D Sub-Appendix
Existing Surface Water Runoff Rate Calculation

Modified Ration Method for Brownfield Runoff

Project Number: 2210419
Project Name: 12 Pilgrim's Lane
Date: 04/05/2022

Area (Ha) 0.033

Storm Return Period	Existing Discharge (L/S)
1yr	2.8
30yr	7.1
100yr	9.1
100yr+40%	12.8

Q= 2.78 * Cv * Cr * I * A

Q = flow rate (l/s)
Cv = Volumetric Runoff Coefficient
Cr = Routing Coefficient
I - Rainfall intensity
A = Area (Ha)

Under summer rainfall conditions Cv ranges from 0.6 - 0.9, for fully impermeable areas value of 0.75 should be used.

The routing coeffcieint varies between 1 and 2 and accounts for the effect of rainfall characterisitcs and catchment shape on the peak runoff magnitude.
The SuDS manual recoomends a fixed value for Cr of 1.3 for design.

Rainfall intensity is calculated following Walling Procedure Volume 4 and is as follows:

1.0 Determination of M5-60 min and r

60 minute, 5 year storm (M5-60) has a rainfall depth

M5-60 20.000
Ratio r 0.4

2.0 Determination of M5-D

M5-D = Z1 (M5-60min)
Z1 is taken from A3.a or A.3b for values between 0.12 and 0.45 and for durations between 5 minutes and 48 hours read to 0.01.

Assuming 1yr 15min, 30yr 15 min, 100yr 15min

Z1 0.64
M5-15 12.8 mm

3.0 Determination of MT-D

MT-D is obtained from the relationship:
MT-D = Z2(M5-D)

Taken from Table A1 for 1yr return period 15min storm
Z2 = 0.62
M1-15= 7.9

Taken from Table A1 for 30yr return period 15min storm
Z2= 1.56
M30-15= 20.0

Taken from Table A1 for 100yr return period 15min storm
Z2= 1.99
M100-15= 25.5

4 **Determination of point rainfall intensities**

i= 31.744 mm/hr

i= 79.872 mm/hr

i= 101.888 mm/hr

5 Application of areal reduction factor

From chart A4 where area is greater than 1km2
ARF= 1

Average 1yr intensity	Average 30yr intensity	Average 100yr intensity	Average 100yr+40% intensity
31.7	79.9	101.9	142.6

E Sub-Appendix
Greenfield Runoff Rates

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	MIke Ash
Site name:	12 Pilgrim's Lane
Site location:	12 Pilgrim's Lane

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.55571° N
Longitude:	0.17173° W
Reference:	2966501668
Date:	May 04 2022 12:08

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	650	650
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.44	0.44
1 in 1 year (l/s):	0.38	0.38
1 in 30 years (l/s):	1.02	1.02
1 in 100 year (l/s):	1.41	1.41
1 in 200 years (l/s):	1.66	1.66

F Sub-Appendix
Microdrainage Source Control Calculations

Summary of Results for 1 year Return Period

Half Drain Time : 11 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	98.449	0.099	0.0	1.8	1.8	1.4	O K
30 min Summer	98.456	0.106	0.0	1.8	1.8	1.5	O K
60 min Summer	98.448	0.098	0.0	1.8	1.8	1.3	O K
120 min Summer	98.430	0.080	0.0	1.5	1.5	1.1	O K
180 min Summer	98.418	0.068	0.0	1.3	1.3	0.9	O K
240 min Summer	98.410	0.060	0.0	1.1	1.1	0.8	O K
360 min Summer	98.401	0.051	0.0	0.9	0.9	0.7	O K
480 min Summer	98.395	0.045	0.0	0.8	0.8	0.6	O K
600 min Summer	98.391	0.041	0.0	0.6	0.6	0.6	O K
720 min Summer	98.388	0.038	0.0	0.6	0.6	0.5	O K
960 min Summer	98.384	0.034	0.0	0.5	0.5	0.5	O K
1440 min Summer	98.379	0.029	0.0	0.3	0.3	0.4	O K
2160 min Summer	98.374	0.024	0.0	0.3	0.3	0.3	O K
2880 min Summer	98.372	0.022	0.0	0.2	0.2	0.3	O K
4320 min Summer	98.369	0.019	0.0	0.2	0.2	0.3	O K
5760 min Summer	98.367	0.017	0.0	0.1	0.1	0.2	O K
7200 min Summer	98.365	0.015	0.0	0.1	0.1	0.2	O K
8640 min Summer	98.364	0.014	0.0	0.1	0.1	0.2	O K
10080 min Summer	98.363	0.013	0.0	0.1	0.1	0.2	O K
15 min Winter	98.460	0.110	0.0	1.8	1.8	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	33.555	0.0	2.1	13
30 min Summer	21.677	0.0	2.7	21
60 min Summer	13.524	0.0	3.3	38
120 min Summer	8.257	0.0	4.1	68
180 min Summer	6.154	0.0	4.6	98
240 min Summer	4.989	0.0	4.9	128
360 min Summer	3.684	0.0	5.5	188
480 min Summer	2.966	0.0	5.9	248
600 min Summer	2.506	0.0	6.2	308
720 min Summer	2.184	0.0	6.5	368
960 min Summer	1.757	0.0	7.0	490
1440 min Summer	1.294	0.0	7.7	734
2160 min Summer	0.954	0.0	8.5	1100
2880 min Summer	0.768	0.0	9.1	1468
4320 min Summer	0.565	0.0	10.1	2200
5760 min Summer	0.454	0.0	10.8	2936
7200 min Summer	0.384	0.0	11.4	3576
8640 min Summer	0.335	0.0	11.9	4392
10080 min Summer	0.298	0.0	12.4	5136
15 min Winter	33.555	0.0	2.3	14

