

## MICRODRAINAGE CALCULATIONS

Quick Storage Estimate

Pages 1-11 – Units 7a – 7b

Pages 12-30 – Units 1 – 6 + David Lloyd

100 Year + 40% Climate Change Event

Quick Storage Estimate

Micro Drainage

**Variables**

FEH Rainfall

Return Period (years) 100

Version 2013 Point

Site GB 457460 221065 SP 57460 21065

Cv (Summer) 0.750

Cv (Winter) 0.840

Impemeable Area (ha) 2.300

Maximum Allowable Discharge (l/s) 8.0

Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 40

Analyse OK Cancel Help

Enter Return Period between 2 and 1000

Quick Storage Estimate

Micro Drainage

**Results**

Global Variables require approximate storage of between 1674 m<sup>3</sup> and 1979 m<sup>3</sup>.  
 These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Return Period between 2 and 1000

Grange House  
John Dalton St  
Manchester M2 6FW

Catalyst Bicester  
Units 7a-7b

Date 07/03/2022

Designed by James Griffiths

File Units 7a-7b Final Analysis.MDX

Checked by WB

Micro Drainage

Network 2017.1



STORM SEWER DESIGN by the Modified Rational Method

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	17.500	0.060	291.7	0.150	15.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	31.100	0.155	200.6	0.120	15.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	21.500	0.110	195.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	14.000	0.095	147.4	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	60.000	0.475	126.3	0.190	15.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	33.000	0.195	169.2	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	11.700	0.040	292.5	0.025	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	53.100	0.180	295.0	0.150	15.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	34.500	0.115	300.0	0.090	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.000	53.100	0.220	241.4	0.200	15.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	16.100	0.055	292.7	0.050	0.00	0.0	0.600	o	600	Pipe/Conduit	
6.000	53.100	0.275	193.1	0.180	15.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	23.000	0.075	306.7	0.045	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.005	7.000	0.025	280.0	0.040	0.00	0.0	0.600	o	600	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	84.51	15.32	63.570	0.150	0.0	0.0	0.0	0.92	64.7	34.3
2.000	84.01	15.47	63.870	0.120	0.0	0.0	0.0	1.11	78.2	27.3
2.001	82.97	15.79	63.715	0.120	0.0	0.0	0.0	1.12	79.2	27.3
2.002	82.40	15.97	63.605	0.140	0.0	0.0	0.0	1.29	91.4	31.2
3.000	83.20	15.72	64.105	0.190	0.0	0.0	0.0	1.40	98.8	42.8
3.001	81.77	16.17	63.630	0.220	0.0	0.0	0.0	1.21	85.2	48.7
1.001	81.26	16.34	63.510	0.535	0.0	0.0	0.0	1.18	188.2	117.7
4.000	82.39	15.97	63.650	0.150	0.0	0.0	0.0	0.91	64.3	33.5
1.002	79.80	16.83	63.470	0.775	0.0	0.0	0.0	1.17	185.8	167.5
5.000	82.68	15.88	63.575	0.200	0.0	0.0	0.0	1.01	71.2	44.8
1.003	79.26	17.02	63.355	1.025	0.0	0.0	0.0	1.42	401.0	220.0
6.000	82.98	15.78	63.575	0.180	0.0	0.0	0.0	1.13	79.7	40.5
1.004	78.48	17.29	63.300	1.250	0.0	0.0	0.0	1.39	391.7	265.7
1.005	78.25	17.37	63.225	1.290	0.0	0.0	0.0	1.45	410.1	273.4

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STORM SEWER DESIGN by the Modified Rational Method

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
7.000	85.000	0.575	147.8	0.134	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
7.001	5.000	0.150	33.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
8.000	27.500	0.095	289.5	0.122	15.00	0.0	0.600	o	375	Pipe/Conduit	🔒
9.000	15.000	0.070	214.3	0.250	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
8.001	85.000	0.285	298.2	0.110	0.00	0.0	0.600	o	450	Pipe/Conduit	🔒
8.002	28.000	0.095	294.7	0.012	0.00	0.0	0.600	o	450	Pipe/Conduit	🔒
8.003	5.500	0.025	220.0	0.110	0.00	0.0	0.600	o	450	Pipe/Conduit	🔒
1.006	6.000	0.100	60.0	0.200	0.00	0.0	0.600	o	525	Pipe/Conduit	🔒
1.007	8.000	0.100	80.0	0.000	0.00	0.0	0.600	o	525	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)
7.000	82.00	16.10	63.925	0.134	0.0	0.0	0.0	1.29	91.3	29.8
7.001	81.90	16.13	63.350	0.134	0.0	0.0	0.0	2.73	193.2	29.8
8.000	84.13	15.43	63.775	0.122	0.0	0.0	0.0	1.06	117.1	27.8
9.000	84.79	15.23	63.825	0.250	0.0	0.0	0.0	1.07	75.6	57.4
8.001	80.35	16.64	63.605	0.482	0.0	0.0	0.0	1.17	186.4	104.9
8.002	79.20	17.04	63.320	0.494	0.0	0.0	0.0	1.18	187.5	106.0
8.003	79.01	17.10	63.225	0.604	0.0	0.0	0.0	1.37	217.4	129.2
1.006	78.16	17.41	63.000	2.228	0.0	0.0	0.0	2.90	626.8	471.6
1.007	78.01	17.46	62.900	2.228	0.0	0.0	0.0	2.51	542.5	471.6

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)
1.007	Headwall 8	65.000	62.800	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 * 10m <sup>3</sup> /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 Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 1    Number of Storage Structures 5    Number of Real Time Controls 0

Grange House  
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Catalyst Bicester  
Units 7a-7b



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Simulation Criteria for Storm

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 457460 221065 SP 57460 21065
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

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Online Controls for Storm

Complex Manhole: S76, DS/PN: 1.007, Volume (m³): 4.7

Hydro-Brake® Optimum

Unit Reference MD-SHE-0124-8000-1500-8000  
 Design Head (m) 1.500  
 Design Flow (l/s) 8.0  
 Flush-Flo™ Calculated  
 Objective Minimise upstream storage  
 Application Surface  
 Sump Available Yes  
 Diameter (mm) 124  
 Invert Level (m) 62.900  
 Minimum Outlet Pipe Diameter (mm) 150  
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	8.0	Kick-Flo®	0.925	6.4
Flush-Flo™	0.444	8.0	Mean Flow over Head Range	-	7.0

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	4.4	1.200	7.2	3.000	11.1	7.000	16.6
0.200	7.2	1.400	7.7	3.500	11.9	7.500	17.2
0.300	7.8	1.600	8.2	4.000	12.7	8.000	17.7
0.400	8.0	1.800	8.7	4.500	13.4	8.500	18.2
0.500	8.0	2.000	9.2	5.000	14.1	9.000	18.7
0.600	7.9	2.200	9.6	5.500	14.8	9.500	19.2
0.800	7.3	2.400	10.0	6.000	15.4		
1.000	6.6	2.600	10.4	6.500	16.0		

Weir

Discharge Coef 0.544 Width (m) 1.800 Invert Level (m) 64.400

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Storage Structures for Storm

Cellular Storage Manhole: S67, DS/PN: 2.000

Invert Level (m) 63.870 Safety Factor 2.0  
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30  
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	15.0	0.0	0.780	450.0	0.0
0.379	15.0	0.0	0.781	0.0	0.0
0.380	450.0	0.0			

Cellular Storage Manhole: S65, DS/PN: 4.000

Invert Level (m) 63.650 Safety Factor 2.0  
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30  
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	25.5	0.0	0.800	638.0	0.0
0.399	25.5	0.0	0.801	0.0	0.0
0.400	638.0	0.0			

Cellular Storage Manhole: S63, DS/PN: 5.000

Invert Level (m) 63.575 Safety Factor 2.0  
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30  
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	25.5	0.0	0.825	850.0	0.0
0.424	25.5	0.0	0.826	0.0	0.0
0.425	850.0	0.0			

