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1 Hastings Meadow Close Kirby Muxloe Leicestershire LE9 2DR	LYCHAGTE LANE BURBAGE STORM V10 FEH	
Date 12/09/2024 File STORM V10-FEH-SPLIT TAN...	Designed by JR Checked by	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for STORM V08.sws

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.700	Add Flow / Climate Change (%)	0
Ratio R	0.406	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	0	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.000
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 V08.sws

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.512	4-8	0.721	8-12	0.005

Total Area Contributing (ha) = 1.239

Total Pipe Volume (m³) = 66.928

Network Design Table for STORM V08.sws

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	14.542	0.073	199.2	0.030	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	28.491	0.142	200.6	0.028	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	11.483	0.057	201.5	0.042	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	23.741	0.119	199.5	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	33.684	1.296	26.0	0.159	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	8.702	0.058	150.0	0.114	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	19.807	0.132	150.1	0.069	0.00	0.0	0.600	o	375	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	0.00	5.22	107.117	0.030	0.0	0.0	0.0	1.11	78.5	0.0
1.001	0.00	5.65	107.044	0.058	0.0	0.0	0.0	1.11	78.2	0.0
1.002	0.00	5.82	106.902	0.100	0.0	0.0	0.0	1.10	78.0	0.0
1.003	0.00	6.18	106.844	0.124	0.0	0.0	0.0	1.11	78.4	0.0
1.004	0.00	6.36	106.725	0.283	0.0	0.0	0.0	3.10	218.9	0.0
1.005	0.00	6.47	105.429	0.397	0.0	0.0	0.0	1.28	90.6	0.0
1.006	0.00	6.70	105.297	0.466	0.0	0.0	0.0	1.48	163.1	0.0

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Simulation Criteria for STORM V08.sws

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.406		

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Online Controls for STORM V08.sws

Hydro-Brake® Optimum Manhole: S20, DS/PN: 1.013, Volume (m³): 5.4

Unit Reference	MD-SHE-0131-9000-1545-9000
Design Head (m)	1.545
Design Flow (l/s)	9.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	131
Invert Level (m)	102.215
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.545	9.0
Flush-Flo™	0.456	9.0
Kick-Flo®	0.956	7.2
Mean Flow over Head Range	-	7.9

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	8.0	3.000	12.3	7.000	18.4
0.200	8.0	1.400	8.6	3.500	13.2	7.500	19.1
0.300	8.7	1.600	9.1	4.000	14.1	8.000	19.7
0.400	9.0	1.800	9.7	4.500	14.9	8.500	20.2
0.500	9.0	2.000	10.2	5.000	15.7	9.000	20.8
0.600	8.9	2.200	10.6	5.500	16.4	9.500	21.3
0.800	8.3	2.400	11.1	6.000	17.1		
1.000	7.3	2.600	11.5	6.500	17.8		

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Storage Structures for STORM V08.sws

Complex Manhole: S20, DS/PN: 1.013

Tank or Pond

Invert Level (m) 102.260

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	0.0	0.500	296.9	0.900	308.7	1.400	157.1
0.100	157.1	0.600	308.7	1.000	296.9	1.500	0.0
0.200	214.2	0.700	314.4	1.100	278.7		
0.300	252.0	0.750	315.0	1.200	252.0		
0.400	278.7	0.800	314.4	1.300	214.2		

Cellular Storage

Invert Level (m) 102.560 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	360.0	0.0	1.201	0.0	0.0
1.200	360.0	0.0			

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Kirby Muxloe

Leicestershire LE9 2DR

LYCHAGTE LANE

BURBAGE

STORM V10 FEH

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Micro Drainage

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM V08.sws

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 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 FEH D1 (1km) 0.367

F (1km) 2.363

FEH Rainfall Version 1999 D2 (1km) 0.344

Cv (Summer) 0.750

Site Location D3 (1km) 0.253

Cv (Winter) 0.840

C (1km) -0.027

E (1km) 0.305

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) 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 100

Climate Change (%) 40

PN

US/MH Name

Event

US/CL (m)

Water Level (m)

Surcharged Depth (m)

Flooded Volume (m³)

Flow / Cap.

1.000

S1

60 minute 100 year Summer I+40%

108.918

107.209

-0.208

0.000

0.19

1.001

S2

60 minute 100 year Summer I+40%

109.365

107.167

-0.177

0.000

0.34

1.002

S3

60 minute 100 year Summer I+40%

109.902

107.089

-0.113

0.000

0.67

1.003

S4

60 minute 100 year Summer I+40%

109.722

107.043

-0.101

0.000

0.74

1.004

S8

60 minute 100 year Summer I+40%

109.085

106.898

-0.127

0.000

0.59

1.005

S9

60 minute 100 year Summer I+40%

108.174

106.426

0.697

0.000

2.68

1.006

S10

60 minute 100 year Summer I+40%

107.930

105.968

0.296

0.000

1.41

2.000

S22

60 minute 100 year Summer I+40%

108.287

106.150

-0.085

0.000

0.69

2.001

S23

60 minute 100 year Summer I+40%

107.500

105.788

0.153

0.000

0.98

1.007

S11

60 minute 100 year Summer I+40%

107.384

105.690

0.150

0.000

1.56

1.008

S12

60 minute 100 year Summer I+40%

106.957

105.296

-0.134

0.000

0.65

3.000

S13

60 minute 100 year Summer I+40%

105.885

104.838

0.583

0.000

0.60

3.001

S14

60 minute 100 year Summer I+40%

106.172

104.793

0.637

0.000

0.62

1.009

S16

60 minute 100 year Summer I+40%

105.563

104.730

0.721

0.000

1.49

1.010

S17

60 minute 100 year Summer I+40%

104.977

103.783

0.187

0.000

1.26

1.011

S18

600 minute 100 year Winter I+40%

104.761

103.751

0.265

0.000

0.21

1.012

S19

600 minute 100 year Winter I+40%

104.550

103.749

0.889

0.000

0.23

1.013

S20

600 minute 100 year Winter I+40%

104.550

103.748

1.233

0.000

0.13

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