Summary of Results for 1 year Return Period

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	98.463	0.113	0.0	1.8	1.8	1.5	O K
60 min Winter	98.446	0.096	0.0	1.7	1.7	1.3	O K
120 min Winter	98.422	0.072	0.0	1.4	1.4	1.0	O K
180 min Winter	98.409	0.059	0.0	1.1	1.1	0.8	O K
240 min Winter	98.402	0.052	0.0	0.9	0.9	0.7	O K
360 min Winter	98.393	0.043	0.0	0.7	0.7	0.6	O K
480 min Winter	98.388	0.038	0.0	0.6	0.6	0.5	O K
600 min Winter	98.385	0.035	0.0	0.5	0.5	0.5	O K
720 min Winter	98.382	0.032	0.0	0.4	0.4	0.4	O K
960 min Winter	98.379	0.029	0.0	0.3	0.3	0.4	O K
1440 min Winter	98.374	0.024	0.0	0.3	0.3	0.3	O K
2160 min Winter	98.371	0.021	0.0	0.2	0.2	0.3	O K
2880 min Winter	98.368	0.018	0.0	0.1	0.1	0.3	O K
4320 min Winter	98.366	0.016	0.0	0.1	0.1	0.2	O K
5760 min Winter	98.364	0.014	0.0	0.1	0.1	0.2	O K
7200 min Winter	98.363	0.013	0.0	0.1	0.1	0.2	O K
8640 min Winter	98.362	0.012	0.0	0.1	0.1	0.2	O K
10080 min Winter	98.361	0.011	0.0	0.1	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	21.677	0.0	3.0	22
60 min Winter	13.524	0.0	3.7	38
120 min Winter	8.257	0.0	4.6	70
180 min Winter	6.154	0.0	5.1	100
240 min Winter	4.989	0.0	5.5	130
360 min Winter	3.684	0.0	6.1	188
480 min Winter	2.966	0.0	6.6	248
600 min Winter	2.506	0.0	6.9	308
720 min Winter	2.184	0.0	7.3	366
960 min Winter	1.757	0.0	7.8	492
1440 min Winter	1.294	0.0	8.6	736
2160 min Winter	0.954	0.0	9.5	1084
2880 min Winter	0.768	0.0	10.2	1472
4320 min Winter	0.565	0.0	11.3	2140
5760 min Winter	0.454	0.0	12.1	2920
7200 min Winter	0.384	0.0	12.8	3672
8640 min Winter	0.335	0.0	13.4	4336
10080 min Winter	0.298	0.0	13.9	5104

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.033

Time (mins) From:	To:	Area (ha)
0	4	0.033

Model Details

Storage is Online Cover Level (m) 99.900

Cellular Storage Structure

Invert Level (m) 98.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.4	0.0	0.801	0.0	0.0
0.800	14.4	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	98.350
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0
Flush-Flo™	0.240	2.0
Kick-Flo®	0.504	1.6
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.0	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.0	1.600	2.7	4.000	4.2	8.000	5.8
0.400	1.9	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.6	2.000	3.0	5.000	4.7	9.000	6.2
0.600	1.8	2.200	3.2	5.500	4.9	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.3		

Summary of Results for 30 year Return Period

Half Drain Time : 21 minutes.

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
15 min Summer	98.631	0.281	0.0	2.0	2.0	3.8	O K
30 min Summer	98.661	0.311	0.0	2.0	2.0	4.3	O K
60 min Summer	98.653	0.303	0.0	2.0	2.0	4.1	O K
120 min Summer	98.596	0.246	0.0	2.0	2.0	3.4	O K
180 min Summer	98.544	0.194	0.0	2.0	2.0	2.6	O K
240 min Summer	98.503	0.153	0.0	1.9	1.9	2.1	O K
360 min Summer	98.454	0.104	0.0	1.8	1.8	1.4	O K
480 min Summer	98.433	0.083	0.0	1.6	1.6	1.1	O K
600 min Summer	98.421	0.071	0.0	1.4	1.4	1.0	O K
720 min Summer	98.413	0.063	0.0	1.2	1.2	0.9	O K
960 min Summer	98.404	0.054	0.0	1.0	1.0	0.7	O K
1440 min Summer	98.394	0.044	0.0	0.7	0.7	0.6	O K
2160 min Summer	98.386	0.036	0.0	0.5	0.5	0.5	O K
2880 min Summer	98.382	0.032	0.0	0.4	0.4	0.4	O K
4320 min Summer	98.377	0.027	0.0	0.3	0.3	0.4	O K
5760 min Summer	98.373	0.023	0.0	0.2	0.2	0.3	O K
7200 min Summer	98.371	0.021	0.0	0.2	0.2	0.3	O K
8640 min Summer	98.370	0.020	0.0	0.2	0.2	0.3	O K
10080 min Summer	98.368	0.018	0.0	0.1	0.1	0.2	O K
15 min Winter	98.672	0.322	0.0	2.0	2.0	4.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	82.422	0.0	5.1	15
30 min Summer	52.865	0.0	6.5	25
60 min Summer	32.372	0.0	8.0	42
120 min Summer	19.231	0.0	9.5	74
180 min Summer	14.034	0.0	10.4	106
240 min Summer	11.177	0.0	11.1	136
360 min Summer	8.104	0.0	12.0	192
480 min Summer	6.446	0.0	12.8	250
600 min Summer	5.394	0.0	13.3	308
720 min Summer	4.662	0.0	13.8	370
960 min Summer	3.701	0.0	14.6	490
1440 min Summer	2.671	0.0	15.9	734
2160 min Summer	1.926	0.0	17.2	1096
2880 min Summer	1.526	0.0	18.1	1460
4320 min Summer	1.098	0.0	19.6	2168
5760 min Summer	0.869	0.0	20.7	2936
7200 min Summer	0.725	0.0	21.5	3584
8640 min Summer	0.625	0.0	22.3	4400
10080 min Summer	0.551	0.0	22.9	5136
15 min Winter	82.422	0.0	5.7	16