Cellular Storage Manhole: S62, DS/PN: 6.000

Invert Level (m) 63.575 Safety Factor 2.0  
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30  
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	25.5	0.0	0.825	850.0	0.0
0.424	25.5	0.0	0.826	0.0	0.0
0.425	850.0	0.0			

Tank or Pond Manhole: SWALE, DS/PN: 1.006

Invert Level (m) 63.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	524.0	0.400	801.0	0.800	1086.0	1.200	1381.0	1.401	0.0
0.200	661.0	0.600	942.0	1.000	1233.0	1.400	1532.0		

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Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m <sup>3</sup> )	Pipe Volume (m <sup>3</sup> )	Storage	Total Volume (m <sup>3</sup> )
				Structure Volume (m <sup>3</sup> )	
1.000	S61	1.335	1.237	0.000	2.572
2.000	S67	1.278	2.198	55.805	59.282
2.001	S66	1.453	1.520	0.000	2.973
2.002	S65	1.295	0.990	0.000	2.285
3.000	S69	1.125	4.241	0.000	5.366
3.001	S68	1.719	2.333	0.000	4.052
1.001	S60	2.011	1.861	0.000	3.872
4.000	S65	1.301	3.753	79.755	84.809
1.002	S59	2.068	5.487	0.000	7.555
5.000	S63	1.385	3.753	105.431	110.570
1.003	S58	2.757	4.552	0.000	7.309
6.000	S62	1.385	3.753	105.431	110.570
1.004	S57	2.783	6.503	0.000	9.286
1.005	S56	2.695	1.979	0.000	4.674
7.000	S71	1.272	6.008	0.000	7.281
7.001	S70	1.866	0.353	0.000	2.220
8.000	S75	1.954	3.037	0.000	4.991
9.000	PI	1.216	1.060	0.000	2.276
8.001	S74	1.997	13.519	0.000	15.515
8.002	S73	2.405	4.453	0.000	6.858
8.003	S72	2.541	0.875	0.000	3.415
1.006	SWALE	3.534	1.299	1425.635	1430.468
1.007	S76	3.711	1.732	0.000	5.443
Total		45.087	76.498	1772.057	1893.641



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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 \* 10m<sup>3</sup>/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 Offline Controls 0 Number of Time/Area Diagrams 0  
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 457460 221065 SP 57460 21065  
Data Type Point  
Cv (Summer) 0.750  
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, 2880, 4320  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Flooded		Pipe		Status
				Level (m)	Volume (m <sup>3</sup> )	Maximum Vol (m <sup>3</sup> )	Flow (l/s)	
1.000	S61	30 minute 2 year Winter I+0%	64.750	63.717	0.000	0.161	12.8	OK
2.000	S67	30 minute 2 year Winter I+0%	65.000	63.946	0.000	0.420	10.3	OK
2.001	S66	30 minute 2 year Winter I+0%	65.000	63.791	0.000	0.199	10.3	OK
2.002	S65	30 minute 2 year Winter I+0%	64.750	63.716	0.000	0.310	11.6	OK
3.000	S69	30 minute 2 year Winter I+0%	65.100	64.189	0.000	0.089	16.3	OK
3.001	S68	30 minute 2 year Winter I+0%	65.150	63.743	0.000	0.263	18.5	OK
1.001	S60	30 minute 2 year Winter I+0%	64.915	63.703	0.000	2.668	44.5	OK
4.000	S65	30 minute 2 year Winter I+0%	64.800	63.745	0.000	0.825	12.7	OK
1.002	S59	30 minute 2 year Winter I+0%	64.915	63.676	0.000	2.063	63.0	OK
5.000	S63	30 minute 2 year Winter I+0%	64.800	63.677	0.000	0.894	17.1	OK
1.003	S58	30 minute 2 year Winter I+0%	64.915	63.598	0.000	3.948	82.9	OK
6.000	S62	30 minute 2 year Winter I+0%	64.800	63.667	0.000	0.801	15.4	OK
1.004	S57	30 minute 2 year Winter I+0%	64.875	63.560	0.000	3.108	100.6	OK
1.005	S56	360 minute 2 year Winter I+0%	64.750	63.514	0.000	2.584	34.5	OK
7.000	S71	30 minute 2 year Winter I+0%	65.050	63.997	0.000	0.076	11.5	OK
7.001	S70	360 minute 2 year Winter I+0%	65.000	63.513	0.000	0.604	3.6	OK
8.000	S75	30 minute 2 year Winter I+0%	65.140	63.855	0.000	0.107	10.5	OK
9.000	PI	30 minute 2 year Winter I+0%	64.900	63.945	0.000	0.130	21.5	OK
8.001	S74	15 minute 2 year Winter I+0%	65.000	63.754	0.000	0.421	41.0	OK
8.002	S73	360 minute 2 year Winter I+0%	65.000	63.514	0.000	1.811	13.3	OK
8.003	S72	360 minute 2 year Winter I+0%	65.000	63.514	0.000	2.658	16.2	OK
1.006	SWALE	360 minute 2 year Winter I+0%	65.000	63.513	0.000	361.373	9.3	OK
1.007	S76	360 minute 2 year Winter I+0%	65.000	63.506	0.000	2.033	8.0	SURCHARGED

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30 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 \* 10m<sup>3</sup>/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 Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 1    Number of Storage Structures 5    Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 457460 221065 SP 57460 21065  
Data Type Point  
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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, 2880, 4320  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Flooded Volume (m <sup>3</sup> )	Pipe Maximum Vol (m <sup>3</sup> )	Pipe Flow (l/s)	Status
1.000	S61	240 minute 30 year Winter I+0%	64.750	63.986	0.000	0.465	10.6	SURCHARGED
2.000	S67	30 minute 30 year Winter I+0%	65.000	64.038	0.000	0.943	23.3	OK
2.001	S66	30 minute 30 year Winter I+0%	65.000	64.010	0.000	1.891	23.8	OK
2.002	S65	240 minute 30 year Winter I+0%	64.750	63.985	0.000	1.809	9.9	SURCHARGED
3.000	S69	30 minute 30 year Winter I+0%	65.100	64.239	0.000	0.146	38.7	OK
3.001	S68	240 minute 30 year Winter I+0%	65.150	63.991	0.000	2.202	15.6	SURCHARGED
1.001	S60	240 minute 30 year Winter I+0%	64.915	63.981	0.000	5.064	37.5	SURCHARGED
4.000	S65	240 minute 30 year Winter I+0%	64.800	63.984	0.000	2.926	10.6	SURCHARGED
1.002	S59	240 minute 30 year Winter I+0%	64.915	63.976	0.000	6.014	53.8	SURCHARGED
5.000	S63	240 minute 30 year Winter I+0%	64.800	63.966	0.000	3.429	14.1	SURCHARGED
1.003	S58	180 minute 30 year Winter I+0%	64.915	63.955	0.000	9.965	86.8	SURCHARGED
6.000	S62	480 minute 30 year Winter I+0%	64.800	63.912	0.000	2.956	7.3	SURCHARGED
1.004	S57	480 minute 30 year Winter I+0%	64.875	63.911	0.000	8.633	46.3	SURCHARGED
1.005	S56	480 minute 30 year Winter I+0%	64.750	63.910	0.000	7.209	46.7	SURCHARGED
7.000	S71	30 minute 30 year Winter I+0%	65.050	64.039	0.000	0.124	27.2	OK
7.001	S70	480 minute 30 year Winter I+0%	65.000	63.910	0.000	4.798	5.0	SURCHARGED
8.000	S75	480 minute 30 year Winter I+0%	65.140	63.911	0.000	0.188	5.0	OK
9.000	PI	30 minute 30 year Winter I+0%	64.900	64.030	0.000	0.226	51.1	OK
8.001	S74	480 minute 30 year Winter I+0%	65.000	63.911	0.000	2.138	19.7	OK
8.002	S73	480 minute 30 year Winter I+0%	65.000	63.911	0.000	13.230	18.0	SURCHARGED
8.003	S72	480 minute 30 year Winter I+0%	65.000	63.910	0.000	5.212	21.5	SURCHARGED
1.006	SWALE	480 minute 30 year Winter I+0%	65.000	63.910	0.000	768.800	14.3	SURCHARGED
1.007	S76	480 minute 30 year Winter I+0%	65.000	63.935	0.000	2.794	8.0	SURCHARGED

