

F. Surface Water Drainage Calculations

Appendices

807 High Road, Tottenham
Project Number: WIE20265

Document Reference: WIE20265-100-R-1-3-1-FRA

CALCULATIONS

Company: WIE
 Sheet No: 1 of 1
 By: Craig Thwaites
 Checked:

Office: London
 Project No: WIE16362
 Date: 04.04.2018
 Date: 04.04.2018

Project Title: 807 High Road, Tottenham
 Calculations Title: Existing Surface Water Runoff Rate

LOCATION	CALCULATIONS	OPTIONS
	Calculations based on: Design and Analysis of urban storm drainage. The Wallingford Procedure, Volume 1 Principles methods and practice.	
	User Input Data	
	Total site area 0.060 ha	
	SAAR (From FEH) 626	
	Rainfall Intensity (From FEH) 46.7	
	PIMP (% impervious) 100 %	
	Soil Type 0.40	
	Very Low Runoff (well drained sandy, loamy or earthy peat soils) 0.15	
	Low Runoff (Very permeable soils (e.g. gravel, sand) 0.30	
	Moderate (Very fine sands, silts and sedimentary clays) 0.40	
	High Runoff (Clayey or loamy soils) 0.45	
	Very High Runoff (Soils of the wet uplands) 0.50	
Fig. 9.7	UCWI (From Figure 9.7 of Wallingford Method) 57	
Eqn. 13	$Q_p \text{ (peak discharge)} = 2.78 C_v CR i A$	
	Where: Q_p (Peak Discharge) i = rainfall intensity A = Total Area	
From FEH	Average rainfall Intensity (i) M100_60 is: 46.7 mm	
Eqn 7.20	$C_v = PR/100$	
Eqn 7.3	$PR = (0.829 PIMP) + (25.0 SOIL) + (0.078 UCWI) - 20.7$	
	PIMP (Percentage of catchment which is impervious) 100 %	
Page 52	Note: PIMP can not be less than 40% 40 %	
	Thus value of PIMP to be used 100 %	
	Soil: 0.40 UCWI: 57.49	
	PR = 76.68	
	Thus $C_v = 0.77$	
Sec 7.10	CR (Recommended for simulation and design) 1.3	
	Q_p for 1 in 100 year 60 minute duration = 7.8 l/s or 129.3 l/s/ha	

