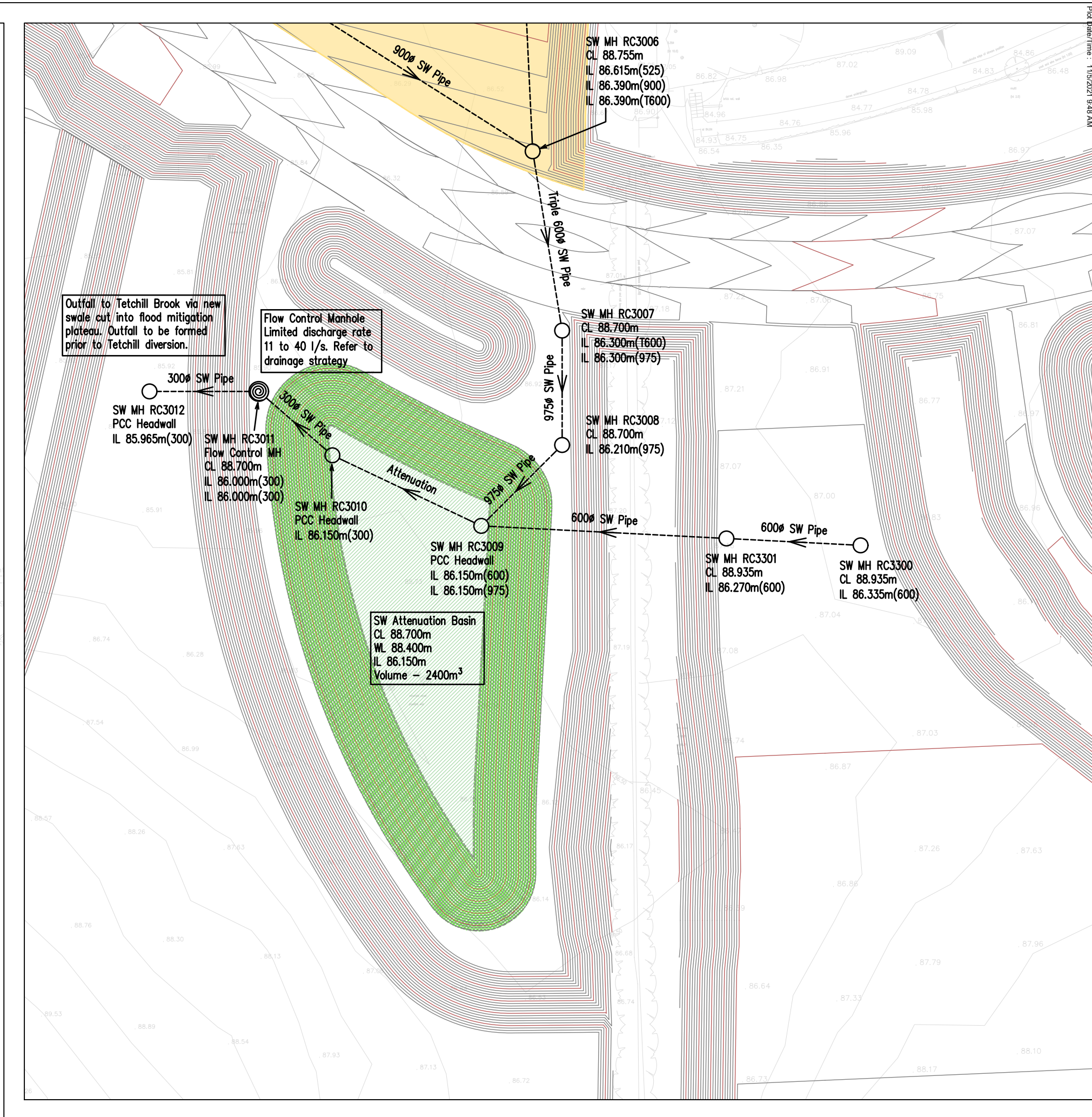
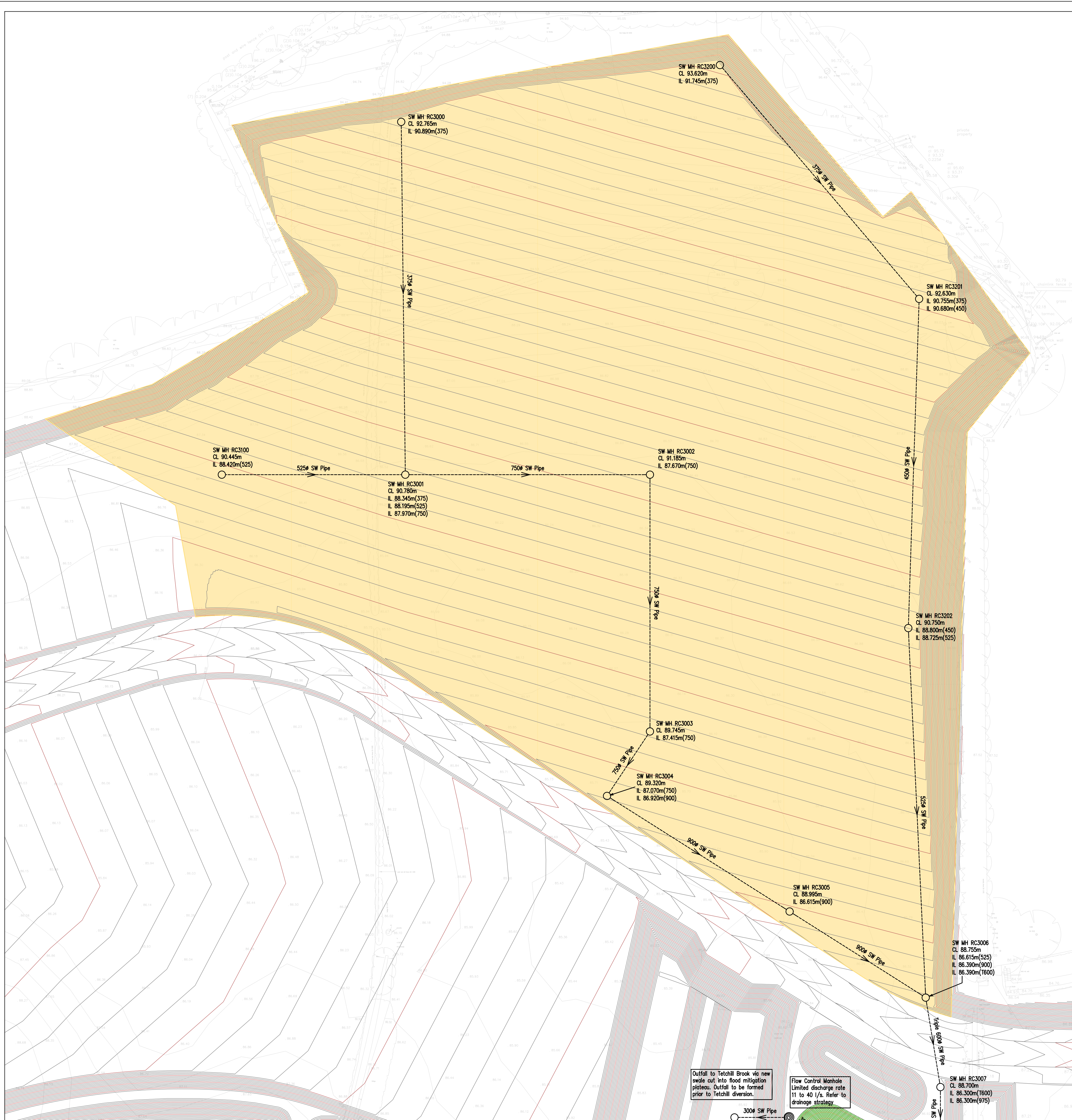


APPENDIX JI



Surface Water Strategy		
Development Catchment Plan		
	Residential 3	= 31920m ²
Modelled Impermeable Area		
Residential 3 @ 75% PIMP		= 23945m ²
75% PIMP = 65% now +10% allowance for future creep		
Surface Water Discharge Rates		
10.7 to 40.0 l/s depending on return period		
Surface Water Quality		
SW Runoff from the future residential plots and associated infrastructure must be cleansed/treated within the plot in accordance with Shropshire current guidance/Ciria C753 standards prior to discharging to the watercourse.		

Rev.	Description	Rev. by	Date
Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF T: 0161 837 1500 W: www.sginfrastructure.co.uk			
Client			
Formal Investments			
Architect			
Roberts Limbrick			
Project			
Ellesmere Wharf Phase 2			
Title			
Surface Water Strategy Preliminary Drainage - Residential Zone			
Date	22.02.2023	Drawn By	DOR
Size	A1	Checked By	DOR
Scale	1:2000	Approved By	DOR
Dwg. No.	C1581-SGI-ZZ-00-DR-C-0203		Rev
			P

APPENDIX J2

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 11:49	Designed by sgicivils	
File Resi - Catchment 3 001 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	86.553	2.545	34.0	0.240	2.50	0.0	0.600		o	375	Pipe/Conduit	
2.000	45.000	0.225	200.0	0.240	2.50	0.0	0.600		o	525	Pipe/Conduit	
1.001	60.000	0.300	200.0	0.240	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.002	63.000	0.255	247.1	0.240	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.003	19.000	0.345	55.1	0.240	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.004	53.000	0.305	173.8	0.240	0.00	0.0	0.600		o	900	Pipe/Conduit	
1.005	39.495	0.225	175.5	0.240	0.00	0.0	0.600		o	900	Pipe/Conduit	
3.000	75.350	0.990	76.1	0.240	2.50	0.0	0.600		o	375	Pipe/Conduit	
3.001	80.799	1.880	43.0	0.240	0.00	0.0	0.600		o	450	Pipe/Conduit	
3.002	90.747	2.110	43.0	0.240	0.00	0.0	0.600		o	525	Pipe/Conduit	
1.006	22.239	0.090	247.1	0.000	0.00	0.0	0.600		ooo	600	Triple Pipe	
1.007	14.000	0.090	155.6	0.000	0.00	0.0	0.600		o	975	Pipe/Conduit	
1.008	14.000	0.060	233.3	0.000	0.00	0.0	0.600		o	975	Pipe/Conduit	
4.000	16.441	0.065	252.9	0.180	2.50	0.0	0.600		o	600	Pipe/Conduit	
4.001	30.053	0.120	250.4	0.180	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.009	20.162	0.001	20162.0	0.000	0.00	0.0		0.035	→_/		Pond/Tank	
1.010	11.934	0.050	238.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.011	13.370	0.134	99.8	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	0.00	1.00	90.890	0.240	0.0	0.0	0.0	3.12	344.2	0.0
2.000	0.00	1.00	88.420	0.240	0.0	0.0	0.0	1.58	342.1	0.0
1.001	0.00	1.00	87.970	0.720	0.0	0.0	0.0	1.98	872.6	0.0
1.002	0.00	1.00	87.670	0.960	0.0	0.0	0.0	1.78	784.6	0.0
1.003	0.00	1.00	87.415	1.200	0.0	0.0	0.0	3.78	1668.1	0.0
1.004	0.00	1.00	86.920	1.440	0.0	0.0	0.0	2.37	1510.3	0.0
1.005	0.00	1.00	86.615	1.680	0.0	0.0	0.0	2.36	1502.7	0.0
3.000	0.00	1.00	91.745	0.240	0.0	0.0	0.0	2.08	229.6	0.0
3.001	0.00	1.00	90.680	0.480	0.0	0.0	0.0	3.11	494.3	0.0
3.002	0.00	1.00	88.725	0.720	0.0	0.0	0.0	3.42	740.9	0.0
1.006	0.00	1.00	86.390	2.400	0.0	0.0	0.0	1.54	1310.2	0.0
1.007	0.00	1.00	86.300	2.400	0.0	0.0	0.0	2.64	1969.1	0.0
1.008	0.00	1.00	86.210	2.400	0.0	0.0	0.0	2.15	1606.0	0.0
4.000	0.00	1.00	86.335	0.180	0.0	0.0	0.0	1.53	431.6	0.0
4.001	0.00	1.00	86.270	0.360	0.0	0.0	0.0	1.53	433.8	0.0
1.009	0.00	1.00	86.150	2.760	0.0	0.0	0.0	0.17	21784.1	0.0
1.010	0.00	1.00	86.149	2.760	0.0	0.0	0.0	1.01	71.6	0.0
1.011	0.00	1.00	86.099	2.760	0.0	0.0	0.0	1.57	111.3	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.240	0.240	0.240
2.000	-	-	100	0.240	0.240	0.240
1.001	-	-	100	0.240	0.240	0.240
1.002	-	-	100	0.240	0.240	0.240
1.003	-	-	100	0.240	0.240	0.240
1.004	-	-	100	0.240	0.240	0.240
1.005	-	-	100	0.240	0.240	0.240
3.000	-	-	100	0.240	0.240	0.240
3.001	-	-	100	0.240	0.240	0.240
3.002	-	-	100	0.240	0.240	0.240
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.180	0.180	0.180
4.001	-	-	100	0.180	0.180	0.180
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				2.760	2.760	2.760

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)
1.011	RC2013	88.700	85.965	0.000	1200	0

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4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 11:49	Designed by sgicivils	
File Resi - Catchment 3 001 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

Online Controls for Storm

Complex Manhole: RC3011, DS/PN: 1.011, Volume (m³): 3.7

Hydro-Brake® Optimum

Unit Reference MD-SCU-0124-2300-2300-2300
Design Head (m) 2.300
Design Flow (l/s) 23.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 124
Invert Level (m) 86.099
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)	2.300	23.0	Kick-Flo®	0.185	7.0
Flush-Flo™	0.147	7.2	Mean Flow over Head Range	-	15.5

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)	Depth (m)	Flow (l/s)
0.100	4.9	0.800	13.9	2.000	21.5	4.000	30.0	7.000	39.4
0.200	7.3	1.000	15.4	2.200	22.5	4.500	31.8	7.500	40.7
0.300	8.8	1.200	16.8	2.400	23.5	5.000	33.4	8.000	42.0
0.400	10.0	1.400	18.1	2.600	24.4	5.500	35.0	8.500	43.3
0.500	11.1	1.600	19.3	3.000	26.1	6.000	36.5	9.000	44.5
0.600	12.1	1.800	20.4	3.500	28.1	6.500	38.0	9.500	45.7

Hydro-Brake® Optimum

Unit Reference MD-SCU-0173-3500-1400-3500
Design Head (m) 1.400
Design Flow (l/s) 35.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 173
Invert Level (m) 86.999
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)	1.400	35.0	Kick-Flo®	0.259	15.7
Flush-Flo™	0.204	16.1	Mean Flow over Head Range	-	23.5

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)	Depth (m)	Flow (l/s)
0.100	6.8	0.300	16.8	0.500	21.4	0.800	26.8	1.200	32.5
0.200	16.1	0.400	19.2	0.600	23.3	1.000	29.8	1.400	35.0

Hydro-Brake® Optimum									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.600	37.3	2.400	45.4	4.000	58.1	6.000	70.8	8.000	81.5
1.800	39.5	2.600	47.2	4.500	61.6	6.500	73.6	8.500	83.9
2.000	41.6	3.000	50.6	5.000	64.8	7.000	76.3	9.000	86.3
2.200	43.5	3.500	54.5	5.500	67.9	7.500	79.0	9.500	88.6

Storage Structures for Storm

Tank or Pond Pipe: 1.009

Manning's N 0.035 Invert Level (m) 86.150

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	580.0	2.350	1568.0	2.351	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
1.000	RC3000	15 Summer	2	+0%	100/15 Summer				91.004	-0.261	0.000
2.000	RC3100	15 Summer	2	+0%	100/15 Summer				88.586	-0.359	0.000
1.001	RC3001	15 Summer	2	+0%	100/15 Summer				88.209	-0.511	0.000
1.002	RC3002	15 Summer	2	+0%	100/15 Summer				87.943	-0.477	0.000
1.003	RC3003	15 Summer	2	+0%	100/15 Summer				87.662	-0.503	0.000
1.004	RC3004	15 Summer	2	+0%	100/15 Summer				87.197	-0.623	0.000
1.005	RC3005	15 Summer	2	+0%	100/15 Summer				86.927	-0.588	0.000
3.000	RC3200	15 Summer	2	+0%	100/15 Summer				91.886	-0.234	0.000
3.001	RC3201	15 Summer	2	+0%	100/15 Summer				90.822	-0.308	0.000
3.002	RC3202	15 Summer	2	+0%	100/15 Summer				88.881	-0.369	0.000
1.006	RC3006	480 Summer	2	+0%	30/15 Summer				86.814	-0.176	0.000
1.007	RC3007	480 Summer	2	+0%	30/120 Summer				86.813	-0.462	0.000
1.008	RC3008	480 Summer	2	+0%	30/60 Summer				86.812	-0.373	0.000
4.000	RC3300	480 Summer	2	+0%	5/180 Winter				86.812	-0.123	0.000
4.001	RC3301	480 Summer	2	+0%	5/120 Summer				86.812	-0.058	0.000
1.009	RC3009	480 Summer	2	+0%					86.812	-1.588	0.000
1.010	RC3010	480 Summer	2	+0%	2/15 Summer				86.812	0.363	0.000
1.011	RC3011	240 Summer	2	+0%	2/15 Summer	100/480 Summer			86.930	0.531	0.000

Half Drain Pipe							
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RC3000	0.19			63.0	OK	
2.000	RC3100	0.21			62.7	OK	
1.001	RC3001	0.21			160.4	OK	
1.002	RC3002	0.27			184.7	OK	
1.003	RC3003	0.24			218.4	OK	
1.004	RC3004	0.20			248.5	OK	
1.005	RC3005	0.26			278.0	OK	
3.000	RC3200	0.29			62.3	OK	

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

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
3.001	RC3201	0.21			97.2	OK	
3.002	RC3202	0.19			133.6	OK	
1.006	RC3006	0.09			87.9	OK	
1.007	RC3007	0.07			84.2	OK	
1.008	RC3008	0.09			82.9	OK	
4.000	RC3300	0.02			6.4	OK	
4.001	RC3301	0.03			11.9	OK	
1.009	RC3009	0.00			123.1	OK	
1.010	RC3010	0.40			23.1	SURCHARGED	
1.011	RC3011	0.14			12.9	SURCHARGED	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
1.000	RC3000	15 Summer	5	+0%	100/15 Summer				91.025	-0.240	0.000
2.000	RC3100	15 Summer	5	+0%	100/15 Summer				88.619	-0.326	0.000
1.001	RC3001	15 Summer	5	+0%	100/15 Summer				88.257	-0.463	0.000
1.002	RC3002	15 Summer	5	+0%	100/15 Summer				87.998	-0.422	0.000
1.003	RC3003	15 Summer	5	+0%	100/15 Summer				87.712	-0.453	0.000
1.004	RC3004	15 Summer	5	+0%	100/15 Summer				87.249	-0.571	0.000
1.005	RC3005	15 Summer	5	+0%	100/15 Summer				86.992	-0.523	0.000
3.000	RC3200	15 Summer	5	+0%	100/15 Summer				91.915	-0.205	0.000
3.001	RC3201	15 Summer	5	+0%	100/15 Summer				90.849	-0.281	0.000
3.002	RC3202	15 Summer	5	+0%	100/15 Summer				88.909	-0.341	0.000
1.006	RC3006	360 Winter	5	+0%	30/15 Summer				86.982	-0.008	0.000
1.007	RC3007	360 Winter	5	+0%	30/120 Summer				86.975	-0.300	0.000
1.008	RC3008	360 Winter	5	+0%	30/60 Summer				86.974	-0.211	0.000
4.000	RC3300	360 Winter	5	+0%	5/180 Winter				86.974	0.039	0.000
4.001	RC3301	360 Winter	5	+0%	5/120 Summer				86.974	0.104	0.000
1.009	RC3009	360 Winter	5	+0%					86.974	-1.426	0.000
1.010	RC3010	360 Winter	5	+0%	2/15 Summer				86.974	0.525	0.000
1.011	RC3011	480 Winter	5	+0%	2/15 Summer	100/480 Summer			87.102	0.703	0.000

Half Drain Pipe							
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RC3000	0.27			88.5	OK	
2.000	RC3100	0.29			88.2	OK	
1.001	RC3001	0.29			222.4	OK	
1.002	RC3002	0.38			258.0	OK	
1.003	RC3003	0.33			305.4	OK	
1.004	RC3004	0.28			348.3	OK	
1.005	RC3005	0.36			388.1	OK	
3.000	RC3200	0.39			84.7	OK	

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

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
3.001	RC3201	0.29			135.1	OK	
3.002	RC3202	0.27			185.2	OK	
1.006	RC3006	0.09			87.5	OK	
1.007	RC3007	0.07			83.2	OK	
1.008	RC3008	0.09			81.8	OK	
4.000	RC3300	0.02			6.5	SURCHARGED	
4.001	RC3301	0.03			12.0	SURCHARGED	
1.009	RC3009	0.00			90.7	OK	
1.010	RC3010	0.28			16.3	SURCHARGED	
1.011	RC3011	0.17			15.6	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	RC3000	15 Summer	30	+0%	100/15 Summer				91.083	-0.182	0.000
2.000	RC3100	15 Summer	30	+0%	100/15 Summer				88.705	-0.240	0.000
1.001	RC3001	15 Summer	30	+0%	100/15 Summer				88.398	-0.322	0.000
1.002	RC3002	15 Summer	30	+0%	100/15 Summer				88.189	-0.231	0.000
1.003	RC3003	15 Summer	30	+0%	100/15 Summer				87.876	-0.289	0.000
1.004	RC3004	15 Summer	30	+0%	100/15 Summer				87.482	-0.338	0.000
1.005	RC3005	15 Summer	30	+0%	100/15 Summer				87.400	-0.115	0.000
3.000	RC3200	15 Summer	30	+0%	100/15 Summer				91.998	-0.122	0.000
3.001	RC3201	15 Summer	30	+0%	100/15 Summer				90.942	-0.188	0.000
3.002	RC3202	15 Summer	30	+0%	100/15 Summer				89.017	-0.233	0.000
1.006	RC3006	240 Winter	30	+0%	30/15 Summer				87.352	0.362	0.000
1.007	RC3007	240 Winter	30	+0%	30/120 Summer				87.350	0.075	0.000
1.008	RC3008	240 Winter	30	+0%	30/60 Summer				87.349	0.164	0.000
4.000	RC3300	240 Winter	30	+0%	5/180 Winter				87.348	0.413	0.000
4.001	RC3301	240 Winter	30	+0%	5/120 Summer				87.348	0.478	0.000
1.009	RC3009	240 Winter	30	+0%					87.347	-1.053	0.000
1.010	RC3010	240 Winter	30	+0%	2/15 Summer				87.347	0.898	0.000
1.011	RC3011	360 Winter	30	+0%	2/15 Summer	100/480 Summer			87.395	0.996	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RC3000	0.50			165.2	OK	
2.000	RC3100	0.53			160.3	OK	
1.001	RC3001	0.58			440.2	OK	
1.002	RC3002	0.78			531.5	OK	
1.003	RC3003	0.69			636.8	OK	
1.004	RC3004	0.58			718.3	OK	
1.005	RC3005	0.66			704.5	OK	
3.000	RC3200	0.72			156.9	OK	

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

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
3.001	RC3201	0.61			283.6	OK	
3.002	RC3202	0.58			403.8	OK	
1.006	RC3006	0.19			190.5	SURCHARGED	
1.007	RC3007	0.16			186.9	SURCHARGED	
1.008	RC3008	0.20			184.2	SURCHARGED	
4.000	RC3300	0.05			15.3	SURCHARGED	
4.001	RC3301	0.09			29.9	SURCHARGED	
1.009	RC3009	0.00			209.9	OK	
1.010	RC3010	0.61			35.4	SURCHARGED	
1.011	RC3011	0.37			33.9	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	RC3000	15 Summer		100	+45%	100/15 Summer				91.460	0.195	0.000
2.000	RC3100	15 Summer		100	+45%	100/15 Summer				90.006	1.061	0.000
1.001	RC3001	15 Summer		100	+45%	100/15 Summer				89.970	1.250	0.000
1.002	RC3002	15 Summer		100	+45%	100/15 Summer				89.867	1.447	0.000
1.003	RC3003	15 Summer		100	+45%	100/15 Summer				89.584	1.419	0.000
1.004	RC3004	15 Summer		100	+45%	100/15 Summer				89.181	1.361	0.000
1.005	RC3005	15 Summer		100	+45%	100/15 Summer				88.892	1.377	0.000
3.000	RC3200	15 Summer		100	+45%	100/15 Summer				93.406	1.286	0.000
3.001	RC3201	15 Summer		100	+45%	100/15 Summer				91.759	0.629	0.000
3.002	RC3202	15 Summer		100	+45%	100/15 Summer				90.167	0.917	0.000
1.006	RC3006	15 Summer		100	+45%	30/15 Summer				88.531	1.541	0.000
1.007	RC3007	240 Winter		100	+45%	30/120 Summer				88.181	0.906	0.000
1.008	RC3008	240 Winter		100	+45%	30/60 Summer				88.178	0.993	0.000
4.000	RC3300	240 Winter		100	+45%	5/180 Winter				88.177	1.242	0.000
4.001	RC3301	240 Winter		100	+45%	5/120 Summer				88.177	1.307	0.000
1.009	RC3009	240 Winter		100	+45%					88.175	-0.225	0.000
1.010	RC3010	240 Winter		100	+45%	2/15 Summer				88.175	1.726	0.000
1.011	RC3011	240 Winter		100	+45%	2/15 Summer	100/480 Summer			88.233	1.834	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RC3000	0.97			317.9	SURCHARGED	
2.000	RC3100	1.04			314.2	SURCHARGED	
1.001	RC3001	0.97			733.7	SURCHARGED	
1.002	RC3002	1.25			855.4	SURCHARGED	
1.003	RC3003	1.14			1052.0	FLOOD RISK	
1.004	RC3004	0.97			1205.3	FLOOD RISK	
1.005	RC3005	1.25			1331.7	FLOOD RISK	
3.000	RC3200	1.31			285.6	FLOOD RISK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.001	RC3201	1.01			470.6	SURCHARGED	
3.002	RC3202	0.93			643.5	SURCHARGED	
1.006	RC3006	1.91			1930.9	FLOOD RISK	
1.007	RC3007	0.33			376.6	SURCHARGED	
1.008	RC3008	0.40			375.6	SURCHARGED	
4.000	RC3300	0.09			29.0	SURCHARGED	
4.001	RC3301	0.17			58.0	SURCHARGED	
1.009	RC3009	0.01			431.6	FLOOD RISK	
1.010	RC3010	1.03			59.4	FLOOD RISK	
1.011	RC3011	0.58			53.3	SURCHARGED	

APPENDIX J3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 12:02	Designed by sgicivils	
File Resi - Catchment 3 001 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	86.553	2.545	34.0	0.240	2.50	0.0	0.600		o	375	Pipe/Conduit	
2.000	45.000	0.225	200.0	0.240	2.50	0.0	0.600		o	525	Pipe/Conduit	
1.001	60.000	0.300	200.0	0.240	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.002	63.000	0.255	247.1	0.240	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.003	19.000	0.345	55.1	0.240	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.004	53.000	0.305	173.8	0.240	0.00	0.0	0.600		o	900	Pipe/Conduit	
1.005	39.495	0.225	175.5	0.240	0.00	0.0	0.600		o	900	Pipe/Conduit	
3.000	75.350	0.990	76.1	0.240	2.50	0.0	0.600		o	375	Pipe/Conduit	
3.001	80.799	1.880	43.0	0.240	0.00	0.0	0.600		o	450	Pipe/Conduit	
3.002	90.747	2.110	43.0	0.240	0.00	0.0	0.600		o	525	Pipe/Conduit	
1.006	22.239	0.090	247.1	0.000	0.00	0.0	0.600		ooo	600	Triple Pipe	
1.007	14.000	0.090	155.6	0.000	0.00	0.0	0.600		o	975	Pipe/Conduit	
1.008	14.000	0.060	233.3	0.000	0.00	0.0	0.600		o	975	Pipe/Conduit	
4.000	16.441	0.065	252.9	0.180	2.50	0.0	0.600		o	600	Pipe/Conduit	
4.001	30.053	0.120	250.4	0.180	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.009	20.162	0.001	20162.0	0.000	0.00	0.0		0.035 → _ /			Pond/Tank	
1.010	11.934	0.050	238.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.011	13.370	0.134	99.8	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	0.00	1.00	90.890	0.240	0.0	0.0	0.0	3.12	344.2	0.0
2.000	0.00	1.00	88.420	0.240	0.0	0.0	0.0	1.58	342.1	0.0
1.001	0.00	1.00	87.970	0.720	0.0	0.0	0.0	1.98	872.6	0.0
1.002	0.00	1.00	87.670	0.960	0.0	0.0	0.0	1.78	784.6	0.0
1.003	0.00	1.00	87.415	1.200	0.0	0.0	0.0	3.78	1668.1	0.0
1.004	0.00	1.00	86.920	1.440	0.0	0.0	0.0	2.37	1510.3	0.0
1.005	0.00	1.00	86.615	1.680	0.0	0.0	0.0	2.36	1502.7	0.0
3.000	0.00	1.00	91.745	0.240	0.0	0.0	0.0	2.08	229.6	0.0
3.001	0.00	1.00	90.680	0.480	0.0	0.0	0.0	3.11	494.3	0.0
3.002	0.00	1.00	88.725	0.720	0.0	0.0	0.0	3.42	740.9	0.0
1.006	0.00	1.00	86.390	2.400	0.0	0.0	0.0	1.54	1310.2	0.0
1.007	0.00	1.00	86.300	2.400	0.0	0.0	0.0	2.64	1969.1	0.0
1.008	0.00	1.00	86.210	2.400	0.0	0.0	0.0	2.15	1606.0	0.0
4.000	0.00	1.00	86.335	0.180	0.0	0.0	0.0	1.53	431.6	0.0
4.001	0.00	1.00	86.270	0.360	0.0	0.0	0.0	1.53	433.8	0.0
1.009	0.00	1.00	86.150	2.760	0.0	0.0	0.0	0.17	21784.1	0.0
1.010	0.00	1.00	86.149	2.760	0.0	0.0	0.0	1.01	71.6	0.0
1.011	0.00	1.00	86.099	2.760	0.0	0.0	0.0	1.57	111.3	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.240	0.240	0.240
2.000	-	-	100	0.240	0.240	0.240
1.001	-	-	100	0.240	0.240	0.240
1.002	-	-	100	0.240	0.240	0.240
1.003	-	-	100	0.240	0.240	0.240
1.004	-	-	100	0.240	0.240	0.240
1.005	-	-	100	0.240	0.240	0.240
3.000	-	-	100	0.240	0.240	0.240
3.001	-	-	100	0.240	0.240	0.240
3.002	-	-	100	0.240	0.240	0.240
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.180	0.180	0.180
4.001	-	-	100	0.180	0.180	0.180
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				2.760	2.760	2.760

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.011	RC2013	88.700	85.965	0.000	1200	0
Datum (m) 85.965 Offset (mins) 0						

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	1.035	27	1.035	53	1.035	79	1.035	105	1.035	131	1.035	157	1.035	183	1.035
2	1.035	28	1.035	54	1.035	80	1.035	106	1.035	132	1.035	158	1.035	184	1.035
3	1.035	29	1.035	55	1.035	81	1.035	107	1.035	133	1.035	159	1.035	185	1.035
4	1.035	30	1.035	56	1.035	82	1.035	108	1.035	134	1.035	160	1.035	186	1.035
5	1.035	31	1.035	57	1.035	83	1.035	109	1.035	135	1.035	161	1.035	187	1.035
6	1.035	32	1.035	58	1.035	84	1.035	110	1.035	136	1.035	162	1.035	188	1.035
7	1.035	33	1.035	59	1.035	85	1.035	111	1.035	137	1.035	163	1.035	189	1.035
8	1.035	34	1.035	60	1.035	86	1.035	112	1.035	138	1.035	164	1.035	190	1.035
9	1.035	35	1.035	61	1.035	87	1.035	113	1.035	139	1.035	165	1.035	191	1.035
10	1.035	36	1.035	62	1.035	88	1.035	114	1.035	140	1.035	166	1.035	192	1.035
11	1.035	37	1.035	63	1.035	89	1.035	115	1.035	141	1.035	167	1.035	193	1.035
12	1.035	38	1.035	64	1.035	90	1.035	116	1.035	142	1.035	168	1.035	194	1.035
13	1.035	39	1.035	65	1.035	91	1.035	117	1.035	143	1.035	169	1.035	195	1.035
14	1.035	40	1.035	66	1.035	92	1.035	118	1.035	144	1.035	170	1.035	196	1.035
15	1.035	41	1.035	67	1.035	93	1.035	119	1.035	145	1.035	171	1.035	197	1.035
16	1.035	42	1.035	68	1.035	94	1.035	120	1.035	146	1.035	172	1.035	198	1.035
17	1.035	43	1.035	69	1.035	95	1.035	121	1.035	147	1.035	173	1.035	199	1.035
18	1.035	44	1.035	70	1.035	96	1.035	122	1.035	148	1.035	174	1.035	200	1.035
19	1.035	45	1.035	71	1.035	97	1.035	123	1.035	149	1.035	175	1.035	201	1.035
20	1.035	46	1.035	72	1.035	98	1.035	124	1.035	150	1.035	176	1.035	202	1.035
21	1.035	47	1.035	73	1.035	99	1.035	125	1.035	151	1.035	177	1.035	203	1.035
22	1.035	48	1.035	74	1.035	100	1.035	126	1.035	152	1.035	178	1.035	204	1.035
23	1.035	49	1.035	75	1.035	101	1.035	127	1.035	153	1.035	179	1.035	205	1.035
24	1.035	50	1.035	76	1.035	102	1.035	128	1.035	154	1.035	180	1.035	206	1.035
25	1.035	51	1.035	77	1.035	103	1.035	129	1.035	155	1.035	181	1.035	207	1.035
26	1.035	52	1.035	78	1.035	104	1.035	130	1.035	156	1.035	182	1.035	208	1.035

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
209	1.035	270	1.035	331	1.035	392	1.035	453	1.035	514	1.035	575	1.035	636	1.035
210	1.035	271	1.035	332	1.035	393	1.035	454	1.035	515	1.035	576	1.035	637	1.035
211	1.035	272	1.035	333	1.035	394	1.035	455	1.035	516	1.035	577	1.035	638	1.035
212	1.035	273	1.035	334	1.035	395	1.035	456	1.035	517	1.035	578	1.035	639	1.035
213	1.035	274	1.035	335	1.035	396	1.035	457	1.035	518	1.035	579	1.035	640	1.035
214	1.035	275	1.035	336	1.035	397	1.035	458	1.035	519	1.035	580	1.035	641	1.035
215	1.035	276	1.035	337	1.035	398	1.035	459	1.035	520	1.035	581	1.035	642	1.035
216	1.035	277	1.035	338	1.035	399	1.035	460	1.035	521	1.035	582	1.035	643	1.035
217	1.035	278	1.035	339	1.035	400	1.035	461	1.035	522	1.035	583	1.035	644	1.035
218	1.035	279	1.035	340	1.035	401	1.035	462	1.035	523	1.035	584	1.035	645	1.035
219	1.035	280	1.035	341	1.035	402	1.035	463	1.035	524	1.035	585	1.035	646	1.035
220	1.035	281	1.035	342	1.035	403	1.035	464	1.035	525	1.035	586	1.035	647	1.035
221	1.035	282	1.035	343	1.035	404	1.035	465	1.035	526	1.035	587	1.035	648	1.035
222	1.035	283	1.035	344	1.035	405	1.035	466	1.035	527	1.035	588	1.035	649	1.035
223	1.035	284	1.035	345	1.035	406	1.035	467	1.035	528	1.035	589	1.035	650	1.035
224	1.035	285	1.035	346	1.035	407	1.035	468	1.035	529	1.035	590	1.035	651	1.035
225	1.035	286	1.035	347	1.035	408	1.035	469	1.035	530	1.035	591	1.035	652	1.035
226	1.035	287	1.035	348	1.035	409	1.035	470	1.035	531	1.035	592	1.035	653	1.035
227	1.035	288	1.035	349	1.035	410	1.035	471	1.035	532	1.035	593	1.035	654	1.035
228	1.035	289	1.035	350	1.035	411	1.035	472	1.035	533	1.035	594	1.035	655	1.035
229	1.035	290	1.035	351	1.035	412	1.035	473	1.035	534	1.035	595	1.035	656	1.035
230	1.035	291	1.035	352	1.035	413	1.035	474	1.035	535	1.035	596	1.035	657	1.035
231	1.035	292	1.035	353	1.035	414	1.035	475	1.035	536	1.035	597	1.035	658	1.035
232	1.035	293	1.035	354	1.035	415	1.035	476	1.035	537	1.035	598	1.035	659	1.035
233	1.035	294	1.035	355	1.035	416	1.035	477	1.035	538	1.035	599	1.035	660	1.035
234	1.035	295	1.035	356	1.035	417	1.035	478	1.035	539	1.035	600	1.035	661	1.035
235	1.035	296	1.035	357	1.035	418	1.035	479	1.035	540	1.035	601	1.035	662	1.035
236	1.035	297	1.035	358	1.035	419	1.035	480	1.035	541	1.035	602	1.035	663	1.035
237	1.035	298	1.035	359	1.035	420	1.035	481	1.035	542	1.035	603	1.035	664	1.035
238	1.035	299	1.035	360	1.035	421	1.035	482	1.035	543	1.035	604	1.035	665	1.035
239	1.035	300	1.035	361	1.035	422	1.035	483	1.035	544	1.035	605	1.035	666	1.035
240	1.035	301	1.035	362	1.035	423	1.035	484	1.035	545	1.035	606	1.035	667	1.035
241	1.035	302	1.035	363	1.035	424	1.035	485	1.035	546	1.035	607	1.035	668	1.035
242	1.035	303	1.035	364	1.035	425	1.035	486	1.035	547	1.035	608	1.035	669	1.035
243	1.035	304	1.035	365	1.035	426	1.035	487	1.035	548	1.035	609	1.035	670	1.035
244	1.035	305	1.035	366	1.035	427	1.035	488	1.035	549	1.035	610	1.035	671	1.035
245	1.035	306	1.035	367	1.035	428	1.035	489	1.035	550	1.035	611	1.035	672	1.035
246	1.035	307	1.035	368	1.035	429	1.035	490	1.035	551	1.035	612	1.035	673	1.035
247	1.035	308	1.035	369	1.035	430	1.035	491	1.035	552	1.035	613	1.035	674	1.035
248	1.035	309	1.035	370	1.035	431	1.035	492	1.035	553	1.035	614	1.035	675	1.035
249	1.035	310	1.035	371	1.035	432	1.035	493	1.035	554	1.035	615	1.035	676	1.035
250	1.035	311	1.035	372	1.035	433	1.035	494	1.035	555	1.035	616	1.035	677	1.035
251	1.035	312	1.035	373	1.035	434	1.035	495	1.035	556	1.035	617	1.035	678	1.035
252	1.035	313	1.035	374	1.035	435	1.035	496	1.035	557	1.035	618	1.035	679	1.035
253	1.035	314	1.035	375	1.035	436	1.035	497	1.035	558	1.035	619	1.035	680	1.035
254	1.035	315	1.035	376	1.035	437	1.035	498	1.035	559	1.035	620	1.035	681	1.035
255	1.035	316	1.035	377	1.035	438	1.035	499	1.035	560	1.035	621	1.035	682	1.035
256	1.035	317	1.035	378	1.035	439	1.035	500	1.035	561	1.035	622	1.035	683	1.035
257	1.035	318	1.035	379	1.035	440	1.035	501	1.035	562	1.035	623	1.035	684	1.035
258	1.035	319	1.035	380	1.035	441	1.035	502	1.035	563	1.035	624	1.035	685	1.035
259	1.035	320	1.035	381	1.035	442	1.035	503	1.035	564	1.035	625	1.035	686	1.035
260	1.035	321	1.035	382	1.035	443	1.035	504	1.035	565	1.035	626	1.035	687	1.035
261	1.035	322	1.035	383	1.035	444	1.035	505	1.035	566	1.035	627	1.035	688	1.035
262	1.035	323	1.035	384	1.035	445	1.035	506	1.035	567	1.035	628	1.035	689	1.035
263	1.035	324	1.035	385	1.035	446	1.035	507	1.035	568	1.035	629	1.035	690	1.035
264	1.035	325	1.035	386	1.035	447	1.035	508	1.035	569	1.035	630	1.035	691	1.035
265	1.035	326	1.035	387	1.035	448	1.035	509	1.035	570	1.035	631	1.035	692	1.035
266	1.035	327	1.035	388	1.035	449	1.035	510	1.035	571	1.035	632	1.035	693	1.035
267	1.035	328	1.035	389	1.035	450	1.035	511	1.035	572	1.035	633	1.035	694	1.035
268	1.035	329	1.035	390	1.035	451	1.035	512	1.035	573	1.035	634	1.035	695	1.035
269	1.035	330	1.035	391	1.035	452	1.035	513	1.035	574	1.035	635	1.035	696	1.035

