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Merchant Exchange 17-19 Whitworth Street West Manchester M1 5WG		
Date 01/07/2022 11:57 File Proposed Drainage West o...		
Designed by Marta.Wolska Checked by		
Micro Drainage		Network 2018.1.1

<u>Existing Network Details for SW West</u>											
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
2.000	10.606	0.177	59.9	0.045	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	35.086	0.351	100.0	0.111	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	9.552	0.040	238.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.003	28.632	0.119	240.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	18.670	0.187	100.0	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	5.807	0.415	14.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	20.955	0.210	100.0	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	6.126	0.061	100.0	0.030	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	24.636	0.328	75.1	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.004	24.237	0.101	240.0	0.025	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.000	17.989	0.180	99.9	0.134	5.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	4.692	0.059	79.5	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit	

<u>Network Results Table</u>						
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)	
2.000	73.800	0.045	0.0	1.69	67.3	
2.001	73.622	0.156	0.0	1.31	52.0	
2.002	73.121	0.156	0.0	1.01	71.6	
2.003	73.081	0.156	0.0	1.01	71.3	
3.000	73.900	0.020	0.0	1.00	17.8	
4.000	74.250	0.021	0.0	2.71	47.8	
3.001	73.650	0.067	0.0	1.31	52.0	
5.000	74.400	0.030	0.0	1.00	17.8	
3.002	73.440	0.133	0.0	1.51	60.1	
2.004	72.962	0.314	0.0	1.01	71.4	
6.000	73.800	0.134	0.0	1.31	52.0	
7.000	74.280	0.024	0.0	1.13	19.9	

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Merchant Exchange

17-19 Whitworth Street West

Manchester M1 5WG

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Existing Network Details for SW West

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
7.001	3.264	0.068	48.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
6.001	17.239	0.388	44.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
6.002	18.934	0.221	85.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
2.005	43.458	0.109	400.0	0.047	0.00	0.0	0.600	o	450	Pipe/Conduit
8.000	10.932	0.109	100.3	0.014	5.00	0.0	0.600	o	100	Pipe/Conduit
2.006	19.972	0.050	400.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
9.000	28.309	0.472	60.0	0.130	5.00	0.0	0.600	o	225	Pipe/Conduit
9.001	15.020	0.250	60.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
9.002	11.573	0.116	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
9.003	5.868	0.020	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
9.004	7.661	0.026	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
9.005	8.002	0.027	300.0	0.079	0.00	0.0	0.600	o	450	Pipe/Conduit
2.007	7.791	0.078	99.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
2.008	27.125	0.543	50.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
7.001	74.221	0.024	0.0	1.46	25.7
6.001	73.620	0.158	0.0	1.97	78.2
6.002	73.232	0.158	0.0	1.41	56.2
2.005	72.700	0.519	0.0	1.01	160.7
8.000	73.700	0.014	0.0	0.77	6.0
2.006	72.591	0.533	0.0	1.01	160.7
9.000	74.200	0.130	0.0	1.69	67.3
9.001	73.728	0.130	0.0	1.69	67.2
9.002	73.478	0.130	0.0	1.31	52.0
9.003	72.600	0.130	0.0	1.17	185.8
9.004	72.580	0.130	0.0	1.17	185.8
9.005	72.546	0.209	0.0	1.17	185.8
2.007	72.519	0.742	0.0	1.57	111.2
2.008	71.860	0.742	0.0	2.23	157.5