Bailey Johnson Hayes		Page 10
Grange House John Dalton St Manchester M2 6FW	Catalyst Bicester Units 7a-7b	
Date 07/03/2022 File Units 7a-7b Final Analysis.MDX	Designed by James Griffiths Checked by WB	
Micro Drainage	Network 2017.1	

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 \* 10m<sup>3</sup>/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 Offline Controls 0      Number of Time/Area Diagrams 0  
Number of Online Controls 1      Number of Storage Structures 5      Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 457460 221065 SP 57460 21065  
Data Type Point  
Cv (Summer) 0.750  
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, 2880, 4320  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Flooded		Pipe Maximum Flow (l/s)	Status
				Level (m)	Volume (m <sup>3</sup> )		
1.000	S61	600 minute 100 year Winter I+40%	64.750	64.317	0.000	0.839 9.0	SURCHARGED
2.000	S67	30 minute 100 year Winter I+40%	65.000	64.358	0.000	16.922 27.0	SURCHARGED
2.001	S66	30 minute 100 year Winter I+40%	65.000	64.321	0.000	2.794 26.4	SURCHARGED
2.002	S65	600 minute 100 year Winter I+40%	64.750	64.316	0.000	2.234 8.4	SURCHARGED
3.000	S69	30 minute 100 year Winter I+40%	65.100	64.617	0.000	0.574 69.8	SURCHARGED
3.001	S68	30 minute 100 year Winter I+40%	65.150	64.360	0.000	4.936 75.6	SURCHARGED
1.001	S60	600 minute 100 year Winter I+40%	64.915	64.316	0.000	5.542 32.0	SURCHARGED
4.000	S65	600 minute 100 year Winter I+40%	64.800	64.315	0.000	54.607 8.9	SURCHARGED
1.002	S59	600 minute 100 year Winter I+40%	64.915	64.315	0.000	6.512 46.0	SURCHARGED
5.000	S63	600 minute 100 year Winter I+40%	64.800	64.314	0.000	84.127 11.9	SURCHARGED
1.003	S58	600 minute 100 year Winter I+40%	64.915	64.313	0.000	10.603 60.9	SURCHARGED
6.000	S62	600 minute 100 year Winter I+40%	64.800	64.312	0.000	83.844 10.8	SURCHARGED
1.004	S57	600 minute 100 year Winter I+40%	64.875	64.312	0.000	9.566 74.1	SURCHARGED
1.005	S56	600 minute 100 year Winter I+40%	64.750	64.311	0.000	7.990 76.0	SURCHARGED
7.000	S71	600 minute 100 year Winter I+40%	65.050	64.312	0.000	0.432 8.0	SURCHARGED
7.001	S70	600 minute 100 year Winter I+40%	65.000	64.311	0.000	7.005 6.9	SURCHARGED
8.000	S75	240 minute 100 year Winter I+40%	65.140	64.343	0.000	0.806 15.0	SURCHARGED
9.000	PI	180 minute 100 year Winter I+40%	64.900	64.360	0.000	0.599 39.2	SURCHARGED
8.001	S74	240 minute 100 year Winter I+40%	65.000	64.338	0.000	4.901 58.1	SURCHARGED
8.002	S73	600 minute 100 year Winter I+40%	65.000	64.312	0.000	14.717 26.4	SURCHARGED
8.003	S72	600 minute 100 year Winter I+40%	65.000	64.311	0.000	5.786 32.5	SURCHARGED
1.006	SWALE	600 minute 100 year Winter I+40%	65.000	64.311	0.000	1296.408 24.5	SURCHARGED

Grange House  
 John Dalton St  
 Manchester M2 6FW

Catalyst Bicester  
 Units 7a-7b



Date 07/03/2022  
 File Units 7a-7b Final Analysis.MDX

Designed by James Griffiths  
 Checked by WB

Micro Drainage

Network 2017.1

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

PN	US/MH Name	Event	US/CL (m)	Water Flooded		Pipe		Status
				Level (m)	Volume (m <sup>3</sup> )	Maximum Vol (m <sup>3</sup> )	Flow (l/s)	
1.007	S76	120 minute 100 year Winter I+40%	65.000	64.461	0.000	3.724	12.6	SURCHARGED

100 Year + 40% Climate Change Event

**Quick Storage Estimate**

**Variables**

FEH Rainfall

Return Period (years) 100

Version 2013 Point

Site GB 457460 221065 SP 57460 21065

Cv (Summer) 0.750

Cv (Winter) 0.840

Impemeable Area (ha) 6.000

Maximum Allowable Discharge (l/s) 12.0

Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 40

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

**Quick Storage Estimate**

**Results**

Global Variables require approximate storage of between 4737 m<sup>3</sup> and 5761 m<sup>3</sup>.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Bailey Johnson Hayes		Page 13
Grange House John Dalton St Manchester M2 6FW		Catalyst Bicester Units 1-6 +DL
Date 08/03/2022 File Units 1-6 + DL Final Analys...		Designed by James Griffiths Checked by WB
Micro Drainage		Network 2017.1



STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

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	50.000	0.150	333.3	0.080	15.00	0.0	0.600	o	375	Pipe/Conduit	🔒
2.000	52.500	0.122	430.3	0.165	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
3.000	40.700	0.150	271.3	0.085	15.00	0.0	0.600	o	225	Pipe/Conduit	🔒
2.001	17.500	0.135	129.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
4.000	18.500	0.109	169.7	0.080	15.00	0.0	0.600	o	225	Pipe/Conduit	🔒
5.000	65.000	0.325	200.0	0.090	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
2.002	5.000	0.010	500.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	🔒
1.001	22.800	0.070	325.7	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	🔒
6.000	40.500	0.220	184.1	0.077	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
1.002	37.000	0.125	296.0	0.150	0.00	0.0	0.600	o	525	Pipe/Conduit	🔒
7.000	55.800	0.194	287.6	0.210	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
7.001	14.100	0.045	313.3	0.000	0.00	0.0	0.600	o	300	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	82.79	15.84	63.750	0.080	0.0	0.0	0.0	0.99	109.0	17.9
2.000	81.79	16.16	63.872	0.165	0.0	0.0	0.0	0.75	53.1	36.5
3.000	82.74	15.86	63.900	0.085	0.0	0.0	0.0	0.79	31.4	19.0
2.001	81.14	16.38	63.750	0.250	0.0	0.0	0.0	1.38	97.5	54.9
4.000	84.54	15.31	63.824	0.080	0.0	0.0	0.0	1.00	39.8	18.3
5.000	82.37	15.98	63.940	0.090	0.0	0.0	0.0	1.11	78.3	20.1
2.002	80.87	16.47	63.610	0.420	0.0	0.0	0.0	0.90	143.5	92.0
1.001	79.96	16.78	63.600	0.500	0.0	0.0	0.0	1.24	267.5	108.3
6.000	83.63	15.58	63.750	0.077	0.0	0.0	0.0	1.16	81.7	17.4
1.002	78.60	17.25	63.530	0.727	0.0	0.0	0.0	1.30	280.7	154.8
7.000	82.27	16.01	63.824	0.210	0.0	0.0	0.0	0.92	65.2	46.8
7.001	81.45	16.27	63.630	0.210	0.0	0.0	0.0	0.88	62.4	46.8

Grange House  
John Dalton St  
Manchester M2 6FW

Catalyst Bicester  
Units 1-6 +DL

Date 08/03/2022

Designed by James Griffiths

File Units 1-6 + DL Final Analys...

