

Mucklow & Harris Ltd		Page 1
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA	Fole Diary CB COLLIER Network B	
Date 28/11/2022 08:38 File Storm B 22.06.22.MDX	Designed by Riaz Alam Checked by	
Innovyze	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 404500 337500 SK 04500 37500
Data Type	Point
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	60
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
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	0.116	4-8	0.022

Total Area Contributing (ha) = 0.138

Total Pipe Volume (m³) = 2.632

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	20.020	0.250	80.1	0.025	6.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	6.310	0.100	63.1	0.019	6.00	0.0	0.600	o	225	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	6.23	111.550	0.025	0.0	0.0	0.0	1.46	58.2	0.0
2.000	0.00	6.06	111.400	0.019	0.0	0.0	0.0	1.65	65.6	0.0

Mucklow & Harris Ltd		Page 3
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA	Fole Diary CB COLLIER Network B	
Date 28/11/2022 08:38 File Storm B 22.06.22.MDX	Designed by Riaz Alam Checked by	
Innovyze	Network 2019.1	

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)	Pipes In PN	Invert Level (m)	Diameter (mm)	Backd (mm)
20	112.550	1.000	Open Manhole	1200	1.000	111.550	225				
21	112.100	0.700	Open Manhole	475	2.000	111.400	225				
22	112.100	0.800	Open Manhole	1200	1.001	111.300	225	1.000	111.300	225	
FCC B	112.100	2.100	Open Manhole	1800	1.002	110.000	225	2.000	111.300	225	
Headwall 2	111.800	1.850	Open Manhole	0		OUTFALL		1.001	110.000	225	
								1.002	109.950	225	

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

Mucklow & Harris Ltd	Page 4
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA	Fole Diary CB COLLIER Network B
Date 28/11/2022 08:38 File Storm B 22.06.22.MDX	Designed by Riaz Alam Checked by
Innovyze	Network 2019.1



PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
1.000	o	225	20	112.550	111.550	0.775	Open Manhole	1200
2.000	o	225	21	112.100	111.400	0.475	Open Manhole	475
1.001	o	225	22	112.100	111.300	0.575	Open Manhole	1200
1.002	o	225	FCC B	112.100	110.000	1.875	Open Manhole	1800

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	20.020	80.1	22	112.100	111.300	0.575	Open Manhole	1200
2.000	6.310	63.1	22	112.100	111.300	0.575	Open Manhole	1200
1.001	32.550	25.0	FCC B	112.100	110.000	1.875	Open Manhole	1800
1.002	7.305	146.1	Headwall 2	111.800	109.950	1.625	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall	Outfall	C. Level	I. Level	Min	D,L	W
Pipe Number	Name	(m)	(m)	I. Level (m)	(mm)	(mm)
1.002	Headwall 2	111.800	109.950	0.000	0	0

Simulation Criteria for Storm

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 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	2
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	0.373
Return Period (years)	100	Profile Type	Summer
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Mucklow & Harris Ltd		Page 5
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA	Fole Diary CB COLLIER Network B	
Date 28/11/2022 08:38 File Storm B 22.06.22.MDX	Designed by Riaz Alam Checked by	
Innovyze	Network 2019.1	
<u>Synthetic Rainfall Details</u> Storm Duration (mins) 30		
©1982-2019 Innovyze		

Mucklow & Harris Ltd		Page 6
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA	Fole Diary CB COLLIER Network B	
Date 28/11/2022 08:38 File Storm B 22.06.22.MDX	Designed by Riaz Alam Checked by	
Innovyze	Network 2019.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: FCC B, DS/PN: 1.002, Volume (m³): 6.6

Unit Reference	MD-SHE-0176-1500-0900-1500
Design Head (m)	0.900
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	176
Invert Level (m)	110.000
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	15.0
Flush-Flo™	0.303	15.0
Kick-Flo®	0.648	12.8
Mean Flow over Head Range	-	12.6

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	6.2	1.200	17.2	3.000	26.6	7.000	40.1
0.200	14.6	1.400	18.5	3.500	28.7	7.500	41.4
0.300	15.0	1.600	19.7	4.000	30.6	8.000	42.8
0.400	14.8	1.800	20.9	4.500	32.4	8.500	44.0
0.500	14.4	2.000	21.9	5.000	34.1	9.000	45.3
0.600	13.6	2.200	23.0	5.500	35.7	9.500	46.3
0.800	14.2	2.400	23.9	6.000	37.2		
1.000	15.8	2.600	24.9	6.500	38.7		

Mucklow & Harris Ltd		Page 7
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA	Fole Diary CB COLLIER Network B	
Date 28/11/2022 08:38 File Storm B 22.06.22.MDX	Designed by Riaz Alam Checked by	
Innovyze	Network 2019.1	

Storage Structures for Storm

Porous Car Park Manhole: 20, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	65.0
Max Percolation (l/s)	180.6	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	111.550	Cap Volume Depth (m)	0.350

Tank or Pond Manhole: FCC B, DS/PN: 1.002

Invert Level (m) 110.150

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	38.0	0.700	38.0	1.400	0.0	2.100	0.0
0.100	38.0	0.800	38.0	1.500	0.0	2.200	0.0
0.200	38.0	0.801	0.0	1.600	0.0	2.300	0.0
0.300	38.0	1.000	0.0	1.700	0.0	2.400	0.0
0.400	38.0	1.100	0.0	1.800	0.0	2.500	0.0
0.500	38.0	1.200	0.0	1.900	0.0		
0.600	38.0	1.300	0.0	2.000	0.0		

Mucklow & Harris Ltd

Page 11

Studio 313 Scott House

The Custard Factory, Gibb St...

Birmingham, B9 4AA

Fole Diary

CB COLLIER

Network B

Date 28/11/2022 08:38

File Storm B 22.06.22.MDX

Designed by Riaz Alam

Checked by

Innovyze

Network 2019.1

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

Simulation Criteria

Areal Reduction Factor 1.000

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coeffiecient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Online Controls 1

Number of Offline Controls 0

Number of Storage Structures 2

Number of Time/Area Diagrams 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000

Ratio R 0.373

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

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) 1, 2, 30, 100

Climate Change (%) 0, 0, 0, 40

US/MH

PN

Name

Storm

Return Period

Climate Change

First (X) Surcharge

First (Y) Flood

First (Z) Overflow

Overflow Act.

Water Level (m)

1.000

20

15 Winter

100

+40%

111.626

2.000

21

15 Winter

100

+40%

111.472

1.001

22

15 Winter

100

+40%

111.403

1.002

FCC B

30 Winter

100

+40%

30/15 Summer

110.780

Surcharged Flooded

US/MH

PN

Name

Depth (m)

Volume (m³)

Flow / Cap.

Overflow (l/s)

Pipe Flow (l/s)

Status

Level Exceeded

1.000

20

-0.149

0.000

0.25

13.1

OK

2.000

21

-0.153

0.000

0.23

10.1

OK

1.001

22

-0.122

0.000

0.41

40.5

OK

1.002

FCC B

0.555

0.000

0.47

15.0

SURCHARGED

©1982-2019 Innovyze