Waterman Group		Page 1
Pickfords Wharf Clink Street London, SE1 9DG		
Date 09/06/2020 14:29 File 200218_Blue Roof.SRCX	Designed by CSCT Checked by	
Innovyze		Source Control 2019.1
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.400 Area (ha) 0.060 Urban 0.000 SAAR (mm) 626 Region Number Region 6 Results 1/s QBAR Rural 0.2 QBAR Urban 0.2 Q100 years 0.6 Q1 year 0.2 Q30 years 0.4 Q100 years 0.6		
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 141 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (1/s)</th><th>Max Control (1/s)</th><th>Max Σ Outflow (1/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>9.690</td><td>0.490</td><td>0.0</td><td>1.7</td><td>1.7</td><td>16.5</td><td>O K</td></tr><tr><td>30 min Summer</td><td>9.808</td><td>0.608</td><td>0.0</td><td>1.7</td><td>1.7</td><td>20.5</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>9.889</td><td>0.689</td><td>0.0</td><td>1.7</td><td>1.7</td><td>23.2</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>9.979</td><td>0.779</td><td>0.0</td><td>1.7</td><td>1.7</td><td>26.3</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>9.996</td><td>0.796</td><td>0.0</td><td>1.7</td><td>1.7</td><td>26.8</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>9.991</td><td>0.791</td><td>0.0</td><td>1.7</td><td>1.7</td><td>26.7</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>9.952</td><td>0.752</td><td>0.0</td><td>1.7</td><td>1.7</td><td>25.4</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>9.899</td><td>0.699</td><td>0.0</td><td>1.7</td><td>1.7</td><td>23.6</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>9.842</td><td>0.642</td><td>0.0</td><td>1.7</td><td>1.7</td><td>21.7</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>9.785</td><td>0.585</td><td>0.0</td><td>1.7</td><td>1.7</td><td>19.7</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>9.653</td><td>0.453</td><td>0.0</td><td>1.7</td><td>1.7</td><td>15.3</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>9.459</td><td>0.259</td><td>0.0</td><td>1.7</td><td>1.7</td><td>8.7</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>9.327</td><td>0.127</td><td>0.0</td><td>1.6</td><td>1.6</td><td>4.3</td><td>O K</td></tr><tr><td>2880 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Summer</td><td>5.847</td><td>0.0</td><td>60.0</td><td>808</td></tr><tr><td>2160 min Summer</td><td>4.033</td><td>0.0</td><td>62.1</td><td>1128</td></tr><tr><td>2880 min Summer</td><td>3.101</td><td>0.0</td><td>63.6</td><td>1472</td></tr><tr><td>4320 min Summer</td><td>2.154</td><td>0.0</td><td>66.3</td><td>2204</td></tr><tr><td>5760 min Summer</td><td>1.673</td><td>0.0</td><td>68.6</td><td>2936</td></tr><tr><td>7200 min Summer</td><td>1.387</td><td>0.0</td><td>71.1</td><td>3632</td></tr><tr><td>8640 min Summer</td><td>1.196</td><td>0.0</td><td>73.6</td><td>4400</td></tr><tr><td>10080 min Summer</td><td>1.061</td><td>0.0</td><td>76.2</td><td>5032</td></tr><tr><td>15 min Winter</td><td>166.280</td><td>0.0</td><td>17.7</td><td>18</td></tr></tbody></table>							Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (1/s)	Max Control (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status	15 min Summer	9.690	0.490	0.0	1.7	1.7	16.5	O K	30 min Summer	9.808	0.608	0.0	1.7	1.7	20.5	Flood Risk	60 min Summer	9.889	0.689	0.0	1.7	1.7	23.2	Flood Risk	120 min Summer	9.979	0.779	0.0	1.7	1.7	26.3	Flood Risk	180 min Summer	9.996	0.796	0.0	1.7	1.7	26.8	Flood Risk	240 min Summer	9.991	0.791	0.0	1.7	1.7	26.7	Flood Risk	360 min Summer	9.952	0.752	0.0	1.7	1.7	25.4	Flood Risk	480 min Summer	9.899	0.699	0.0	1.7	1.7	23.6	Flood Risk	600 min Summer	9.842	0.642	0.0	1.7	1.7	21.7	Flood Risk	720 min Summer	9.785	0.585	0.0	1.7	1.7	19.7	Flood Risk	960 min Summer	9.653	0.453	0.0	1.7	1.7	15.3	O K	1440 min Summer	9.459	0.259	0.0	1.7	1.7	8.7	O K	2160 min Summer	9.327	0.127	0.0	1.6	1.6	4.3	O K	2880 min Summer	9.284	0.084	0.0	1.4	1.4	2.8	O K	4320 min Summer	9.259	0.059	0.0	1.0	1.0	2.0	O K	5760 min Summer	9.249	0.049	0.0	0.8	0.8	1.6	O K	7200 min Summer	9.243	0.043	0.0	0.7	0.7	1.5	O K	8640 min Summer	9.239	0.039	0.0	0.6	0.6	1.3	O K	10080 min Summer	9.237	0.037	0.0	0.5	0.5	1.2	O K	15 min Winter	9.690	0.490	0.0	1.7	1.7	16.5	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	166.280	0.0	17.7	18	30 min Summer	106.854	0.0	22.8	33	60 min Summer	65.327	0.0	27.9	62	120 min Summer	42.102	0.0	36.0	118	180 min Summer	31.993	0.0	41.0	148	240 min Summer	26.057	0.0	44.5	180	360 min Summer	19.169	0.0	49.2	248	480 min Summer	15.223	0.0	52.0	318	600 min Summer	12.648	0.0	54.1	386	720 min Summer	10.830	0.0	55.5	456	960 min Summer	8.425	0.0	57.6	580	1440 min Summer	5.847	0.0	60.0	808	2160 min Summer	4.033	0.0	62.1	1128	2880 min Summer	3.101	0.0	63.6	1472	4320 min Summer	2.154	0.0	66.3	2204	5760 min Summer	1.673	0.0	68.6	2936	7200 min Summer	1.387	0.0	71.1	3632	8640 min Summer	1.196	0.0	73.6	4400	10080 min Summer	1.061	0.0	76.2	5032	15 min Winter	166.280	0.0	17.7	18
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Pickfords Wharf Clink Street London, SE1 9DG		807 High Road, Tottenham Below Ground Attenuation 1 in 100 year + 40% CC					
Date 01/06/2020 File 200218_Below Ground Tan...		Designed by C. Thwaites Checked by					
Innovyze		Source Control 2019.1					
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	9.809	0.609	0.0	1.7	1.7	20.5	Flood Risk
60 min Winter	9.891	0.691	0.0	1.7	1.7	23.3	Flood Risk
120 min Winter	9.986	0.786	0.0	1.7	1.7	26.5	Flood Risk
180 min Winter	9.997	0.797	0.0	1.7	1.7	26.9	Flood Risk
240 min Winter	9.987	0.787	0.0	1.7	1.7	26.6	Flood Risk
360 min Winter	9.930	0.730	0.0	1.7	1.7	24.6	Flood Risk
480 min Winter	9.854	0.654	0.0	1.7	1.7	22.1	Flood Risk
600 min Winter	9.770	0.570	0.0	1.7	1.7	19.2	Flood Risk
720 min Winter	9.667	0.467	0.0	1.7	1.7	15.8	O K
960 min Winter	9.499	0.299	0.0	1.7	1.7	10.1	O K
1440 min Winter	9.327	0.127	0.0	1.6	1.6	4.3	O K
2160 min Winter	9.271	0.071	0.0	1.2	1.2	2.4	O K
2880 min Winter	9.256	0.056	0.0	0.9	0.9	1.9	O K
4320 min Winter	9.243	0.043	0.0	0.7	0.7	1.5	O K
5760 min Winter	9.237	0.037	0.0	0.5	0.5	1.2	O K
7200 min Winter	9.233	0.033	0.0	0.4	0.4	1.1	O K
8640 min Winter	9.231	0.031	0.0	0.4	0.4	1.0	O K
10080 min Winter	9.229	0.029	0.0	0.3	0.3	1.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	106.854	0.0	22.8	32			
60 min Winter	65.327	0.0	27.9	60			
120 min Winter	42.102	0.0	36.0	116			
180 min Winter	31.993	0.0	41.0	154			
240 min Winter	26.057	0.0	44.5	188			
360 min Winter	19.169	0.0	49.2	266			
480 min Winter	15.223	0.0	52.0	342			
600 min Winter	12.648	0.0	54.1	418			
720 min Winter	10.830	0.0	55.5	484			
960 min Winter	8.425	0.0	57.6	590			
1440 min Winter	5.847	0.0	60.0	794			
2160 min Winter	4.033	0.0	62.1	1104			
2880 min Winter	3.101	0.0	63.6	1468			
4320 min Winter	2.154	0.0	66.3	2196			
5760 min Winter	1.673	0.0	68.6	2920			
7200 min Winter	1.387	0.0	71.1	3648			
8640 min Winter	1.196	0.0	73.6	4360			
10080 min Winter	1.061	0.0	76.2	5112			
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Waterman Group		Page 3
Pickfords Wharf Clink Street London, SE1 9DG	807 High Road, Tottenham Below Ground Attenuation 1 in 100 year + 40% CC	
Date 01/06/2020 File 200218_Below Ground Tan...	Designed by C. Thwaites Checked by	
Innovyze Source Control 2019.1		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 533853 191473 TQ 33853 91473
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.950
Cv (Winter)	0.950
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.045

