SURFACE WATER MEANS OF DISPOSAL REPORT

AT

CONNAUGHT HOUSE
5 - 9 CONNAUGHT GARDENS
HIGHGATE
N10 3LH

FOR

AXIOM STRUCTURES LTD

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Revision: A Amended to gravity outfall

1.0 Introduction

1.1 This report has been prepared in connection with the above development and no responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

1.2 The location, size, depth and identification of existing services that may be shown or referred to in this report have been assessed from non-intrusive observations, record drawings and the like. Any Contractor shall safely carry out intrusive investigations, trial holes or soundings, prior to commencing any works, to satisfy himself that it is safe to proceed and that the assessments are accurate. Any discrepancies shall be notified to the Client prior to the commencement of any works.

1.3 JDH Consulting Engineers LLP was appointed by Alan Bowling, Director of Axiom Structures Limited, on the 10th August 2015.

1.4 The purpose of this report is to evaluate the means of surface water disposal and SuDS requirements, to satisfy the drainage Planning Conditions for the proposed terraced town houses.

2.0 Investigation

2.1 The surface water drainage system has been designed in accordance with CIRIA C697 The SUDS Manual. The SuDS system shall accommodate the 1:100 year return period + 30% global warming.

2.2 Surface water disposal should be directed to ground (through infiltration) as the first option; the second option being directly to a watercourse (with an agreed restricted discharge) and the third option to surface water sewer (with an agreed restricted discharge).

2.3 The first option to discharge to ground using conventional soakaways is not practical, due to the London clay.

2.4 The second option to discharge to a watercourse is not viable, as there is no watercourse on the site boundary.

2.5 Therefore, the surface water discharge is to be directed to sewer, via the existing lateral drain.

2.6 Greenfield Runoff

MicroDrainage source control 2015.1 software was used to calculate the QBAR (the (arithmetic) mean annual maximum flood) flow rate in litres per second for the area of greenfield site to be occupied by the proposed development of 0.090ha.

The calculations show that QBAR should be taken as 0.4 litres per second.

The SUDS Manual recommends in Chapter 3, page 7 - box 3.1 item 3 “Extended Attenuation Storage” that the maximum discharge rate for attenuation storage is reduced to the region of QBAR or 2 litres per second per Hectare (ha) whichever is the greater. Therefore, 2 litres per ha x 0.09ha = 0.18 litres per second; QBAR of 0.4 litres per second is to be considered.

However, a volumetric restriction of 0.4 litres per second would be vulnerable to blockage. SuDS guidance issued by the BREEAM Centre at the Building Research Establishment (BRE) under contract to the Department for Communities and Local Government, states that where the greenfield runoff “*limiting discharge is less than 5 litres per second at a discharge point, a flow rate of up to 5 litres per second may be used where required to reduce the risk of blockage”.* Therefore, the greenfield runoff of (QBAR) 0.4 litres per second, with an orifice of only 15mm diameter, should be increased to 54mm diameter to reduce the risk of blockage.

2.7 Attenuation Storage Volume

MicroDrainage source control 2015.1 software was used to calculate the storage volume required to accommodate the 1:100 year return period + 30% global warming, without the tank and/or drainage system overflowing.

The calculation shows that the required attenuation storage is 24.1m3, peaking at 60 minutes during a winter storm. The attenuation tank is to be located within the lowest rear garden lower ground floor.

The MicroDrainage calculations supporting the above statements are contained within section 3.0 Calculations, of this report.

3.0 Calculations

Greenfield Runoff page 1 of 1

JDH Consulting Engineers LLP		Page 1
96 Norwich Road Tacolneston Norwich NR16 1BY	Connaught House Highgate Greenfield Runoff	
Date 19.08.2015 File 150819 Greenfield Runoff...	Designed by jdh Checked by	
Micro Drainage	Source Control 2015.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 675 Urban 0.000
Area (ha) 0.090 Soil 0.450 Region Number Region 6

Results l/s

QBAR Rural 0.4
QBAR Urban 0.4

Q100 years 1.2

Q1 year 0.3
Q30 years 0.9
Q100 years 1.2

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96 Norwich Road Tacolneston Norwich NR16 1BY	Connaught House Highgate Attenuation	
Date 11.01/2016 File 160111 Attenuation 5 Ls...	Designed by jdh Checked by	
Micro Drainage	Source Control 2015.1	

