

Link Engineering		Page 1
Lombard House 145 Great Charles Street Birmingham, B3 3LP		
Date 18/03/2025 15:10 File LM3103 - East Grinstead ...	Designed by Link Engineering Checked by	
Innovyze	Network 2019.1	

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)	5	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.344	Minimum Backdrop Height (m)	20.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	19.000
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	0.013	4-8	0.004

Total Area Contributing (ha) = 0.016

Total Pipe Volume (m³) = 2.476

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
S1.000	31.840	0.103	309.1	0.009	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	12.762	0.086	148.4	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.60	125.099	0.009	0.0	0.0	0.0	0.89	62.8	1.2
S1.001	50.00	5.86	124.996	0.016	0.0	0.0	0.0	0.82	14.5	2.2

Link Engineering		Page 3
Lombard House 145 Great Charles Street Birmingham, B3 3LP		
Date 18/03/2025 15:10	Designed by Link Engineering	
File LM3103 - East Grinstead ...	Checked by	
Innovyze	Network 2019.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S2, DS/PN: S1.001, Volume (m³): 3.7

Unit Reference	MD-SHE-0069-2000-0900-2000
Design Head (m)	0.900
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level	124.996
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.0	Kick-Flo®	0.568	1.6
Flush-Flo™	0.278	2.0	Mean Flow over Head Range	-	1.8

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	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5
0.400	1.9	1.800	2.7	4.500	4.2	8.500	5.7
0.500	1.8	2.000	2.9	5.000	4.4	9.000	5.8
0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.1	6.000	4.8		
1.000	2.1	2.600	3.2	6.500	5.0		

Link Engineering		Page 4
Lombard House 145 Great Charles Street Birmingham, B3 3LP		
Date 18/03/2025 15:10 File LM3103 - East Grinstead ...	Designed by Link Engineering Checked by	
Innovyze	Network 2019.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

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 Coefficient	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	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.347
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%	100/15 Winter				125.128
S1.001	S2	15 Winter	1	+0%	30/15 Summer				125.081

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Level Status
S1.000	S1	-0.271	0.000	0.02		1.1	OK
S1.001	S2	-0.065	0.000	0.12		1.5	OK

©1982-2019 Innovyze

Link Engineering		Page 5
Lombard House 145 Great Charles Street Birmingham, B3 3LP		
Date 18/03/2025 15:10 File LM3103 - East Grinstead ...		
Designed by Link Engineering Checked by		
Innovyze		Network 2019.1

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

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 Coefficient	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	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.347
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	30 Winter	30	+35%	100/15 Winter				125.264
S1.001	S2	30 Winter	30	+35%	30/15 Summer				125.263

PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap. (l/s)	Pipe Overflow Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.135	0.000	0.05	2.6	OK	
S1.001	S2	0.117	0.000	0.15	2.0	SURCHARGED	

©1982-2019 Innovyze

Link Engineering		Page 6
Lombard House 145 Great Charles Street Birmingham, B3 3LP		
Date 18/03/2025 15:10	Designed by Link Engineering	
File LM3103 - East Grinstead ...	Checked by	
Innovyze	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

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	0	Number of Real Time Controls	0

Synthetic Rainfall Details

```
Margin for Flood Risk Warning (mm) 300.0      DVD Status OFF
      Analysis Timestep   Fine Inertia Status OFF
      DTS Status          ON
```

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 35, 40

									Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
S1.000	S1	30 Winter	100	+40%	100/15 Winter				125.564
S1.001	S2	30 Winter	100	+40%	30/15 Summer				125.563

PN	US/MH	Surcharged	Flooded	Pipe			Status	Level Exceeded
	Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.000	S1	0.165	0.000	0.06		3.4	SURCHARGED	
S1.001	S2	0.417	0.000	0.15		2.0	SURCHARGED	