



HBL ASSOCIATES LIMITED
Brook House,
Weybrook Rd
Stockport, M19 2QD

File: FW and SW Drainage Model (Public SW Sewer).l
Network: Private - Storm Network
Adam Prince
18/06/2021

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	200.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
IC01	0.008	5.00	30.500	450	382811.710	392852.288	1.300
IC02	0.012	5.00	30.500	450	382798.860	392865.146	1.663
IC03	0.004	5.00	30.237	450	382808.629	392874.911	1.737
MH01			30.385	1200	382818.524	392870.540	2.069
MH02	0.023	5.00	30.310	1200	382821.302	392873.316	2.018
ATTENUATION TANK	0.017	5.00	30.467	1500	382832.999	392861.683	2.204
IC04	0.009	5.00	30.500	450	382827.833	392861.225	1.000
IC06	0.026	5.00	30.124	450	382813.658	392880.953	1.226
IC07	0.020	5.00	30.098	450	382830.846	392882.855	1.440
MH03			30.500	1200	382830.056	392846.444	2.340
8805			30.500		382832.313	392844.885	2.565



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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	IC01	IC02	18.178	0.600	29.200	28.887	0.313	58.1	100	5.30	134.2
1.001	IC02	IC03	13.813	0.600	28.837	28.500	0.337	41.0	150	5.45	132.8
1.002	IC03	MH01	10.817	0.600	28.500	28.391	0.109	99.2	150	5.62	131.2
1.003	MH01	MH02	3.927	0.600	28.316	28.292	0.024	163.6	225	5.69	130.6
1.004	MH02	ATTENUATION TANK	16.497	0.600	28.292	28.263	0.029	568.9	225	6.20	126.2
2.000	IC04	MH01	13.169	0.600	29.500	28.441	1.059	12.4	150	5.08	136.5
4.000	IC06	MH02	10.805	0.600	28.898	28.708	0.190	56.9	100	5.18	135.5
3.000	IC07	MH02	13.494	0.600	28.658	28.442	0.216	62.5	150	5.18	135.5
1.005	ATTENUATION TANK	MH03	15.510	0.600	28.263	28.160	0.103	150.6	150	6.45	124.1
1.006	MH03	8805	2.743	0.600	28.160	27.935	0.225	12.2	150	6.50	123.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.012	8.0	4.1	1.200	1.513	0.008	0.0
1.001	1.576	27.9	10.2	1.513	1.587	0.020	0.0
1.002	1.008	17.8	12.1	1.587	1.844	0.024	0.0
1.003	1.019	40.5	16.5	1.844	1.793	0.033	0.0
1.004	0.541	21.5	49.0	1.793	1.979	0.102	0.0
2.000	2.872	50.8	4.7	0.850	1.794	0.009	0.0
4.000	1.023	8.0	13.4	1.126	1.502	0.026	0.0
3.000	1.274	22.5	10.3	1.290	1.718	0.020	0.0
1.005	0.816	14.4	56.2	2.054	2.190	0.119	0.0
1.006	2.901	51.3	56.0	2.190	2.415	0.119	0.0



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Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	17.000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.400	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	40	0	0
30	0	0	0				

Node ATTENUATION TANK Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	28.263	Product Number	CTL-SHE-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	119.760	33.888	2 year 180 minute summer	24.133	6.210
2 year 15 minute winter	84.042	33.888	2 year 180 minute winter	15.687	6.210
2 year 30 minute summer	77.518	21.935	2 year 240 minute summer	19.039	5.032
2 year 30 minute winter	54.399	21.935	2 year 240 minute winter	12.649	5.032
2 year 60 minute summer	51.720	13.668	2 year 360 minute summer	14.516	3.735
2 year 60 minute winter	34.361	13.668	2 year 360 minute winter	9.436	3.735
2 year 120 minute summer	31.549	8.338	2 year 480 minute summer	11.436	3.022
2 year 120 minute winter	20.961	8.338	2 year 480 minute winter	7.598	3.022



