

Ironside Farrar Ltd		Page 1
3 Worsley Court Walkden Manchester M28 3NJ	Smithy Bridge Road Rochdale East Catchment RevB	
Date 12/10/2022 15:51	Designed by RDE	
File 30329 SMITHY BRIDGE EAST...	Checked by	
Micro Drainage	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.580	4-8	1.059

Total Pipe Volume (m³) = 992.169

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.000	50.207	2.008	25.0	0.051	4.00	0.0	0.600	o	150	Pipe/Conduit		
1.001	85.794	6.602	13.0	0.139	0.00	0.0	0.600	o	225	Pipe/Conduit		
2.000	45.894	2.085	22.0	0.117	4.00	0.0	0.600	o	225	Pipe/Conduit		

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	4.41	149.000	0.051	0.0	0.0	0.0	2.02	35.7	0.0
1.001	0.00	4.81	146.917	0.190	0.0	0.0	0.0	3.65	145.1	0.0
2.000	0.00	4.27	142.400	0.117	0.0	0.0	0.0	2.80	111.4	0.0

Ironside Farrar Ltd

3 Worsley Court

Walkden

Manchester M28 3NJ

Date 12/10/2022 15:51

File 30329 SMITHY BRIDGE EAST...

Smithy Bridge Road

Rochdale

East Catchment RevB

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Network 2020.1

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Micro Drainage

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.006	8.932	0.089	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	28.453	0.071	400.0	0.032	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.008	41.305	0.103	400.0	0.185	0.00	0.0	0.600	o	1200	Pipe/Conduit	
6.000	33.498	2.792	12.0	0.096	4.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	19.213	1.601	12.0	0.110	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.002	28.129	2.344	12.0	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.009	36.323	0.091	400.0	0.113	0.00	0.0	0.600	o	1200	Pipe/Conduit	
7.000	81.646	0.204	400.0	0.140	4.00	0.0	0.600	o	1200	Pipe/Conduit	
7.001	27.407	0.069	400.0	0.062	0.00	0.0	0.600	o	1200	Pipe/Conduit	
7.002	40.599	0.101	400.0	0.048	0.00	0.0	0.600	o	1200	Pipe/Conduit	
8.000	32.556	2.713	12.0	0.106	4.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	25.475	1.019	25.0	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.002	15.437	0.039	400.0	0.066	0.00	0.0	0.600	o	1200	Pipe/Conduit	
8.003	13.678	0.034	400.0	0.140	0.00	0.0	0.600	o	1200	Pipe/Conduit	
7.003	15.427	0.039	400.0	0.043	0.00	0.0	0.600	o	1200	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.006	0.00	6.23	135.685	1.427	0.0	0.0	0.0	1.31	52.0	0.0
1.007	0.00	6.48	133.652	1.459	0.0	0.0	0.0	1.86	2108.6	0.0
1.008	0.00	6.85	133.581	1.644	0.0	0.0	0.0	1.86	2108.6	0.0
6.000	0.00	4.15	142.200	0.096	0.0	0.0	0.0	3.80	151.0	0.0
6.001	0.00	4.23	139.408	0.206	0.0	0.0	0.0	3.80	151.0	0.0
6.002	0.00	4.35	136.797	0.249	0.0	0.0	0.0	3.80	151.0	0.0
1.009	0.00	7.18	133.478	2.006	0.0	0.0	0.0	1.86	2108.6	0.0
7.000	0.00	4.73	133.800	0.140	0.0	0.0	0.0	1.86	2108.6	0.0
7.001	0.00	4.97	133.596	0.202	0.0	0.0	0.0	1.86	2108.6	0.0
7.002	0.00	5.34	133.527	0.250	0.0	0.0	0.0	1.86	2108.6	0.0
8.000	0.00	4.14	140.300	0.106	0.0	0.0	0.0	3.80	151.0	0.0
8.001	0.00	4.30	137.587	0.134	0.0	0.0	0.0	2.63	104.5	0.0
8.002	0.00	4.44	133.499	0.200	0.0	0.0	0.0	1.86	2108.6	0.0
8.003	0.00	4.56	133.460	0.340	0.0	0.0	0.0	1.86	2108.6	0.0
7.003	0.00	5.48	133.426	0.633	0.0	0.0	0.0	1.86	2108.6	0.0