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Manhole Schedules for SW West											
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)	Backdrop (mm)
1	75.210	1.410	Open Manhole	600	2.000	73.800	225				
SA3B	75.362	1.740	Open Manhole	600	2.001	73.622	225	2.000	73.623	225	1
SA3G	75.254	2.133	Open Manhole	600	2.002	73.121	300	2.001	73.271	225	
SA3	75.020	1.939	Open Manhole	600	2.003	73.081	300	2.002	73.081	300	
SA4A	75.412	1.512	Open Manhole	450	3.000	73.900	150				
SA4B	75.314	1.064	Open Manhole	450	4.000	74.250	150				
SA4C	75.322	1.672	Open Manhole	450	3.001	73.650	225	3.000	73.713	150	63
								4.000	73.835	150	185
SA4D	75.452	1.052	Open Manhole	450	5.000	74.400	150				
SA4E	75.384	1.944	Open Manhole	450	3.002	73.440	225	3.001	73.440	225	
								5.000	74.339	150	824
SA4	75.334	2.372	Open Manhole	600	2.004	72.962	300	2.003	72.962	300	
								3.002	73.112	225	
SA5A	75.348	1.548	Open Manhole	600	6.000	73.800	225				
SA5B	75.335	1.055	Open Manhole	450	7.000	74.280	150				
SA5C	75.327	1.106	Open Manhole	450	7.001	74.221	150	7.000	74.221	150	
SA5D	75.325	1.705	Open Manhole	600	6.001	73.620	225	6.000	73.620	225	
								7.001	74.153	150	458
SA5E	75.399	2.167	Open Manhole	600	6.002	73.232	225	6.001	73.232	225	
SA5	75.208	2.508	Open Manhole	1500	2.005	72.700	450	2.004	72.861	300	161
								6.002	73.011	225	86
SA6B	75.337	1.637	Open Manhole	450	8.000	73.700	100				
SA6	75.398	2.807	Open Manhole	1500	2.006	72.591	450	2.005	72.591	450	
								8.000	73.591	100	700
SA7A	75.366	1.166	Open Manhole	600	9.000	74.200	225				
SA7E	75.350	1.622	Open Manhole	600	9.001	73.728	225	9.000	73.728	225	
SA7F	75.363	1.885	Open Manhole	600	9.002	73.478	225	9.001	73.478	225	
SA7	75.219	2.619	Open Manhole	1500	9.003	72.600	450	9.002	73.362	225	537
TANK 1	75.230	2.650	Junction		9.004	72.580	450	9.003	72.580	450	
SA8A	75.276	2.730	Open Manhole	1500	9.005	72.546	450	9.004	72.554	450	8
SA8	75.335	2.816	Open Manhole	2100	2.007	72.519	300	2.006	72.541	450	97
								9.005	72.519	450	
CA1	75.488	3.628	Open Manhole	1500	2.008	71.860	300	2.007	72.441	300	581
CA2	75.198	3.881	Open Manhole	1500	2.009	71.318	300	2.008	71.318	300	
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PIPELINE SCHEDULES for SW West

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.005	o	450	SA8A	75.276	72.546	2.280	Open Manhole	1500
2.007	o	300	SA8	75.335	72.519	2.441	Open Manhole	2100
2.008	o	300	CA1	75.488	71.860	3.253	Open Manhole	1500
2.009	o	300	CA2	75.198	71.318	3.580	Open Manhole	1500
2.010	o	300	CA3	74.199	70.204	3.695	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.005	8.002	300.0	SA8	75.335	72.519	2.366	Open Manhole	2100
2.007	7.791	99.9	CA1	75.488	72.441	2.672	Open Manhole	1500
2.008	27.125	50.0	CA2	75.198	71.318	3.506	Open Manhole	1500
2.009	55.684	50.0	CA3	74.199	70.204	3.695	Open Manhole	1200
2.010	4.777	50.0	c2 outfall	73.200	70.108	2.792	Open Manhole	750

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Surcharged Outfall Details for SW West

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
60	1.750	300	1.750	540	1.750	780	1.750	1020	1.750	1260	1.750
120	1.750	360	1.750	600	1.750	840	1.750	1080	1.750	1320	1.750
180	1.750	420	1.750	660	1.750	900	1.750	1140	1.750	1380	1.750
240	1.750	480	1.750	720	1.750	960	1.750	1200	1.750	1440	1.750

Simulation Criteria for SW West

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Storm Duration (mins)	30
Ratio R	0.347		

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Online Controls for SW West

Complex Manhole: SA8, DS/PN: 2.007, Volume (m³): 13.6

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0309-5600-1000-5600
Design Head (m)	1.000
Design Flow (l/s)	56.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	309
Invert Level (m)	72.519
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	1800

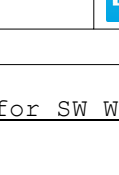
Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	56.0	Kick-Flo®	0.793	50.1
Flush-Flo™	0.459	56.0	Mean Flow over Head Range	-	44.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.4	1.200	61.1	3.000	95.3	7.000	144.2
0.200	31.7	1.400	65.9	3.500	102.8	7.500	149.1
0.300	53.9	1.600	70.3	4.000	109.7	8.000	153.9
0.400	55.7	1.800	74.4	4.500	116.2	8.500	158.5
0.500	55.9	2.000	78.3	5.000	122.3	9.000	163.0
0.600	55.0	2.200	82.0	5.500	128.1	9.500	167.4
0.800	50.3	2.400	85.5	6.000	133.7		
1.000	56.0	2.600	88.9	6.500	139.0		

Orifice

Diameter (m) 0.135 Discharge Coefficient 0.600 Invert Level (m) 73.319

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.347
Region England and Wales Cv (Summer)			0.740
M5-60 (mm)	18.500	Cv (Winter)	0.850