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
697	1.035	758	1.035	819	1.035	880	1.035	941	1.035	1002	1.035	1063	1.035	1124	1.035
698	1.035	759	1.035	820	1.035	881	1.035	942	1.035	1003	1.035	1064	1.035	1125	1.035
699	1.035	760	1.035	821	1.035	882	1.035	943	1.035	1004	1.035	1065	1.035	1126	1.035
700	1.035	761	1.035	822	1.035	883	1.035	944	1.035	1005	1.035	1066	1.035	1127	1.035
701	1.035	762	1.035	823	1.035	884	1.035	945	1.035	1006	1.035	1067	1.035	1128	1.035
702	1.035	763	1.035	824	1.035	885	1.035	946	1.035	1007	1.035	1068	1.035	1129	1.035
703	1.035	764	1.035	825	1.035	886	1.035	947	1.035	1008	1.035	1069	1.035	1130	1.035
704	1.035	765	1.035	826	1.035	887	1.035	948	1.035	1009	1.035	1070	1.035	1131	1.035
705	1.035	766	1.035	827	1.035	888	1.035	949	1.035	1010	1.035	1071	1.035	1132	1.035
706	1.035	767	1.035	828	1.035	889	1.035	950	1.035	1011	1.035	1072	1.035	1133	1.035
707	1.035	768	1.035	829	1.035	890	1.035	951	1.035	1012	1.035	1073	1.035	1134	1.035
708	1.035	769	1.035	830	1.035	891	1.035	952	1.035	1013	1.035	1074	1.035	1135	1.035
709	1.035	770	1.035	831	1.035	892	1.035	953	1.035	1014	1.035	1075	1.035	1136	1.035
710	1.035	771	1.035	832	1.035	893	1.035	954	1.035	1015	1.035	1076	1.035	1137	1.035
711	1.035	772	1.035	833	1.035	894	1.035	955	1.035	1016	1.035	1077	1.035	1138	1.035
712	1.035	773	1.035	834	1.035	895	1.035	956	1.035	1017	1.035	1078	1.035	1139	1.035
713	1.035	774	1.035	835	1.035	896	1.035	957	1.035	1018	1.035	1079	1.035	1140	1.035
714	1.035	775	1.035	836	1.035	897	1.035	958	1.035	1019	1.035	1080	1.035	1141	1.035
715	1.035	776	1.035	837	1.035	898	1.035	959	1.035	1020	1.035	1081	1.035	1142	1.035
716	1.035	777	1.035	838	1.035	899	1.035	960	1.035	1021	1.035	1082	1.035	1143	1.035
717	1.035	778	1.035	839	1.035	900	1.035	961	1.035	1022	1.035	1083	1.035	1144	1.035
718	1.035	779	1.035	840	1.035	901	1.035	962	1.035	1023	1.035	1084	1.035	1145	1.035
719	1.035	780	1.035	841	1.035	902	1.035	963	1.035	1024	1.035	1085	1.035	1146	1.035
720	1.035	781	1.035	842	1.035	903	1.035	964	1.035	1025	1.035	1086	1.035	1147	1.035
721	1.035	782	1.035	843	1.035	904	1.035	965	1.035	1026	1.035	1087	1.035	1148	1.035
722	1.035	783	1.035	844	1.035	905	1.035	966	1.035	1027	1.035	1088	1.035	1149	1.035
723	1.035	784	1.035	845	1.035	906	1.035	967	1.035	1028	1.035	1089	1.035	1150	1.035
724	1.035	785	1.035	846	1.035	907	1.035	968	1.035	1029	1.035	1090	1.035	1151	1.035
725	1.035	786	1.035	847	1.035	908	1.035	969	1.035	1030	1.035	1091	1.035	1152	1.035
726	1.035	787	1.035	848	1.035	909	1.035	970	1.035	1031	1.035	1092	1.035	1153	1.035
727	1.035	788	1.035	849	1.035	910	1.035	971	1.035	1032	1.035	1093	1.035	1154	1.035
728	1.035	789	1.035	850	1.035	911	1.035	972	1.035	1033	1.035	1094	1.035	1155	1.035
729	1.035	790	1.035	851	1.035	912	1.035	973	1.035	1034	1.035	1095	1.035	1156	1.035
730	1.035	791	1.035	852	1.035	913	1.035	974	1.035	1035	1.035	1096	1.035	1157	1.035
731	1.035	792	1.035	853	1.035	914	1.035	975	1.035	1036	1.035	1097	1.035	1158	1.035
732	1.035	793	1.035	854	1.035	915	1.035	976	1.035	1037	1.035	1098	1.035	1159	1.035
733	1.035	794	1.035	855	1.035	916	1.035	977	1.035	1038	1.035	1099	1.035	1160	1.035
734	1.035	795	1.035	856	1.035	917	1.035	978	1.035	1039	1.035	1100	1.035	1161	1.035
735	1.035	796	1.035	857	1.035	918	1.035	979	1.035	1040	1.035	1101	1.035	1162	1.035
736	1.035	797	1.035	858	1.035	919	1.035	980	1.035	1041	1.035	1102	1.035	1163	1.035
737	1.035	798	1.035	859	1.035	920	1.035	981	1.035	1042	1.035	1103	1.035	1164	1.035
738	1.035	799	1.035	860	1.035	921	1.035	982	1.035	1043	1.035	1104	1.035	1165	1.035
739	1.035	800	1.035	861	1.035	922	1.035	983	1.035	1044	1.035	1105	1.035	1166	1.035
740	1.035	801	1.035	862	1.035	923	1.035	984	1.035	1045	1.035	1106	1.035	1167	1.035
741	1.035	802	1.035	863	1.035	924	1.035	985	1.035	1046	1.035	1107	1.035	1168	1.035
742	1.035	803	1.035	864	1.035	925	1.035	986	1.035	1047	1.035	1108	1.035	1169	1.035
743	1.035	804	1.035	865	1.035	926	1.035	987	1.035	1048	1.035	1109	1.035	1170	1.035
744	1.035	805	1.035	866	1.035	927	1.035	988	1.035	1049	1.035	1110	1.035	1171	1.035
745	1.035	806	1.035	867	1.035	928	1.035	989	1.035	1050	1.035	1111	1.035	1172	1.035
746	1.035	807	1.035	868	1.035	929	1.035	990	1.035	1051	1.035	1112	1.035	1173	1.035
747	1.035	808	1.035	869	1.035	930	1.035	991	1.035	1052	1.035	1113	1.035	1174	1.035
748	1.035	809	1.035	870	1.035	931	1.035	992	1.035	1053	1.035	1114	1.035	1175	1.035
749	1.035	810	1.035	871	1.035	932	1.035	993	1.035	1054	1.035	1115	1.035	1176	1.035
750	1.035	811	1.035	872	1.035	933	1.035	994	1.035	1055	1.035	1116	1.035	1177	1.035
751	1.035	812	1.035	873	1.035	934	1.035	995	1.035	1056	1.035	1117	1.035	1178	1.035
752	1.035	813	1.035	874	1.035	935	1.035	996	1.035	1057	1.035	1118	1.035	1179	1.035
753	1.035	814	1.035	875	1.035	936	1.035	997	1.035	1058	1.035	1119	1.035	1180	1.035
754	1.035	815	1.035	876	1.035	937	1.035	998	1.035	1059	1.035	1120	1.035	1181	1.035
755	1.035	816	1.035	877	1.035	938	1.035	999	1.035	1060	1.035	1121	1.035	1182	1.035
756	1.035	817	1.035	878	1.035	939	1.035	1000	1.035	1061	1.035	1122	1.035	1183	1.035
757	1.035	818	1.035	879	1.035	940	1.035	1001	1.035	1062	1.035	1123	1.035	1184	1.035

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1185	1.035	1217	1.035	1249	1.035	1281	1.035	1313	1.035	1345	1.035	1377	1.035	1409	1.035
1186	1.035	1218	1.035	1250	1.035	1282	1.035	1314	1.035	1346	1.035	1378	1.035	1410	1.035
1187	1.035	1219	1.035	1251	1.035	1283	1.035	1315	1.035	1347	1.035	1379	1.035	1411	1.035
1188	1.035	1220	1.035	1252	1.035	1284	1.035	1316	1.035	1348	1.035	1380	1.035	1412	1.035
1189	1.035	1221	1.035	1253	1.035	1285	1.035	1317	1.035	1349	1.035	1381	1.035	1413	1.035
1190	1.035	1222	1.035	1254	1.035	1286	1.035	1318	1.035	1350	1.035	1382	1.035	1414	1.035
1191	1.035	1223	1.035	1255	1.035	1287	1.035	1319	1.035	1351	1.035	1383	1.035	1415	1.035
1192	1.035	1224	1.035	1256	1.035	1288	1.035	1320	1.035	1352	1.035	1384	1.035	1416	1.035
1193	1.035	1225	1.035	1257	1.035	1289	1.035	1321	1.035	1353	1.035	1385	1.035	1417	1.035
1194	1.035	1226	1.035	1258	1.035	1290	1.035	1322	1.035	1354	1.035	1386	1.035	1418	1.035
1195	1.035	1227	1.035	1259	1.035	1291	1.035	1323	1.035	1355	1.035	1387	1.035	1419	1.035
1196	1.035	1228	1.035	1260	1.035	1292	1.035	1324	1.035	1356	1.035	1388	1.035	1420	1.035
1197	1.035	1229	1.035	1261	1.035	1293	1.035	1325	1.035	1357	1.035	1389	1.035	1421	1.035
1198	1.035	1230	1.035	1262	1.035	1294	1.035	1326	1.035	1358	1.035	1390	1.035	1422	1.035
1199	1.035	1231	1.035	1263	1.035	1295	1.035	1327	1.035	1359	1.035	1391	1.035	1423	1.035
1200	1.035	1232	1.035	1264	1.035	1296	1.035	1328	1.035	1360	1.035	1392	1.035	1424	1.035
1201	1.035	1233	1.035	1265	1.035	1297	1.035	1329	1.035	1361	1.035	1393	1.035	1425	1.035
1202	1.035	1234	1.035	1266	1.035	1298	1.035	1330	1.035	1362	1.035	1394	1.035	1426	1.035
1203	1.035	1235	1.035	1267	1.035	1299	1.035	1331	1.035	1363	1.035	1395	1.035	1427	1.035
1204	1.035	1236	1.035	1268	1.035	1300	1.035	1332	1.035	1364	1.035	1396	1.035	1428	1.035
1205	1.035	1237	1.035	1269	1.035	1301	1.035	1333	1.035	1365	1.035	1397	1.035	1429	1.035
1206	1.035	1238	1.035	1270	1.035	1302	1.035	1334	1.035	1366	1.035	1398	1.035	1430	1.035
1207	1.035	1239	1.035	1271	1.035	1303	1.035	1335	1.035	1367	1.035	1399	1.035	1431	1.035
1208	1.035	1240	1.035	1272	1.035	1304	1.035	1336	1.035	1368	1.035	1400	1.035	1432	1.035
1209	1.035	1241	1.035	1273	1.035	1305	1.035	1337	1.035	1369	1.035	1401	1.035	1433	1.035
1210	1.035	1242	1.035	1274	1.035	1306	1.035	1338	1.035	1370	1.035	1402	1.035	1434	1.035
1211	1.035	1243	1.035	1275	1.035	1307	1.035	1339	1.035	1371	1.035	1403	1.035	1435	1.035
1212	1.035	1244	1.035	1276	1.035	1308	1.035	1340	1.035	1372	1.035	1404	1.035	1436	1.035
1213	1.035	1245	1.035	1277	1.035	1309	1.035	1341	1.035	1373	1.035	1405	1.035	1437	1.035
1214	1.035	1246	1.035	1278	1.035	1310	1.035	1342	1.035	1374	1.035	1406	1.035	1438	1.035
1215	1.035	1247	1.035	1279	1.035	1311	1.035	1343	1.035	1375	1.035	1407	1.035	1439	1.035
1216	1.035	1248	1.035	1280	1.035	1312	1.035	1344	1.035	1376	1.035	1408	1.035	1440	1.035

SGi Consulting		Page 6
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 12:02	Designed by sgicivils	
File Resi - Catchment 3 001 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

Online Controls for Storm

Complex Manhole: RC3011, DS/PN: 1.011, Volume (m³): 3.7

Hydro-Brake® Optimum

Unit Reference MD-SCU-0124-2300-2300-2300
Design Head (m) 2.300
Design Flow (l/s) 23.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 124
Invert Level (m) 86.099
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)	2.300	23.0	Kick-Flo®	0.185	7.0
Flush-Flo™	0.147	7.2	Mean Flow over Head Range	-	15.5

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)	Depth (m)	Flow (l/s)
0.100	4.9	0.800	13.9	2.000	21.5	4.000	30.0	7.000	39.4
0.200	7.3	1.000	15.4	2.200	22.5	4.500	31.8	7.500	40.7
0.300	8.8	1.200	16.8	2.400	23.5	5.000	33.4	8.000	42.0
0.400	10.0	1.400	18.1	2.600	24.4	5.500	35.0	8.500	43.3
0.500	11.1	1.600	19.3	3.000	26.1	6.000	36.5	9.000	44.5
0.600	12.1	1.800	20.4	3.500	28.1	6.500	38.0	9.500	45.7

Hydro-Brake® Optimum

Unit Reference MD-SCU-0173-3500-1400-3500
Design Head (m) 1.400
Design Flow (l/s) 35.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 173
Invert Level (m) 86.999
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)	1.400	35.0	Kick-Flo®	0.259	15.7
Flush-Flo™	0.204	16.1	Mean Flow over Head Range	-	23.5

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)	Depth (m)	Flow (l/s)
0.100	6.8	0.300	16.8	0.500	21.4	0.800	26.8	1.200	32.5
0.200	16.1	0.400	19.2	0.600	23.3	1.000	29.8	1.400	35.0

Hydro-Brake® Optimum									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.600	37.3	2.400	45.4	4.000	58.1	6.000	70.8	8.000	81.5
1.800	39.5	2.600	47.2	4.500	61.6	6.500	73.6	8.500	83.9
2.000	41.6	3.000	50.6	5.000	64.8	7.000	76.3	9.000	86.3
2.200	43.5	3.500	54.5	5.500	67.9	7.500	79.0	9.500	88.6

Storage Structures for Storm

Tank or Pond Pipe: 1.009

Manning's N 0.035 Invert Level (m) 86.150

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	580.0	2.350	1568.0	2.351	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	RC3000	15 Summer	2	+0%	100/15 Summer					91.004	-0.261	0.000
2.000	RC3100	15 Summer	2	+0%	100/15 Summer					88.586	-0.359	0.000
1.001	RC3001	15 Summer	2	+0%	100/15 Summer					88.209	-0.511	0.000
1.002	RC3002	15 Summer	2	+0%	100/15 Summer					87.943	-0.477	0.000
1.003	RC3003	15 Summer	2	+0%	100/15 Summer					87.662	-0.503	0.000
1.004	RC3004	15 Summer	2	+0%	100/15 Summer					87.197	-0.623	0.000
1.005	RC3005	1440 Winter	2	+0%	30/360 Summer					87.137	-0.378	0.000
3.000	RC3200	15 Summer	2	+0%	100/15 Summer					91.886	-0.234	0.000
3.001	RC3201	15 Summer	2	+0%	100/15 Summer					90.822	-0.308	0.000
3.002	RC3202	15 Summer	2	+0%	100/15 Summer					88.881	-0.369	0.000
1.006	RC3006	1440 Winter	2	+0%	2/480 Summer					87.137	0.147	0.000
1.007	RC3007	1440 Winter	2	+0%	30/120 Summer					87.137	-0.138	0.000
1.008	RC3008	1440 Winter	2	+0%	5/600 Summer					87.137	-0.048	0.000
4.000	RC3300	1440 Winter	2	+0%	2/360 Summer					87.136	0.201	0.000
4.001	RC3301	1440 Winter	2	+0%	2/240 Summer					87.136	0.266	0.000
1.009	RC3009	1440 Winter	2	+0%						87.136	-1.264	0.000
1.010	RC3010	1440 Winter	2	+0%	2/15 Summer					87.136	0.687	0.000
1.011	RC3011	1440 Winter	2	+0%	2/15 Summer					87.279	0.880	0.000

								Half Drain	Pipe
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
1.000	RC3000	0.19			63.0	OK			
2.000	RC3100	0.21			62.7	OK			
1.001	RC3001	0.21			160.4	OK			
1.002	RC3002	0.27			184.7	OK			
1.003	RC3003	0.24			218.4	OK			
1.004	RC3004	0.20			248.5	OK			
1.005	RC3005	0.02			17.5	OK			
3.000	RC3200	0.29			62.3	OK			

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

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
3.001	RC3201	0.21			97.2	OK	
3.002	RC3202	0.19			133.6	OK	
1.006	RC3006	0.02			24.0	SURCHARGED	
1.007	RC3007	0.02			22.8	OK	
1.008	RC3008	0.02			22.4	OK	
4.000	RC3300	0.01			1.9	SURCHARGED	
4.001	RC3301	0.01			3.6	SURCHARGED	
1.009	RC3009	0.00			101.6	OK	
1.010	RC3010	0.38			21.8	SURCHARGED	
1.011	RC3011	0.23			21.3	SURCHARGED	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	RC3000	15 Summer	5	+0%	100/15 Summer					91.025	-0.240	0.000
2.000	RC3100	15 Summer	5	+0%	100/15 Summer					88.619	-0.326	0.000
1.001	RC3001	15 Summer	5	+0%	100/15 Summer					88.257	-0.463	0.000
1.002	RC3002	15 Summer	5	+0%	100/15 Summer					87.998	-0.422	0.000
1.003	RC3003	15 Summer	5	+0%	100/15 Summer					87.712	-0.453	0.000
1.004	RC3004	1440 Winter	5	+0%	100/15 Summer					87.269	-0.551	0.000
1.005	RC3005	1440 Winter	5	+0%	30/360 Summer					87.269	-0.246	0.000
3.000	RC3200	15 Summer	5	+0%	100/15 Summer					91.915	-0.205	0.000
3.001	RC3201	15 Summer	5	+0%	100/15 Summer					90.849	-0.281	0.000
3.002	RC3202	15 Summer	5	+0%	100/15 Summer					88.909	-0.341	0.000
1.006	RC3006	1440 Winter	5	+0%	2/480 Summer					87.269	0.279	0.000
1.007	RC3007	1440 Winter	5	+0%	30/120 Summer					87.268	-0.007	0.000
1.008	RC3008	1440 Winter	5	+0%	5/600 Summer					87.267	0.082	0.000
4.000	RC3300	1440 Winter	5	+0%	2/360 Summer					87.266	0.331	0.000
4.001	RC3301	1440 Winter	5	+0%	2/240 Summer					87.266	0.396	0.000
1.009	RC3009	1440 Winter	5	+0%						87.266	-1.134	0.000
1.010	RC3010	1440 Winter	5	+0%	2/15 Summer					87.266	0.817	0.000
1.011	RC3011	1440 Winter	5	+0%	2/15 Summer					87.402	1.003	0.000

									Half Drain	Pipe
PN	US/MH Name	Flow Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded			
1.000	RC3000	0.27			88.5	OK				
2.000	RC3100	0.29			88.2	OK				
1.001	RC3001	0.29			222.4	OK				
1.002	RC3002	0.38			258.0	OK				
1.003	RC3003	0.33			305.4	OK				
1.004	RC3004	0.02			19.0	OK				
1.005	RC3005	0.02			21.8	OK				
3.000	RC3200	0.39			84.7	OK				

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

		Half Drain Pipe					
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
3.001	RC3201	0.29			135.1		OK
3.002	RC3202	0.27			185.2		OK
1.006	RC3006	0.03			31.3	SURCHARGED	
1.007	RC3007	0.03			30.7		OK
1.008	RC3008	0.03			30.2	SURCHARGED	
4.000	RC3300	0.01			2.3	SURCHARGED	
4.001	RC3301	0.01			4.5	SURCHARGED	
1.009	RC3009	0.00			101.7		OK
1.010	RC3010	0.56			32.4	SURCHARGED	
1.011	RC3011	0.35			31.8	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	RC3000	15 Summer	30	+0%	100/15 Summer				91.083	-0.182	0.000
2.000	RC3100	15 Summer	30	+0%	100/15 Summer				88.705	-0.240	0.000
1.001	RC3001	15 Summer	30	+0%	100/15 Summer				88.398	-0.322	0.000
1.002	RC3002	15 Summer	30	+0%	100/15 Summer				88.189	-0.231	0.000
1.003	RC3003	15 Summer	30	+0%	100/15 Summer				87.876	-0.289	0.000
1.004	RC3004	1440 Winter	30	+0%	100/15 Summer				87.629	-0.191	0.000
1.005	RC3005	1440 Winter	30	+0%	30/360 Summer				87.629	0.114	0.000
3.000	RC3200	15 Summer	30	+0%	100/15 Summer				91.998	-0.122	0.000
3.001	RC3201	15 Summer	30	+0%	100/15 Summer				90.942	-0.188	0.000
3.002	RC3202	15 Summer	30	+0%	100/15 Summer				89.017	-0.233	0.000
1.006	RC3006	1440 Winter	30	+0%	2/480 Summer				87.629	0.639	0.000
1.007	RC3007	1440 Winter	30	+0%	30/120 Summer				87.629	0.354	0.000
1.008	RC3008	1440 Winter	30	+0%	5/600 Summer				87.628	0.443	0.000
4.000	RC3300	1440 Winter	30	+0%	2/360 Summer				87.627	0.692	0.000
4.001	RC3301	1440 Winter	30	+0%	2/240 Summer				87.627	0.757	0.000
1.009	RC3009	1440 Winter	30	+0%					87.627	-0.773	0.000
1.010	RC3010	1440 Winter	30	+0%	2/15 Summer				87.627	1.178	0.000
1.011	RC3011	1440 Winter	30	+0%	2/15 Summer				87.780	1.381	0.000

				Half Drain	Pipe		
	US/MH	Flow /	Overflow	Time	Flow		Level
PN	Name	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
1.000	RC3000	0.50			165.2	OK	
2.000	RC3100	0.53			160.3	OK	
1.001	RC3001	0.58			440.2	OK	
1.002	RC3002	0.78			531.5	OK	
1.003	RC3003	0.69			636.8	OK	
1.004	RC3004	0.02			28.6	OK	
1.005	RC3005	0.03			33.4	SURCHARGED	
3.000	RC3200	0.72			156.9	OK	

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

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
3.001	RC3201	0.61			283.6	OK	
3.002	RC3202	0.58			403.8	OK	
1.006	RC3006	0.05			47.7	SURCHARGED	
1.007	RC3007	0.04			47.7	SURCHARGED	
1.008	RC3008	0.05			47.7	SURCHARGED	
4.000	RC3300	0.01			3.4	SURCHARGED	
4.001	RC3301	0.02			6.9	SURCHARGED	
1.009	RC3009	0.00			93.8	OK	
1.010	RC3010	0.71			41.0	SURCHARGED	
1.011	RC3011	0.44			40.3	SURCHARGED	

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0
Inlet Coeffiecient 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 1
Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
Data Type Point

FEH Rainfall Version 2013 Cv (Summer) 1.000

Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

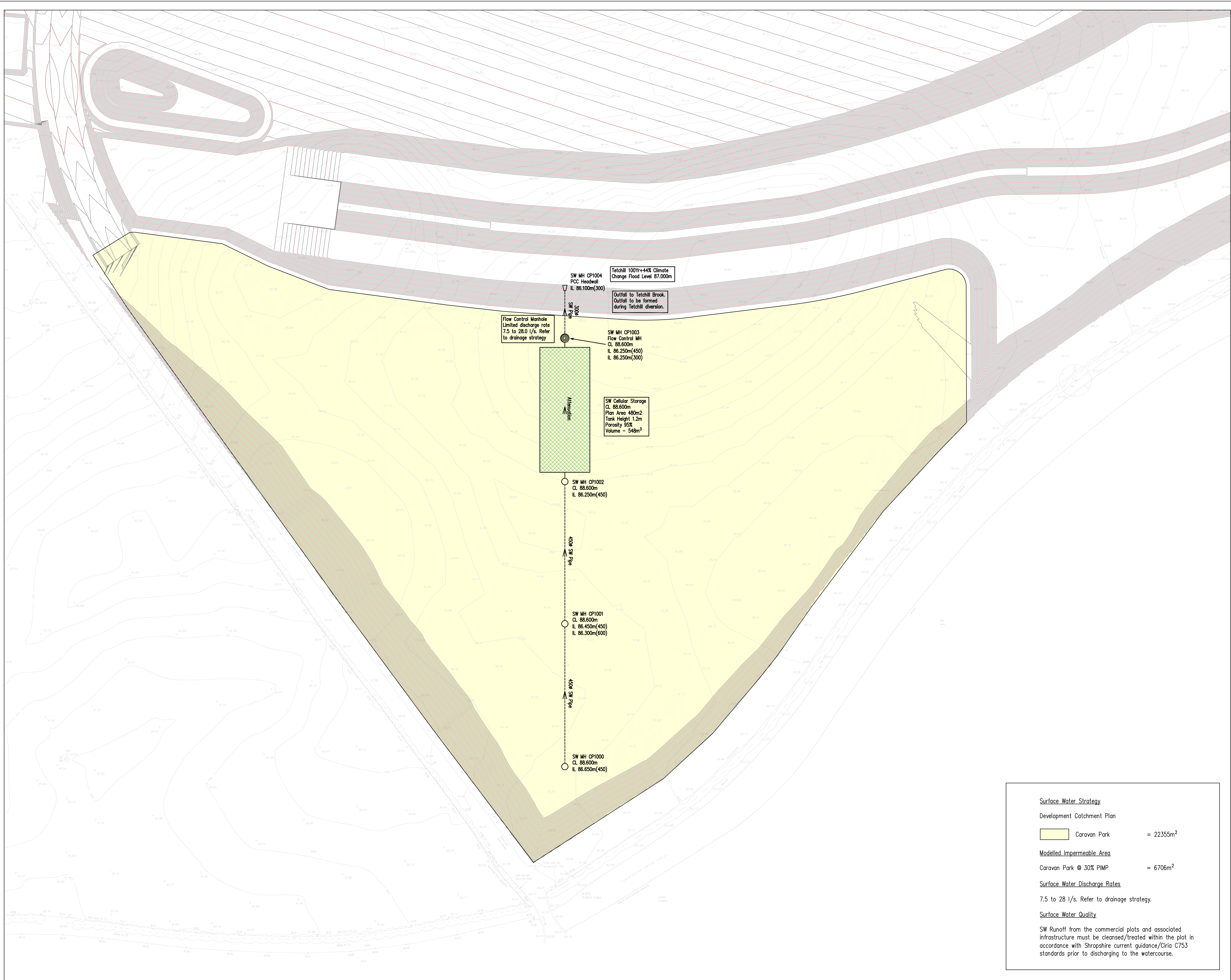
									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	RC3000	15 Summer		100	+45%	100/15 Summer				91.460	0.195	0.000
2.000	RC3100	15 Summer		100	+45%	100/15 Summer				90.006	1.061	0.000
1.001	RC3001	15 Summer		100	+45%	100/15 Summer				89.970	1.250	0.000
1.002	RC3002	15 Summer		100	+45%	100/15 Summer				89.867	1.447	0.000
1.003	RC3003	15 Summer		100	+45%	100/15 Summer				89.584	1.419	0.000
1.004	RC3004	15 Summer		100	+45%	100/15 Summer				89.181	1.361	0.000
1.005	RC3005	15 Summer		100	+45%	30/360 Summer				88.892	1.377	0.000
3.000	RC3200	15 Summer		100	+45%	100/15 Summer				93.406	1.286	0.000
3.001	RC3201	15 Summer		100	+45%	100/15 Summer				91.759	0.629	0.000
3.002	RC3202	15 Summer		100	+45%	100/15 Summer				90.167	0.917	0.000
1.006	RC3006	15 Summer		100	+45%	2/480 Summer				88.531	1.541	0.000
1.007	RC3007	360 Winter		100	+45%	30/120 Summer				88.344	1.069	0.000
1.008	RC3008	360 Winter		100	+45%	5/600 Summer				88.343	1.158	0.000
4.000	RC3300	360 Winter		100	+45%	2/360 Summer				88.342	1.407	0.000
4.001	RC3301	360 Winter		100	+45%	2/240 Summer				88.342	1.472	0.000
1.009	RC3009	360 Winter		100	+45%					88.341	-0.059	0.000
1.010	RC3010	360 Winter		100	+45%	2/15 Summer				88.340	1.891	0.000
1.011	RC3011	480 Summer		100	+45%	2/15 Summer				88.376	1.977	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RC3000	0.97			317.9	SURCHARGED	
2.000	RC3100	1.04			314.2	SURCHARGED	
1.001	RC3001	0.97			733.7	SURCHARGED	
1.002	RC3002	1.25			855.4	SURCHARGED	
1.003	RC3003	1.14			1052.0	FLOOD RISK	
1.004	RC3004	0.97			1205.3	FLOOD RISK	
1.005	RC3005	1.25			1331.7	FLOOD RISK	
3.000	RC3200	1.31			285.6	FLOOD RISK	

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

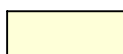
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
3.001	RC3201	1.01			470.6	SURCHARGED	
3.002	RC3202	0.93			643.5	SURCHARGED	
1.006	RC3006	1.91			1930.9	FLOOD RISK	
1.007	RC3007	0.23			265.1	SURCHARGED	
1.008	RC3008	0.28			264.1	SURCHARGED	
4.000	RC3300	0.07			20.5	SURCHARGED	
4.001	RC3301	0.12			40.9	SURCHARGED	
1.009	RC3009	0.01			303.1	FLOOD RISK	
1.010	RC3010	0.66			38.1	FLOOD RISK	
1.011	RC3011	0.40			36.4	SURCHARGED	

APPENDIX KI



Surface Water Strategy

Development Catchment Plan

 Caravan Park = 22355m²

Modelled Impermeable Area

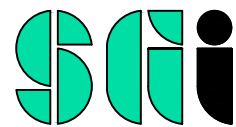
Caravan Park @ 30% PIMP = 6706m²

Surface Water Discharge Rates

7.5 to 28 l/s. Refer to drainage strategy.

Surface Water Quality

SW Runoff from the commercial plots and associated infrastructure must be cleansed/treated within the plot in accordance with Shropshire current guidance/Ciria C753 standards prior to discharging to the watercourse.

Rev.	Description	Rev. by	Date
 Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF T: 0161 837 1500 W: www.sginfrastructure.co.uk			

Client
Formal Investments

Architect
Roberts Limbrick

Project
Canalside Development, Shropshire

Title
**Surface Water Strategy
Preliminary Drainage - Caravan Park**

Date	22.02.2023	Drawn By	DOR
Size	A1	Checked By	DOR
Scale	1:2000	Approved By	DOR

Dwg. No. **C1581-SGI-ZZ-00-DR-C-0213** Rev **P1**

APPENDIX K2

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	39.925	0.150	266.2	0.224	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.001	39.925	0.099	403.3	0.224	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.002	40.150	0.001	40150.0	0.224	0.00	0.0		0.050	→[↓]		Cellular Storage	
1.003	14.848	0.150	99.0	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	0.00	1.00	86.650	0.224	0.0	0.0	0.0	1.24	197.4	0.0
1.001	0.00	1.00	86.350	0.448	0.0	0.0	0.0	1.21	341.1	0.0
1.002	0.00	1.00	86.251	0.672	0.0	0.0	0.0	0.06	878.0	0.0
1.003	0.00	1.00	86.250	0.672	0.0	0.0	0.0	1.58	111.7	0.0

SGi Consulting		Page 2
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 17:31	Designed by sgicivils	
File Caravan Park - Catchment 1 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.224	0.224	0.224
1.001	-	-	100	0.224	0.224	0.224
1.002	-	-	100	0.224	0.224	0.224
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.672	0.672	0.672

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)
1.003	CC5003	88.600	86.100	0.000	0	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: CP1003, DS/PN: 1.003, Volume (m³): 532.4

Unit Reference MD-SCU-0115-2000-2350-2000
Design Head (m) 2.350
Design Flow (l/s) 20.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 115
Invert Level (m) 86.250
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)	2.350	20.0	Kick-Flo®	0.172	5.8
Flush-Flo™	0.146	5.9	Mean Flow over Head Range	-	13.5

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)	Depth (m)	Flow (l/s)
0.100	4.4	0.800	12.0	2.000	18.5	4.000	25.8	7.000	33.8
0.200	6.3	1.000	13.3	2.200	19.4	4.500	27.3	7.500	35.0
0.300	7.6	1.200	14.5	2.400	20.2	5.000	28.8	8.000	36.1
0.400	8.6	1.400	15.6	2.600	21.0	5.500	30.1	8.500	37.2
0.500	9.6	1.600	16.6	3.000	22.5	6.000	31.4	9.000	38.2
0.600	10.4	1.800	17.6	3.500	24.2	6.500	32.7	9.500	39.3

Storage Structures for Storm

Cellular Storage Pipe: 1.002

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	86.251	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	480.0	0.0	1.200	480.0	0.0	1.201	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CP1000	15 Summer		2	+0%	100/15 Summer				86.834	-0.266	0.000
1.001	CP1001	15 Summer		2	+0%	100/15 Summer				86.584	-0.366	0.000
1.002	CP1002	360 Summer		2	+0%					86.483	-0.969	0.000
1.003	CP1003	360 Summer		2	+0%	5/240 Summer				86.483	-0.067	0.000

		Half Drain		Pipe			Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded
1.000	CP1000	0.33			58.4	OK	
1.001	CP1001	0.31			88.6	OK	
1.002	CP1002	0.01		164	29.5	OK	
1.003	CP1003	0.07			6.7	OK	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CP1000	15 Summer		5	+0%	100/15 Summer				86.873	-0.227	0.000
1.001	CP1001	15 Summer		5	+0%	100/15 Summer				86.631	-0.319	0.000
1.002	CP1002	240 Summer		5	+0%					86.553	-0.899	0.000
1.003	CP1003	240 Summer		5	+0%	5/240 Summer				86.553	0.003	0.000

					Half Drain	Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded	
1.000	CP1000	0.45			79.4	OK		
1.001	CP1001	0.42			122.8	OK		
1.002	CP1002	0.01		154	49.6	OK		
1.003	CP1003	0.08			7.6	SURCHARGED		

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model		FEH	Data Type Point
FEH Rainfall Version		2013 Cv	(Summer) 1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv	(Winter) 1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5	Second Increment	(Extended)
DTS Status			ON
DVD Status			OFF
Inertia Status			OFF
Profile(s)			Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)			2, 5, 30, 100
Climate Change (%)			0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CP1000	15 Summer		30	+0%	100/15 Summer				86.988	-0.112	0.000
1.001	CP1001	15 Summer		30	+0%	100/15 Summer				86.803	-0.147	0.000
1.002	CP1002	180 Winter		30	+0%					86.779	-0.673	0.000
1.003	CP1003	180 Winter		30	+0%	5/240 Summer				86.779	0.229	0.000

Half Drain Pipe							
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	CP1000	0.84			147.2	OK	
1.001	CP1001	0.87			252.4	OK	
1.002	CP1002	0.01			68.4	OK	
1.003	CP1003	0.11			9.8	SURCHARGED	

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv (Winter)	1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5	Second Increment (Extended)	
DTS Status			ON
DVD Status			OFF
Inertia Status			OFF
Profile(s)			Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)			2, 5, 30, 100
Climate Change (%)			0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CP1000	15 Summer		100	+45%	100/15 Summer				87.681	0.581	0.000
1.001	CP1001	180 Winter		100	+45%	100/15 Summer				87.367	0.417	0.000
1.002	CP1002	180 Winter		100	+45%					87.365	-0.087	0.000
1.003	CP1003	180 Winter		100	+45%	5/240 Summer				87.365	0.815	0.000

				Half Drain	Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	CP1000	1.61			282.8	SURCHARGED	
1.001	CP1001	0.31			89.4	SURCHARGED	
1.002	CP1002	0.03			131.6	OK	
1.003	CP1003	0.15			14.0	SURCHARGED	

APPENDIX K3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 17:21	Designed by sgicivils	
File Caravan Park - Catchment 1 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	39.925	0.150	266.2	0.224	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.001	39.925	0.099	403.3	0.224	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.002	40.150	0.001	40150.0	0.224	0.00	0.0		0.050	→[↓]		Cellular Storage	
1.003	14.848	0.150	99.0	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	0.00	1.00	86.650	0.224	0.0	0.0	0.0	1.24	197.4	0.0
1.001	0.00	1.00	86.350	0.448	0.0	0.0	0.0	1.21	341.1	0.0
1.002	0.00	1.00	86.251	0.672	0.0	0.0	0.0	0.06	878.0	0.0
1.003	0.00	1.00	86.250	0.672	0.0	0.0	0.0	1.58	111.7	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.224	0.224	0.224
1.001	-	-	100	0.224	0.224	0.224
1.002	-	-	100	0.224	0.224	0.224
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.672	0.672	0.672