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Micro Drainage

Smithy Bridge Road
Rochdale
East Catchment RevB

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Micro Drainage

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	150.475	149.000	1.325	Open Manhole	1200
1.001	o	225	2	148.675	146.917	1.533	Open Manhole	1200
2.000	o	225	3	144.150	142.400	1.525	Open Manhole	1200
1.002	o	300	4	142.275	140.240	1.735	Open Manhole	1500
1.003	o	375	5	140.025	137.216	2.434	Open Manhole	1500
3.000	o	1200	6	145.550	142.406	1.944	Open Manhole	2400
3.001	o	1200	7	145.910	142.357	2.353	Open Manhole	2400
3.002	o	1200	8	145.580	142.325	2.055	Open Manhole	2400
3.003	o	1200	9	145.825	142.140	2.485	Open Manhole	2400
3.004	o	1200	10	145.650	142.090	2.360	Open Manhole	2400
4.000	o	1200	11	147.575	142.088	4.287	Open Manhole	2400
3.005	o	225	12	145.775	142.000	3.550	Open Manhole	2700
3.006	o	225	13	141.850	137.524	4.101	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	50.207	25.0	2	148.675	146.992	1.533	Open Manhole	1200
1.001	85.794	13.0	4	142.275	140.315	1.735	Open Manhole	1500
2.000	45.894	22.0	4	142.275	140.315	1.735	Open Manhole	1500
1.002	60.289	20.4	5	140.025	137.291	2.434	Open Manhole	1500
1.003	11.388	38.5	14	141.000	136.920	3.705	Open Manhole	1050
3.000	19.668	400.0	7	145.910	142.357	2.353	Open Manhole	2400
3.001	12.640	400.0	8	145.580	142.325	2.055	Open Manhole	2400
3.002	74.146	400.0	9	145.825	142.140	2.485	Open Manhole	2400
3.003	20.009	400.0	10	145.650	142.090	2.360	Open Manhole	2400
3.004	35.819	400.0	12	145.775	142.000	2.575	Open Manhole	2700
4.000	35.215	400.0	12	145.775	142.000	2.575	Open Manhole	2700
3.005	65.875	14.7	13	141.850	137.524	4.101	Open Manhole	1200
3.006	4.997	11.0	14	141.000	137.070	3.705	Open Manhole	1050

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.004	ooo	-2	14	141.000	135.795	3.705	Open Manhole	1050
5.000	ooo	-2	15	141.000	135.795	3.705	Open Manhole	1050
1.005	o	1200	15	139.000	135.700	2.100	Open Manhole	1050
1.006	o	225	16	139.000	135.685	3.090	Open Manhole	2100
1.007	o	1200	17	138.675	133.652	3.823	Open Manhole	2400
1.008	o	1200	18	138.350	133.581	3.569	Open Manhole	2400
6.000	o	225	19	143.950	142.200	1.525	Open Manhole	1200
6.001	o	225	20	141.150	139.408	1.517	Open Manhole	1200
6.002	o	225	21	139.525	136.797	2.503	Open Manhole	1200
1.009	o	1200	22	137.925	133.478	3.247	Open Manhole	2400
7.000	o	1200	23	136.500	133.800	1.500	Open Manhole	2400
7.001	o	1200	24	136.600	133.596	1.804	Open Manhole	2400