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	98.706	0.356	0.0	2.0	2.0	4.9	O K
60 min Winter	98.687	0.337	0.0	2.0	2.0	4.6	O K
120 min Winter	98.598	0.248	0.0	2.0	2.0	3.4	O K
180 min Winter	98.521	0.171	0.0	1.9	1.9	2.3	O K
240 min Winter	98.470	0.120	0.0	1.8	1.8	1.6	O K
360 min Winter	98.429	0.079	0.0	1.5	1.5	1.1	O K
480 min Winter	98.414	0.064	0.0	1.2	1.2	0.9	O K
600 min Winter	98.406	0.056	0.0	1.0	1.0	0.8	O K
720 min Winter	98.401	0.051	0.0	0.9	0.9	0.7	O K
960 min Winter	98.394	0.044	0.0	0.7	0.7	0.6	O K
1440 min Winter	98.386	0.036	0.0	0.5	0.5	0.5	O K
2160 min Winter	98.380	0.030	0.0	0.4	0.4	0.4	O K
2880 min Winter	98.377	0.027	0.0	0.3	0.3	0.4	O K
4320 min Winter	98.372	0.022	0.0	0.2	0.2	0.3	O K
5760 min Winter	98.370	0.020	0.0	0.2	0.2	0.3	O K
7200 min Winter	98.368	0.018	0.0	0.1	0.1	0.2	O K
8640 min Winter	98.367	0.017	0.0	0.1	0.1	0.2	O K
10080 min Winter	98.366	0.016	0.0	0.1	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	52.865	0.0	7.3	27
60 min Winter	32.372	0.0	9.0	46
120 min Winter	19.231	0.0	10.7	80
180 min Winter	14.034	0.0	11.7	110
240 min Winter	11.177	0.0	12.4	138
360 min Winter	8.104	0.0	13.5	192
480 min Winter	6.446	0.0	14.3	252
600 min Winter	5.394	0.0	14.9	308
720 min Winter	4.662	0.0	15.5	370
960 min Winter	3.701	0.0	16.4	492
1440 min Winter	2.671	0.0	17.8	716
2160 min Winter	1.926	0.0	19.2	1076
2880 min Winter	1.526	0.0	20.3	1456
4320 min Winter	1.098	0.0	21.9	2144
5760 min Winter	0.869	0.0	23.1	2936
7200 min Winter	0.725	0.0	24.1	3672
8640 min Winter	0.625	0.0	24.9	4464
10080 min Winter	0.551	0.0	25.7	5168

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)	21.000	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.033

Time (mins) From:	To:	Area (ha)
0	4	0.033

Model Details

Storage is Online Cover Level (m) 99.900

Cellular Storage Structure

Invert Level (m) 98.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.4	0.0	0.801	0.0	0.0
0.800	14.4	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	98.350
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0
Flush-Flo™	0.240	2.0
Kick-Flo®	0.504	1.6
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.0	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.0	1.600	2.7	4.000	4.2	8.000	5.8
0.400	1.9	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.6	2.000	3.0	5.000	4.7	9.000	6.2
0.600	1.8	2.200	3.2	5.500	4.9	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.3		

Summary of Results for 100 year Return Period

Half Drain Time : 33 minutes.

