STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.300	Add Flow / Climate Change (%)	0
Ratio R	0.353	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Surface Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.082	4-8	0.022

Total Area Contributing (ha) = 0.104

Total Pipe Volume (m³) = 3.238

Network Design Table for Surface Network 1

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	9.050	0.091	99.5	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	11.600	0.119	97.5	0.006	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	4.773	0.160	29.8	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	7.025	0.047	149.5	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	9.353	0.210	44.5	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit	
4.000	4.665	0.360	13.0	0.006	5.00	0.0	0.600	o	100	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	46.35	5.20	80.400	0.006	0.0	0.0	0.0	0.77	6.1	0.8
1.001	45.43	5.44	80.309	0.012	0.0	0.0	0.0	0.78	6.1	1.5
2.000	46.88	5.06	80.350	0.006	0.0	0.0	0.0	1.42	11.1	0.8
1.002	44.92	5.59	80.140	0.024	0.0	0.0	0.0	0.82	14.5	2.9
3.000	46.58	5.13	80.350	0.006	0.0	0.0	0.0	1.16	9.1	0.8
4.000	46.96	5.04	80.500	0.006	0.0	0.0	0.0	2.16	16.9	0.8

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Network Design Table for Surface Network 1

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
1.003	11.573	0.103	112.4	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	8.995	0.460	19.6	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.004	17.403	0.580	30.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	13.562	0.131	103.5	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
6.001	12.261	0.123	99.7	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	10.973	0.310	35.4	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
7.001	9.485	0.444	21.4	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.002	2.870	0.016	179.4	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	15.663	0.670	23.4	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
6.003	9.025	0.070	128.9	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
9.000	15.060	0.240	62.8	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit	
6.004	6.657	0.080	83.2	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.005	5.409	0.105	51.5	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	1.669	0.030	55.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	5.643	0.080	70.5	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)
1.003	44.22	5.79	80.093	0.041	0.0	0.0	0.0	0.95	16.7	4.9
5.000	46.77	5.09	80.500	0.005	0.0	0.0	0.0	1.75	13.8	0.6
1.004	43.81	5.91	79.915	0.051	0.0	0.0	0.0	2.40	95.3	6.1
6.000	45.96	5.30	79.300	0.005	0.0	0.0	0.0	0.76	5.9	0.6
6.001	45.22	5.50	79.119	0.010	0.0	0.0	0.0	1.01	17.8	1.2
7.000	46.55	5.14	79.800	0.005	0.0	0.0	0.0	1.30	10.2	0.6
7.001	46.28	5.21	79.440	0.010	0.0	0.0	0.0	2.19	38.7	1.3
6.002	44.99	5.57	78.996	0.025	0.0	0.0	0.0	0.75	13.2	3.0
8.000	46.47	5.16	79.700	0.005	0.0	0.0	0.0	1.60	12.6	0.6
6.003	44.54	5.70	78.905	0.035	0.0	0.0	0.0	1.15	45.7	4.2
9.000	46.11	5.26	79.200	0.006	0.0	0.0	0.0	0.97	7.6	0.7
6.004	44.27	5.77	78.835	0.047	0.0	0.0	0.0	1.43	57.0	5.6
6.005	44.11	5.82	78.755	0.053	0.0	0.0	0.0	1.83	72.6	6.3
1.005	43.75	5.93	78.650	0.104	0.0	0.0	0.0	1.35	23.9	12.3
1.006	43.49	6.01	78.620	0.104	0.0	0.0	0.0	1.20	21.2	12.3

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
PS1	81.000	0.600	Open Manhole	300	1.000	80.400	100				
PS2	81.000	0.691	Open Manhole	450	1.001	80.309	100	1.000	80.309	100	
PS3	81.000	0.650	Open Manhole	300	2.000	80.350	100				
PS4	81.000	0.860	Open Manhole	450	1.002	80.140	150	1.001	80.190	100	
								2.000	80.190	100	
PS5	81.000	0.650	Open Manhole	300	3.000	80.350	100				
PS6	81.150	0.650	Open Manhole	300	4.000	80.500	100				
PS7	81.000	0.907	Open Manhole	450	1.003	80.093	150	1.002	80.093	150	
								3.000	80.140	100	
								4.000	80.140	100	
PS8	81.150	0.650	Open Manhole	300	5.000	80.500	100				
PS9	81.150	1.235	Open Manhole	450	1.004	79.915	225	1.003	79.990	150	
								5.000	80.040	100	
PS10	79.850	0.550	Open Manhole	300	6.000	79.300	100				
PS11	80.150	1.031	Open Manhole	450	6.001	79.119	150	6.000	79.169	100	
PS12	80.300	0.500	Open Manhole	300	7.000	79.800	100				
PS13	79.850	0.410	Open Manhole	450	7.001	79.440	150	7.000	79.490	100	
PS14	80.525	1.529	Open Manhole	450	6.002	78.996	150	6.001	78.996	150	
								7.001	78.996	150	
PS15	80.300	0.600	Open Manhole	300	8.000	79.700	100				
PS16	80.525	1.620	Open Manhole	600	6.003	78.905	225	6.002	78.980	150	
								8.000	79.030	100	
PS17	80.294	1.094	Open Manhole	450	9.000	79.200	100				
PS18	80.500	1.665	Open Manhole	600	6.004	78.835	225	6.003	78.835	225	
								9.000	78.960	100	
PS19	80.462	1.707	Open Manhole	600	6.005	78.755	225	6.004	78.755	225	
PS20	80.500	1.850	Open Manhole	1200	1.005	78.650	150	1.004	79.335	225	760
								6.005	78.650	225	
PS21	80.252	1.632	Open Manhole	450	1.006	78.620	150	1.005	78.620	150	
PS22	80.300	1.760	Open Manhole	1200		OUTFALL		1.006	78.540	150	

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PIPELINE SCHEDULES for Surface Network 1

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	100	PS1	81.000	80.400	0.500	Open Manhole	300
1.001	o	100	PS2	81.000	80.309	0.591	Open Manhole	450
2.000	o	100	PS3	81.000	80.350	0.550	Open Manhole	300
1.002	o	150	PS4	81.000	80.140	0.710	Open Manhole	450
3.000	o	100	PS5	81.000	80.350	0.550	Open Manhole	300
4.000	o	100	PS6	81.150	80.500	0.550	Open Manhole	300
1.003	o	150	PS7	81.000	80.093	0.757	Open Manhole	450
5.000	o	100	PS8	81.150	80.500	0.550	Open Manhole	300
1.004	o	225	PS9	81.150	79.915	1.010	Open Manhole	450
6.000	o	100	PS10	79.850	79.300	0.450	Open Manhole	300
6.001	o	150	PS11	80.150	79.119	0.881	Open Manhole	450
7.000	o	100	PS12	80.300	79.800	0.400	Open Manhole	300
7.001	o	150	PS13	79.850	79.440	0.260	Open Manhole	450
6.002	o	150	PS14	80.525	78.996	1.379	Open Manhole	450