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.004	38.000	400.0	15	139.000	135.700	1.800	Open Manhole	1050
5.000	38.000	400.0	15	139.000	135.700	1.800	Open Manhole	1050
1.005	3.761	250.7	16	139.000	135.685	2.115	Open Manhole	2100
1.006	8.932	100.0	17	138.675	135.595	2.855	Open Manhole	2400
1.007	28.453	400.0	18	138.350	133.581	3.569	Open Manhole	2400
1.008	41.305	400.0	22	137.925	133.478	3.247	Open Manhole	2400
6.000	33.498	12.0	20	141.150	139.408	1.517	Open Manhole	1200
6.001	19.213	12.0	21	139.525	137.807	1.493	Open Manhole	1200
6.002	28.129	12.0	22	137.925	134.453	3.247	Open Manhole	2400
1.009	36.323	400.0	31	137.400	133.387	2.813	Open Manhole	2700
7.000	81.646	400.0	24	136.600	133.596	1.804	Open Manhole	2400
7.001	27.407	400.0	25	136.625	133.527	1.898	Open Manhole	2400

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.002	o	1200	25	136.625	133.527	1.898	Open Manhole	2400
8.000	o	225	26	142.050	140.300	1.525	Open Manhole	1200
8.001	o	225	27	139.300	137.587	1.488	Open Manhole	1200
8.002	o	1200	28	138.175	133.499	3.476	Open Manhole	2400
8.003	o	1200	29	137.625	133.460	2.965	Open Manhole	2400
7.003	o	1200	30	137.200	133.426	2.574	Open Manhole	2700
1.010	o	300	31	137.400	133.387	3.713	Open Manhole	2700
1.011	o	300	32	134.550	133.180	1.070	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.002	40.599	400.0	30	137.200	133.426	2.574	Open Manhole	2700
8.000	32.556	12.0	27	139.300	137.587	1.488	Open Manhole	1200
8.001	25.475	25.0	28	138.175	136.568	1.382	Open Manhole	2400
8.002	15.437	400.0	29	137.625	133.460	2.965	Open Manhole	2400
8.003	13.678	400.0	30	137.200	133.426	2.574	Open Manhole	2700
7.003	15.427	400.0	31	137.400	133.387	2.813	Open Manhole	2700
1.010	16.584	80.1	32	134.550	133.180	1.070	Open Manhole	1200
1.011	7.489	79.7		133.400	133.086	0.014	Open Manhole	1200

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

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<u>Simulation Criteria for Storm</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Profile Type</td> <td>Summer</td> </tr> <tr> <td>Return Period (years)</td> <td>2</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.000</td> <td>Storm Duration (mins)</td> <td>30</td> </tr> <tr> <td>Ratio R</td> <td>0.252</td> <td></td> <td></td> </tr> </table>			Rainfall Model	FSR	Profile Type	Summer	Return Period (years)	2	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.000	Storm Duration (mins)	30	Ratio R	0.252		
Rainfall Model	FSR	Profile Type	Summer																			
Return Period (years)	2	Cv (Summer)	0.750																			
Region	England and Wales	Cv (Winter)	0.840																			
M5-60 (mm)	19.000	Storm Duration (mins)	30																			
Ratio R	0.252																					
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 12, DS/PN: 3.005, Volume (m³): 96.2

Unit Reference	MD-SHE-0095-6400-2900-6400
Design Head (m)	2.900
Design Flow (l/s)	6.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	95
Invert Level (m)	142.000
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)	2.900	6.4	Kick-Flo®	0.848	3.6
Flush-Flo™	0.415	4.5	Mean Flow over Head Range	-	4.8

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)
0.100	3.1	1.200	4.2	3.000	6.5	7.000	9.7
0.200	4.1	1.400	4.5	3.500	7.0	7.500	10.0
0.300	4.4	1.600	4.8	4.000	7.4	8.000	10.3
0.400	4.5	1.800	5.1	4.500	7.9	8.500	10.6
0.500	4.5	2.000	5.4	5.000	8.3	9.000	10.9
0.600	4.4	2.200	5.6	5.500	8.6	9.500	11.2
0.800	3.9	2.400	5.8	6.000	9.0		
1.000	3.9	2.600	6.1	6.500	9.4		

