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**FORMER STAGECOACH SITE,
BOWES STREET, MANCHESTER**

**SURFACE WATER DRAINAGE WORKS
PLANNING APPLICATION 113982/FO/2016
PLANNING CONDITION 13**

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40 Peter Street
Manchester
M2 5GP
C1262/DOR/EAJ/20190027*



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Client: Rowlinsons Construction Ltd

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SECTION I PLANNING CONDITION 13

- Application number: CDN/18/0844
- Proposal: Discharge of Condition 13 (Surface Water Drainage Works) relating to planning application 113982/FO/2016
- Location: Former Stagecoach Site Bowes Street Manchester

MANCHESTER CITY COUNCIL

Planning Condition 13

- 1.1. No development shall take place until surface water drainage works have been implemented in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements national standards and details that have been submitted to and approved in writing by the Local Planning Authority.

Reason

- 1.2. The application site is located within a critical drainage area and in line with the requirements in relation to sustainable urban drainage systems, further consideration should be given to the control of surface water at the site in order to minimise localised flood risk pursuant policies EN14 and DMI of the Core Strategy for Manchester.

LEAD LOCAL FLOOD AUTHORITY COMMENTS (22/01/2019)

- 1.3. The information submitted and uploaded onto the planning portal on 8 November 2018 has been considered.
- 1.4. In order to discharge the drainage planning condition, further information is needed to confirm that the proposed drainage design is adequate to manage flood risk.

The outstanding evidence required:

- 1.5. Assessment of overland flow routes for extreme events (exceedance of design capacity, blockages of drainage elements including inlets or surcharge of discharge outfalls) that is diverted away from buildings. The flood water should be routed towards the less vulnerable areas i.e. open spaces, car parks and roads. FFLs to be at least 150mm higher than cover levels of adjacent manholes and inlet structures wherever practicable – in cases when that is not feasible, mitigation measures need to be proposed in a form of interception drains or similar. A layout with overland



flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.

SECTION 2 PROPOSED SURFACE WATER DRAINAGE

SURFACE WATER OVERVIEW

2.1. The proposed surface water drainage for the former Stagecoach Site has been split into five individual networks as per the approved surface water strategy. The runoff catchment for each network is shown in **Figure 2.1** and for this report the networks will be referred to as;

- *Care Facility – (Zone E)*
- *Elmswood Avenue – (Zone D)*
- *Regent Avenue – (Zone C)*
- *Yew Tree Avenue – (Zone B)*
- *Laurel Avenue – (Zone A)*

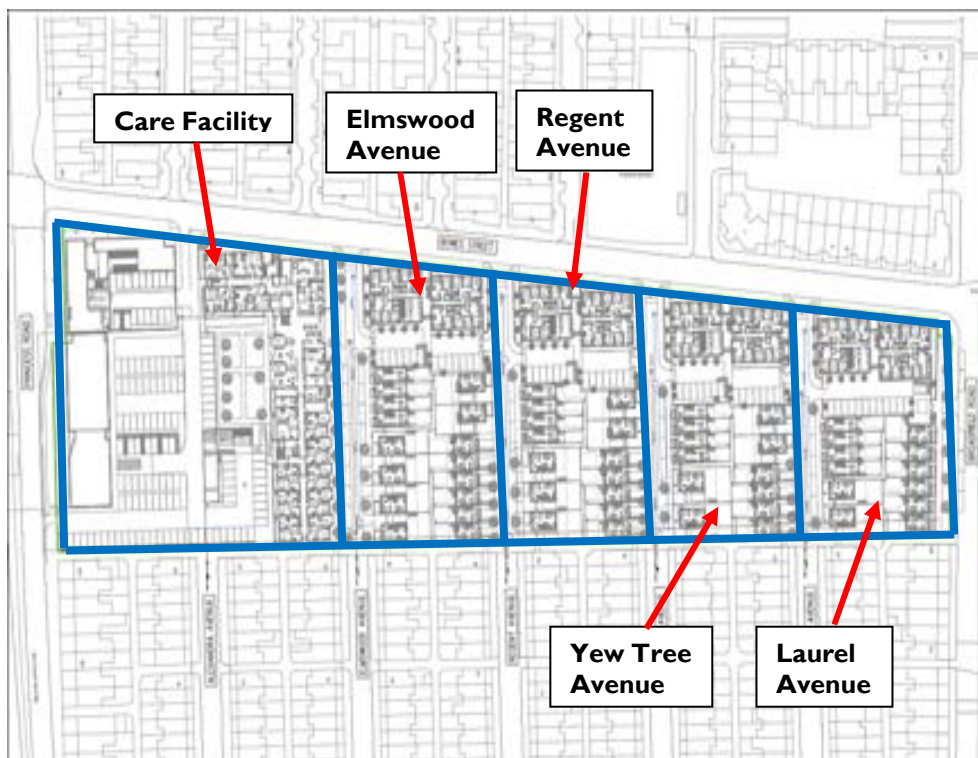


Figure 2.1 Illustrative SW Catchments

SECTION 3 CARE FACILITY

DRAINAGE LAYOUT

- 3.1. A full-size copy of the Care Facility Drainage Layout has been included within **Appendix A1**.



Figure 3.1 Care Facility Drainage Layout

FINISHED FLOOR LEVELS

- 3.2. The finished floor levels for the Extra Care Facility has been set to suit the existing Bowes Street carriageway which results in the southern section of the building, becoming elevated when compared to the surrounding ground.
- 3.3. The perimeter path around the building has been designed to falls away to ensure any runoff is shed away to less vulnerable areas. A copy of the latest architect's plan with levels has been included within **Appendix A2**.

DRAINAGE SIMULATIONS

- 3.4. The proposed surface water network has been modelled using Microdrainage (Windes) and simulated against several different return periods. A copy of the simulation results has been included within **Appendix A3** and a summary provided below;

Return Period	Surcharge	Climate Change	Peak Flow Rate	Status
1 Year	-	-	10.2 l/s	Ok
2 Year	-	-	12.8 l/s	Ok
5 Year	-	-	16.0 l/s	Ok*
30 Year	-	-	19.3 l/s	Surcharged
30 Year	1m Head	-	19.9 l/s	Surcharged
100 Year	-	40%	19.9 l/s	Surcharged
1000 Year	-	-	19.9 l/s	Surcharged

Figure 3.2 Care Facility Zone E - Microdrainage Summary

* Surcharged outfall chamber due to flow control device.

EXCEEDANCE FLOW ROUTES

3.5. Flooding from the surface water network can occur during extreme storm events due to capacity issues, blockages and surcharged outfalls.

Capacity

3.6. As shown in **Figure 3.2**. The proposed surface water network has the capacity to cater for all return periods up to and including the 1000-year event.

Blockages

3.7. The surface water network will be regularly maintained by a Private Maintenance Company and therefore the risk of blockages should be minimal.

3.8. Nevertheless, if a blockage did occur then the flow control chamber would be the cause. The flow control chamber is situated at the lowest area of **Zone E** and flooding would occur from this chamber and/or the adjacent permeable paving.

3.9. The runoff escaping the network/SuDS structures would pond along the south boundary kerb line and if exceed the and perimeter wall prevent the runoff leaving the site. The potential flood risk to the proposed and existing properties should therefore be negligible.

3.10. A copy of the overland flow route has been included in **Appendix F1**.

Surcharged Outfall

3.11. As shown in **Figure 4.2** the proposed network has the capacity to cater for a 30-year event with a surcharged outfall (1m above outfall soffit). This is in accordance with United Utilities Guidance.

SECTION 4 ELMSWOOD AVENUE

DRAINAGE LAYOUT

- 4.1. A full-size copy of the Elmswood Avenue Drainage Layout has been included within **Appendix B1**.

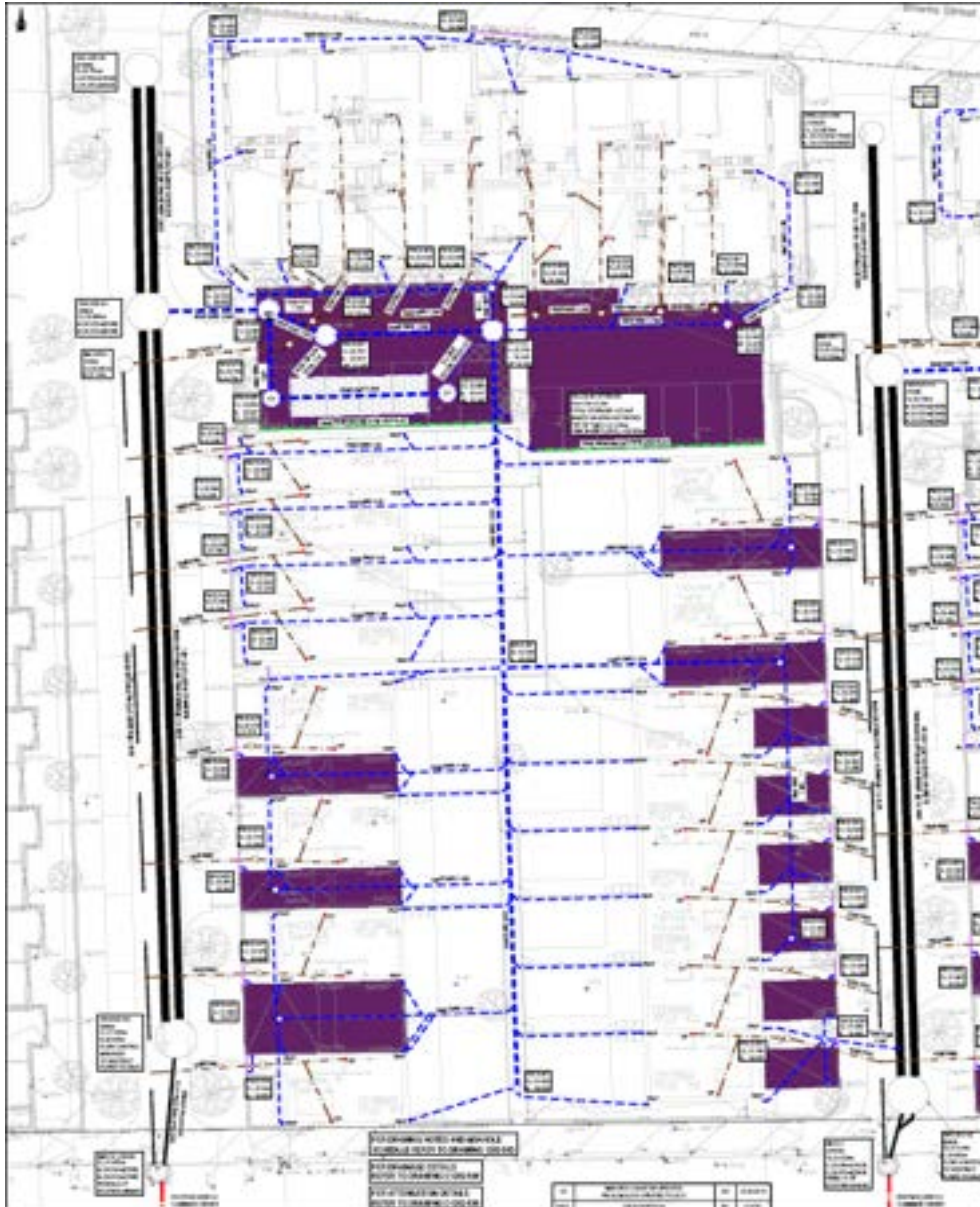


Figure 4.1 Elmswood Avenue Drainage Layout

FINISHED FLOOR LEVELS

- 4.2. The finished floor levels for the proposed dwellings have been set to suit the adjacent highway and are stepped in level from north to south. The primary entrance to the properties has been set with level thresholds, but the access ramp to the property ensures runoff is shed away from the building and to a linear channel and/or permeable paving.

- 4.3. A copy of the latest architect's plan has been included within **Appendix B2** which identifies the levels around the proposed dwellings.

DRAINAGE SIMULATIONS

- 4.4. The proposed surface water network has been modelled using Microdrainage (Windes) and simulated against several different return periods. A copy of the simulation results has been included within **Appendix B3** and a summary provided below;

Return Period	Surcharge	Climate Change	Peak Flow Rate	Status
1 Year	-	-	17.5 l/s	Ok
2 Year	-	-	18.7 l/s	Ok*
5 Year	-	-	19.6 l/s	Ok*
30 Year	-	-	19.9 l/s	Ok*
30 Year	1m Head	-	11.5 l/s	Surcharged
100 Year	-	40%	20.6 l/s	Surcharged
1000 Year	-	-	21.4 l/s	Flood Risk

Figure 4.2 Elmswood Zone D - Microdrainage Summary

* Surcharged outfall chamber due to flow control device.

EXCEEDANCE FLOW ROUTES

- 4.5. Flooding from the surface water network can occur during extreme storm events due to capacity issues, blockages and surcharged outfalls.

Capacity

- 4.6. As shown in **Figure 4.2**. The proposed surface water network has the capacity to cater for all return periods up to and including the 1000-year event.

Blockages

- 4.7. The surface water network will be regularly maintained by United Utilities and a Private Maintenance Company and thus the risk of blockages should be minimal.
- 4.8. Nevertheless, if a blockage did occur then the flow control chamber would be the cause. The flow control chamber is situated at the lowest part of **Zone D** and flooding would occur from this chamber and/or the adjacent highway gullies.
- 4.9. The runoff escaping the network would flow southwards onto Elmswood Avenue (existing) and would be quickly captured by the existing highway gullies. The potential flood risk to the proposed and existing properties should therefore be negligible.



- 4.10. A copy of the overland flow route has been included in **Appendix F1**.

Surcharged Outfall

- 4.11. As shown in **Figure 4.2** the proposed network has the capacity to cater for a 30-year event with a surcharged outfall (1m above outfall soffit). This is in accordance with United Utilities Guidance.

SECTION 5 REGENT AVENUE

DRAINAGE LAYOUT

- 5.1. A full-size copy of the Regent Avenue Drainage Layout has been included within **Appendix C1**.

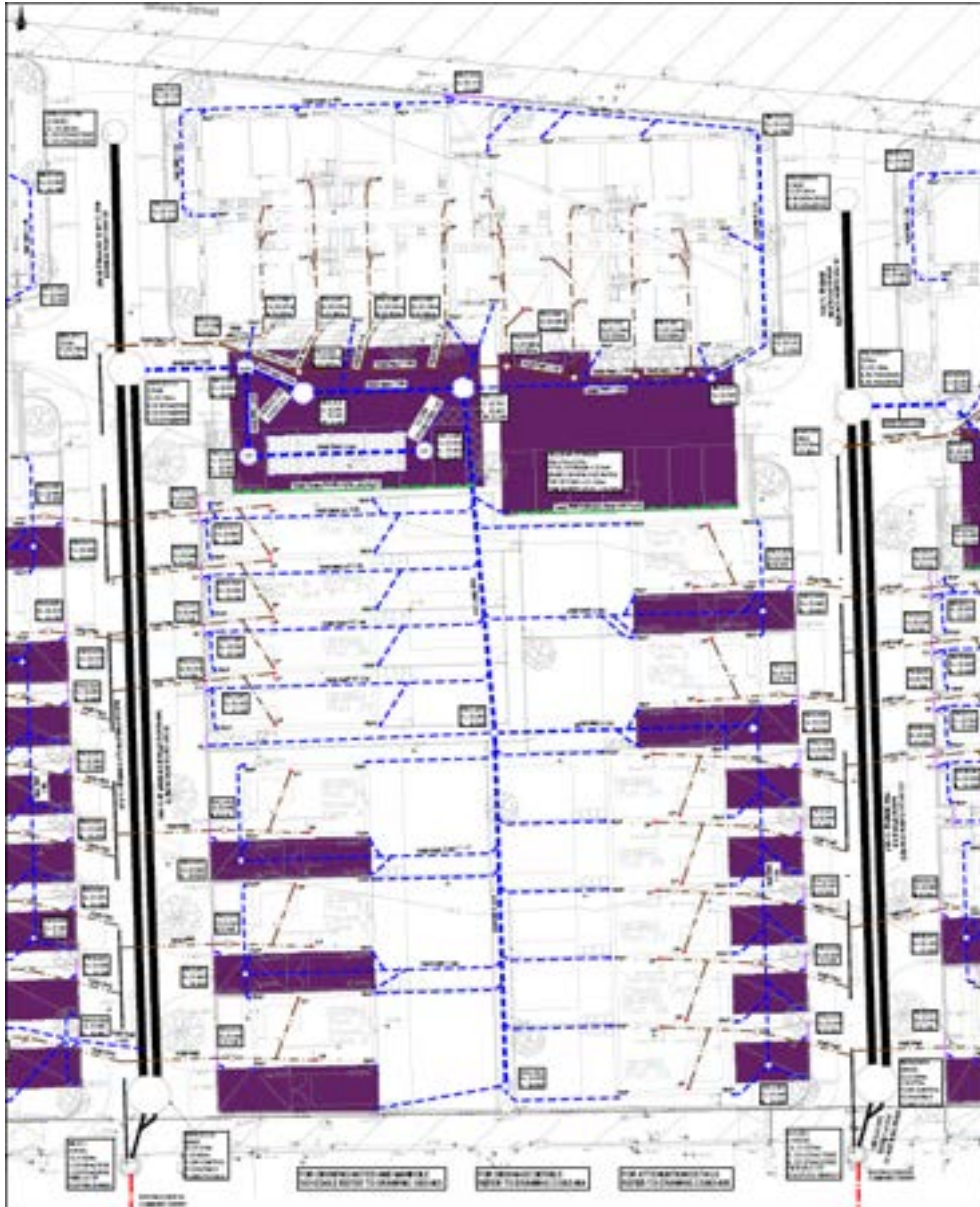


Figure 5.1 Regent Avenue Drainage Layout

FINISHED FLOOR LEVELS

- 5.2. The finished floor levels for the proposed dwellings have been set to suit the adjacent highway and are stepped in level from north to south. The primary entrance to the properties has been set with level thresholds, but the access ramp to the property ensures runoff is shed away from the building and to a linear channel and/or permeable paving.

- 5.3. A copy of the latest architect's plan has been included within **Appendix C2** which identifies the levels around the proposed dwellings.

DRAINAGE SIMULATIONS

- 5.4. The proposed surface water network has been modelled using Microdrainage (Windes) and simulated against several different return periods. A copy of the simulation results has been included within **Appendix C3** and a summary provided below;

Return Period	Surcharge	Climate Change	Flow Rate	Status
1 Year	-	-	17.4 l/s	Ok
2 Year	-	-	18.8 l/s	Ok*
5 Year	-	-	19.7 l/s	Ok*
30 Year	-	-	19.9 l/s	Surcharged
30 Year	1m Head	-	12.7 l/s	Flood Risk
100 Year	-	40%	22.0 l/s	Flood Risk
1000 Year	-	-	22.7 l/s	Flood Risk

Figure 5.2 Regent Zone C - Microdrainage Summary

* Surcharged outfall chamber due to flow control device.

EXCEEDANCE FLOW ROUTES

- 5.5. Flooding from the surface water network can occur during extreme storm events due to capacity issues, blockages and surcharged outfalls.

Capacity

- 5.6. As shown in **Figure 5.2**. The proposed surface water network has the capacity to cater for all return periods up to and including the 1000-year event.

Blockages

- 5.7. The surface water network will be regularly maintained by United Utilities and a Private Maintenance Company and thus the risk of blockages should be minimal.
- 5.8. Nevertheless, if a blockage did occur then the flow control chamber would be the cause. The flow control chamber is situated at the lowest part of **Zone C** and flooding would occur from this chamber and/or the adjacent highway gullies.
- 5.9. The runoff escaping the network would flow southwards onto Regent Avenue (existing) and would be quickly captured by the existing highway gullies. The potential flood risk to the proposed and existing properties should therefore be negligible.



- 5.10. A copy of the overland flow route has been included in **Appendix F1**.

Surcharged Outfall

- 5.11. As shown in **Figure 5.2** the proposed network has the capacity to cater for a 30-year event with a surcharged outfall (1m above outfall soffit). This is in accordance with United Utilities Guidance.

SECTION 6 YEW TREE AVENUE

DRAINAGE LAYOUT

- 6.1. A full-size copy of the Yew Tree Avenue Drainage Layout has been included within **Appendix D1**.

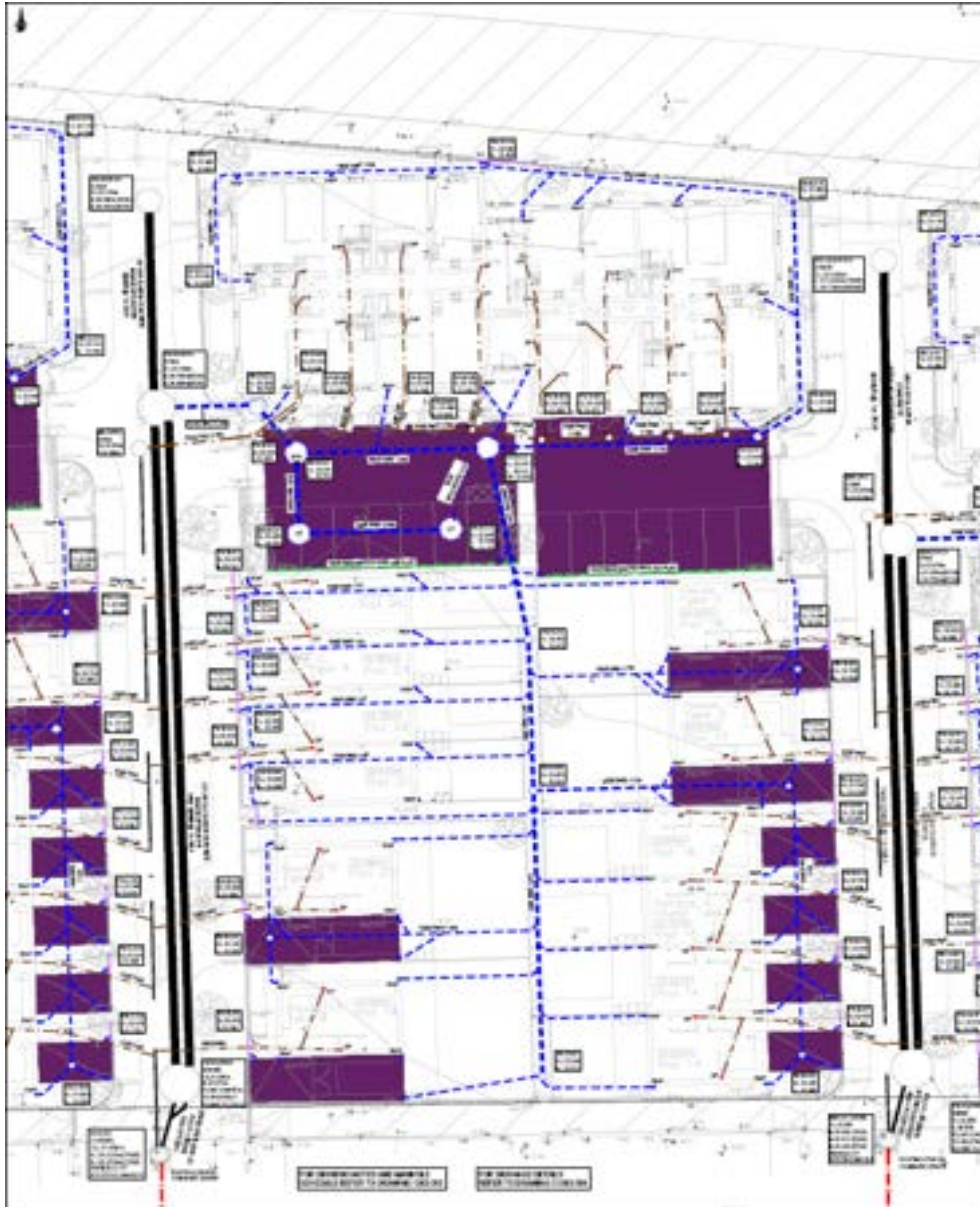


Figure 6.1 Yew Tree Avenue Drainage Layout

FINISHED FLOOR LEVELS

- 6.2. The finished floor levels for the proposed dwellings have been set to suit the adjacent highway and are stepped in level from north to south. The primary entrance to the properties has been set with level thresholds, but the access ramp to the property ensures runoff is shed away from the building and to a linear channel and/or permeable paving.

- 6.3. A copy of the latest architect's plan has been included within **Appendix D2** which identifies the levels around the proposed dwellings.

DRAINAGE SIMULATIONS

- 6.4. The proposed surface water network has been modelled using Microdrainage (Windes) and simulated against several different return periods. A copy of the simulation results has been included within **Appendix D3** and a summary provided below;

Return Period	Surcharge	Climate Change	Flow Rate	Status
1 Year	-	-	14.9 l/s	Ok
2 Year	-	-	18.1 l/s	Ok
5 Year	-	-	19.0 l/s	Ok*
30 Year	-	-	19.9 l/s	Ok*
30 Year	1m Head	-	19.7 l/s	Flood Risk
100 Year	-	40%	19.9 l/s	Flood Risk
1000 Year	-	-	21.0 l/s	Flood Risk

Figure 6.2 Yew Tree Zone B - Microdrainage Summary

* Surcharged outfall chamber due to flow control device.

EXCEEDANCE FLOW ROUTES

- 6.5. Flooding from the surface water network can occur during extreme storm events due to capacity issues, blockages and surcharged outfalls.

Capacity

- 6.6. As shown in **Figure 6.2**. The proposed surface water network has the capacity to cater for all return periods up to and including the 1000-year event.

Blockages

- 6.7. The surface water network will be regularly maintained by United Utilities and a Private Maintenance Company and thus the risk of blockages should be minimal.
- 6.8. Nevertheless, if a blockage did occur then the flow control chamber would be the cause. The flow control chamber is situated at the lowest part of **Zone B** and flooding would occur from this chamber and/or the adjacent highway gullies.
- 6.9. The runoff escaping the network would flow southwards onto Yew Tree Avenue (existing) and would be quickly captured by the existing highway gullies. The potential flood risk to the proposed and existing properties should therefore be negligible.



- 6.10. A copy of the overland flow route has been included in **Appendix F1**.

Surcharged Outfall

- 6.11. As shown in **Figure 6.2** the proposed network has the capacity to cater for a 30-year event with a surcharged outfall (1m above outfall soffit). This is in accordance with United Utilities Guidance.

SECTION 7 LAUREL AVENUE

DRAINAGE LAYOUT

- 7.1. A full-size copy of the Laurel Avenue Drainage Layout has been included within **Appendix E1**.

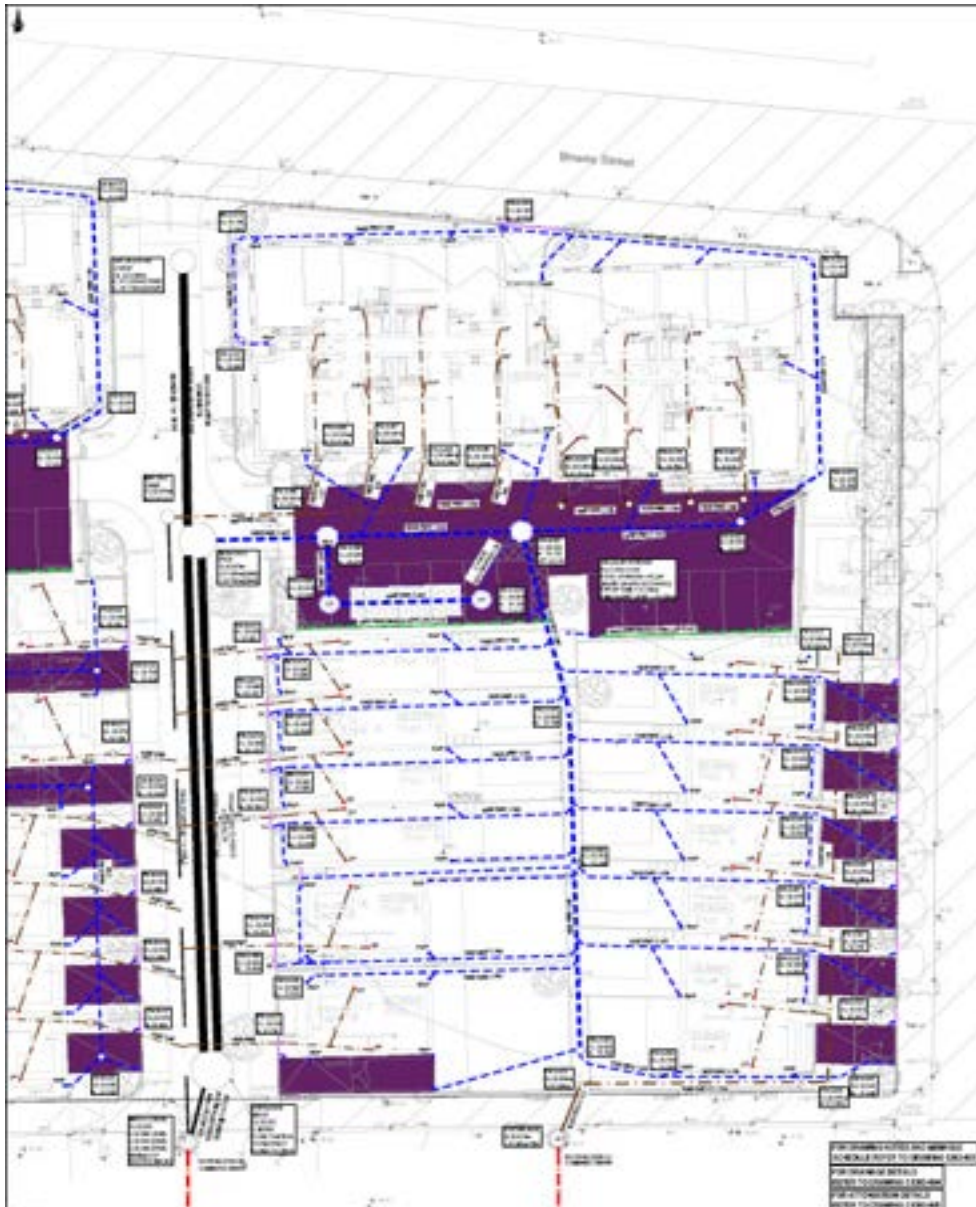


Figure 7.1 Laurel Avenue Drainage Layout

FINISHED FLOOR LEVELS

- 7.2. The finished floor levels for the proposed dwellings have been set to suit the adjacent highway and are stepped in level from north to south. The primary entrance to the properties has been set with level thresholds, but the access ramp to the property ensures runoff is shed away from the building and to a linear channel and/or permeable paving.

- 7.3. A copy of the latest architect's plan has been included within **Appendix E2** which identifies the levels around the proposed dwellings.

DRAINAGE SIMULATIONS

- 7.4. The proposed surface water network has been modelled using Microdrainage (Windes) and simulated against several different return periods. A copy of the simulation results has been included within **Appendix E3** and a summary provided below;

Return Period	Surcharge	Climate Change	Flow Rate	Status
1 Year	-	-	16.2 l/s	Ok
2 Year	-	-	18.9 l/s	Ok
5 Year	-	-	19.7 l/s	Ok
30 Year	-	-	20.0 l/s	Ok
30 Year	1m Head	-	19.8 l/s	Surcharged
100 Year	-	40%	20.5 l/s	Flood Risk
1000 Year	-	-	21.3 l/s	Flood Risk

Figure 7.2 Laurel Zone A - Microdrainage Summary

* Surcharged outfall chamber due to flow control device.

EXCEEDANCE FLOW ROUTES

- 7.5. Flooding from the surface water network can occur during extreme storm events due to capacity issues, blockages and surcharged outfalls.

Capacity

- 7.6. As shown in **Figure 7.2**. The proposed surface water network has the capacity to cater for all return periods up to and including the 1000-year event.

Blockages

- 7.7. The surface water network will be regularly maintained by United Utilities and a Private Maintenance Company and thus the risk of blockages should be minimal.
- 7.8. Nevertheless, if a blockage did occur then the flow control chamber would be the cause. The flow control chamber is situated at the lowest part of **Zone A** and flooding would occur from this chamber and/or the adjacent highway gullies.
- 7.9. The runoff escaping the network would flow southwards onto Laurel Avenue (existing) and would be quickly captured by the existing highway gullies. The potential flood risk to the proposed and existing properties should therefore be negligible.



- 7.10. A copy of the overland flow route has been included in **Appendix F1**.

Surcharged Outfall

- 7.11. As shown in **Figure 7.2** the proposed network has the capacity to cater for a 30-year event with a surcharged outfall (1m above outfall soffit). This is in accordance with United Utilities Guidance.

SECTION 8 HIGHWAY DRAINAGE CHECK

- 8.1. On the 4th March 2019 the LLFA requested additional information regarding the highway drainage capacity. The request has been copied below along with our response.

LLFA Request 1

We understand that the consultant has undertaken an assessment of the flows within the underground network and showed that there will be no flooding on the surface for 1000 year storms. However, it needs to be said that for that capacity to be utilised in the below ground attenuation, inlets at the surface need to have the same capacity to convey swiftly runoff into the underground attenuation. Having in mind that the gullies and inlet channels are usually designed to convey 5 year storms it would be interesting what type of inlets have been used and if typical gullies and channels have been used, how many of them are proposed for the drainage system to work as proposed.

SGI Response 1

- 8.2. The proposed development has installed 450mm x 900mm highway gullies with a 150mm outlet. As shown on the enclosed plan (**Appendix G**) the proposed catchment area/runoff for each of the gullies can be accommodated by the outlet to the underground network.
- 8.3. The linear channels along the property boundaries (ACO M100D 30.0) only receive runoff from small areas i.e. flows from the ramp to the threshold. Based on ACO's hydraulic software these channels would only be 6.53% full during the 100 year plus climate change event (Average ramp size 3m x 1.8m).



Shepherd Gilmour
Consulting Engineers

APPENDIX C3

SGi Consulting		Page 1
4th Floor, Colchester House 40 Peter Street Manchester, M2 5GP		
Date 14/02/2019 16:46	Designed by DOREilly	
File Regent Zone C MD.MDX	Checked by	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	26.795	0.112	239.2	0.039	5.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	25.531	0.255	100.1	0.023	5.00	0.0	0.600		o	150	Pipe/Conduit	
S2.001	18.561	0.109	170.3	0.018	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.001	17.048	0.071	240.1	0.039	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	16.800	0.001	16800.0	0.019	5.00	0.0		0.030 → ↓ ←			Porous Car Park	
S3.001	2.111	1.736	1.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.002	3.300	0.014	235.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	18.000	0.001	18000.0	0.019	5.00	0.0		0.030 → ↓ ←			Porous Car Park	
S4.001	1.837	1.485	1.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.003	5.858	0.024	244.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	7.487	0.075	99.8	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
S5.001	19.577	0.196	99.9	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.002	21.484	0.215	99.9	0.016	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.003	15.720	0.092	170.9	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.004	4.770	0.028	170.4	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.005	17.805	1.105	16.1	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.004	11.500	0.033	348.5	0.016	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)
S1.000	45.14	5.44	30.656	0.039	0.0	0.0	0.0	1.01	71.5	4.8
S2.000	45.21	5.42	31.058	0.023	0.0	0.0	0.0	1.00	17.7	2.8
S2.001	44.12	5.73	30.728	0.041	0.0	0.0	0.0	1.00	39.7	4.9
S1.001	43.18	6.01	30.544	0.119	0.0	0.0	0.0	1.01	71.4	13.9
S3.000	29.13	12.93	32.360	0.019	0.0	0.0	0.0	0.04	40.0	1.5
S3.001	29.12	12.94	32.359	0.019	0.0	0.0	0.0	9.22	162.9	1.5
S1.002	29.06	12.99	30.473	0.138	0.0	0.0	0.0	1.02	72.1	13.9
S4.000	28.11	13.80	32.095	0.019	0.0	0.0	0.0	0.03	38.7	1.4
S4.001	28.10	13.80	32.094	0.019	0.0	0.0	0.0	9.14	161.5	1.4
S1.003	28.00	13.90	30.459	0.157	0.0	0.0	0.0	1.00	70.8	13.9
S5.000	46.32	5.12	32.296	0.002	0.0	0.0	0.0	1.01	17.8	0.3
S5.001	45.12	5.45	32.221	0.016	0.0	0.0	0.0	1.01	17.8	2.0
S5.002	43.87	5.80	32.025	0.032	0.0	0.0	0.0	1.01	17.8	3.8
S5.003	43.01	6.07	31.736	0.034	0.0	0.0	0.0	1.00	39.7	4.0
S5.004	42.75	6.15	31.644	0.034	0.0	0.0	0.0	1.00	39.7	4.0
S5.005	42.47	6.24	31.616	0.048	0.0	0.0	0.0	3.28	130.3	5.5
S1.004	27.74	14.13	30.435	0.221	0.0	0.0	0.0	0.84	59.1	16.6

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	4.538	0.033	137.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	12.609	0.001	12609.0	0.000	5.00	0.0		0.050	→[↓]		Cellular Storage	
S6.001	6.715	0.028	239.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.006	8.511	0.036	236.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S7.000	17.961	0.043	417.7	0.004	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.007	54.995	0.135	407.4	0.082	0.00	0.0	0.600		oo	45	Pipe/Conduit	
S1.008	5.580	0.028	199.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S1.005	27.68	14.18	30.402	0.221	0.0	0.0	0.0	1.34	94.6	16.6
S6.000	38.33	7.73	30.398	0.000	0.0	0.0	0.0	0.08	139.4	0.0
S6.001	38.06	7.84	30.397	0.000	0.0	0.0	0.0	1.01	71.5	0.0
S1.006	27.53	14.32	30.369	0.221	0.0	0.0	0.0	1.02	72.0	16.6
S7.000	45.84	5.25	30.076	0.004	0.0	0.0	0.0	1.19	335.1	0.5
S1.007	26.74	15.09	30.033	0.307	0.0	0.0	0.0	1.20	677.8	22.2
S1.008	26.64	15.19	29.898	0.307	0.0	0.0	0.0	0.92	36.7	22.2

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.008	SMHCC1	31.520	29.870	0.000	0	0

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Online Controls for Storm

Non Return Valve Manhole: SSW-C-007, DS/PN: S1.001, Volume (m³): 3.0

Orifice Manhole: SSW-C-018, DS/PN: S5.005, Volume (m³): 0.5

Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 31.616

Non Return Valve Manhole: SSW-C-022, DS/PN: S6.001, Volume (m³): 24.0

Hydro-Brake® Optimum Manhole: SSWUUC102, DS/PN: S1.008, Volume (m³): 40.9

Unit Reference	MD-SHE-0196-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	196
Invert Level (m)	29.898
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	20.0	Kick-Flo®	0.827	16.8
Flush-Flo™	0.376	20.0	Mean Flow over Head Range	-	17.1

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	6.8	0.800	17.4	2.000	25.5	4.000	35.6	7.000	46.7
0.200	18.3	1.000	18.3	2.200	26.7	4.500	37.7	7.500	48.2
0.300	19.8	1.200	20.0	2.400	27.8	5.000	39.6	8.000	49.8
0.400	20.0	1.400	21.5	2.600	28.9	5.500	41.5	8.500	51.3
0.500	19.7	1.600	22.9	3.000	31.0	6.000	43.3	9.000	52.7
0.600	19.4	1.800	24.3	3.500	33.4	6.500	45.0	9.500	54.1

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Offline Controls for Storm

Pipe Manhole: SSW-C-019, DS/PN: S1.004, Loop to PN: S6.000

Diameter (m)	0.100	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.500	Upstream Invert Level (m)	31.400

Pipe Manhole: SSW-C-019, DS/PN: S1.004, Loop to PN: S6.000

Diameter (m)	0.100	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.500	Upstream Invert Level (m)	31.400

Pipe Manhole: SSW-C-020, DS/PN: S1.005, Loop to PN: S6.000

Diameter (m)	0.100	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.500	Upstream Invert Level (m)	31.400

Storage Structures for Storm

Porous Car Park Pipe: S3.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	16.8
Membrane Percolation (mm/hr)	1000	Slope (1:X)	16800.0
Max Percolation (l/s)	50.4	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.360		

Porous Car Park Pipe: S4.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	18000.0
Max Percolation (l/s)	54.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.095		

Cellular Storage Pipe: S6.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	30.398	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	30.0	0.0	0.800	30.0	0.0	0.801	0.0	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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SSW-C-001	15 Winter	1	+0%	100/15 Summer				30.710
S2.000	SSW-C-005	15 Winter	1	+0%	100/15 Summer				31.099
S2.001	SSW-C-006	15 Winter	1	+0%	100/15 Summer				30.782
S1.001	SSW-C-007	15 Winter	1	+0%	100/15 Summer				30.639
S3.000	S5	15 Winter	1	+0%					32.388
S3.001	S6	30 Winter	1	+0%					32.369
S1.002	SCP JUNCTION 1	15 Winter	1	+0%					30.587
S4.000	S8	15 Winter	1	+0%					32.123
S4.001	S9	30 Winter	1	+0%					32.104
S1.003	SCP JUNCTION 2	15 Winter	1	+0%					30.582
S5.000	SSW-C-013	15 Winter	1	+0%	1000/15 Summer				32.307
S5.001	SSW-C-014	15 Winter	1	+0%	100/15 Winter				32.253
S5.002	SSW-C-015	15 Winter	1	+0%	100/15 Summer				32.070
S5.003	SSW-C-016	15 Winter	1	+0%	100/15 Summer				31.783
S5.004	SSW-C-017	15 Winter	1	+0%	30/15 Winter				31.725
S5.005	SSW-C-018	15 Winter	1	+0%	30/15 Summer				31.722
S1.004	SSW-C-019	15 Winter	1	+0%	100/15 Summer		100/60 Winter	8	30.574
S1.005	SSW-C-020	15 Winter	1	+0%	100/15 Summer		1000/30 Summer	7	30.518
S6.000	SSW-C-021	120 Winter	1	+0%					30.398
S6.001	SSW-C-022	120 Winter	1	+0%	1000/30 Winter				30.397
S1.006	SSW-C-023	15 Winter	1	+0%	100/15 Summer				30.493
S7.000	SSWUUC100	15 Winter	1	+0%	100/15 Winter				30.123
S1.007	SSWUUC101	15 Winter	1	+0%	100/15 Winter				30.123
S1.008	SSWUUC102	30 Winter	1	+0%	2/15 Winter				30.088

PN	US/MH Name	Surcharged	Flooded			Pipe	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
S1.000	SSW-C-001	-0.246	0.000	0.07		4.6	OK
S2.000	SSW-C-005	-0.109	0.000	0.16		2.7	OK

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

PN	US/MH Name	Surcharged Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Status
S2.001	SSW-C-006	-0.171	0.000	0.13	4.6	OK
S1.001	SSW-C-007	-0.205	0.000	0.22	13.1	OK
S3.000	S5	-0.322	0.000	0.01	1.2	OK
S3.001	S6	-0.140	0.000	0.01	1.2	OK
S1.002	SCP JUNCTION 1	-0.186	0.000	0.21	13.0	OK*
S4.000	S8	-0.322	0.000	0.01	1.1	OK
S4.001	S9	-0.140	0.000	0.01	1.1	OK
S1.003	SCP JUNCTION 2	-0.177	0.000	0.22	13.3	OK*
S5.000	SSW-C-013	-0.139	0.000	0.02	0.2	OK
S5.001	SSW-C-014	-0.118	0.000	0.10	1.7	OK
S5.002	SSW-C-015	-0.105	0.000	0.20	3.3	OK
S5.003	SSW-C-016	-0.178	0.000	0.10	3.5	OK
S5.004	SSW-C-017	-0.144	0.000	0.12	3.5	OK
S5.005	SSW-C-018	-0.119	0.000	0.04	4.8	OK
S1.004	SSW-C-019	-0.161	0.000	0.44	0.0 19.4	OK
S1.005	SSW-C-020	-0.184	0.000	0.32	0.0 19.5	OK
S6.000	SSW-C-021	-0.801	0.000	0.00	0.0	OK
S6.001	SSW-C-022	-0.300	0.000	0.00	0.0	OK
S1.006	SSW-C-023	-0.176	0.000	0.36	19.5	OK
S7.000	SSWUUC100	-0.553	0.000	0.00	0.4	OK
S1.007	SSWUUC101	-0.510	0.000	0.04	25.2	OK
S1.008	SSWUUC102	-0.035	0.000	0.63	17.4	OK

