

Waterman Group		Page 1																												
Pickfords Wharf Clink Street London, SE1 9DG																														
Date 17/01/2023 10:39	Designed by MRNF																													
File Microdrainage (12 Jan 2...	Checked by																													
Innovyze	Network 2020.1.3																													
<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for Storm</u> Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table> <tr> <td>Return Period (years)</td> <td>100</td> <td>PIMP (%)</td> <td>100</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.100</td> <td>Add Flow / Climate Change (%)</td> <td>40</td> </tr> <tr> <td>Ratio R</td> <td>0.357</td> <td>Minimum Backdrop Height (m)</td> <td>0.200</td> </tr> <tr> <td>Maximum Rainfall (mm/hr)</td> <td>50</td> <td>Maximum Backdrop Height (m)</td> <td>1.500</td> </tr> <tr> <td>Maximum Time of Concentration (mins)</td> <td>30</td> <td>Min Design Depth for Optimisation (m)</td> <td>1.200</td> </tr> <tr> <td>Foul Sewage (l/s/ha)</td> <td>0.000</td> <td>Min Vel for Auto Design only (m/s)</td> <td>1.00</td> </tr> <tr> <td>Volumetric Runoff Coeff.</td> <td>0.750</td> <td>Min Slope for Optimisation (1:X)</td> <td>500</td> </tr> </table> Designed with Level Soffits			Return Period (years)	100	PIMP (%)	100	M5-60 (mm)	18.100	Add Flow / Climate Change (%)	40	Ratio R	0.357	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
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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	-	-	100	0.018	0.018	0.018
3.000	-	-	100	0.016	0.016	0.016
3.001	-	-	100	0.047	0.047	0.047
3.002	-	-	100	0.040	0.040	0.040
4.000	-	-	100	0.010	0.010	0.010
5.000	-	-	100	0.012	0.012	0.012
5.001	-	-	100	0.015	0.015	0.015
4.001	-	-	100	0.019	0.019	0.019
3.003	-	-	100	0.015	0.015	0.015
3.004	-	-	100	0.007	0.007	0.007
6.000	-	-	100	0.021	0.021	0.021
3.005	-	-	100	0.021	0.021	0.021
3.006	-	-	100	0.009	0.009	0.009
3.007	-	-	100	0.006	0.006	0.006
7.000	-	-	100	0.015	0.015	0.015
8.000	-	-	100	0.013	0.013	0.013
9.000	-	-	100	0.015	0.015	0.015
8.001	-	-	100	0.027	0.027	0.027
3.008	-	-	100	0.031	0.031	0.031
3.009	-	-	100	0.000	0.000	0.000
3.010	-	-	100	0.000	0.000	0.000
3.011	-	-	100	0.024	0.024	0.024
3.012	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.016	0.016	0.016
10.000	-	-	100	0.016	0.016	0.016
10.001	-	-	100	0.018	0.018	0.018
10.002	-	-	100	0.000	0.000	0.000
10.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.431	0.431	0.431