SGi Consulting		Page 3
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 17:21	Designed by sgicivils	
File Caravan Park - Catchment 1 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

TAKE OFF DETAILS for Storm

Length Calculations based on 'True Length'

Warning - The following pipes have not been classified:

1.000
1.001
1.003

Warning - The following manholes have not been classified:

CP1000
CP1001
CP1002
CP1003

Pipes

Number 4
Total Length (m) 129.973
Volume (m³) 547.0319

Manholes

Number 4
True Depth (m) 8.899
Volume (m³) 13.4934

Outfalls

Number 1
True Depth (m) 2.500
Volume (m³) 0.0000

Flow Controls

Number 1

Storage Structures

Number 0
Volume (m³) 0.0000

TOTALS FOR MANHOLES

Diameter	Width	Manhole	Class	Number	Ring	Depth	Cost	Add	Cost	Total	Cost
(mm)	(mm)					(m)	(£)		(£)		(£)
1500			Unclassified	1		1.650	?.??		?.??		?.??
1350			Unclassified	3		4.698	?.??		?.??		?.??
TOTALS				4		6.348	0.00		0.00		0.00

TOTALS FOR PIPES

Diameter (mm)	Pipe Class	Number	Length (m)	Cost (£)
	Cellular Storage	1	38.800	0.00
300	Unclassified	1	14.173	?.??
450	Unclassified	1	38.500	?.??
600	Unclassified	1	38.500	?.??
TOTALS		4	129.973	0.00

SGi Consulting		Page 6
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 17:21	Designed by sgicivils	
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Micro Drainage	Network 2020.1.3	

TOTALS FOR MATERIALS

No materials are used

GROUND WORKS - Pipe Excavation by Depth

Depth <=	Length	Volume	Cost
(m)	(m)	(m³)	(£)
TOTALS	0.000	0.0000	0.00

GROUND WORKS - Totals

Item	Volume / Area	Cost
	(m³) (m²)	(£)
MH Excavation	0.0000	0.00
Pipe Excavation	0.0000	0.00
Pipe Replacement	532.7438	0.00
Pipe Reinstatement	463.8605	0.00
Removal	-532.7438	0.00
TOTALS		0.00

TOTALS FOR FLOW CONTROLS

Name	Number	Cost (£)
Hydro-Brake®	1	0.00
TOTALS	1	0.00

TOTALS FOR STORAGE STRUCTURES

There are no storage structures

TOTAL COSTS

Item	Cost (£)
Manholes	0.00
Pipes	0.00
Materials	0.00
Ground Works	0.00
Flow Controls	0.00
Storage Structures	0.00
TOTAL	0.00

BREAKDOWN FOR MANHOLES

USMH Name	PN	MH Class	Diameter (mm)	Width (mm)	Ring Depth (m)	Cost (£)	Add Cost (£)	Total (£)
CP1000	1.000	Unclassified	1350		1.500	?.??	?.??	?.??
CP1001	1.001	Unclassified	1500		1.650	?.??	?.??	?.??
CP1002	1.002	Unclassified	1350		1.148	?.??	?.??	?.??
CP1003	1.003	Unclassified	1350		2.050	?.??	?.??	?.??
TOTALS					6.348	0.00	0.00	0.00

BREAKDOWN FOR PIPES

PN	Pipe Class	Diameter (mm)	Min Cover D (m)	Max Cover D (m)	Length (m)	Cost / m (£)	Total Cost (£)
1.000	Unclassified	450	1.500	1.650	38.500	?.??	?.??
1.001	Unclassified	600	1.650	1.749	38.500	?.??	?.??
1.002	Cellular Storage				38.800	0.00	0.000
1.003	Unclassified	300	2.050	2.200	14.173	?.??	?.??
TOTALS					129.973		0.00

BREAKDOWN FOR MANHOLE BLINDING (£0.00/m³)

USMH Name	PN	Diameter (mm)	Width (mm)	Height (m)	Volume (m³)	Cost (£)
CP1000	1.000	1350		?.???	?.????	?.??
CP1001	1.001	1500		?.???	?.????	?.??
CP1002	1.002	1350		?.???	?.????	?.??
CP1003	1.003	1350		?.???	?.????	?.??
TOTALS				0.000	0.0000	0.00

BREAKDOWN FOR PIPE SURROUND

PN	Length (m)	Diameter (mm)	Surround	Volume (m³)	Cost / m³ (£)	Cost (£)
1.000	38.500	450	Unclassified	?.????	?.??	?.??
1.001	38.500	600	Unclassified	?.????	?.??	?.??
1.003	14.173	300	Unclassified	?.????	?.??	?.??
TOTALS	91.173			0.0000		0.00

BREAKDOWN FOR MANHOLE SURROUND

USMH Name	PN	Diameter (mm)	Width (mm)	Depth (m)	Surround	Volume (m³)	Cost / m³ (£)	Cost (£)
CP1000	1.000	1350		1.950	Unclassified	?.????	?.??	?.??
CP1001	1.001	1500		2.250	Unclassified	?.????	?.??	?.??
CP1002	1.002	1350		2.349	Unclassified	?.????	?.??	?.??
CP1003	1.003	1350		2.350	Unclassified	?.????	?.??	?.??
TOTALS				8.899		0.0000		0.00

BREAKDOWN FOR MANHOLE BASE

USMH Name	PN	Diameter (mm)	Width (mm)	Height (m)	Base	Volume (m³)	Cost / m³ (£)	Cost (£)
CP1000	1.000	1350		?.???	Unclassified	?.????	?.??	?.??
CP1001	1.001	1500		?.???	Unclassified	?.????	?.??	?.??
CP1002	1.002	1350		?.???	Unclassified	?.????	?.??	?.??
CP1003	1.003	1350		?.???	Unclassified	?.????	?.??	?.??
TOTALS				0.000		0.0000		0.00

BREAKDOWN FOR DEPTH BANDS			
PN	Dia (mm)	Length > 0.000 (m)	
1.000	450	38.500	38.500
1.001	600	38.500	38.500
1.002		38.800	38.800
1.003	300	14.173	14.173
TOTALS		129.973	129.973

BREAKDOWN FOR PIPE EXCAVATION / REINSTATEMENT

PN	Dia (mm)	Length (m)	Ex. Volume (m³)	Ex. Cost (£)	Rep. Volume (m³)	Rep. Cost (£)	Rem. Volume (m³)	Rem. Cost (£)	Rein. Area (m²)	Rein. Cost (£)	Total Cost (£)
1.000	450	38.500	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?.??
1.001	600	38.500	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?.??
1.002		38.800	0.0000	0.00	532.7438	0.00	-532.7438	0.00	463.8605	0.00	0.00
1.003	300	14.173	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?.??
TOTALS		129.973	0.0000	0.00	532.7438	0.00	-532.7438	0.00	463.8605	0.00	0.00

BREAKDOWN FOR MANHOLE EXCAVATION

USMH Name	PN	Dia (mm)	Width (mm)	Depth (m)	Total Dia (m)	Total Width (m)	Total Depth (m)	Ex. Volume (m³)	Ex. Cost (£)	Rem. Volume (m³)	Rem. Cost (£)	Total C (£)
CP1000	1.000	1350		1.500	?.???		?.???	?.????	?.??	?.????	?.??	?
CP1001	1.001	1500		1.650	?.???		?.???	?.????	?.??	?.????	?.??	?
CP1002	1.002	1350		1.148	?.???		?.???	?.????	?.??	?.????	?.??	?
CP1003	1.003	1350		2.050	?.???		?.???	?.????	?.??	?.????	?.??	?
TOTALS				6.348			0.000	0.0000	0.00	0.0000	0.00	0

BREAKDOWN FOR FLOW CONTROLS

USMH Name	PN	Flow Control	Online/Offline	Cost (£)
CP1003	1.003	Hydro-Brake®	Online	0.00
TOTALS				0.000

BREAKDOWN FOR STORAGE STRUCTURES

There are no storage structures

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	CC5003	88.600	86.100	0.000	0	0
Datum (m) 86.100 Offset (mins) 0						

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.900	40	0.900	79	0.900	118	0.900	157	0.900	196	0.900	235	0.900
2	0.900	41	0.900	80	0.900	119	0.900	158	0.900	197	0.900	236	0.900
3	0.900	42	0.900	81	0.900	120	0.900	159	0.900	198	0.900	237	0.900
4	0.900	43	0.900	82	0.900	121	0.900	160	0.900	199	0.900	238	0.900
5	0.900	44	0.900	83	0.900	122	0.900	161	0.900	200	0.900	239	0.900
6	0.900	45	0.900	84	0.900	123	0.900	162	0.900	201	0.900	240	0.900
7	0.900	46	0.900	85	0.900	124	0.900	163	0.900	202	0.900	241	0.900
8	0.900	47	0.900	86	0.900	125	0.900	164	0.900	203	0.900	242	0.900
9	0.900	48	0.900	87	0.900	126	0.900	165	0.900	204	0.900	243	0.900
10	0.900	49	0.900	88	0.900	127	0.900	166	0.900	205	0.900	244	0.900
11	0.900	50	0.900	89	0.900	128	0.900	167	0.900	206	0.900	245	0.900
12	0.900	51	0.900	90	0.900	129	0.900	168	0.900	207	0.900	246	0.900
13	0.900	52	0.900	91	0.900	130	0.900	169	0.900	208	0.900	247	0.900
14	0.900	53	0.900	92	0.900	131	0.900	170	0.900	209	0.900	248	0.900
15	0.900	54	0.900	93	0.900	132	0.900	171	0.900	210	0.900	249	0.900
16	0.900	55	0.900	94	0.900	133	0.900	172	0.900	211	0.900	250	0.900
17	0.900	56	0.900	95	0.900	134	0.900	173	0.900	212	0.900	251	0.900
18	0.900	57	0.900	96	0.900	135	0.900	174	0.900	213	0.900	252	0.900
19	0.900	58	0.900	97	0.900	136	0.900	175	0.900	214	0.900	253	0.900
20	0.900	59	0.900	98	0.900	137	0.900	176	0.900	215	0.900	254	0.900
21	0.900	60	0.900	99	0.900	138	0.900	177	0.900	216	0.900	255	0.900
22	0.900	61	0.900	100	0.900	139	0.900	178	0.900	217	0.900	256	0.900
23	0.900	62	0.900	101	0.900	140	0.900	179	0.900	218	0.900	257	0.900
24	0.900	63	0.900	102	0.900	141	0.900	180	0.900	219	0.900	258	0.900
25	0.900	64	0.900	103	0.900	142	0.900	181	0.900	220	0.900	259	0.900
26	0.900	65	0.900	104	0.900	143	0.900	182	0.900	221	0.900	260	0.900
27	0.900	66	0.900	105	0.900	144	0.900	183	0.900	222	0.900	261	0.900
28	0.900	67	0.900	106	0.900	145	0.900	184	0.900	223	0.900	262	0.900
29	0.900	68	0.900	107	0.900	146	0.900	185	0.900	224	0.900	263	0.900
30	0.900	69	0.900	108	0.900	147	0.900	186	0.900	225	0.900	264	0.900
31	0.900	70	0.900	109	0.900	148	0.900	187	0.900	226	0.900	265	0.900
32	0.900	71	0.900	110	0.900	149	0.900	188	0.900	227	0.900	266	0.900
33	0.900	72	0.900	111	0.900	150	0.900	189	0.900	228	0.900	267	0.900
34	0.900	73	0.900	112	0.900	151	0.900	190	0.900	229	0.900	268	0.900
35	0.900	74	0.900	113	0.900	152	0.900	191	0.900	230	0.900	269	0.900
36	0.900	75	0.900	114	0.900	153	0.900	192	0.900	231	0.900	270	0.900
37	0.900	76	0.900	115	0.900	154	0.900	193	0.900	232	0.900	271	0.900
38	0.900	77	0.900	116	0.900	155	0.900	194	0.900	233	0.900	272	0.900
39	0.900	78	0.900	117	0.900	156	0.900	195	0.900	234	0.900	273	0.900

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
313	0.900	374	0.900	435	0.900	496	0.900	557	0.900	618	0.900	679	0.900	740	0.900
314	0.900	375	0.900	436	0.900	497	0.900	558	0.900	619	0.900	680	0.900	741	0.900
315	0.900	376	0.900	437	0.900	498	0.900	559	0.900	620	0.900	681	0.900	742	0.900
316	0.900	377	0.900	438	0.900	499	0.900	560	0.900	621	0.900	682	0.900	743	0.900
317	0.900	378	0.900	439	0.900	500	0.900	561	0.900	622	0.900	683	0.900	744	0.900
318	0.900	379	0.900	440	0.900	501	0.900	562	0.900	623	0.900	684	0.900	745	0.900
319	0.900	380	0.900	441	0.900	502	0.900	563	0.900	624	0.900	685	0.900	746	0.900
320	0.900	381	0.900	442	0.900	503	0.900	564	0.900	625	0.900	686	0.900	747	0.900
321	0.900	382	0.900	443	0.900	504	0.900	565	0.900	626	0.900	687	0.900	748	0.900
322	0.900	383	0.900	444	0.900	505	0.900	566	0.900	627	0.900	688	0.900	749	0.900
323	0.900	384	0.900	445	0.900	506	0.900	567	0.900	628	0.900	689	0.900	750	0.900
324	0.900	385	0.900	446	0.900	507	0.900	568	0.900	629	0.900	690	0.900	751	0.900
325	0.900	386	0.900	447	0.900	508	0.900	569	0.900	630	0.900	691	0.900	752	0.900
326	0.900	387	0.900	448	0.900	509	0.900	570	0.900	631	0.900	692	0.900	753	0.900
327	0.900	388	0.900	449	0.900	510	0.900	571	0.900	632	0.900	693	0.900	754	0.900
328	0.900	389	0.900	450	0.900	511	0.900	572	0.900	633	0.900	694	0.900	755	0.900
329	0.900	390	0.900	451	0.900	512	0.900	573	0.900	634	0.900	695	0.900	756	0.900
330	0.900	391	0.900	452	0.900	513	0.900	574	0.900	635	0.900	696	0.900	757	0.900
331	0.900	392	0.900	453	0.900	514	0.900	575	0.900	636	0.900	697	0.900	758	0.900
332	0.900	393	0.900	454	0.900	515	0.900	576	0.900	637	0.900	698	0.900	759	0.900
333	0.900	394	0.900	455	0.900	516	0.900	577	0.900	638	0.900	699	0.900	760	0.900
334	0.900	395	0.900	456	0.900	517	0.900	578	0.900	639	0.900	700	0.900	761	0.900
335	0.900	396	0.900	457	0.900	518	0.900	579	0.900	640	0.900	701	0.900	762	0.900
336	0.900	397	0.900	458	0.900	519	0.900	580	0.900	641	0.900	702	0.900	763	0.900
337	0.900	398	0.900	459	0.900	520	0.900	581	0.900	642	0.900	703	0.900	764	0.900
338	0.900	399	0.900	460	0.900	521	0.900	582	0.900	643	0.900	704	0.900	765	0.900
339	0.900	400	0.900	461	0.900	522	0.900	583	0.900	644	0.900	705	0.900	766	0.900
340	0.900	401	0.900	462	0.900	523	0.900	584	0.900	645	0.900	706	0.900	767	0.900
341	0.900	402	0.900	463	0.900	524	0.900	585	0.900	646	0.900	707	0.900	768	0.900
342	0.900	403	0.900	464	0.900	525	0.900	586	0.900	647	0.900	708	0.900	769	0.900
343	0.900	404	0.900	465	0.900	526	0.900	587	0.900	648	0.900	709	0.900	770	0.900
344	0.900	405	0.900	466	0.900	527	0.900	588	0.900	649	0.900	710	0.900	771	0.900
345	0.900	406	0.900	467	0.900	528	0.900	589	0.900	650	0.900	711	0.900	772	0.900
346	0.900	407	0.900	468	0.900	529	0.900	590	0.900	651	0.900	712	0.900	773	0.900
347	0.900	408	0.900	469	0.900	530	0.900	591	0.900	652	0.900	713	0.900	774	0.900
348	0.900	409	0.900	470	0.900	531	0.900	592	0.900	653	0.900	714	0.900	775	0.900
349	0.900	410	0.900	471	0.900	532	0.900	593	0.900	654	0.900	715	0.900	776	0.900
350	0.900	411	0.900	472	0.900	533	0.900	594	0.900	655	0.900	716	0.900	777	0.900
351	0.900	412	0.900	473	0.900	534	0.900	595	0.900	656	0.900	717	0.900	778	0.900
352	0.900	413	0.900	474	0.900	535	0.900	596	0.900	657	0.900	718	0.900	779	0.900
353	0.900	414	0.900	475	0.900	536	0.900	597	0.900	658	0.900	719	0.900	780	0.900
354	0.900	415	0.900	476	0.900	537	0.900	598	0.900	659	0.900	720	0.900	781	0.900
355	0.900	416	0.900	477	0.900	538	0.900	599	0.900	660	0.900	721	0.900	782	0.900
356	0.900	417	0.900	478	0.900	539	0.900	600	0.900	661	0.900	722	0.900	783	0.900
357	0.900	418	0.900	479	0.900	540	0.900	601	0.900	662	0.900	723	0.900	784	0.900
358	0.900	419	0.900	480	0.900	541	0.900	602	0.900	663	0.900	724	0.900	785	0.900
359	0.900	420	0.900	481	0.900	542	0.900	603	0.900	664	0.900	725	0.900	786	0.900
360	0.900	421	0.900	482	0.900	543	0.900	604	0.900	665	0.900	726	0.900	787	0.900
361	0.900	422	0.900	483	0.900	544	0.900	605	0.900	666	0.900	727	0.900	788	0.900
362	0.900	423	0.900	484	0.900	545	0.900	606	0.900	667	0.900	728	0.900	789	0.900
363	0.900	424	0.900	485	0.900	546	0.900	607	0.900	668	0.900	729	0.900	790	0.900
364	0.900	425	0.900	486	0.900	547	0.900	608	0.900	669	0.900	730	0.900	791	0.900
365	0.900	426	0.900	487	0.900	548	0.900	609	0.900	670	0.900	731	0.900	792	0.900
366	0.900	427	0.900	488	0.900	549	0.900	610	0.900	671	0.900	732	0.900	793	0.900
367	0.900	428	0.900	489	0.900	550	0.900	611	0.900	672	0.900	733	0.900	794	0.900
368	0.900	429	0.900	490	0.900	551	0.900	612	0.900	673	0.900	734	0.900	795	0.900
369	0.900	430	0.900	491	0.900	552	0.900	613	0.900	674	0.900	735	0.900	796	0.900
370	0.900	431	0.900	492	0.900	553	0.900	614	0.900	675	0.900	736	0.900	797	0.900
371	0.900	432	0.900	493	0.900	554	0.900	615	0.900	676	0.900	737	0.900	798	0.900
372	0.900	433	0.900	494	0.900	555	0.900	616	0.900	677	0.900	738	0.900	799	0.900
373	0.900	434	0.900	495	0.900	556	0.900	617	0.900	678	0.900	739	0.900	800	0.900

Surcharged Outfall Details for Storm

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801	0.900	862	0.900	923	0.900	984	0.900	1045	0.900	1106	0.900	1167	0.900	1228	0.900
802	0.900	863	0.900	924	0.900	985	0.900	1046	0.900	1107	0.900	1168	0.900	1229	0.900
803	0.900	864	0.900	925	0.900	986	0.900	1047	0.900	1108	0.900	1169	0.900	1230	0.900
804	0.900	865	0.900	926	0.900	987	0.900	1048	0.900	1109	0.900	1170	0.900	1231	0.900
805	0.900	866	0.900	927	0.900	988	0.900	1049	0.900	1110	0.900	1171	0.900	1232	0.900
806	0.900	867	0.900	928	0.900	989	0.900	1050	0.900	1111	0.900	1172	0.900	1233	0.900
807	0.900	868	0.900	929	0.900	990	0.900	1051	0.900	1112	0.900	1173	0.900	1234	0.900
808	0.900	869	0.900	930	0.900	991	0.900	1052	0.900	1113	0.900	1174	0.900	1235	0.900
809	0.900	870	0.900	931	0.900	992	0.900	1053	0.900	1114	0.900	1175	0.900	1236	0.900
810	0.900	871	0.900	932	0.900	993	0.900	1054	0.900	1115	0.900	1176	0.900	1237	0.900
811	0.900	872	0.900	933	0.900	994	0.900	1055	0.900	1116	0.900	1177	0.900	1238	0.900
812	0.900	873	0.900	934	0.900	995	0.900	1056	0.900	1117	0.900	1178	0.900	1239	0.900
813	0.900	874	0.900	935	0.900	996	0.900	1057	0.900	1118	0.900	1179	0.900	1240	0.900
814	0.900	875	0.900	936	0.900	997	0.900	1058	0.900	1119	0.900	1180	0.900	1241	0.900
815	0.900	876	0.900	937	0.900	998	0.900	1059	0.900	1120	0.900	1181	0.900	1242	0.900
816	0.900	877	0.900	938	0.900	999	0.900	1060	0.900	1121	0.900	1182	0.900	1243	0.900
817	0.900	878	0.900	939	0.900	1000	0.900	1061	0.900	1122	0.900	1183	0.900	1244	0.900
818	0.900	879	0.900	940	0.900	1001	0.900	1062	0.900	1123	0.900	1184	0.900	1245	0.900
819	0.900	880	0.900	941	0.900	1002	0.900	1063	0.900	1124	0.900	1185	0.900	1246	0.900
820	0.900	881	0.900	942	0.900	1003	0.900	1064	0.900	1125	0.900	1186	0.900	1247	0.900
821	0.900	882	0.900	943	0.900	1004	0.900	1065	0.900	1126	0.900	1187	0.900	1248	0.900
822	0.900	883	0.900	944	0.900	1005	0.900	1066	0.900	1127	0.900	1188	0.900	1249	0.900
823	0.900	884	0.900	945	0.900	1006	0.900	1067	0.900	1128	0.900	1189	0.900	1250	0.900
824	0.900	885	0.900	946	0.900	1007	0.900	1068	0.900	1129	0.900	1190	0.900	1251	0.900
825	0.900	886	0.900	947	0.900	1008	0.900	1069	0.900	1130	0.900	1191	0.900	1252	0.900
826	0.900	887	0.900	948	0.900	1009	0.900	1070	0.900	1131	0.900	1192	0.900	1253	0.900
827	0.900	888	0.900	949	0.900	1010	0.900	1071	0.900	1132	0.900	1193	0.900	1254	0.900
828	0.900	889	0.900	950	0.900	1011	0.900	1072	0.900	1133	0.900	1194	0.900	1255	0.900
829	0.900	890	0.900	951	0.900	1012	0.900	1073	0.900	1134	0.900	1195	0.900	1256	0.900
830	0.900	891	0.900	952	0.900	1013	0.900	1074	0.900	1135	0.900	1196	0.900	1257	0.900
831	0.900	892	0.900	953	0.900	1014	0.900	1075	0.900	1136	0.900	1197	0.900	1258	0.900
832	0.900	893	0.900	954	0.900	1015	0.900	1076	0.900	1137	0.900	1198	0.900	1259	0.900
833	0.900	894	0.900	955	0.900	1016	0.900	1077	0.900	1138	0.900	1199	0.900	1260	0.900
834	0.900	895	0.900	956	0.900	1017	0.900	1078	0.900	1139	0.900	1200	0.900	1261	0.900
835	0.900	896	0.900	957	0.900	1018	0.900	1079	0.900	1140	0.900	1201	0.900	1262	0.900
836	0.900	897	0.900	958	0.900	1019	0.900	1080	0.900	1141	0.900	1202	0.900	1263	0.900
837	0.900	898	0.900	959	0.900	1020	0.900	1081	0.900	1142	0.900	1203	0.900	1264	0.900
838	0.900	899	0.900	960	0.900	1021	0.900	1082	0.900	1143	0.900	1204	0.900	1265	0.900
839	0.900	900	0.900	961	0.900	1022	0.900	1083	0.900	1144	0.900	1205	0.900	1266	0.900
840	0.900	901	0.900	962	0.900	1023	0.900	1084	0.900	1145	0.900	1206	0.900	1267	0.900
841	0.900	902	0.900	963	0.900	1024	0.900	1085	0.900	1146	0.900	1207	0.900	1268	0.900
842	0.900	903	0.900	964	0.900	1025	0.900	1086	0.900	1147	0.900	1208	0.900	1269	0.900
843	0.900	904	0.900	965	0.900	1026	0.900	1087	0.900	1148	0.900	1209	0.900	1270	0.900
844	0.900	905	0.900	966	0.900	1027	0.900	1088	0.900	1149	0.900	1210	0.900	1271	0.900
845	0.900	906	0.900	967	0.900	1028	0.900	1089	0.900	1150	0.900	1211	0.900	1272	0.900
846	0.900	907	0.900	968	0.900	1029	0.900	1090	0.900	1151	0.900	1212	0.900	1273	0.900
847	0.900	908	0.900	969	0.900	1030	0.900	1091	0.900	1152	0.900	1213	0.900	1274	0.900
848	0.900	909	0.900	970	0.900	1031	0.900	1092	0.900	1153	0.900	1214	0.900	1275	0.900
849	0.900	910	0.900	971	0.900	1032	0.900	1093	0.900	1154	0.900	1215	0.900	1276	0.900
850	0.900	911	0.900	972	0.900	1033	0.900	1094	0.900	1155	0.900	1216	0.900	1277	0.900
851	0.900	912	0.900	973	0.900	1034	0.900	1095	0.900	1156	0.900	1217	0.900	1278	0.900
852	0.900	913	0.900	974	0.900	1035	0.900	1096	0.900	1157	0.900	1218	0.900	1279	0.900
853	0.900	914	0.900	975	0.900	1036	0.900	1097	0.900	1158	0.900	1219	0.900	1280	0.900
854	0.900	915	0.900	976	0.900	1037	0.900	1098	0.900	1159	0.900	1220	0.900	1281	0.900
855	0.900	916	0.900	977	0.900	1038	0.900	1099	0.900	1160	0.900	1221	0.900	1282	0.900
856	0.900	917	0.900	978	0.900	1039	0.900	1100	0.900	1161	0.900	1222	0.900	1283	0.900
857	0.900	918	0.900	979	0.900	1040	0.900	1101	0.900	1162	0.900	1223	0.900	1284	0.900
858	0.900	919	0.900	980	0.900	1041	0.900	1102	0.900	1163	0.900	1224	0.900	1285	0.900
859	0.900	920	0.900	981	0.900	1042	0.900	1103	0.900	1164	0.900	1225	0.900	1286	0.900
860	0.900	921	0.900	982	0.900	1043	0.900	1104	0.900	1165	0.900	1226	0.900	1287	0.900
861	0.900	922	0.900	983	0.900	1044	0.900	1105	0.900	1166	0.900	1227	0.900	1288	0.900

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1289	0.900	1308	0.900	1327	0.900	1346	0.900	1365	0.900	1384	0.900	1403	0.900	1422	0.900
1290	0.900	1309	0.900	1328	0.900	1347	0.900	1366	0.900	1385	0.900	1404	0.900	1423	0.900
1291	0.900	1310	0.900	1329	0.900	1348	0.900	1367	0.900	1386	0.900	1405	0.900	1424	0.900
1292	0.900	1311	0.900	1330	0.900	1349	0.900	1368	0.900	1387	0.900	1406	0.900	1425	0.900
1293	0.900	1312	0.900	1331	0.900	1350	0.900	1369	0.900	1388	0.900	1407	0.900	1426	0.900
1294	0.900	1313	0.900	1332	0.900	1351	0.900	1370	0.900	1389	0.900	1408	0.900	1427	0.900
1295	0.900	1314	0.900	1333	0.900	1352	0.900	1371	0.900	1390	0.900	1409	0.900	1428	0.900
1296	0.900	1315	0.900	1334	0.900	1353	0.900	1372	0.900	1391	0.900	1410	0.900	1429	0.900
1297	0.900	1316	0.900	1335	0.900	1354	0.900	1373	0.900	1392	0.900	1411	0.900	1430	0.900
1298	0.900	1317	0.900	1336	0.900	1355	0.900	1374	0.900	1393	0.900	1412	0.900	1431	0.900
1299	0.900	1318	0.900	1337	0.900	1356	0.900	1375	0.900	1394	0.900	1413	0.900	1432	0.900
1300	0.900	1319	0.900	1338	0.900	1357	0.900	1376	0.900	1395	0.900	1414	0.900	1433	0.900
1301	0.900	1320	0.900	1339	0.900	1358	0.900	1377	0.900	1396	0.900	1415	0.900	1434	0.900
1302	0.900	1321	0.900	1340	0.900	1359	0.900	1378	0.900	1397	0.900	1416	0.900	1435	0.900
1303	0.900	1322	0.900	1341	0.900	1360	0.900	1379	0.900	1398	0.900	1417	0.900	1436	0.900
1304	0.900	1323	0.900	1342	0.900	1361	0.900	1380	0.900	1399	0.900	1418	0.900	1437	0.900
1305	0.900	1324	0.900	1343	0.900	1362	0.900	1381	0.900	1400	0.900	1419	0.900	1438	0.900
1306	0.900	1325	0.900	1344	0.900	1363	0.900	1382	0.900	1401	0.900	1420	0.900	1439	0.900
1307	0.900	1326	0.900	1345	0.900	1364	0.900	1383	0.900	1402	0.900	1421	0.900	1440	0.900

Online Controls for Storm

Hydro-Brake® Optimum Manhole: CP1003, DS/PN: 1.003, Volume (m³): 532.4

Unit Reference MD-SCU-0115-2000-2350-2000
Design Head (m) 2.350
Design Flow (l/s) 20.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 115
Invert Level (m) 86.250
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)	2.350	20.0	Kick-Flo®	0.172	5.8
Flush-Flo™	0.146	5.9	Mean Flow over Head Range	-	13.5

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)	Depth (m)	Flow (l/s)
0.100	4.4	0.800	12.0	2.000	18.5	4.000	25.8	7.000	33.8
0.200	6.3	1.000	13.3	2.200	19.4	4.500	27.3	7.500	35.0
0.300	7.6	1.200	14.5	2.400	20.2	5.000	28.8	8.000	36.1
0.400	8.6	1.400	15.6	2.600	21.0	5.500	30.1	8.500	37.2
0.500	9.6	1.600	16.6	3.000	22.5	6.000	31.4	9.000	38.2
0.600	10.4	1.800	17.6	3.500	24.2	6.500	32.7	9.500	39.3

Storage Structures for Storm

Cellular Storage Pipe: 1.002

Manning's N 0.050 Infiltration Coefficient Side (m/hr) 0.00000
Invert Level (m) 86.251 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	480.0	0.0	1.200	480.0	0.0	1.201	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change		Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CP1000	15 Summer		2	+0%	100/15 Summer				86.834	-0.266	0.000
1.001	CP1001	1440 Winter		2	+0%	30/240 Summer				86.776	-0.174	0.000
1.002	CP1002	1440 Winter		2	+0%	100/180 Summer				86.776	-0.676	0.000
1.003	CP1003	1440 Winter		2	+0%	2/180 Summer				86.777	0.227	0.000

					Half Drain		Pipe			
					US/MH	Flow /	Overflow	Time	Flow	Level
PN	Name	Cap.	(l/s)	(mins)						Exceeded
1.000	CP1000	0.33							58.4	OK
1.001	CP1001	0.02							4.8	OK
1.002	CP1002	0.00		192					7.0	OK
1.003	CP1003	0.11							9.8	SURCHARGED

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CP1000	1440	Winter	30	+0%	100/15	Summer			87.075	-0.025	0.000
1.001	CP1001	1440	Winter	30	+0%	30/240	Summer			87.075	0.125	0.000
1.002	CP1002	1440	Winter	30	+0%	100/180	Summer			87.075	-0.377	0.000
1.003	CP1003	1440	Winter	30	+0%	2/180	Summer			87.075	0.525	0.000

Half Drain Pipe								Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded	
1.000	CP1000	0.02			4.4	OK		
1.001	CP1001	0.03			8.4	SURCHARGED		
1.002	CP1002	0.00		683	12.1	OK		
1.003	CP1003	0.13			12.0	SURCHARGED		

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv (Winter)	1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5	Second Increment	(Extended)
DTS Status			ON
DVD Status			OFF
Inertia Status			OFF
Profile(s)			Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)			2, 5, 30, 100
Climate Change (%)			0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
									(m)	(m)	(m³)
1.000	CP1000	240 Winter	100	+45%	100/15	Summer			88.499	1.399	0.000
1.001	CP1001	240 Winter	100	+45%	30/240	Summer			88.496	1.546	0.000
1.002	CP1002	240 Winter	100	+45%	100/180	Summer			88.494	1.042	0.000
1.003	CP1003	240 Winter	100	+45%	2/180	Summer			88.494	1.944	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level
							Exceeded
1.000	CP1000	0.21			36.6	FLOOD RISK	
1.001	CP1001	0.24			70.7	FLOOD RISK	
1.002	CP1002	0.02			105.6	FLOOD RISK	
1.003	CP1003	0.17			16.1	FLOOD RISK	

APPENDIX LI



Rev.	Description	Rev. by	Date
SGI Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF T: 0161 837 1500 W: www.sginfrastructure.co.uk			
Client			
Formal Investments			
Architect			
Roberts Limbrick			
Project			
Ellesmere Wharf Phase 2			
Title			
Surface Water Strategy Preliminary Drainage - Holiday Cabins			
Date	22.02.2023	Drawn By	DOR
Size	A1	Checked By	DOR
Scale	1:2000	Approved By	DOR
Dwg. No.	C1581-SGI-ZZ-00-DR-C-0204		
			Rev
			P1

APPENDIX L2

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 14:42	Designed by sgicivils	
File Holiday Cabins - Catchment 2 00...	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	55.000	0.450	122.2	0.173	2.50	0.0	0.600		o	450	Pipe/Conduit	
4.001	60.000	0.150	400.0	0.173	0.00	0.0	0.600		o	600	Pipe/Conduit	
4.002	60.000	0.150	400.0	0.173	0.00	0.0	0.600		o	750	Pipe/Conduit	
4.003	10.000	0.001	10000.0	0.000	0.00	0.0		0.035	→_/		Pond/Tank	
4.004	10.000	0.049	204.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.005	20.000	0.200	100.0	0.000	0.00	0.0	0.600		o	150	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)
4.000	0.00	1.00	87.120	0.173	0.0	0.0	0.0	1.84	292.3	0.0
4.001	0.00	1.00	86.520	0.346	0.0	0.0	0.0	1.21	342.5	0.0
4.002	0.00	1.00	86.220	0.519	0.0	0.0	0.0	1.39	615.4	0.0
4.003	0.00	1.00	86.070	0.519	0.0	0.0	0.0	0.22	14320.7	0.0
4.004	0.00	1.00	86.069	0.519	0.0	0.0	0.0	1.10	77.5	0.0
4.005	0.00	1.00	86.020	0.519	0.0	0.0	0.0	1.00	17.8	0.0

SGi Consulting		Page 2
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 14:42	Designed by sgicivils	
File Holiday Cabins - Catchment 2 00...	Checked by	
Micro Drainage	Network 2020.1.3	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
4.000	-	-	100	0.173	0.173	0.173
4.001	-	-	100	0.173	0.173	0.173
4.002	-	-	100	0.173	0.173	0.173
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
4.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.519	0.519	0.519

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)
4.005	HC1006	87.800	85.820	0.000	1800	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: HC1005, DS/PN: 4.005, Volume (m³): 3.5

Unit Reference MD-SHE-0135-1200-2580-1200
Design Head (m) 2.580
Design Flow (l/s) 12.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 135
Invert Level (m) 86.020
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.580	12.0	Kick-Flo®	1.206	8.4
Flush-Flo™	0.587	10.6	Mean Flow over Head Range	-	9.8

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)	Depth (m)	Flow (l/s)
0.100	4.9	0.800	10.4	2.000	10.6	4.000	14.8	7.000	19.3
0.200	8.8	1.000	9.8	2.200	11.1	4.500	15.6	7.500	19.9
0.300	9.8	1.200	8.4	2.400	11.6	5.000	16.4	8.000	20.6
0.400	10.3	1.400	9.0	2.600	12.0	5.500	17.2	8.500	21.2
0.500	10.6	1.600	9.6	3.000	12.9	6.000	17.9	9.000	21.8
0.600	10.6	1.800	10.1	3.500	13.9	6.500	18.6	9.500	22.3

Storage Structures for Storm

Tank or Pond Pipe: 4.003

Manning's N 0.035 Invert Level (m) 86.070

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	2.530	470.0	2.531	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.000
 FEH Rainfall Version 1999 E (1km) 0.000
 Site Location GB 339198 334094 SJ 39198 34094 F (1km) 0.000
 C (1km) 0.000 Cv (Summer) 1.000
 D1 (1km) 0.000 Cv (Winter) 1.000
 D2 (1km) 0.000

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded		
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.
4.000	HC1000	15	Summer	2	+0%					87.165	-0.405	0.000	0.02
4.001	HC1001	15	Summer	2	+0%					86.586	-0.534	0.000	0.03
4.002	HC1002	15	Summer	2	+0%					86.295	-0.675	0.000	0.02
4.003	HC1003	15	Summer	2	+0%					86.128	-2.472	0.000	0.00
4.004	HC1004	15	Summer	2	+0%					86.128	-0.241	0.000	0.07
4.005	HC1005	15	Summer	2	+0%					86.108	-0.062	0.000	0.24

Half Drain Pipe					
PN	US/MH Name	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded
4.000	HC1000			5.3	OK
4.001	HC1001			8.7	OK
4.002	HC1002			11.8	OK
4.003	HC1003			10.6	OK
4.004	HC1004			4.0	OK
4.005	HC1005			4.0	OK

5 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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FEH	D3 (1km)	0.000
FEH Rainfall Version	1999	E (1km)	0.000
Site Location	GB 339198 334094 SJ 39198 34094	F (1km)	0.000
C (1km)	0.000	Cv (Summer)	1.000
D1 (1km)	0.000	Cv (Winter)	1.000
D2 (1km)	0.000		
Margin for Flood Risk Warning (mm)		300.0	
Analysis Timestep	2.5	Second Increment (Extended)	
DTS Status		ON	
DVD Status		OFF	
Inertia Status		OFF	
Profile(s)		Summer and Winter	
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)		2, 5, 30, 100	
Climate Change (%)		0, 0, 0, 45	

									Water	Surcharged	Flooded		
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.
4.000	HC1000	15	Summer	5	+0%					87.165	-0.405	0.000	0.02
4.001	HC1001	15	Summer	5	+0%					86.586	-0.534	0.000	0.03
4.002	HC1002	15	Summer	5	+0%					86.295	-0.675	0.000	0.02
4.003	HC1003	15	Summer	5	+0%					86.128	-2.472	0.000	0.00
4.004	HC1004	15	Summer	5	+0%					86.128	-0.241	0.000	0.07
4.005	HC1005	15	Summer	5	+0%					86.108	-0.062	0.000	0.24