	Time (mins)	Area
From:	To:	(ha)
	0	4 0.045

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Waterman Group		Page 4
Pickfords Wharf Clink Street London, SE1 9DG	807 High Road, Tottenham Below Ground Attenuation 1 in 100 year + 40% CC	
Date 01/06/2020 File 200218_Below Ground Tan...	Designed by C. Thwaites Checked by	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 9.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	35.5	0.0	0.800	35.5	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0065-1700-0800-1700
Design Head (m) 0.800
Design Flow (l/s) 1.7
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 65
Invert Level (m) 9.200
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	1.7
Flush-Flo™	0.243	1.7
Kick-Flo®	0.506	1.4
Mean Flow over Head Range	-	1.5

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	1.5	1.200	2.0	3.000	3.1	7.000	4.6
0.200	1.7	1.400	2.2	3.500	3.3	7.500	4.8
0.300	1.7	1.600	2.3	4.000	3.6	8.000	4.9
0.400	1.6	1.800	2.5	4.500	3.8	8.500	5.1
0.500	1.4	2.000	2.6	5.000	3.9	9.000	5.2
0.600	1.5	2.200	2.7	5.500	4.1	9.500	5.4
0.800	1.7	2.400	2.8	6.000	4.3		
1.000	1.9	2.600	2.9	6.500	4.5		