Checked by WB

Micro Drainage

Network 2017.1



STORM SEWER DESIGN by the Modified Rational Method

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
8.000	73.400	0.240	305.8	0.115	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
7.002	12.000	0.180	66.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
1.003	36.000	0.120	300.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	🔒
9.000	54.300	0.238	228.2	0.080	15.00	0.0	0.600	o	225	Pipe/Conduit	🔒
9.001	38.200	0.153	249.7	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
9.002	9.000	0.110	81.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
1.004	22.500	0.068	330.9	0.020	0.00	0.0	0.600	o	525	Pipe/Conduit	🔒
10.000	32.000	0.320	100.0	0.300	15.00	0.0	0.600	o	375	Pipe/Conduit	🔒
1.005	23.500	0.072	326.4	0.065	0.00	0.0	0.600	o	750	Pipe/Conduit	🔒
11.000	60.000	0.300	200.0	0.140	15.00	0.0	0.600	o	225	Pipe/Conduit	🔒
11.001	11.000	0.055	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
12.000	85.000	0.283	300.0	0.100	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
1.006	34.500	0.105	328.6	0.070	0.00	0.0	0.600	o	750	Pipe/Conduit	🔒
1.007	26.700	0.090	296.7	0.140	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)
8.000	81.17	16.37	63.825	0.115	0.0	0.0	0.0	0.89	63.2	25.3
7.002	80.89	16.46	63.585	0.325	0.0	0.0	0.0	2.22	245.4	71.2
1.003	77.32	17.72	63.405	1.052	0.0	0.0	0.0	1.29	278.8	220.3
9.000	82.14	16.05	64.011	0.080	0.0	0.0	0.0	0.86	34.3	17.8
9.001	79.82	16.82	63.773	0.125	0.0	0.0	0.0	0.82	32.7	27.0
9.002	79.57	16.91	63.620	0.125	0.0	0.0	0.0	1.74	123.0	27.0
1.004	76.51	18.02	63.285	1.197	0.0	0.0	0.0	1.23	265.4	248.0
10.000	84.59	15.29	63.537	0.300	0.0	0.0	0.0	1.81	200.1	68.7
1.005	75.85	18.28	63.217	1.562	0.0	0.0	0.0	1.54	681.9	320.9
11.000	82.03	16.09	63.970	0.140	0.0	0.0	0.0	0.92	36.6	31.1
11.001	81.42	16.28	63.670	0.140	0.0	0.0	0.0	0.92	36.6	31.1
12.000	80.56	16.57	63.875	0.100	0.0	0.0	0.0	0.90	63.8	21.8
1.006	74.90	18.65	63.145	1.872	0.0	0.0	0.0	1.54	679.6	379.7
1.007	74.22	18.93	63.040	2.012	0.0	0.0	0.0	1.62	715.5	404.4

Grange House  
John Dalton St  
Manchester M2 6FW

Catalyst Bicester  
Units 1-6 +DL

Date 08/03/2022

Designed by James Griffiths

File Units 1-6 + DL Final Analys...

Checked by WB



Micro Drainage

Network 2017.1

STORM SEWER DESIGN by the Modified Rational Method

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
13.000	28.300	0.100	283.0	0.120	15.00	0.0	0.600	o	375	Pipe/Conduit	🔒
13.001	50.000	0.175	285.7	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
13.002	44.100	0.150	294.0	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
1.008	22.500	0.075	300.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	🔒
14.000	31.000	0.105	295.2	0.120	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
14.001	44.300	0.150	295.3	0.210	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
14.002	12.100	0.041	295.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
1.009	22.500	0.075	300.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	🔒
15.000	38.800	0.259	150.0	0.075	15.00	0.0	0.600	o	225	Pipe/Conduit	🔒
15.001	22.100	0.075	294.7	0.080	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
16.000	60.000	0.300	200.0	0.225	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
15.002	28.800	0.150	192.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
17.000	43.000	0.215	200.0	0.080	15.00	0.0	0.600	o	300	Pipe/Conduit	🔒
18.000	8.000	0.024	333.3	1.413	15.00	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)
13.000	84.10	15.44	63.750	0.120	0.0	0.0	0.0	1.07	118.4	27.3
13.001	81.62	16.22	63.650	0.170	0.0	0.0	0.0	1.07	117.8	37.6
13.002	79.54	16.92	63.475	0.220	0.0	0.0	0.0	1.05	116.1	47.4
1.008	73.66	19.16	62.950	2.232	0.0	0.0	0.0	1.61	711.5	445.3
14.000	83.68	15.57	63.730	0.120	0.0	0.0	0.0	0.91	64.3	27.2
14.001	81.46	16.27	63.550	0.330	0.0	0.0	0.0	1.05	115.9	72.8
14.002	80.88	16.46	63.400	0.330	0.0	0.0	0.0	1.05	115.9	72.8
1.009	73.11	19.39	62.875	2.562	0.0	0.0	0.0	1.61	711.5	507.2
15.000	83.55	15.61	63.450	0.075	0.0	0.0	0.0	1.07	42.4	17.0
15.001	82.26	16.01	63.100	0.155	0.0	0.0	0.0	0.91	64.4	34.5
16.000	82.61	15.90	63.325	0.225	0.0	0.0	0.0	1.11	78.3	50.3
15.002	81.13	16.38	62.950	0.380	0.0	0.0	0.0	1.30	144.0	83.5
17.000	83.43	15.65	63.640	0.080	0.0	0.0	0.0	1.11	78.3	18.1
18.000	85.13	15.14	63.375	1.413	0.0	0.0	0.0	0.99	109.0<	325.8



Grange House  
John Dalton St  
Manchester M2 6FW

Catalyst Bicester  
Units 1-6 +DL

Date 08/03/2022

Designed by James Griffiths

File Units 1-6 + DL Final Analys...

Checked by WB



Micro Drainage

Network 2017.1

STORM SEWER DESIGN by the Modified Rational Method

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
17.001	17.200	0.052	330.8	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
19.000	65.000	0.325	200.0	0.110	15.00	0.0	0.600	o	225	Pipe/Conduit	
19.001	8.000	0.040	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
20.000	76.000	0.380	200.0	0.075	15.00	0.0	0.600	o	300	Pipe/Conduit	
21.000	56.500	0.275	205.5	0.085	15.00	0.0	0.600	o	225	Pipe/Conduit	
22.000	50.000	0.275	181.8	0.065	15.00	0.0	0.600	o	225	Pipe/Conduit	
22.001	50.000	0.275	181.8	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
21.001	18.400	0.061	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
17.002	32.500	0.065	500.0	0.012	0.00	0.0	0.600	o	450	Pipe/Conduit	
17.003	19.300	0.040	482.5	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
23.000	51.400	0.175	293.7	0.200	15.00	0.0	0.600	o	300	Pipe/Conduit	
24.000	30.000	0.150	200.0	0.110	15.00	0.0	0.600	o	300	Pipe/Conduit	
23.001	14.000	0.130	107.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
25.000	20.000	0.075	266.7	0.100	15.00	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)
17.001	82.50	15.94	63.350	1.493	0.0	0.0	0.0	0.99	109.4<	333.6
19.000	81.75	16.18	63.825	0.110	0.0	0.0	0.0	0.92	36.6	24.4
19.001	81.31	16.32	63.500	0.110	0.0	0.0	0.0	0.92	36.6	24.4
20.000	81.86	16.14	63.755	0.075	0.0	0.0	0.0	1.11	78.3	16.6
21.000	82.19	16.04	63.725	0.085	0.0	0.0	0.0	0.91	36.1	18.9
22.000	82.73	15.86	64.000	0.065	0.0	0.0	0.0	0.97	38.4	14.6
22.001	80.11	16.72	63.725	0.085	0.0	0.0	0.0	0.97	38.4	18.4
21.001	79.13	17.06	63.450	0.170	0.0	0.0	0.0	0.90	63.8	36.4
17.002	77.46	17.66	63.225	1.860	0.0	0.0	0.0	0.90	143.5<	390.2
17.003	76.53	18.01	63.160	1.947	0.0	0.0	0.0	0.92	146.1<	403.5
23.000	82.49	15.94	63.575	0.200	0.0	0.0	0.0	0.91	64.5	44.7
24.000	84.07	15.45	63.475	0.110	0.0	0.0	0.0	1.11	78.3	25.0
23.001	82.07	16.07	63.325	0.310	0.0	0.0	0.0	1.75	192.8	68.9
25.000	84.56	15.30	63.600	0.100	0.0	0.0	0.0	1.10	122.0	22.9