Hydro-Brake® Optimum Manhole: 16, DS/PN: 1.006, Volume (m³): 14.0

Unit Reference	MD-SHE-0175-2130-3000-2130
Design Head (m)	3.000
Design Flow (l/s)	21.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	175
Invert Level (m)	135.685
Minimum Outlet Pipe Diameter (mm)	225

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<u>Hydro-Brake® Optimum Manhole: 16, DS/PN: 1.006, Volume (m³): 14.0</u>							
Suggested Manhole Diameter (mm) 1800							
Control Points		Head (m)	Flow (l/s)	Control Points		Head (m)	Flow (l/s)
Design Point (Calculated)		3.000	21.3	Kick-Flo®		1.558	15.6
Flush-Flo™		0.753	19.9	Mean Flow over Head Range		-	17.9
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.2	1.200	18.9	3.000	21.3	7.000	32.0
0.200	15.3	1.400	17.5	3.500	22.9	7.500	33.1
0.300	17.3	1.600	15.8	4.000	24.4	8.000	34.1
0.400	18.6	1.800	16.7	4.500	25.9	8.500	35.1
0.500	19.3	2.000	17.6	5.000	27.2	9.000	36.1
0.600	19.7	2.200	18.4	5.500	28.5	9.500	37.1
0.800	19.9	2.400	19.1	6.000	29.7		
1.000	19.6	2.600	19.9	6.500	30.9		
<u>Hydro-Brake® Optimum Manhole: 31, DS/PN: 1.010, Volume (m³): 75.6</u>							
Unit Reference		MD-SHE-0268-5050-2950-5050					
Design Head (m)		2.950					
Design Flow (l/s)		50.5					
Flush-Flo™		Calculated					
Objective		Minimise upstream storage					
Application		Surface					
Sump Available		Yes					
Diameter (mm)		268					
Invert Level (m)		133.387					
Minimum Outlet Pipe Diameter (mm)		300					
Suggested Manhole Diameter (mm)		Site Specific Design (Contact Hydro International)					
Control Points		Head (m)	Flow (l/s)	Control Points		Head (m)	Flow (l/s)
Design Point (Calculated)		2.950	50.5	Kick-Flo®		1.798	39.8
Flush-Flo™		0.844	50.5	Mean Flow over Head Range		-	44.0
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.5	0.200	27.6	0.300	42.6	0.400	46.0
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Storage Structures for Storm

Cellular Storage Manhole: 12, DS/PN: 3.005

Invert Level (m) 144.250 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	270.0	0.0	0.801	0.0	0.0
0.800	270.0	0.0			

Cellular Storage Manhole: 31, DS/PN: 1.010

Invert Level (m) 135.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	99.0	0.0	1.201	0.0	0.0
1.200	99.0	0.0			

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1 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 Coefficient 0.800								
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000								
Foul Sewage per hectare (l/s) 0.000								
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0								
Number of Online Controls 3 Number of Storage Structures 2 Number of Real Time Controls 0								
Synthetic Rainfall Details								
Rainfall Model FSR Ratio R 0.252								
Region England and Wales Cv (Summer) 0.750								
M5-60 (mm) 19.000 Cv (Winter) 0.840								
Margin for Flood Risk Warning (mm) 300.0								
Analysis Timestep 2.5 Second Increment (Extended)								
DTS Status ON								
DVD Status ON								
Inertia Status 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) 1, 2, 30, 100								
Climate Change (%) 0, 0, 0, 45								
Water								
PN	US/MH Name	Storm	Return Climate Period Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	1	15 Winter	1 +0%					149.042
1.001	2	15 Winter	1 +0%					146.973
2.000	3	15 Winter	1 +0%					142.454
1.002	4	15 Winter	1 +0%	100/15 Summer				140.340
1.003	5	15 Winter	1 +0%	100/15 Summer				137.354
3.000	6	360 Winter	1 +0%	100/60 Winter				142.591
3.001	7	360 Winter	1 +0%	100/60 Winter				142.591
3.002	8	360 Winter	1 +0%	100/60 Winter				142.591
3.003	9	360 Winter	1 +0%	100/60 Summer				142.591
3.004	10	360 Winter	1 +0%	100/60 Summer				142.591
4.000	11	360 Winter	1 +0%	100/60 Summer				142.591
3.005	12	360 Winter	1 +0%	1/15 Summer				142.591
3.006	13	15 Winter	1 +0%	100/15 Summer				137.597
1.004	14	120 Winter	1 +0%	100/180 Winter				136.097
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Micro Drainage		Network 2020.1	
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm			

