

WML Consulting Ltd		Page 1
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	Moss Lane East Surface Water Design	
Date 15/11/2022 12:21 File Surface Design.MDX	Designed by RH Checked by RZ	
Innovyze	Network 2020.1.3	

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)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.364	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.024	4-8	0.000

Total Area Contributing (ha) = 0.024

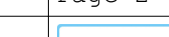
Total Pipe Volume (m³) = 1.366

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)	Section Type	Auto Design
1.000	20.201	0.202	100.0	0.011	2.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	10.000	0.100	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	1.347	0.013	103.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	15.878	0.159	99.9	0.009	2.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	4.202	0.156	26.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	2.34	98.950	0.011	0.0	0.0	0.0	1.00	17.8	1.5
1.001	50.00	2.50	98.748	0.011	0.0	0.0	0.0	1.00	17.8	1.5
1.002	50.00	2.52	98.648	0.011	0.0	0.0	0.0	0.99	17.4	1.5
2.000	50.00	2.26	98.950	0.009	0.0	0.0	0.0	1.01	17.8	1.2
2.001	50.00	2.30	98.791	0.009	0.0	0.0	0.0	1.95	34.4	1.2

WML Consulting Ltd		Page 2
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	Moss Lane East Surface Water Design	
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Network Design Table for Storm

Network Results Table

Free Flowing Outfall Details for Storm

1.005	CW01	100.000	98.379	0.000	600	450
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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 Coeffiecient	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

Synthetic Rainfall Details

WML Consulting Ltd		Page 3
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	Moss Lane East Surface Water Design	
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<u>Online Controls for Storm</u> <u>Orifice Manhole: SW05, DS/PN: 1.005, Volume (m³): 0.3</u> Diameter (m) 0.022 Discharge Coefficient 0.600 Invert Level (m) 98.523		
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WML Consulting Ltd		Page 4
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	Moss Lane East Surface Water Design	
Date 15/11/2022 12:21 File Surface Design.MDX	Designed by RH Checked by RZ	
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Storage Structures for Storm

Porous Car Park Manhole: SW04, DS/PN: 1.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.5
Max Percolation (l/s)	10.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	99.200	Membrane Depth (mm)	0

WML Consulting Ltd		Page 5
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	Moss Lane East Surface Water Design	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

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, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	40

US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.
1.000	RE01	120	Winter	100	+40%	100/15	Summer	
1.001	SW01	120	Winter	100	+40%	100/15	Summer	
1.002	SW02	120	Winter	100	+40%	100/15	Summer	
2.000	RE02	120	Winter	100	+40%	100/15	Summer	
2.001	SW03	120	Winter	100	+40%	100/15	Summer	
1.003	SW04	120	Winter	100	+40%	100/15	Summer	
1.004	SW04	60	Winter	100	+40%	100/15	Summer	100/30 Winter
1.005	SW05	120	Winter	100	+40%	100/15	Summer	100/15 Summer

PN	US/MH Name	Water	Surcharged	Flooded	Half Drain		Pipe	Status	
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)		Flow (l/s)
1.000	RE01	99.669	0.569	0.000	0.12			2.0	SURCHARGED
1.001	SW01	99.665	0.767	0.000	0.12			1.9	SURCHARGED
1.002	SW02	99.664	0.866	0.000	0.17			1.9	SURCHARGED
2.000	RE02	99.668	0.568	0.000	0.10			1.6	SURCHARGED
2.001	SW03	99.664	0.723	0.000	0.06			1.6	SURCHARGED

WML Consulting Ltd		Page 6
No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL	Moss Lane East Surface Water Design	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Half Drain Time	Pipe Flow	Status
		(m)	(m)	(m³)	Cap. (l/s)	(mins)	(l/s)	
1.003	SW04	99.664	0.879	0.000	0.20	67	3.0	SURCHARGED
1.004	SW04	100.000	1.279	0.006	0.13		1.7	FLOOD
1.005	SW05	100.000	1.327	0.094	0.06		1.0	FLOOD

PN	US/MH Name	Level Exceeded
1.000	RE01	
1.001	SW01	
1.002	SW02	
2.000	RE02	
2.001	SW03	
1.003	SW04	
1.004	SW04	3
1.005	SW05	15