

Our Ref: J-15503-HG-01  
26 March 2024

W Marsh and Son  
Resugga Farm  
St Stephens  
St Austell  
Cornwall

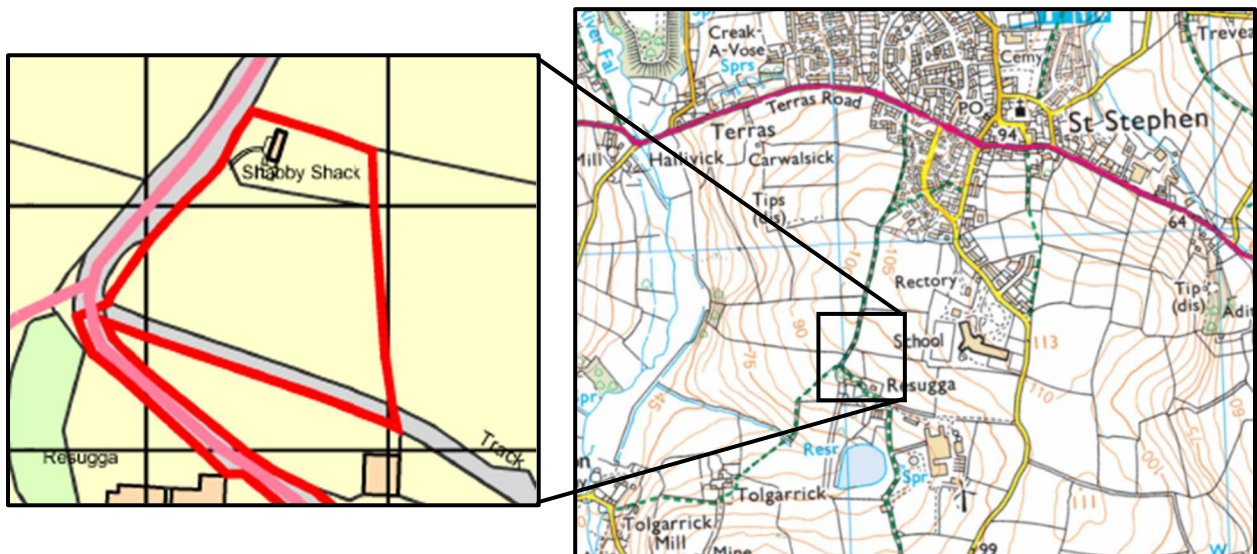
**RE: Proposed Unit at Resugga Farm, St Stephens - Surface Water and Foul Water Drainage Report**

### Introduction

Our client is proposing to site a single unit at Resugga Farm, St Stephens for tourism purposes. This application also covers the retention of 'Shabby Shack' which is a single tourism unit.

The site is located at Resugga Farm, St Stephens. The approximate grid reference for the site is SW 94028 52707. A site location plan is shown in **Figure 1** below.

Nijhuis Industries Ltd. have been instructed to outline the surface water and foul water drainage proposals, in line with the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and Cornwall Council Guidance.



**Figure 1. Site Location Plan**

### Percolation Test Results

To establish the subsoil conditions on the land and whether infiltration was a viable option, percolation tests were undertaken in line with the relevant guidance on the 23/02/2024 by others. The percolation test results are included in **Annex B**.

A total of four trial pits were undertaken for the foul drainage percolation testing. Two trial pits were undertaken for the surface water drainage percolation testing. The results are outlined below. The testing indicated that infiltration is a viable solution for the drainage of the site.

**Foul Water Percolation Test Results**

Trial Pit 1	Trial Pit 2	Trial Pit 3	Trial Pit 4
22 s/mm	22.8 s/mm	19 s/mm	19 s/mm
25 s/mm	31 s/mm	21 s/mm	20 s/mm
26 s/mm	28 s/mm	27 s/mm	22 s/mm

**Table 1. Foul Percolation Test Results**

Based on the percolation test results above, a rate of 26.5 s/mm for the design of the foul drainage field. This is an average of the slowest rate of each trial pit. This is further outlined below.

**Surface Water Percolation Test Results**

Trial Pit 1	Trial Pit 2
0.138 m/hr	0.139 m/hr
0.177 m/hr	0.148 m/hr
0.158 m/hr	0.165 m/hr

**Table 2. Surface Water Percolation Test Results**

Based on the percolation test results above a conservative rate of 0.138 m/hr will be used for the design of the infiltration system. This is detailed further below.

**Foul Water Drainage**

B.S. 6297 states that percolation values should be between 15s/mm and 100s/mm. The overall average rate produced from percolation testing is 26.5 s/mm. this is a suitable rate for the design of a non-mains foul drainage system without the need for an Environmental Permit.