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.252
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	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)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	2	+0%					149.049
1.001	2	15 Winter	2	+0%					146.981
2.000	3	15 Winter	2	+0%					142.462
1.002	4	15 Winter	2	+0%	100/15 Summer				140.355
1.003	5	15 Winter	2	+0%	100/15 Summer				137.376
3.000	6	360 Winter	2	+0%	100/60 Winter				142.693
3.001	7	360 Winter	2	+0%	100/60 Winter				142.693
3.002	8	360 Winter	2	+0%	100/60 Winter				142.693
3.003	9	360 Winter	2	+0%	100/60 Summer				142.693
3.004	10	360 Winter	2	+0%	100/60 Summer				142.693
4.000	11	360 Winter	2	+0%	100/60 Summer				142.693
3.005	12	360 Winter	2	+0%	1/15 Summer				142.693
3.006	13	15 Winter	2	+0%	100/15 Summer				137.606
1.004	14	120 Winter	2	+0%	100/180 Winter				136.171

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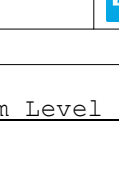
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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	1	-0.101	0.000	0.23		8.0	OK	
1.001	2	-0.161	0.000	0.18		25.0	OK	
2.000	3	-0.163	0.000	0.17		18.4	OK	
1.002	4	-0.185	0.000	0.31		72.1	OK	
1.003	5	-0.215	0.000	0.37		79.6	OK	
3.000	6	-0.913	0.000	0.00		1.6	OK	
3.001	7	-0.864	0.000	0.00		1.3	OK	
3.002	8	-0.832	0.000	0.00		3.3	OK	
3.003	9	-0.647	0.000	0.00		4.3	OK	
3.004	10	-0.597	0.000	0.00		5.7	OK	
4.000	11	-0.595	0.000	0.00		2.6	OK	
3.005	12	0.468	0.000	0.03	259	4.5	SURCHARGED	
3.006	13	-0.143	0.000	0.29		27.2	OK	
1.004	14	-1.124	0.000	0.01		50.9	OK	