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	9.050	99.5	PS2	81.000	80.309	0.591	Open Manhole	450
1.001	11.600	97.5	PS4	81.000	80.190	0.710	Open Manhole	450
2.000	4.773	29.8	PS4	81.000	80.190	0.710	Open Manhole	450
1.002	7.025	149.5	PS7	81.000	80.093	0.757	Open Manhole	450
3.000	9.353	44.5	PS7	81.000	80.140	0.760	Open Manhole	450
4.000	4.665	13.0	PS7	81.000	80.140	0.760	Open Manhole	450
1.003	11.573	112.4	PS9	81.150	79.990	1.010	Open Manhole	450
5.000	8.995	19.6	PS9	81.150	80.040	1.010	Open Manhole	450
1.004	17.403	30.0	PS20	80.500	79.335	0.940	Open Manhole	1200
6.000	13.562	103.5	PS11	80.150	79.169	0.881	Open Manhole	450
6.001	12.261	99.7	PS14	80.525	78.996	1.379	Open Manhole	450
7.000	10.973	35.4	PS13	79.850	79.490	0.260	Open Manhole	450
7.001	9.485	21.4	PS14	80.525	78.996	1.379	Open Manhole	450
6.002	2.870	179.4	PS16	80.525	78.980	1.395	Open Manhole	600

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PIPELINE SCHEDULES for Surface Network 1

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)
8.000	o	100	PS15	80.300	79.700	0.500	Open Manhole	300
6.003	o	225	PS16	80.525	78.905	1.395	Open Manhole	600
9.000	o	100	PS17	80.294	79.200	0.994	Open Manhole	450
6.004	o	225	PS18	80.500	78.835	1.440	Open Manhole	600
6.005	o	225	PS19	80.462	78.755	1.482	Open Manhole	600
1.005	o	150	PS20	80.500	78.650	1.700	Open Manhole	1200
1.006	o	150	PS21	80.252	78.620	1.482	Open Manhole	450

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)
8.000	15.663	23.4	PS16	80.525	79.030	1.395	Open Manhole	600
6.003	9.025	128.9	PS18	80.500	78.835	1.440	Open Manhole	600
9.000	15.060	62.8	PS18	80.500	78.960	1.440	Open Manhole	600
6.004	6.657	83.2	PS19	80.462	78.755	1.482	Open Manhole	600
6.005	5.409	51.5	PS20	80.500	78.650	1.625	Open Manhole	1200
1.005	1.669	55.6	PS21	80.252	78.620	1.482	Open Manhole	450
1.006	5.643	70.5	PS22	80.300	78.540	1.610	Open Manhole	1200

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Network Classifications for Surface Network 1

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	PS1	100	0.500	0.591	Unclassified	300	0	0.500	Unclassified
1.001	PS2	100	0.591	0.710	Unclassified	450	0	0.591	Unclassified
2.000	PS3	100	0.550	0.710	Unclassified	300	0	0.550	Unclassified
1.002	PS4	150	0.710	0.757	Unclassified	450	0	0.710	Unclassified
3.000	PS5	100	0.550	0.760	Unclassified	300	0	0.550	Unclassified
4.000	PS6	100	0.550	0.760	Unclassified	300	0	0.550	Unclassified
1.003	PS7	150	0.757	1.010	Unclassified	450	0	0.757	Unclassified
5.000	PS8	100	0.550	1.010	Unclassified	300	0	0.550	Unclassified
1.004	PS9	225	0.940	1.010	Unclassified	450	0	1.010	Unclassified
6.000	PS10	100	0.450	0.881	Unclassified	300	0	0.450	Unclassified
6.001	PS11	150	0.881	1.379	Unclassified	450	0	0.881	Unclassified
7.000	PS12	100	0.260	0.400	Unclassified	300	0	0.400	Unclassified
7.001	PS13	150	0.260	1.379	Unclassified	450	0	0.260	Unclassified
6.002	PS14	150	1.379	1.395	Unclassified	450	0	1.379	Unclassified
8.000	PS15	100	0.500	1.395	Unclassified	300	0	0.500	Unclassified
6.003	PS16	225	1.395	1.440	Unclassified	600	0	1.395	Unclassified
9.000	PS17	100	0.994	1.440	Unclassified	450	0	0.994	Unclassified
6.004	PS18	225	1.440	1.482	Unclassified	600	0	1.440	Unclassified
6.005	PS19	225	1.482	1.625	Unclassified	600	0	1.482	Unclassified
1.005	PS20	150	1.482	1.700	Unclassified	1200	0	1.700	Unclassified
1.006	PS21	150	1.482	1.610	Unclassified	450	0	1.482	Unclassified

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TAKE OFF DETAILS for Surface Network 1

Length Calculations based on 'Centre-Centre'

Warning - The following pipes have not been classified:

1.000
1.001
2.000
1.002
3.000
4.000
1.003
5.000
1.004
6.000
6.001
7.000
7.001
6.002
8.000
6.003
9.000
6.004
6.005
1.005
1.006

Warning - The following manholes have not been classified:

PS1
PS2
PS3
PS4
PS5
PS6
PS7
PS8
PS9
PS10
PS11
PS12
PS13
PS14
PS15
PS16
PS17
PS18
PS19
PS20
PS21

Pipes

Number	21
Total Length (m)	192.714
Volume (m³)	3.2378

Manholes

Number	21
True Depth (m)	21.081
Volume (m³)	5.3398

Outfalls

Number	1
True Depth (m)	1.760

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TAKE OFF DETAILS for Surface Network 1

Volume (m³) 1.9905

Flow Controls

Number 1

Storage Structures

Number 1
Volume (m³) 27.7083

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TOTALS FOR MANHOLES

Diameter (mm)	Width (mm)	Manhole Class	Number	Ring Depth (m)	Cost ()	Add Cost ()	Total Cost ()
300		Unclassified	8	4.050	?.??	?.??	?.??
600		Unclassified	3	4.317	?.??	?.??	?.??
1200		Unclassified	1	1.700	?.??	?.??	?.??
450		Unclassified	9	8.064	?.??	?.??	?.??
TOTALS			21	18.131	0.00	0.00	0.00

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TOTALS FOR PIPES

Diameter (mm)	Pipe Class	Number	Length (m)	Cost ()
100	Unclassified	10	103.694	?.??
150	Unclassified	7	50.526	?.??
225	Unclassified	4	38.494	?.??
TOTALS		21	192.714	0.00

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TOTALS FOR MATERIALS

No materials are used

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GROUND WORKS - Pipe Excavation by Depth

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

GROUND WORKS - Totals

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

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TOTALS FOR FLOW CONTROLS

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

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TOTALS FOR STORAGE STRUCTURES

Name	Number	Volume (m^3)	Cost ()
Cellular Storage	1	27.7083	0.00
TOTALS	1	27.7083	0.00

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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

