

Bloor Homes		Page 0
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Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

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	56.304	1.220	46.2	0.066	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	27.593	0.541	51.0	0.196	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	39.001	0.570	68.4	0.138	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	18.449	0.271	68.0	0.117	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	47.406	0.924	51.3	0.024	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	44.109	1.160	38.0	0.145	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	54.866	0.939	58.5	0.227	0.00	0.0	0.600	o	525	Pipe/Conduit	
3.000	41.004	0.172	238.0	0.158	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	28.032	1.540	18.2	0.135	5.00	0.0	0.600	o	300	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	50.00	5.40	99.040	0.066	0.0	0.0	0.0	2.32	164.0	9.0
1.001	50.00	5.57	97.670	0.262	0.0	0.0	0.0	2.85	453.6	35.5
2.000	50.00	5.34	98.190	0.138	0.0	0.0	0.0	1.90	134.5	18.7
2.001	50.00	5.50	97.620	0.255	0.0	0.0	0.0	1.91	135.0	34.6
1.002	50.00	5.84	97.129	0.541	0.0	0.0	0.0	2.84	452.3	73.3
1.003	50.00	6.07	96.205	0.686	0.0	0.0	0.0	3.31	525.7	92.8
1.004	50.00	6.38	94.970	0.912	0.0	0.0	0.0	2.93	635.1	123.6
3.000	50.00	5.67	95.432	0.158	0.0	0.0	0.0	1.01	71.7	21.3
4.000	50.00	5.13	96.800	0.135	0.0	0.0	0.0	3.70	261.7	18.3

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Network Design Table for Surface Network 6

Network Results Table

Free Flowing Outfall Details for Surface Network 6

1.009	S7025	Headwall	94.550	93.350	0.000	0	0
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Simulation Criteria for Surface Network 6

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

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Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Surface Network 6

Hydro-Brake® Optimum Manhole: S7024 Control Chamber, DS/PN: 1.009, Volume (m³): 15.7

Unit Reference	MD-SHE-0132-8000-1000-8000
Design Head (m)	1.000
Design Flow (l/s)	8.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	132
Invert Level (m)	93.600
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	8.0
Flush-Flo™	0.302	8.0
Kick-Flo®	0.664	6.6
Mean Flow over Head Range	-	6.9

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	4.7	1.200	8.7	3.000	13.4	7.000	20.1
0.200	7.8	1.400	9.4	3.500	14.5	7.500	20.8
0.300	8.0	1.600	10.0	4.000	15.4	8.000	21.5
0.400	7.9	1.800	10.5	4.500	16.3	8.500	22.1
0.500	7.7	2.000	11.1	5.000	17.1	9.000	22.7
0.600	7.2	2.200	11.6	5.500	17.9	9.500	23.3
0.800	7.2	2.400	12.1	6.000	18.7		
1.000	8.0	2.600	12.6	6.500	19.4		

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Storage Structures for Surface Network 6

Tank or Pond Manhole: S7024 Control Chamber, DS/PN: 1.009

Invert Level (m) 93.600

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1144.8	0.500	1463.7	1.000	1818.9	1.500	2209.1
0.100	1204.8	0.600	1531.9	1.100	1894.1	1.600	2291.4
0.200	1267.4	0.700	1601.5	1.200	1970.8	1.700	2375.1
0.300	1331.4	0.800	1672.6	1.300	2048.8		
0.400	1396.8	0.900	1745.0	1.400	2128.3		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 6

PN	US/MH Name	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)
				Level (m)	Depth (m)	Volume (m³)		
1.000	S8045			99.145	-0.195	0.000	0.26	
1.001	S8046			97.880	-0.240	0.000	0.44	
2.000	S8042			98.419	-0.071	0.000	0.68	
2.001	S8043			98.150	0.230	0.000	1.34	
1.002	S8170			97.709	0.130	0.000	0.80	
1.003	S7016			97.273	0.618	0.000	0.78	
1.004	S7019			96.623	1.128	0.000	0.80	
3.000	S8070			96.510	0.778	0.000	1.34	
4.000	S8072			96.924	-0.176	0.000	0.36	
3.001	S8071			96.187	0.627	0.000	0.33	
3.002	S8062			96.080	1.425	0.000	0.74	
1.005	S8063			95.982	1.426	5.524	4.27	
1.006	S8073			95.524	1.009	0.000	2.17	
1.007	S7022 Headwall			94.425	0.000	0.000	1.32	
1.008	S7023 Headwall			94.375	0.075	0.000	0.13	
1.009	S7024 Control Chamber			94.395	0.345	0.000	0.03	

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S8045		40.4	OK	
1.001	S8046		170.1	OK	
2.000	S8042		84.3	OK	
2.001	S8043		156.1	SURCHARGED	
1.002	S8170		326.2	SURCHARGED	
1.003	S7016		366.4	SURCHARGED	
1.004	S7019		457.5	SURCHARGED	
3.000	S8070		89.2	SURCHARGED	
4.000	S8072		83.9	OK	
3.001	S8071		161.2	SURCHARGED	
3.002	S8062		230.3	FLOOD RISK	
1.005	S8063		708.8	FLOOD	2
1.006	S8073		772.7	SURCHARGED	
1.007	S7022 Headwall		424.2	SURCHARGED*	
1.008	S7023 Headwall		45.4	SURCHARGED*	
1.009	S7024 Control Chamber		8.0	SURCHARGED	