Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Gurveer Jutte
Site name:	Beehive Centre
Site location:	Cambridge

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:	52.20574° N
Longitude:	0.14488° E
Reference:	2649967453
Date:	Jun 12 2024 15:01

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1

Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	540	540
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

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

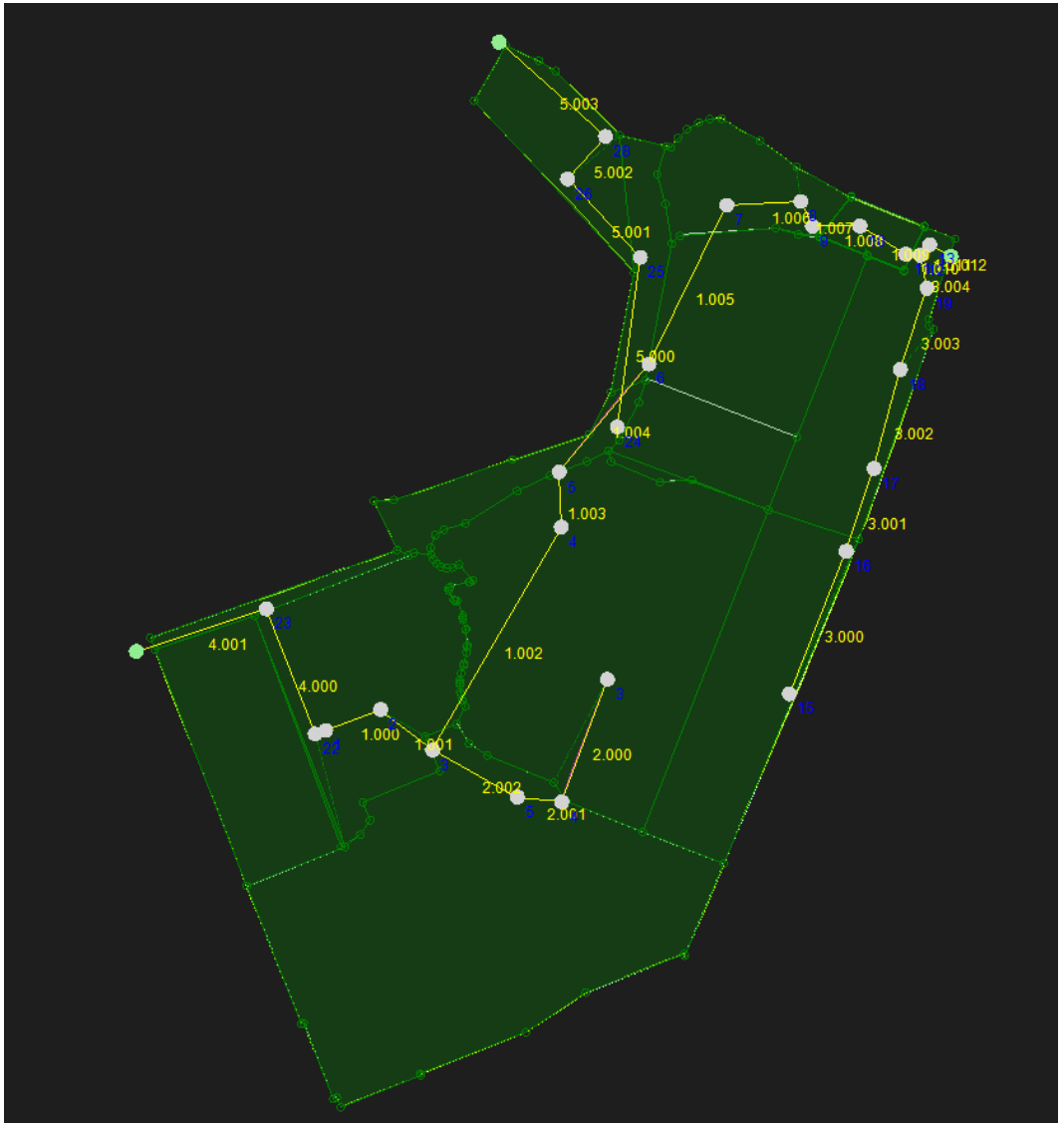
Default Edited

Q_{BAR} (l/s):	1.35	1.35
1 in 1 year (l/s):	1.17	1.17
1 in 30 years (l/s):	3.3	3.3
1 in 100 year (l/s):	4.79	4.79
1 in 200 years (l/s):	5.66	5.66

Existing Site Brownfield Runoff Calculations

Appendices

Railway Pensions Nominees Limited
Project Number: WIE17469-110
Document Reference: WIE17469-110-R-1-1-4-FRADS_Project Otter



Appendices

Railway Pensions Nominees Limited

Project Number: WIE17469-110

Document Reference: WIE17469-110-R-1-1-4-FRADS_Project Otter

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.450	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	24.277	0.243	99.9	0.000	5.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	27.259	0.273	99.8	0.648	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	54.171	0.542	100.0	1.343	5.00	0.0	0.600	o	450	Pipe/Conduit	
2.001	18.448	0.184	100.3	1.660	0.00	0.0	0.600	o	600	Pipe/Conduit	
2.002	40.132	0.040	1003.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.002	106.473	0.194	550.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	22.724	0.023	988.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	58.147	0.145	400.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	73.126	0.146	500.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.20	9.280	0.000	0.0	0.0	0.0	2.03	323.5	0.0
1.001	50.00	5.42	9.360	0.648	0.0	0.0	0.0	2.03	323.6	87.7
2.000	50.00	5.44	9.770	1.343	0.0	0.0	0.0	2.03	323.4	181.8
2.001	50.00	5.57	9.200	3.002	0.0	0.0	0.0	2.43	687.7	406.6
2.002	50.00	6.45	9.016	3.002	0.0	0.0	0.0	0.76	215.0«	406.6
1.002	50.00	9.12	9.000	3.650	0.0	0.0	0.0	0.66	46.9«	494.3
1.003	50.00	9.89	8.800	3.650	0.0	0.0	0.0	0.49	34.8«	494.3
1.004	50.00	11.14	8.760	3.650	0.0	0.0	0.0	0.78	55.1«	494.3
1.005	50.00	12.89	8.600	3.650	0.0	0.0	0.0	0.70	49.2«	494.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.006	30.561	0.153	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	11.312	0.019	600.0	0.259	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	19.651	0.197	100.0	0.764	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	22.332	0.015	1500.0	0.071	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	5.909	0.788	7.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	63.549	0.635	100.0	0.542	5.00	0.0	0.600	o	500	Pipe/Conduit	
3.001	36.106	0.241	150.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
3.002	42.384	0.326	130.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
3.003	35.389	0.393	90.0	0.443	0.00	0.0	0.600	o	500	Pipe/Conduit	
3.004	13.889	0.198	70.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
1.011	5.834	0.083	70.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
1.012	10.083	0.144	70.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
4.000	55.490	0.222	250.0	0.453	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	56.637	0.227	249.5	0.057	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	70.789	0.566	125.0	0.181	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	44.255	0.177	250.0	0.149	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	23.628	0.158	150.0	0.259	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.003	58.842	0.392	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.006	50.00	13.35	8.450	3.650	0.0	0.0	0.0	1.11	78.3«	494.3
1.007	50.00	13.58	8.270	3.909	0.0	0.0	0.0	0.82	130.8«	529.3
1.008	50.00	13.79	8.250	4.673	0.0	0.0	0.0	1.57	111.1«	632.8
1.009	50.00	14.72	8.020	4.744	0.0	0.0	0.0	0.40	28.1«	642.3
1.010	50.00	14.74	8.000	4.744	0.0	0.0	0.0	5.78	408.2«	642.3
3.000	50.00	5.49	9.070	0.542	0.0	0.0	0.0	2.17	426.6	73.4
3.001	50.00	5.83	8.390	0.542	0.0	0.0	0.0	1.77	347.8	73.4
3.002	50.00	6.20	8.140	0.542	0.0	0.0	0.0	1.90	373.8	73.4
3.003	50.00	6.46	7.800	0.985	0.0	0.0	0.0	2.29	449.8	133.4
3.004	50.00	6.54	7.390	0.985	0.0	0.0	0.0	2.60	510.3	133.4
1.011	50.00	14.78	7.190	5.729	0.0	0.0	0.0	2.60	510.3«	775.7
1.012	50.00	14.84	7.100	5.729	0.0	0.0	0.0	2.60	510.3«	775.7
4.000	50.00	5.93	11.030	0.453	0.0	0.0	0.0	0.99	70.0	61.3
4.001	50.00	6.89	10.770	0.510	0.0	0.0	0.0	0.99	70.0	69.1
5.000	50.00	6.01	9.650	0.181	0.0	0.0	0.0	1.17	46.4	24.5
5.001	50.00	6.91	9.080	0.331	0.0	0.0	0.0	0.82	32.7«	44.8
5.002	50.00	7.28	8.870	0.590	0.0	0.0	0.0	1.07	42.4«	79.9
5.003	50.00	8.20	8.700	0.590	0.0	0.0	0.0	1.07	42.4«	79.9

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location GB 546583 258531 TL 46583 58531	
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	30 minute 2 year Winter I+0%	12.010	10.673	0.943	0.000	0.00
1.001	2	15 minute 2 year Winter I+0%	12.460	10.456	0.646	0.000	0.29
2.000	3	15 minute 2 year Winter I+0%	11.210	10.480	0.260	0.000	0.69
2.001	4	15 minute 2 year Winter I+0%	11.300	10.473	0.673	0.000	0.88
2.002	5	15 minute 2 year Winter I+0%	11.600	10.463	0.847	0.000	2.15
1.002	3	15 minute 2 year Winter I+0%	12.200	10.448	1.148	0.000	2.05
1.003	4	15 minute 2 year Winter I+0%	12.180	9.863	0.763	0.000	4.29
1.004	5	15 minute 2 year Winter I+0%	11.900	9.709	0.649	0.000	1.64
1.005	6	120 minute 2 year Winter I+0%	10.460	9.565	0.665	0.000	1.81
1.006	7	120 minute 2 year Winter I+0%	9.590	9.144	0.394	0.000	1.20
1.007	8	120 minute 2 year Winter I+0%	9.360	8.982	0.262	0.000	1.28
1.008	9	60 minute 2 year Winter I+0%	9.670	9.009	0.459	0.000	1.28
1.009	10	60 minute 2 year Winter I+0%	9.020	8.682	0.362	0.000	6.24
1.010	11	60 minute 2 year Winter I+0%	9.120	8.163	-0.137	0.000	0.57
3.000	15	15 minute 2 year Winter I+0%	10.940	9.234	-0.336	0.000	0.23
3.001	16	15 minute 2 year Winter I+0%	10.110	8.576	-0.314	0.000	0.30

2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		0.8	SURCHARGED
1.001	2		78.4	SURCHARGED
2.000	3		203.5	SURCHARGED
2.001	4		380.1	SURCHARGED
2.002	5		354.3	SURCHARGED
1.002	3		93.5	SURCHARGED
1.003	4		89.6	SURCHARGED
1.004	5		85.7	SURCHARGED
1.005	6		85.4	SURCHARGED
1.006	7		85.5	SURCHARGED
1.007	8		90.5	SURCHARGED
1.008	9		123.8	SURCHARGED
1.009	10		127.4	SURCHARGED
1.010	11		127.5	OK
3.000	15		89.0	OK
3.001	16		89.2	OK

2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
3.002	17	15 minute 2 year Winter I+0%	9.950	8.316	-0.324	0.000	0.27	
3.003	18	15 minute 2 year Winter I+0%	9.670	8.014	-0.286	0.000	0.38	
3.004	19	15 minute 2 year Winter I+0%	9.580	7.742	-0.148	0.000	0.45	
1.011	12	15 minute 2 year Winter I+0%	9.290	7.706	0.016	0.000	1.12	
1.012	13	15 minute 2 year Winter I+0%	9.530	7.479	-0.121	0.000	0.92	
4.000	22	15 minute 2 year Winter I+0%	12.010	11.344	0.014	0.000	1.02	
4.001	23	15 minute 2 year Winter I+0%	12.090	11.082	0.012	0.000	1.04	
5.000	24	15 minute 2 year Winter I+0%	10.990	9.786	-0.089	0.000	0.64	
5.001	25	15 minute 2 year Summer I+0%	10.030	9.582	0.277	0.000	1.02	
5.002	26	15 minute 2 year Winter I+0%	9.950	9.525	0.430	0.000	1.40	
5.003	28	15 minute 2 year Winter I+0%	10.170	9.215	0.290	0.000	1.32	

PN	US/MH Name	Pipe Flow (l/s)	Status
3.002	17	87.9	OK
3.003	18	146.5	OK
3.004	19	138.5	OK
1.011	12	245.4	SURCHARGED
1.012	13	242.8	OK
4.000	22	67.8	SURCHARGED
4.001	23	68.8	SURCHARGED
5.000	24	28.9	OK
5.001	25	31.9	SURCHARGED
5.002	26	54.4	SURCHARGED
5.003	28	53.8	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location GB 546583 258531 TL 46583 58531	
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	30 minute 30 year Summer I+0%	12.010	12.012	2.282	1.905	0.13
1.001	2	30 minute 30 year Summer I+0%	12.460	11.918	2.108	0.000	0.79
2.000	3	15 minute 30 year Summer I+0%	11.210	11.340	1.120	130.029	0.86
2.001	4	15 minute 30 year Winter I+0%	11.300	11.421	1.621	120.982	1.46
2.002	5	15 minute 30 year Winter I+0%	11.600	11.612	1.996	11.762	3.59
1.002	3	15 minute 30 year Winter I+0%	12.200	11.909	2.609	0.616	2.34
1.003	4	15 minute 30 year Winter I+0%	12.180	10.822	1.722	0.000	4.84
1.004	5	120 minute 30 year Winter I+0%	11.900	10.543	1.483	0.000	1.90
1.005	6	120 minute 30 year Winter I+0%	10.460	10.124	1.224	0.000	2.11
1.006	7	60 minute 30 year Winter I+0%	9.590	9.610	0.860	19.611	1.82
1.007	8	30 minute 30 year Winter I+0%	9.360	9.437	0.717	76.587	2.16
1.008	9	30 minute 30 year Winter I+0%	9.670	9.442	0.892	0.000	1.61
1.009	10	15 minute 30 year Winter I+0%	9.020	9.024	0.704	3.744	7.94
1.010	11	15 minute 30 year Winter I+0%	9.120	8.528	0.228	0.000	0.77
3.000	15	15 minute 30 year Winter I+0%	10.940	9.335	-0.235	0.000	0.53
3.001	16	15 minute 30 year Winter I+0%	10.110	8.785	-0.105	0.000	0.67

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		34.8	FLOOD
1.001	2		217.0	SURCHARGED
2.000	3		254.6	FLOOD
2.001	4		629.7	FLOOD
2.002	5		591.2	FLOOD
1.002	3		106.7	FLOOD
1.003	4		101.1	SURCHARGED
1.004	5		99.5	SURCHARGED
1.005	6		99.4	SURCHARGED
1.006	7		129.4	FLOOD
1.007	8		152.5	FLOOD
1.008	9		155.6	FLOOD RISK
1.009	10		162.1	FLOOD
1.010	11		170.8	SURCHARGED
3.000	15		208.5	OK
3.001	16		200.4	OK

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
3.002	17	15 minute 30 year Winter I+0%	9.950	8.702	0.062	0.000	0.57
3.003	18	15 minute 30 year Winter I+0%	9.670	8.603	0.303	0.000	0.75
3.004	19	15 minute 30 year Winter I+0%	9.580	8.379	0.489	0.000	0.93
1.011	12	15 minute 30 year Winter I+0%	9.290	8.203	0.513	0.000	1.96
1.012	13	15 minute 30 year Winter I+0%	9.530	7.816	0.216	0.000	1.64
4.000	22	15 minute 30 year Winter I+0%	12.010	12.021	0.691	10.834	1.59
4.001	23	15 minute 30 year Winter I+0%	12.090	11.587	0.517	0.000	1.72
5.000	24	15 minute 30 year Winter I+0%	10.990	10.990	1.115	0.211	1.25
5.001	25	15 minute 30 year Winter I+0%	10.030	10.059	0.754	29.314	1.75
5.002	26	15 minute 30 year Winter I+0%	9.950	9.962	0.867	12.221	1.71
5.003	28	15 minute 30 year Winter I+0%	10.170	9.527	0.602	0.000	1.59