It is proposed that the foul drainage for the units will drain to a septic tank which will then outfall to a drainage field.

The units are outlined below:

- 1 Bed Property - 2 Pe
- 2 Bed Property - 4 Pe

The foul treatment plant is to be designed as suitable for a total of 6 persons, in line with guidance outlined in industry approved 'British Water Flow and Loads 4'.

Under the guidance of British Water Flows and Loads 4 the document suggests that occupants produce 150l/hd/dy of wastewater and as such the total daily volume of the discharge is likely to be approximately 0.9m<sup>3</sup>/dy.

**Drainage Field Calculations:**

The following calculation is used in order to assess the base area of drainage field trench required;  $A_t = V_p \times Pe \times 0.25$  (for a septic tank).

Where  $A_t$  = The trench base area,  $P_e$  = the population equivalent of the property and  $V_p$  = the infiltration rate obtained from the percolation testing.

The population equivalent of the development is 6. If we use the calculation above with a  $V_p$  of 26.5, the outcome is the requirement to install 39.75m<sup>2</sup> of drainage field.

Utilising a trench width of 900mm, the total linear meterage required is 44.2m.

**Annex A** of this report shows a conceptual foul drainage scheme, allowing the septic tank to be at least 7m from any building and the drainage field to be 15m from any building.

### **Surface Water Drainage**

In line with the Surface Water Drainage Hierarchy, the preferable drainage solution for this site would be to drain all surface water runoff from the development to ground soakaways. As percolation was successful infiltration options have been explored below.

It is determined that the impermeable area for the site is 75m<sup>2</sup>. Based on this a single soakaway is proposed for the site. MicroDrainage software was used to model the minimum size for the infiltration system, using the calculations and measurements outlined above.

Using the outlined impermeable area and an infiltration rate of 0.138 m/hr. The required soakaway is 7.5m<sup>2</sup> x 0.8m (depth). The MicroDrainage calculations are included with this report in **Annex C**.

### **Conclusions**

Our client is proposing a tourism unit at Resugga Farm. This application also covers the retention of the existing unit on site called 'Shabby Shack'. Following on from successful percolation testing an infiltration drainage scheme has been outlined for foul and surface water drainage.

It is proposed that the foul from the site will be connected to a septic tank which will discharge into a drainage field.

The surface water runoff from the site will drain to a single soakaway.

The proposed conceptual drainage layout is included in **Annex A**.

Provided the recommendations outlined in this report are adopted in the development proposal then there is the capacity to manage the surface water runoff from the development onsite. With regard to the criteria outlined in the PPG, the development is appropriate on this site from a flood risk perspective.

Yours sincerely  
For and on behalf of Nijhuis Industries Ltd

Hannah Graham  
Flood Risk and Drainage Engineer

Enc.	Annex A	Proposed Drainage Drawing
	Annex B	Percolation Test Results
	Annex C	Calculations