Half Drain Pipe					
PN	US/MH Name	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded
4.000	HC1000			5.3	OK
4.001	HC1001			8.7	OK
4.002	HC1002			11.8	OK
4.003	HC1003			10.6	OK
4.004	HC1004			4.0	OK
4.005	HC1005			4.0	OK

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 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 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

D3 (1km) 0.000

FEH Rainfall Version 1999

E (1km) 0.000

Site Location GB 339198 334094 SJ 39198 34094

F (1km) 0.000

C (1km) 0.000

Cv (Summer) 1.000

D1 (1km) 0.000

Cv (Winter) 1.000

D2 (1km) 0.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded		
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.
4.000	HC1000	15	Summer	30	+0%					87.165	-0.405	0.000	0.02
4.001	HC1001	15	Summer	30	+0%					86.590	-0.530	0.000	0.03
4.002	HC1002	15	Summer	30	+0%					86.301	-0.669	0.000	0.03
4.003	HC1003	15	Summer	30	+0%					86.130	-2.470	0.000	0.00
4.004	HC1004	15	Summer	30	+0%					86.130	-0.239	0.000	0.07
4.005	HC1005	15	Summer	30	+0%					86.111	-0.059	0.000	0.25

Half Drain Pipe					
PN	US/MH Name	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded
4.000	HC1000			5.3	OK
4.001	HC1001			9.8	OK
4.002	HC1002			13.4	OK
4.003	HC1003			12.4	OK
4.004	HC1004			4.2	OK
4.005	HC1005			4.2	OK

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.000
 FEH Rainfall Version 1999 E (1km) 0.000
 Site Location GB 339198 334094 SJ 39198 34094 F (1km) 0.000
 C (1km) 0.000 Cv (Summer) 1.000
 D1 (1km) 0.000 Cv (Winter) 1.000
 D2 (1km) 0.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded		
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.
4.000	HC1000	15	Summer	100	+45%					87.172	-0.398	0.000	0.03
4.001	HC1001	15	Summer	100	+45%					86.604	-0.516	0.000	0.05
4.002	HC1002	15	Summer	100	+45%					86.316	-0.654	0.000	0.04
4.003	HC1003	15	Summer	100	+45%					86.151	-2.449	0.000	0.00
4.004	HC1004	15	Summer	100	+45%					86.151	-0.218	0.000	0.10
4.005	HC1005	15	Summer	100	+45%					86.139	-0.031	0.000	0.37

Half Drain Pipe					
PN	US/MH Name	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded Status
4.000	HC1000			7.9	OK
4.001	HC1001			14.1	OK
4.002	HC1002			20.4	OK
4.003	HC1003			18.2	OK
4.004	HC1004			6.2	OK
4.005	HC1005			6.1	OK

APPENDIX L3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 24/03/2023 14:37	Designed by sgicivils	
File Holiday Cabins - Catchment 2 00...	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	55.000	0.450	122.2	0.173	2.50	0.0	0.600		o	450	Pipe/Conduit	
4.001	60.000	0.150	400.0	0.173	0.00	0.0	0.600		o	600	Pipe/Conduit	
4.002	60.000	0.150	400.0	0.173	0.00	0.0	0.600		o	750	Pipe/Conduit	
4.003	10.000	0.001	10000.0	0.000	0.00	0.0		0.035	→_/		Pond/Tank	
4.004	10.000	0.049	204.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.005	20.000	0.200	100.0	0.000	0.00	0.0	0.600		o	150	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)
4.000	0.00	1.00	87.120	0.173	0.0	0.0	0.0	1.84	292.3	0.0
4.001	0.00	1.00	86.520	0.346	0.0	0.0	0.0	1.21	342.5	0.0
4.002	0.00	1.00	86.220	0.519	0.0	0.0	0.0	1.39	615.4	0.0
4.003	0.00	1.00	86.070	0.519	0.0	0.0	0.0	0.22	14320.7	0.0
4.004	0.00	1.00	86.069	0.519	0.0	0.0	0.0	1.10	77.5	0.0
4.005	0.00	1.00	86.020	0.519	0.0	0.0	0.0	1.00	17.8	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
4.000	-	-	100	0.173	0.173	0.173
4.001	-	-	100	0.173	0.173	0.173
4.002	-	-	100	0.173	0.173	0.173
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
4.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.519	0.519	0.519

Surcharged 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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4.005 HC1006 87.800 85.820 0.000 1800 0

Datum (m) 85.820 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	1.210	39	1.210	77	1.210	115	1.210	153	1.210	191	1.210	229	1.210	267	1.210
2	1.210	40	1.210	78	1.210	116	1.210	154	1.210	192	1.210	230	1.210	268	1.210
3	1.210	41	1.210	79	1.210	117	1.210	155	1.210	193	1.210	231	1.210	269	1.210
4	1.210	42	1.210	80	1.210	118	1.210	156	1.210	194	1.210	232	1.210	270	1.210
5	1.210	43	1.210	81	1.210	119	1.210	157	1.210	195	1.210	233	1.210	271	1.210
6	1.210	44	1.210	82	1.210	120	1.210	158	1.210	196	1.210	234	1.210	272	1.210
7	1.210	45	1.210	83	1.210	121	1.210	159	1.210	197	1.210	235	1.210	273	1.210
8	1.210	46	1.210	84	1.210	122	1.210	160	1.210	198	1.210	236	1.210	274	1.210
9	1.210	47	1.210	85	1.210	123	1.210	161	1.210	199	1.210	237	1.210	275	1.210
10	1.210	48	1.210	86	1.210	124	1.210	162	1.210	200	1.210	238	1.210	276	1.210
11	1.210	49	1.210	87	1.210	125	1.210	163	1.210	201	1.210	239	1.210	277	1.210
12	1.210	50	1.210	88	1.210	126	1.210	164	1.210	202	1.210	240	1.210	278	1.210
13	1.210	51	1.210	89	1.210	127	1.210	165	1.210	203	1.210	241	1.210	279	1.210
14	1.210	52	1.210	90	1.210	128	1.210	166	1.210	204	1.210	242	1.210	280	1.210
15	1.210	53	1.210	91	1.210	129	1.210	167	1.210	205	1.210	243	1.210	281	1.210
16	1.210	54	1.210	92	1.210	130	1.210	168	1.210	206	1.210	244	1.210	282	1.210
17	1.210	55	1.210	93	1.210	131	1.210	169	1.210	207	1.210	245	1.210	283	1.210
18	1.210	56	1.210	94	1.210	132	1.210	170	1.210	208	1.210	246	1.210	284	1.210
19	1.210	57	1.210	95	1.210	133	1.210	171	1.210	209	1.210	247	1.210	285	1.210
20	1.210	58	1.210	96	1.210	134	1.210	172	1.210	210	1.210	248	1.210	286	1.210
21	1.210	59	1.210	97	1.210	135	1.210	173	1.210	211	1.210	249	1.210	287	1.210
22	1.210	60	1.210	98	1.210	136	1.210	174	1.210	212	1.210	250	1.210	288	1.210
23	1.210	61	1.210	99	1.210	137	1.210	175	1.210	213	1.210	251	1.210	289	1.210
24	1.210	62	1.210	100	1.210	138	1.210	176	1.210	214	1.210	252	1.210	290	1.210
25	1.210	63	1.210	101	1.210	139	1.210	177	1.210	215	1.210	253	1.210	291	1.210
26	1.210	64	1.210	102	1.210	140	1.210	178	1.210	216	1.210	254	1.210	292	1.210
27	1.210	65	1.210	103	1.210	141	1.210	179	1.210	217	1.210	255	1.210	293	1.210
28	1.210	66	1.210	104	1.210	142	1.210	180	1.210	218	1.210	256	1.210	294	1.210
29	1.210	67	1.210	105	1.210	143	1.210	181	1.210	219	1.210	257	1.210	295	1.210
30	1.210	68	1.210	106	1.210	144	1.210	182	1.210	220	1.210	258	1.210	296	1.210
31	1.210	69	1.210	107	1.210	145	1.210	183	1.210	221	1.210	259	1.210	297	1.210
32	1.210	70	1.210	108	1.210	146	1.210	184	1.210	222	1.210	260	1.210	298	1.210
33	1.210	71	1.210	109	1.210	147	1.210	185	1.210	223	1.210	261	1.210	299	1.210
34	1.210	72	1.210	110	1.210	148	1.210	186	1.210	224	1.210	262	1.210	300	1.210
35	1.210	73	1.210	111	1.210	149	1.210	187	1.210	225	1.210	263	1.210	301	1.210
36	1.210	74	1.210	112	1.210	150	1.210	188	1.210	226	1.210	264	1.210	302	1.210
37	1.210	75	1.210	113	1.210	151	1.210	189	1.210	227	1.210	265	1.210	303	1.210
38	1.210	76	1.210	114	1.210	152	1.210	190	1.210	228	1.210	266	1.210	304	1.210

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
305	1.210	366	1.210	427	1.210	488	1.210	549	1.210	610	1.210	671	1.210	732	1.210
306	1.210	367	1.210	428	1.210	489	1.210	550	1.210	611	1.210	672	1.210	733	1.210
307	1.210	368	1.210	429	1.210	490	1.210	551	1.210	612	1.210	673	1.210	734	1.210
308	1.210	369	1.210	430	1.210	491	1.210	552	1.210	613	1.210	674	1.210	735	1.210
309	1.210	370	1.210	431	1.210	492	1.210	553	1.210	614	1.210	675	1.210	736	1.210
310	1.210	371	1.210	432	1.210	493	1.210	554	1.210	615	1.210	676	1.210	737	1.210
311	1.210	372	1.210	433	1.210	494	1.210	555	1.210	616	1.210	677	1.210	738	1.210
312	1.210	373	1.210	434	1.210	495	1.210	556	1.210	617	1.210	678	1.210	739	1.210
313	1.210	374	1.210	435	1.210	496	1.210	557	1.210	618	1.210	679	1.210	740	1.210
314	1.210	375	1.210	436	1.210	497	1.210	558	1.210	619	1.210	680	1.210	741	1.210
315	1.210	376	1.210	437	1.210	498	1.210	559	1.210	620	1.210	681	1.210	742	1.210
316	1.210	377	1.210	438	1.210	499	1.210	560	1.210	621	1.210	682	1.210	743	1.210
317	1.210	378	1.210	439	1.210	500	1.210	561	1.210	622	1.210	683	1.210	744	1.210
318	1.210	379	1.210	440	1.210	501	1.210	562	1.210	623	1.210	684	1.210	745	1.210
319	1.210	380	1.210	441	1.210	502	1.210	563	1.210	624	1.210	685	1.210	746	1.210
320	1.210	381	1.210	442	1.210	503	1.210	564	1.210	625	1.210	686	1.210	747	1.210
321	1.210	382	1.210	443	1.210	504	1.210	565	1.210	626	1.210	687	1.210	748	1.210
322	1.210	383	1.210	444	1.210	505	1.210	566	1.210	627	1.210	688	1.210	749	1.210
323	1.210	384	1.210	445	1.210	506	1.210	567	1.210	628	1.210	689	1.210	750	1.210
324	1.210	385	1.210	446	1.210	507	1.210	568	1.210	629	1.210	690	1.210	751	1.210
325	1.210	386	1.210	447	1.210	508	1.210	569	1.210	630	1.210	691	1.210	752	1.210
326	1.210	387	1.210	448	1.210	509	1.210	570	1.210	631	1.210	692	1.210	753	1.210
327	1.210	388	1.210	449	1.210	510	1.210	571	1.210	632	1.210	693	1.210	754	1.210
328	1.210	389	1.210	450	1.210	511	1.210	572	1.210	633	1.210	694	1.210	755	1.210
329	1.210	390	1.210	451	1.210	512	1.210	573	1.210	634	1.210	695	1.210	756	1.210
330	1.210	391	1.210	452	1.210	513	1.210	574	1.210	635	1.210	696	1.210	757	1.210
331	1.210	392	1.210	453	1.210	514	1.210	575	1.210	636	1.210	697	1.210	758	1.210
332	1.210	393	1.210	454	1.210	515	1.210	576	1.210	637	1.210	698	1.210	759	1.210
333	1.210	394	1.210	455	1.210	516	1.210	577	1.210	638	1.210	699	1.210	760	1.210
334	1.210	395	1.210	456	1.210	517	1.210	578	1.210	639	1.210	700	1.210	761	1.210
335	1.210	396	1.210	457	1.210	518	1.210	579	1.210	640	1.210	701	1.210	762	1.210
336	1.210	397	1.210	458	1.210	519	1.210	580	1.210	641	1.210	702	1.210	763	1.210
337	1.210	398	1.210	459	1.210	520	1.210	581	1.210	642	1.210	703	1.210	764	1.210
338	1.210	399	1.210	460	1.210	521	1.210	582	1.210	643	1.210	704	1.210	765	1.210
339	1.210	400	1.210	461	1.210	522	1.210	583	1.210	644	1.210	705	1.210	766	1.210
340	1.210	401	1.210	462	1.210	523	1.210	584	1.210	645	1.210	706	1.210	767	1.210
341	1.210	402	1.210	463	1.210	524	1.210	585	1.210	646	1.210	707	1.210	768	1.210
342	1.210	403	1.210	464	1.210	525	1.210	586	1.210	647	1.210	708	1.210	769	1.210
343	1.210	404	1.210	465	1.210	526	1.210	587	1.210	648	1.210	709	1.210	770	1.210
344	1.210	405	1.210	466	1.210	527	1.210	588	1.210	649	1.210	710	1.210	771	1.210
345	1.210	406	1.210	467	1.210	528	1.210	589	1.210	650	1.210	711	1.210	772	1.210
346	1.210	407	1.210	468	1.210	529	1.210	590	1.210	651	1.210	712	1.210	773	1.210
347	1.210	408	1.210	469	1.210	530	1.210	591	1.210	652	1.210	713	1.210	774	1.210
348	1.210	409	1.210	470	1.210	531	1.210	592	1.210	653	1.210	714	1.210	775	1.210
349	1.210	410	1.210	471	1.210	532	1.210	593	1.210	654	1.210	715	1.210	776	1.210
350	1.210	411	1.210	472	1.210	533	1.210	594	1.210	655	1.210	716	1.210	777	1.210
351	1.210	412	1.210	473	1.210	534	1.210	595	1.210	656	1.210	717	1.210	778	1.210
352	1.210	413	1.210	474	1.210	535	1.210	596	1.210	657	1.210	718	1.210	779	1.210
353	1.210	414	1.210	475	1.210	536	1.210	597	1.210	658	1.210	719	1.210	780	1.210
354	1.210	415	1.210	476	1.210	537	1.210	598	1.210	659	1.210	720	1.210	781	1.210
355	1.210	416	1.210	477	1.210	538	1.210	599	1.210	660	1.210	721	1.210	782	1.210
356	1.210	417	1.210	478	1.210	539	1.210	600	1.210	661	1.210	722	1.210	783	1.210
357	1.210	418	1.210	479	1.210	540	1.210	601	1.210	662	1.210	723	1.210	784	1.210
358	1.210	419	1.210	480	1.210	541	1.210	602	1.210	663	1.210	724	1.210	785	1.210
359	1.210	420	1.210	481	1.210	542	1.210	603	1.210	664	1.210	725	1.210	786	1.210
360	1.210	421	1.210	482	1.210	543	1.210	604	1.210	665	1.210	726	1.210	787	1.210
361	1.210	422	1.210	483	1.210	544	1.210	605	1.210	666	1.210	727	1.210	788	1.210
362	1.210	423	1.210	484	1.210	545	1.210	606	1.210	667	1.210	728	1.210	789	1.210
363	1.210	424	1.210	485	1.210	546	1.210	607	1.210	668	1.210	729	1.210	790	1.210
364	1.210	425	1.210	486	1.210	547	1.210	608	1.210	669	1.210	730	1.210	791	1.210
365	1.210	426	1.210	487	1.210	548	1.210	609	1.210	670	1.210	731	1.210	792	1.210

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
793	1.210	854	1.210	915	1.210	976	1.210	1037	1.210	1098	1.210	1159	1.210	1220	1.210
794	1.210	855	1.210	916	1.210	977	1.210	1038	1.210	1099	1.210	1160	1.210	1221	1.210
795	1.210	856	1.210	917	1.210	978	1.210	1039	1.210	1100	1.210	1161	1.210	1222	1.210
796	1.210	857	1.210	918	1.210	979	1.210	1040	1.210	1101	1.210	1162	1.210	1223	1.210
797	1.210	858	1.210	919	1.210	980	1.210	1041	1.210	1102	1.210	1163	1.210	1224	1.210
798	1.210	859	1.210	920	1.210	981	1.210	1042	1.210	1103	1.210	1164	1.210	1225	1.210
799	1.210	860	1.210	921	1.210	982	1.210	1043	1.210	1104	1.210	1165	1.210	1226	1.210
800	1.210	861	1.210	922	1.210	983	1.210	1044	1.210	1105	1.210	1166	1.210	1227	1.210
801	1.210	862	1.210	923	1.210	984	1.210	1045	1.210	1106	1.210	1167	1.210	1228	1.210
802	1.210	863	1.210	924	1.210	985	1.210	1046	1.210	1107	1.210	1168	1.210	1229	1.210
803	1.210	864	1.210	925	1.210	986	1.210	1047	1.210	1108	1.210	1169	1.210	1230	1.210
804	1.210	865	1.210	926	1.210	987	1.210	1048	1.210	1109	1.210	1170	1.210	1231	1.210
805	1.210	866	1.210	927	1.210	988	1.210	1049	1.210	1110	1.210	1171	1.210	1232	1.210
806	1.210	867	1.210	928	1.210	989	1.210	1050	1.210	1111	1.210	1172	1.210	1233	1.210
807	1.210	868	1.210	929	1.210	990	1.210	1051	1.210	1112	1.210	1173	1.210	1234	1.210
808	1.210	869	1.210	930	1.210	991	1.210	1052	1.210	1113	1.210	1174	1.210	1235	1.210
809	1.210	870	1.210	931	1.210	992	1.210	1053	1.210	1114	1.210	1175	1.210	1236	1.210
810	1.210	871	1.210	932	1.210	993	1.210	1054	1.210	1115	1.210	1176	1.210	1237	1.210
811	1.210	872	1.210	933	1.210	994	1.210	1055	1.210	1116	1.210	1177	1.210	1238	1.210
812	1.210	873	1.210	934	1.210	995	1.210	1056	1.210	1117	1.210	1178	1.210	1239	1.210
813	1.210	874	1.210	935	1.210	996	1.210	1057	1.210	1118	1.210	1179	1.210	1240	1.210
814	1.210	875	1.210	936	1.210	997	1.210	1058	1.210	1119	1.210	1180	1.210	1241	1.210
815	1.210	876	1.210	937	1.210	998	1.210	1059	1.210	1120	1.210	1181	1.210	1242	1.210
816	1.210	877	1.210	938	1.210	999	1.210	1060	1.210	1121	1.210	1182	1.210	1243	1.210
817	1.210	878	1.210	939	1.210	1000	1.210	1061	1.210	1122	1.210	1183	1.210	1244	1.210
818	1.210	879	1.210	940	1.210	1001	1.210	1062	1.210	1123	1.210	1184	1.210	1245	1.210
819	1.210	880	1.210	941	1.210	1002	1.210	1063	1.210	1124	1.210	1185	1.210	1246	1.210
820	1.210	881	1.210	942	1.210	1003	1.210	1064	1.210	1125	1.210	1186	1.210	1247	1.210
821	1.210	882	1.210	943	1.210	1004	1.210	1065	1.210	1126	1.210	1187	1.210	1248	1.210
822	1.210	883	1.210	944	1.210	1005	1.210	1066	1.210	1127	1.210	1188	1.210	1249	1.210
823	1.210	884	1.210	945	1.210	1006	1.210	1067	1.210	1128	1.210	1189	1.210	1250	1.210
824	1.210	885	1.210	946	1.210	1007	1.210	1068	1.210	1129	1.210	1190	1.210	1251	1.210
825	1.210	886	1.210	947	1.210	1008	1.210	1069	1.210	1130	1.210	1191	1.210	1252	1.210
826	1.210	887	1.210	948	1.210	1009	1.210	1070	1.210	1131	1.210	1192	1.210	1253	1.210
827	1.210	888	1.210	949	1.210	1010	1.210	1071	1.210	1132	1.210	1193	1.210	1254	1.210
828	1.210	889	1.210	950	1.210	1011	1.210	1072	1.210	1133	1.210	1194	1.210	1255	1.210
829	1.210	890	1.210	951	1.210	1012	1.210	1073	1.210	1134	1.210	1195	1.210	1256	1.210
830	1.210	891	1.210	952	1.210	1013	1.210	1074	1.210	1135	1.210	1196	1.210	1257	1.210
831	1.210	892	1.210	953	1.210	1014	1.210	1075	1.210	1136	1.210	1197	1.210	1258	1.210
832	1.210	893	1.210	954	1.210	1015	1.210	1076	1.210	1137	1.210	1198	1.210	1259	1.210
833	1.210	894	1.210	955	1.210	1016	1.210	1077	1.210	1138	1.210	1199	1.210	1260	1.210
834	1.210	895	1.210	956	1.210	1017	1.210	1078	1.210	1139	1.210	1200	1.210	1261	1.210
835	1.210	896	1.210	957	1.210	1018	1.210	1079	1.210	1140	1.210	1201	1.210	1262	1.210
836	1.210	897	1.210	958	1.210	1019	1.210	1080	1.210	1141	1.210	1202	1.210	1263	1.210
837	1.210	898	1.210	959	1.210	1020	1.210	1081	1.210	1142	1.210	1203	1.210	1264	1.210
838	1.210	899	1.210	960	1.210	1021	1.210	1082	1.210	1143	1.210	1204	1.210	1265	1.210
839	1.210	900	1.210	961	1.210	1022	1.210	1083	1.210	1144	1.210	1205	1.210	1266	1.210
840	1.210	901	1.210	962	1.210	1023	1.210	1084	1.210	1145	1.210	1206	1.210	1267	1.210
841	1.210	902	1.210	963	1.210	1024	1.210	1085	1.210	1146	1.210	1207	1.210	1268	1.210
842	1.210	903	1.210	964	1.210	1025	1.210	1086	1.210	1147	1.210	1208	1.210	1269	1.210
843	1.210	904	1.210	965	1.210	1026	1.210	1087	1.210	1148	1.210	1209	1.210	1270	1.210
844	1.210	905	1.210	966	1.210	1027	1.210	1088	1.210	1149	1.210	1210	1.210	1271	1.210
845	1.210	906	1.210	967	1.210	1028	1.210	1089	1.210	1150	1.210	1211	1.210	1272	1.210
846	1.210	907	1.210	968	1.210	1029	1.210	1090	1.210	1151	1.210	1212	1.210	1273	1.210
847	1.210	908	1.210	969	1.210	1030	1.210	1091	1.210	1152	1.210	1213	1.210	1274	1.210
848	1.210	909	1.210	970	1.210	1031	1.210	1092	1.210	1153	1.210	1214	1.210	1275	1.210
849	1.210	910	1.210	971	1.210	1032	1.210	1093	1.210	1154	1.210	1215	1.210	1276	1.210
850	1.210	911	1.210	972	1.210	1033	1.210	1094	1.210	1155	1.210	1216	1.210	1277	1.210
851	1.210	912	1.210	973	1.210	1034	1.210	1095	1.210	1156	1.210	1217	1.210	1278	1.210
852	1.210	913	1.210	974	1.210	1035	1.210	1096	1.210	1157	1.210	1218	1.210	1279	1.210
853	1.210	914	1.210	975	1.210	1036	1.210	1097	1.210	1158	1.210	1219	1.210	1280	1.210

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1281	1.210	1301	1.210	1321	1.210	1341	1.210	1361	1.210	1381	1.210	1401	1.210	1421	1.210
1282	1.210	1302	1.210	1322	1.210	1342	1.210	1362	1.210	1382	1.210	1402	1.210	1422	1.210
1283	1.210	1303	1.210	1323	1.210	1343	1.210	1363	1.210	1383	1.210	1403	1.210	1423	1.210
1284	1.210	1304	1.210	1324	1.210	1344	1.210	1364	1.210	1384	1.210	1404	1.210	1424	1.210
1285	1.210	1305	1.210	1325	1.210	1345	1.210	1365	1.210	1385	1.210	1405	1.210	1425	1.210
1286	1.210	1306	1.210	1326	1.210	1346	1.210	1366	1.210	1386	1.210	1406	1.210	1426	1.210
1287	1.210	1307	1.210	1327	1.210	1347	1.210	1367	1.210	1387	1.210	1407	1.210	1427	1.210
1288	1.210	1308	1.210	1328	1.210	1348	1.210	1368	1.210	1388	1.210	1408	1.210	1428	1.210
1289	1.210	1309	1.210	1329	1.210	1349	1.210	1369	1.210	1389	1.210	1409	1.210	1429	1.210
1290	1.210	1310	1.210	1330	1.210	1350	1.210	1370	1.210	1390	1.210	1410	1.210	1430	1.210
1291	1.210	1311	1.210	1331	1.210	1351	1.210	1371	1.210	1391	1.210	1411	1.210	1431	1.210
1292	1.210	1312	1.210	1332	1.210	1352	1.210	1372	1.210	1392	1.210	1412	1.210	1432	1.210
1293	1.210	1313	1.210	1333	1.210	1353	1.210	1373	1.210	1393	1.210	1413	1.210	1433	1.210
1294	1.210	1314	1.210	1334	1.210	1354	1.210	1374	1.210	1394	1.210	1414	1.210	1434	1.210
1295	1.210	1315	1.210	1335	1.210	1355	1.210	1375	1.210	1395	1.210	1415	1.210	1435	1.210
1296	1.210	1316	1.210	1336	1.210	1356	1.210	1376	1.210	1396	1.210	1416	1.210	1436	1.210
1297	1.210	1317	1.210	1337	1.210	1357	1.210	1377	1.210	1397	1.210	1417	1.210	1437	1.210
1298	1.210	1318	1.210	1338	1.210	1358	1.210	1378	1.210	1398	1.210	1418	1.210	1438	1.210
1299	1.210	1319	1.210	1339	1.210	1359	1.210	1379	1.210	1399	1.210	1419	1.210	1439	1.210
1300	1.210	1320	1.210	1340	1.210	1360	1.210	1380	1.210	1400	1.210	1420	1.210	1440	1.210

Online Controls for Storm

Hydro-Brake® Optimum Manhole: HC1005, DS/PN: 4.005, Volume (m³): 3.5

Unit Reference	MD-SHE-0135-1200-2580-1200
Design Head (m)	2.580
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	135
Invert Level (m)	86.020
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.580	12.0	Kick-Flo®	1.206	8.4
Flush-Flo™	0.587	10.6	Mean Flow over Head Range	-	9.8

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)	Depth (m)	Flow (l/s)
0.100	4.9	0.800	10.4	2.000	10.6	4.000	14.8	7.000	19.3
0.200	8.8	1.000	9.8	2.200	11.1	4.500	15.6	7.500	19.9
0.300	9.8	1.200	8.4	2.400	11.6	5.000	16.4	8.000	20.6
0.400	10.3	1.400	9.0	2.600	12.0	5.500	17.2	8.500	21.2
0.500	10.6	1.600	9.6	3.000	12.9	6.000	17.9	9.000	21.8
0.600	10.6	1.800	10.1	3.500	13.9	6.500	18.6	9.500	22.3

Storage Structures for Storm

Tank or Pond Pipe: 4.003

Manning's N 0.035 Invert Level (m) 86.070

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	40.0	2.530	470.0	2.531	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.000
 FEH Rainfall Version 1999 E (1km) 0.000
 Site Location GB 339198 334094 SJ 39198 34094 F (1km) 0.000
 C (1km) 0.000 Cv (Summer) 1.000
 D1 (1km) 0.000 Cv (Winter) 1.000
 D2 (1km) 0.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
4.000	HC1000	15 Summer	2	+0%					87.165	-0.405	0.000
4.001	HC1001	15 Summer	2	+0%					86.586	-0.534	0.000
4.002	HC1002	15 Summer	2	+0%					86.295	-0.675	0.000
4.003	HC1003	120 Winter	2	+0%					86.157	-2.443	0.000
4.004	HC1004	60 Summer	2	+0%					86.157	-0.212	0.000
4.005	HC1005	60 Summer	2	+0%	100/15 Summer				86.159	-0.011	0.000

				Half Drain	Pipe		
	US/MH	Flow /	Overflow	Time	Flow		Level
PN	Name	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
4.000	HC1000	0.02			5.3	OK	
4.001	HC1001	0.03			8.7	OK	
4.002	HC1002	0.02			11.8	OK	
4.003	HC1003	0.00			1.7	OK	
4.004	HC1004	0.00			0.3	OK	
4.005	HC1005	0.00			0.0	OK	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.000
 FEH Rainfall Version 1999 E (1km) 0.000
 Site Location GB 339198 334094 SJ 39198 34094 F (1km) 0.000
 C (1km) 0.000 Cv (Summer) 1.000
 D1 (1km) 0.000 Cv (Winter) 1.000
 D2 (1km) 0.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
4.000	HC1000	15 Summer	5	+0%					87.165	-0.405	0.000
4.001	HC1001	15 Summer	5	+0%					86.586	-0.534	0.000
4.002	HC1002	15 Summer	5	+0%					86.295	-0.675	0.000
4.003	HC1003	120 Winter	5	+0%					86.157	-2.443	0.000
4.004	HC1004	60 Summer	5	+0%					86.157	-0.212	0.000
4.005	HC1005	60 Summer	5	+0%	100/15 Summer				86.159	-0.011	0.000

		Half Drain Pipe			Level	
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status Exceeded
4.000	HC1000	0.02			5.3	OK
4.001	HC1001	0.03			8.7	OK
4.002	HC1002	0.02			11.8	OK
4.003	HC1003	0.00			1.7	OK
4.004	HC1004	0.00			0.3	OK
4.005	HC1005	0.00			0.0	OK

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 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 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

D3 (1km) 0.000

FEH Rainfall Version 1999

E (1km) 0.000

Site Location GB 339198 334094 SJ 39198 34094

F (1km) 0.000

C (1km) 0.000

Cv (Summer) 1.000

D1 (1km) 0.000

Cv (Winter) 1.000

D2 (1km) 0.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
4.000	HC1000	15 Summer		30	+0%					87.165	-0.405	0.000
4.001	HC1001	15 Summer		30	+0%					86.590	-0.530	0.000
4.002	HC1002	15 Summer		30	+0%					86.301	-0.669	0.000
4.003	HC1003	240 Winter		30	+0%					86.155	-2.445	0.000
4.004	HC1004	120 Summer		30	+0%					86.155	-0.214	0.000
4.005	HC1005	15 Winter		30	+0%	100/15 Summer				86.159	-0.011	0.000

				Half Drain	Pipe		
	US/MH	Flow /	Overflow	Time	Flow		Level
PN	Name	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
4.000	HC1000	0.02			5.3	OK	
4.001	HC1001	0.03			9.8	OK	
4.002	HC1002	0.03			13.4	OK	
4.003	HC1003	0.00			1.6	OK	
4.004	HC1004	0.00			0.3	OK	
4.005	HC1005	0.00			0.0	OK	

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FEH	D3 (1km)	0.000
FEH Rainfall Version	1999	E (1km)	0.000
Site Location	GB 339198 334094 SJ 39198 34094	F (1km)	0.000
C (1km)	0.000	Cv (Summer)	1.000
D1 (1km)	0.000	Cv (Winter)	1.000
D2 (1km)	0.000		
Margin for Flood Risk Warning (mm)		300.0	
Analysis Timestep	2.5 Second	Increment (Extended)	
DTS Status		ON	
DVD Status		OFF	
Inertia Status		OFF	
Profile(s)		Summer and Winter	
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)		2, 5, 30, 100	
Climate Change (%)		0, 0, 0, 45	

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
4.000	HC1000	15 Summer	100	+45%						87.172	-0.398	0.000
4.001	HC1001	15 Summer	100	+45%						86.604	-0.516	0.000
4.002	HC1002	15 Summer	100	+45%						86.316	-0.654	0.000
4.003	HC1003	480 Winter	100	+45%						86.225	-2.375	0.000
4.004	HC1004	480 Winter	100	+45%						86.225	-0.144	0.000
4.005	HC1005	480 Winter	100	+45%	100/15 Summer					86.230	0.060	0.000

Half Drain Pipe							
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
4.000	HC1000	0.03			7.9	OK	
4.001	HC1001	0.05			14.1	OK	
4.002	HC1002	0.04			20.4	OK	
4.003	HC1003	0.00			3.0	OK	
4.004	HC1004	0.01			0.8	OK	
4.005	HC1005	0.00			0.0	SURCHARGED	

APPENDIX MI

Surface Water Strategy

Development Catchment Plan

$$\text{Commercial 1} = 5645\text{m}^2$$

Modelled Impermeable Area

Commercial 1 @ 75% PIMP = 4234m²

Surface Water Discharge Rates

4.6 to 11.7 l/s. Refer to drainage strategy.

Surface Water Quality

SW Runoff from the commercial plots and associated infrastructure must be cleansed/treated within the plot in accordance with Shropshire current guidance/Ciria C753 standards prior to discharging to the watercourse.