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
3.002	17		188.2	SURCHARGED
3.003	18		289.4	SURCHARGED
3.004	19		288.7	SURCHARGED
1.011	12		432.3	SURCHARGED
1.012	13		431.9	SURCHARGED
4.000	22		105.6	FLOOD
4.001	23		114.1	SURCHARGED
5.000	24		56.5	FLOOD
5.001	25		54.5	FLOOD
5.002	26		66.6	FLOOD
5.003	28		65.2	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 minute 100 year Summer I+0%	12.010	12.014	2.284	5.699	0.27
1.001	2	30 minute 100 year Summer I+0%	12.460	11.893	2.083	0.000	1.03
2.000	3	15 minute 100 year Winter I+0%	11.210	11.472	1.252	262.384	0.84
2.001	4	15 minute 100 year Winter I+0%	11.300	11.531	1.731	231.588	1.60
2.002	5	15 minute 100 year Summer I+0%	11.600	11.602	1.986	16.129	3.88
1.002	3	15 minute 100 year Winter I+0%	12.200	12.216	2.916	1.934	2.43
1.003	4	15 minute 100 year Winter I+0%	12.180	10.934	1.834	0.000	5.00
1.004	5	180 minute 100 year Winter I+0%	11.900	10.635	1.575	0.000	1.95
1.005	6	180 minute 100 year Winter I+0%	10.460	10.187	1.287	0.000	2.16
1.006	7	120 minute 100 year Winter I+0%	9.590	9.644	0.894	54.227	1.84
1.007	8	15 minute 100 year Winter I+0%	9.360	9.465	0.745	105.223	2.22
1.008	9	60 minute 100 year Winter I+0%	9.670	9.491	0.941	0.000	1.65
1.009	10	30 minute 100 year Winter I+0%	9.020	9.034	0.714	14.333	8.60
1.010	11	15 minute 100 year Summer I+0%	9.120	8.631	0.331	0.000	0.82
3.000	15	15 minute 100 year Winter I+0%	10.940	9.538	-0.032	0.000	0.69
3.001	16	15 minute 100 year Summer I+0%	10.110	9.179	0.289	0.000	0.78

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		72.0	FLOOD
1.001	2		282.2	SURCHARGED
2.000	3		248.3	FLOOD
2.001	4		689.1	FLOOD
2.002	5		638.7	FLOOD
1.002	3		110.7	FLOOD
1.003	4		104.5	SURCHARGED
1.004	5		102.1	SURCHARGED
1.005	6		102.0	FLOOD RISK
1.006	7		131.0	FLOOD
1.007	8		157.0	FLOOD
1.008	9		159.7	FLOOD RISK
1.009	10		175.7	FLOOD
1.010	11		181.7	SURCHARGED
3.000	15		270.8	OK
3.001	16		234.0	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
3.002	17	15 minute 100 year Summer I+0%	9.950	9.071	0.431	0.000	0.71
3.003	18	15 minute 100 year Winter I+0%	9.670	9.060	0.760	0.000	0.94
3.004	19	15 minute 100 year Winter I+0%	9.580	8.688	0.798	0.000	1.17
1.011	12	15 minute 100 year Winter I+0%	9.290	8.410	0.720	0.000	2.22
1.012	13	15 minute 100 year Winter I+0%	9.530	7.920	0.320	0.000	1.85
4.000	22	15 minute 100 year Winter I+0%	12.010	12.041	0.711	30.806	1.63
4.001	23	15 minute 100 year Winter I+0%	12.090	11.661	0.591	0.000	1.79
5.000	24	15 minute 100 year Summer I+0%	10.990	10.994	1.119	4.023	1.28
5.001	25	30 minute 100 year Winter I+0%	10.030	10.083	0.778	53.130	1.75
5.002	26	15 minute 100 year Winter I+0%	9.950	9.974	0.879	24.041	1.71
5.003	28	15 minute 100 year Winter I+0%	10.170	9.535	0.610	0.000	1.60

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
3.002	17		233.7	SURCHARGED
3.003	18		364.1	SURCHARGED
3.004	19		364.0	SURCHARGED
1.011	12		488.5	SURCHARGED
1.012	13		487.7	SURCHARGED
4.000	22		107.9	FLOOD
4.001	23		119.1	SURCHARGED
5.000	24		57.8	FLOOD
5.001	25		54.7	FLOOD
5.002	26		66.7	FLOOD
5.003	28		65.4	SURCHARGED

101 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 minute 101 year Winter I+40%	12.010	12.030	2.300	21.089	0.47
1.001	2	30 minute 101 year Winter I+40%	12.460	12.098	2.288	0.000	1.16
2.000	3	15 minute 101 year Winter I+40%	11.210	11.622	1.402	411.612	0.84
2.001	4	15 minute 101 year Winter I+40%	11.300	11.674	1.874	374.262	1.69
2.002	5	15 minute 101 year Winter I+40%	11.600	11.662	2.046	65.469	4.02
1.002	3	15 minute 101 year Winter I+40%	12.200	12.234	2.934	5.686	2.47
1.003	4	15 minute 101 year Winter I+40%	12.180	11.007	1.907	0.000	5.09
1.004	5	240 minute 101 year Winter I+40%	11.900	10.782	1.722	0.000	1.99
1.005	6	240 minute 101 year Winter I+40%	10.460	10.297	1.397	0.000	2.21
1.006	7	120 minute 101 year Winter I+40%	9.590	9.719	0.969	129.091	1.88
1.007	8	60 minute 101 year Winter I+40%	9.360	9.595	0.875	234.571	2.26
1.008	9	15 minute 101 year Winter I+40%	9.670	9.672	1.122	2.348	1.80
1.009	10	30 minute 101 year Winter I+40%	9.020	9.070	0.750	49.837	8.81
1.010	11	15 minute 101 year Winter I+40%	9.120	8.841	0.541	0.000	0.83
3.000	15	15 minute 101 year Winter I+40%	10.940	10.681	1.111	0.000	0.89
3.001	16	15 minute 101 year Summer I+40%	10.110	10.113	1.223	3.386	0.95

101 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

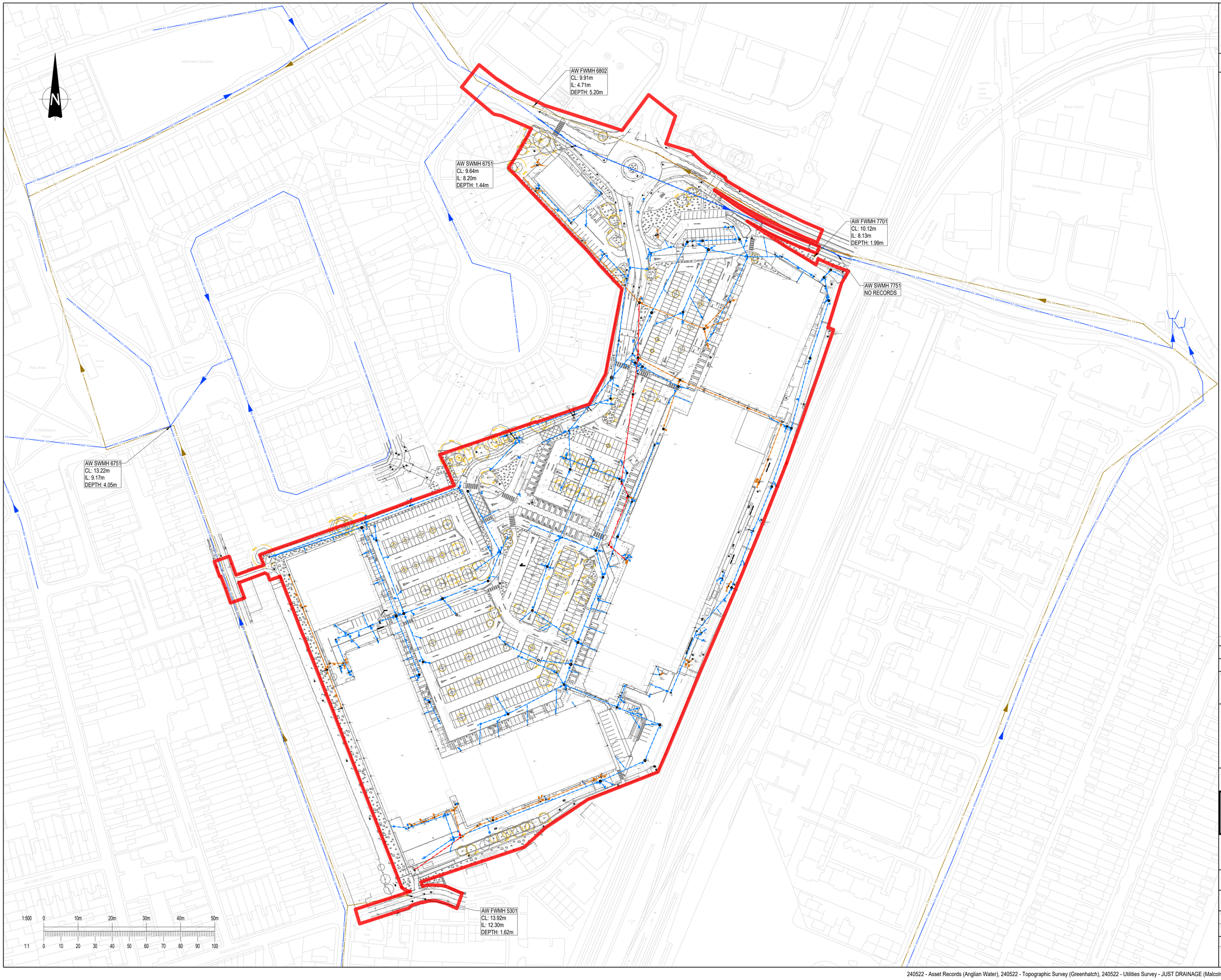
PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		127.9	FLOOD
1.001	2		318.8	SURCHARGED
2.000	3		248.9	FLOOD
2.001	4		724.9	FLOOD
2.002	5		661.0	FLOOD
1.002	3		112.6	FLOOD
1.003	4		106.3	SURCHARGED
1.004	5		104.4	SURCHARGED
1.005	6		104.4	FLOOD RISK
1.006	7		134.0	FLOOD
1.007	8		159.6	FLOOD
1.008	9		173.5	FLOOD
1.009	10		179.9	FLOOD
1.010	11		184.1	FLOOD RISK
3.000	15		346.6	FLOOD RISK
3.001	16		285.3	FLOOD

101 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
3.002	17	15 minute 101 year Summer I+40%	9.950	9.906	1.266	0.000	0.90
3.003	18	15 minute 101 year Winter I+40%	9.670	9.679	1.379	9.104	1.18
3.004	19	15 minute 101 year Winter I+40%	9.580	9.130	1.240	0.000	1.48
1.011	12	15 minute 101 year Winter I+40%	9.290	8.696	1.006	0.000	2.51
1.012	13	15 minute 101 year Winter I+40%	9.530	8.064	0.464	0.000	2.09
4.000	22	15 minute 101 year Winter I+40%	12.010	12.078	0.748	68.382	1.66
4.001	23	15 minute 101 year Winter I+40%	12.090	11.719	0.649	0.000	1.90
5.000	24	15 minute 101 year Summer I+40%	10.990	11.004	1.129	14.174	1.28
5.001	25	30 minute 101 year Winter I+40%	10.030	10.120	0.815	89.866	1.76
5.002	26	15 minute 101 year Summer I+40%	9.950	9.988	0.893	37.730	1.72
5.003	28	30 minute 101 year Winter I+40%	10.170	9.544	0.619	0.000	1.61

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
3.002	17		297.9	FLOOD RISK
3.003	18		459.6	FLOOD
3.004	19		459.3	SURCHARGED
1.011	12		553.3	SURCHARGED
1.012	13		553.3	SURCHARGED
4.000	22		109.8	FLOOD
4.001	23		126.3	SURCHARGED
5.000	24		57.8	FLOOD
5.001	25		55.0	FLOOD
5.002	26		66.8	FLOOD
5.003	28		66.0	SURCHARGED

F. Proposed Drainage Arrangements



GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER'S, ARCHITECT'S OR OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.
3. THE CONTRACTOR MUST ENSURE AND WILL BE HELD RESPONSIBLE FOR THE OVERALL STABILITY OF THE BUILDING/STRUCTURE/EXCAVATION AT ALL STAGES OF THE WORK.
4. ALL WORK BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
5. ALL WORK IS TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES AND REGULATIONS.

LEGEND:

- APPLICATION BOUNDARY
- EXISTING TREE AND ROOT PROTECTION AREA

PRIVATE DRAINAGE:
(SURVEYED BY MALCOLM HUGHES 2022)

- FWS(E) — FOUL SEWER AND MANHOLE
- SWS(E) — SURFACE WATER SEWER AND MANHOLE
- CWS(E) — COMBINED WATER SEWER AND MANHOLE

PUBLIC DRAINAGE:
(ANGLIAN WATER ASSET RECORDS 2024)

- EX FWS — FOUL SEWER AND MANHOLE
- EX SWS — SURFACE WATER SEWER AND MANHOLE

Rev	Date	Description	By	Chk
P01	16.07.24	FIRST ISSUE	GJ	CP

Amendments

Project: PROJECT OTTER

Title: EXISTING DRAINAGE LAYOUT

Client: RAILPEN LTD

waterman
Pickfords Wharf Clink Street London SE1 9DG
+44 207 928 7888
mail@watermangroup.com www.watermangroup.com

Work Stage	STAGE 3 Spatial coordination	RIBA
Suitability	COORDINATION	S1

Designed By	GJ	Director	AS	Waterman Ref	WIE17469
Drawn By	GJ	Date	16.07.24	Scales @ A1	1:500

Project	Originator	Functional	Spatial	Form	Discipline	Number	Revision
EPBP	WAT	ZZ	XX	DR	C	920505	P01

File Path: N:\Projects\WIE17469\05 Project Otter\7_CAD\02_Drainage\

240522 - Asset Records (Anglian Water), 240522 - Topographic Survey (Greenhatch), 240522 - Utilities Survey - JUST DRAINAGE (Malcolm Hughes), A1-Wat-ISO-S-2023, OS, WIE17469-100_SA_77_Tree_Survey

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER'S, ARCHITECT'S OR OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
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3. THE CONTRACTOR MUST ENSURE AND WILL BE HELD RESPONSIBLE FOR THE OVERALL STABILITY OF THE BUILDING/STRUCTURE/EXCAVATION AT ALL STAGES OF THE WORK.
4. ALL WORK BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
5. ALL WORK IS TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES AND REGULATIONS.

