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Barton Arcade Manchester M3 2BH		
Date 20/03/2025 16:04 File SW 241129 stormbrake.mdx	Designed by phill Checked by	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

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# - Indicates pipe length does not match coordinates
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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	57.670	1.873	30.8	0.141	5.00	0.0	0.600	o	300	Pipe/Conduit		
1.001	26.392	0.066	399.9	0.413	0.00	0.0	0.600	o	600	Pipe/Conduit		
2.000	17.119	0.150	114.1	0.031	5.00	0.0	0.600	o	300	Pipe/Conduit		
2.001	12.383	0.089	139.1	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit		
1.002	38.385	0.097	395.7	0.013	0.00	0.0	0.600	o	900	Pipe/Conduit		
1.003	20.598	0.051	403.9	0.099	0.00	0.0	0.600	o	900	Pipe/Conduit		
3.000	17.776	0.050	355.5	0.000	5.00	0.0	0.600	o	750	Pipe/Conduit		

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	100.00	5.34	74.000	0.141	0.0	0.0	0.0	2.84	201.0	43.3
1.001	100.00	5.70	71.827	0.554	0.0	0.0	0.0	1.21	342.6	170.0
2.000	100.00	5.19	72.300	0.031	0.0	0.0	0.0	1.47	104.0	9.5
2.001	100.00	5.29	71.850	0.031	0.0	0.0	0.0	2.06	583.2	9.5
1.002	100.00	6.11	71.461	0.598	0.0	0.0	0.0	1.57	998.1	183.5
1.003	98.79	6.33	71.364	0.697	0.0	0.0	0.0	1.55	987.9	211.3
3.000	100.00	5.20	71.688	0.000	0.0	0.0	0.0	1.48	653.1	0.0

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Manhole Schedules for SW

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)
SW1	76.476	2.476	Open Manhole	1350	1.000	74.000	300			
SW2	76.652	4.825	Open Manhole	1800	1.001	71.827	600	1.000	72.127	300
SW9	73.634	1.334	Open Manhole	1350	2.000	72.300	300			
SW10	74.608	2.758	Open Manhole	1800	2.001	71.850	600	2.000	72.150	300
SW3	75.066	3.605	Open Manhole	2400	1.002	71.461	900	1.001	71.761	600
								2.001	71.761	600
SW4	75.648	4.284	Open Manhole	2400	1.003	71.364	900	1.002	71.364	900
SW11	76.636	4.948	Open Manhole	2400	3.000	71.688	750			
SW12	76.316	4.678	Open Manhole	2400	3.001	71.638	750	3.000	71.638	750
SW5	75.340	4.327	Open Manhole	3000	1.004	71.013	1200	1.003	71.313	900
								3.001	71.463	750
SW6	74.124	3.261	Open Manhole	2700	1.005	70.863	1200	1.004	70.863	1200
SW7	74.008	3.198	Open Manhole	2700	1.006	70.810	1200	1.005	70.810	1200
SW8	73.751	2.982	Open Manhole	2700	1.007	70.769	225	1.006	70.769	1200
Structure - (12)	72.000	1.700	Open Manhole	1200		OUTFALL		1.007	70.300	225

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW1	385891.455	405532.851	385891.455	405532.851	Required	
SW2	385868.651	405479.880	385868.651	405479.880	Required	
SW9	385863.413	405427.284	385863.413	405427.284	Required	
SW10	385857.560	405443.371	385857.560	405443.371	Required	
SW3	385857.967	405455.748	385857.967	405455.748	Required	
SW4	385822.668	405470.828	385822.668	405470.828	Required	
SW5	385803.788	405479.063	385803.788	405479.063	Required	

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Manhole Schedules for SW

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW6	385779.916	405423.878	385779.916	405423.878	Required	
SW7	385770.180	405400.364	385770.180	405400.364	Required	
SW8	385758.020	405378.256	385758.020	405378.256	Required	
Structure - (12)	385737.676	405379.087			No Entry	

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Free Flowing Outfall Details for SW

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	Structure - (12)	72.000	70.300	70.000	1200	0

Simulation Criteria for SW

Volumetric Runoff Coeff	0.850	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/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	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.850
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.355		

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<u>Online Controls for SW</u>							
<u>Complex Manhole: SW8, DS/PN: 1.007, Volume (m³): 32.1</u>							
<u>Depth/Flow Relationship</u>							
Invert Level (m) 70.769							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.090	0.0000	0.800	14.6400	1.510	13.0400	2.220	15.1900
0.180	10.5300	0.890	14.2400	1.600	13.3500	2.310	15.4200
0.270	12.8700	0.980	13.6200	1.690	13.6500	2.400	15.6400
0.360	14.2900	1.070	12.7300	1.780	13.9300	2.490	15.8500
0.440	14.9200	1.160	11.6500	1.870	14.2000	2.580	16.0600
0.530	14.9900	1.250	12.0300	1.960	14.4700		
0.620	14.9600	1.330	12.3800	2.050	14.7200		
0.710	14.8600	1.420	12.7200	2.140	14.9600		
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<u>Storage Structures for SW</u> <u>Tank or Pond Manhole: SW8, DS/PN: 1.007</u> Invert Level (m) 72.400 <table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td></tr><tr><td>0.000</td><td>215.0</td><td>1.000</td><td>215.0</td><td>1.001</td><td>0.0</td></tr></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	215.0	1.000	215.0	1.001	0.0
Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)									
0.000	215.0	1.000	215.0	1.001	0.0									
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Summary of Critical Results by Maximum Level (Rank 1) for SW

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 1

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.356

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000

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

Return Period(s) (years) 100

Climate Change (%) 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW1	15 Winter	100	+45%					74.134
1.001	SW2	240 Winter	100	+45%	100/15	Winter			73.572
2.000	SW9	240 Winter	100	+45%	100/30	Summer			73.570
2.001	SW10	240 Winter	100	+45%	100/15	Winter			73.570
1.002	SW3	240 Winter	100	+45%	100/15	Summer			73.570
1.003	SW4	240 Winter	100	+45%	100/15	Summer			73.569
3.000	SW11	240 Winter	100	+45%	100/15	Winter			73.568
3.001	SW12	240 Winter	100	+45%	100/15	Summer			73.568
1.004	SW5	240 Winter	100	+45%	100/15	Summer			73.568
1.005	SW6	240 Winter	100	+45%	100/15	Summer			73.568
1.006	SW7	240 Winter	100	+45%	100/15	Summer			73.568
1.007	SW8	240 Winter	100	+45%	100/15	Summer			73.567

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW1	-0.166	0.000	0.40			76.5	OK	
1.001	SW2	1.145	0.000	0.22			61.3	SURCHARGED	
2.000	SW9	0.970	0.000	0.04			3.3	FLOOD RISK	

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Summary of Critical Results by Maximum Level (Rank 1) for SW

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap.	(l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Overflow						
2.001	SW10	1.120	0.000	0.01					2.4	SURCHARGED	
1.002	SW3	1.209	0.000	0.08					62.1	SURCHARGED	
1.003	SW4	1.305	0.000	0.11					71.2	SURCHARGED	
3.000	SW11	1.130	0.000	0.00					1.1	SURCHARGED	
3.001	SW12	1.180	0.000	0.02					11.8	SURCHARGED	
1.004	SW5	1.355	0.000	0.05					87.4	SURCHARGED	
1.005	SW6	1.505	0.000	0.07					85.1	SURCHARGED	
1.006	SW7	1.558	0.000	0.08					82.7	SURCHARGED	
1.007	SW8	2.573	0.000	0.28					16.1	FLOOD RISK	