

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
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Methodology

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

Notes

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

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

Soil characteristics

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

(2) Are flow rates $< 5.0 \text{ l/s}$?

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.

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

(3) Is $\text{SPR/SPRHOST} \leq 0.3$?

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

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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

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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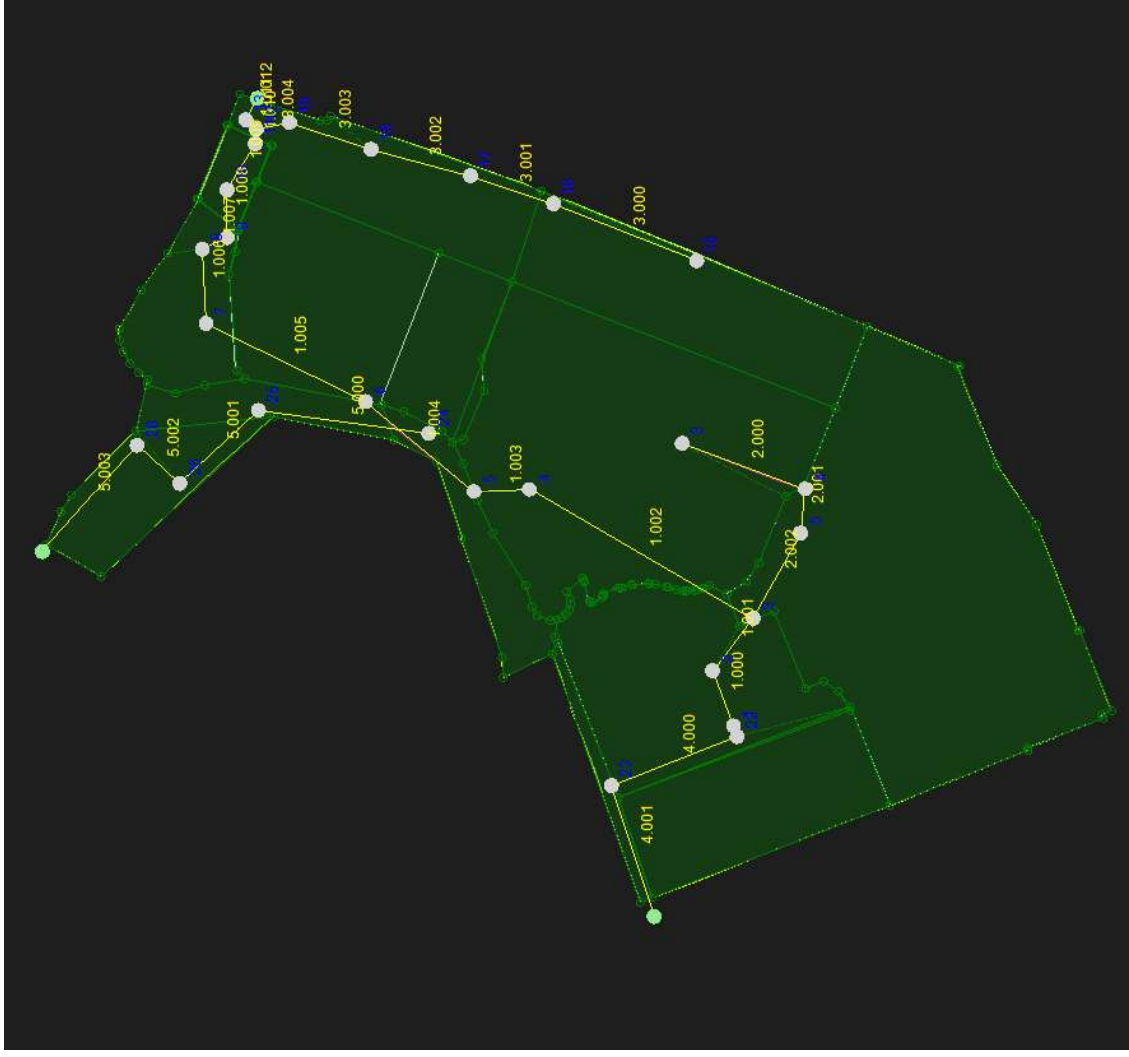
Existing Site Brownfield Runoff Calculations

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

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Waterman Group		Page 1
Pickfords Wharf Clink Street London, SE1 9DG		
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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

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Page 2



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

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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

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Page 4



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 Coefficient 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

						Water	Surcharged	Flooded	
	US/MH				US/CL	Level	Depth	Volume	Flow /
PN	Name	Event			(m)	(m)	(m)	(m³)	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

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Waterman Group		Page 5
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2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH		Pipe	Status
	Name	Overflow (l/s)	Flow (l/s)	
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

Waterman Group		Page 6
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2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water			Volume (m³)	Flow / Cap.	Overflow (l/s)
				Level (m)	Depth (m)	Flooded			
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		Status
		Flow (l/s)		
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	

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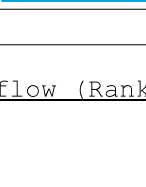
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Page 7



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

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Waterman Group		Page 8
Pickfords Wharf Clink Street London, SE1 9DG		
Date 11/08/2023 11:37 File 230811_Existing.MDX	Designed by CSSW Checked by	
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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

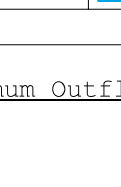
PN	US/MH		Pipe	Status
	Name	Overflow (l/s)	Flow (l/s)	
1.000	1		34.8	FLOOD
1.001	2		217.0	SURCHARGED
2.000	3		254.6	FLOOD
2.001	4		629.7	FLOOD
2.002	5		591.2	FLOOD
1.002	3		106.7	FLOOD
1.003	4		101.1	SURCHARGED
1.004	5		99.5	SURCHARGED
1.005	6		99.4	SURCHARGED
1.006	7		129.4	FLOOD
1.007	8		152.5	FLOOD
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

Waterman Group		Page 9
Pickfords Wharf Clink Street London, SE1 9DG		
Date 11/08/2023 11:37 File 230811_Existing.MDX	Designed by CSSW Checked by	
Innovyze	Network 2020.1.3	

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

PN	US/MH Name	Event	US/CL (m)	Water			Flooded	
				Level (m)	Depth (m)	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	Pipe 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

Waterman Group		Page 10
Pickfords Wharf Clink Street London, SE1 9DG		
Date 11/08/2023 11:37 File 230811_Existing.MDX		
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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 * 10m ³ /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

US/MH	Event	US/CL	Water Level	Surcharged Depth	Flooded Volume	Flow / Cap.
PN	Name	(m)	(m)	(m)	(m ³)	
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

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Waterman Group		Page 11
Pickfords Wharf Clink Street London, SE1 9DG		
Date 11/08/2023 11:37 File 230811_Existing.MDX	Designed by CSSW Checked by	
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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH		Pipe	Status
	Name	Overflow (l/s)	Flow (l/s)	
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

Waterman Group		Page 12
Pickfords Wharf Clink Street London, SE1 9DG		
Date 11/08/2023 11:37 File 230811_Existing.MDX	Designed by CSSW Checked by	
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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	Pipe 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	

Waterman Group

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Date 11/08/2023 11:37
File 230811_Existing.MDX

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Page 13



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Network 2020.1.3

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

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F. Proposed Drainage Arrangements

Appendices

Railway Pensions Nominees Limited

Project Number: WIE17469-110

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