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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 600 minute summer	9.363	2.561	30 year 240 minute summer	35.759	9.450
2 year 600 minute winter	6.398	2.561	30 year 240 minute winter	23.758	9.450
2 year 720 minute summer	8.339	2.235	30 year 360 minute summer	26.939	6.932
2 year 720 minute winter	5.605	2.235	30 year 360 minute winter	17.511	6.932
2 year 960 minute summer	6.846	1.803	30 year 480 minute summer	20.981	5.545
2 year 960 minute winter	4.535	1.803	30 year 480 minute winter	13.940	5.545
2 year 1440 minute summer	4.967	1.331	30 year 600 minute summer	17.039	4.661
2 year 1440 minute winter	3.338	1.331	30 year 600 minute winter	11.642	4.661
2 year 2160 minute summer	3.558	0.983	30 year 720 minute summer	15.093	4.045
2 year 2160 minute winter	2.451	0.983	30 year 720 minute winter	10.143	4.045
2 year 2880 minute summer	2.959	0.793	30 year 960 minute summer	12.278	3.233
2 year 2880 minute winter	1.989	0.793	30 year 960 minute winter	8.133	3.233
2 year 4320 minute summer	2.241	0.586	30 year 1440 minute summer	8.788	2.355
2 year 4320 minute winter	1.476	0.586	30 year 1440 minute winter	5.906	2.355
2 year 5760 minute summer	1.846	0.473	30 year 2160 minute summer	6.201	1.714
2 year 5760 minute winter	1.195	0.473	30 year 2160 minute winter	4.273	1.714
2 year 7200 minute summer	1.568	0.400	30 year 2880 minute summer	5.100	1.367
2 year 7200 minute winter	1.012	0.400	30 year 2880 minute winter	3.428	1.367
2 year 8640 minute summer	1.368	0.349	30 year 4320 minute summer	3.798	0.993
2 year 8640 minute winter	0.883	0.349	30 year 4320 minute winter	2.501	0.993
2 year 10080 minute summer	1.219	0.311	30 year 5760 minute summer	3.090	0.791
2 year 10080 minute winter	0.787	0.311	30 year 5760 minute winter	2.000	0.791
30 year 15 minute summer	226.195	64.005	30 year 7200 minute summer	2.598	0.663
30 year 15 minute winter	158.733	64.005	30 year 7200 minute winter	1.677	0.663
30 year 30 minute summer	147.452	41.724	30 year 8640 minute summer	2.248	0.574
30 year 30 minute winter	103.475	41.724	30 year 8640 minute winter	1.451	0.574
30 year 60 minute summer	98.615	26.061	30 year 10080 minute summer	1.989	0.507
30 year 60 minute winter	65.517	26.061	30 year 10080 minute winter	1.284	0.507
30 year 120 minute summer	59.946	15.842	100 year +40% CC 15 minute summer	408.473	115.584
30 year 120 minute winter	39.827	15.842	100 year +40% CC 15 minute winter	286.647	115.584
30 year 180 minute summer	45.598	11.734	100 year +40% CC 30 minute summer	268.775	76.054
30 year 180 minute winter	29.640	11.734	100 year +40% CC 30 minute winter	188.614	76.054



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Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 60 minute summer	180.954	47.821	100 year +40% CC 960 minute winter	14.700	5.844
100 year +40% CC 60 minute winter	120.222	47.821	100 year +40% CC 1440 minute summer	15.789	4.232
100 year +40% CC 120 minute summer	110.370	29.168	100 year +40% CC 1440 minute winter	10.611	4.232
100 year +40% CC 120 minute winter	73.327	29.168	100 year +40% CC 2160 minute summer	11.070	3.059
100 year +40% CC 180 minute summer	83.953	21.604	100 year +40% CC 2160 minute winter	7.628	3.059
100 year +40% CC 180 minute winter	54.572	21.604	100 year +40% CC 2880 minute summer	9.060	2.428
100 year +40% CC 240 minute summer	65.765	17.380	100 year +40% CC 2880 minute winter	6.089	2.428
100 year +40% CC 240 minute winter	43.693	17.380	100 year +40% CC 4320 minute summer	6.697	1.751
100 year +40% CC 360 minute summer	49.370	12.705	100 year +40% CC 4320 minute winter	4.410	1.751
100 year +40% CC 360 minute winter	32.092	12.705	100 year +40% CC 5760 minute summer	5.418	1.387
100 year +40% CC 480 minute summer	38.291	10.119	100 year +40% CC 5760 minute winter	3.507	1.387
100 year +40% CC 480 minute winter	25.439	10.119	100 year +40% CC 7200 minute summer	4.536	1.157
100 year +40% CC 600 minute summer	30.992	8.477	100 year +40% CC 7200 minute winter	2.928	1.157
100 year +40% CC 600 minute winter	21.176	8.477	100 year +40% CC 8640 minute summer	3.910	0.998
100 year +40% CC 720 minute summer	27.387	7.340	100 year +40% CC 8640 minute winter	2.524	0.998
100 year +40% CC 720 minute winter	18.406	7.340	100 year +40% CC 10080 minute summer	3.448	0.880
100 year +40% CC 960 minute summer	22.191	5.844	100 year +40% CC 10080 minute winter	2.226	0.880



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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC01	11	29.227	0.027	1.2	0.0075	0.0000	OK
15 minute winter	IC02	15	28.890	0.053	3.1	0.0163	0.0000	OK
30 minute winter	IC03	25	28.886	0.386	4.1	0.0792	0.0000	SURCHARGED
30 minute winter	MH01	25	28.886	0.570	3.5	0.6451	0.0000	SURCHARGED
30 minute winter	MH02	25	28.886	0.594	8.2	0.8076	0.0000	SURCHARGED
30 minute winter	ATTENUATION TANK	25	28.886	0.623	8.0	1.1971	0.0000	SURCHARGED
15 minute winter	IC04	10	29.517	0.017	1.4	0.0058	0.0000	OK
15 minute winter	IC06	10	28.950	0.052	4.0	0.0302	0.0000	OK
15 minute winter	IC07	15	28.887	0.229	3.1	0.0999	0.0000	SURCHARGED
60 minute winter	MH03	53	28.193	0.033	5.0	0.0377	0.0000	OK
60 minute winter	8805	53	27.967	0.032	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	IC01	1.000	IC02	1.2	0.725	0.151	0.0301	
15 minute winter	IC02	1.001	IC03	3.1	0.811	0.110	0.1601	
30 minute winter	IC03	1.002	MH01	2.5	0.631	0.139	0.1904	
30 minute winter	MH01	1.003	MH02	2.8	0.161	0.068	0.1562	
30 minute winter	MH02	1.004	ATTENUATION TANK	6.1	0.310	0.285	0.6561	
30 minute winter	ATTENUATION TANK	Hydro-Brake®	MH03	5.0				
15 minute winter	IC04	2.000	MH01	1.4	1.130	0.027	0.1230	
15 minute winter	IC06	4.000	MH02	3.9	0.991	0.491	0.0570	
15 minute winter	IC07	3.000	MH02	3.1	0.797	0.136	0.2376	
60 minute winter	MH03	1.006	8805	5.0	1.776	0.097	0.0077	13.7