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BREAKDOWN FOR MANHOLES

USMH Name	PN	MH Class	Diameter (mm)	Width (mm)	Ring Depth (m)	Cost ()	Add Cost ()	Total ()
PS1	1.000	Unclassified	300		0.500	?.??	?.??	?.??
PS2	1.001	Unclassified	450		0.591	?.??	?.??	?.??
PS3	2.000	Unclassified	300		0.550	?.??	?.??	?.??
PS4	1.002	Unclassified	450		0.710	?.??	?.??	?.??
PS5	3.000	Unclassified	300		0.550	?.??	?.??	?.??
PS6	4.000	Unclassified	300		0.550	?.??	?.??	?.??
PS7	1.003	Unclassified	450		0.757	?.??	?.??	?.??
PS8	5.000	Unclassified	300		0.550	?.??	?.??	?.??
PS9	1.004	Unclassified	450		1.010	?.??	?.??	?.??
PS10	6.000	Unclassified	300		0.450	?.??	?.??	?.??
PS11	6.001	Unclassified	450		0.881	?.??	?.??	?.??
PS12	7.000	Unclassified	300		0.400	?.??	?.??	?.??
PS13	7.001	Unclassified	450		0.260	?.??	?.??	?.??
PS14	6.002	Unclassified	450		1.379	?.??	?.??	?.??
PS15	8.000	Unclassified	300		0.500	?.??	?.??	?.??
PS16	6.003	Unclassified	600		1.395	?.??	?.??	?.??
PS17	9.000	Unclassified	450		0.994	?.??	?.??	?.??
PS18	6.004	Unclassified	600		1.440	?.??	?.??	?.??
PS19	6.005	Unclassified	600		1.482	?.??	?.??	?.??
PS20	1.005	Unclassified	1200		1.700	?.??	?.??	?.??
PS21	1.006	Unclassified	450		1.482	?.??	?.??	?.??
TOTALS					18.131	0.00	0.00	0.00

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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	100	0.500	0.591	9.050	?.??	?.??
1.001	Unclassified	100	0.591	0.710	11.600	?.??	?.??
2.000	Unclassified	100	0.550	0.710	4.773	?.??	?.??
1.002	Unclassified	150	0.710	0.757	7.025	?.??	?.??
3.000	Unclassified	100	0.550	0.760	9.353	?.??	?.??
4.000	Unclassified	100	0.550	0.760	4.665	?.??	?.??
1.003	Unclassified	150	0.757	1.010	11.573	?.??	?.??
5.000	Unclassified	100	0.550	1.010	8.995	?.??	?.??
1.004	Unclassified	225	0.940	1.010	17.403	?.??	?.??
6.000	Unclassified	100	0.450	0.881	13.562	?.??	?.??
6.001	Unclassified	150	0.881	1.379	12.261	?.??	?.??
7.000	Unclassified	100	0.260	0.400	10.973	?.??	?.??
7.001	Unclassified	150	0.260	1.379	9.485	?.??	?.??
6.002	Unclassified	150	1.379	1.395	2.870	?.??	?.??
8.000	Unclassified	100	0.500	1.395	15.663	?.??	?.??
6.003	Unclassified	225	1.395	1.440	9.025	?.??	?.??
9.000	Unclassified	100	0.994	1.440	15.060	?.??	?.??
6.004	Unclassified	225	1.440	1.482	6.657	?.??	?.??
6.005	Unclassified	225	1.482	1.625	5.409	?.??	?.??
1.005	Unclassified	150	1.482	1.700	1.669	?.??	?.??
1.006	Unclassified	150	1.482	1.610	5.643	?.??	?.??
TOTALS					192.714		0.00

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BREAKDOWN FOR MANHOLE BLINDING (0.00/m³)

USMH Name	PN	Diameter (mm)	Width (mm)	Height (m)	Volume (m³)	Cost ()
PS1	1.000	300		?.???	?.????	?.??
PS2	1.001	450		?.???	?.????	?.??
PS3	2.000	300		?.???	?.????	?.??
PS4	1.002	450		?.???	?.????	?.??
PS5	3.000	300		?.???	?.????	?.??
PS6	4.000	300		?.???	?.????	?.??
PS7	1.003	450		?.???	?.????	?.??
PS8	5.000	300		?.???	?.????	?.??
PS9	1.004	450		?.???	?.????	?.??
PS10	6.000	300		?.???	?.????	?.??
PS11	6.001	450		?.???	?.????	?.??
PS12	7.000	300		?.???	?.????	?.??
PS13	7.001	450		?.???	?.????	?.??
PS14	6.002	450		?.???	?.????	?.??
PS15	8.000	300		?.???	?.????	?.??
PS16	6.003	600		?.???	?.????	?.??
PS17	9.000	450		?.???	?.????	?.??
PS18	6.004	600		?.???	?.????	?.??
PS19	6.005	600		?.???	?.????	?.??
PS20	1.005	1200		?.???	?.????	?.??
PS21	1.006	450		?.???	?.????	?.??
TOTALS				0.000	0.0000	0.00

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BREAKDOWN FOR PIPE SURROUND

PN	Length (m)	Diameter (mm)	Surround	Volume (m³)	Cost / m³ ()	Cost ()
1.000	9.050	100	Unclassified	?.????	?.??	?.??
1.001	11.600	100	Unclassified	?.????	?.??	?.??
2.000	4.773	100	Unclassified	?.????	?.??	?.??
1.002	7.025	150	Unclassified	?.????	?.??	?.??
3.000	9.353	100	Unclassified	?.????	?.??	?.??
4.000	4.665	100	Unclassified	?.????	?.??	?.??
1.003	11.573	150	Unclassified	?.????	?.??	?.??
5.000	8.995	100	Unclassified	?.????	?.??	?.??
1.004	17.403	225	Unclassified	?.????	?.??	?.??
6.000	13.562	100	Unclassified	?.????	?.??	?.??
6.001	12.261	150	Unclassified	?.????	?.??	?.??
7.000	10.973	100	Unclassified	?.????	?.??	?.??
7.001	9.485	150	Unclassified	?.????	?.??	?.??
6.002	2.870	150	Unclassified	?.????	?.??	?.??
8.000	15.663	100	Unclassified	?.????	?.??	?.??
6.003	9.025	225	Unclassified	?.????	?.??	?.??
9.000	15.060	100	Unclassified	?.????	?.??	?.??
6.004	6.657	225	Unclassified	?.????	?.??	?.??
6.005	5.409	225	Unclassified	?.????	?.??	?.??
1.005	1.669	150	Unclassified	?.????	?.??	?.??
1.006	5.643	150	Unclassified	?.????	?.??	?.??
TOTALS	192.714			0.0000		0.00

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BREAKDOWN FOR MANHOLE SURROUND