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Waterman Group					Page 1																																																																																																																																																																																																																																																																																		
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 1723 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (1/s)</th><th>Max Control (1/s)</th><th>Max Σ Outflow (1/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>9.873</td><td>0.073</td><td>0.0</td><td>0.1</td><td>0.1</td><td>5.9</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>9.893</td><td>0.093</td><td>0.0</td><td>0.1</td><td>0.1</td><td>7.5</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>9.913</td><td>0.113</td><td>0.0</td><td>0.1</td><td>0.1</td><td>9.2</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>9.944</td><td>0.144</td><td>0.0</td><td>0.1</td><td>0.1</td><td>11.7</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>9.962</td><td>0.162</td><td>0.0</td><td>0.1</td><td>0.1</td><td>13.1</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>9.974</td><td>0.174</td><td>0.0</td><td>0.1</td><td>0.1</td><td>14.1</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>9.988</td><td>0.188</td><td>0.0</td><td>0.1</td><td>0.1</td><td>15.2</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>9.995</td><td>0.195</td><td>0.0</td><td>0.1</td><td>0.1</td><td>15.7</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>9.997</td><td>0.197</td><td>0.0</td><td>0.1</td><td>0.1</td><td>16.0</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>9.998</td><td>0.198</td><td>0.0</td><td>0.1</td><td>0.1</td><td>16.1</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>9.997</td><td>0.197</td><td>0.0</td><td>0.1</td><td>0.1</td><td>15.9</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>9.988</td><td>0.188</td><td>0.0</td><td>0.1</td><td>0.1</td><td>15.2</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>9.976</td><td>0.176</td><td>0.0</td><td>0.1</td><td>0.1</td><td>14.2</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>9.967</td><td>0.167</td><td>0.0</td><td>0.1</td><td>0.1</td><td>13.5</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>9.951</td><td>0.151</td><td>0.0</td><td>0.1</td><td>0.1</td><td>12.2</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>9.939</td><td>0.139</td><td>0.0</td><td>0.1</td><td>0.1</td><td>11.3</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>9.930</td><td>0.130</td><td>0.0</td><td>0.1</td><td>0.1</td><td>10.5</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>9.922</td><td>0.122</td><td>0.0</td><td>0.1</td><td>0.1</td><td>9.9</td><td>Flood Risk</td></tr><tr><td>10080 min Summer</td><td>9.916</td><td>0.116</td><td>0.0</td><td>0.1</td><td>0.1</td><td>9.4</td><td>Flood Risk</td></tr><tr><td>15 min Winter</td><td>9.873</td><td>0.073</td><td>0.0</td><td>0.1</td><td>0.1</td><td>5.9</td><td>Flood Risk</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>166.280</td><td>0.0</td><td>3.7</td><td>19</td></tr><tr><td>30 min Summer</td><td>106.854</td><td>0.0</td><td>4.3</td><td>34</td></tr><tr><td>60 min Summer</td><td>65.327</td><td>0.0</td><td>7.9</td><td>64</td></tr><tr><td>120 min Summer</td><td>42.102</td><td>0.0</td><td>9.5</td><td>124</td></tr><tr><td>180 min Summer</td><td>31.993</td><td>0.0</td><td>10.4</td><td>184</td></tr><tr><td>240 min Summer</td><td>26.057</td><td>0.0</td><td>11.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>19.169</td><td>0.0</td><td>11.6</td><td>362</td></tr><tr><td>480 min Summer</td><td>15.223</td><td>0.0</td><td>11.9</td><td>482</td></tr><tr><td>600 min Summer</td><td>12.648</td><td>0.0</td><td>12.0</td><td>602</td></tr><tr><td>720 min Summer</td><td>10.830</td><td>0.0</td><td>12.1</td><td>722</td></tr><tr><td>960 min Summer</td><td>8.425</td><td>0.0</td><td>12.0</td><td>960</td></tr><tr><td>1440 min Summer</td><td>5.847</td><td>0.0</td><td>11.6</td><td>1254</td></tr><tr><td>2160 min Summer</td><td>4.033</td><td>0.0</td><td>19.0</td><td>1604</td></tr><tr><td>2880 min Summer</td><td>3.101</td><td>0.0</td><td>18.9</td><td>1992</td></tr><tr><td>4320 min Summer</td><td>2.154</td><td>0.0</td><td>17.9</td><td>2812</td></tr><tr><td>5760 min Summer</td><td>1.673</td><td>0.0</td><td>22.7</td><td>3632</td></tr><tr><td>7200 min Summer</td><td>1.387</td><td>0.0</td><td>23.5</td><td>4464</td></tr><tr><td>8640 min Summer</td><td>1.196</td><td>0.0</td><td>24.2</td><td>5264</td></tr><tr><td>10080 min Summer</td><td>1.061</td><td>0.0</td><td>24.8</td><td>6048</td></tr><tr><td>15 min Winter</td><td>166.280</td><td>0.0</td><td>3.7</td><td>19</td></tr></tbody></table>							Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (1/s)	Max Control (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status	15 min Summer	9.873	0.073	0.0	0.1	0.1	5.9	Flood Risk	30 min Summer	9.893	0.093	0.0	0.1	0.1	7.5	Flood Risk	60 min Summer	9.913	0.113	0.0	0.1	0.1	9.2	Flood Risk	120 min Summer	9.944	0.144	0.0	0.1	0.1	11.7	Flood Risk	180 min Summer	9.962	0.162	0.0	0.1	0.1	13.1	Flood Risk	240 min Summer	9.974	0.174	0.0	0.1	0.1	14.1	Flood Risk	360 min Summer	9.988	0.188	0.0	0.1	0.1	15.2	Flood Risk	480 min Summer	9.995	0.195	0.0	0.1	0.1	15.7	Flood Risk	600 min Summer	9.997	0.197	0.0	0.1	0.1	16.0	Flood Risk	720 min Summer	9.998	0.198	0.0	0.1	0.1	16.1	Flood Risk	960 min Summer	9.997	0.197	0.0	0.1	0.1	15.9	Flood Risk	1440 min Summer	9.988	0.188	0.0	0.1	0.1	15.2	Flood Risk	2160 min Summer	9.976	0.176	0.0	0.1	0.1	14.2	Flood Risk	2880 min Summer	9.967	0.167	0.0	0.1	0.1	13.5	Flood Risk	4320 min Summer	9.951	0.151	0.0	0.1	0.1	12.2	Flood Risk	5760 min Summer	9.939	0.139	0.0	0.1	0.1	11.3	Flood Risk	7200 min Summer	9.930	0.130	0.0	0.1	0.1	10.5	Flood Risk	8640 min Summer	9.922	0.122	0.0	0.1	0.1	9.9	Flood Risk	10080 min Summer	9.916	0.116	0.0	0.1	0.1	9.4	Flood Risk	15 min Winter	9.873	0.073	0.0	0.1	0.1	5.9	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	166.280	0.0	3.7	19	30 min Summer	106.854	0.0	4.3	34	60 min Summer	65.327	0.0	7.9	64	120 min Summer	42.102	0.0	9.5	124	180 min Summer	31.993	0.0	10.4	184	240 min Summer	26.057	0.0	11.0	242	360 min Summer	19.169	0.0	11.6	362	480 min Summer	15.223	0.0	11.9	482	600 min Summer	12.648	0.0	12.0	602	720 min Summer	10.830	0.0	12.1	722	960 min Summer	8.425	0.0	12.0	960	1440 min Summer	5.847	0.0	11.6	1254	2160 min Summer	4.033	0.0	19.0	1604	2880 min Summer	3.101	0.0	18.9	1992	4320 min Summer	2.154	0.0	17.9	2812	5760 min Summer	1.673	0.0	22.7	3632	7200 min Summer	1.387	0.0	23.5	4464	8640 min Summer	1.196	0.0	24.2	5264	10080 min Summer	1.061	0.0	24.8	6048	15 min Winter	166.280	0.0	3.7	19
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Waterman Group		Page 2					
Pickfords Wharf Clink Street London, SE1 9DG	807 High Road, Tottenham Blue Roof Attenuation 1 in 100 yr + 40% CC						
Date 01/06/2020 File 200218_Blue Roof.SRCX	Designed by C. Thwaites Checked by						
Innovyze		Source Control 2019.1					
<u>Summary of Results for 100 year Return Period (+40%)</u>							
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	9.893	0.093	0.0	0.1	0.1	7.5	Flood Risk
60 min Winter	9.913	0.113	0.0	0.1	0.1	9.2	Flood Risk
120 min Winter	9.944	0.144	0.0	0.1	0.1	11.7	Flood Risk
180 min Winter	9.962	0.162	0.0	0.1	0.1	13.1	Flood Risk
240 min Winter	9.974	0.174	0.0	0.1	0.1	14.1	Flood Risk
360 min Winter	9.988	0.188	0.0	0.1	0.1	15.2	Flood Risk
480 min Winter	9.995	0.195	0.0	0.1	0.1	15.8	Flood Risk
600 min Winter	9.998	0.198	0.0	0.1	0.1	16.0	Flood Risk
720 min Winter	9.999	0.199	0.0	0.1	0.1	16.1	Flood Risk
960 min Winter	9.998	0.198	0.0	0.1	0.1	16.0	Flood Risk
1440 min Winter	9.989	0.189	0.0	0.1	0.1	15.3	Flood Risk
2160 min Winter	9.975	0.175	0.0	0.1	0.1	14.2	Flood Risk
2880 min Winter	9.964	0.164	0.0	0.1	0.1	13.3	Flood Risk
4320 min Winter	9.946	0.146	0.0	0.1	0.1	11.8	Flood Risk
5760 min Winter	9.930	0.130	0.0	0.1	0.1	10.6	Flood Risk
7200 min Winter	9.918	0.118	0.0	0.1	0.1	9.6	Flood Risk
8640 min Winter	9.909	0.109	0.0	0.1	0.1	8.8	Flood Risk
10080 min Winter	9.901	0.101	0.0	0.1	0.1	8.1	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	106.854	0.0	4.3	34			
60 min Winter	65.327	0.0	7.9	64			
120 min Winter	42.102	0.0	9.5	122			
180 min Winter	31.993	0.0	10.4	180			
240 min Winter	26.057	0.0	11.0	240			
360 min Winter	19.169	0.0	11.6	356			
480 min Winter	15.223	0.0	11.9	474			
600 min Winter	12.648	0.0	12.0	590			
720 min Winter	10.830	0.0	12.1	702			
960 min Winter	8.425	0.0	12.0	926			
1440 min Winter	5.847	0.0	11.6	1354			
2160 min Winter	4.033	0.0	19.0	1668			
2880 min Winter	3.101	0.0	18.9	2132			
4320 min Winter	2.154	0.0	17.9	3024			
5760 min Winter	1.673	0.0	22.7	3872			
7200 min Winter	1.387	0.0	23.5	4752			
8640 min Winter	1.196	0.0	24.2	5536			
10080 min Winter	1.061	0.0	24.8	6352			
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Waterman Group		Page 3
Pickfords Wharf Clink Street London, SE1 9DG	807 High Road, Tottenham Blue Roof Attenuation 1 in 100 yr + 40% CC	
Date 01/06/2020 File 200218_Blue Roof.SRCX	Designed by C. Thwaites Checked by	
Innovyze Source Control 2019.1		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 533853 191473 TQ 33853 91473
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.950
Cv (Winter)	0.950
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.015