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STORM SEWER DESIGN by the Modified Rational Method

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
25.001	50.000	0.175	285.7	0.038	0.00	0.0	0.600	o	375	Pipe/Conduit	
25.002	35.800	0.155	231.0	0.038	0.00	0.0	0.600	o	375	Pipe/Conduit	
17.004	32.500	0.065	500.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
17.005	50.800	0.105	483.8	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.010	4.000	0.150	26.7	0.650	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.011	4.000	0.050	80.0	0.000	0.00	0.0	0.600	o	450	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)
25.001	82.04	16.08	63.525	0.138	0.0	0.0	0.0	1.07	117.8	30.7
25.002	80.52	16.59	63.350	0.176	0.0	0.0	0.0	1.19	131.2	38.4
17.004	75.24	18.52	62.970	2.433	0.0	0.0	0.0	1.08	306.0«	495.8
17.005	73.36	19.28	62.905	2.433	0.0	0.0	0.0	1.10	311.1«	495.8
1.010	73.07	19.41	62.800	6.025	0.0	0.0	0.0	3.95	628.1«	1192.2
1.011	73.00	19.44	62.650	6.025	0.0	0.0	0.0	2.27	361.8«	1192.2

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)
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1.011 Headwall 5 64.500 62.600 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 Offline Controls 0 Number of Time/Area Diagrams 0  
 Number of Online Controls 2 Number of Storage Structures 7 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
 Return Period (years) 30  
 FEH Rainfall Version 2013  
 Site Location GB 457460 221065 SP 57460 21065  
 Data Type Point  
 Summer Storms Yes

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Synthetic Rainfall Details

Winter Storms    Yes  
                     Cv (Summer) 0.750  
                     Cv (Winter) 0.840  
 Storm Duration (mins)    30

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S28, DS/PN: 17.001, Volume (m³): 5.9

Unit Reference MD-SHE-0318-6000-1000-6000  
Design Head (m) 1.000  
Design Flow (l/s) 60.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 318  
Invert Level (m) 63.350  
Minimum Outlet Pipe Diameter (mm) 375  
Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	60.0	Kick-Flo®	0.801	53.9
Flush-Flo™	0.472	60.0	Mean Flow over Head Range	-	47.6

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	9.5	1.200	65.5	3.000	102.2	7.000	154.5
0.200	32.6	1.400	70.6	3.500	110.1	7.500	159.9
0.300	57.0	1.600	75.3	4.000	117.6	8.000	165.0
0.400	59.6	1.800	79.7	4.500	124.5	8.500	170.0
0.500	59.9	2.000	83.9	5.000	131.1	9.000	174.8
0.600	59.1	2.200	87.9	5.500	137.3	9.500	179.5
0.800	54.0	2.400	91.7	6.000	143.3		
1.000	60.0	2.600	95.3	6.500	149.0		

Complex Manhole: S13, DS/PN: 1.011, Volume (m³): 3.0

Hydro-Brake® Optimum

Unit Reference MD-SHE-0156-1200-1150-1200  
Design Head (m) 1.150  
Design Flow (l/s) 12.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 156  
Invert Level (m) 62.650  
Minimum Outlet Pipe Diameter (mm) 225  
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.150	12.0	Kick-Flo®	0.763	9.9
Flush-Flo™	0.345	12.0	Mean Flow over Head Range	-	10.3

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

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Hydro-Brake® Optimum

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	5.6	1.200	12.2	3.000	18.9	7.000	28.4
0.200	11.4	1.400	13.2	3.500	20.4	7.500	29.4
0.300	11.9	1.600	14.0	4.000	21.7	8.000	30.3
0.400	11.9	1.800	14.8	4.500	23.0	8.500	31.2
0.500	11.7	2.000	15.6	5.000	24.2	9.000	32.1
0.600	11.4	2.200	16.3	5.500	25.3	9.500	32.9
0.800	10.1	2.400	17.0	6.000	26.4		
1.000	11.2	2.600	17.7	6.500	27.4		

Weir

Discharge Coef 0.544 Width (m) 1.800 Invert Level (m) 63.800

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Storage Structures for Storm

Porous Car Park Manhole: S23, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	30.0
Max Percolation (l/s)	50.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.000	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: RE, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	83.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.000	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: S20, DS/PN: 7.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	15.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	208.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.000	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: RE, DS/PN: 11.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	55.0
Max Percolation (l/s)	122.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.000	Cap Volume Depth (m)	0.400

Cellular Storage Manhole: SPUR, DS/PN: 18.000

Invert Level (m)	63.375	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 <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	700.0	0.0	1.001	0.0	0.0
1.000	700.0	0.0			

Porous Car Park Manhole: RE, DS/PN: 19.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	60.0
Max Percolation (l/s)	100.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.000	Cap Volume Depth (m)	0.400

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Tank or Pond Manhole: SWALE, DS/PN: 1.010

Invert Level (m) 62.800

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	5073.0	0.400	5611.0	0.800	6158.0	1.001	0.0
0.200	5340.0	0.600	5883.0	1.000	6435.0		

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Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m <sup>3</sup> )	Pipe Volume (m <sup>3</sup> )	Storage	Total Volume (m <sup>3</sup> )
				Structure Volume (m <sup>3</sup> )	
1.000	S7	1.503	5.522	0.000	7.025
2.000	S23	1.163	3.711	21.600	26.474
3.000	S25	0.961	1.618	0.000	2.580
2.001	S22	1.159	1.237	0.000	2.396
4.000	S26	1.047	0.736	0.000	1.783
5.000	RE	1.001	4.595	36.000	41.595
2.002	S21	1.560	0.795	0.000	2.355
1.001	S6	1.944	4.936	0.000	6.879
6.000	S9	1.159	2.863	0.000	4.022
1.002	S5	2.068	8.010	0.000	10.077
7.000	S20	1.047	3.944	90.000	94.992
7.001	S19	1.267	0.997	0.000	2.263
8.000	S18	1.159	5.188	0.000	6.348
7.002	S17	1.882	1.325	0.000	3.208
1.003	S4	2.288	7.793	0.000	10.082
9.000	S16	0.836	2.159	0.000	2.995
9.001	S15	1.275	1.519	0.000	2.793
9.002	S14	1.250	0.636	0.000	1.886
1.004	S3	2.501	4.871	0.000	7.371
10.000	IC	1.593	3.534	0.000	5.127
1.005	S2	3.647	10.382	0.000	14.029
11.000	RE	0.713	2.386	52.800	55.898
11.001	S46	1.052	0.437	0.000	1.489
12.000	S47	1.188	6.008	0.000	7.196
1.006	S45	4.339	15.242	0.000	19.580
1.007	S51	4.606	11.796	0.000	16.402
13.000	S48	1.646	3.126	0.000	4.772
13.001	S49	1.503	5.522	0.000	7.025
13.002	S50	1.897	4.871	0.000	6.767
1.008	S1	4.008	9.940	0.000	13.948
14.000	S52	2.200	2.191	0.000	4.391
14.001	S53	1.646	4.893	0.000	6.539
14.002	S54	1.825	1.336	0.000	3.161
1.009	S55	4.899	9.940	0.000	14.839
15.000	S41	1.244	1.543	0.000	2.787
15.001	S42	1.583	1.562	0.000	3.146
16.000	S44	1.470	4.241	0.000	5.711
15.002	S43	2.433	3.181	0.000	5.614
17.000	S27	1.425	3.039	0.000	4.465
18.000	SPUR	2.326	0.884	665.222	668.431
17.001	S28	2.183	1.900	0.000	4.083
19.000	RE	1.001	2.584	43.200	46.785
19.001	S36	1.318	0.318	0.000	1.636
20.000	S35	1.306	5.372	0.000	6.678
21.000	S30	1.329	2.246	0.000	3.575
22.000	RE	1.018	1.988	0.000	3.006
22.001	S31	1.159	1.988	0.000	3.147
21.001	S29	1.470	1.301	0.000	2.771
17.002	S10	2.183	5.169	0.000	7.352
17.003	S37	2.491	3.070	0.000	5.560
23.000	S34	1.244	3.633	0.000	4.877
24.000	S32	1.329	2.121	0.000	3.449
23.001	S33	1.897	1.546	0.000	3.443
25.000	S38	1.610	2.209	0.000	3.819