USMH Name	PN	Diameter (mm)	Width (mm)	Depth (m)	Surround	Volume (m³)	Cost / m³ ()	Cost ()
PS1	1.000	300		0.600	Unclassified	?.????	?.??	?.??
PS2	1.001	450		0.691	Unclassified	?.????	?.??	?.??
PS3	2.000	300		0.650	Unclassified	?.????	?.??	?.??
PS4	1.002	450		0.860	Unclassified	?.????	?.??	?.??
PS5	3.000	300		0.650	Unclassified	?.????	?.??	?.??
PS6	4.000	300		0.650	Unclassified	?.????	?.??	?.??
PS7	1.003	450		0.907	Unclassified	?.????	?.??	?.??
PS8	5.000	300		0.650	Unclassified	?.????	?.??	?.??
PS9	1.004	450		1.235	Unclassified	?.????	?.??	?.??
PS10	6.000	300		0.550	Unclassified	?.????	?.??	?.??
PS11	6.001	450		1.031	Unclassified	?.????	?.??	?.??
PS12	7.000	300		0.500	Unclassified	?.????	?.??	?.??
PS13	7.001	450		0.410	Unclassified	?.????	?.??	?.??
PS14	6.002	450		1.529	Unclassified	?.????	?.??	?.??
PS15	8.000	300		0.600	Unclassified	?.????	?.??	?.??
PS16	6.003	600		1.620	Unclassified	?.????	?.??	?.??
PS17	9.000	450		1.094	Unclassified	?.????	?.??	?.??
PS18	6.004	600		1.665	Unclassified	?.????	?.??	?.??
PS19	6.005	600		1.707	Unclassified	?.????	?.??	?.??
PS20	1.005	1200		1.850	Unclassified	?.????	?.??	?.??
PS21	1.006	450		1.632	Unclassified	?.????	?.??	?.??
TOTALS				21.081		0.0000		0.00

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BREAKDOWN FOR MANHOLE BASE

USMH Name	PN	Diameter (mm)	Width (mm)	Height (m)	Base	Volume (m^3)	Cost / m^3 ( )	Cost ()
PS1	1.000	300		?.???	Unclassified	?.????	?.??	?.??
PS2	1.001	450		?.???	Unclassified	?.????	?.??	?.??
PS3	2.000	300		?.???	Unclassified	?.????	?.??	?.??
PS4	1.002	450		?.???	Unclassified	?.????	?.??	?.??
PS5	3.000	300		?.???	Unclassified	?.????	?.??	?.??
PS6	4.000	300		?.???	Unclassified	?.????	?.??	?.??
PS7	1.003	450		?.???	Unclassified	?.????	?.??	?.??
PS8	5.000	300		?.???	Unclassified	?.????	?.??	?.??
PS9	1.004	450		?.???	Unclassified	?.????	?.??	?.??
PS10	6.000	300		?.???	Unclassified	?.????	?.??	?.??
PS11	6.001	450		?.???	Unclassified	?.????	?.??	?.??
PS12	7.000	300		?.???	Unclassified	?.????	?.??	?.??
PS13	7.001	450		?.???	Unclassified	?.????	?.??	?.??
PS14	6.002	450		?.???	Unclassified	?.????	?.??	?.??
PS15	8.000	300		?.???	Unclassified	?.????	?.??	?.??
PS16	6.003	600		?.???	Unclassified	?.????	?.??	?.??
PS17	9.000	450		?.???	Unclassified	?.????	?.??	?.??
PS18	6.004	600		?.???	Unclassified	?.????	?.??	?.??
PS19	6.005	600		?.???	Unclassified	?.????	?.??	?.??
PS20	1.005	1200		?.???	Unclassified	?.????	?.??	?.??
PS21	1.006	450		?.???	Unclassified	?.????	?.??	?.??
TOTALS				0.000		0.0000		0.00

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BREAKDOWN FOR DEPTH BANDS

PN	Dia (mm)	Length (m)	> 0.000
1.000	100	9.050	9.050
1.001	100	11.600	11.600
2.000	100	4.773	4.773
1.002	150	7.025	7.025
3.000	100	9.353	9.353
4.000	100	4.665	4.665
1.003	150	11.573	11.573
5.000	100	8.995	8.995
1.004	225	17.403	17.403
6.000	100	13.562	13.562
6.001	150	12.261	12.261
7.000	100	10.973	10.973
7.001	150	9.485	9.485
6.002	150	2.870	2.870
8.000	100	15.663	15.663
6.003	225	9.025	9.025
9.000	100	15.060	15.060
6.004	225	6.657	6.657
6.005	225	5.409	5.409
1.005	150	1.669	1.669
1.006	150	5.643	5.643
TOTALS		192.714	192.714

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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 C ()
1.000	100	9.050	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.001	100	11.600	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
2.000	100	4.773	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.002	150	7.025	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
3.000	100	9.353	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
4.000	100	4.665	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.003	150	11.573	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
5.000	100	8.995	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.004	225	17.403	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.000	100	13.562	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.001	150	12.261	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
7.000	100	10.973	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
7.001	150	9.485	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.002	150	2.870	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
8.000	100	15.663	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.003	225	9.025	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
9.000	100	15.060	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.004	225	6.657	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.005	225	5.409	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.005	150	1.669	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.006	150	5.643	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
TOTALS		192.714	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0

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BREAKDOWN FOR MANHOLE EXCAVATION

USMH Name	PN	Dia (mm)	Width (mm)	Depth (m)	Total Dia (m)	Total Width (m)	Total Depth (m)	Ex. Volume (m^3)	Ex. Cost ()	Rem. Volume (m^3)	Rem. Cost ()	Tot
PS1	1.000	300		0.500	?.???		?.???	?.????	?.??	?.????	?.??	
PS2	1.001	450		0.591	?.???		?.???	?.????	?.??	?.????	?.??	
PS3	2.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS4	1.002	450		0.710	?.???		?.???	?.????	?.??	?.????	?.??	
PS5	3.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS6	4.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS7	1.003	450		0.757	?.???		?.???	?.????	?.??	?.????	?.??	
PS8	5.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS9	1.004	450		1.010	?.???		?.???	?.????	?.??	?.????	?.??	
PS10	6.000	300		0.450	?.???		?.???	?.????	?.??	?.????	?.??	
PS11	6.001	450		0.881	?.???		?.???	?.????	?.??	?.????	?.??	
PS12	7.000	300		0.400	?.???		?.???	?.????	?.??	?.????	?.??	
PS13	7.001	450		0.260	?.???		?.???	?.????	?.??	?.????	?.??	
PS14	6.002	450		1.379	?.???		?.???	?.????	?.??	?.????	?.??	
PS15	8.000	300		0.500	?.???		?.???	?.????	?.??	?.????	?.??	
PS16	6.003	600		1.395	?.???		?.???	?.????	?.??	?.????	?.??	
PS17	9.000	450		0.994	?.???		?.???	?.????	?.??	?.????	?.??	
PS18	6.004	600		1.440	?.???		?.???	?.????	?.??	?.????	?.??	
PS19	6.005	600		1.482	?.???		?.???	?.????	?.??	?.????	?.??	
PS20	1.005	1200		1.700	?.???		?.???	?.????	?.??	?.????	?.??	
PS21	1.006	450		1.482	?.???		?.???	?.????	?.??	?.????	?.??	
TOTALS				18.131			0.000	0.0000	0.00	0.0000	0.00	

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BREAKDOWN FOR FLOW CONTROLS

USMH Name	PN	Flow Control	Online/Offline	Cost ()
PS20	1.005	Hydro-Brake®	Online	0.00
TOTALS				0.000

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BREAKDOWN FOR STORAGE STRUCTURES

USMH Name	PN	Storage Structure	Volume (m^3)	Cost ()
PS20	1.005	Cellular Storage	27.7083	0.00
TOTALS			27.708	0.00