Time (mins)		Area
From:	To:	(ha)
0	4	0.015

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Waterman Group		Page 4
Pickfords Wharf Clink Street London, SE1 9DG	807 High Road, Tottenham Blue Roof Attenuation 1 in 100 yr + 40% CC	
Date 01/06/2020 File 200218_Blue Roof.SRCX	Designed by C. Thwaites Checked by	
Innovyze Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 9.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.96
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	84.3	0.0	0.200	84.3	0.0

Orifice Outflow Control

Diameter (m) 0.010 Discharge Coefficient 0.600 Invert Level (m) 9.800

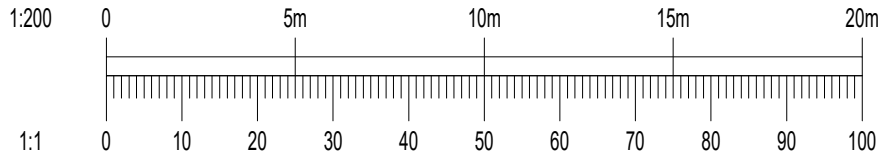
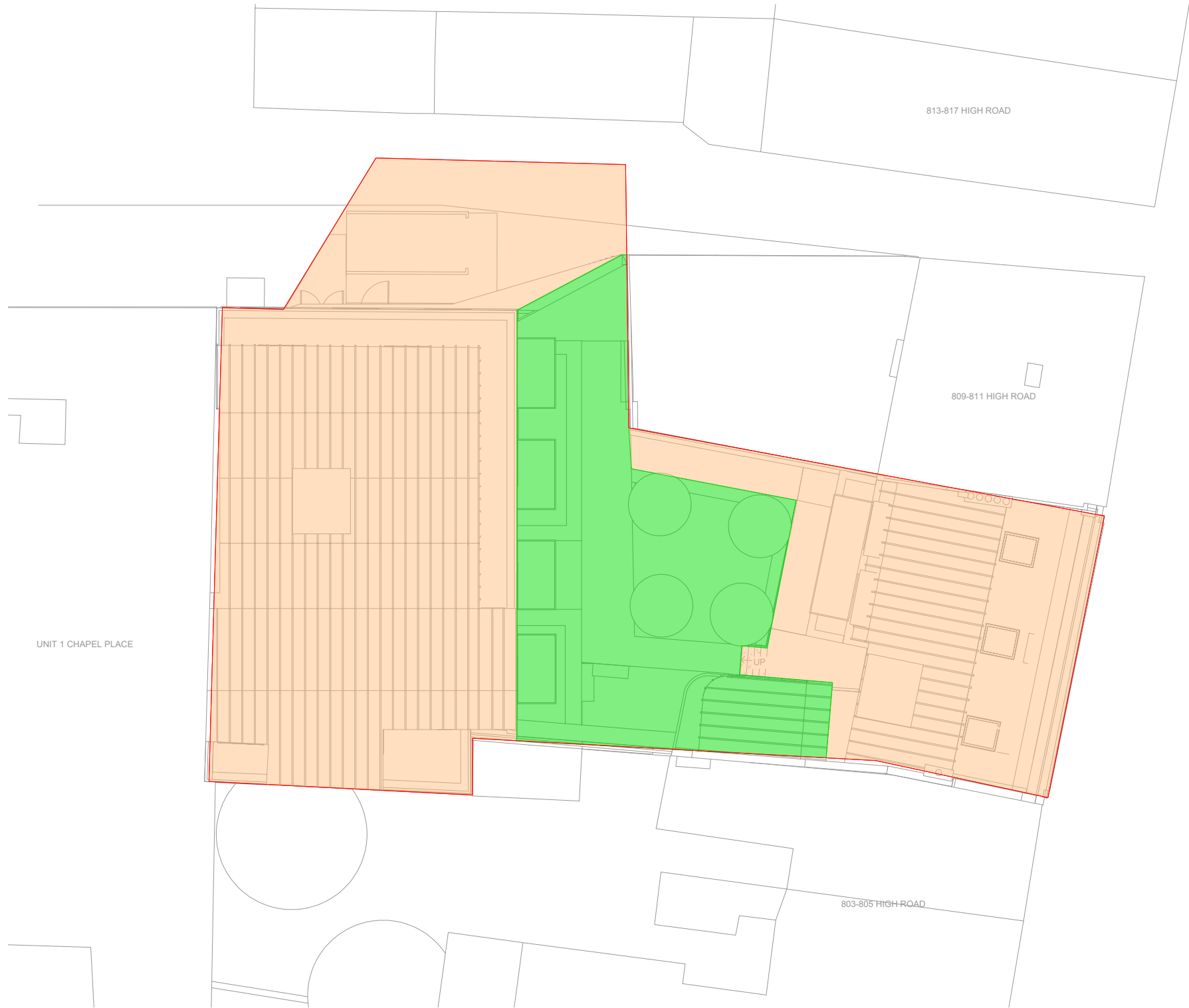
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G. Surface Water Drainage Strategy Drawings