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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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SSW-C-001	15 Winter	2	+0%	100/15 Summer				30.718
S2.000	SSW-C-005	15 Winter	2	+0%	100/15 Summer				31.105
S2.001	SSW-C-006	15 Winter	2	+0%	100/15 Summer				30.790
S1.001	SSW-C-007	15 Winter	2	+0%	100/15 Summer				30.655
S3.000	S5	15 Winter	2	+0%					32.392
S3.001	S6	30 Winter	2	+0%					32.372
S1.002	SCP JUNCTION 1	15 Winter	2	+0%					30.609
S4.000	S8	15 Winter	2	+0%					32.127
S4.001	S9	30 Winter	2	+0%					32.108
S1.003	SCP JUNCTION 2	15 Winter	2	+0%					30.605
S5.000	SSW-C-013	15 Winter	2	+0%	1000/15 Summer				32.311
S5.001	SSW-C-014	15 Winter	2	+0%	100/15 Winter				32.257
S5.002	SSW-C-015	15 Winter	2	+0%	100/15 Summer				32.076
S5.003	SSW-C-016	15 Winter	2	+0%	100/15 Summer				31.790
S5.004	SSW-C-017	15 Winter	2	+0%	30/15 Winter				31.744
S5.005	SSW-C-018	15 Winter	2	+0%	30/15 Summer				31.741
S1.004	SSW-C-019	15 Winter	2	+0%	100/15 Summer		100/60 Winter	8	30.598
S1.005	SSW-C-020	15 Winter	2	+0%	100/15 Summer		1000/30 Summer	7	30.536
S6.000	SSW-C-021	120 Winter	2	+0%					30.398
S6.001	SSW-C-022	120 Winter	2	+0%	1000/30 Winter				30.397
S1.006	SSW-C-023	15 Winter	2	+0%	100/15 Summer				30.512
S7.000	SSWUUC100	30 Winter	2	+0%	100/15 Winter				30.148
S1.007	SSWUUC101	30 Winter	2	+0%	100/15 Winter				30.148
S1.008	SSWUUC102	30 Winter	2	+0%	2/15 Winter				30.135

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	SSW-C-001	-0.238	0.000	0.09	6.0	OK	
S2.000	SSW-C-005	-0.103	0.000	0.21	3.5	OK	

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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		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S2.001	SSW-C-006	-0.163	0.000	0.17		5.9	OK
S1.001	SSW-C-007	-0.189	0.000	0.27		16.5	OK
S3.000	S5	-0.318	0.000	0.02		1.7	OK
S3.001	S6	-0.137	0.000	0.02		1.6	OK
S1.002	SCP JUNCTION 1	-0.164	0.000	0.27		16.6	OK*
S4.000	S8	-0.318	0.000	0.01		1.5	OK
S4.001	S9	-0.136	0.000	0.02		1.5	OK
S1.003	SCP JUNCTION 2	-0.154	0.000	0.28		17.3	OK*
S5.000	SSW-C-013	-0.135	0.000	0.02		0.3	OK
S5.001	SSW-C-014	-0.114	0.000	0.13		2.1	OK
S5.002	SSW-C-015	-0.099	0.000	0.25		4.3	OK
S5.003	SSW-C-016	-0.171	0.000	0.13		4.5	OK
S5.004	SSW-C-017	-0.125	0.000	0.16		4.5	OK
S5.005	SSW-C-018	-0.100	0.000	0.05		6.2	OK
S1.004	SSW-C-019	-0.137	0.000	0.57	0.0	25.1	OK
S1.005	SSW-C-020	-0.166	0.000	0.41	0.0	25.1	OK
S6.000	SSW-C-021	-0.801	0.000	0.00		0.0	OK
S6.001	SSW-C-022	-0.300	0.000	0.00		0.0	OK
S1.006	SSW-C-023	-0.157	0.000	0.46		25.0	OK
S7.000	SSWUUC100	-0.528	0.000	0.00		0.5	OK
S1.007	SSWUUC101	-0.485	0.000	0.05		29.5	OK
S1.008	SSWUUC102	0.012	0.000	0.68		18.8	SURCHARGED

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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 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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SSW-C-001	15 Winter	5	+0%	100/15 Summer				30.727
S2.000	SSW-C-005	15 Winter	5	+0%	100/15 Summer				31.112
S2.001	SSW-C-006	15 Winter	5	+0%	100/15 Summer				30.799
S1.001	SSW-C-007	15 Winter	5	+0%	100/15 Summer				30.676
S3.000	S5	15 Winter	5	+0%					32.397
S3.001	S6	15 Winter	5	+0%					32.375
S1.002	SCP JUNCTION 1	15 Winter	5	+0%					30.641
S4.000	S8	15 Winter	5	+0%					32.132
S4.001	S9	30 Winter	5	+0%					32.110
S1.003	SCP JUNCTION 2	15 Winter	5	+0%					30.636
S5.000	SSW-C-013	15 Winter	5	+0%	1000/15 Summer				32.312
S5.001	SSW-C-014	15 Winter	5	+0%	100/15 Winter				32.262
S5.002	SSW-C-015	15 Winter	5	+0%	100/15 Summer				32.084
S5.003	SSW-C-016	15 Winter	5	+0%	100/15 Summer				31.801
S5.004	SSW-C-017	15 Winter	5	+0%	30/15 Winter				31.765
S5.005	SSW-C-018	15 Winter	5	+0%	30/15 Summer				31.761
S1.004	SSW-C-019	15 Winter	5	+0%	100/15 Summer		100/60 Winter	8	30.626
S1.005	SSW-C-020	15 Winter	5	+0%	100/15 Summer		1000/30 Summer	7	30.556
S6.000	SSW-C-021	120 Winter	5	+0%					30.398
S6.001	SSW-C-022	120 Winter	5	+0%	1000/30 Winter				30.397
S1.006	SSW-C-023	15 Winter	5	+0%	100/15 Summer				30.535
S7.000	SSWUUC100	30 Winter	5	+0%	100/15 Winter				30.212
S1.007	SSWUUC101	30 Winter	5	+0%	100/15 Winter				30.213
S1.008	SSWUUC102	30 Winter	5	+0%	2/15 Winter				30.199

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	SSW-C-001	-0.229	0.000	0.12	7.7	OK	
S2.000	SSW-C-005	-0.096	0.000	0.27	4.6	OK	

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

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
S2.001	SSW-C-006	-0.154	0.000	0.21		7.7	OK
S1.001	SSW-C-007	-0.168	0.000	0.34		20.9	OK
S3.000	S5	-0.313	0.000	0.02		2.3	OK
S3.001	S6	-0.134	0.000	0.03		2.3	OK
S1.002	SCP JUNCTION 1	-0.132	0.000	0.34		21.0	OK*
S4.000	S8	-0.313	0.000	0.02		2.2	OK
S4.001	S9	-0.134	0.000	0.03		2.1	OK
S1.003	SCP JUNCTION 2	-0.123	0.000	0.36		22.1	OK*
S5.000	SSW-C-013	-0.134	0.000	0.03		0.4	OK
S5.001	SSW-C-014	-0.109	0.000	0.17		2.8	OK
S5.002	SSW-C-015	-0.091	0.000	0.33		5.5	OK
S5.003	SSW-C-016	-0.160	0.000	0.17		5.8	OK
S5.004	SSW-C-017	-0.104	0.000	0.20		5.7	OK
S5.005	SSW-C-018	-0.080	0.000	0.07		7.9	OK
S1.004	SSW-C-019	-0.109	0.000	0.73	0.0	32.1	OK
S1.005	SSW-C-020	-0.146	0.000	0.53	0.0	32.0	OK
S6.000	SSW-C-021	-0.801	0.000	0.00		0.0	OK
S6.001	SSW-C-022	-0.300	0.000	0.00		0.0	OK
S1.006	SSW-C-023	-0.134	0.000	0.59		31.9	OK
S7.000	SSWUUC100	-0.464	0.000	0.00		0.6	OK
S1.007	SSWUUC101	-0.420	0.000	0.06		36.9	OK
S1.008	SSWUUC102	0.076	0.000	0.72		19.7	SURCHARGED

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SSW-C-001	15 Winter	30	+0%	100/15 Summer				30.810
S2.000	SSW-C-005	15 Winter	30	+0%	100/15 Summer				31.124
S2.001	SSW-C-006	15 Winter	30	+0%	100/15 Summer				30.822
S1.001	SSW-C-007	15 Winter	30	+0%	100/15 Summer				30.800
S3.000	S5	15 Winter	30	+0%					32.406
S3.001	S6	15 Winter	30	+0%					32.380
S1.002	SCP JUNCTION 1	15 Winter	30	+0%					30.755
S4.000	S8	15 Winter	30	+0%					32.141
S4.001	S9	15 Winter	30	+0%					32.115
S1.003	SCP JUNCTION 2	15 Summer	30	+0%					30.712
S5.000	SSW-C-013	15 Winter	30	+0%	1000/15 Summer				32.315
S5.001	SSW-C-014	15 Winter	30	+0%	100/15 Winter				32.277
S5.002	SSW-C-015	15 Winter	30	+0%	100/15 Summer				32.109
S5.003	SSW-C-016	15 Winter	30	+0%	100/15 Summer				31.891
S5.004	SSW-C-017	15 Winter	30	+0%	30/15 Winter				31.873
S5.005	SSW-C-018	15 Winter	30	+0%	30/15 Summer				31.866
S1.004	SSW-C-019	15 Summer	30	+0%	100/15 Summer		100/60 Winter	8	30.684
S1.005	SSW-C-020	15 Winter	30	+0%	100/15 Summer		1000/30 Summer	7	30.592
S6.000	SSW-C-021	120 Winter	30	+0%					30.398
S6.001	SSW-C-022	120 Winter	30	+0%	1000/30 Winter				30.397
S1.006	SSW-C-023	15 Winter	30	+0%	100/15 Summer				30.575
S7.000	SSWUUC100	30 Winter	30	+0%	100/15 Winter				30.388
S1.007	SSWUUC101	30 Winter	30	+0%	100/15 Winter				30.388
S1.008	SSWUUC102	30 Winter	30	+0%	2/15 Winter				30.358

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)		
S1.000	SSW-C-001	-0.146	0.000	0.17	11.0	OK	
S2.000	SSW-C-005	-0.084	0.000	0.40	6.7	OK	

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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		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
S2.001	SSW-C-006	-0.131	0.000	0.34		12.2	OK
S1.001	SSW-C-007	-0.044	0.000	0.50		30.5	OK
S3.000	S5	-0.304	0.000	0.04		3.9	OK
S3.001	S6	-0.129	0.000	0.05		3.9	OK
S1.002	SCP JUNCTION 1	-0.018	0.000	0.45		27.7	OK*
S4.000	S8	-0.304	0.000	0.03		3.7	OK
S4.001	S9	-0.129	0.000	0.05		3.6	OK
S1.003	SCP JUNCTION 2	-0.047	0.000	0.50		30.6	OK*
S5.000	SSW-C-013	-0.131	0.000	0.04		0.6	OK
S5.001	SSW-C-014	-0.094	0.000	0.30		5.0	OK
S5.002	SSW-C-015	-0.066	0.000	0.59		9.9	OK
S5.003	SSW-C-016	-0.070	0.000	0.28		9.9	OK
S5.004	SSW-C-017	0.004	0.000	0.34		9.7	SURCHARGED
S5.005	SSW-C-018	0.025	0.000	0.11		12.8	SURCHARGED
S1.004	SSW-C-019	-0.051	0.000	0.98	0.0	43.3	OK
S1.005	SSW-C-020	-0.110	0.000	0.72	0.0	43.7	OK
S6.000	SSW-C-021	-0.801	0.000	0.00		0.0	OK
S6.001	SSW-C-022	-0.300	0.000	0.00		0.0	OK
S1.006	SSW-C-023	-0.094	0.000	0.81		43.9	OK
S7.000	SSWUUC100	-0.288	0.000	0.00		0.8	OK
S1.007	SSWUUC101	-0.245	0.000	0.09		52.0	OK
S1.008	SSWUUC102	0.235	0.000	0.73		19.9	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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SSW-C-001	60 Winter	100	+40%	100/15 Summer				31.431
S2.000	SSW-C-005	60 Winter	100	+40%	100/15 Summer				31.446
S2.001	SSW-C-006	60 Winter	100	+40%	100/15 Summer				31.435
S1.001	SSW-C-007	60 Winter	100	+40%	100/15 Summer				31.428
S3.000	S5	15 Winter	100	+40%					32.423
S3.001	S6	15 Winter	100	+40%					32.390
S1.002	SCP JUNCTION 1	180 Winter	100	+40%					30.773
S4.000	S8	15 Winter	100	+40%					32.158
S4.001	S9	15 Winter	100	+40%					32.126
S1.003	SCP JUNCTION 2	180 Winter	100	+40%					30.759
S5.000	SSW-C-013	15 Winter	100	+40%	1000/15 Summer				32.412
S5.001	SSW-C-014	15 Winter	100	+40%	100/15 Winter				32.410
S5.002	SSW-C-015	15 Winter	100	+40%	100/15 Summer				32.377
S5.003	SSW-C-016	15 Winter	100	+40%	100/15 Summer				32.222
S5.004	SSW-C-017	15 Winter	100	+40%	30/15 Winter				32.194
S5.005	SSW-C-018	15 Winter	100	+40%	30/15 Summer				32.183
S1.004	SSW-C-019	60 Winter	100	+40%	100/15 Summer		100/60 Winter	8	31.410
S1.005	SSW-C-020	60 Winter	100	+40%	100/15 Summer		1000/30 Summer	7	31.395
S6.000	SSW-C-021	60 Winter	100	+40%					30.405
S6.001	SSW-C-022	60 Winter	100	+40%	1000/30 Winter				30.403
S1.006	SSW-C-023	60 Winter	100	+40%	100/15 Summer				31.380
S7.000	SSWUUC100	60 Winter	100	+40%	100/15 Winter				31.371
S1.007	SSWUUC101	60 Winter	100	+40%	100/15 Winter				31.371
S1.008	SSWUUC102	60 Winter	100	+40%	2/15 Winter				31.369

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m³)	Flow Cap.	Flow / Overflow (l/s)	Flow (l/s)	Status	
S1.000	SSW-C-001	0.475	0.000	0.16		10.2	FLOOD RISK	
S2.000	SSW-C-005	0.238	0.000	0.39		6.6	SURCHARGED	

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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		Pipe Flow	Status	Level
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		Exceeded
S2.001	SSW-C-006	0.482	0.000	0.30		10.9	SURCHARGED	
S1.001	SSW-C-007	0.584	0.000	0.51		31.2	SURCHARGED	
S3.000	S5	-0.287	0.000	0.07		8.1	OK	
S3.001	S6	-0.119	0.000	0.10		8.1	OK	
S1.002	SCP JUNCTION 1	0.000	0.000	0.31		18.7	SURCHARGED*	
S4.000	S8	-0.287	0.000	0.07		7.8	OK	
S4.001	S9	-0.118	0.000	0.10		7.7	OK	
S1.003	SCP JUNCTION 2	0.000	0.000	0.35		21.3	SURCHARGED*	
S5.000	SSW-C-013	-0.034	0.000	0.07		1.1	OK	
S5.001	SSW-C-014	0.039	0.000	0.50		8.4	SURCHARGED	
S5.002	SSW-C-015	0.202	0.000	0.88		14.7	SURCHARGED	
S5.003	SSW-C-016	0.261	0.000	0.43		15.2	SURCHARGED	
S5.004	SSW-C-017	0.325	0.000	0.54		15.5	SURCHARGED	
S5.005	SSW-C-018	0.342	0.000	0.18		20.9	SURCHARGED	
S1.004	SSW-C-019	0.675	0.000	1.33	0.7	58.7	SURCHARGED	
S1.005	SSW-C-020	0.693	0.000	0.92	0.0	56.1	SURCHARGED	
S6.000	SSW-C-021	-0.794	0.000	0.00		0.7	OK	
S6.001	SSW-C-022	-0.294	0.000	0.00		0.2	OK	
S1.006	SSW-C-023	0.711	0.000	1.00		54.3	SURCHARGED	
S7.000	SSWUUC100	0.695	0.000	0.01		2.1	SURCHARGED	
S1.007	SSWUUC101	0.738	0.000	0.10		58.4	SURCHARGED	
S1.008	SSWUUC102	1.246	0.000	0.80		22.0	FLOOD RISK	

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

Simulation Criteria

Areal Reduction Factor 1.000 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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SSW-C-001	60 Winter	1000	+0%	100/15 Summer				31.649
S2.000	SSW-C-005	60 Winter	1000	+0%	100/15 Summer				31.718
S2.001	SSW-C-006	60 Winter	1000	+0%	100/15 Summer				31.667
S1.001	SSW-C-007	60 Winter	1000	+0%	100/15 Summer				31.649
S3.000	S5	15 Winter	1000	+0%					32.429
S3.001	S6	15 Winter	1000	+0%					32.393
S1.002	SCP JUNCTION 1	180 Winter	1000	+0%					30.773
S4.000	S8	15 Winter	1000	+0%					32.164
S4.001	S9	15 Winter	1000	+0%					32.129
S1.003	SCP JUNCTION 2	180 Winter	1000	+0%					30.759
S5.000	SSW-C-013	15 Winter	1000	+0%	1000/15 Summer				32.670
S5.001	SSW-C-014	15 Winter	1000	+0%	100/15 Winter				32.667
S5.002	SSW-C-015	15 Winter	1000	+0%	100/15 Summer				32.619
S5.003	SSW-C-016	15 Winter	1000	+0%	100/15 Summer				32.405
S5.004	SSW-C-017	15 Winter	1000	+0%	30/15 Winter				32.357
S5.005	SSW-C-018	15 Winter	1000	+0%	30/15 Summer				32.344
S1.004	SSW-C-019	30 Winter	1000	+0%	100/15 Summer		100/60 Winter	8	31.483
S1.005	SSW-C-020	30 Winter	1000	+0%	100/15 Summer		1000/30 Summer	7	31.476
S6.000	SSW-C-021	60 Winter	1000	+0%					31.132
S6.001	SSW-C-022	60 Winter	1000	+0%	1000/30 Winter				31.132
S1.006	SSW-C-023	30 Winter	1000	+0%	100/15 Summer				31.479
S7.000	SSWUUC100	60 Winter	1000	+0%	100/15 Winter				31.480
S1.007	SSWUUC101	30 Winter	1000	+0%	100/15 Winter				31.480
S1.008	SSWUUC102	30 Winter	1000	+0%	2/15 Winter				31.478

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	
S1.000	SSW-C-001	0.693	0.000	0.20		12.8	FLOOD RISK	
S2.000	SSW-C-005	0.510	0.000	0.46		7.8	FLOOD RISK	

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
S2.001	SSW-C-006	0.714	0.000	0.37		13.1	SURCHARGED	
S1.001	SSW-C-007	0.805	0.000	0.63		38.3	SURCHARGED	
S3.000	S5	-0.281	0.000	0.09		9.8	OK	
S3.001	S6	-0.116	0.000	0.12		9.8	OK	
S1.002	SCP JUNCTION 1	0.000	0.000	0.36		22.3	SURCHARGED*	
S4.000	S8	-0.281	0.000	0.09		9.4	OK	
S4.001	S9	-0.115	0.000	0.12		9.4	OK	
S1.003	SCP JUNCTION 2	0.000	0.000	0.41		25.1	SURCHARGED*	
S5.000	SSW-C-013	0.224	0.000	0.09		1.4	SURCHARGED	
S5.001	SSW-C-014	0.296	0.000	0.54		9.1	SURCHARGED	
S5.002	SSW-C-015	0.444	0.000	0.98		16.5	SURCHARGED	
S5.003	SSW-C-016	0.444	0.000	0.50		17.5	SURCHARGED	
S5.004	SSW-C-017	0.488	0.000	0.62		17.7	SURCHARGED	
S5.005	SSW-C-018	0.503	0.000	0.21		24.1	SURCHARGED	
S1.004	SSW-C-019	0.748	0.000	2.20	33.5	96.8	SURCHARGED	
S1.005	SSW-C-020	0.774	0.000	1.58	14.9	96.3	SURCHARGED	
S6.000	SSW-C-021	-0.067	0.000	0.11		43.1	OK	
S6.001	SSW-C-022	0.435	0.000	0.18		9.1	SURCHARGED	
S1.006	SSW-C-023	0.810	0.000	1.76		95.7	SURCHARGED	
S7.000	SSWUUC100	0.804	0.000	0.01		2.1	SURCHARGED	
S1.007	SSWUUC101	0.847	0.000	0.16		98.2	SURCHARGED	
S1.008	SSWUUC102	1.355	0.000	0.83		22.7	FLOOD RISK	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	26.795	0.112	239.2	0.039	5.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	25.531	0.255	100.1	0.023	5.00	0.0	0.600		o	150	Pipe/Conduit	
S2.001	18.561	0.109	170.3	0.018	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.001	17.048	0.071	240.1	0.039	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	16.800	0.001	16800.0	0.019	5.00	0.0		0.030 → ↓ ←			Porous Car Park	
S3.001	2.111	1.736	1.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.002	3.300	0.014	235.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	18.000	0.001	18000.0	0.019	5.00	0.0		0.030 → ↓ ←			Porous Car Park	
S4.001	1.837	1.485	1.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.003	5.858	0.024	244.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	7.487	0.075	99.8	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
S5.001	19.577	0.196	99.9	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.002	21.484	0.215	99.9	0.016	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.003	15.720	0.092	170.9	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.004	4.770	0.028	170.4	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.005	17.805	1.105	16.1	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.004	11.500	0.033	348.5	0.016	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)
S1.000	45.14	5.44	30.656	0.039	0.0	0.0	0.0	1.01	71.5	4.8
S2.000	45.21	5.42	31.058	0.023	0.0	0.0	0.0	1.00	17.7	2.8
S2.001	44.12	5.73	30.728	0.041	0.0	0.0	0.0	1.00	39.7	4.9
S1.001	43.18	6.01	30.544	0.119	0.0	0.0	0.0	1.01	71.4	13.9
S3.000	29.13	12.93	32.360	0.019	0.0	0.0	0.0	0.04	40.0	1.5
S3.001	29.12	12.94	32.359	0.019	0.0	0.0	0.0	9.22	162.9	1.5
S1.002	29.06	12.99	30.473	0.138	0.0	0.0	0.0	1.02	72.1	13.9
S4.000	28.11	13.80	32.095	0.019	0.0	0.0	0.0	0.03	38.7	1.4
S4.001	28.10	13.80	32.094	0.019	0.0	0.0	0.0	9.14	161.5	1.4
S1.003	28.00	13.90	30.459	0.157	0.0	0.0	0.0	1.00	70.8	13.9
S5.000	46.32	5.12	32.296	0.002	0.0	0.0	0.0	1.01	17.8	0.3
S5.001	45.12	5.45	32.221	0.016	0.0	0.0	0.0	1.01	17.8	2.0
S5.002	43.87	5.80	32.025	0.032	0.0	0.0	0.0	1.01	17.8	3.8
S5.003	43.01	6.07	31.736	0.034	0.0	0.0	0.0	1.00	39.7	4.0
S5.004	42.75	6.15	31.644	0.034	0.0	0.0	0.0	1.00	39.7	4.0
S5.005	42.47	6.24	31.616	0.048	0.0	0.0	0.0	3.28	130.3	5.5
S1.004	27.74	14.13	30.435	0.221	0.0	0.0	0.0	0.84	59.1	16.6

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	4.538	0.033	137.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	12.609	0.001	12609.0	0.000	5.00	0.0		0.050	→[↓]		Cellular Storage	
S6.001	6.715	0.028	239.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.006	8.511	0.036	236.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S7.000	17.961	0.043	417.7	0.004	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.007	54.995	0.135	407.4	0.082	0.00	0.0	0.600		oo	45	Pipe/Conduit	
S1.008	5.580	0.028	199.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S1.005	27.68	14.18	30.402	0.221	0.0	0.0	0.0	1.34	94.6	16.6
S6.000	38.33	7.73	30.398	0.000	0.0	0.0	0.0	0.08	139.4	0.0
S6.001	38.06	7.84	30.397	0.000	0.0	0.0	0.0	1.01	71.5	0.0
S1.006	27.53	14.32	30.369	0.221	0.0	0.0	0.0	1.02	72.0	16.6
S7.000	45.84	5.25	30.076	0.004	0.0	0.0	0.0	1.19	335.1	0.5
S1.007	26.74	15.09	30.033	0.307	0.0	0.0	0.0	1.20	677.8	22.2
S1.008	26.64	15.19	29.898	0.307	0.0	0.0	0.0	0.92	36.7	22.2

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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S1.008 SMHCC1 31.520 29.870 0.000 0 0

Datum (m) 30.095 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	1.000	13	1.000	25	1.000	37	1.000	49	1.000	61	1.000	73	1.000
2	1.000	14	1.000	26	1.000	38	1.000	50	1.000	62	1.000	74	1.000
3	1.000	15	1.000	27	1.000	39	1.000	51	1.000	63	1.000	75	1.000
4	1.000	16	1.000	28	1.000	40	1.000	52	1.000	64	1.000	76	1.000
5	1.000	17	1.000	29	1.000	41	1.000	53	1.000	65	1.000	77	1.000
6	1.000	18	1.000	30	1.000	42	1.000	54	1.000	66	1.000	78	1.000
7	1.000	19	1.000	31	1.000	43	1.000	55	1.000	67	1.000	79	1.000
8	1.000	20	1.000	32	1.000	44	1.000	56	1.000	68	1.000	80	1.000
9	1.000	21	1.000	33	1.000	45	1.000	57	1.000	69	1.000	81	1.000
10	1.000	22	1.000	34	1.000	46	1.000	58	1.000	70	1.000	82	1.000
11	1.000	23	1.000	35	1.000	47	1.000	59	1.000	71	1.000	83	1.000
12	1.000	24	1.000	36	1.000	48	1.000	60	1.000	72	1.000	84	1.000

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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)
97	1.000	156	1.000	215	1.000	274	1.000	333	1.000	392	1.000	451	1.000	510	1.000
98	1.000	157	1.000	216	1.000	275	1.000	334	1.000	393	1.000	452	1.000	511	1.000
99	1.000	158	1.000	217	1.000	276	1.000	335	1.000	394	1.000	453	1.000	512	1.000
100	1.000	159	1.000	218	1.000	277	1.000	336	1.000	395	1.000	454	1.000	513	1.000
101	1.000	160	1.000	219	1.000	278	1.000	337	1.000	396	1.000	455	1.000	514	1.000
102	1.000	161	1.000	220	1.000	279	1.000	338	1.000	397	1.000	456	1.000	515	1.000
103	1.000	162	1.000	221	1.000	280	1.000	339	1.000	398	1.000	457	1.000	516	1.000
104	1.000	163	1.000	222	1.000	281	1.000	340	1.000	399	1.000	458	1.000	517	1.000
105	1.000	164	1.000	223	1.000	282	1.000	341	1.000	400	1.000	459	1.000	518	1.000
106	1.000	165	1.000	224	1.000	283	1.000	342	1.000	401	1.000	460	1.000	519	1.000
107	1.000	166	1.000	225	1.000	284	1.000	343	1.000	402	1.000	461	1.000	520	1.000
108	1.000	167	1.000	226	1.000	285	1.000	344	1.000	403	1.000	462	1.000	521	1.000
109	1.000	168	1.000	227	1.000	286	1.000	345	1.000	404	1.000	463	1.000	522	1.000
110	1.000	169	1.000	228	1.000	287	1.000	346	1.000	405	1.000	464	1.000	523	1.000
111	1.000	170	1.000	229	1.000	288	1.000	347	1.000	406	1.000	465	1.000	524	1.000
112	1.000	171	1.000	230	1.000	289	1.000	348	1.000	407	1.000	466	1.000	525	1.000
113	1.000	172	1.000	231	1.000	290	1.000	349	1.000	408	1.000	467	1.000	526	1.000
114	1.000	173	1.000	232	1.000	291	1.000	350	1.000	409	1.000	468	1.000	527	1.000
115	1.000	174	1.000	233	1.000	292	1.000	351	1.000	410	1.000	469	1.000	528	1.000
116	1.000	175	1.000	234	1.000	293	1.000	352	1.000	411	1.000	470	1.000	529	1.000
117	1.000	176	1.000	235	1.000	294	1.000	353	1.000	412	1.000	471	1.000	530	1.000
118	1.000	177	1.000	236	1.000	295	1.000	354	1.000	413	1.000	472	1.000	531	1.000
119	1.000	178	1.000	237	1.000	296	1.000	355	1.000	414	1.000	473	1.000	532	1.000
120	1.000	179	1.000	238	1.000	297	1.000	356	1.000	415	1.000	474	1.000	533	1.000
121	1.000	180	1.000	239	1.000	298	1.000	357	1.000	416	1.000	475	1.000	534	1.000
122	1.000	181	1.000	240	1.000	299	1.000	358	1.000	417	1.000	476	1.000	535	1.000
123	1.000	182	1.000	241	1.000	300	1.000	359	1.000	418	1.000	477	1.000	536	1.000
124	1.000	183	1.000	242	1.000	301	1.000	360	1.000	419	1.000	478	1.000	537	1.000
125	1.000	184	1.000	243	1.000	302	1.000	361	1.000	420	1.000	479	1.000	538	1.000
126	1.000	185	1.000	244	1.000	303	1.000	362	1.000	421	1.000	480	1.000	539	1.000
127	1.000	186	1.000	245	1.000	304	1.000	363	1.000	422	1.000	481	1.000	540	1.000
128	1.000	187	1.000	246	1.000	305	1.000	364	1.000	423	1.000	482	1.000	541	1.000
129	1.000	188	1.000	247	1.000	306	1.000	365	1.000	424	1.000	483	1.000	542	1.000
130	1.000	189	1.000	248	1.000	307	1.000	366	1.000	425	1.000	484	1.000	543	1.000
131	1.000	190	1.000	249	1.000	308	1.000	367	1.000	426	1.000	485	1.000	544	1.000
132	1.000	191	1.000	250	1.000	309	1.000	368	1.000	427	1.000	486	1.000	545	1.000
133	1.000	192	1.000	251	1.000	310	1.000	369	1.000	428	1.000	487	1.000	546	1.000
134	1.000	193	1.000	252	1.000	311	1.000	370	1.000	429	1.000	488	1.000	547	1.000
135	1.000	194	1.000	253	1.000	312	1.000	371	1.000	430	1.000	489	1.000	548	1.000
136	1.000	195	1.000	254	1.000	313	1.000	372	1.000	431	1.000	490	1.000	549	1.000
137	1.000	196	1.000	255	1.000	314	1.000	373	1.000	432	1.000	491	1.000	550	1.000
138	1.000	197	1.000	256	1.000	315	1.000	374	1.000	433	1.000	492	1.000	551	1.000
139	1.000	198	1.000	257	1.000	316	1.000	375	1.000	434	1.000	493	1.000	552	1.000
140	1.000	199	1.000	258	1.000	317	1.000	376	1.000	435	1.000	494	1.000	553	1.000
141	1.000	200	1.000	259	1.000	318	1.000	377	1.000	436	1.000	495	1.000	554	1.000
142	1.000	201	1.000	260	1.000	319	1.000	378	1.000	437	1.000	496	1.000	555	1.000
143	1.000	202	1.000	261	1.000	320	1.000	379	1.000	438	1.000	497	1.000	556	1.000
144	1.000	203	1.000	262	1.000	321	1.000	380	1.000	439	1.000	498	1.000	557	1.000
145	1.000	204	1.000	263	1.000	322	1.000	381	1.000	440	1.000	499	1.000	558	1.000
146	1.000	205	1.000	264	1.000	323	1.000	382	1.000	441	1.000	500	1.000	559	1.000
147	1.000	206	1.000	265	1.000	324	1.000	383	1.000	442	1.000	501	1.000	560	1.000
148	1.000	207	1.000	266	1.000	325	1.000	384	1.000	443	1.000	502	1.000	561	1.000
149	1.000	208	1.000	267	1.000	326	1.000	385	1.000	444	1.000	503	1.000	562	1.000
150	1.000	209	1.000	268	1.000	327	1.000	386	1.000	445	1.000	504	1.000	563	1.000
151	1.000	210	1.000	269	1.000	328	1.000	387	1.000	446	1.000	505	1.000	564	1.000
152	1.000	211	1.000	270	1.000	329	1.000	388	1.000	447	1.000	506	1.000	565	1.000
153	1.000	212	1.000	271	1.000	330	1.000	389	1.000	448	1.000	507	1.000	566	1.000
154	1.000	213	1.000	272	1.000	331	1.000	390	1.000	449	1.000	508	1.000	567	1.000
155	1.000	214	1.000	273	1.000	332	1.000	391	1.000	450	1.000	509	1.000	568	1.000

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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)
569	1.000	628	1.000	687	1.000	746	1.000	805	1.000	864	1.000	923	1.000	982	1.000
570	1.000	629	1.000	688	1.000	747	1.000	806	1.000	865	1.000	924	1.000	983	1.000
571	1.000	630	1.000	689	1.000	748	1.000	807	1.000	866	1.000	925	1.000	984	1.000
572	1.000	631	1.000	690	1.000	749	1.000	808	1.000	867	1.000	926	1.000	985	1.000
573	1.000	632	1.000	691	1.000	750	1.000	809	1.000	868	1.000	927	1.000	986	1.000
574	1.000	633	1.000	692	1.000	751	1.000	810	1.000	869	1.000	928	1.000	987	1.000
575	1.000	634	1.000	693	1.000	752	1.000	811	1.000	870	1.000	929	1.000	988	1.000
576	1.000	635	1.000	694	1.000	753	1.000	812	1.000	871	1.000	930	1.000	989	1.000
577	1.000	636	1.000	695	1.000	754	1.000	813	1.000	872	1.000	931	1.000	990	1.000
578	1.000	637	1.000	696	1.000	755	1.000	814	1.000	873	1.000	932	1.000	991	1.000
579	1.000	638	1.000	697	1.000	756	1.000	815	1.000	874	1.000	933	1.000	992	1.000
580	1.000	639	1.000	698	1.000	757	1.000	816	1.000	875	1.000	934	1.000	993	1.000
581	1.000	640	1.000	699	1.000	758	1.000	817	1.000	876	1.000	935	1.000	994	1.000
582	1.000	641	1.000	700	1.000	759	1.000	818	1.000	877	1.000	936	1.000	995	1.000
583	1.000	642	1.000	701	1.000	760	1.000	819	1.000	878	1.000	937	1.000	996	1.000
584	1.000	643	1.000	702	1.000	761	1.000	820	1.000	879	1.000	938	1.000	997	1.000
585	1.000	644	1.000	703	1.000	762	1.000	821	1.000	880	1.000	939	1.000	998	1.000
586	1.000	645	1.000	704	1.000	763	1.000	822	1.000	881	1.000	940	1.000	999	1.000
587	1.000	646	1.000	705	1.000	764	1.000	823	1.000	882	1.000	941	1.000	1000	1.000
588	1.000	647	1.000	706	1.000	765	1.000	824	1.000	883	1.000	942	1.000	1001	1.000
589	1.000	648	1.000	707	1.000	766	1.000	825	1.000	884	1.000	943	1.000	1002	1.000
590	1.000	649	1.000	708	1.000	767	1.000	826	1.000	885	1.000	944	1.000	1003	1.000
591	1.000	650	1.000	709	1.000	768	1.000	827	1.000	886	1.000	945	1.000	1004	1.000
592	1.000	651	1.000	710	1.000	769	1.000	828	1.000	887	1.000	946	1.000	1005	1.000
593	1.000	652	1.000	711	1.000	770	1.000	829	1.000	888	1.000	947	1.000	1006	1.000
594	1.000	653	1.000	712	1.000	771	1.000	830	1.000	889	1.000	948	1.000	1007	1.000
595	1.000	654	1.000	713	1.000	772	1.000	831	1.000	890	1.000	949	1.000	1008	1.000
596	1.000	655	1.000	714	1.000	773	1.000	832	1.000	891	1.000	950	1.000	1009	1.000
597	1.000	656	1.000	715	1.000	774	1.000	833	1.000	892	1.000	951	1.000	1010	1.000
598	1.000	657	1.000	716	1.000	775	1.000	834	1.000	893	1.000	952	1.000	1011	1.000
599	1.000	658	1.000	717	1.000	776	1.000	835	1.000	894	1.000	953	1.000	1012	1.000
600	1.000	659	1.000	718	1.000	777	1.000	836	1.000	895	1.000	954	1.000	1013	1.000
601	1.000	660	1.000	719	1.000	778	1.000	837	1.000	896	1.000	955	1.000	1014	1.000
602	1.000	661	1.000	720	1.000	779	1.000	838	1.000	897	1.000	956	1.000	1015	1.000
603	1.000	662	1.000	721	1.000	780	1.000	839	1.000	898	1.000	957	1.000	1016	1.000
604	1.000	663	1.000	722	1.000	781	1.000	840	1.000	899	1.000	958	1.000	1017	1.000
605	1.000	664	1.000	723	1.000	782	1.000	841	1.000	900	1.000	959	1.000	1018	1.000
606	1.000	665	1.000	724	1.000	783	1.000	842	1.000	901	1.000	960	1.000	1019	1.000
607	1.000	666	1.000	725	1.000	784	1.000	843	1.000	902	1.000	961	1.000	1020	1.000
608	1.000	667	1.000	726	1.000	785	1.000	844	1.000	903	1.000	962	1.000	1021	1.000
609	1.000	668	1.000	727	1.000	786	1.000	845	1.000	904	1.000	963	1.000	1022	1.000
610	1.000	669	1.000	728	1.000	787	1.000	846	1.000	905	1.000	964	1.000	1023	1.000
611	1.000	670	1.000	729	1.000	788	1.000	847	1.000	906	1.000	965	1.000	1024	1.000
612	1.000	671	1.000	730	1.000	789	1.000	848	1.000	907	1.000	966	1.000	1025	1.000
613	1.000	672	1.000	731	1.000	790	1.000	849	1.000	908	1.000	967	1.000	1026	1.000
614	1.000	673	1.000	732	1.000	791	1.000	850	1.000	909	1.000	968	1.000	1027	1.000
615	1.000	674	1.000	733	1.000	792	1.000	851	1.000	910	1.000	969	1.000	1028	1.000
616	1.000	675	1.000	734	1.000	793	1.000	852	1.000	911	1.000	970	1.000	1029	1.000
617	1.000	676	1.000	735	1.000	794	1.000	853	1.000	912	1.000	971	1.000	1030	1.000
618	1.000	677	1.000	736	1.000	795	1.000	854	1.000	913	1.000	972	1.000	1031	1.000
619	1.000	678	1.000	737	1.000	796	1.000	855	1.000	914	1.000	973	1.000	1032	1.000
620	1.000	679	1.000	738	1.000	797	1.000	856	1.000	915	1.000	974	1.000	1033	1.000
621	1.000	680	1.000	739	1.000	798	1.000	857	1.000	916	1.000	975	1.000	1034	1.000
622	1.000	681	1.000	740	1.000	799	1.000	858	1.000	917	1.000	976	1.000	1035	1.000
623	1.000	682	1.000	741	1.000	800	1.000	859	1.000	918	1.000	977	1.000	1036	1.000
624	1.000	683	1.000	742	1.000	801	1.000	860	1.000	919	1.000	978	1.000	1037	1.000
625	1.000	684	1.000	743	1.000	802	1.000	861	1.000	920	1.000	979	1.000	1038	1.000
626	1.000	685	1.000	744	1.000	803	1.000	862	1.000	921	1.000	980	1.000	1039	1.000
627	1.000	686	1.000	745	1.000	804	1.000	863	1.000	922	1.000	981	1.000	1040	1.000

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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)
1041	1.000	1091	1.000	1141	1.000	1191	1.000	1241	1.000	1291	1.000	1341	1.000	1391	1.000
1042	1.000	1092	1.000	1142	1.000	1192	1.000	1242	1.000	1292	1.000	1342	1.000	1392	1.000
1043	1.000	1093	1.000	1143	1.000	1193	1.000	1243	1.000	1293	1.000	1343	1.000	1393	1.000
1044	1.000	1094	1.000	1144	1.000	1194	1.000	1244	1.000	1294	1.000	1344	1.000	1394	1.000
1045	1.000	1095	1.000	1145	1.000	1195	1.000	1245	1.000	1295	1.000	1345	1.000	1395	1.000
1046	1.000	1096	1.000	1146	1.000	1196	1.000	1246	1.000	1296	1.000	1346	1.000	1396	1.000
1047	1.000	1097	1.000	1147	1.000	1197	1.000	1247	1.000	1297	1.000	1347	1.000	1397	1.000
1048	1.000	1098	1.000	1148	1.000	1198	1.000	1248	1.000	1298	1.000	1348	1.000	1398	1.000
1049	1.000	1099	1.000	1149	1.000	1199	1.000	1249	1.000	1299	1.000	1349	1.000	1399	1.000
1050	1.000	1100	1.000	1150	1.000	1200	1.000	1250	1.000	1300	1.000	1350	1.000	1400	1.000
1051	1.000	1101	1.000	1151	1.000	1201	1.000	1251	1.000	1301	1.000	1351	1.000	1401	1.000
1052	1.000	1102	1.000	1152	1.000	1202	1.000	1252	1.000	1302	1.000	1352	1.000	1402	1.000
1053	1.000	1103	1.000	1153	1.000	1203	1.000	1253	1.000	1303	1.000	1353	1.000	1403	1.000
1054	1.000	1104	1.000	1154	1.000	1204	1.000	1254	1.000	1304	1.000	1354	1.000	1404	1.000
1055	1.000	1105	1.000	1155	1.000	1205	1.000	1255	1.000	1305	1.000	1355	1.000	1405	1.000
1056	1.000	1106	1.000	1156	1.000	1206	1.000	1256	1.000	1306	1.000	1356	1.000	1406	1.000
1057	1.000	1107	1.000	1157	1.000	1207	1.000	1257	1.000	1307	1.000	1357	1.000	1407	1.000
1058	1.000	1108	1.000	1158	1.000	1208	1.000	1258	1.000	1308	1.000	1358	1.000	1408	1.000
1059	1.000	1109	1.000	1159	1.000	1209	1.000	1259	1.000	1309	1.000	1359	1.000	1409	1.000
1060	1.000	1110	1.000	1160	1.000	1210	1.000	1260	1.000	1310	1.000	1360	1.000	1410	1.000
1061	1.000	1111	1.000	1161	1.000	1211	1.000	1261	1.000	1311	1.000	1361	1.000	1411	1.000
1062	1.000	1112	1.000	1162	1.000	1212	1.000	1262	1.000	1312	1.000	1362	1.000	1412	1.000
1063	1.000	1113	1.000	1163	1.000	1213	1.000	1263	1.000	1313	1.000	1363	1.000	1413	1.000
1064	1.000	1114	1.000	1164	1.000	1214	1.000	1264	1.000	1314	1.000	1364	1.000	1414	1.000
1065	1.000	1115	1.000	1165	1.000	1215	1.000	1265	1.000	1315	1.000	1365	1.000	1415	1.000
1066	1.000	1116	1.000	1166	1.000	1216	1.000	1266	1.000	1316	1.000	1366	1.000	1416	1.000
1067	1.000	1117	1.000	1167	1.000	1217	1.000	1267	1.000	1317	1.000	1367	1.000	1417	1.000
1068	1.000	1118	1.000	1168	1.000	1218	1.000	1268	1.000	1318	1.000	1368	1.000	1418	1.000
1069	1.000	1119	1.000	1169	1.000	1219	1.000	1269	1.000	1319	1.000	1369	1.000	1419	1.000
1070	1.000	1120	1.000	1170	1.000	1220	1.000	1270	1.000	1320	1.000	1370	1.000	1420	1.000
1071	1.000	1121	1.000	1171	1.000	1221	1.000	1271	1.000	1321	1.000	1371	1.000	1421	1.000
1072	1.000	1122	1.000	1172	1.000	1222	1.000	1272	1.000	1322	1.000	1372	1.000	1422	1.000
1073	1.000	1123	1.000	1173	1.000	1223	1.000	1273	1.000	1323	1.000	1373	1.000	1423	1.000
1074	1.000	1124	1.000	1174	1.000	1224	1.000	1274	1.000	1324	1.000	1374	1.000	1424	1.000
1075	1.000	1125	1.000	1175	1.000	1225	1.000	1275	1.000	1325	1.000	1375	1.000	1425	1.000
1076	1.000	1126	1.000	1176	1.000	1226	1.000	1276	1.000	1326	1.000	1376	1.000	1426	1.000
1077	1.000	1127	1.000	1177	1.000	1227	1.000	1277	1.000	1327	1.000	1377	1.000	1427	1.000
1078	1.000	1128	1.000	1178	1.000	1228	1.000	1278	1.000	1328	1.000	1378	1.000	1428	1.000
1079	1.000	1129	1.000	1179	1.000	1229	1.000	1279	1.000	1329	1.000	1379	1.000	1429	1.000
1080	1.000	1130	1.000	1180	1.000	1230	1.000	1280	1.000	1330	1.000	1380	1.000	1430	1.000
1081	1.000	1131	1.000	1181	1.000	1231	1.000	1281	1.000	1331	1.000	1381	1.000	1431	1.000
1082	1.000	1132	1.000	1182	1.000	1232	1.000	1282	1.000	1332	1.000	1382	1.000	1432	1.000
1083	1.000	1133	1.000	1183	1.000	1233	1.000	1283	1.000	1333	1.000	1383	1.000	1433	1.000
1084	1.000	1134	1.000	1184	1.000	1234	1.000	1284	1.000	1334	1.000	1384	1.000	1434	1.000
1085	1.000	1135	1.000	1185	1.000	1235	1.000	1285	1.000	1335	1.000	1385	1.000	1435	1.000
1086	1.000	1136	1.000	1186	1.000	1236	1.000	1286	1.000	1336	1.000	1386	1.000	1436	1.000
1087	1.000	1137	1.000	1187	1.000	1237	1.000	1287	1.000	1337	1.000	1387	1.000	1437	1.000
1088	1.000	1138	1.000	1188	1.000	1238	1.000	1288	1.000	1338	1.000	1388	1.000	1438	1.000
1089	1.000	1139	1.000	1189	1.000	1239	1.000	1289	1.000	1339	1.000	1389	1.000	1439	1.000
1090	1.000	1140	1.000	1190	1.000	1240	1.000	1290	1.000	1340	1.000	1390	1.000	1440	1.000