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TAKE OFF DETAILS for Surface Network 1

Length Calculations based on 'True Length'

Warning - The following pipes have not been classified:

1.000
1.001
2.000
1.002
3.000
4.000
1.003
5.000
1.004
6.000
6.001
7.000
7.001
6.002
8.000
6.003
9.000
6.004
6.005
1.005
1.006

Warning - The following manholes have not been classified:

PS1
PS2
PS3
PS4
PS5
PS6
PS7
PS8
PS9
PS10
PS11
PS12
PS13
PS14
PS15
PS16
PS17
PS18
PS19
PS20
PS21

Pipes

Number	21
Total Length (m)	181.764
Volume (m³)	3.0195

Manholes

Number	21
True Depth (m)	21.081
Volume (m³)	5.3398

Outfalls

Number	1
True Depth (m)	1.760

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TAKE OFF DETAILS for Surface Network 1

Volume (m³) 1.9905

Flow Controls

Number 1

Storage Structures

Number 1
Volume (m³) 27.7083

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TOTALS FOR MANHOLES

Diameter (mm)	Width (mm)	Manhole Class	Number	Ring Depth (m)	Cost ()	Add Cost ()	Total Cost ()
300		Unclassified	8	4.050	?.??	?.??	?.??
600		Unclassified	3	4.317	?.??	?.??	?.??
1200		Unclassified	1	1.700	?.??	?.??	?.??
450		Unclassified	9	8.064	?.??	?.??	?.??
TOTALS			21	18.131	0.00	0.00	0.00

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TOTALS FOR PIPES

Diameter (mm)	Pipe Class	Number	Length (m)	Cost ()
100	Unclassified	10	99.644	?.??
150	Unclassified	7	46.551	?.??
225	Unclassified	4	35.569	?.??
TOTALS		21	181.764	0.00

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TOTALS FOR MATERIALS

No materials are used

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GROUND WORKS - Pipe Excavation by Depth

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

GROUND WORKS - Totals

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

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TOTALS FOR FLOW CONTROLS

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

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TOTALS FOR STORAGE STRUCTURES

Name	Number	Volume (m^3)	Cost ()
Cellular Storage	1	27.7083	0.00
TOTALS	1	27.7083	0.00

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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

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BREAKDOWN FOR MANHOLES

USMH Name	PN	MH Class	Diameter (mm)	Width (mm)	Ring Depth (m)	Cost ()	Add Cost ()	Total ()
PS1	1.000	Unclassified	300		0.500	?.??	?.??	?.??
PS2	1.001	Unclassified	450		0.591	?.??	?.??	?.??
PS3	2.000	Unclassified	300		0.550	?.??	?.??	?.??
PS4	1.002	Unclassified	450		0.710	?.??	?.??	?.??
PS5	3.000	Unclassified	300		0.550	?.??	?.??	?.??
PS6	4.000	Unclassified	300		0.550	?.??	?.??	?.??
PS7	1.003	Unclassified	450		0.757	?.??	?.??	?.??
PS8	5.000	Unclassified	300		0.550	?.??	?.??	?.??
PS9	1.004	Unclassified	450		1.010	?.??	?.??	?.??
PS10	6.000	Unclassified	300		0.450	?.??	?.??	?.??
PS11	6.001	Unclassified	450		0.881	?.??	?.??	?.??
PS12	7.000	Unclassified	300		0.400	?.??	?.??	?.??
PS13	7.001	Unclassified	450		0.260	?.??	?.??	?.??
PS14	6.002	Unclassified	450		1.379	?.??	?.??	?.??
PS15	8.000	Unclassified	300		0.500	?.??	?.??	?.??
PS16	6.003	Unclassified	600		1.395	?.??	?.??	?.??
PS17	9.000	Unclassified	450		0.994	?.??	?.??	?.??
PS18	6.004	Unclassified	600		1.440	?.??	?.??	?.??
PS19	6.005	Unclassified	600		1.482	?.??	?.??	?.??
PS20	1.005	Unclassified	1200		1.700	?.??	?.??	?.??
PS21	1.006	Unclassified	450		1.482	?.??	?.??	?.??
TOTALS					18.131	0.00	0.00	0.00

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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	100	0.500	0.591	8.675	?.??	?.??
1.001	Unclassified	100	0.591	0.710	11.150	?.??	?.??
2.000	Unclassified	100	0.550	0.710	4.398	?.??	?.??
1.002	Unclassified	150	0.710	0.757	6.575	?.??	?.??
3.000	Unclassified	100	0.550	0.760	8.978	?.??	?.??
4.000	Unclassified	100	0.550	0.760	4.290	?.??	?.??
1.003	Unclassified	150	0.757	1.010	11.123	?.??	?.??
5.000	Unclassified	100	0.550	1.010	8.620	?.??	?.??
1.004	Unclassified	225	0.940	1.010	16.578	?.??	?.??
6.000	Unclassified	100	0.450	0.881	13.187	?.??	?.??
6.001	Unclassified	150	0.881	1.379	11.811	?.??	?.??
7.000	Unclassified	100	0.260	0.400	10.598	?.??	?.??
7.001	Unclassified	150	0.260	1.379	9.035	?.??	?.??
6.002	Unclassified	150	1.379	1.395	2.345	?.??	?.??
8.000	Unclassified	100	0.500	1.395	15.213	?.??	?.??
6.003	Unclassified	225	1.395	1.440	8.425	?.??	?.??
9.000	Unclassified	100	0.994	1.440	14.535	?.??	?.??
6.004	Unclassified	225	1.440	1.482	6.057	?.??	?.??
6.005	Unclassified	225	1.482	1.625	4.509	?.??	?.??
1.005	Unclassified	150	1.482	1.700	0.844	?.??	?.??
1.006	Unclassified	150	1.482	1.610	4.818	?.??	?.??
TOTALS					181.764		0.00

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BREAKDOWN FOR MANHOLE BLINDING (0.00/m³)

USMH Name	PN	Diameter (mm)	Width (mm)	Height (m)	Volume (m³)	Cost ()
PS1	1.000	300		?.???	?.????	?.??
PS2	1.001	450		?.???	?.????	?.??
PS3	2.000	300		?.???	?.????	?.??
PS4	1.002	450		?.???	?.????	?.??
PS5	3.000	300		?.???	?.????	?.??
PS6	4.000	300		?.???	?.????	?.??
PS7	1.003	450		?.???	?.????	?.??
PS8	5.000	300		?.???	?.????	?.??
PS9	1.004	450		?.???	?.????	?.??
PS10	6.000	300		?.???	?.????	?.??
PS11	6.001	450		?.???	?.????	?.??
PS12	7.000	300		?.???	?.????	?.??
PS13	7.001	450		?.???	?.????	?.??
PS14	6.002	450		?.???	?.????	?.??
PS15	8.000	300		?.???	?.????	?.??
PS16	6.003	600		?.???	?.????	?.??
PS17	9.000	450		?.???	?.????	?.??
PS18	6.004	600		?.???	?.????	?.??
PS19	6.005	600		?.???	?.????	?.??
PS20	1.005	1200		?.???	?.????	?.??
PS21	1.006	450		?.???	?.????	?.??
TOTALS				0.000	0.0000	0.00