Appendices

807 High Road, Tottenham
Project Number: WIE20265

Document Reference: WIE20265-100-R-1-3-1-FRA



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- FOUL CONNECTIONS FROM CATCHMENTS TO UTILISE EXISTING CONNECTIONS WHERE POSSIBLE. CCTV DRAINAGE SURVEY IS TO BE UNDERTAKEN AT THE DETAILED DESIGN STAGE TO CONFIRM CONNECTIONS

KEY

- SITE BOUNDARY
- CATCHMENT 1 - TO BLUE ROOF (AREA = 0.015Ha)
- CATCHMENT 2 - TO BELOW GROUND TANK (AREA = 0.045Ha)

P01	09.06.20	FIRST ISSUE	CT
Rev	Date	Description	By

Amendments

Project
807 High Road, Tottenham

Title
DRAINAGE STRATEGY
DRAINAGE CATCHMENTS

Client
Tottenham Hotspur Football Club

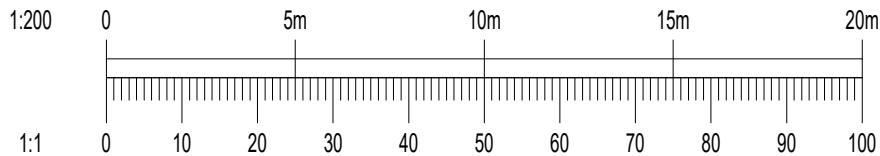
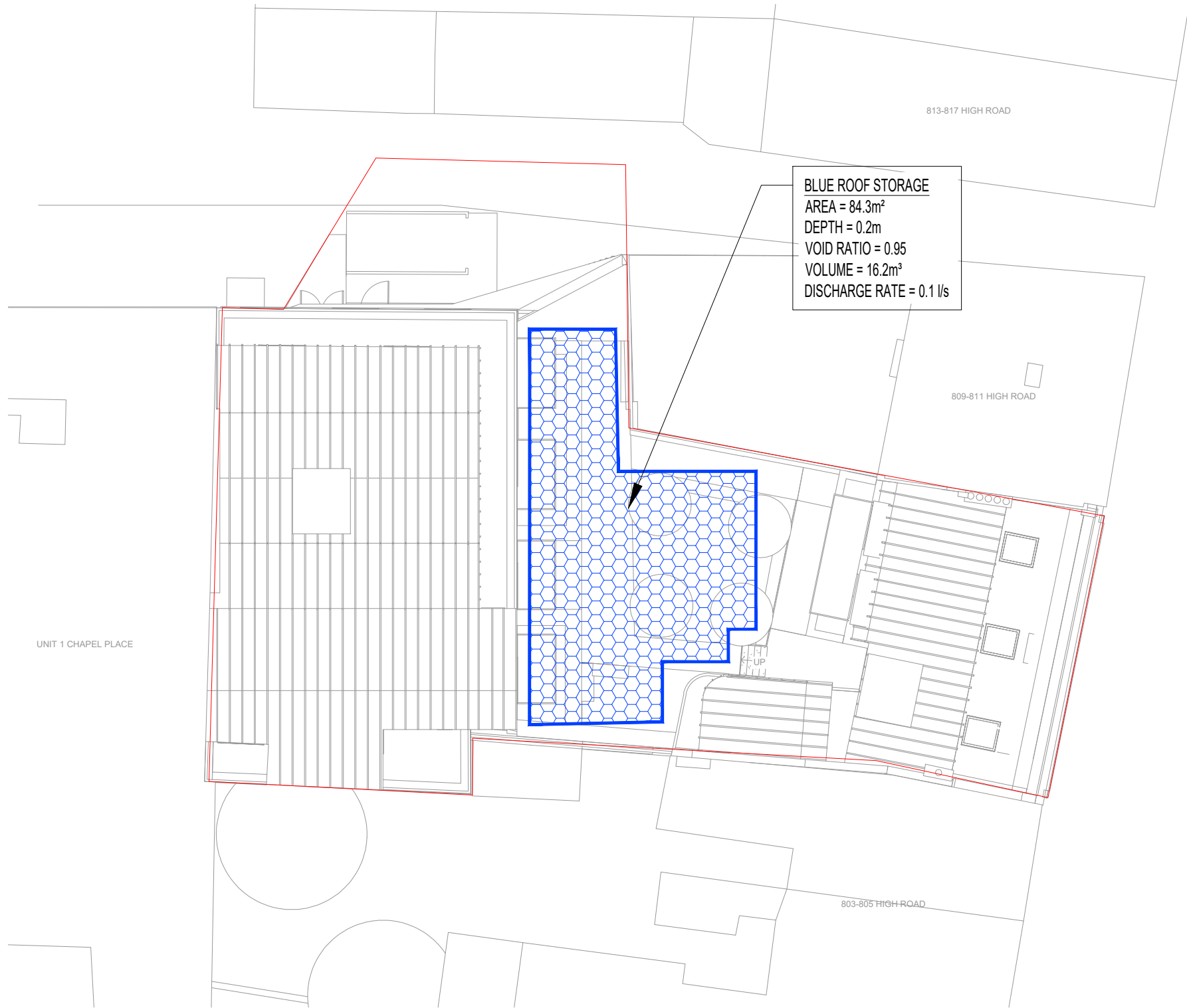