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

Half Drain Time : 43 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	63.513	0.713	0.0	5.0	5.0	16.6	O K
30 min Summer	63.662	0.862	0.0	5.0	5.0	20.1	O K
60 min Summer	63.676	0.876	0.0	5.0	5.0	20.4	O K
120 min Summer	63.589	0.789	0.0	5.0	5.0	18.4	O K
180 min Summer	63.482	0.682	0.0	5.0	5.0	15.9	O K
240 min Summer	63.351	0.551	0.0	5.0	5.0	12.8	O K
360 min Summer	63.142	0.342	0.0	5.0	5.0	8.0	O K
480 min Summer	62.997	0.197	0.0	5.0	5.0	4.6	O K
600 min Summer	62.902	0.102	0.0	4.9	4.9	2.4	O K
720 min Summer	62.842	0.042	0.0	4.7	4.7	1.0	O K
960 min Summer	62.800	0.000	0.0	4.3	4.3	0.0	O K
1440 min Summer	62.800	0.000	0.0	3.1	3.1	0.0	O K
2160 min Summer	62.800	0.000	0.0	2.2	2.2	0.0	O K
2880 min Summer	62.800	0.000	0.0	1.8	1.8	0.0	O K
4320 min Summer	62.800	0.000	0.0	1.3	1.3	0.0	O K
5760 min Summer	62.800	0.000	0.0	1.0	1.0	0.0	O K
7200 min Summer	62.800	0.000	0.0	0.8	0.8	0.0	O K
8640 min Summer	62.800	0.000	0.0	0.7	0.7	0.0	O K
10080 min Summer	62.800	0.000	0.0	0.6	0.6	0.0	O K
15 min Winter	63.626	0.826	0.0	5.0	5.0	19.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	133.353	0.0	22.4	23
30 min Summer	86.129	0.0	29.0	34
60 min Summer	52.933	0.0	35.8	56
120 min Summer	31.451	0.0	42.5	90
180 min Summer	22.910	0.0	46.1	124
240 min Summer	18.204	0.0	49.2	154
360 min Summer	13.101	0.0	53.1	214
480 min Summer	10.380	0.0	56.0	272
600 min Summer	8.659	0.0	58.3	326
720 min Summer	7.464	0.0	60.4	382
960 min Summer	5.902	0.0	63.7	0
1440 min Summer	4.232	0.0	68.6	0
2160 min Summer	3.031	0.0	73.7	0
2880 min Summer	2.390	0.0	77.4	0
4320 min Summer	1.708	0.0	83.0	0
5760 min Summer	1.345	0.0	87.1	0
7200 min Summer	1.116	0.0	90.4	0
8640 min Summer	0.959	0.0	93.2	0
10080 min Summer	0.843	0.0	95.6	0
15 min Winter	133.353	0.0	25.2	23

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Micro Drainage	Source Control 2015.1	

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	63.802	1.002	0.0	5.0	5.0	23.3	O K
60 min Winter	63.837	1.037	0.0	5.0	5.0	24.1	O K
120 min Winter	63.711	0.911	0.0	5.0	5.0	21.2	O K
180 min Winter	63.555	0.755	0.0	5.0	5.0	17.6	O K
240 min Winter	63.355	0.555	0.0	5.0	5.0	12.9	O K
360 min Winter	63.048	0.248	0.0	5.0	5.0	5.8	O K
480 min Winter	62.877	0.077	0.0	4.8	4.8	1.8	O K
600 min Winter	62.801	0.001	0.0	4.6	4.6	0.0	O K
720 min Winter	62.800	0.000	0.0	4.0	4.0	0.0	O K
960 min Winter	62.800	0.000	0.0	3.1	3.1	0.0	O K
1440 min Winter	62.800	0.000	0.0	2.2	2.2	0.0	O K
2160 min Winter	62.800	0.000	0.0	1.6	1.6	0.0	O K
2880 min Winter	62.800	0.000	0.0	1.3	1.3	0.0	O K
4320 min Winter	62.800	0.000	0.0	0.9	0.9	0.0	O K
5760 min Winter	62.800	0.000	0.0	0.7	0.7	0.0	O K
7200 min Winter	62.800	0.000	0.0	0.6	0.6	0.0	O K
8640 min Winter	62.800	0.000	0.0	0.5	0.5	0.0	O K
10080 min Winter	62.800	0.000	0.0	0.4	0.4	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	86.129	0.0	32.5	35
60 min Winter	52.933	0.0	40.1	58
120 min Winter	31.451	0.0	47.8	96
180 min Winter	22.910	0.0	52.0	134
240 min Winter	18.204	0.0	55.1	166
360 min Winter	13.101	0.0	59.4	222
480 min Winter	10.380	0.0	62.8	274
600 min Winter	8.659	0.0	65.5	312
720 min Winter	7.464	0.0	67.7	0
960 min Winter	5.902	0.0	71.4	0
1440 min Winter	4.232	0.0	76.8	0
2160 min Winter	3.031	0.0	82.5	0
2880 min Winter	2.390	0.0	86.7	0
4320 min Winter	1.708	0.0	93.0	0
5760 min Winter	1.345	0.0	97.6	0
7200 min Winter	1.116	0.0	101.3	0
8640 min Winter	0.959	0.0	104.4	0
10080 min Winter	0.843	0.0	107.0	0

