

**Surface Water Drainage Design
Land adjacent to Sleepers Cottage
The Halt
Elham
CT4 6TP**

Mr Kincaid

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1. Introduction

The following surface water design has been produced for development of a single dwelling on land adjacent to Sleepers Cottage, The Halt, Elham, CT4 6TP

A flood risk assessment produced to support the planning application and accepted by the Environment Agency considered flood risk from groundwater at the site. The flood risk assessment concluded that:

Groundwater flooding represents the greatest risk of flooding at the site. In 2000/01 shallow groundwater flooding occurred in parts of the site. The proposed dwelling and existing accessway lie outside the areas that were flooded.

Analysis of the topographical and hydrological contours has been used to identify areas of the site that are potentially subject to groundwater flooding. This has been used to position the proposed dwelling in the area at lowest flood risk. The access is above the potential groundwater flooding level.

The flood risk assessment considered surface water runoff and states:

The Code for Sustainable Homes places a mandatory requirement on new development for surface water management, SUR1. This requires peak runoff for the developed site to be no greater than for the pre-development site for the 1 in 1 and 1 in 100 year rainfall event with an allowance for climate change.

If there is no increase in the man-made impermeable area as a result of the new development, then the peak rate of runoff criterion does not apply.

Where the pre-development peak rate of runoff for the site would result in a requirement for the post-development flow rate (referred to as the limiting discharge) to be less than 5 l/s at a discharge point, a flow rate of up to 5 l/s may be used where required to reduce the risk of blockage.

Soakaways are usually only acceptable where there is at least 1m separation between the base of the soakaway and groundwater level. Given the potentially high groundwater level soakaways are considered inappropriate for the disposal of surface water runoff. As runoff is less than 5 l/s this can be discharged from the site without attenuation and meet the requirements of the Code for Sustainable Homes. It is recommended that roof water is collected for irrigation of the garden and that excess water is discharged to the Nailbourne.

2. Surface Water Discharge

The proposed roof area is 120m². Water butts will be installed on rainwater pipes that collect water from a significant area of the roof. The overflow from these and flow from other rainwater pipes will be discharged to the Nailbourne. A silt trap with non-return valves on all inlets will remove debris. An outfall will be construed with ragstone setts providing scour protection. The drainage layout is shown on drawing 511-201. Drainage details are shown on drawing 511-301.

Discharge from the site under various storm conditions is shown below:

Return Period	Q l/s
1	1.1
30	2.6
100	3.4
100+30%	4.4

Discharge from the site is less than 5 l/s under all storm events up to and including the 1 in 100 year plus climate change event. Given the lag that often occurs between heavy rainfall and elevated groundwater levels this discharge will not increase the risk of groundwater flooding.

The analysis for the 1 in 100 year plus climate change event is shown on the following pages.

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Micro Drainage		Source Control 2015.1				
<u>Summary of Results for 100 year Return Period (+30%)</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer		82.181	0.081	3.8	0.1	O K
30 min Summer		82.183	0.083	4.0	0.1	O K
60 min Summer		82.180	0.080	3.7	0.1	O K
120 min Summer		82.171	0.071	2.8	0.1	O K
180 min Summer		82.162	0.062	2.2	0.1	O K
240 min Summer		82.156	0.056	1.8	0.1	O K
360 min Summer		82.149	0.049	1.4	0.1	O K
480 min Summer		82.145	0.045	1.1	0.1	O K
600 min Summer		82.141	0.041	1.0	0.0	O K
720 min Summer		82.138	0.038	0.8	0.0	O K
960 min Summer		82.134	0.034	0.7	0.0	O K
1440 min Summer		82.129	0.029	0.5	0.0	O K
2160 min Summer		82.125	0.025	0.4	0.0	O K
2880 min Summer		82.122	0.022	0.3	0.0	O K
4320 min Summer		82.118	0.018	0.2	0.0	O K
5760 min Summer		82.116	0.016	0.2	0.0	O K
7200 min Summer		82.114	0.014	0.1	0.0	O K
8640 min Summer		82.113	0.013	0.1	0.0	O K
10080 min Summer		82.113	0.013	0.1	0.0	O K
15 min Winter		82.185	0.085	4.3	0.1	O K
30 min Winter		82.186	0.086	4.4	0.1	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer		129.929	0.0	2.9	13	
30 min Summer		86.927	0.0	3.9	22	
60 min Summer		55.351	0.0	5.0	36	
120 min Summer		33.909	0.0	6.1	68	
180 min Summer		25.025	0.0	6.8	98	
240 min Summer		20.115	0.0	7.2	128	
360 min Summer		14.774	0.0	8.0	188	
480 min Summer		11.848	0.0	8.5	248	
600 min Summer		9.975	0.0	9.0	306	
720 min Summer		8.662	0.0	9.4	368	
960 min Summer		6.927	0.0	10.0	484	
1440 min Summer		5.045	0.0	10.9	732	
2160 min Summer		3.666	0.0	11.9	1072	
2880 min Summer		2.919	0.0	12.6	1424	
4320 min Summer		2.114	0.0	13.7	2164	
5760 min Summer		1.680	0.0	14.5	2888	
7200 min Summer		1.407	0.0	15.2	3560	
8640 min Summer		1.217	0.0	15.8	4256	
10080 min Summer		1.077	0.0	16.3	5000	
15 min Winter		129.929	0.0	3.3	14	
30 min Winter		86.927	0.0	4.4	22	
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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	82.178	0.078	3.5	0.1	O K
120 min Winter	82.165	0.065	2.3	0.1	O K
180 min Winter	82.155	0.055	1.8	0.1	O K
240 min Winter	82.150	0.050	1.4	0.1	O K
360 min Winter	82.142	0.042	1.0	0.0	O K
480 min Winter	82.138	0.038	0.8	0.0	O K
600 min Winter	82.135	0.035	0.7	0.0	O K
720 min Winter	82.133	0.033	0.6	0.0	O K
960 min Winter	82.129	0.029	0.5	0.0	O K
1440 min Winter	82.125	0.025	0.4	0.0	O K
2160 min Winter	82.121	0.021	0.3	0.0	O K
2880 min Winter	82.118	0.018	0.2	0.0	O K
4320 min Winter	82.115	0.015	0.2	0.0	O K
5760 min Winter	82.113	0.013	0.1	0.0	O K
7200 min Winter	82.112	0.012	0.1	0.0	O K
8640 min Winter	82.112	0.012	0.1	0.0	O K
10080 min Winter	82.111	0.011	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	55.351	0.0	5.6	38
120 min Winter	33.909	0.0	6.8	66
180 min Winter	25.025	0.0	7.6	94
240 min Winter	20.115	0.0	8.1	128
360 min Winter	14.774	0.0	8.9	182
480 min Winter	11.848	0.0	9.6	244
600 min Winter	9.975	0.0	10.1	316
720 min Winter	8.662	0.0	10.5	374
960 min Winter	6.927	0.0	11.2	492
1440 min Winter	5.045	0.0	12.2	738
2160 min Winter	3.666	0.0	13.3	1080
2880 min Winter	2.919	0.0	14.1	1476
4320 min Winter	2.114	0.0	15.3	2136
5760 min Winter	1.680	0.0	16.3	2992
7200 min Winter	1.407	0.0	17.0	3416
8640 min Winter	1.217	0.0	17.7	4272
10080 min Winter	1.077	0.0	18.2	4768

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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)	21.000	Shortest Storm (mins)	15
Ratio R	0.356	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.012

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.004		4 8 0.004		8 12 0.004	

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