, 1:400, climate change storm return period, to achieve a half empty bins within 24 hours, and safely accommodated storm flows without flooding on or off site.

System A 'Total infiltration / Loading Overlay 2 Based on assumed UCR value of 0.5% actual thickness to be based on UCR values determined on site by localised testing.

A 'good' filtration rate of 0.04570m/hr was used in the design, taken as the average from percolation testing on site. Only the base infiltration has been considered.

SDM = Estimate of proposed impermeable area discharging into the porous structure via adjacent impermeable permeable and other areas draining on or into the porous structure.

Sub-base min. 270m² area x 5.5mm, type A20 class angular coarse graded aggregate with a void ratio of at least 90%. Aggregate proportion to comply with BS EN 13042.

Main components to be in accordance BS EN 7533 and all geosyncline in accordance with Interpave Guidance 2010.

Grange municipal **IN ANCEP** subject to detailed design following localised geotechnical investigation and recommendations.

The above is subject to agreement with Building Control,

Abstract

For Approval

P02 13/08/20	Issued for approval	rmh
P02 13/08/20	Issued for comments	rmh
jmla (south east) limited consulting structural & civil engineers party wall surveys principal designers & asbestos consultants floor-removal coach & horses passage www.jmla.co.uk 01392 691326 0191 5501046 consultants@jmla.co.uk		
contact: Mr & Mrs M Jenkins architect/interior design Malcolm Jenkins Associates		
project Elm Lodge, Tamarisk Way Ferring B12 SER		
drawing title Proposed New Dwelling Drainage Layout		
scale	date	drawn by
as shown @ A1	aug 20	rmh
06984-jmla-TY-00-DR-D-2200-S4-P02		