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<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.000	15	120 Winter	2	+0%	100/180 Winter				136.166
1.005	15	120 Winter	2	+0%	100/60 Winter				136.166
1.006	16	60 Winter	2	+0%	1/15 Summer				136.177
1.007	17	60 Winter	2	+0%	100/60 Summer				133.955
1.008	18	60 Winter	2	+0%	100/60 Summer				133.950
6.000	19	15 Winter	2	+0%					142.249
6.001	20	15 Winter	2	+0%					139.478
6.002	21	15 Winter	2	+0%					136.872
1.009	22	60 Winter	2	+0%	100/30 Winter				133.940
7.000	23	60 Winter	2	+0%	100/60 Summer				133.925
7.001	24	60 Winter	2	+0%	100/60 Summer				133.924
7.002	25	60 Winter	2	+0%	100/30 Winter				133.924
8.000	26	15 Winter	2	+0%					140.351
8.001	27	15 Winter	2	+0%					137.656
8.002	28	60 Winter	2	+0%	100/30 Winter				133.924
8.003	29	60 Winter	2	+0%	100/30 Winter				133.924
7.003	30	60 Winter	2	+0%	100/30 Winter				133.923
1.010	31	60 Winter	2	+0%	1/15 Summer				133.921
1.011	32	60 Winter	2	+0%					133.353
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.000	15	-1.129	0.000	0.00			0.1	OK	
1.005	15	-0.734	0.000	0.03			27.5	OK	
1.006	16	0.267	0.000	0.45			19.1	SURCHARGED	
1.007	17	-0.897	0.000	0.01			20.1	OK	
1.008	18	-0.831	0.000	0.02			29.6	OK	
6.000	19	-0.176	0.000	0.11			15.1	OK	
6.001	20	-0.155	0.000	0.21			28.8	OK	
6.002	21	-0.150	0.000	0.24			34.1	OK	
1.009	22	-0.738	0.000	0.03			48.1	OK	
7.000	23	-1.075	0.000	0.01			11.8	OK	
7.001	24	-0.872	0.000	0.01			8.5	OK	
7.002	25	-0.804	0.000	0.01			8.9	OK	
8.000	26	-0.174	0.000	0.12			16.7	OK	
8.001	27	-0.156	0.000	0.21			20.2	OK	
8.002	28	-0.775	0.000	0.02			16.0	OK	
8.003	29	-0.737	0.000	0.02			22.9	OK	
7.003	30	-0.703	0.000	0.02			16.4	OK	
1.010	31	0.234	0.000	0.46		41	48.6	SURCHARGED	
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<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>								
		Surcharged	Flooded		Half Drain	Pipe		
	US/MH	Depth	Volume	Flow /	Time	Flow		Level
PN	Name	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
1.011	32	-0.127	0.000	0.63			48.6	OK
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.252
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status ON

Inertia Status 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) 1, 2, 30, 100

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%					149.069
1.001	2	15 Winter	30	+0%					147.015
2.000	3	15 Winter	30	+0%					142.488
1.002	4	15 Winter	30	+0%	100/15 Summer				140.423
1.003	5	15 Winter	30	+0%	100/15 Summer				137.479
3.000	6	480 Winter	30	+0%	100/60 Winter				143.235
3.001	7	480 Winter	30	+0%	100/60 Winter				143.235
3.002	8	480 Winter	30	+0%	100/60 Winter				143.235
3.003	9	480 Winter	30	+0%	100/60 Summer				143.235
3.004	10	480 Winter	30	+0%	100/60 Summer				143.235
4.000	11	480 Winter	30	+0%	100/60 Summer				143.233
3.005	12	480 Winter	30	+0%	1/15 Summer				143.233
3.006	13	15 Summer	30	+0%	100/15 Summer				137.652
1.004	14	180 Winter	30	+0%	100/180 Winter				136.492