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Online Controls for Storm

Non Return Valve Manhole: SSW-C-007, DS/PN: S1.001, Volume (m³): 3.0

Orifice Manhole: SSW-C-018, DS/PN: S5.005, Volume (m³): 0.5

Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 31.616

Non Return Valve Manhole: SSW-C-022, DS/PN: S6.001, Volume (m³): 24.0

Hydro-Brake® Optimum Manhole: SSWUUC102, DS/PN: S1.008, Volume (m³): 40.9

Unit Reference	MD-SHE-0196-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	196
Invert Level (m)	29.898
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	20.0	Kick-Flo®	0.827	16.8
Flush-Flo™	0.376	20.0	Mean Flow over Head Range	-	17.1

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	6.8	0.800	17.4	2.000	25.5	4.000	35.6	7.000	46.7
0.200	18.3	1.000	18.3	2.200	26.7	4.500	37.7	7.500	48.2
0.300	19.8	1.200	20.0	2.400	27.8	5.000	39.6	8.000	49.8
0.400	20.0	1.400	21.5	2.600	28.9	5.500	41.5	8.500	51.3
0.500	19.7	1.600	22.9	3.000	31.0	6.000	43.3	9.000	52.7
0.600	19.4	1.800	24.3	3.500	33.4	6.500	45.0	9.500	54.1

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Offline Controls for Storm

Pipe Manhole: SSW-C-019, DS/PN: S1.004, Loop to PN: S6.000

Diameter (m)	0.100	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.500	Upstream Invert Level (m)	31.400

Pipe Manhole: SSW-C-019, DS/PN: S1.004, Loop to PN: S6.000

Diameter (m)	0.100	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.500	Upstream Invert Level (m)	31.400

Pipe Manhole: SSW-C-020, DS/PN: S1.005, Loop to PN: S6.000

Diameter (m)	0.100	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.500	Upstream Invert Level (m)	31.400

Storage Structures for Storm

Porous Car Park Pipe: S3.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	16.8
Membrane Percolation (mm/hr)	1000	Slope (1:X)	16800.0
Max Percolation (l/s)	50.4	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.360		

Porous Car Park Pipe: S4.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	18000.0
Max Percolation (l/s)	54.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.095		

Cellular Storage Pipe: S6.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	30.398	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	30.0	0.0	0.800	30.0	0.0	0.801	0.0	0.0

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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

Number of Input Hydrographs 0 Number of Offline Controls 3 Number of Time/Area Diagrams 0
 Number of Online Controls 4 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSW-C-001	180 Winter	30	+0%	30/60 Summer			
S2.000	SSW-C-005	180 Winter	30	+0%	30/120 Winter			
S2.001	SSW-C-006	180 Winter	30	+0%	30/60 Summer			
S1.001	SSW-C-007	180 Winter	30	+0%	30/60 Summer	30/1440 Summer		
S3.000	S5	15 Winter	30	+0%				
S3.001	S6	15 Winter	30	+0%				
S1.002	SCP JUNCTION 1	120 Winter	30	+0%				
S4.000	S8	15 Winter	30	+0%				
S4.001	S9	15 Winter	30	+0%				
S1.003	SCP JUNCTION 2	120 Winter	30	+0%				
S5.000	SSW-C-013	15 Winter	30	+0%				
S5.001	SSW-C-014	15 Winter	30	+0%				
S5.002	SSW-C-015	15 Winter	30	+0%				
S5.003	SSW-C-016	15 Winter	30	+0%				
S5.004	SSW-C-017	15 Winter	30	+0%	30/15 Winter			
S5.005	SSW-C-018	15 Winter	30	+0%	30/15 Summer			
S1.004	SSW-C-019	1440 Winter	30	+0%	30/30 Winter		30/1440 Summer	2
S1.005	SSW-C-020	1440 Winter	30	+0%	30/30 Winter		30/1440 Winter	1
S6.000	SSW-C-021	1440 Winter	30	+0%				
S6.001	SSW-C-022	1440 Winter	30	+0%				
S1.006	SSW-C-023	1440 Winter	30	+0%	30/30 Summer			
S7.000	SSWUUC100	180 Winter	30	+0%	30/30 Winter			
S1.007	SSWUUC101	180 Winter	30	+0%	30/30 Summer			
S1.008	SSWUUC102	180 Winter	30	+0%	30/15 Summer			

PN	US/MH Name	Water	Surcharged	Flooded			Pipe	Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.000	SSW-C-001	31.275	0.319	0.000	0.05		2.9	SURCHARGED	
S2.000	SSW-C-005	31.282	0.074	0.000	0.10		1.7	SURCHARGED	

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

PN	US/MH Name	Water	Surcharged	Flooded			Pipe		
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Level Exceeded
S2.001	SSW-C-006	31.277	0.324	0.000	0.09		3.1	SURCHARGED	
S1.001	SSW-C-007	31.273	0.429	0.000	0.14		8.7	SURCHARGED	
S3.000	S5	32.406	-0.304	0.000	0.04		3.9	OK	
S3.001	S6	32.380	-0.129	0.000	0.05		3.9	OK	
S1.002	SCP JUNCTION 1	30.773	0.000	0.000	0.21		12.6	SURCHARGED*	
S4.000	S8	32.141	-0.304	0.000	0.03		3.7	OK	
S4.001	S9	32.115	-0.129	0.000	0.05		3.6	OK	
S1.003	SCP JUNCTION 2	30.759	0.000	0.000	0.23		14.0	SURCHARGED*	
S5.000	SSW-C-013	32.315	-0.131	0.000	0.04		0.6	OK	
S5.001	SSW-C-014	32.277	-0.094	0.000	0.30		5.0	OK	
S5.002	SSW-C-015	32.109	-0.066	0.000	0.59		9.9	OK	
S5.003	SSW-C-016	31.891	-0.070	0.000	0.28		9.9	OK	
S5.004	SSW-C-017	31.873	0.004	0.000	0.34		9.7	SURCHARGED	
S5.005	SSW-C-018	31.866	0.025	0.000	0.11		12.8	SURCHARGED	
S1.004	SSW-C-019	31.271	0.536	0.000	0.14	0.5	6.0	SURCHARGED	
S1.005	SSW-C-020	31.305	0.603	0.000	0.12	0.0	7.2	SURCHARGED	
S6.000	SSW-C-021	30.427	-0.772	0.000	0.00		0.5	OK	
S6.001	SSW-C-022	30.427	-0.270	0.000	0.01		0.4	OK	
S1.006	SSW-C-023	31.259	0.590	0.000	0.15		8.3	SURCHARGED	
S7.000	SSWUUC100	31.250	0.574	0.000	0.00		0.3	SURCHARGED	
S1.007	SSWUUC101	31.250	0.617	0.000	0.02		14.1	SURCHARGED	
S1.008	SSWUUC102	31.249	1.126	0.000	0.46		12.7	FLOOD RISK	



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APPENDIX D1



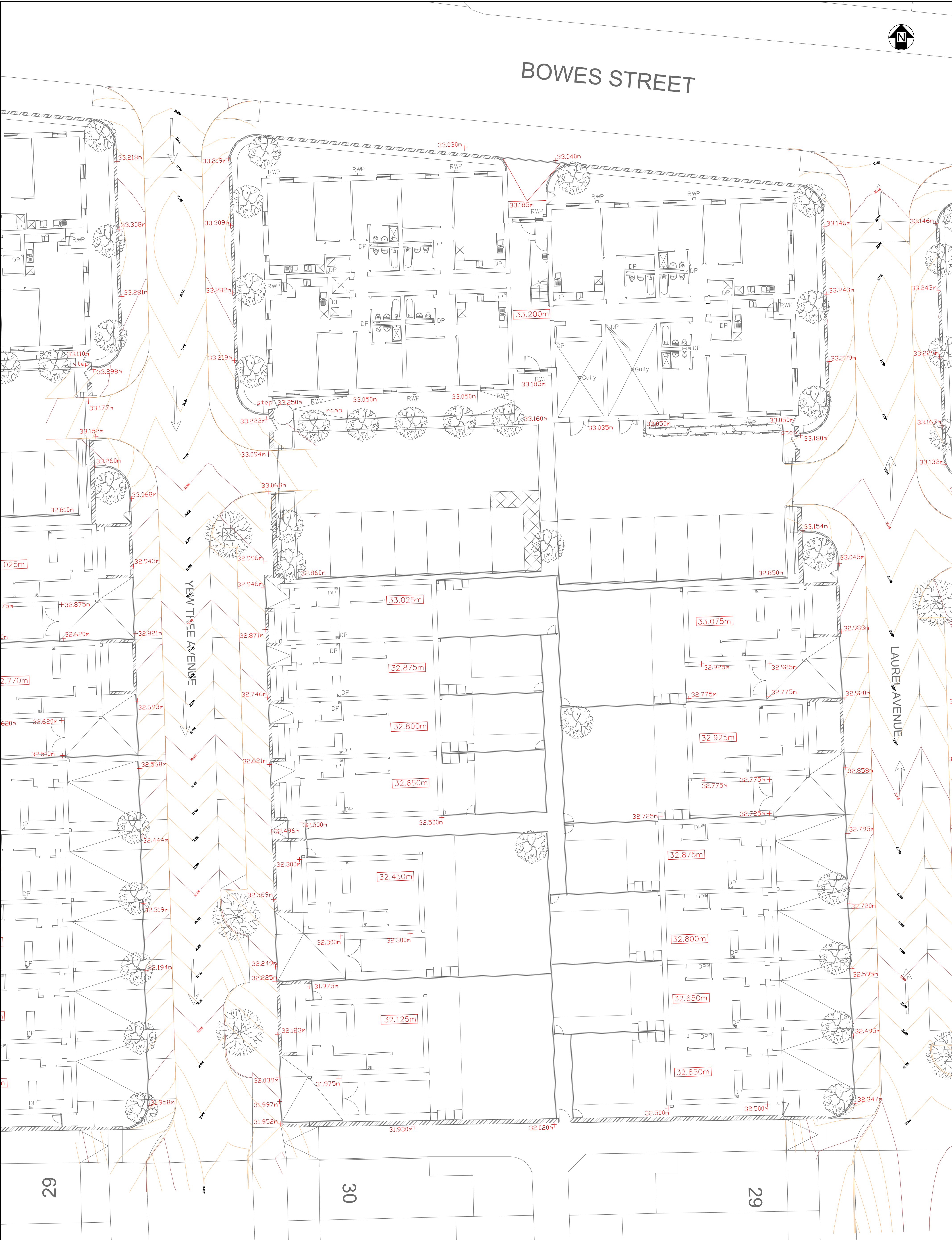
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APPENDIX D2



	Project	Bowes Street, Moss Side			Shepherd Gilmour Consulting Engineers Colchester House, 40 Peter Street, Manchester M2 5GP. Phone: 0161 837 1500. E-mail: sgi@sgiconsulting.co.uk Web: www.sgiconsulting.co.uk	
	Client	Rowlinson Constructions Ltd				
	Scale	A(1)	Date	Drawn by:		
	1:125	15.02.2019	NCM			
	Drawing	Yew Tree Avenue and Zone B Proposed Levels				
This drawing is copyright of Shepherd Gilmour Infrastructure Ltd. No liability will be accepted for amendments by others to either printed or digital versions.						
Drawing No				C1262-004	Rev	P1
Status				Information		



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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	21.677	0.090	240.9	0.028	5.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	20.386	0.204	99.9	0.019	5.00	0.0	0.600		o	150	Pipe/Conduit	
S2.001	18.292	0.108	169.4	0.007	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.001	11.496	0.048	239.5	0.020	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.002	5.088	0.021	242.3	0.011	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	16.801	0.001	16801.0	0.019	5.00	0.0		0.030 → ↓ →			Porous Car Park	
S3.001	1.698	1.397	1.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.003	1.281	0.005	256.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	18.000	0.001	18000.0	0.020	5.00	0.0		0.030 → ↓ →			Porous Car Park	
S4.001	0.804	1.413	0.6	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.004	8.425	0.035	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	7.487	0.075	99.8	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
S5.001	19.577	0.196	99.9	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.002	21.483	0.215	99.9	0.015	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.003	15.649	0.092	170.1	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.004	3.881	0.023	168.7	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.005	19.350	0.114	169.7	0.014	0.00	0.0	0.600		o	225	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)
S1.000	45.45	5.36	31.011	0.028	0.0	0.0	0.0	1.01	71.3	3.4
S2.000	45.52	5.34	31.383	0.019	0.0	0.0	0.0	1.01	17.8	2.3
S2.001	44.43	5.64	31.104	0.026	0.0	0.0	0.0	1.00	39.8	3.1
S1.001	43.78	5.83	30.921	0.074	0.0	0.0	0.0	1.01	71.5	8.8
S1.002	43.50	5.92	30.873	0.085	0.0	0.0	0.0	1.01	71.1	10.0
S3.000	29.13	12.93	32.400	0.019	0.0	0.0	0.0	0.04	40.0	1.5
S3.001	29.12	12.94	32.399	0.019	0.0	0.0	0.0	9.22	162.9	1.5
S1.003	29.09	12.96	30.852	0.104	0.0	0.0	0.0	0.98	69.1	10.0
S4.000	28.11	13.80	32.410	0.020	0.0	0.0	0.0	0.03	38.7	1.5
S4.001	28.11	13.80	32.409	0.020	0.0	0.0	0.0	13.48	238.2	1.5
S1.004	27.95	13.94	30.846	0.124	0.0	0.0	0.0	1.01	71.4	10.0
S5.000	46.32	5.12	31.676	0.002	0.0	0.0	0.0	1.01	17.8	0.3
S5.001	45.12	5.45	31.601	0.016	0.0	0.0	0.0	1.01	17.8	2.0
S5.002	43.87	5.80	31.405	0.031	0.0	0.0	0.0	1.01	17.8	3.7
S5.003	43.01	6.07	31.115	0.033	0.0	0.0	0.0	1.00	39.7	3.8
S5.004	42.81	6.13	31.023	0.033	0.0	0.0	0.0	1.00	39.9	3.8
S5.005	41.81	6.45	31.000	0.047	0.0	0.0	0.0	1.00	39.8	5.3

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	13.705	0.058	236.3	0.011	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	10.872	0.001	10872.0	0.000	5.00	0.0	0.600		o	300	Pipe/Conduit	
S6.001	6.085	0.025	243.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.006	4.534	0.019	238.6	0.005	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.007	7.234	0.029	249.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S7.000	15.687	0.040	392.2	0.004	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.008	51.301	0.127	403.9	0.068	0.00	0.0	0.600		oo	45	Pipe/Conduit	
S1.009	5.553	0.028	198.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S1.005	27.71	14.16	30.811	0.182	0.0	0.0	0.0	1.02	72.0	13.7
S6.000	42.34	6.28	30.781	0.000	0.0	0.0	0.0	0.14	10.0	0.0
S6.001	42.03	6.38	30.780	0.000	0.0	0.0	0.0	1.00	70.9	0.0
S1.006	27.62	14.24	30.753	0.187	0.0	0.0	0.0	1.01	71.6	14.0
S1.007	27.49	14.36	30.734	0.187	0.0	0.0	0.0	0.99	70.0	14.0
S7.000	45.98	5.21	30.445	0.004	0.0	0.0	0.0	1.22	345.9	0.5
S1.008	26.76	15.07	30.405	0.259	0.0	0.0	0.0	1.20	680.7	18.8
S1.009	26.66	15.17	30.278	0.259	0.0	0.0	0.0	0.92	36.8	18.8

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)
S1.009	S	31.850	30.250	0.000	0	0

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Online Controls for Storm

Non Return Valve Manhole: S20, DS/PN: S6.001, Volume (m³): 4.5

Hydro-Brake® Optimum Manhole: S10, DS/PN: S1.009, Volume (m³): 38.5

Unit Reference	MD-SHE-0195-2000-1300-2000
Design Head (m)	1.300
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	195
Invert Level (m)	30.278
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	20.0	Kick-Flo®	0.878	16.6
Flush-Flo™	0.398	20.0	Mean Flow over Head Range	-	17.1

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	6.7	0.800	18.0	2.000	24.6	4.000	34.3	7.000	44.9
0.200	18.1	1.000	17.7	2.200	25.7	4.500	36.3	7.500	46.4
0.300	19.7	1.200	19.3	2.400	26.8	5.000	38.2	8.000	47.9
0.400	20.0	1.400	20.7	2.600	27.9	5.500	40.0	8.500	49.3
0.500	19.8	1.600	22.1	3.000	29.8	6.000	41.7	9.000	50.7
0.600	19.5	1.800	23.4	3.500	32.1	6.500	43.3	9.500	52.1

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Offline Controls for Storm

Pipe Manhole: S6, DS/PN: S1.005, Loop to PN: S6.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.670

Storage Structures for Storm

Porous Car Park Pipe: S3.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	16.8
Membrane Percolation (mm/hr)	1000	Slope (1:X)	16801.0
Max Percolation (l/s)	50.4	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.400		

Porous Car Park Pipe: S4.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	18000.0
Max Percolation (l/s)	54.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.410		

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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 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	15 Winter	1	+0%	100/15 Summer				31.057	-0.254
S2.000	S2	15 Winter	1	+0%	100/15 Summer				31.420	-0.113
S2.001	S3	15 Winter	1	+0%	100/15 Summer				31.148	-0.181
S1.001	S2	15 Winter	1	+0%	100/15 Summer				30.999	-0.222
S1.002	S3	15 Winter	1	+0%	100/15 Summer				30.964	-0.209
S3.000	S6	15 Winter	1	+0%					32.428	-0.322
S3.001	S7	30 Winter	1	+0%					32.410	-0.139
S1.003	S4	15 Winter	1	+0%					30.939	-0.213
S4.000	S9	15 Winter	1	+0%					32.438	-0.322
S4.001	S10	30 Winter	1	+0%					32.420	-0.139
S1.004	S5	15 Winter	1	+0%	100/15 Summer				30.935	-0.211
S5.000	S12	15 Winter	1	+0%					31.687	-0.139
S5.001	S13	15 Winter	1	+0%	1000/60 Winter				31.633	-0.118
S5.002	S14	15 Winter	1	+0%	100/15 Winter				31.449	-0.106
S5.003	S15	15 Winter	1	+0%	1000/15 Summer				31.162	-0.178
S5.004	S16	15 Winter	1	+0%	100/15 Winter				31.075	-0.173
S5.005	S17	15 Winter	1	+0%	100/15 Summer				31.054	-0.171
S1.005	S6	15 Winter	1	+0%	100/15 Summer	1000/30 Winter	2		30.916	-0.195
S6.000	S19	120 Winter	1	+0%	1000/60 Winter				30.781	-0.300
S6.001	S20	120 Winter	1	+0%	1000/60 Winter				30.780	-0.300
S1.006	S7	15 Winter	1	+0%	100/15 Summer				30.873	-0.180
S1.007	S8	15 Winter	1	+0%	100/15 Summer				30.849	-0.185
S7.000	S21	15 Winter	1	+0%	100/30 Winter				30.486	-0.559
S1.008	S9	15 Winter	1	+0%	100/30 Winter				30.486	-0.519
S1.009	S10	30 Winter	1	+0%	5/15 Summer				30.446	-0.057

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Flow Status	
S1.000	S1	0.000	0.05	3.3	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.14		2.3	OK	
S2.001	S3	0.000	0.08		3.0	OK	
S1.001	S2	0.000	0.15		8.4	OK	
S1.002	S3	0.000	0.20		9.5	OK	
S3.000	S6	0.000	0.01		1.2	OK	
S3.001	S7	0.000	0.02		1.1	OK	
S1.003	S4	0.000	0.16		9.6	OK*	
S4.000	S9	0.000	0.01		1.1	OK	
S4.001	S10	0.000	0.02		1.1	OK	
S1.004	S5	0.000	0.16		10.0	OK*	
S5.000	S12	0.000	0.02		0.2	OK	
S5.001	S13	0.000	0.10		1.7	OK	
S5.002	S14	0.000	0.19		3.2	OK	
S5.003	S15	0.000	0.10		3.4	OK	
S5.004	S16	0.000	0.12		3.4	OK	
S5.005	S17	0.000	0.13		4.7	OK	
S1.005	S6	0.000	0.26	0.0	15.6	OK	
S6.000	S19	0.000	0.00		0.0	OK	
S6.001	S20	0.000	0.00		0.0	OK	
S1.006	S7	0.000	0.34		16.0	OK	
S1.007	S8	0.000	0.31		16.0	OK	
S7.000	S21	0.000	0.00		0.3	OK	
S1.008	S9	0.000	0.04		21.2	OK	
S1.009	S10	0.000	0.54		14.9	OK	

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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 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

										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)
S1.000	S1	15 Winter	2	+0%	100/15 Summer				31.065	-0.246
S2.000	S2	15 Winter	2	+0%	100/15 Summer				31.426	-0.107
S2.001	S3	15 Winter	2	+0%	100/15 Summer				31.153	-0.176
S1.001	S2	15 Winter	2	+0%	100/15 Summer				31.011	-0.210
S1.002	S3	15 Winter	2	+0%	100/15 Summer				30.976	-0.197
S3.000	S6	15 Winter	2	+0%					32.432	-0.318
S3.001	S7	30 Winter	2	+0%					32.413	-0.136
S1.003	S4	15 Winter	2	+0%					30.954	-0.198
S4.000	S9	15 Winter	2	+0%					32.443	-0.317
S4.001	S10	30 Winter	2	+0%					32.424	-0.135
S1.004	S5	15 Winter	2	+0%	100/15 Summer				30.952	-0.194
S5.000	S12	15 Winter	2	+0%					31.691	-0.135
S5.001	S13	15 Winter	2	+0%	1000/60 Winter				31.637	-0.114
S5.002	S14	15 Winter	2	+0%	100/15 Winter				31.456	-0.099
S5.003	S15	15 Winter	2	+0%	1000/15 Summer				31.168	-0.172
S5.004	S16	15 Winter	2	+0%	100/15 Winter				31.083	-0.165
S5.005	S17	15 Winter	2	+0%	100/15 Summer				31.063	-0.162
S1.005	S6	15 Winter	2	+0%	100/15 Summer	1000/30 Winter		2	30.934	-0.177
S6.000	S19	120 Winter	2	+0%	1000/60 Winter				30.781	-0.300
S6.001	S20	120 Winter	2	+0%	1000/60 Winter				30.780	-0.300
S1.006	S7	15 Winter	2	+0%	100/15 Summer				30.892	-0.161
S1.007	S8	15 Winter	2	+0%	100/15 Summer				30.867	-0.167
S7.000	S21	30 Winter	2	+0%	100/30 Winter				30.505	-0.540
S1.008	S9	30 Winter	2	+0%	100/30 Winter				30.505	-0.500
S1.009	S10	30 Winter	2	+0%	5/15 Summer				30.483	-0.020

		Flooded		Pipe		Level	
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded
S1.000	S1	0.000	0.07		4.3	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.17		2.9	OK	
S2.001	S3	0.000	0.11		3.9	OK	
S1.001	S2	0.000	0.19		10.8	OK	
S1.002	S3	0.000	0.26		12.2	OK	
S3.000	S6	0.000	0.01		1.7	OK	
S3.001	S7	0.000	0.02		1.5	OK	
S1.003	S4	0.000	0.20		12.6	OK*	
S4.000	S9	0.000	0.02		1.7	OK	
S4.001	S10	0.000	0.02		1.5	OK	
S1.004	S5	0.000	0.21		13.1	OK*	
S5.000	S12	0.000	0.02		0.3	OK	
S5.001	S13	0.000	0.13		2.1	OK	
S5.002	S14	0.000	0.25		4.1	OK	
S5.003	S15	0.000	0.13		4.4	OK	
S5.004	S16	0.000	0.16		4.4	OK	
S5.005	S17	0.000	0.17		6.1	OK	
S1.005	S6	0.000	0.34	0.0	20.2	OK	
S6.000	S19	0.000	0.00		0.0	OK	
S6.001	S20	0.000	0.00		0.0	OK	
S1.006	S7	0.000	0.44		20.8	OK	
S1.007	S8	0.000	0.41		20.8	OK	
S7.000	S21	0.000	0.00		0.4	OK	
S1.008	S9	0.000	0.04		24.8	OK	
S1.009	S10	0.000	0.66		18.1	OK	

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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 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 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

									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)
S1.000	S1	15 Winter	5	+0%	100/15 Summer				31.075	-0.236
S2.000	S2	15 Winter	5	+0%	100/15 Summer				31.432	-0.101
S2.001	S3	15 Winter	5	+0%	100/15 Summer				31.160	-0.169
S1.001	S2	15 Winter	5	+0%	100/15 Summer				31.025	-0.196
S1.002	S3	15 Winter	5	+0%	100/15 Summer				30.992	-0.181
S3.000	S6	15 Winter	5	+0%					32.437	-0.313
S3.001	S7	15 Winter	5	+0%					32.416	-0.133
S1.003	S4	15 Winter	5	+0%					30.974	-0.178
S4.000	S9	15 Winter	5	+0%					32.448	-0.312
S4.001	S10	15 Winter	5	+0%					32.426	-0.133
S1.004	S5	15 Winter	5	+0%	100/15 Summer				30.972	-0.174
S5.000	S12	15 Winter	5	+0%					31.692	-0.134
S5.001	S13	15 Winter	5	+0%	1000/60 Winter				31.642	-0.109
S5.002	S14	15 Winter	5	+0%	100/15 Winter				31.463	-0.092
S5.003	S15	15 Winter	5	+0%	1000/15 Summer				31.175	-0.165
S5.004	S16	15 Winter	5	+0%	100/15 Winter				31.092	-0.156
S5.005	S17	15 Winter	5	+0%	100/15 Summer				31.072	-0.153
S1.005	S6	15 Winter	5	+0%	100/15 Summer	1000/30 Winter	2	30.956	-0.155	
S6.000	S19	120 Winter	5	+0%	1000/60 Winter				30.781	-0.300
S6.001	S20	120 Winter	5	+0%	1000/60 Winter				30.780	-0.300
S1.006	S7	15 Winter	5	+0%	100/15 Summer				30.916	-0.137
S1.007	S8	15 Winter	5	+0%	100/15 Summer				30.889	-0.145
S7.000	S21	30 Winter	5	+0%	100/30 Winter				30.542	-0.503
S1.008	S9	30 Winter	5	+0%	100/30 Winter				30.542	-0.462
S1.009	S10	30 Winter	5	+0%	5/15 Summer				30.536	0.033

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.09	5.5		OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.23		3.8	OK	
S2.001	S3	0.000	0.14		5.0	OK	
S1.001	S2	0.000	0.24		13.9	OK	
S1.002	S3	0.000	0.33		15.7	OK	
S3.000	S6	0.000	0.02		2.3	OK	
S3.001	S7	0.000	0.03		2.2	OK	
S1.003	S4	0.000	0.27		16.3	OK*	
S4.000	S9	0.000	0.02		2.3	OK	
S4.001	S10	0.000	0.03		2.2	OK	
S1.004	S5	0.000	0.28		17.2	OK*	
S5.000	S12	0.000	0.03		0.4	OK	
S5.001	S13	0.000	0.17		2.8	OK	
S5.002	S14	0.000	0.32		5.4	OK	
S5.003	S15	0.000	0.16		5.7	OK	
S5.004	S16	0.000	0.21		5.7	OK	
S5.005	S17	0.000	0.22		7.9	OK	
S1.005	S6	0.000	0.44	0.0	26.3	OK	
S6.000	S19	0.000	0.00		0.0	OK	
S6.001	S20	0.000	0.00		0.0	OK	
S1.006	S7	0.000	0.57		27.1	OK	
S1.007	S8	0.000	0.53		27.0	OK	
S7.000	S21	0.000	0.00		0.6	OK	
S1.008	S9	0.000	0.05		31.2	OK	
S1.009	S10	0.000	0.69		19.0	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 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 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
S1.000	S1	15 Winter	30	+0%	100/15 Summer				31.095	-0.216
S2.000	S2	15 Winter	30	+0%	100/15 Summer				31.443	-0.090
S2.001	S3	15 Winter	30	+0%	100/15 Summer				31.175	-0.154
S1.001	S2	15 Winter	30	+0%	100/15 Summer				31.062	-0.159
S1.002	S3	15 Winter	30	+0%	100/15 Summer				31.040	-0.133
S3.000	S6	15 Winter	30	+0%					32.446	-0.304
S3.001	S7	15 Winter	30	+0%					32.421	-0.128
S1.003	S4	15 Winter	30	+0%					31.029	-0.123
S4.000	S9	15 Winter	30	+0%					32.457	-0.303
S4.001	S10	15 Winter	30	+0%					32.431	-0.128
S1.004	S5	15 Winter	30	+0%	100/15 Summer				31.026	-0.120
S5.000	S12	15 Winter	30	+0%					31.695	-0.131
S5.001	S13	15 Winter	30	+0%	1000/60 Winter				31.657	-0.094
S5.002	S14	15 Winter	30	+0%	100/15 Winter				31.487	-0.068
S5.003	S15	15 Winter	30	+0%	1000/15 Summer				31.198	-0.142
S5.004	S16	15 Winter	30	+0%	100/15 Winter				31.119	-0.129
S5.005	S17	15 Winter	30	+0%	100/15 Summer				31.100	-0.125
S1.005	S6	15 Winter	30	+0%	100/15 Summer	1000/30 Winter	2		31.011	-0.100
S6.000	S19	120 Winter	30	+0%	1000/60 Winter				30.781	-0.300
S6.001	S20	120 Winter	30	+0%	1000/60 Winter				30.780	-0.300
S1.006	S7	15 Winter	30	+0%	100/15 Summer				30.974	-0.079
S1.007	S8	15 Winter	30	+0%	100/15 Summer				30.943	-0.091
S7.000	S21	30 Winter	30	+0%	100/30 Winter				30.691	-0.354
S1.008	S9	30 Winter	30	+0%	100/30 Winter				30.691	-0.314
S1.009	S10	30 Winter	30	+0%	5/15 Summer				30.669	0.166

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.13	8.1		OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.33		5.5	OK	
S2.001	S3	0.000	0.21		7.6	OK	
S1.001	S2	0.000	0.36		20.6	OK	
S1.002	S3	0.000	0.49		23.2	OK	
S3.000	S6	0.000	0.03		3.9	OK	
S3.001	S7	0.000	0.05		3.8	OK	
S1.003	S4	0.000	0.39		24.2	OK*	
S4.000	S9	0.000	0.04		3.9	OK	
S4.001	S10	0.000	0.05		3.8	OK	
S1.004	S5	0.000	0.44		26.7	OK*	
S5.000	S12	0.000	0.04		0.6	OK	
S5.001	S13	0.000	0.30		5.0	OK	
S5.002	S14	0.000	0.58		9.7	OK	
S5.003	S15	0.000	0.29		10.2	OK	
S5.004	S16	0.000	0.38		10.2	OK	
S5.005	S17	0.000	0.40		14.2	OK	
S1.005	S6	0.000	0.69	0.0	41.3	OK	
S6.000	S19	0.000	0.00		0.0	OK	
S6.001	S20	0.000	0.00		0.0	OK	
S1.006	S7	0.000	0.89		42.2	OK	
S1.007	S8	0.000	0.82		42.0	OK	
S7.000	S21	0.000	0.00		0.8	OK	
S1.008	S9	0.000	0.08		45.9	OK	
S1.009	S10	0.000	0.73		19.9	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 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	15 Winter	100	+40%	100/15 Summer				31.565	0.254
S2.000	S2	15 Winter	100	+40%	100/15 Summer				31.624	0.091
S2.001	S3	15 Winter	100	+40%	100/15 Summer				31.570	0.241
S1.001	S2	15 Winter	100	+40%	100/15 Summer				31.549	0.328
S1.002	S3	15 Winter	100	+40%	100/15 Summer				31.467	0.294
S3.000	S6	15 Winter	100	+40%					32.463	-0.287
S3.001	S7	15 Winter	100	+40%					32.432	-0.117
S1.003	S4	30 Winter	100	+40%					31.152	0.000
S4.000	S9	15 Winter	100	+40%					32.475	-0.285
S4.001	S10	15 Winter	100	+40%					32.442	-0.117
S1.004	S5	30 Winter	100	+40%	100/15 Summer				31.147	0.001
S5.000	S12	15 Winter	100	+40%					31.703	-0.123
S5.001	S13	15 Winter	100	+40%	1000/60 Winter				31.680	-0.071
S5.002	S14	15 Winter	100	+40%	100/15 Winter				31.557	0.002
S5.003	S15	60 Winter	100	+40%	1000/15 Summer				31.340	0.000
S5.004	S16	60 Winter	100	+40%	100/15 Winter				31.336	0.088
S5.005	S17	60 Winter	100	+40%	100/15 Summer				31.334	0.109
S1.005	S6	60 Winter	100	+40%	100/15 Summer	1000/30 Winter	2		31.329	0.218
S6.000	S19	120 Winter	100	+40%	1000/60 Winter				30.781	-0.300
S6.001	S20	120 Winter	100	+40%	1000/60 Winter				30.780	-0.300
S1.006	S7	60 Winter	100	+40%	100/15 Summer				31.318	0.265
S1.007	S8	60 Winter	100	+40%	100/15 Summer				31.313	0.279
S7.000	S21	60 Winter	100	+40%	100/30 Winter				31.306	0.261
S1.008	S9	60 Winter	100	+40%	100/30 Winter				31.306	0.301
S1.009	S10	60 Winter	100	+40%	5/15 Summer				31.304	0.801

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.21	13.1		SURCHARGED	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.60		10.0	SURCHARGED	
S2.001	S3	0.000	0.36		12.8	SURCHARGED	
S1.001	S2	0.000	0.51		29.5	SURCHARGED	
S1.002	S3	0.000	0.68		32.3	SURCHARGED	
S3.000	S6	0.000	0.07		8.1	OK	
S3.001	S7	0.000	0.11		8.0	OK	
S1.003	S4	0.000	0.57		34.7	SURCHARGED*	
S4.000	S9	0.000	0.08		8.3	OK	
S4.001	S10	0.000	0.11		8.2	OK	
S1.004	S5	0.000	0.69		42.3	SURCHARGED*	
S5.000	S12	0.000	0.07		1.1	OK	
S5.001	S13	0.000	0.54		9.0	OK	
S5.002	S14	0.000	1.00		16.8	SURCHARGED	
S5.003	S15	0.000	0.27		9.5	OK	
S5.004	S16	0.000	0.35		9.5	SURCHARGED	
S5.005	S17	0.000	0.38		13.6	SURCHARGED	
S1.005	S6	0.000	0.79	0.0	46.9	SURCHARGED	
S6.000	S19	0.000	0.00		0.0	OK	
S6.001	S20	0.000	0.00		0.0	OK	
S1.006	S7	0.000	1.00		47.4	SURCHARGED	
S1.007	S8	0.000	0.93		47.4	SURCHARGED	
S7.000	S21	0.000	0.01		1.3	SURCHARGED	
S1.008	S9	0.000	0.09		55.7	SURCHARGED	
S1.009	S10	0.000	0.73		19.9	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 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 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	60 Winter	1000	+0%	100/15 Summer				31.797	0.486
S2.000	S2	60 Winter	1000	+0%	100/15 Summer				31.818	0.285
S2.001	S3	60 Winter	1000	+0%	100/15 Summer				31.801	0.472
S1.001	S2	60 Winter	1000	+0%	100/15 Summer				31.792	0.571
S1.002	S3	60 Winter	1000	+0%	100/15 Summer				31.783	0.610
S3.000	S6	15 Winter	1000	+0%					32.469	-0.281
S3.001	S7	15 Winter	1000	+0%					32.435	-0.114
S1.003	S4	180 Winter	1000	+0%					31.152	0.000
S4.000	S9	15 Winter	1000	+0%					32.481	-0.279
S4.001	S10	15 Winter	1000	+0%					32.445	-0.114
S1.004	S5	180 Winter	1000	+0%	100/15 Summer				31.147	0.001
S5.000	S12	60 Winter	1000	+0%					31.792	-0.034
S5.001	S13	60 Winter	1000	+0%	1000/60 Winter				31.791	0.040
S5.002	S14	60 Winter	1000	+0%	100/15 Winter				31.782	0.227
S5.003	S15	60 Winter	1000	+0%	1000/15 Summer				31.766	0.426
S5.004	S16	60 Winter	1000	+0%	100/15 Winter				31.761	0.513
S5.005	S17	60 Winter	1000	+0%	100/15 Summer				31.760	0.535
S1.005	S6	60 Winter	1000	+0%	100/15 Summer	1000/30 Winter	2		31.753	0.642
S6.000	S19	60 Winter	1000	+0%	1000/60 Winter				31.746	0.665
S6.001	S20	60 Winter	1000	+0%	1000/60 Winter				31.744	0.664
S1.006	S7	60 Winter	1000	+0%	100/15 Summer				31.743	0.690
S1.007	S8	60 Winter	1000	+0%	100/15 Summer				31.737	0.703
S7.000	S21	60 Winter	1000	+0%	100/30 Winter				31.729	0.684
S1.008	S9	60 Winter	1000	+0%	100/30 Winter				31.729	0.725
S1.009	S10	60 Winter	1000	+0%	5/15 Summer				31.727	1.224

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.14	8.8		FLOOD RISK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.39		6.5	SURCHARGED	
S2.001	S3	0.000	0.24		8.6	SURCHARGED	
S1.001	S2	0.000	0.39		22.1	SURCHARGED	
S1.002	S3	0.000	0.53		25.3	SURCHARGED	
S3.000	S6	0.000	0.09		9.6	OK	
S3.001	S7	0.000	0.13		9.7	OK	
S1.003	S4	0.000	0.28		17.0	SURCHARGED*	
S4.000	S9	0.000	0.09		10.0	OK	
S4.001	S10	0.000	0.13		10.0	OK	
S1.004	S5	0.000	0.33		20.2	SURCHARGED*	
S5.000	S12	0.000	0.05		0.7	OK	
S5.001	S13	0.000	0.33		5.6	SURCHARGED	
S5.002	S14	0.000	0.64		10.8	SURCHARGED	
S5.003	S15	0.000	0.33		11.4	SURCHARGED	
S5.004	S16	0.000	0.42		11.3	SURCHARGED	
S5.005	S17	0.000	0.45		16.1	SURCHARGED	
S1.005	S6	0.000	0.82	16.5	49.1	SURCHARGED	
S6.000	S19	0.000	0.33		9.3	SURCHARGED	
S6.001	S20	0.000	0.07		3.7	SURCHARGED	
S1.006	S7	0.000	1.02		48.4	SURCHARGED	
S1.007	S8	0.000	0.93		47.4	SURCHARGED	
S7.000	S21	0.000	0.01		1.8	SURCHARGED	
S1.008	S9	0.000	0.10		59.4	SURCHARGED	
S1.009	S10	0.000	0.76		21.0	FLOOD RISK	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	21.677	0.090	240.9	0.028	5.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	20.386	0.204	99.9	0.019	5.00	0.0	0.600		o	150	Pipe/Conduit	
S2.001	18.292	0.108	169.4	0.007	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.001	11.496	0.048	239.5	0.020	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.002	5.088	0.021	242.3	0.011	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	16.801	0.001	16801.0	0.019	5.00	0.0		0.030 → ↓ →			Porous Car Park	
S3.001	1.698	1.397	1.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.003	1.281	0.005	256.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	18.000	0.001	18000.0	0.020	5.00	0.0		0.030 → ↓ →			Porous Car Park	
S4.001	0.804	1.413	0.6	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.004	8.425	0.035	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	7.487	0.075	99.8	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
S5.001	19.577	0.196	99.9	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.002	21.483	0.215	99.9	0.015	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.003	15.649	0.092	170.1	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.004	3.881	0.023	168.7	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S5.005	19.350	0.114	169.7	0.014	0.00	0.0	0.600		o	225	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)
S1.000	45.45	5.36	31.011	0.028	0.0	0.0	0.0	1.01	71.3	3.4
S2.000	45.52	5.34	31.383	0.019	0.0	0.0	0.0	1.01	17.8	2.3
S2.001	44.43	5.64	31.104	0.026	0.0	0.0	0.0	1.00	39.8	3.1
S1.001	43.78	5.83	30.921	0.074	0.0	0.0	0.0	1.01	71.5	8.8
S1.002	43.50	5.92	30.873	0.085	0.0	0.0	0.0	1.01	71.1	10.0
S3.000	29.13	12.93	32.400	0.019	0.0	0.0	0.0	0.04	40.0	1.5
S3.001	29.12	12.94	32.399	0.019	0.0	0.0	0.0	9.22	162.9	1.5
S1.003	29.09	12.96	30.852	0.104	0.0	0.0	0.0	0.98	69.1	10.0
S4.000	28.11	13.80	32.410	0.020	0.0	0.0	0.0	0.03	38.7	1.5
S4.001	28.11	13.80	32.409	0.020	0.0	0.0	0.0	13.48	238.2	1.5
S1.004	27.95	13.94	30.846	0.124	0.0	0.0	0.0	1.01	71.4	10.0
S5.000	46.32	5.12	31.676	0.002	0.0	0.0	0.0	1.01	17.8	0.3
S5.001	45.12	5.45	31.601	0.016	0.0	0.0	0.0	1.01	17.8	2.0
S5.002	43.87	5.80	31.405	0.031	0.0	0.0	0.0	1.01	17.8	3.7
S5.003	43.01	6.07	31.115	0.033	0.0	0.0	0.0	1.00	39.7	3.8
S5.004	42.81	6.13	31.023	0.033	0.0	0.0	0.0	1.00	39.9	3.8
S5.005	41.81	6.45	31.000	0.047	0.0	0.0	0.0	1.00	39.8	5.3

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	13.705	0.058	236.3	0.011	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	10.872	0.001	10872.0	0.000	5.00	0.0	0.600		o	300	Pipe/Conduit	
S6.001	6.085	0.025	243.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.006	4.534	0.019	238.6	0.005	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.007	7.234	0.029	249.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S7.000	15.687	0.040	392.2	0.004	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.008	51.301	0.127	403.9	0.068	0.00	0.0	0.600		oo	45	Pipe/Conduit	
S1.009	5.553	0.028	198.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S1.005	27.71	14.16	30.811	0.182	0.0	0.0	0.0	1.02	72.0	13.7
S6.000	42.34	6.28	30.781	0.000	0.0	0.0	0.0	0.14	10.0	0.0
S6.001	42.03	6.38	30.780	0.000	0.0	0.0	0.0	1.00	70.9	0.0
S1.006	27.62	14.24	30.753	0.187	0.0	0.0	0.0	1.01	71.6	14.0
S1.007	27.49	14.36	30.734	0.187	0.0	0.0	0.0	0.99	70.0	14.0
S7.000	45.98	5.21	30.445	0.004	0.0	0.0	0.0	1.22	345.9	0.5
S1.008	26.76	15.07	30.405	0.259	0.0	0.0	0.0	1.20	680.7	18.8
S1.009	26.66	15.17	30.278	0.259	0.0	0.0	0.0	0.92	36.8	18.8

