

HAZEL COTTAGE RUFFORTH

HYDRAULICS REPORT

1. INTRODUCTION

This report provides the background to the surface water and foul design for a development at Hazel Cottage, Rufforth.

2. SURFACE WATER SCHEME

Investigations show that no infiltration is possible on site as the strata is clay. No surface water sewers are available for surface water disposal.

The surface water scheme on the development is to discharge the surface water to the existing combined drain on site at a rate of 0.5l/s, with storage provided as cellular storage under the driveway.

The existing house roof to remain as existing.

3. HYDRAULIC CALCULATIONS

The SuDS system has been modelled in Microdrainage with the following criteria:-

M5-60 = 19mm

Ration $r = 0.4$

Return period 1 in 100 years

Climate change +30%

Contributing areas (roof areas of new house) = 61 sq m and driveway 95 sq m.
(0.016hectares).

The proposed system works satisfactorily in the 1 in 100 year storm plus 30% climate change with no flooding, whilst discharge is limited to 0.5l/s.

The Microdrainage calculations show that the 120 minute storm is the critical event, requiring 5.8 Cu m of storage.

4. FOUL WATER


Foul water will be connected to the public foul sewerage system.



Report by

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APPENDED: Microdrainage Calculations


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Micro Drainage	Source Control 2020.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 134 minutes.

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
15 min Summer	15.567	0.117	0.0	0.4	0.4	3.3	O K
30 min Summer	15.597	0.147	0.0	0.4	0.4	4.2	O K
60 min Summer	15.619	0.169	0.0	0.4	0.4	4.8	O K
120 min Summer	15.626	0.176	0.0	0.4	0.4	5.0	O K
180 min Summer	15.623	0.173	0.0	0.4	0.4	4.9	O K
240 min Summer	15.617	0.167	0.0	0.4	0.4	4.8	O K
360 min Summer	15.604	0.154	0.0	0.4	0.4	4.4	O K
480 min Summer	15.593	0.143	0.0	0.4	0.4	4.1	O K
600 min Summer	15.582	0.132	0.0	0.4	0.4	3.8	O K
720 min Summer	15.573	0.123	0.0	0.4	0.4	3.5	O K
960 min Summer	15.556	0.106	0.0	0.4	0.4	3.0	O K
1440 min Summer	15.529	0.079	0.0	0.3	0.3	2.3	O K
2160 min Summer	15.501	0.051	0.0	0.3	0.3	1.5	O K
2880 min Summer	15.482	0.032	0.0	0.2	0.2	0.9	O K
4320 min Summer	15.460	0.010	0.0	0.2	0.2	0.3	O K
5760 min Summer	15.450	0.000	0.0	0.2	0.2	0.0	O K
7200 min Summer	15.450	0.000	0.0	0.2	0.2	0.0	O K
8640 min Summer	15.450	0.000	0.0	0.1	0.1	0.0	O K
10080 min Summer	15.450	0.000	0.0	0.1	0.1	0.0	O K
15 min Winter	15.582	0.132	0.0	0.4	0.4	3.8	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	121.269	0.0	3.6	18
30 min Summer	79.695	0.0	4.8	32
60 min Summer	49.937	0.0	6.0	60
120 min Summer	30.267	0.0	7.3	102
180 min Summer	22.297	0.0	8.0	134
240 min Summer	17.851	0.0	8.5	168
360 min Summer	12.957	0.0	9.3	236
480 min Summer	10.330	0.0	9.9	306
600 min Summer	8.659	0.0	10.4	374
720 min Summer	7.492	0.0	10.8	440
960 min Summer	5.959	0.0	11.4	568
1440 min Summer	4.309	0.0	12.4	822
2160 min Summer	3.110	0.0	13.4	1188
2880 min Summer	2.466	0.0	14.2	1552
4320 min Summer	1.775	0.0	15.3	2248
5760 min Summer	1.405	0.0	16.2	2936
7200 min Summer	1.171	0.0	16.9	0
8640 min Summer	1.008	0.0	17.4	0
10080 min Summer	0.889	0.0	17.9	0
15 min Winter	121.269	0.0	4.1	18