LEGEND:

- APPLICATION BOUNDARY
- PROPOSED NORTHERN CATCHMENT (TO OUTFALL TO COLDHAM'S LANE SEWER)
- PROPOSED SOUTHERN CATCHMENT (TO OUTFALL TO YORK STREET SEWER)
- PROPOSED PERMEABLE LANDSCAPING AREAS
- EXISTING HIGHWAY AREA TO REMAIN (EXCL. FROM HYDRAULIC MODELLING)
- EXISTING PERMEABLE VEGETATION (EXCL. FROM HYDRUALIC MODELLING

CATCHMENT SUMMARY	AREA (msq)	AREA (Ha)
APPLICATION BOUNDARY	78,500	7.85
NORTHERN CATCHMENT	22,420	2.24
SOUTHERN CATCHMENT	30,747	3.07
PROPOSED PERMEABLE AREAS	10,886	1.09
EXISTING HIGHWAY AREAS	7,250	0.73
EXISTING VEGETATION AREAS	7,181	0.72

Rev	Date	Description	By	Chk
P01	16.07.24	FIRST ISSUE	GJ	CP

Amendments

Project
PROJECT OTTER

Title
PROPOSED SURFACE WATER CATCHMENT LAYOUT

Client
RAILPEN LTD

waterman
Pickfords Wharf Clink Street London SE1 9DG
+44 207 928 7888
mail@watermangroup.com www.watermangroup.com

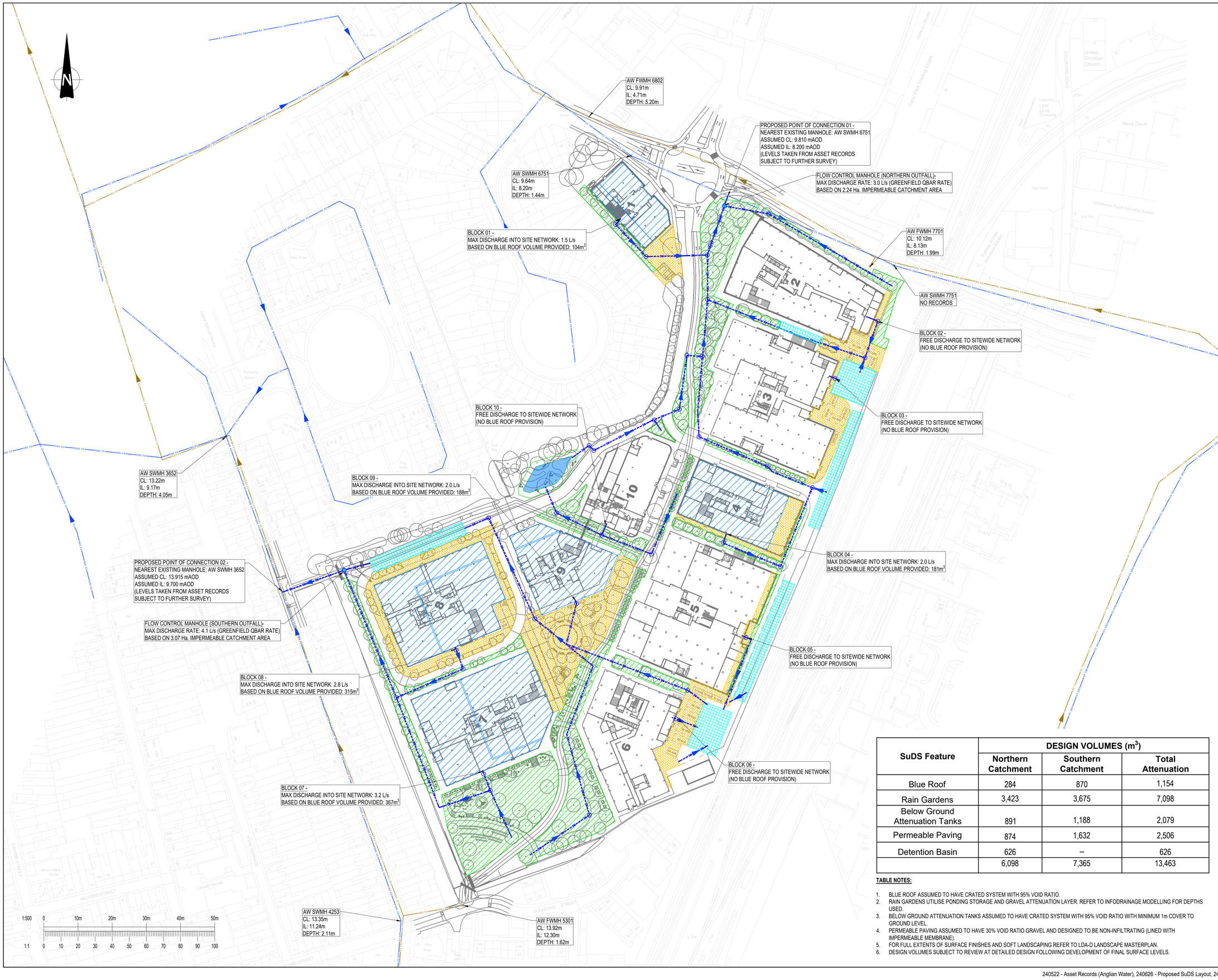
Work Stage: STAGE 3 – Spatial coordination (RIBA)
Suitability: COORDINATION (S1)

Designed By	Director	Waterman Ref
GJ	CP	WIE17469-110
Drawn By	Date	Scales @ A1
GJ	16.07.24	1:1000

Project | Originator | Functional | Spatial | Form | Discipline | Number: 17469-WAT-OTT-XX-DR-C-920509
Revision: P01

File Path: N:\Projects\WIE17469\05 Project Otter\7_CAD\92_Drainage\

A1-Wat-ISO-S-2023, OS



SuDS Feature	DESIGN VOLUMES (m^3)		
	Northern Catchment	Southern Catchment	Total Attenuation
Blue Roof	284	870	1,154
Rain Gardens	3,423	3,675	7,098
Below Ground Attenuation Tanks	891	1,188	2,079
Permeable Paving	874	1,632	2,506
Detention Basin	626	–	626
	6,098	7,365	13,463

TABLE NOTES:

1. BLUE ROOF ASSUMED TO HAVE CRATED SYSTEM WITH 95% VOID RATIO.
2. RAIN GARDENS UTILISE PONDING STORAGE AND GRAVEL ATTENUATION LAYER. REFER TO INFODRAINAGE MODELLING FOR DEPTHS USED.
3. BELOW GROUND ATTENUATION TANKS ASSUMED TO HAVE CRATED SYSTEM WITH 95% VOID RATIO WITH MINIMUM 1m COVER TO GROUND LEVEL.
4. PERMEABLE PAVING ASSUMED TO HAVE 30% VOID RATIO GRAVEL AND DESIGNED TO BE NON-INFILTRATING (LINED WITH IMPERMEABLE MEMBRANE).
5. FOR FULL EXTENTS OF SURFACE FINISHES AND SOFT LANDSCAPING REFER TO LDA-D LANDSCAPE MASTERPLAN.
6. DESIGN VOLUMES SUBJECT TO REVIEW AT DETAILED DESIGN FOLLOWING DEVELOPMENT OF FINAL SURFACE LEVELS.

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER'S, ARCHITECT'S OR OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.
3. THE CONTRACTOR MUST ENSURE AND WILL BE HELD RESPONSIBLE FOR THE OVERALL STABILITY OF THE BUILDING/STRUCTURE/EXCAVATION AT ALL STAGES OF THE WORK.
4. ALL WORK BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY AT WORK ACT ARE SATISFIED.
5. ALL WORK IS TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES AND REGULATIONS.

DRAINAGE NOTES:

1. REFER TO WATERMAN FLOOD RISK AND DRAINAGE STRATEGY REPORT FOR FULL DETAILS OF DRAINAGE RATIONALE AND DESIGN PARAMETERS SUMMARY.
2. EXISTING DRAINAGE AND UTILITIES WITHIN SITE BOUNDARY NOT SHOWN. TO BE ABANDONED AND DIVERTED BY OTHERS.
3. SUSTAINABLE URBAN DRAINAGE FEATURES DESIGNED USING AUTODESK INFODRAINAGE 2024.
4. DESIGN RAINFALL EVENTS ANALYSED INCL. 1-1 YEAR, 1-30 YEAR WITH 35% CLIMATE CHANGE AND 1-100 YEAR WITH 40% CLIMATE CHANGE. USING FEH 2022 RAINFALL DATA.
5. PROPOSED DISCHARGE RATES AT SITE OUTFALLS BASED ON GREENFIELD QBAR RATE OF 1.35 L/s/Ha
6. FOR PROPOSED SURFACE WATER CATCHMENT LAYOUT REFER TO 17469-WAT-OTT-XX-DR-C-920509.
7. FULL DRAINAGE NETWORK DESIGN (ROAD GULLYS, PERFORATED PIPES, INSPECTION CHAMBERS AND RODDING POINTS) SUBJECT TO DETAILED DESIGN.
8. FINAL LEVELS SUBJECT TO DETAILED DESIGN.
9. CONNECTION POINTS TO ANGLIAN WATER NETWORK SUBJECT TO PREDEVELOPMENT ENQUIRY APPROVAL AND SECTION 106 AGREEMENT BY CONTRACTOR.
10. ALL BLOCKS WITH BLUE ROOF TO BE RESTRICTED AS SHOWN ON PLAN, BEFORE DISCHARGING INTO SITEWIDE NETWORK. BLOCKS WITH NO BLUE ROOF TO HAVE FREE DISCHARGE INTO SITEWIDE DRAINAGE NETWORK.

LEGEND:

APPLICATION BOUNDARY

EXISTING DRAINAGE (ANGLIAN WATER):

EX SWS — SURFACE WATER SEWER

EX FWS — FOUL SEWER

PROPOSED DRAINAGE:

SW — SURFACE WATER SEWER AND MANHOLE

FLOW CONTROL MANHOLE

BLUE ROOF
(100mm DEPTH OF STORAGE 95% VOID RATIO)

RAIN GARDEN / BIORETENTION AREAS

PERMEABLE PAVING

BELOW GROUND GEOCELLULAR TANK

DETENTION BASIN

Rev	Date	Description	By	Chk
P02	16.07.24	UPDATED FOLLOWING FINAL MASTERPLAN	GJ	CP
P01	20.06.24	FIRST ISSUE	GJ	CP

Amendments

Project
PROJECT OTTER

Title
PROPOSED DRAINAGE LAYOUT

Client
RAILPEN LTD

waterman
Pickfords Wharf Clink Street London SE1 9DG
+44 207 928 7888
mail@watermangroup.com www.watermangroup.com

Work Stage: STAGE 3 Spatial coordination — RIBA
Suitability: COORDINATION — S1

Designed By	Director	Waterman Ref
GJ	CP	WIE17469-110
Drawn By	Date	Scales @ A1
GJ	20.06.2024	1:1000

Project | Originator | Functional | Spatial | Form | Discipline | Number	Revision
17469-WAT-OTT-XX-DR-C-920510	P02

File Path: N:\Projects\WIE17469\5 Project Otter\7_CAD\92_Drainage\

240522 - Asset Records (Anglian Water), 240626 - Proposed SuDS Layout, 240710 - Landscape GA (LDA-D), A1-Wat-ISO-S-2023, OS (Cropped by LDA)

G. Proposed Drainage Modelling Summary

NORTHERN CATCHMENT MODEL

Appendices

Railway Pensions Nominees Limited

Project Number: WIE17469-110

Document Reference: WIE17469-110-R-1-1-4-FRADS_Project Otter


Block 1 Roof
Block 1 Public Realm
Block 1 RG
EL: 10.500m
BIL: 8.500m
Block 1 PP
Northern Highway
Block 2 Roof
Block 2 RG
EL: 10.400m
Highways RG (2)
EL: 10.000m
BIL: 8.245m
Block 2 RG 1
EL: 10.000m
BIL: 8.350m
Block 2 PP
EL: 10.500m
Block 3 Tank
EL: 10.000m
Depth: 0.600m
BIL: 8.450m
Block 3 Roof
Bioretention (10)
EL: 10.361m
MH3
CL: 12.487m
Depth: 3.887m
IL: 8.600m
Diam.: 1.500m
MH2
CL: 11.076m
Depth: 2.376m
IL: 8.700m
Diam.: 1.500m
Block 3 RG
EL: 11.071m
BIL: 8.771m
Block 3 Public Realm
Block 3 & 4 Highway
Block 4 Tank
EL: 11.000m
Depth: 1.000m
BIL: 8.900m
Site Pond
EL: 10.000m
Depth: 1.250m
BIL: 8.750m
Block 10 Roof
Block 10 Public Realm
Block 10 RG
EL: 11.562m
BIL: 9.062m
Northern Highway (1)
Highways RG
EL: 11.423m
BIL: 9.123m
Block 4 Roof
Block 4 PP
Block 4 Public Realm
Block 4 RG
BIL: 8.935m
SW1.001
SW4.001
SW8.003
375mm

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Title:	Company Address:		
Rainfall Analysis Criteria	Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Runoff Type	Dynamic
Output Interval (mins)	1
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH

Type: FEH

Site Location	GB 546583 258531 TL 46583 58531
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

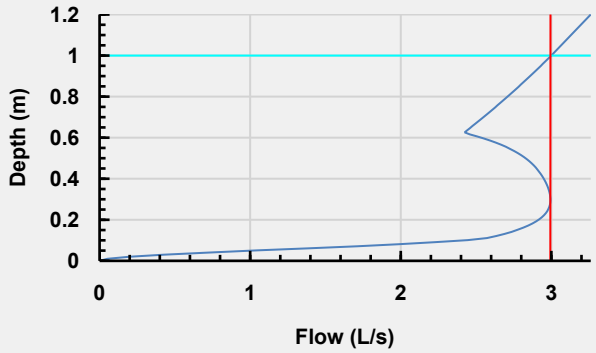
Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Inflow Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Block 1 Public Realm	Block 1 PP		Time of Concentration	0.048	100	0	100	0.048
Block 1 Roof	Block 1 RG		Time of Concentration	0.119	100	0	100	0.119
Block 2 Public Realm	Block 2 PP		Time of Concentration	0.109	100	0	100	0.109
Block 2 Public Realm (1)	Block 2 RG		Time of Concentration	0.043	100	0	100	0.043
Block 2 Roof	Block 2 RG		Time of Concentration	0.358	100	0	100	0.358
Block 3 & 4 Highway	Block 4 Tank		Time of Concentration	0.166	100	0	100	0.166
Block 3 Public Realm	Block 3 RG		Time of Concentration	0.138	100	0	100	0.138
Block 3 Roof	Block 3 Tank		Time of Concentration	0.476	100	0	100	0.476
Block 4 Public Realm	Block 4 PP		Time of Concentration	0.046	100	0	100	0.046
Block 4 Roof	Block 4 RG		Time of Concentration	0.203	100	0	100	0.203
Block 10 Public Realm	Block 10 RG		Time of Concentration	0.012	100	0	100	0.012
Block 10 Public Realm (1)	Highways RG (1)		Time of Concentration	0.005	100	0	100	0.005
Block 10 Roof	Block 10 RG		Time of Concentration	0.182	100	0	100	0.182
Northern Highway	Highways RG (2)		Time of Concentration	0.207	100	0	100	0.207
Northern Highway (1)	Block 10 RG		Time of Concentration	0.121	100	0	100	0.121
Northern Highway (2)	Bioretention (10)		Time of Concentration	0.010	100	0	100	0.010
TOTAL		**0.0**		**2.244**				**2.244**

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Junctions Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
MH5	Outlet	SW1.005	Hydro-Brake®
	Invert Level (m)	8.240	
	Design Depth (m)	1.000	
	Design Flow (L/s)	3.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☑	
	Unit Reference	SHE-0082-3000-1000-3000	
			
MH1	Outlet	SW1.001	Free Discharge
MH2	Outlet	SW1.003	Free Discharge
MH3	Outlet	SW6.003	Free Discharge
MH4	Outlet	SW6.004	Free Discharge

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 3 RG

Type : Bioretention

Ponding Area

Exceedance Level (m)	11.071
Depth (m)	0.300
Base Level (m)	10.771
Top Area (m²)	149.02
Side Slope (1:X)	0.00
Base Area (m²)	149.02
Freeboard (mm)	100
Porosity (%)	100
Length (m)	38.408
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	128.571

Filter Area

Base Level (m)	8.771

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1000	35	50.0	Soil Type
	Storage	1000	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 3 Public Realm
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	SW1.001
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW1.002
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	84.577
Top Perimeter (m)	84.577

Block 2 RG.1

Type : Bioretention

Ponding Area

Exceedance Level (m)	10.000
Depth (m)	0.200
Base Level (m)	9.800
Top Area (m²)	174.001
Side Slope (1:X)	0.00
Base Area (m²)	174.001
Freeboard (mm)	100
Porosity (%)	100
Length (m)	40.674
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	103.368

Filter Area

Base Level (m)	8.350

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	950	35	50.0	Soil Type
	Storage	500	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	SW4.002
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW4.003
Outlet Type	Under Drain

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Advanced

Ponding Area

Base Perimeter (m)	89.904
Top Perimeter (m)	89.904

Block 2 RG

Type : Bioretention

Ponding Area

Exceedance Level (m)	10.400
Depth (m)	0.200
Base Level (m)	10.200
Top Area (m²)	467.17
Side Slope (1:X)	0.00
Base Area (m²)	467.17
Freeboard (mm)	100
Porosity (%)	100
Length (m)	109.384
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	341.776

Filter Area

Base Level (m)	8.300

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1000	35	50.0	Soil Type
	Storage	900	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 2 Public Realm (1)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 2 Roof
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

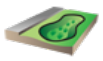
Outlet

Outgoing Connection	SW5.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	227.311
Top Perimeter (m)	227.311



Highways RG (1)

Type : Bioretention

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Ponding Area

Exceedance Level (m)	11.162
Depth (m)	0.200
Base Level (m)	10.962
Top Area (m²)	80.07
Side Slope (1:X)	0.00
Base Area (m²)	80.07
Freeboard (mm)	100
Porosity (%)	100
Length (m)	17.683
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	72.134

