

		Page 1
	Livv Housing Group Moss Green Close Huyton	
Date 28/07/2021 17:06 File 5.MDX	Designed by JHale Checked by	
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)	2	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	0
Ratio R	0.399	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
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	0.106	4-8	0.020

Total Area Contributing (ha) = 0.126

Total Pipe Volume (m³) = 18.653

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	20.693	0.052	400.0	0.065	5.00	0.0	0.600	o	900	Pipe/Conduit	
1.001	12.424	0.031	400.8	0.061	0.00	0.0	0.600	o	750	Pipe/Conduit	

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)
1.000	50.00	5.22	27.500	0.065	0.0	0.0	0.0	1.56	992.7	8.8
1.001	50.00	5.37	27.448	0.126	0.0	0.0	0.0	1.39	614.8	17.1

		Page 2
	Livv Housing Group Moss Green Close Huyton	
Date 28/07/2021 17:06 File 5.MDX	Designed by JHale Checked by	
Innovyze	Network 2020.1.3	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	29.600	2.100	Open Manhole	2100	1.000	27.500	900				
2	29.600	2.152	Open Manhole	2100	1.001	27.448	750	1.000	27.448	900	
	29.390	1.973	Open Manhole	750		OUTFALL		1.001	27.417	750	

No coordinates have been specified, layout information cannot be produced.

		Page 3
Livv Housing Group Moss Green Close Huyton		
Date 28/07/2021 17:06 File 5.MDX	Designed by JHale Checked by	
Innovyze	Network 2020.1.3	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	900	1	29.600	27.500	1.200	Open Manhole	2100
1.001	o	750	2	29.600	27.448	1.402	Open Manhole	2100

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	20.693	400.0	2	29.600	27.448	1.252	Open Manhole	2100
1.001	12.424	400.8		29.390	27.417	1.223	Open Manhole	750

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.001		29.390	27.417	27.380	750	0
-------	--	--------	--------	--------	-----	---

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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
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

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)	19.400	Storm Duration (mins)	30
Ratio R	0.399		

		Page 4
	Livv Housing Group Moss Green Close Huyton	
Date 28/07/2021 17:06 File 5.MDX	Designed by JHale Checked by	
Innovyze	Network 2020.1.3	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 2, DS/PN: 1.001, Volume (m³): 19.3

Unit Reference MD-SHE-0093-5000-1900-5000
Design Head (m) 1.900
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 93
Invert Level (m) 27.448
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.900	5.0
Flush-Flo™	0.406	4.3
Kick-Flo®	0.830	3.4
Mean Flow over Head Range	-	4.0

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	2.9	1.200	4.0	3.000	6.2	7.000	9.2
0.200	3.9	1.400	4.3	3.500	6.7	7.500	9.5
0.300	4.2	1.600	4.6	4.000	7.1	8.000	9.8
0.400	4.3	1.800	4.9	4.500	7.5	8.500	10.1
0.500	4.2	2.000	5.1	5.000	7.9	9.000	10.4
0.600	4.1	2.200	5.4	5.500	8.2	9.500	10.7
0.800	3.6	2.400	5.6	6.000	8.6		
1.000	3.7	2.600	5.8	6.500	8.9		

		Page 5
	Livv Housing Group Moss Green Close Huyton	
Date 28/07/2021 17:06 File 5.MDX	Designed by JHale Checked by	
Innovyze	Network 2020.1.3	

Livv Housing Group
Moss Green Close
Huyton



```
Date 28/07/2021 17:06
File 5.MDX
```

Designed by JHale
Checked by

Innovyze

Network 2020.1.3

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 Coeffiecient	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 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

Rainfall Model	FSR	Ratio R	0.399
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	30 Winter	1	+0%	30/30 Winter				27.817
1.001	2	30 Winter	1	+0%	30/15 Winter				27.817

PN	US/MH Name	Surcharged	Flooded			Half Drain	Pipe		
		Depth	Volume	Flow /	Overflow	Time	Flow	Level	
		(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status Exceeded	
1.000	1	-0.583	0.000	0.01			5.1	OK	
1.001	2	-0.381	0.000	0.01		18	4.2	OK	

Livv Housing Group
Moss Green Close
Huyton



```
Date 28/07/2021 17:06
File 5.MDX
```

Designed by JHale
Checked by

Innovyze

Network 2020.1.3

2 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 Coeffiecient	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 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

Rainfall Model	FSR	Ratio R	0.399
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	30 Winter	2	+0%	30/30 Winter				27.916
1.001	2	30 Winter	2	+0%	30/15 Winter				27.916

PN	US/MH Name	Surcharged	Flooded			Half Drain	Pipe		
		Depth	Volume	Flow /	Overflow	Time	Flow	Level	
		(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status Exceeded	
1.000	1	-0.484	0.000	0.01			6.6	OK	
1.001	2	-0.282	0.000	0.01		21	4.3	OK	

Livv Housing Group
Moss Green Close
Huyton



```
Date 28/07/2021 17:06
File 5.MDX
```

Designed by JHale
Checked by

Innovyze

Network 2020.1.3

100 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 Coeffiecient	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 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

Rainfall Model	FSR	Ratio R	0.399
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.600	Cv (Winter)	0.840

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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water
									Level (m)
1.000	1 60	Winter	100	+40%	30/30	Winter			29.424
1.001	2 60	Winter	100	+40%	30/15	Winter			29.424

PN	US/MH Name	Surcharged	Flooded			Half Drain	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)		
1.000	1	1.024	0.000	0.02			16.5	FLOOD RISK	
1.001	2	1.226	0.000	0.02		86	5.0	FLOOD RISK	