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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S1.009 S 31.850 30.250 0.000 0 0

Datum (m) 30.475 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	1.000	11	1.000	21	1.000	31	1.000	41	1.000	51	1.000	61	1.000
2	1.000	12	1.000	22	1.000	32	1.000	42	1.000	52	1.000	62	1.000
3	1.000	13	1.000	23	1.000	33	1.000	43	1.000	53	1.000	63	1.000
4	1.000	14	1.000	24	1.000	34	1.000	44	1.000	54	1.000	64	1.000
5	1.000	15	1.000	25	1.000	35	1.000	45	1.000	55	1.000	65	1.000
6	1.000	16	1.000	26	1.000	36	1.000	46	1.000	56	1.000	66	1.000
7	1.000	17	1.000	27	1.000	37	1.000	47	1.000	57	1.000	67	1.000
8	1.000	18	1.000	28	1.000	38	1.000	48	1.000	58	1.000	68	1.000
9	1.000	19	1.000	29	1.000	39	1.000	49	1.000	59	1.000	69	1.000
10	1.000	20	1.000	30	1.000	40	1.000	50	1.000	60	1.000	70	1.000

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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)
81	1.000	140	1.000	199	1.000	258	1.000	317	1.000	376	1.000	435	1.000	494	1.000
82	1.000	141	1.000	200	1.000	259	1.000	318	1.000	377	1.000	436	1.000	495	1.000
83	1.000	142	1.000	201	1.000	260	1.000	319	1.000	378	1.000	437	1.000	496	1.000
84	1.000	143	1.000	202	1.000	261	1.000	320	1.000	379	1.000	438	1.000	497	1.000
85	1.000	144	1.000	203	1.000	262	1.000	321	1.000	380	1.000	439	1.000	498	1.000
86	1.000	145	1.000	204	1.000	263	1.000	322	1.000	381	1.000	440	1.000	499	1.000
87	1.000	146	1.000	205	1.000	264	1.000	323	1.000	382	1.000	441	1.000	500	1.000
88	1.000	147	1.000	206	1.000	265	1.000	324	1.000	383	1.000	442	1.000	501	1.000
89	1.000	148	1.000	207	1.000	266	1.000	325	1.000	384	1.000	443	1.000	502	1.000
90	1.000	149	1.000	208	1.000	267	1.000	326	1.000	385	1.000	444	1.000	503	1.000
91	1.000	150	1.000	209	1.000	268	1.000	327	1.000	386	1.000	445	1.000	504	1.000
92	1.000	151	1.000	210	1.000	269	1.000	328	1.000	387	1.000	446	1.000	505	1.000
93	1.000	152	1.000	211	1.000	270	1.000	329	1.000	388	1.000	447	1.000	506	1.000
94	1.000	153	1.000	212	1.000	271	1.000	330	1.000	389	1.000	448	1.000	507	1.000
95	1.000	154	1.000	213	1.000	272	1.000	331	1.000	390	1.000	449	1.000	508	1.000
96	1.000	155	1.000	214	1.000	273	1.000	332	1.000	391	1.000	450	1.000	509	1.000
97	1.000	156	1.000	215	1.000	274	1.000	333	1.000	392	1.000	451	1.000	510	1.000
98	1.000	157	1.000	216	1.000	275	1.000	334	1.000	393	1.000	452	1.000	511	1.000
99	1.000	158	1.000	217	1.000	276	1.000	335	1.000	394	1.000	453	1.000	512	1.000
100	1.000	159	1.000	218	1.000	277	1.000	336	1.000	395	1.000	454	1.000	513	1.000
101	1.000	160	1.000	219	1.000	278	1.000	337	1.000	396	1.000	455	1.000	514	1.000
102	1.000	161	1.000	220	1.000	279	1.000	338	1.000	397	1.000	456	1.000	515	1.000
103	1.000	162	1.000	221	1.000	280	1.000	339	1.000	398	1.000	457	1.000	516	1.000
104	1.000	163	1.000	222	1.000	281	1.000	340	1.000	399	1.000	458	1.000	517	1.000
105	1.000	164	1.000	223	1.000	282	1.000	341	1.000	400	1.000	459	1.000	518	1.000
106	1.000	165	1.000	224	1.000	283	1.000	342	1.000	401	1.000	460	1.000	519	1.000
107	1.000	166	1.000	225	1.000	284	1.000	343	1.000	402	1.000	461	1.000	520	1.000
108	1.000	167	1.000	226	1.000	285	1.000	344	1.000	403	1.000	462	1.000	521	1.000
109	1.000	168	1.000	227	1.000	286	1.000	345	1.000	404	1.000	463	1.000	522	1.000
110	1.000	169	1.000	228	1.000	287	1.000	346	1.000	405	1.000	464	1.000	523	1.000
111	1.000	170	1.000	229	1.000	288	1.000	347	1.000	406	1.000	465	1.000	524	1.000
112	1.000	171	1.000	230	1.000	289	1.000	348	1.000	407	1.000	466	1.000	525	1.000
113	1.000	172	1.000	231	1.000	290	1.000	349	1.000	408	1.000	467	1.000	526	1.000
114	1.000	173	1.000	232	1.000	291	1.000	350	1.000	409	1.000	468	1.000	527	1.000
115	1.000	174	1.000	233	1.000	292	1.000	351	1.000	410	1.000	469	1.000	528	1.000
116	1.000	175	1.000	234	1.000	293	1.000	352	1.000	411	1.000	470	1.000	529	1.000
117	1.000	176	1.000	235	1.000	294	1.000	353	1.000	412	1.000	471	1.000	530	1.000
118	1.000	177	1.000	236	1.000	295	1.000	354	1.000	413	1.000	472	1.000	531	1.000
119	1.000	178	1.000	237	1.000	296	1.000	355	1.000	414	1.000	473	1.000	532	1.000
120	1.000	179	1.000	238	1.000	297	1.000	356	1.000	415	1.000	474	1.000	533	1.000
121	1.000	180	1.000	239	1.000	298	1.000	357	1.000	416	1.000	475	1.000	534	1.000
122	1.000	181	1.000	240	1.000	299	1.000	358	1.000	417	1.000	476	1.000	535	1.000
123	1.000	182	1.000	241	1.000	300	1.000	359	1.000	418	1.000	477	1.000	536	1.000
124	1.000	183	1.000	242	1.000	301	1.000	360	1.000	419	1.000	478	1.000	537	1.000
125	1.000	184	1.000	243	1.000	302	1.000	361	1.000	420	1.000	479	1.000	538	1.000
126	1.000	185	1.000	244	1.000	303	1.000	362	1.000	421	1.000	480	1.000	539	1.000
127	1.000	186	1.000	245	1.000	304	1.000	363	1.000	422	1.000	481	1.000	540	1.000
128	1.000	187	1.000	246	1.000	305	1.000	364	1.000	423	1.000	482	1.000	541	1.000
129	1.000	188	1.000	247	1.000	306	1.000	365	1.000	424	1.000	483	1.000	542	1.000
130	1.000	189	1.000	248	1.000	307	1.000	366	1.000	425	1.000	484	1.000	543	1.000
131	1.000	190	1.000	249	1.000	308	1.000	367	1.000	426	1.000	485	1.000	544	1.000
132	1.000	191	1.000	250	1.000	309	1.000	368	1.000	427	1.000	486	1.000	545	1.000
133	1.000	192	1.000	251	1.000	310	1.000	369	1.000	428	1.000	487	1.000	546	1.000
134	1.000	193	1.000	252	1.000	311	1.000	370	1.000	429	1.000	488	1.000	547	1.000
135	1.000	194	1.000	253	1.000	312	1.000	371	1.000	430	1.000	489	1.000	548	1.000
136	1.000	195	1.000	254	1.000	313	1.000	372	1.000	431	1.000	490	1.000	549	1.000
137	1.000	196	1.000	255	1.000	314	1.000	373	1.000	432	1.000	491	1.000	550	1.000
138	1.000	197	1.000	256	1.000	315	1.000	374	1.000	433	1.000	492	1.000	551	1.000
139	1.000	198	1.000	257	1.000	316	1.000	375	1.000	434	1.000	493	1.000	552	1.000

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Micro Drainage		Network 2018.1

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)
553	1.000	612	1.000	671	1.000	730	1.000	789	1.000	848	1.000	907	1.000	966	1.000
554	1.000	613	1.000	672	1.000	731	1.000	790	1.000	849	1.000	908	1.000	967	1.000
555	1.000	614	1.000	673	1.000	732	1.000	791	1.000	850	1.000	909	1.000	968	1.000
556	1.000	615	1.000	674	1.000	733	1.000	792	1.000	851	1.000	910	1.000	969	1.000
557	1.000	616	1.000	675	1.000	734	1.000	793	1.000	852	1.000	911	1.000	970	1.000
558	1.000	617	1.000	676	1.000	735	1.000	794	1.000	853	1.000	912	1.000	971	1.000
559	1.000	618	1.000	677	1.000	736	1.000	795	1.000	854	1.000	913	1.000	972	1.000
560	1.000	619	1.000	678	1.000	737	1.000	796	1.000	855	1.000	914	1.000	973	1.000
561	1.000	620	1.000	679	1.000	738	1.000	797	1.000	856	1.000	915	1.000	974	1.000
562	1.000	621	1.000	680	1.000	739	1.000	798	1.000	857	1.000	916	1.000	975	1.000
563	1.000	622	1.000	681	1.000	740	1.000	799	1.000	858	1.000	917	1.000	976	1.000
564	1.000	623	1.000	682	1.000	741	1.000	800	1.000	859	1.000	918	1.000	977	1.000
565	1.000	624	1.000	683	1.000	742	1.000	801	1.000	860	1.000	919	1.000	978	1.000
566	1.000	625	1.000	684	1.000	743	1.000	802	1.000	861	1.000	920	1.000	979	1.000
567	1.000	626	1.000	685	1.000	744	1.000	803	1.000	862	1.000	921	1.000	980	1.000
568	1.000	627	1.000	686	1.000	745	1.000	804	1.000	863	1.000	922	1.000	981	1.000
569	1.000	628	1.000	687	1.000	746	1.000	805	1.000	864	1.000	923	1.000	982	1.000
570	1.000	629	1.000	688	1.000	747	1.000	806	1.000	865	1.000	924	1.000	983	1.000
571	1.000	630	1.000	689	1.000	748	1.000	807	1.000	866	1.000	925	1.000	984	1.000
572	1.000	631	1.000	690	1.000	749	1.000	808	1.000	867	1.000	926	1.000	985	1.000
573	1.000	632	1.000	691	1.000	750	1.000	809	1.000	868	1.000	927	1.000	986	1.000
574	1.000	633	1.000	692	1.000	751	1.000	810	1.000	869	1.000	928	1.000	987	1.000
575	1.000	634	1.000	693	1.000	752	1.000	811	1.000	870	1.000	929	1.000	988	1.000
576	1.000	635	1.000	694	1.000	753	1.000	812	1.000	871	1.000	930	1.000	989	1.000
577	1.000	636	1.000	695	1.000	754	1.000	813	1.000	872	1.000	931	1.000	990	1.000
578	1.000	637	1.000	696	1.000	755	1.000	814	1.000	873	1.000	932	1.000	991	1.000
579	1.000	638	1.000	697	1.000	756	1.000	815	1.000	874	1.000	933	1.000	992	1.000
580	1.000	639	1.000	698	1.000	757	1.000	816	1.000	875	1.000	934	1.000	993	1.000
581	1.000	640	1.000	699	1.000	758	1.000	817	1.000	876	1.000	935	1.000	994	1.000
582	1.000	641	1.000	700	1.000	759	1.000	818	1.000	877	1.000	936	1.000	995	1.000
583	1.000	642	1.000	701	1.000	760	1.000	819	1.000	878	1.000	937	1.000	996	1.000
584	1.000	643	1.000	702	1.000	761	1.000	820	1.000	879	1.000	938	1.000	997	1.000
585	1.000	644	1.000	703	1.000	762	1.000	821	1.000	880	1.000	939	1.000	998	1.000
586	1.000	645	1.000	704	1.000	763	1.000	822	1.000	881	1.000	940	1.000	999	1.000
587	1.000	646	1.000	705	1.000	764	1.000	823	1.000	882	1.000	941	1.000	1000	1.000
588	1.000	647	1.000	706	1.000	765	1.000	824	1.000	883	1.000	942	1.000	1001	1.000
589	1.000	648	1.000	707	1.000	766	1.000	825	1.000	884	1.000	943	1.000	1002	1.000
590	1.000	649	1.000	708	1.000	767	1.000	826	1.000	885	1.000	944	1.000	1003	1.000
591	1.000	650	1.000	709	1.000	768	1.000	827	1.000	886	1.000	945	1.000	1004	1.000
592	1.000	651	1.000	710	1.000	769	1.000	828	1.000	887	1.000	946	1.000	1005	1.000
593	1.000	652	1.000	711	1.000	770	1.000	829	1.000	888	1.000	947	1.000	1006	1.000
594	1.000	653	1.000	712	1.000	771	1.000	830	1.000	889	1.000	948	1.000	1007	1.000
595	1.000	654	1.000	713	1.000	772	1.000	831	1.000	890	1.000	949	1.000	1008	1.000
596	1.000	655	1.000	714	1.000	773	1.000	832	1.000	891	1.000	950	1.000	1009	1.000
597	1.000	656	1.000	715	1.000	774	1.000	833	1.000	892	1.000	951	1.000	1010	1.000
598	1.000	657	1.000	716	1.000	775	1.000	834	1.000	893	1.000	952	1.000	1011	1.000
599	1.000	658	1.000	717	1.000	776	1.000	835	1.000	894	1.000	953	1.000	1012	1.000
600	1.000	659	1.000	718	1.000	777	1.000	836	1.000	895	1.000	954	1.000	1013	1.000
601	1.000	660	1.000	719	1.000	778	1.000	837	1.000	896	1.000	955	1.000	1014	1.000
602	1.000	661	1.000	720	1.000	779	1.000	838	1.000	897	1.000	956	1.000	1015	1.000
603	1.000	662	1.000	721	1.000	780	1.000	839	1.000	898	1.000	957	1.000	1016	1.000
604	1.000	663	1.000	722	1.000	781	1.000	840	1.000	899	1.000	958	1.000	1017	1.000
605	1.000	664	1.000	723	1.000	782	1.000	841	1.000	900	1.000	959	1.000	1018	1.000
606	1.000	665	1.000	724	1.000	783	1.000	842	1.000	901	1.000	960	1.000	1019	1.000
607	1.000	666	1.000	725	1.000	784	1.000	843	1.000	902	1.000	961	1.000	1020	1.000
608	1.000	667	1.000	726	1.000	785	1.000	844	1.000	903	1.000	962	1.000	1021	1.000
609	1.000	668	1.000	727	1.000	786	1.000	845	1.000	904	1.000	963	1.000	1022	1.000
610	1.000	669	1.000	728	1.000	787	1.000	846	1.000	905	1.000	964	1.000	1023	1.000
611	1.000	670	1.000	729	1.000	788	1.000	847	1.000	906	1.000	965	1.000	1024	1.000

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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)
1025	1.000	1077	1.000	1129	1.000	1181	1.000	1233	1.000	1285	1.000	1337	1.000	1389	1.000
1026	1.000	1078	1.000	1130	1.000	1182	1.000	1234	1.000	1286	1.000	1338	1.000	1390	1.000
1027	1.000	1079	1.000	1131	1.000	1183	1.000	1235	1.000	1287	1.000	1339	1.000	1391	1.000
1028	1.000	1080	1.000	1132	1.000	1184	1.000	1236	1.000	1288	1.000	1340	1.000	1392	1.000
1029	1.000	1081	1.000	1133	1.000	1185	1.000	1237	1.000	1289	1.000	1341	1.000	1393	1.000
1030	1.000	1082	1.000	1134	1.000	1186	1.000	1238	1.000	1290	1.000	1342	1.000	1394	1.000
1031	1.000	1083	1.000	1135	1.000	1187	1.000	1239	1.000	1291	1.000	1343	1.000	1395	1.000
1032	1.000	1084	1.000	1136	1.000	1188	1.000	1240	1.000	1292	1.000	1344	1.000	1396	1.000
1033	1.000	1085	1.000	1137	1.000	1189	1.000	1241	1.000	1293	1.000	1345	1.000	1397	1.000
1034	1.000	1086	1.000	1138	1.000	1190	1.000	1242	1.000	1294	1.000	1346	1.000	1398	1.000
1035	1.000	1087	1.000	1139	1.000	1191	1.000	1243	1.000	1295	1.000	1347	1.000	1399	1.000
1036	1.000	1088	1.000	1140	1.000	1192	1.000	1244	1.000	1296	1.000	1348	1.000	1400	1.000
1037	1.000	1089	1.000	1141	1.000	1193	1.000	1245	1.000	1297	1.000	1349	1.000	1401	1.000
1038	1.000	1090	1.000	1142	1.000	1194	1.000	1246	1.000	1298	1.000	1350	1.000	1402	1.000
1039	1.000	1091	1.000	1143	1.000	1195	1.000	1247	1.000	1299	1.000	1351	1.000	1403	1.000
1040	1.000	1092	1.000	1144	1.000	1196	1.000	1248	1.000	1300	1.000	1352	1.000	1404	1.000
1041	1.000	1093	1.000	1145	1.000	1197	1.000	1249	1.000	1301	1.000	1353	1.000	1405	1.000
1042	1.000	1094	1.000	1146	1.000	1198	1.000	1250	1.000	1302	1.000	1354	1.000	1406	1.000
1043	1.000	1095	1.000	1147	1.000	1199	1.000	1251	1.000	1303	1.000	1355	1.000	1407	1.000
1044	1.000	1096	1.000	1148	1.000	1200	1.000	1252	1.000	1304	1.000	1356	1.000	1408	1.000
1045	1.000	1097	1.000	1149	1.000	1201	1.000	1253	1.000	1305	1.000	1357	1.000	1409	1.000
1046	1.000	1098	1.000	1150	1.000	1202	1.000	1254	1.000	1306	1.000	1358	1.000	1410	1.000
1047	1.000	1099	1.000	1151	1.000	1203	1.000	1255	1.000	1307	1.000	1359	1.000	1411	1.000
1048	1.000	1100	1.000	1152	1.000	1204	1.000	1256	1.000	1308	1.000	1360	1.000	1412	1.000
1049	1.000	1101	1.000	1153	1.000	1205	1.000	1257	1.000	1309	1.000	1361	1.000	1413	1.000
1050	1.000	1102	1.000	1154	1.000	1206	1.000	1258	1.000	1310	1.000	1362	1.000	1414	1.000
1051	1.000	1103	1.000	1155	1.000	1207	1.000	1259	1.000	1311	1.000	1363	1.000	1415	1.000
1052	1.000	1104	1.000	1156	1.000	1208	1.000	1260	1.000	1312	1.000	1364	1.000	1416	1.000
1053	1.000	1105	1.000	1157	1.000	1209	1.000	1261	1.000	1313	1.000	1365	1.000	1417	1.000
1054	1.000	1106	1.000	1158	1.000	1210	1.000	1262	1.000	1314	1.000	1366	1.000	1418	1.000
1055	1.000	1107	1.000	1159	1.000	1211	1.000	1263	1.000	1315	1.000	1367	1.000	1419	1.000
1056	1.000	1108	1.000	1160	1.000	1212	1.000	1264	1.000	1316	1.000	1368	1.000	1420	1.000
1057	1.000	1109	1.000	1161	1.000	1213	1.000	1265	1.000	1317	1.000	1369	1.000	1421	1.000
1058	1.000	1110	1.000	1162	1.000	1214	1.000	1266	1.000	1318	1.000	1370	1.000	1422	1.000
1059	1.000	1111	1.000	1163	1.000	1215	1.000	1267	1.000	1319	1.000	1371	1.000	1423	1.000
1060	1.000	1112	1.000	1164	1.000	1216	1.000	1268	1.000	1320	1.000	1372	1.000	1424	1.000
1061	1.000	1113	1.000	1165	1.000	1217	1.000	1269	1.000	1321	1.000	1373	1.000	1425	1.000
1062	1.000	1114	1.000	1166	1.000	1218	1.000	1270	1.000	1322	1.000	1374	1.000	1426	1.000
1063	1.000	1115	1.000	1167	1.000	1219	1.000	1271	1.000	1323	1.000	1375	1.000	1427	1.000
1064	1.000	1116	1.000	1168	1.000	1220	1.000	1272	1.000	1324	1.000	1376	1.000	1428	1.000
1065	1.000	1117	1.000	1169	1.000	1221	1.000	1273	1.000	1325	1.000	1377	1.000	1429	1.000
1066	1.000	1118	1.000	1170	1.000	1222	1.000	1274	1.000	1326	1.000	1378	1.000	1430	1.000
1067	1.000	1119	1.000	1171	1.000	1223	1.000	1275	1.000	1327	1.000	1379	1.000	1431	1.000
1068	1.000	1120	1.000	1172	1.000	1224	1.000	1276	1.000	1328	1.000	1380	1.000	1432	1.000
1069	1.000	1121	1.000	1173	1.000	1225	1.000	1277	1.000	1329	1.000	1381	1.000	1433	1.000
1070	1.000	1122	1.000	1174	1.000	1226	1.000	1278	1.000	1330	1.000	1382	1.000	1434	1.000
1071	1.000	1123	1.000	1175	1.000	1227	1.000	1279	1.000	1331	1.000	1383	1.000	1435	1.000
1072	1.000	1124	1.000	1176	1.000	1228	1.000	1280	1.000	1332	1.000	1384	1.000	1436	1.000
1073	1.000	1125	1.000	1177	1.000	1229	1.000	1281	1.000	1333	1.000	1385	1.000	1437	1.000
1074	1.000	1126	1.000	1178	1.000	1230	1.000	1282	1.000	1334	1.000	1386	1.000	1438	1.000
1075	1.000	1127	1.000	1179	1.000	1231	1.000	1283	1.000	1335	1.000	1387	1.000	1439	1.000
1076	1.000	1128	1.000	1180	1.000	1232	1.000	1284	1.000	1336	1.000	1388	1.000	1440	1.000

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Online Controls for Storm

Non Return Valve Manhole: S20, DS/PN: S6.001, Volume (m³): 4.5

Hydro-Brake® Optimum Manhole: S10, DS/PN: S1.009, Volume (m³): 38.5

Unit Reference	MD-SHE-0195-2000-1300-2000
Design Head (m)	1.300
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	195
Invert Level (m)	30.278
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	20.0	Kick-Flo®	0.878	16.6
Flush-Flo™	0.398	20.0	Mean Flow over Head Range	-	17.1

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	6.7	0.800	18.0	2.000	24.6	4.000	34.3	7.000	44.9
0.200	18.1	1.000	17.7	2.200	25.7	4.500	36.3	7.500	46.4
0.300	19.7	1.200	19.3	2.400	26.8	5.000	38.2	8.000	47.9
0.400	20.0	1.400	20.7	2.600	27.9	5.500	40.0	8.500	49.3
0.500	19.8	1.600	22.1	3.000	29.8	6.000	41.7	9.000	50.7
0.600	19.5	1.800	23.4	3.500	32.1	6.500	43.3	9.500	52.1

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Offline Controls for Storm

Pipe Manhole: S6, DS/PN: S1.005, Loop to PN: S6.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.670

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Storage Structures for Storm

Porous Car Park Pipe: S3.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	16.8
Membrane Percolation (mm/hr)	1000	Slope (1:X)	16801.0
Max Percolation (l/s)	50.4	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.400		

Porous Car Park Pipe: S4.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	18000.0
Max Percolation (l/s)	54.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.410		

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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

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	240 Winter	30	+0%	30/60 Winter				31.600	0.289
S2.000	S2	240 Winter	30	+0%	30/120 Winter				31.603	0.070
S2.001	S3	240 Winter	30	+0%	30/60 Winter				31.600	0.271
S1.001	S2	240 Winter	30	+0%	30/60 Winter				31.599	0.378
S1.002	S3	240 Winter	30	+0%	30/60 Summer				31.597	0.424
S3.000	S6	15 Winter	30	+0%					32.446	-0.304
S3.001	S7	15 Winter	30	+0%					32.421	-0.128
S1.003	S4	180 Winter	30	+0%					31.152	0.000
S4.000	S9	15 Winter	30	+0%					32.457	-0.303
S4.001	S10	15 Winter	30	+0%					32.431	-0.128
S1.004	S5	180 Winter	30	+0%	30/60 Summer				31.147	0.001
S5.000	S12	15 Winter	30	+0%					31.695	-0.131
S5.001	S13	15 Winter	30	+0%					31.657	-0.094
S5.002	S14	240 Winter	30	+0%	30/120 Winter				31.604	0.049
S5.003	S15	240 Winter	30	+0%	30/60 Winter				31.599	0.259
S5.004	S16	240 Winter	30	+0%	30/60 Winter				31.598	0.350
S5.005	S17	240 Winter	30	+0%	30/60 Winter				31.597	0.372
S1.005	S6	240 Winter	30	+0%	30/60 Summer			0	31.594	0.483
S6.000	S19	120 Winter	30	+0%					30.781	-0.300
S6.001	S20	120 Winter	30	+0%					30.780	-0.300
S1.006	S7	240 Winter	30	+0%	30/60 Summer				31.589	0.536
S1.007	S8	240 Winter	30	+0%	30/30 Winter				31.587	0.553
S7.000	S21	240 Winter	30	+0%	30/60 Summer				31.584	0.539
S1.008	S9	240 Winter	30	+0%	30/30 Winter				31.584	0.579
S1.009	S10	240 Winter	30	+0%	30/15 Summer				31.583	1.080

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.03	1.7		SURCHARGED	

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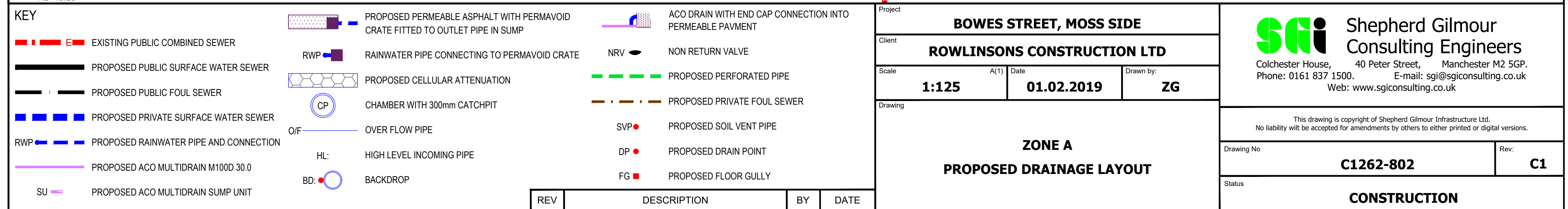
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.000	S2	0.000	0.07		1.2	SURCHARGED	
S2.001	S3	0.000	0.04		1.6	SURCHARGED	
S1.001	S2	0.000	0.08		4.4	SURCHARGED	
S1.002	S3	0.000	0.10		4.9	SURCHARGED	
S3.000	S6	0.000	0.03		3.9	OK	
S3.001	S7	0.000	0.05		3.8	OK	
S1.003	S4	0.000	0.12		7.4	SURCHARGED*	
S4.000	S9	0.000	0.04		3.9	OK	
S4.001	S10	0.000	0.05		3.8	OK	
S1.004	S5	0.000	0.14		8.6	SURCHARGED*	
S5.000	S12	0.000	0.04		0.6	OK	
S5.001	S13	0.000	0.30		5.0	OK	
S5.002	S14	0.000	0.11		1.9	SURCHARGED	
S5.003	S15	0.000	0.06		2.0	SURCHARGED	
S5.004	S16	0.000	0.07		2.0	SURCHARGED	
S5.005	S17	0.000	0.08		2.8	SURCHARGED	
S1.005	S6	0.000	0.17	0.0	10.0	SURCHARGED	
S6.000	S19	0.000	0.00		0.0	OK	
S6.001	S20	0.000	0.00		0.0	OK	
S1.006	S7	0.000	0.21		9.7	SURCHARGED	
S1.007	S8	0.000	0.19		9.6	SURCHARGED	
S7.000	S21	0.000	0.00		0.2	SURCHARGED	
S1.008	S9	0.000	0.02		10.0	SURCHARGED	
S1.009	S10	0.000	0.28		7.7	FLOOD RISK	



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APPENDIX E1





Shepherd Gilmour
Consulting Engineers

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APPENDIX E2



Project				Bowes Street, Moss Side		Shepherd Gilmour Consulting Engineers Colchester House, 40 Peter Street, Manchester M2 5GP. Phone: 0161 837 1500. E-mail: sgi@sgiconsulting.co.uk Web: www.sgiconsulting.co.uk This drawing is copyright of Shepherd Gilmour Infrastructure Ltd. No liability will be accepted for amendments by others to either printed or digital versions. <table><tr><td>Drawing No</td><td>C1262-005</td><td>Rev:</td><td>P1</td></tr><tr><td>Status</td><td colspan="3">Information</td></tr></table>	Drawing No	C1262-005	Rev:	P1	Status	Information		
Drawing No	C1262-005	Rev:	P1											
Status	Information													
Client				Rowlinson Constructions Ltd										
Scale		A(1)	Date	Drawn by:										
1:125			15.02.2019	NCM										
Drawing														
Laurel Avenue and Zone A Proposed Levels														



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APPENDIX E3

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	13.902	0.058	239.7	0.029	5.00	0.0	0.600		o	300	Pipe/Conduit	
S1.001	11.918	0.050	238.4	0.042	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.002	6.375	0.027	236.1	0.007	0.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	14.400	0.001	14400.0	0.017	5.00	0.0		0.030	→ ↓ →		Porous Car Park	
S2.001	3.103	1.061	2.9	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.003	1.535	0.006	255.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	17.007	0.001	17007.0	0.026	5.00	0.0		0.030	→ ↓ →		Porous Car Park	
S3.001	1.153	1.142	1.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.004	5.986	0.025	239.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	7.487	0.075	99.8	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
S4.001	19.577	0.196	99.9	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
S4.002	21.483	0.215	99.9	0.015	0.00	0.0	0.600		o	150	Pipe/Conduit	
S4.003	15.649	0.092	170.1	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
S4.004	7.010	0.041	171.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S4.005	15.659	0.093	168.4	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.005	13.877	0.058	239.3	0.016	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	10.873	0.001	10873.0	0.000	5.00	0.0		0.050	→[↓]		Cellular Storage	
S5.001	5.073	0.021	241.6	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)
S1.000	45.92	5.23	31.298	0.029	0.0	0.0	0.0	1.01	71.5	3.6
S1.001	45.20	5.43	31.240	0.071	0.0	0.0	0.0	1.01	71.7	8.7
S1.002	44.83	5.53	31.190	0.078	0.0	0.0	0.0	1.02	72.0	9.5
S2.000	31.38	11.29	32.400	0.017	0.0	0.0	0.0	0.04	43.2	1.4
S2.001	31.37	11.30	32.399	0.017	0.0	0.0	0.0	5.94	104.9	1.4
S1.003	31.33	11.33	31.163	0.095	0.0	0.0	0.0	0.98	69.2	9.5
S3.000	28.95	13.08	32.450	0.026	0.0	0.0	0.0	0.04	39.8	2.0
S3.001	28.94	13.08	32.449	0.026	0.0	0.0	0.0	10.11	178.7	2.0
S1.004	28.83	13.18	31.157	0.121	0.0	0.0	0.0	1.01	71.5	9.5
S4.000	46.32	5.12	31.993	0.002	0.0	0.0	0.0	1.01	17.8	0.3
S4.001	45.12	5.45	31.918	0.016	0.0	0.0	0.0	1.01	17.8	2.0
S4.002	43.87	5.80	31.722	0.031	0.0	0.0	0.0	1.01	17.8	3.7
S4.003	43.01	6.07	31.433	0.033	0.0	0.0	0.0	1.00	39.7	3.8
S4.004	42.64	6.18	31.341	0.033	0.0	0.0	0.0	1.00	39.6	3.8
S4.005	41.84	6.44	31.300	0.047	0.0	0.0	0.0	1.00	39.9	5.3
S1.005	28.56	13.41	31.132	0.184	0.0	0.0	0.0	1.01	71.5	14.2
S5.000	39.45	7.29	31.096	0.000	0.0	0.0	0.0	0.08	110.7	0.0
S5.001	39.23	7.37	31.095	0.000	0.0	0.0	0.0	1.01	71.2	0.0

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.006	9.250	0.039	237.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	21.169	0.055	384.9	0.004	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.007	40.079	0.097	413.2	0.062	0.00	0.0	0.600		o	600	Pipe/Conduit	
S1.008	5.754	0.178	32.3	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.006	28.38	13.56	31.074	0.184	0.0	0.0	0.0	1.02	71.9	14.2
S6.000	45.71	5.29	30.790	0.004	0.0	0.0	0.0	1.24	349.2	0.5
S1.007	27.75	14.12	30.735	0.250	0.0	0.0	0.0	1.19	336.9	18.8
S1.008	27.73	14.14	30.638	0.250	0.0	0.0	0.0	4.29	1213.9	18.8

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)
S1.008	S	32.250	30.460	0.000	0	0

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Online Controls for Storm

Non Return Valve Manhole: S18, DS/PN: S5.001, Volume (m³): 15.6

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.008, Volume (m³): 21.9

Unit Reference MD-SHE-0194-2000-1350-2000	
Design Head (m)	1.350
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	194
Invert Level (m)	30.638
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	20.0	Kick-Flo®	0.907	16.6
Flush-Flo™	0.414	20.0	Mean Flow over Head Range	-	17.2

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	6.7	0.800	18.3	2.000	24.1	4.000	33.6	7.000	44.1
0.200	18.0	1.000	17.3	2.200	25.2	4.500	35.6	7.500	45.6
0.300	19.7	1.200	18.9	2.400	26.3	5.000	37.5	8.000	47.0
0.400	20.0	1.400	20.3	2.600	27.4	5.500	39.2	8.500	48.4
0.500	19.9	1.600	21.7	3.000	29.3	6.000	40.9	9.000	49.8
0.600	19.6	1.800	22.9	3.500	31.6	6.500	42.5	9.500	51.1

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Offline Controls for Storm

Pipe Manhole: S4, DS/PN: S1.005, Loop to PN: S5.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	32.115

Pipe Manhole: S4, DS/PN: S1.005, Loop to PN: S5.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	32.115

Storage Structures for Storm

Porous Car Park Pipe: S2.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	14.4
Membrane Percolation (mm/hr)	1000	Slope (1:X)	14400.0
Max Percolation (l/s)	43.2	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.400		

Porous Car Park Pipe: S3.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	17.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	17007.0
Max Percolation (l/s)	51.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.450		

Cellular Storage Pipe: S5.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	31.096	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	20.0	0.0	0.800	20.0	0.0	0.801	0.0	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 2 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	15 Winter	1	+0%	100/15 Summer				31.349	-0.249
S1.001	S2	15 Winter	1	+0%	100/15 Summer				31.313	-0.227
S1.002	S3	15 Winter	1	+0%	100/15 Summer				31.272	-0.218
S2.000	S4	15 Winter	1	+0%					32.426	-0.324
S2.001	S5	30 Winter	1	+0%					32.411	-0.138
S1.003	S4	15 Winter	1	+0%	100/15 Summer				31.250	-0.213
S3.000	S7	15 Winter	1	+0%					32.483	-0.317
S3.001	S8	30 Winter	1	+0%					32.465	-0.134
S1.004	S4	15 Winter	1	+0%					31.248	-0.209
S4.000	S4	15 Winter	1	+0%	1000/30 Summer				32.004	-0.139
S4.001	S5	15 Winter	1	+0%	100/30 Winter				31.950	-0.118
S4.002	S6	15 Winter	1	+0%	100/15 Winter				31.766	-0.106
S4.003	S7	15 Winter	1	+0%	100/15 Winter				31.480	-0.178
S4.004	S8	15 Winter	1	+0%	100/15 Winter				31.391	-0.175
S4.005	S9	15 Winter	1	+0%	100/15 Summer				31.355	-0.170
S1.005	S4	15 Winter	1	+0%	100/15 Summer	1000/30 Summer	6		31.236	-0.196
S5.000	S17	120 Winter	1	+0%	1000/60 Winter				31.096	-0.801
S5.001	S18	120 Winter	1	+0%	1000/30 Winter				31.095	-0.300
S1.006	S5	15 Winter	1	+0%	100/15 Summer				31.182	-0.192
S6.000	S20	15 Winter	1	+0%	100/15 Summer				30.862	-0.528
S1.007	S6	15 Winter	1	+0%	100/15 Summer				30.862	-0.473
S1.008	S7	15 Winter	1	+0%	100/15 Summer				30.819	-0.419

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Status	
S1.000	S1	0.000	0.06	3.5	OK	
S1.001	S2	0.000	0.13	7.7	OK	
S1.002	S3	0.000	0.17	8.5	OK	
S2.000	S4	0.000	0.01	1.2	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.001	S5	0.000	0.02		1.1	OK	
S1.003	S4	0.000	0.14		8.7	OK*	
S3.000	S7	0.000	0.02		1.7	OK	
S3.001	S8	0.000	0.02		1.6	OK	
S1.004	S4	0.000	0.15		9.3	OK*	
S4.000	S4	0.000	0.02		0.2	OK	
S4.001	S5	0.000	0.10		1.7	OK	
S4.002	S6	0.000	0.19		3.2	OK	
S4.003	S7	0.000	0.10		3.4	OK	
S4.004	S8	0.000	0.11		3.4	OK	
S4.005	S9	0.000	0.13		4.7	OK	
S1.005	S4	0.000	0.26	0.0	15.5	OK	
S5.000	S17	0.000	0.00		0.0	OK	
S5.001	S18	0.000	0.00		0.0	OK	
S1.006	S5	0.000	0.28		15.4	OK	
S6.000	S20	0.000	0.00		0.6	OK	
S1.007	S6	0.000	0.07		19.0	OK	
S1.008	S7	0.000	0.04		16.2	OK	

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
S1.000	S1	15 Winter	2	+0%	100/15 Summer				31.358	-0.240
S1.001	S2	15 Winter	2	+0%	100/15 Summer				31.324	-0.216
S1.002	S3	15 Winter	2	+0%	100/15 Summer				31.285	-0.205
S2.000	S4	15 Winter	2	+0%					32.430	-0.320
S2.001	S5	30 Winter	2	+0%					32.414	-0.135
S1.003	S4	15 Winter	2	+0%	100/15 Summer				31.266	-0.197
S3.000	S7	15 Winter	2	+0%					32.488	-0.312
S3.001	S8	15 Winter	2	+0%					32.467	-0.132
S1.004	S4	15 Winter	2	+0%					31.263	-0.194
S4.000	S4	15 Winter	2	+0%	1000/30 Summer				32.008	-0.135
S4.001	S5	15 Winter	2	+0%	100/30 Winter				31.954	-0.114
S4.002	S6	15 Winter	2	+0%	100/15 Winter				31.773	-0.099
S4.003	S7	15 Winter	2	+0%	100/15 Winter				31.486	-0.172
S4.004	S8	15 Winter	2	+0%	100/15 Winter				31.398	-0.168
S4.005	S9	15 Winter	2	+0%	100/15 Summer				31.363	-0.162
S1.005	S4	15 Winter	2	+0%	100/15 Summer	1000/30 Summer	6		31.253	-0.179
S5.000	S17	120 Winter	2	+0%	1000/60 Winter				31.096	-0.801
S5.001	S18	120 Winter	2	+0%	1000/30 Winter				31.095	-0.300
S1.006	S5	15 Winter	2	+0%	100/15 Summer				31.199	-0.175
S6.000	S20	15 Winter	2	+0%	100/15 Summer				30.890	-0.500
S1.007	S6	15 Winter	2	+0%	100/15 Summer				30.891	-0.444
S1.008	S7	15 Winter	2	+0%	100/15 Summer				30.866	-0.372

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Status	
S1.000	S1	0.000	0.08	4.5	OK	
S1.001	S2	0.000	0.17	10.0	OK	
S1.002	S3	0.000	0.21	10.9	OK	
S2.000	S4	0.000	0.01	1.6	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.001	S5	0.000	0.02		1.4	OK	
S1.003	S4	0.000	0.18		11.3	OK*	
S3.000	S7	0.000	0.02		2.4	OK	
S3.001	S8	0.000	0.04		2.4	OK	
S1.004	S4	0.000	0.20		12.3	OK*	
S4.000	S4	0.000	0.02		0.3	OK	
S4.001	S5	0.000	0.13		2.1	OK	
S4.002	S6	0.000	0.25		4.1	OK	
S4.003	S7	0.000	0.13		4.4	OK	
S4.004	S8	0.000	0.15		4.4	OK	
S4.005	S9	0.000	0.17		6.1	OK	
S1.005	S4	0.000	0.34	0.0	20.2	OK	
S5.000	S17	0.000	0.00		0.0	OK	
S5.001	S18	0.000	0.00		0.0	OK	
S1.006	S5	0.000	0.36		20.1	OK	
S6.000	S20	0.000	0.00		0.8	OK	
S1.007	S6	0.000	0.09		24.6	OK	
S1.008	S7	0.000	0.04		18.9	OK	

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
S1.000	S1	15 Winter	5	+0%	100/15 Summer				31.368	-0.230
S1.001	S2	15 Winter	5	+0%	100/15 Summer				31.337	-0.203
S1.002	S3	15 Winter	5	+0%	100/15 Summer				31.301	-0.189
S2.000	S4	15 Winter	5	+0%					32.434	-0.316
S2.001	S5	15 Winter	5	+0%					32.417	-0.132
S1.003	S4	15 Winter	5	+0%	100/15 Summer				31.285	-0.178
S3.000	S7	15 Winter	5	+0%					32.494	-0.306
S3.001	S8	15 Winter	5	+0%					32.471	-0.128
S1.004	S4	15 Winter	5	+0%					31.283	-0.174
S4.000	S4	15 Winter	5	+0%	1000/30 Summer				32.009	-0.134
S4.001	S5	15 Winter	5	+0%	100/30 Winter				31.959	-0.109
S4.002	S6	15 Winter	5	+0%	100/15 Winter				31.780	-0.092
S4.003	S7	15 Winter	5	+0%	100/15 Winter				31.493	-0.165
S4.004	S8	15 Winter	5	+0%	100/15 Winter				31.407	-0.159
S4.005	S9	15 Winter	5	+0%	100/15 Summer				31.372	-0.153
S1.005	S4	15 Winter	5	+0%	100/15 Summer	1000/30 Summer	6		31.272	-0.160
S5.000	S17	120 Winter	5	+0%	1000/60 Winter				31.096	-0.801
S5.001	S18	120 Winter	5	+0%	1000/30 Winter				31.095	-0.300
S1.006	S5	15 Winter	5	+0%	100/15 Summer				31.220	-0.154
S6.000	S20	30 Winter	5	+0%	100/15 Summer				30.961	-0.429
S1.007	S6	30 Winter	5	+0%	100/15 Summer				30.961	-0.374
S1.008	S7	30 Winter	5	+0%	100/15 Summer				30.944	-0.294

