

Mucklow & Harris Ltd

5 Ardent Court
William James Way
Henley in Arden, B95 5GF

Date 23/07/2025 15:07
File STORM C 02.07.24.MDX

Innovyze

Fole Diary
CB COLLIER
Network C

Designed by Ben Lee
Checked by

Network 2020.1

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)

FEH Rainfall Version

Site Location GB 404500 337500 SK 04500 37500

Data Type

Maximum Rainfall (mm/hr)

Maximum Time of Concentration (mins)

Foul Sewage (l/s/ha)

Volumetric Runoff Coeff.

PIMP (%)

Add Flow / Climate Change (%)

Minimum Backdrop Height (m)

Maximum Backdrop Height (m)

Min Design Depth for Optimisation (m)

Min Vel for Auto Design only (m/s)

Min Slope for Optimisation (1:X)

2

2013

37500

Point

0

30

0.000

0.750

100

0

0.000

0.000

1.200

1.00

500

Designed with Level Soffits

Time Area Diagram for Storm

Time

Area

(mins)

(ha)

Time

Area

(mins)

(ha)

0-4

0.041

4-8

0.007

Total Area Contributing (ha) = 0.048

Total Pipe Volume (m³) = 1.480

Network Design Table for Storm

PN

Length

Fall

Slope

I.Area

T.E.

Base

k

HYD

DIA

Section Type

Auto

(m)

(m)

(1:X)

(ha)

(mins)

Flow (l/s)

(mm)

SECT

(mm)

Network Results Table

PN

Rain

T.C.

US/IL

E I.Area

E Base

Foul

Add Flow

Vel

Cap

Flow

(mm/hr)

(mins)

(m)

(ha)

Flow (l/s)

(l/s)

(l/s)

(m/s)

(l/s)

(l/s)

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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	12.975	0.200	64.9	0.010	6.00	0.0	0.600	o	150	Pipe/Conduit		
1.001	4.144	0.150	27.6	0.027	0.00	0.0	0.600	o	150	Pipe/Conduit		
1.002	7.500	0.100	75.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit		
1.003	6.351	0.075	84.7	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit		
2.000	15.000	0.100	150.0	0.000	6.00	0.0	0.600	o	225	Pipe/Conduit		
1.004	8.457	0.085	99.5	0.000	0.00	0.0	0.600	o	225	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)
1.000	0.00	6.17	110.600	0.010	0.0	0.0	0.0	1.25	22.1	0.0
1.001	0.00	6.21	110.400	0.037	0.0	0.0	0.0	1.92	34.0	0.0
1.002	0.00	6.32	110.250	0.043	0.0	0.0	0.0	1.16	20.5	0.0
1.003	0.00	6.41	110.150	0.048	0.0	0.0	0.0	1.09	19.3	0.0
2.000	0.00	6.23	110.100	0.000	0.0	0.0	0.0	1.07	42.4	0.0
1.004	0.00	6.52	110.000	0.048	0.0	0.0	0.0	1.31	52.1	0.0