Filter Area

Base Level (m)	8.562

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1400	35	35.0	Soil Type
	Storage	1000	30	30.0	

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Block 10 Public Realm (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW7.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	44.421
Top Perimeter (m)	44.421

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Ponding Area

Exceedance Level (m)	11.562
Depth (m)	0.300
Base Level (m)	11.262
Top Area (m²)	668.72
Side Slope (1:X)	0.00
Base Area (m²)	668.72
Freeboard (mm)	100
Porosity (%)	100
Length (m)	67.751
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	618.579

Filter Area

Base Level (m)	9.062

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1200	35	50.0	Soil Type
	Storage	1000	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 10 Public Realm
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 10 Roof
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	SW6.000
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Northern Highway (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW6.001
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	155.242
Top Perimeter (m)	155.242

Highways RG

Type : Bioretention

Ponding Area

Exceedance Level (m)	11.423
Depth (m)	0.400
Base Level (m)	11.023
Top Area (m²)	176.74
Side Slope (1:X)	0.00
Base Area (m²)	176.74
Freeboard (mm)	100
Porosity (%)	100
Length (m)	53.249
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	165.234

Filter Area

Base Level (m)	9.123

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1000	35	50.0	Soil Type
	Storage	900	30	500.0	

Inlets

Outlets

Outlet

Outgoing Connection	SW6.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	113.137
Top Perimeter (m)	113.137

Block 1 RG

Type : Bioretention

Ponding Area

Exceedance Level (m)	10.500
Depth (m)	0.300
Base Level (m)	10.200
Top Area (m²)	321.23
Side Slope (1:X)	0.00
Base Area (m²)	321.23
Freeboard (mm)	100
Porosity (%)	100
Length (m)	65.078
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	245.752

Filter Area

Base Level (m)	8.500

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	900	35	50.0	Soil Type
	Storage	800	30	500.0	

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 1 Roof
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

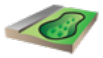
Outgoing Connection	SW3.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	140.029
Top Perimeter (m)	140.029

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		



Bioretention (10)

Type : Bioretention

Ponding Area

Exceedance Level (m)	10.361
Depth (m)	0.100
Base Level (m)	10.261
Top Area (m²)	246.15
Side Slope (1:X)	0.00
Base Area (m²)	246.15
Freeboard (mm)	100
Porosity (%)	100
Length (m)	48.242
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	156.231

Filter Area

Base Level (m)	8.361

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1100	35	50.0	Soil Type
	Storage	800	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Northern Highway (2)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	SW6.004
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW6.005
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	106.688
Top Perimeter (m)	106.688

Block 4 RG

Type : Bioretention

Ponding Area

Exceedance Level (m)	11.235
Depth (m)	0.400
Base Level (m)	10.835
Top Area (m²)	550.52
Side Slope (1:X)	0.00
Base Area (m²)	550.52
Freeboard (mm)	100
Porosity (%)	100
Length (m)	81.829
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	507.776

Filter Area

Base Level (m)	8.935

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	900	35	50.0	Soil Type
	Storage	1000	30	500.0	

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 4 Roof
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW1.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	177.113
Top Perimeter (m)	177.113

Highways RG (2)

Type : Bioretention

Ponding Area

Exceedance Level (m)	10.000
Depth (m)	0.255
Base Level (m)	9.745
Top Area (m²)	1869.13
Side Slope (1:X)	0.00
Base Area (m²)	1869.13
Freeboard (mm)	100
Porosity (%)	100
Length (m)	136.150
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	1250.679

Filter Area

Base Level (m)	8.245

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	4
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1000	35	50.0	Soil Type
	Storage	500	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Northern Highway
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	SW1.003
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	SW3.001
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	SW4.003
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	SW5.000
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	SW6.005
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW1.004
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	299.756
Top Perimeter (m)	299.756

Site Pond

Type : Pond

Dimensions

Exceedance Level (m)	10.000
Depth (m)	1.250
Base Level (m)	8.750
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.612
Total Volume (m³)	431.881

Depth (m)	Area (m²)	Volume (m³)
0.000	300.00	0.000
1.000	650.00	463.863

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	SW6.001
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW6.002
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	42.935
Friction Scheme	Manning's n
n	0.03

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 1 PP

Type : Porous Paving

Dimensions

Exceedance Level (m)	9.900
Depth (m)	1.500
Base Level (m)	8.400
Paving Layer Depth (mm)	400
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	36.945
Long. Slope (1:X)	200.00
Width (m)	12.811
Total Volume (m³)	158.015

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 1 Public Realm
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	SW3.000
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW3.001
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	30.0

Block 4 PP

Type : Porous Paving

Dimensions

Exceedance Level (m)	11.307
Depth (m)	1.800
Base Level (m)	9.507
Paving Layer Depth (mm)	300
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	75.692
Long. Slope (1:X)	200.00
Width (m)	6.821
Total Volume (m³)	236.095

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 4 Public Realm
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW2.000
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	30.0

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 2 PP

Type : Porous Paving

Dimensions

Exceedance Level (m)	10.500
Depth (m)	2.100
Base Level (m)	8.400
Paving Layer Depth (mm)	400
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	122.649
Long. Slope (1:X)	200.00
Width (m)	9.524
Total Volume (m³)	620.028

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	4
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 2 Public Realm
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	SW4.000
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW4.001
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	50.0

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
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	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 3 Tank

Type : Cellular Storage

Dimensions

Exceedance Level (m)	10.000
Depth (m)	0.600
Base Level (m)	8.450
Number of Crates Long	63
Number of Crates Wide	48
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	0.4
Crate Width (m)	0.4
Crate Height (m)	0.6
Total Volume (m³)	276.739

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 3 Roof
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW4.000
Outlet Type	Free Discharge

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 4 Tank

Type : Cellular Storage

Dimensions

Exceedance Level (m)	11.000
Depth (m)	1.000
Base Level (m)	8.900
Number of Crates Long	60
Number of Crates Wide	35
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	0.5
Crate Height (m)	0.5
Total Volume (m³)	499.850

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	SW2.000 Block 3 & 4 Highway
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW2.001
Outlet Type	Free Discharge

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 2 Tank

Type : Cellular Storage

Dimensions

Exceedance Level (m)	10.000
Depth (m)	0.600
Base Level (m)	8.380
Number of Crates Long	22
Number of Crates Wide	22
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	0.5
Crate Height (m)	0.6
Total Volume (m³)	69.990

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	SW4.001
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW4.002
Outlet Type	Free Discharge

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH6	FEH: 2 years: +0 %: 10080 mins: Summer	9.810	8.200	8.211	0.011	0.5	0.000	0.000	0.5	200.475	OK
MH5	FEH: 2 years: +0 %: 10080 mins: Summer	9.860	8.240	8.284	0.044	0.6	0.078	0.000	0.5	200.491	OK
MH1	FEH: 2 years: +0 %: 10080 mins: Summer	10.521	8.800	9.421	0.621	2.3	1.098	0.000	0.0	259.768	Surcharged
MH2	FEH: 2 years: +0 %: 10080 mins: Summer	11.076	8.700	9.022	0.322	4.0	0.569	0.000	3.5	914.573	OK
MH3	FEH: 2 years: +0 %: 10080 mins: Summer	12.487	8.600	9.258	0.658	2.5	1.163	0.000	1.0	260.241	Surcharged
MH4	FEH: 2 years: +0 %: 10080 mins: Summer	11.298	8.400	9.259	0.859	4.0	1.518	0.000	1.9	305.808	Surcharged

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH6	FEH: 30 years: +35 %: 30 mins: Summer	9.810	8.200	8.226	0.026	3.0	0.000	0.000	3.0	4.207	OK
MH5	FEH: 30 years: +35 %: 60 mins: Summer	9.860	8.240	8.643	0.403	4.9	0.711	0.000	3.0	12.880	Surcharged
MH1	FEH: 30 years: +35 %: 10080 mins: Summer	10.521	8.800	9.851	1.051	2.4	1.856	0.000	2.4	389.039	Surcharged
MH2	FEH: 30 years: +35 %: 30 mins: Summer	11.076	8.700	9.143	0.443	57.1	0.782	0.000	56.4	45.370	Surcharged
MH3	FEH: 30 years: +35 %: 10080 mins: Summer	12.487	8.600	9.258	0.658	2.3	1.163	0.000	1.1	304.143	Surcharged
MH4	FEH: 30 years: +35 %: 10080 mins: Winter	11.298	8.400	9.259	0.859	3.7	1.518	0.000	1.9	433.647	Surcharged

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by: GJ	Checked by: CP	Approved By: CP
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH6	FEH: 100 years: +40 %: 30 mins: Summer	9.810	8.200	8.226	0.026	3.0	0.000	0.000	3.0	5.622	OK
MH5	FEH: 100 years: +40 %: 60 mins: Summer	9.860	8.240	8.746	0.506	4.5	0.893	0.000	3.0	13.201	Surcharged
MH1	FEH: 100 years: +40 %: 10080 mins: Winter	10.521	8.800	9.851	1.051	2.7	1.858	0.000	2.6	418.424	Surcharged
MH2	FEH: 100 years: +40 %: 30 mins: Summer	11.076	8.700	9.157	0.457	70.1	0.807	0.000	69.7	59.600	Surcharged
MH3	FEH: 100 years: +40 %: 10080 mins: Winter	12.487	8.600	9.258	0.658	2.3	1.163	0.000	1.2	311.040	Surcharged
MH4	FEH: 100 years: +40 %: 10080 mins: Winter	11.298	8.400	9.259	0.859	3.2	1.518	0.000	1.9	456.949	Surcharged

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Block 3 Tank	FEH: 2 years: +0 %: 10080 mins: Summer	9.026	9.026	0.576	0.576	2.2	264.433	0.000	0.000	0.6	65.530	4.447	OK
Block 4 Tank	FEH: 2 years: +0 %: 10080 mins: Summer	9.421	9.421	0.521	0.521	2.2	259.905	0.000	0.000	1.5	57.778	48.003	OK
Block 3 RG	FEH: 2 years: +0 %: 30 mins: Winter	9.851	9.019	1.004	0.248	15.9	14.114	0.000	0.000	8.1	3.677	89.022	OK
Block 2 RG.1	FEH: 2 years: +0 %: 120 mins: Summer	8.431	8.350	0.000	0.000	0.0	3.968	0.000	0.000	0.0	0.000	96.161	OK
Block 2 RG	FEH: 2 years: +0 %: 15 mins: Summer	9.423	8.567	0.905	0.267	78.9	41.936	0.000	0.000	5.9	1.469	87.730	OK
Highways RG (1)	FEH: 2 years: +0 %: 10080 mins: Summer	9.260	9.259	0.663	0.697	11.9	21.293	0.000	0.000	12.0	688.262	70.481	OK
Block 10 RG	FEH: 2 years: +0 %: 15 mins: Summer	10.203	9.073	1.005	0.011	62.0	41.479	0.000	0.000	0.3	0.126	93.295	OK
Highways RG	FEH: 2 years: +0 %: 120 mins: Summer	9.229	9.132	0.000	0.009	0.1	4.332	0.000	0.000	0.0	0.115	97.378	OK
Block 1 RG	FEH: 2 years: +0 %: 15 mins: Summer	9.434	8.626	0.804	0.126	28.9	19.038	0.000	0.000	3.9	1.207	92.253	OK
Bioretention (10)	FEH: 2 years: +0 %: 10080 mins: Summer	9.257	9.018	0.800	0.658	5.8	53.567	0.000	0.000	11.9	598.095	65.713	OK
Block 4 RG	FEH: 2 years: +0 %: 15 mins: Summer	10.099	8.941	1.000	0.006	39.9	26.125	0.000	0.000	0.1	0.020	94.855	OK
Block 1 PP	FEH: 2 years: +0 %: 10080 mins: Winter	9.019	9.019	0.435	0.619	7.4	74.702	0.000	0.000	11.1	507.058	52.725	OK
Block 4 PP	FEH: 2 years: +0 %: 120 mins: Summer	9.941	9.510	0.055	0.002	4.5	3.272	0.000	0.000	0.0	0.203	98.614	OK
Site Pond	FEH: 2 years: +0 %: 10080 mins: Summer	9.258	9.258	0.508	0.508	2.7	191.676	0.000	0.000	1.3	76.515	55.618	OK
Highways RG (2)	FEH: 2 years: +0 %: 120 mins: Summer	9.018	8.249	0.500	0.004	20.6	69.966	0.000	0.000	0.0	0.072	94.406	OK
Block 2 PP	FEH: 2 years: +0 %: 10080 mins: Summer	9.026	8.722	0.013	0.322	6.7	35.482	0.000	0.000	11.1	280.349	94.277	OK
Block 2 Tank	FEH: 2 years: +0 %: 10080 mins: Summer	8.722	8.722	0.342	0.342	2.9	39.292	0.000	0.000	0.0	20.071	43.860	OK

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Block 3 Tank	FEH: 30 years: +35 %: 10080 mins: Summer	9.882	9.882	1.432	1.432	4.4	276.477	0.000	0.000	4.5	455.732	0.095	OK
Block 4 Tank	FEH: 30 years: +35 %: 10080 mins: Summer	9.849	9.849	0.949	0.949	3.7	473.179	0.000	0.000	2.0	163.620	5.336	OK
Block 3 RG	FEH: 30 years: +35 %: 15 mins: Winter	9.852	9.170	1.004	0.399	77.0	22.768	0.000	0.000	40.3	20.806	82.291	OK
Block 2 RG.1	FEH: 30 years: +35 %: 10080 mins: Summer	8.932	9.395	0.500	1.045	5.3	37.201	0.000	0.000	5.9	32.728	64.011	OK
Block 2 RG	FEH: 30 years: +35 %: 30 mins: Summer	10.473	9.101	1.954	0.801	255.7	153.298	0.000	0.000	45.4	64.118	55.147	OK
Highways RG (1)	FEH: 30 years: +35 %: 480 mins: Summer	9.597	9.562	1.000	1.000	4.8	11.548	0.000	0.000	6.0	24.981	83.991	OK
Block 10 RG	FEH: 30 years: +35 %: 15 mins: Summer	10.210	9.303	1.013	0.241	223.4	106.020	0.000	0.000	42.5	32.896	82.861	OK
Highways RG	FEH: 30 years: +35 %: 240 mins: Summer	9.347	9.347	0.118	0.224	2.2	13.270	0.000	0.000	1.5	4.313	91.969	OK
Block 1 RG	FEH: 30 years: +35 %: 15 mins: Summer	9.440	8.819	0.810	0.319	92.0	40.195	0.000	0.000	39.6	18.882	83.644	OK
Bioretention (10)	FEH: 30 years: +35 %: 30 mins: Summer	9.257	8.374	0.800	0.013	6.3	9.659	0.000	0.000	0.0	0.016	93.817	OK
Block 4 RG	FEH: 30 years: +35 %: 30 mins: Summer	10.107	9.208	1.008	0.273	128.7	70.912	0.000	0.000	45.2	52.351	86.035	OK
Block 1 PP	FEH: 30 years: +35 %: 10080 mins: Winter	9.019	9.019	0.434	0.619	6.5	74.694	0.000	0.000	10.7	741.318	52.730	OK
Block 4 PP	FEH: 30 years: +35 %: 10080 mins: Summer	9.905	9.850	0.019	0.342	7.7	24.779	0.000	0.000	10.2	532.882	89.505	OK
Site Pond	FEH: 30 years: +35 %: 10080 mins: Winter	9.258	9.258	0.508	0.508	2.6	191.700	0.000	0.000	1.2	147.586	55.613	OK
Highways RG (2)	FEH: 30 years: +35 %: 30 mins: Summer	9.019	8.571	0.502	0.326	170.7	165.841	0.000	0.000	4.4	5.293	86.740	OK
Block 2 PP	FEH: 30 years: +35 %: 10080 mins: Summer	9.883	9.882	0.869	1.482	8.1	411.874	0.000	0.000	9.2	722.495	33.572	OK
Block 2 Tank	FEH: 30 years: +35 %: 10080 mins: Summer	9.883	9.883	1.503	1.503	3.5	69.869	0.000	0.000	1.5	103.412	0.173	OK