Rev.	Description	Rev. by	Date
 Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF			
T: 0161 837 1500		W: www.sginfrastructure.co.uk	
Client			
Formal Investments			
Architect			
Roberts Limbrick			
Project			
Canalside Development, Ellesmere			
Title			
Surface Water Strategy Preliminary Drainage - Commercial 3			
Date	22.02.2023	Drawn By	DOR
Size	A1	Checked By	DOR
Scale	1/2000	Approved By	DOR
Dwg. No.		Rev.	
C1581-SGI-ZZ-00-DR-C-0205		P	

APPENDIX M2

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	80.000	0.269	297.4	0.282	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.001	44.000	0.001	44000.0	0.283	0.00	0.0		0.050	→[↓]		Cellular Storage	
1.002	7.718	0.100	77.2	0.000	0.00	0.0	0.600		o	150	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	1.00	87.870	0.282	0.0	0.0	0.0	1.17	186.7	0.0
1.001	0.00	1.00	87.601	0.565	0.0	0.0	0.0	0.06	744.0	0.0
1.002	0.00	1.00	87.600	0.565	0.0	0.0	0.0	1.15	20.2	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.282	0.282	0.282
1.001	-	-	100	0.283	0.283	0.283
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.565	0.565	0.565

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.002 CC5003 89.600 87.500 0.000 0 0

Datum (m) 87.500 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.375	42	0.375	83	0.375	124	0.375	165	0.375	206	0.375	247	0.375
2	0.375	43	0.375	84	0.375	125	0.375	166	0.375	207	0.375	248	0.375
3	0.375	44	0.375	85	0.375	126	0.375	167	0.375	208	0.375	249	0.375
4	0.375	45	0.375	86	0.375	127	0.375	168	0.375	209	0.375	250	0.375
5	0.375	46	0.375	87	0.375	128	0.375	169	0.375	210	0.375	251	0.375
6	0.375	47	0.375	88	0.375	129	0.375	170	0.375	211	0.375	252	0.375
7	0.375	48	0.375	89	0.375	130	0.375	171	0.375	212	0.375	253	0.375
8	0.375	49	0.375	90	0.375	131	0.375	172	0.375	213	0.375	254	0.375
9	0.375	50	0.375	91	0.375	132	0.375	173	0.375	214	0.375	255	0.375
10	0.375	51	0.375	92	0.375	133	0.375	174	0.375	215	0.375	256	0.375
11	0.375	52	0.375	93	0.375	134	0.375	175	0.375	216	0.375	257	0.375
12	0.375	53	0.375	94	0.375	135	0.375	176	0.375	217	0.375	258	0.375
13	0.375	54	0.375	95	0.375	136	0.375	177	0.375	218	0.375	259	0.375
14	0.375	55	0.375	96	0.375	137	0.375	178	0.375	219	0.375	260	0.375
15	0.375	56	0.375	97	0.375	138	0.375	179	0.375	220	0.375	261	0.375
16	0.375	57	0.375	98	0.375	139	0.375	180	0.375	221	0.375	262	0.375
17	0.375	58	0.375	99	0.375	140	0.375	181	0.375	222	0.375	263	0.375
18	0.375	59	0.375	100	0.375	141	0.375	182	0.375	223	0.375	264	0.375
19	0.375	60	0.375	101	0.375	142	0.375	183	0.375	224	0.375	265	0.375
20	0.375	61	0.375	102	0.375	143	0.375	184	0.375	225	0.375	266	0.375
21	0.375	62	0.375	103	0.375	144	0.375	185	0.375	226	0.375	267	0.375
22	0.375	63	0.375	104	0.375	145	0.375	186	0.375	227	0.375	268	0.375
23	0.375	64	0.375	105	0.375	146	0.375	187	0.375	228	0.375	269	0.375
24	0.375	65	0.375	106	0.375	147	0.375	188	0.375	229	0.375	270	0.375
25	0.375	66	0.375	107	0.375	148	0.375	189	0.375	230	0.375	271	0.375
26	0.375	67	0.375	108	0.375	149	0.375	190	0.375	231	0.375	272	0.375
27	0.375	68	0.375	109	0.375	150	0.375	191	0.375	232	0.375	273	0.375
28	0.375	69	0.375	110	0.375	151	0.375	192	0.375	233	0.375	274	0.375
29	0.375	70	0.375	111	0.375	152	0.375	193	0.375	234	0.375	275	0.375
30	0.375	71	0.375	112	0.375	153	0.375	194	0.375	235	0.375	276	0.375
31	0.375	72	0.375	113	0.375	154	0.375	195	0.375	236	0.375	277	0.375
32	0.375	73	0.375	114	0.375	155	0.375	196	0.375	237	0.375	278	0.375
33	0.375	74	0.375	115	0.375	156	0.375	197	0.375	238	0.375	279	0.375
34	0.375	75	0.375	116	0.375	157	0.375	198	0.375	239	0.375	280	0.375
35	0.375	76	0.375	117	0.375	158	0.375	199	0.375	240	0.375	281	0.375
36	0.375	77	0.375	118	0.375	159	0.375	200	0.375	241	0.375	282	0.375
37	0.375	78	0.375	119	0.375	160	0.375	201	0.375	242	0.375	283	0.375
38	0.375	79	0.375	120	0.375	161	0.375	202	0.375	243	0.375	284	0.375
39	0.375	80	0.375	121	0.375	162	0.375	203	0.375	244	0.375	285	0.375
40	0.375	81	0.375	122	0.375	163	0.375	204	0.375	245	0.375	286	0.375
41	0.375	82	0.375	123	0.375	164	0.375	205	0.375	246	0.375	287	0.375

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
329	0.375	390	0.375	451	0.375	512	0.375	573	0.375	634	0.375	695	0.375	756	0.375
330	0.375	391	0.375	452	0.375	513	0.375	574	0.375	635	0.375	696	0.375	757	0.375
331	0.375	392	0.375	453	0.375	514	0.375	575	0.375	636	0.375	697	0.375	758	0.375
332	0.375	393	0.375	454	0.375	515	0.375	576	0.375	637	0.375	698	0.375	759	0.375
333	0.375	394	0.375	455	0.375	516	0.375	577	0.375	638	0.375	699	0.375	760	0.375
334	0.375	395	0.375	456	0.375	517	0.375	578	0.375	639	0.375	700	0.375	761	0.375
335	0.375	396	0.375	457	0.375	518	0.375	579	0.375	640	0.375	701	0.375	762	0.375
336	0.375	397	0.375	458	0.375	519	0.375	580	0.375	641	0.375	702	0.375	763	0.375
337	0.375	398	0.375	459	0.375	520	0.375	581	0.375	642	0.375	703	0.375	764	0.375
338	0.375	399	0.375	460	0.375	521	0.375	582	0.375	643	0.375	704	0.375	765	0.375
339	0.375	400	0.375	461	0.375	522	0.375	583	0.375	644	0.375	705	0.375	766	0.375
340	0.375	401	0.375	462	0.375	523	0.375	584	0.375	645	0.375	706	0.375	767	0.375
341	0.375	402	0.375	463	0.375	524	0.375	585	0.375	646	0.375	707	0.375	768	0.375
342	0.375	403	0.375	464	0.375	525	0.375	586	0.375	647	0.375	708	0.375	769	0.375
343	0.375	404	0.375	465	0.375	526	0.375	587	0.375	648	0.375	709	0.375	770	0.375
344	0.375	405	0.375	466	0.375	527	0.375	588	0.375	649	0.375	710	0.375	771	0.375
345	0.375	406	0.375	467	0.375	528	0.375	589	0.375	650	0.375	711	0.375	772	0.375
346	0.375	407	0.375	468	0.375	529	0.375	590	0.375	651	0.375	712	0.375	773	0.375
347	0.375	408	0.375	469	0.375	530	0.375	591	0.375	652	0.375	713	0.375	774	0.375
348	0.375	409	0.375	470	0.375	531	0.375	592	0.375	653	0.375	714	0.375	775	0.375
349	0.375	410	0.375	471	0.375	532	0.375	593	0.375	654	0.375	715	0.375	776	0.375
350	0.375	411	0.375	472	0.375	533	0.375	594	0.375	655	0.375	716	0.375	777	0.375
351	0.375	412	0.375	473	0.375	534	0.375	595	0.375	656	0.375	717	0.375	778	0.375
352	0.375	413	0.375	474	0.375	535	0.375	596	0.375	657	0.375	718	0.375	779	0.375
353	0.375	414	0.375	475	0.375	536	0.375	597	0.375	658	0.375	719	0.375	780	0.375
354	0.375	415	0.375	476	0.375	537	0.375	598	0.375	659	0.375	720	0.375	781	0.375
355	0.375	416	0.375	477	0.375	538	0.375	599	0.375	660	0.375	721	0.375	782	0.375
356	0.375	417	0.375	478	0.375	539	0.375	600	0.375	661	0.375	722	0.375	783	0.375
357	0.375	418	0.375	479	0.375	540	0.375	601	0.375	662	0.375	723	0.375	784	0.375
358	0.375	419	0.375	480	0.375	541	0.375	602	0.375	663	0.375	724	0.375	785	0.375
359	0.375	420	0.375	481	0.375	542	0.375	603	0.375	664	0.375	725	0.375	786	0.375
360	0.375	421	0.375	482	0.375	543	0.375	604	0.375	665	0.375	726	0.375	787	0.375
361	0.375	422	0.375	483	0.375	544	0.375	605	0.375	666	0.375	727	0.375	788	0.375
362	0.375	423	0.375	484	0.375	545	0.375	606	0.375	667	0.375	728	0.375	789	0.375
363	0.375	424	0.375	485	0.375	546	0.375	607	0.375	668	0.375	729	0.375	790	0.375
364	0.375	425	0.375	486	0.375	547	0.375	608	0.375	669	0.375	730	0.375	791	0.375
365	0.375	426	0.375	487	0.375	548	0.375	609	0.375	670	0.375	731	0.375	792	0.375
366	0.375	427	0.375	488	0.375	549	0.375	610	0.375	671	0.375	732	0.375	793	0.375
367	0.375	428	0.375	489	0.375	550	0.375	611	0.375	672	0.375	733	0.375	794	0.375
368	0.375	429	0.375	490	0.375	551	0.375	612	0.375	673	0.375	734	0.375	795	0.375
369	0.375	430	0.375	491	0.375	552	0.375	613	0.375	674	0.375	735	0.375	796	0.375
370	0.375	431	0.375	492	0.375	553	0.375	614	0.375	675	0.375	736	0.375	797	0.375
371	0.375	432	0.375	493	0.375	554	0.375	615	0.375	676	0.375	737	0.375	798	0.375
372	0.375	433	0.375	494	0.375	555	0.375	616	0.375	677	0.375	738	0.375	799	0.375
373	0.375	434	0.375	495	0.375	556	0.375	617	0.375	678	0.375	739	0.375	800	0.375
374	0.375	435	0.375	496	0.375	557	0.375	618	0.375	679	0.375	740	0.375	801	0.375
375	0.375	436	0.375	497	0.375	558	0.375	619	0.375	680	0.375	741	0.375	802	0.375
376	0.375	437	0.375	498	0.375	559	0.375	620	0.375	681	0.375	742	0.375	803	0.375
377	0.375	438	0.375	499	0.375	560	0.375	621	0.375	682	0.375	743	0.375	804	0.375
378	0.375	439	0.375	500	0.375	561	0.375	622	0.375	683	0.375	744	0.375	805	0.375
379	0.375	440	0.375	501	0.375	562	0.375	623	0.375	684	0.375	745	0.375	806	0.375
380	0.375	441	0.375	502	0.375	563	0.375	624	0.375	685	0.375	746	0.375	807	0.375
381	0.375	442	0.375	503	0.375	564	0.375	625	0.375	686	0.375	747	0.375	808	0.375
382	0.375	443	0.375	504	0.375	565	0.375	626	0.375	687	0.375	748	0.375	809	0.375
383	0.375	444	0.375	505	0.375	566	0.375	627	0.375	688	0.375	749	0.375	810	0.375
384	0.375	445	0.375	506	0.375	567	0.375	628	0.375	689	0.375	750	0.375	811	0.375
385	0.375	446	0.375	507	0.375	568	0.375	629	0.375	690	0.375	751	0.375	812	0.375
386	0.375	447	0.375	508	0.375	569	0.375	630	0.375	691	0.375	752	0.375	813	0.375
387	0.375	448	0.375	509	0.375	570	0.375	631	0.375	692	0.375	753	0.375	814	0.375
388	0.375	449	0.375	510	0.375	571	0.375	632	0.375	693	0.375	754	0.375	815	0.375
389	0.375	450	0.375	511	0.375	572	0.375	633	0.375	694	0.375	755	0.375	816	0.375

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
817	0.375	878	0.375	939	0.375	1000	0.375	1061	0.375	1122	0.375	1183	0.375	1244	0.375
818	0.375	879	0.375	940	0.375	1001	0.375	1062	0.375	1123	0.375	1184	0.375	1245	0.375
819	0.375	880	0.375	941	0.375	1002	0.375	1063	0.375	1124	0.375	1185	0.375	1246	0.375
820	0.375	881	0.375	942	0.375	1003	0.375	1064	0.375	1125	0.375	1186	0.375	1247	0.375
821	0.375	882	0.375	943	0.375	1004	0.375	1065	0.375	1126	0.375	1187	0.375	1248	0.375
822	0.375	883	0.375	944	0.375	1005	0.375	1066	0.375	1127	0.375	1188	0.375	1249	0.375
823	0.375	884	0.375	945	0.375	1006	0.375	1067	0.375	1128	0.375	1189	0.375	1250	0.375
824	0.375	885	0.375	946	0.375	1007	0.375	1068	0.375	1129	0.375	1190	0.375	1251	0.375
825	0.375	886	0.375	947	0.375	1008	0.375	1069	0.375	1130	0.375	1191	0.375	1252	0.375
826	0.375	887	0.375	948	0.375	1009	0.375	1070	0.375	1131	0.375	1192	0.375	1253	0.375
827	0.375	888	0.375	949	0.375	1010	0.375	1071	0.375	1132	0.375	1193	0.375	1254	0.375
828	0.375	889	0.375	950	0.375	1011	0.375	1072	0.375	1133	0.375	1194	0.375	1255	0.375
829	0.375	890	0.375	951	0.375	1012	0.375	1073	0.375	1134	0.375	1195	0.375	1256	0.375
830	0.375	891	0.375	952	0.375	1013	0.375	1074	0.375	1135	0.375	1196	0.375	1257	0.375
831	0.375	892	0.375	953	0.375	1014	0.375	1075	0.375	1136	0.375	1197	0.375	1258	0.375
832	0.375	893	0.375	954	0.375	1015	0.375	1076	0.375	1137	0.375	1198	0.375	1259	0.375
833	0.375	894	0.375	955	0.375	1016	0.375	1077	0.375	1138	0.375	1199	0.375	1260	0.375
834	0.375	895	0.375	956	0.375	1017	0.375	1078	0.375	1139	0.375	1200	0.375	1261	0.375
835	0.375	896	0.375	957	0.375	1018	0.375	1079	0.375	1140	0.375	1201	0.375	1262	0.375
836	0.375	897	0.375	958	0.375	1019	0.375	1080	0.375	1141	0.375	1202	0.375	1263	0.375
837	0.375	898	0.375	959	0.375	1020	0.375	1081	0.375	1142	0.375	1203	0.375	1264	0.375
838	0.375	899	0.375	960	0.375	1021	0.375	1082	0.375	1143	0.375	1204	0.375	1265	0.375
839	0.375	900	0.375	961	0.375	1022	0.375	1083	0.375	1144	0.375	1205	0.375	1266	0.375
840	0.375	901	0.375	962	0.375	1023	0.375	1084	0.375	1145	0.375	1206	0.375	1267	0.375
841	0.375	902	0.375	963	0.375	1024	0.375	1085	0.375	1146	0.375	1207	0.375	1268	0.375
842	0.375	903	0.375	964	0.375	1025	0.375	1086	0.375	1147	0.375	1208	0.375	1269	0.375
843	0.375	904	0.375	965	0.375	1026	0.375	1087	0.375	1148	0.375	1209	0.375	1270	0.375
844	0.375	905	0.375	966	0.375	1027	0.375	1088	0.375	1149	0.375	1210	0.375	1271	0.375
845	0.375	906	0.375	967	0.375	1028	0.375	1089	0.375	1150	0.375	1211	0.375	1272	0.375
846	0.375	907	0.375	968	0.375	1029	0.375	1090	0.375	1151	0.375	1212	0.375	1273	0.375
847	0.375	908	0.375	969	0.375	1030	0.375	1091	0.375	1152	0.375	1213	0.375	1274	0.375
848	0.375	909	0.375	970	0.375	1031	0.375	1092	0.375	1153	0.375	1214	0.375	1275	0.375
849	0.375	910	0.375	971	0.375	1032	0.375	1093	0.375	1154	0.375	1215	0.375	1276	0.375
850	0.375	911	0.375	972	0.375	1033	0.375	1094	0.375	1155	0.375	1216	0.375	1277	0.375
851	0.375	912	0.375	973	0.375	1034	0.375	1095	0.375	1156	0.375	1217	0.375	1278	0.375
852	0.375	913	0.375	974	0.375	1035	0.375	1096	0.375	1157	0.375	1218	0.375	1279	0.375
853	0.375	914	0.375	975	0.375	1036	0.375	1097	0.375	1158	0.375	1219	0.375	1280	0.375
854	0.375	915	0.375	976	0.375	1037	0.375	1098	0.375	1159	0.375	1220	0.375	1281	0.375
855	0.375	916	0.375	977	0.375	1038	0.375	1099	0.375	1160	0.375	1221	0.375	1282	0.375
856	0.375	917	0.375	978	0.375	1039	0.375	1100	0.375	1161	0.375	1222	0.375	1283	0.375
857	0.375	918	0.375	979	0.375	1040	0.375	1101	0.375	1162	0.375	1223	0.375	1284	0.375
858	0.375	919	0.375	980	0.375	1041	0.375	1102	0.375	1163	0.375	1224	0.375	1285	0.375
859	0.375	920	0.375	981	0.375	1042	0.375	1103	0.375	1164	0.375	1225	0.375	1286	0.375
860	0.375	921	0.375	982	0.375	1043	0.375	1104	0.375	1165	0.375	1226	0.375	1287	0.375
861	0.375	922	0.375	983	0.375	1044	0.375	1105	0.375	1166	0.375	1227	0.375	1288	0.375
862	0.375	923	0.375	984	0.375	1045	0.375	1106	0.375	1167	0.375	1228	0.375	1289	0.375
863	0.375	924	0.375	985	0.375	1046	0.375	1107	0.375	1168	0.375	1229	0.375	1290	0.375
864	0.375	925	0.375	986	0.375	1047	0.375	1108	0.375	1169	0.375	1230	0.375	1291	0.375
865	0.375	926	0.375	987	0.375	1048	0.375	1109	0.375	1170	0.375	1231	0.375	1292	0.375
866	0.375	927	0.375	988	0.375	1049	0.375	1110	0.375	1171	0.375	1232	0.375	1293	0.375
867	0.375	928	0.375	989	0.375	1050	0.375	1111	0.375	1172	0.375	1233	0.375	1294	0.375
868	0.375	929	0.375	990	0.375	1051	0.375	1112	0.375	1173	0.375	1234	0.375	1295	0.375
869	0.375	930	0.375	991	0.375	1052	0.375	1113	0.375	1174	0.375	1235	0.375	1296	0.375
870	0.375	931	0.375	992	0.375	1053	0.375	1114	0.375	1175	0.375	1236	0.375	1297	0.375
871	0.375	932	0.375	993	0.375	1054	0.375	1115	0.375	1176	0.375	1237	0.375	1298	0.375
872	0.375	933	0.375	994	0.375	1055	0.375	1116	0.375	1177	0.375	1238	0.375	1299	0.375
873	0.375	934	0.375	995	0.375	1056	0.375	1117	0.375	1178	0.375	1239	0.375	1300	0.375
874	0.375	935	0.375	996	0.375	1057	0.375	1118	0.375	1179	0.375	1240	0.375	1301	0.375
875	0.375	936	0.375	997	0.375	1058	0.375	1119	0.375	1180	0.375	1241	0.375	1302	0.375
876	0.375	937	0.375	998	0.375	1059	0.375	1120	0.375	1181	0.375	1242	0.375	1303	0.375
877	0.375	938	0.375	999	0.375	1060	0.375	1121	0.375	1182	0.375	1243	0.375	1304	0.375

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1305	0.375	1322	0.375	1339	0.375	1356	0.375	1373	0.375	1390	0.375	1407	0.375	1424	0.375
1306	0.375	1323	0.375	1340	0.375	1357	0.375	1374	0.375	1391	0.375	1408	0.375	1425	0.375
1307	0.375	1324	0.375	1341	0.375	1358	0.375	1375	0.375	1392	0.375	1409	0.375	1426	0.375
1308	0.375	1325	0.375	1342	0.375	1359	0.375	1376	0.375	1393	0.375	1410	0.375	1427	0.375
1309	0.375	1326	0.375	1343	0.375	1360	0.375	1377	0.375	1394	0.375	1411	0.375	1428	0.375
1310	0.375	1327	0.375	1344	0.375	1361	0.375	1378	0.375	1395	0.375	1412	0.375	1429	0.375
1311	0.375	1328	0.375	1345	0.375	1362	0.375	1379	0.375	1396	0.375	1413	0.375	1430	0.375
1312	0.375	1329	0.375	1346	0.375	1363	0.375	1380	0.375	1397	0.375	1414	0.375	1431	0.375
1313	0.375	1330	0.375	1347	0.375	1364	0.375	1381	0.375	1398	0.375	1415	0.375	1432	0.375
1314	0.375	1331	0.375	1348	0.375	1365	0.375	1382	0.375	1399	0.375	1416	0.375	1433	0.375
1315	0.375	1332	0.375	1349	0.375	1366	0.375	1383	0.375	1400	0.375	1417	0.375	1434	0.375
1316	0.375	1333	0.375	1350	0.375	1367	0.375	1384	0.375	1401	0.375	1418	0.375	1435	0.375
1317	0.375	1334	0.375	1351	0.375	1368	0.375	1385	0.375	1402	0.375	1419	0.375	1436	0.375
1318	0.375	1335	0.375	1352	0.375	1369	0.375	1386	0.375	1403	0.375	1420	0.375	1437	0.375
1319	0.375	1336	0.375	1353	0.375	1370	0.375	1387	0.375	1404	0.375	1421	0.375	1438	0.375
1320	0.375	1337	0.375	1354	0.375	1371	0.375	1388	0.375	1405	0.375	1422	0.375	1439	0.375
1321	0.375	1338	0.375	1355	0.375	1372	0.375	1389	0.375	1406	0.375	1423	0.375	1440	0.375

Online Controls for Storm

Hydro-Brake® Optimum Manhole: CC5002, DS/PN: 1.002, Volume (m³): 522.4

Unit Reference	MD-SCU-0059-5000-2000-5000
Design Head (m)	2.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	59
Invert Level (m)	87.600
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	5.0	Kick-Flo®	0.089	1.2
Flush-Flo™	0.084	1.2	Mean Flow over Head Range	-	3.4

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)	Depth (m)	Flow (l/s)
0.100	1.3	0.800	3.3	2.000	5.0	4.000	6.9	7.000	9.1
0.200	1.7	1.000	3.6	2.200	5.2	4.500	7.3	7.500	9.4
0.300	2.1	1.200	3.9	2.400	5.4	5.000	7.7	8.000	9.7
0.400	2.4	1.400	4.2	2.600	5.7	5.500	8.1	8.500	9.9
0.500	2.6	1.600	4.5	3.000	6.1	6.000	8.4	9.000	10.2
0.600	2.9	1.800	4.8	3.500	6.5	6.500	8.7	9.500	10.5

Storage Structures for Storm

Cellular Storage Pipe: 1.001

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	87.601	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	470.0	0.0	1.200	470.0	0.0	1.201	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)
1.000	CC5000	15 Summer	2	+0%	30/15 Summer				88.079	-0.241
1.001	CC5001	1440 Winter	2	+0%	100/480 Summer	100/480 Winter			87.979	-0.823
1.002	CC5002	1440 Winter	2	+0%	2/60 Summer				87.979	0.229

		Flooded		Half Drain		Pipe		
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	CC5000	0.000	0.36			63.3	OK	
1.001	CC5001	0.000	0.00		673	5.9	OK	
1.002	CC5002	0.000	0.13			2.3	SURCHARGED	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	
1.000	CC5000	15 Summer	5	+0%	30/15 Summer				88.127	-0.193	
1.001	CC5001	1440 Winter	5	+0%	100/480 Summer	100/480 Winter			88.045	-0.757	
1.002	CC5002	1440 Winter	5	+0%	2/60 Summer				88.045	0.295	

		Flooded		Half Drain		Pipe		
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	CC5000	0.000	0.50			88.3	OK	
1.001	CC5001	0.000	0.00		775	9.7	OK	
1.002	CC5002	0.000	0.14			2.4	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)
1.000	CC5000	15 Summer		30	+0%	30/15 Summer				88.385	0.065
1.001	CC5001	1440 Summer		30	+0%	100/480 Summer	100/480 Winter			88.251	-0.551
1.002	CC5002	1440 Summer		30	+0%	2/60 Summer				88.251	0.501

		Flooded		Half Drain		Pipe		
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	CC5000	0.000	0.95			165.9	SURCHARGED	
1.001	CC5001	0.000	0.00		1150	9.0	OK	
1.002	CC5002	0.000	0.17			2.9	SURCHARGED	

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 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 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

Data Type Point

FEH Rainfall Version 2013

Cv (Summer) 1.000

Site Location GB 339198 334094 SJ 39198 34094

Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5

Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)
1.000	CC5000	15 Summer	100	+45%	30/15 Summer				89.427	1.107
1.001	CC5001	720 Winter	100	+45%	100/480 Summer	100/480 Winter			89.374	0.572
1.002	CC5002	720 Winter	100	+45%	2/60 Summer				89.376	1.626

Flooded				Half Drain Pipe			
PN	US/MH Name	Volume (m³)	Flow / Cap. (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	CC5000	0.000	1.90		332.8	FLOOD RISK	
1.001	CC5001	0.000	0.00		19.2	FLOOD RISK	
1.002	CC5002	0.000	0.25		4.4	FLOOD RISK	

APPENDIX M3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 30/03/2023 08:52	Designed by sgicivils	
File Commercial - Catchment 1 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	80.000	0.269	297.4	0.282	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.001	44.000	0.001	44000.0	0.283	0.00	0.0		0.050	→[↓]		Cellular Storage	
1.002	7.718	0.100	77.2	0.000	0.00	0.0	0.600		o	150	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	1.00	87.870	0.282	0.0	0.0	0.0	1.17	186.7	0.0
1.001	0.00	1.00	87.601	0.565	0.0	0.0	0.0	0.06	744.0	0.0
1.002	0.00	1.00	87.600	0.565	0.0	0.0	0.0	1.15	20.2	0.0

SGi Consulting		Page 2
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 30/03/2023 08:52	Designed by sgicivils	
File Commercial - Catchment 1 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.282	0.282	0.282
1.001	-	-	100	0.283	0.283	0.283
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.565	0.565	0.565

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)
1.002	CC5003	89.600	87.500	0.000	0	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: CC5002, DS/PN: 1.002, Volume (m³): 522.4

Unit Reference	MD-SCU-0057-5000-2200-5000
Design Head (m)	2.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	57
Invert Level (m)	87.600
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	5.0	Kick-Flo®	0.085	1.1
Flush-Flo™	0.077	1.2	Mean Flow over Head Range	-	3.4

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)	Depth (m)	Flow (l/s)
0.100	1.2	0.800	3.1	2.000	4.8	4.000	6.6	7.000	8.7
0.200	1.7	1.000	3.5	2.200	5.0	4.500	7.0	7.500	8.9
0.300	2.0	1.200	3.8	2.400	5.2	5.000	7.4	8.000	9.2
0.400	2.3	1.400	4.0	2.600	5.4	5.500	7.7	8.500	9.5
0.500	2.5	1.600	4.3	3.000	5.8	6.000	8.0	9.000	9.8
0.600	2.7	1.800	4.5	3.500	6.2	6.500	8.4	9.500	10.0

Storage Structures for Storm

Cellular Storage Pipe: 1.001

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	87.601	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	470.0	0.0	1.200	470.0	0.0	1.201	0.0	0.0

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep 2.5 Second Increment (Extended)	
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 5, 30, 100
Climate Change (%)	0, 0, 0, 45

									Water	Surcharged	Flooded
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CC5000	15 Summer	2	+0%	30/15 Summer				88.079	-0.241	0.000
1.001	CC5001	960 Summer	2	+0%					87.880	-0.922	0.000
1.002	CC5002	960 Summer	2	+0%	2/60 Summer				87.880	0.130	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
				Time (mins)	Flow (l/s)		
1.000	CC5000	0.36			63.3	OK	
1.001	CC5001	0.00		512	7.4	OK	
1.002	CC5002	0.11			1.9	SURCHARGED	

5 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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep 2.5 Second Increment (Extended)	
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 5, 30, 100
Climate Change (%)	0, 0, 0, 45

									Water	Surcharged	Flooded
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CC5000	15 Summer	5	+0%	30/15 Summer				88.127	-0.193	0.000
1.001	CC5001	600 Winter	5	+0%					87.956	-0.846	0.000
1.002	CC5002	600 Winter	5	+0%	2/60 Summer				87.956	0.206	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
				Time (mins)	Flow (l/s)		
1.000	CC5000	0.50			88.3	OK	
1.001	CC5001	0.00		432	9.3	OK	
1.002	CC5002	0.12			2.2	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
1.000	CC5000	15 Summer	30	+0%	30/15 Summer				88.385	0.065	0.000
1.001	CC5001	600 Winter	30	+0%					88.180	-0.622	0.000
1.002	CC5002	600 Winter	30	+0%	2/60 Summer				88.180	0.430	0.000

			Half Drain		Pipe					
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded			
1.000	CC5000	0.95			165.9	SURCHARGED				
1.001	CC5001	0.00			11.8	OK				
1.002	CC5002	0.15			2.7	SURCHARGED				

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 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 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

Data Type Point

FEH Rainfall Version 2013 Cv (Summer) 1.000

Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CC5000	15 Summer		100	+45%	30/15 Summer				89.427	1.107	0.000
1.001	CC5001	600 Winter		100	+45%					88.773	-0.029	0.000
1.002	CC5002	600 Winter		100	+45%	2/60 Summer				88.774	1.024	0.000

			Half Drain Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded Status
1.000	CC5000	1.90			332.8	FLOOD RISK
1.001	CC5001	0.01			22.4	OK
1.002	CC5002	0.21			3.7	SURCHARGED

APPENDIX NI



Surface Water Strategy

Development Catchment Plan

Commercial 2 = 22550m²

Modelled Impermeable Area

Commercial 2 @ 65% PIMP = 14660m²

Surface Water Discharge Rates

7.6 to 28.2 l/s. Refer to drainage strategy.

Surface Water Quality

SW Runoff from the commercial plots and associated infrastructure must be cleansed/treated within the plot in accordance with Shropshire current guidance/Ciria C753 standards prior to discharging to the watercourse.

Rev.	Description	Rev. by	Date
Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF T: 0161 837 1500 W: www.sginfrastructure.co.uk			
Client			
Formal Investments			
Architect			
Roberts Limbrick			
Project			
Ellesmere Wharf Phase 2			
Title			
Surface Water Strategy Preliminary Drainage - Leisure 1			
Date	22.02.2023	Drawn By	DOR
Size	A1	Checked By	DOR
Scale	1:500	Approved By	DOR
Dwg. No.	C1581-SGI-ZZ-00-DR-C-0205		
			Rev
			P3

APPENDIX N2

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 09:45	Designed by sgicivils	
File Commercial - Catchment 2 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	45.000	0.940	47.9	0.184	2.50	0.0	0.600		o	375	Pipe/Conduit	
1.001	36.000	0.001	36000.0	0.000	0.00	0.0		0.035 → _ /			Pond/Tank	
1.002	25.000	0.064	390.6	0.000	0.00	0.0	0.600		o	900	Pipe/Conduit	
2.000	72.263	0.605	119.4	0.184	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.003	26.000	0.065	400.0	0.183	0.00	0.0	0.600		o	900	Pipe/Conduit	
3.000	60.000	0.150	400.0	0.183	2.50	0.0	0.600		o	600	Pipe/Conduit	
3.001	60.000	0.150	400.0	0.183	0.00	0.0	0.600		o	750	Pipe/Conduit	
3.002	60.000	0.150	400.0	0.183	0.00	0.0	0.600		o	900	Pipe/Conduit	
1.004	28.000	0.070	400.0	0.183	0.00	0.0	0.600		o	900	Pipe/Conduit	
4.000	80.000	0.270	296.3	0.183	2.50	0.0	0.600		o	600	Pipe/Conduit	
1.005	10.000	0.100	100.0	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	0.00	1.00	86.550	0.184	0.0	0.0	0.0	2.62	289.9	0.0
1.001	0.00	1.00	85.615	0.184	0.0	0.0	0.0	0.11	6218.0	0.0
1.002	0.00	1.00	85.614	0.184	0.0	0.0	0.0	1.58	1004.6	0.0
2.000	0.00	1.00	86.605	0.184	0.0	0.0	0.0	1.86	295.7	0.0
1.003	0.00	1.00	85.550	0.551	0.0	0.0	0.0	1.56	992.7	0.0
3.000	0.00	1.00	86.235	0.183	0.0	0.0	0.0	1.21	342.5	0.0
3.001	0.00	1.00	85.935	0.366	0.0	0.0	0.0	1.39	615.4	0.0
3.002	0.00	1.00	85.635	0.549	0.0	0.0	0.0	1.56	992.7	0.0
1.004	0.00	1.00	85.485	1.283	0.0	0.0	0.0	1.56	992.7	0.0
4.000	0.00	1.00	85.985	0.183	0.0	0.0	0.0	1.41	398.5	0.0
1.005	0.00	1.00	85.415	1.466	0.0	0.0	0.0	1.57	111.1	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.184	0.184	0.184
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.184	0.184	0.184
1.003	-	-	100	0.183	0.183	0.183
3.000	-	-	100	0.183	0.183	0.183
3.001	-	-	100	0.183	0.183	0.183
3.002	-	-	100	0.183	0.183	0.183
1.004	-	-	100	0.183	0.183	0.183
4.000	-	-	100	0.183	0.183	0.183
1.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.466	1.466	1.466

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)
1.005	CC1006	87.900	85.315	0.000	0	0

Online Controls for Storm

Complex Manhole: CC1005, DS/PN: 1.005, Volume (m³): 44.9

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0112-8000-2385-8000
Design Head (m)	2.385
Design Flow (l/s)	8.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	112
Invert Level (m)	85.415
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)	2.385	8.0	Kick-Flo®	1.001	5.3
Flush-Flo™	0.490	6.7	Mean Flow over Head Range	-	6.4

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)	Depth (m)	Flow (l/s)
0.100	3.9	0.800	6.3	2.000	7.4	4.000	10.2	7.000	13.3
0.200	5.9	1.000	5.4	2.200	7.7	4.500	10.8	7.500	13.8
0.300	6.4	1.200	5.8	2.400	8.0	5.000	11.3	8.000	14.2
0.400	6.7	1.400	6.2	2.600	8.3	5.500	11.9	8.500	14.6
0.500	6.7	1.600	6.6	3.000	8.9	6.000	12.4	9.000	15.0
0.600	6.7	1.800	7.0	3.500	9.6	6.500	12.9	9.500	15.4

Hydro-Brake® Optimum

Unit Reference	MD-SCU-0152-2500-1185-2500
Design Head (m)	1.185
Design Flow (l/s)	25.0
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	152
Invert Level (m)	86.615
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)	1.185	25.0	Kick-Flo®	0.228	11.5
Flush-Flo™	0.185	11.7	Mean Flow over Head Range	-	16.8

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)	Depth (m)	Flow (l/s)
0.100	6.0	0.300	13.0	0.500	16.6	0.800	20.7	1.200	25.1
0.200	11.6	0.400	14.9	0.600	18.1	1.000	23.0	1.400	27.1

Hydro-Brake® Optimum

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.600	28.9	2.400	35.1	4.000	44.9	6.000	54.7	8.000	62.9
1.800	30.6	2.600	36.5	4.500	47.6	6.500	56.9	8.500	64.8
2.000	32.1	3.000	39.1	5.000	50.1	7.000	59.0	9.000	66.6
2.200	33.7	3.500	42.1	5.500	52.4	7.500	61.0	9.500	68.4

Storage Structures for Storm

Tank or Pond Pipe: 1.001

Manning's N 0.035 Invert Level (m) 85.615

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	290.0	2.185	1526.0	2.186	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	CC1000	15 Summer	2	+0%	100/60 Summer					86.660	-0.265	0.000
1.001	CC1001	360 Winter	2	+0%						86.042	-1.758	0.000
1.002	CC1002	360 Winter	2	+0%	30/360 Summer					86.042	-0.472	0.000
2.000	CC1100	15 Summer	2	+0%	100/15 Summer					86.734	-0.321	0.000
1.003	CC1003	360 Winter	2	+0%	30/15 Summer					86.043	-0.407	0.000
3.000	CC1200	15 Summer	2	+0%	100/15 Summer					86.397	-0.438	0.000
3.001	CC1201	15 Summer	2	+0%	100/15 Summer					86.124	-0.561	0.000
3.002	CC1202	360 Winter	2	+0%	30/360 Summer					86.042	-0.493	0.000
1.004	CC1004	360 Winter	2	+0%	30/15 Summer					86.042	-0.343	0.000
4.000	CC1300	15 Summer	2	+0%	100/15 Summer					86.132	-0.453	0.000
1.005	CC1005	360 Winter	2	+0%	2/15 Summer					86.043	0.328	0.000

		Half Drain		Pipe				Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded	
1.000	CC1000	0.18			49.2	OK		
1.001	CC1001	0.00			21.9	OK		
1.002	CC1002	0.02			11.8	OK		
2.000	CC1100	0.17			47.4	OK		
1.003	CC1003	0.01			10.5	OK		
3.000	CC1200	0.16			49.6	OK		
3.001	CC1201	0.13			71.4	OK		
3.002	CC1202	0.02			15.5	OK		
1.004	CC1004	0.01			8.3	OK		
4.000	CC1300	0.12			45.7	OK		
1.005	CC1005	0.08			6.7	SURCHARGED		

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	CC1000	15	Summer	5	+0%	100/60	Summer			86.681	-0.244	0.000
1.001	CC1001	360	Winter	5	+0%					86.177	-1.623	0.000
1.002	CC1002	360	Winter	5	+0%	30/360	Summer			86.177	-0.337	0.000
2.000	CC1100	15	Summer	5	+0%	100/15	Summer			86.759	-0.296	0.000
1.003	CC1003	360	Winter	5	+0%	30/15	Summer			86.178	-0.272	0.000
3.000	CC1200	15	Summer	5	+0%	100/15	Summer			86.429	-0.406	0.000
3.001	CC1201	360	Winter	5	+0%	100/15	Summer			86.178	-0.507	0.000
3.002	CC1202	360	Winter	5	+0%	30/360	Summer			86.178	-0.357	0.000
1.004	CC1004	360	Winter	5	+0%	30/15	Summer			86.178	-0.207	0.000
4.000	CC1300	360	Winter	5	+0%	100/15	Summer			86.178	-0.407	0.000
1.005	CC1005	360	Winter	5	+0%	2/15	Summer			86.178	0.463	0.000

		Half Drain Pipe			Level	
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status
1.000	CC1000	0.26			69.0	OK
1.001	CC1001	0.00			10.5	OK
1.002	CC1002	0.01			8.2	OK
2.000	CC1100	0.24			66.6	OK
1.003	CC1003	0.01			9.4	OK
3.000	CC1200	0.21			65.5	OK
3.001	CC1201	0.03			13.8	OK
3.002	CC1202	0.02			18.9	OK
1.004	CC1004	0.01			7.9	OK
4.000	CC1300	0.02			6.9	OK
1.005	CC1005	0.08			6.7	SURCHARGED

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
1.000	CC1000	240 Winter	100	+45%	100/60 Summer				87.117	0.192	0.000
1.001	CC1001	240 Winter	100	+45%					87.115	-0.685	0.000
1.002	CC1002	240 Winter	100	+45%	30/360 Summer				87.115	0.601	0.000
2.000	CC1100	15 Summer	100	+45%	100/15 Summer				87.870	0.815	0.000
1.003	CC1003	60 Winter	100	+45%	30/15 Summer				87.544	1.094	0.000
3.000	CC1200	15 Summer	100	+45%	100/15 Summer				87.826	0.991	0.000
3.001	CC1201	60 Winter	100	+45%	100/15 Summer				87.706	1.021	0.000
3.002	CC1202	60 Winter	100	+45%	30/360 Summer				87.698	1.163	0.000
1.004	CC1004	60 Winter	100	+45%	30/15 Summer				87.698	1.313	0.000
4.000	CC1300	15 Summer	100	+45%	100/15 Summer				87.791	1.206	0.000
1.005	CC1005	60 Winter	100	+45%	2/15 Summer				87.703	1.988	0.000

		Half Drain		Pipe				Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded	
1.000	CC1000	0.12			30.9	SURCHARGED		
1.001	CC1001	0.00			29.1	OK		
1.002	CC1002	0.21			151.3	SURCHARGED		
2.000	CC1100	0.83			230.4	SURCHARGED		
1.003	CC1003	0.08			53.6	FLOOD RISK		
3.000	CC1200	0.72			219.0	SURCHARGED		
3.001	CC1201	0.41			220.1	SURCHARGED		
3.002	CC1202	0.35			288.8	SURCHARGED		
1.004	CC1004	0.10			72.0	SURCHARGED		
4.000	CC1300	0.59			217.3	FLOOD RISK		
1.005	CC1005	0.29			23.0	FLOOD RISK		

APPENDIX N3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 09:50	Designed by sgicivils	
File Commercial - Catchment 2 001.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	45.000	0.940	47.9	0.184	2.50	0.0	0.600		o	375	Pipe/Conduit	
1.001	36.000	0.001	36000.0	0.000	0.00	0.0		0.035 → _ /			Pond/Tank	
1.002	25.000	0.064	390.6	0.000	0.00	0.0	0.600		o	900	Pipe/Conduit	
2.000	72.263	0.605	119.4	0.184	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.003	26.000	0.065	400.0	0.183	0.00	0.0	0.600		o	900	Pipe/Conduit	
3.000	60.000	0.150	400.0	0.183	2.50	0.0	0.600		o	600	Pipe/Conduit	
3.001	60.000	0.150	400.0	0.183	0.00	0.0	0.600		o	750	Pipe/Conduit	
3.002	60.000	0.150	400.0	0.183	0.00	0.0	0.600		o	900	Pipe/Conduit	
1.004	28.000	0.070	400.0	0.183	0.00	0.0	0.600		o	900	Pipe/Conduit	
4.000	80.000	0.270	296.3	0.183	2.50	0.0	0.600		o	600	Pipe/Conduit	
1.005	10.000	0.100	100.0	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	0.00	1.00	86.550	0.184	0.0	0.0	0.0	2.62	289.9	0.0
1.001	0.00	1.00	85.615	0.184	0.0	0.0	0.0	0.11	6218.0	0.0
1.002	0.00	1.00	85.614	0.184	0.0	0.0	0.0	1.58	1004.6	0.0
2.000	0.00	1.00	86.605	0.184	0.0	0.0	0.0	1.86	295.7	0.0
1.003	0.00	1.00	85.550	0.551	0.0	0.0	0.0	1.56	992.7	0.0
3.000	0.00	1.00	86.235	0.183	0.0	0.0	0.0	1.21	342.5	0.0
3.001	0.00	1.00	85.935	0.366	0.0	0.0	0.0	1.39	615.4	0.0
3.002	0.00	1.00	85.635	0.549	0.0	0.0	0.0	1.56	992.7	0.0
1.004	0.00	1.00	85.485	1.283	0.0	0.0	0.0	1.56	992.7	0.0
4.000	0.00	1.00	85.985	0.183	0.0	0.0	0.0	1.41	398.5	0.0
1.005	0.00	1.00	85.415	1.466	0.0	0.0	0.0	1.57	111.1	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.184	0.184	0.184
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.184	0.184	0.184
1.003	-	-	100	0.183	0.183	0.183
3.000	-	-	100	0.183	0.183	0.183
3.001	-	-	100	0.183	0.183	0.183
3.002	-	-	100	0.183	0.183	0.183
1.004	-	-	100	0.183	0.183	0.183
4.000	-	-	100	0.183	0.183	0.183
1.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.466	1.466	1.466