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
15 min Summer	98.736	0.386	0.0	2.0	2.0	5.3	O K
30 min Summer	98.792	0.442	0.0	2.0	2.0	6.0	O K
60 min Summer	98.793	0.443	0.0	2.0	2.0	6.1	O K
120 min Summer	98.730	0.380	0.0	2.0	2.0	5.2	O K
180 min Summer	98.661	0.311	0.0	2.0	2.0	4.3	O K
240 min Summer	98.600	0.250	0.0	2.0	2.0	3.4	O K
360 min Summer	98.516	0.166	0.0	1.9	1.9	2.3	O K
480 min Summer	98.467	0.117	0.0	1.8	1.8	1.6	O K
600 min Summer	98.442	0.092	0.0	1.7	1.7	1.3	O K
720 min Summer	98.430	0.080	0.0	1.5	1.5	1.1	O K
960 min Summer	98.415	0.065	0.0	1.2	1.2	0.9	O K
1440 min Summer	98.401	0.051	0.0	0.9	0.9	0.7	O K
2160 min Summer	98.392	0.042	0.0	0.7	0.7	0.6	O K
2880 min Summer	98.386	0.036	0.0	0.5	0.5	0.5	O K
4320 min Summer	98.380	0.030	0.0	0.4	0.4	0.4	O K
5760 min Summer	98.376	0.026	0.0	0.3	0.3	0.4	O K
7200 min Summer	98.374	0.024	0.0	0.2	0.2	0.3	O K
8640 min Summer	98.372	0.022	0.0	0.2	0.2	0.3	O K
10080 min Summer	98.371	0.021	0.0	0.2	0.2	0.3	O K
15 min Winter	98.792	0.442	0.0	2.0	2.0	6.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	107.269	0.0	6.6	16
30 min Summer	69.314	0.0	8.6	29
60 min Summer	42.578	0.0	10.5	44
120 min Summer	25.252	0.0	12.5	78
180 min Summer	18.359	0.0	13.6	110
240 min Summer	14.561	0.0	14.4	142
360 min Summer	10.503	0.0	15.6	200
480 min Summer	8.323	0.0	16.5	256
600 min Summer	6.944	0.0	17.2	310
720 min Summer	5.987	0.0	17.8	370
960 min Summer	4.734	0.0	18.7	490
1440 min Summer	3.396	0.0	20.2	734
2160 min Summer	2.432	0.0	21.7	1088
2880 min Summer	1.918	0.0	22.8	1460
4320 min Summer	1.371	0.0	24.4	2188
5760 min Summer	1.079	0.0	25.6	2920
7200 min Summer	0.896	0.0	26.6	3640
8640 min Summer	0.769	0.0	27.4	4376
10080 min Summer	0.676	0.0	28.1	5032
15 min Winter	107.269	0.0	7.4	17

Summary of Results for 100 year Return Period

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	98.868	0.518	0.0	2.0	2.0	7.1	O K
60 min Winter	98.864	0.514	0.0	2.0	2.0	7.0	O K
120 min Winter	98.762	0.412	0.0	2.0	2.0	5.6	O K
180 min Winter	98.654	0.304	0.0	2.0	2.0	4.2	O K
240 min Winter	98.566	0.216	0.0	2.0	2.0	3.0	O K
360 min Winter	98.467	0.117	0.0	1.8	1.8	1.6	O K
480 min Winter	98.433	0.083	0.0	1.6	1.6	1.1	O K
600 min Winter	98.419	0.069	0.0	1.3	1.3	0.9	O K
720 min Winter	98.411	0.061	0.0	1.2	1.2	0.8	O K
960 min Winter	98.402	0.052	0.0	0.9	0.9	0.7	O K
1440 min Winter	98.392	0.042	0.0	0.7	0.7	0.6	O K
2160 min Winter	98.384	0.034	0.0	0.5	0.5	0.5	O K
2880 min Winter	98.380	0.030	0.0	0.4	0.4	0.4	O K
4320 min Winter	98.375	0.025	0.0	0.3	0.3	0.3	O K
5760 min Winter	98.372	0.022	0.0	0.2	0.2	0.3	O K
7200 min Winter	98.370	0.020	0.0	0.2	0.2	0.3	O K
8640 min Winter	98.369	0.019	0.0	0.2	0.2	0.3	O K
10080 min Winter	98.367	0.017	0.0	0.1	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	69.314	0.0	9.6	30
60 min Winter	42.578	0.0	11.8	50
120 min Winter	25.252	0.0	14.0	86
180 min Winter	18.359	0.0	15.3	118
240 min Winter	14.561	0.0	16.1	148
360 min Winter	10.503	0.0	17.5	200
480 min Winter	8.323	0.0	18.5	252
600 min Winter	6.944	0.0	19.2	312
720 min Winter	5.987	0.0	19.9	372
960 min Winter	4.734	0.0	21.0	490
1440 min Winter	3.396	0.0	22.6	728
2160 min Winter	2.432	0.0	24.3	1100
2880 min Winter	1.918	0.0	25.5	1484
4320 min Winter	1.371	0.0	27.3	2240
5760 min Winter	1.079	0.0	28.7	2904
7200 min Winter	0.896	0.0	29.8	3648
8640 min Winter	0.769	0.0	30.7	4408
10080 min Winter	0.676	0.0	31.5	4968

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	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.033

Time (mins) From:	To:	Area (ha)
0	4	0.033

Model Details

Storage is Online Cover Level (m) 99.900

Cellular Storage Structure

Invert Level (m) 98.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.4	0.0	0.801	0.0	0.0
0.800	14.4	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	98.350
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0
Flush-Flo™	0.240	2.0
Kick-Flo®	0.504	1.6
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.0	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.0	1.600	2.7	4.000	4.2	8.000	5.8
0.400	1.9	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.6	2.000	3.0	5.000	4.7	9.000	6.2
0.600	1.8	2.200	3.2	5.500	4.9	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.3		

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

Half Drain Time : 51 minutes.