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Block 3 Tank	FEH: 100 years: +40 %: 10080 mins: Winter	9.882	9.882	1.432	1.432	3.0	276.477	0.000	0.000	3.0	477.895	0.095	OK
Block 4 Tank	FEH: 100 years: +40 %: 10080 mins: Summer	9.849	9.849	0.949	0.949	3.9	473.200	0.000	0.000	1.9	235.813	5.332	OK
Block 3 RG	FEH: 100 years: +40 %: 30 mins: Summer	9.860	9.313	1.013	0.542	115.8	33.416	0.000	0.000	69.9	62.469	74.009	OK
Block 2 RG.1	FEH: 100 years: +40 %: 10080 mins: Summer	8.932	9.415	0.500	1.065	5.0	37.401	0.000	0.000	7.4	31.840	63.818	OK
Block 2 RG	FEH: 100 years: +40 %: 30 mins: Summer	10.574	9.111	2.055	0.811	337.7	192.923	0.000	0.000	48.1	99.741	43.553	Flood Risk
Highways RG (1)	FEH: 100 years: +40 %: 960 mins: Summer	9.597	9.562	1.000	1.000	11.6	14.377	0.000	0.000	14.0	93.139	80.069	OK
Block 10 RG	FEH: 100 years: +40 %: 15 mins: Summer	10.289	9.384	1.091	0.322	299.9	127.294	0.000	0.000	69.4	67.526	79.422	OK
Highways RG	FEH: 100 years: +40 %: 30 mins: Summer	10.034	10.116	0.805	0.993	60.0	51.478	0.000	0.000	3.7	0.850	68.846	OK
Block 1 RG	FEH: 100 years: +40 %: 15 mins: Summer	9.444	8.885	0.813	0.385	119.5	49.700	0.000	0.000	47.7	30.474	79.776	OK
Bioretention (10)	FEH: 100 years: +40 %: 30 mins: Summer	9.258	8.422	0.801	0.062	8.5	10.605	0.000	0.000	0.3	0.166	93.212	OK
Block 4 RG	FEH: 100 years: +40 %: 15 mins: Summer	10.103	9.236	1.004	0.301	193.0	85.717	0.000	0.000	55.2	45.285	83.119	OK
Block 1 PP	FEH: 100 years: +40 %: 10080 mins: Summer	9.019	9.019	0.434	0.619	7.2	74.700	0.000	0.000	11.9	829.548	52.726	OK
Block 4 PP	FEH: 100 years: +40 %: 10080 mins: Summer	9.907	9.850	0.021	0.342	6.6	24.781	0.000	0.000	10.9	715.698	89.504	OK
Site Pond	FEH: 100 years: +40 %: 10080 mins: Winter	9.258	9.258	0.508	0.508	3.0	191.701	0.000	0.000	1.3	161.186	55.612	OK
Highways RG (2)	FEH: 100 years: +40 %: 240 mins: Summer	9.018	9.800	0.501	1.555	109.9	408.419	0.000	0.000	8.7	69.672	67.344	OK
Block 2 PP	FEH: 100 years: +40 %: 10080 mins: Winter	9.883	9.882	0.869	1.482	9.5	411.856	0.000	0.000	9.4	737.546	33.575	OK
Block 2 Tank	FEH: 100 years: +40 %: 10080 mins: Winter	9.883	9.883	1.503	1.503	3.2	69.869	0.000	0.000	1.6	113.264	0.173	OK

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SW1.000	FEH: 2 years: +0 %: 10080 mins: Winter	Pipe	Block 4 RG	MH1	11.326	9.935	0.375	121.083	0.0	0.01	2.4	Surcharged
SW1.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	MH1	Block 3 RG	10.521	8.929	0.065	0.007	0.0	0	0.0	OK
SW1.002	FEH: 2 years: +0 %: 15 mins: Winter	Pipe	Block 3 RG	MH2	11.078	9.771	0.242	1.208	0.9	0.04	10.2	Surcharged
SW1.003	FEH: 2 years: +0 %: 10080 mins: Winter	Pipe	MH2	Highways RG (2)	11.076	9.022	0.161	0.000	0.1	0.02	3.5	OK
SW1.004	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Highways RG (2)	MH5	9.908	8.745	0.042	200.716	0.1	0	0.6	Surcharged
SW1.005	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	MH5	MH6	9.860	8.284	0.012	200.475	0.5	0	0.5	OK
SW3.001	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Block 1 PP	Highways RG (2)	9.993	8.926	0.310	0.001	0.0	0.01	1.9	Surcharged
SW3.000	FEH: 2 years: +0 %: 10080 mins: Winter	Pipe	Block 1 RG	Block 1 PP	10.013	9.300	0.375	0.142	0.1	0.01	4.2	Surcharged
SW4.003	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Block 2 RG.1	Highways RG (2)	9.641	8.350	0.000	0.000	0.0	0	0.0	OK
SW5.000	FEH: 2 years: +0 %: 10080 mins: Winter	Pipe	Block 2 RG	Highways RG (2)	10.000	9.200	0.361	0.000	0.0	0.02	3.5	Surcharged
SW4.000	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Block 3 Tank	Block 2 PP	9.782	9.026	0.294	34.273	0.0	0	0.6	Surcharged
SW6.001	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Block 10 RG	Site Pond	13.104	10.062	0.252	39.233	0.3	0.01	1.0	Surcharged
SW6.003	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	MH3	MH4	12.487	9.258	0.375	3.972	0.0	0.01	1.0	Surcharged
SW6.004	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	MH4	Bioretention (10)	11.298	9.259	0.375	0.000	0.0	0.02	1.9	Surcharged
SW7.000	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Highways RG (1)	MH4	11.364	9.241	0.375	210.682	0.0	0.01	4.0	Surcharged
SW6.005	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Bioretention (10)	Highways RG (2)	10.423	9.161	0.329	0.001	0.0	0.01	2.2	Surcharged
SW2.000	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	Block 4 PP	Block 4 Tank	11.737	9.526	0.048	0.368	0.0	0	0.0	OK
SW2.001	FEH: 2 years: +0 %: 60 mins: Summer	Pipe	Block 4 Tank	MH1	10.154	8.942	0.092	1.185	0.2	0.02	2.7	OK
SW6.002	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Site Pond	MH3	12.974	9.258	0.375	5.072	0.2	0.01	1.3	Surcharged
SW6.000	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Highways RG	Block 10 RG	11.486	9.124	0.005	0.046	0.0	0	0.0	OK
SW4.001	FEH: 2 years: +0 %: 10080 mins: Summer	Pipe	Block 2 PP	Block 2 Tank	18.750	8.501	0.332	40.367	0.3	0.02	2.9	OK

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by: GJ	Checked by: CP	Approved By: CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

SW4.002	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Block 2 Tank	Block 2 RG.1	17.557	8.380	0.000	0.000	0.0	0	0.0	OK

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SW1.000	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Block 4 RG	MH1	11.326	9.936	0.263	49.842	0.7	0.22	45.3	Surcharged
SW1.001	FEH: 30 years: +35 %: 10080 mins: Summer	Pipe	MH1	Block 3 RG	10.521	9.851	0.375	0.011	0.0	0.04	2.4	Surcharged
SW1.002	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Block 3 RG	MH2	11.078	9.772	0.375	46.935	0.8	0.25	57.1	Surcharged
SW1.003	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	MH2	Highways RG (2)	11.076	9.143	0.222	0.000	0.8	0.32	56.4	Surcharged
SW1.004	FEH: 30 years: +35 %: 60 mins: Summer	Pipe	Highways RG (2)	MH5	9.908	8.745	0.375	13.606	0.5	0.04	4.9	Surcharged
SW1.005	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	MH5	MH6	9.860	8.571	0.028	4.207	0.8	0.01	3.0	OK
SW3.001	FEH: 30 years: +35 %: 10080 mins: Winter	Pipe	Block 1 PP	Highways RG (2)	9.993	8.926	0.310	0.001	0.0	0.01	2.1	Surcharged
SW3.000	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Block 1 RG	Block 1 PP	10.013	9.302	0.240	2.325	0.5	0.13	36.4	Surcharged
SW4.003	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Block 2 RG.1	Highways RG (2)	9.641	8.350	0.002	0.003	0.0	0	0.0	OK
SW5.000	FEH: 30 years: +35 %: 60 mins: Summer	Pipe	Block 2 RG	Highways RG (2)	10.000	9.368	0.372	0.002	0.4	0.25	46.1	Surcharged
SW4.000	FEH: 30 years: +35 %: 360 mins: Summer	Pipe	Block 3 Tank	Block 2 PP	9.782	9.190	0.375	32.009	0.5	0.43	53.2	Surcharged
SW6.001	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Block 10 RG	Site Pond	13.104	10.064	0.171	92.697	1.3	0.39	65.7	Surcharged
SW6.003	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	MH3	MH4	12.487	8.995	0.375	7.487	0.8	0.16	22.8	Surcharged
SW6.004	FEH: 30 years: +35 %: 10080 mins: Summer	Pipe	MH4	Bioretention (10)	11.298	9.259	0.375	0.000	0.0	0.02	2.0	Surcharged
SW7.000	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Highways RG (1)	MH4	11.364	8.979	0.375	0.000	0.1	0.02	7.4	Surcharged
SW6.005	FEH: 30 years: +35 %: 10080 mins: Summer	Pipe	Bioretention (10)	Highways RG (2)	10.423	9.161	0.329	0.001	0.0	0.01	2.3	Surcharged
SW2.000	FEH: 30 years: +35 %: 120 mins: Summer	Pipe	Block 4 PP	Block 4 Tank	11.737	9.567	0.139	8.530	0.2	0.01	5.4	OK
SW2.001	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Block 4 Tank	MH1	10.154	9.034	0.195	1.875	0.6	0.06	11.3	OK
SW6.002	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Site Pond	MH3	12.974	8.995	0.320	10.500	1.1	0.16	34.1	OK
SW6.000	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Highways RG	Block 10 RG	11.486	9.133	0.024	0.312	0.0	0	0.0	OK
SW4.001	FEH: 30 years: +35 %: 240 mins: Summer	Pipe	Block 2 PP	Block 2 Tank	18.750	8.597	0.375	56.804	1.6	0.2	25.5	OK

SW4.002	FEH: 30 years: +35 %: 10080 mins: Winter	Pipe	Block 2 Tank	Block 2 RG.1	17.557	9.882	0.375	0.000	0.0	0.02	1.6	Surcharged

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SW1.000	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Block 4 RG	MH1	11.326	9.936	0.349	67.358	0.6	0.28	57.3	Surcharged
SW1.001	FEH: 100 years: +40 %: 10080 mins: Winter	Pipe	MH1	Block 3 RG	10.521	9.851	0.375	0.010	0.0	0.04	2.6	Surcharged
SW1.002	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Block 3 RG	MH2	11.078	9.774	0.375	61.156	0.8	0.3	70.1	Surcharged
SW1.003	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	MH2	Highways RG (2)	11.076	9.157	0.230	0.000	1.0	0.4	69.7	Surcharged
SW1.004	FEH: 100 years: +40 %: 360 mins: Summer	Pipe	Highways RG (2)	MH5	9.908	8.745	0.375	92.608	0.4	0.04	4.7	Surcharged
SW1.005	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	MH5	MH6	9.860	8.721	0.028	5.622	0.8	0.01	3.0	Surcharged
SW3.001	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	Block 1 PP	Highways RG (2)	9.993	8.926	0.309	0.001	0.0	0.02	3.2	Surcharged
SW3.000	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Block 1 RG	Block 1 PP	10.013	9.303	0.353	2.391	0.5	0.17	48.0	Surcharged
SW4.003	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Block 2 RG.1	Highways RG (2)	9.641	8.350	0.001	0.005	0.0	0	0.0	OK
SW5.000	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Block 2 RG	Highways RG (2)	10.000	10.218	0.373	0.002	0.4	0.26	48.1	Surcharged
SW4.000	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Block 3 Tank	Block 2 PP	9.782	9.420	0.375	31.158	1.4	1.28	159.4	Surcharged
SW6.001	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Block 10 RG	Site Pond	13.104	10.079	0.184	122.174	1.4	0.45	74.6	Surcharged
SW6.003	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	MH3	MH4	12.487	9.068	0.375	8.151	0.8	0.18	25.1	Surcharged
SW6.004	FEH: 100 years: +40 %: 10080 mins: Winter	Pipe	MH4	Bioretention (10)	11.298	9.259	0.375	0.000	0.0	0.02	1.9	Surcharged
SW7.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Highways RG (1)	MH4	11.364	8.884	0.375	0.000	0.1	0.03	10.1	OK
SW6.005	FEH: 100 years: +40 %: 10080 mins: Summer	Pipe	Bioretention (10)	Highways RG (2)	10.423	9.161	0.329	0.001	0.0	0.01	2.6	Surcharged
SW2.000	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Block 4 PP	Block 4 Tank	11.737	9.582	0.240	23.048	0.2	0.02	8.2	OK
SW2.001	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	Block 4 Tank	MH1	10.154	9.066	0.220	1.980	0.6	0.07	13.2	OK
SW6.002	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Site Pond	MH3	12.974	9.129	0.375	12.036	1.1	0.17	38.0	Surcharged
SW6.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Highways RG	Block 10 RG	11.486	9.914	0.375	9.170	0.0	0	0.0	Surcharged
SW4.001	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Block 2 PP	Block 2 Tank	18.750	8.724	0.375	69.068	2.2	0.58	73.3	OK

SW4.002	FEH: 100 years: +40 %: 10080 mins: Summer	Pipe	Block 2 Tank	Block 2 RG.1	17.557	9.883	0.375	0.000	0.0	0.02	1.7	Surcharged