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BREAKDOWN FOR PIPE SURROUND

PN	Length (m)	Diameter (mm)	Surround	Volume (m^3)	Cost / m^3 ()	Cost ()
1.000	8.675	100	Unclassified	?.????	?.??	?.??
1.001	11.150	100	Unclassified	?.????	?.??	?.??
2.000	4.398	100	Unclassified	?.????	?.??	?.??
1.002	6.575	150	Unclassified	?.????	?.??	?.??
3.000	8.978	100	Unclassified	?.????	?.??	?.??
4.000	4.290	100	Unclassified	?.????	?.??	?.??
1.003	11.123	150	Unclassified	?.????	?.??	?.??
5.000	8.620	100	Unclassified	?.????	?.??	?.??
1.004	16.578	225	Unclassified	?.????	?.??	?.??
6.000	13.187	100	Unclassified	?.????	?.??	?.??
6.001	11.811	150	Unclassified	?.????	?.??	?.??
7.000	10.598	100	Unclassified	?.????	?.??	?.??
7.001	9.035	150	Unclassified	?.????	?.??	?.??
6.002	2.345	150	Unclassified	?.????	?.??	?.??
8.000	15.213	100	Unclassified	?.????	?.??	?.??
6.003	8.425	225	Unclassified	?.????	?.??	?.??
9.000	14.535	100	Unclassified	?.????	?.??	?.??
6.004	6.057	225	Unclassified	?.????	?.??	?.??
6.005	4.509	225	Unclassified	?.????	?.??	?.??
1.005	0.844	150	Unclassified	?.????	?.??	?.??
1.006	4.818	150	Unclassified	?.????	?.??	?.??
TOTALS	181.764			0.0000		0.00

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BREAKDOWN FOR MANHOLE SURROUND

USMH Name	PN	Diameter (mm)	Width (mm)	Depth (m)	Surround	Volume (m^3)	Cost / m^3 ()	Cost ()
PS1	1.000	300		0.600	Unclassified	?.????	?.??	?.??
PS2	1.001	450		0.691	Unclassified	?.????	?.??	?.??
PS3	2.000	300		0.650	Unclassified	?.????	?.??	?.??
PS4	1.002	450		0.860	Unclassified	?.????	?.??	?.??
PS5	3.000	300		0.650	Unclassified	?.????	?.??	?.??
PS6	4.000	300		0.650	Unclassified	?.????	?.??	?.??
PS7	1.003	450		0.907	Unclassified	?.????	?.??	?.??
PS8	5.000	300		0.650	Unclassified	?.????	?.??	?.??
PS9	1.004	450		1.235	Unclassified	?.????	?.??	?.??
PS10	6.000	300		0.550	Unclassified	?.????	?.??	?.??
PS11	6.001	450		1.031	Unclassified	?.????	?.??	?.??
PS12	7.000	300		0.500	Unclassified	?.????	?.??	?.??
PS13	7.001	450		0.410	Unclassified	?.????	?.??	?.??
PS14	6.002	450		1.529	Unclassified	?.????	?.??	?.??
PS15	8.000	300		0.600	Unclassified	?.????	?.??	?.??
PS16	6.003	600		1.620	Unclassified	?.????	?.??	?.??
PS17	9.000	450		1.094	Unclassified	?.????	?.??	?.??
PS18	6.004	600		1.665	Unclassified	?.????	?.??	?.??
PS19	6.005	600		1.707	Unclassified	?.????	?.??	?.??
PS20	1.005	1200		1.850	Unclassified	?.????	?.??	?.??
PS21	1.006	450		1.632	Unclassified	?.????	?.??	?.??
TOTALS				21.081		0.0000		0.00

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BREAKDOWN FOR MANHOLE BASE

USMH Name	PN	Diameter (mm)	Width (mm)	Height (m)	Base	Volume (m^3)	Cost / m^3 ( )	Cost ()
PS1	1.000	300		?.???	Unclassified	?.????	?.??	?.??
PS2	1.001	450		?.???	Unclassified	?.????	?.??	?.??
PS3	2.000	300		?.???	Unclassified	?.????	?.??	?.??
PS4	1.002	450		?.???	Unclassified	?.????	?.??	?.??
PS5	3.000	300		?.???	Unclassified	?.????	?.??	?.??
PS6	4.000	300		?.???	Unclassified	?.????	?.??	?.??
PS7	1.003	450		?.???	Unclassified	?.????	?.??	?.??
PS8	5.000	300		?.???	Unclassified	?.????	?.??	?.??
PS9	1.004	450		?.???	Unclassified	?.????	?.??	?.??
PS10	6.000	300		?.???	Unclassified	?.????	?.??	?.??
PS11	6.001	450		?.???	Unclassified	?.????	?.??	?.??
PS12	7.000	300		?.???	Unclassified	?.????	?.??	?.??
PS13	7.001	450		?.???	Unclassified	?.????	?.??	?.??
PS14	6.002	450		?.???	Unclassified	?.????	?.??	?.??
PS15	8.000	300		?.???	Unclassified	?.????	?.??	?.??
PS16	6.003	600		?.???	Unclassified	?.????	?.??	?.??
PS17	9.000	450		?.???	Unclassified	?.????	?.??	?.??
PS18	6.004	600		?.???	Unclassified	?.????	?.??	?.??
PS19	6.005	600		?.???	Unclassified	?.????	?.??	?.??
PS20	1.005	1200		?.???	Unclassified	?.????	?.??	?.??
PS21	1.006	450		?.???	Unclassified	?.????	?.??	?.??
TOTALS				0.000		0.0000		0.00

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BREAKDOWN FOR DEPTH BANDS

PN	Dia (mm)	Length (m)	> 0.000
1.000	100	8.675	8.675
1.001	100	11.150	11.150
2.000	100	4.398	4.398
1.002	150	6.575	6.575
3.000	100	8.978	8.978
4.000	100	4.290	4.290
1.003	150	11.123	11.123
5.000	100	8.620	8.620
1.004	225	16.578	16.578
6.000	100	13.187	13.187
6.001	150	11.811	11.811
7.000	100	10.598	10.598
7.001	150	9.035	9.035
6.002	150	2.345	2.345
8.000	100	15.213	15.213
6.003	225	8.425	8.425
9.000	100	14.535	14.535
6.004	225	6.057	6.057
6.005	225	4.509	4.509
1.005	150	0.844	0.844
1.006	150	4.818	4.818
TOTALS		181.764	181.764

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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 C ()
1.000	100	8.675	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.001	100	11.150	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
2.000	100	4.398	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.002	150	6.575	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
3.000	100	8.978	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
4.000	100	4.290	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.003	150	11.123	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
5.000	100	8.620	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.004	225	16.578	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.000	100	13.187	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.001	150	11.811	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
7.000	100	10.598	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
7.001	150	9.035	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.002	150	2.345	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
8.000	100	15.213	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.003	225	8.425	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
9.000	100	14.535	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.004	225	6.057	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
6.005	225	4.509	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.005	150	0.844	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
1.006	150	4.818	?.????	?.??	?.????	?.??	?.????	?.??	?.????	?.??	?
TOTALS		181.764	0.0000	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.00	0