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Status	
S1.000	S1	0.000	0.10	5.8	OK	
S1.001	S2	0.000	0.22	12.8	OK	
S1.002	S3	0.000	0.27	13.9	OK	
S2.000	S4	0.000	0.02	2.3	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.001	S5	0.000	0.03		2.1	OK	
S1.003	S4	0.000	0.24		14.5	OK*	
S3.000	S7	0.000	0.03		3.4	OK	
S3.001	S8	0.000	0.05		3.3	OK	
S1.004	S4	0.000	0.27		16.5	OK*	
S4.000	S4	0.000	0.03		0.4	OK	
S4.001	S5	0.000	0.17		2.8	OK	
S4.002	S6	0.000	0.32		5.4	OK	
S4.003	S7	0.000	0.16		5.7	OK	
S4.004	S8	0.000	0.19		5.7	OK	
S4.005	S9	0.000	0.22		7.9	OK	
S1.005	S4	0.000	0.44	0.0	26.3	OK	
S5.000	S17	0.000	0.00		0.0	OK	
S5.001	S18	0.000	0.00		0.0	OK	
S1.006	S5	0.000	0.48		26.4	OK	
S6.000	S20	0.000	0.00		0.9	OK	
S1.007	S6	0.000	0.10		28.9	OK	
S1.008	S7	0.000	0.05		19.7	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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
S1.000	S1	15 Winter	30	+0%	100/15 Summer				31.395	-0.203
S1.001	S2	15 Winter	30	+0%	100/15 Summer				31.377	-0.163
S1.002	S3	15 Winter	30	+0%	100/15 Summer				31.352	-0.138
S2.000	S4	15 Winter	30	+0%					32.442	-0.308
S2.001	S5	15 Winter	30	+0%					32.422	-0.127
S1.003	S4	15 Winter	30	+0%	100/15 Summer				31.341	-0.122
S3.000	S7	15 Winter	30	+0%					32.504	-0.296
S3.001	S8	15 Winter	30	+0%					32.478	-0.121
S1.004	S4	15 Winter	30	+0%					31.338	-0.119
S4.000	S4	15 Winter	30	+0%	1000/30 Summer				32.012	-0.131
S4.001	S5	15 Winter	30	+0%	100/30 Winter				31.974	-0.094
S4.002	S6	15 Winter	30	+0%	100/15 Winter				31.804	-0.068
S4.003	S7	15 Winter	30	+0%	100/15 Winter				31.516	-0.142
S4.004	S8	15 Winter	30	+0%	100/15 Winter				31.432	-0.134
S4.005	S9	15 Winter	30	+0%	100/15 Summer				31.401	-0.124
S1.005	S4	15 Winter	30	+0%	100/15 Summer	1000/30 Summer	6		31.326	-0.106
S5.000	S17	120 Winter	30	+0%	1000/60 Winter				31.096	-0.801
S5.001	S18	120 Winter	30	+0%	1000/30 Winter				31.095	-0.300
S1.006	S5	15 Winter	30	+0%	100/15 Summer				31.275	-0.099
S6.000	S20	30 Winter	30	+0%	100/15 Summer				31.176	-0.214
S1.007	S6	30 Winter	30	+0%	100/15 Summer				31.176	-0.159
S1.008	S7	30 Winter	30	+0%	100/15 Summer				31.140	-0.098

PN	US/MH Name	Flooded		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Status	
S1.000	S1	0.000	0.14	8.4	OK	
S1.001	S2	0.000	0.36	20.9	OK	
S1.002	S3	0.000	0.43	22.1	OK	
S2.000	S4	0.000	0.03	3.7	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.001	S5	0.000	0.06		3.6	OK	
S1.003	S4	0.000	0.38		23.1	OK*	
S3.000	S7	0.000	0.05		5.6	OK	
S3.001	S8	0.000	0.08		5.5	OK	
S1.004	S4	0.000	0.44		27.0	OK*	
S4.000	S4	0.000	0.04		0.6	OK	
S4.001	S5	0.000	0.30		5.0	OK	
S4.002	S6	0.000	0.58		9.7	OK	
S4.003	S7	0.000	0.29		10.2	OK	
S4.004	S8	0.000	0.34		10.2	OK	
S4.005	S9	0.000	0.40		14.3	OK	
S1.005	S4	0.000	0.74	0.0	43.6	OK	
S5.000	S17	0.000	0.00		0.0	OK	
S5.001	S18	0.000	0.00		0.0	OK	
S1.006	S5	0.000	0.79		43.6	OK	
S6.000	S20	0.000	0.01		1.4	OK	
S1.007	S6	0.000	0.14		39.5	OK	
S1.008	S7	0.000	0.05		20.0	OK	

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	60 Winter	100	+40%	100/15 Summer				32.097	0.499
S1.001	S2	60 Winter	100	+40%	100/15 Summer				32.095	0.555
S1.002	S3	60 Winter	100	+40%	100/15 Summer				32.091	0.601
S2.000	S4	15 Winter	100	+40%					32.459	-0.291
S2.001	S5	15 Winter	100	+40%					32.433	-0.116
S1.003	S4	120 Winter	100	+40%	100/15 Summer				31.488	0.025
S3.000	S7	15 Winter	100	+40%					32.525	-0.275
S3.001	S8	15 Winter	100	+40%					32.491	-0.108
S1.004	S4	120 Winter	100	+40%					31.457	0.000
S4.000	S4	60 Winter	100	+40%	1000/30 Summer				32.120	-0.023
S4.001	S5	60 Winter	100	+40%	100/30 Winter				32.119	0.051
S4.002	S6	60 Winter	100	+40%	100/15 Winter				32.112	0.240
S4.003	S7	60 Winter	100	+40%	100/15 Winter				32.097	0.439
S4.004	S8	60 Winter	100	+40%	100/15 Winter				32.093	0.527
S4.005	S9	60 Winter	100	+40%	100/15 Summer				32.090	0.565
S1.005	S4	60 Winter	100	+40%	100/15 Summer	1000/30 Summer	6		32.084	0.652
S5.000	S17	120 Winter	100	+40%	1000/60 Winter				31.096	-0.801
S5.001	S18	120 Winter	100	+40%	1000/30 Winter				31.095	-0.300
S1.006	S5	60 Winter	100	+40%	100/15 Summer				32.071	0.697
S6.000	S20	60 Winter	100	+40%	100/15 Summer				32.061	0.671
S1.007	S6	60 Winter	100	+40%	100/15 Summer				32.061	0.726
S1.008	S7	60 Winter	100	+40%	100/15 Summer				32.057	0.819

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.14	8.3		SURCHARGED	
S1.001	S2	0.000	0.35	20.1		SURCHARGED	
S1.002	S3	0.000	0.42	21.6		SURCHARGED	
S2.000	S4	0.000	0.06	7.5		OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.001	S5	0.000	0.11		7.4	OK	
S1.003	S4	0.000	0.27		16.3	SURCHARGED*	
S3.000	S7	0.000	0.10		11.5	OK	
S3.001	S8	0.000	0.17		11.5	OK	
S1.004	S4	0.000	0.34		20.6	SURCHARGED*	
S4.000	S4	0.000	0.04		0.6	OK	
S4.001	S5	0.000	0.28		4.7	SURCHARGED	
S4.002	S6	0.000	0.54		9.0	SURCHARGED	
S4.003	S7	0.000	0.27		9.5	SURCHARGED	
S4.004	S8	0.000	0.32		9.5	SURCHARGED	
S4.005	S9	0.000	0.38		13.5	SURCHARGED	
S1.005	S4	0.000	0.81	0.0	47.9	SURCHARGED	
S5.000	S17	0.000	0.00		0.0	OK	
S5.001	S18	0.000	0.00		0.0	OK	
S1.006	S5	0.000	0.85		46.8	SURCHARGED	
S6.000	S20	0.000	0.01		2.0	SURCHARGED	
S1.007	S6	0.000	0.15		42.7	FLOOD RISK	
S1.008	S7	0.000	0.05		20.5	FLOOD RISK	

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

Simulation Criteria

Areal Reduction Factor 1.000 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 2 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	30 Winter	1000	+0%	100/15 Summer				32.363	0.765
S1.001	S2	30 Winter	1000	+0%	100/15 Summer				32.357	0.817
S1.002	S3	30 Winter	1000	+0%	100/15 Summer				32.346	0.856
S2.000	S4	15 Winter	1000	+0%					32.464	-0.286
S2.001	S5	15 Winter	1000	+0%					32.436	-0.113
S1.003	S4	180 Winter	1000	+0%	100/15 Summer				31.488	0.025
S3.000	S7	15 Winter	1000	+0%					32.532	-0.268
S3.001	S8	15 Winter	1000	+0%					32.495	-0.104
S1.004	S4	180 Winter	1000	+0%					31.457	0.000
S4.000	S4	30 Winter	1000	+0%	1000/30 Summer				32.278	0.135
S4.001	S5	30 Winter	1000	+0%	100/30 Winter				32.276	0.208
S4.002	S6	30 Winter	1000	+0%	100/15 Winter				32.260	0.388
S4.003	S7	30 Winter	1000	+0%	100/15 Winter				32.229	0.571
S4.004	S8	30 Winter	1000	+0%	100/15 Winter				32.216	0.650
S4.005	S9	30 Winter	1000	+0%	100/15 Summer				32.210	0.685
S1.005	S4	30 Winter	1000	+0%	100/15 Summer	1000/30 Summer	6	32.192	0.760	
S5.000	S17	60 Winter	1000	+0%	1000/60 Winter				31.908	0.011
S5.001	S18	60 Winter	1000	+0%	1000/30 Winter				31.908	0.513
S1.006	S5	30 Winter	1000	+0%	100/15 Summer				32.194	0.820
S6.000	S20	30 Winter	1000	+0%	100/15 Summer				32.194	0.804
S1.007	S6	30 Winter	1000	+0%	100/15 Summer				32.194	0.859
S1.008	S7	30 Winter	1000	+0%	100/15 Summer				32.191	0.953

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
S1.000	S1	0.000	0.24	14.3		FLOOD RISK	
S1.001	S2	0.000	0.61	35.3		SURCHARGED	
S1.002	S3	0.000	0.75	38.2		SURCHARGED	
S2.000	S4	0.000	0.07	9.0		OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S2.001	S5	0.000	0.14		8.9	OK	
S1.003	S4	0.000	0.25		15.1	SURCHARGED*	
S3.000	S7	0.000	0.12		13.8	OK	
S3.001	S8	0.000	0.21		13.8	OK	
S1.004	S4	0.000	0.31		18.9	SURCHARGED*	
S4.000	S4	0.000	0.07		1.0	SURCHARGED	
S4.001	S5	0.000	0.49		8.2	SURCHARGED	
S4.002	S6	0.000	0.95		16.0	SURCHARGED	
S4.003	S7	0.000	0.47		16.4	SURCHARGED	
S4.004	S8	0.000	0.51		15.1	SURCHARGED	
S4.005	S9	0.000	0.61		21.7	SURCHARGED	
S1.005	S4	0.000	1.23	42.8	73.1	SURCHARGED	
S5.000	S17	0.000	0.10		33.9	SURCHARGED	
S5.001	S18	0.000	0.14		6.9	SURCHARGED	
S1.006	S5	0.000	1.23		68.0	SURCHARGED	
S6.000	S20	0.000	0.01		2.2	SURCHARGED	
S1.007	S6	0.000	0.20		58.4	FLOOD RISK	
S1.008	S7	0.000	0.05		21.3	FLOOD RISK	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	13.902	0.058	239.7	0.029	5.00	0.0	0.600		o	300	Pipe/Conduit	
S1.001	11.918	0.050	238.4	0.042	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.002	6.375	0.027	236.1	0.007	0.00	0.0	0.600		o	300	Pipe/Conduit	
S2.000	14.400	0.001	14400.0	0.017	5.00	0.0		0.030	→ ↓ →		Porous Car Park	
S2.001	3.103	1.061	2.9	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.003	1.535	0.006	255.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.000	17.007	0.001	17007.0	0.026	5.00	0.0		0.030	→ ↓ →		Porous Car Park	
S3.001	1.153	1.142	1.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.004	5.986	0.025	239.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S4.000	7.487	0.075	99.8	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
S4.001	19.577	0.196	99.9	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
S4.002	21.483	0.215	99.9	0.015	0.00	0.0	0.600		o	150	Pipe/Conduit	
S4.003	15.649	0.092	170.1	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
S4.004	7.010	0.041	171.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S4.005	15.659	0.093	168.4	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.005	13.877	0.058	239.3	0.016	0.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	10.873	0.001	10873.0	0.000	5.00	0.0		0.050	→[↓]		Cellular Storage	
S5.001	5.073	0.021	241.6	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)
S1.000	45.92	5.23	31.298	0.029	0.0	0.0	0.0	1.01	71.5	3.6
S1.001	45.20	5.43	31.240	0.071	0.0	0.0	0.0	1.01	71.7	8.7
S1.002	44.83	5.53	31.190	0.078	0.0	0.0	0.0	1.02	72.0	9.5
S2.000	31.38	11.29	32.400	0.017	0.0	0.0	0.0	0.04	43.2	1.4
S2.001	31.37	11.30	32.399	0.017	0.0	0.0	0.0	5.94	104.9	1.4
S1.003	31.33	11.33	31.163	0.095	0.0	0.0	0.0	0.98	69.2	9.5
S3.000	28.95	13.08	32.450	0.026	0.0	0.0	0.0	0.04	39.8	2.0
S3.001	28.94	13.08	32.449	0.026	0.0	0.0	0.0	10.11	178.7	2.0
S1.004	28.83	13.18	31.157	0.121	0.0	0.0	0.0	1.01	71.5	9.5
S4.000	46.32	5.12	31.993	0.002	0.0	0.0	0.0	1.01	17.8	0.3
S4.001	45.12	5.45	31.918	0.016	0.0	0.0	0.0	1.01	17.8	2.0
S4.002	43.87	5.80	31.722	0.031	0.0	0.0	0.0	1.01	17.8	3.7
S4.003	43.01	6.07	31.433	0.033	0.0	0.0	0.0	1.00	39.7	3.8
S4.004	42.64	6.18	31.341	0.033	0.0	0.0	0.0	1.00	39.6	3.8
S4.005	41.84	6.44	31.300	0.047	0.0	0.0	0.0	1.00	39.9	5.3
S1.005	28.56	13.41	31.132	0.184	0.0	0.0	0.0	1.01	71.5	14.2
S5.000	39.45	7.29	31.096	0.000	0.0	0.0	0.0	0.08	110.7	0.0
S5.001	39.23	7.37	31.095	0.000	0.0	0.0	0.0	1.01	71.2	0.0

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.006	9.250	0.039	237.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	21.169	0.055	384.9	0.004	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.007	40.079	0.097	413.2	0.062	0.00	0.0	0.600		o	600	Pipe/Conduit	
S1.008	5.754	0.178	32.3	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.006	28.38	13.56	31.074	0.184	0.0	0.0	0.0	1.02	71.9	14.2
S6.000	45.71	5.29	30.790	0.004	0.0	0.0	0.0	1.24	349.2	0.5
S1.007	27.75	14.12	30.735	0.250	0.0	0.0	0.0	1.19	336.9	18.8
S1.008	27.73	14.14	30.638	0.250	0.0	0.0	0.0	4.29	1213.9	18.8

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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S1.008 S 32.250 30.460 0.000 0 0

Datum (m) 30.835 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	1.000	21	1.000	41	1.000	61	1.000	81	1.000	101	1.000	121	1.000
2	1.000	22	1.000	42	1.000	62	1.000	82	1.000	102	1.000	122	1.000
3	1.000	23	1.000	43	1.000	63	1.000	83	1.000	103	1.000	123	1.000
4	1.000	24	1.000	44	1.000	64	1.000	84	1.000	104	1.000	124	1.000
5	1.000	25	1.000	45	1.000	65	1.000	85	1.000	105	1.000	125	1.000
6	1.000	26	1.000	46	1.000	66	1.000	86	1.000	106	1.000	126	1.000
7	1.000	27	1.000	47	1.000	67	1.000	87	1.000	107	1.000	127	1.000
8	1.000	28	1.000	48	1.000	68	1.000	88	1.000	108	1.000	128	1.000
9	1.000	29	1.000	49	1.000	69	1.000	89	1.000	109	1.000	129	1.000
10	1.000	30	1.000	50	1.000	70	1.000	90	1.000	110	1.000	130	1.000
11	1.000	31	1.000	51	1.000	71	1.000	91	1.000	111	1.000	131	1.000
12	1.000	32	1.000	52	1.000	72	1.000	92	1.000	112	1.000	132	1.000
13	1.000	33	1.000	53	1.000	73	1.000	93	1.000	113	1.000	133	1.000
14	1.000	34	1.000	54	1.000	74	1.000	94	1.000	114	1.000	134	1.000
15	1.000	35	1.000	55	1.000	75	1.000	95	1.000	115	1.000	135	1.000
16	1.000	36	1.000	56	1.000	76	1.000	96	1.000	116	1.000	136	1.000
17	1.000	37	1.000	57	1.000	77	1.000	97	1.000	117	1.000	137	1.000
18	1.000	38	1.000	58	1.000	78	1.000	98	1.000	118	1.000	138	1.000
19	1.000	39	1.000	59	1.000	79	1.000	99	1.000	119	1.000	139	1.000
20	1.000	40	1.000	60	1.000	80	1.000	100	1.000	120	1.000	140	1.000

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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)
161	1.000	220	1.000	279	1.000	338	1.000	397	1.000	456	1.000	515	1.000	574	1.000
162	1.000	221	1.000	280	1.000	339	1.000	398	1.000	457	1.000	516	1.000	575	1.000
163	1.000	222	1.000	281	1.000	340	1.000	399	1.000	458	1.000	517	1.000	576	1.000
164	1.000	223	1.000	282	1.000	341	1.000	400	1.000	459	1.000	518	1.000	577	1.000
165	1.000	224	1.000	283	1.000	342	1.000	401	1.000	460	1.000	519	1.000	578	1.000
166	1.000	225	1.000	284	1.000	343	1.000	402	1.000	461	1.000	520	1.000	579	1.000
167	1.000	226	1.000	285	1.000	344	1.000	403	1.000	462	1.000	521	1.000	580	1.000
168	1.000	227	1.000	286	1.000	345	1.000	404	1.000	463	1.000	522	1.000	581	1.000
169	1.000	228	1.000	287	1.000	346	1.000	405	1.000	464	1.000	523	1.000	582	1.000
170	1.000	229	1.000	288	1.000	347	1.000	406	1.000	465	1.000	524	1.000	583	1.000
171	1.000	230	1.000	289	1.000	348	1.000	407	1.000	466	1.000	525	1.000	584	1.000
172	1.000	231	1.000	290	1.000	349	1.000	408	1.000	467	1.000	526	1.000	585	1.000
173	1.000	232	1.000	291	1.000	350	1.000	409	1.000	468	1.000	527	1.000	586	1.000
174	1.000	233	1.000	292	1.000	351	1.000	410	1.000	469	1.000	528	1.000	587	1.000
175	1.000	234	1.000	293	1.000	352	1.000	411	1.000	470	1.000	529	1.000	588	1.000
176	1.000	235	1.000	294	1.000	353	1.000	412	1.000	471	1.000	530	1.000	589	1.000
177	1.000	236	1.000	295	1.000	354	1.000	413	1.000	472	1.000	531	1.000	590	1.000
178	1.000	237	1.000	296	1.000	355	1.000	414	1.000	473	1.000	532	1.000	591	1.000
179	1.000	238	1.000	297	1.000	356	1.000	415	1.000	474	1.000	533	1.000	592	1.000
180	1.000	239	1.000	298	1.000	357	1.000	416	1.000	475	1.000	534	1.000	593	1.000
181	1.000	240	1.000	299	1.000	358	1.000	417	1.000	476	1.000	535	1.000	594	1.000
182	1.000	241	1.000	300	1.000	359	1.000	418	1.000	477	1.000	536	1.000	595	1.000
183	1.000	242	1.000	301	1.000	360	1.000	419	1.000	478	1.000	537	1.000	596	1.000
184	1.000	243	1.000	302	1.000	361	1.000	420	1.000	479	1.000	538	1.000	597	1.000
185	1.000	244	1.000	303	1.000	362	1.000	421	1.000	480	1.000	539	1.000	598	1.000
186	1.000	245	1.000	304	1.000	363	1.000	422	1.000	481	1.000	540	1.000	599	1.000
187	1.000	246	1.000	305	1.000	364	1.000	423	1.000	482	1.000	541	1.000	600	1.000
188	1.000	247	1.000	306	1.000	365	1.000	424	1.000	483	1.000	542	1.000	601	1.000
189	1.000	248	1.000	307	1.000	366	1.000	425	1.000	484	1.000	543	1.000	602	1.000
190	1.000	249	1.000	308	1.000	367	1.000	426	1.000	485	1.000	544	1.000	603	1.000
191	1.000	250	1.000	309	1.000	368	1.000	427	1.000	486	1.000	545	1.000	604	1.000
192	1.000	251	1.000	310	1.000	369	1.000	428	1.000	487	1.000	546	1.000	605	1.000
193	1.000	252	1.000	311	1.000	370	1.000	429	1.000	488	1.000	547	1.000	606	1.000
194	1.000	253	1.000	312	1.000	371	1.000	430	1.000	489	1.000	548	1.000	607	1.000
195	1.000	254	1.000	313	1.000	372	1.000	431	1.000	490	1.000	549	1.000	608	1.000
196	1.000	255	1.000	314	1.000	373	1.000	432	1.000	491	1.000	550	1.000	609	1.000
197	1.000	256	1.000	315	1.000	374	1.000	433	1.000	492	1.000	551	1.000	610	1.000
198	1.000	257	1.000	316	1.000	375	1.000	434	1.000	493	1.000	552	1.000	611	1.000
199	1.000	258	1.000	317	1.000	376	1.000	435	1.000	494	1.000	553	1.000	612	1.000
200	1.000	259	1.000	318	1.000	377	1.000	436	1.000	495	1.000	554	1.000	613	1.000
201	1.000	260	1.000	319	1.000	378	1.000	437	1.000	496	1.000	555	1.000	614	1.000
202	1.000	261	1.000	320	1.000	379	1.000	438	1.000	497	1.000	556	1.000	615	1.000
203	1.000	262	1.000	321	1.000	380	1.000	439	1.000	498	1.000	557	1.000	616	1.000
204	1.000	263	1.000	322	1.000	381	1.000	440	1.000	499	1.000	558	1.000	617	1.000
205	1.000	264	1.000	323	1.000	382	1.000	441	1.000	500	1.000	559	1.000	618	1.000
206	1.000	265	1.000	324	1.000	383	1.000	442	1.000	501	1.000	560	1.000	619	1.000
207	1.000	266	1.000	325	1.000	384	1.000	443	1.000	502	1.000	561	1.000	620	1.000
208	1.000	267	1.000	326	1.000	385	1.000	444	1.000	503	1.000	562	1.000	621	1.000
209	1.000	268	1.000	327	1.000	386	1.000	445	1.000	504	1.000	563	1.000	622	1.000
210	1.000	269	1.000	328	1.000	387	1.000	446	1.000	505	1.000	564	1.000	623	1.000
211	1.000	270	1.000	329	1.000	388	1.000	447	1.000	506	1.000	565	1.000	624	1.000
212	1.000	271	1.000	330	1.000	389	1.000	448	1.000	507	1.000	566	1.000	625	1.000
213	1.000	272	1.000	331	1.000	390	1.000	449	1.000	508	1.000	567	1.000	626	1.000
214	1.000	273	1.000	332	1.000	391	1.000	450	1.000	509	1.000	568	1.000	627	1.000
215	1.000	274	1.000	333	1.000	392	1.000	451	1.000	510	1.000	569	1.000	628	1.000
216	1.000	275	1.000	334	1.000	393	1.000	452	1.000	511	1.000	570	1.000	629	1.000
217	1.000	276	1.000	335	1.000	394	1.000	453	1.000	512	1.000	571	1.000	630	1.000
218	1.000	277	1.000	336	1.000	395	1.000	454	1.000	513	1.000	572	1.000	631	1.000
219	1.000	278	1.000	337	1.000	396	1.000	455	1.000	514	1.000	573	1.000	632	1.000

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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)
633	1.000	692	1.000	751	1.000	810	1.000	869	1.000	928	1.000	987	1.000	1046	1.000
634	1.000	693	1.000	752	1.000	811	1.000	870	1.000	929	1.000	988	1.000	1047	1.000
635	1.000	694	1.000	753	1.000	812	1.000	871	1.000	930	1.000	989	1.000	1048	1.000
636	1.000	695	1.000	754	1.000	813	1.000	872	1.000	931	1.000	990	1.000	1049	1.000
637	1.000	696	1.000	755	1.000	814	1.000	873	1.000	932	1.000	991	1.000	1050	1.000
638	1.000	697	1.000	756	1.000	815	1.000	874	1.000	933	1.000	992	1.000	1051	1.000
639	1.000	698	1.000	757	1.000	816	1.000	875	1.000	934	1.000	993	1.000	1052	1.000
640	1.000	699	1.000	758	1.000	817	1.000	876	1.000	935	1.000	994	1.000	1053	1.000
641	1.000	700	1.000	759	1.000	818	1.000	877	1.000	936	1.000	995	1.000	1054	1.000
642	1.000	701	1.000	760	1.000	819	1.000	878	1.000	937	1.000	996	1.000	1055	1.000
643	1.000	702	1.000	761	1.000	820	1.000	879	1.000	938	1.000	997	1.000	1056	1.000
644	1.000	703	1.000	762	1.000	821	1.000	880	1.000	939	1.000	998	1.000	1057	1.000
645	1.000	704	1.000	763	1.000	822	1.000	881	1.000	940	1.000	999	1.000	1058	1.000
646	1.000	705	1.000	764	1.000	823	1.000	882	1.000	941	1.000	1000	1.000	1059	1.000
647	1.000	706	1.000	765	1.000	824	1.000	883	1.000	942	1.000	1001	1.000	1060	1.000
648	1.000	707	1.000	766	1.000	825	1.000	884	1.000	943	1.000	1002	1.000	1061	1.000
649	1.000	708	1.000	767	1.000	826	1.000	885	1.000	944	1.000	1003	1.000	1062	1.000
650	1.000	709	1.000	768	1.000	827	1.000	886	1.000	945	1.000	1004	1.000	1063	1.000
651	1.000	710	1.000	769	1.000	828	1.000	887	1.000	946	1.000	1005	1.000	1064	1.000
652	1.000	711	1.000	770	1.000	829	1.000	888	1.000	947	1.000	1006	1.000	1065	1.000
653	1.000	712	1.000	771	1.000	830	1.000	889	1.000	948	1.000	1007	1.000	1066	1.000
654	1.000	713	1.000	772	1.000	831	1.000	890	1.000	949	1.000	1008	1.000	1067	1.000
655	1.000	714	1.000	773	1.000	832	1.000	891	1.000	950	1.000	1009	1.000	1068	1.000
656	1.000	715	1.000	774	1.000	833	1.000	892	1.000	951	1.000	1010	1.000	1069	1.000
657	1.000	716	1.000	775	1.000	834	1.000	893	1.000	952	1.000	1011	1.000	1070	1.000
658	1.000	717	1.000	776	1.000	835	1.000	894	1.000	953	1.000	1012	1.000	1071	1.000
659	1.000	718	1.000	777	1.000	836	1.000	895	1.000	954	1.000	1013	1.000	1072	1.000
660	1.000	719	1.000	778	1.000	837	1.000	896	1.000	955	1.000	1014	1.000	1073	1.000
661	1.000	720	1.000	779	1.000	838	1.000	897	1.000	956	1.000	1015	1.000	1074	1.000
662	1.000	721	1.000	780	1.000	839	1.000	898	1.000	957	1.000	1016	1.000	1075	1.000
663	1.000	722	1.000	781	1.000	840	1.000	899	1.000	958	1.000	1017	1.000	1076	1.000
664	1.000	723	1.000	782	1.000	841	1.000	900	1.000	959	1.000	1018	1.000	1077	1.000
665	1.000	724	1.000	783	1.000	842	1.000	901	1.000	960	1.000	1019	1.000	1078	1.000
666	1.000	725	1.000	784	1.000	843	1.000	902	1.000	961	1.000	1020	1.000	1079	1.000
667	1.000	726	1.000	785	1.000	844	1.000	903	1.000	962	1.000	1021	1.000	1080	1.000
668	1.000	727	1.000	786	1.000	845	1.000	904	1.000	963	1.000	1022	1.000	1081	1.000
669	1.000	728	1.000	787	1.000	846	1.000	905	1.000	964	1.000	1023	1.000	1082	1.000
670	1.000	729	1.000	788	1.000	847	1.000	906	1.000	965	1.000	1024	1.000	1083	1.000
671	1.000	730	1.000	789	1.000	848	1.000	907	1.000	966	1.000	1025	1.000	1084	1.000
672	1.000	731	1.000	790	1.000	849	1.000	908	1.000	967	1.000	1026	1.000	1085	1.000
673	1.000	732	1.000	791	1.000	850	1.000	909	1.000	968	1.000	1027	1.000	1086	1.000
674	1.000	733	1.000	792	1.000	851	1.000	910	1.000	969	1.000	1028	1.000	1087	1.000
675	1.000	734	1.000	793	1.000	852	1.000	911	1.000	970	1.000	1029	1.000	1088	1.000
676	1.000	735	1.000	794	1.000	853	1.000	912	1.000	971	1.000	1030	1.000	1089	1.000
677	1.000	736	1.000	795	1.000	854	1.000	913	1.000	972	1.000	1031	1.000	1090	1.000
678	1.000	737	1.000	796	1.000	855	1.000	914	1.000	973	1.000	1032	1.000	1091	1.000
679	1.000	738	1.000	797	1.000	856	1.000	915	1.000	974	1.000	1033	1.000	1092	1.000
680	1.000	739	1.000	798	1.000	857	1.000	916	1.000	975	1.000	1034	1.000	1093	1.000
681	1.000	740	1.000	799	1.000	858	1.000	917	1.000	976	1.000	1035	1.000	1094	1.000
682	1.000	741	1.000	800	1.000	859	1.000	918	1.000	977	1.000	1036	1.000	1095	1.000
683	1.000	742	1.000	801	1.000	860	1.000	919	1.000	978	1.000	1037	1.000	1096	1.000
684	1.000	743	1.000	802	1.000	861	1.000	920	1.000	979	1.000	1038	1.000	1097	1.000
685	1.000	744	1.000	803	1.000	862	1.000	921	1.000	980	1.000	1039	1.000	1098	1.000
686	1.000	745	1.000	804	1.000	863	1.000	922	1.000	981	1.000	1040	1.000	1099	1.000
687	1.000	746	1.000	805	1.000	864	1.000	923	1.000	982	1.000	1041	1.000	1100	1.000
688	1.000	747	1.000	806	1.000	865	1.000	924	1.000	983	1.000	1042	1.000	1101	1.000
689	1.000	748	1.000	807	1.000	866	1.000	925	1.000	984	1.000	1043	1.000	1102	1.000
690	1.000	749	1.000	808	1.000	867	1.000	926	1.000	985	1.000	1044	1.000	1103	1.000
691	1.000	750	1.000	809	1.000	868	1.000	927	1.000	986	1.000	1045	1.000	1104	1.000

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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)
1105	1.000	1147	1.000	1189	1.000	1231	1.000	1273	1.000	1315	1.000	1357	1.000	1399	1.000
1106	1.000	1148	1.000	1190	1.000	1232	1.000	1274	1.000	1316	1.000	1358	1.000	1400	1.000
1107	1.000	1149	1.000	1191	1.000	1233	1.000	1275	1.000	1317	1.000	1359	1.000	1401	1.000
1108	1.000	1150	1.000	1192	1.000	1234	1.000	1276	1.000	1318	1.000	1360	1.000	1402	1.000
1109	1.000	1151	1.000	1193	1.000	1235	1.000	1277	1.000	1319	1.000	1361	1.000	1403	1.000
1110	1.000	1152	1.000	1194	1.000	1236	1.000	1278	1.000	1320	1.000	1362	1.000	1404	1.000
1111	1.000	1153	1.000	1195	1.000	1237	1.000	1279	1.000	1321	1.000	1363	1.000	1405	1.000
1112	1.000	1154	1.000	1196	1.000	1238	1.000	1280	1.000	1322	1.000	1364	1.000	1406	1.000
1113	1.000	1155	1.000	1197	1.000	1239	1.000	1281	1.000	1323	1.000	1365	1.000	1407	1.000
1114	1.000	1156	1.000	1198	1.000	1240	1.000	1282	1.000	1324	1.000	1366	1.000	1408	1.000
1115	1.000	1157	1.000	1199	1.000	1241	1.000	1283	1.000	1325	1.000	1367	1.000	1409	1.000
1116	1.000	1158	1.000	1200	1.000	1242	1.000	1284	1.000	1326	1.000	1368	1.000	1410	1.000
1117	1.000	1159	1.000	1201	1.000	1243	1.000	1285	1.000	1327	1.000	1369	1.000	1411	1.000
1118	1.000	1160	1.000	1202	1.000	1244	1.000	1286	1.000	1328	1.000	1370	1.000	1412	1.000
1119	1.000	1161	1.000	1203	1.000	1245	1.000	1287	1.000	1329	1.000	1371	1.000	1413	1.000
1120	1.000	1162	1.000	1204	1.000	1246	1.000	1288	1.000	1330	1.000	1372	1.000	1414	1.000
1121	1.000	1163	1.000	1205	1.000	1247	1.000	1289	1.000	1331	1.000	1373	1.000	1415	1.000
1122	1.000	1164	1.000	1206	1.000	1248	1.000	1290	1.000	1332	1.000	1374	1.000	1416	1.000
1123	1.000	1165	1.000	1207	1.000	1249	1.000	1291	1.000	1333	1.000	1375	1.000	1417	1.000
1124	1.000	1166	1.000	1208	1.000	1250	1.000	1292	1.000	1334	1.000	1376	1.000	1418	1.000
1125	1.000	1167	1.000	1209	1.000	1251	1.000	1293	1.000	1335	1.000	1377	1.000	1419	1.000
1126	1.000	1168	1.000	1210	1.000	1252	1.000	1294	1.000	1336	1.000	1378	1.000	1420	1.000
1127	1.000	1169	1.000	1211	1.000	1253	1.000	1295	1.000	1337	1.000	1379	1.000	1421	1.000
1128	1.000	1170	1.000	1212	1.000	1254	1.000	1296	1.000	1338	1.000	1380	1.000	1422	1.000
1129	1.000	1171	1.000	1213	1.000	1255	1.000	1297	1.000	1339	1.000	1381	1.000	1423	1.000
1130	1.000	1172	1.000	1214	1.000	1256	1.000	1298	1.000	1340	1.000	1382	1.000	1424	1.000
1131	1.000	1173	1.000	1215	1.000	1257	1.000	1299	1.000	1341	1.000	1383	1.000	1425	1.000
1132	1.000	1174	1.000	1216	1.000	1258	1.000	1300	1.000	1342	1.000	1384	1.000	1426	1.000
1133	1.000	1175	1.000	1217	1.000	1259	1.000	1301	1.000	1343	1.000	1385	1.000	1427	1.000
1134	1.000	1176	1.000	1218	1.000	1260	1.000	1302	1.000	1344	1.000	1386	1.000	1428	1.000
1135	1.000	1177	1.000	1219	1.000	1261	1.000	1303	1.000	1345	1.000	1387	1.000	1429	1.000
1136	1.000	1178	1.000	1220	1.000	1262	1.000	1304	1.000	1346	1.000	1388	1.000	1430	1.000
1137	1.000	1179	1.000	1221	1.000	1263	1.000	1305	1.000	1347	1.000	1389	1.000	1431	1.000
1138	1.000	1180	1.000	1222	1.000	1264	1.000	1306	1.000	1348	1.000	1390	1.000	1432	1.000
1139	1.000	1181	1.000	1223	1.000	1265	1.000	1307	1.000	1349	1.000	1391	1.000	1433	1.000
1140	1.000	1182	1.000	1224	1.000	1266	1.000	1308	1.000	1350	1.000	1392	1.000	1434	1.000
1141	1.000	1183	1.000	1225	1.000	1267	1.000	1309	1.000	1351	1.000	1393	1.000	1435	1.000
1142	1.000	1184	1.000	1226	1.000	1268	1.000	1310	1.000	1352	1.000	1394	1.000	1436	1.000
1143	1.000	1185	1.000	1227	1.000	1269	1.000	1311	1.000	1353	1.000	1395	1.000	1437	1.000
1144	1.000	1186	1.000	1228	1.000	1270	1.000	1312	1.000	1354	1.000	1396	1.000	1438	1.000
1145	1.000	1187	1.000	1229	1.000	1271	1.000	1313	1.000	1355	1.000	1397	1.000	1439	1.000
1146	1.000	1188	1.000	1230	1.000	1272	1.000	1314	1.000	1356	1.000	1398	1.000	1440	1.000

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Online Controls for Storm

Non Return Valve Manhole: S18, DS/PN: S5.001, Volume (m³): 15.6

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.008, Volume (m³): 21.9

Unit Reference	MD-SHE-0194-2000-1350-2000
Design Head (m)	1.350
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	194
Invert Level (m)	30.638
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	20.0	Kick-Flo®	0.907	16.6
Flush-Flo™	0.414	20.0	Mean Flow over Head Range	-	17.2

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	6.7	0.800	18.3	2.000	24.1	4.000	33.6	7.000	44.1
0.200	18.0	1.000	17.3	2.200	25.2	4.500	35.6	7.500	45.6
0.300	19.7	1.200	18.9	2.400	26.3	5.000	37.5	8.000	47.0
0.400	20.0	1.400	20.3	2.600	27.4	5.500	39.2	8.500	48.4
0.500	19.9	1.600	21.7	3.000	29.3	6.000	40.9	9.000	49.8
0.600	19.6	1.800	22.9	3.500	31.6	6.500	42.5	9.500	51.1

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Offline Controls for Storm

Pipe Manhole: S4, DS/PN: S1.005, Loop to PN: S5.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	32.115

Pipe Manhole: S4, DS/PN: S1.005, Loop to PN: S5.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	32.115

Storage Structures for Storm

Porous Car Park Pipe: S2.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	14.4
Membrane Percolation (mm/hr)	1000	Slope (1:X)	14400.0
Max Percolation (l/s)	43.2	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.400		

Porous Car Park Pipe: S3.000

Manning's N	0.030	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	17.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	17007.0
Max Percolation (l/s)	51.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.450		

Cellular Storage Pipe: S5.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	31.096	Safety Factor	1.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	20.0	0.0	0.800	20.0	0.0	0.801	0.0	0.0

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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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
S1.000	S1	180 Winter	30	+0%	30/30 Summer				32.016	0.418	0.000
S1.001	S2	180 Winter	30	+0%	30/30 Summer				32.015	0.475	0.000
S1.002	S3	180 Winter	30	+0%	30/30 Summer				32.012	0.522	0.000
S2.000	S4	15 Winter	30	+0%					32.442	-0.308	0.000
S2.001	S5	15 Winter	30	+0%					32.422	-0.127	0.000
S1.003	S4	120 Winter	30	+0%	30/30 Summer				31.488	0.025	0.000
S3.000	S7	15 Winter	30	+0%					32.504	-0.296	0.000
S3.001	S8	15 Winter	30	+0%					32.478	-0.121	0.000
S1.004	S4	120 Winter	30	+0%					31.457	0.000	0.000
S4.000	S4	180 Winter	30	+0%					32.028	-0.115	0.000
S4.001	S5	180 Winter	30	+0%					32.028	-0.040	0.000
S4.002	S6	180 Winter	30	+0%	30/60 Summer				32.024	0.152	0.000
S4.003	S7	180 Winter	30	+0%	30/30 Winter				32.017	0.359	0.000
S4.004	S8	180 Winter	30	+0%	30/30 Summer				32.014	0.448	0.000
S4.005	S9	180 Winter	30	+0%	30/30 Summer				32.012	0.487	0.000
S1.005	S4	180 Winter	30	+0%	30/30 Summer			0	32.008	0.576	0.000
S5.000	S17	120 Winter	30	+0%					31.096	-0.801	0.000
S5.001	S18	120 Winter	30	+0%					31.095	-0.300	0.000
S1.006	S5	180 Winter	30	+0%	30/15 Winter				32.000	0.626	0.000
S6.000	S20	180 Winter	30	+0%	30/15 Winter				31.994	0.604	0.000
S1.007	S6	180 Winter	30	+0%	30/15 Summer				31.994	0.659	0.000
S1.008	S7	180 Winter	30	+0%	30/15 Summer				31.991	0.753	0.000

		Pipe				Level	
PN	US/MH Name	Flow Cap.	Flow (l/s)	Overflow (l/s)	Status	Exceeded	
S1.000	S1	0.03		1.9	SURCHARGED		
S1.001	S2	0.08		4.4	SURCHARGED		
S1.002	S3	0.09		4.6	SURCHARGED		
S2.000	S4	0.03		3.7	OK		