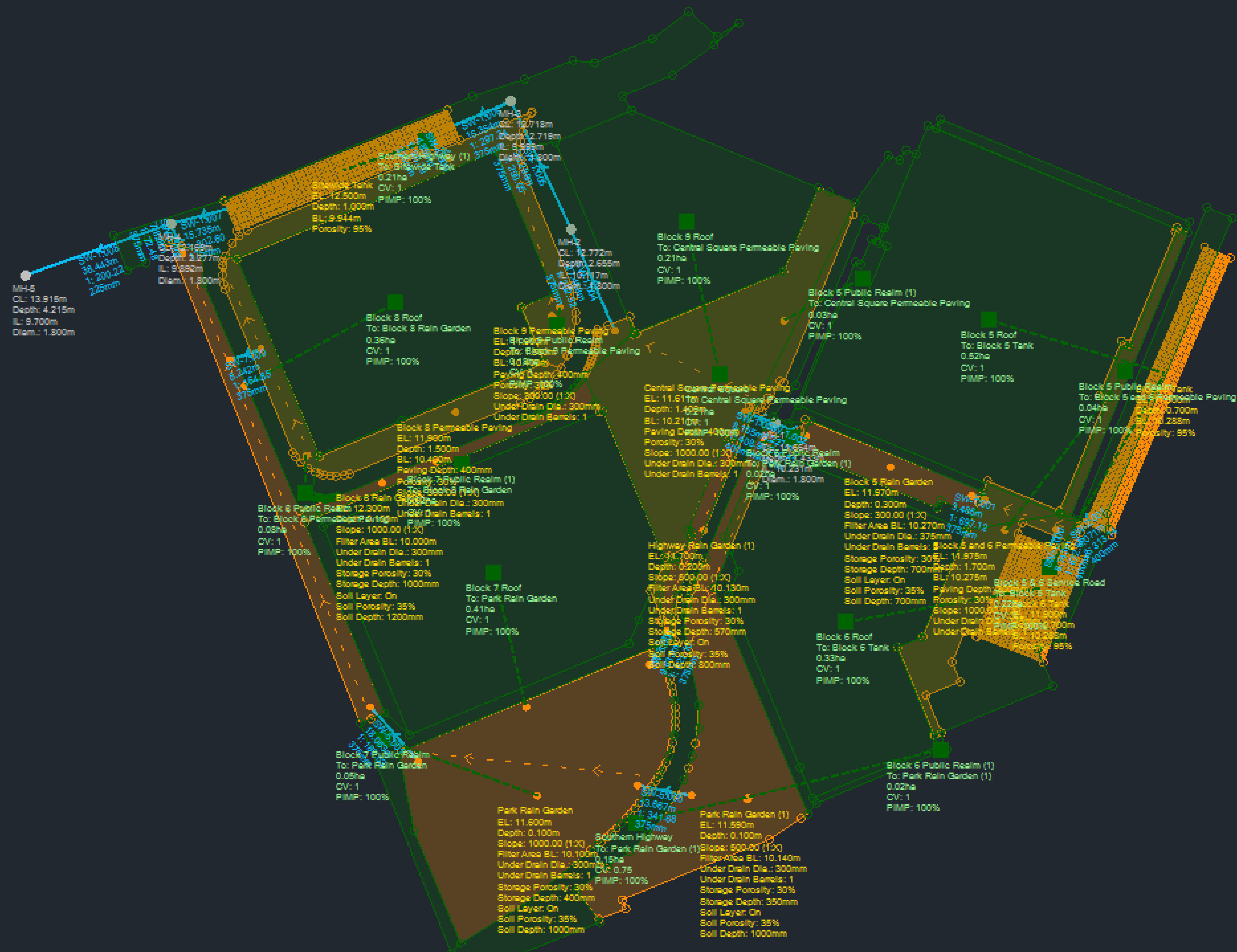
SOUTHERN CATCHMENT MODEL

Appendices

Railway Pensions Nominees Limited

Project Number: WIE17469-110

Document Reference: WIE17469-110-R-1-1-4-FRADS_Project Otter


MH-5
CL: 13.915m
Depth: 4.215m
IL: 9.700m
Diam.: 1.800m
SW-1.008
38.443m
1: 200.22
225mm
Sidewalk Tank
EL: 12.500m
Depth: 1.000m
BL: 9.944m
Porosity: 95%
Southern Highway (1)
To: Sidewalk Tank
0.21ha
CV: 1
PIMP: 100%
MH-2
CL: 12.772m
Depth: 2.655m
Block 9 Roof
To: Central Square Permeable Paving
0.21ha
CV: 1
PIMP: 100%
Block 5 Public Realm (1)
To: Central Square Permeable Paving
0.03ha
CV: 1
PIMP: 100%
Block 8 Roof
To: Block 8 Rain Garden
0.36ha
CV: 1
PIMP: 100%
Block 5 Roof
To: Block 5 Tank
0.52ha
CV: 1
PIMP: 100%
Block 8 Permeable Paving
EL: 11.800m
Depth: 1.500m
Block 5 Rain Garden
EL: 11.970m
Depth: 0.300m
Slope: 300.00 (1:X)
Filter Area BL: 10.270m
Under Drain Dia.: 375mm
Storage Depth: 700mm
Soil Layer: On
Soil Porosity: 35%
Soil Depth: 700mm
Block 8 Public Realm
To: Block 8 Permeable Paving
0.08ha
CV: 1
PIMP: 100%
Block 8 Rain Garden
EL: 12.300m
Slope: 1000.00 (1:X)
Filter Area BL: 10.000m
Under Drain Dia.: 300mm
Under Drain Barrels: 1
Storage Porosity: 30%
Storage Depth: 1000mm
Soil Layer: On
Soil Porosity: 35%
Soil Depth: 1200mm
Block 7 Roof
To: Park Rain Garden
0.41ha
CV: 1
PIMP: 100%
Highway Rain Garden (1)
EL: 11.700m
Depth: 0.300m
Slope: 500.00 (1:X)
Filter Area BL: 10.130m
Under Drain Dia.: 300mm
Under Drain Barrels: 1
Storage Porosity: 30%
Storage Depth: 570mm
Soil Layer: On
Soil Porosity: 35%
Soil Depth: 800mm
Block 6 Roof
To: Block 6 Tank
0.33ha
CV: 1
PIMP: 100%
Block 7 Public Realm
To: Park Rain Garden
0.05ha
CV: 1
PIMP: 100%
Block 6 Public Realm (1)
To: Park Rain Garden (1)
0.02ha
CV: 1
PIMP: 100%
Park Rain Garden
EL: 11.600m
Depth: 0.100m
Slope: 1000.00 (1:X)
Filter Area BL: 10.100m
Under Drain Dia.: 300mm
Under Drain Barrels: 1
Storage Porosity: 30%
Storage Depth: 400mm
Soil Layer: On
Soil Porosity: 35%
Soil Depth: 1000mm
Southern Highway
To: Park Rain Garden (1)
0.15ha
CV: 0.75
PIMP: 100%
Park Rain Garden (1)
EL: 11.590m
Depth: 0.100m
Slope: 500.00 (1:X)
Filter Area BL: 10.140m
Under Drain Dia.: 300mm
Under Drain Barrels: 1
Storage Porosity: 30%
Storage Depth: 350mm
Soil Layer: On
Soil Porosity: 35%
Soil Depth: 1000mm

Project:	Date:		
Project Otter Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Title:	Company Address:		
Rainfall Analysis Criteria	Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Runoff Type	Dynamic
Output Interval (mins)	1
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH

Type: FEH

Site Location	GB 546583 258531 TL 46583 58531
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	35.000
100.0	40.000

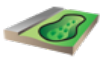
Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Inflow Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Block 5 & 6 Service Road	Block 5 Tank		Time of Concentration	0.220	100	0	100	0.220
Block 5 Public Realm	Block 5 and 6 Permeable Paving		Time of Concentration	0.039	100	0	100	0.039
Block 5 Public Realm (1)	Central Square Permeable Paving		Time of Concentration	0.034	100	0	100	0.034
Block 5 Roof	Block 5 Tank		Time of Concentration	0.523	100	0	100	0.523
Block 6 Public Realm	Park Rain Garden (1)		Time of Concentration	0.019	100	0	100	0.019
Block 6 Public Realm (1)	Park Rain Garden (1)		Time of Concentration	0.025	100	0	100	0.025
Block 6 Roof	Block 6 Tank		Time of Concentration	0.325	100	0	100	0.325
Block 7 Public Realm	Park Rain Garden		Time of Concentration	0.055	100	0	100	0.055
Block 7 Public Realm (1)	Block 8 Rain Garden		Time of Concentration	0.022	100	0	100	0.022
Block 7 Roof	Park Rain Garden		Time of Concentration	0.410	100	0	100	0.410
Block 8 Public Realm	Block 8 Permeable Paving		Time of Concentration	0.083	100	0	100	0.083
Block 8 Roof	Block 8 Rain Garden		Time of Concentration	0.355	100	0	100	0.355
Block 9 Public Realm	Block 9 Permeable Paving		Time of Concentration	0.176	100	0	100	0.176
Block 9 Roof	Central Square Permeable Paving		Time of Concentration	0.213	100	0	100	0.213
Central Square	Central Square Permeable Paving		Time of Concentration	0.209	100	0	100	0.209
Southern Highway	Park Rain Garden (1)		Time of Concentration	0.151	100	0	100	0.151
Southern Highway (1)	Sitewide Tank		Time of Concentration	0.209	100	0	100	0.209
TOTAL		**0.0**		**3.067**				**3.067**

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		



Park Rain Garden

Type : Bioretention

Ponding Area

Exceedance Level (m)	11.600
Depth (m)	0.100
Base Level (m)	11.500
Top Area (m²)	2826.08
Side Slope (1:X)	0.00
Base Area (m²)	2826.08
Freeboard (mm)	0
Porosity (%)	100
Length (m)	87.908
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	1615.216

Filter Area

Base Level (m)	10.100

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1000	35	50.0	Soil Type
	Storage	400	30	500.0	

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 7 Public Realm
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 7 Roof
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	SW-5.000
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	SW-6.000
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

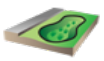
Outlet

Outgoing Connection	SW-5.001
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	240.113
Top Perimeter (m)	240.113



Block 5 Rain Garden Type : Bioretention

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Ponding Area

Exceedance Level (m)	11.970
Depth (m)	0.300
Base Level (m)	11.670
Top Area (m²)	364.23
Side Slope (1:X)	0.00
Base Area (m²)	364.23
Freeboard (mm)	100
Porosity (%)	100
Length (m)	48.482
Long. Slope (1:X)	300.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	246.068

Filter Area

Base Level (m)	10.270

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	375
No. of Barrels	2
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	700	35	50.0	Soil Type
	Storage	700	30	500.0	

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	SW-1.001
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

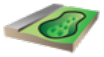
Outlet

Outgoing Connection	SW-1.002
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	111.990
Top Perimeter (m)	111.990



Block 8 Rain Garden Type : Bioretention

Ponding Area

Exceedance Level (m)	12.300
Depth (m)	0.100
Base Level (m)	12.200
Top Area (m²)	934.68
Side Slope (1:X)	0.00
Base Area (m²)	934.68
Freeboard (mm)	100
Porosity (%)	100
Length (m)	128.916
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	679.350

Filter Area

Base Level (m)	10.000

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1200	35	50.0	Soil Type
	Storage	1000	30	500.0	

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 7 Public Realm (1)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	SW-5.001
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	SW-7.000
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 8 Roof
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

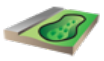
Outlet

Outgoing Connection	SW-5.002
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	272.333
Top Perimeter (m)	272.333



Highway Rain Garden (1)

Type : Bioretention

Ponding Area

Exceedance Level (m)	11.700
Depth (m)	0.200
Base Level (m)	11.500
Top Area (m²)	235.00
Side Slope (1:X)	0.00
Base Area (m²)	235.00
Freeboard (mm)	0
Porosity (%)	100
Length (m)	62.232
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	30.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	156.064

Filter Area

Base Level (m)	10.130

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	800	35	50.0	Soil Type
	Storage	570	30	500.0	

Inlets

Outlets

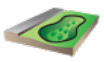
Outlet

Outgoing Connection	SW-6.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	132.016
Top Perimeter (m)	132.016



Park Rain Garden (1)

Type : Bioretention

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Ponding Area

Exceedance Level (m)	11.590
Depth (m)	0.100
Base Level (m)	11.490
Top Area (m²)	1794.89
Side Slope (1:X)	0.00
Base Area (m²)	1794.89
Freeboard (mm)	0
Porosity (%)	100
Length (m)	129.487
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	50.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	1000.875

Filter Area

Base Level (m)	10.140

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	1000	35	50.0	Soil Type
	Storage	350	30	500.0	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Southern Highway Block 6 Public Realm (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 6 Public Realm
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

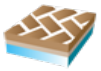
Outlet

Outgoing Connection	SW-5.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	286.697
Top Perimeter (m)	286.697



Central Square Permeable Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	11.611
Depth (m)	1.400
Base Level (m)	10.211
Paving Layer Depth (mm)	400
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	100.377
Long. Slope (1:X)	1000.00
Width (m)	22.581
Total Volume (m³)	684.951

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Central Square
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Block 9 Roof
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	SW-1.003
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 5 Public Realm (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-1.004
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	30.0

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
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	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 5 and 6 Permeable Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	11.975
Depth (m)	1.700
Base Level (m)	10.275
Paving Layer Depth (mm)	300
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	140.242
Long. Slope (1:X)	1000.00
Width (m)	7.187
Total Volume (m³)	434.180

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	375
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 5 Public Realm
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	SW-1.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Point Inflow
Incoming Item(s)	SW-2.001
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-1.001
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	30.0

Block 8 Permeable Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	11.900
Depth (m)	1.500
Base Level (m)	10.400
Paving Layer Depth (mm)	400
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	88.170
Long. Slope (1:X)	300.00
Width (m)	8.246
Total Volume (m³)	244.301

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 8 Public Realm
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-7.000
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	30.0

Block 9 Permeable Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	11.900
Depth (m)	1.500
Base Level (m)	10.400
Paving Layer Depth (mm)	400
Membrane Percolation (m/hr)	30.0
Porosity (%)	30
Length (m)	88.958
Long. Slope (1:X)	300.00
Width (m)	9.015
Total Volume (m³)	269.039

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	300
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 9 Public Realm
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-4.000
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	30.0

Sitewide Tank

Type : Cellular Storage

Dimensions

Exceedance Level (m)	12.500
Depth (m)	1.000
Base Level (m)	9.944
Number of Crates Long	120
Number of Crates Wide	16
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	0.5
Crate Height (m)	0.5
Total Volume (m³)	457.556

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Southern Highway (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	SW-4.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	SW-1.006
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-1.007
Outlet Type	Free Discharge

Advanced

Friction Scheme	Manning's n
n	0.009

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 5 Tank

Type : Cellular Storage

Dimensions

Exceedance Level (m)	11.900
Depth (m)	0.700
Base Level (m)	10.288
Number of Crates Long	150
Number of Crates Wide	14
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	0.5
Crate Height (m)	0.7
Total Volume (m³)	350.037

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 5 Roof
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Block 5 & 6 Service Road
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-2.001
Outlet Type	Free Discharge

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

Block 6 Tank

Type : Cellular Storage

Dimensions

Exceedance Level (m)	11.900
Depth (m)	0.700
Base Level (m)	10.288
Number of Crates Long	55
Number of Crates Wide	35
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	0.5
Crate Height (m)	0.7
Total Volume (m³)	320.943

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Block 6 Roof
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SW-1.000
Outlet Type	Free Discharge

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH-5	FEH: 2 years: +0 %: 360 mins: Summer	13.915	9.700	9.750	0.050	4.1	0.000	0.000	4.1	134.216	OK
MH-4	FEH: 2 years: +0 %: 1440 mins: Summer	12.169	9.892	10.264	0.372	6.1	0.948	0.000	4.1	344.488	Surcharged
MH-2	FEH: 2 years: +0 %: 1440 mins: Summer	12.772	10.117	10.264	0.147	5.5	0.374	0.000	5.3	118.934	OK
MH-3	FEH: 2 years: +0 %: 1440 mins: Summer	12.718	9.999	10.264	0.265	5.3	0.674	0.000	5.1	118.905	OK
MH-1	FEH: 2 years: +0 %: 120 mins: Summer	11.664	10.231	10.514	0.283	5.8	0.720	0.000	6.3	28.894	OK

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH-5	FEH: 30 years: +35 %: 60 mins: Summer	13.915	9.700	9.750	0.050	4.1	0.000	0.000	4.1	22.544	OK
MH-4	FEH: 30 years: +35 %: 480 mins: Summer	12.169	9.892	10.309	0.417	9.1	1.060	0.000	4.1	224.468	Surcharged
MH-2	FEH: 30 years: +35 %: 480 mins: Summer	12.772	10.117	10.309	0.192	7.1	0.488	0.000	7.1	28.323	OK
MH-3	FEH: 30 years: +35 %: 480 mins: Summer	12.718	9.999	10.309	0.310	7.1	0.788	0.000	6.6	28.995	OK
MH-1	FEH: 30 years: +35 %: 30 mins: Summer	11.664	10.231	10.925	0.694	30.9	1.765	0.000	24.0	43.096	Surcharged

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Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH-5	FEH: 100 years: +40 %: 60 mins: Summer	13.915	9.700	9.750	0.050	4.1	0.000	0.000	4.1	23.033	OK
MH-4	FEH: 100 years: +40 %: 480 mins: Summer	12.169	9.892	10.369	0.477	11.6	1.214	0.000	4.1	243.204	Surcharged
MH-2	FEH: 100 years: +40 %: 480 mins: Summer	12.772	10.117	10.369	0.252	8.9	0.642	0.000	8.9	44.325	OK
MH-3	FEH: 100 years: +40 %: 480 mins: Summer	12.718	9.999	10.369	0.370	8.9	0.942	0.000	8.2	45.663	OK
MH-1	FEH: 100 years: +40 %: 30 mins: Summer	11.664	10.231	11.076	0.845	85.0	2.150	0.000	67.7	96.831	Surcharged