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

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Overflow					
1.000	1	-0.081	0.000	0.43				15.1	OK	
1.001	2	-0.127	0.000	0.39				55.8	OK	
2.000	3	-0.137	0.000	0.33				34.7	OK	
1.002	4	-0.117	0.000	0.68				160.2	OK	
1.003	5	-0.112	0.000	0.83				175.8	OK	
3.000	6	-0.371	0.000	0.00				2.2	OK	
3.001	7	-0.322	0.000	0.00				2.1	OK	
3.002	8	-0.290	0.000	0.00				3.2	OK	
3.003	9	-0.105	0.000	0.00				4.1	OK	
3.004	10	-0.055	0.000	0.00				5.1	OK	
4.000	11	-0.055	0.000	0.00				3.9	OK	
3.005	12	1.008	0.000	0.03				4.5	SURCHARGED	
3.006	13	-0.097	0.000	0.62				58.8	OK	
1.004	14	-0.803	0.000	0.01				72.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.000	15	180 Winter	30	+0%	100/180 Winter				136.485
1.005	15	180 Winter	30	+0%	100/60 Winter				136.485
1.006	16	180 Winter	30	+0%	1/15 Summer				136.493
1.007	17	120 Winter	30	+0%	100/60 Summer				134.351
1.008	18	120 Winter	30	+0%	100/60 Summer				134.343
6.000	19	15 Winter	30	+0%					142.268
6.001	20	15 Winter	30	+0%					139.513
6.002	21	15 Summer	30	+0%					136.913
1.009	22	120 Winter	30	+0%	100/30 Winter				134.323
7.000	23	120 Winter	30	+0%	100/60 Summer				134.292
7.001	24	120 Winter	30	+0%	100/60 Summer				134.291
7.002	25	120 Winter	30	+0%	100/30 Winter				134.291
8.000	26	15 Winter	30	+0%					140.371
8.001	27	15 Winter	30	+0%					137.687
8.002	28	120 Winter	30	+0%	100/30 Winter				134.291
8.003	29	120 Winter	30	+0%	100/30 Winter				134.291
7.003	30	120 Winter	30	+0%	100/30 Winter				134.290
1.010	31	120 Winter	30	+0%	1/15 Summer				134.284
1.011	32	180 Winter	30	+0%					133.357
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.000	15	-0.810	0.000	0.00			0.1	OK	
1.005	15	-0.415	0.000	0.04			37.4	OK	
1.006	16	0.584	0.000	0.47			19.9	SURCHARGED	
1.007	17	-0.501	0.000	0.02			21.6	OK	
1.008	18	-0.438	0.000	0.02			32.0	OK	
6.000	19	-0.157	0.000	0.20			28.5	OK	
6.001	20	-0.120	0.000	0.45			61.1	OK	
6.002	21	-0.109	0.000	0.53			73.8	OK	
1.009	22	-0.355	0.000	0.04			57.8	OK	
7.000	23	-0.708	0.000	0.01			14.0	OK	
7.001	24	-0.505	0.000	0.01			8.2	OK	
7.002	25	-0.437	0.000	0.01			11.0	OK	
8.000	26	-0.154	0.000	0.22			31.4	OK	
8.001	27	-0.125	0.000	0.41			39.7	OK	
8.002	28	-0.408	0.000	0.02			21.0	OK	
8.003	29	-0.370	0.000	0.03			30.8	OK	
7.003	30	-0.336	0.000	0.02			18.1	OK	
1.010	31	0.598	0.000	0.48		92	50.5	SURCHARGED	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.252
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	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)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+45%					149.103
1.001	2	15 Winter	100	+45%					147.062
2.000	3	15 Winter	100	+45%					142.527
1.002	4	15 Winter	100	+45%	100/15 Summer				141.570
1.003	5	240 Winter	100	+45%	100/15 Summer				138.727
3.000	6	720 Winter	100	+45%	100/60 Winter				144.902
3.001	7	720 Winter	100	+45%	100/60 Winter				144.902
3.002	8	720 Winter	100	+45%	100/60 Winter				144.902
3.003	9	720 Winter	100	+45%	100/60 Summer				144.902
3.004	10	720 Winter	100	+45%	100/60 Summer				144.902
4.000	11	720 Winter	100	+45%	100/60 Summer				144.902
3.005	12	720 Winter	100	+45%	1/15 Summer				144.902
3.006	13	240 Winter	100	+45%	100/15 Summer				138.730
1.004	14	240 Winter	100	+45%	100/180 Winter				138.723

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

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Volume (m³)	Flow (l/s)					
1.000	1	-0.047	0.000	0.000	0.81			28.1	OK	
1.001	2	-0.080	0.000	0.000	0.74			104.1	OK	
2.000	3	-0.098	0.000	0.000	0.61			64.7	OK	
1.002	4	1.030	0.000	0.000	1.12			263.2	SURCHARGED	
1.003	5	1.136	0.000	0.000	0.38			81.1	SURCHARGED	
3.000	6	1.296	0.000	0.000	0.00			3.2	SURCHARGED	
3.001	7	1.345	0.000	0.000	0.00			2.7	SURCHARGED	
3.002	8	1.377	0.000	0.000	0.00			7.8	SURCHARGED	
3.003	9	1.562	0.000	0.000	0.01			13.1	SURCHARGED	
3.004	10	1.612	0.000	0.000	0.02			24.0	SURCHARGED	
4.000	11	1.614	0.000	0.000	0.00			5.5	SURCHARGED	
3.005	12	2.677	0.000	0.000	0.05	426		6.4	SURCHARGED	
3.006	13	0.981	0.000	0.000	0.30			29.0	SURCHARGED	
1.004	14	1.428	0.000	0.000	0.01			109.8	SURCHARGED	