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
15 min Summer	98.927	0.577	0.0	2.0	2.0	7.9	O K
30 min Summer	99.028	0.678	0.0	2.0	2.0	9.3	O K
60 min Summer	99.046	0.696	0.0	2.0	2.0	9.5	O K
120 min Summer	98.994	0.644	0.0	2.0	2.0	8.8	O K
180 min Summer	98.923	0.573	0.0	2.0	2.0	7.8	O K
240 min Summer	98.842	0.492	0.0	2.0	2.0	6.7	O K
360 min Summer	98.696	0.346	0.0	2.0	2.0	4.7	O K
480 min Summer	98.595	0.245	0.0	2.0	2.0	3.3	O K
600 min Summer	98.528	0.178	0.0	2.0	2.0	2.4	O K
720 min Summer	98.484	0.134	0.0	1.9	1.9	1.8	O K
960 min Summer	98.441	0.091	0.0	1.7	1.7	1.2	O K
1440 min Summer	98.416	0.066	0.0	1.3	1.3	0.9	O K
2160 min Summer	98.401	0.051	0.0	0.9	0.9	0.7	O K
2880 min Summer	98.394	0.044	0.0	0.7	0.7	0.6	O K
4320 min Summer	98.386	0.036	0.0	0.5	0.5	0.5	O K
5760 min Summer	98.382	0.032	0.0	0.4	0.4	0.4	O K
7200 min Summer	98.379	0.029	0.0	0.3	0.3	0.4	O K
8640 min Summer	98.376	0.026	0.0	0.3	0.3	0.4	O K
10080 min Summer	98.375	0.025	0.0	0.3	0.3	0.3	O K
15 min Winter	99.004	0.654	0.0	2.0	2.0	9.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	150.176	0.0	9.3	17
30 min Summer	97.039	0.0	12.0	31
60 min Summer	59.609	0.0	14.7	50
120 min Summer	35.353	0.0	17.5	84
180 min Summer	25.703	0.0	19.1	118
240 min Summer	20.385	0.0	20.2	152
360 min Summer	14.704	0.0	21.8	212
480 min Summer	11.652	0.0	23.1	268
600 min Summer	9.722	0.0	24.1	326
720 min Summer	8.381	0.0	24.9	382
960 min Summer	6.627	0.0	26.2	492
1440 min Summer	4.754	0.0	28.2	734
2160 min Summer	3.405	0.0	30.3	1100
2880 min Summer	2.685	0.0	31.9	1468
4320 min Summer	1.919	0.0	34.2	2144
5760 min Summer	1.511	0.0	35.9	2880
7200 min Summer	1.254	0.0	37.2	3632
8640 min Summer	1.077	0.0	38.4	4328
10080 min Summer	0.947	0.0	39.4	5088
15 min Winter	150.176	0.0	10.4	17

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

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	99.126	0.776	0.0	2.0	2.0	10.6	O K
60 min Winter	99.174	0.824	0.0	2.0	2.0	11.0	O K
120 min Winter	99.079	0.729	0.0	2.0	2.0	10.0	O K
180 min Winter	98.976	0.626	0.0	2.0	2.0	8.6	O K
240 min Winter	98.859	0.509	0.0	2.0	2.0	7.0	O K
360 min Winter	98.638	0.288	0.0	2.0	2.0	3.9	O K
480 min Winter	98.516	0.166	0.0	1.9	1.9	2.3	O K
600 min Winter	98.457	0.107	0.0	1.8	1.8	1.5	O K
720 min Winter	98.435	0.085	0.0	1.6	1.6	1.2	O K
960 min Winter	98.417	0.067	0.0	1.3	1.3	0.9	O K
1440 min Winter	98.402	0.052	0.0	0.9	0.9	0.7	O K
2160 min Winter	98.392	0.042	0.0	0.7	0.7	0.6	O K
2880 min Winter	98.386	0.036	0.0	0.5	0.5	0.5	O K
4320 min Winter	98.380	0.030	0.0	0.4	0.4	0.4	O K
5760 min Winter	98.377	0.027	0.0	0.3	0.3	0.4	O K
7200 min Winter	98.374	0.024	0.0	0.3	0.3	0.3	O K
8640 min Winter	98.372	0.022	0.0	0.2	0.2	0.3	O K
10080 min Winter	98.371	0.021	0.0	0.2	0.2	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	97.039	0.0	13.4	31
60 min Winter	59.609	0.0	16.5	54
120 min Winter	35.353	0.0	19.6	90
180 min Winter	25.703	0.0	21.4	128
240 min Winter	20.385	0.0	22.6	166
360 min Winter	14.704	0.0	24.4	220
480 min Winter	11.652	0.0	25.8	272
600 min Winter	9.722	0.0	26.9	322
720 min Winter	8.381	0.0	27.9	374
960 min Winter	6.627	0.0	29.4	492
1440 min Winter	4.754	0.0	31.6	734
2160 min Winter	3.405	0.0	34.0	1100
2880 min Winter	2.685	0.0	35.7	1468
4320 min Winter	1.919	0.0	38.3	2140
5760 min Winter	1.511	0.0	40.2	2904
7200 min Winter	1.254	0.0	41.7	3640
8640 min Winter	1.077	0.0	43.0	4296
10080 min Winter	0.947	0.0	44.1	5208

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	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.033

Time (mins) From:	To:	Area (ha)
0	4	0.033

Model Details

Storage is Online Cover Level (m) 99.900

Cellular Storage Structure

Invert Level (m) 98.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.4	0.0	0.801	0.0	0.0
0.800	14.4	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	98.350
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0
Flush-Flo™	0.240	2.0
Kick-Flo®	0.504	1.6
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.0	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.0	1.600	2.7	4.000	4.2	8.000	5.8
0.400	1.9	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.6	2.000	3.0	5.000	4.7	9.000	6.2
0.600	1.8	2.200	3.2	5.500	4.9	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.3		