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Date 15/02/2019 09:35 File LAUREL ZONE A MD.MDX	Designed by DOREilly Checked by	
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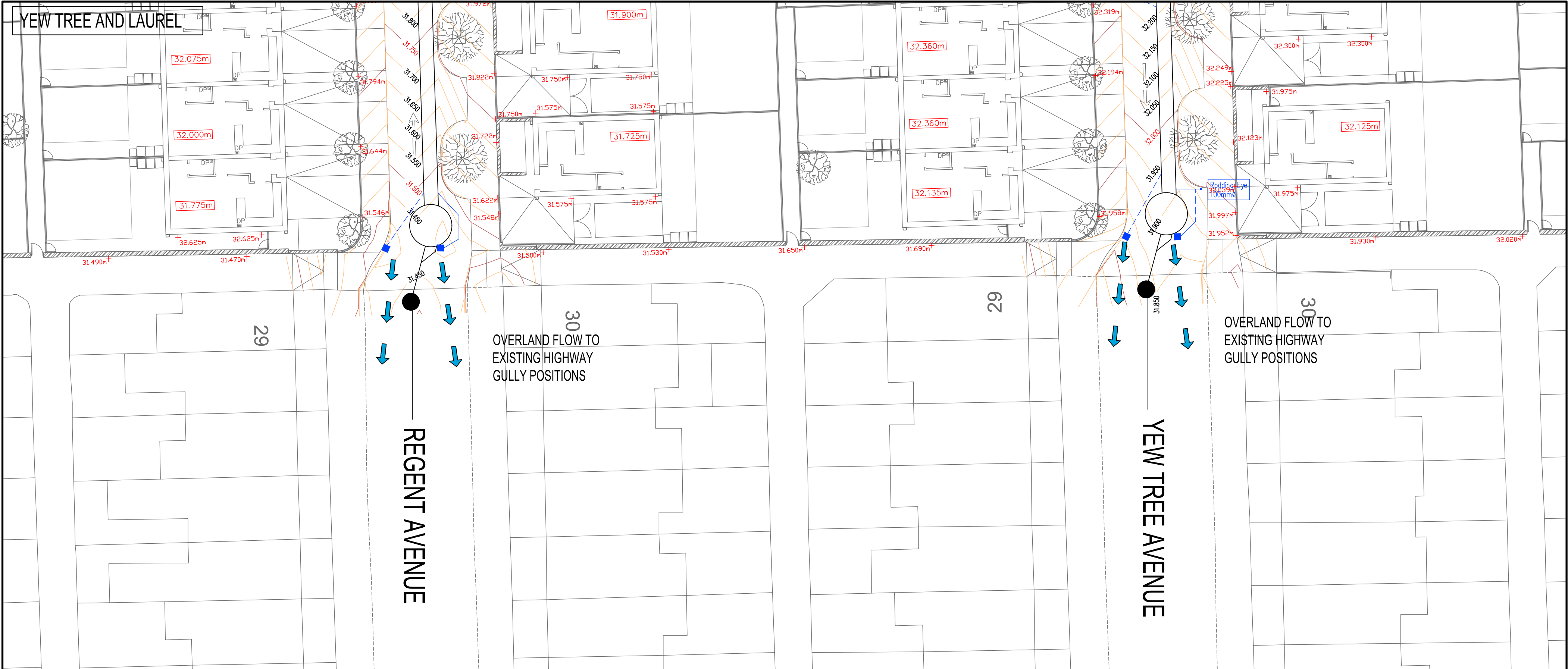
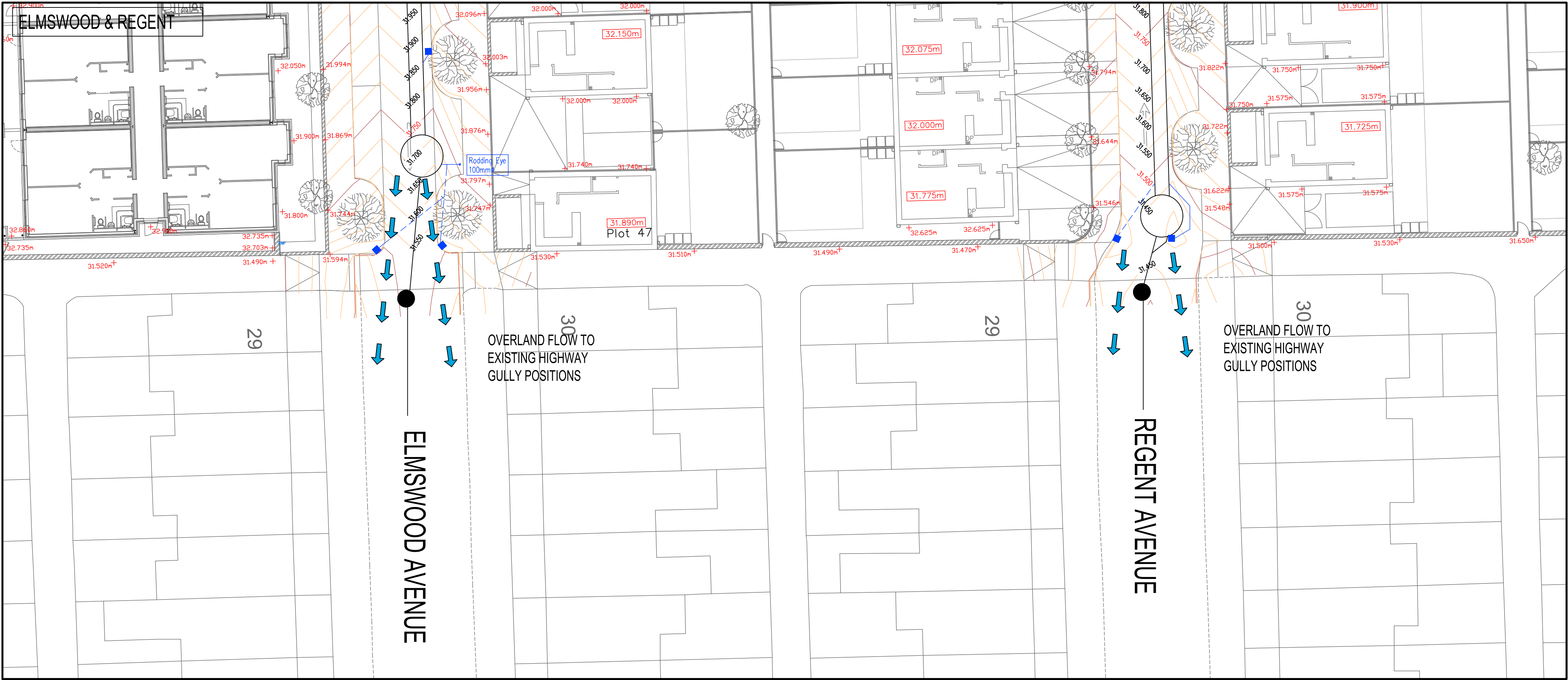
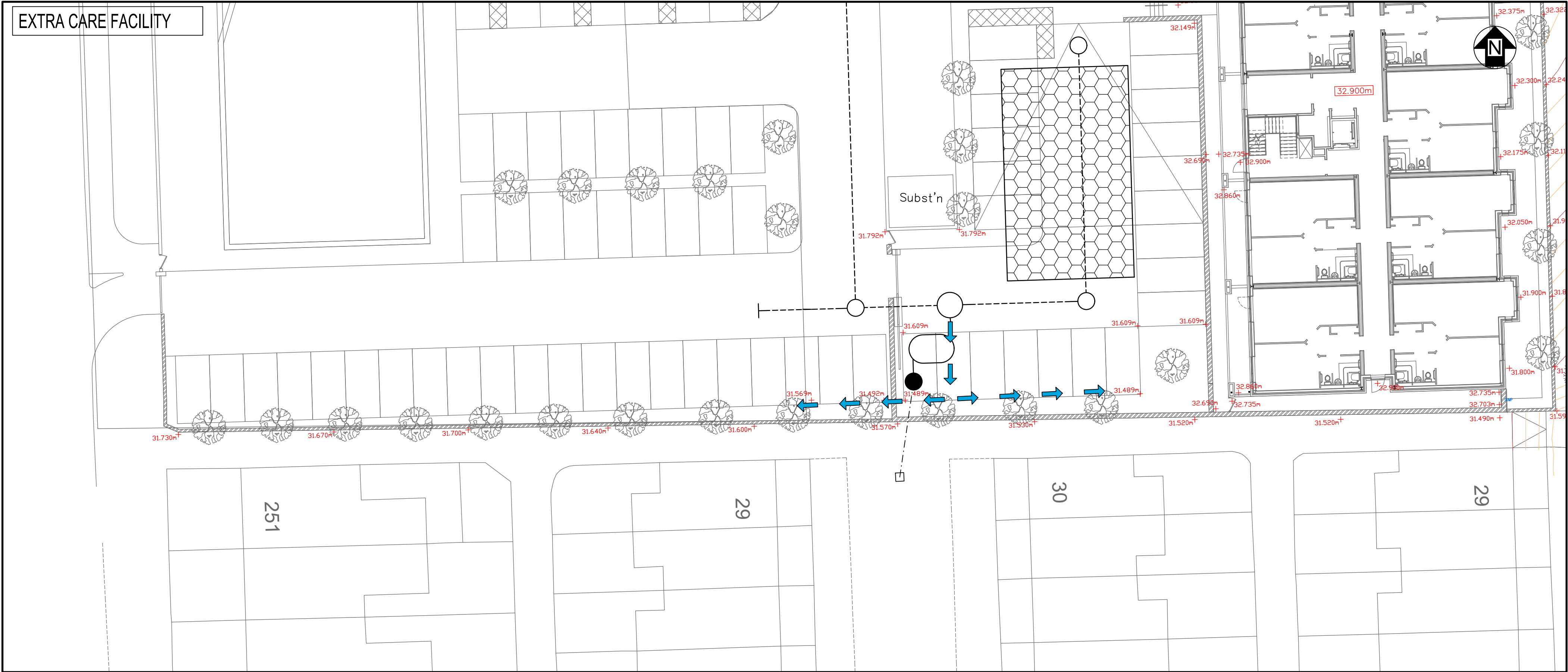
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flow / Overflow		Pipe Flow	Status	Level
		Cap.	(l/s)	(l/s)		Exceeded
S2.001	S5	0.06		3.6	OK	
S1.003	S4	0.12		7.4	SURCHARGED*	
S3.000	S7	0.05		5.6	OK	
S3.001	S8	0.08		5.5	OK	
S1.004	S4	0.14		8.8	SURCHARGED*	
S4.000	S4	0.01		0.1	OK	
S4.001	S5	0.07		1.2	OK	
S4.002	S6	0.14		2.3	SURCHARGED	
S4.003	S7	0.07		2.4	SURCHARGED	
S4.004	S8	0.07		2.2	SURCHARGED	
S4.005	S9	0.09		3.1	SURCHARGED	
S1.005	S4	0.16	0.0	9.6	SURCHARGED	
S5.000	S17	0.00		0.0	OK	
S5.001	S18	0.00		0.0	OK	
S1.006	S5	0.17		9.5	SURCHARGED	
S6.000	S20	0.00		0.3	SURCHARGED	
S1.007	S6	0.04		12.5	FLOOD RISK	
S1.008	S7	0.03		12.4	FLOOD RISK	



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APPENDIX F1



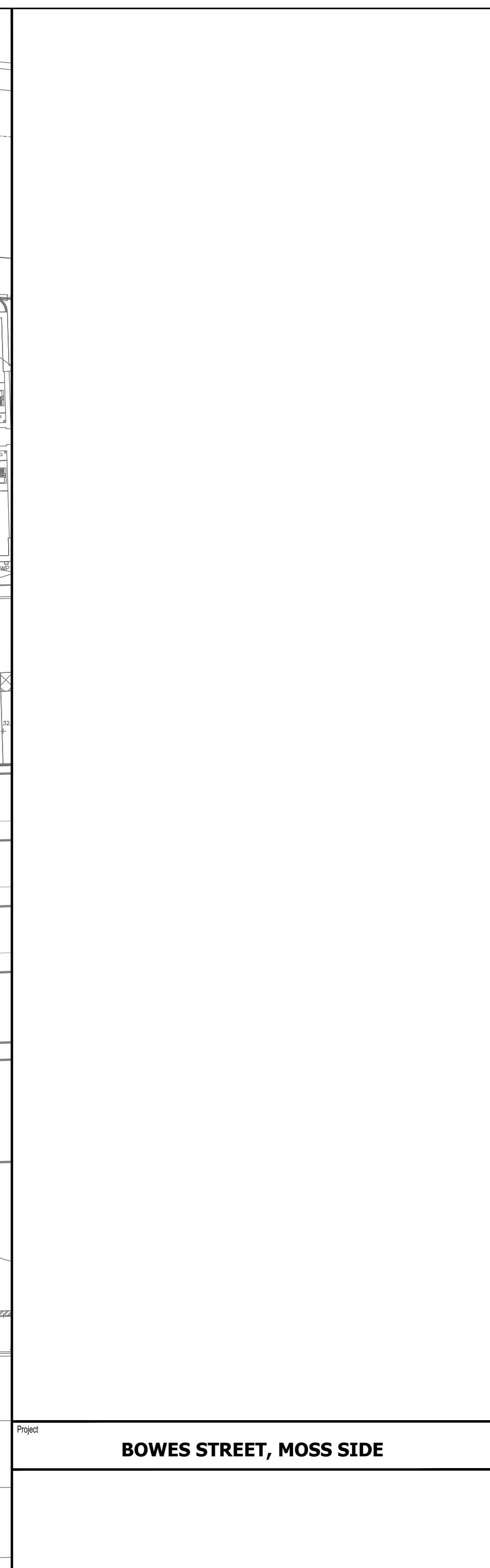
Project	Bowes Street, Moss Side		
Client	Rowlinson Constructions Ltd		
Scale	A(1)	Date	Drawn by:
1:200		15.02.2019	NCM
Drawing	Extreme Overland Flows (Blockage) Proposed Levels		

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Drawing No	Rec:
C1262-006	P1
Status	Information



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APPENDIX G



Flow Rate Calculation
$2.78 \times \text{Area} \times \text{Intensity} = Q \text{ Flow}$

Note:	Rainfall Intensity = 100 Year 5 Min Event plus 40% Climate Change
-------	---

Gully Reference		Gully Catchment		Flow Rate From Gully	
Laurel	No. 1	41	m ²	2.0	1/s
Laurel	No. 2	39	m ²	1.9	1/s
Laurel	No. 3	107	m ²	5.2	1/s
Laurel	No. 4	113	m ²	5.4	1/s
Laurel	No. 5	62	m ²	3.0	1/s
Laurel	No. 6	96	m ²	4.6	1/s
Laurel	No. 7	82	m ²	3.9	1/s
Laurel	No. 8	125	m ²	6.0	1/s

STATUS INFORMATION



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APPENDIX A1



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APPENDIX A2



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APPENDIX A3

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	9.602	0.120	80.0	0.019	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.001	21.288	0.265	80.3	0.018	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	5.194	0.165	31.5	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
2.000	7.494	0.095	78.9	0.000	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	17.710	0.235	75.4	0.017	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.003	22.142	0.235	94.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
3.000	29.486	0.390	75.6	0.059	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	13.287	0.265	50.1	0.020	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.004	12.135	0.065	186.7	0.027	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.005	17.298	0.215	80.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
4.000	8.059	0.200	40.3	0.000	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.006	10.866	0.135	80.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
5.000	19.039	0.210	90.7	0.045	5.00	0.0	0.600		o	150	Pipe/Conduit	
5.001	31.133	0.390	79.8	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.007	18.125	0.035	517.9	0.021	0.00	0.0		0.050	→[↓]		Cellular Storage	
6.000	21.851	0.855	25.6	0.000	5.00	0.0		0.050	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	5.14	31.600	0.019	0.0	0.0	0.0	1.12	19.9	0.0
1.001	0.00	5.46	31.480	0.037	0.0	0.0	0.0	1.12	19.8	0.0
1.002	0.00	5.51	31.215	0.037	0.0	0.0	0.0	1.80	31.8	0.0
2.000	0.00	5.11	31.465	0.000	0.0	0.0	0.0	1.13	20.0	0.0
2.001	0.00	5.36	31.370	0.017	0.0	0.0	0.0	1.16	20.5	0.0
1.003	0.00	5.86	31.050	0.054	0.0	0.0	0.0	1.04	18.3	0.0
3.000	0.00	5.33	31.570	0.059	0.0	0.0	0.0	1.51	59.9	0.0
3.001	0.00	5.45	31.180	0.079	0.0	0.0	0.0	1.85	73.6	0.0
1.004	0.00	6.07	30.915	0.160	0.0	0.0	0.0	0.95	37.9	0.0
1.005	0.00	6.27	30.850	0.160	0.0	0.0	0.0	1.46	58.0	0.0
4.000	0.00	5.08	30.910	0.000	0.0	0.0	0.0	1.59	28.1	0.0
1.006	0.00	6.40	30.635	0.160	0.0	0.0	0.0	1.46	58.0	0.0
5.000	0.00	5.30	31.175	0.045	0.0	0.0	0.0	1.06	18.7	0.0
5.001	0.00	5.65	30.890	0.045	0.0	0.0	0.0	1.46	58.2	0.0
1.007	0.00	7.01	30.155	0.226	0.0	0.0	0.0	0.49	3483.8	0.0
6.000	0.00	5.82	31.305	0.000	0.0	0.0	0.0	0.44	7.8	0.0

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
6.001	8.949	0.180	49.7	0.000	0.00	0.0		0.050	o	150	Pipe/Conduit	
1.008	9.680	0.020	484.0	0.052	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.000	82.639	0.832	99.3	0.058	5.00	0.0	0.600		o	225	Pipe/Conduit	
7.001	6.687	0.023	290.7	0.010	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.009	3.003	0.018	166.8	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.010	2.993	0.017	176.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.011	6.789	0.085	79.9	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
6.001	0.00	6.29	30.450	0.000	0.0	0.0	0.0	0.32	5.6	0.0
1.008	0.00	7.24	30.120	0.278	0.0	0.0	0.0	0.71	50.0	0.0
7.000	0.00	6.05	31.030	0.058	0.0	0.0	0.0	1.31	52.2	0.0
7.001	0.00	6.17	30.123	0.068	0.0	0.0	0.0	0.92	64.8	0.0
1.009	0.00	7.29	30.100	0.346	0.0	0.0	0.0	1.01	40.1	0.0
1.010	0.00	7.34	30.032	0.346	0.0	0.0	0.0	0.98	39.1	0.0
1.011	0.00	7.42	30.015	0.346	0.0	0.0	0.0	1.46	58.2	0.0

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		31.580	29.930	29.970	0	0

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S109, DS/PN: 1.009, Volume (m³): 8.0

Unit Reference MD-SHE-0193-2000-1390-2000
Design Head (m) 1.390
Design Flow (l/s) 20.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 193
Invert Level (m) 30.100
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.390	19.9	Kick-Flo®	0.926	16.4
Flush-Flo™	0.422	19.9	Mean Flow over Head Range	-	17.2

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	6.7	0.800	18.4	2.000	23.7	4.000	33.1	7.000	43.3
0.200	17.9	1.000	17.0	2.200	24.8	4.500	35.0	7.500	44.8
0.300	19.5	1.200	18.6	2.400	25.9	5.000	36.8	8.000	46.2
0.400	19.9	1.400	20.0	2.600	26.9	5.500	38.6	8.500	47.6
0.500	19.8	1.600	21.3	3.000	28.8	6.000	40.2	9.000	48.9
0.600	19.5	1.800	22.5	3.500	31.0	6.500	41.8	9.500	50.2

Storage Structures for Storm

Cellular Storage Pipe: 1.007

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	30.155	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	135.0	135.0	1.000	135.0	183.0	1.001	0.0	183.0

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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 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

									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	S100	15 Winter	1	+0%	100/15 Summer				31.636	-0.114
1.001	S101	15 Winter	1	+0%	100/15 Summer				31.528	-0.102
1.002	S102	15 Winter	1	+0%	30/15 Summer				31.255	-0.110
2.000	S200	120 Winter	1	+0%	100/15 Summer				31.465	-0.150
2.001	S201	15 Winter	1	+0%	100/15 Summer				31.400	-0.120
1.003	S103	15 Winter	1	+0%	30/15 Summer				31.110	-0.090
3.000	S300	15 Winter	1	+0%	1000/15 Summer				31.623	-0.172
3.001	S301	15 Winter	1	+0%	100/15 Summer				31.237	-0.168
1.004	S104	15 Winter	1	+0%	30/15 Summer				31.033	-0.107
1.005	S105	15 Winter	1	+0%	100/15 Summer				30.940	-0.135
4.000	S800	120 Winter	1	+0%	1000/60 Winter				30.910	-0.150
1.006	S106	15 Winter	1	+0%	100/15 Summer				30.729	-0.131
5.000	S400	15 Winter	1	+0%	100/15 Summer				31.232	-0.093
5.001	S401	15 Winter	1	+0%					30.938	-0.177
1.007	S107	60 Winter	1	+0%					30.269	-0.887
6.000	S900	120 Winter	1	+0%					31.305	-0.150
6.001	S901	120 Winter	1	+0%	100/15 Summer				30.450	-0.150
1.008	S108	60 Winter	1	+0%	30/30 Summer				30.268	-0.152
7.000	S600	15 Winter	1	+0%					31.086	-0.169
7.001	S601	60 Winter	1	+0%	30/30 Winter				30.260	-0.163
1.009	S109	60 Winter	1	+0%	5/30 Winter				30.259	-0.066
1.010	PI	60 Winter	1	+0%					30.127	-0.130
1.011	CO100	60 Winter	1	+0%					30.090	-0.150

		Flooded		Pipe		Level	
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded
1.000	S100	0.000	0.13		2.3	OK	
1.001	S101	0.000	0.22		4.1	OK	
1.002	S102	0.000	0.16		4.1	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.00		0.0	OK	
2.001	S201	0.000	0.09		1.7	OK	
1.003	S103	0.000	0.34		5.8	OK	
3.000	S300	0.000	0.13		7.0	OK	
3.001	S301	0.000	0.14		9.1	OK	
1.004	S104	0.000	0.54		17.6	OK	
1.005	S105	0.000	0.34		17.5	OK	
4.000	S800	0.000	0.00		0.0	OK	
1.006	S106	0.000	0.36		17.5	OK	
5.000	S400	0.000	0.30		5.3	OK	
5.001	S401	0.000	0.10		5.4	OK	
1.007	S107	0.000	0.01		14.1	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.00		0.0	OK	
1.008	S108	0.000	0.28		8.4	OK	
7.000	S600	0.000	0.14		7.0	OK	
7.001	S601	0.000	0.09		4.2	OK	
1.009	S109	0.000	0.38		10.1	OK	
1.010	PI	0.000	0.38		10.2	OK	
1.011	CO100	0.000	0.25		10.2	OK	

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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 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

US/MH			Return Climate		First (X)		First (Y)		First (Z)		Water	Surcharged
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level (m)	Depth (m)		
1.000	S100	15 Winter	2	+0%	100/15 Summer				31.641	-0.109		
1.001	S101	15 Winter	2	+0%	100/15 Summer				31.535	-0.095		
1.002	S102	15 Winter	2	+0%	30/15 Summer				31.262	-0.103		
2.000	S200	120 Winter	2	+0%	100/15 Summer				31.465	-0.150		
2.001	S201	15 Winter	2	+0%	100/15 Summer				31.404	-0.116		
1.003	S103	15 Winter	2	+0%	30/15 Summer				31.120	-0.080		
3.000	S300	15 Winter	2	+0%	1000/15 Summer				31.631	-0.164		
3.001	S301	15 Winter	2	+0%	100/15 Summer				31.246	-0.159		
1.004	S104	15 Winter	2	+0%	30/15 Summer				31.054	-0.086		
1.005	S105	15 Winter	2	+0%	100/15 Summer				30.954	-0.121		
4.000	S800	120 Winter	2	+0%	1000/60 Winter				30.910	-0.150		
1.006	S106	15 Winter	2	+0%	100/15 Summer				30.743	-0.117		
5.000	S400	15 Winter	2	+0%	100/15 Summer				31.241	-0.084		
5.001	S401	15 Winter	2	+0%					30.944	-0.171		
1.007	S107	60 Winter	2	+0%					30.304	-0.852		
6.000	S900	120 Winter	2	+0%					31.305	-0.150		
6.001	S901	120 Winter	2	+0%	100/15 Summer				30.450	-0.150		
1.008	S108	60 Winter	2	+0%	30/30 Summer				30.304	-0.116		
7.000	S600	15 Winter	2	+0%					31.094	-0.161		
7.001	S601	60 Winter	2	+0%	30/30 Winter				30.297	-0.126		
1.009	S109	60 Winter	2	+0%	5/30 Winter				30.296	-0.029		
1.010	PI	60 Winter	2	+0%					30.141	-0.116		
1.011	CO100	60 Winter	2	+0%					30.101	-0.139		

Flooded			Pipe		Level	
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status Exceeded
1.000	S100	0.000	0.17		3.0	OK
1.001	S101	0.000	0.28		5.3	OK
1.002	S102	0.000	0.21		5.3	OK

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.00		0.0	OK	
2.001	S201	0.000	0.12		2.2	OK	
1.003	S103	0.000	0.44		7.6	OK	
3.000	S300	0.000	0.16		9.1	OK	
3.001	S301	0.000	0.18		11.7	OK	
1.004	S104	0.000	0.70		22.8	OK	
1.005	S105	0.000	0.44		22.6	OK	
4.000	S800	0.000	0.00		0.0	OK	
1.006	S106	0.000	0.46		22.7	OK	
5.000	S400	0.000	0.39		6.9	OK	
5.001	S401	0.000	0.13		7.0	OK	
1.007	S107	0.000	0.01		18.0	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.00		0.0	OK	
1.008	S108	0.000	0.35		10.7	OK	
7.000	S600	0.000	0.17		8.9	OK	
7.001	S601	0.000	0.11		5.2	OK	
1.009	S109	0.000	0.48		12.8	OK	
1.010	PI	0.000	0.48		12.8	OK	
1.011	CO100	0.000	0.31		12.8	OK	

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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 Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

										Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)
1.000	S100	15 Winter	5	+0%	100/15 Summer					31.647	-0.103
1.001	S101	15 Winter	5	+0%	100/15 Summer					31.543	-0.087
1.002	S102	15 Winter	5	+0%	30/15 Summer					31.268	-0.097
2.000	S200	120 Winter	5	+0%	100/15 Summer					31.465	-0.150
2.001	S201	15 Winter	5	+0%	100/15 Summer					31.409	-0.111
1.003	S103	15 Winter	5	+0%	30/15 Summer					31.156	-0.044
3.000	S300	15 Winter	5	+0%	1000/15 Summer					31.640	-0.155
3.001	S301	15 Winter	5	+0%	100/15 Summer					31.255	-0.150
1.004	S104	15 Winter	5	+0%	30/15 Summer					31.082	-0.058
1.005	S105	15 Winter	5	+0%	100/15 Summer					30.972	-0.103
4.000	S800	120 Winter	5	+0%	1000/60 Winter					30.910	-0.150
1.006	S106	15 Winter	5	+0%	100/15 Summer					30.761	-0.099
5.000	S400	15 Winter	5	+0%	100/15 Summer					31.252	-0.073
5.001	S401	15 Winter	5	+0%						30.952	-0.163
1.007	S107	60 Winter	5	+0%						30.349	-0.807
6.000	S900	120 Winter	5	+0%						31.305	-0.150
6.001	S901	120 Winter	5	+0%	100/15 Summer					30.450	-0.150
1.008	S108	60 Winter	5	+0%	30/30 Summer					30.349	-0.071
7.000	S600	15 Winter	5	+0%						31.103	-0.152
7.001	S601	60 Winter	5	+0%	30/30 Winter					30.342	-0.081
1.009	S109	60 Winter	5	+0%	5/30 Winter					30.341	0.016
1.010	PI	60 Winter	5	+0%						30.157	-0.100
1.011	CO100	60 Winter	5	+0%						30.112	-0.128

		Flooded		Pipe			
	US/MH	Volume	Flow /	Overflow	Flow		Level
PN	Name	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
1.000	S100	0.000	0.22		3.8	OK	
1.001	S101	0.000	0.36		6.8	OK	
1.002	S102	0.000	0.27		6.9	OK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.00		0.0	OK	
2.001	S201	0.000	0.15		2.9	OK	
1.003	S103	0.000	0.56		9.7	OK	
3.000	S300	0.000	0.21		11.8	OK	
3.001	S301	0.000	0.24		15.1	OK	
1.004	S104	0.000	0.90		29.4	OK	
1.005	S105	0.000	0.56		29.2	OK	
4.000	S800	0.000	0.00		0.0	OK	
1.006	S106	0.000	0.60		29.3	OK	
5.000	S400	0.000	0.51		8.9	OK	
5.001	S401	0.000	0.17		9.1	OK	
1.007	S107	0.000	0.01		22.9	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.00		0.0	OK	
1.008	S108	0.000	0.44		13.4	OK	
7.000	S600	0.000	0.22		11.3	OK	
7.001	S601	0.000	0.14		6.6	OK	
1.009	S109	0.000	0.60		16.0	SURCHARGED	
1.010	PI	0.000	0.60		16.0	OK	
1.011	CO100	0.000	0.39		16.0	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

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) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

									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	S100	15	Winter	30	+0%	100/15	Summer			31.658	-0.092
1.001	S101	15	Winter	30	+0%	100/15	Summer			31.564	-0.066
1.002	S102	15	Winter	30	+0%	30/15	Summer			31.398	0.033
2.000	S200	120	Winter	30	+0%	100/15	Summer			31.465	-0.150
2.001	S201	15	Winter	30	+0%	100/15	Summer			31.424	-0.096
1.003	S103	15	Winter	30	+0%	30/15	Summer			31.372	0.172
3.000	S300	15	Winter	30	+0%	1000/15	Summer			31.656	-0.139
3.001	S301	15	Winter	30	+0%	100/15	Summer			31.275	-0.130
1.004	S104	15	Winter	30	+0%	30/15	Summer			31.196	0.056
1.005	S105	15	Winter	30	+0%	100/15	Summer			31.013	-0.062
4.000	S800	120	Winter	30	+0%	1000/60	Winter			30.910	-0.150
1.006	S106	15	Winter	30	+0%	100/15	Summer			30.806	-0.054
5.000	S400	15	Winter	30	+0%	100/15	Summer			31.274	-0.051
5.001	S401	15	Winter	30	+0%					30.965	-0.150
1.007	S107	60	Winter	30	+0%					30.475	-0.681
6.000	S900	120	Winter	30	+0%					31.305	-0.150
6.001	S901	60	Winter	30	+0%	100/15	Summer			30.468	-0.132
1.008	S108	60	Winter	30	+0%	30/30	Summer			30.474	0.054
7.000	S600	15	Winter	30	+0%					31.120	-0.135
7.001	S601	60	Winter	30	+0%	30/30	Winter			30.465	0.042
1.009	S109	60	Winter	30	+0%	5/30	Winter			30.463	0.138
1.010	PI	60	Winter	30	+0%					30.174	-0.083
1.011	CO100	60	Winter	30	+0%					30.123	-0.117

			Flooded			Pipe		
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
1.000	S100	0.000	0.32		5.6	OK		
1.001	S101	0.000	0.60		11.1	OK		
1.002	S102	0.000	0.41		10.5	SURCHARGED		

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.00		0.0	OK	
2.001	S201	0.000	0.28		5.4	OK	
1.003	S103	0.000	0.89		15.3	SURCHARGED	
3.000	S300	0.000	0.31		17.2	OK	
3.001	S301	0.000	0.36		23.3	OK	
1.004	S104	0.000	1.40		45.6	SURCHARGED	
1.005	S105	0.000	0.88		45.5	OK	
4.000	S800	0.000	0.00		0.0	OK	
1.006	S106	0.000	0.92		45.1	OK	
5.000	S400	0.000	0.75		13.1	OK	
5.001	S401	0.000	0.24		13.3	OK	
1.007	S107	0.000	0.01		34.9	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.00		0.0	OK	
1.008	S108	0.000	0.55		16.9	SURCHARGED	
7.000	S600	0.000	0.32		16.3	OK	
7.001	S601	0.000	0.20		9.4	SURCHARGED	
1.009	S109	0.000	0.72		19.3	SURCHARGED	
1.010	PI	0.000	0.72		19.3	OK	
1.011	CO100	0.000	0.47		19.3	OK	

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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 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

									Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)
1.000	S100	15 Winter	100	+40%	100/15 Summer				32.233	0.483
1.001	S101	15 Winter	100	+40%	100/15 Summer				32.203	0.573
1.002	S102	15 Winter	100	+40%	30/15 Summer				31.997	0.632
2.000	S200	15 Winter	100	+40%	100/15 Summer				31.961	0.346
2.001	S201	15 Winter	100	+40%	100/15 Summer				31.959	0.439
1.003	S103	15 Winter	100	+40%	30/15 Summer				31.930	0.730
3.000	S300	15 Winter	100	+40%	1000/15 Summer				31.779	-0.016
3.001	S301	15 Winter	100	+40%	100/15 Summer				31.679	0.274
1.004	S104	15 Winter	100	+40%	30/15 Summer				31.578	0.438
1.005	S105	15 Winter	100	+40%	100/15 Summer				31.306	0.231
4.000	S800	15 Winter	100	+40%	1000/60 Winter				30.960	-0.100
1.006	S106	15 Winter	100	+40%	100/15 Summer				30.960	0.100
5.000	S400	15 Winter	100	+40%	100/15 Summer				31.481	0.156
5.001	S401	15 Winter	100	+40%					30.992	-0.123
1.007	S107	60 Winter	100	+40%					30.862	-0.294
6.000	S900	120 Winter	100	+40%					31.305	-0.150
6.001	S901	60 Winter	100	+40%	100/15 Summer				30.860	0.260
1.008	S108	60 Winter	100	+40%	30/30 Summer				30.860	0.440
7.000	S600	15 Winter	100	+40%					31.158	-0.097
7.001	S601	60 Winter	100	+40%	30/30 Winter				30.851	0.428
1.009	S109	60 Winter	100	+40%	5/30 Winter				30.857	0.532
1.010	PI	30 Summer	100	+40%					30.176	-0.081
1.011	CO100	30 Winter	100	+40%					30.125	-0.115

		Flooded		Pipe			
	US/MH	Volume	Flow /	Overflow	Flow		Level
PN	Name	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
1.000	S100	0.000	0.49		8.6	SURCHARGED	
1.001	S101	0.000	0.89		16.6	SURCHARGED	
1.002	S102	0.000	0.64		16.3	SURCHARGED	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.18		3.1	SURCHARGED	
2.001	S201	0.000	0.38		7.3	SURCHARGED	
1.003	S103	0.000	1.23		21.3	SURCHARGED	
3.000	S300	0.000	0.56		31.0	OK	
3.001	S301	0.000	0.55		34.8	SURCHARGED	
1.004	S104	0.000	2.03		65.9	SURCHARGED	
1.005	S105	0.000	1.27		65.8	SURCHARGED	
4.000	S800	0.000	0.00		0.1	OK	
1.006	S106	0.000	1.34		65.7	SURCHARGED	
5.000	S400	0.000	1.32		23.1	SURCHARGED	
5.001	S401	0.000	0.42		22.9	OK	
1.007	S107	0.000	0.02		62.5	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.02		0.1	SURCHARGED	
1.008	S108	0.000	0.60		18.5	SURCHARGED	
7.000	S600	0.000	0.58		29.4	OK	
7.001	S601	0.000	0.35		16.4	SURCHARGED	
1.009	S109	0.000	0.74		19.9	SURCHARGED	
1.010	PI	0.000	0.74		19.9	OK	
1.011	CO100	0.000	0.48		19.9	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 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 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

									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	S100	15 Winter	1000	+0%	100/15 Summer				32.596	0.846
1.001	S101	15 Winter	1000	+0%	100/15 Summer				32.560	0.930
1.002	S102	15 Winter	1000	+0%	30/15 Summer				32.312	0.947
2.000	S200	15 Winter	1000	+0%	100/15 Summer				32.271	0.656
2.001	S201	15 Winter	1000	+0%	100/15 Summer				32.271	0.751
1.003	S103	15 Winter	1000	+0%	30/15 Summer				32.238	1.038
3.000	S300	15 Winter	1000	+0%	1000/15 Summer				32.072	0.277
3.001	S301	15 Winter	1000	+0%	100/15 Summer				31.946	0.541
1.004	S104	15 Winter	1000	+0%	30/15 Summer				31.804	0.664
1.005	S105	15 Winter	1000	+0%	100/15 Summer				31.465	0.390
4.000	S800	120 Winter	1000	+0%	1000/60 Winter				31.080	0.020
1.006	S106	120 Winter	1000	+0%	100/15 Summer				31.081	0.221
5.000	S400	15 Winter	1000	+0%	100/15 Summer				31.601	0.276
5.001	S401	120 Winter	1000	+0%					31.074	-0.041
1.007	S107	120 Winter	1000	+0%					31.068	-0.088
6.000	S900	120 Winter	1000	+0%					31.305	-0.150
6.001	S901	120 Winter	1000	+0%	100/15 Summer				31.062	0.462
1.008	S108	120 Winter	1000	+0%	30/30 Summer				31.062	0.642
7.000	S600	15 Winter	1000	+0%					31.171	-0.084
7.001	S601	120 Winter	1000	+0%	30/30 Winter				31.050	0.627
1.009	S109	120 Winter	1000	+0%	5/30 Winter				31.052	0.727
1.010	PI	15 Summer	1000	+0%					30.176	-0.081
1.011	CO100	15 Summer	1000	+0%					30.125	-0.115

		Flooded		Pipe			
	US/MH	Volume	Flow /	Overflow	Flow		Level
PN	Name	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
1.000	S100	0.000	0.55		9.7	FLOOD RISK	
1.001	S101	0.000	0.99		18.6	FLOOD RISK	
1.002	S102	0.000	0.71		18.1	FLOOD RISK	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.24		4.2	SURCHARGED	
2.001	S201	0.000	0.44		8.3	SURCHARGED	
1.003	S103	0.000	1.37		23.7	SURCHARGED	
3.000	S300	0.000	0.58		32.5	SURCHARGED	
3.001	S301	0.000	0.62		39.8	SURCHARGED	
1.004	S104	0.000	2.29		74.3	SURCHARGED	
1.005	S105	0.000	1.43		73.9	SURCHARGED	
4.000	S800	0.000	0.00		0.0	SURCHARGED	
1.006	S106	0.000	0.71		34.8	SURCHARGED	
5.000	S400	0.000	1.52		26.6	SURCHARGED	
5.001	S401	0.000	0.18		9.9	OK	
1.007	S107	0.000	0.02		47.0	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.02		0.1	SURCHARGED	
1.008	S108	0.000	0.61		18.6	SURCHARGED	
7.000	S600	0.000	0.67		34.2	OK	
7.001	S601	0.000	0.27		12.3	SURCHARGED	
1.009	S109	0.000	0.74		19.9	SURCHARGED	
1.010	PI	0.000	0.74		19.9	OK	
1.011	CO100	0.000	0.48		19.9	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	9.602	0.120	80.0	0.019	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.001	21.288	0.265	80.3	0.018	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	5.194	0.165	31.5	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
2.000	7.494	0.095	78.9	0.000	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	17.710	0.235	75.4	0.017	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.003	22.142	0.235	94.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
3.000	29.486	0.390	75.6	0.059	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	13.287	0.265	50.1	0.020	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.004	12.135	0.065	186.7	0.027	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.005	17.298	0.215	80.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
4.000	8.059	0.200	40.3	0.000	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.006	10.866	0.135	80.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
5.000	19.039	0.210	90.7	0.045	5.00	0.0	0.600		o	150	Pipe/Conduit	
5.001	31.133	0.390	79.8	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.007	18.125	0.035	517.9	0.021	0.00	0.0		0.050	→[↓]		Cellular Storage	
6.000	21.851	0.855	25.6	0.000	5.00	0.0		0.050	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	5.14	31.600	0.019	0.0	0.0	0.0	1.12	19.9	0.0
1.001	0.00	5.46	31.480	0.037	0.0	0.0	0.0	1.12	19.8	0.0
1.002	0.00	5.51	31.215	0.037	0.0	0.0	0.0	1.80	31.8	0.0
2.000	0.00	5.11	31.465	0.000	0.0	0.0	0.0	1.13	20.0	0.0
2.001	0.00	5.36	31.370	0.017	0.0	0.0	0.0	1.16	20.5	0.0
1.003	0.00	5.86	31.050	0.054	0.0	0.0	0.0	1.04	18.3	0.0
3.000	0.00	5.33	31.570	0.059	0.0	0.0	0.0	1.51	59.9	0.0
3.001	0.00	5.45	31.180	0.079	0.0	0.0	0.0	1.85	73.6	0.0
1.004	0.00	6.07	30.915	0.160	0.0	0.0	0.0	0.95	37.9	0.0
1.005	0.00	6.27	30.850	0.160	0.0	0.0	0.0	1.46	58.0	0.0
4.000	0.00	5.08	30.910	0.000	0.0	0.0	0.0	1.59	28.1	0.0
1.006	0.00	6.40	30.635	0.160	0.0	0.0	0.0	1.46	58.0	0.0
5.000	0.00	5.30	31.175	0.045	0.0	0.0	0.0	1.06	18.7	0.0
5.001	0.00	5.65	30.890	0.045	0.0	0.0	0.0	1.46	58.2	0.0
1.007	0.00	7.01	30.155	0.226	0.0	0.0	0.0	0.49	3483.8	0.0
6.000	0.00	5.82	31.305	0.000	0.0	0.0	0.0	0.44	7.8	0.0

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
6.001	8.949	0.180	49.7	0.000	0.00	0.0		0.050	o	150	Pipe/Conduit	
1.008	9.680	0.020	484.0	0.052	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.000	82.639	0.832	99.3	0.058	5.00	0.0	0.600		o	225	Pipe/Conduit	
7.001	6.687	0.023	290.7	0.010	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.009	3.003	0.018	166.8	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.010	2.993	0.017	176.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.011	6.789	0.085	79.9	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
6.001	0.00	6.29	30.450	0.000	0.0	0.0	0.0	0.32	5.6	0.0
1.008	0.00	7.24	30.120	0.278	0.0	0.0	0.0	0.71	50.0	0.0
7.000	0.00	6.05	31.030	0.058	0.0	0.0	0.0	1.31	52.2	0.0
7.001	0.00	6.17	30.123	0.068	0.0	0.0	0.0	0.92	64.8	0.0
1.009	0.00	7.29	30.100	0.346	0.0	0.0	0.0	1.01	40.1	0.0
1.010	0.00	7.34	30.032	0.346	0.0	0.0	0.0	0.98	39.1	0.0
1.011	0.00	7.42	30.015	0.346	0.0	0.0	0.0	1.46	58.2	0.0

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.011 31.580 29.930 29.970 0 0

Datum (m) 29.970 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	1.000	15	1.000	29	1.000	43	1.000	57	1.000	71	1.000	85	1.000
2	1.000	16	1.000	30	1.000	44	1.000	58	1.000	72	1.000	86	1.000
3	1.000	17	1.000	31	1.000	45	1.000	59	1.000	73	1.000	87	1.000
4	1.000	18	1.000	32	1.000	46	1.000	60	1.000	74	1.000	88	1.000
5	1.000	19	1.000	33	1.000	47	1.000	61	1.000	75	1.000	89	1.000
6	1.000	20	1.000	34	1.000	48	1.000	62	1.000	76	1.000	90	1.000
7	1.000	21	1.000	35	1.000	49	1.000	63	1.000	77	1.000	91	1.000
8	1.000	22	1.000	36	1.000	50	1.000	64	1.000	78	1.000	92	1.000
9	1.000	23	1.000	37	1.000	51	1.000	65	1.000	79	1.000	93	1.000
10	1.000	24	1.000	38	1.000	52	1.000	66	1.000	80	1.000	94	1.000
11	1.000	25	1.000	39	1.000	53	1.000	67	1.000	81	1.000	95	1.000
12	1.000	26	1.000	40	1.000	54	1.000	68	1.000	82	1.000	96	1.000
13	1.000	27	1.000	41	1.000	55	1.000	69	1.000	83	1.000	97	1.000
14	1.000	28	1.000	42	1.000	56	1.000	70	1.000	84	1.000	98	1.000

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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)
113	1.000	172	1.000	231	1.000	290	1.000	349	1.000	408	1.000	467	1.000	526	1.000
114	1.000	173	1.000	232	1.000	291	1.000	350	1.000	409	1.000	468	1.000	527	1.000
115	1.000	174	1.000	233	1.000	292	1.000	351	1.000	410	1.000	469	1.000	528	1.000
116	1.000	175	1.000	234	1.000	293	1.000	352	1.000	411	1.000	470	1.000	529	1.000
117	1.000	176	1.000	235	1.000	294	1.000	353	1.000	412	1.000	471	1.000	530	1.000
118	1.000	177	1.000	236	1.000	295	1.000	354	1.000	413	1.000	472	1.000	531	1.000
119	1.000	178	1.000	237	1.000	296	1.000	355	1.000	414	1.000	473	1.000	532	1.000
120	1.000	179	1.000	238	1.000	297	1.000	356	1.000	415	1.000	474	1.000	533	1.000
121	1.000	180	1.000	239	1.000	298	1.000	357	1.000	416	1.000	475	1.000	534	1.000
122	1.000	181	1.000	240	1.000	299	1.000	358	1.000	417	1.000	476	1.000	535	1.000
123	1.000	182	1.000	241	1.000	300	1.000	359	1.000	418	1.000	477	1.000	536	1.000
124	1.000	183	1.000	242	1.000	301	1.000	360	1.000	419	1.000	478	1.000	537	1.000
125	1.000	184	1.000	243	1.000	302	1.000	361	1.000	420	1.000	479	1.000	538	1.000
126	1.000	185	1.000	244	1.000	303	1.000	362	1.000	421	1.000	480	1.000	539	1.000
127	1.000	186	1.000	245	1.000	304	1.000	363	1.000	422	1.000	481	1.000	540	1.000
128	1.000	187	1.000	246	1.000	305	1.000	364	1.000	423	1.000	482	1.000	541	1.000
129	1.000	188	1.000	247	1.000	306	1.000	365	1.000	424	1.000	483	1.000	542	1.000
130	1.000	189	1.000	248	1.000	307	1.000	366	1.000	425	1.000	484	1.000	543	1.000
131	1.000	190	1.000	249	1.000	308	1.000	367	1.000	426	1.000	485	1.000	544	1.000
132	1.000	191	1.000	250	1.000	309	1.000	368	1.000	427	1.000	486	1.000	545	1.000
133	1.000	192	1.000	251	1.000	310	1.000	369	1.000	428	1.000	487	1.000	546	1.000
134	1.000	193	1.000	252	1.000	311	1.000	370	1.000	429	1.000	488	1.000	547	1.000
135	1.000	194	1.000	253	1.000	312	1.000	371	1.000	430	1.000	489	1.000	548	1.000
136	1.000	195	1.000	254	1.000	313	1.000	372	1.000	431	1.000	490	1.000	549	1.000
137	1.000	196	1.000	255	1.000	314	1.000	373	1.000	432	1.000	491	1.000	550	1.000
138	1.000	197	1.000	256	1.000	315	1.000	374	1.000	433	1.000	492	1.000	551	1.000
139	1.000	198	1.000	257	1.000	316	1.000	375	1.000	434	1.000	493	1.000	552	1.000
140	1.000	199	1.000	258	1.000	317	1.000	376	1.000	435	1.000	494	1.000	553	1.000
141	1.000	200	1.000	259	1.000	318	1.000	377	1.000	436	1.000	495	1.000	554	1.000
142	1.000	201	1.000	260	1.000	319	1.000	378	1.000	437	1.000	496	1.000	555	1.000
143	1.000	202	1.000	261	1.000	320	1.000	379	1.000	438	1.000	497	1.000	556	1.000
144	1.000	203	1.000	262	1.000	321	1.000	380	1.000	439	1.000	498	1.000	557	1.000
145	1.000	204	1.000	263	1.000	322	1.000	381	1.000	440	1.000	499	1.000	558	1.000
146	1.000	205	1.000	264	1.000	323	1.000	382	1.000	441	1.000	500	1.000	559	1.000
147	1.000	206	1.000	265	1.000	324	1.000	383	1.000	442	1.000	501	1.000	560	1.000
148	1.000	207	1.000	266	1.000	325	1.000	384	1.000	443	1.000	502	1.000	561	1.000
149	1.000	208	1.000	267	1.000	326	1.000	385	1.000	444	1.000	503	1.000	562	1.000
150	1.000	209	1.000	268	1.000	327	1.000	386	1.000	445	1.000	504	1.000	563	1.000
151	1.000	210	1.000	269	1.000	328	1.000	387	1.000	446	1.000	505	1.000	564	1.000
152	1.000	211	1.000	270	1.000	329	1.000	388	1.000	447	1.000	506	1.000	565	1.000
153	1.000	212	1.000	271	1.000	330	1.000	389	1.000	448	1.000	507	1.000	566	1.000
154	1.000	213	1.000	272	1.000	331	1.000	390	1.000	449	1.000	508	1.000	567	1.000
155	1.000	214	1.000	273	1.000	332	1.000	391	1.000	450	1.000	509	1.000	568	1.000
156	1.000	215	1.000	274	1.000	333	1.000	392	1.000	451	1.000	510	1.000	569	1.000
157	1.000	216	1.000	275	1.000	334	1.000	393	1.000	452	1.000	511	1.000	570	1.000
158	1.000	217	1.000	276	1.000	335	1.000	394	1.000	453	1.000	512	1.000	571	1.000
159	1.000	218	1.000	277	1.000	336	1.000	395	1.000	454	1.000	513	1.000	572	1.000
160	1.000	219	1.000	278	1.000	337	1.000	396	1.000	455	1.000	514	1.000	573	1.000
161	1.000	220	1.000	279	1.000	338	1.000	397	1.000	456	1.000	515	1.000	574	1.000
162	1.000	221	1.000	280	1.000	339	1.000	398	1.000	457	1.000	516	1.000	575	1.000
163	1.000	222	1.000	281	1.000	340	1.000	399	1.000	458	1.000	517	1.000	576	1.000
164	1.000	223	1.000	282	1.000	341	1.000	400	1.000	459	1.000	518	1.000	577	1.000
165	1.000	224	1.000	283	1.000	342	1.000	401	1.000	460	1.000	519	1.000	578	1.000
166	1.000	225	1.000	284	1.000	343	1.000	402	1.000	461	1.000	520	1.000	579	1.000
167	1.000	226	1.000	285	1.000	344	1.000	403	1.000	462	1.000	521	1.000	580	1.000
168	1.000	227	1.000	286	1.000	345	1.000	404	1.000	463	1.000	522	1.000	581	1.000
169	1.000	228	1.000	287	1.000	346	1.000	405	1.000	464	1.000	523	1.000	582	1.000
170	1.000	229	1.000	288	1.000	347	1.000	406	1.000	465	1.000	524	1.000	583	1.000
171	1.000	230	1.000	289	1.000	348	1.000	407	1.000	466	1.000	525	1.000	584	1.000

