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1 Hastings Meadow Close Kirby Muxloe Leicestershire LE9 2DR	LYCHGATE LANE BURBAGE STORM V10 FSR	
Date 12/09/2024 File STORM V10-FSR-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

LYCHGATE LANE

BURBAGE

STORM V10 FSR

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Micro Drainage

1 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 0.000

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 FSR

Ratio R 0.406

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.700

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

Return Period(s) (years) 1, 2, 30

Climate Change (%) 0, 0, 0

PN

US/MH Name

Event

US/CL (m)

Water Level (m)

Surcharged Depth (m)

Flooded Volume (m³)

Flow / Cap.

1.000

S1

15 minute

1 year

Winter

I+0%

108.918

107.166

-0.251

0.000

0.06

1.001

S2

15 minute

1 year

Winter

I+0%

109.365

107.109

-0.235

0.000

0.10

1.002

S3

15 minute

1 year

Winter

I+0%

109.902

106.993

-0.209

0.000

0.20

1.003

S4

15 minute

1 year

Winter

I+0%

109.722

106.938

-0.206

0.000

0.21

1.004

S8

15 minute

1 year

Winter

I+0%

109.085

106.806

-0.219

0.000

0.16

1.005

S9

15 minute

1 year

Winter

I+0%

108.174

105.625

-0.104

0.000

0.75

1.006

S10

15 minute

1 year

Winter

I+0%

107.930

105.461

-0.211

0.000

0.39

2.000

S22

15 minute

1 year

Winter

I+0%

108.287

106.083

-0.152

0.000

0.23

2.001

S23

15 minute

1 year

Winter

I+0%

107.500

105.451

-0.184

0.000

0.31

1.007

S11

15 minute

1 year

Winter

I+0%

107.384

105.301

-0.239

0.000

0.45

1.008

S12

15 minute

1 year

Winter

I+0%

106.957

105.112

-0.318

0.000

0.19

3.000

S13

15 minute

1 year

Winter

I+0%

105.885

104.052

-0.203

0.000

0.23

3.001

S14

15 minute

1 year

Winter

I+0%

106.172

103.902

-0.254

0.000

0.22

1.009

S16

15 minute

1 year

Winter

I+0%

105.563

103.775

-0.234

0.000

0.46

1.010

S17

15 minute

1 year

Winter

I+0%

104.977

103.256

-0.340

0.000

0.38

1.011

S18

15 minute

1 year

Winter

I+0%

104.761

103.149

-0.337

0.000

0.40

1.012

S19

120 minute

1 year

Winter

I+0%

104.550

102.655

-0.205

0.000

0.17

1.013

S20

120 minute

1 year

Winter

I+0%

104.550

102.654

0.139

0.000

0.13

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<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for STORM V08.sws</u>					
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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for STORM V08.sws

PN	US/MH Name	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow	Status
				(l/s)	
1.000	S1		0.059	5.3	OK
1.001	S2		0.180	9.5	OK
1.002	S3		0.272	15.7	OK
1.003	S4		0.250	19.0	OK
1.004	S8		0.244	42.5	OK
1.005	S9		0.419	59.4	OK
1.006	S10		0.391	69.7	OK
2.000	S22		0.090	20.5	OK
2.001	S23		0.164	27.5	OK
1.007	S11		0.998	108.4	OK
1.008	S12		0.593	117.4	OK
3.000	S13		0.121	19.9	OK
3.001	S14		0.283	29.8	OK
1.009	S16		1.814	160.3	OK
1.010	S17		0.845	160.8	OK
1.011	S18		3.884	180.0	OK
1.012	S19		0.884	68.4	OK
1.013	S20		144.140	9.0	SURCHARGED

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

Rainfall Model	FSR	Ratio R	0.406
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

Profile(s)	Summer and Winter
n(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
(s) (years)	1, 2, 30
Change (%)	0, 0, 0

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1 Hastings Meadow Close
Kirby Muxloe
Leicestershire LE9 2DR

Date 12/09/2024
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LYCHGATE LANE
BURBAGE
STORM V10 FSR

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

for STORM V08.sws

				Pipe	
	US/MH	Overflow	Maximum	Flow	
PN	Name	(l/s)	Vol (m³)	(l/s)	Status
1.000	S1		0.086	10.1	OK
1.001	S2		0.285	19.6	OK
1.002	S3		0.709	33.9	OK
1.003	S4		0.510	42.2	OK
1.004	S8		0.580	96.6	OK
1.005	S9		1.597	133.9	SURCHARGED
1.006	S10		1.197	157.2	SURCHARGED
2.000	S22		0.132	38.9	OK
2.001	S23		0.590	54.1	SURCHARGED
1.007	S11		3.852	238.1	SURCHARGED
1.008	S12		1.201	258.9	OK
3.000	S13		0.369	37.2	SURCHARGED
3.001	S14		1.946	52.2	SURCHARGED
1.009	S16		7.998	326.6	SURCHARGED
1.010	S17		3.115	324.4	OK
1.011	S18		7.540	348.9	OK
1.012	S19		6.447	78.0	SURCHARGED
1.013	S20		327.962	9.0	SURCHARGED

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