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.005 CC1006 87.900 85.315 0.000 0 0

Datum (m) 85.315 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	1.715	34	1.715	67	1.715	100	1.715	133	1.715	166	1.715	199	1.715	232	1.715
2	1.715	35	1.715	68	1.715	101	1.715	134	1.715	167	1.715	200	1.715	233	1.715
3	1.715	36	1.715	69	1.715	102	1.715	135	1.715	168	1.715	201	1.715	234	1.715
4	1.715	37	1.715	70	1.715	103	1.715	136	1.715	169	1.715	202	1.715	235	1.715
5	1.715	38	1.715	71	1.715	104	1.715	137	1.715	170	1.715	203	1.715	236	1.715
6	1.715	39	1.715	72	1.715	105	1.715	138	1.715	171	1.715	204	1.715	237	1.715
7	1.715	40	1.715	73	1.715	106	1.715	139	1.715	172	1.715	205	1.715	238	1.715
8	1.715	41	1.715	74	1.715	107	1.715	140	1.715	173	1.715	206	1.715	239	1.715
9	1.715	42	1.715	75	1.715	108	1.715	141	1.715	174	1.715	207	1.715	240	1.715
10	1.715	43	1.715	76	1.715	109	1.715	142	1.715	175	1.715	208	1.715	241	1.715
11	1.715	44	1.715	77	1.715	110	1.715	143	1.715	176	1.715	209	1.715	242	1.715
12	1.715	45	1.715	78	1.715	111	1.715	144	1.715	177	1.715	210	1.715	243	1.715
13	1.715	46	1.715	79	1.715	112	1.715	145	1.715	178	1.715	211	1.715	244	1.715
14	1.715	47	1.715	80	1.715	113	1.715	146	1.715	179	1.715	212	1.715	245	1.715
15	1.715	48	1.715	81	1.715	114	1.715	147	1.715	180	1.715	213	1.715	246	1.715
16	1.715	49	1.715	82	1.715	115	1.715	148	1.715	181	1.715	214	1.715	247	1.715
17	1.715	50	1.715	83	1.715	116	1.715	149	1.715	182	1.715	215	1.715	248	1.715
18	1.715	51	1.715	84	1.715	117	1.715	150	1.715	183	1.715	216	1.715	249	1.715
19	1.715	52	1.715	85	1.715	118	1.715	151	1.715	184	1.715	217	1.715	250	1.715
20	1.715	53	1.715	86	1.715	119	1.715	152	1.715	185	1.715	218	1.715	251	1.715
21	1.715	54	1.715	87	1.715	120	1.715	153	1.715	186	1.715	219	1.715	252	1.715
22	1.715	55	1.715	88	1.715	121	1.715	154	1.715	187	1.715	220	1.715	253	1.715
23	1.715	56	1.715	89	1.715	122	1.715	155	1.715	188	1.715	221	1.715	254	1.715
24	1.715	57	1.715	90	1.715	123	1.715	156	1.715	189	1.715	222	1.715	255	1.715
25	1.715	58	1.715	91	1.715	124	1.715	157	1.715	190	1.715	223	1.715	256	1.715
26	1.715	59	1.715	92	1.715	125	1.715	158	1.715	191	1.715	224	1.715	257	1.715
27	1.715	60	1.715	93	1.715	126	1.715	159	1.715	192	1.715	225	1.715	258	1.715
28	1.715	61	1.715	94	1.715	127	1.715	160	1.715	193	1.715	226	1.715	259	1.715
29	1.715	62	1.715	95	1.715	128	1.715	161	1.715	194	1.715	227	1.715	260	1.715
30	1.715	63	1.715	96	1.715	129	1.715	162	1.715	195	1.715	228	1.715	261	1.715
31	1.715	64	1.715	97	1.715	130	1.715	163	1.715	196	1.715	229	1.715	262	1.715
32	1.715	65	1.715	98	1.715	131	1.715	164	1.715	197	1.715	230	1.715	263	1.715
33	1.715	66	1.715	99	1.715	132	1.715	165	1.715	198	1.715	231	1.715	264	1.715

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
265	1.715	326	1.715	387	1.715	448	1.715	509	1.715	570	1.715	631	1.715	692	1.715
266	1.715	327	1.715	388	1.715	449	1.715	510	1.715	571	1.715	632	1.715	693	1.715
267	1.715	328	1.715	389	1.715	450	1.715	511	1.715	572	1.715	633	1.715	694	1.715
268	1.715	329	1.715	390	1.715	451	1.715	512	1.715	573	1.715	634	1.715	695	1.715
269	1.715	330	1.715	391	1.715	452	1.715	513	1.715	574	1.715	635	1.715	696	1.715
270	1.715	331	1.715	392	1.715	453	1.715	514	1.715	575	1.715	636	1.715	697	1.715
271	1.715	332	1.715	393	1.715	454	1.715	515	1.715	576	1.715	637	1.715	698	1.715
272	1.715	333	1.715	394	1.715	455	1.715	516	1.715	577	1.715	638	1.715	699	1.715
273	1.715	334	1.715	395	1.715	456	1.715	517	1.715	578	1.715	639	1.715	700	1.715
274	1.715	335	1.715	396	1.715	457	1.715	518	1.715	579	1.715	640	1.715	701	1.715
275	1.715	336	1.715	397	1.715	458	1.715	519	1.715	580	1.715	641	1.715	702	1.715
276	1.715	337	1.715	398	1.715	459	1.715	520	1.715	581	1.715	642	1.715	703	1.715
277	1.715	338	1.715	399	1.715	460	1.715	521	1.715	582	1.715	643	1.715	704	1.715
278	1.715	339	1.715	400	1.715	461	1.715	522	1.715	583	1.715	644	1.715	705	1.715
279	1.715	340	1.715	401	1.715	462	1.715	523	1.715	584	1.715	645	1.715	706	1.715
280	1.715	341	1.715	402	1.715	463	1.715	524	1.715	585	1.715	646	1.715	707	1.715
281	1.715	342	1.715	403	1.715	464	1.715	525	1.715	586	1.715	647	1.715	708	1.715
282	1.715	343	1.715	404	1.715	465	1.715	526	1.715	587	1.715	648	1.715	709	1.715
283	1.715	344	1.715	405	1.715	466	1.715	527	1.715	588	1.715	649	1.715	710	1.715
284	1.715	345	1.715	406	1.715	467	1.715	528	1.715	589	1.715	650	1.715	711	1.715
285	1.715	346	1.715	407	1.715	468	1.715	529	1.715	590	1.715	651	1.715	712	1.715
286	1.715	347	1.715	408	1.715	469	1.715	530	1.715	591	1.715	652	1.715	713	1.715
287	1.715	348	1.715	409	1.715	470	1.715	531	1.715	592	1.715	653	1.715	714	1.715
288	1.715	349	1.715	410	1.715	471	1.715	532	1.715	593	1.715	654	1.715	715	1.715
289	1.715	350	1.715	411	1.715	472	1.715	533	1.715	594	1.715	655	1.715	716	1.715
290	1.715	351	1.715	412	1.715	473	1.715	534	1.715	595	1.715	656	1.715	717	1.715
291	1.715	352	1.715	413	1.715	474	1.715	535	1.715	596	1.715	657	1.715	718	1.715
292	1.715	353	1.715	414	1.715	475	1.715	536	1.715	597	1.715	658	1.715	719	1.715
293	1.715	354	1.715	415	1.715	476	1.715	537	1.715	598	1.715	659	1.715	720	1.715
294	1.715	355	1.715	416	1.715	477	1.715	538	1.715	599	1.715	660	1.715	721	1.715
295	1.715	356	1.715	417	1.715	478	1.715	539	1.715	600	1.715	661	1.715	722	1.715
296	1.715	357	1.715	418	1.715	479	1.715	540	1.715	601	1.715	662	1.715	723	1.715
297	1.715	358	1.715	419	1.715	480	1.715	541	1.715	602	1.715	663	1.715	724	1.715
298	1.715	359	1.715	420	1.715	481	1.715	542	1.715	603	1.715	664	1.715	725	1.715
299	1.715	360	1.715	421	1.715	482	1.715	543	1.715	604	1.715	665	1.715	726	1.715
300	1.715	361	1.715	422	1.715	483	1.715	544	1.715	605	1.715	666	1.715	727	1.715
301	1.715	362	1.715	423	1.715	484	1.715	545	1.715	606	1.715	667	1.715	728	1.715
302	1.715	363	1.715	424	1.715	485	1.715	546	1.715	607	1.715	668	1.715	729	1.715
303	1.715	364	1.715	425	1.715	486	1.715	547	1.715	608	1.715	669	1.715	730	1.715
304	1.715	365	1.715	426	1.715	487	1.715	548	1.715	609	1.715	670	1.715	731	1.715
305	1.715	366	1.715	427	1.715	488	1.715	549	1.715	610	1.715	671	1.715	732	1.715
306	1.715	367	1.715	428	1.715	489	1.715	550	1.715	611	1.715	672	1.715	733	1.715
307	1.715	368	1.715	429	1.715	490	1.715	551	1.715	612	1.715	673	1.715	734	1.715
308	1.715	369	1.715	430	1.715	491	1.715	552	1.715	613	1.715	674	1.715	735	1.715
309	1.715	370	1.715	431	1.715	492	1.715	553	1.715	614	1.715	675	1.715	736	1.715
310	1.715	371	1.715	432	1.715	493	1.715	554	1.715	615	1.715	676	1.715	737	1.715
311	1.715	372	1.715	433	1.715	494	1.715	555	1.715	616	1.715	677	1.715	738	1.715
312	1.715	373	1.715	434	1.715	495	1.715	556	1.715	617	1.715	678	1.715	739	1.715
313	1.715	374	1.715	435	1.715	496	1.715	557	1.715	618	1.715	679	1.715	740	1.715
314	1.715	375	1.715	436	1.715	497	1.715	558	1.715	619	1.715	680	1.715	741	1.715
315	1.715	376	1.715	437	1.715	498	1.715	559	1.715	620	1.715	681	1.715	742	1.715
316	1.715	377	1.715	438	1.715	499	1.715	560	1.715	621	1.715	682	1.715	743	1.715
317	1.715	378	1.715	439	1.715	500	1.715	561	1.715	622	1.715	683	1.715	744	1.715
318	1.715	379	1.715	440	1.715	501	1.715	562	1.715	623	1.715	684	1.715	745	1.715
319	1.715	380	1.715	441	1.715	502	1.715	563	1.715	624	1.715	685	1.715	746	1.715
320	1.715	381	1.715	442	1.715	503	1.715	564	1.715	625	1.715	686	1.715	747	1.715
321	1.715	382	1.715	443	1.715	504	1.715	565	1.715	626	1.715	687	1.715	748	1.715
322	1.715	383	1.715	444	1.715	505	1.715	566	1.715	627	1.715	688	1.715	749	1.715
323	1.715	384	1.715	445	1.715	506	1.715	567	1.715	628	1.715	689	1.715	750	1.715
324	1.715	385	1.715	446	1.715	507	1.715	568	1.715	629	1.715	690	1.715	751	1.715
325	1.715	386	1.715	447	1.715	508	1.715	569	1.715	630	1.715	691	1.715	752	1.715

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
753	1.715	814	1.715	875	1.715	936	1.715	997	1.715	1058	1.715	1119	1.715	1180	1.715
754	1.715	815	1.715	876	1.715	937	1.715	998	1.715	1059	1.715	1120	1.715	1181	1.715
755	1.715	816	1.715	877	1.715	938	1.715	999	1.715	1060	1.715	1121	1.715	1182	1.715
756	1.715	817	1.715	878	1.715	939	1.715	1000	1.715	1061	1.715	1122	1.715	1183	1.715
757	1.715	818	1.715	879	1.715	940	1.715	1001	1.715	1062	1.715	1123	1.715	1184	1.715
758	1.715	819	1.715	880	1.715	941	1.715	1002	1.715	1063	1.715	1124	1.715	1185	1.715
759	1.715	820	1.715	881	1.715	942	1.715	1003	1.715	1064	1.715	1125	1.715	1186	1.715
760	1.715	821	1.715	882	1.715	943	1.715	1004	1.715	1065	1.715	1126	1.715	1187	1.715
761	1.715	822	1.715	883	1.715	944	1.715	1005	1.715	1066	1.715	1127	1.715	1188	1.715
762	1.715	823	1.715	884	1.715	945	1.715	1006	1.715	1067	1.715	1128	1.715	1189	1.715
763	1.715	824	1.715	885	1.715	946	1.715	1007	1.715	1068	1.715	1129	1.715	1190	1.715
764	1.715	825	1.715	886	1.715	947	1.715	1008	1.715	1069	1.715	1130	1.715	1191	1.715
765	1.715	826	1.715	887	1.715	948	1.715	1009	1.715	1070	1.715	1131	1.715	1192	1.715
766	1.715	827	1.715	888	1.715	949	1.715	1010	1.715	1071	1.715	1132	1.715	1193	1.715
767	1.715	828	1.715	889	1.715	950	1.715	1011	1.715	1072	1.715	1133	1.715	1194	1.715
768	1.715	829	1.715	890	1.715	951	1.715	1012	1.715	1073	1.715	1134	1.715	1195	1.715
769	1.715	830	1.715	891	1.715	952	1.715	1013	1.715	1074	1.715	1135	1.715	1196	1.715
770	1.715	831	1.715	892	1.715	953	1.715	1014	1.715	1075	1.715	1136	1.715	1197	1.715
771	1.715	832	1.715	893	1.715	954	1.715	1015	1.715	1076	1.715	1137	1.715	1198	1.715
772	1.715	833	1.715	894	1.715	955	1.715	1016	1.715	1077	1.715	1138	1.715	1199	1.715
773	1.715	834	1.715	895	1.715	956	1.715	1017	1.715	1078	1.715	1139	1.715	1200	1.715
774	1.715	835	1.715	896	1.715	957	1.715	1018	1.715	1079	1.715	1140	1.715	1201	1.715
775	1.715	836	1.715	897	1.715	958	1.715	1019	1.715	1080	1.715	1141	1.715	1202	1.715
776	1.715	837	1.715	898	1.715	959	1.715	1020	1.715	1081	1.715	1142	1.715	1203	1.715
777	1.715	838	1.715	899	1.715	960	1.715	1021	1.715	1082	1.715	1143	1.715	1204	1.715
778	1.715	839	1.715	900	1.715	961	1.715	1022	1.715	1083	1.715	1144	1.715	1205	1.715
779	1.715	840	1.715	901	1.715	962	1.715	1023	1.715	1084	1.715	1145	1.715	1206	1.715
780	1.715	841	1.715	902	1.715	963	1.715	1024	1.715	1085	1.715	1146	1.715	1207	1.715
781	1.715	842	1.715	903	1.715	964	1.715	1025	1.715	1086	1.715	1147	1.715	1208	1.715
782	1.715	843	1.715	904	1.715	965	1.715	1026	1.715	1087	1.715	1148	1.715	1209	1.715
783	1.715	844	1.715	905	1.715	966	1.715	1027	1.715	1088	1.715	1149	1.715	1210	1.715
784	1.715	845	1.715	906	1.715	967	1.715	1028	1.715	1089	1.715	1150	1.715	1211	1.715
785	1.715	846	1.715	907	1.715	968	1.715	1029	1.715	1090	1.715	1151	1.715	1212	1.715
786	1.715	847	1.715	908	1.715	969	1.715	1030	1.715	1091	1.715	1152	1.715	1213	1.715
787	1.715	848	1.715	909	1.715	970	1.715	1031	1.715	1092	1.715	1153	1.715	1214	1.715
788	1.715	849	1.715	910	1.715	971	1.715	1032	1.715	1093	1.715	1154	1.715	1215	1.715
789	1.715	850	1.715	911	1.715	972	1.715	1033	1.715	1094	1.715	1155	1.715	1216	1.715
790	1.715	851	1.715	912	1.715	973	1.715	1034	1.715	1095	1.715	1156	1.715	1217	1.715
791	1.715	852	1.715	913	1.715	974	1.715	1035	1.715	1096	1.715	1157	1.715	1218	1.715
792	1.715	853	1.715	914	1.715	975	1.715	1036	1.715	1097	1.715	1158	1.715	1219	1.715
793	1.715	854	1.715	915	1.715	976	1.715	1037	1.715	1098	1.715	1159	1.715	1220	1.715
794	1.715	855	1.715	916	1.715	977	1.715	1038	1.715	1099	1.715	1160	1.715	1221	1.715
795	1.715	856	1.715	917	1.715	978	1.715	1039	1.715	1100	1.715	1161	1.715	1222	1.715
796	1.715	857	1.715	918	1.715	979	1.715	1040	1.715	1101	1.715	1162	1.715	1223	1.715
797	1.715	858	1.715	919	1.715	980	1.715	1041	1.715	1102	1.715	1163	1.715	1224	1.715
798	1.715	859	1.715	920	1.715	981	1.715	1042	1.715	1103	1.715	1164	1.715	1225	1.715
799	1.715	860	1.715	921	1.715	982	1.715	1043	1.715	1104	1.715	1165	1.715	1226	1.715
800	1.715	861	1.715	922	1.715	983	1.715	1044	1.715	1105	1.715	1166	1.715	1227	1.715
801	1.715	862	1.715	923	1.715	984	1.715	1045	1.715	1106	1.715	1167	1.715	1228	1.715
802	1.715	863	1.715	924	1.715	985	1.715	1046	1.715	1107	1.715	1168	1.715	1229	1.715
803	1.715	864	1.715	925	1.715	986	1.715	1047	1.715	1108	1.715	1169	1.715	1230	1.715
804	1.715	865	1.715	926	1.715	987	1.715	1048	1.715	1109	1.715	1170	1.715	1231	1.715
805	1.715	866	1.715	927	1.715	988	1.715	1049	1.715	1110	1.715	1171	1.715	1232	1.715
806	1.715	867	1.715	928	1.715	989	1.715	1050	1.715	1111	1.715	1172	1.715	1233	1.715
807	1.715	868	1.715	929	1.715	990	1.715	1051	1.715	1112	1.715	1173	1.715	1234	1.715
808	1.715	869	1.715	930	1.715	991	1.715	1052	1.715	1113	1.715	1174	1.715	1235	1.715
809	1.715	870	1.715	931	1.715	992	1.715	1053	1.715	1114	1.715	1175	1.715	1236	1.715
810	1.715	871	1.715	932	1.715	993	1.715	1054	1.715	1115	1.715	1176	1.715	1237	1.715
811	1.715	872	1.715	933	1.715	994	1.715	1055	1.715	1116	1.715	1177	1.715	1238	1.715
812	1.715	873	1.715	934	1.715	995	1.715	1056	1.715	1117	1.715	1178	1.715	1239	1.715
813	1.715	874	1.715	935	1.715	996	1.715	1057	1.715	1118	1.715	1179	1.715	1240	1.715

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1241	1.715	1266	1.715	1291	1.715	1316	1.715	1341	1.715	1366	1.715	1391	1.715	1416	1.715
1242	1.715	1267	1.715	1292	1.715	1317	1.715	1342	1.715	1367	1.715	1392	1.715	1417	1.715
1243	1.715	1268	1.715	1293	1.715	1318	1.715	1343	1.715	1368	1.715	1393	1.715	1418	1.715
1244	1.715	1269	1.715	1294	1.715	1319	1.715	1344	1.715	1369	1.715	1394	1.715	1419	1.715
1245	1.715	1270	1.715	1295	1.715	1320	1.715	1345	1.715	1370	1.715	1395	1.715	1420	1.715
1246	1.715	1271	1.715	1296	1.715	1321	1.715	1346	1.715	1371	1.715	1396	1.715	1421	1.715
1247	1.715	1272	1.715	1297	1.715	1322	1.715	1347	1.715	1372	1.715	1397	1.715	1422	1.715
1248	1.715	1273	1.715	1298	1.715	1323	1.715	1348	1.715	1373	1.715	1398	1.715	1423	1.715
1249	1.715	1274	1.715	1299	1.715	1324	1.715	1349	1.715	1374	1.715	1399	1.715	1424	1.715
1250	1.715	1275	1.715	1300	1.715	1325	1.715	1350	1.715	1375	1.715	1400	1.715	1425	1.715
1251	1.715	1276	1.715	1301	1.715	1326	1.715	1351	1.715	1376	1.715	1401	1.715	1426	1.715
1252	1.715	1277	1.715	1302	1.715	1327	1.715	1352	1.715	1377	1.715	1402	1.715	1427	1.715
1253	1.715	1278	1.715	1303	1.715	1328	1.715	1353	1.715	1378	1.715	1403	1.715	1428	1.715
1254	1.715	1279	1.715	1304	1.715	1329	1.715	1354	1.715	1379	1.715	1404	1.715	1429	1.715
1255	1.715	1280	1.715	1305	1.715	1330	1.715	1355	1.715	1380	1.715	1405	1.715	1430	1.715
1256	1.715	1281	1.715	1306	1.715	1331	1.715	1356	1.715	1381	1.715	1406	1.715	1431	1.715
1257	1.715	1282	1.715	1307	1.715	1332	1.715	1357	1.715	1382	1.715	1407	1.715	1432	1.715
1258	1.715	1283	1.715	1308	1.715	1333	1.715	1358	1.715	1383	1.715	1408	1.715	1433	1.715
1259	1.715	1284	1.715	1309	1.715	1334	1.715	1359	1.715	1384	1.715	1409	1.715	1434	1.715
1260	1.715	1285	1.715	1310	1.715	1335	1.715	1360	1.715	1385	1.715	1410	1.715	1435	1.715
1261	1.715	1286	1.715	1311	1.715	1336	1.715	1361	1.715	1386	1.715	1411	1.715	1436	1.715
1262	1.715	1287	1.715	1312	1.715	1337	1.715	1362	1.715	1387	1.715	1412	1.715	1437	1.715
1263	1.715	1288	1.715	1313	1.715	1338	1.715	1363	1.715	1388	1.715	1413	1.715	1438	1.715
1264	1.715	1289	1.715	1314	1.715	1339	1.715	1364	1.715	1389	1.715	1414	1.715	1439	1.715
1265	1.715	1290	1.715	1315	1.715	1340	1.715	1365	1.715	1390	1.715	1415	1.715	1440	1.715

Online Controls for Storm

Complex Manhole: CC1005, DS/PN: 1.005, Volume (m³): 44.9

Hydro-Brake® Optimum

Unit Reference MD-SHE-0112-8000-2385-8000
Design Head (m) 2.385
Design Flow (l/s) 8.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 112
Invert Level (m) 85.415
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)	2.385	8.0	Kick-Flo®	1.001	5.3
Flush-Flo™	0.490	6.7	Mean Flow over Head Range	-	6.4

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)	Depth (m)	Flow (l/s)
0.100	3.9	0.800	6.3	2.000	7.4	4.000	10.2	7.000	13.3
0.200	5.9	1.000	5.4	2.200	7.7	4.500	10.8	7.500	13.8
0.300	6.4	1.200	5.8	2.400	8.0	5.000	11.3	8.000	14.2
0.400	6.7	1.400	6.2	2.600	8.3	5.500	11.9	8.500	14.6
0.500	6.7	1.600	6.6	3.000	8.9	6.000	12.4	9.000	15.0
0.600	6.7	1.800	7.0	3.500	9.6	6.500	12.9	9.500	15.4

Hydro-Brake® Optimum

Unit Reference MD-SCU-0152-2500-1185-2500
Design Head (m) 1.185
Design Flow (l/s) 25.0
Flush-Flo™ Calculated
Objective Linear discharge profile
Application Surface
Sump Available Yes
Diameter (mm) 152
Invert Level (m) 86.615
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)	1.185	25.0	Kick-Flo®	0.228	11.5
Flush-Flo™	0.185	11.7	Mean Flow over Head Range	-	16.8

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)	Depth (m)	Flow (l/s)
0.100	6.0	0.300	13.0	0.500	16.6	0.800	20.7	1.200	25.1
0.200	11.6	0.400	14.9	0.600	18.1	1.000	23.0	1.400	27.1

Hydro-Brake® Optimum									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.600	28.9	2.400	35.1	4.000	44.9	6.000	54.7	8.000	62.9
1.800	30.6	2.600	36.5	4.500	47.6	6.500	56.9	8.500	64.8
2.000	32.1	3.000	39.1	5.000	50.1	7.000	59.0	9.000	66.6
2.200	33.7	3.500	42.1	5.500	52.4	7.500	61.0	9.500	68.4

Storage Structures for Storm

Tank or Pond Pipe: 1.001

Manning's N 0.035 Invert Level (m) 85.615

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	290.0	2.185	1526.0	2.186	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	CC1000	15 Summer	2	+0%	100/60 Summer					86.660	-0.265	0.000
1.001	CC1001	1440 Winter	2	+0%						86.395	-1.405	0.000
1.002	CC1002	1440 Winter	2	+0%	5/1440 Summer					86.395	-0.119	0.000
2.000	CC1100	15 Summer	2	+0%	100/15 Summer					86.734	-0.321	0.000
1.003	CC1003	1440 Winter	2	+0%	5/960 Summer					86.397	-0.053	0.000
3.000	CC1200	15 Summer	2	+0%	30/960 Summer					86.397	-0.438	0.000
3.001	CC1201	1440 Winter	2	+0%	30/240 Summer					86.397	-0.288	0.000
3.002	CC1202	1440 Winter	2	+0%	5/1440 Summer					86.398	-0.137	0.000
1.004	CC1004	1440 Winter	2	+0%	2/1440 Summer					86.398	0.013	0.000
4.000	CC1300	1440 Winter	2	+0%	5/1440 Summer					86.398	-0.187	0.000
1.005	CC1005	1440 Winter	2	+0%	2/15 Summer	100/60 Summer				86.398	0.683	0.000

								Half Drain	Pipe
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
1.000	CC1000	0.18			49.2	OK			
1.001	CC1001	0.00			17.5	OK			
1.002	CC1002	0.02			13.3	OK			
2.000	CC1100	0.17			47.4	OK			
1.003	CC1003	0.01			10.5	OK			
3.000	CC1200	0.16			49.6	OK			
3.001	CC1201	0.01			3.9	OK			
3.002	CC1202	0.01			5.4	OK			
1.004	CC1004	0.01			8.6	SURCHARGED			
4.000	CC1300	0.01			1.9	OK			
1.005	CC1005	0.08			6.7	SURCHARGED	2		

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	CC1000	15 Summer	5	+0%	100/60 Summer					86.681	-0.244	0.000
1.001	CC1001	1440 Summer	5	+0%						86.540	-1.260	0.000
1.002	CC1002	1440 Winter	5	+0%	5/1440 Summer					86.540	0.026	0.000
2.000	CC1100	15 Summer	5	+0%	100/15 Summer					86.759	-0.296	0.000
1.003	CC1003	1440 Winter	5	+0%	5/960 Summer					86.581	0.131	0.000
3.000	CC1200	1440 Summer	5	+0%	30/960 Summer					86.572	-0.263	0.000
3.001	CC1201	1440 Summer	5	+0%	30/240 Summer					86.572	-0.113	0.000
3.002	CC1202	1440 Winter	5	+0%	5/1440 Summer					86.598	0.063	0.000
1.004	CC1004	1440 Winter	5	+0%	2/1440 Summer					86.603	0.218	0.000
4.000	CC1300	1440 Winter	5	+0%	5/1440 Summer					86.612	0.027	0.000
1.005	CC1005	1440 Winter	5	+0%	2/15 Summer	100/60 Summer				86.614	0.899	0.000

								Half Drain	Pipe
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
1.000	CC1000	0.26			69.0	OK			
1.001	CC1001	0.00			16.9	OK			
1.002	CC1002	0.14			97.5	SURCHARGED			
2.000	CC1100	0.24			66.6	OK			
1.003	CC1003	0.06			43.4	SURCHARGED			
3.000	CC1200	0.01			3.7	OK			
3.001	CC1201	0.03			16.5	OK			
3.002	CC1202	0.02			16.8	SURCHARGED			
1.004	CC1004	0.03			24.5	SURCHARGED			
4.000	CC1300	0.01			3.3	SURCHARGED			
1.005	CC1005	0.08			6.7	SURCHARGED	2		

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	CC1000	1440 Winter	30	+0%	100/60 Summer					86.892	-0.033	0.000
1.001	CC1001	1440 Winter	30	+0%						86.893	-0.907	0.000
1.002	CC1002	1440 Winter	30	+0%	5/1440 Summer					86.893	0.379	0.000
2.000	CC1100	1440 Summer	30	+0%	100/15 Summer					86.942	-0.113	0.000
1.003	CC1003	1440 Winter	30	+0%	5/960 Summer					86.947	0.497	0.000
3.000	CC1200	1440 Winter	30	+0%	30/960 Summer					86.964	0.129	0.000
3.001	CC1201	1440 Summer	30	+0%	30/240 Summer					86.965	0.280	0.000
3.002	CC1202	1440 Summer	30	+0%	5/1440 Summer					86.967	0.432	0.000
1.004	CC1004	1440 Winter	30	+0%	2/1440 Summer					86.972	0.587	0.000
4.000	CC1300	1440 Summer	30	+0%	5/1440 Summer					86.976	0.391	0.000
1.005	CC1005	1440 Summer	30	+0%	2/15 Summer	100/60 Summer				86.977	1.262	0.000

								Half Drain	Pipe
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
1.000	CC1000	0.01			3.7	OK			
1.001	CC1001	0.00			5.0	OK			
1.002	CC1002	0.17			122.6	SURCHARGED			
2.000	CC1100	0.02			5.7	OK			
1.003	CC1003	0.08			53.2	SURCHARGED			
3.000	CC1200	0.02			5.2	SURCHARGED			
3.001	CC1201	0.06			30.8	SURCHARGED			
3.002	CC1202	0.03			23.9	SURCHARGED			
1.004	CC1004	0.04			30.5	SURCHARGED			
4.000	CC1300	0.02			7.9	SURCHARGED			
1.005	CC1005	0.24			18.9	SURCHARGED	2		

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)	Volume (m³)
1.000	CC1000	1440 Winter	100	+45%	100/60 Summer					87.483	0.558	0.000
1.001	CC1001	1440 Winter	100	+45%						87.484	-0.316	0.000
1.002	CC1002	1440 Winter	100	+45%	5/1440 Summer					87.484	0.970	0.000
2.000	CC1100	15 Summer	100	+45%	100/15 Summer					87.897	0.842	0.000
1.003	CC1003	60 Winter	100	+45%	5/960 Summer					87.718	1.268	0.000
3.000	CC1200	15 Summer	100	+45%	30/960 Summer					87.870	1.035	0.000
3.001	CC1201	60 Summer	100	+45%	30/240 Summer					87.838	1.153	0.000
3.002	CC1202	60 Summer	100	+45%	5/1440 Summer					87.822	1.287	0.000
1.004	CC1004	60 Summer	100	+45%	2/1440 Summer					87.806	1.421	0.000
4.000	CC1300	15 Summer	100	+45%	5/1440 Summer					87.839	1.254	0.000
1.005	CC1005	60 Summer	100	+45%	2/15 Summer	100/60 Summer				87.801	2.086	0.820

									Half Drain	Pipe
PN	US/MH Name	Flow Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded			
1.000	CC1000	0.03			7.0	SURCHARGED				
1.001	CC1001	0.00			6.4	OK				
1.002	CC1002	0.39			279.9	SURCHARGED				
2.000	CC1100	0.84			232.4	SURCHARGED				
1.003	CC1003	0.07			50.4	FLOOD RISK				
3.000	CC1200	0.72			221.2	SURCHARGED				
3.001	CC1201	0.48			255.7	SURCHARGED				
3.002	CC1202	0.44			368.5	FLOOD RISK				
1.004	CC1004	0.12			87.5	FLOOD RISK				
4.000	CC1300	0.60			219.8	FLOOD RISK				
1.005	CC1005	0.05			4.2	FLOOD	2			

APPENDIX OI

Surface Water Strategy

Development Catchment Plan

Retail 1

= 8215m²

Retail 2

= 1730m²

Modelled Impermeable Area

Retail 1 @ 75% PIMP = 6160m²

Retail 2 @ 75% PIMP = 1300m²

Surface Water Discharge Rates

Retail 1 = 2.8 to 10.3 l/s. Refer to drainage strategy.

Retail 2 = 5 l/s. Refer to drainage strategy.

Surface Water Quality

SW Runoff from the commercial plots and associated infrastructure must be cleansed/treated within the plot in accordance with Shropshire current guidance/Ciria C753 standards prior to discharging to the watercourse.



Rev.	Description	Rev. by	Date
 Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF T: 0161 837 1500 W: www.sginfrastructure.co.uk			
Client			
Formal Investments			
Architect			
Roberts Limbrick			
Project			
Canalside Development, Shropshire			
Title			
Surface Water Strategy Preliminary Drainage - Commercial 1 & 2			
Date		22.02.2023	Drawn By
Size		A1	Checked By
Scale		1/500	Approved By
Dwg. No.		C1581-SGI-ZZ-00-DR-C-0207	Rev
			P2

APPENDIX O2

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 11:16	Designed by sgicivils	
File Retail - Catchment 1 001 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	90.000	0.224	401.8	0.205	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.001	56.022	0.001	56022.0	0.205	0.00	0.0		0.050	→[↓]		Cellular Storage	
2.000	49.765	0.165	301.6	0.205	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.002	10.018	0.105	95.4	0.000	0.00	0.0	0.600		o	150	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	1.00	87.580	0.205	0.0	0.0	0.0	1.01	160.3	0.0
1.001	0.00	1.00	87.356	0.410	0.0	0.0	0.0	0.05	543.7	0.0
2.000	0.00	1.00	87.520	0.205	0.0	0.0	0.0	1.17	185.3	0.0
1.002	0.00	1.00	87.355	0.615	0.0	0.0	0.0	1.03	18.2	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.205	0.205	0.205
1.001	-	-	100	0.205	0.205	0.205
2.000	-	-	100	0.205	0.205	0.205
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.615	0.615	0.615

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.002 CC1006 87.900 87.250 0.000 0 0