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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)
585	1.000	644	1.000	703	1.000	762	1.000	821	1.000	880	1.000	939	1.000	998	1.000
586	1.000	645	1.000	704	1.000	763	1.000	822	1.000	881	1.000	940	1.000	999	1.000
587	1.000	646	1.000	705	1.000	764	1.000	823	1.000	882	1.000	941	1.000	1000	1.000
588	1.000	647	1.000	706	1.000	765	1.000	824	1.000	883	1.000	942	1.000	1001	1.000
589	1.000	648	1.000	707	1.000	766	1.000	825	1.000	884	1.000	943	1.000	1002	1.000
590	1.000	649	1.000	708	1.000	767	1.000	826	1.000	885	1.000	944	1.000	1003	1.000
591	1.000	650	1.000	709	1.000	768	1.000	827	1.000	886	1.000	945	1.000	1004	1.000
592	1.000	651	1.000	710	1.000	769	1.000	828	1.000	887	1.000	946	1.000	1005	1.000
593	1.000	652	1.000	711	1.000	770	1.000	829	1.000	888	1.000	947	1.000	1006	1.000
594	1.000	653	1.000	712	1.000	771	1.000	830	1.000	889	1.000	948	1.000	1007	1.000
595	1.000	654	1.000	713	1.000	772	1.000	831	1.000	890	1.000	949	1.000	1008	1.000
596	1.000	655	1.000	714	1.000	773	1.000	832	1.000	891	1.000	950	1.000	1009	1.000
597	1.000	656	1.000	715	1.000	774	1.000	833	1.000	892	1.000	951	1.000	1010	1.000
598	1.000	657	1.000	716	1.000	775	1.000	834	1.000	893	1.000	952	1.000	1011	1.000
599	1.000	658	1.000	717	1.000	776	1.000	835	1.000	894	1.000	953	1.000	1012	1.000
600	1.000	659	1.000	718	1.000	777	1.000	836	1.000	895	1.000	954	1.000	1013	1.000
601	1.000	660	1.000	719	1.000	778	1.000	837	1.000	896	1.000	955	1.000	1014	1.000
602	1.000	661	1.000	720	1.000	779	1.000	838	1.000	897	1.000	956	1.000	1015	1.000
603	1.000	662	1.000	721	1.000	780	1.000	839	1.000	898	1.000	957	1.000	1016	1.000
604	1.000	663	1.000	722	1.000	781	1.000	840	1.000	899	1.000	958	1.000	1017	1.000
605	1.000	664	1.000	723	1.000	782	1.000	841	1.000	900	1.000	959	1.000	1018	1.000
606	1.000	665	1.000	724	1.000	783	1.000	842	1.000	901	1.000	960	1.000	1019	1.000
607	1.000	666	1.000	725	1.000	784	1.000	843	1.000	902	1.000	961	1.000	1020	1.000
608	1.000	667	1.000	726	1.000	785	1.000	844	1.000	903	1.000	962	1.000	1021	1.000
609	1.000	668	1.000	727	1.000	786	1.000	845	1.000	904	1.000	963	1.000	1022	1.000
610	1.000	669	1.000	728	1.000	787	1.000	846	1.000	905	1.000	964	1.000	1023	1.000
611	1.000	670	1.000	729	1.000	788	1.000	847	1.000	906	1.000	965	1.000	1024	1.000
612	1.000	671	1.000	730	1.000	789	1.000	848	1.000	907	1.000	966	1.000	1025	1.000
613	1.000	672	1.000	731	1.000	790	1.000	849	1.000	908	1.000	967	1.000	1026	1.000
614	1.000	673	1.000	732	1.000	791	1.000	850	1.000	909	1.000	968	1.000	1027	1.000
615	1.000	674	1.000	733	1.000	792	1.000	851	1.000	910	1.000	969	1.000	1028	1.000
616	1.000	675	1.000	734	1.000	793	1.000	852	1.000	911	1.000	970	1.000	1029	1.000
617	1.000	676	1.000	735	1.000	794	1.000	853	1.000	912	1.000	971	1.000	1030	1.000
618	1.000	677	1.000	736	1.000	795	1.000	854	1.000	913	1.000	972	1.000	1031	1.000
619	1.000	678	1.000	737	1.000	796	1.000	855	1.000	914	1.000	973	1.000	1032	1.000
620	1.000	679	1.000	738	1.000	797	1.000	856	1.000	915	1.000	974	1.000	1033	1.000
621	1.000	680	1.000	739	1.000	798	1.000	857	1.000	916	1.000	975	1.000	1034	1.000
622	1.000	681	1.000	740	1.000	799	1.000	858	1.000	917	1.000	976	1.000	1035	1.000
623	1.000	682	1.000	741	1.000	800	1.000	859	1.000	918	1.000	977	1.000	1036	1.000
624	1.000	683	1.000	742	1.000	801	1.000	860	1.000	919	1.000	978	1.000	1037	1.000
625	1.000	684	1.000	743	1.000	802	1.000	861	1.000	920	1.000	979	1.000	1038	1.000
626	1.000	685	1.000	744	1.000	803	1.000	862	1.000	921	1.000	980	1.000	1039	1.000
627	1.000	686	1.000	745	1.000	804	1.000	863	1.000	922	1.000	981	1.000	1040	1.000
628	1.000	687	1.000	746	1.000	805	1.000	864	1.000	923	1.000	982	1.000	1041	1.000
629	1.000	688	1.000	747	1.000	806	1.000	865	1.000	924	1.000	983	1.000	1042	1.000
630	1.000	689	1.000	748	1.000	807	1.000	866	1.000	925	1.000	984	1.000	1043	1.000
631	1.000	690	1.000	749	1.000	808	1.000	867	1.000	926	1.000	985	1.000	1044	1.000
632	1.000	691	1.000	750	1.000	809	1.000	868	1.000	927	1.000	986	1.000	1045	1.000
633	1.000	692	1.000	751	1.000	810	1.000	869	1.000	928	1.000	987	1.000	1046	1.000
634	1.000	693	1.000	752	1.000	811	1.000	870	1.000	929	1.000	988	1.000	1047	1.000
635	1.000	694	1.000	753	1.000	812	1.000	871	1.000	930	1.000	989	1.000	1048	1.000
636	1.000	695	1.000	754	1.000	813	1.000	872	1.000	931	1.000	990	1.000	1049	1.000
637	1.000	696	1.000	755	1.000	814	1.000	873	1.000	932	1.000	991	1.000	1050	1.000
638	1.000	697	1.000	756	1.000	815	1.000	874	1.000	933	1.000	992	1.000	1051	1.000
639	1.000	698	1.000	757	1.000	816	1.000	875	1.000	934	1.000	993	1.000	1052	1.000
640	1.000	699	1.000	758	1.000	817	1.000	876	1.000	935	1.000	994	1.000	1053	1.000
641	1.000	700	1.000	759	1.000	818	1.000	877	1.000	936	1.000	995	1.000	1054	1.000
642	1.000	701	1.000	760	1.000	819	1.000	878	1.000	937	1.000	996	1.000	1055	1.000
643	1.000	702	1.000	761	1.000	820	1.000	879	1.000	938	1.000	997	1.000	1056	1.000

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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)
1057	1.000	1105	1.000	1153	1.000	1201	1.000	1249	1.000	1297	1.000	1345	1.000	1393	1.000
1058	1.000	1106	1.000	1154	1.000	1202	1.000	1250	1.000	1298	1.000	1346	1.000	1394	1.000
1059	1.000	1107	1.000	1155	1.000	1203	1.000	1251	1.000	1299	1.000	1347	1.000	1395	1.000
1060	1.000	1108	1.000	1156	1.000	1204	1.000	1252	1.000	1300	1.000	1348	1.000	1396	1.000
1061	1.000	1109	1.000	1157	1.000	1205	1.000	1253	1.000	1301	1.000	1349	1.000	1397	1.000
1062	1.000	1110	1.000	1158	1.000	1206	1.000	1254	1.000	1302	1.000	1350	1.000	1398	1.000
1063	1.000	1111	1.000	1159	1.000	1207	1.000	1255	1.000	1303	1.000	1351	1.000	1399	1.000
1064	1.000	1112	1.000	1160	1.000	1208	1.000	1256	1.000	1304	1.000	1352	1.000	1400	1.000
1065	1.000	1113	1.000	1161	1.000	1209	1.000	1257	1.000	1305	1.000	1353	1.000	1401	1.000
1066	1.000	1114	1.000	1162	1.000	1210	1.000	1258	1.000	1306	1.000	1354	1.000	1402	1.000
1067	1.000	1115	1.000	1163	1.000	1211	1.000	1259	1.000	1307	1.000	1355	1.000	1403	1.000
1068	1.000	1116	1.000	1164	1.000	1212	1.000	1260	1.000	1308	1.000	1356	1.000	1404	1.000
1069	1.000	1117	1.000	1165	1.000	1213	1.000	1261	1.000	1309	1.000	1357	1.000	1405	1.000
1070	1.000	1118	1.000	1166	1.000	1214	1.000	1262	1.000	1310	1.000	1358	1.000	1406	1.000
1071	1.000	1119	1.000	1167	1.000	1215	1.000	1263	1.000	1311	1.000	1359	1.000	1407	1.000
1072	1.000	1120	1.000	1168	1.000	1216	1.000	1264	1.000	1312	1.000	1360	1.000	1408	1.000
1073	1.000	1121	1.000	1169	1.000	1217	1.000	1265	1.000	1313	1.000	1361	1.000	1409	1.000
1074	1.000	1122	1.000	1170	1.000	1218	1.000	1266	1.000	1314	1.000	1362	1.000	1410	1.000
1075	1.000	1123	1.000	1171	1.000	1219	1.000	1267	1.000	1315	1.000	1363	1.000	1411	1.000
1076	1.000	1124	1.000	1172	1.000	1220	1.000	1268	1.000	1316	1.000	1364	1.000	1412	1.000
1077	1.000	1125	1.000	1173	1.000	1221	1.000	1269	1.000	1317	1.000	1365	1.000	1413	1.000
1078	1.000	1126	1.000	1174	1.000	1222	1.000	1270	1.000	1318	1.000	1366	1.000	1414	1.000
1079	1.000	1127	1.000	1175	1.000	1223	1.000	1271	1.000	1319	1.000	1367	1.000	1415	1.000
1080	1.000	1128	1.000	1176	1.000	1224	1.000	1272	1.000	1320	1.000	1368	1.000	1416	1.000
1081	1.000	1129	1.000	1177	1.000	1225	1.000	1273	1.000	1321	1.000	1369	1.000	1417	1.000
1082	1.000	1130	1.000	1178	1.000	1226	1.000	1274	1.000	1322	1.000	1370	1.000	1418	1.000
1083	1.000	1131	1.000	1179	1.000	1227	1.000	1275	1.000	1323	1.000	1371	1.000	1419	1.000
1084	1.000	1132	1.000	1180	1.000	1228	1.000	1276	1.000	1324	1.000	1372	1.000	1420	1.000
1085	1.000	1133	1.000	1181	1.000	1229	1.000	1277	1.000	1325	1.000	1373	1.000	1421	1.000
1086	1.000	1134	1.000	1182	1.000	1230	1.000	1278	1.000	1326	1.000	1374	1.000	1422	1.000
1087	1.000	1135	1.000	1183	1.000	1231	1.000	1279	1.000	1327	1.000	1375	1.000	1423	1.000
1088	1.000	1136	1.000	1184	1.000	1232	1.000	1280	1.000	1328	1.000	1376	1.000	1424	1.000
1089	1.000	1137	1.000	1185	1.000	1233	1.000	1281	1.000	1329	1.000	1377	1.000	1425	1.000
1090	1.000	1138	1.000	1186	1.000	1234	1.000	1282	1.000	1330	1.000	1378	1.000	1426	1.000
1091	1.000	1139	1.000	1187	1.000	1235	1.000	1283	1.000	1331	1.000	1379	1.000	1427	1.000
1092	1.000	1140	1.000	1188	1.000	1236	1.000	1284	1.000	1332	1.000	1380	1.000	1428	1.000
1093	1.000	1141	1.000	1189	1.000	1237	1.000	1285	1.000	1333	1.000	1381	1.000	1429	1.000
1094	1.000	1142	1.000	1190	1.000	1238	1.000	1286	1.000	1334	1.000	1382	1.000	1430	1.000
1095	1.000	1143	1.000	1191	1.000	1239	1.000	1287	1.000	1335	1.000	1383	1.000	1431	1.000
1096	1.000	1144	1.000	1192	1.000	1240	1.000	1288	1.000	1336	1.000	1384	1.000	1432	1.000
1097	1.000	1145	1.000	1193	1.000	1241	1.000	1289	1.000	1337	1.000	1385	1.000	1433	1.000
1098	1.000	1146	1.000	1194	1.000	1242	1.000	1290	1.000	1338	1.000	1386	1.000	1434	1.000
1099	1.000	1147	1.000	1195	1.000	1243	1.000	1291	1.000	1339	1.000	1387	1.000	1435	1.000
1100	1.000	1148	1.000	1196	1.000	1244	1.000	1292	1.000	1340	1.000	1388	1.000	1436	1.000
1101	1.000	1149	1.000	1197	1.000	1245	1.000	1293	1.000	1341	1.000	1389	1.000	1437	1.000
1102	1.000	1150	1.000	1198	1.000	1246	1.000	1294	1.000	1342	1.000	1390	1.000	1438	1.000
1103	1.000	1151	1.000	1199	1.000	1247	1.000	1295	1.000	1343	1.000	1391	1.000	1439	1.000
1104	1.000	1152	1.000	1200	1.000	1248	1.000	1296	1.000	1344	1.000	1392	1.000	1440	1.000

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S109, DS/PN: 1.009, Volume (m³): 8.0

Unit Reference MD-SHE-0193-2000-1390-2000
Design Head (m) 1.390
Design Flow (l/s) 20.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 193
Invert Level (m) 30.100
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.390	19.9	Kick-Flo®	0.926	16.4
Flush-Flo™	0.422	19.9	Mean Flow over Head Range	-	17.2

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	6.7	0.800	18.4	2.000	23.7	4.000	33.1	7.000	43.3
0.200	17.9	1.000	17.0	2.200	24.8	4.500	35.0	7.500	44.8
0.300	19.5	1.200	18.6	2.400	25.9	5.000	36.8	8.000	46.2
0.400	19.9	1.400	20.0	2.600	26.9	5.500	38.6	8.500	47.6
0.500	19.8	1.600	21.3	3.000	28.8	6.000	40.2	9.000	48.9
0.600	19.5	1.800	22.5	3.500	31.0	6.500	41.8	9.500	50.2

Storage Structures for Storm

Cellular Storage Pipe: 1.007

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	30.155	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	135.0	135.0	1.000	135.0	183.0	1.001	0.0	183.0

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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

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) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Water	Surcharged
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Overflow	Act.	Level (m)	Depth (m)
1.000	S100	15 Winter	30	+0%						31.658	-0.092
1.001	S101	15 Winter	30	+0%						31.564	-0.066
1.002	S102	15 Winter	30	+0%	30/15 Summer					31.398	0.033
2.000	S200	120 Winter	30	+0%						31.465	-0.150
2.001	S201	15 Winter	30	+0%						31.424	-0.096
1.003	S103	15 Winter	30	+0%	30/15 Summer					31.372	0.172
3.000	S300	15 Winter	30	+0%						31.656	-0.139
3.001	S301	15 Winter	30	+0%						31.275	-0.130
1.004	S104	15 Winter	30	+0%	30/15 Summer					31.196	0.056
1.005	S105	960 Winter	30	+0%						31.040	-0.035
4.000	S800	960 Winter	30	+0%						31.036	-0.024
1.006	S106	960 Winter	30	+0%	30/180 Winter					31.036	0.176
5.000	S400	15 Winter	30	+0%						31.274	-0.051
5.001	S401	1440 Winter	30	+0%						31.037	-0.078
1.007	S107	1440 Winter	30	+0%						31.034	-0.122
6.000	S900	120 Winter	30	+0%						31.305	-0.150
6.001	S901	1440 Winter	30	+0%	30/30 Winter					31.035	0.435
1.008	S108	1440 Winter	30	+0%	30/15 Summer					31.034	0.614
7.000	S600	15 Winter	30	+0%						31.120	-0.135
7.001	S601	1440 Winter	30	+0%	30/15 Summer 30/600 Summer					31.085	0.662
1.009	S109	600 Winter	30	+0%	30/15 Summer					31.150	0.825
1.010	PI	1440 Winter	30	+0%	30/15 Summer					30.978	0.721
1.011	CO100	600 Winter	30	+0%	30/15 Summer					30.988	0.748

Flooded		Pipe		Level	
PN	US/MH Name	Volume (m³)	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status
1.000	S100	0.000	0.32	5.6	OK
1.001	S101	0.000	0.60	11.1	OK
1.002	S102	0.000	0.41	10.5	SURCHARGED

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
2.000	S200	0.000	0.00		0.0	OK	
2.001	S201	0.000	0.28		5.4	OK	
1.003	S103	0.000	0.89		15.3	SURCHARGED	
3.000	S300	0.000	0.31		17.2	OK	
3.001	S301	0.000	0.36		23.3	OK	
1.004	S104	0.000	1.40		45.6	SURCHARGED	
1.005	S105	0.000	0.07		3.4	OK	
4.000	S800	0.000	0.00		0.0	OK	
1.006	S106	0.000	0.07		3.3	SURCHARGED	
5.000	S400	0.000	0.75		13.1	OK	
5.001	S401	0.000	0.01		0.7	OK	
1.007	S107	0.000	0.00		3.3	OK	
6.000	S900	0.000	0.00		0.0	OK	
6.001	S901	0.000	0.01		0.1	SURCHARGED	
1.008	S108	0.000	0.57		17.5	SURCHARGED	
7.000	S600	0.000	0.32		16.3	OK	
7.001	S601	0.000	0.04		1.9	SURCHARGED	
1.009	S109	0.000	0.12		3.3	SURCHARGED	
1.010	PI	0.000	0.74		19.8	SURCHARGED	
1.011	CO100	0.000	0.08		3.2	SURCHARGED	



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APPENDIX B1



KEY

- EXISTING PUBLIC COMBINED SEWER
- PROPOSED PUBLIC SURFACE WATER SEWER
- PROPOSED PUBLIC FOUL SEWER
- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED RAINWATER PIPE AND CONNECTION
- PROPOSED ACO MULTIDRAIN M1000 30.0
- PROPOSED ACO MULTIDRAIN SUMP UNIT
- PROPOSED PERMEABLE ASPHALT WITH PERMAVOID CRATE FITTED TO OUTLET PIPE IN SUMP
- RAINWATER PIPE CONNECTING TO PERMAVOID CRATE
- PROPOSED CELLULAR ATTENUATION
- CHAMBER WITH 300mm CATCHPIT
- OVER FLOW PIPE
- HIGH LEVEL INCOMING PIPE
- BACKDROP
- ACO DRAIN WITH END CAP CONNECTION INTO PERMEABLE PAVEMENT
- NON RETURN VALVE
- PROPOSED PERFORATED PIPE
- PROPOSED PRIVATE FOUL SEWER
- PROPOSED SOIL VENT PIPE
- PROPOSED DRAIN POINT
- PROPOSED FLOOR GULLY

FOR DRAWING NOTES AND MANHOLE SCHEDULE REFER TO DRAWING 1262-503

FOR DRAINAGE DETAILS REFER TO DRAWING C1262-504

FOR ATTENUATION DETAILS REFER TO DRAWING C1262-505

C2	MHUF01 LOCATION UPDATED. FW-D-009 & 010 UPDATED TO SUIT.	ZG	12.02.2019
REV	DESCRIPTION	BY	DATE
Project	BOWES STREET, MOSS SIDE		
Client	ROWLINSONS CONSTRUCTION LTD		
Scale	A(1)	Date	Drawn by:
1:125	01.02.2019	ZG	
Drawing	ZONE D		
PROPOSED DRAINAGE LAYOUT			

MHCC1 (13500)
CL: 31.620m
IL: 29.945m(1500)
IL: 29.870m(2250)
REBUILD OF EXISTING MH0902

EXISTING 2250 UUI COMBINED SEWER

Shepherd Gilmore Consulting Engineers
Colchester House, 40 Peter Street, Manchester M2 5GP.
Phone: 0161 837 1500. E-mail: sg@sgiconsulting.co.uk
Web: www.sgiconsulting.co.uk

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Drawing No	C1262-502	Rev:	C2
Status	CONSTRUCTION		



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APPENDIX B2



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APPENDIX B3

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Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	31.940	0.133	240.0	0.047	5.00	0.0	0.600		o	300	Pipe/Conduit	
2.000	20.920	0.209	100.0	0.017	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	19.850	0.117	169.7	0.009	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.001	17.311	0.072	240.0	0.034	0.00	0.0	0.600		o	300	Pipe/Conduit	
3.000	16.800	0.001	16800.0	0.022	5.00	0.0		0.050 → ↓ ←			Porous Car Park	
3.001	2.593	1.461	1.8	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	2.377	0.010	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.000	17.999	0.001	17999.0	0.026	5.00	0.0		0.050 → ↓ ←			Porous Car Park	
4.001	1.568	1.486	1.1	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.003	5.904	0.025	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.000	7.623	0.076	100.3	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
5.001	5.352	0.054	100.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
5.002	17.000	0.170	100.0	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.000	9.670	0.097	100.0	0.016	5.00	0.0	0.600		o	150	Pipe/Conduit	
6.001	15.800	0.158	100.0	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.002	17.260	0.173	100.0	0.002	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.003	2.630	0.066	40.0	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	44.84	5.53	30.668	0.047	0.0	0.0	0.0	1.01	71.4	7.6
2.000	45.49	5.35	31.011	0.017	0.0	0.0	0.0	1.00	17.8	2.8
2.001	44.31	5.68	30.727	0.026	0.0	0.0	0.0	1.00	39.8	4.2
1.001	43.35	5.96	30.535	0.107	0.0	0.0	0.0	1.01	71.4	16.7
3.000	23.99	18.22	32.075	0.022	0.0	0.0	0.0	0.02	24.0	1.9
3.001	23.98	18.23	32.074	0.022	0.0	0.0	0.0	7.63	134.8	1.9
1.002	23.95	18.27	30.463	0.129	0.0	0.0	0.0	1.01	71.4	16.7
4.000	22.94	19.66	32.090	0.026	0.0	0.0	0.0	0.02	23.2	2.2
4.001	22.93	19.66	32.089	0.026	0.0	0.0	0.0	9.89	174.8	2.2
1.003	22.87	19.76	30.453	0.155	0.0	0.0	0.0	1.01	71.4	16.7
5.000	46.31	5.13	32.105	0.002	0.0	0.0	0.0	1.00	17.7	0.3
5.001	45.98	5.22	32.029	0.002	0.0	0.0	0.0	1.00	17.8	0.3
5.002	44.94	5.50	30.747	0.016	0.0	0.0	0.0	1.00	17.8	2.6
6.000	46.18	5.16	32.105	0.016	0.0	0.0	0.0	1.00	17.8	2.7
6.001	45.21	5.42	32.008	0.030	0.0	0.0	0.0	1.00	17.8	4.9
6.002	44.20	5.71	31.850	0.032	0.0	0.0	0.0	1.00	17.8	5.1
6.003	44.11	5.74	31.678	0.032	0.0	0.0	0.0	1.60	28.2	5.1

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
6.004	17.705	0.102	173.6	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
6.005	3.222	0.030	107.4	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.004	11.958	0.050	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.005	4.538	0.019	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.000	12.600	0.001	12600.0	0.000	5.00	0.0		0.050 →[↓]			Cellular Storage	
7.001	6.710	0.028	239.6	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.006	8.660	0.036	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
8.000	18.100	0.049	369.4	0.010	5.00	0.0	0.600		oo	45	Pipe/Conduit	
1.007	55.180	0.138	399.9	0.097	0.00	0.0	0.600		oo	45	Pipe/Conduit	
1.008	10.182	0.045	226.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
6.004	43.11	6.03	30.635	0.046	0.0	0.0	0.0	0.99	39.3	7.2
6.005	42.98	6.08	30.533	0.048	0.0	0.0	0.0	1.26	50.1	7.4
1.004	22.73	19.96	30.428	0.219	0.0	0.0	0.0	1.01	71.4	18.0
1.005	22.68	20.03	30.378	0.219	0.0	0.0	0.0	1.01	71.4	18.0
7.000	38.34	7.72	30.388	0.000	0.0	0.0	0.0	0.08	139.6	0.0
7.001	38.07	7.83	30.387	0.000	0.0	0.0	0.0	1.01	71.5	0.0
1.006	22.59	20.18	30.359	0.219	0.0	0.0	0.0	1.01	71.4	18.0
8.000	45.89	5.24	30.072	0.010	0.0	0.0	0.0	1.26	712.1	1.7
1.007	22.09	20.94	30.023	0.326	0.0	0.0	0.0	1.21	684.2	26.0
1.008	21.97	21.13	29.885	0.326	0.0	0.0	0.0	0.87	34.4	26.0

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)
1.008	MHCD1	31.530	29.840	0.000	0	0

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Online Controls for Storm

Non Return Valve Manhole: SW-D-025, DS/PN: 7.001, Volume (m³): 23.1

Hydro-Brake® Optimum Manhole: SWUUZD102, DS/PN: 1.008, Volume (m³): 42.2

Unit Reference	MD-SHE-0195-2000-1300-2000
Design Head (m)	1.300
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	195
Invert Level (m)	29.885
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	20.0	Kick-Flo®	0.878	16.6
Flush-Flo™	0.398	20.0	Mean Flow over Head Range	-	17.1

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	6.7	0.800	18.0	2.000	24.6	4.000	34.3	7.000	44.9
0.200	18.1	1.000	17.7	2.200	25.7	4.500	36.3	7.500	46.4
0.300	19.7	1.200	19.3	2.400	26.8	5.000	38.2	8.000	47.9
0.400	20.0	1.400	20.7	2.600	27.9	5.500	40.0	8.500	49.3
0.500	19.8	1.600	22.1	3.000	29.8	6.000	41.7	9.000	50.7
0.600	19.5	1.800	23.4	3.500	32.1	6.500	43.3	9.500	52.1

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Offline Controls for Storm

Pipe Manhole: SW-D-022, DS/PN: 1.004, Loop to PN: 7.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.330

Pipe Manhole: SW-D-022, DS/PN: 1.004, Loop to PN: 7.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.330

Pipe Manhole: SW-D-023, DS/PN: 1.005, Loop to PN: 7.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.320

Storage Structures for Storm

Porous Car Park Pipe: 3.000

Manning's N	0.050	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	16.8
Membrane Percolation (mm/hr)	1000	Slope (1:X)	16800.0
Max Percolation (l/s)	50.4	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.075		

Porous Car Park Pipe: 4.000

Manning's N	0.050	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	17999.0
Max Percolation (l/s)	54.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.090		

Cellular Storage Pipe: 7.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	30.388	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	30.0	0.0	0.800	30.0	0.0	0.801	0.0	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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW-D-001	15 Winter	1	+0%	100/15 Summer				30.728
2.000	SW-D-005	15 Winter	1	+0%	100/15 Winter				31.046
2.001	SW-D-006	15 Winter	1	+0%	100/15 Summer				30.770
1.001	SW-D-007	15 Winter	1	+0%	100/15 Summer				30.625
3.000	1	15 Winter	1	+0%					32.111
3.001	2	30 Winter	1	+0%					32.085
1.002	CP JUNCTION	15 Winter	1	+0%					30.562
4.000	3	15 Winter	1	+0%					32.129
4.001	9	30 Winter	1	+0%					32.102
1.003	CP JUNCTION	15 Winter	1	+0%					30.557
5.000	SW-D-019	15 Winter	1	+0%					32.116
5.001	SW-D-020	15 Winter	1	+0%					32.041
5.002	SW-D-021	15 Winter	1	+0%	100/15 Winter				30.779
6.000	SW-D-013	15 Winter	1	+0%	1000/15 Winter				32.140
6.001	SW-D-014	15 Winter	1	+0%	1000/15 Summer				32.054
6.002	SW-D-015	15 Winter	1	+0%	1000/15 Summer				31.898
6.003	SW-D-016	15 Winter	1	+0%	100/15 Winter				31.725
6.004	SW-D-017	15 Winter	1	+0%	100/15 Summer				30.691
6.005	SW-D-018	15 Winter	1	+0%	100/15 Summer				30.596
1.004	SW-D-022	15 Winter	1	+0%	100/15 Summer		1000/30 Winter	6	30.546
1.005	SW-D-023	15 Winter	1	+0%	100/15 Summer		1000/30 Winter	6	30.508
7.000	SW-D-024	120 Winter	1	+0%					30.388
7.001	SW-D-025	120 Winter	1	+0%	1000/30 Winter				30.387
1.006	SW-D-026	15 Winter	1	+0%	100/15 Summer				30.480
8.000	SWUZZD100	15 Winter	1	+0%	100/30 Summer				30.113
1.007	SWUZZD101	15 Winter	1	+0%	100/15 Winter				30.113
1.008	SWUZZD102	30 Winter	1	+0%	2/15 Winter				30.079

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

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
1.000	SW-D-001	-0.240	0.000	0.09		OK	
2.000	SW-D-005	-0.115	0.000	0.12		OK	
2.001	SW-D-006	-0.182	0.000	0.08		OK	
1.001	SW-D-007	-0.210	0.000	0.20		OK	
3.000	1	-0.314	0.000	0.02		OK	
3.001	2	-0.139	0.000	0.02		OK	
1.002	CP JUNCTION	-0.201	0.000	0.19		OK*	
4.000	3	-0.311	0.000	0.02		OK	
4.001	9	-0.137	0.000	0.02		OK	
1.003	CP JUNCTION	-0.196	0.000	0.20		OK*	
5.000	SW-D-019	-0.139	0.000	0.02		OK	
5.001	SW-D-020	-0.138	0.000	0.02		OK	
5.002	SW-D-021	-0.118	0.000	0.10		OK	
6.000	SW-D-013	-0.115	0.000	0.12		OK	
6.001	SW-D-014	-0.104	0.000	0.20		OK	
6.002	SW-D-015	-0.103	0.000	0.22		OK	
6.003	SW-D-016	-0.102	0.000	0.22		OK	
6.004	SW-D-017	-0.169	0.000	0.14		OK	
6.005	SW-D-018	-0.162	0.000	0.17		OK	
1.004	SW-D-022	-0.182	0.000	0.32	0.0	OK	18.6
1.005	SW-D-023	-0.170	0.000	0.39	0.0	OK	18.4
7.000	SW-D-024	-0.801	0.000	0.00		OK	0.0
7.001	SW-D-025	-0.300	0.000	0.00		OK	0.0
1.006	SW-D-026	-0.179	0.000	0.34		OK	18.6
8.000	SWUZZD100	-0.559	0.000	0.00		OK	0.7
1.007	SWUZZD101	-0.510	0.000	0.04		OK	26.1
1.008	SWUZZD102	-0.031	0.000	0.61		OK	17.5

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW-D-001	15 Winter	2	+0%	100/15 Summer				30.735
2.000	SW-D-005	15 Winter	2	+0%	100/15 Winter				31.051
2.001	SW-D-006	15 Winter	2	+0%	100/15 Summer				30.776
1.001	SW-D-007	15 Winter	2	+0%	100/15 Summer				30.637
3.000	1	15 Winter	2	+0%					32.116
3.001	2	30 Winter	2	+0%					32.089
1.002	CP JUNCTION	15 Winter	2	+0%					30.579
4.000	3	15 Winter	2	+0%					32.135
4.001	9	30 Winter	2	+0%					32.105
1.003	CP JUNCTION	15 Winter	2	+0%					30.575
5.000	SW-D-019	15 Winter	2	+0%					32.120
5.001	SW-D-020	15 Winter	2	+0%					32.044
5.002	SW-D-021	15 Winter	2	+0%	100/15 Winter				30.783
6.000	SW-D-013	15 Winter	2	+0%	1000/15 Winter				32.145
6.001	SW-D-014	15 Winter	2	+0%	1000/15 Summer				32.061
6.002	SW-D-015	15 Winter	2	+0%	1000/15 Summer				31.904
6.003	SW-D-016	15 Winter	2	+0%	100/15 Winter				31.732
6.004	SW-D-017	15 Winter	2	+0%	100/15 Summer				30.699
6.005	SW-D-018	15 Winter	2	+0%	100/15 Summer				30.605
1.004	SW-D-022	15 Winter	2	+0%	100/15 Summer		1000/30 Winter	6	30.565
1.005	SW-D-023	15 Winter	2	+0%	100/15 Summer		1000/30 Winter	6	30.529
7.000	SW-D-024	120 Winter	2	+0%					30.388
7.001	SW-D-025	120 Winter	2	+0%	1000/30 Winter				30.387
1.006	SW-D-026	15 Winter	2	+0%	100/15 Summer				30.498
8.000	SWUZZD100	30 Winter	2	+0%	100/30 Summer				30.138
1.007	SWUZZD101	30 Winter	2	+0%	100/15 Winter				30.138
1.008	SWUZZD102	30 Winter	2	+0%	2/15 Winter				30.125

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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		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
1.000	SW-D-001	-0.233	0.000	0.11		OK	
2.000	SW-D-005	-0.110	0.000	0.16		OK	
2.001	SW-D-006	-0.176	0.000	0.11		OK	
1.001	SW-D-007	-0.198	0.000	0.25		OK	
3.000	1	-0.309	0.000	0.02		OK	
3.001	2	-0.135	0.000	0.02		OK	
1.002	CP JUNCTION	-0.183	0.000	0.25		OK*	
4.000	3	-0.305	0.000	0.03		OK	
4.001	9	-0.134	0.000	0.03		OK	
1.003	CP JUNCTION	-0.178	0.000	0.25		OK*	
5.000	SW-D-019	-0.135	0.000	0.02		OK	
5.001	SW-D-020	-0.135	0.000	0.02		OK	
5.002	SW-D-021	-0.114	0.000	0.13		OK	
6.000	SW-D-013	-0.110	0.000	0.16		OK	
6.001	SW-D-014	-0.097	0.000	0.26		OK	
6.002	SW-D-015	-0.096	0.000	0.28		OK	
6.003	SW-D-016	-0.095	0.000	0.29		OK	
6.004	SW-D-017	-0.161	0.000	0.18		OK	
6.005	SW-D-018	-0.153	0.000	0.22		OK	
1.004	SW-D-022	-0.163	0.000	0.41	0.0	OK	
1.005	SW-D-023	-0.149	0.000	0.50	0.0	OK	
7.000	SW-D-024	-0.801	0.000	0.00		OK	
7.001	SW-D-025	-0.300	0.000	0.00		OK	
1.006	SW-D-026	-0.161	0.000	0.44		OK	
8.000	SWUZZD100	-0.534	0.000	0.00		OK	
1.007	SWUZZD101	-0.485	0.000	0.05		OK	
1.008	SWUZZD102	0.015	0.000	0.65		18.7 SURCHARGED	

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW-D-001	15 Winter	5	+0%	100/15 Summer				30.744
2.000	SW-D-005	15 Winter	5	+0%	100/15 Winter				31.057
2.001	SW-D-006	15 Winter	5	+0%	100/15 Summer				30.782
1.001	SW-D-007	15 Winter	5	+0%	100/15 Summer				30.653
3.000	1	15 Winter	5	+0%					32.122
3.001	2	30 Winter	5	+0%					32.091
1.002	CP JUNCTION	15 Winter	5	+0%					30.602
4.000	3	15 Winter	5	+0%					32.142
4.001	9	30 Winter	5	+0%					32.108
1.003	CP JUNCTION	15 Winter	5	+0%					30.598
5.000	SW-D-019	15 Winter	5	+0%					32.121
5.001	SW-D-020	15 Winter	5	+0%					32.046
5.002	SW-D-021	15 Winter	5	+0%	100/15 Winter				30.788
6.000	SW-D-013	15 Winter	5	+0%	1000/15 Winter				32.151
6.001	SW-D-014	15 Winter	5	+0%	1000/15 Summer				32.069
6.002	SW-D-015	15 Winter	5	+0%	1000/15 Summer				31.913
6.003	SW-D-016	15 Winter	5	+0%	100/15 Winter				31.741
6.004	SW-D-017	15 Winter	5	+0%	100/15 Summer				30.709
6.005	SW-D-018	15 Winter	5	+0%	100/15 Summer				30.615
1.004	SW-D-022	15 Winter	5	+0%	100/15 Summer		1000/30 Winter	6	30.589
1.005	SW-D-023	15 Winter	5	+0%	100/15 Summer		1000/30 Winter	6	30.554
7.000	SW-D-024	120 Winter	5	+0%					30.388
7.001	SW-D-025	120 Winter	5	+0%	1000/30 Winter				30.387
1.006	SW-D-026	15 Winter	5	+0%	100/15 Summer				30.520
8.000	SWUZZD100	30 Winter	5	+0%	100/30 Summer				30.200
1.007	SWUZZD101	30 Winter	5	+0%	100/15 Winter				30.200
1.008	SWUZZD102	30 Winter	5	+0%	2/15 Winter				30.187

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

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
1.000	SW-D-001	-0.224	0.000	0.14		OK	
2.000	SW-D-005	-0.104	0.000	0.20		OK	
2.001	SW-D-006	-0.169	0.000	0.14		OK	
1.001	SW-D-007	-0.182	0.000	0.32		OK	
3.000	1	-0.303	0.000	0.04		OK	
3.001	2	-0.133	0.000	0.03		OK	
1.002	CP JUNCTION	-0.160	0.000	0.31		OK*	
4.000	3	-0.298	0.000	0.04		OK	
4.001	9	-0.131	0.000	0.04		OK	
1.003	CP JUNCTION	-0.154	0.000	0.32		OK*	
5.000	SW-D-019	-0.134	0.000	0.03		OK	
5.001	SW-D-020	-0.133	0.000	0.03		OK	
5.002	SW-D-021	-0.109	0.000	0.17		OK	
6.000	SW-D-013	-0.104	0.000	0.20		OK	
6.001	SW-D-014	-0.089	0.000	0.34		OK	
6.002	SW-D-015	-0.087	0.000	0.36		OK	
6.003	SW-D-016	-0.087	0.000	0.37		OK	
6.004	SW-D-017	-0.151	0.000	0.24		OK	
6.005	SW-D-018	-0.143	0.000	0.29		OK	
1.004	SW-D-022	-0.139	0.000	0.53	0.0	OK	
1.005	SW-D-023	-0.124	0.000	0.64	0.0	OK	
7.000	SW-D-024	-0.801	0.000	0.00		OK	
7.001	SW-D-025	-0.300	0.000	0.00		OK	
1.006	SW-D-026	-0.139	0.000	0.56		OK	
8.000	SWUZZD100	-0.472	0.000	0.00		OK	
1.007	SWUZZD101	-0.422	0.000	0.06		OK	
1.008	SWUZZD102	0.077	0.000	0.68		19.6 SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW-D-001	15 Winter	30	+0%	100/15 Summer				30.762
2.000	SW-D-005	15 Winter	30	+0%	100/15 Winter				31.067
2.001	SW-D-006	15 Winter	30	+0%	100/15 Summer				30.798
1.001	SW-D-007	15 Winter	30	+0%	100/15 Summer				30.703
3.000	1	15 Winter	30	+0%					32.134
3.001	2	15 Winter	30	+0%					32.096
1.002	CP JUNCTION	15 Winter	30	+0%					30.669
4.000	3	15 Winter	30	+0%					32.155
4.001	9	15 Winter	30	+0%					32.113
1.003	CP JUNCTION	15 Winter	30	+0%					30.663
5.000	SW-D-019	15 Winter	30	+0%					32.124
5.001	SW-D-020	15 Winter	30	+0%					32.049
5.002	SW-D-021	15 Winter	30	+0%	100/15 Winter				30.803
6.000	SW-D-013	15 Winter	30	+0%	1000/15 Winter				32.161
6.001	SW-D-014	15 Winter	30	+0%	1000/15 Summer				32.089
6.002	SW-D-015	15 Winter	30	+0%	1000/15 Summer				31.934
6.003	SW-D-016	15 Winter	30	+0%	100/15 Winter				31.762
6.004	SW-D-017	15 Winter	30	+0%	100/15 Summer				30.734
6.005	SW-D-018	15 Winter	30	+0%	100/15 Summer				30.654
1.004	SW-D-022	15 Winter	30	+0%	100/15 Summer		1000/30 Winter	6	30.647
1.005	SW-D-023	15 Winter	30	+0%	100/15 Summer		1000/30 Winter	6	30.612
7.000	SW-D-024	120 Winter	30	+0%					30.388
7.001	SW-D-025	120 Winter	30	+0%	1000/30 Winter				30.387
1.006	SW-D-026	15 Winter	30	+0%	100/15 Summer				30.572
8.000	SWUZZD100	30 Winter	30	+0%	100/30 Summer				30.361
1.007	SWUZZD101	30 Winter	30	+0%	100/15 Winter				30.361
1.008	SWUZZD102	30 Winter	30	+0%	2/15 Winter				30.334