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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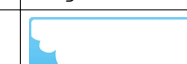
2.001		52.090	45.971	0.000	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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10.003		50.560	46.352	0.000	1200	0
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10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) <u>for Storm</u>									
<u>Simulation Criteria</u>									
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		45.000			
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		2		Number of Time/Area Diagrams		0			
Number of Offline Controls		0		Number of Real Time Controls		0			
<u>Synthetic Rainfall Details</u>									
Rainfall Model		FSR		Ratio R		0.357			
Region England and Wales Cv (Summer)		0.750							
M5-60 (mm)		18.100		Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)		300.0							
Analysis Timestep		2.5 Second Increment (Extended)							
DTS Status		ON							
DVD Status		OFF							
Inertia Status		OFF							
Profile(s)		Summer and Winter							
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440							
Return Period(s) (years)		10							
Climate Change (%)		0							
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.000	S1	15 Winter	10	+0%					46.180
3.000	S21	1440 Winter	10	+0%					50.445
3.001	S20	1440 Winter	10	+0%	10/1440	Winter			50.445
3.002	S19	1440 Winter	10	+0%	10/1440	Winter			50.445
4.000	S14	1440 Winter	10	+0%	10/960	Winter			50.445
5.000	S15	1440 Winter	10	+0%	10/1440	Winter			50.445
5.001	S16	1440 Winter	10	+0%	10/1440	Winter			50.445
4.001	S17	1440 Winter	10	+0%	10/1440	Winter			50.445
3.003	S18	1440 Winter	10	+0%	10/720	Winter			50.445
3.004	S13	1440 Winter	10	+0%	10/720	Winter			50.445
6.000	S11	1440 Winter	10	+0%	10/720	Winter			50.445
3.005	S12	1440 Winter	10	+0%	10/720	Winter			50.445
3.006	S10	1440 Winter	10	+0%	10/600	Winter			50.445
3.007	S9	1440 Winter	10	+0%	10/480	Winter			50.445
7.000	S5	1440 Winter	10	+0%	10/360	Winter			50.445
8.000	S6	1440 Winter	10	+0%					50.445
9.000	S7	1440 Winter	10	+0%					50.445
8.001	S8	1440 Winter	10	+0%	10/360	Winter			50.445
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10 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Cap.					
2.000	S1	-0.069	0.000	0.56				6.1	OK	
3.000	S21	-0.160	0.000	0.01				0.3	OK	
3.001	S20	0.183	0.000	0.02				1.2	SURCHARGED	
3.002	S19	0.420	0.000	0.04				1.9	SURCHARGED	
4.000	S14	0.620	0.000	0.00				0.2	FLOOD RISK	
5.000	S15	0.415	0.000	0.00				0.2	FLOOD RISK	
5.001	S16	0.456	0.000	0.01				0.5	FLOOD RISK	
4.001	S17	0.483	0.000	0.01				1.0	FLOOD RISK	
3.003	S18	0.839	0.000	0.02				3.4	SURCHARGED	
3.004	S13	0.933	0.000	0.05				9.0	SURCHARGED	
6.000	S11	0.910	0.000	0.02				0.6	SURCHARGED	
3.005	S12	0.971	0.000	0.06				12.5	SURCHARGED	
3.006	S10	1.112	0.000	0.10				17.5	SURCHARGED	
3.007	S9	1.210	0.000	0.09				16.0	SURCHARGED	
7.000	S5	1.425	0.000	0.18				5.4	SURCHARGED	
8.000	S6	-0.150	0.000	0.01				0.2	OK	
9.000	S7	-0.150	0.000	0.01				0.3	OK	
8.001	S8	1.309	0.000	0.14				6.2	SURCHARGED	

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10 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
3.008	Tank	1440 Winter	10	+0%	10/15 Summer		
3.009	Tank Outlet	1440 Winter	10	+0%	10/15 Summer		
3.010	S4	1440 Winter	10	+0%	10/15 Summer		
3.011	S3	1440 Winter	10	+0%	10/15 Summer		
3.012	S2 (FC 1)	1440 Winter	10	+0%	10/15 Summer		
2.001	C01	15 Winter	10	+0%			
10.000	S22	960 Winter	10	+0%	10/30 Winter	10/180 Winter	
10.001	S23	960 Winter	10	+0%	10/30 Summer	10/180 Winter	
10.002	S24 (FC2)	720 Winter	10	+0%	10/15 Summer		
10.003	C02	240 Winter	10	+0%			

PN	US/MH Name	Water			Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)
		Overflow Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
3.008	Tank		50.445	2.710	0.000	0.89				119.2
3.009	Tank Outlet		50.445	2.710	0.000	0.59				99.3
3.010	S4		50.445	3.087	0.000	0.43				72.3
3.011	S3		50.445	3.430	0.000	0.23				38.8
3.012	S2 (FC 1)		50.445	4.006	0.000	0.00				0.2
2.001	C01		46.151	-0.146	0.000	0.27				11.9
10.000	S22		48.902	0.677	1.563	0.00				0.7
10.001	S23		48.902	0.759	2.073	0.06				11.0
10.002	S24 (FC2)		48.997	1.241	0.000	0.01				0.1
10.003	C02		46.486	-0.298	0.000	0.00				0.1

PN	US/MH Name	Status	Level Exceeded
3.008	Tank	SURCHARGED	
3.009	Tank Outlet	SURCHARGED	
3.010	S4	SURCHARGED	
3.011	S3	SURCHARGED	
3.012	S2 (FC 1)	SURCHARGED	
2.001	C01	OK	
10.000	S22	FLOOD	14
10.001	S23	FLOOD	14
10.002	S24 (FC2)	SURCHARGED	
10.003	C02	OK	