Datum (m) 87.250 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.140	41	0.140	81	0.140	121	0.140	161	0.140	201	0.140	241	0.140	281	0.140
2	0.140	42	0.140	82	0.140	122	0.140	162	0.140	202	0.140	242	0.140	282	0.140
3	0.140	43	0.140	83	0.140	123	0.140	163	0.140	203	0.140	243	0.140	283	0.140
4	0.140	44	0.140	84	0.140	124	0.140	164	0.140	204	0.140	244	0.140	284	0.140
5	0.140	45	0.140	85	0.140	125	0.140	165	0.140	205	0.140	245	0.140	285	0.140
6	0.140	46	0.140	86	0.140	126	0.140	166	0.140	206	0.140	246	0.140	286	0.140
7	0.140	47	0.140	87	0.140	127	0.140	167	0.140	207	0.140	247	0.140	287	0.140
8	0.140	48	0.140	88	0.140	128	0.140	168	0.140	208	0.140	248	0.140	288	0.140
9	0.140	49	0.140	89	0.140	129	0.140	169	0.140	209	0.140	249	0.140	289	0.140
10	0.140	50	0.140	90	0.140	130	0.140	170	0.140	210	0.140	250	0.140	290	0.140
11	0.140	51	0.140	91	0.140	131	0.140	171	0.140	211	0.140	251	0.140	291	0.140
12	0.140	52	0.140	92	0.140	132	0.140	172	0.140	212	0.140	252	0.140	292	0.140
13	0.140	53	0.140	93	0.140	133	0.140	173	0.140	213	0.140	253	0.140	293	0.140
14	0.140	54	0.140	94	0.140	134	0.140	174	0.140	214	0.140	254	0.140	294	0.140
15	0.140	55	0.140	95	0.140	135	0.140	175	0.140	215	0.140	255	0.140	295	0.140
16	0.140	56	0.140	96	0.140	136	0.140	176	0.140	216	0.140	256	0.140	296	0.140
17	0.140	57	0.140	97	0.140	137	0.140	177	0.140	217	0.140	257	0.140	297	0.140
18	0.140	58	0.140	98	0.140	138	0.140	178	0.140	218	0.140	258	0.140	298	0.140
19	0.140	59	0.140	99	0.140	139	0.140	179	0.140	219	0.140	259	0.140	299	0.140
20	0.140	60	0.140	100	0.140	140	0.140	180	0.140	220	0.140	260	0.140	300	0.140
21	0.140	61	0.140	101	0.140	141	0.140	181	0.140	221	0.140	261	0.140	301	0.140
22	0.140	62	0.140	102	0.140	142	0.140	182	0.140	222	0.140	262	0.140	302	0.140
23	0.140	63	0.140	103	0.140	143	0.140	183	0.140	223	0.140	263	0.140	303	0.140
24	0.140	64	0.140	104	0.140	144	0.140	184	0.140	224	0.140	264	0.140	304	0.140
25	0.140	65	0.140	105	0.140	145	0.140	185	0.140	225	0.140	265	0.140	305	0.140
26	0.140	66	0.140	106	0.140	146	0.140	186	0.140	226	0.140	266	0.140	306	0.140
27	0.140	67	0.140	107	0.140	147	0.140	187	0.140	227	0.140	267	0.140	307	0.140
28	0.140	68	0.140	108	0.140	148	0.140	188	0.140	228	0.140	268	0.140	308	0.140
29	0.140	69	0.140	109	0.140	149	0.140	189	0.140	229	0.140	269	0.140	309	0.140
30	0.140	70	0.140	110	0.140	150	0.140	190	0.140	230	0.140	270	0.140	310	0.140
31	0.140	71	0.140	111	0.140	151	0.140	191	0.140	231	0.140	271	0.140	311	0.140
32	0.140	72	0.140	112	0.140	152	0.140	192	0.140	232	0.140	272	0.140	312	0.140
33	0.140	73	0.140	113	0.140	153	0.140	193	0.140	233	0.140	273	0.140	313	0.140
34	0.140	74	0.140	114	0.140	154	0.140	194	0.140	234	0.140	274	0.140	314	0.140
35	0.140	75	0.140	115	0.140	155	0.140	195	0.140	235	0.140	275	0.140	315	0.140
36	0.140	76	0.140	116	0.140	156	0.140	196	0.140	236	0.140	276	0.140	316	0.140
37	0.140	77	0.140	117	0.140	157	0.140	197	0.140	237	0.140	277	0.140	317	0.140
38	0.140	78	0.140	118	0.140	158	0.140	198	0.140	238	0.140	278	0.140	318	0.140
39	0.140	79	0.140	119	0.140	159	0.140	199	0.140	239	0.140	279	0.140	319	0.140
40	0.140	80	0.140	120	0.140	160	0.140	200	0.140	240	0.140	280	0.140	320	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
321	0.140	382	0.140	443	0.140	504	0.140	565	0.140	626	0.140	687	0.140	748	0.140
322	0.140	383	0.140	444	0.140	505	0.140	566	0.140	627	0.140	688	0.140	749	0.140
323	0.140	384	0.140	445	0.140	506	0.140	567	0.140	628	0.140	689	0.140	750	0.140
324	0.140	385	0.140	446	0.140	507	0.140	568	0.140	629	0.140	690	0.140	751	0.140
325	0.140	386	0.140	447	0.140	508	0.140	569	0.140	630	0.140	691	0.140	752	0.140
326	0.140	387	0.140	448	0.140	509	0.140	570	0.140	631	0.140	692	0.140	753	0.140
327	0.140	388	0.140	449	0.140	510	0.140	571	0.140	632	0.140	693	0.140	754	0.140
328	0.140	389	0.140	450	0.140	511	0.140	572	0.140	633	0.140	694	0.140	755	0.140
329	0.140	390	0.140	451	0.140	512	0.140	573	0.140	634	0.140	695	0.140	756	0.140
330	0.140	391	0.140	452	0.140	513	0.140	574	0.140	635	0.140	696	0.140	757	0.140
331	0.140	392	0.140	453	0.140	514	0.140	575	0.140	636	0.140	697	0.140	758	0.140
332	0.140	393	0.140	454	0.140	515	0.140	576	0.140	637	0.140	698	0.140	759	0.140
333	0.140	394	0.140	455	0.140	516	0.140	577	0.140	638	0.140	699	0.140	760	0.140
334	0.140	395	0.140	456	0.140	517	0.140	578	0.140	639	0.140	700	0.140	761	0.140
335	0.140	396	0.140	457	0.140	518	0.140	579	0.140	640	0.140	701	0.140	762	0.140
336	0.140	397	0.140	458	0.140	519	0.140	580	0.140	641	0.140	702	0.140	763	0.140
337	0.140	398	0.140	459	0.140	520	0.140	581	0.140	642	0.140	703	0.140	764	0.140
338	0.140	399	0.140	460	0.140	521	0.140	582	0.140	643	0.140	704	0.140	765	0.140
339	0.140	400	0.140	461	0.140	522	0.140	583	0.140	644	0.140	705	0.140	766	0.140
340	0.140	401	0.140	462	0.140	523	0.140	584	0.140	645	0.140	706	0.140	767	0.140
341	0.140	402	0.140	463	0.140	524	0.140	585	0.140	646	0.140	707	0.140	768	0.140
342	0.140	403	0.140	464	0.140	525	0.140	586	0.140	647	0.140	708	0.140	769	0.140
343	0.140	404	0.140	465	0.140	526	0.140	587	0.140	648	0.140	709	0.140	770	0.140
344	0.140	405	0.140	466	0.140	527	0.140	588	0.140	649	0.140	710	0.140	771	0.140
345	0.140	406	0.140	467	0.140	528	0.140	589	0.140	650	0.140	711	0.140	772	0.140
346	0.140	407	0.140	468	0.140	529	0.140	590	0.140	651	0.140	712	0.140	773	0.140
347	0.140	408	0.140	469	0.140	530	0.140	591	0.140	652	0.140	713	0.140	774	0.140
348	0.140	409	0.140	470	0.140	531	0.140	592	0.140	653	0.140	714	0.140	775	0.140
349	0.140	410	0.140	471	0.140	532	0.140	593	0.140	654	0.140	715	0.140	776	0.140
350	0.140	411	0.140	472	0.140	533	0.140	594	0.140	655	0.140	716	0.140	777	0.140
351	0.140	412	0.140	473	0.140	534	0.140	595	0.140	656	0.140	717	0.140	778	0.140
352	0.140	413	0.140	474	0.140	535	0.140	596	0.140	657	0.140	718	0.140	779	0.140
353	0.140	414	0.140	475	0.140	536	0.140	597	0.140	658	0.140	719	0.140	780	0.140
354	0.140	415	0.140	476	0.140	537	0.140	598	0.140	659	0.140	720	0.140	781	0.140
355	0.140	416	0.140	477	0.140	538	0.140	599	0.140	660	0.140	721	0.140	782	0.140
356	0.140	417	0.140	478	0.140	539	0.140	600	0.140	661	0.140	722	0.140	783	0.140
357	0.140	418	0.140	479	0.140	540	0.140	601	0.140	662	0.140	723	0.140	784	0.140
358	0.140	419	0.140	480	0.140	541	0.140	602	0.140	663	0.140	724	0.140	785	0.140
359	0.140	420	0.140	481	0.140	542	0.140	603	0.140	664	0.140	725	0.140	786	0.140
360	0.140	421	0.140	482	0.140	543	0.140	604	0.140	665	0.140	726	0.140	787	0.140
361	0.140	422	0.140	483	0.140	544	0.140	605	0.140	666	0.140	727	0.140	788	0.140
362	0.140	423	0.140	484	0.140	545	0.140	606	0.140	667	0.140	728	0.140	789	0.140
363	0.140	424	0.140	485	0.140	546	0.140	607	0.140	668	0.140	729	0.140	790	0.140
364	0.140	425	0.140	486	0.140	547	0.140	608	0.140	669	0.140	730	0.140	791	0.140
365	0.140	426	0.140	487	0.140	548	0.140	609	0.140	670	0.140	731	0.140	792	0.140
366	0.140	427	0.140	488	0.140	549	0.140	610	0.140	671	0.140	732	0.140	793	0.140
367	0.140	428	0.140	489	0.140	550	0.140	611	0.140	672	0.140	733	0.140	794	0.140
368	0.140	429	0.140	490	0.140	551	0.140	612	0.140	673	0.140	734	0.140	795	0.140
369	0.140	430	0.140	491	0.140	552	0.140	613	0.140	674	0.140	735	0.140	796	0.140
370	0.140	431	0.140	492	0.140	553	0.140	614	0.140	675	0.140	736	0.140	797	0.140
371	0.140	432	0.140	493	0.140	554	0.140	615	0.140	676	0.140	737	0.140	798	0.140
372	0.140	433	0.140	494	0.140	555	0.140	616	0.140	677	0.140	738	0.140	799	0.140
373	0.140	434	0.140	495	0.140	556	0.140	617	0.140	678	0.140	739	0.140	800	0.140
374	0.140	435	0.140	496	0.140	557	0.140	618	0.140	679	0.140	740	0.140	801	0.140
375	0.140	436	0.140	497	0.140	558	0.140	619	0.140	680	0.140	741	0.140	802	0.140
376	0.140	437	0.140	498	0.140	559	0.140	620	0.140	681	0.140	742	0.140	803	0.140
377	0.140	438	0.140	499	0.140	560	0.140	621	0.140	682	0.140	743	0.140	804	0.140
378	0.140	439	0.140	500	0.140	561	0.140	622	0.140	683	0.140	744	0.140	805	0.140
379	0.140	440	0.140	501	0.140	562	0.140	623	0.140	684	0.140	745	0.140	806	0.140
380	0.140	441	0.140	502	0.140	563	0.140	624	0.140	685	0.140	746	0.140	807	0.140
381	0.140	442	0.140	503	0.140	564	0.140	625	0.140	686	0.140	747	0.140	808	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
809	0.140	870	0.140	931	0.140	992	0.140	1053	0.140	1114	0.140	1175	0.140	1236	0.140
810	0.140	871	0.140	932	0.140	993	0.140	1054	0.140	1115	0.140	1176	0.140	1237	0.140
811	0.140	872	0.140	933	0.140	994	0.140	1055	0.140	1116	0.140	1177	0.140	1238	0.140
812	0.140	873	0.140	934	0.140	995	0.140	1056	0.140	1117	0.140	1178	0.140	1239	0.140
813	0.140	874	0.140	935	0.140	996	0.140	1057	0.140	1118	0.140	1179	0.140	1240	0.140
814	0.140	875	0.140	936	0.140	997	0.140	1058	0.140	1119	0.140	1180	0.140	1241	0.140
815	0.140	876	0.140	937	0.140	998	0.140	1059	0.140	1120	0.140	1181	0.140	1242	0.140
816	0.140	877	0.140	938	0.140	999	0.140	1060	0.140	1121	0.140	1182	0.140	1243	0.140
817	0.140	878	0.140	939	0.140	1000	0.140	1061	0.140	1122	0.140	1183	0.140	1244	0.140
818	0.140	879	0.140	940	0.140	1001	0.140	1062	0.140	1123	0.140	1184	0.140	1245	0.140
819	0.140	880	0.140	941	0.140	1002	0.140	1063	0.140	1124	0.140	1185	0.140	1246	0.140
820	0.140	881	0.140	942	0.140	1003	0.140	1064	0.140	1125	0.140	1186	0.140	1247	0.140
821	0.140	882	0.140	943	0.140	1004	0.140	1065	0.140	1126	0.140	1187	0.140	1248	0.140
822	0.140	883	0.140	944	0.140	1005	0.140	1066	0.140	1127	0.140	1188	0.140	1249	0.140
823	0.140	884	0.140	945	0.140	1006	0.140	1067	0.140	1128	0.140	1189	0.140	1250	0.140
824	0.140	885	0.140	946	0.140	1007	0.140	1068	0.140	1129	0.140	1190	0.140	1251	0.140
825	0.140	886	0.140	947	0.140	1008	0.140	1069	0.140	1130	0.140	1191	0.140	1252	0.140
826	0.140	887	0.140	948	0.140	1009	0.140	1070	0.140	1131	0.140	1192	0.140	1253	0.140
827	0.140	888	0.140	949	0.140	1010	0.140	1071	0.140	1132	0.140	1193	0.140	1254	0.140
828	0.140	889	0.140	950	0.140	1011	0.140	1072	0.140	1133	0.140	1194	0.140	1255	0.140
829	0.140	890	0.140	951	0.140	1012	0.140	1073	0.140	1134	0.140	1195	0.140	1256	0.140
830	0.140	891	0.140	952	0.140	1013	0.140	1074	0.140	1135	0.140	1196	0.140	1257	0.140
831	0.140	892	0.140	953	0.140	1014	0.140	1075	0.140	1136	0.140	1197	0.140	1258	0.140
832	0.140	893	0.140	954	0.140	1015	0.140	1076	0.140	1137	0.140	1198	0.140	1259	0.140
833	0.140	894	0.140	955	0.140	1016	0.140	1077	0.140	1138	0.140	1199	0.140	1260	0.140
834	0.140	895	0.140	956	0.140	1017	0.140	1078	0.140	1139	0.140	1200	0.140	1261	0.140
835	0.140	896	0.140	957	0.140	1018	0.140	1079	0.140	1140	0.140	1201	0.140	1262	0.140
836	0.140	897	0.140	958	0.140	1019	0.140	1080	0.140	1141	0.140	1202	0.140	1263	0.140
837	0.140	898	0.140	959	0.140	1020	0.140	1081	0.140	1142	0.140	1203	0.140	1264	0.140
838	0.140	899	0.140	960	0.140	1021	0.140	1082	0.140	1143	0.140	1204	0.140	1265	0.140
839	0.140	900	0.140	961	0.140	1022	0.140	1083	0.140	1144	0.140	1205	0.140	1266	0.140
840	0.140	901	0.140	962	0.140	1023	0.140	1084	0.140	1145	0.140	1206	0.140	1267	0.140
841	0.140	902	0.140	963	0.140	1024	0.140	1085	0.140	1146	0.140	1207	0.140	1268	0.140
842	0.140	903	0.140	964	0.140	1025	0.140	1086	0.140	1147	0.140	1208	0.140	1269	0.140
843	0.140	904	0.140	965	0.140	1026	0.140	1087	0.140	1148	0.140	1209	0.140	1270	0.140
844	0.140	905	0.140	966	0.140	1027	0.140	1088	0.140	1149	0.140	1210	0.140	1271	0.140
845	0.140	906	0.140	967	0.140	1028	0.140	1089	0.140	1150	0.140	1211	0.140	1272	0.140
846	0.140	907	0.140	968	0.140	1029	0.140	1090	0.140	1151	0.140	1212	0.140	1273	0.140
847	0.140	908	0.140	969	0.140	1030	0.140	1091	0.140	1152	0.140	1213	0.140	1274	0.140
848	0.140	909	0.140	970	0.140	1031	0.140	1092	0.140	1153	0.140	1214	0.140	1275	0.140
849	0.140	910	0.140	971	0.140	1032	0.140	1093	0.140	1154	0.140	1215	0.140	1276	0.140
850	0.140	911	0.140	972	0.140	1033	0.140	1094	0.140	1155	0.140	1216	0.140	1277	0.140
851	0.140	912	0.140	973	0.140	1034	0.140	1095	0.140	1156	0.140	1217	0.140	1278	0.140
852	0.140	913	0.140	974	0.140	1035	0.140	1096	0.140	1157	0.140	1218	0.140	1279	0.140
853	0.140	914	0.140	975	0.140	1036	0.140	1097	0.140	1158	0.140	1219	0.140	1280	0.140
854	0.140	915	0.140	976	0.140	1037	0.140	1098	0.140	1159	0.140	1220	0.140	1281	0.140
855	0.140	916	0.140	977	0.140	1038	0.140	1099	0.140	1160	0.140	1221	0.140	1282	0.140
856	0.140	917	0.140	978	0.140	1039	0.140	1100	0.140	1161	0.140	1222	0.140	1283	0.140
857	0.140	918	0.140	979	0.140	1040	0.140	1101	0.140	1162	0.140	1223	0.140	1284	0.140
858	0.140	919	0.140	980	0.140	1041	0.140	1102	0.140	1163	0.140	1224	0.140	1285	0.140
859	0.140	920	0.140	981	0.140	1042	0.140	1103	0.140	1164	0.140	1225	0.140	1286	0.140
860	0.140	921	0.140	982	0.140	1043	0.140	1104	0.140	1165	0.140	1226	0.140	1287	0.140
861	0.140	922	0.140	983	0.140	1044	0.140	1105	0.140	1166	0.140	1227	0.140	1288	0.140
862	0.140	923	0.140	984	0.140	1045	0.140	1106	0.140	1167	0.140	1228	0.140	1289	0.140
863	0.140	924	0.140	985	0.140	1046	0.140	1107	0.140	1168	0.140	1229	0.140	1290	0.140
864	0.140	925	0.140	986	0.140	1047	0.140	1108	0.140	1169	0.140	1230	0.140	1291	0.140
865	0.140	926	0.140	987	0.140	1048	0.140	1109	0.140	1170	0.140	1231	0.140	1292	0.140
866	0.140	927	0.140	988	0.140	1049	0.140	1110	0.140	1171	0.140	1232	0.140	1293	0.140
867	0.140	928	0.140	989	0.140	1050	0.140	1111	0.140	1172	0.140	1233	0.140	1294	0.140
868	0.140	929	0.140	990	0.140	1051	0.140	1112	0.140	1173	0.140	1234	0.140	1295	0.140
869	0.140	930	0.140	991	0.140	1052	0.140	1113	0.140	1174	0.140	1235	0.140	1296	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1297	0.140	1315	0.140	1333	0.140	1351	0.140	1369	0.140	1387	0.140	1405	0.140	1423	0.140
1298	0.140	1316	0.140	1334	0.140	1352	0.140	1370	0.140	1388	0.140	1406	0.140	1424	0.140
1299	0.140	1317	0.140	1335	0.140	1353	0.140	1371	0.140	1389	0.140	1407	0.140	1425	0.140
1300	0.140	1318	0.140	1336	0.140	1354	0.140	1372	0.140	1390	0.140	1408	0.140	1426	0.140
1301	0.140	1319	0.140	1337	0.140	1355	0.140	1373	0.140	1391	0.140	1409	0.140	1427	0.140
1302	0.140	1320	0.140	1338	0.140	1356	0.140	1374	0.140	1392	0.140	1410	0.140	1428	0.140
1303	0.140	1321	0.140	1339	0.140	1357	0.140	1375	0.140	1393	0.140	1411	0.140	1429	0.140
1304	0.140	1322	0.140	1340	0.140	1358	0.140	1376	0.140	1394	0.140	1412	0.140	1430	0.140
1305	0.140	1323	0.140	1341	0.140	1359	0.140	1377	0.140	1395	0.140	1413	0.140	1431	0.140
1306	0.140	1324	0.140	1342	0.140	1360	0.140	1378	0.140	1396	0.140	1414	0.140	1432	0.140
1307	0.140	1325	0.140	1343	0.140	1361	0.140	1379	0.140	1397	0.140	1415	0.140	1433	0.140
1308	0.140	1326	0.140	1344	0.140	1362	0.140	1380	0.140	1398	0.140	1416	0.140	1434	0.140
1309	0.140	1327	0.140	1345	0.140	1363	0.140	1381	0.140	1399	0.140	1417	0.140	1435	0.140
1310	0.140	1328	0.140	1346	0.140	1364	0.140	1382	0.140	1400	0.140	1418	0.140	1436	0.140
1311	0.140	1329	0.140	1347	0.140	1365	0.140	1383	0.140	1401	0.140	1419	0.140	1437	0.140
1312	0.140	1330	0.140	1348	0.140	1366	0.140	1384	0.140	1402	0.140	1420	0.140	1438	0.140
1313	0.140	1331	0.140	1349	0.140	1367	0.140	1385	0.140	1403	0.140	1421	0.140	1439	0.140
1314	0.140	1332	0.140	1350	0.140	1368	0.140	1386	0.140	1404	0.140	1422	0.140	1440	0.140

Online Controls for Storm

Hydro-Brake® Optimum Manhole: R1001, DS/PN: 1.002, Volume (m³): 566.7

Unit Reference	MD-SCU-0069-6500-1745-6500
Design Head (m)	1.745
Design Flow (l/s)	6.5
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level (m)	87.355
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.745	6.5	Kick-Flo®	0.104	1.8
Flush-Flo™	0.090	1.8	Mean Flow over Head Range	-	4.4

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)	Depth (m)	Flow (l/s)
0.100	1.8	0.800	4.5	2.000	6.9	4.000	9.6	7.000	12.6
0.200	2.4	1.000	5.0	2.200	7.3	4.500	10.2	7.500	13.0
0.300	2.9	1.200	5.5	2.400	7.6	5.000	10.7	8.000	13.4
0.400	3.3	1.400	5.9	2.600	7.8	5.500	11.2	8.500	13.8
0.500	3.6	1.600	6.2	3.000	8.4	6.000	11.7	9.000	14.2
0.600	3.9	1.800	6.6	3.500	9.0	6.500	12.1	9.500	14.6

Storage Structures for Storm

Cellular Storage Pipe: 1.001

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	87.356	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	500.0	0.0	1.200	500.0	0.0	1.201	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R1000	15 Summer		2	+0%	100/15 Summer				87.770	-0.260	0.000
1.001	R1001	960 Summer		2	+0%					87.630	-0.927	0.000
2.000	R1100	15 Summer		2	+0%	100/15 Summer				87.699	-0.271	0.000
1.002	R1001	960 Summer		2	+0%	2/60 Summer				87.630	0.125	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R1000	0.29			44.0	OK	
1.001	R1001	0.00		456	5.2	OK	
2.000	R1100	0.31			51.4	OK	
1.002	R1001	0.16			2.6	SURCHARGED	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

							Overflow Act.	Water Surcharged Flooded		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood		Level (m)	Depth (m)	Volume (m³)
1.000	R1000	15 Summer	5	+0%	100/15 Summer			87.811	-0.219	0.000
1.001	R1001	720 Summer	5	+0%				87.695	-0.862	0.000
2.000	R1100	15 Summer	5	+0%	100/15 Summer			87.737	-0.233	0.000
1.002	R1001	720 Summer	5	+0%	2/60 Summer			87.695	0.190	0.000

			Half Drain		Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R1000	0.40			61.0	OK	
1.001	R1001	0.00		484	4.8	OK	
2.000	R1100	0.44			73.5	OK	
1.002	R1001	0.18			2.9	SURCHARGED	

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv (Winter)	1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5	Second Increment (Extended)	
DTS Status			ON
DVD Status			OFF
Inertia Status			OFF
Profile(s)			Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)			2, 5, 30, 100
Climate Change (%)			0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R1000	15 Summer		30	+0%	100/15 Summer				87.932	-0.098	0.000
1.001	R1001	480 Winter		30	+0%					87.907	-0.650	0.000
2.000	R1100	480 Winter		30	+0%	100/15 Summer				87.908	-0.062	0.000
1.002	R1001	480 Winter		30	+0%	2/60 Summer				87.908	0.403	0.000

		Half Drain		Pipe			Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded
1.000	R1000	0.75			113.1	OK	
1.001	R1001	0.00			6.1	OK	
2.000	R1100	0.06			9.8	OK	
1.002	R1001	0.23			3.7	SURCHARGED	

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 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 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

Data Type Point

FEH Rainfall Version 2013 Cv (Summer) 1.000

Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded
US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R1000	15 Summer	100	+45%	100/15 Summer				88.632	0.602	0.000
1.001	R1001	480 Winter	100	+45%					88.483	-0.074	0.000
2.000	R1100	480 Winter	100	+45%	100/15 Summer				88.485	0.515	0.000
1.002	R1001	480 Winter	100	+45%	2/60 Summer				88.484	0.979	0.000

		Half Drain		Pipe			Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded
1.000	R1000	1.51			229.1	SURCHARGED	
1.001	R1001	0.00			11.1	OK	
2.000	R1100	0.11			18.7	SURCHARGED	
1.002	R1001	0.32			5.2	SURCHARGED	

APPENDIX O3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 11:16	Designed by sgicivils	
File Retail - Catchment 1 001 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	90.000	0.224	401.8	0.205	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.001	56.022	0.001	56022.0	0.205	0.00	0.0		0.050	→[↓]		Cellular Storage	
2.000	49.765	0.165	301.6	0.205	2.50	0.0	0.600		o	450	Pipe/Conduit	
1.002	10.018	0.105	95.4	0.000	0.00	0.0	0.600		o	150	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	1.00	87.580	0.205	0.0	0.0	0.0	1.01	160.3	0.0
1.001	0.00	1.00	87.356	0.410	0.0	0.0	0.0	0.05	543.7	0.0
2.000	0.00	1.00	87.520	0.205	0.0	0.0	0.0	1.17	185.3	0.0
1.002	0.00	1.00	87.355	0.615	0.0	0.0	0.0	1.03	18.2	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.205	0.205	0.205
1.001	-	-	100	0.205	0.205	0.205
2.000	-	-	100	0.205	0.205	0.205
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.615	0.615	0.615

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.002 CC1006 87.900 87.250 0.000 0 0

Datum (m) 87.250 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.140	41	0.140	81	0.140	121	0.140	161	0.140	201	0.140	241	0.140	281	0.140
2	0.140	42	0.140	82	0.140	122	0.140	162	0.140	202	0.140	242	0.140	282	0.140
3	0.140	43	0.140	83	0.140	123	0.140	163	0.140	203	0.140	243	0.140	283	0.140
4	0.140	44	0.140	84	0.140	124	0.140	164	0.140	204	0.140	244	0.140	284	0.140
5	0.140	45	0.140	85	0.140	125	0.140	165	0.140	205	0.140	245	0.140	285	0.140
6	0.140	46	0.140	86	0.140	126	0.140	166	0.140	206	0.140	246	0.140	286	0.140
7	0.140	47	0.140	87	0.140	127	0.140	167	0.140	207	0.140	247	0.140	287	0.140
8	0.140	48	0.140	88	0.140	128	0.140	168	0.140	208	0.140	248	0.140	288	0.140
9	0.140	49	0.140	89	0.140	129	0.140	169	0.140	209	0.140	249	0.140	289	0.140
10	0.140	50	0.140	90	0.140	130	0.140	170	0.140	210	0.140	250	0.140	290	0.140
11	0.140	51	0.140	91	0.140	131	0.140	171	0.140	211	0.140	251	0.140	291	0.140
12	0.140	52	0.140	92	0.140	132	0.140	172	0.140	212	0.140	252	0.140	292	0.140
13	0.140	53	0.140	93	0.140	133	0.140	173	0.140	213	0.140	253	0.140	293	0.140
14	0.140	54	0.140	94	0.140	134	0.140	174	0.140	214	0.140	254	0.140	294	0.140
15	0.140	55	0.140	95	0.140	135	0.140	175	0.140	215	0.140	255	0.140	295	0.140
16	0.140	56	0.140	96	0.140	136	0.140	176	0.140	216	0.140	256	0.140	296	0.140
17	0.140	57	0.140	97	0.140	137	0.140	177	0.140	217	0.140	257	0.140	297	0.140
18	0.140	58	0.140	98	0.140	138	0.140	178	0.140	218	0.140	258	0.140	298	0.140
19	0.140	59	0.140	99	0.140	139	0.140	179	0.140	219	0.140	259	0.140	299	0.140
20	0.140	60	0.140	100	0.140	140	0.140	180	0.140	220	0.140	260	0.140	300	0.140
21	0.140	61	0.140	101	0.140	141	0.140	181	0.140	221	0.140	261	0.140	301	0.140
22	0.140	62	0.140	102	0.140	142	0.140	182	0.140	222	0.140	262	0.140	302	0.140
23	0.140	63	0.140	103	0.140	143	0.140	183	0.140	223	0.140	263	0.140	303	0.140
24	0.140	64	0.140	104	0.140	144	0.140	184	0.140	224	0.140	264	0.140	304	0.140
25	0.140	65	0.140	105	0.140	145	0.140	185	0.140	225	0.140	265	0.140	305	0.140
26	0.140	66	0.140	106	0.140	146	0.140	186	0.140	226	0.140	266	0.140	306	0.140
27	0.140	67	0.140	107	0.140	147	0.140	187	0.140	227	0.140	267	0.140	307	0.140
28	0.140	68	0.140	108	0.140	148	0.140	188	0.140	228	0.140	268	0.140	308	0.140
29	0.140	69	0.140	109	0.140	149	0.140	189	0.140	229	0.140	269	0.140	309	0.140
30	0.140	70	0.140	110	0.140	150	0.140	190	0.140	230	0.140	270	0.140	310	0.140
31	0.140	71	0.140	111	0.140	151	0.140	191	0.140	231	0.140	271	0.140	311	0.140
32	0.140	72	0.140	112	0.140	152	0.140	192	0.140	232	0.140	272	0.140	312	0.140
33	0.140	73	0.140	113	0.140	153	0.140	193	0.140	233	0.140	273	0.140	313	0.140
34	0.140	74	0.140	114	0.140	154	0.140	194	0.140	234	0.140	274	0.140	314	0.140
35	0.140	75	0.140	115	0.140	155	0.140	195	0.140	235	0.140	275	0.140	315	0.140
36	0.140	76	0.140	116	0.140	156	0.140	196	0.140	236	0.140	276	0.140	316	0.140
37	0.140	77	0.140	117	0.140	157	0.140	197	0.140	237	0.140	277	0.140	317	0.140
38	0.140	78	0.140	118	0.140	158	0.140	198	0.140	238	0.140	278	0.140	318	0.140
39	0.140	79	0.140	119	0.140	159	0.140	199	0.140	239	0.140	279	0.140	319	0.140
40	0.140	80	0.140	120	0.140	160	0.140	200	0.140	240	0.140	280	0.140	320	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
321	0.140	382	0.140	443	0.140	504	0.140	565	0.140	626	0.140	687	0.140	748	0.140
322	0.140	383	0.140	444	0.140	505	0.140	566	0.140	627	0.140	688	0.140	749	0.140
323	0.140	384	0.140	445	0.140	506	0.140	567	0.140	628	0.140	689	0.140	750	0.140
324	0.140	385	0.140	446	0.140	507	0.140	568	0.140	629	0.140	690	0.140	751	0.140
325	0.140	386	0.140	447	0.140	508	0.140	569	0.140	630	0.140	691	0.140	752	0.140
326	0.140	387	0.140	448	0.140	509	0.140	570	0.140	631	0.140	692	0.140	753	0.140
327	0.140	388	0.140	449	0.140	510	0.140	571	0.140	632	0.140	693	0.140	754	0.140
328	0.140	389	0.140	450	0.140	511	0.140	572	0.140	633	0.140	694	0.140	755	0.140
329	0.140	390	0.140	451	0.140	512	0.140	573	0.140	634	0.140	695	0.140	756	0.140
330	0.140	391	0.140	452	0.140	513	0.140	574	0.140	635	0.140	696	0.140	757	0.140
331	0.140	392	0.140	453	0.140	514	0.140	575	0.140	636	0.140	697	0.140	758	0.140
332	0.140	393	0.140	454	0.140	515	0.140	576	0.140	637	0.140	698	0.140	759	0.140
333	0.140	394	0.140	455	0.140	516	0.140	577	0.140	638	0.140	699	0.140	760	0.140
334	0.140	395	0.140	456	0.140	517	0.140	578	0.140	639	0.140	700	0.140	761	0.140
335	0.140	396	0.140	457	0.140	518	0.140	579	0.140	640	0.140	701	0.140	762	0.140
336	0.140	397	0.140	458	0.140	519	0.140	580	0.140	641	0.140	702	0.140	763	0.140
337	0.140	398	0.140	459	0.140	520	0.140	581	0.140	642	0.140	703	0.140	764	0.140
338	0.140	399	0.140	460	0.140	521	0.140	582	0.140	643	0.140	704	0.140	765	0.140
339	0.140	400	0.140	461	0.140	522	0.140	583	0.140	644	0.140	705	0.140	766	0.140
340	0.140	401	0.140	462	0.140	523	0.140	584	0.140	645	0.140	706	0.140	767	0.140
341	0.140	402	0.140	463	0.140	524	0.140	585	0.140	646	0.140	707	0.140	768	0.140
342	0.140	403	0.140	464	0.140	525	0.140	586	0.140	647	0.140	708	0.140	769	0.140
343	0.140	404	0.140	465	0.140	526	0.140	587	0.140	648	0.140	709	0.140	770	0.140
344	0.140	405	0.140	466	0.140	527	0.140	588	0.140	649	0.140	710	0.140	771	0.140
345	0.140	406	0.140	467	0.140	528	0.140	589	0.140	650	0.140	711	0.140	772	0.140
346	0.140	407	0.140	468	0.140	529	0.140	590	0.140	651	0.140	712	0.140	773	0.140
347	0.140	408	0.140	469	0.140	530	0.140	591	0.140	652	0.140	713	0.140	774	0.140
348	0.140	409	0.140	470	0.140	531	0.140	592	0.140	653	0.140	714	0.140	775	0.140
349	0.140	410	0.140	471	0.140	532	0.140	593	0.140	654	0.140	715	0.140	776	0.140
350	0.140	411	0.140	472	0.140	533	0.140	594	0.140	655	0.140	716	0.140	777	0.140
351	0.140	412	0.140	473	0.140	534	0.140	595	0.140	656	0.140	717	0.140	778	0.140
352	0.140	413	0.140	474	0.140	535	0.140	596	0.140	657	0.140	718	0.140	779	0.140
353	0.140	414	0.140	475	0.140	536	0.140	597	0.140	658	0.140	719	0.140	780	0.140
354	0.140	415	0.140	476	0.140	537	0.140	598	0.140	659	0.140	720	0.140	781	0.140
355	0.140	416	0.140	477	0.140	538	0.140	599	0.140	660	0.140	721	0.140	782	0.140
356	0.140	417	0.140	478	0.140	539	0.140	600	0.140	661	0.140	722	0.140	783	0.140
357	0.140	418	0.140	479	0.140	540	0.140	601	0.140	662	0.140	723	0.140	784	0.140
358	0.140	419	0.140	480	0.140	541	0.140	602	0.140	663	0.140	724	0.140	785	0.140
359	0.140	420	0.140	481	0.140	542	0.140	603	0.140	664	0.140	725	0.140	786	0.140
360	0.140	421	0.140	482	0.140	543	0.140	604	0.140	665	0.140	726	0.140	787	0.140
361	0.140	422	0.140	483	0.140	544	0.140	605	0.140	666	0.140	727	0.140	788	0.140
362	0.140	423	0.140	484	0.140	545	0.140	606	0.140	667	0.140	728	0.140	789	0.140
363	0.140	424	0.140	485	0.140	546	0.140	607	0.140	668	0.140	729	0.140	790	0.140
364	0.140	425	0.140	486	0.140	547	0.140	608	0.140	669	0.140	730	0.140	791	0.140
365	0.140	426	0.140	487	0.140	548	0.140	609	0.140	670	0.140	731	0.140	792	0.140
366	0.140	427	0.140	488	0.140	549	0.140	610	0.140	671	0.140	732	0.140	793	0.140
367	0.140	428	0.140	489	0.140	550	0.140	611	0.140	672	0.140	733	0.140	794	0.140
368	0.140	429	0.140	490	0.140	551	0.140	612	0.140	673	0.140	734	0.140	795	0.140
369	0.140	430	0.140	491	0.140	552	0.140	613	0.140	674	0.140	735	0.140	796	0.140
370	0.140	431	0.140	492	0.140	553	0.140	614	0.140	675	0.140	736	0.140	797	0.140
371	0.140	432	0.140	493	0.140	554	0.140	615	0.140	676	0.140	737	0.140	798	0.140
372	0.140	433	0.140	494	0.140	555	0.140	616	0.140	677	0.140	738	0.140	799	0.140
373	0.140	434	0.140	495	0.140	556	0.140	617	0.140	678	0.140	739	0.140	800	0.140
374	0.140	435	0.140	496	0.140	557	0.140	618	0.140	679	0.140	740	0.140	801	0.140
375	0.140	436	0.140	497	0.140	558	0.140	619	0.140	680	0.140	741	0.140	802	0.140
376	0.140	437	0.140	498	0.140	559	0.140	620	0.140	681	0.140	742	0.140	803	0.140
377	0.140	438	0.140	499	0.140	560	0.140	621	0.140	682	0.140	743	0.140	804	0.140
378	0.140	439	0.140	500	0.140	561	0.140	622	0.140	683	0.140	744	0.140	805	0.140
379	0.140	440	0.140	501	0.140	562	0.140	623	0.140	684	0.140	745	0.140	806	0.140
380	0.140	441	0.140	502	0.140	563	0.140	624	0.140	685	0.140	746	0.140	807	0.140
381	0.140	442	0.140	503	0.140	564	0.140	625	0.140	686	0.140	747	0.140	808	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
809	0.140	870	0.140	931	0.140	992	0.140	1053	0.140	1114	0.140	1175	0.140	1236	0.140
810	0.140	871	0.140	932	0.140	993	0.140	1054	0.140	1115	0.140	1176	0.140	1237	0.140
811	0.140	872	0.140	933	0.140	994	0.140	1055	0.140	1116	0.140	1177	0.140	1238	0.140
812	0.140	873	0.140	934	0.140	995	0.140	1056	0.140	1117	0.140	1178	0.140	1239	0.140
813	0.140	874	0.140	935	0.140	996	0.140	1057	0.140	1118	0.140	1179	0.140	1240	0.140
814	0.140	875	0.140	936	0.140	997	0.140	1058	0.140	1119	0.140	1180	0.140	1241	0.140
815	0.140	876	0.140	937	0.140	998	0.140	1059	0.140	1120	0.140	1181	0.140	1242	0.140
816	0.140	877	0.140	938	0.140	999	0.140	1060	0.140	1121	0.140	1182	0.140	1243	0.140
817	0.140	878	0.140	939	0.140	1000	0.140	1061	0.140	1122	0.140	1183	0.140	1244	0.140
818	0.140	879	0.140	940	0.140	1001	0.140	1062	0.140	1123	0.140	1184	0.140	1245	0.140
819	0.140	880	0.140	941	0.140	1002	0.140	1063	0.140	1124	0.140	1185	0.140	1246	0.140
820	0.140	881	0.140	942	0.140	1003	0.140	1064	0.140	1125	0.140	1186	0.140	1247	0.140
821	0.140	882	0.140	943	0.140	1004	0.140	1065	0.140	1126	0.140	1187	0.140	1248	0.140
822	0.140	883	0.140	944	0.140	1005	0.140	1066	0.140	1127	0.140	1188	0.140	1249	0.140
823	0.140	884	0.140	945	0.140	1006	0.140	1067	0.140	1128	0.140	1189	0.140	1250	0.140
824	0.140	885	0.140	946	0.140	1007	0.140	1068	0.140	1129	0.140	1190	0.140	1251	0.140
825	0.140	886	0.140	947	0.140	1008	0.140	1069	0.140	1130	0.140	1191	0.140	1252	0.140
826	0.140	887	0.140	948	0.140	1009	0.140	1070	0.140	1131	0.140	1192	0.140	1253	0.140
827	0.140	888	0.140	949	0.140	1010	0.140	1071	0.140	1132	0.140	1193	0.140	1254	0.140
828	0.140	889	0.140	950	0.140	1011	0.140	1072	0.140	1133	0.140	1194	0.140	1255	0.140
829	0.140	890	0.140	951	0.140	1012	0.140	1073	0.140	1134	0.140	1195	0.140	1256	0.140
830	0.140	891	0.140	952	0.140	1013	0.140	1074	0.140	1135	0.140	1196	0.140	1257	0.140
831	0.140	892	0.140	953	0.140	1014	0.140	1075	0.140	1136	0.140	1197	0.140	1258	0.140
832	0.140	893	0.140	954	0.140	1015	0.140	1076	0.140	1137	0.140	1198	0.140	1259	0.140
833	0.140	894	0.140	955	0.140	1016	0.140	1077	0.140	1138	0.140	1199	0.140	1260	0.140
834	0.140	895	0.140	956	0.140	1017	0.140	1078	0.140	1139	0.140	1200	0.140	1261	0.140
835	0.140	896	0.140	957	0.140	1018	0.140	1079	0.140	1140	0.140	1201	0.140	1262	0.140
836	0.140	897	0.140	958	0.140	1019	0.140	1080	0.140	1141	0.140	1202	0.140	1263	0.140
837	0.140	898	0.140	959	0.140	1020	0.140	1081	0.140	1142	0.140	1203	0.140	1264	0.140
838	0.140	899	0.140	960	0.140	1021	0.140	1082	0.140	1143	0.140	1204	0.140	1265	0.140
839	0.140	900	0.140	961	0.140	1022	0.140	1083	0.140	1144	0.140	1205	0.140	1266	0.140
840	0.140	901	0.140	962	0.140	1023	0.140	1084	0.140	1145	0.140	1206	0.140	1267	0.140
841	0.140	902	0.140	963	0.140	1024	0.140	1085	0.140	1146	0.140	1207	0.140	1268	0.140
842	0.140	903	0.140	964	0.140	1025	0.140	1086	0.140	1147	0.140	1208	0.140	1269	0.140
843	0.140	904	0.140	965	0.140	1026	0.140	1087	0.140	1148	0.140	1209	0.140	1270	0.140
844	0.140	905	0.140	966	0.140	1027	0.140	1088	0.140	1149	0.140	1210	0.140	1271	0.140
845	0.140	906	0.140	967	0.140	1028	0.140	1089	0.140	1150	0.140	1211	0.140	1272	0.140
846	0.140	907	0.140	968	0.140	1029	0.140	1090	0.140	1151	0.140	1212	0.140	1273	0.140
847	0.140	908	0.140	969	0.140	1030	0.140	1091	0.140	1152	0.140	1213	0.140	1274	0.140
848	0.140	909	0.140	970	0.140	1031	0.140	1092	0.140	1153	0.140	1214	0.140	1275	0.140
849	0.140	910	0.140	971	0.140	1032	0.140	1093	0.140	1154	0.140	1215	0.140	1276	0.140
850	0.140	911	0.140	972	0.140	1033	0.140	1094	0.140	1155	0.140	1216	0.140	1277	0.140
851	0.140	912	0.140	973	0.140	1034	0.140	1095	0.140	1156	0.140	1217	0.140	1278	0.140
852	0.140	913	0.140	974	0.140	1035	0.140	1096	0.140	1157	0.140	1218	0.140	1279	0.140
853	0.140	914	0.140	975	0.140	1036	0.140	1097	0.140	1158	0.140	1219	0.140	1280	0.140
854	0.140	915	0.140	976	0.140	1037	0.140	1098	0.140	1159	0.140	1220	0.140	1281	0.140
855	0.140	916	0.140	977	0.140	1038	0.140	1099	0.140	1160	0.140	1221	0.140	1282	0.140
856	0.140	917	0.140	978	0.140	1039	0.140	1100	0.140	1161	0.140	1222	0.140	1283	0.140
857	0.140	918	0.140	979	0.140	1040	0.140	1101	0.140	1162	0.140	1223	0.140	1284	0.140
858	0.140	919	0.140	980	0.140	1041	0.140	1102	0.140	1163	0.140	1224	0.140	1285	0.140
859	0.140	920	0.140	981	0.140	1042	0.140	1103	0.140	1164	0.140	1225	0.140	1286	0.140
860	0.140	921	0.140	982	0.140	1043	0.140	1104	0.140	1165	0.140	1226	0.140	1287	0.140
861	0.140	922	0.140	983	0.140	1044	0.140	1105	0.140	1166	0.140	1227	0.140	1288	0.140
862	0.140	923	0.140	984	0.140	1045	0.140	1106	0.140	1167	0.140	1228	0.140	1289	0.140
863	0.140	924	0.140	985	0.140	1046	0.140	1107	0.140	1168	0.140	1229	0.140	1290	0.140
864	0.140	925	0.140	986	0.140	1047	0.140	1108	0.140	1169	0.140	1230	0.140	1291	0.140
865	0.140	926	0.140	987	0.140	1048	0.140	1109	0.140	1170	0.140	1231	0.140	1292	0.140
866	0.140	927	0.140	988	0.140	1049	0.140	1110	0.140	1171	0.140	1232	0.140	1293	0.140
867	0.140	928	0.140	989	0.140	1050	0.140	1111	0.140	1172	0.140	1233	0.140	1294	0.140
868	0.140	929	0.140	990	0.140	1051	0.140	1112	0.140	1173	0.140	1234	0.140	1295	0.140
869	0.140	930	0.140	991	0.140	1052	0.140	1113	0.140	1174	0.140	1235	0.140	1296	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1297	0.140	1315	0.140	1333	0.140	1351	0.140	1369	0.140	1387	0.140	1405	0.140	1423	0.140
1298	0.140	1316	0.140	1334	0.140	1352	0.140	1370	0.140	1388	0.140	1406	0.140	1424	0.140
1299	0.140	1317	0.140	1335	0.140	1353	0.140	1371	0.140	1389	0.140	1407	0.140	1425	0.140
1300	0.140	1318	0.140	1336	0.140	1354	0.140	1372	0.140	1390	0.140	1408	0.140	1426	0.140
1301	0.140	1319	0.140	1337	0.140	1355	0.140	1373	0.140	1391	0.140	1409	0.140	1427	0.140
1302	0.140	1320	0.140	1338	0.140	1356	0.140	1374	0.140	1392	0.140	1410	0.140	1428	0.140
1303	0.140	1321	0.140	1339	0.140	1357	0.140	1375	0.140	1393	0.140	1411	0.140	1429	0.140
1304	0.140	1322	0.140	1340	0.140	1358	0.140	1376	0.140	1394	0.140	1412	0.140	1430	0.140
1305	0.140	1323	0.140	1341	0.140	1359	0.140	1377	0.140	1395	0.140	1413	0.140	1431	0.140
1306	0.140	1324	0.140	1342	0.140	1360	0.140	1378	0.140	1396	0.140	1414	0.140	1432	0.140
1307	0.140	1325	0.140	1343	0.140	1361	0.140	1379	0.140	1397	0.140	1415	0.140	1433	0.140
1308	0.140	1326	0.140	1344	0.140	1362	0.140	1380	0.140	1398	0.140	1416	0.140	1434	0.140
1309	0.140	1327	0.140	1345	0.140	1363	0.140	1381	0.140	1399	0.140	1417	0.140	1435	0.140
1310	0.140	1328	0.140	1346	0.140	1364	0.140	1382	0.140	1400	0.140	1418	0.140	1436	0.140
1311	0.140	1329	0.140	1347	0.140	1365	0.140	1383	0.140	1401	0.140	1419	0.140	1437	0.140
1312	0.140	1330	0.140	1348	0.140	1366	0.140	1384	0.140	1402	0.140	1420	0.140	1438	0.140
1313	0.140	1331	0.140	1349	0.140	1367	0.140	1385	0.140	1403	0.140	1421	0.140	1439	0.140
1314	0.140	1332	0.140	1350	0.140	1368	0.140	1386	0.140	1404	0.140	1422	0.140	1440	0.140