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KEY

-  SITE BOUNDARY
-  BLUE ROOF ATTENUATION

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Project
807 High Road, Tottenham

Title
DRAINAGE STRATEGY
BLUE ROOF ATTENUATION

Client
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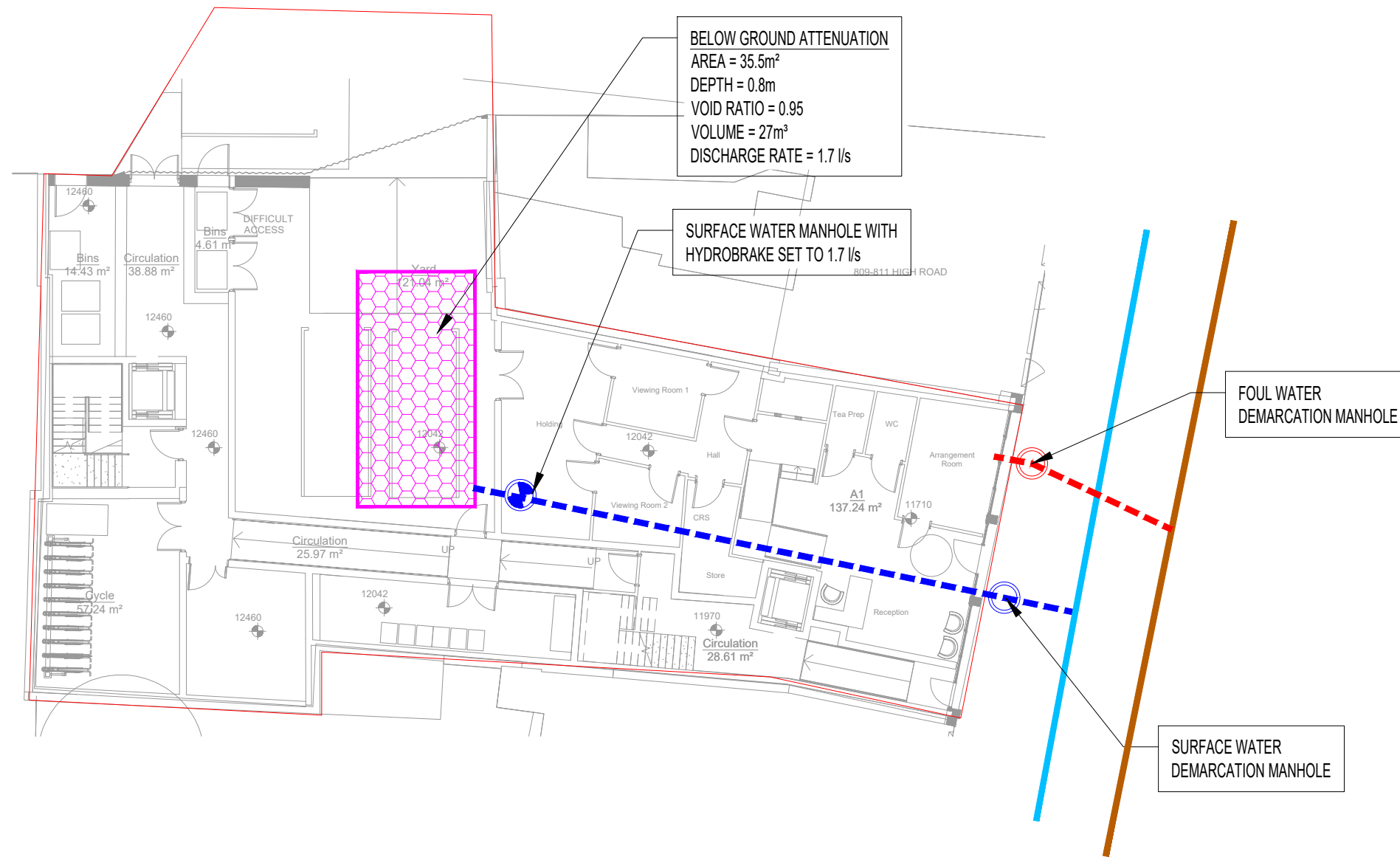
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	BELOW GROUND ATTENUATION
---	PROPOSED SURFACE WATER SEWER
---	PROPOSED FOUL WATER SEWER
—	EXISTING TW SURFACE WATER SEWER
—	EXISTING TW FOUL WATER SEWER

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 - STATUTORY UNDERTAKERS TO BE CONTACTED AT DETAILED DESIGN TO DISCUSS SERVICES DIVERSIONS AND COORDINATION
 - LOCATION OF THAMES WATER ASSETS INDICATIVE ONLY



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Project	807 High Road, Tottenham