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BREAKDOWN FOR MANHOLE EXCAVATION

USMH Name	PN	Dia (mm)	Width (mm)	Depth (m)	Total Dia (m)	Total Width (m)	Total Depth (m)	Ex. Volume (m^3)	Ex. Cost ()	Rem. Volume (m^3)	Rem. Cost ()	Tot
PS1	1.000	300		0.500	?.???		?.???	?.????	?.??	?.????	?.??	
PS2	1.001	450		0.591	?.???		?.???	?.????	?.??	?.????	?.??	
PS3	2.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS4	1.002	450		0.710	?.???		?.???	?.????	?.??	?.????	?.??	
PS5	3.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS6	4.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS7	1.003	450		0.757	?.???		?.???	?.????	?.??	?.????	?.??	
PS8	5.000	300		0.550	?.???		?.???	?.????	?.??	?.????	?.??	
PS9	1.004	450		1.010	?.???		?.???	?.????	?.??	?.????	?.??	
PS10	6.000	300		0.450	?.???		?.???	?.????	?.??	?.????	?.??	
PS11	6.001	450		0.881	?.???		?.???	?.????	?.??	?.????	?.??	
PS12	7.000	300		0.400	?.???		?.???	?.????	?.??	?.????	?.??	
PS13	7.001	450		0.260	?.???		?.???	?.????	?.??	?.????	?.??	
PS14	6.002	450		1.379	?.???		?.???	?.????	?.??	?.????	?.??	
PS15	8.000	300		0.500	?.???		?.???	?.????	?.??	?.????	?.??	
PS16	6.003	600		1.395	?.???		?.???	?.????	?.??	?.????	?.??	
PS17	9.000	450		0.994	?.???		?.???	?.????	?.??	?.????	?.??	
PS18	6.004	600		1.440	?.???		?.???	?.????	?.??	?.????	?.??	
PS19	6.005	600		1.482	?.???		?.???	?.????	?.??	?.????	?.??	
PS20	1.005	1200		1.700	?.???		?.???	?.????	?.??	?.????	?.??	
PS21	1.006	450		1.482	?.???		?.???	?.????	?.??	?.????	?.??	
TOTALS				18.131			0.000	0.0000	0.00	0.0000	0.00	

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BREAKDOWN FOR FLOW CONTROLS

USMH Name	PN	Flow Control	Online/Offline	Cost ()
PS20	1.005	Hydro-Brake®	Online	0.00
TOTALS				0.000

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BREAKDOWN FOR STORAGE STRUCTURES

USMH Name	PN	Storage Structure	Volume (m³)	Cost ()
PS20	1.005	Cellular Storage	27.7083	0.00
TOTALS			27.708	0.00

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006	PS22	80.300	78.540	0.000	1200	0

Simulation Criteria for Surface Network 1

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 Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.300	Storm Duration (mins)	30
Ratio R	0.353		

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Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: PS20, DS/PN: 1.005, Volume (m³): 2.9

Unit Reference	MD-SHE-0099-5000-1450-5000
Design Head (m)	1.450
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	99
Invert Level (m)	78.650
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)	1.450	5.0	Kick-Flo®	0.882	4.0
Flush-Flo™	0.432	5.0	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	3.2	0.800	4.4	2.000	5.8	4.000	8.0	7.000	10.5
0.200	4.5	1.000	4.2	2.200	6.1	4.500	8.5	7.500	10.8
0.300	4.9	1.200	4.6	2.400	6.3	5.000	8.9	8.000	11.2
0.400	5.0	1.400	4.9	2.600	6.6	5.500	9.3	8.500	11.5
0.500	5.0	1.600	5.2	3.000	7.0	6.000	9.7	9.000	11.8
0.600	4.9	1.800	5.5	3.500	7.5	6.500	10.1	9.500	12.1

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Storage Structures for Surface Network 1

Cellular Storage Manhole: PS20, DS/PN: 1.005

Invert Level (m) 78.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	35.0	35.0	0.800	35.0	56.6	0.900	0.0	56.6

Manhole Headloss for Surface Network 1

PN	US/MH Name	US/MH Headloss
1.000	PS1	0.500
1.001	PS2	0.500
2.000	PS3	0.500
1.002	PS4	0.500
3.000	PS5	0.500
4.000	PS6	0.500
1.003	PS7	0.500
5.000	PS8	0.500
1.004	PS9	0.500
6.000	PS10	0.500
6.001	PS11	0.500
7.000	PS12	0.500
7.001	PS13	0.500
6.002	PS14	0.500
8.000	PS15	0.500
6.003	PS16	0.500
9.000	PS17	0.500
6.004	PS18	0.500
6.005	PS19	0.500
1.005	PS20	0.500
1.006	PS21	0.500

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

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 FSR M5-60 (mm) 18.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.353 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	PS1	15 Winter	1	+0%	100/15 Summer				80.424	-0.076	0.000
1.001	PS2	15 Winter	1	+0%	100/15 Summer				80.342	-0.067	0.000
2.000	PS3	15 Winter	1	+0%					80.368	-0.082	0.000
1.002	PS4	15 Winter	1	+0%	100/15 Summer				80.188	-0.102	0.000
3.000	PS5	15 Winter	1	+0%					80.370	-0.080	0.000
4.000	PS6	15 Winter	1	+0%					80.514	-0.086	0.000
1.003	PS7	15 Winter	1	+0%	100/15 Summer				80.150	-0.093	0.000
5.000	PS8	15 Winter	1	+0%					80.514	-0.086	0.000
1.004	PS9	15 Winter	1	+0%					79.953	-0.187	0.000
6.000	PS10	15 Winter	1	+0%	100/30 Summer				79.322	-0.078	0.000
6.001	PS11	15 Winter	1	+0%	100/15 Summer				79.145	-0.124	0.000
7.000	PS12	15 Winter	1	+0%					79.816	-0.084	0.000
7.001	PS13	15 Winter	1	+0%	100/60 Winter				79.458	-0.132	0.000
6.002	PS14	15 Winter	1	+0%	100/15 Summer				79.048	-0.098	0.000
8.000	PS15	15 Winter	1	+0%					79.714	-0.086	0.000
6.003	PS16	15 Winter	1	+0%	100/15 Summer				78.954	-0.176	0.000
9.000	PS17	15 Winter	1	+0%	100/15 Winter				79.221	-0.079	0.000
6.004	PS18	15 Winter	1	+0%	30/15 Winter				78.889	-0.171	0.000
6.005	PS19	15 Winter	1	+0%	30/15 Summer				78.869	-0.111	0.000
1.005	PS20	15 Winter	1	+0%	1/15 Summer				78.867	0.067	0.000
1.006	PS21	15 Winter	1	+0%					78.671	-0.099	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	PS1	0.13		0.7	OK	
1.001	PS2	0.23		1.3	OK	
2.000	PS3	0.08		0.7	OK	
1.002	PS4	0.22		2.7	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
3.000	PS5	0.09		0.7	OK	
4.000	PS6	0.05		0.7	OK	
1.003	PS7	0.31		4.7	OK	
5.000	PS8	0.05		0.6	OK	
1.004	PS9	0.07		5.8	OK	
6.000	PS10	0.11		0.6	OK	
6.001	PS11	0.07		1.1	OK	
7.000	PS12	0.06		0.6	OK	
7.001	PS13	0.03		1.1	OK	
6.002	PS14	0.26		2.8	OK	
8.000	PS15	0.05		0.6	OK	
6.003	PS16	0.10		3.9	OK	
9.000	PS17	0.10		0.7	OK	
6.004	PS18	0.13		5.2	OK	
6.005	PS19	0.12		5.7	OK	
1.005	PS20	0.41		4.5	SURCHARGED	
1.006	PS21	0.25		4.5	OK	