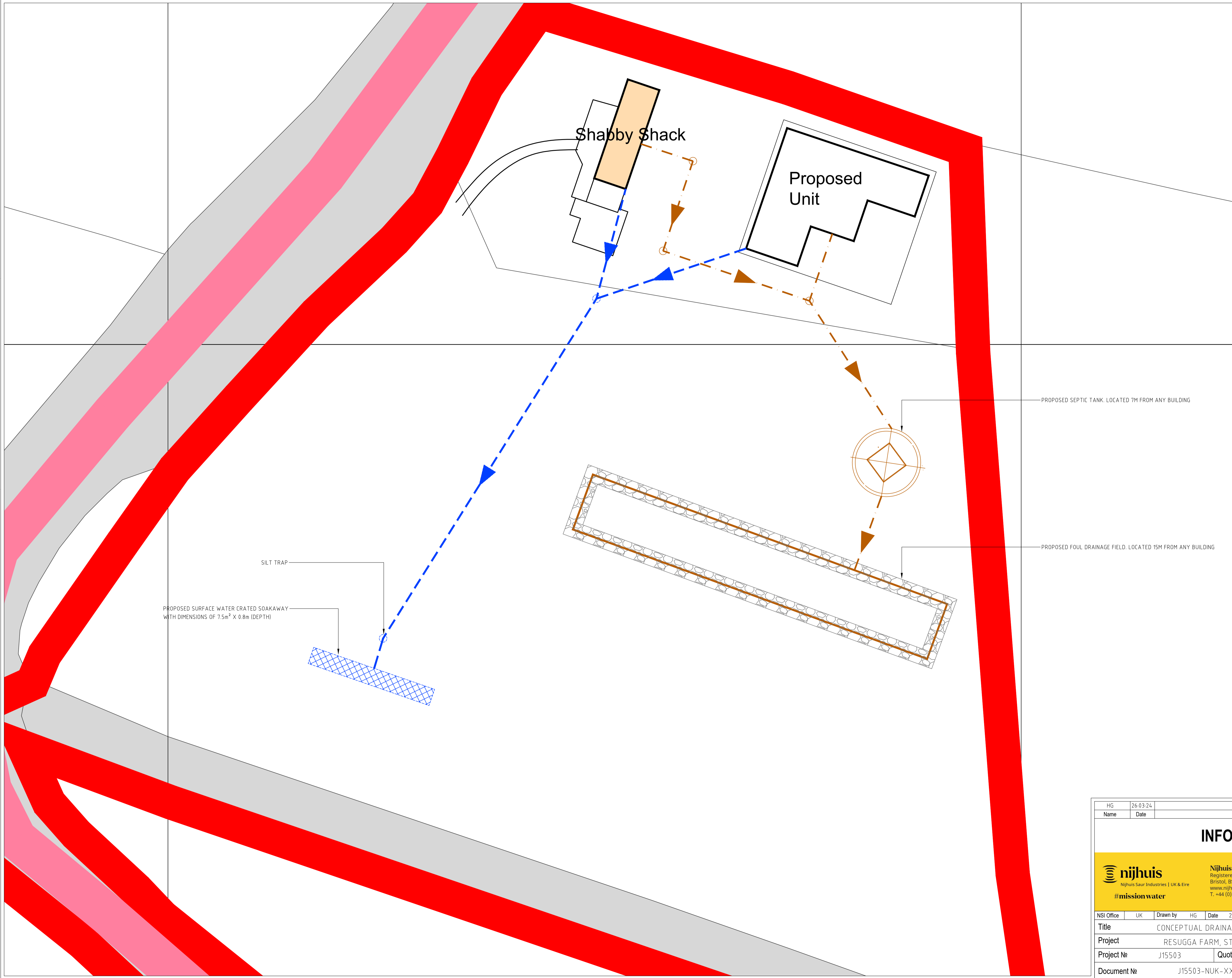
**ANNEX A – PROPOSED DRAINAGE DRAWING**

**NOTES**

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**KEY**

- PROPOSED SITE BOUNDARY
- - - PROPOSED SURFACE WATER DRAINAGE
- - - FOUL DRAINAGE (INDICATIVE)




PROPOSED SEPTIC TANK. LOCATED 7M FROM ANY BUILDING

PROPOSED FOUL DRAINAGE FIELD. LOCATED 15M FROM ANY BUILDING

SILT TRAP

PROPOSED SURFACE WATER CRATED SOAKAWAY WITH DIMENSIONS OF 7.5m² X 0.8m (DEPTH)

HG	26-03-24	PRELIMINARY	P01
Name	Date	Remarks	Revision
<b>INFORMATION</b>			
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NSI Office	UK	Drawn by	HG
Date	26-03-24	Status	S2
Title		CONCEPTUAL DRAINAGE LAYOUT	
Project		RESUGGA FARM, ST STEPHENS	
Project No	J15503	Quotation No	
Document No	J15503-NUK-XX-XX-DR-D-3001-S2-P01		
Revision	P01	Checked by	HG
Release Date	26-03-24	Size	A1
Sheet	1 OF 1	Scale	1:100
Unit	MM		

## **ANNEX B – PERCOLATION TEST RESULTS**

Trial Pit 1

	Test 1
Time (Full) (mins)	0
Time (Empty) (mins)	110
Times (seconds)	6600
Depth (mm)	300
Vp - s/mm	22

Test 2

0  
125  
7500  
300  
25

Test 3

0  
130  
7800  
300  
26

Trial Pit 2

	Test 1
Time (Full) (mins)	0
Time (Empty) (mins)	114
Times (seconds)	6840
Depth (mm)	300
Vp - s/mm	22.8

Test 2

0  
155  
9300  
300  
31

Test 3

0  
140  
8400  
300  
28



Trial Pit 3

	Test 1
Time (Full) (mins)	0
Time (Empty) (mins)	95
Times (seconds)	5700
Depth (mm)	300
Vp - s/mm	19

Test 2

0  
105  
6300  
300  
21

Test 3

0  
135  
8100  
300  
27

Trial Pit 4

	Test 1
Time (Full) (mins)	0
Time (Empty) (mins)	95
Times (seconds)	5700
Depth (mm)	300
Vp - s/mm	19

Test 2

0  
100  
  
6000  
  
300  
  
20

Test 3

0  
110  
  
6600  
  
300  
  
22

















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## **ANNEX C – CALCULATIONS**

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Summary of Results for 100 year Return Period (+50%)