Sub-Appendix

G London Borough of Camden SuDS Pro-Forma

Camden

GREATER**LONDON**AUTHORITY

LoDEG

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	12 Pilgrim's Lane
Address & post code	12 Pilgrim's Lane, NW3 1SN
OS Grid ref. (Easting, Northing)	E 526850
	N 185676
LPA reference (if applicable)	
Brief description of proposed work	A refurbishment of a residential dwelling with a new lower ground floor.
Total site Area	785 m^2
Total existing impervious area	330 m^2
Total proposed impervious area	330 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No
Existing drainage connection type and location	Combined Water Outfall Manhole, To the northwest of site.
Designer Name	Mike Ash
Designer Position	Civil Engineer
Designer Company	Elliott Wood

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	None Recorded
Bedrock geology classification	Claygate and London Clay member
Site infiltration rate	m/s
Depth to groundwater level	m below ground level
Is infiltration feasible?	No

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	N	N
2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
3 attenuate rainwater in ponds or open water features for gradual release	N	N
4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
5 discharge rainwater direct to a watercourse	N	N
6 discharge rainwater to a surface water sewer/drain	N	N
7 discharge rainwater to the combined sewer.	Y	Y

2c. Proposed Discharge Details

Proposed discharge location	To existing outfall manhole
Has the owner/regulator of the discharge location been consulted?	Yes

Camden

GREATERLONDONAUTHORITY

LoDEG

3. Drainage Strategy

3a. Discharge Rates & Required Storage

	Greenfield (GF) runoff rate (l/s)	*Existing discharge rate (l/s)*	*Required storage for GF rate (m^3)*	*Proposed discharge rate (l/s)*
Qbar	0.44			
1 in 1	0.38	2.8	3.15	1.8
1 in 30	1.02	7.1	6.6	2
1 in 100	1.41	9.1	8.2	2
1 in 100 + CC			14	
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Vortex Flow Control		

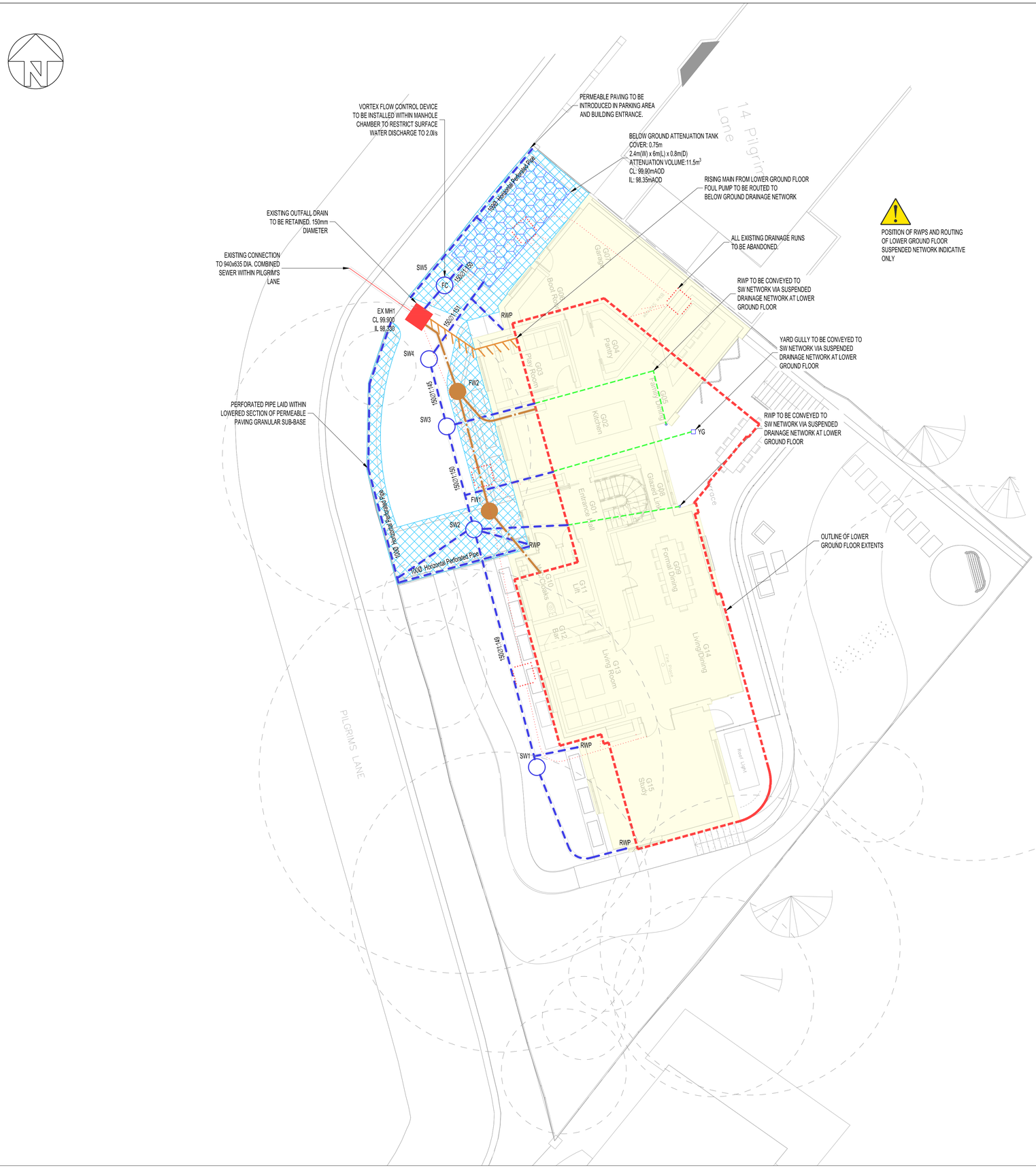
3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	70	70	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	260		11.5
Total	**330**	**70**	**11.5**