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Central Square Permeable Paving	FEH: 2 years: +0 %: 360 mins: Summer	10.492	10.339	0.181	0.128	24.8	101.745	0.000	0.000	14.9	71.209	85.146	OK
Block 5 and 6 Permeable Paving	FEH: 2 years: +0 %: 10080 mins: Summer	10.638	10.641	0.223	0.366	20.6	88.897	0.000	0.000	13.8	3677.583	79.525	OK
Block 8 Permeable Paving	FEH: 2 years: +0 %: 10080 mins: Winter	11.137	11.133	0.443	0.733	8.9	127.887	0.000	0.000	7.7	151.972	47.652	OK
Block 9 Permeable Paving	FEH: 2 years: +0 %: 360 mins: Summer	10.783	10.484	0.087	0.084	9.1	19.837	0.000	0.000	8.0	36.314	92.627	OK
Sitewide Tank	FEH: 2 years: +0 %: 1440 mins: Summer	10.264	10.264	0.320	0.320	10.9	145.839	0.000	0.000	6.1	231.159	68.127	OK
Block 5 Tank	FEH: 2 years: +0 %: 10080 mins: Summer	10.638	10.638	0.350	0.350	5.0	174.690	0.000	0.000	7.0	1034.929	50.094	OK
Block 6 Tank	FEH: 2 years: +0 %: 10080 mins: Summer	10.638	10.638	0.350	0.350	4.7	160.189	0.000	0.000	5.9	824.703	50.088	OK
Park Rain Garden	FEH: 2 years: +0 %: 10080 mins: Summer	10.588	11.071	0.400	0.971	7.3	527.251	0.000	0.000	3.3	183.738	67.357	OK
Block 5 Rain Garden	FEH: 2 years: +0 %: 120 mins: Summer	10.516	10.514	0.085	0.244	6.1	24.118	0.000	0.000	9.3	29.862	90.199	OK
Block 8 Rain Garden	FEH: 2 years: +0 %: 15 mins: Summer	11.130	10.031	1.001	0.031	74.3	60.657	0.000	0.000	1.7	0.250	91.071	OK
Highway Rain Garden (1)	FEH: 2 years: +0 %: 15 mins: Summer	10.254	10.130	0.000	0.000	0.0	4.512	0.000	0.000	0.0	0.000	97.109	OK
Park Rain Garden (1)	FEH: 2 years: +0 %: 120 mins: Summer	10.749	10.197	0.350	0.057	15.6	72.833	0.000	0.000	0.3	0.357	92.723	OK

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Central Square Permeable Paving	FEH: 30 years: +35 %: 60 mins: Summer	10.895	10.300	0.584	0.089	205.2	178.236	0.000	0.000	8.9	28.157	73.978	OK
Block 5 and 6 Permeable Paving	FEH: 30 years: +35 %: 10080 mins: Summer	10.638	10.641	0.223	0.366	23.1	88.855	0.000	0.000	21.9	3916.316	79.535	OK
Block 8 Permeable Paving	FEH: 30 years: +35 %: 10080 mins: Summer	11.138	11.133	0.444	0.733	9.0	127.947	0.000	0.000	7.7	304.698	47.627	OK
Block 9 Permeable Paving	FEH: 30 years: +35 %: 60 mins: Summer	11.010	10.593	0.313	0.193	79.3	56.544	0.000	0.000	30.4	40.468	78.983	OK
Sitewide Tank	FEH: 30 years: +35 %: 480 mins: Summer	10.309	10.309	0.365	0.365	27.9	166.221	0.000	0.000	8.6	180.307	63.672	OK
Block 5 Tank	FEH: 30 years: +35 %: 240 mins: Summer	10.779	10.779	0.491	0.491	146.0	244.859	0.000	0.000	77.8	425.493	30.048	OK
Block 6 Tank	FEH: 30 years: +35 %: 240 mins: Summer	10.771	10.771	0.483	0.483	81.0	220.638	0.000	0.000	38.8	179.650	31.253	OK
Park Rain Garden	FEH: 30 years: +35 %: 10080 mins: Winter	10.588	10.777	0.400	0.677	7.0	465.265	0.000	0.000	3.6	171.749	71.195	OK
Block 5 Rain Garden	FEH: 30 years: +35 %: 30 mins: Summer	10.926	10.925	0.494	0.655	26.1	68.903	0.000	0.000	23.1	27.893	71.998	OK
Block 8 Rain Garden	FEH: 30 years: +35 %: 30 mins: Summer	11.153	10.264	1.024	0.264	236.7	157.011	0.000	0.000	40.9	34.279	76.888	OK
Highway Rain Garden (1)	FEH: 30 years: +35 %: 60 mins: Summer	10.693	10.650	0.438	0.520	35.0	38.383	0.000	0.000	12.6	9.816	75.406	OK
Park Rain Garden (1)	FEH: 30 years: +35 %: 15 mins: Winter	10.750	10.140	0.351	0.000	108.8	91.065	0.000	0.000	0.0	0.000	90.901	OK

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Central Square Permeable Paving	FEH: 100 years: +40 %: 60 mins: Summer	11.057	10.347	0.745	0.136	278.8	219.122	0.000	0.000	4.9	51.373	68.009	OK
Block 5 and 6 Permeable Paving	FEH: 100 years: +40 %: 360 mins: Winter	10.795	10.797	0.379	0.522	93.6	136.062	0.000	0.000	9.3	173.808	68.662	OK
Block 8 Permeable Paving	FEH: 100 years: +40 %: 30 mins: Summer	11.008	11.004	0.314	0.604	160.7	99.727	0.000	0.000	5.1	1.561	59.179	OK
Block 9 Permeable Paving	FEH: 100 years: +40 %: 30 mins: Summer	11.256	10.665	0.559	0.265	147.7	76.375	0.000	0.000	49.5	47.767	71.612	OK
Sitewide Tank	FEH: 100 years: +40 %: 480 mins: Summer	10.369	10.369	0.425	0.425	31.3	193.778	0.000	0.000	11.6	208.821	57.649	OK
Block 5 Tank	FEH: 100 years: +40 %: 120 mins: Summer	10.909	10.909	0.621	0.621	306.8	309.924	0.000	0.000	141.0	468.541	11.460	OK
Block 6 Tank	FEH: 100 years: +40 %: 120 mins: Summer	10.897	10.897	0.609	0.609	196.7	278.371	0.000	0.000	48.8	213.802	13.265	OK
Park Rain Garden	FEH: 100 years: +40 %: 10080 mins: Summer	10.588	10.755	0.400	0.655	7.2	459.118	0.000	0.000	3.5	173.464	71.575	OK
Block 5 Rain Garden	FEH: 100 years: +40 %: 30 mins: Summer	11.052	11.844	0.620	1.574	85.0	137.663	0.000	0.000	78.2	55.817	44.055	OK
Block 8 Rain Garden	FEH: 100 years: +40 %: 30 mins: Summer	11.228	10.315	1.100	0.315	321.9	175.041	0.000	0.000	35.0	60.583	74.234	OK
Highway Rain Garden (1)	FEH: 100 years: +40 %: 30 mins: Summer	10.764	11.614	0.509	1.484	75.8	63.843	0.000	0.000	40.6	25.927	59.092	OK
Park Rain Garden (1)	FEH: 100 years: +40 %: 60 mins: Summer	10.750	11.059	0.351	0.919	191.2	270.754	0.000	0.000	0.1	0.022	72.948	OK

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SW-1.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Block 5 and 6 Permeable Paving	Block 5 Rain Garden	11.370	10.280	0.000	0.000	0.0	0	0.0	OK
SW-1.002	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Block 5 Rain Garden	MH-1	11.603	10.403	0.232	1.143	0.1	0.05	8.4	OK
SW-1.003	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	MH-1	Central Square Permeable Paving	11.664	10.482	0.210	5.359	0.1	0.08	8.8	OK
SW-1.004	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	Central Square Permeable Paving	MH-2	12.369	10.361	0.106	49.647	0.7	0.13	14.6	OK
SW-1.005	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	MH-2	MH-3	12.772	10.258	0.198	49.623	0.3	0.12	14.3	OK
SW-1.008	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	MH-4	MH-5	12.169	10.253	0.051	134.216	0.6	0.11	4.1	Surcharged
SW-5.002	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	Block 8 Rain Garden	MH-4	12.164	11.000	0.307	48.302	0.4	0.06	14.1	Surcharged
SW-5.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Park Rain Garden	Block 8 Rain Garden	15.790	10.500	0.001	0.006	0.0	0	0.0	Surcharged
SW-7.000	FEH: 2 years: +0 %: 10080 mins: Winter	Pipe	Block 8 Permeable Paving	Block 8 Rain Garden	12.225	10.986	0.367	0.004	0.1	0.04	6.6	Surcharged
SW-4.000	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	Block 9 Permeable Paving	Sitewide Tank	12.326	10.482	0.053	34.644	0.8	0.04	8.0	OK
SW-5.000	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Park Rain Garden (1)	Park Rain Garden	11.767	10.140	0.000	0.000	0.0	0	0.0	OK
SW-6.000	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Highway Rain Garden (1)	Park Rain Garden	11.679	10.130	0.000	0.000	0.0	0	0.0	OK
SW-1.007	FEH: 2 years: +0 %: 480 mins: Summer	Pipe	Sitewide Tank	MH-4	12.154	10.245	0.328	121.153	0.2	0.06	6.6	OK
SW-1.006	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	MH-3	Sitewide Tank	12.718	10.254	0.282	49.065	0.2	0.12	13.9	OK
SW-1.000	FEH: 2 years: +0 %: 10080 mins: Winter	Pipe	Block 6 Tank	Block 5 and 6 Permeable Paving	11.293	10.638	0.287	58.328	0.1	0.08	7.3	OK
SW-2.001	FEH: 2 years: +0 %: 240 mins: Summer	Pipe	Block 5 Tank	Block 5 and 6 Permeable Paving	11.048	10.546	0.195	1.623	0.5	0.16	21.5	OK

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SW-1.001	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Block 5 and 6 Permeable Paving	Block 5 Rain Garden	11.370	10.397	0.006	0.000	0.0	0	0.0	OK
SW-1.002	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Block 5 Rain Garden	MH-1	11.603	10.799	0.400	10.492	0.3	0.21	34.2	Surcharged
SW-1.003	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	MH-1	Central Square Permeable Paving	11.664	10.878	0.400	15.728	0.3	0.3	35.0	Surcharged
SW-1.004	FEH: 30 years: +35 %: 480 mins: Winter	Pipe	Central Square Permeable Paving	MH-2	12.369	10.362	0.137	29.630	0.6	0.07	8.7	OK
SW-1.005	FEH: 30 years: +35 %: 480 mins: Winter	Pipe	MH-2	MH-3	12.772	10.301	0.243	29.623	0.3	0.07	8.4	OK
SW-1.008	FEH: 30 years: +35 %: 60 mins: Summer	Pipe	MH-4	MH-5	12.169	10.281	0.051	22.544	0.6	0.11	4.1	Surcharged
SW-5.002	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Block 8 Rain Garden	MH-4	12.164	11.005	0.293	28.888	0.5	0.16	38.4	Surcharged
SW-5.001	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Park Rain Garden	Block 8 Rain Garden	15.790	10.511	0.004	0.038	0.0	0	0.0	Surcharged
SW-7.000	FEH: 30 years: +35 %: 10080 mins: Summer	Pipe	Block 8 Permeable Paving	Block 8 Rain Garden	12.225	10.987	0.367	0.007	0.1	0.05	7.6	Surcharged
SW-4.000	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Block 9 Permeable Paving	Sitewide Tank	12.326	10.625	0.120	35.407	1.3	0.19	39.1	OK
SW-5.000	FEH: 30 years: +35 %: 15 mins: Summer	Pipe	Park Rain Garden (1)	Park Rain Garden	11.767	10.490	0.085	2.862	0.0	0	0.0	OK
SW-6.000	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Highway Rain Garden (1)	Park Rain Garden	11.679	10.606	0.299	8.102	0.2	0.18	20.3	Surcharged
SW-1.007	FEH: 30 years: +35 %: 30 mins: Summer	Pipe	Sitewide Tank	MH-4	12.154	10.238	0.320	4.495	0.3	0.1	10.9	OK
SW-1.006	FEH: 30 years: +35 %: 480 mins: Winter	Pipe	MH-3	Sitewide Tank	12.718	10.300	0.329	29.096	0.2	0.07	7.6	OK
SW-1.000	FEH: 30 years: +35 %: 120 mins: Summer	Pipe	Block 6 Tank	Block 5 and 6 Permeable Paving	11.293	10.770	0.400	58.579	0.3	0.48	43.5	Surcharged
SW-2.001	FEH: 30 years: +35 %: 60 mins: Summer	Pipe	Block 5 Tank	Block 5 and 6 Permeable Paving	11.048	10.737	0.372	1.454	1.2	0.98	130.7	Surcharged

Project:	Date:		
Project Otter (Southern Catchment Model) Beehive Centre Cambridge	23/10/2024		
	Designed by:	Checked by:	Approved By:
	GJ	CP	CP
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Waterman Group Pickfords Wharf, Clink Street, London SE1 9DG		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SW-1.001	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Block 5 and 6 Permeable Paving	Block 5 Rain Garden	11.370	10.476	0.069	0.000	0.0	0	0.0	OK
SW-1.002	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Block 5 Rain Garden	MH-1	11.603	11.700	0.400	14.342	0.6	0.45	73.4	Surcharged
SW-1.003	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	MH-1	Central Square Permeable Paving	11.664	11.043	0.400	34.379	0.6	0.63	73.2	Surcharged
SW-1.004	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	Central Square Permeable Paving	MH-2	12.369	10.371	0.205	24.077	0.6	0.08	8.9	OK
SW-1.005	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	MH-2	MH-3	12.772	10.369	0.311	22.478	0.3	0.08	8.9	OK
SW-1.008	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	MH-4	MH-5	12.169	10.347	0.051	23.033	0.6	0.11	4.1	Surcharged
SW-5.002	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Block 8 Rain Garden	MH-4	12.164	11.020	0.279	19.178	0.5	0.17	39.1	Surcharged
SW-5.001	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Park Rain Garden	Block 8 Rain Garden	15.790	10.530	0.209	11.068	0.0	0	0.0	Surcharged
SW-7.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Block 8 Permeable Paving	Block 8 Rain Garden	12.225	10.748	0.339	14.766	0.0	0	0.0	OK
SW-4.000	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Block 9 Permeable Paving	Sitewide Tank	12.326	10.717	0.136	43.058	1.4	0.24	49.4	OK
SW-5.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Park Rain Garden (1)	Park Rain Garden	11.767	10.492	0.368	34.305	0.0	0	0.0	OK
SW-6.000	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Highway Rain Garden (1)	Park Rain Garden	11.679	11.523	0.375	18.423	0.5	0.37	40.7	Surcharged
SW-1.007	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Sitewide Tank	MH-4	12.154	10.291	0.373	5.621	0.4	0.14	16.1	OK
SW-1.006	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	MH-3	Sitewide Tank	12.718	10.369	0.375	19.801	0.2	0.07	8.2	OK
SW-1.000	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Block 6 Tank	Block 5 and 6 Permeable Paving	11.293	10.875	0.400	55.398	0.4	0.54	48.8	Surcharged
SW-2.001	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Block 5 Tank	Block 5 and 6 Permeable Paving	11.048	10.837	0.400	1.315	1.5	1.39	185.5	Surcharged

H. Statutory Authority Consultations

Pre-Planning Assessment Report

Beehive Centre

InFlow Reference: PPE-0211319

Assessment Type: Used Water

Report published: 05/08/2024

Thank you for submitting a pre-planning enquiry.

This has been produced for Waterman Infrastructure & Environment.

Your reference number is **PPE-0211319**.

This report can be submitted as a drainage strategy for the development should it seek planning permission.

If you have any questions upon receipt of this report, you can submit a further question via InFlow. Alternatively, please contact the Planning & Capacity team on **07929 786 955** or email planningliaison@anglianwater.co.uk

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Section 1 - Proposed development

The response within this report has been based on the following information which was submitted as part of your application:

List of planned developments	
Type of development	**No. Of units**
Business	5

The anticipated residential build rate is:

Year	Y1
Build rate	5

Development type: Brownfield

Planning application status: Pending Consideration

Site grid reference number: TL4662258561

The comments contained within this report relate to the public water mains and sewers indicated on our records.

Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2 - Assets affected

Our records indicate that we have the following types of assets within or overlapping the boundary of your development site as listed in the table below.

Additionally, it is highly recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence. We are unable to permit development either over or within the easement strip without our prior consent. The extent of the easement is provided in the table below. Please be aware that the existing water mains/public sewers should be located in highway or open space and not in private gardens. This is to ensure available access for any future maintenance and repair and this should be taken into consideration when planning your site layout.

Water and Used water easement information		
Asset type	Pipe size (mm)	Total easement required (m)
Sewer mains	375	3.00 m either side of the centre line
Sewer mains	450	3.50 m either side of the centre line
Sewer mains	525	3.50 m either side of the centre line

If it is not possible to avoid our assets then these may need to be diverted in accordance with Section 185 of the Water Industry Act (1991). You will need to make a formal application if you would like a diversion to be considered.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3 - Water recycling services

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and effluent quality arising from your development.

Water recycling centre

The foul drainage from this development is in the catchment of Cambridge Water Recycling Centre which currently does not have capacity to treat the flows from the development site. Anglian Water has applied to the Environment Agency for an interim new permit to address exceedance. Please note that it is Anglian Water responsibility to take the necessary steps to ensure there is capacity to accommodate the domestic flows from the proposed development.