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia 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)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
2.000	1 15	Winter	100	+40%	100/15 Summer	100/15 Winter			75.210
2.001	SA3B 15	Winter	100	+40%	100/15 Summer				75.204
2.002	SA3G 30	Winter	100	+40%	30/15 Summer				74.899
2.003	SA3 30	Winter	100	+40%	30/15 Summer				74.829
3.000	SA4A 30	Winter	100	+40%	100/15 Summer				74.925
4.000	SA4B 30	Winter	100	+40%	100/15 Summer				74.911
3.001	SA4C 30	Winter	100	+40%	100/15 Summer				74.899
5.000	SA4D 30	Winter	100	+40%	100/15 Winter				74.878
3.002	SA4E 30	Winter	100	+40%	100/15 Summer				74.860
2.004	SA4 30	Winter	100	+40%	30/15 Summer				74.743
6.000	SA5A 15	Winter	100	+40%	100/15 Summer				75.017
7.000	SA5B 30	Winter	100	+40%	100/15 Summer				74.865
7.001	SA5C 30	Winter	100	+40%	100/15 Summer				74.853
6.001	SA5D 30	Winter	100	+40%	100/15 Summer				74.845
6.002	SA5E 30	Winter	100	+40%	30/15 Winter				74.707

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
2.000	1	1.185	0.387	0.33		18.7	FLOOD	1
2.001	SA3B	1.357	0.000	1.31		64.3	FLOOD RISK	
2.002	SA3G	1.478	0.000	0.98		54.3	SURCHARGED	
2.003	SA3	1.448	0.000	0.83		53.5	FLOOD RISK	
3.000	SA4A	0.875	0.000	0.47		8.0	SURCHARGED	
4.000	SA4B	0.511	0.000	0.22		8.9	SURCHARGED	
3.001	SA4C	1.024	0.000	0.51		24.0	SURCHARGED	
5.000	SA4D	0.328	0.000	0.84		13.1	SURCHARGED	
3.002	SA4E	1.195	0.000	0.87		48.1	SURCHARGED	
2.004	SA4	1.481	0.000	1.66		105.9	SURCHARGED	
6.000	SA5A	0.992	0.000	1.23		60.6	SURCHARGED	
7.000	SA5B	0.435	0.000	0.69		10.5	SURCHARGED	
7.001	SA5C	0.482	0.000	0.63		10.4	SURCHARGED	
6.001	SA5D	1.000	0.000	0.79		55.4	SURCHARGED	
6.002	SA5E	1.250	0.000	1.08		54.5	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for SW West											
US/MH		Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water		
PN	Name								Level (m)		
2.005	SA5	30	Winter	100	+40%	30/15	Summer			74.613	
8.000	SA6B	30	Winter	100	+40%	100/15	Summer			74.586	
2.006	SA6	30	Winter	100	+40%	30/15	Summer			74.570	
9.000	SA7A	30	Winter	100	+40%	100/15	Summer			74.648	
9.001	SA7E	30	Winter	100	+40%	100/15	Summer			74.602	
9.002	SA7F	30	Winter	100	+40%	100/15	Summer			74.571	
9.003	SA7	30	Winter	100	+40%	30/15	Summer			74.547	
9.004	TANK 1	30	Winter	100	+40%	30/15	Summer			74.544	
9.005	SA8A	30	Winter	100	+40%	30/15	Summer			74.540	
2.007	SA8	30	Winter	100	+40%	30/15	Summer			74.532	
2.008	CA1	30	Winter	100	+40%					72.071	
2.009	CA2	30	Winter	100	+40%					71.522	
2.010	CA3	30	Winter	100	+40%	100/15	Summer			70.620	
Surcharged Flooded											
US/MH		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe		Status	Level		
PN	Name					Flow (l/s)	Flow (l/s)		Exceeded		
2.005	SA5	1.463	0.000	1.18	169.9			SURCHARGED			
8.000	SA6B	0.786	0.000	1.03	6.0			SURCHARGED			
2.006	SA6	1.529	0.000	1.30	168.3			SURCHARGED			
9.000	SA7A	0.223	0.000	0.88	57.2			SURCHARGED			
9.001	SA7E	0.649	0.000	0.95	55.9			SURCHARGED			
9.002	SA7F	0.868	0.000	1.22	53.9			SURCHARGED			
9.003	SA7	1.497	0.000	0.39	44.0			SURCHARGED			
9.004	TANK 1	1.514	0.000	0.30	51.1			SURCHARGED*			
9.005	SA8A	1.544	0.000	0.44	54.1			SURCHARGED			
2.007	SA8	1.713	0.000	1.70	119.3			SURCHARGED			
2.008	CA1	-0.089	0.000	0.84	119.3			OK			
2.009	CA2	-0.096	0.000	0.80	119.0			OK			
2.010	CA3	0.116	0.000	1.54	119.2			SURCHARGED			
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