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Volume Summary (Static)

Pipe Number	USMH Name	Manhole Volume (m <sup>3</sup> )	Pipe Volume (m <sup>3</sup> )	Storage Structure Volume (m <sup>3</sup> )	Total Volume (m <sup>3</sup> )
25.001	S39	1.718	5.522	0.000	7.240
25.002	S40	2.076	3.954	0.000	6.030
17.004	S11	3.411	9.189	0.000	12.600
17.005	S12	3.702	14.363	0.000	18.066
1.010	SWALE	4.326	0.636	5750.806	5755.768
1.011	S13	2.648	0.636	0.000	3.284
Total		113.728	238.255	6659.627	7011.610

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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 \* 10m<sup>3</sup>/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 Offline Controls 0      Number of Time/Area Diagrams 0  
Number of Online Controls 2      Number of Storage Structures 7      Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 457460 221065 SP 57460 21065  
Data Type Point  
Cv (Summer) 0.750  
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, 2880, 4320  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Flooded Volume (m <sup>3</sup> )	Pipe Maximum Flow (l/s)	Status
1.000	S7	30 minute 2 year Winter I+0%	64.800	63.824	0.000	6.8	OK
2.000	S23	30 minute 2 year Winter I+0%	64.900	63.980	0.000	14.1	OK
3.000	S25	30 minute 2 year Winter I+0%	64.750	63.975	0.000	7.3	OK
2.001	S22	30 minute 2 year Winter I+0%	64.775	63.853	0.000	21.4	OK
4.000	S26	30 minute 2 year Winter I+0%	64.750	63.891	0.000	6.9	OK
5.000	RE	30 minute 2 year Winter I+0%	64.825	64.003	0.000	7.3	OK
2.002	S21	30 minute 2 year Winter I+0%	64.700	63.785	0.000	35.3	OK
1.001	S6	30 minute 2 year Winter I+0%	64.700	63.770	0.000	42.1	OK
6.000	S9	30 minute 2 year Winter I+0%	64.775	63.809	0.000	6.6	OK
1.002	S5	30 minute 2 year Winter I+0%	64.700	63.715	0.000	56.9	OK
7.000	S20	30 minute 2 year Winter I+0%	64.750	63.934	0.000	18.0	OK
7.001	S19	30 minute 2 year Winter I+0%	64.750	63.753	0.000	17.9	OK
8.000	S18	30 minute 2 year Winter I+0%	64.850	63.906	0.000	9.8	OK
7.002	S17	30 minute 2 year Winter I+0%	64.900	63.687	0.000	27.7	OK
1.003	S4	30 minute 2 year Winter I+0%	64.700	63.632	0.000	83.8	OK
9.000	S16	30 minute 2 year Winter I+0%	64.750	64.080	0.000	6.8	OK
9.001	S15	15 minute 2 year Winter I+0%	64.900	63.867	0.000	11.1	OK
9.002	S14	15 minute 2 year Winter I+0%	64.725	63.693	0.000	11.1	OK
1.004	S3	30 minute 2 year Winter I+0%	64.700	63.543	0.000	94.2	OK
10.000	IC	30 minute 2 year Winter I+0%	64.650	63.632	0.000	25.8	OK
1.005	S2	30 minute 2 year Winter I+0%	64.650	63.480	0.000	121.7	OK
11.000	RE	30 minute 2 year Winter I+0%	64.600	64.038	0.000	7.0	OK
11.001	S46	30 minute 2 year Winter I+0%	64.600	63.742	0.000	7.0	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Flooded		Pipe		Status
				Level (m)	Volume (m <sup>3</sup> )	Maximum Vol (m <sup>3</sup> )	Flow (l/s)	
12.000	S47	30 minute 2 year Winter I+0%	64.925	63.949	0.000	0.078	8.6	OK
1.006	S45	30 minute 2 year Winter I+0%	64.850	63.415	0.000	2.634	138.5	OK
1.007	S51	30 minute 2 year Winter I+0%	64.850	63.319	0.000	3.834	144.0	OK
13.000	S48	30 minute 2 year Winter I+0%	64.900	63.829	0.000	0.106	10.3	OK
13.001	S49	15 minute 2 year Winter I+0%	64.700	63.743	0.000	0.358	15.1	OK
13.002	S50	15 minute 2 year Winter I+0%	64.800	63.588	0.000	0.510	20.8	OK
1.008	S1	30 minute 2 year Winter I+0%	64.525	63.247	0.000	3.419	159.8	OK
14.000	S52	30 minute 2 year Winter I+0%	65.675	63.814	0.000	0.090	10.3	OK
14.001	S53	15 minute 2 year Winter I+0%	64.700	63.703	0.000	0.411	36.3	OK
14.002	S54	15 minute 2 year Winter I+0%	64.675	63.566	0.000	1.198	35.9	OK
1.009	S55	30 minute 2 year Winter I+0%	64.800	63.183	0.000	3.133	183.1	OK
15.000	S41	30 minute 2 year Winter I+0%	64.550	63.510	0.000	0.062	6.5	OK
15.001	S42	15 minute 2 year Winter I+0%	64.500	63.209	0.000	0.124	16.0	OK
16.000	S44	30 minute 2 year Winter I+0%	64.625	63.428	0.000	0.111	19.3	OK
15.002	S43	30 minute 2 year Winter I+0%	64.650	63.079	0.000	0.343	32.8	OK
17.000	S27	30 minute 2 year Winter I+0%	64.900	63.702	0.000	0.064	6.9	OK
18.000	SPUR	180 minute 2 year Winter I+0%	65.000	63.611	0.000	157.300	28.1	OK
17.001	S28	180 minute 2 year Winter I+0%	64.875	63.601	0.000	1.434	29.6	OK
19.000	RE	30 minute 2 year Winter I+0%	64.710	63.904	0.000	0.083	9.4	OK
19.001	S36	30 minute 2 year Winter I+0%	64.665	63.587	0.000	0.209	9.4	OK
20.000	S35	30 minute 2 year Winter I+0%	64.910	63.814	0.000	0.061	6.4	OK
21.000	S30	30 minute 2 year Winter I+0%	64.900	63.795	0.000	0.073	7.3	OK
22.000	RE	30 minute 2 year Winter I+0%	64.900	64.058	0.000	0.060	5.6	OK
22.001	S31	30 minute 2 year Winter I+0%	64.750	63.793	0.000	0.151	7.2	OK
21.001	S29	30 minute 2 year Winter I+0%	64.750	63.554	0.000	0.380	14.4	OK
17.002	S10	120 minute 2 year Winter I+0%	64.750	63.420	0.000	0.611	39.5	OK
17.003	S37	30 minute 2 year Winter I+0%	64.900	63.358	0.000	1.716	42.2	OK
23.000	S34	30 minute 2 year Winter I+0%	64.675	63.683	0.000	0.117	17.1	OK
24.000	S32	30 minute 2 year Winter I+0%	64.650	63.547	0.000	0.076	9.5	OK
23.001	S33	30 minute 2 year Winter I+0%	64.650	63.434	0.000	0.368	26.6	OK
25.000	S38	30 minute 2 year Winter I+0%	64.725	63.673	0.000	0.097	8.6	OK
25.001	S39	15 minute 2 year Winter I+0%	64.725	63.609	0.000	0.298	12.2	OK
25.002	S40	15 minute 2 year Winter I+0%	64.800	63.444	0.000	0.367	16.7	OK
17.004	S11	30 minute 2 year Winter I+0%	64.900	63.219	0.000	0.747	83.2	OK
17.005	S12	30 minute 2 year Winter I+0%	65.000	63.131	0.000	2.319	83.0	OK
1.010	SWALE	720 minute 2 year Winter I+0%	64.500	63.031	0.000	1214.452	12.9	OK
1.011	S13	720 minute 2 year Winter I+0%	64.500	63.058	0.000	0.876	12.0	OK