Half Drain Time : 263 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	98.361	0.361	0.1	2.6	O K
30 min Summer	98.438	0.438	0.2	3.1	O K
60 min Summer	98.520	0.520	0.2	3.7	O K
120 min Summer	98.594	0.594	0.2	4.2	O K
180 min Summer	98.624	0.624	0.2	4.4	O K
240 min Summer	98.639	0.639	0.2	4.6	O K
360 min Summer	98.654	0.654	0.2	4.7	O K
480 min Summer	98.657	0.657	0.2	4.7	O K
600 min Summer	98.654	0.654	0.2	4.7	O K
720 min Summer	98.648	0.648	0.2	4.6	O K
960 min Summer	98.604	0.604	0.2	4.3	O K
1440 min Summer	98.527	0.527	0.2	3.8	O K
2160 min Summer	98.431	0.431	0.2	3.1	O K
2880 min Summer	98.353	0.353	0.1	2.5	O K
4320 min Summer	98.235	0.235	0.1	1.7	O K
5760 min Summer	98.152	0.152	0.1	1.1	O K
7200 min Summer	98.096	0.096	0.1	0.7	O K
8640 min Summer	98.062	0.062	0.1	0.4	O K
10080 min Summer	98.048	0.048	0.1	0.3	O K
15 min Winter	98.405	0.405	0.2	2.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	178.805	0.0	18
30 min Summer	111.264	0.0	33
60 min Summer	69.235	0.0	62
120 min Summer	43.082	0.0	120
180 min Summer	32.642	0.0	176
240 min Summer	26.809	0.0	204
360 min Summer	20.312	0.0	268
480 min Summer	16.682	0.0	336
600 min Summer	14.319	0.0	406
720 min Summer	12.640	0.0	476
960 min Summer	10.043	0.0	616
1440 min Summer	7.262	0.0	882
2160 min Summer	5.252	0.0	1276
2880 min Summer	4.173	0.0	1648
4320 min Summer	3.010	0.0	2380
5760 min Summer	2.388	0.0	3112
7200 min Summer	1.995	0.0	3752
8640 min Summer	1.723	0.0	4416
10080 min Summer	1.521	0.0	5136
15 min Winter	178.805	0.0	18

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Summary of Results for 100 year Return Period (+50%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	98.493	0.493	0.2	3.5	O K
60 min Winter	98.588	0.588	0.2	4.2	O K
120 min Winter	98.679	0.679	0.2	4.8	O K
180 min Winter	98.718	0.718	0.2	5.1	O K
240 min Winter	98.736	0.736	0.2	5.2	O K
360 min Winter	98.750	0.750	0.2	5.3	O K
480 min Winter	98.751	0.751	0.2	5.4	O K
600 min Winter	98.743	0.743	0.2	5.3	O K
720 min Winter	98.730	0.730	0.2	5.2	O K
960 min Winter	98.667	0.667	0.2	4.7	O K
1440 min Winter	98.555	0.555	0.2	4.0	O K
2160 min Winter	98.420	0.420	0.2	3.0	O K
2880 min Winter	98.314	0.314	0.1	2.2	O K
4320 min Winter	98.163	0.163	0.1	1.2	O K
5760 min Winter	98.071	0.071	0.1	0.5	O K
7200 min Winter	98.046	0.046	0.1	0.3	O K
8640 min Winter	98.040	0.040	0.1	0.3	O K
10080 min Winter	98.035	0.035	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	111.264	0.0	32
60 min Winter	69.235	0.0	62
120 min Winter	43.082	0.0	118
180 min Winter	32.642	0.0	174
240 min Winter	26.809	0.0	226
360 min Winter	20.312	0.0	282
480 min Winter	16.682	0.0	360
600 min Winter	14.319	0.0	438
720 min Winter	12.640	0.0	514
960 min Winter	10.043	0.0	664
1440 min Winter	7.262	0.0	950
2160 min Winter	5.252	0.0	1360
2880 min Winter	4.173	0.0	1732
4320 min Winter	3.010	0.0	2464
5760 min Winter	2.388	0.0	3112
7200 min Winter	1.995	0.0	3672
8640 min Winter	1.723	0.0	4400
10080 min Winter	1.521	0.0	5120

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 193850 52500 SW 93850 52500
C (1km)	-0.029
D1 (1km)	0.449
D2 (1km)	0.334
D3 (1km)	0.328
E (1km)	0.295
F (1km)	2.475
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+50

Time Area Diagram

Total Area (ha) 0.008

<b>Time (mins)</b>	<b>Area</b>
<b>From: To:</b>	<b>(ha)</b>
0	4 0.008

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 98.000 Safety Factor 3.0  
Infiltration Coefficient Base (m/hr) 0.13800 Porosity 0.95  
Infiltration Coefficient Side (m/hr) 0.13800

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	7.5	7.5	0.801	0.0	16.3
0.800	7.5	16.3			

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Event: 480 min Winter