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Micro Drainage	Source Control 2015.1	

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)	20.100	Shortest Storm (mins)	15
Ratio R	0.440	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.090

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.030	4	8	0.030	8	12	0.030

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

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Micro Drainage	Source Control 2015.1	

Model Details

Storage is Online Cover Level (m) 65.070

Cellular Storage Structure

Invert Level (m) 62.800 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	24.5	0.0	1.201	0.0	0.0
1.200	24.5	0.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0099-5000-1400-5000
Design Head (m)	1.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	99
Invert Level (m)	62.600
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	5.0
Flush-Flo™	0.413	5.0
Kick-Flo®	0.852	4.0
Mean Flow over Head Range	-	4.4

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	3.3	1.200	4.6	3.000	7.1	7.000	10.6
0.200	4.6	1.400	5.0	3.500	7.7	7.500	11.0
0.300	4.9	1.600	5.3	4.000	8.2	8.000	11.3
0.400	5.0	1.800	5.6	4.500	8.6	8.500	11.7
0.500	4.9	2.000	5.9	5.000	9.1	9.000	12.0
0.600	4.8	2.200	6.2	5.500	9.5	9.500	12.3
0.800	4.3	2.400	6.4	6.000	9.9		
1.000	4.3	2.600	6.7	6.500	10.3		

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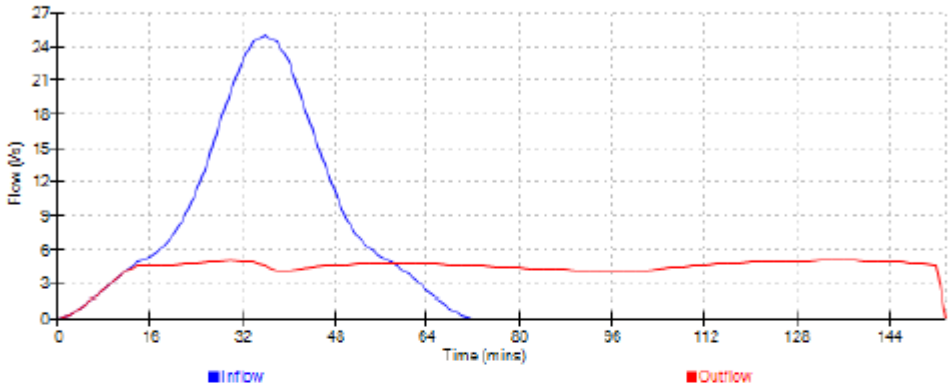
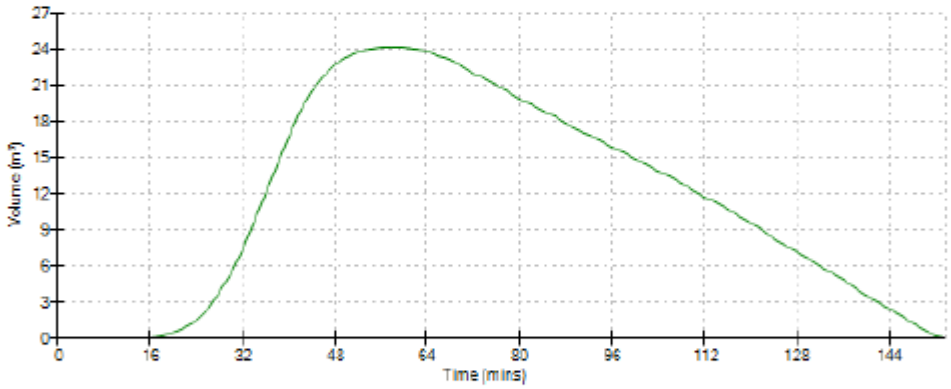
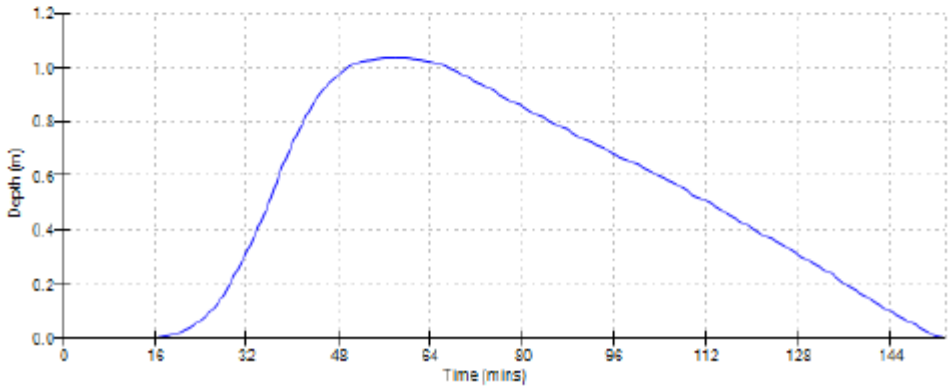
Event: 60 min Winter