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Grange House John Dalton St Manchester M2 6FW	Catalyst Bicester Units 1-6 +DL	
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30 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 \* 10m<sup>3</sup>/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 Offline Controls 0      Number of Time/Area Diagrams 0  
Number of Online Controls 2      Number of Storage Structures 7      Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 457460 221065 SP 57460 21065  
Data Type Point  
Cv (Summer) 0.750  
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, 2880, 4320  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Flooded			Pipe		Status
				Level (m)	Volume (m <sup>3</sup> )	Maximum Vol (m <sup>3</sup> )	Flow (l/s)		
1.000	S7	30 minute 30 year Winter I+0%	64.800	63.905	0.000	0.215	16.1	OK	
2.000	S23	30 minute 30 year Winter I+0%	64.900	64.046	0.000	2.660	31.6	OK	
3.000	S25	30 minute 30 year Winter I+0%	64.750	64.023	0.000	0.134	17.3	OK	
2.001	S22	30 minute 30 year Winter I+0%	64.775	63.951	0.000	2.674	48.0	OK	
4.000	S26	30 minute 30 year Winter I+0%	64.750	63.937	0.000	0.123	16.2	OK	
5.000	RE	30 minute 30 year Winter I+0%	64.825	64.034	0.000	3.205	16.2	OK	
2.002	S21	30 minute 30 year Winter I+0%	64.700	63.904	0.000	3.557	78.9	OK	
1.001	S6	30 minute 30 year Winter I+0%	64.700	63.890	0.000	3.889	93.9	OK	
6.000	S9	30 minute 30 year Winter I+0%	64.775	63.871	0.000	0.131	15.6	OK	
1.002	S5	30 minute 30 year Winter I+0%	64.700	63.848	0.000	4.720	117.7	OK	
7.000	S20	30 minute 30 year Winter I+0%	64.750	64.003	0.000	0.796	40.9	OK	
7.001	S19	30 minute 30 year Winter I+0%	64.750	63.860	0.000	1.861	41.1	OK	
8.000	S18	30 minute 30 year Winter I+0%	64.850	63.954	0.000	0.141	23.3	OK	
7.002	S17	30 minute 30 year Winter I+0%	64.900	63.824	0.000	2.903	63.1	OK	
1.003	S4	30 minute 30 year Winter I+0%	64.700	63.790	0.000	6.447	181.2	OK	
9.000	S16	30 minute 30 year Winter I+0%	64.750	64.123	0.000	0.121	16.3	OK	
9.001	S15	15 minute 30 year Winter I+0%	64.900	63.943	0.000	0.752	27.5	OK	
9.002	S14	15 minute 30 year Winter I+0%	64.725	63.739	0.000	0.390	27.6	OK	
1.004	S3	30 minute 30 year Winter I+0%	64.700	63.710	0.000	6.410	202.1	OK	
10.000	IC	30 minute 30 year Winter I+0%	64.650	63.702	0.000	0.229	61.0	OK	
1.005	S2	30 minute 30 year Winter I+0%	64.650	63.644	0.000	6.783	263.0	OK	
11.000	RE	30 minute 30 year Winter I+0%	64.600	64.092	0.000	12.308	20.1	OK	
11.001	S46	30 minute 30 year Winter I+0%	64.600	63.802	0.000	0.433	20.1	OK	

Grange House  
John Dalton St  
Manchester M2 6FW

Catalyst Bicester  
Units 1-6 +DL

Date 08/03/2022

Designed by James Griffiths

File Units 1-6 + DL Final Analys...

Checked by WB




Micro Drainage

Network 2017.1

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Flooded Volume (m <sup>3</sup> )	Maximum Vol (m <sup>3</sup> )	Pipe Flow (l/s)	Status
12.000	S47	30 minute 30 year Winter I+0%	64.925	63.994	0.000	0.129	20.4	OK
1.006	S45	30 minute 30 year Winter I+0%	64.850	63.588	0.000	5.736	305.1	OK
1.007	S51	30 minute 30 year Winter I+0%	64.850	63.503	0.000	8.591	316.1	OK
13.000	S48	30 minute 30 year Winter I+0%	64.900	63.873	0.000	0.169	24.5	OK
13.001	S49	15 minute 30 year Winter I+0%	64.700	63.804	0.000	0.894	36.9	OK
13.002	S50	15 minute 30 year Winter I+0%	64.800	63.665	0.000	1.501	53.1	OK
1.008	S1	30 minute 30 year Winter I+0%	64.525	63.442	0.000	7.835	353.8	OK
14.000	S52	15 minute 30 year Winter I+0%	65.675	63.880	0.000	0.164	23.8	OK
14.001	S53	15 minute 30 year Winter I+0%	64.700	63.847	0.000	1.597	97.1	OK
14.002	S54	15 minute 30 year Winter I+0%	64.675	63.742	0.000	3.923	89.0	OK
1.009	S55	30 minute 30 year Winter I+0%	64.800	63.382	0.000	6.656	410.7	OK
15.000	S41	30 minute 30 year Winter I+0%	64.550	63.546	0.000	0.103	15.3	OK
15.001	S42	15 minute 30 year Winter I+0%	64.500	63.301	0.000	0.343	42.5	OK
16.000	S44	30 minute 30 year Winter I+0%	64.625	63.496	0.000	0.187	45.8	OK
15.002	S43	720 minute 30 year Winter I+0%	64.650	63.264	0.000	2.685	11.0	OK
17.000	S27	120 minute 30 year Winter I+0%	64.900	63.860	0.000	0.244	9.0	OK
18.000	SPUR	120 minute 30 year Winter I+0%	65.000	63.874	0.000	332.241	54.0	SURCHARGED
17.001	S28	120 minute 30 year Winter I+0%	64.875	63.856	0.000	4.272	57.0	SURCHARGED
19.000	RE	30 minute 30 year Winter I+0%	64.710	63.955	0.000	0.142	22.3	OK
19.001	S36	30 minute 30 year Winter I+0%	64.665	63.647	0.000	0.532	22.3	OK
20.000	S35	30 minute 30 year Winter I+0%	64.910	63.846	0.000	0.098	15.2	OK
21.000	S30	30 minute 30 year Winter I+0%	64.900	63.837	0.000	0.122	17.3	OK
22.000	RE	30 minute 30 year Winter I+0%	64.900	64.093	0.000	0.100	13.2	OK
22.001	S31	15 minute 30 year Winter I+0%	64.750	63.834	0.000	0.268	16.9	OK
21.001	S29	30 minute 30 year Winter I+0%	64.750	63.619	0.000	1.131	33.4	OK
17.002	S10	30 minute 30 year Winter I+0%	64.750	63.557	0.000	2.803	90.7	OK
17.003	S37	30 minute 30 year Winter I+0%	64.900	63.494	0.000	3.739	94.8	OK
23.000	S34	30 minute 30 year Winter I+0%	64.675	63.755	0.000	0.198	40.7	OK
24.000	S32	30 minute 30 year Winter I+0%	64.650	63.590	0.000	0.125	22.5	OK
23.001	S33	30 minute 30 year Winter I+0%	64.650	63.500	0.000	1.159	63.1	OK
25.000	S38	30 minute 30 year Winter I+0%	64.725	63.714	0.000	0.157	20.5	OK
25.001	S39	15 minute 30 year Winter I+0%	64.725	63.661	0.000	0.617	29.7	OK
25.002	S40	15 minute 30 year Winter I+0%	64.800	63.506	0.000	1.071	41.9	OK
17.004	S11	30 minute 30 year Winter I+0%	64.900	63.363	0.000	2.911	183.2	OK
17.005	S12	480 minute 30 year Winter I+0%	65.000	63.286	0.000	5.341	74.3	OK
1.010	SWALE	720 minute 30 year Winter I+0%	64.500	63.264	0.000	2515.993	18.2	SURCHARGED
1.011	S13	480 minute 30 year Winter I+0%	64.500	63.382	0.000	1.426	12.0	SURCHARGED