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	3
Drainage hierarchy (2b)	3
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	4
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	4
Proposed SuDS measures & specifications (3b)	3
4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	65 - Appendix H
Detailed drainage design drawings, including exceedance flow routes	65 - Appendix H
Detailed landscaping plans	65 - Appendix H
Maintenance strategy	6
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	3
b) biodiversity?	3
c) amenity?	3

H Sub-Appendix
Proposed Below Ground Drainage Layout



BELOW GROUND DRAINAGE NOTES

1. THE LOCATION AND LEVEL OF EXISTING DRAINAGE CONNECTIONS AND EXISTING SERVICES IS TO BE CHECKED PRIOR TO COMMENCEMENT OF DRAINAGE WORKS. ANY VARIANCE TO THE DETAILS ON THIS DRAWING AND THE SCHEDULE IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
2. THE DESIGN IS BASED ON THE INFORMATION AVAILABLE ON THE DATE OF ISSUE FROM OTHER PARTIES (EG. ARCHITECT AND M & E ENGINEER). IT IS SUBJECT TO CHANGE RESULTING FROM UPDATES TO THE AVAILABLE INFORMATION FROM OTHERS.
3. THE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE NBS SPECIFICATIONS, ASSOCIATED MANHOLE SCHEDULE AND STANDARD DRAINAGE DETAIL DRAWINGS WHERE APPLICABLE.
4. THE POSITIONS OF FOUL AND SURFACE WATER DRAINAGE POINTS ARE INDICATIVE ONLY, REFER TO THE ARCHITECTS DRAWINGS FOR SETTING OUT DETAILS.
5. PRIVATE FOUL AND SURFACE WATER DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS PART H, BS EN752 AND BS EN12056.
6. DRAINS AT LOWER GROUND FLOOR LEVEL ARE TO BE CONSTRUCTED USING CAST IRON (ENSIGN OR EQUIVALENT) AND FLEXIBLY JOINTED TO BS 437.
7. DRAINS AT GROUND LEVEL ARE TO BE CONSTRUCTED USING VITRIFIED CLAY PIPES TO BS EN 295-1 SUPER STRENGTH SPECIFICATION (HEPWORTH SUPERSLEVE) OR SIMILAR APPROVED.
8. ALL SOIL CONNECTIONS UNDER BUILDINGS TO BE 100mm DIA LAID AT A MINIMUM GRADIENT OF 1:40 UNLESS NOTED OTHERWISE.
9. ALL SURFACE WATER CONNECTIONS TO BE 150mm DIAMETER AND TO BE LAID AT A MINIMUM GRADIENT OF 1:80 UNLESS NOTED OTHERWISE .
10. ALL SOIL CONNECTIONS AND RAINWATER PIPES SHOULD BE RODDABLE FROM GROUND LEVEL.
11. RAINWATER DOWN PIPES ARE TO CONNECT TO A DRAIN VIA A REST BEND. WHERE DRAINAGE IS COMBINED A 'P' TRAP MUST ALSO BE PROVIDED.
12. IN CASES OF IN SITU CONCRETE FLOOR SLABS, DRAINS ARE TO BE CAST INTEGRAL WITH THE SLAB WHERE PIPE COVER TO THE CROWN IS LESS THAN 300mm. - NOTE SPECIAL PROVISIONS APPLY TO LOWER GROUND FLOOR SLABS - SEE DETAILED DRAINAGE AND STRUCTURAL DRAWINGS. CONCRETE ENCASEMENT TO BE REINFORCED AS PER DRAINAGE DETAIL.
13. IN CASES OF SUSPENDED FLOORS WHERE A VOID OF 300mm OR MORE EXISTS BELOW FLOOR DRAINS ARE TO BE SUSPENDED USING A PROPRIETARY HANGER SYSTEM OR CAST INTEGRAL WITH THE FLOOR.
14. WHERE DRAINS PASS THROUGH FOUNDATIONS OR OTHER RIGID STRUCTURES A LINTEL OR SLEEVE IS TO BE USED AND PROVISION FOR FLEXIBILITY IS TO BE MADE USING ROCKER PIPES.
15. BACKFILLING OF DRAIN TRENCHES ADJACENT TO BUILDING OR OTHER STRUCTURES IS TO BE IN ACCORDANCE WITH DIAGRAM 8 OF THE BUILDING REGULATIONS.
16. ANY PIPE OR GULLY OR OTHER FITTING OR DUCT PENETRATING THE LOWER GROUND FLOOR SLAB OR WALL IS TO BE WATERPROOFED USING HYDROPHILIC STRIPS OR PUDDLE FLANGES TO ENSURE A WATER TIGHT JOINT. CONCRETE SURROUND TO DRAINAGE PIPES AND FITTINGS MAY BE REQUIRED IN CERTAIN CASES - REFER TO DETAILED DRAINAGE DRAWINGS AND RELEVANT STRUCTURAL DETAILS.
17. EXISTING FOUNDATIONS AND RETAINING WALLS MUST NOT BE UNDERMINED BY NEW DRAINAGE RUNS UNLESS AGREED IN WRITING WITH THE STRUCTURAL ENGINEER. CONTRACTOR TO SUBMIT METHOD STATEMENTS AND TEMPORARY WORKS PROPOSALS TO THE STRUCTURAL ENGINEER FOR COMMENT PRIOR TO COMMENCEMENT OF WORKS.
18. ALL DRAINAGE EXCAVATIONS SHOULD BE RISK ASSESSED BY THE CONTRACTOR TO ENSURE TRENCH SAFETY / STABILISATION MEASURES ARE CONSIDERED DURING THE CONSTRUCTION PERIOD. ANY EXCAVATIONS LEFT EXPOSED SHOULD BE INSPECTED BY A COMPETENT PERSON ON A DAILY BASIS. GROUND CONDITIONS SHOULD BE MONITORED AND TOOL BOX TALKS SHOULD INCLUDE SITE INVESTIGATION INFORMATION TO AID THE CONTRACTORS ONGOING RISK ASSESSMENT AND METHOD OF EXCAVATION. ALL EXCAVATIONS SHOULD BE ASSESSED BY A COMPETENT PERSON FOR CONFINED SPACES REQUIREMENTS.
19. THE CONTRACTOR IS TO CONSIDER PHASING OF THE DRAINAGE INSTALLATION AND ARE TO PROVIDE TEMPORARY DRAINAGE MEASURES THEY DETERMINE ARE REQUIRED.
20. SuDS ARE TO BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS MADE WITHIN THE CIRIA SUDS MANUAL C753 (WITH PARTICULAR ATTENTION DRAWN TO CHAPTER 31) AND CIRIA GUIDANCE ON THE CONSTRUCTION OF SuDS C768. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONSIDER CONSTRUCTION PROGRAMME OF SuDS.
21. DETAILED DESIGN OF GEOCELLULAR ATTENUATION CRATES IS A CDP ITEM AND SHOULD BE BASED ON LEVEL, LAYOUT AND VOLUME DETAILS SHOWN. DETAILED DESIGN INFORMATION SHOULD BE PROVIDED TO THE CIVIL ENGINEER TO PASS COMMENT.
22. ALL MANHOLE COVER LEVELS SHOWN ARE APPROXIMATE AND ARE TO SUIT THE FINAL GROUND OR BUILDING LEVELS .
23. MANHOLE COVERS IN BLOCK PAVED AREAS ARE TO BE RECESSED UNLESS NOTED OTHERWISE.
24. ALL INTERNAL MANHOLE COVERS ARE TO BE NON-VENTILATING AND DOUBLE SEALED.
25. ALL EXTERNAL FOUL AND COMBINED WATER MANHOLE COVERS IN FOOTPATHS AND PAVED AREAS (OTHER THAN ROADS) ARE TO BE NON-VENTILATING AND SINGLE SEALED UNLESS NOTED OTHERWISE.
26. ALL EXTERNAL SURFACE WATER MANHOLE COVERS ARE TO BE NON-VENTILATING UNLESS NOTED OTHERWISE.
27. ALL MANHOLE COVERS ARE TO BE INSTALLED SQUARE TO PAVING, KERB LINES OR BUILDINGS.
28. FOR ADOPTED DRAINAGE, MANHOLE COVERS ARE TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE DCG OR SPECIFIC WATER AUTHORITY REQUIREMENT.
29. INSPECTION CHAMBERS ARE TO HAVE A REDUCED ACCESS PIECE WHEN THE DEPTH IS GREATER THAN 1.2m TO THE BASE OF THE CHAMBER.