Title	BELOW GROUND ATTENUATION AND DRAINAGE STRATEGY
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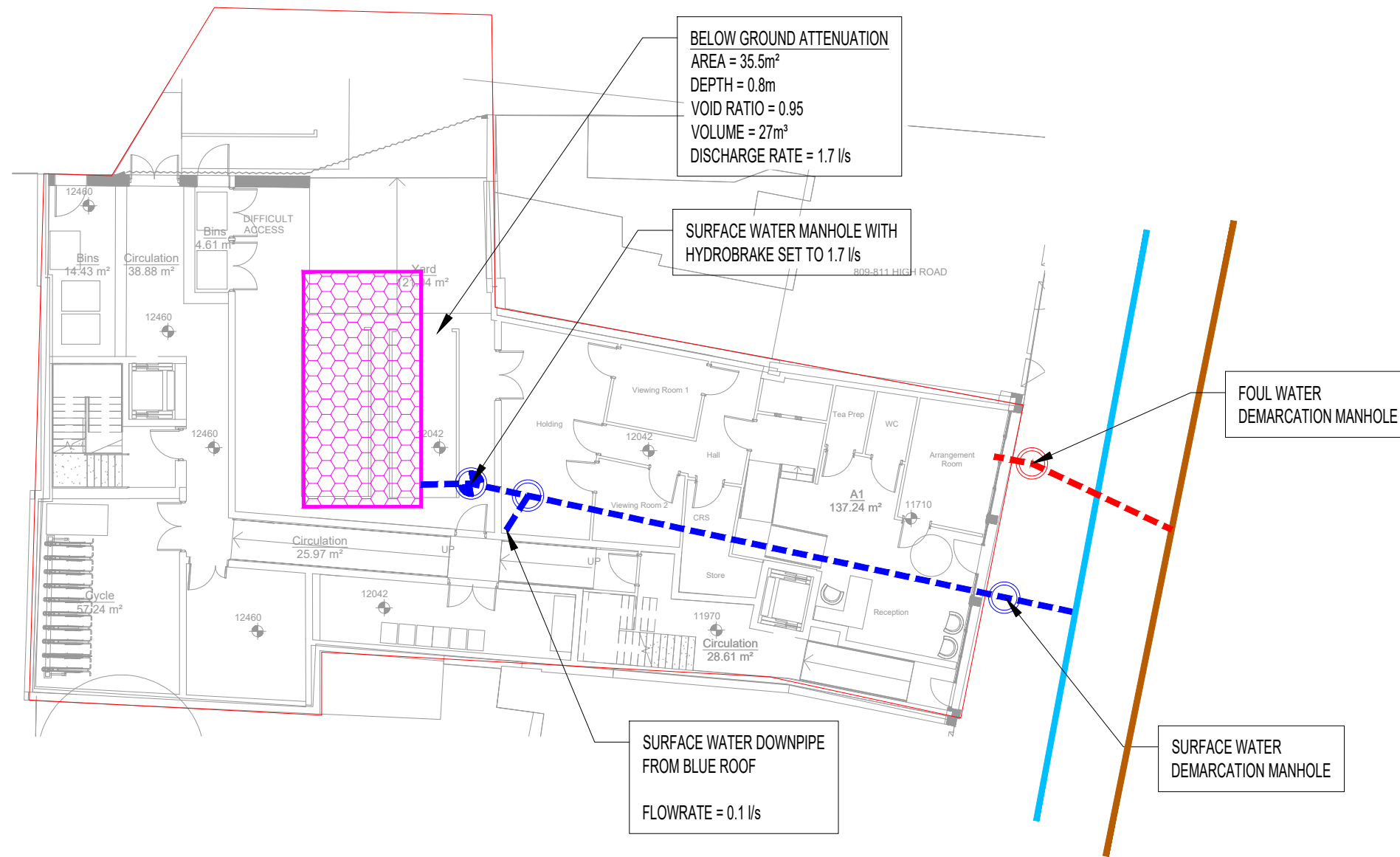
KEY	
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	BELOW GROUND ATTENUATION
	PROPOSED SURFACE WATER SEWER
	PROPOSED FOUL WATER SEWER
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H. Haringey SuDS Proforma

Appendices

807 High Road, Tottenham
Project Number: WIE20265

Document Reference: WIE20265-100-R-1-3-1-FRA

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	807 High Road, Tottenham
	Address & post code	807 High Road, Tottenham, London, N17 8ER, UK
	OS Grid ref. (Easting, Northing)	E 533849 N 191456
	LPA reference (if applicable)	
	Brief description of proposed work	2.6.10. 807 High Road is a medium scale commercial and residential development in the heart of Tottenham, just to the north west of the stadium. Planning consent was granted to take down the existing High Road building, replacing it with an enhanced 4 storey brick building
	Total site Area	0.06 m ²
	Total existing impervious area	0.06 m ²
	Total proposed impervious area	0.06 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Site is in a Critical Drainage Area (CDA)
	Existing drainage connection type and location	assumed to be into Thames Water 610mm surface water sewer running from north to south beneath High Road
Designer Name		
Designer Position		

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	Gravel	
	Bedrock geology classification	London Clay	
	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	Y	Y
	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	Y	
	7 discharge rainwater to the combined sewer.	Y	N
2c. Proposed Discharge Details			
Proposed discharge location	surface water sewer running from north to south		
Has the owner/regulator of the discharge location been	accommodate the proposed surface water		

	Designer Company	
--	------------------	--

	consulted?	
--	------------	--

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)
	Q _{bar}	0.2		
	1 in 1	0.2		
	1 in 30	0.4		
	1 in 100	0.6	7.8	
	1 in 100 + CC			57.1
	Climate change allowance used		40%	
	3b. Principal Method of Flow Control			
	Hydrobrake 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	150	0	0
	Filter strips	0	0	0
	Filter drains	0	0	0
	Bioretention / tree pits	0	0	0
	Pervious pavements	0	0	0
	Swales	0	0	0
	Basins/ponds	0	0	0
	Attenuation tanks	450		0
	Total	600	0	0

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Pages 15 and 17
	Drainage hierarchy (2b)	Pages 17 and 18
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Drainage Drawing in Appendix G; Thames Water correspondence in Appendix E
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Appendix F
	Proposed SuDS measures & specifications (3b)	Pages 17, 18 and 19: Drainage drawing in Appendix G
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Page 4 and Appendix B
	Detailed drainage design drawings, including exceedance flow routes	Appendix G
	Detailed landscaping plans	Drainage Strategy drawing in Appendix
	Maintenance strategy	Pages 22 and 23
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Page 22
	b) biodiversity?	
	c) amenity?	

UK and Ireland Office Locations