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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		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
1.000	SW-D-001	-0.206	0.000	0.21		OK	
2.000	SW-D-005	-0.094	0.000	0.30		OK	
2.001	SW-D-006	-0.154	0.000	0.21		OK	
1.001	SW-D-007	-0.131	0.000	0.48		OK	
3.000	1	-0.291	0.000	0.06		OK	
3.001	2	-0.128	0.000	0.05		OK	
1.002	CP JUNCTION	-0.093	0.000	0.47		OK*	
4.000	3	-0.285	0.000	0.07		OK	
4.001	9	-0.126	0.000	0.06		OK	
1.003	CP JUNCTION	-0.090	0.000	0.49		OK*	
5.000	SW-D-019	-0.131	0.000	0.04		OK	
5.001	SW-D-020	-0.130	0.000	0.04		OK	
5.002	SW-D-021	-0.094	0.000	0.30		OK	
6.000	SW-D-013	-0.094	0.000	0.30		OK	
6.001	SW-D-014	-0.070	0.000	0.55		OK	
6.002	SW-D-015	-0.067	0.000	0.58		OK	
6.003	SW-D-016	-0.066	0.000	0.60		OK	
6.004	SW-D-017	-0.126	0.000	0.39		OK	
6.005	SW-D-018	-0.104	0.000	0.46		OK	
1.004	SW-D-022	-0.081	0.000	0.80	0.0	OK	
1.005	SW-D-023	-0.066	0.000	0.96	0.0	OK	
7.000	SW-D-024	-0.801	0.000	0.00		OK	
7.001	SW-D-025	-0.300	0.000	0.00		OK	
1.006	SW-D-026	-0.087	0.000	0.84		OK	
8.000	SWUZZD100	-0.311	0.000	0.00		OK	
1.007	SWUZZD101	-0.262	0.000	0.09		OK	
1.008	SWUZZD102	0.224	0.000	0.69		19.9 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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW-D-001	60 Winter	100	+40%	100/15 Summer				31.310
2.000	SW-D-005	60 Winter	100	+40%	100/15 Winter				31.317
2.001	SW-D-006	60 Winter	100	+40%	100/15 Summer				31.310
1.001	SW-D-007	60 Winter	100	+40%	100/15 Summer				31.305
3.000	1	15 Winter	100	+40%					32.158
3.001	2	15 Winter	100	+40%					32.107
1.002	CP JUNCTION	180 Winter	100	+40%					30.763
4.000	3	15 Winter	100	+40%					32.181
4.001	9	15 Winter	100	+40%					32.125
1.003	CP JUNCTION	180 Winter	100	+40%					30.753
5.000	SW-D-019	15 Winter	100	+40%					32.131
5.001	SW-D-020	15 Winter	100	+40%					32.056
5.002	SW-D-021	60 Winter	100	+40%	100/15 Winter				31.297
6.000	SW-D-013	15 Winter	100	+40%	1000/15 Winter				32.184
6.001	SW-D-014	15 Winter	100	+40%	1000/15 Summer				32.148
6.002	SW-D-015	15 Winter	100	+40%	1000/15 Summer				31.998
6.003	SW-D-016	15 Winter	100	+40%	100/15 Winter				31.828
6.004	SW-D-017	60 Winter	100	+40%	100/15 Summer				31.300
6.005	SW-D-018	60 Winter	100	+40%	100/15 Summer				31.295
1.004	SW-D-022	60 Winter	100	+40%	100/15 Summer		1000/30 Winter	6	31.294
1.005	SW-D-023	60 Winter	100	+40%	100/15 Summer		1000/30 Winter	6	31.283
7.000	SW-D-024	120 Winter	100	+40%					30.388
7.001	SW-D-025	120 Winter	100	+40%	1000/30 Winter				30.387
1.006	SW-D-026	60 Winter	100	+40%	100/15 Summer				31.277
8.000	SWUZZD100	60 Winter	100	+40%	100/30 Summer				31.269
1.007	SWUZZD101	60 Winter	100	+40%	100/15 Winter				31.269
1.008	SWUZZD102	60 Winter	100	+40%	2/15 Winter				31.266

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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		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
1.000	SW-D-001	0.342	0.000	0.20		13.0	SURCHARGED	
2.000	SW-D-005	0.156	0.000	0.29		4.9	SURCHARGED	
2.001	SW-D-006	0.358	0.000	0.21		7.4	SURCHARGED	
1.001	SW-D-007	0.470	0.000	0.43		26.3	SURCHARGED	
3.000	1	-0.267	0.000	0.13		8.5	OK	
3.001	2	-0.117	0.000	0.11		8.4	OK	
1.002	CP JUNCTION	0.000	0.000	0.29		17.5	SURCHARGED*	
4.000	3	-0.259	0.000	0.15		10.0	OK	
4.001	9	-0.114	0.000	0.13		9.9	OK	
1.003	CP JUNCTION	0.000	0.000	0.34		20.9	SURCHARGED*	
5.000	SW-D-019	-0.124	0.000	0.07		1.1	OK	
5.001	SW-D-020	-0.123	0.000	0.07		1.1	OK	
5.002	SW-D-021	0.400	0.000	0.28		4.7	SURCHARGED	
6.000	SW-D-013	-0.071	0.000	0.54		8.5	OK	
6.001	SW-D-014	-0.011	0.000	0.97		16.0	OK	
6.002	SW-D-015	-0.002	0.000	1.00		16.6	OK	
6.003	SW-D-016	0.000	0.000	1.02		16.4	SURCHARGED	
6.004	SW-D-017	0.440	0.000	0.37		13.2	SURCHARGED	
6.005	SW-D-018	0.537	0.000	0.48		14.2	SURCHARGED	
1.004	SW-D-022	0.566	0.000	0.84	0.0	48.5	SURCHARGED	
1.005	SW-D-023	0.604	0.000	1.00	0.0	47.4	SURCHARGED	
7.000	SW-D-024	-0.801	0.000	0.00		0.0	OK	
7.001	SW-D-025	-0.300	0.000	0.00		0.0	OK	
1.006	SW-D-026	0.618	0.000	0.87		47.4	SURCHARGED	
8.000	SWUZZD100	0.597	0.000	0.01		2.9	SURCHARGED	
1.007	SWUZZD101	0.646	0.000	0.10		58.4	SURCHARGED	
1.008	SWUZZD102	1.156	0.000	0.72		20.6	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 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 3 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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, 5, 30, 100, 1000
 Climate Change (%) 0, 0, 0, 0, 40, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW-D-001	60 Winter	1000	+0%	100/15 Summer				31.632
2.000	SW-D-005	60 Winter	1000	+0%	100/15 Winter				31.647
2.001	SW-D-006	60 Winter	1000	+0%	100/15 Summer				31.630
1.001	SW-D-007	60 Winter	1000	+0%	100/15 Summer				31.620
3.000	1	15 Winter	1000	+0%					32.165
3.001	2	15 Winter	1000	+0%					32.110
1.002	CP JUNCTION	180 Winter	1000	+0%					30.763
4.000	3	15 Winter	1000	+0%					32.189
4.001	9	15 Winter	1000	+0%					32.128
1.003	CP JUNCTION	180 Winter	1000	+0%					30.753
5.000	SW-D-019	15 Winter	1000	+0%					32.134
5.001	SW-D-020	15 Winter	1000	+0%					32.059
5.002	SW-D-021	60 Winter	1000	+0%	100/15 Winter				31.411
6.000	SW-D-013	15 Winter	1000	+0%	1000/15 Winter				32.276
6.001	SW-D-014	15 Winter	1000	+0%	1000/15 Summer				32.242
6.002	SW-D-015	15 Winter	1000	+0%	1000/15 Summer				32.059
6.003	SW-D-016	15 Winter	1000	+0%	100/15 Winter				31.842
6.004	SW-D-017	60 Winter	1000	+0%	100/15 Summer				31.421
6.005	SW-D-018	60 Winter	1000	+0%	100/15 Summer				31.401
1.004	SW-D-022	60 Winter	1000	+0%	100/15 Summer		1000/30 Winter	6	31.396
1.005	SW-D-023	60 Winter	1000	+0%	100/15 Summer		1000/30 Winter	6	31.387
7.000	SW-D-024	60 Winter	1000	+0%					31.175
7.001	SW-D-025	60 Winter	1000	+0%	1000/30 Winter				31.175
1.006	SW-D-026	60 Winter	1000	+0%	100/15 Summer				31.394
8.000	SWUZZD100	60 Winter	1000	+0%	100/30 Summer				31.403
1.007	SWUZZD101	60 Winter	1000	+0%	100/15 Winter				31.403
1.008	SWUZZD102	60 Winter	1000	+0%	2/15 Winter				31.401

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
1.000	SW-D-001	0.664	0.000	0.23		15.2	FLOOD RISK	
2.000	SW-D-005	0.486	0.000	0.35		5.8	FLOOD RISK	
2.001	SW-D-006	0.679	0.000	0.23		8.1	SURCHARGED	
1.001	SW-D-007	0.785	0.000	0.56		34.0	SURCHARGED	
3.000	1	-0.260	0.000	0.15		10.1	OK	
3.001	2	-0.114	0.000	0.13		10.1	OK	
1.002	CP JUNCTION	0.000	0.000	0.34		20.8	SURCHARGED*	
4.000	3	-0.251	0.000	0.18		12.0	OK	
4.001	9	-0.111	0.000	0.15		11.8	OK	
1.003	CP JUNCTION	0.000	0.000	0.40		24.7	SURCHARGED*	
5.000	SW-D-019	-0.121	0.000	0.08		1.2	OK	
5.001	SW-D-020	-0.120	0.000	0.08		1.2	OK	
5.002	SW-D-021	0.514	0.000	0.34		5.6	SURCHARGED	
6.000	SW-D-013	0.021	0.000	0.61		9.5	SURCHARGED	
6.001	SW-D-014	0.084	0.000	1.07		17.7	SURCHARGED	
6.002	SW-D-015	0.059	0.000	1.11		18.3	SURCHARGED	
6.003	SW-D-016	0.015	0.000	1.15		18.5	SURCHARGED	
6.004	SW-D-017	0.561	0.000	0.45		15.7	SURCHARGED	
6.005	SW-D-018	0.643	0.000	0.49		14.8	SURCHARGED	
1.004	SW-D-022	0.668	0.000	1.08	33.4	62.1	SURCHARGED	
1.005	SW-D-023	0.709	0.000	1.26	16.2	59.9	SURCHARGED	
7.000	SW-D-024	-0.014	0.000	0.12		46.7	OK	
7.001	SW-D-025	0.488	0.000	0.16		8.1	SURCHARGED	
1.006	SW-D-026	0.735	0.000	1.05		57.2	SURCHARGED	
8.000	SWUUSD100	0.731	0.000	0.01		2.8	SURCHARGED	
1.007	SWUUSD101	0.780	0.000	0.10		61.3	SURCHARGED	
1.008	SWUUSD102	1.291	0.000	0.75		21.4	FLOOD RISK	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	31.940	0.133	240.0	0.047	5.00	0.0	0.600		o	300	Pipe/Conduit	
2.000	20.920	0.209	100.0	0.017	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	19.850	0.117	169.7	0.009	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.001	17.311	0.072	240.0	0.034	0.00	0.0	0.600		o	300	Pipe/Conduit	
3.000	16.800	0.001	16800.0	0.022	5.00	0.0		0.050 → ↓ ←			Porous Car Park	
3.001	2.593	1.461	1.8	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	2.377	0.010	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.000	17.999	0.001	17999.0	0.026	5.00	0.0		0.050 → ↓ ←			Porous Car Park	
4.001	1.568	1.486	1.1	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.003	5.904	0.025	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.000	7.623	0.076	100.3	0.002	5.00	0.0	0.600		o	150	Pipe/Conduit	
5.001	5.352	0.054	100.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
5.002	17.000	0.170	100.0	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.000	9.670	0.097	100.0	0.016	5.00	0.0	0.600		o	150	Pipe/Conduit	
6.001	15.800	0.158	100.0	0.014	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.002	17.260	0.173	100.0	0.002	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.003	2.630	0.066	40.0	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	44.84	5.53	30.668	0.047	0.0	0.0	0.0	1.01	71.4	7.6
2.000	45.49	5.35	31.011	0.017	0.0	0.0	0.0	1.00	17.8	2.8
2.001	44.31	5.68	30.727	0.026	0.0	0.0	0.0	1.00	39.8	4.2
1.001	43.35	5.96	30.535	0.107	0.0	0.0	0.0	1.01	71.4	16.7
3.000	23.99	18.22	32.075	0.022	0.0	0.0	0.0	0.02	24.0	1.9
3.001	23.98	18.23	32.074	0.022	0.0	0.0	0.0	7.63	134.8	1.9
1.002	23.95	18.27	30.463	0.129	0.0	0.0	0.0	1.01	71.4	16.7
4.000	22.94	19.66	32.090	0.026	0.0	0.0	0.0	0.02	23.2	2.2
4.001	22.93	19.66	32.089	0.026	0.0	0.0	0.0	9.89	174.8	2.2
1.003	22.87	19.76	30.453	0.155	0.0	0.0	0.0	1.01	71.4	16.7
5.000	46.31	5.13	32.105	0.002	0.0	0.0	0.0	1.00	17.7	0.3
5.001	45.98	5.22	32.029	0.002	0.0	0.0	0.0	1.00	17.8	0.3
5.002	44.94	5.50	30.747	0.016	0.0	0.0	0.0	1.00	17.8	2.6
6.000	46.18	5.16	32.105	0.016	0.0	0.0	0.0	1.00	17.8	2.7
6.001	45.21	5.42	32.008	0.030	0.0	0.0	0.0	1.00	17.8	4.9
6.002	44.20	5.71	31.850	0.032	0.0	0.0	0.0	1.00	17.8	5.1
6.003	44.11	5.74	31.678	0.032	0.0	0.0	0.0	1.60	28.2	5.1

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
6.004	17.705	0.102	173.6	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
6.005	3.222	0.030	107.4	0.002	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.004	11.958	0.050	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.005	4.538	0.019	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.000	12.600	0.001	12600.0	0.000	5.00	0.0		0.050 →[↓]			Cellular Storage	
7.001	6.710	0.028	239.6	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.006	8.660	0.036	240.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
8.000	18.100	0.049	369.4	0.010	5.00	0.0	0.600		oo	45	Pipe/Conduit	
1.007	55.180	0.138	399.9	0.097	0.00	0.0	0.600		oo	45	Pipe/Conduit	
1.008	10.182	0.045	226.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
6.004	43.11	6.03	30.635	0.046	0.0	0.0	0.0	0.99	39.3	7.2
6.005	42.98	6.08	30.533	0.048	0.0	0.0	0.0	1.26	50.1	7.4
1.004	22.73	19.96	30.428	0.219	0.0	0.0	0.0	1.01	71.4	18.0
1.005	22.68	20.03	30.378	0.219	0.0	0.0	0.0	1.01	71.4	18.0
7.000	38.34	7.72	30.388	0.000	0.0	0.0	0.0	0.08	139.6	0.0
7.001	38.07	7.83	30.387	0.000	0.0	0.0	0.0	1.01	71.5	0.0
1.006	22.59	20.18	30.359	0.219	0.0	0.0	0.0	1.01	71.4	18.0
8.000	45.89	5.24	30.072	0.010	0.0	0.0	0.0	1.26	712.1	1.7
1.007	22.09	20.94	30.023	0.326	0.0	0.0	0.0	1.21	684.2	26.0
1.008	21.97	21.13	29.885	0.326	0.0	0.0	0.0	0.87	34.4	26.0

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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1.008 MHCD1 31.530 29.840 0.000 0 0

Datum (m) 30.065 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	1.000	5	1.000	9	1.000	13	1.000	17	1.000	21	1.000	25	1.000
2	1.000	6	1.000	10	1.000	14	1.000	18	1.000	22	1.000	26	1.000
3	1.000	7	1.000	11	1.000	15	1.000	19	1.000	23	1.000	27	1.000
4	1.000	8	1.000	12	1.000	16	1.000	20	1.000	24	1.000	28	1.000

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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)
33	1.000	92	1.000	151	1.000	210	1.000	269	1.000	328	1.000	387	1.000	446	1.000
34	1.000	93	1.000	152	1.000	211	1.000	270	1.000	329	1.000	388	1.000	447	1.000
35	1.000	94	1.000	153	1.000	212	1.000	271	1.000	330	1.000	389	1.000	448	1.000
36	1.000	95	1.000	154	1.000	213	1.000	272	1.000	331	1.000	390	1.000	449	1.000
37	1.000	96	1.000	155	1.000	214	1.000	273	1.000	332	1.000	391	1.000	450	1.000
38	1.000	97	1.000	156	1.000	215	1.000	274	1.000	333	1.000	392	1.000	451	1.000
39	1.000	98	1.000	157	1.000	216	1.000	275	1.000	334	1.000	393	1.000	452	1.000
40	1.000	99	1.000	158	1.000	217	1.000	276	1.000	335	1.000	394	1.000	453	1.000
41	1.000	100	1.000	159	1.000	218	1.000	277	1.000	336	1.000	395	1.000	454	1.000
42	1.000	101	1.000	160	1.000	219	1.000	278	1.000	337	1.000	396	1.000	455	1.000
43	1.000	102	1.000	161	1.000	220	1.000	279	1.000	338	1.000	397	1.000	456	1.000
44	1.000	103	1.000	162	1.000	221	1.000	280	1.000	339	1.000	398	1.000	457	1.000
45	1.000	104	1.000	163	1.000	222	1.000	281	1.000	340	1.000	399	1.000	458	1.000
46	1.000	105	1.000	164	1.000	223	1.000	282	1.000	341	1.000	400	1.000	459	1.000
47	1.000	106	1.000	165	1.000	224	1.000	283	1.000	342	1.000	401	1.000	460	1.000
48	1.000	107	1.000	166	1.000	225	1.000	284	1.000	343	1.000	402	1.000	461	1.000
49	1.000	108	1.000	167	1.000	226	1.000	285	1.000	344	1.000	403	1.000	462	1.000
50	1.000	109	1.000	168	1.000	227	1.000	286	1.000	345	1.000	404	1.000	463	1.000
51	1.000	110	1.000	169	1.000	228	1.000	287	1.000	346	1.000	405	1.000	464	1.000
52	1.000	111	1.000	170	1.000	229	1.000	288	1.000	347	1.000	406	1.000	465	1.000
53	1.000	112	1.000	171	1.000	230	1.000	289	1.000	348	1.000	407	1.000	466	1.000
54	1.000	113	1.000	172	1.000	231	1.000	290	1.000	349	1.000	408	1.000	467	1.000
55	1.000	114	1.000	173	1.000	232	1.000	291	1.000	350	1.000	409	1.000	468	1.000
56	1.000	115	1.000	174	1.000	233	1.000	292	1.000	351	1.000	410	1.000	469	1.000
57	1.000	116	1.000	175	1.000	234	1.000	293	1.000	352	1.000	411	1.000	470	1.000
58	1.000	117	1.000	176	1.000	235	1.000	294	1.000	353	1.000	412	1.000	471	1.000
59	1.000	118	1.000	177	1.000	236	1.000	295	1.000	354	1.000	413	1.000	472	1.000
60	1.000	119	1.000	178	1.000	237	1.000	296	1.000	355	1.000	414	1.000	473	1.000
61	1.000	120	1.000	179	1.000	238	1.000	297	1.000	356	1.000	415	1.000	474	1.000
62	1.000	121	1.000	180	1.000	239	1.000	298	1.000	357	1.000	416	1.000	475	1.000
63	1.000	122	1.000	181	1.000	240	1.000	299	1.000	358	1.000	417	1.000	476	1.000
64	1.000	123	1.000	182	1.000	241	1.000	300	1.000	359	1.000	418	1.000	477	1.000
65	1.000	124	1.000	183	1.000	242	1.000	301	1.000	360	1.000	419	1.000	478	1.000
66	1.000	125	1.000	184	1.000	243	1.000	302	1.000	361	1.000	420	1.000	479	1.000
67	1.000	126	1.000	185	1.000	244	1.000	303	1.000	362	1.000	421	1.000	480	1.000
68	1.000	127	1.000	186	1.000	245	1.000	304	1.000	363	1.000	422	1.000	481	1.000
69	1.000	128	1.000	187	1.000	246	1.000	305	1.000	364	1.000	423	1.000	482	1.000
70	1.000	129	1.000	188	1.000	247	1.000	306	1.000	365	1.000	424	1.000	483	1.000
71	1.000	130	1.000	189	1.000	248	1.000	307	1.000	366	1.000	425	1.000	484	1.000
72	1.000	131	1.000	190	1.000	249	1.000	308	1.000	367	1.000	426	1.000	485	1.000
73	1.000	132	1.000	191	1.000	250	1.000	309	1.000	368	1.000	427	1.000	486	1.000
74	1.000	133	1.000	192	1.000	251	1.000	310	1.000	369	1.000	428	1.000	487	1.000
75	1.000	134	1.000	193	1.000	252	1.000	311	1.000	370	1.000	429	1.000	488	1.000
76	1.000	135	1.000	194	1.000	253	1.000	312	1.000	371	1.000	430	1.000	489	1.000
77	1.000	136	1.000	195	1.000	254	1.000	313	1.000	372	1.000	431	1.000	490	1.000
78	1.000	137	1.000	196	1.000	255	1.000	314	1.000	373	1.000	432	1.000	491	1.000
79	1.000	138	1.000	197	1.000	256	1.000	315	1.000	374	1.000	433	1.000	492	1.000
80	1.000	139	1.000	198	1.000	257	1.000	316	1.000	375	1.000	434	1.000	493	1.000
81	1.000	140	1.000	199	1.000	258	1.000	317	1.000	376	1.000	435	1.000	494	1.000
82	1.000	141	1.000	200	1.000	259	1.000	318	1.000	377	1.000	436	1.000	495	1.000
83	1.000	142	1.000	201	1.000	260	1.000	319	1.000	378	1.000	437	1.000	496	1.000
84	1.000	143	1.000	202	1.000	261	1.000	320	1.000	379	1.000	438	1.000	497	1.000
85	1.000	144	1.000	203	1.000	262	1.000	321	1.000	380	1.000	439	1.000	498	1.000
86	1.000	145	1.000	204	1.000	263	1.000	322	1.000	381	1.000	440	1.000	499	1.000
87	1.000	146	1.000	205	1.000	264	1.000	323	1.000	382	1.000	441	1.000	500	1.000
88	1.000	147	1.000	206	1.000	265	1.000	324	1.000	383	1.000	442	1.000	501	1.000
89	1.000	148	1.000	207	1.000	266	1.000	325	1.000	384	1.000	443	1.000	502	1.000
90	1.000	149	1.000	208	1.000	267	1.000	326	1.000	385	1.000	444	1.000	503	1.000
91	1.000	150	1.000	209	1.000	268	1.000	327	1.000	386	1.000	445	1.000	504	1.000

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Date 14/02/2019 16:13	Designed by DOReilly	
File Elmswood Zone D MD.MDX	Checked by	
Micro Drainage		Network 2018.1

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)
505	1.000	564	1.000	623	1.000	682	1.000	741	1.000	800	1.000	859	1.000	918	1.000
506	1.000	565	1.000	624	1.000	683	1.000	742	1.000	801	1.000	860	1.000	919	1.000
507	1.000	566	1.000	625	1.000	684	1.000	743	1.000	802	1.000	861	1.000	920	1.000
508	1.000	567	1.000	626	1.000	685	1.000	744	1.000	803	1.000	862	1.000	921	1.000
509	1.000	568	1.000	627	1.000	686	1.000	745	1.000	804	1.000	863	1.000	922	1.000
510	1.000	569	1.000	628	1.000	687	1.000	746	1.000	805	1.000	864	1.000	923	1.000
511	1.000	570	1.000	629	1.000	688	1.000	747	1.000	806	1.000	865	1.000	924	1.000
512	1.000	571	1.000	630	1.000	689	1.000	748	1.000	807	1.000	866	1.000	925	1.000
513	1.000	572	1.000	631	1.000	690	1.000	749	1.000	808	1.000	867	1.000	926	1.000
514	1.000	573	1.000	632	1.000	691	1.000	750	1.000	809	1.000	868	1.000	927	1.000
515	1.000	574	1.000	633	1.000	692	1.000	751	1.000	810	1.000	869	1.000	928	1.000
516	1.000	575	1.000	634	1.000	693	1.000	752	1.000	811	1.000	870	1.000	929	1.000
517	1.000	576	1.000	635	1.000	694	1.000	753	1.000	812	1.000	871	1.000	930	1.000
518	1.000	577	1.000	636	1.000	695	1.000	754	1.000	813	1.000	872	1.000	931	1.000
519	1.000	578	1.000	637	1.000	696	1.000	755	1.000	814	1.000	873	1.000	932	1.000
520	1.000	579	1.000	638	1.000	697	1.000	756	1.000	815	1.000	874	1.000	933	1.000
521	1.000	580	1.000	639	1.000	698	1.000	757	1.000	816	1.000	875	1.000	934	1.000
522	1.000	581	1.000	640	1.000	699	1.000	758	1.000	817	1.000	876	1.000	935	1.000
523	1.000	582	1.000	641	1.000	700	1.000	759	1.000	818	1.000	877	1.000	936	1.000
524	1.000	583	1.000	642	1.000	701	1.000	760	1.000	819	1.000	878	1.000	937	1.000
525	1.000	584	1.000	643	1.000	702	1.000	761	1.000	820	1.000	879	1.000	938	1.000
526	1.000	585	1.000	644	1.000	703	1.000	762	1.000	821	1.000	880	1.000	939	1.000
527	1.000	586	1.000	645	1.000	704	1.000	763	1.000	822	1.000	881	1.000	940	1.000
528	1.000	587	1.000	646	1.000	705	1.000	764	1.000	823	1.000	882	1.000	941	1.000
529	1.000	588	1.000	647	1.000	706	1.000	765	1.000	824	1.000	883	1.000	942	1.000
530	1.000	589	1.000	648	1.000	707	1.000	766	1.000	825	1.000	884	1.000	943	1.000
531	1.000	590	1.000	649	1.000	708	1.000	767	1.000	826	1.000	885	1.000	944	1.000
532	1.000	591	1.000	650	1.000	709	1.000	768	1.000	827	1.000	886	1.000	945	1.000
533	1.000	592	1.000	651	1.000	710	1.000	769	1.000	828	1.000	887	1.000	946	1.000
534	1.000	593	1.000	652	1.000	711	1.000	770	1.000	829	1.000	888	1.000	947	1.000
535	1.000	594	1.000	653	1.000	712	1.000	771	1.000	830	1.000	889	1.000	948	1.000
536	1.000	595	1.000	654	1.000	713	1.000	772	1.000	831	1.000	890	1.000	949	1.000
537	1.000	596	1.000	655	1.000	714	1.000	773	1.000	832	1.000	891	1.000	950	1.000
538	1.000	597	1.000	656	1.000	715	1.000	774	1.000	833	1.000	892	1.000	951	1.000
539	1.000	598	1.000	657	1.000	716	1.000	775	1.000	834	1.000	893	1.000	952	1.000
540	1.000	599	1.000	658	1.000	717	1.000	776	1.000	835	1.000	894	1.000	953	1.000
541	1.000	600	1.000	659	1.000	718	1.000	777	1.000	836	1.000	895	1.000	954	1.000
542	1.000	601	1.000	660	1.000	719	1.000	778	1.000	837	1.000	896	1.000	955	1.000
543	1.000	602	1.000	661	1.000	720	1.000	779	1.000	838	1.000	897	1.000	956	1.000
544	1.000	603	1.000	662	1.000	721	1.000	780	1.000	839	1.000	898	1.000	957	1.000
545	1.000	604	1.000	663	1.000	722	1.000	781	1.000	840	1.000	899	1.000	958	1.000
546	1.000	605	1.000	664	1.000	723	1.000	782	1.000	841	1.000	900	1.000	959	1.000
547	1.000	606	1.000	665	1.000	724	1.000	783	1.000	842	1.000	901	1.000	960	1.000
548	1.000	607	1.000	666	1.000	725	1.000	784	1.000	843	1.000	902	1.000	961	1.000
549	1.000	608	1.000	667	1.000	726	1.000	785	1.000	844	1.000	903	1.000	962	1.000
550	1.000	609	1.000	668	1.000	727	1.000	786	1.000	845	1.000	904	1.000	963	1.000
551	1.000	610	1.000	669	1.000	728	1.000	787	1.000	846	1.000	905	1.000	964	1.000
552	1.000	611	1.000	670	1.000	729	1.000	788	1.000	847	1.000	906	1.000	965	1.000
553	1.000	612	1.000	671	1.000	730	1.000	789	1.000	848	1.000	907	1.000	966	1.000
554	1.000	613	1.000	672	1.000	731	1.000	790	1.000	849	1.000	908	1.000	967	1.000
555	1.000	614	1.000	673	1.000	732	1.000	791	1.000	850	1.000	909	1.000	968	1.000
556	1.000	615	1.000	674	1.000	733	1.000	792	1.000	851	1.000	910	1.000	969	1.000
557	1.000	616	1.000	675	1.000	734	1.000	793	1.000	852	1.000	911	1.000	970	1.000
558	1.000	617	1.000	676	1.000	735	1.000	794	1.000	853	1.000	912	1.000	971	1.000
559	1.000	618	1.000	677	1.000	736	1.000	795	1.000	854	1.000	913	1.000	972	1.000
560	1.000	619	1.000	678	1.000	737	1.000	796	1.000	855	1.000	914	1.000	973	1.000
561	1.000	620	1.000	679	1.000	738	1.000	797	1.000	856	1.000	915	1.000	974	1.000
562	1.000	621	1.000	680	1.000	739	1.000	798	1.000	857	1.000	916	1.000	975	1.000
563	1.000	622	1.000	681	1.000	740	1.000	799	1.000	858	1.000	917	1.000	976	1.000

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Date 14/02/2019 16:13	Designed by DOReilly	
File Elmswood Zone D MD.MDX	Checked by	
Micro Drainage		Network 2018.1

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)
977	1.000	1035	1.000	1093	1.000	1151	1.000	1209	1.000	1267	1.000	1325	1.000	1383	1.000
978	1.000	1036	1.000	1094	1.000	1152	1.000	1210	1.000	1268	1.000	1326	1.000	1384	1.000
979	1.000	1037	1.000	1095	1.000	1153	1.000	1211	1.000	1269	1.000	1327	1.000	1385	1.000
980	1.000	1038	1.000	1096	1.000	1154	1.000	1212	1.000	1270	1.000	1328	1.000	1386	1.000
981	1.000	1039	1.000	1097	1.000	1155	1.000	1213	1.000	1271	1.000	1329	1.000	1387	1.000
982	1.000	1040	1.000	1098	1.000	1156	1.000	1214	1.000	1272	1.000	1330	1.000	1388	1.000
983	1.000	1041	1.000	1099	1.000	1157	1.000	1215	1.000	1273	1.000	1331	1.000	1389	1.000
984	1.000	1042	1.000	1100	1.000	1158	1.000	1216	1.000	1274	1.000	1332	1.000	1390	1.000
985	1.000	1043	1.000	1101	1.000	1159	1.000	1217	1.000	1275	1.000	1333	1.000	1391	1.000
986	1.000	1044	1.000	1102	1.000	1160	1.000	1218	1.000	1276	1.000	1334	1.000	1392	1.000
987	1.000	1045	1.000	1103	1.000	1161	1.000	1219	1.000	1277	1.000	1335	1.000	1393	1.000
988	1.000	1046	1.000	1104	1.000	1162	1.000	1220	1.000	1278	1.000	1336	1.000	1394	1.000
989	1.000	1047	1.000	1105	1.000	1163	1.000	1221	1.000	1279	1.000	1337	1.000	1395	1.000
990	1.000	1048	1.000	1106	1.000	1164	1.000	1222	1.000	1280	1.000	1338	1.000	1396	1.000
991	1.000	1049	1.000	1107	1.000	1165	1.000	1223	1.000	1281	1.000	1339	1.000	1397	1.000
992	1.000	1050	1.000	1108	1.000	1166	1.000	1224	1.000	1282	1.000	1340	1.000	1398	1.000
993	1.000	1051	1.000	1109	1.000	1167	1.000	1225	1.000	1283	1.000	1341	1.000	1399	1.000
994	1.000	1052	1.000	1110	1.000	1168	1.000	1226	1.000	1284	1.000	1342	1.000	1400	1.000
995	1.000	1053	1.000	1111	1.000	1169	1.000	1227	1.000	1285	1.000	1343	1.000	1401	1.000
996	1.000	1054	1.000	1112	1.000	1170	1.000	1228	1.000	1286	1.000	1344	1.000	1402	1.000
997	1.000	1055	1.000	1113	1.000	1171	1.000	1229	1.000	1287	1.000	1345	1.000	1403	1.000
998	1.000	1056	1.000	1114	1.000	1172	1.000	1230	1.000	1288	1.000	1346	1.000	1404	1.000
999	1.000	1057	1.000	1115	1.000	1173	1.000	1231	1.000	1289	1.000	1347	1.000	1405	1.000
1000	1.000	1058	1.000	1116	1.000	1174	1.000	1232	1.000	1290	1.000	1348	1.000	1406	1.000
1001	1.000	1059	1.000	1117	1.000	1175	1.000	1233	1.000	1291	1.000	1349	1.000	1407	1.000
1002	1.000	1060	1.000	1118	1.000	1176	1.000	1234	1.000	1292	1.000	1350	1.000	1408	1.000
1003	1.000	1061	1.000	1119	1.000	1177	1.000	1235	1.000	1293	1.000	1351	1.000	1409	1.000
1004	1.000	1062	1.000	1120	1.000	1178	1.000	1236	1.000	1294	1.000	1352	1.000	1410	1.000
1005	1.000	1063	1.000	1121	1.000	1179	1.000	1237	1.000	1295	1.000	1353	1.000	1411	1.000
1006	1.000	1064	1.000	1122	1.000	1180	1.000	1238	1.000	1296	1.000	1354	1.000	1412	1.000
1007	1.000	1065	1.000	1123	1.000	1181	1.000	1239	1.000	1297	1.000	1355	1.000	1413	1.000
1008	1.000	1066	1.000	1124	1.000	1182	1.000	1240	1.000	1298	1.000	1356	1.000	1414	1.000
1009	1.000	1067	1.000	1125	1.000	1183	1.000	1241	1.000	1299	1.000	1357	1.000	1415	1.000
1010	1.000	1068	1.000	1126	1.000	1184	1.000	1242	1.000	1300	1.000	1358	1.000	1416	1.000
1011	1.000	1069	1.000	1127	1.000	1185	1.000	1243	1.000	1301	1.000	1359	1.000	1417	1.000
1012	1.000	1070	1.000	1128	1.000	1186	1.000	1244	1.000	1302	1.000	1360	1.000	1418	1.000
1013	1.000	1071	1.000	1129	1.000	1187	1.000	1245	1.000	1303	1.000	1361	1.000	1419	1.000
1014	1.000	1072	1.000	1130	1.000	1188	1.000	1246	1.000	1304	1.000	1362	1.000	1420	1.000
1015	1.000	1073	1.000	1131	1.000	1189	1.000	1247	1.000	1305	1.000	1363	1.000	1421	1.000
1016	1.000	1074	1.000	1132	1.000	1190	1.000	1248	1.000	1306	1.000	1364	1.000	1422	1.000
1017	1.000	1075	1.000	1133	1.000	1191	1.000	1249	1.000	1307	1.000	1365	1.000	1423	1.000
1018	1.000	1076	1.000	1134	1.000	1192	1.000	1250	1.000	1308	1.000	1366	1.000	1424	1.000
1019	1.000	1077	1.000	1135	1.000	1193	1.000	1251	1.000	1309	1.000	1367	1.000	1425	1.000
1020	1.000	1078	1.000	1136	1.000	1194	1.000	1252	1.000	1310	1.000	1368	1.000	1426	1.000
1021	1.000	1079	1.000	1137	1.000	1195	1.000	1253	1.000	1311	1.000	1369	1.000	1427	1.000
1022	1.000	1080	1.000	1138	1.000	1196	1.000	1254	1.000	1312	1.000	1370	1.000	1428	1.000
1023	1.000	1081	1.000	1139	1.000	1197	1.000	1255	1.000	1313	1.000	1371	1.000	1429	1.000
1024	1.000	1082	1.000	1140	1.000	1198	1.000	1256	1.000	1314	1.000	1372	1.000	1430	1.000
1025	1.000	1083	1.000	1141	1.000	1199	1.000	1257	1.000	1315	1.000	1373	1.000	1431	1.000
1026	1.000	1084	1.000	1142	1.000	1200	1.000	1258	1.000	1316	1.000	1374	1.000	1432	1.000
1027	1.000	1085	1.000	1143	1.000	1201	1.000	1259	1.000	1317	1.000	1375	1.000	1433	1.000
1028	1.000	1086	1.000	1144	1.000	1202	1.000	1260	1.000	1318	1.000	1376	1.000	1434	1.000
1029	1.000	1087	1.000	1145	1.000	1203	1.000	1261	1.000	1319	1.000	1377	1.000	1435	1.000
1030	1.000	1088	1.000	1146	1.000	1204	1.000	1262	1.000	1320	1.000	1378	1.000	1436	1.000
1031	1.000	1089	1.000	1147	1.000	1205	1.000	1263	1.000	1321	1.000	1379	1.000	1437	1.000
1032	1.000	1090	1.000	1148	1.000	1206	1.000	1264	1.000	1322	1.000	1380	1.000	1438	1.000
1033	1.000	1091	1.000	1149	1.000	1207	1.000	1265	1.000	1323	1.000	1381	1.000	1439	1.000
1034	1.000	1092	1.000	1150	1.000	1208	1.000	1266	1.000	1324	1.000	1382	1.000	1440	1.000

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Micro Drainage	Network 2018.1	

Online Controls for Storm

Non Return Valve Manhole: SW-D-025, DS/PN: 7.001, Volume (m³): 23.1

Hydro-Brake® Optimum Manhole: SWUUZD102, DS/PN: 1.008, Volume (m³): 42.2

Unit Reference	MD-SHE-0195-2000-1300-2000
Design Head (m)	1.300
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	195
Invert Level (m)	29.885
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	20.0	Kick-Flo®	0.878	16.6
Flush-Flo™	0.398	20.0	Mean Flow over Head Range	-	17.1

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	6.7	0.800	18.0	2.000	24.6	4.000	34.3	7.000	44.9
0.200	18.1	1.000	17.7	2.200	25.7	4.500	36.3	7.500	46.4
0.300	19.7	1.200	19.3	2.400	26.8	5.000	38.2	8.000	47.9
0.400	20.0	1.400	20.7	2.600	27.9	5.500	40.0	8.500	49.3
0.500	19.8	1.600	22.1	3.000	29.8	6.000	41.7	9.000	50.7
0.600	19.5	1.800	23.4	3.500	32.1	6.500	43.3	9.500	52.1

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Offline Controls for Storm

Pipe Manhole: SW-D-022, DS/PN: 1.004, Loop to PN: 7.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.330

Pipe Manhole: SW-D-022, DS/PN: 1.004, Loop to PN: 7.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.330

Pipe Manhole: SW-D-023, DS/PN: 1.005, Loop to PN: 7.000

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	31.320

Storage Structures for Storm

Porous Car Park Pipe: 3.000

Manning's N	0.050	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	16.8
Membrane Percolation (mm/hr)	1000	Slope (1:X)	16800.0
Max Percolation (l/s)	50.4	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.075		

Porous Car Park Pipe: 4.000

Manning's N	0.050	Width (m)	10.8
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.0
Membrane Percolation (mm/hr)	1000	Slope (1:X)	17999.0
Max Percolation (l/s)	54.0	Depression Storage (mm)	2
Safety Factor	1.0	Evaporation (mm/day)	3
Porosity	0.30	Membrane Depth (mm)	100
Invert Level (m)	32.090		

Cellular Storage Pipe: 7.000

Manning's N	0.050	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	30.388	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	30.0	0.0	0.800	30.0	0.0	0.801	0.0	0.0

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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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.360 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	SW-D-001	240 Winter	30	+0%	30/60 Winter				31.235	0.267
2.000	SW-D-005	240 Winter	30	+0%	30/120 Winter				31.237	0.076
2.001	SW-D-006	240 Winter	30	+0%	30/60 Winter				31.234	0.283
1.001	SW-D-007	240 Winter	30	+0%	30/60 Summer				31.233	0.398
3.000	1	15 Winter	30	+0%					32.134	-0.291
3.001	2	15 Winter	30	+0%					32.096	-0.128
1.002	CP JUNCTION	180 Winter	30	+0%					30.763	0.000
4.000	3	15 Winter	30	+0%					32.155	-0.285
4.001	9	15 Winter	30	+0%					32.113	-0.126
1.003	CP JUNCTION	180 Winter	30	+0%					30.753	0.000
5.000	SW-D-019	15 Winter	30	+0%					32.124	-0.131
5.001	SW-D-020	15 Winter	30	+0%					32.049	-0.130
5.002	SW-D-021	240 Winter	30	+0%	30/60 Winter				31.229	0.332
6.000	SW-D-013	15 Winter	30	+0%					32.161	-0.094
6.001	SW-D-014	15 Winter	30	+0%					32.089	-0.070
6.002	SW-D-015	15 Winter	30	+0%					31.934	-0.067
6.003	SW-D-016	15 Winter	30	+0%					31.762	-0.066
6.004	SW-D-017	240 Winter	30	+0%	30/60 Summer				31.231	0.371
6.005	SW-D-018	240 Winter	30	+0%	30/60 Summer				31.227	0.469
1.004	SW-D-022	240 Winter	30	+0%	30/60 Summer			0	31.227	0.499
1.005	SW-D-023	240 Winter	30	+0%	30/30 Winter			0	31.220	0.542
7.000	SW-D-024	120 Winter	30	+0%					30.388	-0.801
7.001	SW-D-025	120 Winter	30	+0%					30.387	-0.300
1.006	SW-D-026	240 Winter	30	+0%	30/30 Winter				31.217	0.558
8.000	SWUZZD100	240 Winter	30	+0%	30/30 Winter				31.213	0.541
1.007	SWUZZD101	240 Winter	30	+0%	30/30 Winter				31.213	0.590
1.008	SWUZZD102	240 Winter	30	+0%	30/15 Summer				31.211	1.101

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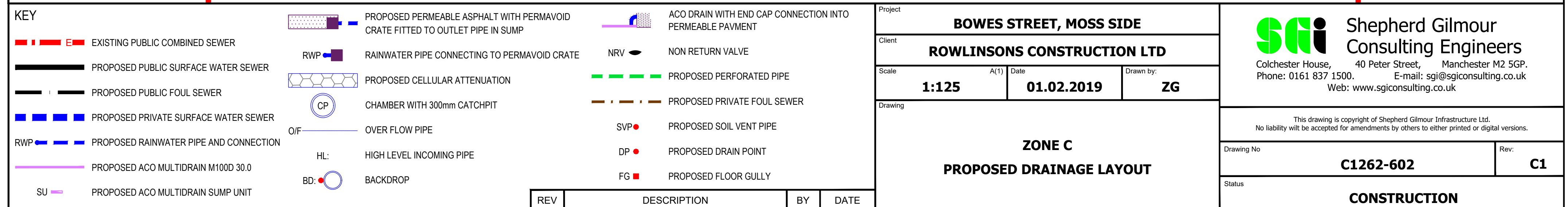
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW-D-001	0.000	0.04		2.8	SURCHARGED	
2.000	SW-D-005	0.000	0.06		1.0	SURCHARGED	
2.001	SW-D-006	0.000	0.04		1.6	SURCHARGED	
1.001	SW-D-007	0.000	0.10		6.2	SURCHARGED	
3.000	1	0.000	0.06		4.1	OK	
3.001	2	0.000	0.05		4.0	OK	
1.002	CP JUNCTION	0.000	0.15		9.0	SURCHARGED*	
4.000	3	0.000	0.07		4.8	OK	
4.001	9	0.000	0.06		4.7	OK	
1.003	CP JUNCTION	0.000	0.17		10.5	SURCHARGED*	
5.000	SW-D-019	0.000	0.04		0.6	OK	
5.001	SW-D-020	0.000	0.04		0.6	OK	
5.002	SW-D-021	0.000	0.06		1.0	SURCHARGED	
6.000	SW-D-013	0.000	0.30		4.7	OK	
6.001	SW-D-014	0.000	0.55		9.1	OK	
6.002	SW-D-015	0.000	0.58		9.6	OK	
6.003	SW-D-016	0.000	0.60		9.6	OK	
6.004	SW-D-017	0.000	0.08		2.8	SURCHARGED	
6.005	SW-D-018	0.000	0.09		2.8	SURCHARGED	
1.004	SW-D-022	0.000	0.20	0.0	11.8	SURCHARGED	
1.005	SW-D-023	0.000	0.24	0.0	11.2	SURCHARGED	
7.000	SW-D-024	0.000	0.00		0.0	OK	
7.001	SW-D-025	0.000	0.00		0.0	OK	
1.006	SW-D-026	0.000	0.20		10.9	SURCHARGED	
8.000	SWUUSD100	0.000	0.00		0.5	SURCHARGED	
1.007	SWUUSD101	0.000	0.02		11.6	SURCHARGED	
1.008	SWUUSD102	0.000	0.40		11.5	SURCHARGED	



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APPENDIX C1





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APPENDIX C2