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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>										
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	
5.000	15	240 Winter	100	+45%	100/180 Winter				138.723	
1.005	15	240 Winter	100	+45%	100/60 Winter				138.723	
1.006	16	240 Winter	100	+45%	1/15 Summer				138.722	
1.007	17	180 Winter	100	+45%	100/60 Summer				136.314	
1.008	18	180 Winter	100	+45%	100/60 Summer				136.313	
6.000	19	15 Winter	100	+45%					142.295	
6.001	20	15 Winter	100	+45%					139.566	
6.002	21	15 Winter	100	+45%					136.975	
1.009	22	180 Winter	100	+45%	100/30 Winter				136.312	
7.000	23	180 Winter	100	+45%	100/60 Summer				136.311	
7.001	24	180 Winter	100	+45%	100/60 Summer				136.311	
7.002	25	180 Winter	100	+45%	100/30 Winter				136.311	
8.000	26	15 Winter	100	+45%					140.401	
8.001	27	15 Winter	100	+45%					137.736	
8.002	28	180 Winter	100	+45%	100/30 Winter				136.311	
8.003	29	180 Winter	100	+45%	100/30 Winter				136.311	
7.003	30	180 Winter	100	+45%	100/30 Winter				136.311	
1.010	31	180 Winter	100	+45%	1/15 Summer				136.310	
1.011	32	1440 Winter	100	+45%					133.357	
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded	
5.000	15	1.428	0.000	0.00			0.9	SURCHARGED		
1.005	15	1.823	0.000	0.05			46.1	FLOOD RISK		
1.006	16	2.813	0.000	0.47			19.9	FLOOD RISK		
1.007	17	1.462	0.000	0.02			24.6	SURCHARGED		
1.008	18	1.532	0.000	0.03			52.7	SURCHARGED		
6.000	19	-0.130	0.000	0.37			53.2	OK		
6.001	20	-0.067	0.000	0.84			114.1	OK		
6.002	21	-0.047	0.000	0.98			137.9	OK		
1.009	22	1.634	0.000	0.07			97.9	SURCHARGED		
7.000	23	1.311	0.000	0.01			20.2	FLOOD RISK		
7.001	24	1.515	0.000	0.01			16.6	FLOOD RISK		
7.002	25	1.583	0.000	0.01			18.2	SURCHARGED		
8.000	26	-0.124	0.000	0.41			58.7	OK		
8.001	27	-0.076	0.000	0.77			74.2	OK		
8.002	28	1.612	0.000	0.03			30.1	SURCHARGED		
8.003	29	1.651	0.000	0.05			46.4	SURCHARGED		
7.003	30	1.685	0.000	0.05			54.0	SURCHARGED		
1.010	31	2.623	0.000	0.48		86	50.4	SURCHARGED		
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3 Worsley Court Walkden Manchester M28 3NJ			Smithy Bridge Road Rochdale East Catchment RevB						
Date 12/10/2022 15:51 File 30329 SMITHY BRIDGE EAST...			Designed by RDE Checked by						
Micro Drainage			Network 2020.1						
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
			Surcharged	Flooded		Half Drain	Pipe		
	US/MH	Depth	Volume	Flow /	Overflow	Time	Flow		Level
PN	Name	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
1.011	32	-0.122	0.000	0.66			50.5	OK	
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