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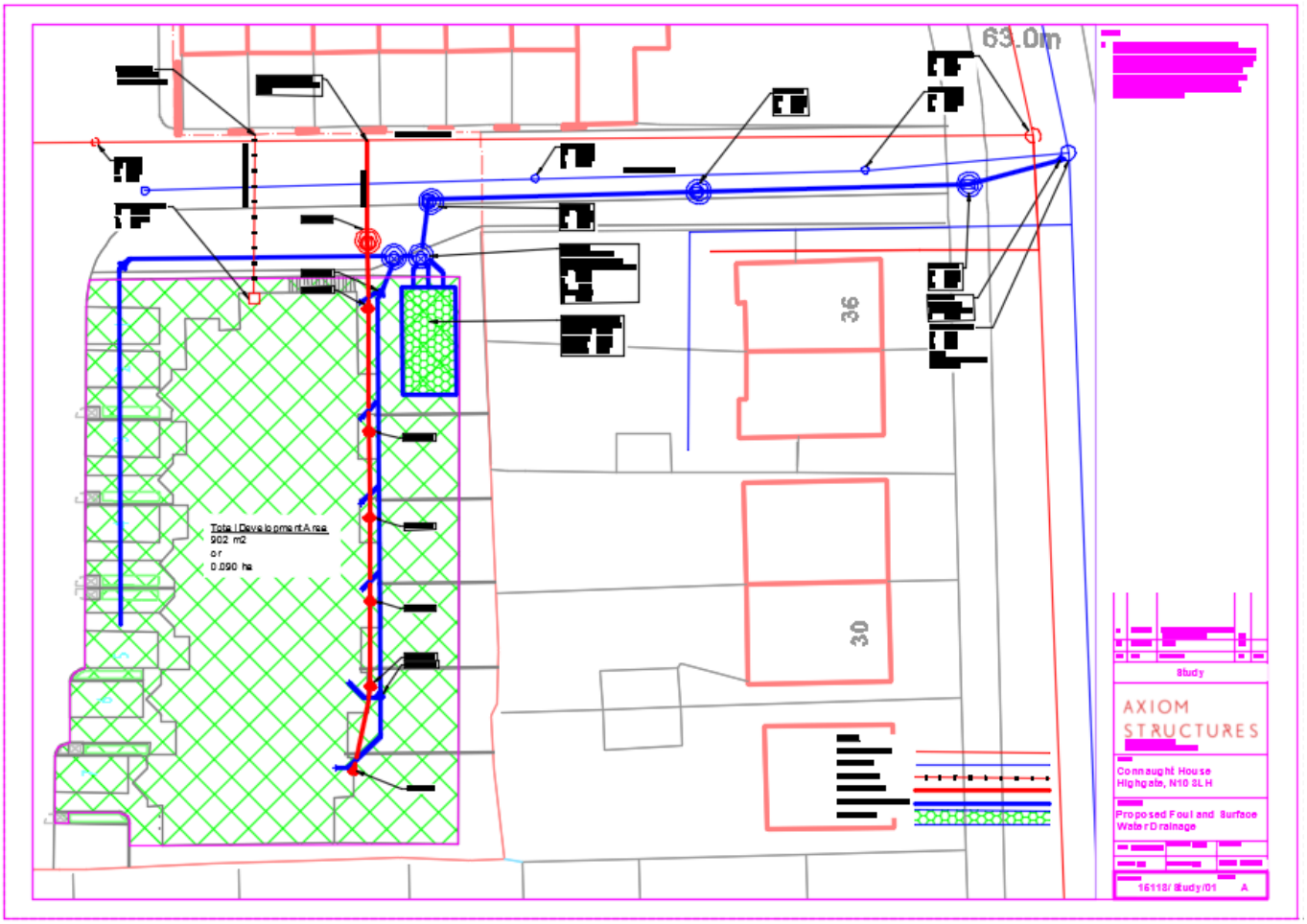
4.0 Drainage Drawing



5.0 Summary

5.1 The surface water drainage system should be designed in accordance with CIRIA C697 The SUDS Manual. The SuDS system shall accommodate the 1:100 year return period + 30% global warming.

5.2 The above calculations demonstrate that 24.1m3 of storm water storage is required when the surface water runoff is restricted to 5 litres per second, following a 60 minute winter storm. This storage is contained within an attenuation tank located within the lowest rear garden. The attenuation tank is to be 7 metres long x 3.5 metres wide and 1.2 metres deep.

5.3 The attention tank is to be evacuated by gravity through a Hydro-Brake Optimum outfall control.