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

LEGEND

- COMBINED WATER MANHOLE
- SURFACE WATER MANHOLE
- EXISTING COMBINED WATER
- PROPOSED SURFACE WATER
- COMBINED WATER PIPE TO BE ABANDONED
- RWP — RAIN WATER PIPE
- YG — YARD GULLY
- GEOCELLULAR SURFACE WATER ATTENUATION (TO CONTRACTOR DESIGN)
- PERMEABLE SURFACING WITH 4/20 GRANULAR SUB-BASE LINED WITH IMPERMEABLE GEO-MEMBRANE
- PROPOSED BUILDING
- LOWER GROUND FLOOR EXTENT OUTLINE
- INDICATIVE SUSPENDED LOWER GROUND FLOOR DRAINAGE NETWORK (TO BE DESIGNED BY MEP ENGINEER)
- FC — FLOW CONTROL CHAMBER
- PROPOSED FOUL MANHOLE
- PROPOSED FOUL WATER
- PROPOSED FOUL WATER RISING MAIN

NOT FOR CONSTRUCTION

rev	sc	date	by	chk	description
P1	S2	29.06.22	MAs	KTr	Issued for information

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Project
12 Pilgrim's Lane
Camden

Drawing title
Proposed Below Ground Drainage General Arrangement

Scale (s)	Date	Drawn
1:100@ A1; 1:200@ A3	June 2022	MAs

Drawing status	Status	Revision
Preliminary	S2	P1

Project no.	Originator	Zone	Level	Type	Role	drg no.
2210419	EWP	ZZ	00	DR	C	10000