Micro
Drainage

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<u>Synthetic Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Profile Type</td> <td>Summer</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.000</td> <td>Storm Duration (mins)</td> <td>30</td> </tr> <tr> <td>Ratio R</td> <td>0.373</td> <td></td> <td></td> </tr> </table>			Rainfall Model	FSR	Profile Type	Summer	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.000	Storm Duration (mins)	30	Ratio R	0.373		
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Online Controls for Storm		
Hydro-Brake® Optimum Manhole: FCC C, DS/PN: 1.004, Volume (m³): 3.2		
Unit Reference MD-SHE-0177-1500-0800-1500 Design Head (m)0.800 Design Flow (l/s)15.0 Flush-Flo™Calculated ObjectiveMinimise upstream storage ApplicationSurface Sump AvailableYes Diameter (mm)177 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)0.80015.0 Flush-Flo™0.28815.0 Control Points Head (m) Flow (l/s) Kick-Flo®0.59013.0 Mean Flow over Head Range-12.5		
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) 0.1006.3 1.20018.2 3.00028.2 7.00042.4 0.20014.7 1.40019.6 3.50030.4 7.50043.9 0.30015.0 1.60020.9 4.00032.4 8.00045.3 0.40014.7 1.80022.1 4.50034.3 8.50046.4 0.50014.2 2.00023.2 5.00036.1 9.00047.8 0.60013.1 2.20024.3 5.50037.8 9.50049.1 0.80015.0 2.40025.3 6.00039.4 1.00016.7 2.60026.3 6.50040.9		
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Storage Structures for Storm Porous Car Park Manhole: 31, DS/PN: 1.001 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>5.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>10.0</td></tr><tr><td>Max Percolation (l/s)</td><td>13.9</td><td>Slope (1:X)</td><td>80.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>110.400</td><td>Membrane Depth (mm)</td><td>0</td></tr></table> Porous Car Park Manhole: 33, DS/PN: 1.003 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>5.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>5.0</td></tr><tr><td>Max Percolation (l/s)</td><td>6.9</td><td>Slope (1:X)</td><td>80.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>0</td></tr><tr><td>Invert Level (m)</td><td>110.150</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> Tank or Pond Manhole: FCC C, DS/PN: 1.004 Invert Level (m) 110.000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr><tr><td>0.000</td><td>15.0</td><td>0.700</td><td>0.0</td><td>1.400</td><td>0.0</td><td>2.100</td><td>0.0</td></tr><tr><td>0.100</td><td>15.0</td><td>0.800</td><td>0.0</td><td>1.500</td><td>0.0</td><td>2.200</td><td>0.0</td></tr><tr><td>0.200</td><td>15.0</td><td>0.900</td><td>0.0</td><td>1.600</td><td>0.0</td><td>2.300</td><td>0.0</td></tr><tr><td>0.300</td><td>15.0</td><td>1.000</td><td>0.0</td><td>1.700</td><td>0.0</td><td>2.400</td><td>0.0</td></tr><tr><td>0.400</td><td>15.0</td><td>1.100</td><td>0.0</td><td>1.800</td><td>0.0</td><td>2.500</td><td>0.0</td></tr><tr><td>0.401</td><td>15.0</td><td>1.200</td><td>0.0</td><td>1.900</td><td>0.0</td><td></td><td></td></tr><tr><td>0.600</td><td>0.0</td><td>1.300</td><td>0.0</td><td>2.000</td><td>0.0</td><td></td><td></td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0	Membrane Percolation (mm/hr)	1000	Length (m)	10.0	Max Percolation (l/s)	13.9	Slope (1:X)	80.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	110.400	Membrane Depth (mm)	0	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0	Membrane Percolation (mm/hr)	1000	Length (m)	5.0	Max Percolation (l/s)	6.9	Slope (1:X)	80.0	Safety Factor	2.0	Depression Storage (mm)	0	Porosity	0.30	Evaporation (mm/day)	0	Invert Level (m)	110.150	Cap Volume Depth (m)	0.350	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	15.0	0.700	0.0	1.400	0.0	2.100	0.0	0.100	15.0	0.800	0.0	1.500	0.0	2.200	0.0	0.200	15.0	0.900	0.0	1.600	0.0	2.300	0.0	0.300	15.0	1.000	0.0	1.700	0.0	2.400	0.0	0.400	15.0	1.100	0.0	1.800	0.0	2.500	0.0	0.401	15.0	1.200	0.0	1.900	0.0			0.600	0.0	1.300	0.0	2.000	0.0		
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1000 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 Coefficient 0.800

Flow per Person per Day (l/per/day) 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 3

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 Cv (Winter) 0.840

Ratio R 0.373

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep DTS Status ON

DVD Status ON

Fine Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1000

Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	30	15 Winter	1000	+0%					110.657
1.001	31	15 Winter	1000	+0%	1000/15 Summer				110.590
1.002	32	15 Winter	1000	+0%	1000/15 Summer				110.510
1.003	33	15 Winter	1000	+0%	1000/15 Summer				110.368
2.000	ATT TANK	30 Winter	1000	+0%					110.280
1.004	FCC C	30 Winter	1000	+0%	1000/15 Summer				110.280

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Pipe Flow (l/s)		
1.000	30	-0.093	0.000	0.31		6.2	OK	
1.001	31	0.040	0.000	0.75	5	18.3	SURCHARGED	
1.002	32	0.110	0.000	1.17		20.7	SURCHARGED	
1.003	33	0.068	0.000	1.42	8	23.0	SURCHARGED	
2.000	ATT TANK	-0.045	0.000	0.01		0.5	OK	

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Micro
Drainage

1000 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

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)		
1.004	FCC C	0.055	0.000	0.36			15.0	SURCHARGED	