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

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 FSR M5-60 (mm) 18.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.353 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	PS1	15 Winter	30	+0%	100/15 Summer				80.439	-0.061	0.000
1.001	PS2	15 Winter	30	+0%	100/15 Summer				80.368	-0.041	0.000
2.000	PS3	15 Winter	30	+0%					80.379	-0.071	0.000
1.002	PS4	15 Winter	30	+0%	100/15 Summer				80.224	-0.066	0.000
3.000	PS5	15 Winter	30	+0%					80.381	-0.069	0.000
4.000	PS6	15 Winter	30	+0%					80.523	-0.077	0.000
1.003	PS7	15 Winter	30	+0%	100/15 Summer				80.198	-0.045	0.000
5.000	PS8	15 Winter	30	+0%					80.523	-0.077	0.000
1.004	PS9	15 Winter	30	+0%					79.980	-0.160	0.000
6.000	PS10	15 Winter	30	+0%	100/30 Summer				79.335	-0.065	0.000
6.001	PS11	15 Winter	30	+0%	100/15 Summer				79.163	-0.106	0.000
7.000	PS12	15 Winter	30	+0%					79.826	-0.074	0.000
7.001	PS13	15 Winter	30	+0%	100/60 Winter				79.470	-0.120	0.000
6.002	PS14	30 Winter	30	+0%	100/15 Summer				79.112	-0.034	0.000
8.000	PS15	15 Winter	30	+0%					79.723	-0.077	0.000
6.003	PS16	30 Winter	30	+0%	100/15 Summer				79.111	-0.019	0.000
9.000	PS17	15 Winter	30	+0%	100/15 Winter				79.234	-0.066	0.000
6.004	PS18	30 Winter	30	+0%	30/15 Winter				79.109	0.049	0.000
6.005	PS19	30 Winter	30	+0%	30/15 Summer				79.107	0.127	0.000
1.005	PS20	30 Winter	30	+0%	1/15 Summer				79.105	0.305	0.000
1.006	PS21	60 Winter	30	+0%					78.674	-0.096	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	PS1	0.32		1.8	OK	
1.001	PS2	0.64		3.7	OK	
2.000	PS3	0.18		1.8	OK	
1.002	PS4	0.59		7.3	OK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
3.000	PS5	0.21		1.8	OK	
4.000	PS6	0.12		1.8	OK	
1.003	PS7	0.82		12.4	OK	
5.000	PS8	0.12		1.5	OK	
1.004	PS9	0.18		15.4	OK	
6.000	PS10	0.26		1.5	OK	
6.001	PS11	0.19		3.1	OK	
7.000	PS12	0.16		1.5	OK	
7.001	PS13	0.09		3.1	OK	
6.002	PS14	0.56		6.0	OK	
8.000	PS15	0.12		1.5	OK	
6.003	PS16	0.22		8.2	OK	
9.000	PS17	0.25		1.8	OK	
6.004	PS18	0.25		10.0	SURCHARGED	
6.005	PS19	0.24		10.8	SURCHARGED	
1.005	PS20	0.46		5.0	SURCHARGED	
1.006	PS21	0.28		5.0	OK	

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

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 FSR M5-60 (mm) 18.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.353 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	PS1	15 Winter	100	+40%	100/15 Summer				80.553	0.053	0.000
1.001	PS2	15 Winter	100	+40%	100/15 Summer				80.527	0.118	0.000
2.000	PS3	15 Winter	100	+40%					80.408	-0.042	0.000
1.002	PS4	15 Winter	100	+40%	100/15 Summer				80.390	0.100	0.000
3.000	PS5	15 Winter	100	+40%					80.393	-0.057	0.000
4.000	PS6	15 Winter	100	+40%					80.532	-0.068	0.000
1.003	PS7	15 Winter	100	+40%	100/15 Summer				80.343	0.100	0.000
5.000	PS8	15 Winter	100	+40%					80.531	-0.069	0.000
1.004	PS9	15 Winter	100	+40%					80.002	-0.138	0.000
6.000	PS10	60 Winter	100	+40%	100/30 Summer				79.597	0.197	0.000
6.001	PS11	60 Winter	100	+40%	100/15 Summer				79.595	0.326	0.000
7.000	PS12	15 Winter	100	+40%					79.836	-0.064	0.000
7.001	PS13	60 Winter	100	+40%	100/60 Winter				79.595	0.005	0.000
6.002	PS14	60 Winter	100	+40%	100/15 Summer				79.593	0.447	0.000
8.000	PS15	15 Winter	100	+40%					79.732	-0.068	0.000
6.003	PS16	60 Winter	100	+40%	100/15 Summer				79.592	0.462	0.000
9.000	PS17	60 Winter	100	+40%	100/15 Winter				79.592	0.292	0.000
6.004	PS18	60 Winter	100	+40%	30/15 Winter				79.590	0.530	0.000
6.005	PS19	60 Winter	100	+40%	30/15 Summer				79.588	0.608	0.000
1.005	PS20	60 Winter	100	+40%	1/15 Summer				79.586	0.786	0.000
1.006	PS21	60 Winter	100	+40%					78.674	-0.096	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	PS1	0.56		3.1	SURCHARGED	
1.001	PS2	1.07		6.1	SURCHARGED	
2.000	PS3	0.33		3.2	OK	
1.002	PS4	1.00		12.4	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
3.000	PS5	0.38		3.2	OK	
4.000	PS6	0.22		3.2	OK	
1.003	PS7	1.41		21.3	SURCHARGED	
5.000	PS8	0.21		2.7	OK	
1.004	PS9	0.31		26.5	OK	
6.000	PS10	0.26		1.5	FLOOD RISK	
6.001	PS11	0.17		2.7	SURCHARGED	
7.000	PS12	0.28		2.7	OK	
7.001	PS13	0.09		2.9	FLOOD RISK	
6.002	PS14	0.57		6.1	SURCHARGED	
8.000	PS15	0.22		2.7	OK	
6.003	PS16	0.23		8.6	SURCHARGED	
9.000	PS17	0.24		1.8	SURCHARGED	
6.004	PS18	0.29		11.6	SURCHARGED	
6.005	PS19	0.29		13.1	SURCHARGED	
1.005	PS20	0.46		5.0	SURCHARGED	
1.006	PS21	0.28		5.0	OK	

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