Our long-term plans for Cambridge WRC are linked to the Cambridge relocation project and the Development Consent Order. The new Cambridge WRC will take all existing domestic flows from current Cambridge WRC and all flows from the future growth within the WRC catchment. We are working with Greater Cambridgeshire to understand the long-term growth figures, using the emerging local plan allocations and planning permissions. This allows us to design and deliver a new Cambridge WRC which can meet future demand.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network.

This connection point has been determined in reference to the calculated discharge flow and on this basis, a 200mm internal diameter pipe is required to drain the development site. We have assessed your preferred connection points is to the 450mm sewer in Coldhams lane and to the 300mm sewer in York Street.

The sewer in Coldhams Lane has been assessed at manhole MH7701 at National Grid reference (NGR) TL 46768 58720, the cover level is unavailable and the invert level is 8.14, and the sewer in York Street has been assessed at manhole MH4401 at NGR TL 46448 58470, the cover and invert levels for this manhole are unavailable in our asset record.

Anglian Water has assessed the impact of gravity flows from the planned development to the public foul sewerage network. We can confirm that this is acceptable as the foul sewerage system, at present, has available capacity for your site. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

It is assumed that the developer will provide the necessary infrastructure to convey flows from the site to the network. Consequently, this report does not include any costs for the conveyance of flows.

Surface water disposal

In principle, your proposed method of surface water disposal is acceptable to Anglian Water. It is our understanding that the evidence to confirm compliance with the surface water hierarchy is not available.

Once the evidence has been confirmed, then connection points may be made to the 525mm surface water sewer in York Street, downstream of manhole MH3652, at NGR TL 46426 58531 and to the 375mm surface water sewer in Coldhams Lane, downstream of manhole MH6751, at NGR TL 46629 58785. These connections may discharge at a total site wide rate of 7.1 litres per second (l/s).

Our assessment has been based on development flows connecting to the nearest surface water sewer of adequate size to drain the proposed development. It is your responsibility to provide the evidence to confirm that all alternative methods of surface water disposal have been explored and these will be required before your connection can be agreed.

This is subject to satisfactory evidence which shows the surface water management hierarchy as outlined in Building Regulations Part H has been explored. This would encompass the results from the site specific infiltration testing and/or confirmation that the flows cannot be discharged to a watercourse. Anglian Water's surface water policy follows the Surface Water hierarchy, outlined in Part H of the Building Regulations. Should your assumptions or evidence change then an alternative solution, connection point or flow rate may be required. You are therefore advised to update Anglian Water with the key supporting evidence at your earliest convenience.

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our website. We will adopt features located in public open space that are designed and constructed, in conjunction with the Local Authority and Lead Local Flood Authority (LLFA), to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating than the assets can be maintained both now and in the future with adequate access.

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

Your development site will be required to pay an Infrastructure charge for each new property connecting to the public water and sewerage network that benefits from Full planning permission. The infrastructure charge replaces the zonal charge as previously identified.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991.

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

- The Infrastructure Charge is based on the cost of any reinforcement and upgrades to our existing network ("Network Reinforcements"), whether designed to address strategic or local capacity issues. For more information on our Infrastructure Charge, please see the 'Useful Information' section of this report.

Infrastructure charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage).

The Water Recycling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ To be Confirmed (TBC)	5	£TBC

Please note that you should also budget for infrastructure charges on non-household premises where applicable and these will be calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge and the relevant multiplier will be applied to the figures set out in our 2024-25 Developer Charging Arrangements to arrive at the amount payable. Details of the relevant multiplier for each fitting can be found on our website.

Section 4 – Points of Connection

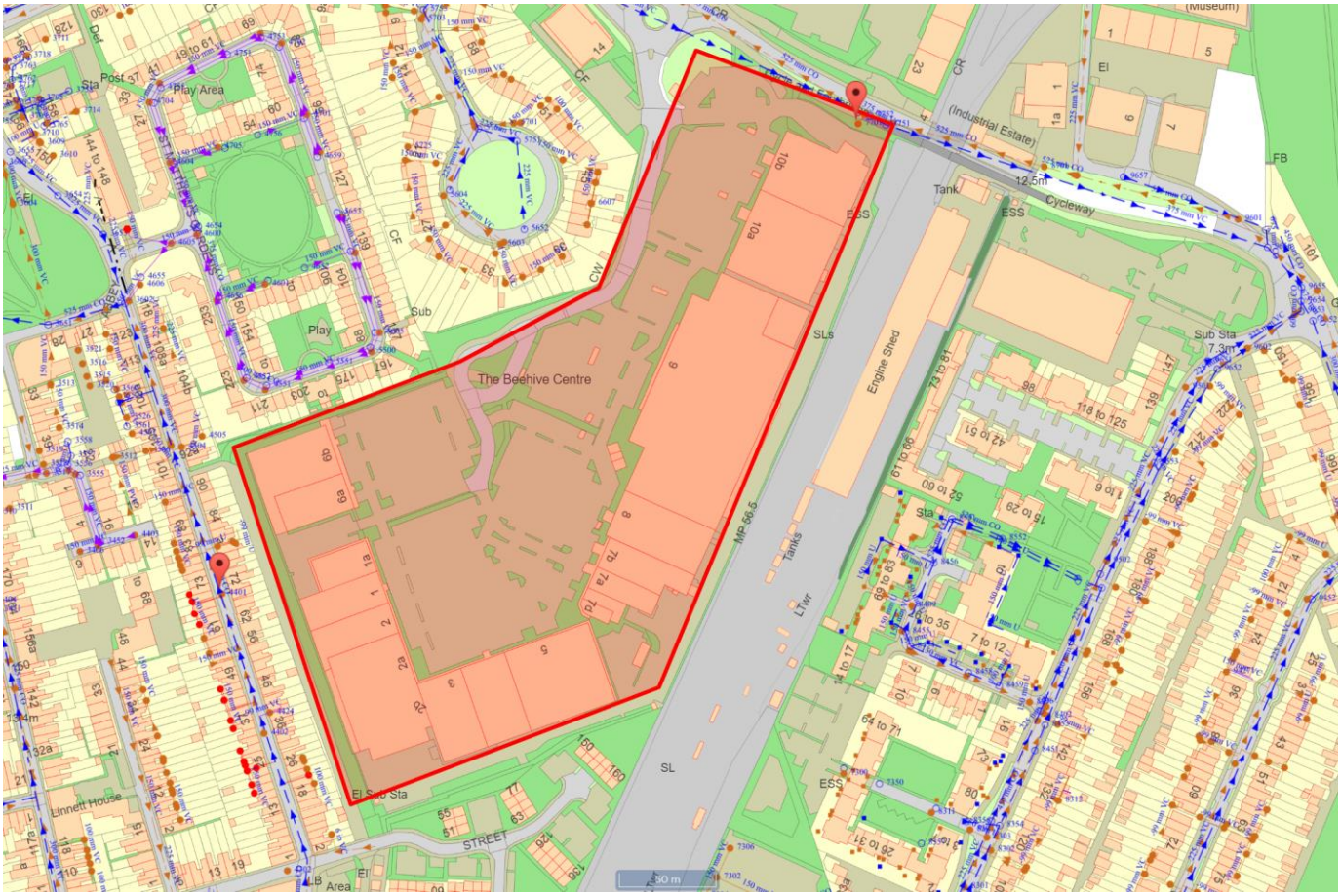

Figure 1 – Showing your water recycling foul points of connection

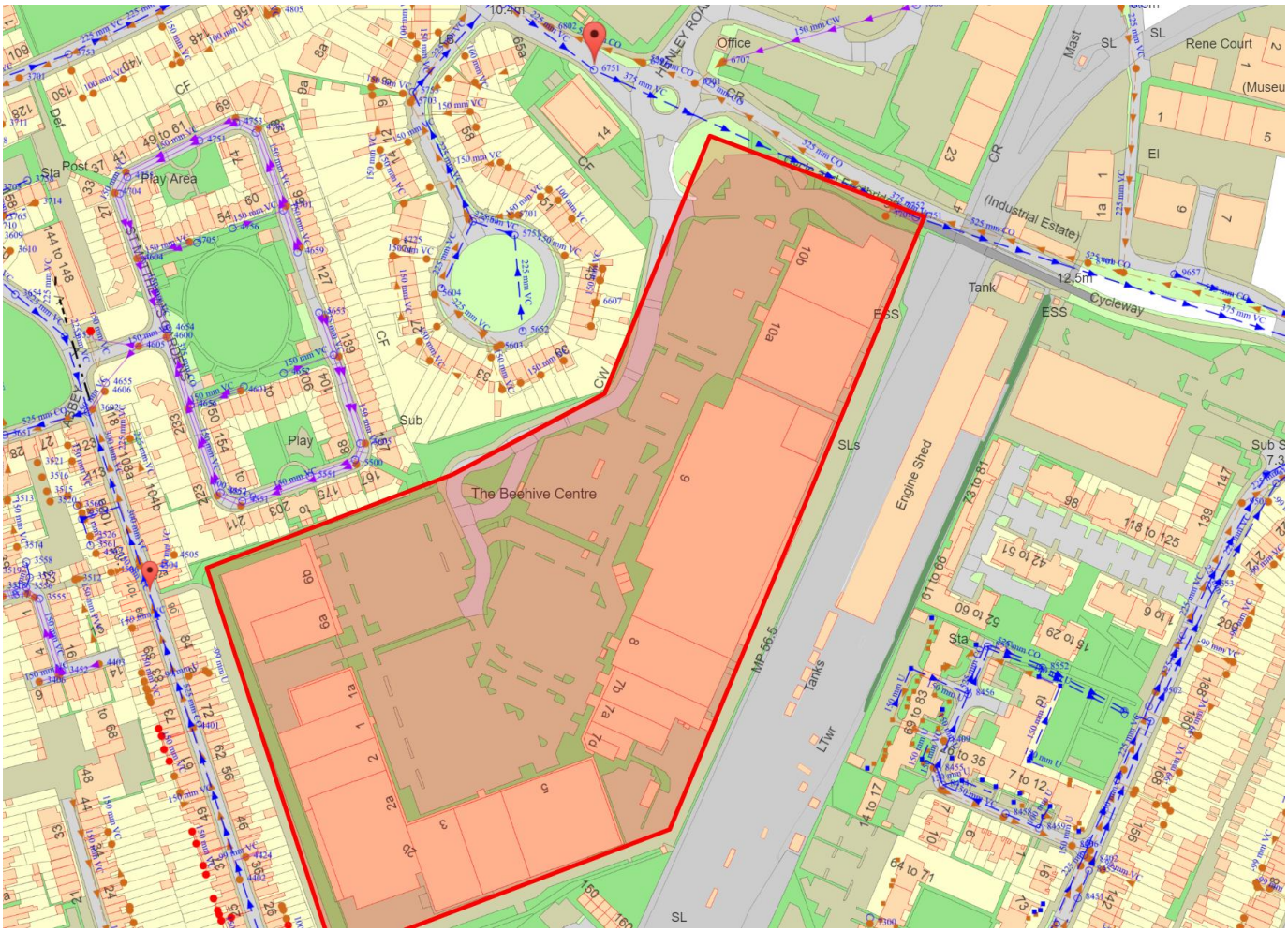

Figure 2 – Showing your water recycling surface water points of connection

Section 5 - Useful information

Water Industry Act – Key used water sections

Section 98:

This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

Section 102:

This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:

This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:

This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185

This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our website or via our Development Services team on **0345 60 66 087**.

Sustainable drainage systems

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term.

Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or SuDS.

SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website

We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site to discuss your application.

Private sewer transfers

Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:

Surface water sewers and lateral drains that do not discharge to the public sewer, e.g. those that discharged to a watercourse.

Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.

Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.

It is anticipated that all new sewer applications will need to have an approved Section104 application ahead of a Section 106 connection

Encroachment

Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our website

Locating our assets

Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from digdat

All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge.

We have more information on our website

Charging arrangements

Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our website

Section 6 - Disclaimer

The information provided in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content.

Furthermore, in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid from the date issued and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s). Our pre-planning reports are valid for 12 months, however please note Anglian Water cannot reserve capacity and available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

My ref: FR/23-000387
Your ref: 23/03204/OUT
Date: 04/09/2023
Doc no: 201109611
Officer: **Jessica Gething**
E Mail: **Jessica.Gething@cambridgeshire.gov.uk**

Executive Director: Frank Jordan
Place and Sustainability
Historic & Natural Environment

Cuma Ahmet
South Cambridgeshire Hall
Cambourne Business Park
Cambourne
Cambridge
CB23 6EA

New Shire Hall
Emery Crescent
Enterprise Campus
Alconbury Weald
PE28 4YE

Proposal: Outline application (with all matters reserved) for the demolition of existing buildings and structures and redevelopment of the site for a new local centre (E (a-f), F1(b-f), F2(b,d)), open space and employment (office and laboratory) floorspace (E(g)(i)(ii) to the ground floor and employment floorspace (office and laboratory) (E(g)(i)(ii) to the upper floors, along with supporting infrastructure, including pedestrian and cycle routes, vehicular access, car and cycle parking, servicing areas, landscaping and utilities. (The Development is the subject of an Environmental Impact Assessment)

Beehive Centre Coldhams Lane Cambridge CB1 3ET Cambridgeshire

Comments from Lead Local Flood Authority (LLFA)

Dear Cuma,

Thank you for your consultation which we received on 24th August 2023.

At present we **object** to the grant of planning permission for the following reasons:

1. **Hydraulic calculations**
The applicant has provided hydraulic modelling for the proposed impermeable areas across the site. It is noted that the Cv values for the winter and summer storms have been input as 0.84 and 0.75 respectively. However, as the modelling is for the impermeable area, these values should be set to 1 to account for the total runoff during storm events.

In accordance with the latest climate change peak rainfall intensity allowances, a climate change allowance should be incorporated into the surface water management scheme for the 3.3% annual exceedance probability rainfall event. The allowance used should be based on the lifetime of the development and therefore should include a 35% climate change allowance on the 3.3% AEP hydraulic calculations.

2. **Exceedance flow paths**
In the event of blockage, exceedance flow paths need to include flood volumes, depths, velocities, and extents, these should be mapped onto a topographical plan of the site. Levels on the topographical plan should represent the post-development situation.

3. **Inappropriate discharge rate**
The proposed discharge rate of 82.2 l/s is excessive when compared to greenfield runoff rate of 36.6 l/s. As outlined in paragraph 6.3.8 of the SPD, brownfield (previously developed land) sites must reduce the existing runoff from the site as part of the redevelopment. Where possible, to provide betterment, redevelopments should look to reinstate greenfield runoff rates.

4. **Sewer undertaker consent required**
The applicant plans to discharge surface water from the site into an existing Private surface water network then into an existing Anglian Water surface water network. However, an 'in-principle' agreement from the sewer undertaker is required to discharge into their system at an agreed rate.

Informatives

Signage
Appropriate signage should be used in multi-function open space areas that would normally be used for recreation but infrequently can flood during extreme events. The signage should clearly explain the use of such areas for flood control and recreation. It should be fully visible so that infrequent flood inundation does not cause alarm. Signage should not be used as a replacement for appropriate design.

Green Roofs
All green roofs should be designed, constructed and maintained in line with the CIRIA SuDS Manual (C753) and the Green Roof Code (GRO).

Pollution Control
Surface water and groundwater bodies are highly vulnerable to pollution and the impact of construction activities. It is essential that the risk of pollution (particularly during the construction phase) is considered and mitigated appropriately. It is important to remember that flow within the watercourse is likely to vary by season and it could be dry at certain times throughout the year. Dry watercourses should not be overlooked as these watercourses may flow or even flood following heavy rainfall.

Assistance For Developers

- Cambridgeshire County Council has a surface water guidance document which is available to view here. This document provides checklists and templates to help ensure you include sufficient information within your drainage strategies. Following this guidance will help reduce the risk of an objection which can hold up a planning application.

- We also offer a pre-application service which enables you to discuss your drainage proposals with the LLFA Officers prior to submission of a formal application.

Yours sincerely,

H Tandy

Hilary Tandy
Flood Risk Business Manager

If you have any queries regarding this application, please contact the Officer named at the top of this letter (contact details are above).

Please note: We are reliant on the accuracy and completeness of the reports in undertaking our review and can take no responsibility for incorrect data or interpretation made by the authors.

I. LLFA Surface Water Drainage Pro-Forma