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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 \* 10m<sup>3</sup>/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 Offline Controls 0      Number of Time/Area Diagrams 0  
Number of Online Controls 2      Number of Storage Structures 7      Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 457460 221065 SP 57460 21065  
Data Type Point  
Cv (Summer) 0.750  
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, 2880, 4320  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Flooded			Pipe	Status
				Level (m)	Volume (m <sup>3</sup> )	Maximum Vol (m <sup>3</sup> )	Flow (l/s)	
1.000	S7	30 minute 100 year Winter I+40%	64.800	64.378	0.000	0.891	29.1	SURCHARGED
2.000	S23	30 minute 100 year Winter I+40%	64.900	64.607	0.000	22.426	53.6	FLOOD RISK
3.000	S25	30 minute 100 year Winter I+40%	64.750	64.594	0.000	0.779	29.7	FLOOD RISK
2.001	S22	30 minute 100 year Winter I+40%	64.775	64.455	0.000	5.988	82.5	SURCHARGED
4.000	S26	30 minute 100 year Winter I+40%	64.750	64.393	0.000	0.638	30.6	SURCHARGED
5.000	RE	30 minute 100 year Winter I+40%	64.825	64.340	0.000	31.070	58.2	SURCHARGED
2.002	S21	30 minute 100 year Winter I+40%	64.700	64.316	0.000	7.339	112.2	SURCHARGED
1.001	S6	30 minute 100 year Winter I+40%	64.700	64.299	0.000	7.160	129.0	SURCHARGED
6.000	S9	30 minute 100 year Winter I+40%	64.775	64.343	0.000	0.665	28.3	SURCHARGED
1.002	S5	30 minute 100 year Winter I+40%	64.700	64.263	0.000	8.665	167.8	SURCHARGED
7.000	S20	30 minute 100 year Winter I+40%	64.750	64.271	0.000	61.384	56.0	SURCHARGED
7.001	S19	30 minute 100 year Winter I+40%	64.750	64.247	0.000	4.551	50.7	SURCHARGED
8.000	S18	15 minute 100 year Winter I+40%	64.850	64.341	0.000	0.578	39.3	SURCHARGED
7.002	S17	30 minute 100 year Winter I+40%	64.900	64.245	0.000	6.942	55.5	SURCHARGED
1.003	S4	30 minute 100 year Winter I+40%	64.700	64.156	0.000	10.171	198.5	SURCHARGED
9.000	S16	30 minute 100 year Winter I+40%	64.750	64.554	0.000	0.609	29.5	FLOOD RISK
9.001	S15	30 minute 100 year Winter I+40%	64.900	64.372	0.000	2.783	40.1	SURCHARGED
9.002	S14	30 minute 100 year Winter I+40%	64.725	64.161	0.000	2.077	37.7	SURCHARGED
1.004	S3	30 minute 100 year Winter I+40%	64.700	64.049	0.000	9.351	232.5	SURCHARGED
10.000	IC	15 minute 100 year Winter I+40%	64.650	64.132	0.000	0.845	108.6	SURCHARGED
1.005	S2	30 minute 100 year Summer I+40%	64.650	63.967	0.000	9.770	329.3	OK
11.000	RE	30 minute 100 year Winter I+40%	64.600	64.185	0.000	24.655	33.2	OK

Grange House  
 John Dalton St  
 Manchester M2 6FW

Catalyst Bicester  
 Units 1-6 +DL



Date 08/03/2022  
 File Units 1-6 + DL Final Analys...

Designed by James Griffiths  
 Checked by WB

Micro Drainage

Network 2017.1

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Flooded Volume (m³)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
11.001	S46	30 minute 100 year Winter I+40%	64.600	63.971	0.000	1.767	37.0	SURCHARGED
12.000	S47	30 minute 100 year Winter I+40%	64.925	64.043	0.000	0.184	36.5	OK
1.006	S45	60 minute 100 year Winter I+40%	64.850	63.897	0.000	14.284	384.4	SURCHARGED
1.007	S51	15 minute 100 year Winter I+40%	64.850	63.791	0.000	15.316	406.0	SURCHARGED
13.000	S48	30 minute 100 year Winter I+40%	64.900	63.928	0.000	0.247	44.4	OK
13.001	S49	15 minute 100 year Winter I+40%	64.700	63.868	0.000	1.547	66.2	OK
13.002	S50	30 minute 100 year Winter I+40%	64.800	63.791	0.000	3.733	80.7	OK
1.008	S1	30 minute 100 year Winter I+40%	64.525	63.727	0.000	16.541	495.6	SURCHARGED
14.000	S52	15 minute 100 year Winter I+40%	65.675	64.386	0.000	0.737	46.5	SURCHARGED
14.001	S53	15 minute 100 year Winter I+40%	64.700	64.312	0.000	3.184	167.8	SURCHARGED
14.002	S54	15 minute 100 year Winter I+40%	64.675	63.901	0.000	5.423	166.5	SURCHARGED
1.009	S55	30 minute 100 year Winter I+40%	64.800	63.657	0.000	11.564	606.4	SURCHARGED
15.000	S41	1440 minute 100 year Winter I+40%	64.550	63.604	0.000	0.169	2.1	OK
15.001	S42	1440 minute 100 year Winter I+40%	64.500	63.604	0.000	2.005	4.2	SURCHARGED
16.000	S44	30 minute 100 year Winter I+40%	64.625	63.698	0.000	0.417	82.5	SURCHARGED
15.002	S43	1440 minute 100 year Winter I+40%	64.650	63.604	0.000	6.510	10.0	SURCHARGED
17.000	S27	120 minute 100 year Winter I+40%	64.900	64.405	0.000	0.860	15.9	SURCHARGED
18.000	SPUR	120 minute 100 year Winter I+40%	65.000	64.359	0.000	655.550	67.3	SURCHARGED
17.001	S28	120 minute 100 year Winter I+40%	64.875	64.532	0.000	5.369	59.9	SURCHARGED
19.000	RE	30 minute 100 year Winter I+40%	64.710	64.045	0.000	5.100	32.0	OK
19.001	S36	30 minute 100 year Winter I+40%	64.665	63.839	0.000	2.082	32.7	SURCHARGED
20.000	S35	30 minute 100 year Winter I+40%	64.910	63.881	0.000	0.137	27.5	OK
21.000	S30	30 minute 100 year Winter I+40%	64.900	64.016	0.000	0.323	30.5	SURCHARGED
22.000	RE	30 minute 100 year Winter I+40%	64.900	64.133	0.000	0.144	23.9	OK
22.001	S31	30 minute 100 year Winter I+40%	64.750	63.948	0.000	0.995	28.9	OK
21.001	S29	30 minute 100 year Winter I+40%	64.750	63.842	0.000	4.165	56.3	SURCHARGED
17.002	S10	30 minute 100 year Winter I+40%	64.750	63.768	0.000	7.273	154.2	SURCHARGED
17.003	S37	30 minute 100 year Winter I+40%	64.900	63.669	0.000	5.639	161.1	SURCHARGED
23.000	S34	30 minute 100 year Winter I+40%	64.675	63.961	0.000	0.430	72.9	SURCHARGED
24.000	S32	30 minute 100 year Winter I+40%	64.650	63.819	0.000	0.384	39.5	SURCHARGED
23.001	S33	30 minute 100 year Winter I+40%	64.650	63.722	0.000	5.327	109.8	SURCHARGED
25.000	S38	30 minute 100 year Winter I+40%	64.725	63.765	0.000	0.230	36.9	OK
25.001	S39	15 minute 100 year Winter I+40%	64.725	63.716	0.000	1.037	53.3	OK
25.002	S40	30 minute 100 year Winter I+40%	64.800	63.664	0.000	3.702	67.0	OK
17.004	S11	1440 minute 100 year Winter I+40%	64.900	63.608	0.000	8.485	60.6	SURCHARGED
17.005	S12	1440 minute 100 year Winter I+40%	65.000	63.606	0.000	9.971	60.0	SURCHARGED
1.010	SWALE	1440 minute 100 year Winter I+40%	64.500	63.604	0.000	4543.430	27.5	SURCHARGED
1.011	S13	480 minute 100 year Winter I+40%	64.500	63.829	0.000	2.067	12.7	SURCHARGED