

WML Consulting Ltd		Page 1
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	8530 - SURFACE WATER DRAINAGE DESIGN REV 02	
Date MARCH 2021 File 8530 - SW - 02.mdx	Designed by KPT Checked by NB	
Innovyze		Network 2014.1.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.360	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	5	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.027	4-8	0.010

Total Area Contributing (ha) = 0.037

Total Pipe Volume (m³) = 1.159

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
S1.000	6.500	0.065	100.0	0.037	5.00	0.0	0.600	o	450	
S1.001	8.000	0.150	53.3	0.000	0.00	0.0	0.600	o	100	
S1.002	8.000	0.150	53.3	0.000	0.00	0.0	0.600	o	100	

Network Results Table

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)
S1.000	5.00	5.05	35.750	0.037	0.0	0.0	0.0	2.03	323.4	0.5
S1.001	5.00	5.18	35.685	0.037	0.0	0.0	0.0	1.06	8.3	0.5
S1.002	5.00	5.31	35.535	0.037	0.0	0.0	0.0	1.06	8.3	0.5

WML Consulting Ltd		Page 2
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Online Controls for Storm

Hydro-Brake Optimum® Manhole: S2, DS/PN: S1.001, Volume (m³): 3.4

Unit Reference MD-SHE-0097-5000-1550-5000
Design Head (m) 1.550
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 97
Invert Level (m) 35.685
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.550	5.0
Flush-Flo™	0.424	4.8
Kick-Flo®	0.868	3.8
Mean Flow over Head Range	-	4.3

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	3.2	1.200	4.4	3.000	6.8	7.000	10.2
0.200	4.4	1.400	4.8	3.500	7.3	7.500	10.5
0.300	4.7	1.600	5.1	4.000	7.8	8.000	10.8
0.400	4.8	1.800	5.4	4.500	8.2	8.500	11.1
0.500	4.8	2.000	5.6	5.000	8.7	9.000	11.4
0.600	4.7	2.200	5.9	5.500	9.1	9.500	11.7
0.800	4.2	2.400	6.1	6.000	9.4		
1.000	4.1	2.600	6.4	6.500	9.8		