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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	IC01	27	29.656	0.456	2.6	0.1285	0.0000	SURCHARGED
30 minute winter	IC02	27	29.656	0.819	6.5	0.2513	0.0000	SURCHARGED
30 minute winter	IC03	27	29.655	1.155	6.3	0.2368	0.0000	SURCHARGED
30 minute winter	MH01	27	29.654	1.338	7.1	1.5133	0.0000	SURCHARGED
30 minute winter	MH02	27	29.654	1.362	12.9	1.8508	0.0000	SURCHARGED
30 minute winter	ATTENUATION TANK	27	29.652	1.389	9.9	2.6676	0.0000	SURCHARGED
30 minute winter	IC04	27	29.654	0.154	2.8	0.0522	0.0000	SURCHARGED
30 minute winter	IC06	27	29.660	0.762	5.8	0.4442	0.0000	SURCHARGED
30 minute winter	IC07	27	29.654	0.996	4.5	0.4354	0.0000	SURCHARGED
30 minute winter	MH03	27	28.196	0.036	5.8	0.0410	0.0000	OK
30 minute winter	8805	27	27.969	0.034	5.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	IC01	1.000	IC02	1.8	0.785	0.226	0.1422	
30 minute winter	IC02	1.001	IC03	4.1	0.793	0.148	0.2432	
30 minute winter	IC03	1.002	MH01	-3.5	0.590	-0.195	0.1904	
30 minute winter	MH01	1.003	MH02	-5.2	0.158	-0.127	0.1562	
30 minute winter	MH02	1.004	ATTENUATION TANK	6.3	0.334	0.295	0.6561	
30 minute winter	ATTENUATION TANK	Hydro-Brake®	MH03	5.8				
30 minute winter	IC04	2.000	MH01	2.0	1.029	0.039	0.2318	
30 minute winter	IC06	4.000	MH02	5.1	1.030	0.638	0.0845	
30 minute winter	IC07	3.000	MH02	3.1	0.773	0.138	0.2376	
30 minute winter	MH03	1.006	8805	5.8	1.853	0.114	0.0086	20.9



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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	IC01	21	30.281	1.081	5.0	0.3050	0.0000	FLOOD RISK
30 minute winter	IC02	20	30.243	1.406	6.8	0.4315	0.0000	FLOOD RISK
30 minute winter	IC03	20	30.219	1.719	8.0	0.3524	0.0000	FLOOD RISK
30 minute winter	MH01	20	30.192	1.876	11.0	2.1215	0.0000	FLOOD RISK
30 minute winter	MH02	20	30.188	1.896	20.2	2.5764	0.0000	FLOOD RISK
30 minute winter	ATTENUATION TANK	20	30.186	1.923	13.9	3.6941	0.0000	FLOOD RISK
30 minute winter	IC04	20	30.199	0.699	5.1	0.2369	0.0000	SURCHARGED
60 minute winter	IC06	34	30.124	1.226	9.3	0.7148	3.5983	FLOOD
60 minute winter	IC07	34	30.098	1.440	14.8	0.6293	8.1843	FLOOD
30 minute winter	MH03	20	28.199	0.039	6.8	0.0444	0.0000	OK
30 minute winter	8805	20	27.972	0.037	6.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	IC01	1.000	IC02	2.6	0.804	0.333	0.1422	
30 minute winter	IC02	1.001	IC03	6.6	0.763	0.235	0.2432	
30 minute winter	IC03	1.002	MH01	8.0	0.635	0.447	0.1904	
30 minute winter	MH01	1.003	MH02	11.2	0.283	0.277	0.1562	
30 minute winter	MH02	1.004	ATTENUATION TANK	7.0	0.355	0.323	0.6561	
30 minute winter	ATTENUATION TANK	Hydro-Brake®	MH03	6.8				
30 minute winter	IC04	2.000	MH01	3.5	1.043	0.068	0.2318	
60 minute winter	IC06	4.000	MH02	4.6	0.940	0.567	0.0845	
60 minute winter	IC07	3.000	MH02	-9.6	0.666	-0.427	0.2376	
30 minute winter	MH03	1.006	8805	6.8	1.929	0.132	0.0096	27.5