Online Controls for Storm

Hydro-Brake® Optimum Manhole: R1001, DS/PN: 1.002, Volume (m³): 566.7

Unit Reference	MD-SCU-0069-6500-1745-6500
Design Head (m)	1.745
Design Flow (l/s)	6.5
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level (m)	87.355
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.745	6.5	Kick-Flo®	0.104	1.8
Flush-Flo™	0.090	1.8	Mean Flow over Head Range	-	4.4

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)	Depth (m)	Flow (l/s)
0.100	1.8	0.800	4.5	2.000	6.9	4.000	9.6	7.000	12.6
0.200	2.4	1.000	5.0	2.200	7.3	4.500	10.2	7.500	13.0
0.300	2.9	1.200	5.5	2.400	7.6	5.000	10.7	8.000	13.4
0.400	3.3	1.400	5.9	2.600	7.8	5.500	11.2	8.500	13.8
0.500	3.6	1.600	6.2	3.000	8.4	6.000	11.7	9.000	14.2
0.600	3.9	1.800	6.6	3.500	9.0	6.500	12.1	9.500	14.6

Storage Structures for Storm

Cellular Storage Pipe: 1.001

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	87.356	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	500.0	0.0	1.200	500.0	0.0	1.201	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R1000	15	Summer	2	+0%	100/15	Summer			87.770	-0.260	0.000
1.001	R1001	960	Summer	2	+0%					87.630	-0.927	0.000
2.000	R1100	15	Summer	2	+0%	100/15	Summer			87.699	-0.271	0.000
1.002	R1001	960	Summer	2	+0%	2/60	Summer			87.630	0.125	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R1000	0.29			44.0	OK	
1.001	R1001	0.00		456	5.2	OK	
2.000	R1100	0.31			51.4	OK	
1.002	R1001	0.16			2.6	SURCHARGED	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

							Overflow Act.	Water Surcharged Flooded		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood		Level (m)	Depth (m)	Volume (m³)
1.000	R1000	15 Summer	5	+0%	100/15 Summer			87.811	-0.219	0.000
1.001	R1001	720 Summer	5	+0%				87.695	-0.862	0.000
2.000	R1100	15 Summer	5	+0%	100/15 Summer			87.737	-0.233	0.000
1.002	R1001	720 Summer	5	+0%	2/60 Summer			87.695	0.190	0.000

			Half Drain		Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R1000	0.40			61.0	OK	
1.001	R1001	0.00		484	4.8	OK	
2.000	R1100	0.44			73.5	OK	
1.002	R1001	0.18			2.9	SURCHARGED	

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094	Cv (Winter)	1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5	Second Increment (Extended)	
DTS Status			ON
DVD Status			OFF
Inertia Status			OFF
Profile(s)			Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440		
Return Period(s) (years)			2, 5, 30, 100
Climate Change (%)			0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change		Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R1000	15 Summer		30	+0%	100/15 Summer				87.932	-0.098	0.000
1.001	R1001	480 Winter		30	+0%					87.907	-0.650	0.000
2.000	R1100	480 Winter		30	+0%	100/15 Summer				87.908	-0.062	0.000
1.002	R1001	480 Winter		30	+0%	2/60 Summer				87.908	0.403	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R1000	0.75			113.1	OK	
1.001	R1001	0.00			6.1	OK	
2.000	R1100	0.06			9.8	OK	
1.002	R1001	0.23			3.7	SURCHARGED	

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 * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coeffiecient 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 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

Data Type Point

FEH Rainfall Version 2013 Cv (Summer) 1.000

Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Period(s) (years) 2, 5, 30, 100

Climate Change (%) 0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

US/MH		Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
PN	Name								(m)	(m)	(m³)
1.000	R1000	15 Summer	100	+45%	100/15 Summer				88.632	0.602	0.000
1.001	R1001	480 Winter	100	+45%					88.483	-0.074	0.000
2.000	R1100	480 Winter	100	+45%	100/15 Summer				88.485	0.515	0.000
1.002	R1001	480 Winter	100	+45%	2/60 Summer				88.484	0.979	0.000

US/MH		Flow / Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
PN	Name					
1.000	R1000	1.51		229.1	SURCHARGED	
1.001	R1001	0.00		11.1	OK	
2.000	R1100	0.11		18.7	SURCHARGED	
1.002	R1001	0.32		5.2	SURCHARGED	

APPENDIX P I

Surface Water Strategy

Development Catchment Plan

Retail 1

= 8215m²

Retail 2

= 1730m²

Modelled Impermeable Area

Retail 1 @ 75% PIMP = 6160m²

Retail 2 @ 75% PIMP = 1300m²

Surface Water Discharge Rates

Retail 1 = 2.8 to 10.3 l/s. Refer to drainage strategy.

Retail 2 = 5 l/s. Refer to drainage strategy.

Surface Water Quality

SW Runoff from the commercial plots and associated infrastructure must be cleansed/treated within the plot in accordance with Shropshire current guidance/Ciria C753 standards prior to discharging to the watercourse.



Rev.	Description	Rev. by	Date
	 Shepherd Gilmour Consulting Engineers 3rd Floor Phoenix House, 45 Cross Street, Manchester, M2 4JF T: 0161 837 1500 W: www.sginfrastructure.co.uk		
Client	Formal Investments		
Architect	Roberts Limbrick		
Project	Canalside Development, Shropshire		
Title	Surface Water Strategy Preliminary Drainage - Commercial 1 & 2		
Date	22.02.2023	Drawn By	DOR
Size	A1	Checked By	DOR
Scale	1/500	Approved By	DOR
Dwg. No.	C1581-SGI-ZZ-00-DR-C-0207		Rev
			P2

APPENDIX P2

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 29/03/2023 14:33	Designed by sgicivils	
File Retail - Catchment 1 002 FEH.MDX	Checked by	
Micro Drainage	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	49.765	0.001	49765.0	0.130	2.50	0.0		0.050	→[1]		Cellular Storage	
1.001	10.081	0.105	96.0	0.000	0.00	0.0	0.600		o	150	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	1.00	87.356	0.130	0.0	0.0	0.0	0.04	64.4	0.0
1.001	0.00	1.00	87.355	0.130	0.0	0.0	0.0	1.03	18.1	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.130	0.130	0.130
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.130	0.130	0.130

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)
1.001	R2002	87.900	87.250	0.000	0	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: R2001, DS/PN: 1.001, Volume (m³): 83.9

Unit Reference MD-SHE-0095-5000-1745-5000
Design Head (m) 1.745
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 95
Invert Level (m) 87.355
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)	1.745	5.0	Kick-Flo®	0.843	3.6
Flush-Flo™	0.413	4.5	Mean Flow over Head Range	-	4.1

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)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.8	2.000	5.3	4.000	7.4	7.000	9.6
0.200	4.1	1.000	3.9	2.200	5.6	4.500	7.8	7.500	9.9
0.300	4.4	1.200	4.2	2.400	5.8	5.000	8.2	8.000	10.2
0.400	4.5	1.400	4.5	2.600	6.0	5.500	8.6	8.500	10.5
0.500	4.4	1.600	4.8	3.000	6.4	6.000	8.9	9.000	10.8
0.600	4.3	1.800	5.1	3.500	6.9	6.500	9.3	9.500	11.1

Storage Structures for Storm

Cellular Storage Pipe: 1.000

Manning's N 0.050
Infiltration Coefficient Side (m/hr) 0.00000
Invert Level (m) 87.356
Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000
Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	110.0	0.0	0.800	110.0	0.0	0.801	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R2000	120	Summer	2	+0%	100/60	Summer			87.487	-0.670	0.000
1.001	R2001	120	Summer	2	+0%	5/30	Summer			87.486	-0.019	0.000

		Half Drain		Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded Status
1.000	R2000	0.02		62	7.9	OK
1.001	R2001	0.23			3.6	OK

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R2000	120	Summer	5	+0%	100/60	Summer			87.537	-0.620	0.000
1.001	R2001	120	Summer	5	+0%	5/30	Summer			87.536	0.031	0.000

								Half Drain	Pipe
PN	US/MH Name	Flow Cap.	Flow / Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
1.000	R2000	0.02		67	10.0	OK			
1.001	R2001	0.25			4.0	SURCHARGED			

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013 Cv	(Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094 Cv	(Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 5, 30, 100
Climate Change (%)	0, 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

					Water Surcharged Flooded							
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.
1.000	R2000	60 Winter	30	+0%	100/60 Summer				87.706	-0.451	0.000	0.04
1.001	R2001	60 Winter	30	+0%	5/30 Summer				87.706	0.201	0.000	0.27

		Half Drain		Pipe			
PN	US/MH Name	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded	
1.000	R2000			18.2	OK		
1.001	R2001			4.4	SURCHARGED		

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013 Cv	(Summer)	1.000
Site Location	GB 339198 334094 SJ 39198 34094 Cv	(Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	2, 5, 30, 100
Climate Change (%)	0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R2000	120 Winter		100	+45%	100/60 Summer				88.693	0.536	0.000
1.001	R2001	120 Winter		100	+45%	5/30 Summer				88.693	1.188	0.000

				Half Drain Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R2000	0.05		78	21.1	SURCHARGED	
1.001	R2001	0.28			4.5	SURCHARGED	

APPENDIX P3

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	49.765	0.001	49765.0	0.130	2.50	0.0		0.050	→[↓]		Cellular Storage	
1.001	10.081	0.105	96.0	0.000	0.00	0.0	0.600		o	150	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	1.00	87.356	0.130	0.0	0.0	0.0	0.04	64.4	0.0
1.001	0.00	1.00	87.355	0.130	0.0	0.0	0.0	1.03	18.1	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.130	0.130	0.130
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.130	0.130	0.130

Surcharged 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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1.001 R2002 87.900 87.250 0.000 0 0

Datum (m) 87.250 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.140	43	0.140	85	0.140	127	0.140	169	0.140	211	0.140	253	0.140
2	0.140	44	0.140	86	0.140	128	0.140	170	0.140	212	0.140	254	0.140
3	0.140	45	0.140	87	0.140	129	0.140	171	0.140	213	0.140	255	0.140
4	0.140	46	0.140	88	0.140	130	0.140	172	0.140	214	0.140	256	0.140
5	0.140	47	0.140	89	0.140	131	0.140	173	0.140	215	0.140	257	0.140
6	0.140	48	0.140	90	0.140	132	0.140	174	0.140	216	0.140	258	0.140
7	0.140	49	0.140	91	0.140	133	0.140	175	0.140	217	0.140	259	0.140
8	0.140	50	0.140	92	0.140	134	0.140	176	0.140	218	0.140	260	0.140
9	0.140	51	0.140	93	0.140	135	0.140	177	0.140	219	0.140	261	0.140
10	0.140	52	0.140	94	0.140	136	0.140	178	0.140	220	0.140	262	0.140
11	0.140	53	0.140	95	0.140	137	0.140	179	0.140	221	0.140	263	0.140
12	0.140	54	0.140	96	0.140	138	0.140	180	0.140	222	0.140	264	0.140
13	0.140	55	0.140	97	0.140	139	0.140	181	0.140	223	0.140	265	0.140
14	0.140	56	0.140	98	0.140	140	0.140	182	0.140	224	0.140	266	0.140
15	0.140	57	0.140	99	0.140	141	0.140	183	0.140	225	0.140	267	0.140
16	0.140	58	0.140	100	0.140	142	0.140	184	0.140	226	0.140	268	0.140
17	0.140	59	0.140	101	0.140	143	0.140	185	0.140	227	0.140	269	0.140
18	0.140	60	0.140	102	0.140	144	0.140	186	0.140	228	0.140	270	0.140
19	0.140	61	0.140	103	0.140	145	0.140	187	0.140	229	0.140	271	0.140
20	0.140	62	0.140	104	0.140	146	0.140	188	0.140	230	0.140	272	0.140
21	0.140	63	0.140	105	0.140	147	0.140	189	0.140	231	0.140	273	0.140
22	0.140	64	0.140	106	0.140	148	0.140	190	0.140	232	0.140	274	0.140
23	0.140	65	0.140	107	0.140	149	0.140	191	0.140	233	0.140	275	0.140
24	0.140	66	0.140	108	0.140	150	0.140	192	0.140	234	0.140	276	0.140
25	0.140	67	0.140	109	0.140	151	0.140	193	0.140	235	0.140	277	0.140
26	0.140	68	0.140	110	0.140	152	0.140	194	0.140	236	0.140	278	0.140
27	0.140	69	0.140	111	0.140	153	0.140	195	0.140	237	0.140	279	0.140
28	0.140	70	0.140	112	0.140	154	0.140	196	0.140	238	0.140	280	0.140
29	0.140	71	0.140	113	0.140	155	0.140	197	0.140	239	0.140	281	0.140
30	0.140	72	0.140	114	0.140	156	0.140	198	0.140	240	0.140	282	0.140
31	0.140	73	0.140	115	0.140	157	0.140	199	0.140	241	0.140	283	0.140
32	0.140	74	0.140	116	0.140	158	0.140	200	0.140	242	0.140	284	0.140
33	0.140	75	0.140	117	0.140	159	0.140	201	0.140	243	0.140	285	0.140
34	0.140	76	0.140	118	0.140	160	0.140	202	0.140	244	0.140	286	0.140
35	0.140	77	0.140	119	0.140	161	0.140	203	0.140	245	0.140	287	0.140
36	0.140	78	0.140	120	0.140	162	0.140	204	0.140	246	0.140	288	0.140
37	0.140	79	0.140	121	0.140	163	0.140	205	0.140	247	0.140	289	0.140
38	0.140	80	0.140	122	0.140	164	0.140	206	0.140	248	0.140	290	0.140
39	0.140	81	0.140	123	0.140	165	0.140	207	0.140	249	0.140	291	0.140
40	0.140	82	0.140	124	0.140	166	0.140	208	0.140	250	0.140	292	0.140
41	0.140	83	0.140	125	0.140	167	0.140	209	0.140	251	0.140	293	0.140
42	0.140	84	0.140	126	0.140	168	0.140	210	0.140	252	0.140	294	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
337	0.140	398	0.140	459	0.140	520	0.140	581	0.140	642	0.140	703	0.140	764	0.140
338	0.140	399	0.140	460	0.140	521	0.140	582	0.140	643	0.140	704	0.140	765	0.140
339	0.140	400	0.140	461	0.140	522	0.140	583	0.140	644	0.140	705	0.140	766	0.140
340	0.140	401	0.140	462	0.140	523	0.140	584	0.140	645	0.140	706	0.140	767	0.140
341	0.140	402	0.140	463	0.140	524	0.140	585	0.140	646	0.140	707	0.140	768	0.140
342	0.140	403	0.140	464	0.140	525	0.140	586	0.140	647	0.140	708	0.140	769	0.140
343	0.140	404	0.140	465	0.140	526	0.140	587	0.140	648	0.140	709	0.140	770	0.140
344	0.140	405	0.140	466	0.140	527	0.140	588	0.140	649	0.140	710	0.140	771	0.140
345	0.140	406	0.140	467	0.140	528	0.140	589	0.140	650	0.140	711	0.140	772	0.140
346	0.140	407	0.140	468	0.140	529	0.140	590	0.140	651	0.140	712	0.140	773	0.140
347	0.140	408	0.140	469	0.140	530	0.140	591	0.140	652	0.140	713	0.140	774	0.140
348	0.140	409	0.140	470	0.140	531	0.140	592	0.140	653	0.140	714	0.140	775	0.140
349	0.140	410	0.140	471	0.140	532	0.140	593	0.140	654	0.140	715	0.140	776	0.140
350	0.140	411	0.140	472	0.140	533	0.140	594	0.140	655	0.140	716	0.140	777	0.140
351	0.140	412	0.140	473	0.140	534	0.140	595	0.140	656	0.140	717	0.140	778	0.140
352	0.140	413	0.140	474	0.140	535	0.140	596	0.140	657	0.140	718	0.140	779	0.140
353	0.140	414	0.140	475	0.140	536	0.140	597	0.140	658	0.140	719	0.140	780	0.140
354	0.140	415	0.140	476	0.140	537	0.140	598	0.140	659	0.140	720	0.140	781	0.140
355	0.140	416	0.140	477	0.140	538	0.140	599	0.140	660	0.140	721	0.140	782	0.140
356	0.140	417	0.140	478	0.140	539	0.140	600	0.140	661	0.140	722	0.140	783	0.140
357	0.140	418	0.140	479	0.140	540	0.140	601	0.140	662	0.140	723	0.140	784	0.140
358	0.140	419	0.140	480	0.140	541	0.140	602	0.140	663	0.140	724	0.140	785	0.140
359	0.140	420	0.140	481	0.140	542	0.140	603	0.140	664	0.140	725	0.140	786	0.140
360	0.140	421	0.140	482	0.140	543	0.140	604	0.140	665	0.140	726	0.140	787	0.140
361	0.140	422	0.140	483	0.140	544	0.140	605	0.140	666	0.140	727	0.140	788	0.140
362	0.140	423	0.140	484	0.140	545	0.140	606	0.140	667	0.140	728	0.140	789	0.140
363	0.140	424	0.140	485	0.140	546	0.140	607	0.140	668	0.140	729	0.140	790	0.140
364	0.140	425	0.140	486	0.140	547	0.140	608	0.140	669	0.140	730	0.140	791	0.140
365	0.140	426	0.140	487	0.140	548	0.140	609	0.140	670	0.140	731	0.140	792	0.140
366	0.140	427	0.140	488	0.140	549	0.140	610	0.140	671	0.140	732	0.140	793	0.140
367	0.140	428	0.140	489	0.140	550	0.140	611	0.140	672	0.140	733	0.140	794	0.140
368	0.140	429	0.140	490	0.140	551	0.140	612	0.140	673	0.140	734	0.140	795	0.140
369	0.140	430	0.140	491	0.140	552	0.140	613	0.140	674	0.140	735	0.140	796	0.140
370	0.140	431	0.140	492	0.140	553	0.140	614	0.140	675	0.140	736	0.140	797	0.140
371	0.140	432	0.140	493	0.140	554	0.140	615	0.140	676	0.140	737	0.140	798	0.140
372	0.140	433	0.140	494	0.140	555	0.140	616	0.140	677	0.140	738	0.140	799	0.140
373	0.140	434	0.140	495	0.140	556	0.140	617	0.140	678	0.140	739	0.140	800	0.140
374	0.140	435	0.140	496	0.140	557	0.140	618	0.140	679	0.140	740	0.140	801	0.140
375	0.140	436	0.140	497	0.140	558	0.140	619	0.140	680	0.140	741	0.140	802	0.140
376	0.140	437	0.140	498	0.140	559	0.140	620	0.140	681	0.140	742	0.140	803	0.140
377	0.140	438	0.140	499	0.140	560	0.140	621	0.140	682	0.140	743	0.140	804	0.140
378	0.140	439	0.140	500	0.140	561	0.140	622	0.140	683	0.140	744	0.140	805	0.140
379	0.140	440	0.140	501	0.140	562	0.140	623	0.140	684	0.140	745	0.140	806	0.140
380	0.140	441	0.140	502	0.140	563	0.140	624	0.140	685	0.140	746	0.140	807	0.140
381	0.140	442	0.140	503	0.140	564	0.140	625	0.140	686	0.140	747	0.140	808	0.140
382	0.140	443	0.140	504	0.140	565	0.140	626	0.140	687	0.140	748	0.140	809	0.140
383	0.140	444	0.140	505	0.140	566	0.140	627	0.140	688	0.140	749	0.140	810	0.140
384	0.140	445	0.140	506	0.140	567	0.140	628	0.140	689	0.140	750	0.140	811	0.140
385	0.140	446	0.140	507	0.140	568	0.140	629	0.140	690	0.140	751	0.140	812	0.140
386	0.140	447	0.140	508	0.140	569	0.140	630	0.140	691	0.140	752	0.140	813	0.140
387	0.140	448	0.140	509	0.140	570	0.140	631	0.140	692	0.140	753	0.140	814	0.140
388	0.140	449	0.140	510	0.140	571	0.140	632	0.140	693	0.140	754	0.140	815	0.140
389	0.140	450	0.140	511	0.140	572	0.140	633	0.140	694	0.140	755	0.140	816	0.140
390	0.140	451	0.140	512	0.140	573	0.140	634	0.140	695	0.140	756	0.140	817	0.140
391	0.140	452	0.140	513	0.140	574	0.140	635	0.140	696	0.140	757	0.140	818	0.140
392	0.140	453	0.140	514	0.140	575	0.140	636	0.140	697	0.140	758	0.140	819	0.140
393	0.140	454	0.140	515	0.140	576	0.140	637	0.140	698	0.140	759	0.140	820	0.140
394	0.140	455	0.140	516	0.140	577	0.140	638	0.140	699	0.140	760	0.140	821	0.140
395	0.140	456	0.140	517	0.140	578	0.140	639	0.140	700	0.140	761	0.140	822	0.140
396	0.140	457	0.140	518	0.140	579	0.140	640	0.140	701	0.140	762	0.140	823	0.140
397	0.140	458	0.140	519	0.140	580	0.140	641	0.140	702	0.140	763	0.140	824	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
825	0.140	886	0.140	947	0.140	1008	0.140	1069	0.140	1130	0.140	1191	0.140	1252	0.140
826	0.140	887	0.140	948	0.140	1009	0.140	1070	0.140	1131	0.140	1192	0.140	1253	0.140
827	0.140	888	0.140	949	0.140	1010	0.140	1071	0.140	1132	0.140	1193	0.140	1254	0.140
828	0.140	889	0.140	950	0.140	1011	0.140	1072	0.140	1133	0.140	1194	0.140	1255	0.140
829	0.140	890	0.140	951	0.140	1012	0.140	1073	0.140	1134	0.140	1195	0.140	1256	0.140
830	0.140	891	0.140	952	0.140	1013	0.140	1074	0.140	1135	0.140	1196	0.140	1257	0.140
831	0.140	892	0.140	953	0.140	1014	0.140	1075	0.140	1136	0.140	1197	0.140	1258	0.140
832	0.140	893	0.140	954	0.140	1015	0.140	1076	0.140	1137	0.140	1198	0.140	1259	0.140
833	0.140	894	0.140	955	0.140	1016	0.140	1077	0.140	1138	0.140	1199	0.140	1260	0.140
834	0.140	895	0.140	956	0.140	1017	0.140	1078	0.140	1139	0.140	1200	0.140	1261	0.140
835	0.140	896	0.140	957	0.140	1018	0.140	1079	0.140	1140	0.140	1201	0.140	1262	0.140
836	0.140	897	0.140	958	0.140	1019	0.140	1080	0.140	1141	0.140	1202	0.140	1263	0.140
837	0.140	898	0.140	959	0.140	1020	0.140	1081	0.140	1142	0.140	1203	0.140	1264	0.140
838	0.140	899	0.140	960	0.140	1021	0.140	1082	0.140	1143	0.140	1204	0.140	1265	0.140
839	0.140	900	0.140	961	0.140	1022	0.140	1083	0.140	1144	0.140	1205	0.140	1266	0.140
840	0.140	901	0.140	962	0.140	1023	0.140	1084	0.140	1145	0.140	1206	0.140	1267	0.140
841	0.140	902	0.140	963	0.140	1024	0.140	1085	0.140	1146	0.140	1207	0.140	1268	0.140
842	0.140	903	0.140	964	0.140	1025	0.140	1086	0.140	1147	0.140	1208	0.140	1269	0.140
843	0.140	904	0.140	965	0.140	1026	0.140	1087	0.140	1148	0.140	1209	0.140	1270	0.140
844	0.140	905	0.140	966	0.140	1027	0.140	1088	0.140	1149	0.140	1210	0.140	1271	0.140
845	0.140	906	0.140	967	0.140	1028	0.140	1089	0.140	1150	0.140	1211	0.140	1272	0.140
846	0.140	907	0.140	968	0.140	1029	0.140	1090	0.140	1151	0.140	1212	0.140	1273	0.140
847	0.140	908	0.140	969	0.140	1030	0.140	1091	0.140	1152	0.140	1213	0.140	1274	0.140
848	0.140	909	0.140	970	0.140	1031	0.140	1092	0.140	1153	0.140	1214	0.140	1275	0.140
849	0.140	910	0.140	971	0.140	1032	0.140	1093	0.140	1154	0.140	1215	0.140	1276	0.140
850	0.140	911	0.140	972	0.140	1033	0.140	1094	0.140	1155	0.140	1216	0.140	1277	0.140
851	0.140	912	0.140	973	0.140	1034	0.140	1095	0.140	1156	0.140	1217	0.140	1278	0.140
852	0.140	913	0.140	974	0.140	1035	0.140	1096	0.140	1157	0.140	1218	0.140	1279	0.140
853	0.140	914	0.140	975	0.140	1036	0.140	1097	0.140	1158	0.140	1219	0.140	1280	0.140
854	0.140	915	0.140	976	0.140	1037	0.140	1098	0.140	1159	0.140	1220	0.140	1281	0.140
855	0.140	916	0.140	977	0.140	1038	0.140	1099	0.140	1160	0.140	1221	0.140	1282	0.140
856	0.140	917	0.140	978	0.140	1039	0.140	1100	0.140	1161	0.140	1222	0.140	1283	0.140
857	0.140	918	0.140	979	0.140	1040	0.140	1101	0.140	1162	0.140	1223	0.140	1284	0.140
858	0.140	919	0.140	980	0.140	1041	0.140	1102	0.140	1163	0.140	1224	0.140	1285	0.140
859	0.140	920	0.140	981	0.140	1042	0.140	1103	0.140	1164	0.140	1225	0.140	1286	0.140
860	0.140	921	0.140	982	0.140	1043	0.140	1104	0.140	1165	0.140	1226	0.140	1287	0.140
861	0.140	922	0.140	983	0.140	1044	0.140	1105	0.140	1166	0.140	1227	0.140	1288	0.140
862	0.140	923	0.140	984	0.140	1045	0.140	1106	0.140	1167	0.140	1228	0.140	1289	0.140
863	0.140	924	0.140	985	0.140	1046	0.140	1107	0.140	1168	0.140	1229	0.140	1290	0.140
864	0.140	925	0.140	986	0.140	1047	0.140	1108	0.140	1169	0.140	1230	0.140	1291	0.140
865	0.140	926	0.140	987	0.140	1048	0.140	1109	0.140	1170	0.140	1231	0.140	1292	0.140
866	0.140	927	0.140	988	0.140	1049	0.140	1110	0.140	1171	0.140	1232	0.140	1293	0.140
867	0.140	928	0.140	989	0.140	1050	0.140	1111	0.140	1172	0.140	1233	0.140	1294	0.140
868	0.140	929	0.140	990	0.140	1051	0.140	1112	0.140	1173	0.140	1234	0.140	1295	0.140
869	0.140	930	0.140	991	0.140	1052	0.140	1113	0.140	1174	0.140	1235	0.140	1296	0.140
870	0.140	931	0.140	992	0.140	1053	0.140	1114	0.140	1175	0.140	1236	0.140	1297	0.140
871	0.140	932	0.140	993	0.140	1054	0.140	1115	0.140	1176	0.140	1237	0.140	1298	0.140
872	0.140	933	0.140	994	0.140	1055	0.140	1116	0.140	1177	0.140	1238	0.140	1299	0.140
873	0.140	934	0.140	995	0.140	1056	0.140	1117	0.140	1178	0.140	1239	0.140	1300	0.140
874	0.140	935	0.140	996	0.140	1057	0.140	1118	0.140	1179	0.140	1240	0.140	1301	0.140
875	0.140	936	0.140	997	0.140	1058	0.140	1119	0.140	1180	0.140	1241	0.140	1302	0.140
876	0.140	937	0.140	998	0.140	1059	0.140	1120	0.140	1181	0.140	1242	0.140	1303	0.140
877	0.140	938	0.140	999	0.140	1060	0.140	1121	0.140	1182	0.140	1243	0.140	1304	0.140
878	0.140	939	0.140	1000	0.140	1061	0.140	1122	0.140	1183	0.140	1244	0.140	1305	0.140
879	0.140	940	0.140	1001	0.140	1062	0.140	1123	0.140	1184	0.140	1245	0.140	1306	0.140
880	0.140	941	0.140	1002	0.140	1063	0.140	1124	0.140	1185	0.140	1246	0.140	1307	0.140
881	0.140	942	0.140	1003	0.140	1064	0.140	1125	0.140	1186	0.140	1247	0.140	1308	0.140
882	0.140	943	0.140	1004	0.140	1065	0.140	1126	0.140	1187	0.140	1248	0.140	1309	0.140
883	0.140	944	0.140	1005	0.140	1066	0.140	1127	0.140	1188	0.140	1249	0.140	1310	0.140
884	0.140	945	0.140	1006	0.140	1067	0.140	1128	0.140	1189	0.140	1250	0.140	1311	0.140
885	0.140	946	0.140	1007	0.140	1068	0.140	1129	0.140	1190	0.140	1251	0.140	1312	0.140

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1313	0.140	1329	0.140	1345	0.140	1361	0.140	1377	0.140	1393	0.140	1409	0.140	1425	0.140
1314	0.140	1330	0.140	1346	0.140	1362	0.140	1378	0.140	1394	0.140	1410	0.140	1426	0.140
1315	0.140	1331	0.140	1347	0.140	1363	0.140	1379	0.140	1395	0.140	1411	0.140	1427	0.140
1316	0.140	1332	0.140	1348	0.140	1364	0.140	1380	0.140	1396	0.140	1412	0.140	1428	0.140
1317	0.140	1333	0.140	1349	0.140	1365	0.140	1381	0.140	1397	0.140	1413	0.140	1429	0.140
1318	0.140	1334	0.140	1350	0.140	1366	0.140	1382	0.140	1398	0.140	1414	0.140	1430	0.140
1319	0.140	1335	0.140	1351	0.140	1367	0.140	1383	0.140	1399	0.140	1415	0.140	1431	0.140
1320	0.140	1336	0.140	1352	0.140	1368	0.140	1384	0.140	1400	0.140	1416	0.140	1432	0.140
1321	0.140	1337	0.140	1353	0.140	1369	0.140	1385	0.140	1401	0.140	1417	0.140	1433	0.140
1322	0.140	1338	0.140	1354	0.140	1370	0.140	1386	0.140	1402	0.140	1418	0.140	1434	0.140
1323	0.140	1339	0.140	1355	0.140	1371	0.140	1387	0.140	1403	0.140	1419	0.140	1435	0.140
1324	0.140	1340	0.140	1356	0.140	1372	0.140	1388	0.140	1404	0.140	1420	0.140	1436	0.140
1325	0.140	1341	0.140	1357	0.140	1373	0.140	1389	0.140	1405	0.140	1421	0.140	1437	0.140
1326	0.140	1342	0.140	1358	0.140	1374	0.140	1390	0.140	1406	0.140	1422	0.140	1438	0.140
1327	0.140	1343	0.140	1359	0.140	1375	0.140	1391	0.140	1407	0.140	1423	0.140	1439	0.140
1328	0.140	1344	0.140	1360	0.140	1376	0.140	1392	0.140	1408	0.140	1424	0.140	1440	0.140

Online Controls for Storm

Hydro-Brake® Optimum Manhole: R2001, DS/PN: 1.001, Volume (m³): 83.9

Unit Reference	MD-SHE-0095-5000-1745-5000
Design Head (m)	1.745
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	95
Invert Level (m)	87.355
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)	1.745	5.0	Kick-Flo®	0.843	3.6
Flush-Flo™	0.413	4.5	Mean Flow over Head Range	-	4.1

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)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.8	2.000	5.3	4.000	7.4	7.000	9.6
0.200	4.1	1.000	3.9	2.200	5.6	4.500	7.8	7.500	9.9
0.300	4.4	1.200	4.2	2.400	5.8	5.000	8.2	8.000	10.2
0.400	4.5	1.400	4.5	2.600	6.0	5.500	8.6	8.500	10.5
0.500	4.4	1.600	4.8	3.000	6.4	6.000	8.9	9.000	10.8
0.600	4.3	1.800	5.1	3.500	6.9	6.500	9.3	9.500	11.1

Storage Structures for Storm

Cellular Storage Pipe: 1.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	87.356	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	110.0	0.0	0.800	110.0	0.0	0.801	0.0	0.0

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R2000	180	Summer	2	+0%	100/60	Summer			87.506	-0.651	0.000
1.001	R2001	180	Summer	2	+0%	2/180	Summer			87.505	0.000	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R2000	0.01		93	5.8	OK	
1.001	R2001	0.20			3.2	SURCHARGED	

5 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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

US/MH			Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water	Surcharged	Flooded
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	Depth	Volume
									(m)	(m)	(m³)
1.000	R2000	180 Summer	5	+0%	100/60 Summer				87.553	-0.604	0.000
1.001	R2001	180 Summer	5	+0%	2/180 Summer				87.553	0.048	0.000

US/MH			Half Drain		Pipe	Level	
PN	Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded
1.000	R2000	0.02		90	7.7	OK	
1.001	R2001	0.23			3.7	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	R2000	120 Summer		30	+0%	100/60 Summer				87.720	-0.437	0.000
1.001	R2001	120 Summer		30	+0%	2/180 Summer				87.720	0.215	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R2000	0.04		100	15.9	OK	
1.001	R2001	0.27			4.4	SURCHARGED	

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 * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 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 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 1.000
 Site Location GB 339198 334094 SJ 39198 34094 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 5, 30, 100
 Climate Change (%) 0, 0, 0, 45

							Overflow Act.	Water Surcharged Flooded		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood		Level (m)	Depth (m)	Volume (m³)
1.000	R2000	120 Winter	100	+45%	100/60	Summer		88.823	0.666	0.000
1.001	R2001	120 Winter	100	+45%	2/180	Summer		88.823	1.318	0.000

			Half Drain		Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	R2000	0.05		48	21.1	FLOOD RISK	
1.001	R2001	0.28			4.6	FLOOD RISK	