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Summary of Results for 100 year Return Period (+30%)

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
30 min Winter	15.617	0.167	0.0	0.4	0.4	4.8	OK
60 min Winter	15.644	0.194	0.0	0.4	0.4	5.5	OK
120 min Winter	15.654	0.204	0.0	0.5	0.5	5.8	OK
180 min Winter	15.650	0.200	0.0	0.5	0.5	5.7	OK
240 min Winter	15.643	0.193	0.0	0.4	0.4	5.5	OK
360 min Winter	15.624	0.174	0.0	0.4	0.4	5.0	OK
480 min Winter	15.607	0.157	0.0	0.4	0.4	4.5	OK
600 min Winter	15.592	0.142	0.0	0.4	0.4	4.0	OK
720 min Winter	15.578	0.128	0.0	0.4	0.4	3.7	OK
960 min Winter	15.554	0.104	0.0	0.3	0.3	3.0	OK
1440 min Winter	15.519	0.069	0.0	0.3	0.3	2.0	OK
2160 min Winter	15.485	0.035	0.0	0.3	0.3	1.0	OK
2880 min Winter	15.464	0.014	0.0	0.2	0.2	0.4	OK
4320 min Winter	15.450	0.000	0.0	0.2	0.2	0.0	OK
5760 min Winter	15.450	0.000	0.0	0.1	0.1	0.0	OK
7200 min Winter	15.450	0.000	0.0	0.1	0.1	0.0	OK
8640 min Winter	15.450	0.000	0.0	0.1	0.1	0.0	OK
10080 min Winter	15.450	0.000	0.0	0.1	0.1	0.0	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	79.695	0.0	5.3	32
60 min Winter	49.937	0.0	6.7	60
120 min Winter	30.267	0.0	8.1	114
180 min Winter	22.297	0.0	9.0	142
240 min Winter	17.851	0.0	9.6	180
360 min Winter	12.957	0.0	10.4	256
480 min Winter	10.330	0.0	11.1	330
600 min Winter	8.659	0.0	11.6	400
720 min Winter	7.492	0.0	12.1	470
960 min Winter	5.959	0.0	12.8	604
1440 min Winter	4.309	0.0	13.9	854
2160 min Winter	3.110	0.0	15.0	1216
2880 min Winter	2.466	0.0	15.9	1584
4320 min Winter	1.775	0.0	17.2	0
5760 min Winter	1.405	0.0	18.1	0
7200 min Winter	1.171	0.0	18.9	0
8640 min Winter	1.008	0.0	19.5	0
10080 min Winter	0.889	0.0	20.1	0

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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)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.016

Time (mins)	Area
From: To:	(ha)
0	4 0.016

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<p><u>Model Details</u></p> <p>Storage is Online Cover Level (m) 16.000</p> <p><u>Cellular Storage Structure</u></p> <p>Invert Level (m) 15.450 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000</p> <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Area (m²)</th> <th>Inf. Area (m²)</th> <th>Depth (m)</th> <th>Area (m²)</th> <th>Inf. Area (m²)</th> </tr> </thead> <tbody> <tr> <td>0.000</td> <td>30.0</td> <td>30.0</td> <td>0.211</td> <td>0.0</td> <td>34.6</td> </tr> <tr> <td>0.210</td> <td>30.0</td> <td>34.6</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><u>Orifice Outflow Control</u></p> <p>Diameter (m) 0.021 Discharge Coefficient 0.600 Invert Level (m) 15.400</p>			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	30.0	30.0	0.211	0.0	34.6	0.210	30.0	34.6			
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)															
0.000	30.0	30.0	0.211	0.0	34.6															
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